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BOTANY RAIL DUPLICATION

ENVIRONMENTAL IMPACT STATEMENT

Botany Rail Duplication

Environmental Impact Statement

1 October 2019

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CERTIFICATION

Submissions of Environmental Impact Statement

Prepared under Part 5.2 of the *Planning and Assessment Act 1979* (NSW) and in accordance with Part 3 of Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*.

Environmental impact statement prepared by:

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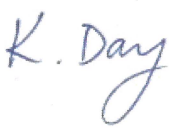
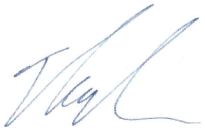
ADDRESS	Gateway 2 Sydney Joint Venture (G2SJV) Level 27, 680 George Street, NSW 2000	
IN RESPECT, OF	Botany Rail Duplication Project Environmental Impact Statement	
APPLICANT NAME AND ADDRESS (THE PROPONENT)	Australian Rail Track Corporation Level 15, 60 Carrington Street Sydney NSW 2000	
PROPOSED DEVELOPMENT	The project involves the construction and operation of a duplicated section of the Botany Line, located in the suburbs of Mascot, Banksmeadow, and Botany. Full details of the key project features and operation are detailed in Chapter 6 (Project features and operation) of this environmental impact statement.	
LAND TO BE DEVELOPED	To be carried out on land within the Bayside Local Government Area as described within this environmental impact statement. The north-western extent of the project site is located in the vicinity of Qantas Drive, south of Coward Street in Mascot. The south-eastern extent of the project is located just to the north of the Stephen Road bridge in Botany. The project would be typically located within the existing Rail Corp owned rail corridor.	
ENVIRONMENTAL IMPACT STATEMENT	This environmental impact statement addresses all matters specified in accordance with Part 5.2 of the *Environmental Planning and Assessment Act 1979* (NSW) and Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (NSW).	
DECLARATION	We certify that we have prepared this environmental impact statement in accordance with the Secretary's Environmental Assessment Requirements (SSI 18_9714) dated 21 December 2018. This environmental impact statement contains all available information that is relevant to the environmental assessment of the infrastructure to which the statement relates. To the best of our knowledge, the information contained in the environmental impact statement is neither false nor misleading.	
SIGNATURES		
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DATE	1 October 2019	1 October 2019

ABBREVIATIONS

ABS	Australian Bureau of Statistics
ACM	asbestos containing material
ADWG	*Australian Drinking Water Guidelines* (NHMRC, 2011)
AECs	areas of environmental concern
AEP	annual exceedance probability
AHD	Australian height datum
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AIP	NSW *Aquifer Interference Policy* (NOW, 2012a)
Air NEPM	*National Environment Protection (Ambient Air Quality) Measure* (NEPC, 2015)
Airports Act	*Airports Act 1996* (Commonwealth)
ALR Act	*Aboriginal Land Rights Act 1983*
AMP	asbestos management plan
ANZECC 2000	*Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC, 2000)
Approved Methods	*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2016)
Applying SEPP 33	*Applying SEPP 33: Hazardous and Offensive Development Application Guidelines* (DoP, 2011a)
ARI	average recurrence interval
ARR	Australian Rainfall and Runoff
ARR 1987	the third edition of Australian Rainfall and Runoff (Institute of Engineers Australia, 1987)
ARR 2019	the fourth edition of Australian Rainfall and Runoff (Geoscience Australia, 2019)
ARTC	Australian Rail Track Corporation
AS	Australian Standard
AS 5334	*AS 5334:2013 Climate change adaptation for settlements and infrastructure – a risk based approach*

AS/NZS 2885.6	*AS/NZS 2885.6, Pipelines – gas and liquid petroleum, part 6: Pipeline safety management* (Standards Australia, 2018)
ASS	acid sulfate soils
ASSMP	acid sulfate soils management plan
Australian Government	Government of the Commonwealth of Australia
BAM	Biodiversity Assessment Method
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
the Blue Book	*Managing Urban Stormwater: Soils and Construction Volume 1* (Landcom, 2004)
BOM	Bureau of Meteorology
BOS	Biodiversity Offsets Scheme
Botany Bay LEP	Botany Bay Local Environmental Plan 2013
CASA	Civil Aviation Safety Authority
CBD	central business district
CEMP	Construction Environmental Management Plan
CHL	Commonwealth Heritage List
the Clean Air Regulation	Protection of the Environment Operations (Clean Air) Regulation 2020
CLM Act	NSW *Contaminated Land Management Act 1997*
CNVMP	Construction Noise and Vibration Management Plan
CO	carbon monoxide
COPCs	contaminants of potential concern
CSB	controlled signal block
CSEP	Community and Stakeholder Engagement Plan
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSM	conceptual site model
CSR	combined services route
CTTAMP	Construction Traffic, Transport and Access Management Plan

DCP	*Botany Bay Development Control Plan 2013*
DECCW	Department of Environment, Climate Change and Water
DIRDC	Australian Government Department of Infrastructure, Regional Development and Cities
DoEE	Department of the Environment and Energy
DoP	Department of Planning
DPIE	Department of Planning, Industry and Environment
EEC	endangered ecological community
EES Group	Environment, Energy and Science Group (formerly NSW Office of Environment and Heritage)
EIS	environmental impact statement
ENM	excavated natural material
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	NSW Environment Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
EPL	environment protection licence
ER	Environmental Representative
ERSA	*En Route Supplement Australia*
ESD	ecologically sustainable development
FDM	*Floodplain Development Manual* (DIPNR, 2005)
FM Act	NSW *Fisheries Management Act 1994*
FPL	Flood Planning Level
G2S JV	Gateway to Sydney Joint Venture
GDEs	groundwater dependent ecosystems
GLT	ground level troughing
GST	Galvanised steel trough
the Guidelines	*Draft Guidelines: Community and Stakeholder Engagement* (DP&E, June 2017a)
HAARD	*Historical Archaeological Assessment and Research Design*

HBT	hollow bearing tree
HC	hydrocarbons
Heritage Act	*Heritage Act 1977*
HIP	Heritage Interpretation Plan
HIPAP No 4	*Hazardous Industry Planning Advisory Paper No 4 – Risk Criteria for Land Use Safety Planning* (DoP, 2011)
HIPAP No 6	*Hazardous Industry Planning Advisory Paper No 6 – Guidelines for Hazard Analysis* (DoP, 2011)
HIS	Heritage Interpretation Strategy
HV	high voltage
ICNG	Interim Construction Noise Guideline
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007*
IS	Infrastructure Sustainability
ISCA	Infrastructure Sustainability Council of Australia
km	kilometres
km/h	kilometres per hour
km^2	square kilometres
KNC	Kelleher Nightingale Consulting
LALC	Local Aboriginal Land Councils
LEP	local environmental plan
LGA	local government area
$L/m^2/h$	litres per metre squared per hour
LOCs	rail location cabinets
LoS	level of service
LPG	liquid petroleum gas
m	metres
m^3	cubic metres
m AHD	metres above the Australian Height Datum
mBGL	metres below ground level

MFN	Metropolitan Freight Network
MNES	matters of national environmental significance
NARCliM	NSW Government's NSW and ACT Regional Climate Modelling project (OEH, 2013b)
NASF	*National Airports Safeguarding Framework* (DIRDC, n.d.)
NCA	noise catchment area
NEPC	National Environmental Protection Council
NEPM 2013	National Environmental Protection (Assessment of Site Contamination) Measure 2013 (NEPC, 2013)
NHL	National Heritage List
NMLs	noise management levels
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPfI	Noise Policy for Industry
NPI	National Pollutant Inventory
NPW Act	NSW *National Parks and Wildlife Act 1974*
NSW	New South Wales
NSW WQOs	NSW *Water Quality and River Flow Objectives*
NWQMS	*National Water Quality Management Strategy* (ANZG, 2018)
O_3	ozone
OEH	(former) NSW Office of Environment and Heritage – now Environment, Energy and Science Group within the DPIE
OLS	obstacle limitation surface
ONVR	Operational Noise and Vibration Review
OOHW	out-of-hours work
PAD	potential archaeological deposit (PAD)
PANS-OPS	Procedures for Air Navigational Services – Aircraft Operations Surface
PCT	plant community type
PEM	*Protocol for Environmental Management* (Victorian EPA, 2007)

PFAS	per- and poly-fluoroalkyl substances
PFAS NEMP	*PFAS National Environmental Management Plan* (EPA, 2018)
PFOS	perfluorooctane sulfonate (a type of PFAS)
$PM_{2.5}$	particulate matter with diameter less than 2.5 microns
PM_{10}	particulate matter with diameter less than 10 microns
PMF	probable maximum flood
POEO Act	NSW *Protection of the Environment Operations Act 1997*
PPE	personal protective equipment
the project	Botany Rail Duplication project
RAP	remediation action plan
the Regulation	Environmental Planning and Assessment Regulation 2000
RING	Rail Infrastructure Noise Guideline (EPA, 2013)
RL	relative level
RMS or Roads and Maritime	Roads and Maritime Services
RNP	Road Noise Policy
SACL	Sydney Airport Corporation Limited
SAMP	*Sydney Airport Master Plan 2039* (SACL, 2018)
SAII	serious and irreversible impact entities
SEARs	Secretary's Environmental Assessment Requirements (for the EIS)
SEPP	state environmental planning policy
SEPP 55	State Environmental Planning Policy No 55 – Remediation of Land
SHI	NSW State Heritage Inventory
SHR	State Heritage Register
SIS	Species Impact Statement
SO_2	sulfur dioxide
EMPs	environmental management plans
SSI	State significant infrastructure

