
Roads and Maritime Services

F6 Extension Stage 1

New M5 Motorway at Arncliffe to
President Avenue at Kogarah

Submissions report



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Executive summary

Roads and Maritime Services (Roads and Maritime) is seeking approval to construct and operate the F6 Extension Stage 1 from the New M5 Motorway at Arncliffe to President Avenue at Kogarah (the project). Once complete, the project would improve connections and travel times between the A1 Princes Highway and other arterial roads, south of President Avenue, and commercial areas in Sydney. It would also improve connections for residents and businesses within the broader regional area, promoting and supporting economic development in areas to the south such as Sutherland and the Illawarra.

The project would comprise a new twin motorway tunnel (around four kilometres in length) between the New M5 Motorway at Arncliffe and President Avenue at Kogarah with a tunnel portal and entry and exit ramps connecting the tunnels to the surface. Works would include connection to the New M5 Motorway, line marking of additional travel lanes between the St Peters interchange to the F6 Extension Stage 1 tunnels, an intersection with President Avenue (including widening and raising of President Avenue), and intersection improvements at the President Avenue/Princes Highway intersection. Mainline tunnel stubs would be constructed to allow for connections to future stages of the F6 Extension.

The project would also provide shared cycle and pedestrian pathways connecting Bestic Avenue, Rockdale to Civic Avenue, Kogarah via Rockdale Bicentennial Park (including an on-road cycleway) and extending this pathway to the southeast to Chuter Avenue/O'Connell Street, around Robinson Street.

Ancillary infrastructure and operational facilities would include an Operational Motorway Control Centre, signage, ventilation structures, fire and safety systems, and emergency evacuation and smoke extraction infrastructure.

As per clause 14 and Schedule 3 of State Environmental Planning Policy (State and Regional Development) 2011, the project is State significant infrastructure under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and requires the approval of the Minister for Planning. The project has also been declared as a critical State significant infrastructure project under section 115V of the EP&A Act and is listed in Schedule 5 of State Environmental Planning Policy (State and Regional Development).

Environmental impact statement

An Environmental Impact Statement (EIS) for the project was prepared to address the Planning Secretary's Environmental Assessment Requirements (SEARs). The EIS was exhibited by the Department of Planning and Environment (DP&E) for 37 calendar days from 7 November to 14 December 2018. Public exhibition of the EIS provided the community, interested parties and key stakeholders (including government agencies and councils) with an understanding of the project and provided the opportunity to provide submissions on the EIS.

Consultation activities undertaken during exhibition of the EIS included a series of community information sessions and 'pop-up' information stands to provide community members an opportunity to discuss the EIS with technical specialists, as well as a series of briefings and the distribution of a range of information materials. The EIS was available to view and download from the DP&E and Roads and Maritime websites and hardcopies were made available to the public at 15 locations. An online EIS navigator tool was also provided to further assist the community in understanding the content of the EIS.

Submissions report

This submissions report outlines Roads and Maritime's response to submissions received on the EIS during the public exhibition period. To prepare this report, Roads and Maritime has reviewed all submissions and prepared responses to the issues raised. Refinements to the project have also been identified to reduce environmental impacts and address stakeholder and community concerns.

A total of 632 community submissions were received by DP&E from 487 submitters. Seven submissions were received from NSW Government agencies and five from local councils.

A summary of the responses provided to the key issues raised in the submissions are outlined in the following section.

Strategic context and project need, including:

- Reliance on other projects
- Inconsistency with community preferences
- The public prefer to use public transport
- The project would discourage the use of, and investment in, public transport projects.

Road and Maritime response:

- The project is viable as a standalone project with forecast benefits and improvements to the traffic network in southern Sydney that are not reliant on future stages of the F6 Extension or the proposed Sydney Gateway project.
- Extensive community engagement and consultation prior to and during public exhibition of the EIS was carried out. Some members of the community identified a preference for the development of public transport infrastructure as an alternative to the project, however other members of the community identified their support for the project.
- The NSW Government is committed to improving travel times and easing congestion for motorists travelling between the Illawarra and commercial areas in Sydney. The development of the F6 Extension is an important part of the long term transport solution for Sydney.
- The project would form the first stage of the F6 Extension, which would provide economic benefits by reducing travel times through southern Sydney and between Sydney and the Illawarra region. Future stages of the F6 Extension are currently under investigation.
- The NSW Government is proposing to deliver a range of road, public transport and active transport projects to address the transport challenges associated with a growing Sydney. In June 2018, the NSW State Government committed \$880 million to modernise the Sydney Trains network.
- The project would not preclude rail infrastructure improvements from occurring as they would address different objectives and would be complementary to the project, further reducing the number of vehicles on surface roads and supporting opportunities for place making at key strategic centres.
- Active transport improvements such as those provided by the project are also regarded as complementary to other transport modes including roads and public transport. They are an essential component of an integrated transport solution, meeting the needs of local communities and shorter distance trips.

Health, safety and hazards, including:

- Health impacts from changes to air quality during operation
- Human health impacts during construction.

Road and Maritime response:

- The human health impact assessment predicted that the operation of the project would result in lower levels of health risk associated with air emissions, when compared with the situation where the project is not operating, due to the reduction of vehicles on surface roads.
- Construction road traffic noise was estimated to be generally compliant with the relevant guidelines and is therefore considered unlikely to significantly impact human health. Roads and Maritime will consult with vulnerable members of the community who are likely to be more susceptible to adverse health effects of noise to accommodate their preferences for noise mitigation, as far as practicable.
- Work carried out outside of standard construction hours has the potential for noise impacts. The noise assessment indicates that sleep disturbance screening criterion is likely to be exceeded at various locations when night-time work is occurring in close proximity to some residential receivers. Given the nature of the construction work, these impacts are unavoidable. A Construction Noise and Vibration Management Plan will be developed for the project prior to

construction and will include protocols that will be adopted to manage works required outside standard construction hours, in accordance with relevant guidelines.

- Where properties have been identified as requiring at-property or operational noise mitigation architectural treatment, Roads and Maritime will consult with those property owners on the early installation of treatments to provide noise mitigation during the construction of the project.

Traffic and transport, including:

- Level and quality of traffic and transport assessment
- Traffic and transport network impacts during operation.

Road and Maritime response:

- Traffic modelling has used the Sydney Strategic Motorway Planning Model version 1 (SMPMv1), which takes into account driver behaviour including the potential for rat-running and avoiding tolls. A key component of the SMPM is the toll choice assignment model, which test impacts of toll and infrastructure strategies and provides infrastructure project traffic forecasts. This toll choice assignment model is designed to forecast the traffic choosing to use tolled and non-tolled routes for the representative peak and inter-peak periods of the day.
- The traffic modelling is fit for purpose, having been based on the most up-to-date input information available at the time of modelling. The traffic modelling approach and assessment has been undertaken in accordance with the Planning Secretary's Environmental Assessment Requirements (SEARs), which outlines the modelling approach to be undertaken for the assessment as well as the guidelines that the assessment needed to follow. Modelling for the EIS has been undertaken in several stages, which ensure that results are as accurate and representative as possible.
- Where the project would connect to the existing road network, some increased congestion is forecast along President Avenue at Kogarah, and on the exit ramps to the St Peters interchange, due to the forecast increase in demand to and from the project. Roads and Maritime will manage this additional traffic demand through network improvements and better use of existing road infrastructure, including, for example, implementation of parking controls.
- Roads and Maritime will undertake a review of operational network performance, in consultation with Transport for NSW and relevant councils, to confirm the operational traffic impacts of the project at both 12 months and at five years after the commencement of operation of the project.

The submissions report sets out the following key information:

- An introduction is provided in **Part A, Chapter A1** (Introduction)
- Clarifications in response to issues raised as well as minor errors and discrepancies noted in the EIS are addressed in **Part A, Chapter A2** (Clarifications)
- Issues raised in submissions received from government agencies and councils are addressed in **Part B** (Response to key stakeholder submissions)
- Issues raised in submissions received from the community are addressed in **Part C** (Response to community submissions)
- An updated list of environmental management measures is provided in **Part D, Chapter D1** (Environmental management measures)
- Conclusions and next steps are summarised in **Part D, Chapter D2** (Conclusion and next steps)
- References are provided in Part D, **Chapter D3** (References)
- Appendices.

The submissions on the EIS are available to view and download on the DP&E Major Projects website.

Preferred infrastructure report

A preferred infrastructure report has been prepared for the project. The preferred infrastructure report describes the design changes and refinements that are proposed to address issues raised during public exhibition of the EIS including:

- President Avenue traffic and access changes
- Extension of the shared cycle and pedestrian pathway from President Avenue through Scarborough Park North to Chuter Avenue/O'Connell Street, south of Robinson Street.

These changes would deliver benefits for the residents of Moorefield Estate and the community in general.

Environmental management measures

Following the exhibition of the EIS, the environmental management measures proposed for the project have been updated to:

- Include additional commitments based on the submissions on the EIS
- Include additional commitments based on design refinements and the findings of further assessment (refer to the preferred infrastructure report)
- Include additional commitments or revise commitments based on further consultation carried out during the preparation of this report
- Modify the wording so that the outcome of the commitment is clearer to implement.

A full list of the environmental management measures proposed for the project is provided in **Chapter D1** (Environmental management measures).

Ongoing consultation with community and stakeholders

Should the project be approved, a construction contractor will be engaged to carry out detailed design and to construct the project. Both Roads and Maritime and the construction contractor will be responsible for communication and consultation with stakeholders and the community during detailed design and construction.

During detailed design, key stakeholders will be engaged on the development of relevant construction management plans. The construction contractor will also prepare a Community Communication Strategy to detail the processes to facilitate communication and feedback between the project team and the community. Community and stakeholder consultation carried out during construction will include updates on the planned construction activities and program and notifications to affected residents and businesses. Enquiries and concerns will be addressed in a timely manner through a complaints handling system.

Conclusion

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. DP&E will, on behalf of the NSW Minister for Planning, review the EIS and this submissions report. Once DP&E has completed its assessment, a draft Environmental Assessment Report will be prepared for the Planning Secretary of DP&E, which may include recommended conditions of approval.

The Environmental Assessment Report will be provided to the NSW Minister for Planning who will then make a determination on the project. If the determination is to approve the project, it is anticipated that conditions of approval would be included.

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III Abbreviations and glossary

III Glossary of terms and abbreviations

Term	Meaning
A	
ADT	Average Daily Traffic. The total volume of traffic (24 hours) passing a roadside observation point over a seven-day period during a set number of weeks; divided by the total number of days. It is calculated from mechanically obtained axle counts.
Aboriginal archaeological site	The present spatial extent of visible Aboriginal archaeological material(s) at a given location
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 Parks and Wildlife Act 1974</i> (NSW)
ABS	Australian Bureau of Statistics
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
ACM	Asbestos containing material
ACTAQ	NSW Government Advisory Committee on Tunnel Air Quality
AHD	Australian height datum
ADT	Average Daily Traffic. The total volume of traffic (24 hours) passing a roadside observation point over a seven-day period during a set number of weeks; divided by the total number of days. It is calculated from mechanically obtained axle counts
Adverse health effect	A change in body function or cell structure that might lead to disease or health problems
AEP	Annual Exceedance Probability
AHD	Australian Height Datum. The standard reference level used to express the relative elevation of various features. A height in metres AHD is essentially the height above sea level.
AHIMS	Aboriginal Heritage Information Management System - A register of NSW Aboriginal heritage information maintained by the NSW Office of Environment and Heritage A register of NSW Aboriginal heritage information maintained by the NSW Office of Environment and Heritage
Airshed	A part of the atmosphere that shares a common flow of air and is exposed to similar meteorological influences
Alluvium	Sediments (clays, sands, gravels and other materials) deposited by flowing water. Deposits can be made by streams on river beds, floodplains and alluvial fans.
AM peak hour	Unless otherwise stated, this refers to vehicle trips arriving at their destination during the average peak one hour in the AM peak period between 7.00 am–9.00 am on a normal working weekday
Amenity	‘The pleasantness of a place as conveyed by desirable attributes including visual, noise, odour etc.’ (AILA 2018)
ANZECC	Australian and New Zealand Environment and Conservation Council
AQIA	Air quality impact assessment

Term	Meaning
Aquifer	Geologic formation, group of formations, or part of a formation capable of transmitting and yielding quantities of water.
Archaeological potential	The likelihood of undetected surface and/or subsurface archaeological materials existing at a location
ARI	Average Recurrence Interval - Average recurrence interval An indicator used to describe the frequency of floods. 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 one per cent chance (ie a one in 100 chance) of occurrence in any one year. Floods generated by runoff from the study catchments is referred to in terms of their ARI, for example the 100 year ARI flood.
Artefact	Any object which has been physically modified by humans
Arncliffe construction ancillary facility (C1)	A construction ancillary facility for the project located at Kogarah Golf Course, Arncliffe. The site is located within the Arncliffe construction ancillary facility also being used as part of the approved New M5 Motorway project.
Arncliffe ventilation facility	A ventilation facility site located in Kogarah Golf Course at Arncliffe. The facility is being built as part of the New M5 Motorway project. As part of this project, fit-out works would be carried out on a section of this facility.
ASS	Acid sulfate soil
At-grade	A road at ground level, not on an embankment or in a cutting
AWT	Average Weekday Traffic. The total volume of traffic (24 hours) passing a roadside observation point over a five-day weekday period during a set number of weeks (outside of school/public holidays); divided by the total number of days. It is generally calculated from axle counts of passing vehicles
B	
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
BAM	Biodiversity Assessment Method
BBWQIP	Botany Bay and Catchment Water Quality Improvement Plan
BC Act	<i>Biodiversity Conservation Act 2016</i> (NSW)
BCR	Benefit cost ratio
BDAR	Biodiversity Development Assessment Report
Biodiversity offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity values from the impacts of development (OEH 2017).
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	Australian Bureau of Meteorology
Bore	A cylindrical drill hole sunk into the ground from which water is pumped for use or monitoring.
Borehole	A hole produced in the ground by drilling for the investigation and assessment of soil and rock profiles.
BTEX	Benzene, toluene, ethylbenzene, xylenes
BTEXN	Benzene, toluene, ethylbenzene, xylenes, naphthalene
BTX	Benzene, toluene and total xylenes
Bus lane	A traffic lane dedicated to buses, but which can also be used by taxis, bicycles and motorcycles
C	

Term	Meaning
Capacity	The nominal maximum number of vehicles which has a reasonable expectation of passing over a given section of a lane or roadway in one direction during a given time period under prevailing roadway conditions
Carcinogen	A substance that causes cancer
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
CBD	Central Business District
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.
Chronic exposure	Contact with a substance or stressor that occurs over a long time (more than one year) [compare with acute exposure and intermediate duration exposure].
Clearing	The removal of vegetation or other obstacles at or above ground level.
Climate change	A change in the state of the climate that can be identified (for example 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 (IPCC 2007)
CLM Act	<i>Contaminated Land Management Act 1997 (NSW)</i>
CNVG	Construction Noise and Vibration Guideline
CNVMP	Construction Noise and Vibration Management Plan
CO	Carbon monoxide
CO ₂	Carbon dioxide
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 estimated and to determine further investigations needed for detailed design
Construction	Includes all physical work required to construct the project.
Construction ancillary facilities	Temporary facilities during construction that include, but are not limited to construction sites (civil and tunnel), sediment basins, temporary water treatment plants, precast yards and material stockpiles, laydown areas, workforce parking, maintenance workshops and offices
Construction boundary	The area required for project construction is referred to as the 'construction boundary'.
Construction fatigue	Impact on receivers in the vicinity of concurrent and/or consecutive construction activities
Construction footprint	The land above and below the ground that is required to construct the project.
Corridor	A substantial segment of the transport network, in which parallel, possibly competing, transport routes (and modes, where appropriate) operate between two locations
CSWMP	Construction Soil and Water Management Plan
CTAMP	Construction Traffic and Access Management Plan
Cul-de-sac	A street or road that is open for vehicular traffic at one end only
Culvert	A structure that allows water to flow under a road
Cumulative impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to the project SEARs for cumulative impact assessment requirements.

Term	Meaning
Cut-and-cover	A method of tunnel construction whereby the structure is built in an open excavation and subsequently covered. The cut-and-cover tunnel structures to be built for the project are located: within Rockdale Bicentennial Park and 427-441 West Botany Street (for the President Avenue connection) (C3) within the Rockdale tunnel site (C2) for tunnel access, for construction purposes.
D	
dB	Decibel - sound level measurement
dB(A)	Decibels (A-weighted)
DEC	Department of Environment and Conservation
DECC	NSW Department of Environment and Climate Change
DECCW	NSW Department of Environment, Climate Change and Water
Design speed	A nominal speed which determines the geometric design features of a road
Detailed design	The phase of the project following concept design where the design is refined, and plans, specifications and estimates are produced, suitable for construction
Detection limit	The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.
Detour	An alternative route, using existing roads, made available to traffic
DI-Fisheries	NSW Department Industries – Fisheries
DI-Water	NSW Department of Industries – Water
DIRDC	Department of Infrastructure, Regional Development and Cities
Discharge	A release of water from a particular source. The volume of water flowing in a stream or through an aquifer past a specific point over a given period of time.
DLWC	Department of Land and Water Conservation
DM 2026	Operation 'do minimum' (DM 2026)
DM 2036	Operation 'do minimum' (DM 2036)
DoEE	Commonwealth Department of Environment and Energy
DP&E	NSW Department of Planning and Environment
Drainage	Natural or artificial means for the interception and removal of surface or subsurface water.
Drawdown	A lowering of the water table in an unconfined aquifer or the potentiometric surface of a confined aquifer caused by the groundwater inflow to tunnels or pumping of groundwater from wells.
Earthworks	All operations involving the loosening, excavating, placing, shaping and compacting of soil or rock.
EIS	Environmental Impact Statement
Embankment	An earthen structure where the road (or other infrastructure) is located above 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.
Emission	The discharge of a substance into the environment.
Enabling works	Works which are required to enable the commencement of the main construction works
Entry ramp	A ramp by which one enters a limited-access highway/tunnel
Entry and exit ramp tunnels	The tunnels which connect the mainline tunnel to the daylight portal
Entry and exit ramps	The ramps that connect the daylight portal with President Avenue
Environment	Includes all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings (from EP&A Act)
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)

Term	Meaning
EP&A Regulation	Environmental Planning and Assessment Regulation 2000 (NSW)
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
Exit ramp	A ramp by which one exits a limited-access highway/tunnel
Exposure	Contact with a substance by swallowing, breathing, or touching the skin or eyes. Also includes contact with a stressor such as noise or vibration. Exposure may be short term [acute exposure], of intermediate duration, or long term [chronic exposure].
F	
Feasible and reasonable	Consideration of standard or good practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. 'Feasible' relates to engineering considerations and what is practical to build. 'Reasonable' relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community expectations and nature and extent of potential improvements
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 tsunami.
Flood immunity	Relates to the level at which a particular structure would be clear of a certain flood event.
Flood prone land	Land susceptible to flooding by the Probable Maximum Flood. Note that the flood prone land is synonymous with flood liable land.
Floodplain	Area of land which is subject to inundation by floods up to and including the probable maximum flood event (i.e. flood prone land).
Floodway area	Those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels.
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
FMS	Flood Management Strategy
Footpath	The paved area in a footway
Footway	An area open to the public designated for the movement of pedestrians or has one of its main uses for pedestrians
G	
GDEs	Groundwater dependent ecosystems. 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
Grade separation	The separation of road, rail or other transport modes, so that crossing movements at intersections are at different levels
GRAL	Dispersion modelling system
GRAMM	Meteorological modelling system
Groundwater	Water located within an aquifer or aquitard that is held in the rocks and soil in interconnected pores or fractures located beneath the water table.
H	
Ha	Hectares

Term	Meaning
Heavy vehicles	A heavy vehicle is classified as a Class 3 vehicle (a two axle truck) or larger, in accordance with the Austroads Vehicle Classification System
Hydrogeology	The study of subsurface water in its geological context.
Hydrology	The study of rainfall and surface water runoff processes.
I	
IAQM	Institute of Air Quality Management
IBRA	Interim Biogeographic Regionalisation for Australia
ICNG	Interim Construction Noise Guideline
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment
Indirect impact	An impact on biodiversity values that occurs when development related activities affect threatened species, threatened species habitat, or ecological communities in a manner other than direct impact. Compared to direct impacts, indirect impacts often:
Inhalation	The act of breathing. A hazardous substance can enter the body this way [see route of exposure].
Interchange	A separation of two or more roads with one or more interconnecting roadways.
IPCC	Intergovernmental Panel on Climate Change
ISCA	Infrastructure Sustainability Council of Australia
L	
LALC	Local Aboriginal Land Council
Landscape character zone	'An area of landscape with similar properties or strongly defined spatial qualities, distinct from areas immediately nearby.' (RMS 2018)
LATM	Local Area Traffic Management
LCV	Light Commercial Vehicle. Vehicles up to 4.5 tonnes Gross Vehicle Mass (GVM), including cars which have been registered for business use
LCZs	landscape character zones
LEP	Local Environmental Plan
LGA	Local Government Area
Local road	A road or street used primarily for access to abutting properties
LoS	Level of Service
M	
m	Metres
m ²	Square metres
m ³	Cubic metres
Mainline tunnels	The F6 Extension (New M5 to President Avenue) mainline tunnels from the New M5 Motorway stub tunnels at Arncliffe and the tunnel stub (around Bay Street).
Managed motorway	A managed motorway uses active traffic management to reduce congestion, improve reliability of travel times and inform travellers of real-time incidents and expected travel times to set destination along the motorway
mg/m ³	micrograms per cubic metre
MLALC	Metropolitan Local Aboriginal Land Council
MNES	Matters of National Environmental Significance
Motorway Operations Control Centre	The motorway controls for operation of the project would be managed from the Operational Motorway Control Centre located at MOC2 at Rockdale.

Term	Meaning
Motorway Operations Complex (MOC)	The operational infrastructure that would be located within three Motorway Operations Complexes (MOC)
MOC1	Arncliffe Motorway Operations Complex. MOC1 is collocated with the New M5 Motorway MOC at Arncliffe. It would contain the Arncliffe ventilation facility, water treatment plant and a substation.
MOC2	Rockdale Motorway Operations Complex (north). The location of MOC2 (Rockdale north) is within the Roads and Maritime depot at Rockdale. It includes the Operational Motorway Control Centre, car parking, workshop, pump room and deluge tanks, workshop and an office.
MOC3	MOC3 (Rockdale south) is located to the west of West Botany Street at Rockdale. It would contain the Rockdale ventilation facility and an intake substation.
Mode	A type or method of transport movement – including for the road corridor: cars, buses, bikes and pedestrians
Motorway	Fast, high volume controlled access roads. May be tolled or untolled
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
MVHT	million vehicle hours travelled
MVKT	million vehicle kilometres travelled
N	
NCA	Noise catchment area
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NH ₃	Ammonia
NHMRC	National Health and Medical Research Council
NMG	Noise Mitigation Guideline
NML	Noise management level
NO	nitric oxide
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides
NSW	New South Wales
NSW EPA	NSW Environment Protection Authority
NSW OEH	NSW Office of Environment and Heritage (formerly DECCW)
O	
O ₃	Ozone
OEMP	Operation Environment Management Plan
Overbridge	Bridge that conveys another road, rail or pedestrians over the described road
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 (Roads and Maritime 2011)
PAD	Potential Archaeological Deposit
PAH	Polycyclic aromatic hydrocarbon
Palaeochannel	Ancient river systems eroded deeply into the landscape and infilled with alluvial sediments. These systems often underlie modern creek or river systems but not always.
PASS	Potential acid sulfate soils

Term	Meaning
PCT	Plant community type
PCU	passenger car units
Peak flood level	The maximum water level occurring during a flood event.
PIRMP	Pollution Incident Response Management Plan
PM	Particulate matter
PM peak hour	Unless otherwise stated, this refers to trips travelling on the network during the average peak one hour in the PM peak period between 3.00 pm–6.00 pm on a weekday hour
PM ₁₀	Particulate matter less than or equal to 10 micrometre diameter
PM _{2.5}	Particulate matter less than or equal to 2.5 micrometre diameter
PMF	Probable Maximum Flood
POEO Act	<i>Protection of the Environment Operations Act 1997</i> (NSW)
Pollutant	Any matter that is not naturally present in the environment.
Portal	The entry and/or exit to a tunnel
Pre-construction	All work prior to, and in respect of the State significant infrastructure, that is excluded from the definition of construction
President Avenue intersection	A connection between the mainline tunnels and the existing surface road network, including upgrade works to President Avenue required to facilitate the new motorway connection.
President Avenue construction ancillary facility (C3)	A construction ancillary facility for the project within Rockdale Bicentennial Park and 427-441 West Botany Street (including a temporarily diverted West Botany Street), north of President Avenue.
Private vehicle	Includes all motorised vehicles such as cars, 4WDs, vans, motorbikes, motor scooters, utes and trucks, not registered for business use
Probability	A statistical measure of the expected chance of flooding (see annual exceedance probability)
Project	A new, multi-lane road link between the New M5 Motorway at Arncliffe and President Avenue at Kogarah
Proponent	The person or organisation that proposes to carry out the project or activity. For the purpose of the project, the proponent is NSW Roads and Maritime Services.
R	
Revegetation	Direct seeding or planting (generally with native species) within an area in order to re-establish vegetation that was previously removed from that area.
Riparian	Relating to the banks of a natural waterway.
Risk	The probability that something would cause injury or harm.
RNP	<i>NSW Road Noise Policy</i>
Road reserve	An 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 picks mounted on a rotary cutter head attached to a hydraulically operated boom.
Roadside	The area from the edge of the carriageway to the boundary of the road reserve
Rockdale Bicentennial Park	Park located within Rockdale and Brighton-Le-Sands, comprised of Ilinden Sports Centre, Rockdale Bicentennial Park North and Rockdale Bicentennial Park East.
Rockdale LEP 2011	Rockdale Local Environmental Plan 2011
Rockdale construction ancillary facility (C2)	A construction ancillary facility for the project located at a Roads and Maritime Depot off West Botany Street, Rockdale

Term	Meaning
Rockdale ventilation facility	A ventilation facility located at West Botany Street, Rockdale (MOC3), above where the driven tunnel portal finishes and the cut-and-cover tunnel commences
Runoff	The portion of water that drains away as surface flow.
S	
Scour	The erosion of material by the action of flowing water.
Screenline	Theoretical boundaries specifically designed to collectively analyse directional and two-way traffic volumes
SEARs	Planning Secretary's Environmental Assessment Requirements
Sensitive receiver	A location where a person works or resides, including residential, hospitals, hotels, shopping centres, play grounds, recreational centres or similar.
SEPP	State Environmental Planning Policy
SES	State Emergency Services
SHR	State Heritage Register
SLG	Stakeholder liaison group
SMP	Sustainability Management Plan
SMPM	Sydney Strategic Motorway Project Model
SO ₂	Sulfur dioxide
SoHI	Statement of Heritage Impact
Spoil	Surplus excavated material
SSI	State significant infrastructure
STM	Strategic Travel Model
Stockpile	Temporarily stored materials such as soil, sand, gravel and spoil/waste.
Stub tunnel	Driven tunnels constructed to connect to potential future motorway links
Surface water	Water flowing or held in streams, rivers and other water bodies in the landscape.
Swale	A shallow, grass-lined drainage channel.
Sydney Gateway	A high-capacity connection between the St Peters interchange (under construction as part of the New M5 project) and the Sydney Airport and Port Botany precinct
Tanked structure	A tanked structure is constructed with a fully impermeable casing or membrane that reduces inflows to such an extent that for all intents and purposes are considered negligible.
TCP	Traffic Control Plan
THC	total hydrocarbons
TMC	Transport Management Centre
Toxicity	The degree of danger posed by a substance to human, animal or plant life.
TP	Total Phosphorus
Transport for NSW	NSW Government Department Transport for NSW
Transport infrastructure	Permanent installations including roads, rail, buildings and storage associated with transport
TRH	Total recoverable hydrocarbons
Tributary	A river or stream flowing into a larger river or lake.
TSP	Total suspended particulates
V	
VENM	Virgin excavated natural material

Term	Meaning
Ventilation facility	Facility for the mechanical removal of air from the mainline tunnels, or mechanical introduction of air into the tunnels. May comprise one or more ventilation outlets
Ventilation outlet	The location and structure from which air within a tunnel is expelled
VHT	vehicle hours travelled
VKT	Vehicle kilometres travelled
W	
WARR Act	<i>Waste Avoidance and Resource Recovery Act 2001 (NSW)</i>
Waterway	Any flowing stream of water, whether natural or artificially regulated (not necessarily permanent).
WestConnex program of works	A 33 kilometre motorway linking Sydney's west and south-west with Sydney Airport and the Port Botany precinct. It includes the M4 Widening, King Georges Road Interchange Upgrade, M4 East, New M5, M4-M5 Link and Sydney Gateway projects.
Western Harbour Tunnel and Beaches Link	The Western Harbour Tunnel component would connect to the M4-M5 Link at the Rozelle interchange, cross underneath Sydney Harbour between the Birchgrove and Waverton areas, and connect with the Warringah Freeway at North Sydney. The Beaches Link component would comprise a tunnel that would connect to the Warringah Freeway, cross underneath Middle Harbour and connect with the Burnt Bridge Creek Deviation at Balgowlah and Wakehurst Parkway at Seaforth. It would also involve the duplication of the Wakehurst Parkway between Seaforth and Frenchs Forest
WM Act	<i>Water Management Act 2000 (NSW)</i>

Roads and Maritime Services

F6 Extension Stage 1

New M5 Motorway at Arncliffe to
President Avenue at Kogarah

Submissions report

Part A
Introduction and clarifications



A Part A Introduction and overview of consultation and submissions received

A1 Introduction

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A1.1 The project

Roads and Maritime Services (Roads and Maritime) is seeking approval to construct and operate the F6 Extension Stage 1 from the New M5 Motorway at Arncliffe to President Avenue at Kogarah (the project). Once complete, it would improve connections and travel times between the A1 Princes Highway and other arterial roads, south of President Avenue, and commercial areas in Sydney. It would also improve connections for residents and businesses within the broader regional area, promoting and supporting economic development in areas to the south such as Sutherland and the Illawarra.

The project would comprise a new twin motorway tunnel (around four kilometres in length) between the New M5 Motorway at Arncliffe and President Avenue at Kogarah with a tunnel portal and entry and exit ramps connecting the tunnels to the surface. Works would include connection to the New M5 Motorway, line marking of additional travel lanes between St Peters interchange to the F6 Extension Stage 1 tunnels, an intersection with President Avenue, including widening and raising of President Avenue, intersection improvements at the President Avenue / Princes Highway intersection. Mainline tunnel stubs would be constructed to allow for connections to future stages of the F6 Extension.

The project would also provide shared cycle and pedestrian pathways connecting Bestic Avenue, Rockdale to Civic Avenue, Kogarah via Rockdale Bicentennial Park (including an on-road cycleway) and extending this pathway to the southeast to O'Connell Street/Chuter Avenue around Robinson Street.

Ancillary infrastructure and operational facilities would include an Operational Motorway Control Centre, signage, ventilation structures and systems, fire and safety systems, and emergency evacuation and smoke extraction infrastructure.

The regional context of the project is shown in **Figure A1-1**. Project features are shown in **Figure A1-2**.

A more detailed description of the project is found in the Environmental Impact Statement (EIS) prepared by Roads and Maritime in November 2018.

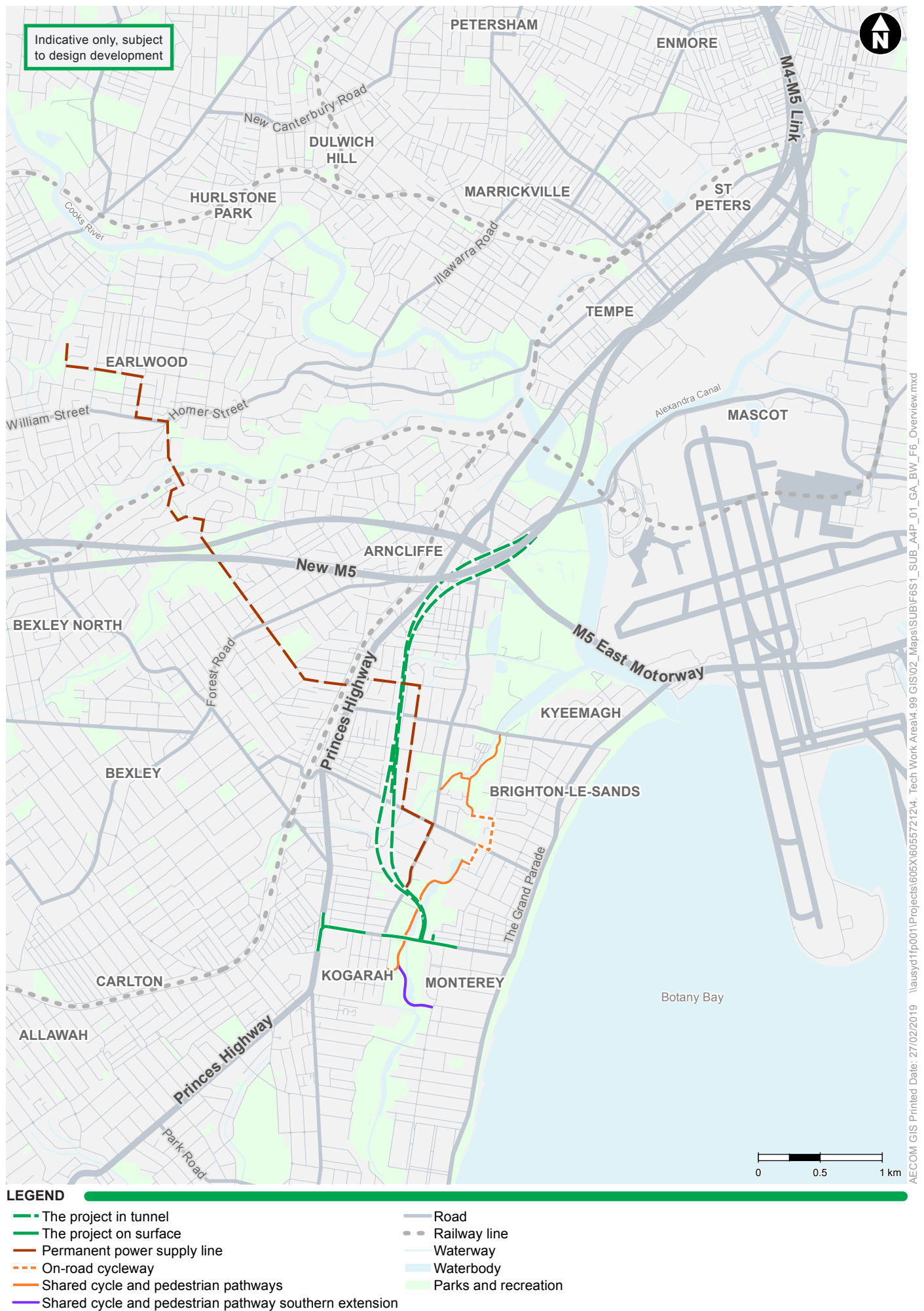


Figure A1-1 Project overview and location

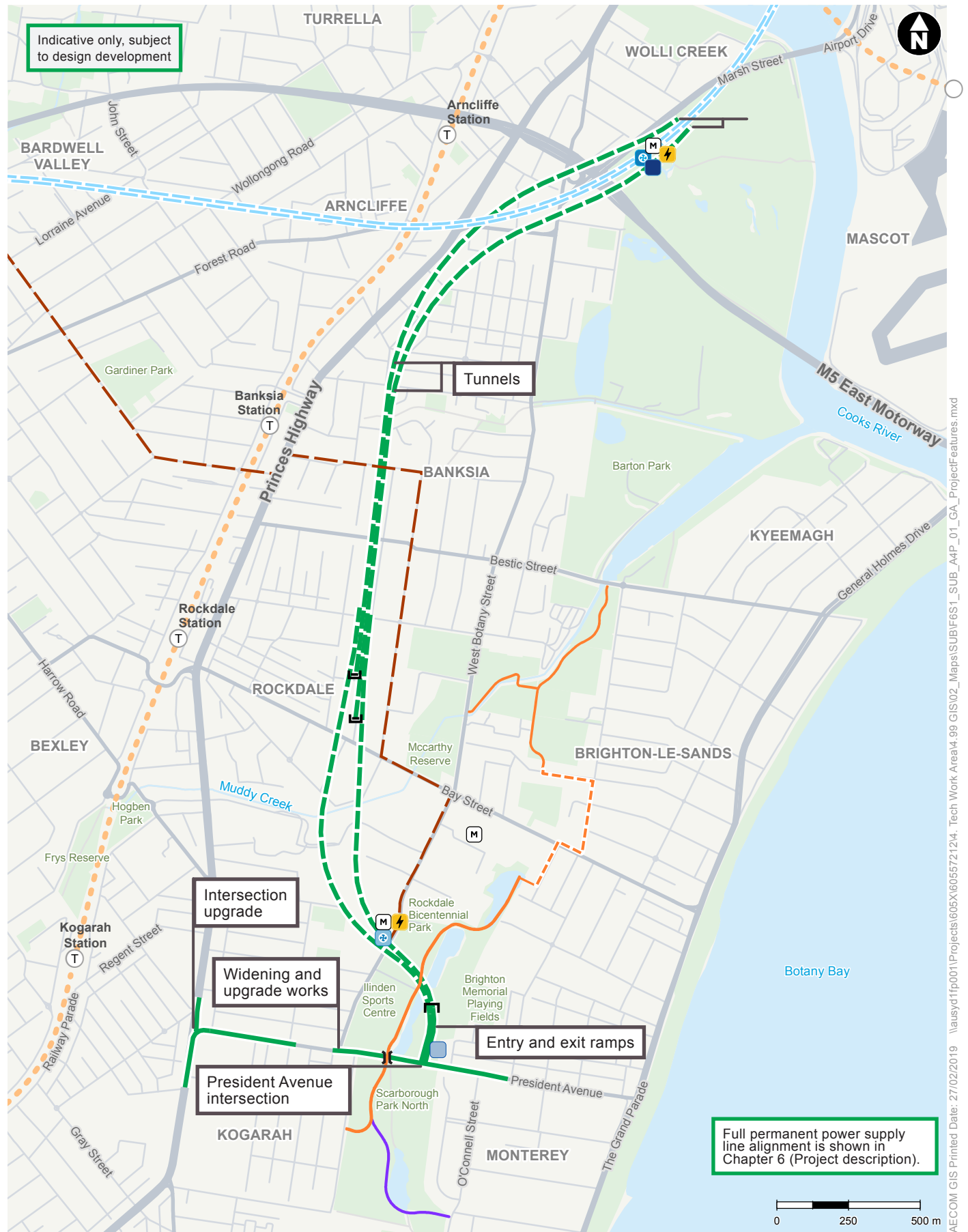


Figure A1-2 Project features

A1.2 Statutory context

Roads and Maritime formed the opinion that the project is likely to significantly affect the environment and would require the preparation of EIS under Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The project does not require development consent under Part 4 of the EP&A Act. Accordingly as per clause 14 and Schedule 3 of State Environmental Planning Policy (State and Regional Development) 2011, the project is State significant infrastructure under Part 5 of the EP&A Act and requires the approval of the Minister for Planning.

A project scoping report was prepared to support a State significant infrastructure application under section 5.15 of the EP&A Act. This application was submitted to the NSW Department of Planning and Environment (DP&E) in November 2017.

The project has also been declared as a critical State significant infrastructure project under section 5.13 of the EP&A Act and is listed in Schedule 5 of State Environmental Planning Policy (State and Regional Development).

In accordance with the requirements of the EP&A Act, an EIS was prepared to assess the potential impacts of the project.

A1.3 Environmental impact statement exhibition

Submissions in response to the F6 Extension Stage 1 EIS were received and accepted by DP&E during the public exhibition period.

This EIS was exhibited by DP&E for 37 calendar days from 7 November to 14 December 2018. Public exhibition of the EIS provided the community, interested parties and key stakeholders (including government agencies and councils) with an understanding of the project and provided the opportunity to comment on the EIS.

The exhibition was advertised in the Canterbury Bankstown Express, the St George Leader (St George edition of the St George and Shire Leader) and the Inner West Courier (City edition). The EIS and supporting materials were made available to view and download on the DP&E website, the project website and at the following locations:

- Roads and Maritime (Head office): 20-44 Ennis Road, Milsons Point NSW 2061
- DP&E office: 320 Pitt Street, Sydney NSW 2000
- Council offices:
 - Bayside Council: Rockdale Customer Service Centre, 444-446 Princes Highway, Rockdale NSW 2216
 - Georges River Council: Kogarah Library and Service Centre: Kogarah Town Square, Belgrave Street, Kogarah NSW 2223
 - Inner West Council: Petersham Customer Service Centre, 2-14 Fisher Street, Petersham NSW 2049
 - Canterbury-Bankstown Council: Bankstown Customer Service Centre: Upper Ground Floor, Bankstown Civic Tower, 66 – 72 Rickard Road (Corner of Jacob Street), Bankstown NSW 2200
- Libraries:
 - Bayside Council:
 - Brighton-Le-Sands Library: 1 Moate Avenue, Brighton-Le-Sands, NSW 2216
 - Rockdale Library: 444-446 Princes Highway, Rockdale NSW 2216
 - Arncliffe Library: 11 Firth St, Arncliffe NSW 2205
 - Sans Souci Library: 104 Russell Ave, Sans Souci NSW 2219
 - Canterbury-Bankstown:
 - Earlwood Library and Knowledge Centre, Corner of Homer and William Street, Earlwood NSW 2206
 - Inner West Council:

- St Peters/Sydenham Library: 39 Unwins Bridge Road, Sydenham NSW 2044
- Georges River Council:
 - Kogarah Library and Service Centre: Kogarah Town Square, Belgrave Street, Kogarah NSW 2223.

Submissions were accepted by DP&E 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 644 submissions were received in response to the EIS. Of that, 12 submissions were received from key stakeholders including NSW government agencies and local councils and 632 community submissions were received from 487 community submitters.

A1.4 Purpose of this document

The Planning Secretary of DP&E provided copies of the submissions to Roads and Maritime. In accordance with section 5.17(6) of the EP&A Act, the Planning Secretary required Roads and Maritime to provide a response to the issues raised in those submissions.

This submissions report identifies the issues raised during exhibition of the EIS and provides responses to those issues (refer to **Part B** for responses to stakeholder submissions and **Part C** for responses to community submissions). The environmental management measures for the project, including any updates and additional measures, are included in **Part D** (Environmental management measures).

A2 Clarifications

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A2.1 Minor errors and discrepancies

This section identifies general clarifications, minor errors and discrepancies identified in the Environmental Impact Assessment (EIS) for the F6 Extension Stage 1 (the project). These errors or discrepancies have been identified through the submissions received or identified by Roads and Maritime Services.

Where relevant, the text provided can be considered to replace the text from the EIS. None of these clarifications result in a significant change to the environmental impacts assessed in the EIS.

Table A2-1 lists the relevant section of the EIS chapter or appendix, states the error or discrepancy and provides relevant clarification.

Table A2-1 Clarifications on the EIS

Chapter/appendix reference	Error/discrepancy	Clarification
Chapter 6 (Project description), section 6.9.9, page 6-31	Submission indicated that the EIS refers to the 'Lowering of ground levels along the eastern side of the tunnel portal extending to the existing Scarborough Ponds within Scarborough Park North to provide an overland flow path to control flow that approaches the tunnel portal from O'Neill Street for events up to the PMF'.	This should read as ' <i>Lowering of ground levels along the eastern side of the tunnel portal extending to the existing Rockdale Bicentennial Park to provide an overland flow path to control flow that approaches the tunnel portal from O'Neill Street for events up to the PMF</i> '.
Chapter 7 (Construction), section 7.3.2 and section 7.7.3; and Chapter 11 (Noise and vibration), section 11.1.4, Table 11-8	These sections of the EIS state that that an acoustic shed would be constructed at the Arncliffe construction ancillary facility (C1).	This is an error in the text. The shed at the proposed Arncliffe construction ancillary facility (C1) would be a standard non-acoustic shed. The shed at the Rockdale construction ancillary facility (C2) would be an acoustic shed. The assessment of potential construction noise impacts in Chapter 11 (Noise and vibration) and Appendix G (Noise and vibration technical report) of the EIS considered a standard non-acoustic shed at the proposed Arncliffe construction ancillary facility (C1). The EIS has therefore correctly assessed a non-acoustic shed at C1.
Chapter 7 (Construction), section 7.6.4; Chapter 8 (Traffic and transport), sections 8.4.3, 8.4.4, and 8.4.5) and Appendix D (Traffic and transport technical report), sections 7.2.4 and 7.4.2	Access arrangements for the C5 construction ancillary facilities	The construction ancillary facility C5 would use West Botany Street for all vehicle access routes. The EIS states that temporary traffic controls would be provided on Bruce Street, a local road to accommodate right-in, left-out access arrangements to C5. There is an error in the construction facility name in these sections where it refers to the use of Bruce Street for C5. This should read C4. Bruce Street would still be required to access C4 by temporary traffic controls through a right-in, left-out arrangement. No impacts to the local road network are anticipated at construction ancillary facility (C5), as heavy and light vehicle access and egress would be directly to and from an arterial road, West Botany Street via a left-in, left-out and right-in, right-out arrangement.
Chapter 11 (Noise and vibration), section 11.3.1	The text preceding Table 11-18 indicates that the cut-and-cover tunnel construction may sometimes be required to be undertaken at night time, on some days.	This is an error. Construction of the cut-and-cover tunnels may occasionally extend into the evening (up to 8pm).
Chapter 13 (Landscape and visual)	Incorrect name - Rockdale Memorial Fields	All references to the Rockdale Memorial Fields should instead refer to the Brighton Memorial Fields.

Chapter/appendix reference	Error/discrepancy	Clarification
Chapter 13 (Landscape and visual), Figure 13-47, Figure 13-48, Figure 13-49 and Figure 13-50	<p>The figure captions for the following figures are incorrect:</p> <ul style="list-style-type: none"> Figure 13-47 displays overshadowing impacts at MOC2 at 3:00pm, however the caption reads 9:00am Figure 13-48 displays overshadowing impacts at MOC2 at 9:00am, however the caption reads 3:00pm Figure 13-49 displays overshadowing impacts at MOC3 at 3:00pm, however the caption reads 9:00am Figure 13-50 displays overshadowing impacts at MOC3 at 9:00am, however the caption reads 3:00pm. 	<p>The captions should instead read:</p> <ul style="list-style-type: none"> Figure 13-47 Overshadowing diagram – MOC2 – June 21 at 3:00pm (winter solace) Figure 13-48 Overshadowing diagram – MOC2 – June 21 at 9:00am (winter solace) Figure 13-49 Overshadowing diagram – MOC3 – June 21 at 3:00pm (winter solace) Figure 13-50 Overshadowing diagram – MOC3 – June 21 at 9:00am (winter solace). <p>This clarification does not change the outcome of the overshadowing assessment as described in Chapter 13 (Landscape and visual) of the EIS.</p>
Chapter 14 (Property and land use), section 14.5.2, Table 14-8	Submission indicated that the EIS states that there is an area 280 metres north east of West Botany Street that has a building height limit of 31 metres.	There is no area 280 metres northeast of West Botany Street zoned for a building height of 31 metres. However, there is an area located around 450 metres to the northwest that is zoned for 31 metres as shown in the Rockdale Local Environmental Plan 2011 (LEP) - Height of Buildings Map-Sheet HOB_004.
Appendix C2 (Landscape character and visual impact assessment), section 6.2 and section 8.2	The operational assessment of landscape character and visual impacts of the works around President Avenue assumes that the project design includes new streetscape planting on the northern side of President Avenue between Traynor Avenue and the Princes Highway.	<p>Further design development has identified that new streetscape planting on the northern side of President Avenue between Traynor Avenue and the Princes Highway may not be possible due to space constraints – this is subject to further design development.</p> <p>Should it be identified that new streetscape planting is not possible in this location, the visibility of President Avenue would be increased for around 12 residential receivers (residential apartment buildings) located on the northern side of President Avenue. This issue would be confirmed and further considered during detailed design with a view to minimising impacts on visual amenity and landscape character.</p>
Appendix C2 (Landscape character and visual impact assessment), section 9	An assessment of the cumulative landscape character and visual impacts of the future stages of the F6 Extension were not included in the EIS.	A discussion of potential cumulative landscape character and visual impacts of future stages of the F6 Extension have now been included in Chapter C12 .

Chapter/appendix reference	Error/discrepancy	Clarification
Appendix E (Air quality technical report), Annexure G, Table G-94 and Table G-95.	Submission indicated that the Air Quality Technical Report includes a regulatory worst-case scenario where emission estimates are based on proposed limit concentrations for each ventilation outlet. Emission rates are provided in Table G-94 and Table G-95 of Annexure G for the regulatory worst-case scenario. Based on the discharge parameters and pollutant emission rates presented in Table G-94 and Table G-95, estimated discharge concentrations for the Stage 1 Rockdale and Stage 2 Rockdale ventilation outlets are lower than the proposed limit concentrations.	The ventilation outlet assumptions that were used in the regulatory worst-case assessment are presented in Table G-95 of Appendix E (Air quality technical report) of the EIS. Tables G-93 and G-94 contain assumptions that were used for the assessment of NO ₂ , and only to confirm that the '2036-Do Something Cumulative' represented the worst-case scenario. The assumptions in Table G-95 are therefore the most relevant.
Appendix E (Air quality technical report), section 9.1.1	Submission noted that the mitigation measures 27 and 28 in section 9.1.1 of Appendix E are labelled as 'desirable' for Zone 2 and not 'highly recommended'. Of the 30 dust management items only 28 are 'highly recommended' for Zone 2 with the two exclusions relating to sand, aggregate and bulk cement. No mention is made of a temporary concrete batching plant in the construction discussion or in the mitigation sections. The SEAR's requirements of Table 1-1 mention concrete batching plants at ancillary facilities and a lot of concrete will be required for the cut and cover section that crosses West Botany Street and through the decline to the tunnels just south of Bay Street.	Mitigation measures 27 and 28 in section 9.1.1 of Appendix E (Air quality technical report) are referred to as 'desirable' and 'N/A' respectively for Zone 2. This is an error. Mitigation measures 27 and 28 should both be 'highly recommended' for Zone 2. A concrete batching plant is not proposed to be used during construction of the project. It is intended that concrete would be sourced from existing concrete batching plants.
Appendix K (Groundwater technical report), page 4-29	A submission included a request for flow directions to be better described. Section 4.10.1 of the report states: <i>"Thus in general, the regional groundwater flow direction through the project footprint is expected to be northwards or north easterly with groundwater ultimately discharging offshore into the Pacific Ocean". In the following page in section 4.10.3, when referring to the Hawkesbury Sandstone, the report states: "Review of the groundwater level contours shows that the dominant groundwater flow direction is easterly towards Botany Bay."</i> Could flow directions be better disclosed?	These comments represent a contrast around regional groundwater flow conditions (generally to the north and northeast) and local flow directions that are easterly. Groundwater contours are presented graphically for the Botany Sands and alluvium (Figure 4-13) and Hawkesbury Sandstone (Figure 4-14) in Appendix K (Groundwater technical report) of the EIS.
Appendix K (Groundwater technical report)	In which EIS are boreholes under construction included? For example, BH1412, BH1413 (Project 80019028).	The boreholes were not included within the hard copy printouts of the EIS to reduce the size of the printed EIS. In the online electronic EIS, the monitoring well construction logs are included as in Annexure F of Appendix K (Groundwater technical report) of the EIS.

