WestConnex M4-M5 Link

Mainline Tunnel

Modification report

September 2018

Roads and Maritime Services

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Prepared for

Roads and Maritime Services

Prepared by

AECOM Australia

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Glossary and terms of abbreviation

Term	Meaning
A	
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
Acoustic louvre	Equipment that provides ventilation and reduces noise from operational facilities
ACTAQ	Advisory Committee on Tunnel Air Quality
Adit	A temporary access tunnel
ADT	Average daily traffic
AECOM	AECOM Australia Pty Ltd
AEP	Annual exceedance probability
Afflux	An increase in water level resulting from obstacles in the flow path
AHD	Australian Height Datum The standard reference level used to express the relative height of various features. A height given in metres AHD is the height above mean sea level
AHIMS	Aboriginal Heritage Information Management System A register of NSW Aboriginal heritage information maintained by the NSW Office of Environment and Heritage
AIP	NSW *Aquifer Inference Policy*
Alignment	The geometric layout (eg of a road) in plan (horizontal) and elevation (vertical)
Alluvium	Soil or sediment left by flowing water
AM peak hour	Unless otherwise stated, this refers to vehicle trips arriving at their destination during the average one hour peak in the AM peak period between 7.00 am and 9.00 am on a normal working weekday
ANZECC	Australian and New Zealand Environment Conservation Council
AQM	Air quality management
Aquifer	A groundwater bearing formation sufficiently permeable to transmit and yield groundwater or water bearing rock
ARI	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
Arterial roads	The main or trunk roads of the state road network that carry predominantly through traffic between regions
AS	Australian Standard
Asphalt or asphaltic concrete	A dense, continuously graded mixture of course and fine aggregates, mineral filler and bitumen usually produced hot in a mixing plant
At-grade	A road at ground level, not on an embankment or in a cutting
ATC	Automatic traffic count
ATN	Active transport network

Term	Meaning
AWS	Automatic weather station
AWT	Average weekday traffic
B	
Background concentration (air quality)	Describes all contributing sources of a pollutant concentration other than road traffic. It includes, for example, contributions from natural sources, industry and domestic activity
Background noise level	The ambient sound-pressure noise level in the absence of the sound under investigation exceeded for 90 per cent of the measurement period. Normally equated to the average minimum A-weighted sound pressure level
BAM	Beta attenuation monitor
Bank cubic metres	A measure of volume representing a cubic metre of unexcavated material. Once material is excavated, it expands to varying degrees depending on its constituents
Biodegradation	Decomposition or breakdown of a substance through the action of micro-organisms (such as bacteria or fungi) or other natural physical processes (such as sunlight)
Bioretention facility	Landscaped depression designed to treat stormwater runoff to remove contaminants and sediment
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
BOD	Biological oxygen demand
BTS	NSW Bureau of Transport Statistics
Bund	A small embankment designed to retain water
Bus lane	A traffic lane dedicated to buses, but which can also be used by taxis, bicycles and motorcycles
C	
Campbell Road civil and tunnel site	A construction ancillary facility for the M4-M5 Link project at St Peters
Campbell Road motorway operations complex	An area where operational ancillary facilities are established. Located within the St Peters interchange, south of Campbell Road at St Peters, on land occupied during construction by the Campbell Road civil and tunnel site
Campbell Road ventilation facility	Ventilation supply and exhaust facilities, axial fans, ventilation outlets and ventilation tunnels. Located at St Peters, within the St Peters interchange site
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
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
CEEC	Critically endangered ecological community A threatened ecological community with a 'critically endangered' listing status under environmental legislation
CEMP	Construction Environmental Management Plan A 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
CHL	Commonwealth Heritage List
CLM Act	*Contaminated Land Management Act 1997* (NSW)

Term	Meaning
CMA	Catchment management authority
CNVG	*Construction Noise and Vibration Guideline* (Roads and Maritime, 2016)
CNVIS	Construction Noise and Vibration Impact Statements
CNVMP	Construction Noise and Vibration Management Plan
CO	Carbon monoxide
Coffer dam	Temporary enclosure built within a body of water to allow the enclosed area to be pumped out
Concept design	Initial functional layout of a road/road system or other infrastructure. Used to facilitate understanding of a project, establish feasibility and provide basis for estimating and to determine further investigations needed for detailed design
Confluence	A point at which streams combine
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 fatigue	Impact on receivers in the vicinity of concurrent and/or consecutive construction activities
Contributory item	Place within a Heritage Conservation Area that contributes to its heritage significance
CORTN	*Calculation of Road Traffic Noise* algorithms (UK Department of Transport 1988)
CSSI	Critical State significant infrastructure
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 impacts	Impacts that, when considered together, have different and/or more substantial impacts than a single impact assessed on its own
D	
dB	Decibel - sound level measurement
dBA	A-weighted decibels A-weighting is applied to instrument-measured sound levels in effort to account for the relative loudness perceived by the human ear, as the ear is less sensitive to low audio frequencies
dBL	Linear weighted decibels
DEC	NSW Department of Environment and Conservation (now OEH and EPA)
DECC	NSW Department of Environment and Climate Change (now OEH)
DECCW	NSW Department of Environment, Climate Change and Water (formerly DECC, now OEH)
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
Deviation	An alteration to the alignment of a portion of a road
DGA	Dense graded asphalt
DIN	German standard
DIRD	Australian Government Department of Infrastructure and Regional Development

Term	Meaning
Discharge	The rate of flow of water measured in terms of volume per unit time, for example, cubic metres per second (m^3/s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving (eg metres per second (m/s))
Divided road	A road with a separate carriageway for each direction of travel created by placing a physical separation (eg median) between the opposing traffic directions
DLWC	NSW Department of Land and Water Conservation
Do minimum	A model scenario that does not incorporate the proposed project infrastructure
Do something	A model scenario that incorporates the proposed project infrastructure
Do something cumulative	A model scenario that incorporates the proposed project infrastructure and other relevant project infrastructure
DoEE	Australian Government Department of the Environment and Energy
DoP	NSW Department of Planning (now Department of Planning and Environment)
DP&E	NSW Department of Planning and Environment
DP&I	NSW Department of Planning and Infrastructure (now Department of Planning and Environment)
DPC	Department of Premier and Cabinet
DPI	NSW Department of Primary Industries
DPI-Fisheries	NSW Department of Primary Industries (Fisheries)
DPI-Water	NSW Department of Primary Industries (Water)
DPSW	NSW Department of Public Works and Services
Drainage	Natural or artificial means for the interception and removal of surface or subsurface water
Drawdown	Reduction in the height of the water table caused by changes in the local environment
DSEWPC	Australian Government Department of Sustainability, Environment, Water, Population and Communities
E	
Earthworks	All operations involved in loosening, excavating, placing, shaping and compacting soil or rock
EB	Eastbound
EC	Elemental carbon
Ecological community	An ecological community is a naturally occurring group of native plants, animals and other organisms that are interacting in a unique habitat
EDMS	(NSW) Emissions Data Management System
EF	Emission factor A quantity which expresses the mass of a pollutant emitted per unit of activity. For road transport the unit of activity is usually either distance (ie g/km) or fuel consumed (ie g/litre)
Egress	Exit
EHC Act	*Environmentally Hazardous Chemicals Act 1985* (NSW)
EIA	Environmental Impact Assessment
EIS	Environmental impact statement
Electrical conductivity	The measure of a material's ability to accommodate the transport of an electric charge
Embankment	An earthen structure where the road (or other infrastructure) subgrade level is about the natural surface
Emergency management	A range of measures to manage risks to communities and the environment. In the flood context it may include measures to prevent, prepare for, respond to and recover from flooding
EMF	Electromagnetic field

Term	Meaning
Emission rate	A quantity which expresses the mass of a pollutant emitted per unit of time (eg g/second)
Emissions scenario	A plausible representation of the future development of emissions of substances that are potentially radiatively active (eg greenhouse gases, aerosols) based on a coherent and internally consistent set of assumptions about driving forces (such as demographic and socio-economic development, technological change) and their key relationships (CSIRO and BoM 2015)
Enabling works	Works which are required to enable the commencement of the main construction works
ENMM	Environmental Noise Management Manual
Entry ramp	A ramp by which one enters a limited-access highway/tunnel
Environment	As defined within the *Environmental Planning and Assessment Act 1979* (NSW), all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings
EOI	Expressions of interest
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	Environmental Planning and Assessment Regulation 2000 (NSW)
EPA	NSW Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
EPHC	Environment Protection Heritage Council
EPL	Environment Protection Licence under the *Protection of the Environment Operations Act 1997* (NSW)
Erosion	A natural process where wind or water detaches a soil particle and provides energy to move the particle
Exit ramp	A ramp by which one exits a limited-access highway/tunnel
Extreme rainfall	There is no consistent global definition for extreme rainfall. It can be defined by either relative rainfall at a location (amount relative to averages), or absolute rainfall amounts (eg over 100 millimetres in a single day). In this report, an extreme rainfall event is defined as the wettest day in 20 years
Extreme temperature	Definitions vary, however this report refers to extreme temperature as hot days (days above 35˚C) and very hot days (days above 40˚C)
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
Flash flooding	Flooding which is sudden and unexpected. It is often caused by sudden local or nearby heavy rainfall. It is often defined as flooding which peaks within six hours of the rain event
Flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami
Flood prone land	Land susceptible to flooding by the probable maximum flood. Note that the flood prone land is also known as flood liable land

Term	Meaning
Flood storage area	Those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. The extent and behaviour of flood storage areas may change with flood severity, and loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. It is necessary to investigate a range of flood sizes before defining flood storage areas
Floodplain	Area of land which is inundated by floods up to and including the probable maximum flood event (ie flood prone land)
Floodplain Risk Management Plan	A management plan developed in accordance with the principles and guidelines in the NSW Floodplain development manual (DIPNR 2005). Usually includes both written and diagrammatic information describing how particular areas of flood prone land are to be used and managed to achieve defined objectives
FMS	Flood management strategy
FPL	Flood planning level
Fracture	Cracks within the strata that develop naturally or as a result of underground works
Freeboard	A factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. It is usually expressed as the difference in height between the adopted flood planning level and the peak height of the flood used to determine the flood planning level. Freeboard provides a factor of safety to compensate for uncertainties in the estimation of flood levels across the floodplain, such as wave action, localised hydraulic behaviour and impacts that are specific event related, such as levee and embankment settlement, and other effects such as 'greenhouse' and climate change. Freeboard is included in the Flood Planning Level
G	
GDE	Groundwater dependent ecosystem Refers to communities of plants, animals and other organisms whose extent and life process are dependent on groundwater, such as wetlands and vegetation on coastal sand dunes
Geomorphology	Physical features of the earth's surface and their relation to its geological structures
Geotechnical investigation	Below ground investigation including soil and groundwater sampling and testing
GHG	Greenhouse gas
GI	Ground integrity
GIS	Geographical information system
GLC	Ground-level concentration
GMP	Groundwater monitoring program
GPS	Global positioning system
Grade	The rate of longitudinal rise (or fall) with respect to the horizontal expressed as a percentage or ratio
Grade separation	The separation of road, rail or other traffic so that crossing movements at intersections are at different levels
Greenhouse gas	Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. Water vapour (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3) are the primary greenhouse gases in the Earth's atmosphere (CSIRO and BoM 2015)
Groundwater	Water that is held in rocks and soil beneath the earth's surface
Groundwater aggressivity	The extent to which groundwater may corrode or degrade materials
Groundwater gauging	Obtaining data from groundwater wells