State and Regional Development SEPP	State Environmental Planning Policy (State and Regional Development) 2011 NSW Government (2011a)
SWMP	Soil and Water Management Plan
T8 line	Sydney Trains T8 Airport and South Line
Technical Framework	*Technical Framework – Assessment and Management of Odour from Stationary Sources in NSW* (DEC, 2006b)
Terminal 1	Sydney Airport's international terminal
Terminals 2/3	Sydney Airport's domestic terminals
TfNSW	Transport for NSW
TSS	total suspended solids
TSP	total suspended particles
VENM	virgin excavated natural material
VOC	volatile organic compounds
WARR Act	*Waste Avoidance and Resource Recovery Act 2007*
the Waste Regulation	Protection of the Environment Operations (Waste) Regulation 2014
WHO	World Health Organisation
WRAP	*Western Regional Air Partnership Fugitive Dust Handbook* (Countess Environmental, 2006)

DEFINITIONS

Aboriginal object	Defined by the *National Parks and Wildlife Act 1974* as: 'any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains'.
Aboriginal site	A place where physical remains or modification of the natural environment indicate past and 'traditional' activities by Aboriginal people. Site types include artefact scatters, isolated artefacts, burials, shell middens, scarred trees, quarries and contact sites. Includes sites listed on the *National Parks and Wildlife Act 1974* (also known as Aboriginal 'objects').
Aboriginal Heritage Information Management System	A register of NSW Aboriginal heritage information maintained by the NSW Office of Environment and Heritage.
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.
Alignment	The geometric layout (eg of a road or railway) in plan (horizontal) and elevation (vertical).
Annual exceedance probability	The chance of a flood of a nominated size occurring in a particular year. The chance of the flood occurring is expressed as a percentage and, for large floods, is the reciprocal of the ARI. For example, the one percent AEP flood event is equivalent to the 100 year ARI flood event.
Aquifer	A layer of soil or rock with sufficient porosity and permeability to enable usable quantities of water to be extracted from it.
Average recurrence interval	The long term average number of years between the occurrence of a flood of a nominated size.
Ballast	Material such as crushed rock or stone used to provide a foundation for a railway track. Ballast usually provides the bed on which railway sleepers are laid, transmits the load from train movements and restrains the track from movement.
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.

Bore	Constructed connection between the surface and a groundwater source that enables groundwater to be transferred to the surface either naturally or through artificial means.
Biophysical environment	The physical environment (water, soil, etc) as well as the biological activity within it (plants, animals, etc).
Botany Line	A dedicated freight rail line (operated by ARTC) that forms part of the Metropolitan Freight Network. The line extends from near Marrickville Station to Port Botany.
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.
Climate change	A change in the state of the climate that can be identified (eg by statistical tests) by changes in the mean and/or variability of its properties, and that persists for an extended period of time, typically decades or longer (CSIRO and BoM 2015).
Climate projection	A climate projection is the simulated response of the climate system to a scenario of future emission or concentration of greenhouse gases and aerosols, generally derived using climate models.
Classified road	A road that meets the definition of a classified road and is listed as such under the *Roads Act 1993* – includes main roads, highways, freeways etc.
Climate	The average weather experienced at a site or region over a period of many years, ranging from months to many thousands of years. The relevant measured quantities are most often surface variables such as temperature, rainfall and wind.
Climate scenario	A plausible and often simplified representation of the future climate, based on an internally consistent set of climatological relationships that has been constructed for explicit use in investigating the potential consequences of anthropogenic climate change, often serving as input to impact models.
Construction compound	An area used as the base for construction activities, usually for the storage of plant, equipment and materials, as well as construction site offices and worker facilities.
Construction environmental management plan	A site-specific plan developed for the construction phase of the project to ensure that all contractors and sub-contractors comply with the environmental conditions of approval for the project and that the environmental risks are properly managed.
Cumulative impacts	Impacts that, when considered together, have different or more substantial effects than a single impact assessed on its own.
Cutting	Formation resulting from the construction of the road below existing ground level, where the material is cut out or excavated.
Dangerous goods	Dangerous goods are substances or articles that pose a risk to people, property or the environment due to their chemical or physical properties. They are usually classified with reference to their immediate risk.
Detailed design	The stage of design where project elements are design in detail, suitable for construction.

Detour	An alternative route, using existing roads, made available to traffic.
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.
Down line	The line carrying trains from/to Port Botany, located on the southern/western side of the rail corridor.
Earthworks	All operations involved in loosening, excavating, placing, shaping and compacting soil or rock.
Embankment	A raised area of earth or other materials used to carry a rail line in certain areas.
Ecologically sustainable development	Development that uses, conserves and enhances the resources of the community so that ecological processes on which life depends are maintained, and the total quality of life, now and in the future, can be increased
Emission	A substance discharged into the air
Enabling works	Works which are required before the start of the main construction works.
Erosion	A natural process where soil or rock is worn away by the action of wind or water.
Existing rail corridor	The corridor within which the existing rail infrastructure is located. In the study area, the existing rail corridor is the Botany Line.
Feasible and reasonable	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. 'Feasible' relates to engineering considerations and what is practical to build. 'Reasonable' relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community expectations and nature and extent of potential improvements.
Flood	Relatively high stream flow which goes over the top of the natural or artificial banks in any part of a stream, river, estuary, lake or dam. It also includes local overland flooding associated with major drainage before entering a watercourse or coastal inundation resulting from super-elevated sea levels 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.
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.
Formation	The earthworks/material on which the ballast, sleepers and tracks are laid.
Freight	Goods transported by truck, train, ship, or aircraft.
Grade	The rate of longitudinal rise (or fall) with respect to the horizontal expressed as a percentage or ratio.
Groundwater	Water that is held in rocks and soil beneath the earth's surface.
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.
Heritage listed	An item, building or place included on statutory heritage lists maintained by local, State and/or the Australian Government
Heavy vehicles	A heavy vehicle is classified as a Class 3 vehicle (a two axle truck) or larger, in accordance with the Austroads Vehicle Classification System.
Hydrogeology	The 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.
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.
L_{A90}(period)	The sound pressure level exceeded for 90 percent of the measurement period.
L_{Aeq}(time)	Typically used to described ambient (background) noise levels.
L_{Amax}	The maximum sound level recorded during the measurement period.
Landscape	All aspects of a tract of land including landform, vegetation, buildings, villages, towns, cities and infrastructure.
Landscape character	The combined quality of built, natural and cultural aspects that make up an area and provide its unique sense of place.
Landscape character zone	An area of landscape with similar properties or strongly defined spatial qualities, distinct from areas immediately adjacent.
Landscape feature	A component, part or feature of the landscape that is prominent or eye-catching, eg hills, buildings, vegetation.

Landscape quality	Largely subjective judgement based on particular characteristics that influence the way in which the environment is experienced, including special interests such as cultural associations, heritage interests, the presence and type of elements as well as condition.
Level of service	Defined by Austroads as a measure for ranking operating road and intersection conditions, based on factors such as speed, travel time, freedom to manoeuvre, interruptions, comfort and convenience.
Local road	Road used primarily to access properties located along the road.
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.
Metropolitan Freight Network	A network of dedicated railway lines for freight in Sydney, linking NSW's rural and interstate rail networks with Port Botany. The Metropolitan Freight Network is managed by ARTC.
Obstacle limitation surface	An invisible surface that defines the airspace surrounding an airport that must be protected from obstacles to ensure that aircraft flying in good weather during the initial and final stages of flight, or in the vicinity of the airport, can do so safely.
Passing loop	A section of track off to the side of the main track/s that allows a train to move to the side.
PFAS	Per-and poly-fluoroalkyl substances, which are manufactured chemicals used in products that resist heat, oil, stains and water. There are many types of PFAS, with the best-known examples being perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), which were used in some fire-fighting foams.
Prescribed airspace	The airspace above any part of either the OLS or the PANS-OPS surfaces for Sydney Airport. The prescribed airspace is regulated under the (Commonwealth) *Airports Act 1996*.
Pollutant	Any measured concentration of solid or liquid matter that is not naturally present in the environment.
Possession	A period of time during which a rail line is blocked to trains to permit work to be carried out on or near the line.
Probable maximum flood	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).
Procedures for Air Navigational Services – Aircraft Operations	The PANS-OPS surface protects aircraft flying into and out of the airport when the flight is guided solely by instruments in conditions of poor visibility. The PANS-OPS surface is generally situated above the OLS.