Chapter/appendix reference	Error/discrepancy	Clarification
Appendix K (Groundwater technical report), Annexure C and section 4.10.4	<p>The submitter raised a concern about the hydrographs presented in Annexure C of Appendix K (Groundwater technical report). Standpipe BH002 (Wickham St, Arncliffe) shows a sharp drop approximately in May 2017 of 0008m. This pipe is screened between 60-70 m. Similarly, standpipe BH1100 (Kyle St, Arncliffe) at approximately the same time and screened depth 75-78 m, shows a sharp drop that exposes the data logger. A manual reading shows a trend with a drop-in excess of 20 m.</p> <p>However, page 4-33 Appendix K: Groundwater Technical Report (Section 4.10.4) states: "No anthropogenic features such as impacts due to irrigation, pumping or passive discharge to unlined subsurface structures were detected"</p> <p>The submitter questioned how the behaviour in these two piezometers be explained, and asked the reason for the substantial drop within the same area at approximately the same time.</p>	<p>The groundwater drawdown in these monitoring wells is attributed to tunnelling activities associated with the construction of the New M5 Motorway.</p> <p>Section 3.7.3.4 of Annexure F in Appendix K explains that BH002 and BH1100 appear to be affected by drawdown due to New M5 tunnelling, with first drawdowns recorded by data loggers in late May 2017. However, scheduling data provided by the contractor indicated that tunnelling commenced at Arncliffe in July 2017. This suggests that either the schedule provided is not completely accurate, or that dewatering commenced prior to tunnel excavation. Logger data for BH1100 indicates 3 metres of drawdown (most likely due to access decline tunnelling) in May 2017, and approximately 9 metres of drawdown is recorded at BH002 between May and September 2017.</p>
Appendix K (Groundwater technical report), section 4.7.6	<p>Page 4-21 (Appendix K: Groundwater Technical Report) states: "A dyke located to the immediate north of the tunnel alignment was intersected in eight boreholes during construction of the west dive structure at Cooks River for the M5 East (Golder 2016) and could also intersect the project tunnels." The dyke described above reached a width of up to 16 m (Golder 2016).</p> <p>Are those boreholes included in this report?</p> <p>If not, is BH040 (Annexure G, borehole logs) a different dyke? How was this implemented in the model?</p>	<p>Only boreholes that were constructed as part of the F6 Extension Stage 1 investigation have been included in Appendix K (Groundwater technical report) of the EIS. BH040 intersects a separate dyke than the major dyke intersected by Golder.</p> <p>Faults and dykes simulated by Golder (2017) were included in a sensitivity run of the model to assess the impacts of inflows to the tunnels. The addition of faults and dykes into the model caused a 40 per cent increase of inflows and minor impacts to storage during construction. However, there were no long-term impacts implying inflows for the long-term prediction have reached steady state conditions.</p>
Appendix K (Groundwater technical report), section 4.7.10	<p>Section 4.7.10 of the report states: "Golder (2016) mapped a relatively complex faulting system based on geotechnical borehole data as part of the M5 Motorway and concluded that the identified faulting was associated with the Woolloomooloo Fault in Arncliffe. Extrapolation of these structures would result in faulting potentially being encountered at the western edge of the Kogarah Golf Course."</p> <p>Has anything been done to constrain this potentially important faulting? How is this included into the model?</p>	<p>The Woolloomooloo Fault in Arncliffe was included in the sensitivity analysis described above. Also, during construction, advance grouting techniques will be implemented in addition to grouting during construction to reduce the bulk hydraulic conductivity of the sandstone and reduce groundwater inflows in the short term and long term.</p>

Chapter/appendix reference	Error/discrepancy	Clarification
Appendix K (Groundwater technical report), section 3.3.4	<p><i>"The model domain is discretised into nine layers with the upper three layers representing fill, regolith, alluvium, Botany Sands (layer 1) ...the lower 6 layers represent the Hawkesbury sandstone"</i></p> <p>What is the physical reason for six model layers in the Hawkesbury sandstone?</p> <p>Are there any semi-continuous shale layers across the model domain? Are the six layers supported by lithologies?</p> <p>Supported by observable transitions between facies? What is the proportion of "massive" to "sheet" facies in the model domain?</p> <p>How the abundant coring developed informed the model?</p> <p>How are fractures and intrusions considered?</p>	<p>The Hawkesbury Sandstone was divided into multiple layers as it cannot be considered as one aquifer but rather a series of stacked aquifers due to the varying geological properties throughout including varying grain size, cementation, interbedded shale layers and fracturing. The layering is based on the geotechnical model developed for the site that was based on a desktop investigation and a geotechnical investigation where over 100 geotechnical boreholes were constructed.</p> <p>The mapping of the geology in the model domain was based on the geotechnical boreholes which included dividing the sandstone into mappable units based on the core in the boreholes. While the various facies were mapped throughout the geotechnical investigation, the proportions of each facies was not calculated along each geotechnical cross section. More details of the intersected geology are available in the geotechnical interpretative reports. The geotechnical boreholes extended to the base of the proposed tunnels and were cored all the way through the sandstone. As part of the logging of the core fracture, orientations and intrusions were recorded. Fractures and intrusions were considered in the model by varying the aquifer properties such as hydraulic conductivity and storage and refining these parameters during the calibration process.</p>
Appendix K (Groundwater technical report), section 4.10.2	Section 4.10.2 states two different groundwater levels for BH1314, where the borehole log only shows one groundwater level.	This is an error in the text. The first mention of BH1314 should be BH1315. The surface water level for BH1315 is 2.72m AHD and for BH1314 is 4.75 m AHD.
Appendix L (Surface water technical report), section 3.1.2, Table 3-3	<p>A submission noted the following errors and omissions in the guideline values cited in Table 3-3 of the Surface Water Technical Report :</p> <ul style="list-style-type: none"> Chlorophyll 'a' in freshwater 'o' The coastal lowland rivers guideline value is 3 µg/L, not 5 µg/L. Salinity in freshwater <ul style="list-style-type: none"> The coastal lowland rivers guideline value is 300 µS/cm, not 2,200 µS/cm. pH in freshwater <ul style="list-style-type: none"> The lowland rivers guideline range is 6.5 to 8.5, not 6.5 to 8.0. Arsenic III in marine water <ul style="list-style-type: none"> Table 3-3 adopts the freshwater guideline value. The marine water interim working level is 2.3 µg/L. 	These errors and omissions are noted. Correction of these errors would not change the outcomes of the surface water quality assessment in the EIS.

Chapter/appendix reference	Error/discrepancy	Clarification
	<ul style="list-style-type: none"> • Arsenic V in marine water <ul style="list-style-type: none"> - Table 3-3 adopts the freshwater guideline value. The marine water interim working level is 4.5 µg/L. • Chromium III in freshwater <ul style="list-style-type: none"> - Table 3-3 does not include a guideline value for chromium III in freshwater. The freshwater interim working level is 3.3 µg/L. • Iron fresh- and marine water <ul style="list-style-type: none"> - Table 3-3 does not include guideline values for iron. The interim working level is 300 µg/L for both freshwater and marine water. • Manganese in marine water <ul style="list-style-type: none"> - Table 3-3 adopts the freshwater guideline value. The marine water interim working level is 80 µg/L. <p>Note that these errors and omissions are also reflected in Table 10-17. Additionally, the EIS applies estuarine and marine guideline values to the freshwater Rockdale Bicentennial Park Pond. The freshwater guideline values should be adopted for Rockdale Bicentennial Park Pond.</p>	
Appendix L (Surface water technical report), Table 6-9 and Table 6-10	<p>Submission noted that Tables 6-9 and 6-10 of Appendix L (Surface Water Technical Report) of the EIS do not specify units for pollutant concentrations. Therefore, these were assumed to be µS/cm for salinity and mg/L for all other pollutants.). However, it is noted that the 'assumed discharge quality' concentrations of arsenic, ammonia and phosphorus are substantially greater than the default guideline values and the combined discharge is predicted to increase the concentrations of some pollutants in the Cooks River (eg Ammonia concentrations are predicted to increase by 2.6% to 280 µg/L, more than 18 times the default stressor guideline value for estuaries [15 µg/L]).</p>	<p>It is noted that pollutant concentration units were not provided in Table 6-10 of Appendix L (Surface water technical report) of the EIS.</p> <p>To confirm, the units are the same as for Table 6-9 (provided in the first row). The guideline value for ammonia is 0.91 mg/L (which the results relate to) rather than ammonium and while the potential risk is acknowledged, the 2.6% only relates to a change from 0.27mg/L to 0.28mg/L for ammonia. Given the baseline water quality is already significantly above the 15ug/L criteria and given concentrations are below the toxicity value, impacts are considered to be negligible.</p> <p>Similarly, for phosphorus, the impact is 1.6% but concentration to two decimal places would stay the same.</p>

A2.2 General clarifications

A2.2.1 Naming inconsistencies – water features

A number of submitters have raised queries about the inconsistencies in naming of the water features in the southern part of the project footprint.

Various technical reports use different terminology for the same water features. This depends on the reference material used and context of the reporting.

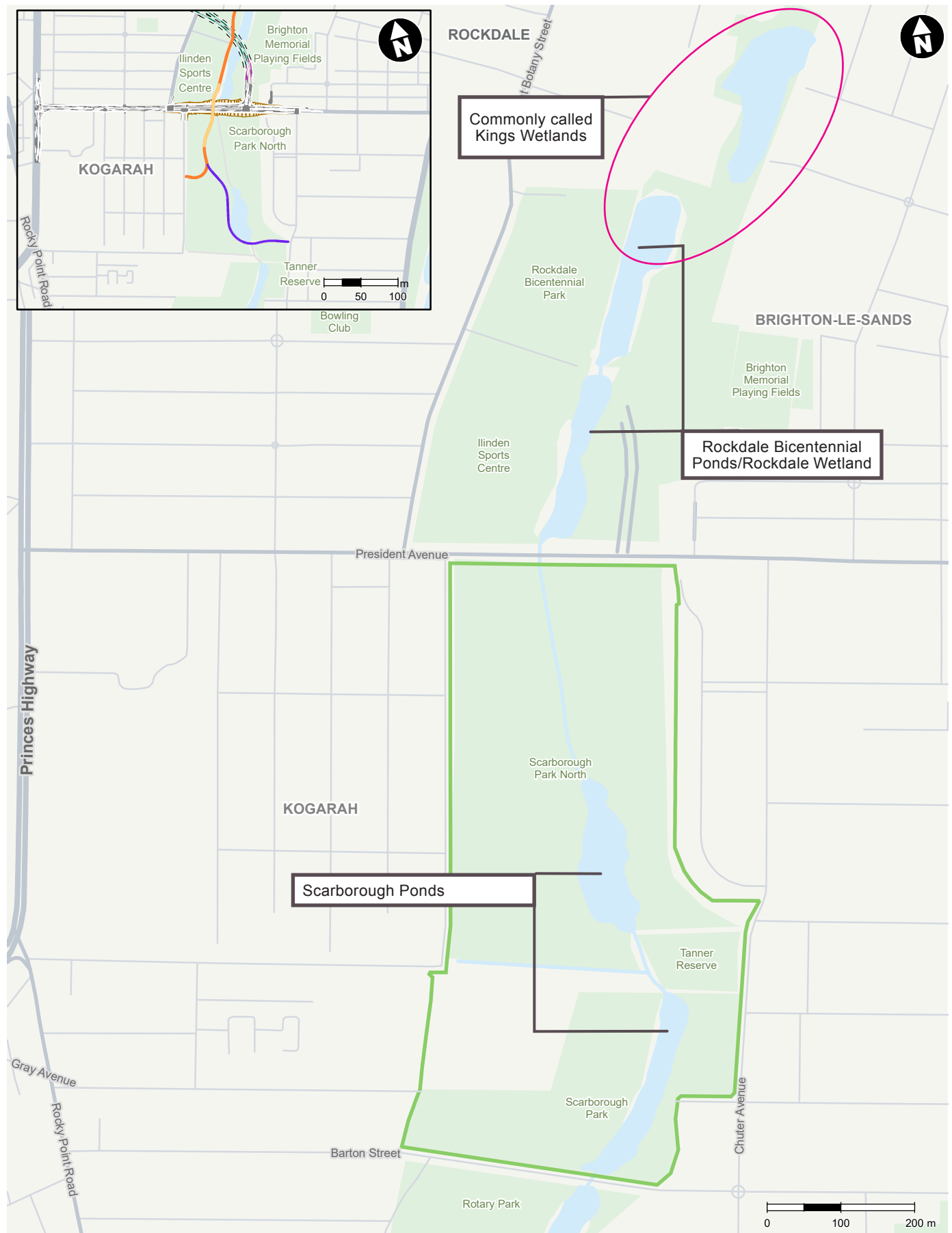
For clarification, the Rockdale Wetlands are the same as the Rockdale Bicentennial Ponds.

The community commonly refers to the Kings Wetlands. This is not a mapped water feature but relates to historical elements in the landscape. The Kings Wetlands refer to the northern part of the Rockdale Wetlands/Bicentennial Ponds.

The area to the south of President Avenue is known as Scarborough Park North and includes waterways referred to as the Scarborough Ponds.

Scarborough Park North is also referred to as Patmore Swamp. The name 'Patmore Swamp' is the name of the heritage listing for part of this area under the Rockdale Local Environmental Plan 2011 (item number 202).

Figure A2-1 has been produced to clarify these different water features and nomenclature.



LEGEND

- | | |
|--|--|
| — Scarborough Pond Catchment | — The project on surface |
| — Scarborough Park North
(Commonly called Patmore Swamp) | — The project as an open slot |
| | — On-road cycleway |
| | — Shared cycle and pedestrian pathways |
| | — President Avenue shared cycle and pedestrian bridge |
| | — Shared cycle and pedestrian pathway southern extension |

Figure A2-1 Water features in the southern part of the project

A2.2.2 Bentonite plant

A bentonite mixing plant would be located within the President Avenue construction ancillary facility (C3) to support the construction of diaphragm walls for the cut-and-cover structures at the President Avenue intersection. The plant would be located within the 'diaphragm wall support site' area within the C3 facility as shown in Figure 7-5 of the EIS. A bentonite plant indicative to that which would be required is shown in **Figure A2-2**.

The exact design and operation of the bentonite plant to be used for the project would be subject to confirmation by the construction contractor. The plant would include establishment of storage tanks/silos, de-sanders, pumps and reticulation pipes. The silo's (for the storage of bentonite clay powder) would be the most visible feature ranging between 10-15 metres high depending on their storage capacity. Bentonite would generally be delivered to the C3 facility as a powder which would be mixed with water within the plant to create a bentonite slurry. The bentonite slurry would be pumped through pipes as required for use in the construction of the diaphragm wall.



Figure A2-2 A bentonite plant with storage silos indicative to the requirement for the President Avenue construction ancillary facility

While construction of the cut-and-cover structures are proposed to occur during standard construction work hours, there may be times when this would extend into the evening (up to 8pm). As the bentonite plant is required to support these works, the plant may also be operated outside of standard construction hours (up to 8pm). The potential impacts associated with the bentonite plant during construction have been assessed throughout the EIS as part of the assessment of impacts associated with the C3 facility. Key aspects associated with the operation of the bentonite plant during construction are described in the sections below.

A2.2.2.1 Traffic and transport

Construction traffic movements associated with the delivery of bentonite clay powder to the C3 facility would be limited to the construction of the diaphragm wall and are included as part of the indicative daily and peak period construction traffic volumes for the C3 facility described in Table 8-19 of the EIS.

A2.2.2.2 Air quality

Bentonite clay powder would be delivered to the C3 facility in sacks prior to being mixed with water to create bentonite slurry. Potential dust impacts would be limited to during the handling of bentonite clay prior to mixing. The operation of the bentonite plant may therefore have a potential for minor dust generation that are consistent with the impacts considered in the assessment of dust impacts for 'Zone 2' (which includes the C3 facility) in section 7.1 of Appendix E (Air quality technical report) of the EIS. The assessment identified a high risk for dust soiling, human health and ecology for all types of activities within 'Zone 2', however, with the implementation of appropriate dust mitigation measures, the assessment concluded that overall construction dust would be manageable.

The Construction Air Quality Management Plan that will be developed for the project will include measures to manage the transport, storage and handling of sand, aggregate and fine materials (which would include bentonite clay).

A2.2.2.3 Noise and vibration

Noise impacts from the establishment and commissioning of the bentonite plant, and the sound power level for the operation of the plant, are included in Table 5-2 of Appendix G (Noise and vibration technical report) of the EIS. The bentonite plant has been assessed as part of the construction noise impacts associated with the construction of diaphragm wall guide-walls and panels. It should be noted that this construction also includes concrete pumping and steel work, in addition to the use of bentonite clay.

As identified in Table 5-5 of Appendix G (Noise and vibration technical report) of the EIS, the construction of diaphragm wall during standard construction hours would be associated with minor exceedances (1 – 10 dB(A)) of noise management levels (NMLs) at a number of receivers and moderate exceedances (11 – 20 dB(A)) of NMLs at five receivers.

As identified in Table 5-16 of Appendix G (Noise and vibration technical report) of the EIS, the construction of diaphragm wall guide walls and panels outside of standard construction hours would be associated with moderately intrusive (16 – 25 dB(A)) exceedances of NMLs at a number of receivers. However, these works would only occur by exception and would not continue past 8 pm.

The potential noise impacts would be managed through the implementation of environmental management measures, as described in **section A2.2.2.6**.

The bentonite plant would not induce vibration that would present a risk of structural damage or impacts to human comfort.

A2.2.2.4 Landscape and visual

Potential landscape character and visual impacts during construction associated with the C3 facility are assessed in section 6.2 and section 8.2 of Appendix C2 (Landscape character and visual impact assessment) of the EIS. The most visible element of the bentonite plant would be the storage silos (refer to **Figure A2-2**). However, other elements within the facility such as cranes would be expected to be taller and more visible.

The assessment considered a large scale of construction activity within the 'diaphragm wall support site' area of the C3 facility and the identified impacts reflect the landscape character and visual impact of works such as the use of a bentonite plant in this setting.

Overall, the C3 facility would result in a high-moderate landscape character impact and moderate to high visual impacts on three viewpoints during construction. Further detail is provided below.

Landscape character assessment

The C3 facility is located within the landscape character zone (LCZ) 4: 'Rockdale Bicentennial and Scarborough Parks' assessed in Appendix C2 (Landscape character and visual impact assessment) of the EIS.

The assessment identified that a large part of Rockdale Bicentennial Park would be used for the C3 facility including excavation and construction of the cut-and-cover structures. The assessment recognised that a substantial portion of this LCZ would be impacted, considerably altering the valued attributes of this landscape character zone during the construction period, and resulting in a high magnitude of change to this landscape character area. The assessment identified an overall high-moderate landscape character impact during construction. The bentonite plant is generally consistent with the character and scale of the other construction works considered at the C3 facility, and therefore does not change the outcome of the landscape character assessment in the EIS.

Visual assessment

The bentonite plant is anticipated to be generally visually contained in the north and west of the C3 facility by nearby industrial buildings on West Botany Street, and to the east by the mature vegetation within Rockdale Bicentennial Park, which would be retained.

In section 8 of Appendix C2 (Landscape character and visual impact assessment) of the EIS three views were assessed which included the diaphragm wall construction area of the C3 facility, including

- Viewpoint 4: View north from the Ilinden Sports Centre
- Viewpoint 7: View south from Brighton-Le-Sands Public School
- Viewpoint 14: View north from West Botany Street.

A summary the visual assessment for the three viewpoints identified above is provided below. These assessment findings apply to the C3 facility, which includes the bentonite plant.

The view north from the Ilinden Sports Centre (refer to Viewpoint 4) includes an unobstructed view across the diaphragm wall construction area of the C3 facility. The assessment in the EIS identified high-moderate visual impact for this view when considering the visual impact associated with the bentonite plant.

In views from Brighton-Le-Sands Public School (refer to Viewpoint 7), a moderate magnitude of change was identified in the EIS due to the establishment of the C3 facility in the background of this view. The assessment in the EIS identified moderate visual impact for this view.

The EIS identified a high magnitude of change in views north along West Botany Street (refer to Viewpoint 14). There would be extensive construction works visible from this location and seen in the context of existing light industrial and commercial buildings. The assessment in the EIS identified a moderate visual impact for this view

A2.2.2.5 Waste management

The plant would mix bentonite clay powder and water to create a bentonite slurry. This process is not associated with the ongoing creation of a by-product or waste stream. Once the bentonite slurry is no longer required for the construction of the diaphragm wall it would be removed from the diaphragm wall site and transported and disposed of off-site at a licensed facility.

A2.2.2.6 Mitigation and management measures

The bentonite plant is consistent with the character and scale of the other construction works considered at the C3 facility. As described above, traffic and transport, air quality, noise and vibration, landscape and visual, and waste impacts associated with the bentonite plant would be consistent with the construction impacts described for the C3 facility in the EIS.

Potential impacts associated with the bentonite plant would therefore be managed through the implementation of the environmental management measures described in **Chapter D1** (Environmental management measures), including:

- A CAQMP will be developed and implemented to monitor and manage potential air quality impacts associated with the construction of the project and activities at construction ancillary facilities. The CAQMP will identify project construction activities with the potential to have air quality impacts and the controls required to avoid, minimise and mitigate these impacts. The plan will include measures to minimise project dust generation and manage the transport, storage and handling of sand, aggregate and fine materials
- A Construction Noise and Vibration Management Plan (CNVMP) will be prepared. The CNVMP will include processes and responsibilities to assess, monitor, minimise and mitigate noise and vibration impacts during construction
- The design and maintenance of construction ancillary facility hoardings will aim to minimise visual impacts and landscape character impacts.

Roads and Maritime Services

F6 Extension Stage 1

New M5 Motorway at Arncliffe to
President Avenue at Kogarah

Submissions report

Part B
Response to stakeholder
submissions



B Part B Response to stakeholder submissions

B1 Advisory Committee for Tunnel Air Quality (ACTAQ)

This chapter addresses issues raised in the submission from the Advisory Committee for Tunnel Air Quality (ACTAQ), acting on behalf of the NSW Government Chief Scientist and Engineer. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B1.1 Assessment of air quality impacts – general

Our overall conclusion of the F6 Extension – Stage 1 EIS is that it constitutes a thorough review of high quality. It covers all of the major issues and areas that an EIS for a project of this scale should. The information presented is of suitable detail and logical in order. The choices made regarding data used and methods followed have been logical and reasonable and it is our view that the benefit of exploring alternative approaches would be questionable or marginal.

Response

The comments are noted.

B1.2 Modelling

B1.2.1 General comments on assessment methodology

We find that the assessment methodology is sound and represents best practice. All of the models and data used are appropriate and expertly used. We have found no significant errors nor important omissions.

Response

The comments are noted.

B1.2.2 Emission modelling

The methodology used to estimate in-tunnel emissions to assess in-tunnel air quality and also being used as input to the dispersion modelling of exhaust emitted through the tunnel ventilation stacks, is very thoroughly and clearly described in the EIS. Although the method used (PIARC 2012) for deriving emission factors does not explicitly provide those for years beyond 2020, the applied approach provides conservative estimates of the emissions of all substances for the scenario years 2024, 2026 and 2036, thus the in-tunnel emissions are more likely to be overestimated in the EIS rather than underestimated.

The approach to use the most recent knowledge on NO₂/NO_x-ratios, as represented by the last update of the EMEP/EEA Air Pollutant Emission Inventory Guidebook from June 2017, to derive primary NO₂ emissions, is very adequate and fit for purpose for the assessment of in-tunnel air quality, as is the modelling of in-tunnel air concentrations of NO₂ for the worst case scenarios with tunnel traffic average speeds down to 20 km/hr.

Furthermore, we acknowledge the attempt to validate the calculated emissions against measured air pollutant concentrations in the M5 East Tunnel in 2015, as well as deriving input data on heavy vehicle mass for the emission modelling based on measurements of actual heavy vehicle mass with a 1 hour resolution (0-24) on heavy vehicles at the Botany WIM (Weigh-in-motion) station near the M5 East motorway.

The approach applied for emissions modelling for the F6 Extension Stage 1 EIS is exactly the same as for the M4-M5 Link EIS from 2017 and the previous WestConnex EISs (New M5 in 2016 and M4 East in 2015). Thus, the NSW EPA model from 2012 was used to calculate speed- and grade-resolved hot running exhaust emission of six pollutants for nine vehicle types, five road types, and nine model years (from 2003 to 2041), the latter defining the composition of the fleet for each type of vehicle, allowing for technological changes.

In the assessment also cold start emissions were taken into account as well as non-exhaust emissions, taken from the most recent version of the EMEP/EEA Air Pollutant Emission Inventory Guidebook from 2016. Since evaporative VOC emissions are not included in the NSW EPA model, these were excluded from the assessment, which is also justified by the fact that running evaporative emissions are considered low and irrelevant for air quality. In addition, the NSW EPA model has been extensively validated (in 2014) in a dedicated tunnel study, in which observed (measured) emission rates were compared with predicted (modelled) emission rates. It was found that the model on average overestimated emissions of each of the pollutants included in the assessment by a factor of 1.7 to 3.3, which indicates that the model outputs generally can be regarded as conservative. The validation study also showed that the model overprediction persisted when emission factors were split into the two vehicle types light-duty and heavy-duty vehicles.

To summarize, the emission modelling approach applied in the F6 Extension Stage 1 assessment can be considered sound and “close-to-state-of-the-art”. Its shortcoming is mainly the lack of update of emission factors in recent years, particularly for newer vehicles (ie Euro 6) - both the NSW EPA model and the PIARC model (applied for calculating emissions ventilated from the WestConnex tunnels, and partly also providing emission factor inputs to the NSW EPA model) were launched in 2012. However, this is compensated by the tendency of the model to overestimate emissions as demonstrated for the Sydney vehicle in-use fleet, which is in line with the precautionary principle that should characterize environmental impact statements in general. However, for future EISs it would be desirable that the applied emission model(s) would include also state-of-the-art emission factors for Euro 6, since this will be the predominating emission concept category in only a few years from now.

Response

The comments are noted.

B1.2.3 Use and evaluation of meteorological and dispersion models (GRAMM, GRAL)

The EIS has given careful attention to the location of the project close to the coast and its implications for meteorological modelling. Coastal locations are likely to experience higher wind speeds than inland locations and potentially different wind directions due to local land-sea breezes. We find that the approach used to address this using the ‘Match-to-Observations’ function in GRAMM (as recommended in the recent evaluation study of the GRAMM-GRAL package) is highly appropriate in this situation and are comfortable that this is likely to provide the most representative results whilst retaining slight conservatism.

The GRAMM-GRAL dispersion modelling suite has been used appropriately and appears to be giving credible results. The evaluation of the models provided in the EIS (Annexure H) relates to the model's ability to capture dispersion from open roadways. The model's apparent success in doing this (albeit with some conservatism) may be used to infer that they will perform similarly well in predicting dispersion from a ventilation stack, although this cannot be directly verified due to the non-existence of an observational dataset for the ventilation stacks only.

Response

The comments are noted.

B1.2.4 Assessment of background air quality

Assessment of background air quality is a surprisingly challenging aspect of any EIS like this. In common with previous WestConnex and NorthConnex projects considerable funds have been spent on air quality monitoring, putting the F6 Extension in the enviable position of having a far richer observational dataset available than most, if not all, comparable projects.

Despite this, and in common with all previous WestConnex projects, datasets of < 1 year have been under-used or discarded due to monitoring starting too late, despite the fact that these data could be extrapolated to 1 year with acceptable uncertainty.

However, this project benefits from a much larger database of air quality measurements than any previous Sydney tunnel project, as far more data from the WestConnex monitoring sites are now available and have been used in the F6 EIS. Furthermore, sufficient data from the F6 project monitoring is provided in the EIS (Annexure D) to assess the likely implications of not using it directly to assess background concentrations.

We find that these data indicate that background concentrations of relevant air pollutants in the area of the F6 Extension may be at the lower end of the range of concentrations monitored at the stations used in the assessment. This implies that the estimates of short-term and long-term background concentrations are likely to be somewhat conservative – maybe more so than in the WestConnex assessments - but not excessively so.

Although not making full use of the data available, we do not believe that the weakness in background air quality assessment is seriously influencing the key conclusions of the EIS, and in particular does not impact the health risk assessment.

Therefore, despite these limitations, we find the current assessment of background air quality to be fit for purpose. However, we recommend that careful consideration is given to this issue for the assessment of any future road and road tunnel projects in Sydney.

Response

The comments are noted.

B1.2.5 Method to estimate NO₂ concentration

The method used has limitations, which the EIS appropriately acknowledges. However, we find the empirical approach of estimating NO₂ concentrations using observational NO₂ and NO_x data to be sound, appropriate and the approach most suited to the purposes of the EIS.

Response

The comments are noted.

B1.3 Assessment and management of construction impacts

The methodology applied for the assessment of construction impacts in the F6 Extension Stage 1 EIS is the same as the one applied in the M4-M5 Link EIS from 2017 and the New M5 and M4 East EIS, both from 2015. For assessing the impacts of dust it is based on the guidance (semi-quantitative approach) provided by the UK Institute of Air Quality Management (IAQM) from 2014, but adapted for use in Sydney, taking into account factors such as the assessment criteria for ambient PM₁₀ concentrations.

As in the previous EISs, the IAQM procedure is applied to assess the impact of dust release during the four stages of construction:

- Demolition
- Earthworks
- Construction
- Track-out.

For each stage the assessment methodology separately considers three different impacts of dust:

- Annoyance due to dust soiling
- Health effects related to an increase in exposure to PM₁₀
- Harm to ecological receptors.

The above-ground construction activities, taking place at a number of separate locations within the construction area, have been grouped into two distinct zones. Dust risk assessments have been made for each combination of construction stage/type of dust impact/zone (ie in all 24 combinations). The assessment resulted in 'High Risk' associated with 14 of these combinations, whereas three were classified as 'Medium Risk' and three as 'Low Risk'. The majority of the 'High Risk' combinations (12) occur in the zone with the largest construction footprint. This zone contains a quite high number of receptors (>1200), mainly residential, within less than 20 meters distance from the source area.

Exhaust particle emissions, as well as other noxious pollutants in the exhaust, from on-site plant and site traffic (mainly heavy-duty vehicles transporting dust and dirt from the construction sites onto the public road network), are not included in the impact assessment, since it is claimed that these are not likely to have a significant impact on local air quality, which is stated without any further evidence (see further comment below).

The procedure to assess the impact of odour (mainly related to the release of hydrogen sulfide (H₂S) during the excavation activities on a historical landfill site with contaminated acid sulfate soils) during the construction phase in the F6 Extension Stage 1 EIS appears to be the most ambitious one applied so far compared to earlier EISs. This includes several steps ranging from the selection of quantitative criteria for the assessment of odour from H₂S, through the application of several dispersion models on local meteorological data, and estimation of H₂S emission rates from local sources. The modelling results show that the nearest receptors are exposed to H₂S concentrations well below the odour level. Nevertheless, the EIS recommends onsite odour measurements to be carried out onsite once the construction operations begin, so that site-specific emission rates can be determined and the exposure pattern for the construction re-modelled, alternatively that site odour audits are carried out to determine the actual impacts at the nearest receptors.

As in the previous EISs, the final step in the assessment of construction impacts involves the determination of mitigation measures for the management of impacts, properly described in the EIS. We acknowledge that most of the proposed mitigation measures are 'highly recommended', since the majority of the construction phase/type of dust impact combinations were classified as 'High Risk' in the assessment. A remark is that one of the mitigation measures highlighted in the EIS is to 'minimise generator and vehicle emissions during construction of the tunnel', which seems contradictory to what is stated about the impact of exhaust emissions from on-site plant and site traffic to be 'unlikely to have a significant impact on air quality' in the assessment chapter. In this case, a clarification from the respondent would be desirable.

To summarize, the approach and ambition of the impact assessment of the construction phase in the F6 Extension Stage 1 EIS is largely the same as in the previous EISs and can be considered sound. In particular the high ambition in the EIS with respect to the approach and methodologies applied to assess the risk for odour exposure due to the release of hydrogen sulfide during the construction activities is acknowledged. For future EISs, it is recommended to consider to substitute, or to complement, the presently applied semi-quantitative approach for the dust impact assessment (IAQM) with the quantitative approach used for odour assessment, since most of the elements for doing this (state-of-the-art dispersion models, qualified modelling and local meteorology) are already in place for the construction impact assessment.

Response

The comments are noted.

To clarify, the qualitative IAQM approach adopted for the project does not assess the impacts of dust, but rather the risk of impact if dust generating activities remain unmitigated. It is a qualitative methodology which rates the risk based on a number of factors, including the number of receptors and their proximity to the construction activities. The outcomes are then used to inform the recommendations for mitigation which, when effectively carried out, should reduce this risk considerably.

It is very difficult to reliably quantify dust emissions from construction activities due to their variable nature over time. There are numerous scenarios which could be modelled and which, in reality, would be short term and subject to the specific meteorological conditions at the time. The maximum impacts are generally short term and so the best outcome is to manage those impacts on a day-to-day basis rather than to try and estimate what the resulting concentrations could be. The IAQM is a practical method that identifies high risk activities and outlines specific mitigation measures to manage those emissions at the source.

Similarly for odour, while ground level concentration predictions can be made based on dispersion modelling, only crude assumptions can be made concerning the likely exposed areas, the length of time they are exposed for and odour emission rates. Again, the best option is to manage the site to keep exposed areas to a minimum, covering odorous areas as quickly as possible and keeping the community fully informed in advance about activities that are likely to generate potential unacceptable odour.

Roads and Maritime will engage closely with the local community prior to excavation works, ensuring they are aware of the potential release of odour, expected from time to time.

To clarify, there would be vehicle emissions associated with construction and every effort will be made to keep these to a minimum, hence the noted mitigation measure. However, it is unlikely that these emissions would be significant relative to those from local surface traffic already in the area.

B1.4 Assessment conclusions and equity issues

This project was the first tunnel project in New South Wales for which the SEARS required 'a qualitative assessment of the redistribution of ambient air quality impacts compared with existing conditions, due to the predicted changes in traffic volumes'. This was provided at the end of section 8.4.11. The analysis shows that the F6 Extension Stage 1 is predicted to make only minor and localised changes to the distribution of air quality impacts, and that, in general, ground-level concentrations are predicted to reduce at most locations. We agree with these conclusions, and agree that the analysis provided meets the requirements of the SEARs. The provision of concentration density plots (figures 8-78 to 8-80) is a technical but unbiased way of visualising these conclusions which we support.

Response

The comments are noted.

B1.5 Health risk assessment

We find the health risk assessment to be sound and agree with those findings directly relating to the ventilation stack emissions. This is also true for the health risks associated with drivers' exposure to elevated NO₂ concentrations when driving through the tunnel, which are below the recommended limit of 0.5 ppm NO₂ also in the worst case scenarios.

Response

The comments are noted.

B1.6 Detailed comments and errata (Appendix E)

- Page 8-4 and 8-16: Wrong referencing - Annexure C should be referenced to instead of Annexure E
- Page 8-5: The model used for input data in the F6 Extension Stage 1 EIS is the Sydney Strategic Planning Model (SMPM). In the previous EISs the corresponding model was the WestConnex Road Traffic Model (WRTM). These are most likely the same model, with only the name being changed, but a clarification would be desirable
- Page 8-11: Footnote references are missing in Table 8-6 on page 8-11
- Page 8-14 – 8-15: Underlying percent emission changes presented in the text on page 8-14 do not agree with corresponding changes in Table 8-10 on page 8-15
- Page 8-16: Instead of acronym LCT, write out Lane Cove Tunnel.

Response

These minor errors in the report are noted.

B Part B Response to stakeholder submissions

B2 NSW Environment Protection Authority (NSW EPA)

This chapter addresses issues raised in the submission from the NSW Environment Protection Authority (NSW EPA). The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B2.1 Water

B2.1.1 Construction phase stormwater management

The EIS does not specify the design storm of sediment basins (indicative of the expected frequency of untreated managed overflows) or assess the potential impact of stormwater discharges.

It is recommended that the proponent:

- specifies the design storm of the proposed sediment basins
- assesses the potential impact of construction phase stormwater discharges on the environmental values of the receiving waterways:
 - with reference to the expected concentration of all potential pollutants of concern and the relevant Australian and New Zealand Guidelines for Fresh and Marine Water Quality guideline values for slightly to moderately disturbed ecosystems
 - including consideration of potential sedimentation impacts.

Response

The sediment basin design will be defined in the Erosion and Sediment Control Plans prepared during detailed design. The design, construction and management of sediment controls, including sediment basins, will be undertaken in accordance with Managing Urban Stormwater – Soils and Construction, Volume 1 (Landcom 2004) and Volume 2D (NSW Department of Environment, Climate Change and Water 2008), commonly referred to as ‘the Blue Book’.

The number, location and size of sediment basins will be confirmed during detailed design. The environmental impact assessment (EIS) for the F6 Extension Stage 1 project (the project) identifies that sediment basins are proposed at the Arncliffe construction ancillary facility (C1), Rockdale construction ancillary facility (C2) and President Avenue construction ancillary facility (C3), as identified on Figure 7-3, Figure 7-4 and Figure 7-5 of the EIS respectively.

Within the President Avenue construction ancillary facility (C3), it is likely that two sediment basins would be provided either side of the Rockdale Bicentennial Park Pond. Rockdale Bicentennial Park Pond and Northern Scarborough Ponds are considered to be moderately sensitive receiving environments. The Blue Book recommends that where receiving waters are sensitive, sediment basins should be sized for an 80th percentile or 85th percentile five day rainfall depth for disturbance periods of less than or greater than six months respectively. Other construction ancillary facilities are likely to be managed by good practice sediment control techniques in accordance with the Blue Book, subject to confirmation during detailed design.

A qualitative assessment of construction water discharges, which included consideration of sediments rather than a quantitative assessment, is reported on in section 5.3 of Appendix L (Surface water technical report) of the EIS. Due to the high variability of water quality and discharge volumes during construction, it is not possible to accurately estimate the quantity of pollutants being discharged from each treatment plant and as such, estimate the impact to receiving water quality from construction surface water releases.

The proposed management measures (refer to **Chapter D1** (Environmental management measures)), including sediment and erosion control in accordance with the Blue Book, treatment of construction wastewater and diversion of construction wastewater to the less sensitive environment of Muddy Creek (where feasible), will minimise pollutant loading of the receiving waterways during construction and avoid pollutant loading (where feasible) to the Scarborough Ponds.

With the implementation of the proposed management measures, which align with standard industry practice, sediment loading to the receiving waterways from construction surface water is considered to be minor and other pollutants such as metals, nutrients and hydrocarbons would be negligible. This is compared to pollutant loading from the wider respective urban catchments and with consideration to the tidal flushing that would also occur within the estuarine environments. It is therefore considered that the project is unlikely to have a material impact on ambient water quality within the receiving

waterways. Therefore the project is likely to have a negligible influence on whether the NSW Water Quality Objectives are protected (if currently met) or achieved (if currently not met) during the construction phase.

B2.1.2 Wastewater discharges – construction phase

As construction phase wastewater discharges would be regulated by an [Environment Protection Licence] EPL, the EPA must consider the matters set out under Section 45 of the *Protection of Environment Operations Act 1997* (the POEO Act), including:

- the pollution caused or likely to be caused by the carrying out of the activity or work concerned and the likely impact of that pollution on the environment;
- the practical measures that could be taken to prevent, control, abate or mitigate that pollution, and to protect the environment from harm as a result of that pollution;
- in relation to an activity or work that causes, is likely to cause or has caused water pollution:
 - the environmental values of water affected by the activity or work;
 - the practical measures that could be taken to restore or maintain those environmental values.

The Water Quality Guidelines 80% species protection guideline values are proposed as discharge criteria for toxicants in construction phase wastewater discharges to the Cooks River and Muddy Creek. The EIS does not assess the impact of these discharges on water quality at the edge of the near field mixing zone or the environmental values of the receiving waterways.

It should be noted that while the proposed works will discharge to highly disturbed waterways the 80% species protection guideline values do not provide appropriate ambient water quality outcomes. The Water Quality Guidelines state that in highly disturbed ecosystems, ecological values can be maintained by applying the default guideline values for slightly disturbed systems (for most toxicants, this is the 95% species protection level). Given the long duration of the construction phase and the potential for cumulative impacts, the guideline values for slightly to moderately disturbed ecosystems provide appropriate ambient water quality targets to support the goal of improvement of the highly disturbed ecosystem rather than maintenance of the disturbed condition.

The EIS proposes adopting the 80th (and 20th for pH) percentile of reference site data as discharge criteria for physical and chemical stressors. The Water Quality Guidelines states that site specific guideline values for physical and chemical stressors should be derived based on the 80th percentile of reference site data (or the 20th percentile of reference site data for stressors that cause problems at low concentrations, such as oxygen) collected over 2 years of monthly sampling. The Water Quality Guidelines define reference condition as 'an environmental quality or condition that is defined from as many similar systems as possible and used as a benchmark for determining the environmental quality or condition to be achieved and/or maintained in a particular system of equivalent type'.

Given that the goal should be to improve ecosystem condition, it is important that appropriate reference sites are used that are representative of slightly to moderately disturbed ecosystem condition. The site-specific values do not appear to have been derived consistent with these requirements as the data are from highly disturbed systems and it is unclear whether values were derived from 2 years of monthly sampling.

The EIS does not consider potential risks of acute toxicity or bioaccumulation associated with construction phase wastewater discharges.

It is unclear whether the proposed discharge criteria include all pollutants of concern potentially present in the wastewater (noting that total petroleum hydrocarbons, volatile organic compounds and chloroform were detected in groundwater along the proposed tunnel route, but no discharge criteria were proposed for these pollutants).

Response

The impact of the discharges within the Cooks River is provided within the box model results in Table 6-8 and Table 6-9 of Appendix L (Surface water technical report) of the EIS. It is acknowledged that modelling to indicate results within close proximity to the outlet have not been defined. The impact on the environmental values is discussed in section 6.3.5 of Appendix L (Surface water technical report) of the EIS.

The proposed discharge criteria was adopted and approved for the adjoining WestConnex New M5 project. Given impacts to ambient waters are considered to be negligible, it is therefore assumed these criteria are appropriate. Given wider catchment loads are by far the greater contributor of pollutants to the Cooks River, providing additional treatment of groundwater which has slightly elevated concentrations would result in a negligible benefit and the additional treatment would result in other environmental impacts (increased energy use, increased use of chemicals, increased loss of open space).

Acute toxicity and bioaccumulation

Given construction discharges to the Cooks River and Muddy Creek would be adequately flushed, acute toxicity impacts are considered to be negligible. Bioaccumulation from project discharges is not considered to be a risk within the Cooks River and Muddy Creek as the loading from the project would be negligible compared to that from the wider catchment. Construction wastewater discharges to Scarborough Ponds will be avoided where feasible and will meet the slightly to moderately disturbed levels, therefore the risk to the environment is considered to be low.

Pollutants of potential concern

All pollutants of potential concern have been identified. Other pollutants detected were screened and not considered to present a risk, considering these were identified in localised zones and would not result in elevated concentrations in groundwater flows within the tunnel, which would be equivalent to average groundwater quality across the entire tunnel length.

B2.1.3 Wastewater discharges – operation phase

During operation, tunnel water will be pumped to a new water treatment plant at Arncliffe, combined with tunnel water from the New M5 and treated prior to discharge to the Cooks River. It is unclear whether these discharges would need to be regulated by an EPL. If the discharges will not be licensed, the operator may not have a defence against a pollution of waters offence, so it is important to ensure that discharges do not contain pollutants at non-trivial levels. If the discharges will be licensed, then the EPA must consider the matters set out in Section 45 matters discussed above in relation to construction phase discharges. Therefore, whether the operation phase wastewater discharges will be licensed or not, an assessment of the potential impact of discharges is required.

For toxicants, the EIS proposes adopting the Water Quality Guidelines 80% species protection guideline values as discharge criteria for the operational water treatment plant. Although the EIS assesses the potential impact of operation phase wastewater discharges on reach-scale water quality, it does not assess the potential impact on water quality in the vicinity of the discharge (ie the mixing zone) or consider the potential risk of bioaccumulation or acute impacts.

The EIS assesses the combined impact of discharges of treated tunnel water from the proposed F6 Extension and the existing New M5 on pollutant concentrations in the Cooks River using a waterway box model to predict concentrations at each box (river reach). With the exception of manganese, the EIS does not compare predicted waterway pollutant concentrations to guideline values or consider whether the predicted water quality would support desired waterway outcomes.

For most pollutants, the 'assumed discharge quality' concentrations reported in Table 6-10 are substantially less than both the proposed discharge criteria and the default guideline values for slightly to moderately disturbed systems. This suggests that these pollutants are unlikely to pose a risk to aquatic ecosystem health (Note that Tables 6-9 and 6-10 of Appendix L (Surface water technical report) of the EIS do not specify units for pollutant concentrations. Therefore, these were assumed to be $\mu\text{S/cm}$ for salinity and mg/L for all other pollutants). However, it is noted that the 'assumed discharge quality' concentrations of arsenic, ammonia and phosphorus are substantially greater than the default guideline values and the combined discharge is predicted to increase the concentrations of some pollutants in the Cooks River (eg Ammonia concentrations are predicted to increase by 2.6% to $280 \mu\text{g/L}$, more than 18 times the default stressor guideline value for estuaries [$15 \mu\text{g/L}$]).

It is unclear whether the assessment considers all pollutants of concern potentially present in the wastewater (noting that total petroleum hydrocarbons, volatile organic compounds and chloroform were detected in groundwater along the proposed tunnel route, but the assessment does not consider these pollutants).

As noted in relation to construction phase discharges, the Water Quality Guidelines default guideline values for slightly to moderately disturbed ecosystems would provide appropriate targets to support the goal of improvement of the Cooks River.

As per construction phase discharges, the EIS proposes deriving discharge criteria for physical and chemical stressors based on 'reference' site data and it is unclear whether this is consistent with the Water Quality Guidelines (See 'Construction phase' section).

It is recommended that the proponent assesses the potential impacts of construction and operation phase wastewater discharges on the environmental values of the receiving waterways. This assessment should:

- Characterise the expected typical and maximum discharge concentrations of all potential pollutants of concern based on the influent quality (with reference to the groundwater assessment), treatment measures and expected treatment performance
- Compare expected discharge concentrations and resulting waterway concentrations at the discharge location to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality guideline values for slightly to moderately disturbed ecosystems
 - For toxicants, this is generally the 95% species protection level with the 99% species protection level recommended to manage potential bioaccumulation or chronic impacts
 - If site-specific physical and chemical stressor guideline values are adopted, then consistent with the Australian and New Zealand Guidelines for Fresh and Marine Water Quality these should be derived based on the 80th percentile of reference-site data (or the 20th percentile for stressors that cause problems at low levels) collected over 24 months of monthly sampling (reference sites should be slightly to moderately disturbed condition to reflect the goal of improving the condition of the receiving waterways)
 - All relevant guideline values should be considered, including interim working levels and physical and chemical stressor guideline values. For example, ammonia concentrations should be compared to the stressor the relevant guideline value (in addition to the toxicant guideline value)
- Demonstrate that discharges will not cause bioaccumulation of pollutants and that maximum discharge concentrations are not at acutely toxic levels.

Response

Assessment of operational discharges

An assessment of the discharges has been undertaken in section 6.3.3 of Appendix L (Surface water technical report) of the EIS and the impact is considered to be negligible. Given the discharge criteria is the same as the approved WestConnex New M5 project and the impact is assessed to be negligible, the discharge concentrations are considered to be acceptable and do not represent pollution. The tunnel water from the New M5 project would not be mixed at the treatment plant. The two projects would therefore only discharge via the same outlet. An EPL was not required for the WestConnex M4 East project or other tunnel water treatment plants in Sydney. As this water is not considered to be contaminated and is representative of typical groundwater quality, Roads and Maritime has assumed that an EPL would not be required.

Assessment of waterway pollutant concentrations

Given the box model indicates the water quality impact is negligible it is inferred that the impact on waterway values stated elsewhere in Appendix L (Surface water technical report) of the EIS would also be negligible. This is discussed in section 6.3.5 of Appendix L (Surface water technical report) of the EIS. Discharging at more stringent criteria would also result in a negligible impact.

Potential impacts to reach-scale water quality during operation

Potential impacts to reach-scale water quality during operation, including impacts in the mixing zone, bioaccumulation and acute toxicity impacts, were not assessed in the EIS. Potential impacts to reach-scale water quality during project operation will be assessed during detailed design.

Discharge quality

It is noted that pollutant concentration units were not provided in Table 6-10 of Appendix L (Surface water technical report) of the EIS. This omission has been recorded in **Chapter A2** (Clarifications). To confirm, the units are the same as for Table 6-9 (provided in the first row). The guideline value for ammonia is 0.91 mg/L (which the results relate to) rather than ammonium and while the potential risk is acknowledged, the 2.6% only relates to a change from 0.27mg/L to 0.28mg/L for ammonia. Given the baseline water quality is already significantly above the 15ug/L criteria and given concentrations are below the toxicity value, impacts are considered to be negligible. Similarly for phosphorus, the impact is 1.6% but concentration to two decimal places would stay the same.

Pollutants of potential concern

All pollutants of potential concern have been identified. Other pollutants detected were screened and not considered to present a risk, considering these were identified in localised zones and would not result in elevated concentrations in groundwater flows within the tunnel, which would be equivalent to average groundwater quality across the entire tunnel length.

Discharge criteria

Refer to **section B2.1.2** for a discussion regarding the justification for the discharge criteria for the project.

Response to recommendations

As described above and in **section B2.1.2**, construction and operational discharges have been qualitatively assessed and will be managed through the implementation of appropriate environmental management measures (refer to **Chapter D1** (Environmental management measures)). Given the high variability of water quality and discharge volumes during construction, it is not possible to accurately estimate the quantity of pollutants being discharged. Given the discharge volumes are negligible compared to tidal inflows in Muddy Creek and Cooks River with the recommended treatments, the discharges are considered to have a negligible benefit.

B2.1.4 Wastewater discharges – guideline values

The following errors and omissions in the guideline values cited in Table 3-3 of the Surface Water Technical Report are noted:

- Chlorophyll a in freshwater
 - The coastal lowland rivers guideline value is 3 µg/L, not 5 µg/L. See footnote d under ANZECC (2000) Table 3.3.2
- Salinity in freshwater
 - The coastal lowland rivers guideline value is 300 µS/cm, not 2,200 µS/cm. See explanatory notes in ANZECC (2000) Table 3.3.3
- pH in freshwater
 - The lowland rivers guideline range is 6.5 to 8.5, not 6.5 to 8.0. See footnote m under ANZECC (2000) Table 3.3.2
- Arsenic III in marine water
 - Table 3-3 adopts the freshwater guideline value. The marine water interim working level is 2.3 µg/L. See the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) - <http://www.waterquality.gov.au/anz-guidelines>
- Arsenic V in marine water
 - Table 3-3 adopts the freshwater guideline value. The marine water interim working level is 4.5 µg/L. See the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) - <http://www.waterquality.gov.au/anz-guidelines>
- Chromium III in freshwater
 - Table 3-3 does not include a guideline value for chromium III in freshwater. The freshwater interim working level is 3.3 µg/L. See the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) - <http://www.waterquality.gov.au/anz-guidelines>

- Iron fresh- and marine water
 - Table 3-3 does not include guideline values for iron. The interim working level is 300 µg/L for both freshwater and marine water. See the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) – <http://www.waterquality.gov.au/anz-guidelines>
- Manganese in marine water
 - Table 3-3 adopts the freshwater guideline value. The marine water interim working level is 80 µg/L. See the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) - <http://www.waterquality.gov.au/anz-guidelines>

Note that these errors and omissions are also reflected in Table 10-17.

Additionally, the EIS applies estuarine and marine guideline values to the freshwater Rockdale Bicentennial Park Pond. The freshwater guideline values should be adopted for Rockdale Bicentennial Park Pond.

Recommendation:

- The proponent should amend the EIS to address these issues.

Response

The errors are noted and have been captured in **Chapter A2** (Clarifications). The errors are considered to be minor and correction of the errors would not change the outcomes of the surface water quality assessment in the EIS.

B2.2 Noise

B2.2.1 Environmental management measures

The EIS has generally adequately considered and assessed construction and operational noise and vibration, including cumulative impacts, the potential for construction (noise) fatigue, and road traffic noise within and outside of the study area.

Further details are required, however, on the how impacts will be managed, consistent with the requirements summarised in Section 8, Appendix G of the EIS. These management measures must be fully developed and implemented as part of the conditions of consent (if approved).

Response

Measures to manage potential noise and vibration are summarised in **Chapter D1** (Environmental management measures). Further detail regarding the management of potential noise and vibration impacts would be developed as part of Construction Noise and Vibration Management Plan (CNVMP) for the project. The plan would:

- Identify relevant performance criteria in relation to noise and vibration
- Identify noise and vibration sensitive receptors and features in the vicinity of the project
- Include standard and additional mitigation measures from the Construction Noise and Vibration Guideline (CNVG) (Roads and Maritime 2016) and details about when each measure would be applied
- Describe the process(es) that would be adopted for carrying out location and activity specific noise and vibration impact assessments to assist with the selection of appropriate noise and vibration mitigation measures
- Consider cumulative impacts from construction noise and construction noise fatigue
- Include protocols that would be adopted to manage works required outside standard construction hours, in accordance with relevant guidelines
- Include a Blast Management Strategy (where blasting is required)
- Detail monitoring that would be carried out to confirm project performance in relation to noise and vibration performance criteria.

The CNVMP would be implemented for the duration of the construction of the project.

B2.2.2 Noise impacts from out of hours works

The construction program is estimated to take up to 4-years. Some work activities are proposed outside of the recommended standard hours (defined in the Interim Construction Noise Guideline (ICNG)) and the EIS does not exclude the possibility of work on weekends and on public holidays. The assessment does not provide sufficient information to identify and justify what construction activities are necessary outside of the recommended standard hours.

The assessment does not offer sufficient supporting details on the proposed activities, the location, and volume of out-of-hours (OOH) works including where there is a risk of sleep disturbance – to allow the community to understand how they will be affected by noise over the duration of the project. This information is essential considering that predicted construction noise levels for some work activities will be 20 dB greater than the relevant noise management level. This will be highly intrusive and clearly audible when such activities take place near sensitive receivers.

To provide greater certainty for the community, the proponent should provide justification and further information. In the absence of justification for OOH works and details assessment of the impacts of those works, construction should be restricted to standard construction hours as per the ICNG.

Response

While Roads and Maritime would seek to limit construction activity to standard construction hours wherever practical, it is inevitable that work on major infrastructure project requires some construction activities to be undertaken outside of these hours.

Activities to be undertaken outside of standard construction hours would include tunnelling and tunnelling support work (including spoil removal), which would need to be undertaken on a 24 hour basis. This is required to limit the overall duration of the project. It should be noted however that certain aspects of construction activities cannot be undertaken during standard construction hours. For example, Transport for NSW's Traffic Management Centre is unlikely to permit roadworks on main roads such as President Avenue during the day, and as such construction would only be able to be undertaken out of standard construction hours. Other work may be required outside standard construction hours for health and safety reasons, or for particular construction requirements. Such works would include:

- Relocation of utilities (where the location is in close proximity to traffic)
- Pavement and median works
- Asphalt works and line-marking
- Use of construction ancillary facilities
- Shared cycle and pedestrian pathway bridgeworks
- Diaphragm wall construction (proposed during the evening period only).

The results of construction noise modelling for out of hours work at each construction ancillary facility and for all surface works is provided in section 11.3.1 of the EIS. Works undertaken outside of standard construction hours have the potential for noise exceedances and the noise assessment also indicates that the sleep disturbance screening criterion is likely to be exceeded at various locations when night-time work is occurring in close proximity to some residential receivers. Given the nature of the construction works, these impacts are unavoidable. The project would aim to minimise such impacts through the application of standard and, if necessary, additional mitigation measures, as outlined in **Chapter D1** (Environmental management measures). It is recognised however that these measures may not ameliorate all noise impacts upon all sensitive receivers for all works.

The noise assessment is required to report the highest likely noise impact for each scenario over a 15 minute period. For most construction activities, it is expected that the actual construction noise level would generally be lower than the worst-case prediction made at the most-exposed receiver. As works progress through the site plant would move further away and receive some shielding from other plant, or neighbouring buildings. The intensity of works would also fluctuate over these periods, reducing the load on the equipment and the number of plant operating simultaneously. Typical noise levels are expected to be 5 dB to 10 dB lower than the noise levels presented in the EIS.

The Construction Noise and Vibration Management Plan (CNVMP) will be developed by the contractor prior to construction and would include protocols which would be adopted to manage works required outside standard construction hours, in accordance with relevant guidelines. Consultation with affected residents for out of hours works would take place with consideration to Practice note vii of the *Environmental Noise Management Manual*¹ and Strategy 2 of the NSW EPA's *Interim Construction Noise Guideline*².

Noisy work (as defined in the EPL) would be scheduled to be undertaken during standard construction hours as far as practicable. Works or activities that cannot be undertaken during standard construction hours would be scheduled as early as possible during the evening and/or night-time periods.

Respite measures would be implemented for noisy work in a manner consistent with EPL, the projects CNVMP, and Roads and Maritime Construction Noise and Vibration Guideline.

B2.2.3 Tunnelling and tunnelling support

Tunnelling and tunnelling support work are proposed to operate 24-hours per day. 'Tunnelling support work' should be defined to ensure that any out-of-hours works associated with tunnelling is appropriate and limited to essential activities necessary to enable tunnelling.