Term	Meaning
GSV	Ground surface visibility
GVA	Gross value add
GVM	Gross vehicle mass
H	
ha	Hectare
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component (OEH 2014a)
Hazard	A source of potential harm or a situation with a potential to cause loss of human life or damage to physical assets
HCA	Heritage conservation area
HCV	Heavy commercial vehicle (interchangeable with HGV – see below)
HDV	Heavy-duty vehicle, which includes heavy goods vehicles, buses and coaches
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
Heritage Act	*Heritage Act 1977* (NSW)
Heritage Council	Heritage Council of NSW
Heritage item	Any place, building or object listed on a statutory heritage register
HGV	Heavy goods vehicle (truck)
Hydraulic conductivity	A characteristic of soil that describes how easily water moves through it
Hydrogeochemical	Chemical characteristics of groundwater
Hydrogeology	The area of geology that deals with the distribution and movement of groundwater in soils and rocks
Hydrology	The study of rainfall and surface water runoff processes
Hz	Hertz. A measure of frequency
I	
ICNG	*Interim Construction Noise Guideline* (NSW DECC 2009a)
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment
In situ	In the natural or original position. Applied to a rock, soil, or fossil when occurring in the situation in which it was originally formed or deposited
Infiltration	The downward movement of water into soil and rock. It is largely governed by the structural condition of the soil, the nature of the soil surface (including presence of vegetation) and the antecedent moisture content of the soil
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007* (NSW)
Ingress	Enter
Inner West Council	The amalgamation of the former local government areas of Ashfield, Leichhardt and Marrickville, proclaimed on 12 May 2016
INP	Industrial Noise Policy
Inside shoulder	The area of pavement outside the traffic lanes that is closest to the 'fast' lane
Interchange	A grade separation of two or more roads with one or more interconnecting carriageways
Intrusive item	Place within a heritage conservation area that detracts from its heritage significance
J	
Just Terms Act	*Land Acquisition (Just Terms Compensation) Act 1991* (NSW)
K	
KFH	Key fish habitat
kL	Kilolitre

Term	Meaning
kL/day	Kilolitres per day
Km	kilometres
kN	Kilonewton
KTP	Key threatening process
L	
L/s/km	Litres per second per kilometre
L_{Aeq}	The 'energy average noise level'
L_{A90}	The "background noise level" in the absence of construction activities. This parameter represents the average minimum noise level during the daytime, evening and night-time periods respectively. The LAeq(15minute) construction Noise Management Levels (NMLs) are based on the LA90 background noise levels
L_{AFmax}	The maximum fast time weighted noise level from road traffic noise occurring at a particular location
LALC	Local Aboriginal land council
Landscape character	The aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. Includes all aspects of a tract of land – built, planted and natural topographical and ecological features
Landscape design	The design of the natural and built environment. Soft landscape design involves design using vegetative materials such as trees, shrubs, groundcovers. Hard landscape design involves design using hard materials such as pavement, walls and ramps
Lane	A portion of the carriageway allotted for the use of a single line of vehicles
LCV	Light commercial vehicle
LCZ	Landscape character zone
Leachate	Liquid that 'leaches' (drains) from a landfill or stockpile
LEP	Local environmental plan
LGA	Local government area
Licensed discharge point	A location where a licensed operation discharges water to the environment in accordance with conditions stipulated within the site environment protection licence (EPL)
Local road	A road or street used primarily for access to abutting properties
Localised flooding	Localised flooding occurs when components of the drainage system are undersized or blocked and cannot accommodate the incoming overland surface flows, resulting in the flooding of a localised area
LoS	Level of service
M	
m	Metres
m^2	Square metres
m^3	Cubic metres
M4 East Motorway/project	A component of the WestConnex program of works. Extension of the M4 Motorway in tunnels between Homebush and Haberfield via Concord. Includes provision for a future connection to the M4-M5 Link at the Wattle Street interchange
M4-M5 Link	The approved project that is subject to this proposed modification. A component of the WestConnex program of works
Mainline tunnels	The M4-M5 Link mainline tunnels connecting with the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters
Mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam
Mean rainfall	The arithmetically averaged total amount of precipitation recorded during a calendar month or year

Term	Meaning
Median	The central reservation which separates carriageways from traffic travelling in the opposite direction
mg/L	Milligrams per litre
microSiemens per centimetre (mS/cm)	A measure of electrical conductivity. Commonly used to measure the salinity of water
Mid-block	Section of road between two intersections
MODFLOW	A three-dimensional finite-difference groundwater model
Motorway	Fast, high volume controlled access roads. May be tolled or untolled
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
MVA	Megavolt-amp
N	
NB	Northbound
NCA	Noise catchment area
NCG	*Noise Criteria Guideline* (Roads and Maritime, 2015)
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
New M5 Motorway/project	A component of the WestConnex program of works. Located from Kingsgrove to St Peters (under construction)
NH_3	Ammonia
NHL	National heritage list
NIWA	National Institute of Water and Atmospheric Research (New Zealand)
NLA	National Library of Australia
NMG	*Noise Mitigation Guideline* (Roads and Maritime, 2015)
NML	Noise management level
Northcote Street civil site	An approved construction ancillary facility for the M4-M5 Link project located at Haberfield
Northcote Street civil and tunnel site	A construction ancillary facility for the M4-M5 project located at Haberfield which would be used as a civil and tunnel site for the proposed modification
NO_X	Oxides of nitrogen
NoW	NSW Office of Water
NPI	National Pollutant Inventory
NSW	New South Wales
NSW EPA	NSW Environment Protection Authority
NSW Health	NSW Department of Health
NWQMS	National Water Quality Management Strategy
NZ	New Zealand
O	
OC	Organic carbon
OCP	Organochlorine Pesticides
OEH	NSW Office of Environment and Heritage (Formerly DECCW)
OEMP	Operational Environmental Management Plan
OOHW	Out-of-hours work
ONVR	Operational Noise and Vibration Review
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	
Parcel of land	Refers to an individual lot number (lot) and deposited plan (DP)
Parramatta Road East civil site	An approved construction ancillary facility for the M4-M5 Link project at Haberfield
Parramatta Road West civil and tunnel site	An approved construction ancillary facility for the M4-M5 Link project at Ashfield (as described in the M4-M5 Link EIS)

Term	Meaning
Parramatta Road East civil site	A construction ancillary facility for the M4-M5 Link project at Haberfield which would be used as civil sites in accordance with condition of approval C19 and other conditions of the project approval for the proposed modification
Parramatta Road West civil site	A construction ancillary facility for the M4-M5 Link project at Haberfield which would be used as civil sites in accordance with condition of approval C19 and other conditions of the project approval for the proposed modification
PASS	Potential acid sulfate soils
Pavement	The portion of a carriageway placed above the subgrade for the support of, and to form a running surface for, vehicular traffic
PCU	Passenger car unit
Peak discharge	The maximum discharge occurring during a flood event
Peak flood level	The maximum water level occurring during a flood event
Permeability	Ability of a material to transmit water
pH	Numeric scale ranging from zero to 14 used to specify the acidity or alkalinity of an aqueous solution. Solutions with a pH less than seven are acidic and solutions with a pH greater than seven are alkaline. Pure water has a pH of seven and is neutral
Piezometer (monitoring well)	A non-pumping monitoring well, generally of small diameter that is used to measure the elevation of the water table or potentiometric surface. A piezometer generally has a short well screen through which water can enter
PM	(Airborne) particulate matter
PM_{10}	Airborne particulate matter with an aerodynamic diameter of less than 10 micrometres (µm)
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of less than 2.5 micrometres (µm)
PM peak hour	Unless otherwise stated, this refers to trips travelling on the network during the average one hour peak period between 3pm to 6pm on a weekday
PMF	Probable maximum flood The flood that occur as a result of the probable maximum precipitation on a study catchment. The probable maximum flood is the largest flood that could conceivably occur at a particular location, usually estimated from probable maximum precipitation coupled with the worst flood producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The probable maximum flood defines the extent of flood prone land (ie the floodplain)
PPV	Peak Particle Velocity
POEO Act	*Protection of the Environment Operations Act 1997* (NSW)
Pollutant	Any measured concentration of solid or liquid matter that is not naturally present in the environment
Portal	The entry and/or exit to a tunnel
ppm	Parts per million
ppmv	Parts per million by volume
Pre-construction	All work prior to, and in respect of the State significant infrastructure, that is excluded from the definition of construction
Probability	A statistical measure of the expected chance or likelihood of occurrence

Term	Meaning
Project	A new multi-lane road link between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters. The project would also include an interchange at Lilyfield and Rozelle (the Rozelle interchange) and a tunnel connection between Anzac Bridge and Victoria Road, east of Iron Cove Bridge (Iron Cove Link). In addition, construction of tunnels, ramps and associated infrastructure to provide connections to the proposed future Western Harbour Tunnel and Beaches Link project would be carried out at the Rozelle interchange
Project footprint	The land required to construct and operate the project. This includes permanent operational infrastructure (including the tunnels), and land required temporarily for construction
Property	Based on ownership, with the potential to contain more than one lot and DP
Proponent	The person or organisation that proposes to carry out the project or activity. For the purpose of the project, the proponent is NSW Roads and Maritime Services
Public transport	Includes train, bus (government and private), ferry (government and private) and light rail (government and private) services
PV	Passenger vehicle
Pyrmont Bridge Road civil and tunnel site	A construction ancillary facility for the M4-M5 Link project at Annandale
Q	
R	
RAP	Remedial action plan
RAP	Registered Aboriginal parties
RBL	Rating background levels
REF	Review of environmental factors
Residual land	Acquired land not required during operation of the project
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
RH	Relative humidity
Riparian	The part of the landscape adjoining rivers and streams that has a direct influence on the water and aquatic ecosystems within them
RNP	Road Noise Policy
Road reserve	A legally defined area of land within which facilities such as roads, footpaths and associated features may be constructed for public travel
Road Safety Strategy	National Road Safety Strategy for Australia 2011 – 2020
Road header	A commonly used machine for excavation in sandstone using picks mounted on a rotary cutter head attached to a hydraulically operated boom
Roads and Maritime	NSW Roads and Maritime Services
Roadside furniture	A general term covering all signs, street lights, protective devices for the control, guidance and safety of traffic and convenience of road users
RTA	NSW Roads and Traffic Authority (now NSW Roads and Maritime Services)
Runoff	The amount of rainfall that ends up as streamflow, also known as rainfall excess
RWR	Residential, workplace and recreational This term refers to all discrete receptor locations along the project corridor, and mainly covers residential and commercial land uses
S	
s	Second

Term	Meaning
S170	State Agency Section 170 Heritage and Conservation Register. Section 170 of the *Heritage Act 1977* (NSW) requires NSW Government agencies to keep a register of heritage items/assets owned, occupied or managed by that government agency
Salinity	The concentration of dissolved salts in water
SB	Southbound
SCATS	Sydney coordinated adaptive traffic system
SCR	Selective catalytic reduction
Scour	Removal of sediment such as sand and gravel from around bridge abutments or piers caused by moving water
SEARs	Secretary's Environmental Assessment Requirements Requirements and specifications for an environmental assessment prepared by the Secretary of the NSW Department of the Planning and Environment under section 115Y of the *Environmental Planning and Assessment Act 1979* (NSW)
Sediment	Material, both mineral and organic, that is being or has been moved from its site of origin by the action of wind, water or gravity and comes to rest either above or below water level
Sedimentation basin	A stormwater detention system that promotes the settling of sediments trough the reduction of flow velocities and temporary detention. Key elements include purpose designed inlet and outlet structures, settling pond and high flow, overflow structures
Sensitive receiver/receptor	Includes residences, educational institutions (including preschools, schools, universities, TAFE colleges), health care facilities (including nursing homes, hospitals), religious facilities (including churches), child care centres, passive recreation areas (including outdoor grounds used for teaching), active recreation areas (including parks and sports grounds), commercial premises (including film and television studios, research facilities, entertainment spaces, temporary accommodation such as caravan parks and camping grounds, restaurants, office premises, retail spaces and industrial premises)
SEPP	State Environmental Planning Policy
SEPP 19	State Environmental Planning Policy No. 19 – Bushland in Urban Areas
SEPP 33	State Environmental Planning Policy No. 33 – Hazardous and Offensive Development
SEPP 55	State Environmental Planning Policy No. 55 – Remediation of Land
SER	Strategic Environmental Review
Settlement	Refers to how ground can move due to the construction of new infrastructure
SHI	NSW State Heritage Inventory database
SHPRC	Sydney Harbour and Parramatta River Catchment
SHR	State Heritage Register
SHWQIP	Sydney Harbour Water Quality Improvement Plan
Shotcrete	The spraying of concrete and mortar onto a surface at high velocity
Shoulder	The portion of the carriageway beyond the traffic lanes adjacent to and flush with the surface of the pavement
SMC	Sydney Motorway Corporation
SMCMA	Sydney Metropolitan Catchment Management Authority
SO_2	Sulfur dioxide
SO_X	Sulfur oxides
SOA	Secondary organic aerosol
Socio-economic	Involving combination of social and economic matters
Soil salinity	Salt content of soil
Span	The distance between the centres of adjacent supports of a bridge
Spoil	Surplus excavated material
SREP	Sydney Regional Environmental Plan