Project	The construction and operation of the Botany Rail Duplication.
Project site	The area that would be directly affected by construction (also known as the construction footprint). It includes the location of operational project infrastructure, the area that would be directly disturbed by the movement of construction plant and machinery, and the location of the storage areas or compounds that would be used to construct that infrastructure.
Proponent	The person or organisation that proposes to carry out the project or activity.
Rail corridor	The corridor within which the rail tracks and associated infrastructure are located.
Rating background level	The underlying level of noise present in an area once transient and short-term noise events are filtered out.
Residual land	Acquired land not required during operation of the project.
Risk	Chance of something happening that will potentially have an undesirable effect. It is measured in terms of consequence and likelihood.
Runoff	The amount of rainfall that ends up as streamflow, also known as rainfall excess.
Secretary's environmental assessment requirements	Requirements and specifications for an environmental assessment prepared by the Secretary of the Department of Planning, Industry and Environment under section 115Y of the *Environmental Planning and Assessment Act 1979* (NSW).
Span	The distance between the centres of adjacent supports of a bridge.
Sensitivity	The capacity of a landscape character area or view to absorb change. In the case of visual impact this also relates to the type of viewer and number of viewers.
Spoil	Material generated by excavation.
Section 170 register	Under section 170 of the *Heritage Act 1977*, all state government agencies must keep and administer a database of heritage assets called a Section 170 Heritage and Conservation Register.
Sensitive receiver	Land uses and activities that are sensitive to potential noise, vibration, air and visual impacts, such as residential dwellings, schools and recreation areas.
Slewing (track)	Relocation of an existing track sideways from its original location to a new location.
Staging	Refers to the division of the project into multiple contract packages for construction purposes, or the construction or operation of the overall project in discrete phases.
Stockpile	Temporary stored materials such as soil, sand, gravel and spoil/waste.

Study area	The study area is defined as the wider area including and surrounding the project site, with the potential to be directly or indirectly affected by the project (eg by noise and vibration, visual or traffic impacts). The actual size and extent of the study area varies according to the nature and requirements of each assessment and the relative potential for impacts but which is sufficient to allow for a complete assessment of the proposed project impacts to be undertaken.
Surface water	Water flowing or held in streams, rivers and other wetlands in the landscape.
Terminal 1	Sydney Airport's international terminal.
Terminal 2	One of Sydney Airport's two domestic terminals, used by number of domestic and regional airlines including Virgin Australia, Jetstar and Rex.
Terminal 3	Qantas's domestic terminal at Sydney Airport.
Track	The structure consisting of the rails, fasteners, sleepers and ballast, which sits on the formation.
Up line	The line carrying trains from/to Port Botany, located on the northern/eastern side of the rail corridor.
Visual amenity	The value of a particular area or view in terms of what is seen.
Visual catchment	Extent of potential visibility to or from a specific area, feature or proposal.
View	The visual experience from the viewer's perspective.
Waste	Waste is defined by the EPA as any matter (whether liquid, solid, gaseous or radioactive) that is discharged, emitted or deposited in the environment in such volume, constituency, or manner as to cause an alteration to the environment.
Waste management hierarchy	The waste management hierarchy is a set of priorities for the efficient use of resources, which underpins the objectives of the *Waste Avoidance and Resource Recovery Act 2001*. The waste management hierarchy progresses from avoidance (most preferred), to re-use/recycling, to disposal (least preferred).
Watercourse	Any flowing stream of water, whether natural or artificially regulated (not necessarily permanent).
Work area	Individual areas within the project site that are subject to construction at any one time.

EXECUTIVE SUMMARY

Botany Duplication Project

The Botany Duplication Project is one of a number of initiatives proposed to improve road and freight transport through the important economic gateways of Sydney Airport and Port Botany. Port Botany is one of Australia's and NSW's most important infrastructure assets, with Port Botany being the largest container port in Australia (and only container port in NSW), as well as NSW's largest bulk liquid and gas port.

The majority of the existing Botany Line has twin tracks with the exception of the section between Mascot and Botany, where there is currently only one track. This single line section currently constrains the ability for freight to enter and depart from Port Botany concurrently. Additional demand arising from the predicted growth in container freight has the potential to create a bottleneck along the line, impacting on reliability and restricting the efficient movement of freight across the broader Sydney freight rail network.

The Botany Rail Duplication Project would reduce the potential for a bottleneck by duplicating the remaining section of single rail track to allow for increases to the capacity on the Botany Line, which is vital to meet the long-term freight demands to Port Botany.

Key features of the Botany Duplication Project

The Botany Duplication Project would involve:

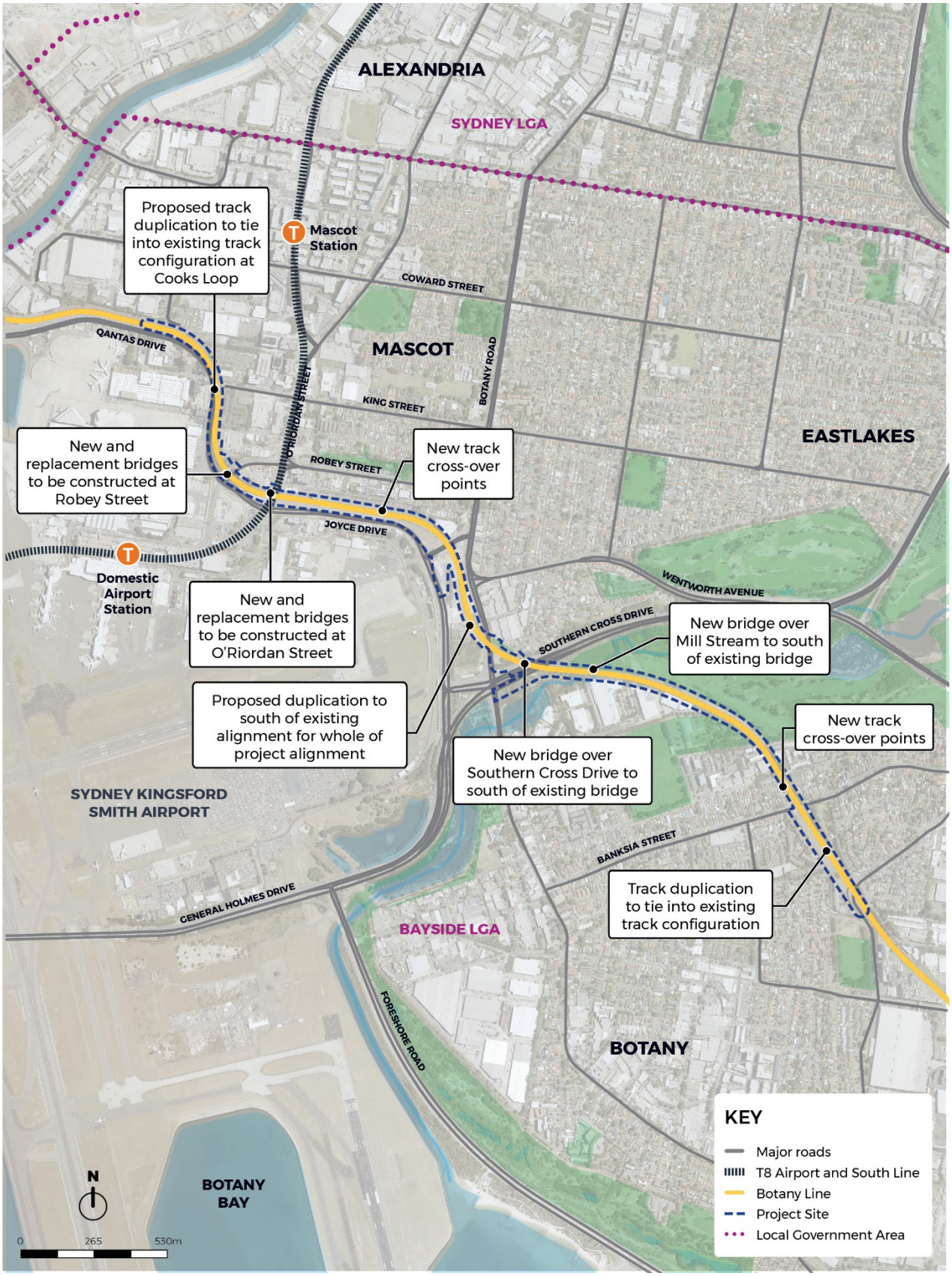
- track duplication – including construction of a new track within the rail corridor for a distance of about three kilometres
- track realignment (slewing) and upgrading – including moving some sections of track sideways (slewing) and upgrading some sections of track to improve the alignment of both tracks and minimise impacts on adjoining land uses
- new crossovers – including construction of new rail crossovers to maintain and improve access at two locations (totalling four new crossovers)
- bridge works – including construction of new bridge structures at Mill Stream, Southern Cross Drive, O'Riordan Street and Robey Street (adjacent to the existing bridges at these locations), and re-construction of the existing bridge structures at Robey Street and O'Riordan Street
- embankment/retaining structures – including construction of new embankment and retaining structures adjacent to Qantas Drive between Robey Street and O'Riordan Street and a new embankment between the Mill Stream and Botany Road bridges.