The proponent should investigate alternatives to removing spoil off-site outside of the recommended standard hours. The EPA considers that an assessment of spoil night-time spoil storage (with removal during standard construction hours) should be undertaken.

Response

Tunnelling support work refers to activities required to support the excavation, storage and transport of tunnel spoil and the construction of the tunnel. It does not include construction works for surface infrastructure.

Tunnelling and tunnelling support work (including spoil removal), would be carried out 24 hours a day, seven days a week. This is required to limit the overall duration of the project. The majority of spoil removal and haulage would occur during standard construction hours (ie 7am – 6pm on weekdays and between 8am – 1pm on Saturday). Where practical, spoil would be removed outside of peak periods. However, some night-time spoil haulage may be required and therefore the assessment has considered this accordingly.

B2.2.4 Ancillary construction facilities

Significant and ongoing exceedances of the construction noise management levels are predicted for out of hours works at the Arncliffe construction ancillary facility.

Construction of the permanent power supply will generally be carried out during the daytime where it will be audible to nearby sensitive receivers as work progresses. The EIS states that some work will be necessary outside of the recommended standard hours. Justification is required for out of hours works, and the community should be consulted to identify appropriate times of work, including respite periods.

Given the likely duration of construction at this site [the Arncliffe construction ancillary facility], further work is needed to identify feasible and reasonable noise mitigation. It is noted that the assumed insertion loss for the Arncliffe construction ancillary facility is 10 dB. By comparison, the assumed insertion loss at the Rockdale construction ancillary facility is reported as 20 dB. It is recommended that the Arncliffe construction ancillary facility be acoustically treated, particularly given the duration of works at this location to manage construction noise impacts and construction fatigue on the affected community.

Response

Section B2.2.2 provides a justification for out of hour works for the project and identifies management measures that will be implemented to manage potential noise impacts from out of hours works.

¹ Roads and Maritime Services (2001) *Environmental Noise Management Manual*

² NSW Department of Environment and Climate Change (2009) *Interim Construction Noise Guideline*

The permanent power supply cable would, for the most part, be constructed and installed during standard construction hours, due to the route mainly following non-arterial roads. However, the following small sections of road may require night works to avoid traffic impacts associated with road closures during the day:

- William Street from the Homer Street intersection to Cameron Avenue
- Wollli Creek Road between Forest Road and Wollongong Road
- Princes Highway, between Tabrett Street and Kimpton Street
- Intersection at Bestic Street and Farr Street
- Bay Street between West Botany St and Farr Street.

The insertion losses described in Chapter 11 (Noise and vibration) of the EIS are applicable to the sheds (acoustic and non-acoustic) that would be constructed for the project and not to the overall construction facilities.

A non-acoustic shed would be constructed at the Arncliffe construction ancillary facility (C1) and an acoustic shed would be constructed at the Rockdale construction ancillary facility (C2). The insertion loss for the non-acoustic shed is reduced compared to the acoustic shed which is the reason for the discrepancy at the two locations.

At the Arncliffe construction ancillary facility (C1), the tunnel decline is located separate from the non-acoustic shed and activities within the shed would be generally limited to spoil stockpiling. Following the construction of the non-acoustic shed, noise levels at the site would be compliant with Noise Management Levels (NMLs) during standard hours. The exceedances of NMLs for out of hours works are considered to relate to the movement of spoil haulage vehicles between the decline and the non-acoustic shed, as opposed to stockpiling activities within the shed. Provision of an acoustic shed or other improvements to the insertion loss of the shed at the Arncliffe construction ancillary facility (C1) would therefore result in a negligible reduction in overall noise levels at this facility.

B2.2.5 Blasting

The proponent is proposing blasting as a method to excavate the tunnel bench and suggests this could reduce exposure to noise and vibration and shorten excavation timeframes. It is recommended that information on the benefits of blasting against other construction methods is provided, including the duration of work if blasting is used instead of other construction methods.

Response

The benefits of blasting compared to other tunnel excavation methods are described in section 11.3.4 of the EIS. Blasting methods can significantly reduce the duration of exposure to noise and vibration for residents and businesses above the tunnels. Blasting would also shorten excavation timeframes. Alternatives such as excavating the bench using heavy rockbreakers have been found to result in much greater ground-borne noise and vibration impacts, spread over weeks rather than as an instantaneous event once a day.

Impacts associated with blasting are largely dependent on the blast methodology. The size of the charge, spaces between charge and timing between charges results in a large variability in the vibration generated by a blast. This variability necessitates the engagement of a specialised blast consultant to design blasts to achieve compliance with the applicable vibration criteria.

If blasting is proposed by the appointed construction contractor(s), vibration impact predictions for blasting operations would be undertaken during the detailed design phase when more information is available on the blasting scope and methods. Blasting would be restricted to standard daytime hours only (except where approved by the relevant authority). Blasting specific noise and vibration mitigation methods will be incorporated into the CNVMP.

A Blast Management Strategy, as part of the CNVMP, will be prepared in accordance with relevant guidelines before blasting begins. Blast patterns would be designed and sequenced to minimise impacts of vibration on properties above the tunnels and on existing below ground infrastructure such as utilities. Blasting would only be undertaken at depths of 30 metres or greater underground and only in locations where the geology is deemed suitable (ie not soft ground).

B2.2.6 Construction groundborne noise and vibration

Although significant groundborne noise and vibration impacts are not predicted (except a minor exceedance of 1 dB at one location), groundborne noise and vibration may be perceptible when construction activities and tunnelling is taking place near sensitive receivers.

The assessment indicates that tunnelling would progress at a rate of approximately 7-metres per day, and perceptible at sensitive receivers for approximately 5-days. The community should be notified about the work, including when it will take place, and when it is likely to be perceptible and for how long.

Response

As described in section 9 of Appendix G (Noise and vibration technical report) of the EIS, the tunnel alignment is quite deep through residential areas, ensuring that sensitive receivers are unlikely to be adversely impacted by the tunnelling activity. Ground-borne noise is expected to exceed the relevant criteria at a single location. While compliance with the criteria is expected elsewhere, receivers directly above the tunnel alignment will still be consulted with to ensure they are aware of the works taking place and to inform them that during times of low ambient noise, residents may be able to hear some ground-borne noise associated with the project.

Details about the communication process and information conveyed to residents would be included in the Community Communication Strategy for the project.

B2.2.7 Construction of the permanent power supply

Construction of the permanent power supply will generally be carried out during the daytime where it will be audible to nearby sensitive receivers as work progresses. The EIS states that some work will be necessary outside of the recommended standard hours. Justification is required for out of hours works, and the community should be consulted to identify appropriate times of work, including respite periods.

Response

Refer to responses in **section B2.2.2** and **section B2.2.4**.

B2.2.8 Cumulative construction noise and construction fatigue

Impacts from cumulative projects more broadly, including the New M5 Motorway may result in cumulative construction noise impacts, and ongoing work, resulting in construction fatigue. This must be carefully managed through effective community engagement.

[It is recommended] That the conditions of approval require:

- The proponent to provide further information regarding the volume and justification for OOH works:
 - The proponent should develop and implement a community engagement strategy and provide the community with a clear understanding of the likely impact of construction and how impacts will be managed
 - The proponent should provide details specific to affected areas including the construction activities that will take place, where they will take place, when they will take place, and for how long and what feasible and reasonable mitigation measures will be applied. Community views should be considered when developing feasible and reasonable mitigation
 - Following commencement of construction, the proponent provide the community with a three month rolling schedule of OOH works
- The proponent to consider further noise mitigation measures for the project. These measures, in addition to those identified in the EIS, be implemented.

Response

As described in section 11.3.6 of the EIS, there is the potential for construction noise fatigue for sensitive receptors around the New M5 Motorway Arncliffe Motorway Operations Complex (MOC1). The Arncliffe ventilation facility, currently being built in this location as part of the New M5 Motorway project, would be utilised during the operation of the F6 Extension Stage 1 project. The ventilation facility works for the project would be limited to just fitout within the constructed ventilation building.

There is the potential for some overlap of works between the two projects. However, given the nature of the works and the limited size of the site, cumulative noise intensive work is unlikely. For example spoil haulage from both the New M5 Motorway and the F6 Extension Stage 1 projects would not occur at the same time. Increase in cumulative noise levels as a result of the project would be less than 3 dB above the predicted noise levels in the EIS. A change of less than 3 dB is generally considered indiscernible, so cumulative noise impacts are unlikely to represent a noticeable noise impact to the local community.

Construction noise impacts from the project are not predicted to be significant, however the extended duration of noise impacts from consecutive construction projects may result in construction noise fatigue. There are currently no guidelines available to assess construction noise fatigue, so this impact would primarily be managed through discussions with the affected community and the careful planning of potential mitigation measures such as respite periods.

Justification for out of hours works is provided in **section B2.2.2** and noise and vibration environmental management measures are discussed in **section B2.2.1**.

All residents affected by noise from the construction of the project which are expected to experience an exceedance of the construction NMLs will be notified about the potential noise impacts prior to the commencement of construction works.

The information provided to the residents will include:

- General sequencing and locations of construction work
- The hours of the project works
- Construction noise and vibration impact predictions for the works
- Construction noise and vibration mitigation measures likely to be implemented on site.

Community consultation regarding construction noise and vibration will be detailed in the Community Communication Strategy for the construction of the project, which will include a complaints handling process. The community will be able to provide feedback via a 24 hour, toll-free project information and complaints line, a dedicated email address and postal address for the project.

B2.3 Air quality

B2.3.1 Uncertainty with assessment of odour from landfill excavation

The Air Quality Technical Report has considered the potential impacts of Hydrogen Sulphide (H₂S) from the proposed landfill excavation during construction as a method of assessing potential odour impacts. The method for assessing H₂S impacts is based on dispersion modelling utilising emission rate data for acid sulfate soils collected by the CSIRO (ie not site-specific data). The EPA considers that there is significant uncertainty associated with the quantitative assessment of odour impacts from the proposed landfill excavation. This is due to a number of factors including but not limited to a lack of site specific odour data, uncertainty in the material characterisation and general modelling uncertainty associated with constructing a robust scenario for quantitatively assessing impacts from this activity.

Given the nature of the activity proposed, conducting further detailed quantitative assessment (modelling) is unlikely to remove all uncertainty and definitively characterise potential odour impacts. Noting previous experiences with the excavation of the Alexandria Landfill for other infrastructure projects, there is a risk of odour impacts during construction. This risk should be adequately considered by the proponent consent authority and communicated to potentially affected receptors.

Should the project be approved, the proponent will be responsible for managing and minimising any odour impacts and complying with Section 129 of the *Protection of the Environment Operations Act, 1997*. This will require implementation of robust proactive and reactive odour mitigation measures including the development of contingency measures that can be implemented in the event that nominated routine mitigation measures do not achieve the desired outcome.

Recommendation:

- The proponent and consent authority carefully consider the risk of potential odour emissions and odour impacts during construction. Potentially affected receptors should be adequately consulted on this issue.

Response

Roads and Maritime acknowledges that there is uncertainty in the quantitative odour assessment, predominantly due to the lack of site specific odour data. Given that the source of the likely odour is below the ground and would only be exposed due to excavation and treatment processes during construction, it was not possible to obtain site specific information for the assessment.

Rather than try to quantify the odour, the most appropriate option is to manage the construction process by keeping exposed areas to a minimum and covering odorous areas as quickly as possible. Roads and Maritime will also engage with the local community prior to excavation works, ensuring they are aware of the potential risks of odour impacts expected from time to time. Regular communication to update the community on upcoming works will also be undertaken in accordance with the Community Communication Strategy for the project.

B2.3.2 Assessment of particulate matter impacts during construction

The Air Quality Technical Report assesses particulate matter impacts during construction based on guidance published by the UK Institute of Air Quality Management. The qualitative assessment identifies areas of high risk associated with generalised activities of the construction stage such as demolition and earthworks.

The risk identification process is conducted with no mitigation measures applied. The qualitative assessment has been utilised to develop generalised mitigation measures for implementation, which are tabulated in Chapter 9.

The management and mitigation measures will need to be further developed upon construction contractor engagement. The risks identified with particulate matter impacts should be adequately considered by the proponent consent authority and communicated to potentially affected receptors. It is noted that the development and implementation of a stakeholder communications plan prior to work commencing on site is nominated within Chapter 9. Engagement with potentially affected stakeholders must be conducted on an ongoing basis.

Recommendations:

- The proponent should develop management plans detailing robust best practice, proactive and reactive particulate matter mitigation measures to prevent and minimise particulate matter emissions
- The proponent and consent authority carefully consider the risk of potential dust emissions and dust impacts during construction. Potentially affected receptors should be adequately consulted on this issue.

Response

A Construction Air Quality Management Plan (CAQMP) will be prepared prior to construction commencing. The CAQMP will describe the environmental management measures to be implemented, including both proactive and reactive measures to reduce particulate matter emissions at the source. Proactive measures include actions such as using available weather forecasts to anticipate adverse weather conditions and responding with additional water carts on site, or changing activities on windy days to those that generate less dust. Reactive measures involve actions such as following protocols for receiving and managing complaints and ongoing communication with local residents and business owners. Consultation during construction will be outlined in the project Community Communication Strategy.

B2.3.3 Assessment of impacts at elevated receptors

Assessment of impacts at elevated receptors has only been considered for PM_{2.5} for the 2036-DSC scenario and there is a lack of clarity on the existence of receptors at a height where notable increases in pollutant concentrations are predicted.

The Air Quality Technical Report assesses the potential impacts at additional heights above ground level (heights of 10, 20, 30 and 45 metres). The assessment of impacts at height are conducted for annual average PM_{2.5} and 24-hour average PM_{2.5}, for the 2036-DSC scenario and does not include existing background. The predictions are presented in concentration changes.

The Air Quality Technical Report advises that:

- 'some of the buildings in the general areas around the F6 Arncliffe and Rockdale ventilation outlets were taller than 30 metres'
- 'the available information on building height was approximate (and incomplete)'
- 'there were significant gaps in the building height data for the subset of RWR receptors'.

The Air Quality Technical Report predicts, a noticeable change in concentration for a receptor height of 45 metres for both annual average and 24-hour average PM_{2.5}.

Based on the information provided, it appears that there are no receptors at a height where a noticeable increase in concentration for PM_{2.5} is predicted. However, the Technical Report advises that there are data gaps in building height information. Further, assessment for other pollutants and averaging times has not been conducted.

It is recommended that the proponent:

- Confirm receptor heights located in proximity to ventilation outlets given the significant data gaps on building height described within the Air Quality Technical Report
- Present predicted impacts for all pollutants and averaging periods for receptors located at height in proximity to ventilation outlets. This includes 1-hour average air toxics and for relevant pollutants accounting for background air quality
- Present predicted impacts for all pollutants and averaging periods for receptors located at height in proximity to ventilation outlets, for the regulatory worst-case scenario.

Response

Confirmation of receptor heights

Rockdale ventilation facility

Land in the immediate vicinity of the Rockdale ventilation facility is zoned industrial with a building height limit of 14.5 metres in the Rockdale Local Environmental Plan (LEP) 2011. The low density zoned residential land which surrounds the industrial zoned land has a building height limit of 8.5 metres. At this height there would be minimal influence from the ventilation outlets and the local air quality is influenced by emissions from the surface road which diminishes at heights towards 10 metres.

A high density residential zoned area with a building height provision of 14.5 metres is located around 250 metres to the west of the ventilation facility. Another high density zoned residential area with a building height limit of 31 metres is located around 450 metres to the northwest of the site.

Arncliffe ventilation facility

Land in the immediate vicinity of the Arncliffe ventilation facility is regulated under the Rockdale LEP 2011 and Sydney Regional Environmental Plan No. 33 – Cooks Cove (SREP 33). The areas to the site's immediate north and north east are zoned for low density residential development and have maximum building heights of 8.5 metres. At this height there is minimal influence from the ventilation outlets and the local air quality is influenced by emissions from the surface road which diminishes at heights towards 10 metres.

North of the Arncliffe ventilation facility towards Cahill Park, building heights are significantly higher and range between 17.5 metres and 29.5 metres in the high density residential zoned area and 46 metres in the mixed use zoned areas. This area is located around 260 metres away (at its closest point). The closest elevated receptors to the Arncliffe ventilation facility are in the area bounded by Marsh Street, Innesdale Road and Levey Street, around 240 metres away and the receptors in these buildings are lower than the 46 metres mixed use height restriction in the LEP.

Assessment of impacts for elevated receptors

The reasons for the focus on the PM_{2.5} increment in the 2036 'Do Something Cumulative' (2036-DSC) scenario are given on page 8-32 of Appendix E (Air quality technical report) of the EIS:

'The focus was on the changes in annual average and maximum 24-hour PM_{2.5} concentrations in the 2036-DSC scenario (assumed to be the worst case scenario). Background concentrations were not taken into account, as these could not be quantified at elevated locations. This also precluded the assessment of NO₂, as NO₂ formation was calculated using total NO_x. Only the changes in the PM_{2.5} concentration are therefore presented in the report.'

Assessment of impacts to elevated receptors accounting for the expected traffic scenario 2036-DSC

To inform the response to the NSW EPA's submission, additional assessment has been undertaken to estimate the incremental changes for all relevant pollutants and averaging periods at existing elevated locations accounting for background air quality in the expected traffic scenario 2036-DSC. The assessment is provided in **Appendix B** (Assessment of impacts to elevated receptors) and the results of the assessment are summarised in this section.

As in Appendix E (Air quality technical report) of the EIS, concentration increments (predicted impacts due to the pollutant source alone) were determined by subtracting the modelled concentrations for surface roads and ventilation outlets in the 2036 'Do Minimum' scenario from those in the 2036-DSC scenario. Background concentrations are not measured at elevated locations. They were therefore not known and could not be incorporated. This also meant that nitrogen dioxide (NO₂) concentrations could not be determined accurately.

As only PM_{2.5} concentrations (annual mean and maximum 24-hour) were modelled at elevated locations, the values for other pollutant metrics were determined using a scaling approach. The approach took into account the specific elevated receptors associated with existing tall buildings near the Arncliffe and Rockdale ventilation outlets. Refer to **Appendix B** (Assessment of impacts to elevated receptors) for further detail regarding the methodology for the assessment. The existing residential, workplace and recreational (RWR) elevated receptors assessed are shown in **Figure B2-1** and **Figure B2-2**.



Figure B2-1 RWR receptors for existing tall buildings to the northeast of the Arncliffe ventilation outlet



Figure B2-2 RWR receptors for existing tall buildings at Rockdale Plaza, to the northwest of the Rockdale ventilation outlet

At the existing elevated receptors there was, in many cases, a decrease in pollutant concentrations.

Where there was predicted to be an increase in pollutant concentrations for the existing elevated receptors, the largest values were generally at a height of 30 metres or 45 metres and generally within relevant criteria.

These largest increases in pollutant concentrations are:

- 0.12 mg/m³ for maximum 1-hour carbon monoxide (CO), or 0.4 per cent of the criterion for RWR-11493 at the corner of the Princes Highway and Ashton Street at Rockdale at a height of 30 metres
- 0.08 µg/m³ for annual mean PM_{2.5}, or 0.9 per cent of the criterion at RWR-00392 and RWR-06701 adjacent to Rockdale Plaza at heights of 30 metres and 45 metres respectively
- 0.16 µg/m³ for maximum 24-hour PM_{2.5}, or 0.6 per cent of the criterion at RWR-11535 on Levey Street at Arncliffe at ground level.

The results for annual mean PM_{2.5} indicate that for all existing elevated receptors near the ventilation outlets, the concentration increments at heights of up to 45 metres above ground level are predicted to be well below the criterion for the change in PM_{2.5} for ΔPM_{2.5} of 1.8 µg/m³ that would cause an unacceptable increase in health risk. The background concentration of NO₂, and therefore any change in its concentration, could not be determined accurately at elevated receptors due to complexity of the conversion processes from NO_x. For oxides of nitrogen (NO_x), the largest predicted increments were:

- 1.1 µg/m³ for annual mean NO_x, at RWR 6701 at a height of 45 metres
- 81 µg/m³ for maximum 1-hour NO_x at RWR 6702 at a height of 10 metres.

Assuming a maximum 1-hour background NO_x concentration of 589 µg/m³ (as used for RWR receptors at ground level) at this location and height, and therefore a total 1-hour NO_x concentration of 670 µg/m³, the resulting NO₂/NO_x ratio would be 0.29 and the total NO₂ concentration would be 191 µg/m³. This is still below the criterion of 246 µg/m³. In reality, the background NO_x concentration at a height of 30 metres would probably be somewhat lower than at ground level due to reduced influence of vehicle emissions (refer to **Appendix B** (Assessment of impacts to elevated receptors) for further detail).

With respect to air toxics, the largest predicted (positive) increments occurred at a height of 45 metres, and were as follows:

- Benzene, maximum 1-hour concentration of $0.6 \mu\text{g}/\text{m}^3$, or two per cent of the criterion
- Potential aromatic hydrocarbons (PAHs), maximum 1-hour concentration of $0.08 \mu\text{g}/\text{m}^3$, or two per cent of the criterion
- Formaldehyde, maximum 1-hour concentration of $0.8 \mu\text{g}/\text{m}^3$, or four per cent of the criterion
- 1,3-butadiene, maximum 1-hour concentration of $0.17 \mu\text{g}/\text{m}^3$, or 0.04 per cent of the criterion
- Ethylbenzene, maximum 1-hour concentration of $0.2 \mu\text{g}/\text{m}^3$, or 0.003 per cent of the criterion.

No data was available to enable background 1-hour concentrations of air toxics to be determined.

Assessment of impacts to elevated receptors accounting for regulatory worst case scenario

In Appendix E (Air quality technical report) of the EIS, pollutant concentrations in the regulatory worst case scenario (ventilation outlet contributions only) were modelled for ground level. For this report, additional assessment has been carried out to estimate the outlet contributions at elevated locations. The assessment is provided in **Appendix B** (Assessment of impacts to elevated receptors) and the results of the assessment are summarised in this section.

The assessment focussed on the specific elevated receptors associated with existing elevated receptors near the Rockdale and Arncliffe ventilation outlets and covered all relevant pollutants and averaging periods.

The highest ventilation outlet contributions for the existing elevated receptors were predicted at a height of 45 metres, and at this height the largest predicted outlet contributions occurred at receptor RWR-11534, located to the northeast of the Arncliffe ventilation outlet. These contributions were:

- $0.82 \text{ mg}/\text{m}^3$ for maximum 1-hour CO, or three per cent of the criterion
- $0.74 \mu\text{g}/\text{m}^3$ for annual mean $\text{PM}_{2.5}$, or nine per cent of the criterion
- $6.61 \mu\text{g}/\text{m}^3$ for maximum 24-hour $\text{PM}_{2.5}$, or 13 per cent of the criterion.

The results for annual mean $\text{PM}_{2.5}$ indicate that for all existing tall buildings, the changes in concentration at heights of up to 45 metres above ground level are acceptable (ie below the criterion for $\Delta\text{PM}_{2.5}$ of $1.8 \mu\text{g}/\text{m}^3$).

For NO_2 , the ventilation outlet contribution could not be known accurately. For NO_x the largest predicted outlet contributions at a height of 45 metres were:

- $13.2 \mu\text{g}/\text{m}^3$ for annual mean NO_x , or 20 per cent of the criterion
- $381.6 \mu\text{g}/\text{m}^3$ for maximum 1-hour NO_x , which exceeds the criterion.

However, as noted above, there is considerable uncertainty in the estimated 1-hour NO_x concentration and in reality the increment for maximum 1-hour NO_x is likely to be within the criterion of $246 \mu\text{g}/\text{m}^3$ (refer to **Appendix B** (Assessment of impacts to elevated receptors) for further detail).

With respect to air toxics the largest predicted outlet contributions at a height of 45 metres were as follows:

- Benzene, maximum 1-hour concentration of $3.3 \mu\text{g}/\text{m}^3$, or 11 per cent of the criterion
- PAHs, maximum 1-hour concentration of $0.04 \mu\text{g}/\text{m}^3$, or 10 per cent of the criterion
- Formaldehyde, maximum 1-hour concentration of $4.3 \mu\text{g}/\text{m}^3$, or 22 per cent of the criterion
- 1,3-butadiene, maximum 1-hour concentration of $0.9 \mu\text{g}/\text{m}^3$, or two per cent of the criterion
- Ethylbenzene, maximum 1-hour concentration of $1.09 \mu\text{g}/\text{m}^3$, or 0.01 per cent of the criterion.

No data were available to enable background 1-hour concentrations of air toxics to be determined.

Summary

In summary, negative concentration increments are predicted for many elevated receptors. Where positive concentration increments are predicted, these would be within the relevant criteria. The exception to this is the predicted concentration increment for maximum 1-hour NO_x (at a height of 30 metres), however, there is considerable uncertainty in the estimated 1-hour NO_x concentration and in reality the increment for maximum 1-hour NO_x is likely to be just within the relevant criterion.

B2.3.4 Discrepancy between emission limits and emissions concentrations

Discrepancy between proposed emission limits and emission concentrations derived from information presented in Annexure G for the regulatory worst-case scenario

The Air Quality Technical Report includes a regulatory worst-case scenario where emission estimates are based on proposed limit concentrations for each ventilation outlet. Emission rates are provided in Table G-94 and Table G-95 of Annexure G for the regulatory worst-case scenario.

Based on the discharge parameters and pollutant emission rates presented in Table G-94 and Table G-95, estimated discharge concentrations for the Stage 1 Rockdale and Stage 2 Rockdale ventilation outlets are lower than the proposed limit concentrations.

Recommendation:

- the proponent verify the pollutant emission rates in the regulatory worst-case scenario are consistent with the proposed emission limits.

Response

The ventilation outlet assumptions that were used in the regulatory worst-case assessment are presented in Table G-95 of Appendix E (Air quality technical report) of the EIS. Tables G-93 and G-94 contain assumptions that were used for the assessment of NO₂, and only to confirm that 2036-Do Something Cumulative represented the worst-case scenario. The assumptions in Table G-95 are therefore the most relevant.

It is noted that the tables contain the following transcription errors:

- Table G-93
 - For outlet F, the exit velocity per sub-outlet should be 2.7 m/s (not 6.3 m/s as stated)
- Table G-94
 - For outlet B, the exit velocity per sub-outlet should be 3.6 m/s (not 2.7 m/s as stated)
 - For outlet B, the PM10 emission rate should be 0.231 kg/h (not 0.168 kg/h as stated)
 - For outlet B, the PM2.5 emission rate should be 0.231 kg/h (not 0.168 kg/h as stated)
 - For outlet B, the NOX emission rate should be 4.200 kg/h (not 3.060 kg/h as stated)
 - For outlet B, the CO emission rate should be 8.400 kg/h (not 6.120 kg/h as stated)
 - For outlet B, the VOC/THC emission rate should be 0.840 kg/h (not 0.612 kg/h as stated)
 - For outlet F, the exit velocity per sub-outlet should be 2.9 m/s (not 6.3 m/s as stated)
- Table G-95
 - For outlet E, the exit velocity per sub-outlet should be 4.7 m/s (not 4.8 m/s as stated)
 - For outlet F, the exit velocity per sub-outlet should be 3.7 m/s (not 6.3 m/s as stated)
 - For outlet G, the exit velocity per sub-outlet should be 3.7 m/s (not 6.3 m/s as stated)

The correct assumptions were used in the air quality modelling.

B2.3.5 Assessment of total 1-hour air toxic impacts

Assessment of total 1-hour air toxic impacts not clearly presented for the regulatory worst-case scenario.

The Air Quality Technical Report provides an assessment of air toxics (expected and regulatory worst case scenarios) by comparing the change in the maximum predicted one hour average concentration of each compound to the corresponding impact assessment criterion in the EPAs Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (the Approved Methods). It is also noted that maximum ventilation outlet contributions at any receptor is compared against the impact assessment criterion in the Approved Methods. The predicted total concentration for individual air toxics is not contained within the Air Quality Technical Report.

It is noted that the Human Health Technical Report (Appendix F) presents maximum predicted 1 hour average concentrations (background plus project) for the 2026 and 2036 scenarios. Based on the maximum 1 hour values presented within Appendix F and the maximum outlet contributions for the regulatory worst case assessment (presented in the Air Quality Technical Report) it can be deduced that total concentration for some individual air toxics (eg benzene, 1,3-butadiene, formaldehyde) is likely to be below the impact assessment criterion contained in the Approved Methods (for the regulatory worst case scenario). It is noted that utilising these pieces of information to deduce total concentration is likely to “double count” contributions from some sources for the purposes of informing total concentration from ventilation outlets and surface roads (for the regulatory worst-case scenario).

However, total predicted concentration for some compounds cannot be deduced from the information presented for the regulatory worst-case scenario. For example, the Air Quality Technical Report presents maximum 1 hour ventilation outlet contributions for PAHs and Ethylbenzene, however the Human Health Technical Report does not present 1 hour average concentrations for PAHs and Ethylbenzene. Hence total concentration for all air toxics cannot be deduced for the regulatory worst-case scenario, to enable a comparison against impact assessment criterion contained in the Approved Methods.

Recommendation:

- To provide a transparent review of predicted air toxic concentrations, it is recommended that the proponent provide predicted impact (ventilation outlet and surface road) at receptors for speciated air toxics for both the expected traffic and regulatory worst-case scenarios.

Response

The predicted total concentrations for individual air toxics are not presented in Appendix E (Air quality technical report) of the EIS. This is because 1-hour background concentrations for these compounds were not available.

NSW EPA has noted that Appendix F (Human health technical report) of the EIS presents maximum predicted 1-hour average concentrations (background plus project) for the 2026 and 2036 scenarios. However, the results that are presented do not include background concentrations.

B2.3.6 Analysis of model evaluation

Analysis of model evaluation does not include site specific monitoring data.

Two project-specific stations were established for the F6 Extensions in late 2017. One of the stations (F6:01) was at a background location, and the other at a roadside location. Annexure D of the Air Quality Technical Report advises that given the date of deployment, the time period covered was too short for these to be included directly in the development of background concentrations and for model evaluation. However, the data from the stations has been presented within Annexure D.

During review of other infrastructure projects (ie the new M5), the EPA had recommended that future projects should include up to date analysis of project specific monitoring data, with respect to modelling methodologies (ie conversions of NO_x to NO₂) and model evaluation.

The EPA notes that Annexure H includes a model evaluation, however the model evaluation has not been conducted for the project specific monitoring locations. The EPA considers that the evaluation with project specific monitoring data should be included despite the noted difference in the time periods covered by the site-specific data. Annexure E of the Air Quality Technical Report provides the analysis conducted for the derivation of the empirical formula for NO_x-to NO₂ conversion. TA-Air notes that Figure E-7 includes project specific monitoring data collected for the two project specific stations. However, a comparison of the empirical approach with the site-specific data does not appear to be included. The EPA considers that a comparison of project specific data with the NO₂/NO_x function adopted for the project assessment should be included.

Recommendations:

- the assessment include a model evaluation with the site-specific monitoring data
- project specific monitoring be compared against the NO₂/NO_x function adopted for the project.

Response

Model evaluation with site-specific monitoring data

The performance of the GRAL model was not evaluated for the project-specific monitoring stations because measurements at these stations only commenced in December 2017, whereas the GRAL modelling was undertaken for the 2016 calendar year. When evaluating dispersion models it is vital that the air pollution measurements and the meteorological measurements used in the model are coupled (ie they are for the same time period), and this was not possible in this case. Although an evaluation for the project-specific monitoring stations could in principle be undertaken for the 2018 calendar year, this would require the complete remodelling of traffic, emissions, meteorology and air quality for this year. This would represent a large amount of work for model evaluation at a single site.

A simpler approach using site specific data was therefore adopted, using basic statistics from the model time series for NO_x (in 2016) compared with those from the monitoring data (in 2018). This comparison should only be viewed as indicative of model performance given the decoupling of the meteorology and the pollution measurements, and differences in data availability.

A comprehensive evaluation of the GRAMM-GRAL system was conducted by Manansala et al.³ and a brief summary of this work is provided in section H.1 of Annexure H of Appendix E (Air quality technical report) of the EIS. The study showed that the system is capable of giving good average predictions which reflect the spatial distribution of concentrations near roads with reasonable accuracy. The model chain gives results that are at least as good as those produced by other models that are currently in use in Australia.

The study was also subjected to an external review by Dr David Carslaw of the University of York in the United Kingdom. This review is available on the website of the NSW Chief Scientist and Engineer⁴. The reviewer noted that 'The report (and appendices) represent a thorough and comprehensive assessment of the GRAL/GRAMM models for use in Australia'.

The results from the model evaluation based on the project-specific monitoring data are consistent with the findings of Manansala et al. (2017) in that GRAL tends to overestimate concentrations. However, the degree of overestimation at the F6 Extension Stage 1 project-specific stations is relatively large (eg a factor of 2.7 at the roadside station for annual mean NO_x) compared with the more detailed study. Notwithstanding the considerable uncertainty associated with the comparison for the project-specific stations, this suggests that there is a considerable margin of safety built into the dispersion modelling for the project.

The results for the comparison are provided in **Table B-1**. The data for the 'roadside' station (Tancred Avenue, Kyeemagh) is of more interest here, although it is clear that there is a relatively small road traffic increment above background. It should be noted that the station is approximately 8 metres from the kerb of Tancred Avenue. On the assumption that the NO_x statistics would not vary greatly from year to year, the results suggest that the model probably overestimated concentrations at the roadside site and supports the view that the prediction method would have been conservative.

³Manansala et al. (2017) Optimisation of the application of GRAL in the Australian context

⁴http://www.chiefscientist.nsw.gov.au/data/assets/pdf_file/0008/138158/Comments-on-Optimisation-of-the-application-of-GRAL-in-the-Australian-context.pdf

Table B-1 Comparison between measurements and model outputs for NO_x at the F6 Extension roadside monitoring station (Tancred Avenue, Kyeemagh)

Statistic (NO _x)	Background station (F6:01)		Roadside station (F6:02)	
	Model (2016)	Measurements (2018)	Model (2016)	Measurements (2018)
Data availability (%)	98%	89%	98%	95%
Annual average concentration (µg/m ³)	75.2	41.5	151.3	56.0
Median concentration (µg/m ³)	46.7	21.4	112.1	39.6
98th percentile concentration (µg/m ³)	312.0	213.5	516.1	214.9
Maximum concentration (µg/m ³)	817.3	479.4	1719.8	464.7

Project specific monitoring be compared against the NO₂/NO_x function adopted for the project

At the time of the air quality study for the EIS, data from the two project-specific monitoring stations (one background, one roadside) were only available for the period between December 2017 and June 2018. Data is now available up to December 2018. For the two F6 Extension monitoring stations, **Figure B-3** shows the hourly mean NO_x and NO₂/NO_x data for the full period. It can be seen that all the measurements from the F6 Extension monitoring stations were inside the envelope of the conversion function that was used in the air quality assessment, and this reflects the conservative nature of the NO₂ assessment for the specific area of the project.

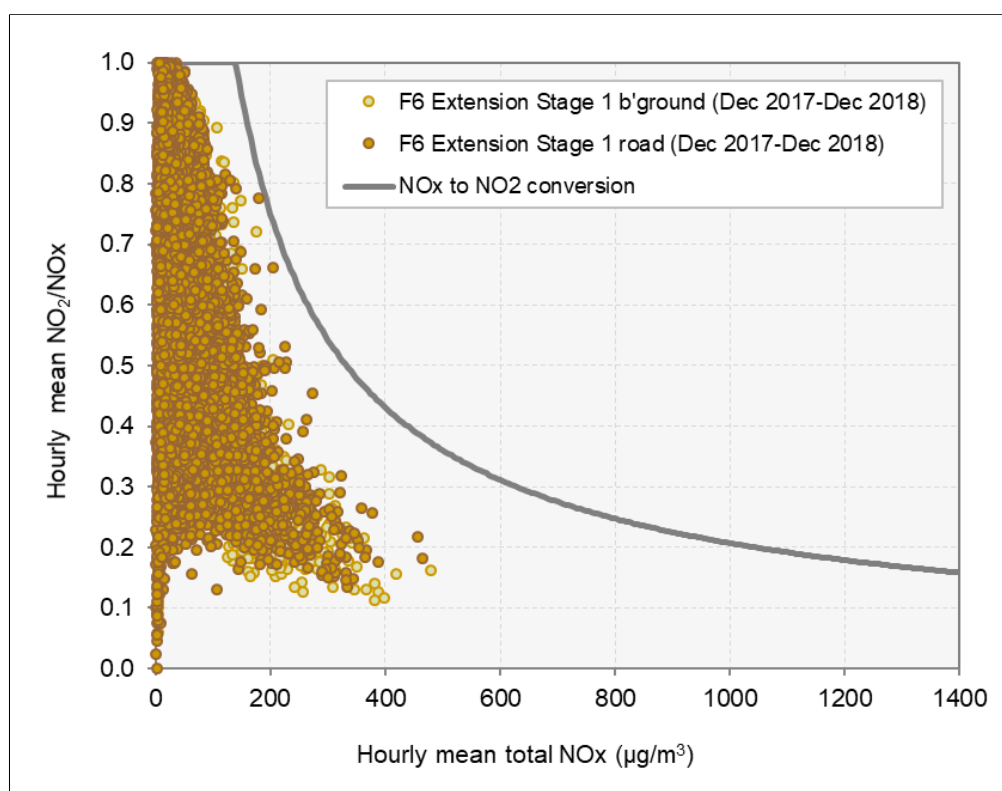


Figure B-3 Hourly mean NO₂/NO_x and NO_x at F6 Extension Stage 1 stations (December 2017 to December 2018)

B2.3.7 Implications of ventilation design changes

The EIS advises that a plume rise assessment would be carried out in accordance with the Civil and Aviation Safety Authority's (CASA) requirements and that approval may be required for the F6 Extension Stage 1 ventilation outlets with regards to the CASA requirements. Based on this information it is unclear if the design of the ventilation system will need modification to accommodate outcomes of any plume rise assessment. The EPA advise that should variations to the ventilation system design be required, then reassessment of air quality impacts would also need to be conducted.

Recommendation:

- Should the project design be modified as a result of the plume rise assessments, then reassessment of air quality impacts will need to be undertaken.

Response

The plume rise assessment for the project has been completed subject to final approval from the Civil Aviation Safety Authority and Department of Infrastructure, Regional Development and Cities. No design changes for the ventilation outlets are required based on the plume rise assessment. A copy of the decision will be provided to the NSW Department of Planning and Environment when received.

B2.4 Contamination

B2.4.1 General

There are no sites within the proposed development footprint which are regulated by the EPA under the *Contaminated Land Management Act 1997* (the CLM Act). There are two sites relatively close to the proposed development, which are on the public list of notified sites to the EPA under Section 60 of the CLM Act:

- Caltex service station, 29 President Avenue Kogarah
- 7 Eleven service station, 736 Princes Highway Kogarah.

The Contamination Technical Report (EIS Appendix J) identifies the above sites as not being above the tunnel alignment, but they are adjacent to the 'project on surface'. Although these sites have been determined by the EPA as not warranting regulation under the CLM Act, there may be potential for disturbance and compromise of underground petroleum storage systems (UPSS) from the development, which could result in petroleum hydrocarbon contaminants being released into the environment.

The Contamination Technical Report (Appendix J of the EIS) has focused on a number of specific areas over the site and identified several other commercial and industrial properties within the vicinity of the development footprint with potentially contaminating activities. These include but are not limited to: the Suez Waste Transfer Station at 5 Lindsay Street Rockdale, 23 Field Regiment of the Royal Australian Artillery at 40 Beach Street Rockdale, and various small industrial and commercial businesses. Historical contaminating activities have been identified above the alignment including but not limited to former dry cleaners, chemical manufacturers, and plastics manufacturers. The depth to groundwater is anticipated to be quite shallow in many locations (refer to Section 4.1.12 of the contamination report). The contamination technical report has also identified an area of historical landfilling in Rockdale Bicentennial Park and lands east of Muddy Creek. Therefore, any excavation works may result in the generation of contaminated soil, groundwater or hazardous gas from these current or former activities.

There has not been sufficient sampling and assessment over identified areas of concern to confirm risks arising from contamination. As such, further detailed assessment is required.

The presence of contamination has been confirmed at the Rockdale Bicentennial Park and Civic Avenue Reserve (in vicinity of proposed Ancillary Facilities), with contamination confirmed in groundwater (nutrients, and volatile total recoverable hydrocarbon contamination reported in Table 4-8 of report), soil (contaminated fill by a range of contaminants including putrescible fill, see Table 4-32) and landfill gas (carbon dioxide and hydrogen sulphide gas results exceeding workplace criteria). It is not clear how deep this material was buried so it is difficult for the EPA to assess if the concentrations have been determined appropriately.

The proponent needs to provide additional information assessing the risks arising from the landfill at Bicentennial Park. From the information presented in the EIS it was not clear where the landfills are located or if there is one or more, but landfills may lie across C2 and C3 areas (the Rockdale construction Ancillary facility and President Avenue Ancillary facilities). It is not clear how potential landfill leachate or gases will be appropriately managed. The EPA agrees with the Contamination Technical Report findings that there will be a need to undertake further investigations in several areas across the development area following detailed design.

Response

Potential contamination from petrol stations

As described in section 5.2.2 of Appendix J (Contamination technical report) of the EIS, there is a potential for shallow tunnelling (such as near portals, adits or cut-and-cover tunnels) to encounter impacted groundwater from sources such as petrol stations, with dissolved and undissolved petroleum hydrocarbon plumes or other industrial sources. The highest risk location for the project, due to the geology and large area of potential contamination sources, is the Rockdale industrial area and Rockdale Bicentennial Park.

The likelihood of encountering plumes of high concentrations of contaminants or non-aqueous phase liquids (NAPL) is low given that they have not been detected in the monitoring wells sampled along the proposed tunnel alignment to date and there are no sites that are regulated by the NSW EPA within the vicinity of the alignment. The extracted groundwater however, is likely to contain concentrations of metals and nutrients above background concentrations and low concentrations of chemical and petroleum hydrocarbon contaminants as detected in groundwater investigations to date. The groundwater would require treatment to meet water quality requirements prior to discharge to the receiving environment (for example Muddy Creek/Cooks River).

The 7 Eleven service station at 736 Princes Highway, Kogarah is being acquired for the project for use as part of the Princes Highway construction ancillary facility (C6).

Further assessment of contamination

The areas identified as medium and high risk within the project footprint will be further investigated in accordance with NSW EPA guidelines during detailed design and investigation sampling plans will be informed by existing data and project design. It is noted that that further investigations would not be required within the Arncliffe ancillary facility (C1), as these have been completed by the New M5 Motorway project.

All contamination investigations will be undertaken by a suitably qualified and experienced person in accordance with guidelines made or approved under the CLM Act. Subject to the outcomes of the investigations, Remediation Action Plan (RAPs) may be required and implemented in the event that site remediation is warranted prior to construction. An independent NSW EPA Accredited Site Auditor will be engaged to review contamination reports and evaluate the suitability of sites where remediation is potentially required for a specified use as part of the project.

Potential contamination from former landfill

Section 4 of Appendix J (Contamination technical report) of the EIS identifies that Rockdale Bicentennial Park was used as a former landfill in the 1970s by Rockdale Municipal Council prior to redevelopment as a park in the 1980s.

Based on the intrusive investigation data, historical aerial imagery and maps reviewed, uncontrolled filling also occurred in areas around Rockdale Bicentennial Park within the Rockdale construction ancillary facility (C2) and President Avenue construction ancillary facility (C3). However, this is not clearly defined due to the nature of the filling that occurred, limited intrusive investigations and available council records.

Further detailed site investigations will be undertaken during detailed design to identify the extent of landfilling within the project footprint. RAPs for the Rockdale construction ancillary facility (C2) and President Avenue construction ancillary facility (C3) will be prepared during the detailed design phase. These would include the RAPs and ongoing short and long-term monitoring requirements.

B2.4.2 Methodology used to determine risks associated with areas of contamination

The methodology for the assessment is typical of a large-scale contamination assessment report. The report prepared a preliminary conceptual site model in which several medium to high risk areas of concern were identified. The EPA considers that all these areas will need further detailed assessment to ensure sufficient sampling density has been used to adequately characterise and manage the contamination.

Response

The areas identified as medium and high risk within the project footprint will be further investigated during detailed design and investigation sampling plans will be informed by existing data and project design. It is noted that further investigations would not be required within the Arncliffe ancillary facility (C1), as these have been completed by the New M5 Motorway project.

Further sampling for waste classification with a higher sampling density will be undertaken during detailed design to adequately classify the fill and soil in proposed excavation areas in accordance with the NSW EPA *Waste Classification Guidelines*.

B2.4.3 Groundwater and surface water technical reports

The methodology undertaken for the groundwater and surface water technical reports is acceptable to provide a general large-scale assessment of risks arising from potential contamination. However, there is a need for ongoing monitoring of surface waters and groundwaters before, during and after the construction to assess for a range of contaminants of concern.

Response

A program to monitor potential surface water quality impacts of the project will be developed and included in a Construction Soil and Water Management Plan (CSWMP) (refer to **Chapter D1** (Environmental management measures)).

The program will include the water quality monitoring parameters (including pH, turbidity, dissolved oxygen, nitrogen and metals) and the monitoring locations (including Muddy Creek, Rockdale Bicentennial Park, North Scarborough Ponds and Cooks River) identified in Annexure G of Appendix L (Surface water technical report) of the EIS.

Prior to construction, a groundwater monitoring program will be prepared and implemented to monitor groundwater levels, construction and operational groundwater inflows in the tunnels, and groundwater quality in the three main aquifers impacted by construction works.

The program will identify groundwater monitoring locations, performance criteria in relation to groundwater inflow and levels, and potential remedial actions that will be considered to address potential impacts. As a minimum, the program will include monthly manual groundwater level and quality monitoring and weekly monitoring of inflow volumes and quality.

The data collected will be used as a baseline to monitor impacts on surface and groundwater levels and groundwater quality during construction.

B2.4.4 Adequacy of mitigation measures

High level mitigation measures have been presented under the EIS to address potential contamination. These are presented in the technical reports for contamination, groundwater and surface waters. The EPA considers that further assessments need to be undertaken to better characterise the extent and risk surrounding potential contamination, and plans developed to mitigate those risks.

The contamination assessment information presented in the EIS is not detailed enough to clearly identify the depths and general extent of all likely contamination relative to the proposed development, so any mitigation measures proposed so far need to be refined on the basis of further contamination investigations. Such detailed investigations should be conducted to fully characterise areas of the site with medium to high risk which will be subject to the redevelopment. The investigation should include further and detailed assessment of soil, groundwater, soil vapour, hazardous ground gas, and acid sulfate soils where applicable, for contaminants of concern.

If additional contamination is found during the detailed site assessment, a NSW EPA accredited site auditor should be engaged to review the adequacy of any future contamination assessments and management plans and also evaluate site suitability for proposed use.

The proponent should also clarify if the landfill will be intersected or not and include provide plans for reinstatement of any capping or protective barriers to ensure containment of the landfills

Response

The areas identified as medium and high risk within the project footprint will be further investigated during detailed design and investigation sampling plans will be informed by existing data and project design. It is noted that that further investigations would not be required within the Arncliffe ancillary facility (C1), as these have been completed by the New M5 Motorway project. The outcome of further contamination investigations during detailed design will be used to inform the preparation of relevant management plans for the management of potential contamination impacts.

All contamination investigations will be undertaken by a suitably qualified and experienced person in accordance with guidelines made or approved under the CLM Act. Subject to the outcomes of the investigations, RAPs may be required and implemented in the event that site remediation is warranted prior to construction. An independent NSW EPA Accredited Site Auditor will be engaged to review contamination reports and evaluate the suitability of sites where remediation is required for a specified use as part of the project. Parts of the permanent project footprint which are assessed as containing soil or groundwater contamination that poses an unacceptable risk to human or ecological receptors, will be remediated following further investigations. The need for remediation will be undertaken by considering the risks of undertaking the works. If the risks posed to the environment and human health is greater than the contamination remaining in situ, then the need for active remediation will be reconsidered and alternative management options such as capping or implementation of long-term environmental management plans investigated. The RAPs will include the assessment of sustainable remediation options and consideration of the *Waste Avoidance and Resource Recovery Act 2001* (NSW). Refer to section 8.1.1 of Appendix J (Contamination technical report) of the EIS for further information.

The project would intersect Rockdale Bicentennial Park and therefore would intersect potential landfill. Refer to **section B2.4.1** for further information regarding potential contamination from former landfill areas. The RAP that would be developed based on the findings of investigations during detailed design would specify landfill gas and leachate control measures, including capping in accordance with current NSW EPA guidelines.

B2.4.5 Further assessment of contamination risks

Further investigation is warranted to quantify risks associated with exposure to contamination (fill material, landfill leachate, landfill gas, and other potential contamination) during construction and operation of the project.

If the project is approved, the consent should require the development of Construction Environment Management Plans and Remedial Action Plans to manage short term risks as well as Operational Environment Management Plans to manage long term risks associated with exposures to potential contamination which cannot be fully remediated. The requirements should include long term operational EMPs for management of groundwater (and subsequent contamination), and possibly landfill leachate and hazardous ground gas.

Response

As described in section 9.2 of Appendix J (Contamination technical report) of the EIS, following completion of project construction, ancillary facilities will be remediated in accordance with RAPs, where required, based on the findings of investigations and the intended land use or rehabilitation requirements. Prior to the operational phase of the project, a NSW EPA Accredited Site Auditor will be engaged to review all contamination reports and evaluate the suitability of sites for a specified use as part of the project.

A CEMP will also be prepared for the project. The CEMP would include management measures for areas within the project footprint identified as being potentially contaminated as well as areas within the project footprint that have been assessed as low risk that do not require further assessment or remediation but would be managed through the implementation of the CEMP.

The CEMP would include CSWMP sub-plans to manage potentially contaminated soil and water for each construction ancillary facility. Sub-plans for the President Avenue construction ancillary facility (C3) will have specific mitigation measures for leachate and landfill gas management for works within Rockdale Bicentennial Park, based on the findings of additional investigations planned to be undertaken during the detailed design phase.

B2.4.6 Cumulative impacts from WestConnex

There is the potential for contamination to be released into the environment as a consequence of the development, if the in-situ potential contamination is not controlled appropriately. Several areas of environmental concern have been identified in proximity to the Project. There are both short term and long-term consequences associated with potential exposures of contaminants to the community and environment.

- Exposures of site workers to hazardous concentrations of landfill gases and contaminated leachate
- Exposures of site workers and surrounding community to contaminated seepage waters from the tunnelling works
- Exposure to contaminants resulting in potential damage to existing subsurface infrastructure, degradation of groundwater resources and land quality, reduction in ecological communities and diversity in the surrounding surface water receiving environments.

Response

A range of environmental management measures will be implemented to manage potential impacts to site workers, the community and the built and natural environment. The environmental management measures for the project are summarised in **Chapter D1** (Environmental management measures) and discussed in the sections above.

As described in section 8.3 of Appendix J (Contamination technical report) of the EIS, a qualitative assessment of cumulative impacts associated with other projects in the vicinity of project, in particular other WestConnex projects (such as the New M5 Motorway project) has been carried out. The projects could result in the identification of pre-existing contamination which may require management or remediation. The projects currently under construction all incorporate construction and operation contamination management and mitigation measures to prevent adverse impacts on human health and the environment. Other committed projects that are still in the planning stages would be required to incorporate similar mitigation measures in accordance with legislative requirements to prevent adverse impacts.

Therefore, with due consideration of the proposed management measures to be implemented as part of the project, there are likely to be minimal adverse cumulative contamination impacts associated with the construction and operation of these projects.

B2.4.7 Further recommendations

1. The proponent should ensure the proposed development does not:
 - result in a change of risk in relation to any pre-existing contamination on the site so as to result in significant contamination
 - result in release of pollution on the site.
2. The proponent conduct further detailed site assessments across the footprint of the site, focusing on areas of environmental concern which have been identified with medium to high risk, and areas which have not been able to be accessed previously for site assessment. The detailed site assessments must include further assessment and sampling of soil, groundwater, soil vapour and landfill gas where applicable.
3. The proponent must develop Remedial Action Plans to address any contamination on the site which may pose unacceptable risks to human health and environment.
4. Further assessment and management of potential contamination is required in areas where the proposal will intersect former landfills, including the buried waste at Rockdale (to determine how deep this material is buried and whether the concentrations of contaminants have been determined accurately) and Bicentennial Park. The EIS contamination report included a summary of a previous landfill gas assessment, however this is insufficient as it is based on single reading

from three wells and it is not known where the wells were situated or if sampling was representative.

The EPA makes the following specific recommendations for further assessment and planning around landfills:

- a) Monitor surface waters and groundwaters during construction and operational phases of the development for contaminants of concern associated with landfills (including but not limited to per and polyfluoroalkyl compounds) and hazardous ground gases.
 - b) In accordance with recent amendments to the Protection of the Environment Operations (Waste) Regulation 2014 (Waste Regulation), EPA approval is required prior to the exhumation of waste from any current or former landfill (see Waste section below).
 - c) The proponent must conduct further assessments in all potential landfill areas, to assess and monitor risks to construction workers and future site users from landfill leachate and landfill gas and assess the extent of those risks.
 - d) If a landfill mass will be excavated into under the development, the proponent must undertake measures to reinstate any capping or protective material.
 - e) The proponent must prepare and follow a landfill gas management program for the management of landfill gas and leachate during any construction and operational phases of the development on the site.
 - f) The proponent must adopt reporting triggers including reporting to the relevant authority in the event that unacceptable levels are reached on the site. Remedial Action Plans where applicable must be developed for any landfill sites requiring works to ensure compliance with Environmental Guidelines: Solid Waste Landfills (NSW EPA, 2016) and requirements of the Protection of the Environment Operations Act (1997), and to ensure mitigation strategies during the construction and post construction phases. There needs to be contingency actions listed in the event that landfill gas is reported above safe thresholds, to ensure protection of remediation workers.
 - g) Post-construction, the proponent should issue a Validation and Verification Report with endorsement from a NSW accredited contaminated site auditor who has significant experience with landfill gas and landfill leachate management, outlining the gas protection measures adopted at the site and vicinity of the site, and an independent report validating the performance of these systems and verifying their adequacy.
 - h) The proponent should prepare Long Term Environment Management Plans (LTEMPs) for the landfills where ongoing management will be required, or revise any existing LTEMPs once remedial actions have been completed, and following amendments to any monitoring strategy. The plans must prescribe procedures for the maintenance of any landfill gas and leachate mitigation systems, procedures for the periodic monitoring of landfill gas on the site, and contingency plans for unexpected finds and for unacceptable risks that are detected or encountered.
5. The proponent should prepare and follow a Construction Environment Management Plan and Operational Environment Management Plan to manage potentially contaminated groundwater arising from dewatering and excavated material which may be generated during construction and operational phases of the development. The CEMP and OEMP should include a comprehensive and representative program for monitoring and reporting of groundwater and surface waters across the development to confirm if there is any migration of contamination and subsequent degradation of water quality as a consequence of the development and provide protocols in the event that rising contamination is found. The groundwater monitoring program should assess contaminants of concern as informed by further detailed contamination site assessments, targeting in both the alluvial and sandstone aquifers, and any paleochannels as relevant.
 6. The proponent should prepare a Hazardous Materials Protocol to include procedures and mitigating measures to be followed in the event that hazardous building products including asbestos, and hazardous chemicals, are found.
 7. The proponent should prepare a detailed Acid Sulfate Soil Management Plan for the management of excavated material in accordance with the NSW ASSMAC (1998) Acid Sulfate Soil Manual. The proponent must pay proper regard to the EPA Waste Classification Guidelines (2014) for all acid sulfate soils that need to be transported and treated offsite. There is potential for acid sulfate

soils to be present in the development which could present a risk to the site by acidification and mobilisation of any contamination present.