Term	Meaning
SREP 26	*Sydney Regional Environmental Plan No. 26 – City West*
SSI	State significant infrastructure
SSIAR	State significant infrastructure application report
St Peters interchange	A component of the New M5 project, located at the former Alexandria Landfill site at St Peters. Approved and under construction as part of the New M5 project. Additional construction works proposed as part of the M4-M5 Link project
Staging	Refers to the division of the project into multiple contract packages for construction purposes, and/or the construction or operation of the overall project in discrete phases
State and Regional Development SEPP	State Environmental Planning Policy (State and Regional Development) 2011
Stockpile	Temporary stored materials such as soil, sand, gravel, spoil/waste
Storativity	The volume of water an aquifer releases from, or takes into storage, per unit surface area of the aquifer per unit change in head. It is equal to the product of specific storage and aquifer thickness. In an unconfined aquifer the storativity is known as the specific yield
Strata	Geological layers below the ground surface
Stream order	A classification system which assigns an 'order' to waterways according to the number of additional tributaries associated with each waterway, to provide a measure of system complexity
Structure (soil)	The way soil particles group together to form aggregates
Stub tunnel	Driven tunnels constructed to connect to potential future motorway links
Surface road concentration (air quality)	Describes the contribution of pollutants from the surface road network. It includes not only the contribution of the nearest road at the receptor, but also the net contribution of the modelled road network at the receptor
Surface water	Water flowing or held in streams, rivers and other wetlands in the landscape
SW	Water quality monitoring sample ID
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
Sydney Harbour Catchment SREP	*Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005*
T	
TBM	Tunnel boring machine
TEOM	Tapered Element Oscillating Microbalance
TEOM-FDMS	TEOM with Filter Dynamic Measurement System
TEQ	Toxicity equivalent
TEUs	20-foot equivalent units
The Blue Book	*Managing Urban Stormwater – Soils and Construction Volumes 1 and 2* (NSW Government 2004 and 2006)
THC	Total hydrocarbons
Topography	Surface features in an area of land
Total concentration (air quality)	The sum of the background, surface road and ventilation outlet concentrations. It may relate to conditions with or without the project under assessment
Toxicity	The degree of danger posed by a substance to human, animal or plant life
TPA	Transport Performance Analytics
Transport for NSW	NSW Government Department Transport for NSW
TRAQ	Tool for Roadside Air Quality
TRH	Total recoverable hydrocarbons
Truck and dog construction vehicle	A vehicle with 20 cubic metre capacity and maximum length of 19 metres
TSC Act	*Threatened Species Conservation Act 1995* (NSW)

Term	Meaning
TSP	Total suspended particulate (matter)
TSS	Total suspended solids
Tunnel boring machine	An excavation machine that 'bores' through soil or rock to create a tunnel with a circular cross section (as opposed to drilling and blasting methods)
Turbidity	A measure of light penetration through a water column containing particles of matter in suspension
Typical cross section	A cross section of a carriageway showing typical dimensional details, furniture locations and features of the pavement construction
U	
UDLP	Urban Design and Landscape Plan
UDLP land	Project land that has been identified as subject to the UDLP
UK	United Kingdom
Ultrafines	Particulate matter below 0.1 microns in diameter
UN	United Nations
Urban design	The process and product of designing human settlements, and their supporting infrastructure, in urban and rural environments
V	
V/C	Volume to capacity ratio
VDV	Vibration dose value
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
VENM	Virgin excavated natural material
Ventilation outlet	The location and structure from which air within a tunnel is expelled
VIA	Visual impact assessment
Visual amenity	Pleasantness or attractiveness of a place or area
Vulnerable	As defined under the *Threatened Species Conservation Act 1995* (NSW), a species that is facing a high risk of extinction in NSW in the medium-term future
VWP	Vibrating wire piezometers
W	
Water table	The surface of saturation in an unconfined aquifer at which the pressure of the water is equal to that of the atmosphere
Waterway	Any flowing stream of water, whether natural or artificially regulated (not necessarily permanent)
Wattle Street civil and tunnel site	A construction ancillary facility for the M4-M5 Link project located at Haberfield
Wattle Street interchange	An interchange to connect Wattle Street (City West Link) with the M4 East and the M4-M5 Link tunnels. Approved and under construction as part of the M4 East project. Additional construction works proposed as part of the M4-M5 Link project
Western Harbour Tunnel and Beaches Link	The Western Harbour Tunnel component would connect to the M4-M5 Link at the Rozelle interchange, cross underneath Sydney Harbour between the Birchgrove and Waverton areas, and connect with the Warringah Freeway at North Sydney. The Beaches Link component would comprise a tunnel that would connect to the Warringah Freeway, cross underneath Middle Harbour and connect with the Burnt Bridge Creek Deviation at Balgowlah and Wakehurst Parkway at Seaforth. It would also involve the duplication of the Wakehurst Parkway between Seaforth and Frenchs Forest
WestConnex program of works	A program of works that includes the M4 Widening, King Georges Road Interchange Upgrade, M4 East, New M5 and M4-M5 Link projects
WM Act	*Water Management Act 2000* (NSW)
WQIP	Water quality improvement plan

Term	Meaning
WQPMP	Water quality plan and monitoring program
WRTM	WestConnex Road Traffic Model
WSROC	Western Sydney Regional Organisation of Councils Ltd
WSUD	Water sensitive urban design
WQO	Water quality objective
Other	
β coefficient	Beta coefficient A measure of sensitivity
µg	microgram
$\mu g/m^3$	micrograms per cubic metre

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Executive summary

The approved project

The M4-M5 Link project (the project) is part of the WestConnex program of works that, together with the proposed future Sydney Gateway, would facilitate improved connections between western Sydney, Sydney Airport and Port Botany and south and south-west Sydney, as well as better connectivity between the important economic centres along Sydney's Global Economic Corridor and through local communities.

The project includes the construction and operation of a new multi-lane road link between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters, an interchange at Lilyfield and Rozelle (the Rozelle interchange) and a tunnel connection between Anzac Bridge and Victoria Road, east of Iron Cove Bridge (Iron Cove Link).

Approval for the construction and operation of the project was granted on 17 April 2018 by the NSW Minister for Planning (application number SSI 7485).

The approved project provides for the construction and operation of the project in two stages:

- Stage 1[1] - construction of the mainline tunnels between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters. These works are anticipated to commence in 2018 with the mainline tunnel opening to traffic in 2022.
- Stage 2[2] - construction of the Rozelle interchange and Iron Cove Link. Stage 2 works are expected to commence in 2019.

The Environmental Impact Statement (EIS) described and assessed 12 construction ancillary facilities and the Submissions and Preferred Infrastructure Report (SPIR) described and assessed an additional construction ancillary facility, White Bay civil site. Within the Haberfield and Ashfield area the EIS described and assessed two options for construction ancillary facilities (Option A and Option B). The EIS also stated that the number, location and layout of construction ancillary facilities would be finalised as part of construction planning during detailed design.

Condition of approval C19 provides that only one of two ancillary facility options (A or B) presented in Chapter 6 of the EIS can be implemented at Haberfield except if one site is used for parking and other works that do not exceed the 'noise affected' Noise Management Levels as identified in the Interim Construction Noise Guideline (NSW DECC, 2009) (ICNG).

Proposed modification

Construction design and planning has progressed since the assessment contained in the EIS and SPIR and a review of the concept design for the approved project has occurred. As a result, following ongoing construction design and planning, the proponent has further optimised the construction site arrangements assessed in the EIS and SPIR to reduce community impacts and to decrease the overall number of construction sites required for Stage 1 of the project.

The proponent proposes to:

- Remove the Darley Road civil and tunnel site (C4) from the project
- Proceed with Option A for the construction ancillary facilities proposed at Haberfield and Ashfield but with changes to some activities at a number of the construction ancillary facilities which arise from the removal of the Darley Road civil and tunnel site and the use of the Northcote Street site for tunnelling.

[1] M4-M5 Link Stage 1 (the mainline tunnel) is also commonly referred to as Stage 3A of the WestConnex program of works

[2] M4-M5 Link Stage 2 (the Rozelle interchange and Iron Cove Link) is also commonly referred to as Stage 3B of the WestConnex program of works

The proposed changes are summarised in Table 1**Table 1** and described further below.

Table 1 Change to construction ancillary facilities at Haberfield, Ashfield and Leichhardt

EIS and SPIR	Proposed modification
Wattle Street civil and tunnel site (C1a)	No change
Haberfield civil site (C2a/C2b)[1]	No change
Northcote Street civil site (C3a)	Northcote Street civil and tunnel site. Includes tunnelling, spoil handling and spoil haulage from this site
Parramatta Road West civil and tunnel site (C1b)	Parramatta Road West civil site[2] Inclusion of a temporary pedestrian walkway above Parramatta Road to link to the Parramatta Road East civil site.
Parramatta Road East civil site (C3b)	Parramatta Road East civil site[2] Inclusion of a temporary pedestrian walkway above Parramatta Road to link to the Parramatta Road West civil site.
Darley Road civil and tunnel site (C4)	Removal of site

Notes

1. The use and footprint of this site was amended in sections B11.6.8 and C6.1.3 of the SPIR to be as per the arrangement for the Haberfield civil site (C2b).
2. Condition C19 of the planning approval allowed use of the site for parking and other works that do not exceed the 'noise affected' Noise Management Levels as identified in the ICNG.

The proposed modification relates to Stage 1 of the approved project. The following points provide an overview of the proposed modification:

- The Northcote Street civil site (C3a) would become a civil and tunnel site. This would result in 24 hours, seven days a week tunnelling works being carried out from this location within an existing acoustic shed. The Northcote Street site is currently being used for tunnelling as part of the M4 East project. A construction access tunnel is to be provided from the Northcote Street site that utilises part of the existing access tunnel for the M4 East project. Two spoil haulage routes from this site are proposed, Route A (Wattle Street / Ramsay Street / Fairlight Street / Great North Road) and Route B (Wattle Street / G-loop). Relevant conditions of the project approval would apply to the use of this site for tunnelling and civil works to ensure potential impacts are managed consistently with the project approval
- The Parramatta Road West and Parramatta Road East civil sites (C1b and C3b) would be used as civil sites in accordance with condition of approval C19 and other conditions of the project approval. The sites would be used for site offices, light and heavy vehicle car parking, shuttle bus services, workshop and storage of equipment, materials and construction machinery. Both sites would operate 24 hours a day, seven days a week in accordance with the conditions of the project approval. No tunnelling, tunnel spoil stockpiling and handling or tunnel spoil haulage would occur at these sites
- A temporary pedestrian walkway would be constructed above Parramatta Road to connect the Parramatta Road East and Parramatta Road West civil sites. The pedestrian walkway would only be available for use by project staff during the construction phase of the project and would not be available for public use. The pedestrian walkway would be demobilised upon completion of the construction phase of the project
- Removal of the Darley Road civil and tunnel site (C4) from the project. No construction activities or permanent operational infrastructure would be provided at this location. The EIS provided for construction spoil to be removed from the Darley Road site. This spoil would now be removed from other tunnelling sites
- The relocation of the operational water treatment plant from the Darley Road motorway operations complex (as described in the EIS) to the Campbell Road motorway operations complex at the St Peters interchange.

As a result of the changes proposed in the modification, certain conditions of approval will need to be deleted or modified.

Consultation

The following consultation activities have been carried out for the proposed modification to date:

- Media releases to Sydney metro news organisations
- M4-M5 Link Community Update Brochure and Community Update Email
- Meetings with WestConnex Community Reference Groups
- Door knocking of stakeholders in the Ashfield, Haberfield and Leichhardt areas likely to be impacted by the modification and along the proposed haulage routes for the Northcote Street civil and tunnel site
- Meetings with the NSW Environment Protection Authority, Sydney Water, Inner West Council and City of Sydney Council.