Ancillary work would also include bi-directional signalling upgrades, drainage work and protecting/relocating utilities along the length of the project. The Botany Duplication Project would also require temporary facilities during construction, including compounds, laydown areas and site access. The key features of the Botany Duplication Project are shown on Figure ES.1. Further description of the project is provided in Chapter 6 of this environmental impact statement (EIS).

Timing of construction

Subject to approval of the project, construction is planned to start at the end of 2020, and is expected to take about three years for the main construction works to be undertaken. Construction is expected to be completed in late 2023 with commissioning activities undertaken in early 2024.

Further information on the construction methodology is provided in Chapter 7 of this EIS.



Note: Indicative, subject to detailed design

Figure ES.1 Key features of the Botany Duplication Project

Why is the Botany Duplication Project needed?

Efficient access to Port Botany is critical for the economic growth and prosperity of Sydney, NSW and Australia. The amount of container freight handled by Port Botany is predicted to significantly increase in the future. Transporting more freight to and from Port Botany by rail will place additional demands on the existing Botany Line, particularly the single line section of track, which is already an existing constraint to this section of the wider freight network.

The Botany Duplication Project is needed to improve operational efficiency, flexibility and reliability for freight customers who use the existing Botany Line and to meet the anticipated future increase in freight train movements. By 2030, the Botany Duplication Project is expected to allow for increased freight movement on the Botany Line from the current average of about 20 trains per day (per direction) up to around 45 trains per day (per direction) by 2030, based on current and predicted operational requirements identified by ARTC.

Project objectives

The primary objective of the Botany Duplication Project is to increase capacity along the Botany Line to meet the forecast growth in demand for container freight transport to and from Port Botany. Secondary objectives of the project are to:

- provide increased operational efficiency, flexibility and reliability for freight customers
- increase rail mode share for containerised freight relative to road freight from Port Botany
- support connection to, and operation of, current and future intermodal terminals within the Sydney metropolitan area to meet their targeted freight capacity.

Planning, design and approval process

What is the planning approval process?

The Botany Duplication Project has been classified as State significant infrastructure (SSI) in accordance with Division 5.2 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). As SSI, the project requires approval from the NSW Minister for Planning. ARTC has also requested that the project be declared as Critical SSI.

This EIS has been prepared to support the application for approval of the project under Division 5.2 of the EP&A Act. It addresses the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning, Industry and Environment (DPIE) dated 21 December 2018. It also addresses the form and content requirements of schedule 2 of the Environmental Planning and Assessment Regulation 2000 (the Regulation).

Further information on the approval requirements is provided in Chapter 3.

How have the community and stakeholders been involved?

The consultation strategy has been designed to inform the community and key stakeholders and encourage participation to allow the project's development to benefit from stakeholder and community input. As part of the options development, project planning, and preparation of the EIS, ARTC undertook a range of consultation activities with various government and agency stakeholders. ARTC has also undertaken a series of community engagement activities prior to and during the preparation of the EIS.

Consultation activities undertaken to date have included:

- stakeholder briefings and agency engagement sessions with key NSW Government agencies
- meetings with Bayside Council
- engagement of Representative Aboriginal Organisations
- consultation and engagement with local businesses, education, land owners and local interest groups
- consultation with the local community through engagement such as:
    - community information line, project email and project specific webpage
    - printed fact sheets, project information packs and project mail outs
    - community information pop-up sessions
    - face-to-face door knocking activities.

Consultation activities would continue as the project progresses. Further discussion of the community and stakeholder involvement for the project is provided in Chapter 4 of this EIS.

The Environmental Impact Statement

What is the purpose of the EIS?

This EIS has been prepared by the Gateway to Sydney Joint Venture (WSP Australia Pty Limited and GHD Pty Ltd) on behalf of ARTC to assess the potential impacts of the Botany Duplication Project and to determine the required management and mitigation measures to avoid and/or minimise potential impacts. The preparation of this EIS has been undertaken to meet the requirements of the project SEARs which were issued by DPIE on 21 December 2018.

How were the impacts assessed?

This EIS was prepared through initial community and stakeholder consultation and detailed specialist assessment of key environmental issues, including field surveys, data analysis and predictive modelling where appropriate. The EIS process included a detailed environmental risk analysis to scope the level of assessment required, identify key risks and confirm those issues that require management and mitigation. A summary of the potential impacts of the project are presented in Part B of this EIS. The detailed specialist assessments are contained in Volume 2 to 6 of this EIS.

What are the key findings of the EIS?

Key impacts (positive and negative impacts) during construction and operation of the project are summarised below in Table ES.1.

Table ES.1 Summary of key potential impacts of the project

ISSUE	KEY POTENTIAL IMPACTS
Traffic, transport and access	During construction of the project there would be delays in the road network within the project area. The key construction impacts of the project on traffic, transport and access would include: • traffic delays as a result of proposed road closure periods at Robey Street, O'Riordan Street and Southern Cross Drive and localised temporary lane closures to facilitate day-to-day construction activities, resulting in potential delays, increased travel times and impacts on bus services • minor impacts on road traffic and active transport from the movement of construction vehicles on the general road network and accessing the project site. Following completion of construction, no changes to the road network, pedestrian footpaths or bus networks are proposed.

ISSUE	KEY POTENTIAL IMPACTS
Noise and vibration	The nearest receivers to the project are relatively close in some areas. The worst-case construction noise impacts for the project are likely to be 'high' at certain times. During operation, the project is predicted to result in increased rail noise levels in the study area. The increased noise levels result in a number of areas where receivers are predicted to exceed the noise criteria levels. These areas are generally near to curved track and include: • around King Street • near Baxter Road • near Botany Road and McBurney Avenue • along Myrtle Street.
Air quality	In general, air quality impacts are expected to be minor and manageable through established mitigation and management measures. Potential impacts would result from the generation of dust from construction works and the movement of equipment and machinery. Operational air quality impacts are not anticipated for any pollutants. Operational air quality impacts from the project were not deemed to be significant.
Biodiversity	The project would remove small areas of native vegetation which could provide some nesting and foraging habitat. This would not result in a significant impact on threatened species. The project would remove about 0.72 hectares of native vegetation. Potential effects on foraging habitat for these species in the project site would be offset. The project crosses the Botany Wetlands and Mill Stream. There would be minor removal of riparian vegetation. There would be no blockage of fish passage along Mill Stream or impact on mapped Coastal Wetlands as a result of the project, and no threatened aquatic species are anticipated to be impacted.
Contamination	There are existing areas of contamination within the project site. This includes asbestos containing materials (ACM). Acid sulfate soils (ASS) are also likely to be present within the project site. Erosion and sedimentation during construction could result in the contamination of soils and surface waters. This may impact on downstream water quality. Leaks and spills during construction and operation may cause contamination impacts on soil and water.
Hydrology, flooding	The majority of construction activities and the presence of construction compounds and work sites have the potential to impact local overland flows and flood behaviour. Runoff or rainfall within the project site has the potential to cause localised flooding issues and adverse downstream impacts. There may be impacts on downstream water quality as a result of key activities such as earthworks. During operation the project would have no significant impact on the extent of the floodplain or its hazard categorisation. Changes in flooding patterns would not result in a significant change to the Flood Planning Area or the future development potential of land located outside the project footprint, or the social and economic costs of flooding.
Water quality and soils	Construction of the project has the potential to result in surface water impacts such as increased sedimentation, erosion, pollutants and contaminants, which could reduce the existing water quality and harm the aquatic ecosystems. However, these potential impacts are likely to be temporary and negligible compared to the existing poor water quality of surrounding waterways. Negligible adverse groundwater impacts are expected during construction and operation of the project, providing management and mitigation measures are implemented.