8. The proponent should prepare an Unexpected Finds Protocol. The protocol should include procedures and mitigating measures to be followed in the event unexpected contamination is encountered during the development (which potentially could include asbestos containing materials), prior to commencing any work on the development site. The proponent should ensure that the procedure includes details of who will be responsible for implementing the unexpected finds procedure and the roles and responsibilities of all parties involved.
9. The proponent must assess and manage contamination at the site with proper regard to guidelines made or endorsed by the NSW EPA under the Contaminated Land Management Act 1997 including but not limited to:
 - Sampling Design Guidelines (NSW EPA, 1995)
www.epa.nsw.gov.au/resources/clm/95059sampgdline.pdf
 - Guidelines for the NSW Site Auditor Scheme (3rd edition) (NSW EPA, 2017)
<https://www.epa.nsw.gov.au/publications/contaminatedland/17p0269-guidelines-for-the-nsw-site-auditor-scheme-third-edition>
 - Guidelines for Consultants Reporting on Contaminated Sites (NSW OEH 2011)
www.epa.nsw.gov.au/resources/clm/20110650consultantsglines.pdf
 - Guidelines for the Assessment and Management of Groundwater Contamination (NSW DEC 2007)
 - The National Environment Protection (Assessment of Contamination) Measure 1999 (as amended 2013, NEPC 2013)
 - Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG 2018)
 - Australian and New Zealand Guidelines for Fresh and Marine Water Quality - Water Quality for primary industries (ANZECC 2000).
10. The proponent must ensure that any contamination identified as meeting the trigger in the EPA 'Guidelines for the Duty to Report Contamination' is notified (or re-notified) in accordance with requirements of section 60 of the Contaminated Land Management Act'.
11. The processes outlined in State Environmental Planning Policy 55 - Remediation of Land (SEPP55) be followed, to assess the suitability of the land and any remediation required in relation to the proposed use.

Response

The recommendations are noted and are considered to be generally consistent with the commitments made in the EIS, including the environmental management measures to manage potential contamination impacts which are summarised in **Chapter D1** (Environmental management measures) and discussed in the sections above.

Management and remediation of potential landfill contamination

As described in **section B2.4.1**, further detailed investigation and assessment will be undertaken in order to develop plans for leachate and landfill gas management.

The three dual groundwater/landfill gas monitoring wells (TP1308, TP1309 and TP1310) were installed within the central area of the project where the greatest depth of landfill was encountered and where bulk earthworks for the tunnel decline is proposed. The locations of these wells are shown on Figure 4-9 and 4-10 of the Appendix J (Contamination technical report) of the EIS.

Sites requiring remediation will have a RAP developed prior to the commencement of construction. The RAP will be prepared by a suitably qualified and experienced contaminated lands specialist and independently audited by a NSW EPA Accredited Site Auditor.

Remediation and validation activities will be completed by a contaminated lands specialist, independent to the construction contractor. A validation report will be prepared by the specialist and reviewed by the appointed independent NSW EPA Accredited Site Auditor.

The need for remediation will be undertaken by considering the risks of undertaking the works. If the risks posed to the environment and human health is greater than the contamination remaining in situ,

then the need for active remediation will be reconsidered and alternative management options such as capping or implementation of long-term environmental management plans investigated. The RAPs will include the assessment of sustainable remediation options and consideration of the WARR Act.

Measures that will be implemented to monitor surface and groundwater quality are described in **section B2.4.3**.

B2.5 Waste

The types and quantities of waste have been estimated by the proponent and include waste types such as tunnel spoil, asbestos, VENM, ASS, some hazardous waste etc. All waste generated from the entire Project is to be recorded, classified and disposed to a facility that can lawfully accept that waste.

The EIS identified notes that approximately 1M tonnes of tunnel spoil will be generated from the Project and some taken offsite for reuse or disposal. Any tunnel spoil generated from the Project will require a resource recovery order and/or exemption in order to be reused and will need to be applied for and granted prior to its generation – note the tunnel spoil will not necessarily be classified as VENM. The EPA recommends that the EIS provides more detailed information on how spoil from the project will be holistically managed to ensure adequate oversight of spoil haulage and disposal by any future construction contractors should the project be approved.

The EPA notes that the assessment contains information regarding the generation and disposal of hazardous waste however it appears there is no reference to those wastes being immobilised prior to disposal. The proponent should contact the EPA (HIEH Hazardous Waste Section) for immobilisation approvals and/or information about transport and disposal of hazardous waste to ensure it is conducted in a manner that does not impact on human health and the environment.

Table 21.3.1 of the Waste Management report mentions that hazardous waste would be sent for the 'recovery of energy where possible'. The EPA is unaware of any energy from waste facilities that accept hazardous waste for energy recovery and this is not permitted by the EPA's energy from waste policy.

The EPA considers that there may be impacts associated with previously landfilled waste at Rockdale Bicentennial Park/Scarborough Park area. Impacts that may occur from exhuming previously landfilled waste include air quality impacts, odour, exposure of leachate and gas, and uncovering of unclassified/unknown wastes. As outlined above, recent changes to the Protection of the Environment Operations (Waste) Regulation 2014 require EPA approval prior to the exhumation of waste from any current or former landfill. For the EPA to grant this approval, The EIS should detail how construction activities will be managed to prevent or minimise those impacts. Details regarding the nature and extent of the capped old landfill/s, proposed impacts on the capping and how the Applicant proponent will either restore the cap after works or manage environmental impacts from those works is also required.

Response

Waste management

All waste generated by the construction of the project, including spoil, would be classified in accordance with the NSW EPA *Waste Classification Guidelines*. Depending on the extent of contamination, spoil would be considered for reuse within the project footprint. Where reuse on site is not possible, spoil would be either be re-used under an appropriate resource recovery exemption or disposed of lawfully at an appropriately licensed facility. Where required, waste would be transported by a licensed contractor in accordance with relevant waste transport guidelines to manage potential impacts to human health and the environment.

A Construction Waste Management Plan (CWMP) will be prepared for the project prior to construction and will detail appropriate waste management procedures.

The CWMP will:

- Document expected waste types and volumes for the project
- Describe procedures for managing office and project waste materials including separation, treatment and disposal in accordance with relevant guidelines
- Detail waste reporting requirements including the implementation of a waste register

- Detail the process for identifying waste re-use sites including approval requirements.

The NSW EPA's comment regarding energy from waste facilities is noted.

Landfill waste at Rockdale Bicentennial Park

Refer to the responses in **section B2.4.7** for information regarding potential impacts associated with the former landfill.

B Part B Response to stakeholder submissions

B13 NSW Health

This chapter addresses issues raised in the submission from NSW Health. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion)/

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B13.1 Operation of the F6 Extension Stage 1

B13.1.1 Ambient air quality impacts

The primary source of community exposure to air pollution is from pre-existing regional air pollution, followed by pollution from surface road traffic. The project is expected to change the volume of traffic on surface road networks. Traffic volume will increase in some locations and reduce in others. These changes are associated with a redistribution of ground level air quality impacts.

Appendix E (Air quality technical report) and Appendix F (Human health risk technical report) indicates that the project design has been iteratively developed to minimise potential air quality and health impacts. Based on the current design, the EIS predicts that annual average PM_{2.5} within the study area may exceed relevant ambient air quality guideline values at all receptor locations, primarily as a result of background air pollution. Meeting long term air quality goals in the project area will require significant reductions in fine particle emissions across Sydney. For these reasons, it is important that all reasonable measures are taken to minimise exposure to traffic related air pollution.

Response

The comments are noted.

B13.1.2 Elevated receptors

Appendix E (Air quality technical report) of the EIS provides an assessment of air quality impacts at 10, 20, 30 and 45 metres above ground level. This assessment is based on the predicted changes in annual average and maximum 24-hour concentration of PM_{2.5} as a result of the project. At each increasing elevation the predicted influence of surface road traffic was clearly reduced, compared with at ground level.

At a height of 30 metres, the impact of surface level traffic was negligible. The contribution of tunnel ventilation outlets became more noticeable, although the largest changes in PM_{2.5} were still lower than at ground level.

At a height of 45 metres, the maximum annual average PM_{2.5} (1.58 pg/m³) and maximum 24-hour PM_{2.5} (15 pg/m³) at any receptor location was markedly higher than at ground level. The increase in PM_{2.5} at elevations of 45 meters are greater than those predicted at ground level resulting from surface road traffic.

The EIS classifies the air quality and health impacts to elevated receptors as being acceptable. This is because none of the receptor locations with the maximum increases in PM_{2.5} are known to have existing buildings with a height of more than 20 metres. The EIS classifies the impacts to theoretical receptors at 45 metres as being unacceptable. It is recommended that the Department of Planning take this information into account in regards to future planning developments.

Response

The comments are noted.

B13.1.3 Filtration of in-tunnel air

The EIS provides a rationale for the exclusion of in-tunnel filtration systems in the project design. Chapter 9 (Air Quality) describes that inclusion of a filtration system is expected to have a negligible impact on air quality. The project's proposed ventilation system is expected to ensure compliance with air quality criteria both in-tunnel and at ventilation outlets.

Response

The comment is noted.

B13.1.4 In-tunnel air quality

The EIS describes that modelled in-tunnel air quality meets operational criteria. It is therefore considered unlikely to result in pollutant exposures known to be associated with health effects provided commuters have motor vehicle windows closed and ventilation on recirculate.

The predicted in-tunnel air quality would appear to be consistent with the *In-tunnel air quality (nitrogen dioxide) policy*. However, as noted in Chapter 10 (Health safety and hazards), *the NO₂ guideline may*

not be protective of all health effects for all individuals. There is potential for severe asthmatic individuals, especially if they use motorbikes, to experience some change in respiratory response after using the tunnels, particularly when congested.

NSW Health notes that signage has been used to mitigate risk for tunnel users for similar developments and recommends the development of appropriate and targeted communication strategies for this project.

Response

Message signs related to traffic, location, directions, warnings and variable conditions would be incorporated within the tunnels and on surface roads at tunnel approaches. Further, variable message signs would be mounted on gantries along those roads which approach the tunnels and would be used to advise motorists of traffic conditions.

Variable message signs have the capability of displaying information to motorists with regards to in-tunnel air quality conditions and recommendations to reduce health impacts.

B13.1.5 Noise

Noise levels associated with operation of the project are expected to exceed management levels at some receptor locations. The EIS has identified locations where surface road traffic noise is expected to exceed the relevant criteria for residential land uses. A total of 107 receptor locations, including residential properties and schools may require noise mitigation measures.

NSW Health notes that next steps in the development assessment process includes the development of an Operational Noise and Vibration Review (ONVR) for the mitigation of noise impacts. The ONVR will be reviewed by NSW Health and the appropriate regulatory authorities.

Response

The comment is noted.

B13.2 Construction of the F6 Extension Stage 1

B13.2.1 Ambient air quality impacts

The EIS identifies that air quality impacts associated with dust and soil from construction are expected to occur at a number of receptor locations, including *high-sensitivity receptors* such as residences, cafes and schools.

Chapter 10 (Health, safety and hazards) describes these impacts as *temporary and relatively short-lived*. However, consideration should be given to quantifying the likely duration of exposures to inform risk characterisation.

NSW Health notes that next steps in the development assessment process includes development of a Construction Air Quality Management Plan (CAQMP) to address air quality impacts associated with construction. The CAQMP will be reviewed by NSW Health and the appropriate regulatory authorities.

Response

The comments are noted.

The risk of dust impacts from a demolition/construction site causing health impacts has been calculated based on the following:

- The nature and duration of the activities being undertaken
- The size of the site
- The meteorological conditions (wind speed, direction and rainfall). Adverse impacts are more likely to occur downwind of the site and during drier periods
- The proximity of receptors to activities
- The sensitivity of the receptors to dust
- The adequacy of the mitigation measures applied to reduce or eliminate dust.

It is difficult to reliably quantify dust emissions from construction activities, due to the variability of the weather at times when specific construction activities are undertaken. The CAQMP will include measures to minimise potential impacts to health resulting from air quality issues generated from construction activities.

B13.2.2 Noise

Noise levels associated with construction of the project are expected to exceed management levels at a number of receptor locations. Five receptor locations have been specifically identified in the EIS as *highly affected* (noise exceeding 75 dB(A)) from both standard and out-of-hours construction noise. These include receptors at the Rockdale, President Avenue and Princes Highway construction ancillary facilities, the cut-and-cover works at West Botany Street and the President Avenue surface works. The worst-case noise levels are sufficiently high that health impacts may occur.

NSW Health notes that next steps in the development assessment process includes the development of a Construction Noise and Vibration Management Plan (CNVMP) for the mitigation of construction noise impacts. The CNVMP will be reviewed by NSW Health and the appropriate regulatory authorities.

NSW Health recommends that the CNVMP include tailored interventions for the most vulnerable receptors, for example Cairnsfoot School children. All reasonable measures should be taken to limit community exposure to construction noise associated with construction.

Response

The comments are noted.

Roads and Maritime will consult with vulnerable members of the community who are likely to be more susceptible to adverse health effects from noise (especially those who are elderly, who do not speak English, are housebound, or who may be unwell) to accommodate their preferences for noise mitigation, as far as practicable.

Consultation will also be undertaken with all schools likely to be affected, and in particular Cairnsfoot Special School, to determine suitable mitigation measures, where necessary (refer to environmental management measure NV3 in **Chapter D1** (Environmental management measures)). Consultation with schools, including Cairnsfoot Special School, will allow for tailored interventions against noise impacts as required.

B13.2.3 Odour

The EIS provides some discussion about the potential odours from disturbance of acid sulphate soils and historic landfills in the region. Exposure to high levels of hydrogen sulphide may cause people with pre-existing respiratory conditions to experience worsening of their symptoms. NSW Health's past experience is that hydrogen sulphide odours generate significant public health and wellbeing complaints.

NSW Health notes that next steps in the development assessment process includes the development of a Construction Air Quality Management Plan (CAQMP) for the mitigation of odour and air quality impacts. The CNVMP will be reviewed by NSW Health and the appropriate regulatory authorities.

Response

The comments are noted.

B13.2.4 Other impacts

Chapter 17 (Groundwater and geology) and Appendix J (Contamination technical report) of the EIS have identified a high volume of residential bores in the area (including approximately 370 registered bores and potentially additional unregistered bores). The EIS notes that potential water quality impacts from the construction phase of the project will be managed via the appropriate management plans and site specific procedures. Although not used for drinking purposes, it is recommended that there be clear communication with the local communities about the risk and consequences of any bore water contamination.

Response

In accordance with environmental management measure GW10 (refer to **Chapter D1** (Environmental management measures)), potential risks of the project contaminating bore water during construction will be identified. Affected bore users will be notified that the bore water is not suitable for use and the corrective actions being taken by the project. Bore users will be notified again once the bore water is safe for use.

B13.3 Other potential health Impacts

Significant health benefits are associated with active transport such as walking, cycling, and public transport. It is important that the project has minimal impact on the accessibility and availability of active transport. Incorporation of active transport infrastructure (walking and cycling paths) into the project are supported and encouraged.

Response

The comment is noted.

B Part B Response to stakeholder submissions

B4 NSW Office of Environment and Heritage (NSW OEH)

This chapter addresses issues raised in the submission from the NSW Office of Environment and Heritage (OEH). The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B4.1 Biodiversity

In relation to biodiversity, OEH notes from the Biodiversity Development Assessment Report (BDAR) that the Biodiversity Assessment Method (BAM) has been applied to quantify and describe the biodiversity values of the project area and the offsets required to address any unavoidable impacts. OEH unfortunately is unable to comment on how accurately the BAM has been applied as the BAM Calculator has not been finalised by the Assessor and relevant spatial data has not been provided. OEH will be able to comment on the BDAR when these matters are addressed.

Response

The comment from OEH is noted. The Biodiversity Assessment Method calculations were uploaded onto the online OEH Biodiversity assessment tool in late 2018 and spatial data from the Assessor, Eco Logical Australia, were provided to OEH for review during the course of the submissions response process. Using this information, OEH officers will be able to complete the assessment of the BDAR.

B4.2 Surface water and flooding

In relation to flooding, OEH has reviewed Appendix M of the EIS (the Flooding Technical Report [FTR]) and is of the view that it follows accepted floodplain risk management practice. OEH notes:

- The FTR utilises hydrologic and hydraulic models from previously undertaken assessments of the New M5 Motorway at the vicinity of the project footprint. Annexure A provides a comparison to available councils' existing studies. The models identify existing flooding characteristics and identify areas that require further detailed assessment
- Potential impacts during the construction and operational related flood risk have been addressed by the FTR in sections 5 and 6 (and depicted in Figures 5-1 to 5-3 and 6-1 to 6-4) respectively
- The potential impacts from climate change on flooding behaviour due to sea level rise and increased rainfall intensities have been documented by the FTR
- The assessment proposes a Flood Management Strategy (FMS) be prepared for flood affected land prior to construction in consultation with directly affected landowners, OEH, Sydney Water and relevant councils. The main objective of the FMS is to demonstrate that existing flooding characteristics will not be exacerbated as a consequence of the project.
- The FTR outlines suitable management strategies for the construction and operational impacts. These strategies will be considered for the FMS in the detailed design phase.

OEH is satisfied that the impacts of flooding and the existing flood risk [of] construction has been considered.

Response

The comments from OEH regarding the suitability of the Flooding technical report are noted.

B Part B Response to stakeholder submissions

B5 Heritage Council of NSW

This chapter addresses issues raised in the submission from the Heritage Council of NSW. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B5.1 Kings Wetland

The Heritage Council of NSW (the Heritage Council) provided the following comments on Kings Wetland:

- The proposed haulage road will impact vegetation on the eastern side of Kings Wetland
- The areas to the south of Kings Road forms part of the 1940s reclamation works. The area to the north of Kings Road is remnant vegetation
- A landscape rehabilitation plan is proposed to be developed in conjunction with Bayside Council
- There is no detail in the EIS that shows the exact route of the haulage road and where it will feed into the existing road network adjacent to Kings Wetland
- Remnant vegetation in Kings Wetlands is an important part of its identified significance. Damage to remnant vegetation is to be avoided.

Response

Points 1, 2 and 3 above are consistent with the EIS and are noted.

As shown in the historical research and from aerial photography (refer to Plate 3 of Appendix N (Statement of heritage impact) of the EIS), the area of Kings Wetland to the north of Kings Road represents the remnant vegetation associated with the pre-1788 environment of the wetland.

Potential impacts to Kings Wetland are described in section 19.3.1 of the EIS. The project works are likely to have a moderate impact to the Kings Wetland heritage listing. Existing vegetation along the eastern boundary of the listed area would be removed to enable construction of a temporary haulage road. The existing vegetation along the wetland/creek area would not be impacted.

The President Avenue construction ancillary facility (C3) is shown in Figure 7-5 of the EIS. Temporary haulage access is identified between two vegetation exclusion zones in the north east of the site. The temporary haulage road generally follows an existing cleared path within Rockdale Bicentennial Park. The road width would be kept to a minimum and the road would be cordoned off to protect incursions into the vegetation. The temporary haulage road would connect to the existing road network at the following locations:

- To the south at President Avenue
- To the west at West Botany Street.

The exact route of the temporary haulage road would be determined during detailed design. Access to and from the President Avenue construction ancillary facility (C3) is described in further detail in Table 7-5 of the EIS.

B5.2 Patmore Swamp

The Heritage Council provided the following comments on Patmore Swamp:

- A 30m section of Patmore Swamp will be reclaimed for the President Avenue Upgrade
- A new shared cycle-pedestrian way will be constructed through Patmore Swamp
- The total area to be impacted is approximately 4% of the Patmore Swamp
- Protection areas will be established alongside works areas in Patmore Swamp to limit the extent of damage
- A heritage interpretation strategy is proposed to be prepared to outline opportunities for interpretation to be integrated into the design of the shared cycle and pedestrian pathway through Patmore Swamp
- No specific detail around the content, approach or timing of the heritage strategy has been provided
- The Construction Heritage Management Plan to be prepared for the project should contain a timeline for the development and implementation of the heritage interpretation strategy for Patmore Swamp

- The Construction Heritage Management Plan should contain a commitment that the proponent will complete and implement a heritage interpretation strategy within 6 months of the issue of approval
- The heritage interpretation strategy should include the following:
 - Discussion of the heritage significance of Patmore Swamp
 - Consultation plan that describes how interpretation will be developed in consultation with the local community and Bayside council
 - A commitment that consultation will inform the content and nature of proposed interpretation
 - Implementation schedule including timeframes for the installation of interpretation
- The site protection measures should be implemented to minimise impacts to Patmore Swamp.

Response

Point 1, 2, 3, 4 and 5 above are consistent with the EIS and are noted.

In accordance with environmental management measure NAH6 (refer to **Chapter D1** (Environmental management measures)), a heritage interpretation strategy will be prepared to outline opportunities for heritage interpretation being integrated into the design of the shared cycle and pedestrian pathway through Patmore Swamp. Heritage interpretation involves providing information to visitors to allow them to experience the history of a particular place. Heritage interpretation can be communicated through a number of methods including signage and artworks.

The heritage interpretation strategy will include:

- A discussion of the key interpretive themes, stories and messages proposed to interpret the history and significance of Patmore Swamp
- Identification of interpretive initiatives implemented to mitigate impacts to Patmore Swamp.

The content of the heritage interpretation strategy will be agreed to in consultation with OEH and Bayside Council. The heritage interpretation strategy will be prepared prior to the completion of the construction of the shared cycle and pedestrian pathway through Patmore Swamp.

In accordance with environmental management measure NAH6, a protection area will be established as a no-go area during construction along either side of the proposed shared cycle and pedestrian pathways and along the new boundary of President Avenue and Patmore Swamp, to preserve as much of the existing vegetation as is practical within the boundaries of the heritage listing. The delineation of the protection area will be maintained throughout the construction period.

B5.3 General matters

The Heritage Council provided the following general comments:

- The proponent has committed to the preparation of a Construction Heritage Management Plan for the project. The plan will detail measures to minimise impacts on identified heritage features within the project boundary and will also detail procedures to manage unexpected heritage finds
- An archaeological assessment was completed as part of the Statement of Heritage Impact. No historical archaeological sites were identified or predicted. The commitment to manage unexpected finds through the Construction Heritage Management Plan is appropriate.

Response

The comments are noted.

B5.4 Recommendations

The Heritage Council recommended the following conditions of consent.

- The proposed haulage road in Kings Wetlands should not damage remnant vegetation north of Kings Road

- The landscape rehabilitation plan should include timeframes for completion and an ongoing monitoring program to assess the success of the rehabilitation. It is recommended that a time limit of six months from the end of use of the haulage road be conditioned for the completion of all landscape rehabilitation
- The Construction Heritage Management Plans should be submitted to the Heritage Council of NSW prior to finalisation
- The Construction Heritage Management Plan should contain a commitment that the proponent will complete and implement a heritage interpretation strategy within 6 months of the issue of approval
- The heritage interpretation strategy should include the following:
 - Discussion of the heritage significance of Patmore Swamp
 - Consultation plan that describes how interpretation will be developed in consultation with the local community and bayside council
 - A commitment that consultation will inform the content and nature of proposed interpretation
 - Implementation schedule including timeframes for the installation of interpretation
- The site protection measures should be implemented to minimise impacts to Patmore Swamp.

Response

As shown in Figure 7-5 of the EIS, the northern extent of the President Avenue construction ancillary facility (C3) is located to the south of Kings Road. The temporary haulage access road would be located within the boundary of the construction ancillary facility and would therefore not directly impact the area of remnant vegetation to the north of Kings Road (refer to **section B5.1** for further information regarding potential impacts to Kings Wetland).

The landscape rehabilitation plan is likely to form a component of the Urban Design and Landscape Plan for the project. The Urban Design and Landscape Plan will include the timing for the implementation of rehabilitation works, monitoring and maintenance procedures and contingencies where rehabilitation measures are not satisfactory (refer to environmental management measure LVIA1 in **Chapter D1** (Environmental management measures)).

The Heritage Management Plan will be prepared in consultation with the Heritage Council of NSW.

B Part B Response to stakeholder submissions

B6 Fire and Rescue NSW

This chapter addresses issues raised in the submission from Fire and Rescue NSW. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B6.1 Recommended conditions of approval

Fire and Rescue NSW recommended the following conditions of approval for the F6 Extension Stage 1 project (the project):

1. At least six months prior to the opening of the project, the proponent shall prepare an Emergency Response Plan, in consultation with Fire & Rescue NSW (FRNSW) and NSW Police. The plan shall include, but not necessarily be limited to:
 - a) protocols and procedures to be followed during emergency situations associated with the operation of the project including vehicle collisions, fires and explosions including taking into account the needs of people with a disability or who may experience access problems in emergency situations.
 - b) details of traffic management measures to be implemented during emergencies, where appropriate, to minimise the potential for escalation of the emergency.
 - c) management and infrastructure measures to address the potential environmental impacts of an emergency situation, including measures for containment of contaminated fire-fighting water, fuel spills and gaseous combustion products.
 - d) a training and testing program to ensure that all operational staff are familiar with the plan and coordination with FRNSW and NSW Police is regularly exercised.
 - e) a simulated emergency response exercise in accordance with the approved Emergency Response Plan, including the proponent, FRNSW and NSW Police shall be undertaken on at least one occasion at least one month prior to the opening of the project to traffic.

Note: FRNSW and NSW Police shall participate in the emergency response exercise at a time agreed with the proponent after being provided with at least one month notification of the exercise.

2. The proponent shall undertake an initial and ongoing annual Hazard Reviews of the project for the first five years of operation. The reviews must address all hazardous incidents that have occurred during the preceding period.
 - a) The initial review shall be undertaken for the first three months of operation after the opening of the project to traffic.
 - b) Subsequent reviews shall be undertaken for the following nine months and thereafter twelve monthly intervals.
 - c) A report outlining the results of the hazard review, and any proposed additional safety measures to be implemented in response to the findings of the review, shall be submitted to FRNSW no later than one month after the review period.

The proponent shall respond to FRNSW requirements in relation to the findings of the review, within such time as may be agreed by FRNSW. Where FRNSW continues to hold concerns, these are to be resolved to the satisfaction of RMS. FRNSW may direct the proponent to undertake further hazard review following any major incident in the tunnel.

3. The proponent shall develop a Fire Engineering Brief and Fire Engineering Reports to address fire and life safety in the tunnel. The reports shall outline fire protection systems and other tunnel equipment, systems, and operational protocols required for fire and smoke management. In developing the reports, the proponent shall undertake a detailed fire engineering study in accordance with the Australian Building Codes Board International Fire Engineering Guidelines, the Project Deed and in consultation with FRNSW.
 - a) Detailed design of the tunnel shall incorporate the design and operational measures developed in the fire engineering study and in accordance with the Project Deed to minimise the potential for, and effect of, fire and hazardous material incidents in the tunnel.
 - b) The reports shall be developed in consultation with FRNSW. The final design of the tunnel in relation to the fire and life safety features shall be verified against the fire engineering study and Project Deed in consultation with FRNSW by a suitably qualified independent person(s)/organisation. The proponent shall respond in writing to any recommendations made by FRNSW. Where FRNSW continues to hold concerns, these are to be resolved to the satisfaction of RMS.

4. Prior to the opening of the project to traffic, a full audit of the fire and life safety system as defined by the fire engineering study developed in Condition 3 above shall be undertaken by an independent person(s)/organisation and in consultation with FRNSW. The objective of the audit shall be to ensure that all design and operational measures outlined in the fire engineering study and Project Deed have been installed, are operational and achieve the required design criteria. The results of the safety audit shall be submitted to FRNSW prior to opening of the project to traffic. The proponent shall respond in writing to any recommendations resulting from FRNSW review of the audit. Where FRNSW continues to hold concerns, these are to be resolved to the satisfaction of RMS.
5. Fire simulation and hot smoke testing shall be undertaken as part of the simulated emergency response exercise to be staged prior to opening of the project to traffic. The proponent shall respond in writing to any recommendations made by FRNSW as a result of the exercise. Where FRNSW continues to hold concerns, these are to be resolved to the satisfaction of RMS.
6. A detailed maintenance-testing program outlining the methods of testing the fire and life safety systems and schedule for implementation shall be developed in consultation with FRNSW prior to opening of the project to traffic. The proponent shall respond in writing to any recommendations made by FRNSW. Where FRNSW continues to hold concerns, these are to be resolved to the satisfaction of RMS.
7. Maintenance testing of fire and life safety systems must be undertaken at least annually, or any other interval as required by the design engineer and FRNSW. Results of maintenance testing shall be made available to FRNSW for review and the proponent shall respond in writing to any additional requirements to ensure the reliability of the fire and life safety systems. Where FRNSW continues to hold concerns, these are to be resolved to the satisfaction of RMS.
8. That the F6 Stage 1 fire hydrant system incorporates motorised isolating valves (with local manual override actuation capability). Motorised isolating valves are to be installed in locations and configured such that when remotely actuated, restore emergency fire hydrant water supplies to the fire hydrant system while minimising disruptions to any potential FRNSW firefighting operational activities that may be in progress.
9. That the F6 Stage 1 fire hydrant system incorporates motorised isolating valves that can be remotely actuated and controlled from the tunnels control centre.
10. In addition, to ensure that hydraulic fire main failures can be quickly identified and isolated, FRNSW recommends that leak detection be incorporated into fire service mains that serve the tunnel's deluge and fire hydrant systems.

Response

The project has been designed to meet appropriate fire and life safety requirements in the event of an incident or accident in the tunnel, as described in Chapter 6 (Project description) of the EIS and includes:

- Twin tunnels which would allow motorists to move to a safe place underground into a fire-separated carriageway in the event of a fire in another carriage way
- Emergency egress and access for emergency response teams
- Smoke control system
- Water suppression system.

In accordance with environmental management measure HS4 (refer to **Chapter D1** (Environmental management measures)), an Incident Response Protocol will be developed as part of the Emergency Response Plan for the project and implemented in the event of an accident or incident. The protocol will detail operational management measures associated with the storage, handling and transport of hazardous substances and dangerous goods, including spill response.

Recommended conditions 1 to 7 inclusive describe fire and incident safety processes that must be adhered to both during delivery of the asset and in the subsequent operation of the asset. These clauses are consistent with previous projects, therefore Roads and Maritime Services (Roads and Maritime) has no objection to these.

Recommended conditions 8, 9 and 10 prescribe FRNSW's preferred solution related to remotely operable hydrant isolation valves. These requirements are different to recommended conditions 1 to 7 as they define a solution rather than a process. Therefore, although these solutions are consistent with similar recent projects, Roads and Maritime propose that these requirements are discussed separately with FRNSW.

Roads and Maritime will continue to consult with key stakeholders throughout detailed design, construction and operation of the project. This will include consultation with FRNSW and NSW Police in relation to fire safety, emergency planning and management of the project.

B Part B Response to stakeholder submissions

B7 Bayside Council

This chapter addresses issues raised in the submission from Bayside Council. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B7.1 Consultation

Issues identified in the introduction of Bayside Council's submission are addressed by exception in this section. Issues raised in the introduction that are also raised elsewhere in the submission are addressed as relevant throughout the remainder of this chapter.

B7.1.1 Length of the EIS exhibition period

The EIS comprises seven volumes which provide detailed information and complex data requiring analysis. Council wrote to the Department of Planning and Environment (DPE) on 19 September 2018 requesting a longer exhibition period, with a proposed exhibition period of 28 days insufficient for both Council and the Bayside LGA community to review and respond to the EIS. The DPE in their response of 24 September 2018 did not commit to an extended exhibition period. In October 2018 Council again resolved to request an extension to the public exhibition period.

Whilst the exhibition period was extended for a further 7 days, the 35 day exhibition period is still inadequate to allow for proper consideration of the many and significant issues. This is further shortened by the need to meet the Council meeting cycle. Council has, therefore, been unable to undertake a detailed analysis of the EIS and means that Council has not provided detailed comment on all areas of the EIS including air quality, noise and traffic modelling.

Response

Prior to the public exhibition of the EIS, extensive consultation was carried out from June 2016 during the preliminary planning phase and throughout the EIS planning phase until August 2018. The community consultation activities carried out used a variety of communication and engagement tools and included doorknocking of 1,500 residences and businesses at Arncliffe, Kogarah, Monterey and Rockdale between June and July 2018 (refer to **section C.1** for further information).

Under the *Environmental Planning and Assessment Act 1979* (EP&A Act), the Planning Secretary of the NSW Department of Planning and Environment (DP&E) is responsible for setting the timing and duration of public exhibition periods for an Environmental Impact Statement (EIS). For the F6 Extension Stage 1 project (the project), the Planning Secretary of DP&E determined to extend the public exhibition period from the minimum statutory requirement of 28 days by one week to a total of 37 days (from 7 November to 14 December 2018). This exhibition period did not extend into the NSW school holiday period and provided adequate opportunity for stakeholders and the community to consider the proposal and provide informed comments.

During the public exhibition period, a series of community information sessions and 'Pop-up' information stands were held to provide community members an opportunity to discuss the EIS with technical specialists and to learn about the submission process. Other activities carried out to support the display of the EIS included an online EIS navigator tool and the provision of a project overview document and project fact sheets.

Ongoing consultation will be carried out with Bayside Council on matters relating to the project.

B7.2 F6 project strategic context and project need

B7.2.1 Future stages of the F6 Extension

This section comprises a compilation of the issues raised by Bayside Council that relate to future stages of the F6 Extension, along with responses to these issues.

This project does not include Stage 2 (to connect to Taren Point).

[...]

The large volume of southbound motorway traffic expected to exit the tunnel onto President Avenue will likely result in traffic congestion in southern Sydney. Council maintains that it is imperative that the announcement and planning for Stage 2 (Kogarah to Taren Point) occurs as part of Stage 1.

[...]

Certainty is sought by Council and indeed the local community with reference to an expected completion date for the entire F6 extension project from Arncliffe to Loftus (also note Council's comments in relation to the F6 Staging Options). Guarantees are sought for extending detailed design for the next stages – providing a timeline for the completion of the project will go some way to alleviate concerns that the F6 Stage 1 extension is merely moving a traffic bottleneck 4kms to the south, replicating issues that were present previously.

[...]

Council maintains that it is imperative that the announcement and planning for Stage 2 (Kogarah to Taren Point) occurs as part of Stage 1, as without this there will be significant congestion in the Bayside local area.

[...]

Request Stage 2 progress through to Taren Point (be accelerated) and not terminate at President Avenue (also refer to Staging Options comments).

[...]

The large volume of southbound motorway traffic expected to exit the tunnel onto President Avenue will likely result in traffic congestion in southern Sydney. The Infrastructure Australia Priority list released in July 2018 identifies the construction of the F6 corridor from Arncliffe to Waterfall as a priority initiative. Council maintains that it is imperative that the announcement and planning for Section B works occurs as part of Stage 1. As such Option 2 - New M5 motorway to Taren Point Road (Section A + B) should be the preferred option or Option 3 - New M5 Motorway to Port Hacking Road (Section A + B+ C).

Response

The project would form the first stage of the F6 Extension, which would provide economic benefits by reducing travel times through southern Sydney and between Sydney and the Illawarra region. Future stages of the F6 Extension are currently under investigation and would be subject to separate environmental assessment and planning approval. However, there is currently no formal commitment from the NSW Government regarding the development of a design or timeline for future stages of the F6 Extension.

Chapter 8 (Traffic and transport) of the EIS provides an assessment of potential traffic impacts for a range of scenarios including the F6 Extension Stage 1 only (operation 'Do something' scenarios) as well as the F6 Extension Stage 1 along with future stages of the F6 Extension (operation 'Cumulative' scenario).

Where the project would connect to the existing road network, some increased congestion is forecast along President Avenue at Kogarah, and on the exit ramps to the St Peters interchange, due to the forecast increase in demand to and from the project. Roads and Maritime will manage this additional traffic demand through network improvements and better use of existing road infrastructure, including, for example, implementation of parking controls.

The NSW Government is committed to improving travel times and easing congestion for motorists travelling between the Illawarra and commercial areas in Sydney. The development of the F6 Extension is an important part of the long term transport solution for Sydney.

Long term access to Sydney City and North Sydney are considered in future motorway plans. More information can be found in the *Future Transport Strategy 2056*, which is the NSW Government's 40 year vision for transport outcomes in NSW. The *Future Transport Strategy 2056* identifies the F6 Extension – Kogarah to Loftus as an initiative for investigation in the next 10 years.

B7.2.2 Connection to Port Botany and Sydney Airport

This section comprises a compilation of the issues raised by Bayside Council that relate to a potential connection to Port Botany and Sydney Airport, along with responses to these issues.

This project does not include Stage 2 (to connect to Taren Point) nor does it provide a direct link to Port Botany, both of which are key priorities for Bayside Council. This omission is therefore reflected in Council's response to Project Benefits, Consistency with Strategic Planning, Corridor Analysis Options and the F6 Extension Staging Options sections of the EIS.

[...]

The EIS does not include a motorway connection to Australia's busiest port [Port Botany], where road container movements are expected to triple in over the next 20 years. Bayside Council strongly advise that investigations begin into direct Port Botany access at/or near the Marsh Street interchange as a high priority.

[...]

Council considers that the project will not adequately benefit the efficient /productive movement of port-orientated freight traffic from both Port Botany and Port Kembla travelling through the Bayside LGA. The EIS does not include a motorway connection to Australia's busiest port, where road container movements are expected to triple over the next 20 years. The project instead remains reliant on the utility of General Holmes Drive as its southern thoroughfare, detracting from any future vision of local centre amenity and liveability, while creating considerable safety concerns for the residents and visitors of this beachside destination. This is exacerbated by the Sydney Gateway project which does not provide a motorway link to Port Botany.

Council is undertaking the development of a Master Plan for Brighton-Le-Sands. The lack of a motorway connection to Port Botany is a significant impediment to Council's work to enhance the liveability of this area, as a reduction in traffic on The Grand Parade is critical to improving amenity in this important destination for Sydneysiders and visitors.

[...]

Bayside Council have requested as part of its August 2018 submission that the northern connection (Marsh St) should include access roads that enable direct Port Botany (Foreshore Rd) access. The EIS does not include these access roads. Port freight container volume (TUE units) is predicted to triple from 2.5 million units (2018) to 7.0 million by the year 2040. It is forecast that approximately 80% of that container freight will be serviced by the road network. [Bayside Council make the following recommendations:]

- Considering the adverse impact to the community and strategic value of the Brighton-Le-Sands town centre if Grand Parade remains a main freight route, Bayside Council strongly advise that investigations begin into direct Port Botany access at/or near the Marsh Street interchange.
- The Level of Service on the surrounding road network [should] be monitored post completion of the M5 East and Sydney Gateway projects.

The Sydney Gateway project (adjacent RMS [Roads and Maritime] motorway project) has detailed Airport access only from the St Peters Interchange, with no direct connections [to the F6 Extension Stage 1 project that would allow freight to] that would provide access to otherwise provide Port Botany freight to otherwise access the F6 and bypass Brighton-Le-Sands. In the absence of a direct motorway connection, General Holmes Drive and the local town centre of Brighton-Le-Sands will continue to be burdened by the movement of south-bound freight traffic volume into the future.

Brighton-Le-Sands is a local, regional and international destination in its own right and the attractiveness of the option of downgrading of General Holmes Drive away from a freight passage route (movement corridor) to that functioning as destination (place) should be acknowledged by the RMS [Roads and Maritime] as part of this project. As highlighted earlier this potential future road function of General Holmes Drive aligns with Bayside Council master planning for Brighton-Le-Sands and seeks to enable foreshore accessibility to the residents of the Kyeemagh, Brighton-Le-Sands and nearby suburbs.

[...]

Council Minute 2018/110 (13 June Council Meeting) expressed "That a connection to Sydney Airport for those coming from the south be included in this project." This connection is a key issue for Council, with a record 43.3 million passengers passing through Sydney Airport and these numbers are projected to increase to 74.3 million passengers as well as 1 million tonnes of freight entering Sydney by Sydney Airport. It is acknowledged that the proposed Sydney Gateway project could provide a connection to the airport via the St Peters Interchange, however this is still in the planning stage.

As highlighted previously, the EIS does not address port access and the proposed Sydney Gateway project only provides access into the airport and not to Foreshore Drive. Council requests the [Roads and Maritime] investigate a direct motorway connection from Port Botany to the F6 via an access point at the Arncliffe interchange.

Response

The project, through a connection with the New M5 Motorway, would assist in providing more efficient and economic transport connections for freight vehicles, workers and other commercial operators travelling from the A1 Princes Highway to Sydney Airport, Port Botany and other industrial and commercial areas in Sydney. However, motorway connectivity to Sydney Airport and Port Botany is not an objective of the project.

Motorway connectivity to Sydney Airport would be delivered by the proposed Sydney Gateway road project. The Sydney Gateway road project would also improve traffic flow towards Port Botany and beyond. Sydney Gateway is comprised of two projects:

- A new alternative route to the domestic and international terminals from the Sydney motorway network at St Peters interchange. Sydney Gateway would include a new dedicated flyover from Qantas Drive to the domestic airport. This project would be delivered by Roads and Maritime.
- A duplicated three-kilometre section of the Port Botany freight rail line to increase capacity and improve service reliability. This project would be delivered by Australian Rail Track Corporation (ARTC).

A State Significant Infrastructure (SSI Application) has been submitted by Roads and Maritime to DP&E for the road infrastructure component of the Sydney Gateway project and this project is subject to ongoing design, environmental assessment; and Federal and State planning approval.

An EIS is being prepared by ARTC for the rail duplication component of the project and this project is subject to ongoing design, environmental assessment and State planning approval.

As part of the development of the project, initial traffic analysis using the EIS traffic model was undertaken for Sydney Airport and Port Botany to understand the volume of traffic travelling to the F6 corridor area. The analysis indicated that around 10-15% of traffic movements originating from Sydney Airport and Port Botany travel within the F6 corridor area, while the remainder travel west or north.

A small proportion of NSW freight travels through southern Sydney, as the majority of road freight infrastructure, such as major redistribution centres, are in western and south-western Sydney. Most freight vehicles would therefore use the M2 and M5 Motorways, meaning that a growth in road freight volumes is unlikely to significantly contribute to network pressures in southern Sydney.

Given the above, a connection to Sydney Airport and Port Botany was not considered further for inclusion as part of the project.

The Grand Parade currently provides a connection for traffic traveling between southern Sydney and the Sydney Airport and Port Botany. For the project, reduced daily traffic is forecast on sections of General Holmes Drive and heavy vehicle volumes are forecast to fall by approximately 30 per cent on General Holmes Drive, each weekday. The forecast changes for The Grand Parade and General Holmes Drive would improve liveability and amenity in Brighton-Le-Sands.

Roads surrounding President Avenue would still be required for surface traffic movements to destinations not serviced by the F6 Extension or the New M5 Motorway. General Holmes Drive will remain an important connection to Sydney Airport.

B7.2.3 Public transport improvements

This section comprises a compilation of the issues raised by Bayside Council that relate to public transport improvements, along with responses to these issues.

In addition to the proposed F6 motorway Council strongly advocates for improved public transport options and active transport routes to reduce ongoing demand on roads.

[...]

The F6 project aims to improve personal motor vehicle accessibility and in doing so seeks to complement the NSW Government's '30-minute city' paradigm. This concept of accessibility and productivity must also be addressed with sustainable transport options incorporated into the greater project scope. That being, ensuring the provision of high quality, desirable public transport amenity (such as shelters, expanded bus services, last mile options) are included as part of a regional vision for community movement. Council therefore seeks [that] RMS [Roads and Maritime] and Transport NSW, in collaboration with Bayside Council investigate options of priority public transport options [as] part of the planning for the F6 extension.

[...]

Council supports investigation of public transport options, with public transport already at capacity.

Response

Council's comments are noted. The NSW Government is proposing to deliver a range of transport infrastructure projects including road, public transport and active transport projects to address the transport challenges associated with a growing Sydney and to provide a range of transport alternatives to support the variety of trips being made across the city.

In June 2018, the NSW State Government committed to improvements on the T4 Illawarra Line and T8 Airport Line following an \$880 million investment in technology improvements to modernise the Sydney Trains network. The improvements will allow for:

- Five more trains an hour during the peak on the T4 Illawarra Line from Cronulla, which is an increase of up to 30 per cent in capacity
- Eight more services an hour on the T8 Airport Line at the International, Domestic, Mascot and Green Square stations, meaning trains at least on average every four minutes instead every six, along with extra services from Revesby.

The initial investment of \$880 million goes towards developing and starting deployment of digital systems to replace legacy signalling and train control with modern, internationally proven, intelligent systems across the Sydney Trains network.

Over the next 10 years, the investment will deliver the following benefits to the T4 and T8 lines:

- More services that will reduce wait times, meet demand and provide more seats for long distance customers
- Faster travel times for customers through digital train control technology and upgraded rail infrastructure, creating more opportunities for express trains
- Improved reliability and reduced customer impacts from incidents.

Improvements to public transport, including improved bus services, would be complementary to the project. The project is aligned with the '*simpler, faster, better*' strategy of *Sydney's Bus Future*¹ as it would:

- Improve bus travel times and travel time reliability on existing routes due to a decrease in through traffic on arterial roads
- Create opportunities on arterial and other roads for bus service improvements.

The project would not preclude rail infrastructure improvements from occurring as they would address different objectives. Any rail infrastructure improvements (such as the upgrades to the T4 Illawarra Line and T8 Airport Line as described above) are likely to be complementary to the project as they would further reduce the number of vehicles on surface roads and would provide opportunity for place making at key strategic centres.

Active transport improvements are regarded as complementary to other transport modes including roads and public transport. They are an essential component of an integrated transport solution, meeting the needs of local communities and shorter distance commuters.

The provision of public transport amenity and priority public transport options is outside the scope of the project and is the subject of separate Roads and Maritime and other NSW Government projects, including the Bus Priority Infrastructure Program.²

The project would provide shared cycle and pedestrian pathways aimed at improving north-south active transport movements between Bestic Street and Civic Avenue. Changes to the active transport corridor (ATC) in the southern part of the project footprint including an extended pathway to O'Connell Street are proposed and are described in the preferred infrastructure report.

¹ Transport for NSW (2013) *Sydney's Bus Future*

² <https://www.rms.nsw.gov.au/projects/easing-sydneys-congestion/bus-priority-program.html>

B7.3 Project benefits

B7.3.1 Better Placed policy

RMS [Roads and Maritime] works [with] and provides funding to Bayside Council to implement the Better Placed policy at key locations along Grand Parade and Princes Highway.

Response

The project would provide opportunities for the implementation of the Better Placed³ policy by reducing through traffic, including freight vehicles, at key locations along The Grand Parade and Princes Highway. These opportunities are described in section 4.4.3 of the EIS. The realisation of these opportunities are outside the scope of this project and would need to be delivered by others.

B7.4 Project alternatives

B7.4.1 Clearway extensions

Bayside Council does not support the proposed clearway extensions along Princes Highway, Rocky Point Road and The Grand Parade as Council believes that any expansion of the clearways program would impact local business and the ability of residents to access local destinations. As outlined in the Mayoral Letter (March 2018) Council has requested consultation with Council, residents and community groups be undertaken before any consideration for [is given to] extending the operation of clearways in Bayside LGA. NSW Government must substantiate the need for clearways, qualify the economic impact to local business and demonstrate how the public domain along these roadways will be improved for residents, businesses and visitors to the area before any such program is considered to be implemented.

Response

The clearway extensions noted by Bayside Council are not part of the project and are subject to the Roads and Maritime Clearways Project.

However, the project includes changes to on-street parking along President Avenue during peak periods to support the operational performance of the President Avenue intersection. With the project, President Avenue would operate with clearway conditions during AM and PM peak periods, west of O'Connell Street. In off-peak periods and at night, on-street parking along President Avenue would be reinstated as per existing conditions, with some exceptions as outlined in section 8.7.3 of the EIS.

All businesses along President Avenue to the west of the West Botany Street intersection have some form of business access independent of on-street parking provisions on President Avenue. As such, there would be no impact to services and deliveries for these businesses. The project would implement peak period clearways in both directions along President Avenue which may reduce the number of parking opportunities for customers of these businesses. President Avenue already has existing clearways eastbound in the AM peak and westbound in the PM peak, and as such the change from the existing scenario would not be substantial. Furthermore, parking availability in adjacent side streets would remain unchanged.

B7.5 Corridor analysis options

B7.5.1 Future land use planning for the existing F6 corridor

This section comprises a compilation of the issues raised by Bayside Council that relate to the future of the existing F6 corridor, along with responses to these issues.

Council requests that it is part of any decision-making by the State Government for deciding the future of the F6 open space corridor, particularly in light of increased population projections for the Bayside LGA.

[...]

³ <http://www.governmentarchitect.nsw.gov.au/thinking/integrated-design-policy/introducing-better-placed>

Given the existing F6 corridor is no longer required for its original purpose, Council requests that it is part of any decision making by the State Government for deciding the future of the F6 open space corridor, particularly in light of increased population projections for the Bayside LGA.

[...]

Bayside Council has been impacted by the F6 corridor since 1951. The future of this corridor is of the utmost importance, given the significant amount of open space contained within it.

Council notes the comments in the EIS regarding [the] decision to be made in collaboration with Bayside Council and re-iterates the need for its involvement in planning for the future of the land affected by the corridor.

Response

The existing F6 reserved corridor is zoned SP2 Infrastructure corridor. As an outcome from the development of the F6 Extension Stage 1, the NSW Government has determined that this section of the existing F6 reserved corridor would no longer be used for a motorway connection as originally intended when the reserve was established in 1951.

The future use of the existing F6 reserved corridor between Arncliffe and Kogarah that would not be required for the project is being considered by Transport for NSW. The use of the corridor as a transport corridor or to facilitate future transport infrastructure is a priority consideration for Transport for NSW.

Initially, a review of the corridor for public and active transport uses is being undertaken as part of a wider review of the integrated transport needs for the area. The review is being carried out in consultation with Bayside Council. Other uses and needs for the growing population in southern Sydney will also be considered for the future use of the corridor, including community and open space uses. Once the need for the corridor has been identified, the NSW Government would consult further with the community and local councils.

*Future Transport Strategy 2056*⁴ released in March 2018, provides the vision for how transport can support growth and the economy of Greater Sydney and NSW over the next 40 years. The strategy identifies strategic directions and visionary initiatives, including a South East Mass Transit Link to Kogarah and Miranda. This is an initiative for long term (20+ years) investigation that would consider options using the established SP2 Infrastructure corridor.

Any assessment or decision regarding the future of this corridor would be separate to the planning approval process for the project and would be developed in collaboration with DP&E, Transport for NSW and Bayside Council.

B7.6 F6 Extension Staging Options

B7.6.1 Transport of hazardous goods within tunnels

Bayside Council is aware of current limitations placed on the transport of dangerous and hazardous goods through tunnel structures. Any further discussion surrounding prospective modifications to these controls will be welcomed in an effort to understand the impact to the community.

Response

Dangerous goods and hazardous substances are not allowed to be transported within prohibited areas, in accordance with Road Rules 2014 – Regulation 300-2: NSW rule: carriage of dangerous goods in prohibited areas (Regulation 300-2). Prohibited areas are listed under Regulation 300-2 and include Sydney's major tunnels.

The project tunnels would be listed as a prohibited area under Regulation 300-2 prior to the commencement of the operation of the project. Signage would be provided near tunnel entry portals advising of applicable restrictions to ensure compliance with Regulation 300-2.

In the event of future modifications to Regulation 300-2, signage near the tunnel entry portals would be updated if required to ensure compliance with the regulation.

⁴ NSW Government (2018) *Future Transport Strategy 2056*

B7.7 Bicentennial Park Reinstatement

B7.7.1 Scope and delivery of reinstatement works

- The impact of the project on Bicentennial Park, Brighton-Le-Sands is significant. The planning and management for the relocation of facilities and infrastructure, both temporarily and permanently, needs to be prioritised.
- To better understand the potential impacts of the F6 on the community assets in Bicentennial Park precinct, the RMS [Roads and Maritime] has agreed to fund a Recreation Needs Analysis [which] will be jointly managed by Council and RMS [Roads and Maritime]. This study has commenced and will identify ways in which the impacts can be mitigated and compensated. Interim feedback has been provided to RMS [Roads and Maritime] on temporary impacts and permanent impacts. The Recreation Needs analysis will be provided to the Department of Planning and Environment when complete.
- As previously noted, a detailed scope and program will need to be agreed by Council and the RMS [Roads and Maritime], ensuring relocation works are completed prior to construction of the site compound at Bicentennial Park.
- As highlighted in Bayside Council report (14 November 2018) Item 8.3, Council has identified a number of options for compensation including:
 - Certainty of land tenure for Council where temporary and permanent assets are to be located
 - Transfer of ownership to Council (or care and control) of residual land at Bicentennial East soccer fields
 - Exploring permanent community recreation opportunities on land that it held in Trust for road and recreation purposes or on other Council land.

It is requested this November 2018 Council report is considered as part of Council's submission.

- The scope and delivery for the re-instatement of Bicentennial Park needs to be agreed by Council and RMS [Roads and Maritime], including a program for completion. The construction of playing fields at Brighton Memorial playing fields will need to be considered to cater for the permanent loss of a playing field at Bicentennial Park. These works would be completed on behalf of council by the appointed contractor.
- The F6 tender documents should include a performance specification associated with the replacement of the sporting facilities with detailed design and development consent approval, either in a new proposed location or reinstated back on the existing site.

Response

Sporting fields and recreational facilities within Rockdale Bicentennial Park would be directly impacted by the project, including a playground with equipment, a skate park, an open recreational oval and up to three soccer playing fields.