The modification report will be exhibited for 14 days from 12 September 2018. The community and other stakeholders will be able to provide feedback on the modification to the NSW Department of Planning and Environment (DPE) as submissions.

Following exhibition of the modification Roads and Maritime will review the submissions received and respond to the issues raised in a Response to Submissions Report for the modification. This report will be provided to DPE and will be assessed prior to a determination being made. If during exhibition or during the response to submissions process further changes to the proposed modification are identified, these changes would also be described and assessed.

Environmental assessment

Potential environmental impacts associated with the proposed modification have been assessed in the modification report and compared to the environmental impacts assessed in the EIS. Key environmental impacts for the proposed modification are summarised below.

Traffic and transport

A construction traffic assessment was undertaken for the construction ancillary facilities in the Haberfield and Ashfield area, including the proposed spoil haulage routes from the Northcote Street civil and tunnel site. The assessment determined that there would be minimal impact on the mid-block roadway and intersection level of service through the Haberfield, Ashfield and Five Dock modelled road network.

The proposed spoil haulage routes for the Northcote Street civil and tunnel site would be more direct and less constrained by comparison to the proposed spoil haulage route for the Parramatta Road West civil and tunnel site described in the EIS and SPIR. The proposed spoil haulage routes would be restricted to state roads that are controlled by Roads and Maritime. Use of the G-loop would allow spoil haulage vehicles the option of using the M4 East motorway tunnels and, as a result, reduce impacts on the surface road network.

The proposed use of the Parramatta Road West and Parramatta Road East civil sites would result in reduction in heavy vehicle traffic impacts compared to the construction site arrangements proposed in the M4-M5 Link EIS and SPIR.

A preliminary assessment of parking provision for the construction ancillary facilities in the Haberfield and Ashfield area indicated that the proposed parking provision of around a total of 200 spaces would be able to meet the forecast construction workforce parking demand.

The construction of a temporary pedestrian walkway above Parramatta Road to connect the Parramatta Road East and Parramatta Road West civil sites is likely to have a minimal impact on traffic and transport. Impacts on the road network would occur primarily during establishment and decommissioning of the walkway structure and therefore over a short duration.

The relocation of the operational water treatment plant from Darley Road to the Campbell Road motorway operation complex (MOC5) at St Peters interchange is likely to have a negligible change in impact on traffic and transport users compared to the impact assessment in the M4-M5 Link EIS and SPIR, as no change in peak construction traffic volume or length of construction is forecast.

Noise and vibration

For the Northcote Street civil and tunnel site, minor noise impacts are predicted during the establishment and decommissioning of the site. These works would be conducted during standard daytime hours only and would be relatively short in duration. Tunnelling activities would occur largely within the existing acoustic shed and are predicted to result in minor to moderate impacts at surrounding receivers. A range of mitigation measures are available to mitigate these exceedances.

Minor noise impacts are predicted during site establishment and decommissioning of the G-loop, with some of these works likely to be undertaken outside of standard construction hours. These out of hours works would be of limited duration and managed by the mitigation measures in the M4-M5 Link SPIR and the relevant conditions of the project approval.

The two spoil haulage routes for the Northcote Street civil and tunnel site have been assessed and predicted noise from construction traffic is below the 2dB increase threshold for both spoil haulage routes. The project should consider the potential impact from maximum noise levels that heavy vehicles may have on surrounding receivers along Ramsay Street, Fairlight Street and Great North Road when finalising the routes for construction traffic during the night time period.

The new construction access tunnel at the Northcote Street civil and tunnel site will pass under a limited number of (less than 10) residential properties in the vicinity of Walker Avenue and Alt Street. Construction of the access tunnel will result in minimal ground-borne noise impacts to these properties when road headers are being used. During rock-breaker tunnelling works it is predicted that the night time criterion would be exceeded at a number of sensitive receivers in the vicinity of the access tunnel. A range of mitigation measures are available to mitigate these impacts.

A qualitative consistency assessment was undertaken for the proposed use of the Parramatta Road West and Parramatta Road East civil sites. The use of the sites is considered to be consistent with the assessment of noise impacts undertaken in the M4-M5 Link EIS and SPIR and would not result in a change to the mitigation measures proposed. The proposed modification would remove tunnelling activities from the site and is therefore expected to result in a reduction in the impact on nearby receivers previously predicted in association with tunnelling related activities.

A Construction Noise and Vibration Impact Statement (CNVIS) will be prepared based on the finalised construction methodology and will include consideration of the indicative revised layout and use of the site, including the location of specific items of plant. The CNVIS will include details of how the noise emissions from the sites will be managed to achieve compliance with the applicable noise management levels as required by condition of approval C19. Where non-compliances are predicted within the CNVIS, the contractor will explore a range of at source noise mitigation options.

Minor to moderate impacts are predicted at a small number of sensitive receivers during the limited night works to complete the lifting of the bridge span for the pedestrian walkway over Parramatta Road. The use of the pedestrian walkway by workers during the construction period is expected to result in negligible noise impacts.

Potential noise impacts associated with the construction of the water treatment plant would be consistent with the construction scenarios assessed in the EIS which did not identify any noise impacts at nearby receivers.

The water treatment plant at the Campbell Road motorway operations complex would include specific equipment designed to achieve compliance with the relevant noise criteria. The equipment and sound power levels modelled for the water treatment plant are indicative only and may be subject to change during the detailed design phase of the project.

Air quality

The construction air quality assessment involved the application of a semi-quantitative risk-based approach which was adapted for the proposed modification.

The assessment determined that without mitigation measures the risk of dust impacts due to construction activities was 'medium' to 'high'. However, if the identified mitigation measures are included in the relevant air quality management plans, construction dust is unlikely to represent a serious ongoing problem. Any effects would be temporary and relatively short in duration in the context of the total duration of the project. Provided that mitigation measures are implemented, the potential impacts are not considered to be significant.

Surface water and flooding

A surface water and flooding assessment was undertaken to assess potential construction and operational impacts in relation to surface water hydrology, surface water quality and flooding. The potential flood risk and localised drainage impacts associated with the modification are considered to be acceptable based on the mitigation measures in the M4-M5 Link SPIR and the relevant conditions of the project approval. The assessment of flood risk and mitigation measures identified will need to be refined as part of the future detailed design process.

Water quality impacts associated with construction phase discharges from the various construction sites and the proposed operational water treatment plant at the Campbell Road motorway operations complex have been assessed. Potential impacts on surface water quality during construction and operation of the modification are considered to be minor and manageable based on the mitigation measures in the M4-M5 Link SPIR and the relevant conditions of the project approval.

The relocated operational water treatment plant would be designed so that treated water would be in accordance with the discharge criteria specified in condition of approval E187 of the project approval. Treated water would be discharged to Alexandra Canal either via the proposed stormwater infrastructure for the New M5 project or via existing drainage infrastructure. Alternatively it would be discharged to sewer via a Trade Waste Agreement.

Potential scour and erosion impacts associated with releases to Dobroyd Canal, Alexandra Canal and Johnstons Creek are considered to be negligible. As potential scour impacts at Alexandra Canal are considered to be negligible, impacts on contaminated sediments in Alexandra Canal are also considered to be negligible beyond those assessed and approved as part of the New M5 project.

Other key benefits and impacts

The proposed modification would result in the following key benefits and impacts:

- The removal of the Darley Road civil and tunnel site from the project will ensure that potential noise, air quality, traffic and other impacts associated with tunnelling are avoided in this area. In addition potential ground-borne noise and vibration impacts associated with the proposed construction of a temporary access tunnel at this location would also be avoided
- The removal of the Darley Road civil and tunnel site from the project will result in tunnelling works at other project tunnelling sites being extended by around six months. This would result in an increase in the duration of traffic, air quality, noise and other impacts directly associated with tunnelling at these locations
- The use of the Northcote Street civil and tunnel site will extend tunnelling operations and associated noise, air quality, traffic and parking impacts at this site for a further four years. This site is being used for tunnelling by the M4 East project. This enables existing infrastructure at the site such as the acoustic shed, driveways, water treatment plant, site offices and other structures to be re-used thereby reducing impacts associated with site establishment activities
- The new construction access tunnel at the Northcote Street civil and tunnel site will be at a depth of over 30 metres where it passes under a limited number of residential properties in the vicinity of Walker Avenue and Alt Street. Predicted settlement impacts are minimal and well within accepted criteria

- The temporary overhead pedestrian walkway between the Parramatta Road West and Parramatta Road East civil sites would allow for the safe and efficient movement of construction workers over Parramatta Road. The walkway structure has been designed to achieve a clearance of six metres above Parramatta Road to allow for the safe movement of traffic. The visual impacts of the structure will be minimal when considered in the context of visual environment along this section of the Parramatta Road corridor
- The relocation of the operational water treatment plant to the Campbell Road motorway operations centre will occupy a small area of additional land at the St Peters interchange. However, the additional footprint would result in only a minimal impact on the proposed area of open space and landscaping on the southern side of Campbell Road that is being delivered as part of the New M5 project. The visual impact of the water treatment plant would be minimal.

Matters of national environmental significance

The nature of the modification activities means that no matters of national environmental significance under the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act) are likely to be impacted. As such, the modification application has not been referred to the Australian Government Department of the Environment and Energy for further assessment or approval under the EPBC Act.

Environmental management measures

The impacts associated with proposed modification can generally be accommodated by the existing environmental management measures provided in the EIS and SPIR. An additional environmental management measure has been recommended in relation the visual impacts associated with the relocation of the operational water treatment plant to St Peters. Some environmental management measures have been amended or deleted as a result of the removal of the Darley Road civil and tunnel site from the project.

Conditions of approval

Changes to a number of the conditions of approval have been proposed to accommodate the proposed modification. The proposed changes would provide certainty regarding the arrangement of construction ancillary facility sites at Haberfield and Ashfield and the removal of the Darley Road site at Leichhardt. All other conditions of approval would continue to apply to the project.

1 Introduction

1.1 Purpose of this report

This modification report provides the environmental assessment for the proposed modification to the M4-M5 Link project (the project) in accordance with section 5.25 of the *Environmental Planning & Assessment Act 1979* (NSW) (EP&A Act). This report includes:

- An overview of the approved project
- A description of the proposed modification to the approved project
- An assessment of the potential environmental impacts of the proposed modification
- Details of the changes to the conditions of the project approval required by the proposed modification
- Details of the changes to the approved environmental management measures required by the proposed modification
- Justification for the proposed modification.

1.2 Overview of M4-M5 Link project

Approval for the construction and operation of the project was granted on 17 April 2018 by the NSW Minister for Planning (application number SSI 7485). **Figure 1-1** provides an overview of the approved project.

The Environmental Impact Statement (EIS) describes construction and operation of the M4-M5 Link in two stages:

Stage 1[1], as described in the EIS included:

- Construction of the mainline tunnels between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters, stub tunnels to the Rozelle interchange (at the Inner West subsurface interchange) and ancillary infrastructure at the Darley Road motorway operations complex (MOC1) and Campbell Road motorway operations complex (MOC5)
- These works are anticipated to commence in 2018 with the mainline tunnel opening to traffic in 2022.

Stage 2[2] as described in the EIS, included:

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

The M4-M5 Link project is part of the WestConnex program of works that, together with the proposed future Sydney Gateway, would facilitate improved connections between western Sydney, Sydney Airport and Port Botany and south and south-west Sydney, as well as better connectivity between the

[1] M4-M5 Link Stage 1 (the mainline tunnel) is also commonly referred to as Stage 3A of the WestConnex program of works

[2] M4-M5 Link Stage 2 (the Rozelle interchange and Iron Cove Link) is also commonly referred to as Stage 3B of the WestConnex program of works

important economic centres along Sydney's Global Economic Corridor and through local communities.

A more comprehensive overview of the M4-M5 Link project, as well as other aspects of the WestConnex program of works, is provided within the EIS and the Submissions and Preferred Infrastructure Report (SPIR).