ISSUE	KEY POTENTIAL IMPACTS
Non-Aboriginal heritage	Construction of the project would require the demolition and replacement of two locally listed heritage items within the project site, resulting in a major impact to the fabric of the items. The project would also require remediation works to one locally listed item. Construction of the project would have a moderate potential to impact local and state significant archaeological remains throughout the project site. The project is not expected to have any operational impact to Non-Aboriginal Heritage.
Aboriginal heritage	No Aboriginal places or objects were identified within the project site. Furthermore, due to the highly disturbed nature of the ground, intact archaeological deposits are not likely to be present below the ground surface. Therefore, the project is unlikely to impact any Aboriginal heritage items or places, potential Aboriginal archaeology, or intangible cultural heritage values.
Land use and property	To allow for the construction and operation of the project, a number of land use and property impacts are expected. These include temporary occupation of land for site compounds, permanent property acquisitions, the removal and replacement of advertising billboards, and disruptions to access of private properties in the vicinity of the project site. Impacts associated with land use and property would be mitigated through consultation with affected land owners and businesses.
Landscape character and visual amenity	There would be adverse impacts on landscape character and to viewpoints during the day within the study area. This is due to several bridge replacements, the removal of trees along the southern side of the rail corridor, and the location of site compounds. At night there would be minor visual impacts from potential lighting of the night works. During operation, the project would be largely absorbed into the character of views, due to the existing highly urban character of areas to the west of the site, and the reinstatement of the billboards, which largely screen views of the bridges at Robey Road and O'Riordan Street.
Social	Social benefits that may result from the construction of the project include an increase in construction-related employment opportunities and potentially an increase in expenditure at local business. There would however be some reduced amenity of the local area during construction. Overall, the project is expected to result in long-term benefits to local and Greater Sydney communities. These mainly relate to increased rail freight efficiency and capacity across the regional and national freight network and less congestion on the roads due to reduced freight movements made by trucks.
Risks, health and safety	Adjustments or protection works would be carried out to some utilities within the project site. Any works required would be carried out with the involvement of the asset owner. Potential impacts are considered to be manageable through established mitigation and management measures. During construction, there would be public health and safety risks due to the proximity of sensitive receivers to the project site. This may result in traffic confusion, injury, potential exposure to contaminated land, access issues, air quality impacts and noise and vibration impacts. During construction and operation, the storage and handling of dangerous goods and hazardous materials could cause leaks and spills. Where work is required that may impact Sydney Airport obstacle limitation surface, consultation would be carried out with Sydney Airport Corporation Limited to seek relevant approval exemptions and crane permits (as required).
Climate change	No extreme climate change risks were identified in the climate risk assessment. One high risk was identified in relation to the failure of communications and signalling systems caused by flooding, as a result of an increase in rainfall intensity combined with sea level rise. This risk would be minimised through ongoing design development.

How would the impacts be managed?

A suite of management and mitigation measures are proposed to be implemented to reduce the potential adverse impacts of the project (refer Chapter 24 this EIS). These measures would be incorporated into the final design process, the construction environmental management plan and operation management plans and systems (and other management documents as outlined in Chapter 24) as relevant.

Provided the measures and commitments specified in the EIS are applied and effectively implemented during the design, construction and operational phases, the identified environmental impacts are considered to be acceptable, feasible and manageable.

Next steps

ARTC is seeking approval from the Minister for Planning and Public Spaces (as delegated to the Secretary of the DPIE) for construction and operation of the Botany Duplication Project. Subsequent steps in the process are as follows:

- exhibition of the EIS for a minimum of 30 days and invitation for the community and stakeholders to make submissions
- consideration of submissions. Submissions received by the Secretary would be provided to ARTC and any relevant public authorities. ARTC may then be required to prepare and submit:
    - a submissions report, responding to issues raised in the submissions
    - a preferred infrastructure report, outlining any proposed changes to the project to minimise its environmental impacts or to deal with any other issues raised (if required)
- determination of the EIS. The Secretary of the DPIE would then make a decision on the project and, if approved, set Conditions of Approval.

Consultation with the community and stakeholders would continue throughout the detailed design and construction phases. Further discussion of the proposed community and stakeholder engagement activities to be undertaken following display of this EIS is provided in Chapter 4.

PART A

Background and project information

BOTANY RAIL DUPLICATION

ENVIRONMENTAL IMPACT STATEMENT

1. INTRODUCTION

Australian Rail Track Corporation (ARTC) proposes to construct and operate a new second rail track largely within the existing Botany Line rail corridor between Mascot and Botany, in the Bayside local government area. The Botany Rail Duplication ('the project') would increase freight rail capacity to and from Port Botany. The location of the project is shown on Figure 1.1. This environmental impact statement (EIS) has been prepared to support the application for approval of the project as State significant infrastructure (SSI), and address the Secretary Environmental Assessment Requirements (the SEARs) issued by the Department of Planning, Industry and Environment (DPIE) on 21 December 2018.

1.1 Background

1.1.1 NSW Freight Network and Port Botany

The project is one of a number of initiatives proposed to improve road and freight transport through the important economic gateways of Sydney Airport and Port Botany. Port Botany is one of Australia and NSW's most important infrastructure assets, with Port Botany being the largest container port in Australia, and NSW's largest bulk liquid and gas port and only container port. Efficient access to Port Botany is critical to the economic growth and prosperity of Sydney, NSW and Australia. The amount of container freight handled by Port Botany is predicted to significantly increase in the future. Transporting more freight to and from Port Botany by rail will place additional demands on the existing Botany Line, particularly the single line section of track, which is already an existing constraint to this section of the wider freight network.

The majority of the existing Botany Line has twin tracks with the exception of the section between Mascot and Botany, where there is currently only one track. This single line section currently constrains the ability for freight to enter and depart from Port Botany concurrently. Additional demand arising from the predicted growth in container freight has the potential to create a bottleneck along the line, impacting on reliability and restricting the efficient movement of freight across the broader Sydney freight rail network. The project would reduce the potential for bottlenecks by duplicating the remaining section of single rail track to increase to the capacity on the Botany Line, which is vital to meet the long-term freight demands to Port Botany.

In the development of the project, ARTC has worked closely with the NSW Roads and Maritime Services as the proponent of the nearby Sydney Gateway road project. This motorway project would link the Sydney motorway network with Sydney Airport, and is subject to a separate environmental assessment process, being delivered by Roads and Maritime.

1.1.2 The proponent

ARTC is the proponent for the project. ARTC is an Australian Government owned statutory corporation that manages more than 8500 kilometres of rail track in NSW, Queensland, South Australia, Victoria and Western Australia. ARTC manages the Metropolitan Freight Network, which runs throughout the Sydney metropolitan region and includes the current Botany Line. ARTC is responsible for:

- selling access to the rail network to train operators
- capital investment in the network
- managing train operations across the network
- maintaining the network
- developing new business.

Figure 1.1 Location of the project

1.2 Project overview

1.2.1 Objectives of the project

The primary objective of the project is to increase capacity along the Botany Line to meet the forecast growth in demand for container freight transport to and from Port Botany. Secondary objectives of the project are to:

- provide increased operational efficiency, flexibility and reliability for freight customers
- increase rail mode share for containerised freight relative to road freight from Port Botany
- support connection to, and operation of, current and future intermodal terminals within the Sydney metropolitan area to meet their targeted freight capacity.

1.2.2 Key features of the project

The project would involve:

- track duplication – including construction of a new track within the rail corridor for a distance of about three kilometres
- track realignment (slewing) and upgrading – including moving some sections of track sideways (slewing) and upgrading some sections of track to improve the alignment of both tracks and minimise impacts on adjoining land uses
- new crossovers – including construction of new rail crossovers to maintain and improve access at two locations (totalling four new crossovers)
- bridge works – including construction of new bridge structures at Mill Stream, Southern Cross Drive, O'Riordan Street and Robey Street (adjacent to the existing bridges at these locations), and re-construction of the existing bridge structures at Robey Street and O'Riordan Street
- embankment/retaining structures – including construction of new embankment and retaining structures adjacent to Qantas Drive between Robey Street and O'Riordan Street and a new embankment between the Mill Stream and Botany Road bridges.