Some of these facilities would be offset with new facilities at nearby locations so as to ensure continuity of facilities for the community. The construction and installation of these facilities would be subject to separate planning approvals and are outside the scope of the EIS. Roads and Maritime will continue to work with Bayside Council to complete the Recreation Needs Analysis for the area, which will confirm current use and compare with future needs. Roads and Maritime will consult with key stakeholders through the Stakeholder Liaison Group during the development of offset facilities and permanent reconfiguration of the Rockdale Bicentennial Park facilities.

A concept design for the reinstatement of Rockdale Bicentennial Park has been prepared (refer to Figure 6-12 of the EIS) having regard to the urban design objectives and principles in section 6.2 of the EIS. The concept design is detailed further in Appendix C (Place making and urban design) of the EIS.

Upon completion of the project, the following features will be provided at Rockdale Bicentennial Park:

- Supplementary tree and shrub planting to screen the motorway entry and to integrate with adjacent interfaces
- A rebuilt section of the existing wetland within Rockdale Bicentennial Park (part of Rockdale Wetlands)

- Reinstatement of key active recreational facilities impacted by the works, including the playground and skate park, with similar (like for like) facilities
- Improved pedestrian circulation, connectivity and lighting associated with the playing fields
- Improved pedestrian circulation, including temporary and permanent bridging structure across the wetland within Rockdale Bicentennial Park
- Replacement of the playground and skate park at Rockdale Bicentennial Park North
- Provision for additional recreational and furniture amenity including seating, bin enclosures, bicycle racks, shelters and drinking fountains.

The concept design will be refined during the development of an Urban Design and Landscape Plan, which will be prepared based on the detailed design for the project and in accordance with relevant commitments in this EIS. The Urban Design and Landscape Plan will also be prepared in consultation with Bayside Council, other key stakeholders and the community and made available to the public.

The F6 Extension Stage 1 tunnel has been located to maximise the future functionality of the remaining areas of the Rockdale Bicentennial Park. Rockdale Bicentennial Park and the associated recreational open space would be reinstated with a new car park to the north, a skate park and children's playground. The playing fields on the eastern side of the Rockdale Wetlands would be reinstated to maximise available playing field area within the available residual land following construction.

As described above, the concept design for the reinstatement of Rockdale Bicentennial Park will be refined during the development of an Urban Design and Landscape Plan, which will be prepared based on the detailed design for the project. The detailed design will be prepared based on the approved project as described in the EIS and the preferred infrastructure report and will be consistent with any conditions of approval and other requirements of DP&E related to the reinstatement of Rockdale Bicentennial Park, if approved. Where the detailed design is inconsistent with the approved project, further assessment and approval will be taken as required by the *Environmental Planning and Assessment Act 1979*.

The project would require the temporary and permanent use of Bayside Council owned land within Rockdale Bicentennial Park. Roads and Maritime will enter into agreements with Bayside Council about the temporary or permanent use of this land. Where council owned land is required temporarily, an agreement would generally be established through a lease or a Memorandum of Understanding. For land owned by Bayside Council that would be required permanently for public purposes, Roads and Maritime will discuss and make arrangement for the transfer of this land. Further detail regarding the nature of lease agreements is subject to separate discussions between Roads and Maritime and Bayside Council and is beyond the scope of the EIS.

The report referred to as the 'Bayside Council report (14 November 2018)' relates to suggestions regarding potential offsets for recreational facilities during construction. As described above, the construction and installation of these facilities would be subject to separate planning approvals and are outside the scope of the EIS.

Roads and Maritime will continue to work with Bayside Council to complete the Recreation Needs Analysis for the area, including the scope of the works for the offset of recreational facilities during construction and the final relocation plan and permanent reconfiguration of the Rockdale Bicentennial Park facilities.

B7.8 Shared cycle and pedestrian pathways

B7.8.1 Shared cycle and pedestrian pathways and President Avenue pedestrian bridge

- A separated 3.0m (cycle) + 1.5m (pedestrian) path width is preferred for the main cycle/pedestrian facility where space allows in the interest of user safety, desirability and overall quality.
- A southern active transport corridor should be extended to Riverside Drive, San Souci along the open space / green grid corridor.
- Secondary feeder paths to the main corridor are sought to be incorporated into the design, this will enable greater community access and accessible east/west movement. Bayside Council cycleway maps can provide guidance on the preferred east/west connections.

- Shared Paths are requested on the main east/west roads (Bay and President) enabling access between town centres of Rockdale and Brighton-Le-Sands (Bay St) and Kogarah and Botany Bay Foreshore (President Avenue) – the widths are request[ed] to be at a minimum of 3.0m and designed to be of high quality.
- It is requested that the project incorporate a shared path signalised crossing point at the southern portal entrance (on the northern side of President Avenue). The pedestrian and cycle access is critical to both the employment and education centre of Kogarah, but also to allow local community foreshore and sporting field access. A diversion to a crossing point 200m to the north is an undesirable outcome.
- It is advised that the cycleway (north-south) be that of a separated facility as opposed to a shared path, ie an active transport corridor that is separated from traffic, with pedestrians separated from cycle traffic where space allows. Separation of users on such an active travel corridor is designed to enhance user safety and encourages equitable community participation with a safe and desirable transport link as both a commuter and recreation cycleway.
- The active transport route needs to moved out of the wetland/endangered ecological communities, particularly at Scarborough Park.
- The Active Transport facility is requested to be within [an] open space corridor and is firmly requested to not re-enter the road network at England/Crawford Street. Doing so would act to render the facility undesirable for path users. Investigations should be made to ensure the active transport path is direct, safe and efficient in the effort to maintain the path's considerably high quality in a north/south direction within the Rockdale wetlands corridor.
- Council requests RMS [Roads and Maritime] to undertake a Road Safety Audit of the existing Commuter Cycleway along Crawford Road, O'Connell Street and Chuter Avenue as the F6 EIS indicates that traffic volumes will increase along these streets and this may endanger cyclists using this route.
- RMS [Roads and Maritime] upgrades the commuter cycleway in O'Connell Street and Chuter Avenue between President Avenue and Barton Street as part of the proposed works to encourage non vehicle transport options.
- The shared path bridge over President Avenue requires a southern connection, ie to Barton Street or further to Sans Souci, particularly as the current bridge facility proposed in the EIS will not enable a southern access to the wider network.
- The bridge (if proposed on the western side of the interchange) would enable access to the eastern / foreshore as a path option, in addition to a southerly route.
- Construct a cycle path on the eastern side of Scarborough Ponds between President Avenue and Barton Street.
- RMS [Roads and Maritime] works closely with Bayside Council in finalising the active transport/shared pathway route as part of the F6 project.

Response

Shared cycle and pedestrian pathways design

The project would deliver new shared cycle and pedestrian pathways. The EIS describes the development of shared cycle and pedestrian pathways from Bestic Street, Brighton-Le-Sands south to Civic Avenue, Kogarah through the reinstated Rockdale Bicentennial Park, including some parts as an on-road cycleway. As part of the project, a dedicated shared bridge would be built over President Avenue. The shared cycle and pedestrian pathways would be designed to respond to the surrounding context without obstructing visibility or creating a safety concern.

It is also proposed to extend the shared cycle and pedestrian pathway described in the EIS to O'Connell Street/Chuter Avenue around Robinson Street. The proposed change is described in the preferred infrastructure report and would provide access to the eastern side of Scarborough Ponds. A southern active transport corridor extending to Riverside Drive, Sans Souci is outside the scope of the project.

Where possible, the shared pathways would be a separate pedestrian path and cycleway unless surrounding constraints require a shared section. The average off-road width would be five metres, comprising a three metre, two-way cycle lane, 1.5 metre pedestrian path and 0.5 metre buffer.

The shared cycle and pedestrian pathways would be subject to detailed design in accordance with the Urban Design and Landscape Plan for the project. The plan will be developed in consultation with local councils including Bayside Council. A number of route options for the active transport corridor were considered. An active transport corridor that provided a direct route (ie a predominately separated off-street pathway) between Rockdale Bicentennial Park and Bruce Street required property acquisition as well as additional impacts to adjacent residents and potential pedestrian and cyclist safety issues through Kings Wetland south of Bay Street. As a result, changes to the active transport route in this area have not been progressed at this time.

The project would generally reduce traffic volumes on surface roads which would improve pedestrian and cyclist safety and amenity on existing on-road shared paths and adjacent pedestrian paths.

The preferred active transport corridor route has been designed to provide a safe and direct connection between Bestic Street and Civic Avenue, via an overpass over President Avenue, while minimising impacts on property and utilising the existing F6 reserved corridor.

Roads and Maritime will continue to work with Bayside Council to deliver safe and equitable access for all road users.

The planned shared cycle and pedestrian pathways would provide opportunity for east to west pedestrian and cycleway linkages between Rockdale and Kogarah train stations, and the Botany Bay foreshore.

Refer to **section B7.11** for information regarding potential road safety impacts.

Pedestrian and cyclist connectivity at President Avenue

The project would retain existing signalised pedestrian crossings of President Avenue at Princes Highway, West Botany Street and O'Connell Street. Existing footpaths would be upgraded where widening of President Avenue is proposed. Between West Botany Street and O'Neill Street, the main east-west pedestrian movement would be on the southern side of President Avenue, adjacent to Scarborough Park North, by way of a new shared path. Pedestrian connectivity would be provided within and around Rockdale Bicentennial Park to enable movement of pedestrians and cyclists within the parkland and to/from President Avenue.

A signalised crossing point on the northern side of President Avenue is not required given that east-west pedestrian movement would be available on the southern side of President Avenue and north-south movements across President Avenue would be available via the existing signalised pedestrian crossings of President Avenue described above. The majority of east-west pedestrian and cyclists movements along President Avenue would originate beyond West Botany Street and O'Connell Street and therefore the use of the existing signalised pedestrian crossings at these locations is not considered to be a significant diversion.

The option to use the existing pedestrian crossings is considered to be preferable to using the project shared cycle and pedestrian pathways that would be provided to the north.

It is noted that the shared cycle and pedestrian bridge would enable pedestrian and cycle access to the east and south (however east-west movements would primarily be available via the shared path on the southern side of President Avenue).

Proximity of pedestrian and cyclist infrastructure to wetlands

Options to relocate the shared cycle and pedestrian pathways to the east away from the wetlands are constrained by potential privacy, noise and night lighting impacts to nearby residential properties. It is considered that effective management of potential impacts to wetlands is the preferred option.

Chapter 12 (Biodiversity) of the EIS provides a summary of the biodiversity impacts associated with the project and considers the impact of all components of the project, including the construction and operation of the shared cycle and pedestrian pathways. The project has substantially avoided biodiversity impacts by using, as much as possible, already disturbed sites for above ground components. The following environmental management measures (refer to **Chapter D1** (Environmental management measures)) will be implemented to minimise the impact of the construction and operation of the shared cycle and pedestrian pathways on biodiversity:

- B1: Detailed design will avoid or minimise the need for native vegetation and habitat removal for the construction of the project, where feasible

- B2: Detailed design of the project will avoid or minimise artificial light impacts on biodiversity within and immediately adjacent to the operational project (eg downward-facing lighting along the shared cycle and pedestrian pathways)
- B3: A Wetlands Management Plan will be prepared and implemented, in consultation with relevant stakeholders, to manage waterbodies and riparian land within the project footprint that may be impacted by the project during construction.

The location of sections of the pedestrian and cyclist infrastructure would provide the opportunity for cyclists and pedestrians to enjoy the biodiversity values of the area. Urban design and landscape treatments would be finalised during the preparation of the Urban Design and Landscape Plan for the project. The plan will be developed in consultation with local councils, including Bayside Council.

B7.9 Construction

B7.9.1 Arncliffe construction ancillary facility

- Council would like to work with RMS [Roads and Maritime] on the design, orientation and location of the ventilation and water re-use facility. Council will be aiming to minimise the area of community land to be acquired by RMS [Roads and Maritime] and the impacts of the facility to park users in the future.
- For correct identification Council request that 7.3.2 Arncliffe construction ancillary facility in the EIS clearly define the boundaries between the Kogarah Golf Course lands at Marsh Street and those lands owned by Bayside Council.
- Kogarah Golf Club had leased a portion of Council land for their golf course, prior to RMS [Roads and Maritime]' current occupation for the M5 project. Council requests that the proposed design of the Arncliffe Ancillary facility show the proposed built form as it straddles the boundaries of RMS [Roads and Maritime] /Council and the Kogarah Golf Course.
- Council has provided previous commentary to RMS [Roads and Maritime] in relation to the potential spoil opportunities and Council requests the proponent prior to the engagement of contractors to engage fully with council on the potential opportunities for the management of spoil.

Response

The Arncliffe construction ancillary facility (C1) would require the continued occupation of six hectares of land currently being used to construct the New M5 Motorway (not including the lands to be permanently acquired in this location) that is owned by Bayside Council at Kogarah Golf Course.

During the construction of the project the use of a reduced area of Kogarah Golf Course would continue, as would lease arrangements between Roads and Maritime and Bayside Council.

The Arncliffe Motorway Operations Complex being constructed as part of the New M5 Motorway would be used for the proposed Arncliffe ventilation facility. As a result, the design, orientation and location of the facility has already been determined as part of the New M5 Motorway project. A substation and water treatment plant would be constructed adjacent to the New M5 Motorway Arncliffe Motorway Operations Complex, within MOC1 for the project.

The substation and water treatment plant would require the permanent partial acquisition of land at Kogarah Golf Course which is owned by Bayside Council. This land is currently affected by a 'Charitable Trust' preferring the use of the land for a road over recreation. The land proposed to be acquired has been designed to minimise potential impacts to the golf course. However, the final area to be acquired is subject to detailed design. Options to minimise the permanent footprint of the facility will be investigated during detailed design.

Roads and Maritime agrees with Bayside Council that local spoil disposal sites are preferable in terms of cost of disposal and reducing traffic impacts. However, at this point, no such local opportunities have been confirmed or finalised. The spoil reuse options identified in the EIS allow for the use of suitable spoil, including within the project. Refer to **section B7.10.2** for further information regarding spoil disposal options.

B7.9.2 Rockdale construction ancillary facility

- Council has no objection to the use of the existing RMS [Roads and Maritime] depot located on West Botany Street, other than consideration of traffic impacts of increased truck movements on West Botany Street.
- The use of the Rockdale facility impacts on the local community with heavy truck vehicular movements and noise. It is not isolated and does not have barriers or main roads that would provide a buffer zone to the residents similar to the Arncliffe site. Council's preference is that the main spoil removal occurs at the Arncliffe facility.

Response

If only a single spoil removal site were used for a tunnelling project of this scale, the overall rate of spoil excavation would be limited and this would result in an increased overall construction timeframe and duration of environmental impacts for spoil removal activities compared to a scenario where multiple sites are used. In the event that spoil removal activities were limited to a single site, there would also be an increased risk of delays and associated project cost increases in the event of an issue at the site that temporarily prevents the removal of spoil.

The increase in peak hour truck movements on West Botany Street from use of the existing Roads and Maritime depot on West Botany Street (Rockdale construction ancillary facility (C2)), is forecast to form 2-3 per cent of forecast construction year peak hour traffic on West Botany Street. This change would likely fall within the daily traffic variation on the road and is considered to have a negligible operational impact. The remaining heavy movements would occur outside of the peak hours.

As described in section 11.3.1 of the EIS, noise levels from the construction works associated with the facility would exceed Noise Management Levels (NMLs) at nearby receptors during all construction scenarios. It should be noted though that the number and scale of exceedances varies substantially throughout the construction period. Noise levels would decrease through the respective Noise Catchment Areas (NCAs) with distance from construction works and the noise modelling results in the EIS represent a worst case scenario for receptors closest to the construction works.

Construction noise mitigation measures incorporated into the design of the Rockdale construction ancillary facility include a spoil shed (for spoil handling activities) and site hoarding. Night-time haulage will be avoided where practical and feasible to minimise noise impacts.

A range of other environmental management measures will be implemented to manage potential construction noise impacts (refer to **Chapter D1** (Environmental management measures)), including:

- NV1: A Construction Noise and Vibration Management Plan (CNVMP) will be prepared. The CNVMP will include processes and responsibilities to assess, monitor, minimise and mitigate noise and vibration impacts during construction.

The plan will:

- Identify relevant performance criteria in relation to noise and vibration
- Identify noise and vibration sensitive receptors and features in the vicinity of the project
- Include standard and additional mitigation measures from the Roads and Maritime *Construction Noise and Vibration Guideline*⁵ (CNVG) and details about when each will be applied
- Describe the process(es) that will be adopted for carrying out location and activity specific noise and vibration impact assessments to assist with the selection of appropriate mitigation measures
- Consider cumulative construction noise impacts and construction noise fatigue
- Include protocols that will be adopted to manage works required outside standard construction hours, in accordance with relevant guidelines
- Include a Blast Management Strategy (where blasting is required)

⁵ Roads and Maritime Services (2016) *Construction Noise and Vibration Guideline*

- Detail monitoring that will be carried out to confirm project performance in relation to noise and vibration performance criteria

The CNVMP will be implemented for the duration of the construction of the project.

- NV2: Detailed noise assessments will be carried out for all ancillary facilities required for construction of the project. The requirement for temporary noise walls within ancillary facilities and adjacent to construction works, and the requirement for other appropriate noise management measures, will be assessed and implemented prior to the commencement of activities which have the potential to cause noise or vibration impacts
- NV3: All residents affected by noise from the construction of the project which is expected to exceed the construction noise management levels will be notified about potential noise impacts prior to the commencement of construction works.

The Rockdale construction ancillary facility (C2) would result in traffic and noise impacts, however, traffic impacts are considered to be minor and noise impacts would be managed through the implementation of the environmental management measures described above.

B7.9.3 President Avenue intersection and construction ancillary facility

- As noted, there will be an impact on existing recreation facilities.
- The relocation of the Skate Park, playground and sporting fields will need to be completed prior to commencement of construction of this facility, to ensure minimal impact on current users of this space. As noted above the Recreation Needs Analysis jointly managed by Council and RMS [Roads and Maritime] has commenced and will identify ways in which the impacts can be mitigated and compensated. Interim feedback has been provided to RMS [Roads and Maritime] on temporary impacts and permanent impacts.
- Council will require a performance brief for the appointed contractor which demonstrates a program to relocate works at the cost of the F6 extension.

Response

As announced in November 2018, Roads and Maritime has committed to providing new and upgraded sporting and recreational facilities in nearby locations to offset the temporary loss of these facilities during construction of the project. These facilities will include the creation of new grass and synthetic playing fields and the upgrade of existing amenity block facilities. These facilities would be provided so as to ensure continuity of facilities for the community. This commitment is included in the project as environmental management measure SE2 (refer to **Chapter D1** (Environmental management measures)).

Roads and Maritime and Bayside Council are developing a full inventory of parkland and recreational assets that would be affected by the project in order to ensure any loss is compensated for as per agreement with Bayside Council or the asset owners as relevant.

Roads and Maritime will continue to work in partnership with Bayside Council to complete the Recreation Needs Analysis for the area, including the final relocation plan and permanent reconfiguration of the Rockdale Bicentennial Park facilities. Reconfigured facilities would be comparable with existing facilities, and where possible, enhanced according to the needs of the users.

Roads and Maritime will work with Bayside Council and the construction contractor to ensure the reconfigured facilities are delivered in accordance with stated commitments in the EIS, this report and as required by the conditions of approval for the project, should it be approved.

Refer to **section B7.7.1** for further information regarding the reinstatement of Bicentennial Park.

B7.9.4 Princes Highway construction ancillary facility

- Location of Princes Highway and President Avenue intersection upgrade works. Council will require further details of the location and impact on traffic or adjacent land uses to be able to comment on this.
- Ingress and egress of vehicles needs to be managed appropriately within the current transport networks and consideration should be given to the proximity to the local school and technical college as part of this.

Response

Works for the construction of the Princes Highway and President Avenue intersection would be supported by the Princes Highway construction ancillary facility which is shown in Figure 7-7 of the EIS. The extent of the construction boundary for the Princes Highway and President Avenue intersection works is shown in Figure 7-13.

Temporary changes to the road network, active transport, public transport and access routes at and around the intersection are described in section 7.6.1 to section 7.6.4 of the EIS.

Should the project be approved, the Construction Traffic and Access Management Plan (CTAMP) will guide the maintenance of safe access for St George TAFE and James Cook Boys' Technology High School during the operation of the Princes Highway construction ancillary facility (C6). It will include measures to ensure that safe routes are provided for pedestrians during construction.

B7.9.5 Shared cycle and pedestrian pathways construction ancillary facilities

Council will require detailed design and consultation in relation to access to either side of Muddy Creek Recreation Area.

Response

The detailed design of the shared cycle and pedestrian pathways would be developed in continued consultation with Bayside Council and other key stakeholders such as Sydney Water. Access would be required from the C5 site across Muddy Creek and to the section of the shared pedestrian and cycle pathway adjoining Bestic Street. Roads and Maritime would enter into an agreement with Bayside Council and the relevant government department regarding the temporary access and use of land to construct the shared cycle and pedestrian pathway.

B7.9.6 General comments

- Most construction sites are located where demand for street parking is high and Council anticipates parking concerns will be further exacerbated when construction commences. Council must be provided with a copy of the Construction Traffic and Access Management Plan (CTAMP) with details for shuttle bus services to and from these sites.
- Bus companies must be contacted for changes to bus stops and bus zone locations and provided with an opportunity to comment on any proposed changes. Compliance with Disability Discrimination Act (DDA) may require provisions of temporary bus pads at the new locations. Council should be consulted and provided with details prior to these changes occurring.
- Council seeks consultation with [regarding] where those boundaries [of construction ancillary facilities] intercede with Council owned properties.
- RMS [Roads and Maritime] should demonstrate to Council appropriate environmental management of the ancillary facilities (listed at 7.3.1 – 7.3.8). This includes (but is not limited to) Environmental Management Plans (EMP), Standard Operating Procedures (SOPs), Safe Work Method Statements (SWMS), Remediation Action Plans (RAP)(where appropriate) for all activities planned to be undertaken upon these sites, including (but not limited to) storage of spoil, water treatment, excavation of land etc.
- Geotechnical testing to ascertain the condition of the land prior to works will need to be undertaken and equivalent testing prior to handing back the land.
- RMS [Roads and Maritime] will be required to accept the land in its current condition.
- Given the potential for significant onsite contamination associated with former land uses, council requires detailed environmental reports and remediation action plans in relation to any construction works involving the excavation of soil from the areas.
- Bayside Council requests mechanisms which require the F6 proponents to engage with Council in terms of these and additional construction sites, transport impacts and potential land use sites.

Response

Car parking

Some of the project's workforce would drive to construction sites and require car parking. The number of construction personnel requiring parking would vary over the duration of the construction program.

A preliminary assessment of parking provision is provided in section 8.4.4 of the EIS. The assessment is based on approximate peak workforce estimates and anticipates that the total parking provision within the construction sites would be able to meet forecast parking demand. While Rockdale construction ancillary facility (C2) has a forecast deficit, the forecast surplus at the other construction ancillary facilities in the vicinity could be used to mitigate associated impacts. Opportunities to provide additional car parking within the Rockdale construction ancillary facility are being investigated and will be confirmed in the CTAMP.

To assist in minimising impacts from the construction workforce using on-street parking, the use of public transport would be encouraged (where feasible). All construction ancillary facilities are located about a 15 minute walk from a train station. The Rockdale construction ancillary facility (C2) and President Avenue construction ancillary facility (C3) are also serviced by one or more bus routes. However, workers starting or ending shifts very early or very late would be more likely to use private vehicles.

Impacts to bus services

The project may require the temporary relocation of some bus stops along President Avenue during construction, which may result in some passengers having to walk a short distance further to access a temporary bus stop. Temporary changes to bus stops would be undertaken in consultation with Transport for NSW and bus operators and would seek to minimise the distance from existing bus stops. Access to temporary bus stops would be compliant with the *Disability Discrimination Act 1992* (Commonwealth).

Construction ancillary facilities

Roads and Maritime will develop a Construction Environmental Management Plan to oversee all activities to be undertaken at ancillary facility locations, for the full duration of their use. Bayside Council will be consulted during the preparation of this plan.

Potential contamination and geotechnical impacts

An assessment of potential soil and contamination impacts associated with the project is summarised in Chapter 16 (Soils and contamination) of the EIS.

Detailed site contamination investigations will be undertaken in accordance with the NSW EPA (1995) *Sampling Design Guidelines* within the following ancillary facilities and construction sites prior to commencement of construction at these sites:

- Rockdale construction ancillary facility (C2)
- President Avenue construction ancillary facility (C3), specifically Rockdale Bicentennial Park and 427 to 441 West Botany Street
- Parts of the shared cycle and pedestrian pathways where earth works are required within Civic Avenue, Bicentennial Park, Rockdale Women's Sports Field, Greg Atkins Mini Field, CA Redmond Field and White Oak Reserve
- Princes Highway construction ancillary facility (C6), the 7-Eleven service station at 734 Princes Highway, Kogarah
- The substation within St George TAFE.

Where required, based on the results of the additional investigations, a Remedial Action Plan (RAP) will be prepared.

A Construction Soil and Water Management Plan (CSWMP) will be prepared for the project. The plan will detail the process and measures to manage and monitor soil and water impacts associated with the construction works, including contaminated land and will:

- Describe measures to minimise and /or manage sediment and erosion within the project footprint, including overland flow, including requirements for Erosion and Sediment Control Plans (ESCP)

- Describe stockpile management measures, including location restrictions, separation of waste types, stabilisation and sediment controls
- Describe measures for managing waste, including spoil classification and handling
- Describe procedures for managing unexpected contamination finds
- Describe procedures for managing groundwater impacts including treatment requirements
- Describe procedures for dewatering accumulated water on site and within sediment basins, including discharge criteria and sign off
- Describe spill management procedures including requirements for locating and maintaining spill response materials such as spill kits
- Detail surface water and groundwater monitoring requirements, including discharge criteria.

Measures will be consistent with the Blue Book⁶ and relevant Roads and Maritime guidelines.

A Work Health and Safety Plan will be implemented during construction of the project, supplemented by site and activity specific Safe Work Method Statements.

A range of geotechnical investigations has been carried out to inform the project concept design. Geotechnical considerations relate primarily to engineering design and are outside the scope of the EIS. The final geotechnical condition of land that would be temporarily acquired and returned to Bayside Council would be agreed with Roads and Maritime as part of a lease agreement.

Potential acid sulfate soils impacts will be managed as part of the CSWMP. If the project is approved, the plan will be prepared in consultation with relevant authorities, as specified in the conditions of approval.

Consultation with council

The updated environmental management measures for the project are summarised in **Chapter D1** (Environmental management measures) and include a number of measures which involve consultation with relevant councils, including during the preparation of a CTAMP (refer to environmental management measure TT1). The CTAMP will be prepared in accordance with applicable guidelines and relevant standards, guides and manuals.

The CTAMP will include a car parking strategy for construction staff at the various worksites, prepared in consultation with local councils and stakeholders associated with facilities adjacent to the project site.

Roads and Maritime will consult with Bayside Council and other relevant stakeholders on the development of the Construction Environmental Management Plan and various sub-plans, as required.

B7.9.7 Project construction activities

- A detailed program and scope for preparatory investigations will need to be provided to Council, to ensure we can mitigate impacts on users where possible.
- Council will be the first point of contact for the community should issues arise and it is essential that Council understands the scope and timing of these works to notify users and engage with the contractor or contractors if issues are identified by the community.
- Council would also request that in terms of environmental site testing and geotechnical works, that council is extended the ability to both rely and use work that is undertaken as part of the F6 project.
- The Council has previously requested that clean stock pile spoil be reused to enhance local recreation areas and minimise impacts on local transport networks. Council has significant land holdings where the reuse of spoil would achieve a significant community benefit. Council seeks a Spoil Management Plan which identifies spoil locations and necessary approvals

⁶ Landcom (2004) Managing Urban Stormwater: Soils and construction – Volume 1

Response

If the project is approved, a construction contractor would be engaged to carry out detailed design and construct the project. Both Roads and Maritime Services (Roads and Maritime) and the construction contractor will be responsible for the ongoing communication with council, stakeholders and the community during project construction.

The community and stakeholder consultation carried out during construction will include updates on the planned construction activities and program, will respond to enquiries and concerns in a timely manner, and will seek to minimise potential impacts where possible. A detailed Community Communication Strategy will be prepared to detail the processes to facilitate communication and feedback between the project team and the community.

Refer to **section B7.10.2** for information regarding spoil disposal options.

B7.9.8 Construction of the Rockdale ventilation facility

The Rockdale ventilation facility will be constructed on the west side of West Botany Street and is located within close proximity to existing residential properties including high-density residential and traditional housing. Council requests that there is further consultation on the impact of these ventilation facilities in terms of air quality, size and structure and ongoing noise given proximity to the community in general.

Response

Community consultation has been carried out prior to public exhibition of the EIS to provide opportunities for the community and stakeholders to learn more about the project, and have their say. This has included consultation regarding ventilation facilities as summarised throughout section 3.2 and 3.3 of the EIS.

A Communications Strategy will be developed to facilitate ongoing consultation with key stakeholders including Council, during the detailed design, construction and operation of the project. The ventilation facility would be located in an industrial and commercial complex. The air quality assessment (refer to Chapter 9 (Air quality) and Appendix E (Air quality impact assessment) of the EIS) predicts that the contribution of emissions from the ventilation outlets to community exposure to air quality is small relative to the contribution of emissions from traffic on surface roads and from other pollution sources. The primary source of community exposure to air pollution is from existing regional air pollution, followed by emissions from the surface road traffic.

The statement by the NSW Chief Health Officer at the time of the EIS exhibition stated that *'NSW Health considers that any pollution-related health effects from the project are likely to be primarily a result of changes in volumes of traffic on the surface road network, not a result of the tunnel ventilation outlets'*.

Noise emissions from ventilation facilities during operation of the project would be influenced by the volumes of traffic using the project tunnels. Ventilation fans within the project tunnels would be operated at different speeds to maintain acceptable in-tunnel air quality, with the speed of the ventilation fans therefore related to traffic conditions within the tunnels.

The predicted noise levels for fixed facilities (which includes project ventilation outlets) presented in Appendix G (Noise and vibration technical report) of the EIS demonstrates that during normal traffic conditions, low speed traffic conditions and emergency operating conditions, the operational noise criteria would not be exceeded during neutral or adverse weather conditions. Worst case noise levels at the Rockdale (south) ventilation facility are provided in **Table B7-1**.

Table B7-1 Rockdale (south) ventilation facility emergency traffic – predicted L_{Aeq} (15min) night-time noise levels

NCA	Most affected receiver	Criteria dB(A)	Neutral conditions dB(A)	Adverse conditions dB(A)	Number of exceedances
NCA09	53 O'Neill St, Brighton-Le-Sands	37	32	33	0
NCA11	79 French St, Kogarah	43	32	34	0
NCA14	465 W Botany St, Kogarah	56	23	27	0
NCA15	6 Annette Ave, Kogarah	37	18	23	0

NCA17	24 Colson Crescent St, Monterey	37	25	28	0
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The assessment also found that the noise would not contain any low-frequency or tonal characteristics and that the $L_{A1(1min)}$ levels at all receptors would comply with the sleep disturbance noise screening criteria and therefore no further sleep disturbance assessment is required.

B7.9.9 Permanent power supply connection

Council notes that there is a proposed new permanent power supply connection that will be trenched and run along significant parts of the new F6 extension. Council has large areas of currently unserviced land that forms part of the recreational facility and that there may be opportunities for small independent substations to be situated along the route to enable connection to the power and provide for other community facilities within the parks that may not be existing.

Response

The permanent power supply connection has been developed to meet the operational requirements of the project. Once constructed, this infrastructure would be wholly owned and maintained by Ausgrid. The provision of power to community facilities is outside the scope of the project.

B7.10 Spoil storage, transport and disposal options

B7.10.1 Spoil transport options

Council has reviewed the proposed spoil transport options including heavy rail and potentially barge transport. Council understands both of those options were considered for the previous WestConnex project and neither option was feasible. The obvious disadvantage of heavy transport to relocate spoil is:

- Impact on existing road networks.
- Noise and fume pollution from heavy truck movements on residents.
- Damage to existing road network.
- Traffic congestion associated with large transport truck movements.

Response

Spoil would be hauled using heavy vehicles to spoil reuse and disposal sites. The potential impacts associated with the movement of heavy vehicles during construction (including traffic, air quality and noise impacts) are assessed throughout the EIS and a number of environmental management measures are proposed to manage these impacts.

As described in section 5.5.4 of the EIS, consideration was given to various modes available to store and transport spoil. Heavy rail and barge transport present a number of issues including that the material would need to be double (or possibly triple) handled, as trucks would be required to move material to the barge loading facility, and potentially from the barge to its final location, if this does not have barge access. Infrastructure upgrades would also potentially be required to allow the barge loading facility to receive the material.

Spoil removal using heavy vehicles (ie trucks) is the preferred transport option for the project and would involve transporting material from the construction sites directly to the spoil's final destination. This would be primarily via the arterial road network. The use of trucks would avoid the need for double or triple handling, as would be the case with rail or barging options, but would result in a higher number of trucks on the road. This increase is considered acceptable given the transport options.

B7.10.2 Spoil disposal options

- Bayside Council notes that several spoil management sites have been identified in Chapter 21 as part of the waste management, which range from 40 to 70 kilometres from the project. Council has previously engaged with Roads and Maritime Services in relation to feasible spoil management options located within the council (Bayside Council area), with a clearly demonstrable public benefit in terms of the reduction of truck movements on the local street

network and associated impacts and to provide a public benefit by using the spoil for the rehabilitation of dilapidated lands most notably used as former tip sites.

- The EIS should extend to consider feasible options within the Bayside municipality and include them in the assessment of the project for the spoil disposal. Any approvals for the project should extend to include the disposal of large amounts of material on land requiring capping layers or potential stabilisation through extracted quality sandstone materials.
- There is a demonstrable public benefit both in terms of:
 - Cost savings for transport or material away from the project site.
 - The saving or net benefit of not needing to import spoil at a later date for projects.
 - Potential public benefit through minimal expenditure in relation to the total project size.
- The alternative or additional spoil reuse options should not be left for the construction contractor to negotiate or progress given that the proposed 1.4 million cubic meters of spoil becomes a designated development under the EPA Act, and requires specific approvals for placing it. It further requires specialist strategic planning and engineering advice to enable its reuse in surrounding land areas. The use of these areas and the identification of these lands should be a key criterion for spoil disposal as an option for the F6 extension to maximise the public benefit that can be achieved, minimising the impact on surrounding communities.
- Council notes the waste management levy is a significant consideration in relation to the storage and use of spoil in a project of this size.

Response

Roads and Maritime agrees with Bayside Council that local spoil disposal sites are preferable in terms of cost of disposal and reducing traffic impacts. However, at this point, no defined local opportunities have been confirmed or finalised. The spoil reuse options identified in the EIS allow for the use of suitable spoil, including within the project.

Spoil would be delivered to the spoil management sites in accordance with the conditions of approval and (if applicable) environment protection licences governing those sites. The spoil reuse and disposal sites identified in the EIS are based on the current existing availability of spoil receiving locations (including projects with a fill deficit) across the Sydney area. Construction of the project would occur over a four year period, with spoil generation peaking in year two.

The following criteria would be applied to determine the priority given to the identified spoil reuse and disposal sites, including how much spoil would be sent to each site, and to evaluate any additional spoil reuse or disposal options that emerge during construction:

- Environmental benefit - preference for the material to be reused for environmental works (eg coastal protection works), clean fill on other projects, or land restoration
- Traffic impacts – with a preference for haulage routes that keep to major arterial roads and minimise total haulage requirements as far as possible
- Approvals – any receiving location would need to be approved to receive the applicable type and volume of spoil
- Economic feasibility – feasibility of transporting the spoil compared to the options already identified, including consideration of the distances to be travelled.

The waste levy under the *Protection of the Environment Operations Act 1979* requires certain licensed waste facilities in NSW to pay a contribution for each tonne of waste received at the facility. The contribution aims to reduce the amount of waste being landfilled and promote recycling and resource recovery. As described above, the project would target a 95 per cent beneficial re-use of the usable spoil to minimise the amount of waste being sent to landfill.

Spoil management and transport is a component of the overall F6 Extension project. Roads and Maritime is seeking approval for the project as State significant infrastructure under Part 5, Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The EIS prepared for the project considers impacts associated with spoil management and transport and therefore separate approvals or assessment (eg a separate EIS required for a designated development under Schedule 3 of the Environmental Planning and Assessment Regulation 2000) of spoil management and transport is not required.

B7.11 Traffic impacts

B7.11.1 Local access at President Avenue

- O'Neill Street conversion to a cul-de-sac has not been presented to Council for discussion. A left in and left out access would be preferred to be maintained for O'Neill Street but it is acknowledged that the changes in level may not allow for this to be possible. Access to memorial playing fields, tennis courts, and car park through Sybil Lane will be impacted. Local residents and Brighton-Le-Sands Public School must be consulted on the proposed change by RMS [Roads and Maritime] and Council be involved as an interested party in the process.
- Lachal Avenue's proposed 2-way conversion in [is] not supported as it will lead to loss of all parking in the street due to its narrow width of only 7.2m. This is a loss of amenity for residents in addition to extra traffic movements. Access for Moorefield Estate for residents turning right out is not considered safe or adequate from Lachal Avenue as the opportunity to make the right turn with the proposed F6 increase in traffic will be extremely limited.
- Moorefield Avenue's conversion to a cul-de-sac is not supported. Left in-left out access must be maintained to avoid unnecessary circulation of local traffic along Annette Avenue. Council sees no safety benefit derived from preventing left in and left out movement.
- Civic Avenue's proposed left in/left out only is not supported by Council. The preferred option is for a signalised intersection to accommodate safe right turning movements into and out of Moorefield estate. A right turn holding lane can be provided to minimise impact on traffic along President Avenue. Civic Avenue is sufficiently wide for this treatment and will have minimal impact on residents, parking and amenities and provide access to residents. Along with traffic signals, Council would also like additional traffic calming measures installed in Civic Avenue and Marshall Street to make this route less attractive as a shortcut for southbound vehicles between President Avenue and Rocky Point Road.

Response

O'Neill Street has been reconfigured as a cul-de-sac due to safety reasons. Access to the Brighton Memorial Playing Fields and nearby tennis courts would be available from Crawford Road via O'Neill Street and/or Sybil Lane. Future forecast volumes along Crawford Road, north of President Avenue, indicates volume decreases due to the impact of the project. Therefore, community access to the Brighton Memorial Playing Fields would cause minimal impact to the operation of Crawford Road.

Proposed changes to access arrangements at Moorefield Estate in response to community and stakeholder feedback are described and assessed in the preferred infrastructure report. The following changes are proposed to the access arrangements at Moorefield Estate:

- Lachal Avenue would be converted from one-way northbound to one-way southbound (inbound movements from President Avenue only). A right turn bay and traffic signals would be provided for the right turn into Lachal Avenue from President Avenue, to ensure safe vehicle movements
- Traynor Avenue would be converted from one-way southbound to one-way northbound. Only left turn movements into President Avenue would be permitted
- The cul-de-sac at Moorefield Avenue, as described in the EIS, would not proceed. Moorefield Avenue would therefore not be altered from the existing access arrangement
- An additional 60 metre southbound left turn bay at the existing signalised intersection at West Botany Street and President Avenue would be provided
- A signalised intersection would be provided for movements between Civic Avenue and President Avenue. Available traffic movements would remain the same as the existing network configuration. The intersection would operate with continuous eastbound through movements along President Avenue. A pedestrian crossing would be provided across Civic Avenue
- The right turn from Cross Street into President Avenue would be banned.

B7.11.2 Moorefield Estate Transport Working Group

- Council supports the consultation held 28 November 2018 for the Moorefield Estate, St George School, TAFE, James Cook High School and Moorefield Girls School.

- The RMS [Roads and Maritime] intersection designs for the President Avenue Option B discussed at the meeting should consider the following:
 - Allow access to the F6 extension tunnel from the Moorefield Estate.
 - Design the right turn holding bay from Civic Avenue into President Avenue travelling east with sufficient length to allow vehicles to merge safely.
 - Community consultation should be undertaken if there is any proposed loss of parking on Civic Avenue.
 - Community consultation, including with the businesses, should be undertaken regarding the loss of parking on President Avenue with the future introduction of morning and afternoon peak hour clearways.
 - Load limit restrictions should be considered for the Moorefield Estate streets to prevent heavy vehicle through traffic.
 - Bus access into Lachal Avenue for St George School students should be maintained and considered in future road network designs.
 - The change in level at the intersection of Traynor Avenue/Annette Avenue should be considered in future road network designs.
 - Consider the uses of 'Keep Clear' markings on President Avenue at Lachal Avenue under the Option B proposal.
 - The footpath width at President Avenue/Princes Highway intersection must not be reduced to allow road widening. The local schools and TAFE in the local area means there is high pedestrian traffic using these footpaths.
 - Community consultation process by RMS [Roads and Maritime]/F6 project managers must be undertaken with local residents affected by proposed changes.
 - Investigate opportunities to increase safety at the Marshall Road/Rocky Point Road for vehicles exiting the Moorefield Estate.
 - Investigate the current change "no right turn" from Rocky Point Road southbound.
- A similar RMS [Roads and Maritime] Community Traffic Meeting needs to be made available for residents in the Chuter/O'Connell precinct area.

Response

Proposed changes to access arrangements at Moorefield Estate in response to community and stakeholder feedback are described and assessed in the preferred infrastructure report. A summary of these changes is listed in **section B7.11.1**.

Roads and Maritime will, in conjunction with Bayside Council, implement Local Area Traffic Management (LATM) measures, such as heavy vehicle load limits, raised pedestrian crossings and speed humps, to reduce traffic demand on O'Connell Street/Chuter Avenue as well as Civic Avenue/Marshall Street.

There are currently no plans for a Community Traffic Meeting for this location.

B7.11.3 Princes Highway/President Avenue intersection

- No improvement works are proposed for westbound/southbound traffic. Council has concerns about the delays and queue lengths at the intersection of the Princes Highway/President Avenue and the potential use of Civic Avenue/Marshall Street as a thoroughfare by traffic if the existing intersection configuration performs at less than optimum levels to cater to the increased traffic from F6. Traffic modelling must provide a comparison for time taken to use the Princes Highway/President Avenue intersection with the existing cycleway vs using Civic Avenue/Marshall Street to travel to Rocky Point Road.
- There are safety concerns with accessing Marshall Street at Rocky Point Road with the existing left-in/left-out arrangement. Marshall Street is too close to the fork of Princes Highway and Rocky Point Road with a sharp left in and an equally difficult left turn out movement due to traffic coming at speed. Expected increase in traffic flow at the intersection will exacerbate current safety concerns. Council wants improvements to this intersection to make it safe for all road users.

Response

No additional improvements are considered on the westbound approach to the intersection. However, additional capacity ie a right turn lane, is provided on the northbound approach and an additional short left turn bay would be provided on the southbound approach to the Princes Highway/President Avenue intersection. This would enable signal time allocation to be maintained on the approaches. Traffic modelling at the intersection shows that the proposed intersection layout with the project results in little change in intersection performance in the 2026 AM peak hour and improved performance in the 2036 AM peak hour. In the 2026 and 2036 PM peak hour, the intersection performance is forecast to worsen. However, the intersection is still forecast to perform at Level of Service (LoS) D, which is considered acceptable. This information is detailed in section 8.7.3 of the EIS.

Strategic traffic model results indicate a daily two-way increase along Civic Avenue/Marshall Street of about 1,400 vehicles per day with the project. There are existing traffic calming measures in place, with three speed humps along Civic Avenue/Marshall Street, between President Avenue and Rocky Point Road, which would deter motorists from this route. Should the project be approved, Roads and Maritime will work with Council to minimise impacts of the project on Civic Avenue/Marshall Street.

The comment regarding safety at the intersection of Marshall Street and Rocky Point Road is noted. This is an existing issue and the project would not further decrease the safety of the intersection. Roads and Maritime Network Safety has carried out initial investigations of the intersection of Marshall Street/Rocky Point Road. The crash data results indicate that there are no issues at this intersection.

B7.11.4 President Avenue intersection

- Pedestrian facilities have not been provided at the entry/exit of the tunnels at President Avenue. Council has concerns about pedestrian safety, accessibility and connection to Bicentennial Park, Memorial Playing Fields and O'Neill Street without these facilities and footpath design and construction must provide suitable connection on [the] southern side including additional pedestrian phase on President Avenue at O'Connell Street (on western side).
- A pedestrian phase at traffic signals would be required across Civic Avenue as part of Council's preferred option of Civic Avenue traffic signals.
- Pedestrian phase on President Avenue on the eastern side of West Botany Street traffic signals is required to facilitate access to Bicentennial Park
- A number of properties have driveways east of O'Neill Street on President Avenue. The extent of embankment currently encroaches along these properties and must ensure that their vehicles do not scrape at the bottom and driveway accesses are maintained or reconstructed at no cost to Council or residents if they are adversely impacted.
- Impacts of the proposal on O'Connell Street and Chuter Avenue have not been addressed. Council is concerned about an increase in traffic along this route between Sandringham Street and President Avenue in both directions to access the F6. Council requests the speed limit in O'Connell Street/Chuter Avenue to be reduced to 50kmph. Council would also like the provision of a traffic calming scheme along the entire length of this route including treatments at the intersections with side streets to make this route less attractive for use as a thoroughfare. The traffic calming scheme designed as part of the delivery of F6 must be in consultation with Council's traffic team.
- RMS [Roads and Maritime] are requested to undertake post completion surveys to monitor how the predicted traffic impacts transpire and whether the proposed mitigation measures are effective. These counts are to be undertaken at 12 monthly intervals post completion, for a period of 5 years, with RMS [Roads and Maritime] required to implement treatment measures if the traffic conditions have deteriorated.
- RMS [Roads and Maritime] are [is] requested to monitor and remediate the road surface impacted during the proposed construction period.

Response

Pedestrian facilities at President Avenue intersection

Refer to **section B7.8.1** for information regarding pedestrian and cyclist connectivity at President Avenue.

Traffic signal phasing for pedestrians at Civic Avenue

Proposed changes to access arrangements at Moorefield Estate in response to community and stakeholder feedback are described and assessed in the preferred infrastructure report. As part of the proposed changes, a signalised intersection would be provided for movements between Civic Avenue and President Avenue. A pedestrian phase would be included for the traffic signals.

Traffic signal phasing for pedestrians at West Botany Street

Signal phasing would not be changed from the existing arrangement at the intersection of West Botany Street and President Avenue, which includes a pedestrian phase. Additional time allocated for pedestrians would reduce time for traffic vehicles increasing queue lengths and delays at the intersection.

Impacts to driveways on O'Neil Street

Design of the upgraded President Avenue will ensure there is an appropriate grade between the modified President Avenue and driveway access to residences to the north and south of the road, including along O'Neil Street.

Impacts to O'Connell Street

As detailed in section 8.7.3.2 of the EIS, more traffic is forecast to use O'Connell Street with the project. Roads and Maritime will, in consultation with Council, implement LATM measures, such as chicanes and speed humps, to reduce traffic demand and minimise the impacts of the project on O'Connell/Chuter streets as well as Civic Avenue/Marshall Street.

Review of operational traffic performance

Roads and Maritime will undertake a review of operational network performance, in consultation with Transport for NSW and Council, to confirm the operational traffic impacts of the project on the President Avenue corridor and the surrounding arterial roads and major intersections at both 12 months and at five years after the commencement of operation of the project. This is detailed in Table 8-65 of the EIS.

Physical impacts to road surfaces

Prior to impacting roads, a road dilapidation report will be prepared, identifying existing conditions of local roads and mechanisms to repair damage to the road network caused by heavy vehicle movements associated with the project. This is detailed in Table 8-65 of the EIS.

B7.11.5 General comments

Council requests that detailed traffic management plans be prepared that identify:

- Impacts on local streets
- Proposed intersection upgrades
- Proposed clearways
- Impacts of parking demand and proposed parking offset
- Impacts on parking for the neighbouring industrial areas
- Impacts on safety and access to and from the Moorefield Estate precinct
- Pedestrian and Active Transport Management Plan.

Response

Should the project be approved, a CTAMP will be prepared. The CTAMP will communicate changes in traffic conditions, including impacts on local streets, to road user groups and other affected stakeholders. The CTAMP will also identify proposed intersection upgrades, proposed clearways, and impacts on parking demand and proposed offset. Council's comments regarding consideration of impacts on parking for neighbouring industrial areas, and impacts on safety and access to and from the Moorefield Estate, is noted and will be considered in the development of the CTAMP. The CTAMP will also document safe routes for pedestrians and cyclists during construction. Council's comment regarding a Pedestrian and Active Transport Management Plan is noted and will be considered in the development of the CTAMP.

B7.12 Air quality

B7.12.1 Potential air quality impacts during operation

- Council seeks additional air quality monitoring stations. These should be provided adjacent to the two proposed ventilation stacks. These monitoring stations should be located at an appropriate elevation to reflect the elevated ventilation outlets design.
- An additional air quality monitoring station should also be located close to O'Connell St, Monterey to reflect the likelihood of significant increase of traffic on this roadway as a result of the proposed motorway.
- Illinden Sports Fields should be identified as a sensitive receptor in terms of air quality if this site has not yet been included.
- RMS [Roads and Maritime] to provide details of mitigation measures if there is found to be poor air quality adjacent to the tunnel entry/exit and also next to the Illinden Sports Fields.
- RMS [Roads and Maritime] should investigate the creation of micro climates around ventilation stacks and sensitive receptors through tree planting to reduce flow of pollutants.
- RMS [Roads and Maritime] to develop a Development Control Plan amendment for Council consideration to include design parameters to minimise adverse air quality impacts on potential future development immediately around stacks.
- RMS [Roads and Maritime] to provide details on what it has learnt from air quality monitoring for WestConnex and the new M5 projects and how these lessons learnt will be implemented for the F6 project.

Response

The number and locations of ambient air quality monitoring stations during the operation of the project will be developed in consultation with ACTAQ.

The Illinden Sports Field was subject to a detailed air quality analysis as one of the 17,509 recreational, workplace and residential receptor sites assessed. As described in section 9.6 of the EIS, under expected traffic conditions, the predicted contribution of tunnel ventilation outlets to pollutant concentrations was negligible for all receptors at ground level. Illinden Sports Field is RWR receptor 10378 in Appendix E (Air quality technical report) of the EIS. The changes in the specific criteria pollutants and air toxics at the Illinden Sports Field and their respective criteria are shown in **Table B7-2**.

Table B7-2 Changes in concentration for criteria pollutants and air toxics at the Illinden Sports Field (Receptor 10378)

Metric	Scenario	Criteria pollutants								Air toxics				
		CO	CO	NO ₂	NO ₂	PM ₁₀	PM ₁₀	PM _{2.5}	PM _{2.5}	Benze ne	PAHs	Formal dehyde	1,3 butadie ne	Ethylbe nzene
		Max 1h	Max 8h	Max 1h	Annual	Max 24h	Annual	Max 24h	Annual	Max 1h	Max 1h	Max 1h	Max 1h	Max 1h
Change in concentration (Receptor 10378)	2026-DS	-0.03	-0.02	-0.62	0.24	0.17	0.06	0.07	0.06	-0.15	-0.05	-0.06	-0.15	-0.05
	2036-DS	-0.03	-0.02	0.62	0.27	0.12	0.12	0.18	0.12	0.25	0.05	0.06	0.25	0.05
	2036-DSC	-0.05	-0.04	1.36	0.16	0.36	0.13	0.13	0.11	0.35	0.07	0.09	0.35	0.07
Criterion		30	10	246	62	50	25	25	8	29	0.4	20	40	8,000

The air quality modelling results in **Table B7-2** show that the changes in pollutant concentrations, both decreases and increases, are very small compared the criteria.

In February 2018, the NSW Government announced reforms to the regulation of ventilation outlets for motorway tunnels in NSW. As part of the reforms, ventilation outlets will be regulated by the NSW EPA. The NSW EPA will require tunnel operators to meet air quality limits and undertake air quality monitoring, where practicable.

The future development of land (including rezoning) in the vicinity of the project ventilation outlets that may involve multistorey buildings above 30 metres in height would need to consider the air dispersion performance of the outlets. Roads and Maritime will assist Bayside Council in determining any relevant land use considerations applicable to future development for inclusion in local environmental plans or development control plans, where required.

The air quality assessment demonstrates that air quality between 10 and 30 metres above ground level is generally better than air quality at ground level as the influence of surface road traffic reduces above 8-10 metres.

The WestConnex tunnel projects are not yet open to traffic so no operational air quality monitoring data is available. However, data from the extensive air quality monitoring for the M5 East is available⁷.

The ventilation outlets would be around 35 metres and would discharge emissions at velocities high enough to ensure rapid dispersion, and therefore dilution, in the atmosphere above the outlets. The modelling shows that the effects of the outlets are not in evidence below at least 35 metres, therefore planting of vegetation around the outlets would have no impact on air quality.

B7.13 Noise and vibration

B7.13.1 Potential noise impacts during construction and operation

- Noise mitigation measures need to be identified for the construction phase and all affected sensitive receivers have an opportunity for the installation of mitigation measures.
- The 159 receptors that will exceed both day time and night time noise levels at the operational phase should all have an opportunity for the installation of mitigation measures. A process for organisations/sensitive receivers to request mitigation measures needs to be in place.
- At the operational phase clarity is required as to what the meaning of feasible and reasonable and who determines this. This requires further consultation to ensure that this is an acceptable definition and process.
- Council requests that all affected sensitive receivers have an opportunity to request mitigation measures.
- RMS [Roads and Maritime] to provide regular updates to the community of upcoming noise impacts.

Response

Construction noise

A range of environmental management measures is proposed to manage potential construction noise impacts (refer to **Chapter D1** (Environmental management measures)). Feasible and reasonable management measures applied on Roads and Maritime projects are identified in the CNVG.

⁷<https://www.rms.nsw.gov.au/projects/sydney-south/m5-east/outside-air-quality-monitoring/index.html><https://www.rms.nsw.gov.au/projects/sydney-south/m5-east/outside-air-quality-monitoring/index.html>

A Construction Noise and Vibration Management Plan (CNVMP) will be prepared for the project prior to construction. The CNVMP will include processes and responsibilities to assess, monitor, minimise and mitigate noise and vibration impacts during construction. The CNVMP will include standard and additional mitigation measures from the CNVG and details about when each will be applied. Mitigation measures will be implemented based on the outcomes of the CNVMP and/or the environmental management measures and conditions of approval for the project (if approved) rather than by requests from the community. Notwithstanding, consultation will be undertaken regarding noise impacts, as described below.