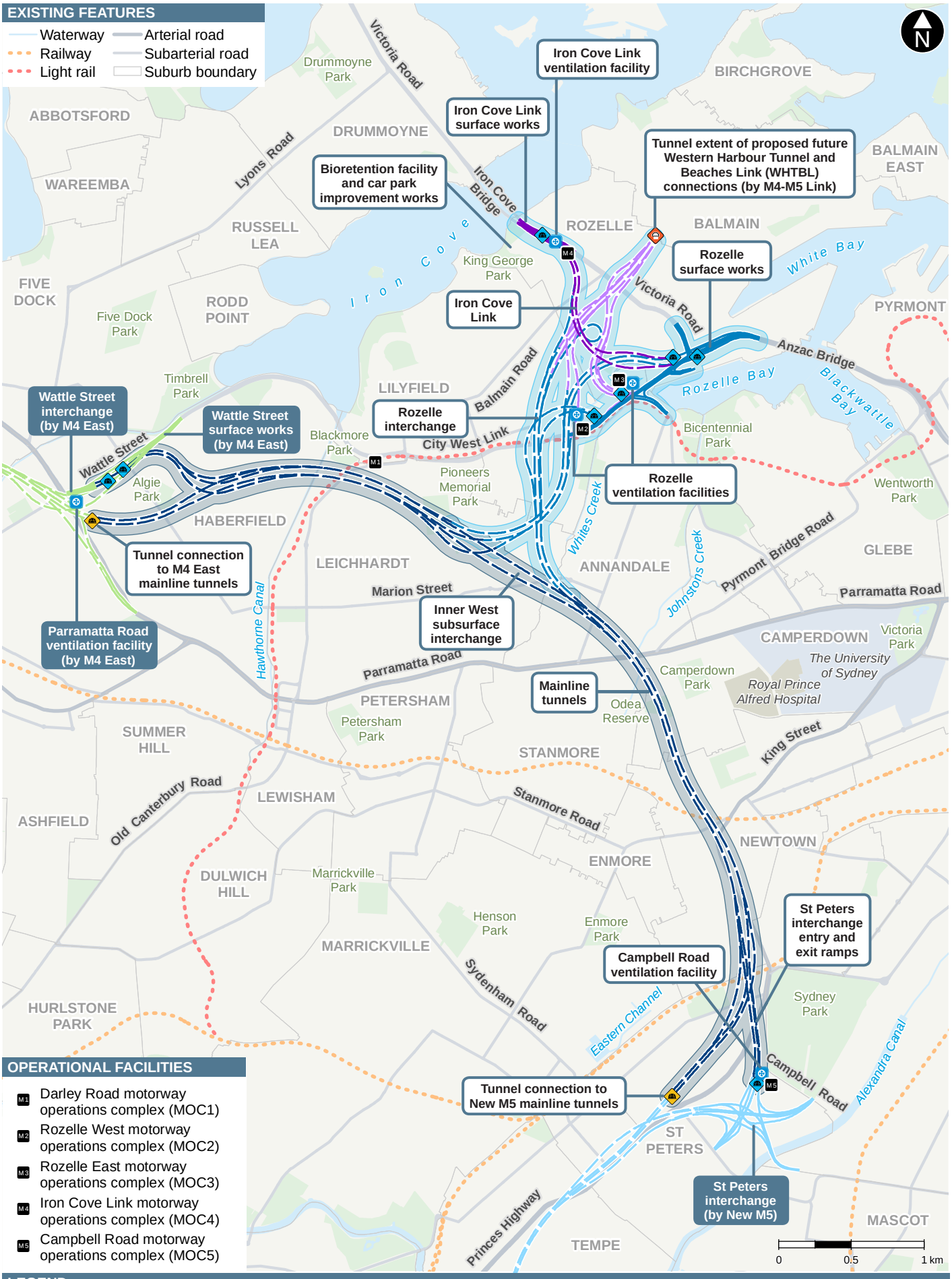

Figure 1-1 EIS overview of the M4-M5 Link project

1.3 Construction design and planning

The EIS for the project described and assessed 12 construction ancillary facilities. Part D of the SPIR described and assessed an additional construction ancillary facility, White Bay civil site (C11). Section 6.5.1 of the EIS stated that the number, location and layout of construction ancillary facilities would be finalised as part of detailed construction planning for the project.

Within the Haberfield and Ashfield area the EIS described and assessed two options for construction ancillary facilities (Option A and Option B as shown in Error! Reference source not found.).

Table 1-1 Possible construction ancillary facility combinations at Haberfield and Ashfield assessed in the EIS

Option A	Option B
Wattle Street civil and tunnel site (C1a)	Parramatta Road West civil and tunnel site (C1b)
Haberfield civil and tunnel site (C2a)	Haberfield civil site (C2b)
Northcote Street civil site (C3a)	Parramatta Road East civil site (C3b)

Section C6.1.3 of the SPIR clarified that the contractor may choose to use all or some of the construction ancillary facilities identified in the EIS, including any combination of the Option A and Option B facilities at Haberfield and Ashfield.

Condition of approval C19 provides that only one of two ancillary facility options (A or B) presented in Chapter 6 of the EIS can be implemented at Haberfield except if one site is used for parking and other works that do not exceed the 'noise affected' Noise Management Levels as identified in the Interim Construction Noise Guideline (NSW DECC, 2009) (ICNG).

Construction design and planning has progressed since the assessment contained in the EIS and SPIR and a review of the concept design for the approved project has occurred. As a result, following ongoing construction design and planning, the proponent has further optimised the construction site arrangements assessed in the EIS and SPIR to reduce community impacts and to decrease the overall number of construction sites required for Stage 1 of the project.

The proponent proposes to:

- Remove the Darley Road civil and tunnel site (C4) from the project
- Proceed with Option A for the construction ancillary facilities proposed at Haberfield and Ashfield but with changes to some activities at a number of the construction ancillary facilities which arise from the removal of the Darley Road civil and tunnel site and the use of the Northcote Street site for tunnelling.

The proposed changes are summarised in **Table 1-2** and described in **section 1.4** below.

Table 1-2 Change to construction ancillary facilities at Haberfield, Ashfield and Leichhardt

EIS and SPIR	Proposed modification
Wattle Street civil and tunnel site (C1a)	No change
Haberfield civil site (C2a/C2b)[1]	No change
Northcote Street civil site (C3a)	Northcote Street civil and tunnel site. Includes tunnelling, spoil handling and spoil haulage from this site
Parramatta Road West civil and tunnel site (C1b)	Parramatta Road West civil site[2] Inclusion of a temporary pedestrian walkway above Parramatta Road to link to the Parramatta Road East civil site.

EIS and SPIR	Proposed modification
Parramatta Road East civil site (C3b)	Parramatta Road East civil site[2] Inclusion of a temporary pedestrian walkway above Parramatta Road to link to the Parramatta Road West civil site.
Darley Road civil and tunnel site (C4)	Removal of site

Notes

1. The use and footprint of this site was amended in sections B11.6.8 and C6.1.3 of the SPIR to be as per the arrangement for the Haberfield civil site (C2b).
2. Condition C19 allowed use of the site for parking and other works that do not exceed the 'noise affected' Noise Management Levels as identified in the ICNG.

1.4 Overview of modification

The proposed modification relates to Stage 1 of the approved project. The following points provide an overview of the proposed modification:

- The Northcote Street civil site (C3a) would become a civil and tunnel site. This would result in 24 hours, seven days a week tunnelling works being carried out from this location within an existing acoustic shed. The Northcote Street site is being used for tunnelling as part of the M4 East project. A construction access tunnel is to be provided from the Northcote Street site that utilises part of the existing access tunnel for the M4 East project. Proposed spoil haulage routes to and from this site are identified in this modification report. Relevant conditions of the project approval would apply to the use of this site for tunnelling and civil works to ensure potential impacts are managed consistently with the project approval
- The Parramatta Road West and Parramatta Road East civil sites (C1b and C3b) would be used as civil sites in accordance with condition of approval C19 and other conditions of the project approval. The sites would be used for site offices, light and heavy vehicle car parking, shuttle bus services, workshop and storage of equipment, materials and construction machinery. Both sites would operate 24 hours a day, 7 days a week in accordance with the conditions of the project approval. No tunnelling, tunnel spoil stockpiling and handling or tunnel spoil haulage would occur at these sites
- A temporary pedestrian walkway would be constructed above Parramatta Road to connect the Parramatta Road East and Parramatta Road West civil sites. The pedestrian walkway would only be available for use by project staff during the construction phase of the project and would not be available for public use. The pedestrian walkway would be demobilised upon completion of the construction phase of the project
- Removal of the Darley Road civil and tunnel site (C4) from the project. No construction activities or permanent operational infrastructure would be provided at this location. The EIS provided for construction spoil to be removed from the Darley Road site. This spoil would now be removed from other tunnelling sites
- The relocation of the operational water treatment plant from the Darley Road motorway operations complex (as described in the EIS) to the Campbell Road motorway operations complex at the St Peters interchange.

Chapter 4 (Proposed modification) of this report provides a detailed description of the proposed modification.

The proposed modification would require changes to the conditions of the project approval. Proposed changes to the project approval are detailed in **Chapter 7** (Conditions of approval).

1.5 Need for modification

Since approval was granted for the M4-M5 Link, a contractor has been appointed to construct Stage 1 of the approved project on behalf of the proponent, NSW Roads and Maritime Services (Roads and Maritime).

Construction design and planning has progressed since the assessment contained in the EIS and SPIR and a review of the concept design for the approved project has occurred. As a result, the proponent has further optimised the construction site arrangements assessed in the EIS and SPIR to reduce environmental and community impacts and to decrease the overall number of construction sites required for the project. The main changes are described in **section 1.4** and in further detail in **Chapter 4** (Proposed modification).

However, not all of the changes proposed can be accommodated within the existing project approval. As such it is necessary to seek a modification to the project approval in accordance with Section 5.25 of the EP&A Act.

The approval of the modification would allow the contractor to construct the project using the approach summarised above.

1.6 Site establishment and/or construction works

Site establishment works (in accordance with an approved Site Establishment Management Plan) and/or construction works (in accordance with an approved Construction Environmental Management Plan) are proposed at a number of the project construction sites and will be carried out in accordance with the conditions of approval for the project.

1.7 Structure of this report

This report is structured as follows:

- **Chapter 1** (Introduction) provides an overview of the modification, its scope and purpose
- **Chapter 2** (Assessment process) outlines the statutory assessment requirements and explains the steps in the assessment and approval process
- **Chapter 3** (Approved project) provides a description of the approved project with a more detailed focus on the elements that are proposed to be changed by the modification
- **Chapter 4** (Proposed modification) provides a detailed description of the modification to the approved project
- **Chapter 5** (Consultation) outlines the consultation activities undertaken to date and in the future
- **Chapter 6** (Environmental assessment) identifies the relevant environmental issues, assesses the potential impacts of the modification and presents environmental management measures in response to those impacts
- **Chapter 7** (Conditions of approval) identifies the conditions of the project approval that are required to be amended as part of this modification
- **Chapter 8** (Environmental management measures) details changes to the approved environmental management measures as a result of this modification
- **Chapter 9** (Modification justification and conclusions) presents the justification for the modification
- **Appendix A** (Environmental assessment requirements for modification)
- **Appendix B** (Traffic and transport report)
- **Appendix C** (Noise and vibration report)
- **Appendix D** (Air quality report)
- **Appendix E** (Surface water and flooding report)
- **Appendix F** (Site photos).

2 Assessment process

This chapter describes the planning approval process and framework for the modification of the WestConnex M4-M5 Link (the project). The modification is related to Stage 1 of the project as described in **Chapter 1** (Introduction).

2.1 Approval framework

2.1.1 Project approval

The project was declared as State Significant Infrastructure (SSI) and Critical State Significant Infrastructure (critical SSI) and was therefore assessed and approved under Part 5 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). An Environmental Impact Statement (EIS) was prepared and placed on public exhibition from 18 August to 16 October 2017.

Following the public exhibition, a number of submissions (over 13,000) were received from the community and from NSW Government agencies and local councils. A submissions and preferred infrastructure report (SPIR) was produced to document the responses to the issues raised and to assess design changes in responses to the submissions received. The SPIR was lodged with the NSW Department of Planning and Environment (DPE) in January 2018.

Planning approval was granted by the NSW Minister for Planning on 17 April 2018 (application number SSI 7485) and was subject to a number of conditions relating to the construction and operation of the project.

2.1.2 Modification application

Since approval was granted for the M4-M5 Link, a contractor has been appointed to construct Stage 1 of the approved project on behalf of the proponent, NSW Roads and Maritime Services (Roads and Maritime).