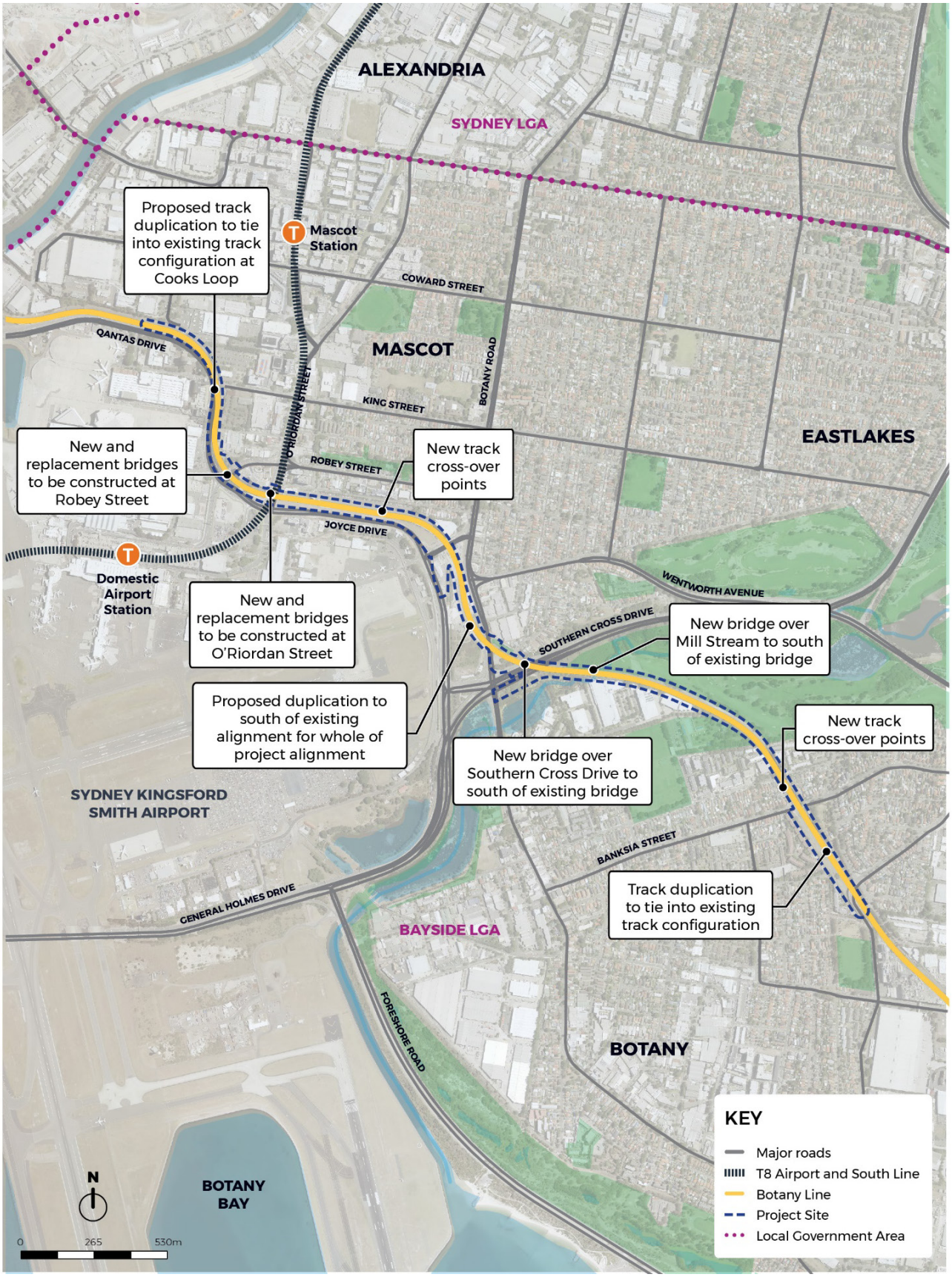
Ancillary work would also include bi-directional signalling upgrades, drainage work and protecting/relocating utilities along the length of the project. The project would also require a series of temporary facilities during construction, including compounds, laydown areas and site access. The key features of the project are shown on Figure 1.2, with further description provided in Chapter 6.

1.2.3 Operation of the project

The project would form part of the Botany Line which is a section of the Metropolitan Freight Network which is managed and maintained by ARTC. ARTC is not responsible for the operation of rolling stock (trains and wagons). Train services are currently, and would continue to be, provided by a variety of operators who utilise the ARTC network to transport goods. The existing functionality of the existing infrastructure associated within the Botany Line would be retained.

As discussed in Chapter 5, the project aims to improve operational efficiency, flexibility and reliability for freight customers, and as such, during operation of the project, the number of freight train movements are anticipated to increase. By 2030, the project would increase freight movement on the Botany Line from the current average of about 20 trains per day (per direction), up to around 45 trains per day, per direction by 2030.

Further information on the operation of the project is provided in Chapter 6.



Note: Indicative, subject to detailed design

Figure 1.2 Key features of the project – overview

1.2.4 Timing of construction

Subject to approval of the project, construction is planned to start at the end of 2020, and is expected to take around three years for the main construction works to be undertaken. Construction is expected to be completed in late 2023 with commissioning activities undertaken in early 2024.

Some features of the project would be constructed while the existing rail line continues to operate. Other features of the project would need to be constructed during programmed weekend rail possession or morning periods when rail services along the line are not operating. The timing of construction would also be based on several constraints including:

- constraints associated with work that would compromise the obstacle limitation surface (OLS) of Sydney Airport
- the need to maintain road access within the local area
- future construction works associated with the Sydney Gateway road project.

Further information on the construction methodology is provided in Chapter 7.

1.3 Purpose of this EIS

The project is classified as SSI in accordance with Division 5.2 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). As SSI, the project requires approval from the NSW Minister for Planning and Public Spaces. ARTC has also requested that the project be declared as Critical SSI. As at the time of preparing this EIS, this request was still being considered.

This EIS has been prepared to support the application for approval of the project under Division 5.2 of the EP&A Act. It addresses the SEARs issued by the DPIE dated 21 December 2018 (refer to Appendix A). It also addresses the form and content requirements of schedule 2 of the Environmental Planning and Assessment Regulation 2000 (the Regulation) (refer to Appendix C).

Further information on the approval requirements is provided in Chapter 3.

1.4 Structure of this EIS

The EIS (Volume 1A and Volume 1B) is structured in four main parts:

- **Part A: Background and project information:**
  - An introduction to the EIS (Chapter 1)
  - A description of the project site and the general biophysical and socio-economic environment within which the project would be located (Chapter 2)
  - An overview of the statutory context and approval requirements for the project (Chapter 3)
  - A summary of the consultation that has occurred and is proposed for future project stages (Chapter 4)
  - A description of the background to the project, including the project need, alternatives to the project as a whole, how the design has developed, and the options considered as part of the design process (Chapter 5)
  - A description of the project features and operation (Chapter 6), including the design features and infrastructure proposed, operation, maintenance and other related information
  - A description of the indicative construction process and activities (Chapter 7).
- **Part B: Environmental assessment:**
  - The results of the assessment of the potential impacts of the project (Chapters 8 to 23).

- **Part C: Synthesis and conclusion:**
  - A consolidated summary of the key potential impacts, the proposed approach to environmental management and a compilation of the mitigation measures (Chapter 24)
  - Conclusion and justification (Chapter 25).
- **Appendices**
  - Appendix A – SEARs and agency requirements
  - Appendix B – Risk Register
  - Appendix C – EP&A Regulations
  - Appendix D – Additional Statutory requirements
  - Appendix E – Strategic planning review
  - Appendix F – Options assessment.

The specialist technical reports prepared as an input to the EIS are provided in Volumes 2 to 6 and include:

- Volume 2:
  - Technical Report 1 – Traffic and Transport Impact Assessment
  - Technical Report 2 – Noise and Vibration Impact Assessment
  - Technical Report 3 – Air Quality Impact Assessment
- Volume 3:
  - Technical Report 4 – Biodiversity Development Assessment Report
  - Technical Report 5 – Contamination Assessment
- Volume 4:
  - Technical Report 6 – Flooding Impact Assessment
  - Technical Report 7 – Groundwater Impact Assessment
  - Technical Report 8 – Surface Water Impact Assessment
- Volume 5:
  - Technical Report 9 – Statement of Heritage Impact
  - Technical Report 10 – Aboriginal Archaeological Survey Report
  - Technical Report 11 – Landscape and Visual Impact Assessment
  - Technical Report 12 – Social Impact Assessment
- Volume 6:
  - Technical Report 13 – Health Impact Assessment
  - Technical Report 14 – Hazard and Risk Assessment
  - Technical Report 15 – Airport Operations Assessment
  - Technical Report 16 – Climate Change Assessment.

2. LOCATION AND SETTING

This EIS assesses the potential impacts of the project on the project site and, where relevant, the broader study area. This chapter describes the project site and study area for the purpose of the EIS, including a summary of its general biophysical and cultural (community, land use and socio-economic) environment. Further information on the existing environment as it is relevant to each individual environmental issue considered as part of this EIS is provided in chapters 8 to 23.

2.1 The project site

2.1.1 General description

The term 'project site' is used in this EIS to refer to the area that would be directly disturbed by construction of the project (for example, as a result of ground disturbance and the construction of foundations for structures etc).

The project site is located about eight kilometres south of the Sydney CBD within the Bayside local government area (LGA). The north-western extent of the project site is located in the vicinity of Qantas Drive, south of Coward Street in Mascot. The south-eastern extent of the project is located just to the north of the Stephen Road bridge in Botany. The project site is shown on Figure 1.2.

The majority of works associated with the project would be undertaken within the existing rail corridor (as shown previously on Figure 1.2). The project site would generally include:

- the existing rail corridor along the Botany Line (the existing rail corridor) between the north-western extent of the project site in Mascot and the south-eastern extent in Botany
- bridges crossing the rail corridor where works are proposed as part of the project (refer to section 6.3)
- the proposed locations of work areas, construction compounds and other storage/laydown areas (described in section 7.4).

2.1.2 Land ownership

The existing rail corridor is owned by the NSW Government (RailCorp) and leased by ARTC. The rail infrastructure within the rail corridor is owned and operated by ARTC. The majority of the project would be undertaken within the existing rail corridor or on land for which ARTC has existing access agreements. However, to facilitate the project a limited amount of property acquisitions would be required to widen the existing rail corridor.

Property acquisition would be limited to parts of commercially-owned land parcels adjacent to the existing corridor. The extent of property impacts would be refined and confirmed during detailed design in consultation with property owners. Further discussion regarding the land requirements for the project is provided in section 6.8.

Some additional areas of land would be required temporarily during construction. Details of temporary land requirements and associated land ownership is provided in section 7.5.6.