All residents predicted to experience an exceedance of the construction Noise Management Levels will be notified about potential noise impacts prior to the commencement of construction works.

Community consultation regarding construction noise and vibration will be detailed in the Community Communication Strategy for the construction of the project and will include a complaints handling process. The community will be able to provide feedback via a 24 hour, toll-free project information and complaints line, a dedicated email address and postal address for the project.

For out of hours works, consultation with affected residents will take place with consideration of the CNVG and Strategy 2 of the *Interim Construction Noise Guideline*⁸ (ICNG).

The process regarding community update notices informing them of scheduled work, in particular that which may cause noise impact would be addressed within the Community Communication Strategy.

Operational noise

As detailed in environmental management measure NV5 (refer to **Chapter D1** (Environmental management measures)), receptors identified as requiring at-property noise mitigation because of an exceedance of operational traffic noise goals, will be offered treatment prior to construction commencing. The receptors which are predicted to trigger consideration of noise mitigation will be confirmed during future design phases of the project and any additional eligible receptors will be contacted and noise mitigation options discussed with them.

Feasible and reasonable management measures are defined by Roads and Maritime in the CNVG as:

- **Feasible:** Feasibility relates to engineering considerations (what can be practically built).
- **Reasonable:** Selecting reasonable measures from those that are feasible involves judging whether the overall noise benefits provide significant social, economic or environmental benefits.

The complete definition of feasible and reasonable is presented in section 2 of the CNVG.

B7.14 Biodiversity

B7.14.1 Biodiversity environmental management measures

- Removal of trees (particularly hollow bearing) will result in habitat loss for numerous fauna species in an area already lacking tree canopy. Delivering biodiversity offsets does not take into account the fragmentation of habitat and does not prevent the ongoing decline of biodiversity values within the LGA.
- RMS [Roads and Maritime] must work with Bayside Council to identify a replacement program that can increase urban tree canopy and enhance biodiversity connectivity within the LGA.

Response

The field surveys conducted as part of the biodiversity assessment for the project included a hollow bearing tree survey. The survey did not identify any suitable hollow-bearing trees for certain threatened species including the Powerful Owl and Masked Owl.

The Biodiversity Assessment Method (BAM) and the BAM Credit Calculator include consideration of fragmentation, connectivity and patch size in the offset calculations. If areas to be cleared include hollow bearing trees, then the offset rules specify that the offsets must also contain hollows. Roads and Maritime will identify offsets in proximity to the project area where suitable.

⁸ DECC (2009) *Interim Construction Noise Guideline*

Where removal of trees is unavoidable, trees will be replaced in accordance with the tree management strategy for the project. The location of replacement trees will be determined in consultation with relevant stakeholders (including Bayside Council). The strategy will be used to guide the management of trees, including those within riparian areas that need to be removed and to consider options for their replacement.

B7.14.2 Level and quality of biodiversity assessment

- In relation to the Magenta Lilly Pilly, the Rockdale Biodiversity Strategy has identified other Magenta Lilly Pilly species around Hawthorne Street Natural Area and Bardwell Valley Golf Course. As a result Bayside Council requests RMS [Roads and Maritime] to include a biodiversity offset of these Magenta Lilly Pillies
- In relation to the management and mitigation strategies to protect biodiversity within Scarborough and Bicentennial Parks note Council's mapping has identified within the Bicentennial Park and Scarborough Park North precinct:
 - Vegetation communities inclusive of:
 - Alluvial bangalay forest
 - Revegetation areas
 - Swamp paperbark scrub
 - Threatened fauna habitat for:
 - Green and golden bell frog
 - Potential for grey-headed flying fox
 - Significant flora location for:
 - Bangalay sand forest
 - Estuarine reed land
 - Swamp oak floodplain forest
 - Swamp sclerophyll forest
 - Sydney Freshwater Wetlands
 - Key fish habitat

Therefore the RMS [Roads and Maritime] needs to work closely with Bayside Council to identify and implement mitigation measures to reduce the impact to these biodiversity traits.

Response

It is noted that the Magenta Lilly Pilly has been identified in other locations. The Biodiversity Offsets Scheme would only apply to naturally occurring populations of threatened plants, not horticultural varieties. The Magenta Lilly Pilly National Recovery Plan points to horticultural varieties being of dubious origin and infers that they do not contribute to the overall species recovery (refer to Page 17 of the National Recovery Plan Magenta Lilly Pilly *Syzygium paniculatum*⁹). Therefore, the loss of plants that have been planted in a park setting, of unknown provenance, should not form part of any required offset for the species.

Targeted survey, consistent with the Commonwealth guidelines¹⁰ for Green and Golden Bell Frog at Scarborough wetland, did not reveal this species being present within the study area. Habitat for that species in this location is marginal at best. However, through the implementation of environmental management measures described in **Chapter D1** (Environmental management measures), potential impacts on native vegetation communities and threatened species habitat will be managed.

It is noted that Council mapping identifies other flora and fauna species and habitat. The EIS includes an assessment of potential impacts to the Green and Golden Bell Frog, Grey-headed Flying Fox, swamp oak floodplain forest, and swamp sclerophyll forest. The assessment in Chapter 12 (Biodiversity) of the EIS did not identify that the other listed communities identified by Bayside Council would be directly impacted by the project.

⁹ NSW Office of Environment and Heritage (2012) National Recovery Plan Magenta Lilly Pilly *Syzygium paniculatum*

¹⁰ Commonwealth of Australia (2009) Significant impact guidelines for the vulnerable green and golden bell frog (*Litoria aurea*) Nationally threatened species and ecological communities EPBC Act policy statement 3.19

Notwithstanding, a plan for the rehabilitation of all areas directly affected by construction, will be included as part of the Construction Flora and Fauna Management Plan. Rehabilitation will be carried out in accordance with relevant Roads and Maritime biodiversity including *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*¹¹.

B7.14.3 Potential impacts to terrestrial fauna

- The project will remove 4.45 hectares of habitat. It is requested that all loss of potential habitats be reinstated for the Grey-headed Flying-fox within the local area with a focus on winter food species. This is to be undertaken in collaboration with Bayside Council.
- Given that the region already has vulnerable populations of the Green and Golden Bell Frog, it is requested that pilot habitats be established and managed by RMS [Roads and Maritime] similar to the Eve Street, Arncliffe habitat undertaken for the new M5. This is to be undertaken in collaboration with Bayside Council. Bayside Council has the expectation that RMS [Roads and Maritime] will install an environmentally appropriate (including outside of endangered ecological communities/wetlands) shared pathway within Scarborough and Bicentennial Parklands that showcases the biodiversity values of the area including signage and viewing points.
- The project does not adequately identify mitigation strategies to minimise / prevent disturbance or physical impact to waterbirds.

Response

Threatened species and habitat removal

The project would result in the loss of around 4.45 hectares of potential foraging habitat for the Grey-headed Flying-fox, which is listed as Vulnerable under the *Biodiversity Conservation Act 2016* (NSW) (BC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act). However, no Grey-headed Flying-fox roosting sites or camps occur within the study area, and therefore it was concluded that the species would not be impacted by the works. Detailed design will avoid or minimise the need for native vegetation and habitat removal for the construction of the project, where feasible. In addition, the tree management strategy for the project (refer to Chapter 13 (Landscape and visual) of the EIS) will involve strategies for the replacement of trees where removal cannot be avoided, including consideration of plant species that would benefit Grey-headed Flying-fox foraging.

Green and Golden Bell Frogs

The biodiversity assessment completed for the project identified that impacts to the Green and Golden Bell Frog would not be significant and a referral to the Commonwealth, as well as any offsets, is not required. Potential impacts to Green and Golden Bell Frogs would be managed through the implementation of environmental management measure B5 (refer to **Chapter D1** (Environmental management measures)). The establishment of pilot habitats is therefore not considered to be warranted.

The project has substantially avoided impacts to wetlands by using, as much as possible, already disturbed sites for above ground project components, such as the shared cycle and pedestrian pathways. A Wetlands Management Plan will be prepared and implemented, in consultation with relevant stakeholders, to manage waterbodies and riparian land within the project footprint that may be impacted by the project during construction. The objectives of the plan will be to:

- Maintain and improve the condition of the affected wetlands
- Reinstatement and rehabilitate any riparian land impacted by the project
- Provide positive ecological and amenity outcomes for the environment and local community.

Refer to environmental management measure B3 in **Chapter D1** (Environmental management measures) for further detail.

¹¹ Roads & Traffic Authority (2011) *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects*

The location of sections of the pedestrian and cyclist infrastructure would provide the opportunity for cyclists and pedestrians to enjoy the biodiversity values of the area. Urban design and landscape treatments, including signage and viewing points, would be finalised during the preparation of the Urban Design and Landscape Plan for the project. The plan will be developed in consultation with local councils, including Bayside Council and other key stakeholders.

Waterbirds

Potential impacts to waterbirds will be managed through the implementation of a Wetlands Management Plan as described above. The plan will include consideration of potential water quality, hydrology, amenity and flora and fauna impacts and mitigation (refer to environmental management measure B3 in **Chapter D1** (Environmental management measures)).

B7.14.4 Potential impacts to aquatic biodiversity

- RMS [Roads and Maritime] as part of its consultation with Bayside Council discussed the Kings Road Wetland and its restoration. This issue is not addressed in the EIS. Council therefore requests the EIS needs to address how the F6 Project will improve the environmental condition of Kings Rd Wetland as well as improve community access to this open space
- Further information is required from the RMS [Roads and Maritime] on [how] the proposed F6 works will improve or at a minimum maintain water quality within the Bicentennial and Scarborough park wetlands, particularly in light of the key fish habitat at Tonbridge Creek which is recognised as important fish breeding habitat for Botany Bay. This is particularly important given that no mitigation measures have been proposed, nor any plans to at ensure that the aquatic environment remains habitable. It is expected that RMS [Roads and Maritime] will liaise with Bayside Council to address these issues.
- As a minimum Council requests that a Wetland Environmental Management and Maintenance Plan is developed for this project and to include details on
 - Protection of threatened species and endangered ecological communities
 - Protection of other native vegetation communities, and flora and fauna
 - Protection of terrestrial and aquatic habitat
 - Protection of migratory species
 - Inter-relationship between the motorway and the surrounding natural area
 - Impact of development on ecological significance of the area
 - Measures to reduce adverse environmental impact
 - Management of pest species (plant and animal) during and post construction

Response

The opportunity to address weed infestation associated with Kings Wetland is identified as Opportunity 5 in Appendix C1 (Place Making and Urban Design Strategy) of the EIS. The realisation of this opportunity is the responsibility of the DP&E, Roads and Maritime and Bayside Council.

The opportunity to improve water quality in the Rockdale Wetlands is identified as part of Opportunity 6 in Appendix C1 (Place Making and Urban Design Strategy) of the EIS. The realisation of this opportunity is the responsibility of Bayside Council in partnership with local community groups.

Table 12-13 of the EIS provides an assessment of the potential impacts to the Kings Wetland. The temporary haulage route within C3 at Rockdale Bicentennial Park runs through the 'Kings Road Wetland'. The Kings Wetland is modified with highly disturbed vegetation and impacted by stormwater runoff and other urban pollution in the area of the haulage route.

Wetlands Management Plan

A Wetlands Management Plan will be prepared and implemented, in consultation with relevant stakeholders, to collectively manage waterbodies and riparian land within the project footprint that may be impacted by the project during construction. The objectives of the plan will be to:

- Maintain or improve the condition of the affected wetlands
- Reinstatement any riparian land impacted by the project

- Provide positive ecological and amenity outcomes for the environment and local community.

The plan will include:

- Consideration of potential water quality, hydrology, amenity and flora and fauna impacts and mitigation
- A process for dewatering and restoration of the Rockdale Wetland, including measures developed by an ecologist to handle and relocate aquatic fauna
- A monitoring program to assess the effectiveness of the mitigation measures and to identify new measures that may be required.

The plan will be prepared by a suitably qualified ecologist with experience in wetlands management.

B7.14.5 Potential impacts to groundwater dependent ecosystems

Bayside Council seeks further clarification from RMS [Roads and Maritime] to provide details across all the groundwater dependent ecosystems, including details on the methodology and relevant management strategies to mitigate the impacts on the natural environment including Landing Lights Wetlands, Marsh St and Bicentennial and Scarborough Ponds which contain a number of endangered ecological communities and threatened species habitat.

Response

Potential impacts to groundwater dependent ecosystems are discussed in section 8.5.2 of Appendix H (Biodiversity development assessment report) of the EIS.

Groundwater modelling completed for the project predicted that the long-term surface water drawdown within Rockdale Wetlands ranges from 0.28 metres to 0.32 metres (as summarised in Chapter 17 (Groundwater and geology) of the EIS). However, the wetlands are not classified as a high priority groundwater dependent ecosystem (GDE) and the wetlands are highly modified to act as flood mitigation basins. Consequently the projected groundwater drawdown is likely to be mediated by the inflow from stormwater.

At Scarborough Park North, the GDE is fed by both surface flows (including stormwater from the wetland and associated water) and a weak tidal influence from Botany Bay. The potential GDE is present as reed lands and is fed by stormwater inflows from the wetland and associated water as well as a weak tidal influence. This potential GDE has a moderate reliance on subsurface water. A potential drawdown of between 0.11 and 0.12 metres is likely to be mediated by the inflow of water from stormwater.

Drawdown in excess of the seasonal variation of 0.05 metres is predicted at Landing Lights, Eve Street, Spring Street, King Street and Marsh Street Wetlands, with long term drawdown predicted to vary from 0.28 metres at Landing Lights Wetland to 0.47 metres at the Marsh Street Wetland (refer to Chapter 17 (Groundwater and geology) of the EIS). However, these predicted drawdowns are not considered to result in significant impacts to these wetlands because they are not dependent on groundwater.

Potential impacts to other GDEs in the vicinity of Kogarah Golf Course and the Cooks River (including Marsh Street and Landing Lights) were assessed as being low as a result of groundwater level decline during the construction of the project. Elsewhere within the study area, wetlands have limited groundwater dependence and are therefore unlikely to be adversely impacted by groundwater level decline associated with the construction phase of the project.

Overall, the biodiversity assessment found that the project is not expected to significantly affect or change groundwater flows, providing impacts to wetlands and drainage lines are kept to a minimum. A Wetlands Management Plan will be prepared and implemented (refer to **section B7.14.4**)

B7.15 Landscape and visual

B7.15.1 Northern surface works

A further view point location for consideration would be that from Valda Street Reserve at the end of Valda Street adjoining Marsh Street where a local hierarchy playspace is currently located. An analysis of this area should be undertaken.

Response

The Valda Street Reserve was visited during field investigations for the Landscape Character and Visual Impact Assessment. It is located below the level of Marsh Street and there is a corridor of mature trees on the road embankment which visually encloses the playground. It is not expected that there would be views of the project from this location.

Viewpoint 1, view east from near Marsh Street pedestrian underpass, is located opposite the reserve, and was selected for assessment as it is located in a locally elevated area where there is a view across the existing M5 construction site and towards the project.

The assessment concluded that there would be a negligible visual impact in this view as the proposal would be located beyond the New M5 Motorway Substation and Motorway Ventilation facility.

B7.15.2 Southern surface works

- View from the Brighton-Le-Sands Public School, Brighton Memorial Reserve fields and playspace are considered to be affected by the degree of loss of trees including significant /high value trees within Bicentennial Park despite the retained vegetation to the west of the fields. An analysis of this area should be undertaken.

NOTE - Rockdale Memorial Fields frequently referred to in the EIS is named Brighton Memorial Fields /Reserve.

- Further current passive recreation use areas /Viewpoint locations (Figure 13-22) which could be affected are the existing off-leash dog area off Civic Avenue, Colson Avenue playspace, Moorefield Reserve playspace and Victory Avenue playspace (Beach St, outside of the F6 construction footprint). A view analysis of these areas should be undertaken.

Response

View from the Brighton-Le-Sands public school

Viewpoint 7, View south from Brighton-Le-Sands Public School, was selected to represent views from the Brighton-Le-Sands public school. The school itself has fencing and vegetation within the site that would partially screen views of the project. The view selected shows a less obstructed view from the property boundary. An artist's impression of the project from this view is provided in Figure 8-18 of Appendix C2 (Landscape and visual technical report) of the EIS.

View from the Brighton Memorial Reserve Fields (and playspace)

Chapter A2 (Clarifications) has clarified that all references to the Rockdale Memorial Fields in the EIS are meant to describe the Brighton Memorial Fields. This playspace was visited during field investigations, however, it was determined that the view shown at Viewpoint 6, View south from the Rockdale Memorial Field, is representative of views from the reserve and would include a greater extent of the project footprint.

Off leash dog area off Civic Avenue

This location was visited during site investigations for the EIS. Viewpoint 10, View east from Civic Avenue, was selected and represents views from the off leash dog area and adjacent residential properties. The selected view was chosen as it includes a greater extent of the project footprint and provides a greater visual context.

Colson Avenue playspace

The potential visual impact on the Colson Avenue playspace was considered in the assessment. This park is separated from the project footprint to the north and south by residential areas, and has mature vegetation to the west, screening views across the wider Civic Avenue Reserve. The property to the north and vegetation to the west prevent views of the project footprint. Viewpoint 8, View north from Colson Crescent, is located to the north of the playspace and was selected to represent views from this area. It shows a worst-case scenario of visibility of the project footprint.

Moorefield Reserve playspace

The Moorefield Reserve and playspace do not have views of the project footprint. They are located within residential areas to the south of President Avenue and west of Civic Avenue. There would be no landscape character or visual impact at this location. Refer to Figure 7-3 and Figure 7-5 of Appendix C2 (Landscape and visual technical report) of the EIS.

Victory Avenue playspace

The Victory Avenue playspace is located approximately 200 metres to the west of the project footprint. Views from this playspace are enclosed by residential and industrial development, to the east, obstructing views towards the project footprint. The proposed ventilation facility is not expected to be visible from this location due to intervening built form and distance. Refer to Figure 7-4 of Appendix C2 (Landscape character and visual impact assessment) of the EIS.

B7.15.3 Tree removal

- Figure 13-40 of the EIS shows 'Trees that would potentially be removed and their assessed value – southern surface works'. The EIS does not identify how the trees within Bicentennial Park are to be protected throughout the construction period and subsequent close down of Bicentennial Park precinct. Council therefore requests RMS [Roads and Maritime] collaborate with Council and provide information on the proposed tree protection zones.
- The EIS identifies the loss of 449 trees in total. Many of these have been recorded as having a HIGH assessed value. No discussion has been held with Council on this matter, with such a high number of trees to be removed to have an adverse impact on tree canopy cover. Collaboration with Council is required and replacement must be planned in consultation with Council.
- Landscape treatments - Supplementary tree planting and screening to be provided along President Ave to offset tree removal and re-establish a visual screen along the corridor and also at tunnel portal and entry and exit ramps to comply with dot pints provided below.
- It is considered that preparation of any comprehensive tree report should be conducted by an independent team of highly experienced and qualified arborists in consultation with Bayside Council.
- All endeavour should be made to protect trees through the construction period for [ongoing] retention ongoing, particularly in respect of significant /high value trees on the site.
- Replacement of any trees lost should be at a ratio of no less than 1:5 to ensure succession.
- Reinforcement plantings of canopy trees along the construction footprint early in the project would assist both succession and screening of the work site.
- Any replacement plantings should target an increase in tree canopy and aim to enhance Bayside Council's position in respect of the Sydney Green Grid
- Consideration of strata vault systems or similar where plantings are likely to impact over [the] long term on other assets.

Response

Measures to manage potential impacts from the removal of trees are described in **Chapter D1** (Environmental management measures). Relevant measures will be captured in a tree management strategy which will include the protection of trees retained in the work area in accordance with Australian Standard AS4970: Australian Standard for Protection of Trees on Development Sites. Key aspects of this standard have been detailed within Appendix B of the Arboricultural Assessment report (refer to Annexure A of Appendix C2 (Landscape and visual technical report) of the EIS) and include prescribed setbacks, trunk and root protection and tree sensitive construction measures.

Landscape treatments and planting proposals are outlined in Appendix C1 (Place Making and Urban Design Strategy). The area surrounding the tunnel portal and entry and exit ramps would be planted with a variety of low, mid and canopy vegetation reflective of the adjacent wetlands and recreational open space species.

Where removal of trees is unavoidable, trees will be replaced in accordance with the tree management strategy for the project, which will be prepared in consultation with relevant stakeholders (including Bayside Council). The tree management strategy, as outlined in section 13.8 of the EIS, addresses the above points made by Bayside Council on the impact on trees for the project and the proposed replacement landscaping. Replacement trees will be planted during site rehabilitation following the completion of significant construction activities within the project footprint. Planting of replacement trees prior to the completion of significant construction activities could result in a risk of damage to replacement trees.

Tree replacement will be carried out so there is a net increase in the total number of trees provided by the project compared to the total number of trees to be removed. Tree replacement will occur within the vicinity of the project where possible. Roads and Maritime will work with Bayside Council to identify alternative replacement locations where necessary. A ratio of 1:5 is not reasonable given the additional Biodiversity Assessment Method offsets that will be provided for the project and that it is unlikely that there is appropriate area within 500 metres of the project to cater for this number of replacement trees.

B7.15.4 Landscape character and visual environmental management measures

- Future maintenance of landscape works to be considered in the design process to ensure ongoing maintenance is minimised.
- Issue is raised as to how reconstruction of a section of the wetland system at completion of F6 works will affect the remainder of the wetland system and its environmental stability - also [how will] the construction period will affect the wetland system?
- Key active recreational facilities within Bicentennial Park to be impacted by the works also include a large community events open space area, picnic and BBQ facilities and car parking, to be acknowledged in re-instatement of level of amenity.

Response

Ongoing maintenance requirements will be considered for landscape treatment during detailed design. A key principle of the urban design strategy is to promote urban amenity by incorporating extensive tree planting of endemic species into the design. This will help towards the longer term maintenance of the landscaping. The Urban Design and Landscape Plan will be developed during detailed design and will incorporate Bayside Council's requirements for rehabilitation and regeneration of disturbed areas that seek to successfully establish and maintain new landscaped areas.

The biodiversity assessment completed for the project (refer to Appendix H (Biodiversity development assessment report) of the EIS) included an assessment of the potential impacts on the aquatic habitat and wetlands within the vicinity of the project. The outcomes of the assessment are summarised in section 12.3.3 and 12.4.3 of the EIS.

Construction works within Rockdale Bicentennial Park would require diversion of the waterbody and loss of around 0.2 hectares of aquatic habitat. The survival of any population is unlikely to be impacted given the current size of refuge pools available. Species currently inhabiting the pond are also likely to be those tolerant of urban pressures, such as poor water quality. The riparian vegetation would be restored after the reinstatement of the wetland and Rockdale Bicentennial Park following construction.

There would also be a small area of reeds and aquatic habitat requiring removal from the waterway within Scarborough Park North for the project. This small area (<10 metre channel length) is currently in poor condition and would not significantly alter the ecological value of this wetland. Replacement culverts beneath the road at President Avenue and any minor channel works to tie in the modified road corridor would disturb soft benthic sediment, creating sediment plumes downstream if not contained (such as the potential to impact Tonbridge Creek). Any dredged material will be tested for acid sulfate soil potential, then treated and disposed of accordingly.

In addition, potential erosion, sedimentation and surface water quality impacts to the Rockdale Wetlands system would be managed during construction as per the management measures identified in Chapter 17 (Soils and contamination) and Chapter 18 (Surface water flooding) of the EIS.

Refer to **section B7.7** for information regarding the reinstatement of Bicentennial Park. The reconfigured facilities will be comparable with existing facilities, including the community events open space area, picnic and BBQ facilities and car parking.

B7.15.5 Options for the relocation of assets within Bicentennial Park

As highlighted previously to better understand the potential impacts of the F6 on the community assets in Bicentennial Park precinct the RMS [Roads and Maritime] has agreed to fund a Recreation Needs Analysis and will be jointly managed by Council and RMS [Roads and Maritime]. This study has commenced and will identify ways in which the impacts can be mitigated and compensated. Interim feedback has been provided to RMS [Roads and Maritime] on temporary impacts and permanent impacts. The Recreation Needs analysis will be provided to the Depart [Department] of Planning and Environment when complete.

Response

Refer to **section B7.7** for information regarding the reinstatement of Bicentennial Park. Roads and Maritime will continue to work with Bayside Council to complete the Recreation Needs Analysis for the area, including the final relocation plan and permanent reconfiguration of the Rockdale Bicentennial Park facilities.

B7.15.6 Urban design

- President Avenue Pedestrian Bridge Design - to promote public art and community ownership of our public infrastructure, it is requested that public art be included in the design of the Bridge.
- Council would like further information on the future design on President Avenue. Council requests RMS [Roads and Maritime] to provide street sections (building line to building line) to understand the location of the indicated tree planting, the width of the footpath, front setback to provide further comments.
- Both the proposed construction and final infrastructure of the motorway (including ventilation stacks) will impact on the visual amenity, connectivity and functionality of the local area. Consequently:
 - The F6 project should take into consideration urban design from the early planning stages, concept designs to the details of the final infrastructure, such as pedestrian bridges.
 - The architectural design of the proposed ventilation facilities on West Botany Street should be well integrated with the surrounding built form and streetscape. The proposed development should refer to Council's Design Review Panel and the Council's Strategic Planning department for comments.
 - The design of the tunnel portals should [be] seen as an opportunity to create a significant landmark. The design principles should include creativity [and] innovation but should respect the wetland context and be legible and straightforward in form.
 - The design of the President Avenue Shared Cycle and Pedestrian Bridge should see an opportunity to create a piece of functional as well as a significant visual feature which sits within the built and natural landscapes. The design principles should include capitalising the views to the Bay, enhancing the visual connections between the green wetland and Scarborough Park North, which will add visual interest and identity to the environment.
 - Council request the establishment of an Urban Design Panel to review design of temporary and permanent infrastructure.

Response

Urban design has been considered during the development of the concept design for the project through the development of urban design objectives. The urban design objectives have been adopted from the 'WestConnex Urban Design Framework' and modified to suit the contextual environment of the proposed F6 Extension Stage 1. To further strengthen this, '*Beyond the Pavement – Urban design policy, procedures and design principles*¹²' underpins the urban design objectives for the project and is integral to the urban design outcome.

To ensure an integrated 'whole of corridor' response with the surrounding environment, the following urban design objectives have been developed to govern the project outcomes:

- Leading edge environmental responsiveness

¹² Roads and Maritime Services (2014) *Beyond the Pavement – Urban design policy, procedures and design principles*

- Connectivity, accessibility and legibility
- Place making
- Urban renewal and liveability
- Memorable identity and a safe, enjoyable experience
- A new quality benchmark.

Urban design and landscape treatments would be finalised during the preparation of the Urban Design and Landscape Plan for the project. The plan will be developed in consultation with local councils, including Bayside Council. Public art will be considered for inclusion in the design of the President Avenue pedestrian bridge as part of the Urban Design and Landscape Plan.

Operational ancillary facilities

During detailed design, there will be a detailed review and finalisation of the architectural treatment of the motorway's operational ancillary facilities, ventilation facilities, the President Avenue intersection portals and all permanent infrastructure, including the President Avenue shared cycle and pedestrian bridge. The architectural treatment of these facilities will be guided by ventilation facility performance requirements, the outcomes of community consultation and urban design principles. Landscaping works will be carried out next to disturbed areas; around operational infrastructure (such as ventilation facilities); and along the shared cycle and pedestrian pathways.

To offset some of the vegetation to be removed at Rockdale Bicentennial Park, the area surrounding the tunnel portal and entry and exit ramps will be planted with a variety of low, mid and canopy vegetation reflective of the adjacent wetlands and recreational open space landscape plantings.

Supplementary tree planting and screening will be provided along President Avenue to offset the removal of trees and to re-establish a visual screen along the corridor.

B7.16 Property and land use

B7.16.1 Property acquisition

- The form of acquisition of Council owned properties, and timing of these acquisitions should be discussed and negotiated as a first priority.
- It is important that both Council and RMS [Roads and Maritime] understand timing and form of acquisitions, to enable works associated with these acquisitions to be undertaken and completed prior to acquisition.
- Council recommends that the first acquisitions be leasehold acquisitions, and the freehold acquisitions occur post construction, to enable the acquisition to accurately capture the as built location of the road/facility.
- Council requests that RMS [Roads and Maritime] consider access licences and variation of existing leases, as an alternative to compulsory acquisition for the Arncliffe facility.
- Council notes the impending termination of the existing lease for open space at Bicentennial East between Bayside Council (Lessee) and RMS [Roads and Maritime] (Lessor). Council seeks assurance that post construction, RMS intend to issue a new lease in perpetuity or transfer this land to Council for ongoing use of the land for open space.
- RMS [Roads and Maritime] to minimise [the] impacts that [of] service location[s] within Scarborough Park will have. The freehold acquisition of this space should only occur upon completion of the works, to ensure it captures built form.
- RMS [Roads and Maritime] to work with Council on the programming of this acquisition, and management of impacts to parking, existing sporting clubs etc.
- Council requires to understand what the impacts will be on the Bardwell Valley Golf Course parcel of land. This land is owned by Council, and will need to be consulted as part of the planning for these works. Council requires to know what form of acquisition this will be, ie compulsory acquisition of easement.

- As noted previously, Environmental Management upon Council land occupied by RMS [Roads and Maritime] is required. RMS [Roads and Maritime] will be required to demonstrate environmental management through geotechnical condition assessments undertaken prior to [occupation] and prior to hand back of the land.

Response

The need to discuss the form of property acquisition is noted. Roads and Maritime has engaged with Council on property matters and will keep the relevant council staff informed on the process.

It is proposed that all existing services located in both the verges and the roadway of President Avenue will be relocated into a new services corridor immediately south of the President Avenue works, within Scarborough Park. This new service easement would not preclude Council use of the land, however it would preclude planting of trees and any sort of building development above it. Given the current use of the land as open space, utility related land use impacts at this location are considered to be low. Land required for the service easement is subject to ongoing discussions between Roads and Maritime and Bayside Council.

The construction of the permanent power supply for the project would result in brief, temporary interruptions to some recreation land uses at Bardwell Valley Golf Club and Silver Jubilee Park. Where the project would traverse the Bardwell Valley Golf Club, use of some sections of the course may be interrupted for a period of approximately one to two weeks (subject to the final construction method and associated temporary or permanent impact to property). Roads and Maritime will continue to discuss the form of acquisition with Bayside Council, following the detailed design of the permanent power supply route.

Land that is temporarily acquired would be returned to Bayside Council in a geotechnical condition that is equivalent or improved compared to the existing condition of the land.

B7.17 Social and economic

B7.17.1 Social and economic environmental management measures

- Council seeks to review the proposed measures to be implemented by RMS [Roads and Maritime] to mitigate the impacts the F6 project will have on businesses, residents and the community (traffic calming, parking, noise, air quality etc.).
- Council supports the preparation of a Community and Social Management Plan, however this plan should be prepared prior to the construction phase rather than the operation phase of the project. The local community will be impacted by the project during the construction phase, it is therefore necessary to prepare the Community and Social Management plan at this point in the project.
- Council seeks the opportunity to provide input to the development of the Business Management Plan, Community Communication Strategy, Construction Fatigue Protocol and the Community and Social Management Plan when they are developed. The Community Communication Strategy should include measures that update residents and local businesses about any changes to the project (for example delays) and provide them with an opportunity to seek further information about the project.
- Construction fatigue has been identified in the EIS for communities around most of the construction sites. Council seeks:
 - A requirement for a utilities manager with enforcement powers be appointed to coordinate project and utilities works so that cumulative construction impacts on residents around worksites are minimised.
 - Measures to require the dissemination of community information, adequate lead times for notices and immediate availability of all notices on the proponent's website.
- That all Council assets within the identified zone have a condition assessment undertaken. Bayside Council is to have the opportunity to have input into the assessment of Council assets.
- That Council is kept updated of the number and location of properties that are found to be impacted by tunnelling.

- That all property owners are regularly informed of the process and support that will be provided by RMS [Roads and Maritime]

Response

An updated list of environmental management measures is provided in **Chapter D1** (Environmental management measures). These measures include the proposed management plans that will form part of the CEMP. The CEMP will provide a structured approach to the management of issues identified in the EIS and the minimisation of any potential impacts from the project. The CEMP will be developed in accordance with the approval conditions of the project (should it be approved) and the commitments made within the EIS and this report.

The proposed Community and Social Management Plan will detail the process for identification and implementation of measures to offset community and social impacts associated with the project. The plan will be prepared by a suitably qualified and experienced person(s) in consultation with the community and relevant councils. It is anticipated that this plan will be prepared within 12 months of the commencement of construction.

A Community Communication Strategy will be prepared prior to construction to detail the processes to facilitate communication between the project team and the community. This will include processes to keep affected stakeholders (eg local councils, residents and local businesses) informed about changes to the program of works. The strategy will require approval from the Planning Secretary of DP&E prior to construction works commencing.

For this project, consideration of construction fatigue is most relevant to receptors surrounding the Arncliffe construction ancillary facility (C1), proposed to be undertaken at Kogarah Golf Course, which is currently being used for construction of the New M5 Motorway. Coordination between the project and the New M5 Motorway project would consider any potential overlap between the respective construction programs and allow for maximum respite time between intensive construction activities, where possible. Construction program coordination and potential construction fatigue implications will be identified early and mitigation developed, where necessary.

The extent and impacts of construction fatigue will be assessed by:

- Identifying where the project would have sustained impacts to stakeholders or community members
- Identifying whether the project would result in similar or overlapping impacts with other projects, to the same stakeholders or community members
- Analysing whether the project would increase the magnitude and intensity of overlapping impacts on any stakeholders or community members
- Analysing the extension of duration of impacts for stakeholders or community members.

Ongoing community consultation would occur throughout the construction period, with consultation and complaints management coordinated with the New M5 Motorway project team, where possible to reduce the potential for consultation fatigue and complaints fatigue.

A Construction Fatigue Protocol will be prepared and implemented as part of the CNVMP for the project to address potential construction fatigue impacts. The protocol will include consideration of noise attenuation and periods of respite for affected stakeholders, where reasonable and feasible, and restricting out of hours work where practicable.

Overall, utility relocation works are expected to be of local extent, short duration and low severity. As such, the magnitude of impact is expected to be moderate. Potential construction fatigue impacts associated with utility works would be managed in accordance with the construction fatigue management measures described above.

In accordance with environmental management measure PL4 (refer to **Chapter D1** (Environmental management measures)), prior to the commencement of construction, building condition surveys will be offered, in writing, to the owners of properties where there is a potential for construction activities to cause cosmetic or structural damage. This offer would be extended to local councils for any council assets that the preliminary screening assessment identifies a potential risk to the asset. If accepted, a comprehensive written and photographic condition report of the property/structure will be produced by an appropriate professional prior to relevant works commencing.

As described above, the community will be informed of the offer for building condition surveys in writing. Other support measures for the community will be communicated via the Community Communication Strategy as described above.

In accordance with environmental management measure PL5 (refer to **Chapter D1** (Environmental management measures)), interface agreements will be entered into with relevant owners of infrastructure and utility services (including Bayside Council) likely to be impacted by construction of the project. The agreements will likely identify:

- Minimum separation distances and appropriate settlement criteria for utility infrastructure
- Settlement monitoring requirements during construction
- Contingency actions in the event that settlement limits are exceeded.

B7.17.2 Kogarah Golf Course

- RMS [Roads and Maritime] [is] to demonstrate how they plan to work with the Kogarah Golf Club (KGC) to mitigate the impacts of the project, considering noise, air quality, ongoing loss of part of their course, loss of membership.
- RMS [Roads and Maritime] to work with Council on the re-instatement of the Council community land post works. This land is currently affected by a 'Charitable Trust', permitting the usage upon the land to being road over recreation. Council would like to work with RMS [Roads and Maritime] to have the road purpose removed post completion of the proposed leasehold in late 2024. This will enable the land to be used for open space and recreation into perpetuity.

Response

The Kogarah Golf Course is a private golf course with club facilities. Continued occupation of this area of Kogarah Golf Course would be consistent with the current use of the site as a construction ancillary facility. Roads and Maritime currently supports this business with special rates for membership to account for the reduction in golf course facilities, from an 18-hole course to a nine-hole course.

Kogarah Golf Course would be included in the Business Management Plan for the project. The Business Management Plan will be prepared prior to construction to detail the process for identification of and communication with businesses adversely affected by construction works. Additionally, as per environmental management measure SE4 (refer to **Chapter D1** (Environmental management measures)), a Construction Fatigue Protocol will be prepared and implemented for the project. The protocol will include consideration of noise attenuation and periods of respite for affected businesses.

Residual land would be restored following the completion of activities and returned to the landowner (Kogarah Golf Course) in accordance with the lease agreement.

Any assessment or decision regarding the future of this corridor would be separate to the planning approval process for the project and will be developed in collaboration with DP&E, Transport for NSW and Bayside Council.

B7.17.3 Bardwell Valley Golf Course

Council request a detailed scope of works to be undertaken upon this land, including the form of acquisition required, ie easement.

Response

Land that would be temporarily or permanently acquired is identified in section 14.4.1 of the EIS. Land to be temporarily or permanently acquired would be subject to the final alignment of the permanent power supply route.

The power line route and construction methodology will be confirmed during detailed design. The nature of the necessary land agreements will be included in ongoing discussions between Roads and Maritime and Bayside Council.

B7.17.4 Impacts to car parking

Parking spaces will be lost as a result of the F6 project. This will impact on remaining sporting fields, such as Bicentennial South.

Council would like to review and comment on the Construction Traffic and Access Management Plan (CTAMP) to ensure we are across the management of these parking issues and the mitigation of the issues.

Response

In accordance with environmental management measure TT1, a CTAMP will be prepared as part of the CEMP. The CTAMP proposes a car parking strategy detailing measures to manage parking in adjacent streets and to reduce impact on businesses. The CTAMP will be developed in consultation with Bayside Council and stakeholders adjacent to the construction sites.

B7.17.5 Reinstatement of Bicentennial Park

- Council will work with RMS [Roads and Maritime] on the concept design for urban design and landscaping works at Bicentennial Park.
- Council would like to include works upon Brighton Memorial playing fields to ensure re-instatement of all playing fields. We would like to work with RMS [Roads and Maritime] on finalising the concept plan for this site.

Response

Refer to **section B7.7** for information regarding the reinstatement of Bicentennial Park. Roads and Maritime will continue to work in partnership with Bayside Council to complete the Recreation Needs Analysis for the area, including the concept design for offset facilities and permanent reconfiguration of the Rockdale Bicentennial Park facilities.

B7.17.6 Settlement impacts at Muddy Creek

The ground settlement of Muddy Creek concrete channel is a concern, given the Sydney Water project commencing concurrently with the F6 project.

Council would like for RMS [Roads and Maritime]/Sydney Water and Council to talk about the impacts the F6 project may have on the stormwater channel and to develop strategies to mitigate these impacts.

Response

The Muddy Creek constructed channel is a concrete lined stormwater drain managed by Sydney Water. The Sydney Water proposal to naturalise sections of Muddy Creek is likely to increase groundwater recharge and may partially increase the baseflow to the creek. The project tunnels would be located more than 50 metres below the channel level.

As detailed in section 17.4.10 of the EIS, the groundwater assessment for the project identified the possibility of settlement impacts to the Muddy Creek channel. These risks would be confirmed within a geotechnical model of representative geological and groundwater conditions to be prepared prior to the commencement of tunnelling. In accordance with environmental management measure PL5, interface agreements will be entered into with relevant owners of infrastructure and utility services likely to be impacted by construction of the project. Refer to **section B7.17.1** for further information.

Ongoing consultation with Sydney Water will continue regarding protection of assets within the project footprint. Refer to **section B3.2** for Roads and Maritime response to Sydney Water's submission on this issue.

B7.17.7 Social and economic environmental management measures

- Council to provide feedback on the Site Establishment Management Plan, prior to being adopted to ensure appropriate measures have been considered
- Council would like a detailed scope and program of works to be delivered, showing the establishment of relocated sporting fields prior to construction.
- Council to provide feedback on the Community and Social Management Plan prior to adopting
- Council to provide feedback on the Community Consultation Strategy, prior to being adopted.
- Council to provide feedback on the Business Management Plan prior to adopting.

Response

Bayside Council's request to provide feedback is noted.

B7.18 Surface water, flooding and groundwater

B7.18.1 Flooding

- Council requests the flood management strategy which will be completed as part of the detailed design stage shall be provided to Council. Detailed design of the mitigation measures shall be provided.
- All flood mitigation measures (construction and operational stages) shall be incorporated in the flood model and flood mapping shall be updated once this information is available. Revised flood maps shall be provided to Council in GIS (grid/Ascii) file format for review.
- Section 6.1.4 indicates that compensatory flood storage can be provided to offset the combined effect of the President Avenue tunnel portal and surface works, Princes Highway and President Ave intersection upgrade. These storage areas shall be included in the updated flood model at detailed design stage.
- Section 6.1.4, Table 6 – 3 stated that proposed transverse drainage XD01 will increase the 1%AEP flow by 5.7m²/sec. While Council supports the increased capacity of the transverse drainage under President Avenue, an appropriate energy dissipation outlet structure shall be designed to avoid downstream erosion.
- There is an opportunity to provide new drainage network along President Lane and connect it to the proposed new drainage infrastructure (adjacent to the proposed water quality basin). This has potential to reduce flooding in O'Neill Street. We seek that RMS [Roads and Maritime] investigates this option.
- It is indicated that the cumulative impact of the new M5 motorway, F6 Stage 1 and future stages of the F6 extension may have a significant effect on flooding. It is recommended that a concept future F6 extension around President Avenue be considered to identify cumulative impacts and future flood mitigation measures.
- Ensure where Council stormwater infrastructure is modified by the works during and post construction alternative infrastructure is constructed that mitigates any increase in flooding. Council shall be consulted on the detailed design of this stormwater infrastructure.
- Ensure the existing major stormwater pipes on the eastern side of the Bicentennial Park Ponds are retained or alternate measures installed during the construction to maintain stormwater flows.
- Identify in collaboration with Council opportunities to improve water quality which may include the installation of a deep curtain wall along the eastern boundary of the Bicentennial Park to stop leachate flowing into the ponds.

Response

A Flood Management Strategy (FMS) will be prepared prior to commencement of construction by a suitably qualified and experienced person in consultation with directly affected landowners, Sydney Water, OEH, SES and relevant councils, including Bayside Council. The FMS will be prepared prior to construction to demonstrate how flooding risks and behaviours will be mitigated during both the construction and operational phases. The provision of updated flood modelling and mapping to Council will be subject to separate agreement with Roads and Maritime.

The key features of the concept flood and stormwater management strategy for the President Avenue intersection and surface works described in section 6.1.4 of Appendix M (Flooding technical report) of the EIS will be included in future flood modelling, subject to detailed design.

Appropriate dissipation and scour protection from construction discharges will be provided to unlined systems such as Rockdale Bicentennial Park Pond and Northern Scarborough Pond. No protection would be required for construction discharges which ultimately discharge to the concrete channel of Muddy Creek.

If the design identifies the risk of scour due to excessive velocities during construction and operation, the appropriate scour and erosion protection measures will be implemented at drainage outlets for both temporary and permanent works (refer to environmental management measure SWF8 in **Chapter D1** (Environmental management measures)).

The proposed drainage infrastructure has been developed to meet the operational requirements of the project. The provision of a new drainage network beyond the project footprint is outside the scope of the project.

An assessment of cumulative flooding impacts for the project is summarised in section 18.5.2 of the EIS. The assessment found that while the cumulative impact of the project with the New M5 Motorway project would increase peak 1% Annual Exceedance Probability (AEP) flood levels by a maximum of 30 millimetres, increases would be confined to the open space of the Kogarah Golf Course and the road reserve of Marsh Street.

As noted in Table 7-1 of Appendix M (Flooding technical report) of the EIS, cumulative impacts would need to be assessed as part of potential future stages of the F6 Extension (President Avenue to Loftus). However, given the minor nature of flood impacts associated with the project, it is expected that the cumulative impacts of the multiple stages can be managed through appropriate mitigation measures. Such measures may include, for example, the provision of compensatory floodplain storage within the Scarborough Ponds floodplain.

Where discharge to the stormwater network is required, drainage structures will be assessed and upgraded as required to ensure that the stormwater network has appropriate capacity. These assessments will be undertaken during detailed design. If the project is approved, Bayside Council will be consulted during detailed design in relation to affected council assets or where stormwater drainage connections will be made or modified.

Stormwater infrastructure on the eastern side of Rockdale Bicentennial Park is not anticipated to be impacted by the construction of the project, subject to detailed design.

Treatment measures will be implemented within the waterbodies of Scarborough Park North and Rockdale Bicentennial Park, disturbed by the project during construction, to reduce algal bloom conditions and contribute to achieving the NSW WQOs over time. Treatments will be considered in consultation with Bayside Council and will include macrophyte zones and bank reshaping of the wetland zones; and if confirmed to be an optimal approach in detailed design, the use of solar powered devices to aerate the water column (refer to environmental management measure SWF3 in **Chapter D1** (Environmental management measures)).

B7.18.2 Surface water

- The surface water balance in Table 6-1 and 6-2 preliminarily indicates the impact to the surface discharge volume due to the proposed new M5 Motorway and F6 stage 1 construction. Detailed assessment of the surface water management and discharge system shall be forwarded to Council once designed.
- Detailed design of water treatment facility and monitoring system and maintenance schedule shall be forwarded to Council once available.
- The impact of adding treated ground water into wetlands should consider the risk of this addition impacting the thermal stratification. Groundwater may require thermal adjustment and addition to the top or bottom of the wetlands to minimise the risk of negative impacts.
- Where constructional and operational plans require discharge via Council's stormwater network system, an assessment of the drainage system shall be undertaken to identify the capacity of the system to avoid local flooding and erosion. There may be an impact on asset capacity and the condition of the asset should be considered by RMS [Roads and Maritime] prior to assumption that the asset has capacity.
- Council notes installation of new GPTs and seeks clarification that these will be maintained by RMS [Roads and Maritime] or funding provided to Council for ongoing maintenance.

Response

Water discharges

As described in section 5.2.2 and Figure 5-2 of Appendix L (Surface water technical report) of the EIS, it is assumed treated construction wastewater (including treated groundwater) from construction ancillary facilities C2 and C3 would be directed to Muddy Creek via the stormwater network rather than Rockdale Bicentennial Park Pond or Scarborough Ponds.

In the event that discharge to Muddy Creek is not feasible (to be determined during detailed design), discharge from C3 may be directed to the open water channel running between President Avenue and Northern Scarborough Pond. The open water channel is understood to be shallower than Northern Scarborough Pond, but the depth is unconfirmed and it is not known whether thermal stratification occurs in this reach of the pond system.

During operation, tunnel groundwater would be pumped to the water treatment plant at the Arncliffe motorway operations complex (MOC1) and then discharged to the Cooks River through a direct drainage connection at Marsh Street.

Thermal stratification

Indicative criteria for the temperature of discharged construction wastewater (along with other water quality criteria) is provided in Appendix L, however, it is acknowledged that this may not fully cater for impacts to the thermal stratification of Northern Scarborough Pond.

The greatest potential risk of temperature impacts to the water column would be associated with discharging warm water to a zone of deep, cold and anoxic water in a way that results in a turnover event (breakdown of stratification) causing adverse water quality and ecological impacts in the upper layers of the ponds. It is acknowledged that this could occur but is considered unlikely due to the mixing which would occur within the open channel downstream of President Avenue prior to the discharge effluent entering the Northern Scarborough Pond.

To manage the potential risk of impacting thermal stratification, treated construction wastewater will be stored and buffered within the treatment basin prior to release so that temperatures are likely to be similar to that of the surface water as well as being well oxygenated. Where the temperature of the discharge is warmer than the surface water, the discharged water would remain on the surface. Where cooler, the effluent discharge would tend to sink to the depth of water at a similar temperature and would tend to oxygenate the deeper water column. These processes are not considered to pose a risk to water quality.

While unlikely, discharging construction wastewater to the base of the water column is considered to pose a potential risk of impacting thermal stratification and will be avoided.

While treated construction wastewater is not proposed to be released to Rockdale Bicentennial Park Pond, treated surface water may be discharged to this pond. Treated surface water releases to Bicentennial Park Pond will be subject to temperature discharge criteria (to be finalised at the completion of water quality monitoring) and discharged at surface to minimise potential impacts.

Impacts to council infrastructure and maintenance

Where discharge to the stormwater network is required, drainage structures will be assessed and upgraded as required to ensure that the stormwater network has appropriate capacity. These assessments will be undertaken during detailed design. If the project is approved, Bayside Council will be consulted during detailed design in relation to affected council assets or where stormwater drainage connections will be made or modified.

Gross pollutant traps (GPTs) are no longer being considered as part of potential treatment measures to be implemented within the waterbodies of Scarborough Park North and Rockdale Bicentennial Park. Treatments to be considered in consultation with Bayside Council will include macrophyte zones, bank reshaping of the wetland zones and if confirmed to be an optimal approach in detailed design, the use of solar powered devices to aerate the water column (refer to environmental management measure SWF3 in **Chapter D1** (Environmental management measures)).

B7.18.3 Potential settlement impacts associated with groundwater drawdown

- Council requests that as part of the detailed design, information is provided to Council on settlement associated with dewatering. Of particular interest is how settlement will impact on the

Council stormwater asset, Spring Street Drain, (a concrete lined channel) located above the area with the greatest expected groundwater drawdown and settlement.

- Council requests survey and monitoring of the Spring Street open channel to evaluate if settlement is impacting the condition of the asset. Remediation will be sought from RMS [Roads and Maritime] if an impact is observed.

Response

In accordance with environmental management measure PL4 (refer to **Chapter D1** (Environmental management measures)), prior to the commencement of construction, building condition surveys will be offered, in writing, to the owners of properties where there is a potential for construction activities to cause cosmetic or structural damage. If accepted, a comprehensive written and photographic condition report of the property/structure will be produced by an appropriate professional prior to relevant works commencing.

In accordance with environmental management measure PL5, interface agreements will be entered into with relevant owners of infrastructure and utility services likely to be impacted by construction of the project. The agreements will likely identify:

- Minimum separation distances and appropriate settlement criteria for utility infrastructure
- Settlement monitoring requirements during construction
- Contingency actions in the event that settlement limits are exceeded.

It is noted that in the vicinity of the Spring Street Drain, ground movement could be within the range of 2 – 50 millimetres. Ground settlement as a result of the project will be managed to comply with agreed settlement criteria (refer to environmental management measure PL5 in **Chapter D1** (Environmental management measures)).

A geotechnical model of representative geological and groundwater conditions will be prepared by the construction contractor during the detailed design phase prior to the commencement of tunnelling. The model will be used to assess predicted settlement impacts and ground movement during the construction and operation of the project.

B7.18.4 Groundwater

- The draw down associated with Rockdale/Scarborough ponds, Landing Lights wetland and Marsh St wetland should be monitored. This will require surveying the wetland wetted area extent prior to works and following construction. The extent of the potential draw down should be plotted (rather than just a depth provided) to better identify the impact (reduced area of shallow ponds may have [a] large impact on pond extent with only [a] small decrease in groundwater level). This will have a large visual impact and impact on biodiversity that relies on the ponds.
- Council supports the appropriate reuse of treated groundwater on sports fields and open spaces to increase return to ground water and reduce the impact on stormwater system.
- Council requests to be informed of the final arrangements for treatment and reuse during the detailed design.
- Council notes that the pH sampling was impacted by cement grout in bores and this should be resolved prior to works commencement to ensure accurate baseline water quality samples are available.
- Council requests to be informed of discharge water quality by way of exception reporting.
- Drainage blanket design at President Avenue, Council is interested in the detailed design which should consider the impact on trees in the park not being able to access groundwater.
- Recommend closer spacing of groundwater flow meters than 1km centres. Assessment of the issues will be difficult to determine with such a distance between flow meters.
- Note risks associated with potential acid sulfate soils, which will be managed under a Construction Soil and Water management Plan. Forward to Council detail once available.
- Council has provided RMS [Roads and Maritime] with a detailed report on water quality for Bicentennial Park Ponds and Scarborough Ponds and seeks to work closely with RMS [Roads and Maritime] to identify works to improve water quality as part of these works.

Response

Rockdale Wetland/Scarborough Ponds

The Rockdale Wetland and Scarborough Ponds are not concrete lined and are therefore in hydraulic connection with the underlying alluvium. Any decline in water levels in these waterbodies is likely to be, in part, balanced with diverted stormwater and floodwaters in the flood mitigation scheme for the project. Therefore monitoring of water levels is not required.

Discharge of treated groundwater

Surplus tunnel groundwater will be treated at an operational water treatment facility at the Arncliffe Motorway Operations Complex (MOC1) before discharge into the Cooks River. Treated groundwater will not be discharged to the stormwater system.

pH sampling

Table 17-5 of the EIS describes the groundwater quality within the study area which has been informed by the groundwater field investigations for the project. The table identifies that for both the alluvium and Hawkesbury and stone, pH levels are generally between pH 5 to 6.5, with the exception of some instances of pH greater than 10. Instances of pH greater than 10 are considered to be outliers and the pH levels are attributed to interference of cement grout in monitoring wells. Sufficient groundwater quality data has been collected to identify that pH levels of 5 to 6.5 are an appropriate groundwater quality baseline.

Drainage blanket design

Mitigation measures such as the installation of drainage blankets to direct groundwater around impervious barriers, such as secant piled walls or diaphragm walls, will be explored during the detailed design of the project.

Acid sulfate soils

Potential acid sulfate soils impacts will be managed as part of the CSWMP which will be prepared in consultation with the relevant authority.

Groundwater flow metres

The project design criterion for groundwater inflows is one litre per second per kilometre of tunnel. Groundwater flow meters would be spaced at a minimum of one kilometre intervals to ensure the minimum inflow criteria is being met. This distance is considered appropriate to monitor groundwater flows against the design criterion.

Improvement to water quality

Treatment measures will be implemented within the waterbodies of Scarborough Park North and Rockdale Bicentennial Park, disturbed by the project during construction, to reduce algal bloom conditions and contribute to achieving the NSW WQOs over time (refer to **section B7.18.1** for further information).

B7.19 Non-Aboriginal heritage

B7.19.1 Non-Aboriginal heritage environmental management measures

Chapter 7 of the Statement of Heritage Impact contains a number of management recommendations and should be adopted as the minimum standards for management.