Construction design and planning has progressed since the assessment contained in the EIS and SPIR and a review of the concept design for the approved project has occurred. As a result, the proponent has further optimised the construction site arrangements assessed in the EIS and SPIR to reduce environmental and community impacts and to decrease the overall number of construction sites required for Stage 1 of the project.

However, not all of the changes proposed can be accommodated within the existing project approval. As such Roads and Maritime as the proponent for the project, is proposing to modify project approval SSI 7485 under Section 5.25 of the EP&A Act. Section 5.25(2) of the EP&A Act states that "*the proponent may request the Minister to modify the Minister's approval for State significant infrastructure. The Minister's approval for a modification is not required if the infrastructure as modified will be consistent with the existing approval under this Division*".

Section 5.25(3) states that "*the request for the Minister's approval is to be lodged with the Planning Secretary. The Planning Secretary may notify the proponent of environmental assessment requirements with respect to the proposed modification that the proponent must comply with before the matter will be considered by the Minister*". Section 5.25(4) states that "*the Minister may modify the approval (with or without conditions) or disapprove of the modification*".

As a result of the changes proposed in the modification, certain conditions of approval will need to be deleted or modified. These changes are discussed further in **Chapter 7** (Conditions of approval).

2.2 Environmental planning instruments

Section 2.2 of the EIS provides an overview of the environmental planning instruments (EPIs) relevant to the project. This section notes that "*in general, section 115ZF(2) of the EP&A Act* (now section 5.22(2)) *excludes the application of environmental planning instruments to SSI projects (except as those instruments apply to the declaration of SSI or critical SSI*". Nevertheless a review of Section 2.2 of the EIS has confirmed that the discussion of the various EPIs relevant to the project remains valid for this modification application and as such it has not been repeated below. Indeed, as this

modification application applies to some areas of the project, certain EPIs (e.g. Sydney Regional Environmental Plan No. 26 – City West) are not relevant.

A review of current EPIs has identified that two new State Environmental Planning Policies (SEPPs) have been gazetted since lodgement of the EIS for the project. These are *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (Vegetation SEPP) and *State Environmental Planning Policy (Coastal Management) 2018* (Coastal SEPP). A review of these SEPPs has confirmed that the Vegetation SEPP is not relevant for the modification application as no vegetation is likely to be impacted as a result of this modification.

The G-loop (refer to **Chapter 4** (Proposed modification) for further information) for the proposed modification is partially located within the Coastal Environment Area and Coastal Use Area mapped under the Coastal Management SEPP around Iron Cove Creek and Reg Coady Reserve.

Potential impacts to this area of Iron Cove Creek and Reg Coady Reserve are considered in **Chapter 6** (Environmental Assessment). The pedestrian path along the north side of Dobroyd Parade, which would be completed upon the opening of the M4 East project, would be realigned around the perimeter of the G-loop and existing access to the foreshore and adjacent open space areas would be maintained for pedestrians and cyclists. Works in this area would be located on waterfront land and would therefore be carried out in accordance with NSW Department of Primary Industries controlled activity guidelines as required by condition of approval E189 for the project.

On completion of construction of the M4-M5 Link project, the G-loop infrastructure would be removed and that part of Reg Coady Reserve would be rehabilitated in accordance with the M4 East Residual Land Management Plan.

2.3 Other NSW legislation

Section 2.3 of the EIS provides an overview of the other NSW legislation relevant to the project. A review of Section 2.3 of the EIS has confirmed that the discussion of the other NSW legislation relevant to the project remains valid for this modification application and as such it has not been repeated below. This includes the need for an Environment Protection Licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act). In accordance with clause 35 of Schedule 1 of the POEO Act, an Environment Protection Licence would be required for construction of the project.

2.4 Commonwealth legislation

Section 2.4 of the EIS provides an overview of Commonwealth legislation that is relevant to the project. It considered the requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) (EPBC Act) and the *Airports Act 1996* (Commonwealth).

Consistent with the approved project described in the EIS and SPIR, the nature of the modification activities means that no matters of national environmental significance are likely to be impacted. As such, the modification application has not been referred to the Australian Government Department of the Environment and Energy for further assessment or approval under the EPBC Act.

The modification works would also not involve any changes to the design and operation of the mainline tunnels including any of the ventilation facilities, and therefore would not affect the air quality assessment in the EIS for the project. As such the modification activities would not be a controlled activity as defined in section 183 of the *Airports Act 1996* (Commonwealth).

3 Approved project

This chapter provides a general overview of the approved project with a focus on the specific project elements that are subject to the modification. The approved project is fully described in Chapter 5 and Chapter 6 of the Environmental Impact Statement (EIS) and Part D of the Submissions and Preferred Infrastructure Report (SPIR) for the WestConnex M4-M5 Link (the project).

3.1 General description of approved project

Approval for the construction and operation of the project was granted by the NSW Minister for Planning on 17 April 2018. The project approval provides for the construction and operation of a new multi-lane road link between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters which is Stage 1 of the project. The project also includes an interchange at Lilyfield and Rozelle (the Rozelle interchange) and a tunnel connection between Anzac Bridge and Victoria Road, east of Iron Cove Bridge (Iron Cove Link), which is Stage 2 of the project. Stage 2 also includes the construction of tunnels, ramps and associated infrastructure to provide connections to the proposed future Western Harbour Tunnel and Beaches Link project at the Rozelle interchange.

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

The key components of the project are shown in **Figure 3-1**. In summary the approved project comprises:

- Twin mainline motorway tunnels between the M4 East at Haberfield and the New M5 at St Peters
- Connection of the mainline tunnels to the M4 East project, comprising tunnel-to-tunnel connections and entry and exit ramps connections between the mainline tunnels and the Wattle Street interchange at Haberfield
- Connection of the mainline tunnels to the New M5 project, comprising tunnel-to-tunnel connections to the New M5 mainline tunnels and entry and exit ramp connections between the mainline tunnels and the St Peters interchange
- The Inner West subsurface interchange (underground interchange at Leichhardt and Annandale) that will link the mainline tunnels with the Rozelle interchange and the Iron Cove Link
- A new interchange at Lilyfield and Rozelle (the Rozelle interchange) that will connect the M4-M5 Link mainline tunnels with City West Link, Anzac Bridge, Iron Cove Link and the proposed future Western Harbour Tunnel and Beaches Link
- Twin tunnels that will connect Victoria Road near the eastern abutment of Iron Cove Bridge and Anzac Bridge (the Iron Cove Link). Underground entry and exit ramps will also provide a tunnel connection between the Iron Cove Link and the New M5 project (via the M4-M5 Link mainline tunnels)
- Motorway operational infrastructure including substations, water treatment plans, ventilation facilities and outlets, offices, on-site storage and parking for employees. Tunnel ventilation systems, including ventilation supply and exhaust facilities, axial fans, ventilation outlets and ventilation tunnels.

The EIS describes the construction and operation of the project in two stages.

Stage 1 as described in the EIS:

- Construction of the mainline tunnels between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters, stub tunnels to the Rozelle interchange (at the Inner West subsurface interchange) and ancillary infrastructure at the Darley Road motorway operations complex (MOC1) and Campbell Road motorway operations complex (MOC5)
- These works are anticipated to commence in 2018 with the mainline tunnel opening to traffic in 2022.

Stage 2 as described in the EIS:

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

At the time of the planning approval for the project, the total construction period for both stages of the project was expected to be around five years. This included commissioning that will occur concurrently with the final stages of construction.

Chapter 6 of the EIS and the SPIR provide more detail regarding the indicative construction work and strategy for the project.

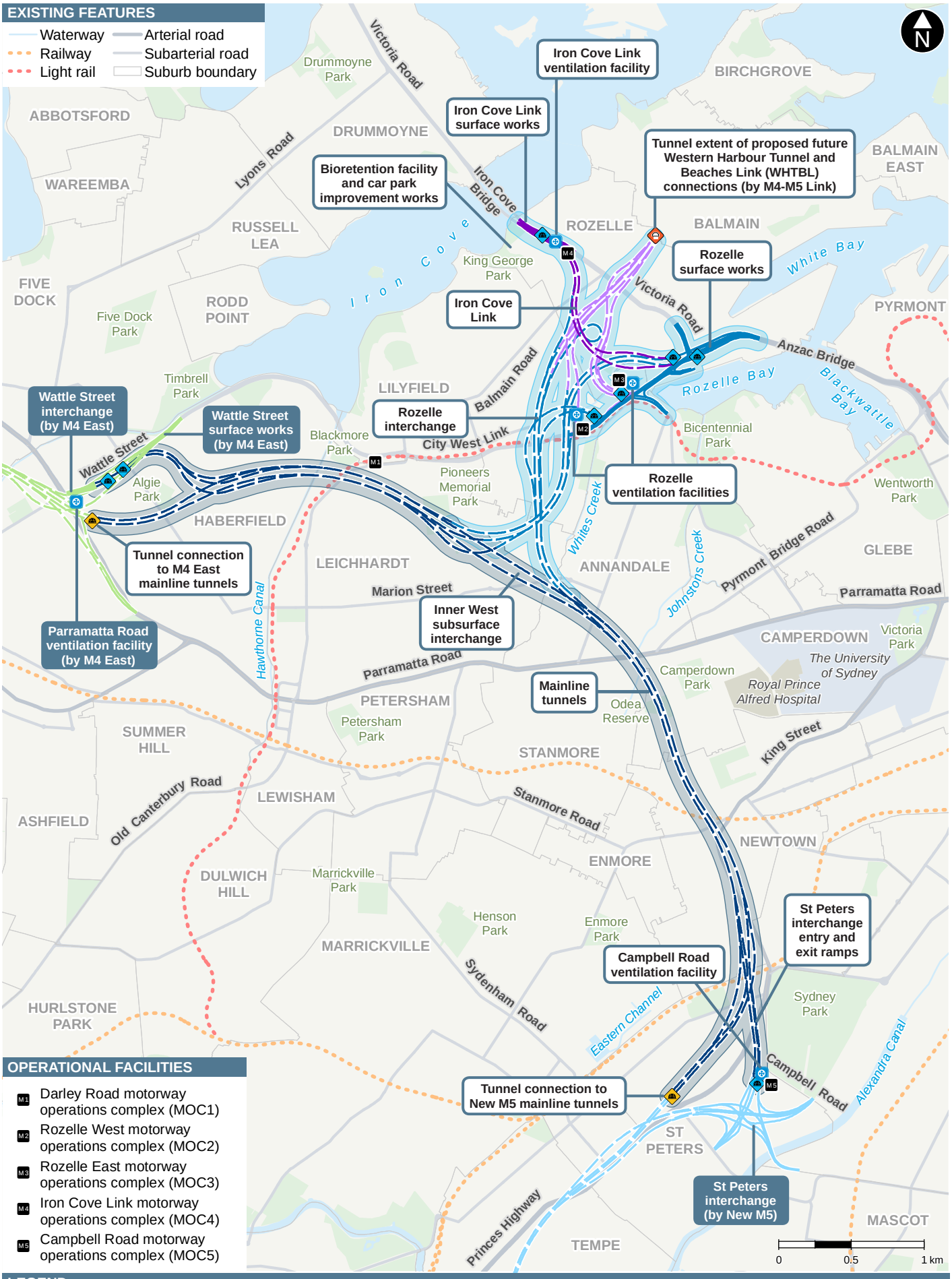

Figure 3-1 EIS Overview of approved project

3.2 Haberfield and Ashfield

The EIS described and assessed 12 construction ancillary facilities. Part D of the SPIR described and assessed an additional construction ancillary facility, White Bay civil site (C11). The EIS provided indicative site layouts arrangements and details of potential activities that will be provided at each site, subject to detailed construction planning.

Section 6.5.1 of the EIS stated that the number, location and layout of construction ancillary facilities would be finalised as part of construction planning during detailed design. The environmental performance outcomes stated in the EIS and the SPIR as well as the criteria identified in relevant conditions of approval would be considered as part of this process.

Within the Haberfield and Ashfield area two options for combinations of construction ancillary facilities were described and assessed in the EIS. The two options are identified in **Table 3-1**.