2.2 The study area

The study area is defined as the project site and wider area, incorporating all land with the potential to be directly or indirectly affected by the project as it relates to the potential impact being assessed (for example, by noise and vibration, visual or traffic impacts). The actual size and extent of the study area varies according to the nature and requirements of each assessment and the relative potential for impacts. For example, the study area for the heritage assessment is generally restricted to the area within the project construction footprint and immediate surrounds (such as the setting for a heritage item).

In comparison, the study areas for other potential impacts such as noise and vibration assessment or social and business impacts have been based on catchment areas, and extend to further reaching areas. These areas have been defined for each specialist area in the relevant impact assessment chapter.

The study area is characterised by a diverse mix of land uses, significant employment areas, major transport and freight facilities including important environmental features and recreation resources. A general description of the study area is provided in sections 2.2 and 2.2.2.

2.2.1 General social and cultural environment

A summary of the general social and cultural characteristics of the study area is provided below. It should be noted that the land within the project site itself has typically been previously disturbed as a result of the construction and operation of the existing rail corridor.

Transport infrastructure

Significant transport infrastructure in the study area includes the Botany Line, Sydney Airport, public transport, numerous regional and local roads, and active transport facilities. A brief overview of key existing transport infrastructure in the study area is provided below. Further information on the existing traffic and transport environment in the vicinity of the project site is provided in Chapter 8.

Existing freight network

The Botany Line forms part of the Metropolitan Freight Network, which is a dedicated freight only rail track network operated by ARTC. The Metropolitan Freight Network, which has a total length of about 21 kilometres, extends from Port Botany to near Marrickville Station, where it connects to the Metropolitan Goods Line (refer to Figure 2.1). Before reaching Marrickville, the Botany Line passes the Cooks River Intermodal Terminal. The majority of the rail track network is located within the freight rail corridor managed by ARTC. A 5.6 kilometre long section between Marrickville and Campsie is located in a rail corridor that is shared with Sydney Trains.

The Botany Line is used seven days a week, by around 11 to 17 trains per day (about 22 to 34 train movements per day) and a maximum of around three trains per hour (up to around six train movements per hour). The peak period for existing operations is between around 9.45 am and 10.45 am on weekdays, with up to around seven train movements during this time.

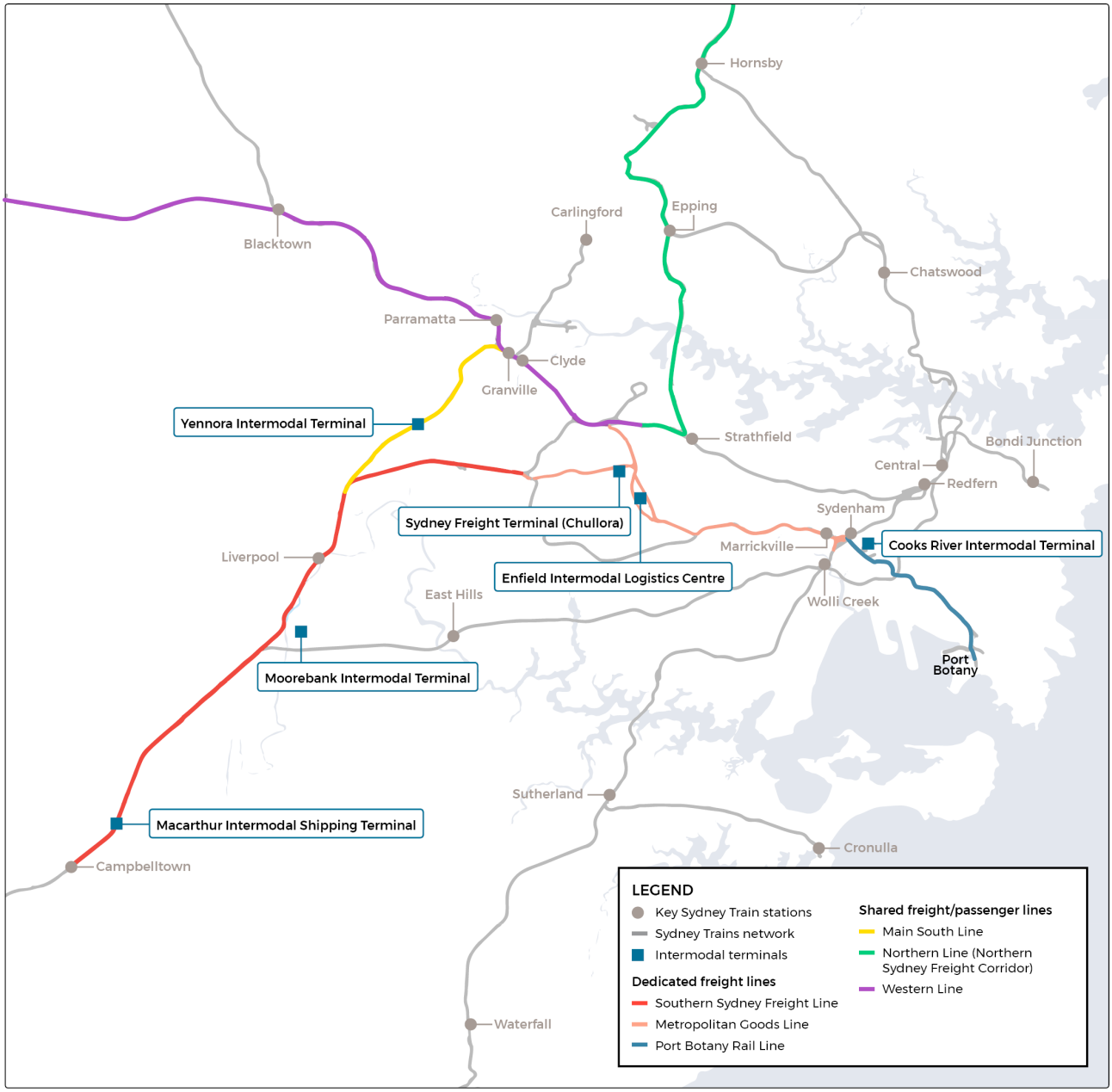


Figure 2.1 Location of the Botany Line in Sydney's freight rail network

Port Botany

Port Botany is one of Australia and NSW's most important infrastructure assets and is the largest container port in Australia. The port is also NSW's only container port as well as its largest bulk liquid and gas port. Port Botany handles 99 percent of NSW's container demand, moving more than 6,000 containers on average every day. The port also handles 98 percent of NSW's consumption of liquid petroleum gas (LPG), 90 percent of bulk chemical products, 30 percent of refined petroleum fuels and 100 percent of bitumen products (NSW Ports 2015).

As described in section 1.1, the amount of container freight handled by Port Botany is predicted to significantly increase in the future. Further discussion of the predicted growth of freight handling at Port Botany is provided in Chapter 5.

Existing major freight activity precincts

Major freight activity precincts and intermodal distribution centres are located across Sydney (shown on Figure 2.1), generally close to strategic road and rail corridors, including ARTC's rail corridors. Over 80 percent of containers moving through Port Botany are delivered to locations within a 40 kilometre radius of the port. This is projected to remain the dominant distribution pattern over the next 30 years (NSW Ports 2015).

While outside of the immediate project site, the Botany Line, as part of the Metropolitan Freight Network, provides a connection between Port Botany and a number of key intermodal terminals and logistics centres including:

- Cooks River Intermodal Terminal
- Yennora Intermodal Terminal
- Enfield Intermodal Logistics Centre
- Chullora Intermodal Terminal
- Macarthur Intermodal Shipping Terminal
- Villawood Intermodal Terminal
- Moorebank Intermodal Terminal (under construction).

Sydney Airport

Sydney Airport, which is located to the south and west of the majority of the project site, is one of Australia's most important pieces of transport infrastructure. As well as serving passengers travelling to and from Sydney, it is also Australia's largest transport and logistics hub. Around 34 international, six domestic and six regional airlines operate from the airport to around 97 destinations. Of these destinations, 11 international and eight regional destinations are not served by any other Australian airport (SACL, 2014a). The airport also generates traffic volumes associated with employee traffic movements.

The airspace around Sydney Airport is protected by a series of invisible 'surfaces' at varying altitudes, which include the OLS and the Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) surface. These surfaces form part of the airport's prescribed airspace, which is regulated by the Department of Infrastructure, Transport, Cities and Regional Development under the (Commonwealth) *Airports Act 1996* (Airports Act). Intrusions into the OLS require approval under the Airports Act. Intrusions into the PANS-OPS surface are prohibited and these limitations have been considered as part of the design and development of the project.

Further information about the requirements under the Airports Act is provided in Chapter 3.

Cooks River Intermodal Terminal

The Cooks River Intermodal Terminal is located in St Peters to the west of Alexandra Canal (around 1.5 kilometres west of the project). The terminal is owned by NSW Ports and operated by Maritime Container Services Pty Ltd as an inland extension to Port Botany for empty container storage. It is connected to the port by the Botany Line, with eight rail sidings located within the terminal. The terminal provides facilities for container storage, repair, washing and upgrading, as well as other ancillary container related services. The terminal enables empty containers to be transferred by road and rail to regional New South Wales for packing with export trade.