Response

The environmental management measures for non-Aboriginal heritage impacts identified in the EIS and summarised in **Chapter D1** (Environmental management measures) will be implemented during the construction and operation of the project.

B7.20 Aboriginal heritage

B7.20.1 Consultation

Ongoing consultation with the Metropolitan Local Aboriginal Land Council should occur throughout the F6 project.

Response

Consultation with the relevant local Aboriginal Land Council occurred during the preparation of the EIS. This consultation and the accompanying site survey did not identify any archaeological sites, objects or areas affected by the project.

B7.21 Climate change and greenhouse gas

B7.21.1 Alternative energy sources

- Council requests RMS [Roads and Maritime] use green sourced energy during construction and operation phases.
- The EIS should indicate opportunities where the project could be using alternative sources of energy (solar lights, signage) and GHG emissions reduction opportunities that arise from the project construction.

Response

A number of environmental management measures are proposed to minimise energy requirements, increase energy efficiency and propose the use of renewable energy during the construction and operation of the project (these are also included in **Chapter D1** (Environmental management measures)):

- GG1: Targets to reduce GHG emissions, including the use of GreenPower and/or other renewable energy sources, will be included as part of the project's Sustainability Management Plan to assist in achieving 'Design' and 'As Built' ratings of Excellent under the Infrastructure Sustainability Council of Australia infrastructure rating tool
- GG3: Energy efficiency will be considered during the design of mechanical and electrical systems such as the tunnel ventilation system, tunnel lighting, water treatment systems and electronic toll and surveillance systems. Energy efficient systems will be installed where reasonable and practicable. The installation and use of solar power on operational infrastructure will be considered as part of detailed design, in order to reduce the GHG emissions of the project
- GG7: Raw materials will be managed to reduce energy requirements for their processing. For example, stockpiled materials will be covered or provided undercover storage where possible to reduce moisture content of materials, and therefore the process and handling requirements.

B7.21.2 Ground surface temperature and urban heat island effect

- Information as to whether modelling of the soil ground and surface temperature with and without F6 being built has been modelled and how any impacts can be mitigated.
- RMS [Roads and Maritime] has not identified measures to ensure associated surface infrastructure, including tunnel interchanges and project buildings, have minimal impacts on the heat island effect. Bayside Council would propose that these measures should include an increase in tree canopy within the project boundary and tree canopy increase along President Avenue as per the Eastern District Plan for Sustainability in relation to increasing urban tree canopy cover and delivering Green Grid connections

Response

Soil and surface temperature modelling and modelling of urban heat intensities were not within the scope of the EIS and not a requirement of the SEARs for the project. Given that the majority of project infrastructure would be below the surface in tunnels, with minimal increase in building footprint, any increase in the “urban heat island effect” and an increase in local average temperature increase is not anticipated to result in significant cumulative impacts. Where trees are removed to facilitate construction of the project, replacement trees will be selected and planted in accordance with the tree management strategy to be developed for the project.

B7.22 Sustainability

B7.22.1 Sustainability of construction methods

- Bayside Council would like to understand how NSW Government with Transport for NSW and RMS [Roads and Maritime] aim to adopt more sustainable construction methods over that period of time in order to achieve net-zero emissions by 2050.
- The EIS needs to identify the measures to ensure associated surface infrastructure, including tunnel interchanges and project buildings, will support the NSW Government’s goal of achieving a pathway towards net-zero emissions by 2050 as per Eastern City District Plan for Sustainability.

Response

The design of the project has been optimised to minimise energy and resource requirements, and the associated greenhouse gas (GHG) emissions, where feasible (refer to section 22.5.3 of the EIS for further information).

A number of environmental management measures has also been identified to reduce the GHG emissions generated by the project (refer to **Chapter D1** (Environmental management measures)).

Sustainability of the project will be assessed in accordance with the Infrastructure Sustainability Council of Australia (ISCA) Rating Tool to determine and set an appropriate target rating for the project, in accordance with the SEARs. The project is seeking a minimum IS ‘Design’ and ‘As-Built’ rating of ‘Excellent’ under the Design and As-Built Infrastructure Sustainability (IS) Version 1.2 ratings (refer to section 23.2 of the EIS for further information).

Transport for NSW released its *Future Transport Strategy 2056* in 2018. The strategy outlines a range of initiatives which will contribute to making transport systems in NSW more sustainable in the long term.

B7.23 Land use planning

B7.23.1 Brighton-Le-Sands Masterplan

Council is preparing a draft Brighton-Le-Sands Masterplan in order to holistically consider a range of issues and the relationships between them to inform the future planning and design of the area. Brighton-Le-Sands masterplan will provide a vision, a spatial framework and strategies to guide the future development and public domain improvements of the area. It also allows incremental change that is aligned with the current and future needs of the community. The draft Masterplan is anticipated to be released for public exhibition in early 2019.

The key goals of this project will:

Review the existing urban planning framework (ie land use and urban design specifications) for the area, and where necessary recommend changes to reflect current government, Council and community aspirations. F6 Extension project

Discuss with the community and stakeholders opportunities/expectations for the Brighton-Le-Sands public domain, tourism, and future developments.

Holistically consider a range of issues and the relationships between them to inform the planning and design of the area, including:

- economic vitality, businesses and tourism

- a variety of transport modes including pedestrians, cycling, public transport and vehicles
- amenity, safety in the public domain area
- urban character and identity of Brighton-Le-Sands
- environmental issues such as flooding, WSUD and biodiversity
- social inclusion and equity
- form based plan.

Similar opportunities have been identified in F6 project so that Council would like to work with RMS [Roads and Maritime] to further develop the dot points below.

- The Grand Parade - The proposed F6 Extension aims to divert existing heavy traffic away from The Grand Parade. The Grand Parade is currently classified as a State Road, owned and managed by RMS [Roads and Maritime]. Council would like further information about the vision for the future Grand Parade. Council requests that RMS [Roads and Maritime] scope the opportunity to reduce traffic lanes, extend footpath on the western side, provide and transform The Grand Parade into a pedestrian-friendly, green, increased access point to the beach and vibrant beachside Avenue.
- Bay Street - The proposed F6 Extension aims to divert existing heavy traffic away from Bay Street. It is currently the main shopping street at Brighton-Le-Sands. However, the centre suffers from a high volume of traffic and noise. Bay Street is presently classified as a State Road, owned and managed by RMS [Roads and Maritime]. Council would like to discuss with RMS [Roads and Maritime] their vision for Bay Street. In particular Council requests that RMS [Roads and Maritime] scope the opportunity to reduce traffic lanes, extend footpath, provide a separated cycle lane, provide and transform Bay Street into a pedestrian/cycle friendly, urban and main street character type of streetscape.
- Opportunity for amenity improvements for East-West Streets - Council supports the opportunity identified (Appendix C page 96) to facilitate a comfortable shaded environment for bicycle and pedestrian east-west links to connect Botany Bay and other major centres. It also aligns with the opportunity that Council has identified in the Brighton-Le-Sands Masterplan. This might include zoning changes and funding mechanisms. Council requests a meeting with RMS [Roads and Maritime] to further discuss the nominated amenity improvements/ possible delivery methodology for East-West streets.

Response

The preparation of the draft Masterplan is noted.

While the project may facilitate opportunities for revitalisation at The Grand Parade, Bay Street and east-west pedestrian links, potential projects to reduce traffic lanes and provide additional cycle and pedestrian infrastructure in these locations are separate to the F6 Extension Stage 1 project and would be subject to separate environmental assessment.

B Response to stakeholder submissions

B8 Inner West Council

This chapter addresses issues raised in the submission from the Inner West Council. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B8.1 General comments

Inner West Council opposes Sydney's expanding urban motorway network and its inevitable negative impacts on generations to come. Whilst the Inner West Council area would not be directly impacted by the F6 Extension Stage 1 (the project) and Council recognises there may be benefits to other council areas, the resultant impacts of the project will nonetheless adversely affect Inner West communities and localities. Additionally, Council considers the expanding motorway network to be contrary to the State Government's vision for three metropolitan cities and instead supports a combination of solutions to address population growth including sustainable and mass transport choices and coordinated demand management, particularly with new development.

If the project goes ahead the design needs to support other forms of access, including local walking and cycling movements with improved connectivity and amenity features, and better public transport serving centres.

Response

Consistency with strategic planning and policy

The project is consistent with NSW Government strategic planning and policies including *Future Transport 2056*¹. The project is identified in *Future Transport 2056* as a committed initiative for the next 0 – 10 years, with future stages of the F6 Extension also identified as a visionary motorway for investigation. Committed initiatives are for immediate detailed planning or are part of key maintenance, renewal or safety programs.

*A Metropolis of Three Cities – the Greater Sydney Region Plan*², was prepared concurrently with *Future Transport 2056* and the *State Infrastructure Strategy* to align land use, transport and infrastructure planning to reshape Greater Sydney as three unique but connected cities.

The project would facilitate improved commuting from south of Sydney to the Eastern City/Harbour central business district (CBD) (as described in the *Greater Sydney Region Plan*) and surrounding Global Economic Corridor, helping to unlock a catchment of employment resources in the Illawarra region, where there is better access to affordable housing. This improved connection and commuter access has potential to relieve pressure on Sydney's constrained development and growth in the Harbour CBD.

Current NSW Government policy has a focus on delivering transport projects, including public transport to the Western Sydney Airport, and through this, employment growth in key centres such as Parramatta, Western Sydney Airport, and the southwest and northwest growth centres. However, while Western Sydney is expected to deliver strong job growth over the next 20 years, employment in the eastern part of Sydney, namely the Sydney CBD, would also continue to grow. This means that people from south of Sydney would continue to travel north for employment opportunities.

The F6 Extension Stage 1 (the project), together with the Sydney motorway network, would form an inner western bypass of the Sydney CBD for vehicles travelling north-south and facilitate connections to Greater Parramatta (as described in the *Greater Sydney Region Plan*).

Public transport alternatives

The NSW Government is proposing to deliver a range of transport infrastructure projects including road, public transport and active transport projects to address the transport challenges associated with a growing Sydney and to provide a range of transport alternatives to support the variety of trips being made across the city.

There is currently no motorway between the existing M1 Princes Motorway south of Waterfall and the Sydney motorway network. All local and through traffic, including heavy vehicle traffic, is currently required to use the arterial road network to travel between Waterfall and Sydney, principally the A1 Princes Highway, the A3 King Georges Road and/or the A6 Heathcote Road/New Illawarra Road. This results in traffic congestion, leading to delayed travel times.

¹ NSW Government (2018) *Future Transport Strategy 2056*

² Greater Sydney Commission (2018) *Greater Sydney Region Plan – a metropolis of three cities*

The project is identified in *Future Transport 2056* as a committed initiative for the next 0 – 10 years, with future stages of the F6 Extension also identified as a visionary motorway for investigation. Committed initiatives are for immediate detailed planning or are part of key maintenance, renewal or safety programs.

The *Greater Sydney Services and Infrastructure Plan* component of the overarching *Future Transport 2056* identifies that the project, in combination with future stages of the F6 Extension, would complete the missing link in the Sydney motorway network between the Princes Highway and the Sydney motorway network.

As part of an integrated transport solution for Sydney, the project is expected to reduce traffic on parts of the Sydney road network. This investment in Sydney's road network would contribute to improvements across the network and would generate benefits to the local and the wider Australian economy.

The *Greater Sydney Services and Infrastructure Plan* component of the overarching *Future Transport* identifies that for all types of transport, public and private, roads will continue to perform an important function in transporting people and goods within Greater Sydney. Efficient, reliable and easy to-understand journeys will be enabled through a clear road hierarchy that better separates different types of trips.

While public transport is part of the integrated transport solution for Sydney, it is recognised that not all trips in Sydney can be served by public transport³, especially trips to dispersed destinations, or commercial trips requiring the movement of large or heavy goods/materials. A congested road network also affects road-based public transport, increased bus travel times and variable journey time.

Demand management alternatives

To have a major impact on road traffic, travel demand management measures would require considerable changes in social attitudes, travel behaviour and government policy and can take many years to achieve. Therefore, while travel demand management could help reduce demand on the road network during peak times, its effectiveness would be limited by other constraints, such as:

- Land use patterns, in particular the location of new jobs relative to areas of residential growth
- The availability of alternative travel modes at the user's origin and destination such as public transport and active transport
- Flexibility of working arrangements to take advantage of 'time of day' tolling or transport pricing benefits.

Travel demand management changes alone are therefore not a viable alternative to meeting the project objectives. They are, however, viewed as complementary initiatives, together with the project, to reduce the impacts of road traffic on Sydney's road network.

Future Transport 2056 identifies the need to encourage the community to use the transport system differently by shifting to walking, cycling or public transport and traveling outside the peaks to reduce congestion and channel demand where there is capacity. One initiative identified in *Future Transport 2056* to encourage the community to travel outside of peak hours is Transport for NSW's 'Travel Choices'⁴, which is a tool help people avoid delays when navigating the network by choosing the most efficient transport modes, routes and travel times. 'Travel Choices' aims to shape long term, sustainable travel behaviour, aligned to future workplaces.

Development of pedestrian, cyclist and public transport connections

The project would deliver new shared cycle and pedestrian pathways. These would be developed from Bestic Street, Brighton-Le-Sands south to Civic Avenue, Kogarah through the reinstated Rockdale Bicentennial Park, including some parts as an on-road cycleway. As part of the project, a dedicated shared bridge would be built over President Avenue.

³ NSW Government (2014) *NSW State Infrastructure Strategy*

⁴ <https://www.mysydney.nsw.gov.au/travel-choices>

An extension of the active transport corridor in the southern part of the project footprint to Chuter Avenue/O'Connell Street is also proposed and is described and assessed in the preferred infrastructure report. This would provide around 600 metres of additional shared cycle and pedestrian pathway to be delivered by the project.

The new shared cycle and pedestrian pathways would also result in opportunities for further co-ordinated development of an active transport network to link to key centres. A range of opportunities are outlined in Appendix C1 (Place making and urban design strategy) of the EIS including:

- Opportunity 1: Establish a shared and pedestrian pathways system throughout the existing F6 reserved corridor
- Opportunity 3: Extension of off-road shared cycle and pedestrian pathways between CA Redmond Field to Bicentennial Park
- Opportunity 9: Alternative shared cycle and pedestrian pathways route to that currently proposed including at Whiteoak Reserve and Rockdale Women's Sports Fields
- Opportunity 10: Improvement of on-road cycleway route at Bruce Street, Francis Avenue, Bay Street and England Street
- Opportunity 11: Amenity improvements for cycle and pedestrian links on east-west streets.

Furthermore, the project is also aligned with the 'simpler, faster, better' strategy of *Sydney's Bus Future* and would:

- Improve bus travel times and travel time reliability on existing routes due to a decrease in through traffic on arterial roads
- Create opportunities on arterial and other roads for bus service improvements.

B8.2 More traffic in congested streets

The F6 Extension Stage 1 along with WestConnex and the Western Harbour Tunnel are duplicating the radial road network previously laid out in Sydney, funnelling traffic into the inner city. This is taking place despite a newly adopted planning vision which seeks to transform Greater Sydney into a metropolis of three cities with supporting centres located throughout Sydney. The Inner West Council area is a condensed high-density location which already experiences significant traffic congestion, and this project along with WestConnex Stages 1, 2. and 3 and the Western Harbour Tunnel will funnel more traffic into confined local streets and high pedestrian areas. Increased traffic forecast on the exit ramps at St Peters will impact a community already bearing the burdens of WestConnex following years of major construction.

The Environmental Impact Statement (EIS) cites the benefit of traffic bypassing up to 23 sets of traffic lights on the Princes Highway and it is these perceived benefits of improved convenience and reliability that result in more people choosing to drive - known as induced demand. The EIS forecasts only a slight improvement of the wider road network in 2026 and 2036 as a result of a small drop in the daily Vehicle Kilometres Travelled (VKT) and daily Vehicle Hours Travelled (VHT) on nonmotorway roads with the road network accommodating more or longer trips in a shorter time. These long lasting operational consequences will adversely affect residents and businesses of the Inner West clogging local streets and intersections and raising concerns about more future road widenings as part of the RMS Network Integration Program.

Meanwhile the EIS identifies no or negligible improvements for VKT and VHT for on-road freight for scenarios not including the F6 Extension Stage 2, and modelling of the cumulative scenario (including F6 Stage 2, Sydney Gateway, Western Harbour Tunnel and Beaches Link) shows motorway segments would operate at only LOS D with higher potential for congestion and queuing should an incident occur.

While other major cities around the world have abandoned large-scale radial motorways, the NSW Government continues to push forward with ineffective methods to address road congestion. The RMS Traffic Volume Viewer shows traffic volumes on the Princes Highway in Banksia and Grand Parade/General Holmes Drive have remained stable over the last ten years and the same stability can be seen on other major roads including the ANZAC Bridge, Parramatta Road and Victoria Road - and yet more roadways continue to be proposed.

With Sydney's population' to reach 6.4 million by 2036 - a 50 percent increase from 2011 -, the accompanying growth in travel demand needs to be accommodated without building more motorways, freeing-up existing road space for commercial traffic movements. Inner West Council supports a combination of solutions to address dispersed population growth and land use changes and influence new travel behaviours particularly for commuter and discretionary trips. In addition to mass transport in growth areas, congestion charging needs to be applied in congested centres.

Genuine incentives to travel during non-peak periods need to be provided, a safe and connected regional bike network needs to be implemented and NSW government leadership is needed on travel planning for the occupants of new major development sites. The project alternatives outlined in Part 5 of the EIS only identify existing RMS programs and public transport services and fails to address the broader suite of much-needed alternatives as Sydney's population grows.

Should the project go ahead, a portal serving Sydney Airport at General Holmes Drive should be considered to reduce the pressure and scope of Sydney Gateway and the project should to be comprehensively modelled and exhibited along with the F6 Extension Stage 2.

Response

Congestion within the Inner West Council local government area

The F6 Extension Stage 1 project is not part of the WestConnex program of works. However, the project would connect to the Sydney motorway network. Traffic analysis for the project therefore includes the completed WestConnex motorway and Sydney Gateway as part of the 'Do minimum' scenarios.

Strategic traffic modelling for the project forecasted a negligible change in traffic volumes on the road network within the Inner West Council local government area (LGA). In both the 2026 and 2036 modelled scenarios, there are slight changes in traffic volumes with the project in the AM and PM peak hours of about 50 vehicles or less. Across the day, this change is of about 500 vehicles or less. The only area where there is a larger change in traffic volumes within the Inner West Council LGA that is not addressed in the EIS, is the Anzac Bridge, where there are changes in traffic volumes with the project of about 100 vehicles or less in the AM and PM peak hours and about 1,000 vehicles or less across the day. This would be considered a negligible change in traffic, forming only a small percentage of the peak hour and daily traffic on this road. Refer to **section B8.1** for information regarding the *Greater Sydney Region Plan* and the context of the project within the planned metropolis of three cities.

Induced demand

A new or substantially upgraded road can induce changes in trip patterns, which then appear as induced traffic demand. This induced demand is included in the strategic traffic forecasts for the project. The analysis of induced demand for the project at opening (2026) incorporates a completed WestConnex and Sydney Gateway motorway. Induced demand in the future 2036 scenario, which equates to about 0.3 per cent additional daily trips in the Sydney metropolitan area, would result in a negligible impact to the traffic network. This future scenario also includes the future F6 Extension.

Forecast benefits

There are reductions in traffic forecast on key roads with the project, which would be expected to improve bus speed and reliability. There are several bus routes that operate along The Grand Parade/General Holmes Drive, Princes Highway, north of President Avenue, Airport Drive and King Georges Road, all of which are forecast to have reductions in traffic with the implementation of the project. It is acknowledged that not all trips in Sydney can be undertaken by public transport as customer needs are diverse. Trips that require travel over long distances, that are dispersed across multiple destinations, or that require the transport of equipment or supplies, cannot be fully serviced by public transport alone. Investment in a range of modes, including road infrastructure, is therefore required to meet transport needs in Sydney and in NSW.

The physical length of the project is short in terms of the average heavy vehicle trip distance and therefore a significant impact on heavy vehicle kilometres travelled (VKT) or vehicle hours travelled (VHT) is not expected. The benefits rather come from the removal of heavy vehicles from surface roads in the vicinity of the project. Strategic traffic forecasts indicate that the project has the benefit of reducing heavy vehicle volumes on key arterial north-south road links between Arncliffe and Kogarah. With the project, heavy vehicle volumes are forecast to drop by more than 40 per cent on the Princes Highway and more than 30 per cent on General Holmes Drive in 2026 and 2036. This is detailed in section 9.6 of Appendix D (Traffic and transport technical report) of the EIS.

Modelling indicates that in the 2036 'Cumulative' scenario, F6 Extension Stage 1 motorway segments will operate at Levels of Service D or better. This indicates that the motorway should be able to operate acceptably but would be more susceptible to congestion and queuing in the event of an incident and there may be delays at intersections for off-ramps.

Traffic volumes on the Princes Highway and The Grand Parade

The stability of traffic volumes on the Princes Highway and The Grand Parade can be explained by the fact that these roads are currently at capacity. Increased daily traffic is forecast along the Princes Highway and The Grande Parade due to the forecast increase in population and changes to employment distribution across Sydney.

Strategic alternatives to the project

The NSW Government is proposing to deliver a range of transport infrastructure projects including road, public transport and active transport projects to address the transport challenges associated with a growing Sydney and to provide a range of transport alternatives to support the variety of trips being made across the city.

The *Greater Sydney Services and Infrastructure Plan* identifies that for all types of transport, public and private, roads will continue to perform an important function in transporting people and goods within Greater Sydney. Efficient, reliable and easy to-understand journeys will be enabled through a clear road hierarchy that better separates different types of trips.

Changes to travel behaviours and land use planning are discussed in **section B8.1** under the sub-heading 'demand management measures'. *Future Transport 2056* identifies the need to encourage the community to use the transport system differently by shifting to walking, cycling or public transport and traveling outside the peaks to reduce congestion and channel demand where there is capacity.

Future Transport 2056 also identifies that NSW Government is committed to working with local councils and communities on integrated transport and land use planning and investigate the potential to develop 20 year precinct plans for all strategically important centres and places.

However, travel demand management changes (including changes to land use planning) alone are not a viable alternative to meeting the project objectives. They are, however, viewed as complementary initiatives, together with the project, to reduce the impacts of road traffic on Sydney's road network.

As described in **section B8.1**, the project would deliver new shared cycle and pedestrian pathways which would also result in opportunities for further co-ordinated development of an active transport network to link to key centres. A range of opportunities are outlined in Appendix C1 (Place making and urban design strategy) of the EIS.

Connection to Sydney Airport

Initial traffic analysis using the EIS traffic model was undertaken for the Airport and Port Botany to understand the volume of traffic within the F6 corridor area. The analysis indicated that around 10-15% of traffic movements originating from Sydney Airport and Port Botany travel within the F6 corridor, while the remainder travel west or north.

Given the above, a direct connection to Sydney Airport and Port Botany was not considered further for inclusion as part of the project.

B8.3 Active transport

Inner West Council is concerned about the increased traffic in and around St Peters and Rozelle due to the project's link to WestConnex Stage 3 would result in an overall deterioration of conditions for walking and cycling in the longer-term. The project needs to ensure feedback about the local access needs of pedestrians cyclists are addressed including with improved pedestrian and cycling infrastructure and amenities such as shelter, shade and seating.

Widened intersections around the Haberfield and St Peters interchange have led to increased road crossing distances and the proposal to widen and raise President Avenue and alter the President Avenue/ Princes Highway intersection with additional lanes and turning movements needs to ensure pedestrians can quickly and easily move around their local area.

Likewise, changes to pedestrian and bicycle access during construction often impose significantly on people walking and cycling. Inner West Council is keen to ensure lessons have been learned and approaches taken with WestConnex are not continued including inadequate widths provided for shared walk/cycle paths, bulky poles installed on footpaths and installation of signs and electrical cabinets affecting pedestrian movements and visual amenity. Temporary access arrangements and the preparation of Construction Traffic and Access Management Plans need to take council and community concerns into account and ensure diversions are convenient and direct and not forcing people to walk or cycle in dangerous circumstances as they seek a shorter path.

Providing faster driving trips with an expanding motorway network should not undermine the directions in the Greater Sydney Region Plan for healthy lifestyles and connected communities.

Future Transport 2056 is underpinned by the movement and place framework while the Eastern District Plan aims to achieve great places to live and work. The EIS says the project would support the movement and place framework by changing the role of arterial roads such as Grand Parade and the Princes Highway however simultaneously says the project would allow these arterial roads to retain their purpose as movement corridors. The rollout of the Sydney strategic motorway network needs to be accompanied by a comprehensive review of road classifications, categorisations and funding to support place-based planning on surface roads serving Local Centres. Access to centres needs to be improved by removing through traffic and supporting local access primarily by walking and cycling and the Sydney Regional Bike Network now in development by Transport for NSW needs to be implemented immediately with funding and leadership from the State Government.

Response

Shared pedestrian and cycle pathways

Community consultation has been carried out for the development of the shared pedestrian and cycle pathways, including with St George Bicycle User Group, Bicycle NSW and Bayside Council, as described in section 3.2 and section 3.3 of the EIS,. The shared cycle and pedestrian pathways would be subject to detailed design in accordance with the Urban Design and Landscape Plan for the project. The plan will be developed in consultation with stakeholders and communities and will be made available for comment.

The opportunity to provide additional recreation and furniture amenity (such as shelter, shading and seating) is identified in Appendix C1 (Place making and urban design strategy) of the EIS and is subject to the detailed design of the project.

Crossing time at widened intersections

Where intersections are widened for the project, the crossing time for pedestrians at traffic signals would be adjusted accordingly and optimised to cater for the additional width. This would ensure safe conditions giving sufficient walk time for pedestrians and cyclists.

Impacts to pedestrian and cyclist connectivity during construction

The need to ensure footpaths are not unduly obstructed by temporary works is noted and this concern will be considered as part of the Construction Traffic and Access Management Plan (CTAMP) for the project (refer to environmental management measure TT1 in **Chapter D1** (Environmental management measures)). The CTAMP will communicate changes in traffic conditions, including impacts on people walking or cycling. It will include measures to ensure that safe routes are provided for pedestrians and cyclists during construction, which will include consideration of the location of temporary works and construction infrastructure. Where pedestrian and cyclist access is restricted or removed due to construction activities, an alternate route which complies with the relevant standards will be provided and signposted.

Healthy lifestyles and connected communities

The project would deliver new shared cycle and pedestrian pathways, and improve amenity within Rockdale Bicentennial Park (following the completion of the construction of the project) contributing to Sydney's Green Grid. The project would also result in further place making opportunities for connectivity, landscape amenity and recreational amenity to facilitate active and healthy lifestyles for the community. A range of opportunities are outlined in Appendix C1 (Place making and urban design strategy) of the EIS.

The project would provide improved city to city and centre to centre connections, as well as better north-south and east-west pedestrian connectivity through the provision of the shared pedestrian and cycle pathways.

Road classifications

A number of State roads around the Sydney Metropolitan have been reviewed and finalised for road classification in accordance with the Movement and Place Framework which underpins *Future Transport 2056*. There are a number of roads within the F6 corridor that have been considered as part of this plan.

Improvement of active transport connections

The new shared cycle and pedestrian pathways would also result in opportunities for further co-ordinated development of an active transport network to link to key centres (see **section B8.1** for further information). Implementation of the Sydney Regional Bike Network is outside the scope of the project.

B8.4 Community health impacts

The expanding urban motorway network and the F6 Extension will impose known health impacts both cumulatively and locally. Studies worldwide indicate that urban motorways contribute to private car dependency resulting in sedentary living in addition to reduced air quality, increased traffic noise and the psychological distress created by property acquisitions and changes in property values.

This project represents the first stage of a larger project leaving communities uncertain about future project iterations and impacts as the project expands and changes. The proposal for incremental motorway stages stretching across Sydney does not provide the certainty needed by Local Government as we prepare Local Strategic Planning Statements and the entire F6 Extension should be modelled and exhibited simultaneously demonstrating the locations of all facilities, traffic impacts and smog affected areas.

The EIS acknowledges additional induced daily trips throughout the Sydney metropolitan area as a result of the project and with more vehicles will come more emissions. Council accepts that per vehicle emissions have declined in recent years due to technological advances but remains concerned that additional traffic generated by the project and the motorway network will negate these technological-improvements.

The EIS states filtration of the project would result in no material change in air quality, saying predicted changes in the concentration of pollutants would be driven by traffic changes on surface roads. The directions in the Eastern City District Plan include reduced transport-related gas emissions and to ensure the cited improvements in air quality are achieved, accompanying measures are needed including a major review of existing road classifications, categorisations and funding, implementation of safe and connected bicycle network throughout Sydney and assessment of the cumulative changes to air quality resulting from all of the current and likely future motorway projects proposed for Sydney.

Response

Car dependency and human health impacts associated with motorways

Once the project is complete, it is expected that reductions in vehicle delays in a number of areas would occur. Traffic congestion and long commuting times can contribute to increased levels of stress and fatigue, more aggressive behaviour and increased traffic and accident risks on residential and local roads as drivers try to avoid congested areas.⁵ Increased travel times reduce the available time to spend on healthy behaviours such as exercise, or engage in social interactions with family and friends. Long commute times are also associated with sleep disturbance, low self-rated health and absence from work. Reducing travel times and road congestion is expected to reduce these health impacts.

The project would deliver new shared cycle and pedestrian pathways. These would be developed from Bestic Street, Brighton-Le-Sands south to Civic Avenue, Kogarah through the reinstated Rockdale Bicentennial Park, including some parts as an on-road cycleway. As part of the project, a dedicated shared bridge would be built over President Avenue.

An extension of the active transport corridor in the southern part of the project footprint to Chuter Avenue/O'Connell Street near Robinson Street is proposed and is described and assessed in the preferred infrastructure report. This would provide around 600 metres of additional shared cycle and pedestrian pathway to be delivered by the project.

Improvements in the active transport network, including improvements in transport connections, would have a positive benefit on community health. Where active transport opportunities are improved and offer safe alternatives to driving and public transport, they can encourage more active recreation and commuting activities.

The project would improve amenity within Rockdale Bicentennial Park (following the completion of the construction of the project), contributing to Sydney's Green Grid, by potentially improving health and opportunities for social interaction and cohesion.

The potential human health impacts of the project have been modelled and assessed with management measures proposed in Appendix F (Human health technical report) and Chapter 10 (Health, safety and hazards) of the EIS. The human health risk assessment was prepared in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for the project.

Uncertainty regarding future stages of the F6 Extension

The existing F6 reserved corridor between Arncliffe and Loftus was reserved in the 1950s to ensure land was available to accommodate the required road infrastructure for a future connection to link the existing A1 Princes Highway at Loftus with the Sydney motorway network at Arncliffe. The reservation of this corridor has provided an indication of its intended future use.

Future stages of the F6 Extension have and will be identified in strategic transport planning policy to provide a high level indication of the timing and potential scope of the projects. The *Future Transport Strategy 2056* identifies the F6 Extension – Kogarah to Loftus as an initiative for investigation in the next 10 years.

The majority of the project is located underground, with permanent surface infrastructure located within the existing F6 reserved corridor. A motorway tunnel option for the project minimises impacts to land use, property and social infrastructure and provides flexibility for future land use changes above the tunnel alignment compared to an above-ground option.

Roads and Maritime is carrying out initial geotechnical investigations along the proposed Section B (Kogarah to Taren Point) and Section C (Taren Point to Loftus) of the F6 Extension. However, there is currently no formal commitment from the NSW Government regarding the development of a design or timeline for future stages of the F6 Extension.

Assessment of future stages of the F6 Extension

The project would form the first stage of the F6 Extension with future stages of the F6 Extension being subject to separate environmental assessment and planning approval.

⁵ Hansson, E, Mattisson, K, Björk, J, Östergren, P-O & Jakobsson, K (2011) 'Relationship between commuting and health outcomes in a cross-sectional population survey in southern Sweden', BMC Public Health, vol. 11, no. 1, p. 834

However, the project cumulative operational assessments for traffic, air and noise presented in the EIS do include consideration of future stages of the F6 Extension.

Induced traffic and potential air quality impacts from vehicle emissions

A new or substantially upgraded road can induce changes in trip patterns, which then appear as induced traffic demand. This induced demand is included in the strategic traffic forecasts for the project. Induced demand in the 2036 modelled scenario (which includes the completed WestConnex motorway and future stages of the F6 Extension), equates to about 0.3 per cent additional daily trips in the Sydney metropolitan area and therefore would result in a negligible contribution to vehicle emissions. Notwithstanding, the air quality modelling in the EIS includes consideration of induced demand.

Emissions of air pollutants from motor vehicles in Sydney have decreased significantly since 2003. Despite there being more cars and trucks on the road, vehicle emissions have fallen over the past twenty years, as a result of improved fuel quality and engine designs. There will be a further decline over the next decade as new, cleaner vehicles replace older models.

Emissions associated with the operation of the tunnel relate to the discharge of air from within the tunnel to atmosphere via ventilation outlets. The existing emissions associated with motor vehicle use on surface roads would be displaced into the mainline tunnels and emitted via the ventilation outlets. As described in section 9.6 of the EIS, the predicted contribution of tunnel ventilation outlets to pollutant concentrations was negligible for all receptors.

Air quality modelling predicted noticeable decreases for the key pollutant PM_{2.5} along several roads, including Botany Street, Southern Cross Drive and General Holmes Drive, The Grand Parade to the north of President Avenue, President Avenue to the east of the F6 Extension Stage 1, and Marsh Street. These changes reflect reductions in the surface road traffic of between two and 22 per cent on these roads.

Cumulative impacts were assessed, with the 2036 cumulative scenario including all stages of the F6 Extension, M4-M5 Link, M5 East, New M5 and Western Harbour Tunnel and Beaches Link projects.

Tunnel infrastructure will be designed in such a way that the generation of pollutant emissions by the traffic using the tunnel is minimised.

In-tunnel air quality will be managed through monitoring and management of the ventilation systems and, where necessary, traffic management (refer to environmental management measure AQ4 in **Chapter D1** (Environmental management measures)).

Eastern City District Plan

Given that the project would primarily redistribute existing vehicle emissions and that there will be a further decline in emissions over the next decade as new, cleaner vehicles replace older models as described above, the project is not inconsistent with the directions in the *Eastern City District Plan*⁶ to reduce transport-related emissions.

Notwithstanding, with regard to the suggestions made by Inner West Council:

- A number of State roads around the Sydney Metropolitan Area have been reviewed and finalised for road classification in accordance with the Movement and Place Framework which underpins *Future Transport 2056*. There are a number of roads within the F6 corridor that have been considered as part of this plan
- The project would provide shared cycle and pedestrian pathways and the potential for further active transport connections as described in **section B8.1** (other active transport improvements throughout Sydney are outside the scope of the project)
- An assessment of the cumulative changes to air quality resulting from existing and proposed motorway projects in Sydney is provided in section 9.6 of the EIS and concluded that ambient air quality in the future 2036 scenario would meet the required criteria.

⁶ Greater Sydney Commission (2018) *Eastern City District Plan*

B8.5 Local impacts and urban design

The impact of motorways and the associated operational infrastructure imposes enormously on local neighbourhoods, and motorway projects now under construction provide opportunities to achieve better outcomes.

With different stages of WestConnex, Inner West Council has seen disappointing outcomes as a result of the following:

- The M4-M5 Link Concept Design was strongly premised on new open space at Rozelle but the application subsequently proposed motorway support facilities which significantly restricted its use and attractiveness
- The introduction of a flyover in Rozelle as a result of project iterations has resulted in the loss of shared path bridge originally proposed to connect local communities
- Recreational areas proposed in Rozelle and St Peters and comprehensively consulted with the community may not be fully delivered due to budget limitations
- Residual land and roadside spaces which are bleak unusable spaces and impose an immediate financial burden for council maintenance.

Local benefits such as useable open space and connections between neighbourhoods are important features of these major projects and they need to be honoured and delivered. Projects need to be fully developed and costed to maintain community trust and ensure the delivery of all exhibited components. Project iterations should not involve significant changes that undermine the exhibited concept or remove local benefits, and improved planning and commitment is needed to ensure residual lands and roadside spaces can be used constructively either by the local community or in the provision of other benefits in future. The handover of land to local government needs to be accompanied by maintenance funding in the initial period following handover.

In addition, the proponent needs to consider alternative approaches to the RMS standards when similar practical outcomes can be achieved, Inner West Council sought exemption from the RMS standards for variable message signs to minimise visual impacts and ensure walk/cycle paths were not obstructed however, compliance with the standards was insisted upon. Council appreciates the convenience of standards in providing certainty for the proponent however consideration needs to be given to alternative mechanisms in response to community concerns.

The President Avenue construction facility would require the provision of temporary sporting and recreational facilities including a skate park, children's playground and sporting fields, with investigations to take place during detailed design. The Inner West Council area has limited sporting and recreation facilities including a high demand for use and the impact of additional demand on parks and open space in the south-western corner of the council area needs to be assessed in collaboration with Inner West Council.

Response

Project commitments

Roads and Maritime acknowledges that motorway projects do impact local communities and is committed to providing the benefits from the project for communities affected. Project benefits are described in section 4.4 of the EIS.

While the EIS is based on a concept design of the project, it has considered feedback from the community and stakeholders on suggested amendments to the project design. Some of these amendments that result in improved community outcomes are described and assessed in the preferred infrastructure report.

Should the project be approved, the detailed design process will consider any necessary refinements to the concept design. Refinements may be necessary where the detailed design process identifies issues or opportunities regarding stakeholder and community issues, constructability, cost or other considerations for the delivery of the project. This process is part of the development of all major projects.

While there is every intention for Roads and Maritime to fulfil the commitments made in the EIS, should necessary design refinements be inconsistent with these commitments, further assessment and justification for the proposed changes may be required.

Residual land

Land handover and ongoing maintenance responsibilities and funding for community areas would be subject to an agreement between Roads and Maritime and the relevant local councils.

RMS design standards

The purpose of Roads and Maritime standards includes setting a consistent basis for the design and implementation of infrastructure that ensures the safety of all road users. The standards are informed by research and good practice for road network operations. While infrastructure such as variable message signs may result in local impacts to visual amenity, this must be balanced against the need to maintain road safety.

Impacts to sporting and recreational facilities

Sporting fields and recreational facilities within Rockdale Bicentennial Park would be directly impacted by the project, including a playground with equipment, a skate park, an open recreational oval and up to three soccer playing fields.

Some of these facilities would be offset with new facilities at nearby locations so as to ensure continuity of facilities for the community. The construction and installation of these facilities would be subject to separate planning approvals and are outside the scope of the EIS. Roads and Maritime will continue to work with Bayside Council to complete the Recreation Needs Analysis for the area, including the final relocation plan and permanent reconfiguration of the Rockdale Bicentennial Park facilities. Roads and Maritime would consult with key stakeholders through the Stakeholder Liaison Group during the development of offset facilities and permanent reconfiguration of the Rockdale Bicentennial Park facilities.

B Part B Response to stakeholder submissions

B9 Georges River Council

This chapter addresses issues raised in the submission from Georges River Council. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B9.1 Traffic and transport

The proposal to increase the capacity at the President Avenue and Princes Highway intersection has the potential to increase network pressure, increase delay times at the intersection during peak hours, and increase travel time for buses.

Council is concerned about the additional traffic from the F6 Extension on the surrounding road network - particularly along the Princes Highway, South Street, Kensington Street, and Gladstone Street. Furthermore, the existing AM peak traffic congestion on Princes Highway (to the north of the President Avenue intersection) will be exacerbated by the additional traffic from the F6.

Without any review and/or upgrade to the signalisation of Princes Highway, Council is concerned that the pedestrian-oriented local streets of the Kogarah Town Centre will be utilised by motorists as a detour to bypass the build-up of traffic on Princes Highway, thereby significantly impacting on the safety and amenity of Kogarah Town Centre where sensitive land uses like hospitals and child care are located.

The Princes Highway experiences high levels of daily traffic including freight, commuter and leisure travel. By building motorway tunnels and widening the intersection to accommodate more capacity, it will encourage the use of Princes Highway which will see resultant traffic volume increase the flow from Princes Highway and President Avenue intersection through to the Georges River LGA. The additional traffic loads are expected to add to the pressures of the existing health facilities in the immediate vicinity, including St George Hospital and St George TAFE.

The EIS acknowledges that delay time at the intersection will increase during AM and PM peak hours.

The EIS does not justify that the significant expenditure proposed on the intersection updates, benefits the public transport and active transport network as well as the broader community including public transport users, pedestrians, cyclists and communities generally.

Response

Intersection performance along the Princes Highway

A decrease in traffic is forecast on the Princes Highway, north of the President Avenue intersection, in the AM peak hour. The assessment of intersection performance on the Princes Highway at the President Avenue intersection, and further to the north at the Bay Street intersection, forecasts that overall the project has a small impact on intersection operation at these locations.

At the Princes Highway/Bay Street intersection, the project either results in no change, or a slight improvement in intersection performance in both the AM and PM peak hours.

At the Princes Highway/President Avenue intersection, in the AM peak hour, there is a negligible change in intersection performance in 2026 and a slight improvement in 2036. In the PM peak hour, performance is forecast to decrease but remains acceptable at Level of Service (LoS) D. As part of the project, the Princes Highway/President Avenue intersection is proposed to be upgraded, with an additional right turn lane provided from Princes Highway to President Avenue. Signal operation at this intersection would also be optimised with downstream intersections.

At the Princes Highway/Rocky Point Road intersection, the project has negligible impact in 2026. In the 2036 AM peak, there is a decrease in performance, but it remains acceptable at LoS D. In the 2036 PM peak, the project does not impact intersection performance.

Further detail of performance at these intersections can be found in section 8.7.3.2 of the EIS.

Impact of through traffic to the Georges River LGA

Strategic traffic forecasts indicate that there will be increases in traffic volumes on some areas of the road network as vehicles access the project. In the Georges River Local Government Area (LGA), an increase in traffic as a result of the project is expected on the Princes Highway, which forms part of the A1 Highway, a key movement corridor in Sydney and NSW. The greatest increases in traffic are expected to occur on the Princes Highway around the Princes Highway/President Avenue and Princes Highway/Rocky Point Road intersections. These are the key Princes Highway intersections in the vicinity of St George Hospital and St George TAFE. The performance of these intersections with the project is detailed in the above section regarding intersection performance along the Princes Highway.

Potential impact on Kogarah Town Centre

As part of the project, the Princes Highway/President Avenue intersection is proposed to be upgraded, with an additional right turn lane provided from the Princes Highway to President Avenue. Signal operation at this intersection would also be optimised with downstream intersections. These measures will help reduce any potential impacts to Kogarah Town Centre by helping to keep motorists on the main road network, which bypasses the Kogarah Town Centre.

Any potential impacts on Kogarah Town Centre were assessed as part of the EIS. Strategic traffic model results forecast small impacts in terms of increased traffic to the road network in the Kogarah Town Centre to the west of the Princes Highway. In the AM peak, there is a forecast two-way increase of about 50 vehicles to this area from the Princes Highway. In the PM peak, there is a forecast two-way increase of about 150 vehicles an hour from the Princes Highway. This is not considered to be a large increase in traffic during the hour-long peak period.

Project justification

The project would provide the first stage of a dedicated motorway connection between Sydney's south and the broader motorway network. As well as providing travel time savings, this connection would have the impact of shifting vehicles away from the surface arterial road network. The project's impact in reducing traffic on key arterial road corridors parallel to the project has been documented in the EIS. Screenline analysis undertaken as part of the traffic assessment for the project to examine how traffic might shift between alternative parallel routes or corridors throughout the traffic assessment study area found that the project predominantly shifted traffic off surface arterial routes.

The analysis also indicates that the project has the impact of reducing heavy vehicle volumes on key arterial north-south road links between Arncliffe and Kogarah, including the Princes Highway. Full details of the outcomes of the heavy vehicle screenline analysis can be found in Annexure B of Appendix D (Traffic and transport technical report) of the EIS. The project is needed to facilitate improved connections between southern Sydney, the Sydney central business district and Port Botany, as well as better connectivity between key employment hubs and commercial, health and education centres, and local communities. The project would also provide more efficient and economic transport connections between the A1 Princes Highway and Sydney Airport.

A Business Case for the F6 Extension Stage 1 project was developed between November 2017 and March 2018 by Roads and Maritime Services. A full economic cost-benefit analysis was undertaken of the project in accordance with NSW Treasury Guidelines for Capital Business Cases, as well as Infrastructure NSW and Infrastructure Australia requirements.

The Business Case completed for the project demonstrated strategic merit, a well-defined project scope and a positive benefit cost ratio (BCR) of between 1.31 and 1.56, depending on the quantifiable benefits included. Under sensitivity testing, the analysis largely continued to return positive BCRs.

Improvements to public transport would be complementary to the project and the project would not preclude improvements from occurring as they would address different objectives.

The project is also aligned with the '*simpler, faster, better*' strategy of *Sydney's Bus Future*¹ as it aims to:

- Improve bus travel times and travel time reliability on existing routes due to a decrease in through traffic on arterial roads
- Create opportunities on arterial and other roads for bus service improvements.

In terms of bus travel times, while the traffic assessment indicates that for bus routes across President Avenue and the immediate surrounding road network there is a small forecast increase in average bus travel times of about a minute with the project, it also shows overall travel time savings on bus routes that travel along West Botany Street and General Holmes Drive of between one and six minutes.

Active transport improvements are an essential component of an integrated transport solution, meeting the needs of local communities and shorter distance commuters. The project would provide shared cycle and pedestrian pathways aimed at improving north-south active transport movements between Bestic Street and Civic Avenue. Changes to the active transport corridor in the southern part of the

¹ Transport for NSW (2013) *Sydney's Bus Future*

project footprint, including an extended pathway to Chuter Avenue/O'Connell Street, are proposed and are described and assessed in the preferred infrastructure report.

B9.2 Air quality

As the F6 Extension will inevitably lead to traffic growth across the Princes Highway and its immediate catchment, emissions are likely to substantially increase. The vehicle emissions may have a health impact on the St George Private and Public Hospitals.

The Princes Highway construction ancillary facility area (C6) is defined as 'High Risk' in relation to dust impacts in the EIS. The EIS has not adequately considered and addressed the impact of dust during construction. At the local level, the area between Kogarah train station and Princes Highway consists of a high-density community including patients in hospitals.

Response

Operational vehicle emissions

The project is expected to result in a redistribution of impacts associated with vehicle emissions, specifically in relation to emissions derived from vehicles using surface roads. For much of the community this would result in no change or a small improvement (ie 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 tolerable/acceptable.

Potential health impacts at St George Private and Public Hospitals have been assessed. The Human Health Risk Assessment (refer to Appendix F (Human health technical report) of the EIS) for the project calculated risks for hospitals/medical receptors in the study area associated with short term exposure to changes in nitrogen dioxide concentrations with operation of the project. The maximum calculated risks for hospitals/medical receptors were found to be below or equal to 4×10^{-62} and are therefore considered to be acceptable³.

The predicted change in annual concentrations for air quality indicators, such as particulate matter, were modelled for three project scenarios at St George Hospital. These scenarios were for 2026 (project opening), 2036 (future operations) and the cumulative case (with other motorway projects). For both PM₁₀ and PM_{2.5}, the increase in concentration at St George Hospital was less than 0.05 µg/m³; which equates to less than one per cent of the air quality criterion (refer to Annexure F of Appendix F (Human health technical report) of the EIS)

Individual risk associated with changes in PM_{2.5} and PM₁₀ concentrations from the project (ventilation outlet plus roadway emissions) at the maximum impacted hospital, was calculated, for the operational years 2026 and 2036 (refer to Table 6.24 and Table 6.25 of Appendix F (Human health technical report) of the EIS). For the 2026 scenario, the maximum hospital PM_{2.5} mortality all causes risk was found to be 7×10^{-6} and the PM₁₀ maximum hospital mortality all causes risk was 4×10^{-7} . This represents a tolerable and negligible risk respectively. For the 2036 scenario, the maximum hospital PM_{2.5} mortality all causes risk was found to be 7×10^{-6} and the PM₁₀ maximum hospital mortality all causes risk was 5×10^{-7} . This represents a tolerable and negligible risk respectively.

This means that operational vehicle emissions from the project would have negligible air quality and associated health risk impacts on St George Private and Public Hospitals.

Construction dust impacts

The qualitative IAQM approach adopted for the project does not assess the impacts of dust, but rather the risk of impact if dust generating activities remain unmitigated. The outcomes are then used to inform the recommendations for mitigation.

² The assessment of health impacts for a population associated with exposure to particulate matter has been undertaken utilising the methodology presented by the WHO (Ostro 2004) where the exposure-response relationships have been directly considered. The methodology for the calculation of risk is described in Annexure A or Appendix F (Human health technical report) of the EIS.

³ While there is no guidance available on what level of risk is considered to be unacceptable in the community, a level in excess of 10^{-4} for increased risk (one chance in 10,000) has been generally adopted by health authorities as a point where risk is considered to be unacceptable. Annexure C of Appendix F (Human health technical report) of the EIS presents a discussion on levels of risk that are considered to be negligible, tolerable/acceptable and unacceptable.

The Princes Highway construction ancillary facility (C6) was found to have high risk based on the number of sensitive receptors within proximity of the site, as detailed in section 9.5.2 of the EIS. Activities which would occur at the C6 facility with the potential to create dust emissions include demolition, earthworks, construction and track-out. A Construction Air Quality Management Plan (CAQMP) will be developed and implemented to manage potential air quality impacts associated with the construction of the project and activities at construction ancillary facilities. The management plan will identify project construction activities with the potential to have air quality impacts and the controls required to avoid, minimise and mitigate these impacts.

With regards to dust management, the CAQMP will include measures to:

- Minimise project dust generation from stockpiles, haulage routes, work activities, exposed ground surfaces and spoil sheds
- Manage the transport, storage and handling of sand, aggregate and fine materials
- Modify or cease dust generating works during unfavourable weather conditions.

The CAQMP will be implemented for the duration of construction. Site inspections will be undertaken to ensure that the mitigation measures implemented are effective. Systems will also be in place during construction, such as a Complaints Management System, for the community to report any concerns about dust issues.

B9.3 Noise and vibration

The EIS acknowledges that six properties in Georges River LGA will be exposed to a high level of noise which will exceed the noise criteria of Cumulative Noise Limit and request mitigation measures. Council is concerned more properties than those listed will suffer from the impacts of noise and vibration during both construction and operation.

Response

The noise and vibration assessment for the project (refer to Appendix G (Noise and vibration technical report) of the EIS) was prepared in accordance with the SEARs for the project. The construction noise assessment was conducted in accordance with the NSW Environment Protection Authority (NSW EPA) *Interim Construction Noise Guideline* and the Roads and Maritime *Construction Noise and Vibration Guideline*. Reasonable worst case construction scenarios were assessed including assessment of work outside of standard construction hours (including night-time).

The operational road traffic noise assessment was also completed in accordance with the NSW EPA *NSW Road Noise Policy* and Roads and Maritime's *Noise Criteria Guideline* and *Noise Mitigation Guideline*.

Works which may impact receivers within Georges River LGA include surface works along President Avenue and at the Princes Highway President Avenue intersection and the Princes Highway construction ancillary facility (C6). Works outside of standard construction hours would be required at these locations.

A range of environmental management measures are proposed to manage potential construction noise impacts. A Construction Noise and Vibration Management Plan (CNVMP) will be prepared and implemented throughout the duration of the project construction.

A detailed noise assessment will be carried out for the Princes Highway construction ancillary facility (C6). Mitigation of noise will be a key consideration of work planning, and specific noise management measures will be implemented prior to the commencement of activities which have the potential to cause noise impacts.

Noisy work will be scheduled to be undertaken during the standard hours as far as possible. Noisy activities that cannot be undertaken during standard construction hours will be scheduled as early as possible during the evening and/or night-time periods.

Respite measures will be implemented for noisy work and vibration intensive activities in a manner consistent with Environment Protection Licence (EPL) and Roads and Maritime guideline requirements. Respite measures may include the restriction to the hours of construction activities resulting in impulsive or tonal noise (such as rock hammering, pile driving), or other appropriate measures agreed between the contractor and residential receiver such as alternative accommodation.

All residents affected by noise from the construction of the project which are expected to experience an exceedance of the construction noise management levels will be notified prior to the commencement of the construction works. Respite measures will be implemented for noisy work and vibration intensive activities in a manner consistent with EPL and Roads and Maritime guideline requirements. Receptors requiring at-property operational noise mitigation will be identified and offered treatment prior to commencement of construction works that affects them.

Community consultation regarding construction noise and vibration will be detailed in the Community Communication Strategy for the construction of the project and will include a complaints handling process. The community will be able to provide feedback via a 24 hour, toll-free project information and complaints line, a dedicated email address and postal address for the project.

An assessment of road traffic noise impacts is provided in section 11.4.1 of the EIS. Residential receivers within the Georges River LGA identified in the EIS as potentially impacted by operational noise are discussed in this section.

These receivers would be considered for architectural treatment. Most of these receivers are apartment buildings, some of which do not face the project. Only receivers impacted by the works would be considered for architectural treatment. Apartments which face away from the project may not be eligible for noise mitigation. This would be confirmed during the detailed design phase of the project. Types of architectural treatment are detailed in Roads and Maritime's *At-Receiver Noise Treatment Guideline*.

B9.4 Soils and contamination

The EIS indicates the 7-Eleven Service Station on C6 site has been assessed as high risk as petroleum soil and groundwater contamination is known to be present at concentrations above the NSW EPA assessment criteria. The excavation of soil for the removal of the underground storage tanks (USTs) could bring a high risk of people exposing to dust, odour, contaminated groundwater and soil. The lack of monitoring and notification would have negative impacts on the offices, amenities, and workshops on the site during the construction and operation.

Response

A detailed site (contamination) investigation will be undertaken in accordance with the NSW EPA *Sampling Design Guidelines*⁴ within the 7-Eleven service station at 734 Princes Highway, Kogarah, prior to commencement of construction. If required, based on the results of the additional investigation, a Remedial Action Plan (RAP) will be prepared prior to construction (refer to environmental management measure SC3 in **Chapter D1** (Environmental management measures)). The RAP will be prepared in accordance with NSW EPA Guidelines and will:

- Set remediation goals that ensure the remediated site will be suitable for the proposed use and will pose no unacceptable risk to human health or to the environment
- Document procedures and plans to be implemented to reduce risks to acceptable levels for the proposed site use
- Establish the environmental safeguards required to complete the remediation in an environmentally acceptable manner.

A Construction Soil and Water Management Plan (CSWMP) will also be prepared in accordance with the Blue Book⁵ and relevant Roads and Maritime guidelines. The CSWMP will detail the process and measures to manage and monitor soil and water impacts associated with the construction works, including contaminated land.