Table 3-1 Possible construction ancillary facility combinations at Haberfield and Ashfield assessed in EIS

Option A	Option B
Wattle Street civil and tunnel site (C1a)	Parramatta Road West civil and tunnel site (C1b)
Haberfield civil and tunnel site (C2a)	Haberfield civil site (C2b)
Northcote Street civil site (C3a)	Parramatta Road East civil site (C3b)

The SPIR clarified that the contractor may choose to use all or some of the construction ancillary facilities identified in the EIS, including any combination of the Option A and Option B facilities at Haberfield/Ashfield.

The planning approval for the project (condition C19) specified that only one of the two ancillary facility options is to be implemented at Haberfield except if one site is used for parking and other works that do not exceed the 'Noise affected' Noise Management Levels as identified in the *Interim Construction Noise Guideline* (DECC, 2009).

Below is a description of the sites listed in **Table 3-1** that are relevant to the proposed modification. The description below is based on how the sites were described and assessed in the EIS and approved for use as part of the project approval.

3.2.1 Northcote Street civil site

The Northcote Street civil site (C3a) at Haberfield is located between Wattle Street and Wolseley Street at Haberfield and was assessed in the EIS as a construction ancillary facility. The site is currently being used as a civil and tunnel site for the M4 East project.

The indicative EIS site layout under the existing project approval is provided in **Figure 3-2**. The EIS described and assessed the use of this site for construction workforce parking of around 150 spaces and to support construction activities at nearby civil and tunnel sites, including laydown and storage of materials.

The EIS described the entry and exit arrangements for heavy vehicles using the site from Parramatta Road. Light vehicles were to enter the site from Wolseley Street and exit onto Wattle Street. Northcote Street was to be closed at the intersection with Parramatta Road with the construction site occupying a section of Northcote Street (around 100 square metres). Upon completion of construction works, the EIS stated that this section of Northcote Street and the intersection with Parramatta Road would reopen.

The EIS described the use of the site for civil construction during standard construction work hours and acknowledged that some works outside of standard construction hours may be required. The EIS described construction workforce parking occurring 24 hours a day, seven days a week. Feasible and reasonable management strategies would be investigated to minimise potential noise impacts associated with out-of-hours construction activities at the site, including minimising the volume of heavy vehicles using the laydown area at night and the provision of temporary noise barriers along the boundary with adjoining residential properties.

At the completion of construction works, as described in the EIS, the site was to be rehabilitated in preparation for a future use that would be determined in accordance with the M4 East Residual Land Management Plan as required under the M4 East conditions of approval (SSI 6307).

The program for works to be carried out at the site was provided in Table 6-8, section 6.5.4 of the EIS.

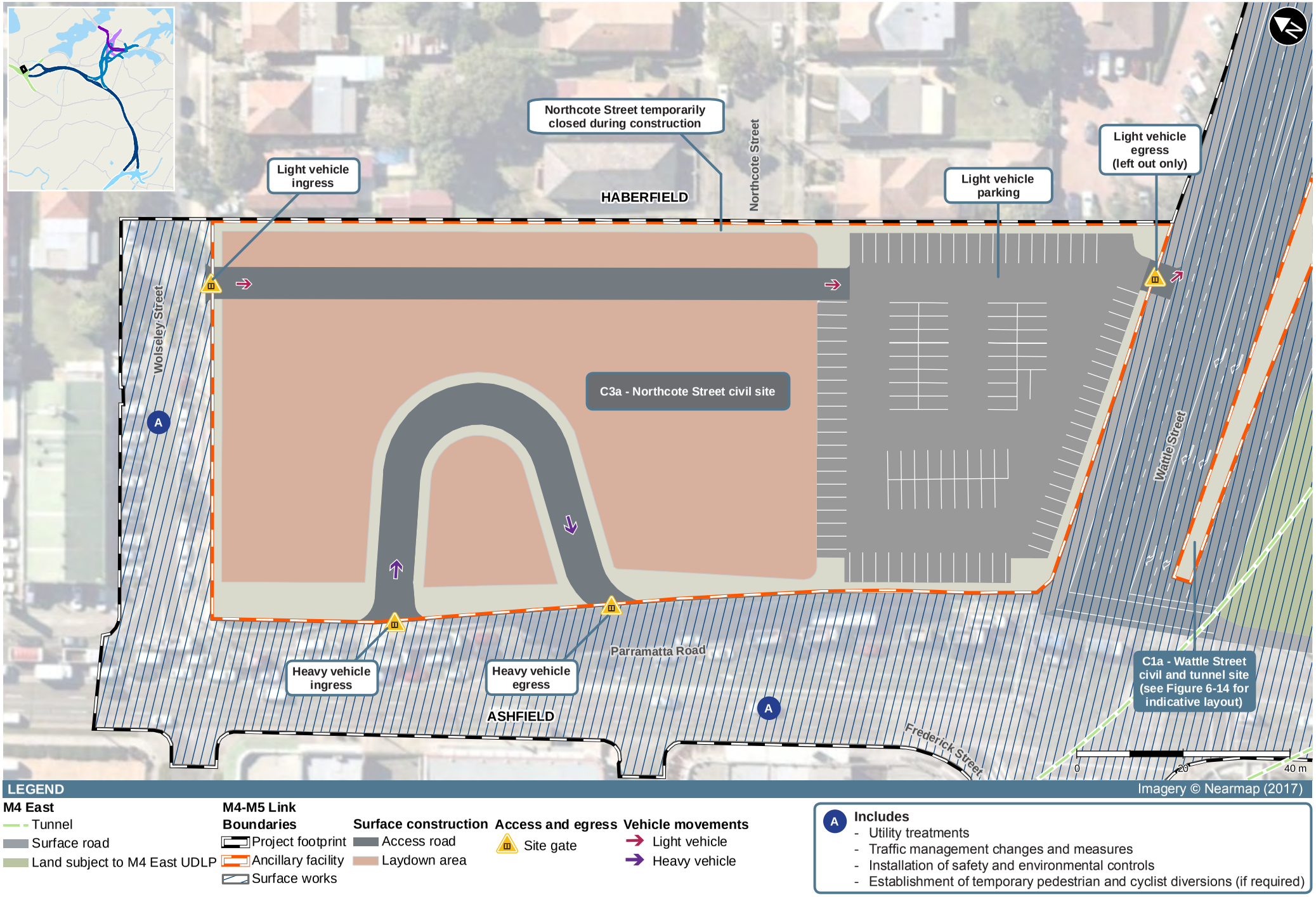

Figure 3-2 EIS Indicative Northcote Street civil site (C3a) layout

3.2.2 Parramatta Road West civil and tunnel site

The Parramatta West civil and tunnel site (C1b) is located west of Parramatta Road, between north of Alt Street and Bland Street at Ashfield. The site is mostly vacant and is comprised of a former car dealership, servicing workshop and several smaller commercial premises on the western side of Parramatta Road near Bland Street. The site consists of land owned by Roads and Maritime and one commercial property to be acquired.

The EIS identified that the site was to be used for tunnelling during construction and included an acoustic shed, temporary site offices, a workshop and storage facilities, a laydown area, entry and exit points for construction traffic, a temporary substation, temporary ventilation for the tunnels, a temporary water treatment plant and sediment pond, workforce amenities and car parking.

The EIS identified that site establishment works would include provision of temporary noise attenuation measures, construction of a temporary access tunnel, utility works, and establishment of site offices. Some of the site establishment works such as construction of a temporary access tunnel would be carried out in accordance with a Construction Environmental Management Plan (CEMP) that would be subject to approval.

The EIS described that construction activities would be undertaken within the acoustic shed, 24 hours a day, seven days a week. These activities included tunnelling, spoil handling and spoil haulage. All spoil stockpiling will be within the acoustic shed. Construction traffic would enter and exit the site to and from the western (northbound) carriageway of Parramatta Road via new driveways. Other activities that were to occur outside of the acoustic shed included laydown, storage of materials, and delivery of materials. Once works were completed the site was to be demobilised to prepare the site for a future use in accordance with the M4-M5 Link Residual Land Management Plan.

The EIS described a power supply connection for the site. The power connection was to be provided to the site from the Croydon Zone substation. The maximum demand of 10 Mega Volt Amp (MVA) would require two High Voltage Connections (HVCs) connected by underground cables to the Ausgrid (high voltage) network. The route of the connection was detailed in Appendix F (Utility Management Strategy) of the EIS.

The indicative EIS site layout is provided in **Figure 3-3** below and an indicative program of works was provided in Table 6-9 in section 6.5.5 of the EIS.

3.2.3 Parramatta Road East civil site

The Parramatta Road East civil site is located east of Parramatta Road at Haberfield between land north of Alt Street and Bland Street. The site is mostly vacant and is comprised of a former car dealership. The site is owned by Roads and Maritime.

The EIS identified that this site would be used to support tunnelling construction activities and to provide workforce parking with around 140 parking spaces provided. The site would include temporary site offices, ingress and egress of light vehicles, workforce amenities and car parking.

The key construction activities that were to be carried out at and supported by this site were to include establishment of site offices, amenities and temporary infrastructure including temporary noise attenuation measures and fencing, utility works, support for tunnelling construction activities. No tunnelling works were proposed from this site.

Upon the completion of construction works the site was to be demobilised and prepared for a future use in accordance with the M4-M5 Link Residual Land Management Plan.

Section 6.5.7 of the EIS provided a more detailed description of the site as well an indicative construction program in Table 6-11. An indicative EIS site layout is provided in **Figure 3-3** below.

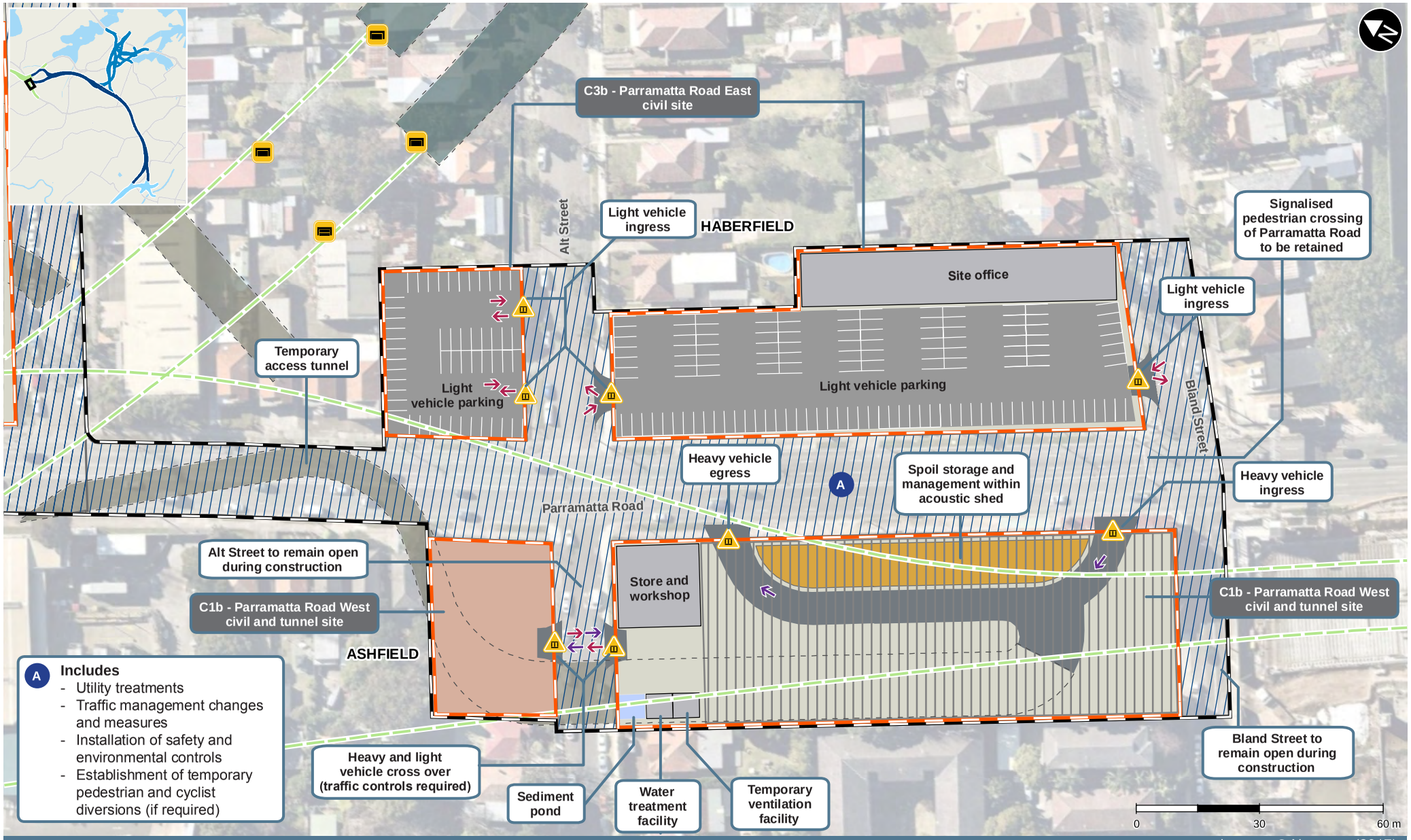

Figure 3-3 EIS Indicative Parramatta Road West civil and tunnel site (C1b) and Parramatta Road East civil site (C3b) layout

3.3 Leichhardt

3.3.1 Darley Road civil and tunnel site

The Darley Road civil and tunnel site (C4) is located at Leichhardt between the Inner West Light Rail Line to the north and Darley Road to the south. The site is currently occupied by a commercial premise that was to be demolished to facilitate construction. Immediately adjacent in the northeast corner of the site is the Leichhardt North light rail stop.