⁴ NSW Environment Protection Authority (1995) *Sampling Design Guidelines*

⁵ Landcom (2004) *Managing Urban Stormwater: Soils and Construction Volume 1*

B9.5 Human health risk

As mentioned above in this submission, should the project proceed, increased traffic volumes to and from the F6 Extension would contribute to reduce air quality and increased noise and vibration. Council is of the view that any reduction in air quality is unacceptable and will contribute to reductions in the quality of human health.

The travel time benefits of the F6 Extension appear to be over-estimated, whilst the health costs are under-estimated. The health impact assessment should investigate whether the proposal to upgrade the intersection and building motorway tunnels will encourage private vehicle use and a sedentary lifestyle, which leads to less healthy lives by becoming less active.

Response

Human health impacts due to increased traffic

Air quality

Potential human health impacts associated with operational air emissions from the project have been modelled and assessed, with management measures proposed in Appendix F (Human health technical report) and Chapter 10 (Health, safety and hazards) of the EIS.

As described in **section B9.2**, 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 tolerable/acceptable.

A new or substantially upgraded road can result in changes to trip patterns, which then appear as induced traffic demand. This induced demand has been included in the strategic traffic forecasts for the project. Induced demand in 2036 was found to be about 0.3 per cent additional daily trips in the Sydney metropolitan area and therefore would result in a negligible contribution to vehicle emissions.

Noise and vibration

The operational noise and vibration assessment predicts that noise criteria will be exceeded at a number of properties adjacent to the project without mitigation measures, with 109 properties considered eligible for mitigation measures due to operational noise (as described in section 9.6.4 of the EIS). These properties are primarily along the Princes Highway and President Avenue. Many of these properties currently experience elevated noise levels so mitigation measures may provide a net benefit to those receptors.

Mitigation measures will be applied at the source where possible, with at-property architectural treatments for noise only considered when all other options have been exhausted. Receptors requiring at-property operational noise mitigation will be identified and offered treatment prior to commencement of construction works that affects them. Noise mitigation measures are summarised in **Chapter D1** (Environmental management measures).

Car dependency and human health impacts associated with motorways

Traffic congestion and long commuting times can contribute to increased levels of stress and fatigue, more aggressive behaviour and increased traffic and accident risks on residential and local roads as drivers try to avoid congested areas.⁶ Increased travel times reduce the available time to spend on healthy behaviours such as exercise, or engage in social interactions with family and friends. Long commute times are also associated with sleep disturbance, low self-rated health and absence from work.

Once the project is complete, it is expected that reductions in vehicle delays in a number of areas would occur. Reducing travel times and road congestion is expected to reduce the health impacts described above. Over half (57.5%) of the study area currently travel to work by car (as a driver). The project would therefore reduce the time these commuters spend in their vehicles by improving journey times.

The project would also deliver new shared cycle and pedestrian pathways.

⁶ Hansson, E, Mattisson, K, Björk, J, Östergren, P-O & Jakobsson, K (2011) 'Relationship between commuting and health outcomes in a cross-sectional population survey in southern Sweden', BMC Public Health, vol. 11, no. 1, p. 834

Improvements in the active transport network, including improvements in transport connections, would have a positive benefit on community health. Where active transport opportunities are improved and offer safe alternatives to driving and public transport, they can encourage more active recreation and commuting activities.

The project would improve amenity within Rockdale Bicentennial Park (following the completion of the construction of the project) contributing to Sydney's Green Grid, potentially improving health and opportunities for social interaction and cohesion.

B9.6 Heritage

The proposal to upgrade the intersection would have adverse impacts on two local heritage items along Princes Highway, St Paul's Anglican Church and Hall, and Shop and Residence. The construction of the project will have a potential negative impact on the structure and external environment of the historic buildings. Therefore Council requests detailed heritage assessment and mitigation measures including dilapidation reports.

Response

The historic heritage assessment undertaken for the project is detailed in Appendix N (Statement of heritage impact) of the EIS. The noise and vibration assessment identified that a safe working distance to avoid cosmetic damage to structures due to vibration was 25 metres, assessed against the maximum rating for construction plant (refer to section 5.5 in Appendix G (Noise and vibration technical report) of the EIS).

St. Pauls Anglican Church is located over 25 metres from the proposed surface works and therefore has not been assessed as being at risk of cosmetic damage. Analysis of mapped heritage items identified that the Shop and Residence (located approximately seven metres from the closest work area location) is the only known heritage item within 25 metres of the proposed surface works with a potential for vibration impacts.

To avoid impacts to Shop and Residence, vibration monitoring of the heritage item will be undertaken during vibration intensive construction works to ensure vibration limits are not exceeded. The monitoring system will include real time notification to the Site Foreman of any exceedances of the applicable limits so that appropriate corrective action can be taken (refer to environmental management measure NAH8 in **Chapter D1** (Environmental management measures)).

B9.7 Stormwater and flooding

The EIS acknowledges that new surface roadway exposed to direct rainfall is proposed at the intersection of President Avenue and Princes Highway. Given the proposed development, there is potential that the contaminated stormwater flows into the local stormwater network will impact the stormwater quality if it is not captured and appropriately processed.

Response

Stormwater treatment measures are proposed to manage potential impacts generated from surface pavements. A preliminary stormwater drainage strategy, including treatment measures, has been developed for the project and will be finalised during detailed design. The final selection and design of treatments will consider the sensitivity of the environment, changes in imperviousness as a result of the project, environmental, operational and hydraulic constraints, and the Botany Bay and Catchment Water Quality Improvement Plan objectives and targets for pollutant load reductions. While sections of President Avenue would continue to drain without treatment (as per the existing situation), MUSIC modelling for the project demonstrated that additional load due to new pavement as a result of operation of the project would result in minor increases in total pollutant loads for total suspended solids, total phosphorus and total nitrogen (refer to Table 6.6 of Appendix L (Surface water technical report) of the EIS). Minor increases in pollutant load would be offset by treatment of an upstream residential catchment on O'Neil Street, which would be diverted into a proposed grass swale.

B Part B Response to stakeholder submissions

B10 Canterbury - Bankstown Council

This chapter addresses issues raised in the submission from Canterbury-Bankstown Council. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B10.1 Project development and alternatives

The submission concerns the route of the electricity supply to the project.

Council proposes two options as alternative routes:

- Option 1. Via Westfield, William, Hood, Homer, Matilda Bay on to Hartill Law to the Proposed Route
- Option 2 is to utilise the electrical feed to the Bexley MOC and head to West Botany MOC3, if there is capacity. This could be via Bexley Road.

A sketch plan of Council's suggested route options is provided in its submission.

Response

The route of the permanent power supply connection was developed based on the most direct and efficient connection between the Ausgrid Canterbury substation and the Rockdale Motorway Operations Complex south (MOC3). It has also been developed so that it avoids arterial roads where possible in order to minimise impacts on the local traffic and transport network during construction. The route is located within the road reserve, where possible, to minimise impacts to open space, private property, vegetation and heritage items.

The route is indicative and would be further refined and confirmed in consultation with Ausgrid and other key stakeholders, including Canterbury-Bankstown Council.

It is assumed that the 'West Botany MOC3' referred to in the submission refers to the Rockdale Motorway Operations Complex (MOC3) for the F6 Extension Stage 1 project and that the 'Bexley MOC' refers to the Bexley Road South motorway operations complex (MOC2) for the New M5 Motorway project.

The substation at the Bexley Road South motorway operations complex (MOC2) has been designed to meet power requirements for the New M5 Motorway project. There is not sufficient capacity to provide the required power supply for the F6 Extension Stage 1 project.

The alternative route options suggested by Canterbury-Bankstown Council will be considered during design development. Council will be consulted on the outcomes of the route options assessment. (refer to environmental management measure SE7 in **Chapter D1** (Environmental management measures)).

B Part B Response to stakeholder submissions

B11 City of Sydney

This chapter addresses issues raised in the submission from the City of Sydney Council. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B11.1 Lack of consistency with the NSW Government's stated policy frameworks

B11.1.1 Public transport alternatives and Future Transport 2056

The Government's own Regional and District plans acknowledge that the future of Sydney's competitiveness comes from creating connected places where people live in close proximity to jobs. This can only be delivered through affordable, reliable public transport.

The Government's own transport plans acknowledge that public transport has superior carrying capacity - a train line (one track in each direction) can move around 50,000 people an hour, compared with two motorway lanes that can only move around 5,000 people per hour. In terms of return on investment for infrastructure, public transport therefore offers a solution that provides ten times the capacity (or ten times less space on surface or in tunnels to move the same demand).

The F6 Extension Stage 1 as outlined in the Environmental Impact Statement (EIS) does little to contribute to the Government's vision and objectives set out in Future Transport 2056, which has a focus on the role of transport in delivering movement and place outcomes that support the character of our future communities.

Transport 2056 refers to:

- a productive economy which relies on an efficient transport system, noting that congestion and network inefficiency increase costs, constrain growth, and stifle economic development and the mobility of services and labour
- liveable communities which promote social inclusion and the health and wellbeing of the people who live in them
- mobility as a 'placemaker' which can transform the public domain, activate centres and unlock new commercial and housing developments, renewing existing neighbourhoods and spaces
- Places for people (such as the Sydney City Centre and Village Centres) are the heart of communities and are more people orientated street environments. To support Places for People, the Movement and Place Framework identifies the need to better prioritise public transport, pedestrians, cycle and freight access whilst limiting through traffic with no destination in the centre.

The answers to the issues and opportunities outlined in Transport 2056 do not lie with building more tollways like the F6 Extension. The Government needs to commit to its own strategies and plans to achieve sustainable transport solutions with a focus on public and active transport.

Response

The NSW Government is proposing to deliver a range of transport infrastructure projects including road, public transport and active transport projects to address the transport challenges associated with a growing Sydney and to provide a range of transport alternatives to support the variety of trips being made across the city.

There is currently no motorway between the existing M1 Princes Motorway south of Waterfall and the Sydney motorway network. All local and through traffic, including heavy vehicle traffic, is currently required to use the arterial road network to travel between Waterfall and Sydney, principally the A1 Princes Highway, the A3 King Georges Road and/or the A6 Heathcote Road/New Illawarra Road. This results in traffic congestion, leading to delayed travel times.

The project is identified in *Future Transport 2056*¹ as a committed initiative for the next 0 – 10 years, with future stages of the F6 Extension also identified as a visionary motorway for investigation. Committed initiatives are for immediate detailed planning or are part of key maintenance, renewal or safety programs.

¹ NSW Government (2018) *Future Transport Strategy 2056*

The *Greater Sydney Services and Infrastructure Plan*² component of the overarching *Future Transport 2056* identifies that the project, in combination with future stages of the F6 Extension, would complete the missing link in the Sydney motorway network between the Princes Highway and the Sydney motorway network.

As part of an integrated transport solution for Sydney, the project is expected to reduce traffic on parts of the Sydney road network. This investment in Sydney's road network would contribute to improvements across the network and would generate benefits to the local and the wider Australian economy.

The *Greater Sydney Services and Infrastructure Plan* identifies that for all types of transport, public and private, roads will continue to perform an important function in transporting people and goods within Greater Sydney. Efficient, reliable and easy to-understand journeys will be enabled through a clear road hierarchy that better separates different types of trips.

While public transport is part of the integrated transport solution for Sydney, it is recognised that not all trips in Sydney can be served by public transport³, especially trips to dispersed destinations, or commercial trips requiring the movement of large or heavy goods/materials. A congested road network also affects road-based public transport, increased bus travel times and variable journey time.

Section 4.2.2 of the EIS describes how future trends in transport have been taken into consideration in the development of the project in line with the *Future Transport Strategy 2056*. The EIS notes the trend that a greater percentage of the population is travelling on public transport and the concurrent development of autonomous vehicles for both buses and cars. Connected and automated vehicles are expected to reduce rates of road trauma caused by human error, improve traffic flow and efficiently manage higher traffic volumes. Motorways will drive and facilitate this shift and will respond to these emerging technologies.

In addition to these trends, there is still a need to make provision for the growth in commercial and freight travel demand (eg trade vehicles, grocery and goods delivery) and to reduce congestion across the Sydney road network.

Future Transport 2056 outlines that the NSW Government will continue to embrace automation to achieve safety and efficiency benefits as well as service improvements for customers by:

- Enabling new and upgraded physical and digital assets to support new technologies and to adapt to future developments
- Identifying road infrastructure and furniture required to support automated vehicles
- Implementing intelligent traffic management methods to improve road network efficiency
- Delivering 'Smart Motorways' on all NSW motorways
- Supporting the NSW Innovation Strategy to manage the workforce transition associated with the increase in automation.

With these emerging trends, the need for rapid transport infrastructure, including motorways, will remain. The project will play an important role in meeting the needs of these emerging trends and be part of an integrated transport solution for Greater Sydney.

Future Transport 2056 is underpinned by the movement and place framework (refer to section 4.4.3 of the EIS). Along with future stages of the F6 Extension, the project would support the movement and place framework by changing the role of arterial roads such as The Grand Parade and the Princes Highway. Currently these routes function primarily as movement corridors. The reduction in traffic associated with the F6 Extension would provide the opportunity for sections of these arterial roads to transition to 'vibrant streets' and 'local streets' (as described in *Future Transport 2056*).

The project would provide opportunities for the implementation of the *Better Placed* policy⁴ by reducing through traffic, including freight vehicles, at key locations along The Grand Parade and Princes Highway:

² Transport for NSW (2018) *Greater Sydney Services and Infrastructure Plan*

³ NSW Government (2014) *NSW State Infrastructure Strategy*

⁴ <http://www.governmentarchitect.nsw.gov.au/thinking/integrated-design-policy/introducing-better-placed>

- The Grand Parade currently provides a connection for traffic traveling between southern Sydney and the Sydney CBD. As a result, this key corridor along the shores of Botany Bay is often congested, resulting in reduced amenity of the foreshore precinct. By reducing through traffic at this location, the project would reduce amenity impacts for the users of the Botany Bay foreshore
- Reduced daily traffic is forecast on sections of the Princes Highway through Arncliffe and Banksia with the project, assisting the facilitation of this strategy. By reducing the number of vehicles on surface roads, the project supports future growth and urban changes along the Princes Highway corridor and improves the safety of connections for active transport users.

B11.1.2 Assessment process

There is a fatal flaw in the environmental assessment process for the F6 Extension insofar as the project goes against key NSW Government transport and land use policies and strategies.

While the EIS makes reference to these policies and strategies, the City questions the validity of the EIS interpretation that the project supports them.

Response

The project is consistent with NSW Government transport and land use policies and strategies as described in **section B11.1.1**. The project is identified in *Future Transport 2056* as a committed initiative for the next 0 – 10 years, with future stages of the F6 Extension also identified as a visionary motorway for investigation.

B11.2 Traffic and transport

B11.2.1 Operational traffic network impacts

The Traffic and Transport Technical Report (Appendix D of the EIS) discusses the operational performance of the St Peters Interchange and surrounding area for the 'with project' scenario in Section 10.4.2. The assessment of the 2036 AM peak hour concludes that "significant queuing is forecast on the exit ramp from the F6/New M5 Motorway to the Campbell Road/Euston Road intersection, which may queue back to the mainline motorway". Queuing at the exit ramps creates significant safety concerns as a result of drivers quickly reducing their speed. The City is concerned that in response to the poor level of service on the ramps, the Roads and Maritime Services (RMS) may decide to modify the signal operations at the intersection to allow more signal time to vehicles exiting the ramp. Modifying the signals in this way would cause significant delays to pedestrians, people who bike and vehicles along Campbell Road which would be unacceptable to the City.

The stated objectives of the proposed F6 include improvements to urban amenity and place making by reducing traffic along key corridors such as Princes Highway and The Grand Parade/General Holmes Drive. The screenline traffic assessment (refer to section 9.3.1 of the EIS) indicates a reduction of just under 15 per cent in 2026 and 2036 on General Holmes Drive/The Grand Parade. The reduction on Princes Highway has been assessed at around five per cent in 2026 and 2036 and more than 10 per cent in 2026 and 2036.

Even with the reduction of traffic volumes on the existing arterial network around the proposed F6 Extension Stage 1 area, the overall result is an increase in traffic volumes by 14-17 per cent, which suggests induced traffic demands and mode shift from public to private modes of transport. This is a very poor outcome for the City.

The screenline peak hour assessment (Section 9.3.2) shows an increase of around 66 per cent increase in traffic volume on the F6 Extension Stage 1 during the PM peak hour in the 2036 cumulative scenario. Further information is required however to understand this scenario as no explanation has been provided for this increase.

Response

Impacts at the St Peters interchange

Queuing on the exit ramps at the St Peters interchange would potentially occur by 2036 and is not expected at the opening of the project. Future improvements to traffic flow on Euston Road are anticipated as a result of the King Street Gateway project, which would reduce traffic on Campbell Road.

An Operational Road Network Performance Review will be undertaken within 12 months and five years from the opening of the project to confirm the network operational impacts with the project. The review will identify relevant mitigation measures, if required, to address impacts on road network performance. Traffic modelling for this operational review will also consider potential queuing and safety impacts (including on pedestrian and cyclist movements) at the St Peters interchange and surrounds.

The results of the review will be considered in future operational network performance planning carried out by Roads and Maritime. The Review will be undertaken in consultation with Transport for NSW and relevant councils.

Forecast traffic increases

When comparing the 'Cumulative' scenario to the 'Do Something' scenario, the patterns of change in the forecast two-way peak hour volumes crossing the F6 Extension Stage 1 screenline during the AM and PM peak hours are similar to those observed for the forecast daily volumes. The large percentage increase in traffic on the F6 Extension Stage 1 motorway reflects the increased attractiveness of the motorway in the 'Cumulative' scenario, when connectivity is improved by construction of future stages of the F6 Extension from Kogarah to Loftus, and the Western Harbour Tunnel and Beaches Link projects. This information is detailed in section 9.3.2 and section 9.3.1 of the EIS.

The assumptions in the traffic assessment for the project include all committed future transport projects (including public transport projects) and the impact that these projects would have on the road network.

Traffic modelling

The assessment of potential traffic and transport impacts of the project was undertaken using the SMPM version 1 which provides a platform to understand changes in future weekday travel patterns under different land use, transport infrastructure and pricing scenarios. The SMPM was validated against observed traffic data and adjusted to reflect driver behaviour on Sydney's toll roads from Value of Travel Time Savings (VTTS) surveys, as described in Chapter 4 of Appendix D (Traffic and transport technical report) of the EIS. Future demands were estimated by applying future year traffic growth forecast by the Sydney Strategic Travel Model (STM) to the SMPM to produce the most likely future base case scenario.

The key objective of SMPM was to forecast traffic demand and growth in traffic volumes on key roads in the project area. The focus of SMPM on key roads means that traffic forecasting data from SMPM is suitable for providing evidence of high level travel patterns across parallel routes on the arterial road network. It is recognised that future traffic volumes and conditions may differ from the current predictions due to the large number of variable factors that affect traffic, including population distribution and future development. A new or substantially upgraded road can induce changes in trip patterns, which then appear as induced traffic demand. This induced demand is included in the strategic traffic forecasts for the project.

B11.2.2 WestConnex program of works

WestConnex has been proposed as a solution to regional traffic impacting local communities. WestConnex Stages 1 to 3 have necessitated significant road augmentations around portals to deal with the traffic generated by the project.

Should the F6 Extension proceed:

- There must be no further allocation of road capacity (physical or operational) to serve traffic generated by WestConnex on road corridors leading to or within the City (such as roads connecting to the St Peters Interchange)
- It must include reallocation of road space (to public transport, active transport or better place outcomes) on roads leading to or within the City to limit induction of travel by motor vehicles. Reallocating road space to dedicated bus lanes or cycleways is one way of promoting more sustainable travel behaviour while reducing traffic induction. Traffic induction happens when people who didn't previously drive take advantage of road capacity freed up as other drivers divert to the WestConnex.

Response

The F6 Extension Stage 1 project is not being delivered as part of the WestConnex program of works, however, the project would connect to the Sydney motorway network. Traffic analysis for the project has included the completed WestConnex motorway and Sydney Gateway as part of the 'Do minimum' scenarios. The potential for induced traffic demand has therefore been considered in the traffic and transport assessment for the project.

Strategic traffic modelling for the project forecasted a negligible change in traffic volumes on the road network within the City of Sydney LGA and therefore reallocation of road space is not considered to be necessary.

B11.2.3 Congestion impacts on travel choices

Despite the Government's own policies, there is a major focus in the F6 Extension Stage 1 EIS on the bypassing of 23 sets of traffic lights on the Princes Highway. The Government is failing to make the link between what is considered to be the benefits of reduced congestion - reduced travel time and improved safety - with the effect this has on people's travel choices. If people can, or perceive they can, achieve a faster travel time by car than by public or active transport, people will switch mode to what is most attractive. The reverse is true for when capacity is reduced, people will move to active or public transport (particularly when there is priority or a dedicated corridor) to achieve the travel time savings. Reduced capacity is a primary trigger to implement demand management strategies, as is occurring in the CBD as a result of light rail implementation.

Since the light rail construction commenced in 2015, there has been an 11 per cent reduction in the number of inbound vehicles and a 9.4 per cent increase in public transport use into the CBD during the morning peak period. This shows that productivity in the global city centre is boosted by more public transport capacity and additional road capacity is not required.'

The EIS must address the intrinsic conflict with the NSW Government's policy to shift travel onto more efficient modes, such as public transport, with the proposal to make it more attractive for people to drive.

The EIS shows that only around 10% of the projected traffic on the F6 Extension would be heavy vehicles. It is clear, therefore that the financial viability of WestConnex requires the project to attract a significant amount of trips in private vehicles.

Response

The NSW Government is proposing to deliver a range of transport infrastructure projects including road, public transport and active transport projects to address the transport challenges associated with a growing Sydney and to provide a range of transport alternatives to support the variety of trips being made across the city.

The project would be complementary to public transport and rail freight transport improvements, which aim to provide an integrated, multi-modal transport system being delivered by the NSW Government. There are reductions in traffic forecast on key roads with the project, which would be expected to improve bus speed and reliability. There are several bus routes that operate along The Grand Parade/General Holmes Drive, Princes Highway, Airport Drive and King Georges Road, all of which are forecast to have reductions in traffic with the implementation of the project.

Not all trips in Sydney can be undertaken by public transport as customer needs are diverse. Trips that require travel over long distances, that are dispersed across multiple destinations, or that require the transport of equipment or supplies, cannot be fully serviced by public transport alone. Investment in a range of modes, including road infrastructure, is therefore required to meet transport needs in Sydney and in NSW.

The NSW Government plans to continue to optimise the use of the current road network in Sydney and invest in projects that improve connectivity and address congestion. The following measures are identified in *Future Transport 2056* for future investigation to tackle congestion and are complementary to large scale transport infrastructure projects:

- Dynamic, real time management of the network to improve performance and reduce the impact of incidents, events and planned maintenance
- Plan and manage transport networks for the best use and optimum movement of people and goods along and across transport corridors and within precincts, whilst creating better places and amenity for communities

- Progressively review roads and road space allocated on best use to achieve better customer outcomes and better places
- Encourage customers to use the transport system differently by shifting to walking, cycling or public transport and traveling outside the peaks to reduce congestion and channel demand where there is capacity
- Continue to manage private vehicle congestion in high demand areas through the Parking Space Levy
- Reserve corridors for future network development.

B11.2.4 Impacts to the economy

As a key driver for the national economy, the area covered by the City is vital to Australia's future and the future of NSW. The City economy now totals approximately \$125 billion, or almost a quarter of the entire NSW economy. Independent analysts suggest the City economy alone is contributing more than 10 per cent of Australia's current economic growth. It has overtaken the mining sector as the principal driver of Australia's economy along with the inner centres of other major Australian cities like Melbourne and Brisbane.

This economic growth is driving an increase in jobs. Since 2006, job numbers have grown by 100,000 to 498,000, an increase of almost 30 per cent, making the City the epicentre of jobs and job growth in Australia. This is notable, because during this period of unprecedented economic development:

- the number of people driving to the City Centre was steady between 2003 and 2031
- Inbound vehicles to the CBD during the morning peak period have reduced by some 12 percent since light rail construction started in 2015.

One of the most significant risks to this is the Government's relentless focus on expanding the urban motorway network. Why would this Government risk economic growth by attracting more cars into the Harbour CBD when every plan about the central city's competitiveness has been working to get cars out? And why would the Government risk compromising the future of our city's economy, entrenching the east-west social divide and condemning thousands of people to privatised, unsustainable, expensive and inefficient tolled car travel.

The EIS must address the intrinsic conflict with the NSW Government's transport, landuse and economic policies relating to the City and the Sydney City Centre by making it more attractive for people to drive.

Response

Strategic traffic modelling for the project forecasted a negligible change in traffic volumes on the road network within the City of Sydney LGA. Additional trips from the project within the City of Sydney LGA are anticipated to primarily be through-trips which would not terminate in the Sydney CBD.

Employment and connectivity

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.

Over 25 per cent of all Sydney jobs are located in the Global Economic Corridor, which extends from Norwest Business Park in the north through to the Sydney CBD and on to Port Botany and Sydney Airport in the south. Western Sydney is expected to deliver strong job growth over the next 20 years, however employment in the eastern part of Sydney, namely Sydney CBD, would also continue to grow. This means that people from south of Sydney would continue to travel north for employment opportunities. The project would improve existing transport connections to the Global Economic Corridor and the eastern part of Sydney, as well as facilitating growth in suburban areas to the south.

For commuters, the project would lead to a more reliable road network, reducing commuting time and lowering vehicle operating costs. The project would facilitate improved commuting from points south of Sydney, helping to unlock a catchment of employment resources in the Illawarra region, where there is better access to affordable housing. This improved connection and commuter access has potential to relieve pressure on Sydney's constrained development and growth.

The NSW Government is proposing to deliver a range of transport infrastructure projects including road, public transport and active transport projects across Greater Sydney to address the transport challenges. This includes the infrastructure to facilitate east-west movements (eg WestConnex and the planned Sydney Metro West and Sydney Metro Western Sydney Airport projects) as well planning and investment around the three cities concept – the Western Parkland City, the Central River City and the Eastern Harbour City (refer to the *Greater Sydney Region Plan*⁵).

B11.2.5 WestConnex program of works

The EIS's for all current stages of WestConnex have so far failed to provide:

- A clear functional specification of the role of WestConnex in relation to vehicle access for the City and Sydney City Centre - ie is it aiming to bring people to/ from the City or act as a bypass?
- A transparent assessment of projections of how WestConnex will change traffic to/from and within the City and City Centre.
- Clear commitments for how the NSW Government plans to prevent, manage and mitigate the impacts of WestConnex-generated traffic on the City and City Centre. This should include reallocation of road space (to public transport, active transport or better place outcomes) on roads leading to and roads within the City to limit induction of travel by motor vehicles.

Because the F6 Extension will add to Stages 1-3 and result in cumulative impacts on the City and City Centre, the EIS for the F6 Extension must provide the above.

Response

The performance review commitments for the various WestConnex motorway projects are captured in the conditions of approval for these projects and include assessment of operational performance 12 months and five years after operations commence. Should any changes be required as a result of these assessments, including any additional mitigation measures, these would warrant further discussion with the relevant councils.

As described in **section B11.2.2**, traffic analysis for the project has included the WestConnex projects in the 'Do minimum' scenarios and therefore the potential for induced traffic demand was considered.

B11.2.6 Active transport

The Government's focus on more motorways means more traffic, and less attention being given to active transport both in terms of existing and future networks. The City is concerned about any potential deterioration in conditions for walking and cycling as a consequence of the Government delivering more roads, including the F6 Extension.

The City wishes to work with the Government to help it achieve its own goals in relation to active transport. This means the provision of direct, safe and convenient access for people walking and riding, rather than prioritising more space for vehicular traffic and service areas.

Key issues to be addressed:

- Because of the additional WestConnex traffic generated by the F6 Extension, the EIS must address the cumulative impacts of the project on the City and City Centre.
- This must include commitments to reallocate street space to active transport (widened footpaths, additional separated cycleways) to ensure that the City can help deliver NSW Government's policies and strategies relating to active transport and improving place outcomes.

Response

Strategic traffic modelling for the project forecasted a negligible change in traffic volumes on the road network within the City of Sydney LGA.

The project would provide shared cycle and pedestrian pathways aimed at improving north-south active transport movements between Bestic Street and Civic Avenue. Changes to the active transport corridor in the southern part of the project footprint, including an extended shared cycle and pedestrian pathway to Chuter Avenue/O'Connell Street, are described and assessed in the preferred infrastructure report.

⁵ Greater Sydney Commission (2018) *Greater Sydney Region Plan – A metropolis of three cities*

B11.2.7 WestConnex and other toll road projects

From the limited information that is publically available, WestConnex Stages does not appear to be financially viable. It depends on other new tollways including the F6 Extension, Western Harbour Tunnel and Beaches Link to be built, to generate enough traffic for tolls to deliver sufficient revenue to cover the capital costs of WestConnex.

In the absence of more information it is impossible to accurately determine the final benefits and costs of the combined impact of these tollways on Sydney. The City sees no benefit and many disbenefits in the Government continuing with any of these projects.

Key issues to be addressed:

- The EIS must be transparent on the reliance of project viability (financial, economic and operational) on any future (as yet unapproved) stages.
- This is critical to understand the risk of changes to impacts identified in the EIS in the case where future stages are not delivered or are delivered later than assumed.

Response

Viability of the project

A Business Case for the F6 Extension Stage 1 project was developed between November 2017 and March 2018 by Roads and Maritime Services. A Business Case Summary was prepared by Infrastructure NSW, the NSW Government's independent infrastructure advisory agency.⁶

A full economic cost-benefit analysis was undertaken of the project in accordance with NSW Treasury *Guidelines for Capital Business Cases*, as well as Infrastructure NSW and Infrastructure Australia requirements.

The Business Case completed for the project provided the recommended analysis and demonstrated strategic merit, a well-defined project scope and a Net Present Value of between \$851 million and \$478 million, and a positive benefit cost ration (BCR) of between 1.31 and 1.56, depending on the quantifiable benefits included. Under sensitivity testing, the analysis continued to return positive BCRs in all but one scenario.

The Business Case Summary prepared by Infrastructure NSW noted that the project has a long development history and the core issues and opportunities are well understood. It was noted that the preferred option described in the Business Case is highly likely to deliver significant service improvement and the net benefits claimed. It was determined that this, together with the governance arrangements in place to deliver the project, represented a sound basis for the government's investment decision.

Reliance of the project on future stages of the F6 Extension

The project has been assessed as a standalone project and is not reliant on future stages of the F6 Extension to be viable for road users (as described further below). The project would provide a number of benefits as identified in the Final Business Case, including:

- Transport benefits would result from reduced travel time and better reliability for road users; better connectivity for active transport; and improved road safety. These benefits are estimated at \$2,005 million
- Productivity benefits would result from it being easier for people to get to jobs, for businesses to access their markets and for heavy vehicles to move more efficiently through southern Sydney. These benefits are estimated to be \$236 million
- City-shaping benefits would result from easier access for residents when through traffic is reduced from local centres and more certainty is provided around planning and investment. These benefits are estimated at \$137 million.

The Business Case relates to only Stage 1 of the F6 Extension. As described above, the Business Case demonstrated the viability of the project. Potential future Stages of the F6 Extension would be subject to separate business cases, environmental assessment and approvals.

¹² Infrastructure NSW (2018) Final Business Case Summary: F6 Extension – Stage 1
http://www.infrastructure.nsw.gov.au/media/1664/f6-extension-stage-1_fbc-summary_final.pdf

Chapter 8 (Traffic and transport) of the EIS provides an assessment of potential traffic impacts for a range of scenarios including the F6 Extension Stage 1 only (operation 'Do something' scenario) as well as the F6 Extension Stage 1 along with future stages of the F6 Extension (operation 'Cumulative' scenario).

A number of key benefits and improvements are forecast as a result of the 'do something' scenario (ie the scenario that considers the project without future stages of the F6 Extension):

- Improved network productivity on the Sydney metropolitan network, with more trips forecast to be made or longer distances travelled on the network in a shorter time. The forecast increase in vehicle kilometres travelled (VKT) and reduction in vehicle hours travelled (VHT) is mainly due to traffic using the new motorway, with small reductions in daily VKT and VHT forecast on non-motorway roads. As the project is a comparatively short section of motorway in the context of the metropolitan road network, the impact is small
- The project, along with investment in other road, public transport and active transport projects, would help to accommodate the forecast growth in population and travel demand in the Sydney metropolitan area
- Reduced travel times are forecast between Kogarah and Mascot, Sydney CBD, North Sydney, Macquarie Park and Parramatta in the peak directions of travel in the peak periods
- Reduced daily traffic is forecast on sections of major arterial roads including sections of the Princes Highway, West Botany Street and General Holmes Drive
- Heavy vehicle volumes are forecast to fall by approximately 40 per cent on sections of Princes Highway and West Botany Street and by more than 30 per cent on General Holmes Drive, each weekday

Where the project would connect to the existing road network, some increased congestion is forecast along President Avenue, Kogarah, and on the exit ramps to the St Peters interchange, due to the forecast increase in demand to and from the project.

B11.3 Air quality

B11.3.1 Impacts from ventilation outlets

The City strongly objects to the F6 Extension being approved as it will lead to a decline in air quality affecting the City.

The F6 Extension Stage 1 EIS proposes ventilation facilities at Marsh St, Arncliffe and West Botany St, Rockdale. NSW Health (Sections 3.2 and 3.3) has expressed concerns over the lack of filtration provided in the ventilation facilities and Bayside Council, through whose boundary the F6 Extension would run, has expressed a preference for filtered ventilation outlets. The community has also expressed concerns over the health and safety impacts on residents in the area and called for an investigation into the impacts of unfiltered ventilation outlets, which the City supports.

RMS has responded by stating "Experience from previous motorway tunnel projects in Sydney has demonstrated that emissions from tunnel ventilation outlets do not measurably affect focal or regional air quality". It also noted that "Evidence to date suggests that the effectiveness of filtration, when applied to road tunnels, is limited to specific situations. Repeated assessments have concluded that there is little to no health benefit for surrounding communities in installing tunnel air treatment systems", adding at Section 9.1.2 that, "Around the world, there are relatively few road tunnels with installed filtration systems. There are no Australian road tunnel projects that have installed air filtration systems, these projects rely on the primary approach of dilution of air pollution, through ventilation systems. The inclusion of in-tunnel air filtration for the project was evaluated, based on the predicted air quality results, and found not to provide any material benefit to air quality or community health. As a result, no in-tunnel filtration system is proposed for the project".

The City does not agree with RMS's conclusions or its justification for not using filtration in the tunnel ventilation outlets. International projects of a similar nature that use filtration should be compared against those that do not, in order to assess the improvements in air quality. The City's view is that ventilation outlets must be filtered.

Response

Potential operational air quality impacts associated with the project are described in Chapter 9 (Air quality) and Appendix E (Air quality technical report) of the EIS. As described in section 9.6 of the EIS, under expected traffic conditions:

- The predicted contribution of tunnel ventilation outlets to pollutant concentrations was negligible for all receptors
- Any predicted changes in concentrations were driven by changes in the traffic volumes on the modelled surface road network, not by the tunnel ventilation outlets.

City of Sydney's disagreement with the justification for not using tunnel filtration systems is noted, however no supporting evidence for this view is provided. A discussion of international projects of a similar nature that do and do not use air filtration systems, as well as information on the efficiencies of these systems, their cost effectiveness and how frequently they are used, is provided in section 9.2.2 of Appendix E (Air quality technical report) of the EIS.

In February 2018, the NSW Government announced reforms to the regulation of ventilation outlets for motorway tunnels in NSW. The reforms apply to the project and include:

- Ventilation outlets will be regulated by the NSW Environment Protection Authority (NSW EPA). The NSW EPA will require tunnel operators to meet air quality limits and undertaken air quality monitoring, where practicable
- The Advisory Committee on Tunnel Air Quality (ACTAQ) will coordinate a scientific review of a project's air emissions from ventilation outlets
- The NSW Chief Health Officer will release a statement on the potential health impacts of emissions from tunnel ventilation outlets
- The Minister for Planning will not approve a motorway tunnel project until the ACTAQ scientific review is considered.

The Chief Scientists and ACTAQ review of tunnel ventilation is summarised in **Chapter B1**. The review stated *'Our overall conclusion of the F6 Extension – Stage 1 EIS is that it constitutes a thorough review of high quality. It covers all of the major issues and areas that an EIS for a project of this scale should. The information presented is of suitable detail and logical in order. The choices made regarding data used and methods followed have been logical and reasonable and it is our view that the benefit of exploring alternative approaches would be questionable or marginal'*.

The review of the project by the Chief Health Officer noted stated: *The draft EIS predicts that the contribution of emissions from road tunnel ventilation outlets to community exposures is small relative to the contribution of emissions from traffic on surface roads from other pollution sources. The primary source of community exposure to air pollution is from pre-existing regional air pollution, followed by pollution from surface road traffic. NSW Health considers that any potential air pollution-related health effects from the project are likely to be primarily a result of changes in volumes of traffic on the surface road network, not a result of the tunnel ventilation outlets.* A subsequent review of the final EIS by the Chief Health Officer re-iterated the above conclusions.

B11.3.2 Human health impacts from vehicle emissions

Vehicles are becoming increasingly efficient, but more rigorous emissions standards incorporating Particulate Matter (PM) have only been in place in Australia since 2013 and only apply to emissions; there are no measures in place to reduce the significant non-emission vehicle contribution to particulates. In NSW around 78 per cent of the vehicle fleet was manufactured before these regulations were put in place.

Research has shown that any exposure to PM generated by traffic is detrimental to health; there is no safe exposure level. Further, children, the elderly and people with chronic disease are particularly at risk of the health effects of traffic related PM. These particulates are a classified carcinogen and are known to have critical, and at times fatal, consequences if elevated. Concentrations of PM_{2.5} and PM₁₀ in Sydney are already near the current Australian standard and in excess of proposed standards.

The adverse health impacts of living close to busy roads is well documented and studies looking specifically at Sydney have shown consistent results. These health impacts include increased mortality, respiratory and cardio-vascular disease, and adverse birth outcomes. Many other health impacts have also been associated with living near busy roads including cancers.

While larger particulates are concentrated in road corridors, smaller particulates are more evenly spread across the urban area as the smaller particles remain airborne. People living within 500 metres of heavily affected areas have demonstrably shorter lives, much higher incidences of chronic lung conditions and higher levels of cardiovascular diseases.

Should the F6 Extension proceed, the dual effects of induced traffic and toll avoidance will see traffic volumes increase and congestion worsen, increasing exposure to PM across metropolitan Sydney. As two-thirds of the NSW population lives in metropolitan Sydney in relatively close proximity to major roads, vehicles are one of the most important sources of PM exposure in NSW and therefore a significant contributor to negative health outcomes.

Key issues to be addressed:

- Because of the additional WestConnex traffic generated by the F6 Extension, the EIS must address the cumulative impacts of the project on the City and City Centre.
- The EIS must clearly and transparently assess and address air quality impacts arising from additional traffic (and congestion) generated by WestConnex (with the F6 Extension) along surface roads within the City.

Response

Cumulative air quality impacts

Strategic traffic modelling for the project forecasted a negligible change in traffic volumes on the road network within the City of Sydney LGA and therefore an assessment of potential air quality impacts from vehicle emissions within the City of Sydney LGA was not undertaken.

In total, seven separate tunnel ventilation outlets were included in the operational air quality assessment (refer to Table 9-12 and Table 9-13 in the EIS). These included the two outlets associated with the project as well as existing or future projects (M4-M5 Link, M5 East, New M5 Motorway and future F6 Extension). Further, for the 2036 cumulative scenario, the Western Harbour Tunnel and Beaches Link projects were also considered.

The cumulative assessment identified that the expected operation of the project, together with other projects, would result in acceptable ambient air quality.

B Part B Response to stakeholder submissions

B12 Department of industry

This chapter addresses issues raised in the submission from the Department of Industry. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion).

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B12.1 Department of Industry – Water and natural resources access regulator

B12.1.1 Consultation

Dol Water requests a meeting with the proponent's groundwater consultants and modellers to discuss water issues and required model review.

Response

Roads and Maritime have met with the Department of Industry – Water to discuss the groundwater modelling as requested.

B12.1.2 Inflows at the Rockdale tunnel access decline

Detailed justification of why additional rock grouting and sealing is not being proposed to seal the undrained tunnel sections to less than 1 litre per second per kilometre. The department has concerns with the Rockdale tunnel access decline as it is proposed to be 2L/sec/km.

Response

An exception to the one litre per second per kilometre criteria has been applied to the drained section of the Rockdale construction access decline for which the limit modelled is two litres per second per kilometre. This inflow criteria was chosen given that the tunnel would be used for a shorter duration than the mainline operational tunnels.

This criteria was considered in the groundwater modelling for the project and confirmed that predicted groundwater inflows at the Rockdale access decline would be between one and two litres per second per kilometre (refer to Table 27 of Annexure G of Appendix K (Groundwater technical report) of the EIS). The predicted groundwater drawdown is based on these predicted inflows, however, use of the higher inflow criteria in the groundwater modelling provides a conservative result.

Despite the assessment concluding minimal impact resulting from this tunnel section, Roads and Maritime Services has since determined that a suitably waterproofed tunnel is the preferable design solution to achieve the standard groundwater inflow criteria of one litre per second per kilometre. This criteria will be applied to the groundwater modelling undertaken during the detailed design phase.

B12.1.3 Geological cross sections and revised groundwater modelling

A series of detailed geological cross sections and long sections of the F6 tunnel extension stage 1 is required for the purpose of both groundwater flow and groundwater modelling.

A revision of the conceptual and numerical groundwater models and report will be required.

Response

A north-south oriented hydrogeological cross-section extending from St Peters to Sans Souci and Botany Bay to the south is presented in Figure 17-6 of the EIS.

The assessment of potential groundwater impacts in Chapter 17 (Groundwater and geology) of the EIS included the development of a three-dimensional numerical groundwater model in accordance with the *Australian Groundwater Modelling Guidelines*¹ to simulate existing groundwater conditions, project infrastructure, caverns and associated subsurface ancillary infrastructure including ventilation shafts. The groundwater assessment has been reviewed by an independent technical peer reviewer in accordance with the *Australian Groundwater Modelling Guidelines*.

A detailed groundwater model will be developed by the construction contractor (refer to environmental management measure GW5 in **Chapter D1** (Environmental management measures)). The model will be used to predict groundwater inflow rates and volumes within the tunnels and groundwater levels (including drawdown) in adjacent areas during construction and operation of the project.

¹ Barnett B, Townley LR, Post V, Evans RE, Hunt RJ, Peeters L, Richardson S, Werner AD, Knapton A and Boronkay A (2012) *Australian Groundwater Modelling Guidelines*, Waterlines Report Series No 82, National Water Commission, Canberra, 191 pp. June

Roads and Maritime have met with the Department of Industry – Water to discuss the requests for geological cross sections and revised groundwater modelling. As agreed at the meeting, geological cross sections and further sensitivity analysis results from the model will be provided to Department of Industry – Water. Roads and Maritime will continue to engage with the Department of Industry – Water.

B12.1.4 Work on waterfront land

Any works undertaken within watercourses or waterfront lands should be done so in accordance with the Department of Industry – Lands and Water's Guidelines for Controlled Activities <https://www.industry.nsw.gov.au/water/licensing-trade/approvals/controlled-activities>.

Response

In accordance with environmental management measure SWF6, all works within watercourses or on waterfront land will be managed in accordance with the *Controlled Activities on Waterfront Land guidelines*² (refer to **Chapter D1** (Environmental management measures)).

B12.1.5 Consultation

The following plans are to be developed in consultation with DoI Water:

- Construction soil and water management plan;
- Erosion and sediment control plan;
- Operational environmental monitoring plan.

Response

A Construction Soil and Water Management Plan (CSWMP), which will include Erosion Control and Sediment Plans, will be prepared for the project in consultation with the Department of Industry – Water (refer to environmental management measure SC1 in **Chapter D1** (Environmental management measures)).

Ongoing groundwater monitoring during the operation of the project would be determined by the project operator in consultation with the Department of Industry – Water.

B12.2 Department of Primary Industries – Fisheries

B12.2.1 Impact to key fish habitat

DPI Fisheries considers that this proposal would have minimal impact on key fish habitat provided that the following mitigation measures are implemented: B3-4; SC1; SC4-5; SC7; SWF1-2; SWF7-8.

Response

The comment is noted. The identified environmental management measures (summarised in **Chapter D1** (Environmental management measures)) will be implemented during the construction and operation of the project.

B12.2.2 Impact to Rockdale Bicentennial Park wetland

Although the wetland within Bicentennial Park is not listed as key fish habitat, the water quality and level within the wetland should be the same as existing or improved following construction.

Response

In accordance with environmental management measure SWF1 in **Chapter D1** (Environmental management measures), a program to monitor potential surface water quality impacts of the project will be developed and included in the CSWMP. The program will include the water quality monitoring parameters and the monitoring locations (including Rockdale Bicentennial Park) identified in Annexure G of Appendix L (Surface water technical report) of the EIS.

² Department of Primary Industries (2012) *Controlled Activities on Waterfront Land guidelines*

The surface water monitoring program will continue for a minimum of three years following the completion of construction, or until the affected waterways are certified by a suitably qualified and experienced independent expert as being of an equal or better condition than pre construction conditions (or as otherwise required by any project conditions of approval) (refer to measure SWF3).

B12.2.3 Construction management plans

DPI Fisheries requests the opportunity to review and provide comment on the:

- Construction Flora and Fauna Management Plan;
- Construction Soil and Water Management Plan; and
- Acid Sulphate Soil Management Plan.

Response

The request to review the identified construction management plans is noted. The CSWMP will be prepared for the project in consultation with the Department of Industry – Water and Fisheries.

B Part B Response to stakeholder submissions

B13 NSW Health

This chapter addresses issues raised in the submission from NSW Health. The submissions text is included verbatim. However, editorial amendments to clarify text, where required, are provided as strikethrough (for text deletion) or in square brackets (for text insertion)/

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B13.1 Operation of the F6 Extension Stage 1

B13.1.1 Ambient air quality impacts

The primary source of community exposure to air pollution is from pre-existing regional air pollution, followed by pollution from surface road traffic. The project is expected to change the volume of traffic on surface road networks. Traffic volume will increase in some locations and reduce in others. These changes are associated with a redistribution of ground level air quality impacts.

Appendix E (Air quality technical report) and Appendix F (Human health risk technical report) indicates that the project design has been iteratively developed to minimise potential air quality and health impacts. Based on the current design, the EIS predicts that annual average $PM_{2.5}$ within the study area may exceed relevant ambient air quality guideline values at all receptor locations, primarily as a result of background air pollution. Meeting long term air quality goals in the project area will require significant reductions in fine particle emissions across Sydney. For these reasons, it is important that all reasonable measures are taken to minimise exposure to traffic related air pollution.

Response

The comments are noted.

B13.1.2 Elevated receptors

Appendix E (Air quality technical report) of the EIS provides an assessment of air quality impacts at 10, 20, 30 and 45 metres above ground level. This assessment is based on the predicted changes in annual average and maximum 24-hour concentration of $PM_{2.5}$ as a result of the project. At each increasing elevation the predicted influence of surface road traffic was clearly reduced, compared with at ground level.

At a height of 30 metres, the impact of surface level traffic was negligible. The contribution of tunnel ventilation outlets became more noticeable, although the largest changes in $PM_{2.5}$ were still lower than at ground level.

At a height of 45 metres, the maximum annual average $PM_{2.5}$ ($1.58 \mu g/m^3$) and maximum 24-hour $PM_{2.5}$ ($15 \mu g/m^3$) at any receptor location was markedly higher than at ground level. The increase in $PM_{2.5}$ at elevations of 45 meters are greater than those predicted at ground level resulting from surface road traffic.

The EIS classifies the air quality and health impacts to elevated receptors as being acceptable. This is because none of the receptor locations with the maximum increases in $PM_{2.5}$ are known to have existing buildings with a height of more than 20 metres. The EIS classifies the impacts to theoretical receptors at 45 metres as being unacceptable. It is recommended that the Department of Planning take this information into account in regards to future planning developments.

Response

The comments are noted.

B13.1.3 Filtration of in-tunnel air

The EIS provides a rationale for the exclusion of in-tunnel filtration systems in the project design. Chapter 9 (Air Quality) describes that inclusion of a filtration system is expected to have a negligible impact on air quality. The project's proposed ventilation system is expected to ensure compliance with air quality criteria both in-tunnel and at ventilation outlets.

Response

The comment is noted.

B13.1.4 In-tunnel air quality

The EIS describes that modelled in-tunnel air quality meets operational criteria. It is therefore considered unlikely to result in pollutant exposures known to be associated with health effects provided commuters have motor vehicle windows closed and ventilation on recirculate.

The predicted in-tunnel air quality would appear to be consistent with the *In-tunnel air quality (nitrogen dioxide) policy*. However, as noted in Chapter 10 (Health safety and hazards), *the NO_2 guideline may*

not be protective of all health effects for all individuals. There is potential for severe asthmatic individuals, especially if they use motorbikes, to experience some change in respiratory response after using the tunnels, particularly when congested.

NSW Health notes that signage has been used to mitigate risk for tunnel users for similar developments and recommends the development of appropriate and targeted communication strategies for this project.

Response

Message signs related to traffic, location, directions, warnings and variable conditions would be incorporated within the tunnels and on surface roads at tunnel approaches. Further, variable message signs would be mounted on gantries along those roads which approach the tunnels and would be used to advise motorists of traffic conditions.

Variable message signs have the capability of displaying information to motorists with regards to in-tunnel air quality conditions and recommendations to reduce health impacts.

B13.1.5 Noise

Noise levels associated with operation of the project are expected to exceed management levels at some receptor locations. The EIS has identified locations where surface road traffic noise is expected to exceed the relevant criteria for residential land uses. A total of 107 receptor locations, including residential properties and schools may require noise mitigation measures.

NSW Health notes that next steps in the development assessment process includes the development of an Operational Noise and Vibration Review (ONVR) for the mitigation of noise impacts. The ONVR will be reviewed by NSW Health and the appropriate regulatory authorities.

Response

The comment is noted.

B13.2 Construction of the F6 Extension Stage 1

B13.2.1 Ambient air quality impacts

The EIS identifies that air quality impacts associated with dust and soil from construction are expected to occur at a number of receptor locations, including *high-sensitivity receptors* such as residences, cafes and schools.

Chapter 10 (Health, safety and hazards) describes these impacts as *temporary and relatively short-lived*. However, consideration should be given to quantifying the likely duration of exposures to inform risk characterisation.

NSW Health notes that next steps in the development assessment process includes development of a Construction Air Quality Management Plan (CAQMP) to address air quality impacts associated with construction. The CAQMP will be reviewed by NSW Health and the appropriate regulatory authorities.

Response

The comments are noted.

The risk of dust impacts from a demolition/construction site causing health impacts has been calculated based on the following:

- The nature and duration of the activities being undertaken
- The size of the site
- The meteorological conditions (wind speed, direction and rainfall). Adverse impacts are more likely to occur downwind of the site and during drier periods
- The proximity of receptors to activities
- The sensitivity of the receptors to dust
- The adequacy of the mitigation measures applies to reduce or eliminate dust.

It is difficult to reliably quantify dust emissions from construction activities, due to the variability of the weather at times when specific construction activities are undertaken. The CAQMP will include measures to minimise potential impacts to health resulting from air quality issues generated from construction activities.

B13.2.2 Noise

Noise levels associated with construction of the project are expected to exceed management levels at a number of receptor locations. Five receptor locations have been specifically identified in the EIS as *highly affected* (noise exceeding 75 dB(A)) from both standard and out-of-hours construction noise. These include receptors at the Rockdale, President Avenue and Princes Highway construction ancillary facilities, the cut-and-cover works at West Botany Street and the President Avenue surface works. The worst-case noise levels are sufficiently high that health impacts may occur.

NSW Health notes that next steps in the development assessment process includes the development of a Construction Noise and Vibration Management Plan (CNVMP) for the mitigation of construction noise impacts. The CNVMP will be reviewed by NSW Health and the appropriate regulatory authorities.

NSW Health recommends that the CNVMP include tailored interventions for the most vulnerable receptors, for example Cairnsfoot School children. All reasonable measures should be taken to limit community exposure to construction noise associated with construction.

Response

The comments are noted.

Roads and Maritime will consult with vulnerable members of the community who are likely to be more susceptible to adverse health effects from noise (especially those who are elderly, who do not speak English, are housebound, or who may be unwell) to accommodate their preferences for noise mitigation, as far as practicable.

Consultation will also be undertaken with all schools likely to be affected, and in particular Cairnsfoot Special School, to determine suitable mitigation measures, where necessary (refer to environmental management measure NV3 in **Chapter D1** (Environmental management measures)). Consultation with schools, including Cairnsfoot Special School, will allow for tailored interventions against noise impacts as required.

B13.2.3 Odour

The EIS provides some discussion about the potential odours from disturbance of acid sulphate soils and historic landfills in the region. Exposure to high levels of hydrogen sulphide may cause people with pre-existing respiratory conditions to experience worsening of their symptoms. NSW Health's past experience is that hydrogen sulphide odours generate significant public health and wellbeing complaints.

NSW Health notes that next steps in the development assessment process includes the development of a Construction Air Quality Management Plan (CAQMP) for the mitigation of odour and air quality impacts. The CNVMP will be reviewed by NSW Health and the appropriate regulatory authorities.

Response

The comments are noted.

B13.2.4 Other impacts

Chapter 17 (Groundwater and geology) and Appendix J (Contamination technical report) of the EIS have identified a high volume of residential bores in the area (including approximately 370 registered bores and potentially additional unregistered bores). The EIS notes that potential water quality impacts from the construction phase of the project will be managed via the appropriate management plans and site specific procedures. Although not used for drinking purposes, it is recommended that there be clear communication with the local communities about the risk and consequences of any bore water contamination.

Response

In accordance with environmental management measure GW10 (refer to **Chapter D1** (Environmental management measures)), potential risks of the project contaminating bore water during construction will be identified. Affected bore users will be notified that the bore water is not suitable for use and the corrective actions being taken by the project. Bore users will be notified again once the bore water is safe for use.

B13.3 Other potential health Impacts

Significant health benefits are associated with active transport such as walking, cycling, and public transport. It is important that the project has minimal impact on the accessibility and availability of active transport. Incorporation of active transport infrastructure (walking and cycling paths) into the project are supported and encouraged.

Response

The comment is noted.