The site was described and assessed within the EIS, and approved for use as a tunnelling site subject to conditions of approval. During construction the site was to be provided with a temporary site office, a workshop and storage facilities, a laydown area, entry and exit points for construction traffic, an acoustic shed, a temporary substation, temporary ventilation for the tunnels, a temporary water treatment plant and sediment pond, workforce amenities and car parking.

The key construction activities proposed for the site included demolition of existing buildings and structures, establishment of temporary noise attenuation measures, utility works, establishment of site office, laydown and storage of materials, delivery of materials, construction of acoustic shed, construction of temporary access tunnel, tunnel excavation and construction of the Darley Road motorway operations complex including a substation and water treatment plant.

Spoil from tunnel excavation was to be stockpiled within the acoustic shed prior to transport from the site to a suitable disposal or reuse site. The EIS described that heavy vehicles would access the site via City West Link, James Street and Darley Road and exit the site via Darley Road and then City West Link. Spoil haulage from the site was to occur during standard construction hours.

Prior to demobilisation, rehabilitation and works to prepare the remaining project land on the site for a future use were to be carried out in accordance with the M4-M5 Link Residual Land Management Plan.

Section 6.5.8 of the EIS provided a detailed description of the construction activities proposed at the Darley Road civil and tunnel site with an indicative construction program provided in Table 6-12 of the EIS. **Figure 3-4** below provides the indicative EIS site layout.

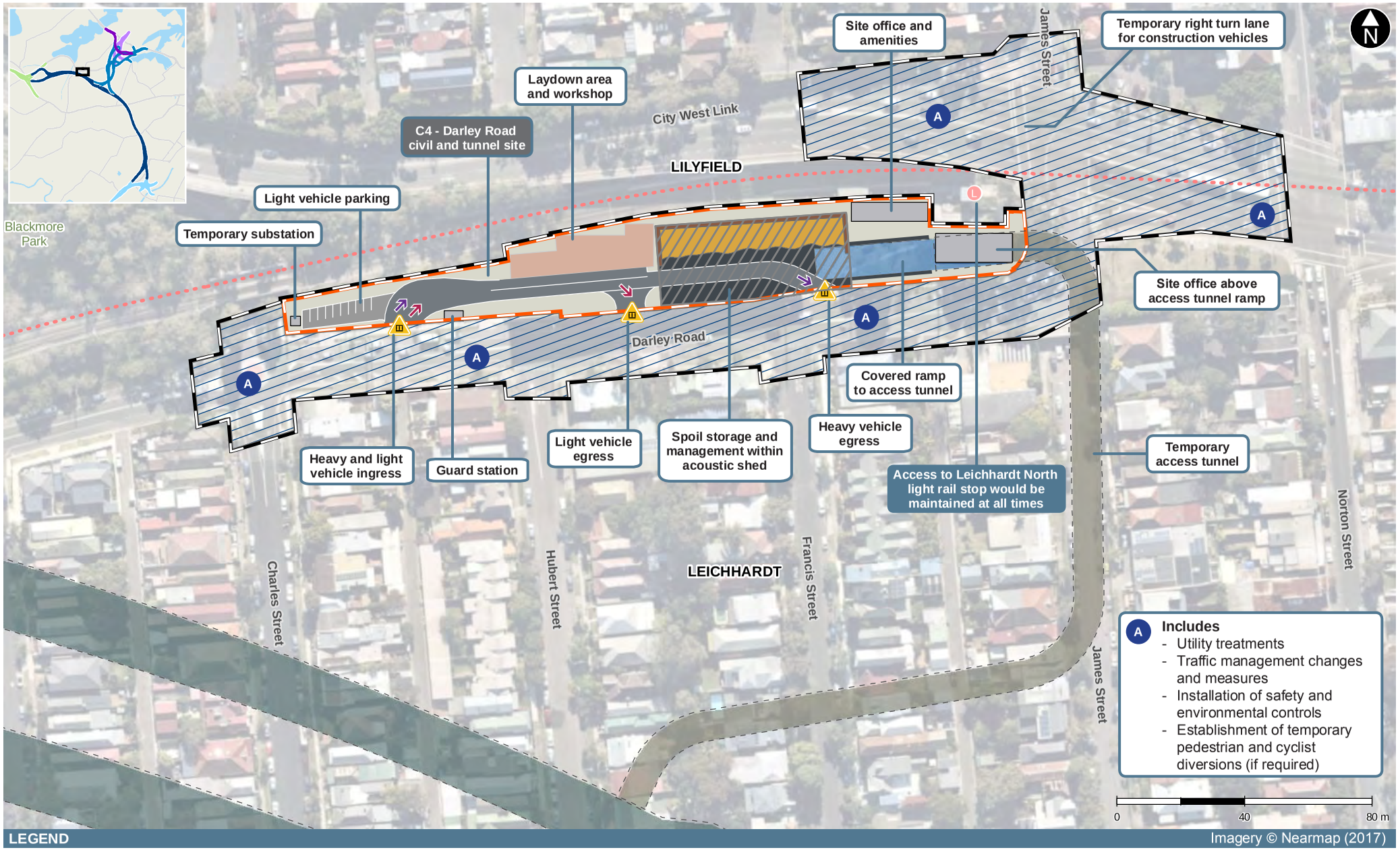

Figure 3-4 EIS Indicative Darley Road civil and tunnel site (C4) layout

3.3.2 Darley Road motorway operations complex

A motorway operations complex (MOC) was proposed at Darley Road for the project. The motorway operations complex was identified as MOC1 within the EIS. The operational ancillary infrastructure to be provided as part of the motorway operations complex was to primarily include a water treatment plant, substation and associated car parking.

Figure 3-5 below provides an indicative site layout for the Darley Road motorway operations complex (MOC1). It included an operational water treatment plant to treat groundwater collected within the project tunnels prior to discharge. Options for the discharge of treated water from the Darley Road water treatment plant included:

- Direct discharge to Hawthorne Canal, which would require a pipe to be installed along Canal Road and the construction of a new outlet in the wall of the Hawthorne Canal
- Direct discharge to the existing stormwater pipework in an adjoining road (i.e. Canal Road), which would require a pipe to be installed to connect to existing piped drainage
- Direct discharge into the sewer system located on the site, which would require a Trade Waste Agreement with Sydney Water.

The overall design, capacity and discharge of the water treatment plant was detailed in section 2.4.2 of Appendix Q (Surface Water and Flooding) of the EIS.

3.4 St Peters

3.4.1 Campbell Road motorway operations complex

The Campbell Road motorway operations complex (MOC5) at St Peters is located within the St Peters interchange, south of Campbell Road at St Peters, on land occupied during construction by the Campbell Road civil and tunnel site.

The operational ancillary facilities that were described at the Campbell Road motorway operations complex primarily included a ventilation facility, motor control room, substation and associated car parking.

Figure 3-6 below provides the EIS site layout and position of the Campbell Road motorway operations complex.

Figure 3-5 EIS Darley Road motorway operations complex (MOC1)

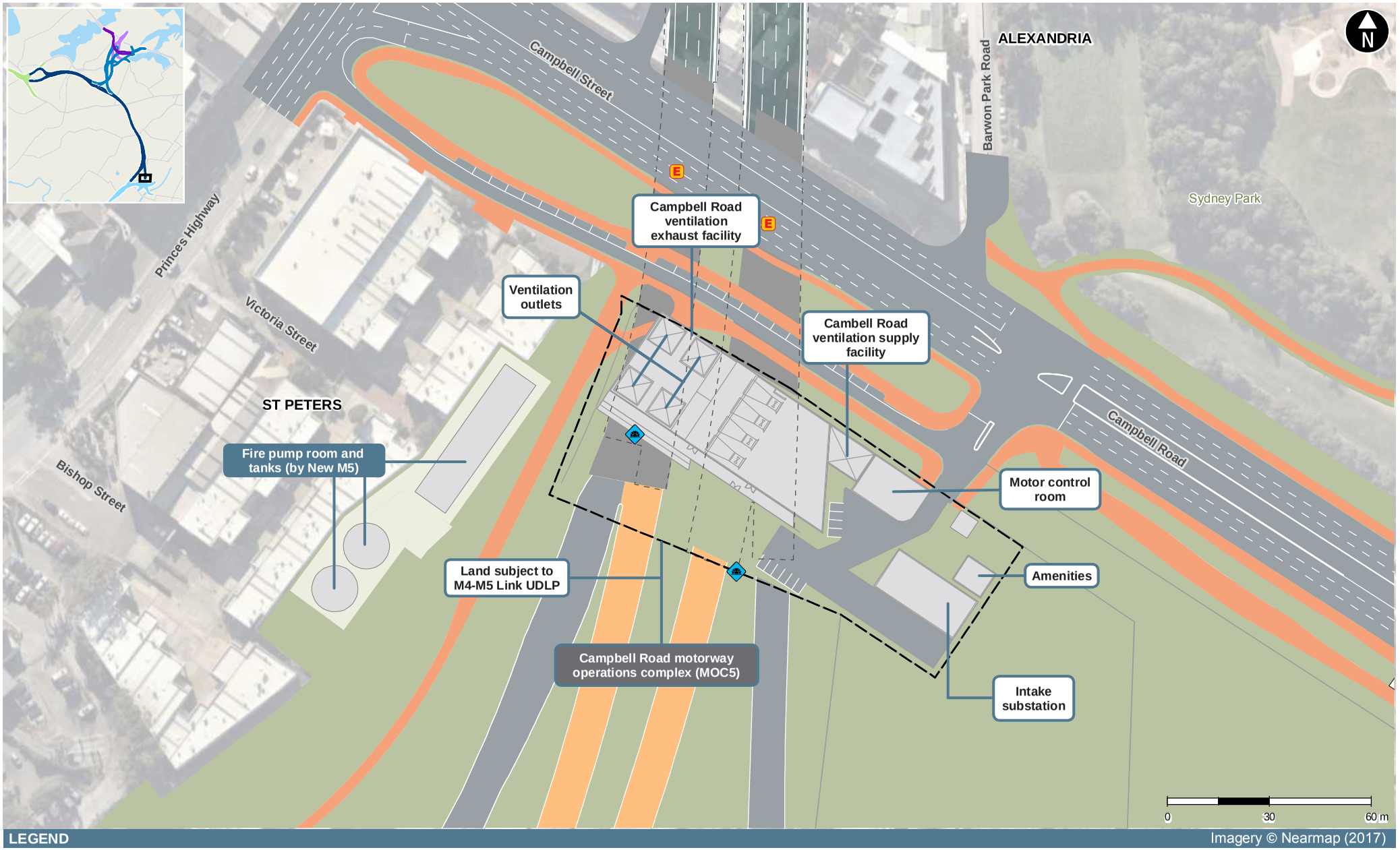

Figure 3-6 EIS Campbell Road motorway operations complex (MOC5)

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