Roads

A number of classified main roads are located in the area surrounding the project site, including General Holmes Drive and Southern Cross Drive (part of the M1), O'Riordan Street and Botany Road. The project site crosses Southern Cross Drive, Botany Road, O'Riordan Street and Robey Street via existing rail underbridges. In addition to providing access to Sydney Airport and Port Botany, the roads around the airport also play a role in providing an east–west arterial function within the regional road network as well as facilitating access to the local road network of surrounding suburbs.

Other roads in close proximity to the project side include Qantas Drive, Joyce Drive, Mill Pond Road, Banksia Street and Stephen Road. Further information on these roads is provided in Chapter 8.

Public transport

The Sydney Trains T8 Airport and South Line (T8 Line) passenger rail line travels through a tunnel near the project site, with stations at Mascot (Mascot Station), Terminal 1 of Sydney Airport (International Airport Station) and Terminals 2 and 3 of Sydney Airport (Domestic Airport Station). The T8 line crosses under Joyce Drive and the Botany Line and generally follows the alignment of O'Riordan Street to the north. The T8 line is operated by Sydney Trains.

A number of bus routes cross the project site via the roads passing under the rail bridges or travelling in proximity to the existing rail corridor. Further information regarding existing public transport within the vicinity of the project site is provided in Chapter 8.

Active transport

The pedestrian network in proximity of the project site consists of footpaths and dedicated road crossings. Both signalised and un-signalised pedestrian crossing facilities are located throughout the footpath/road network. A pedestrian overbridge crosses the rail corridor (and project site) near the south-eastern end of the project site, connecting Banksia Street on either side of the corridor.

There are no dedicated cycling facilities within or immediately adjacent to the project site. However, there are a number of active transport corridors located in the wider study area. These are provided in a variety of forms including shared paths and dedicated cycleways. The active transport infrastructure in the broader vicinity of the project site includes:

- the Bourke Road Cycleway
- the Alexandra Canal
- a shared path located along Wentworth Avenue between Dranesfield Avenue and Bay Street
- a shared path along the east side of O'Riordan Street which is part of the Airport North project which was proposed to extend from Joyce Drive to Gardeners Road.

Further information on traffic, transport and access is provided in Chapter 8.

Land use and property

The majority of the project site is located within an active rail corridor used for freight purposes. Land uses adjoining the project site have been historically separated due to the location of the existing rail corridor. Land uses adjoining the project site and within the wider study area include a varied and relatively dense mix of land uses. These include significant areas of transportation corridors (road and rail), Sydney Airport, a number of industrial and commercial uses (including warehouses, container terminal uses), hotels and other residential land uses with other uses (including education and recreation uses) scattered throughout the study area.

Medium to high density residential areas (including multi-storey apartment buildings) are located primarily towards the north-western end of the project site in Mascot. Lower density residential areas (mainly detached housing interspersed with low rise apartment buildings) are located towards the south-eastern end of the project site in Botany and Pagewood.

Further information on land use and property is provided in Chapter 17.

Socio-economic

The project site is located within three suburbs in the Bayside LGA (Mascot, Botany and Pagewood). The Bayside LGA resident population in 2018 (as at 30 June 2018) was identified as being around 174,380 people (ABS, 2018).

The Bayside local government area is characterised by near-city suburbs, with substantial industrial and commercial areas and a wide range of housing styles and densities. A number of suburbs in the LGA, including Mascot and Botany, are undergoing significant urban renewal.

The areas surrounding the project site offers a range of community infrastructure and facilities, with a number of parks and the Eastlake Golf Course located immediately adjacent to the south-eastern end of the project site.

Sydney Airport and Port Botany are two of the most important economic assets in Sydney and Australia as a whole. The airport, port and businesses in the surrounding area are significant generators of economic activity nationally. The area around and including Sydney Airport and Port Botany is one of the largest employment areas in Sydney. Further information on the economic significance of the airport and port, and the predicted growth in passengers, freight and employment, is provided in section 5.1.2.

A number of commercial/industrial premises and businesses are located adjacent to the project site in Mascot and Botany. In addition, a number of large advertising billboards are located within and adjacent to the project site, between Qantas and Joyce drives and the Botany Line.

Further information on the socio-economic environment is provided in Chapter 19.

Heritage

Non-Aboriginal heritage

The study area has a long history of settlement and development, with significant historical features and activities including agriculture, Sydney's drinking water supply, dredging and reclamation, development of Sydney Airport and Port Botany, and industrial, residential and commercial development.

A number of heritage sites are located within or adjacent to the project study area. This includes the Sydney (Kingsford Smith) Airport Group (State and local heritage significance), the curtilage for which is partially within the project site and study area. One listed item of State and local significance, the Botany Water Reserves (also known as the Botany Wetlands), is also located directly adjacent to the project site (including the areas of Mill Stream, associated wetlands and Eastlake Golf Course to the north and south of the alignment, generally east and south of Southern Cross Drive). This item is listed on the State heritage register, Sydney Water's section 170 register and the *Botany Bay Local Environmental Plan 2013* (the Botany Bay LEP) (City of Botany Bay, 2013a).

Three other local heritage items are located within the project site – the Robey Street, O'Riordan Street and Botany Road bridges. The bridges are all listed on the ARTC section 170 register. The Botany Road bridge is also listed as a local heritage item under the Botany Bay LEP.

Further information on non-Aboriginal heritage is provided in Chapter 15.

Aboriginal heritage

The study area is located within the traditional country of the Darug language group. The Gameygal (or Camerigal) is the band of the Darug group that are believed to have occupied the areas around Botany Bay in the vicinity of the project site.

The existing rail corridor is highly disturbed due to its current rail corridor use. No listed Aboriginal heritage sites have been identified as being located within the project site. The closest previously recorded Aboriginal heritage site is a potential archaeological deposit (PAD) located to the south of the Cooks River and outside the project site. As a result of the high levels of previous ground disturbance, the archaeological significance of the project site is considered to be overall low.

Further information on Aboriginal heritage is provided in Chapter 16.

2.2.2 General biophysical environment

A summary of the general biophysical characteristics of the study area is provided below.

Soils and contamination

The regional geology of the study area consists of Triassic Hawkesbury Sandstone and Ashfield Shale overlaid by Quaternary sediments, extending from the project site to the east. To the west of the project site, a majority of the Sydney Airport site is located on fill associated with the reclamation and stabilisation of the Sydney Airport site.

Most of the study area is mapped as ‘disturbed terrain’ (due to its current rail corridor use), which extends across Mascot and includes Sydney Airport as well as the rail corridor and adjacent areas. Sections of the project site near Qantas, Joyce and Southern Cross drives have also been identified as being located on fill. To the south of Southern Cross Drive, the project site is located on Quaternary deposits consisting of marine sand.

Additionally, a number of potentially current and historical contaminating activities and land uses are (or have previously been) located within or around the project site, including:

- contamination associated with rail activities that may be present in ballast and formation materials and soils within and next to the rail corridor
- historical landfilling operations, which have potentially resulted in the importation of fill material containing metals, asbestos and other contaminants
- use of land in the study area for industrial or other potentially contaminating activities.

Further information on geology and soils is provided in Chapter 14. Further information on soil contamination is provided in Chapter 12.

Hydrology, flooding and groundwater

The study area through which the existing rail corridor is located across Botany Bay and Cooks River catchment areas. Surface water from the northern portion of the project site flows to Alexandra Canal via existing drainage network and the Upper Mascot Open Channel. Surface water from the southern portion of the project site flows to Mill Stream, directly via overland flow or through existing drainage networks.

The Mill Stream catchment is a sub catchment of the Botany Bay catchment, which is part of the Georges River catchment. Alexandra Canal is located within the lower reaches of Cooks River catchment.

The project site crosses Mill Stream, which is located in the Botany Wetlands (a series of interconnected open freshwater ponds, former water supply dams and shallow swamp areas to the south of Southern Cross Drive). Mill Stream discharges to Botany Bay near Sydney Airport and Foreshore Beach. Downstream of the project site, Mill Stream flows into Mill Pond and Engine Pond, which are located in the Sydney Airport Wetlands.

Alexandra Canal, which is located about 200 metres west of the project site, is one of the main tributaries of Cooks River. It discharges to Cooks River on the western side of Sydney Airport. Alexandra Canal is tidally dominated through its connection to the Cooks River. The tidal influence from the Cooks River extends to the head of the canal.

The northern portion of the project site discharges to Alexandra Canal via the Upper Mascot open channel. A portion of the project site runoff flows to the Sydney Airport stormwater drainage network to Northern Pond before final discharge to Alexandra Canal. Sections of the existing rail corridor have also been identified as currently prone to overland flow during exceedances (localised flooding) which occur during periods of heavy rainfall.

The project site, and wider study area, is underlain by the Botany Sand Beds aquifer, an extensive alluvial and coastal sand bed aquifer extending north and east from Botany Bay to Surry Hills and Centennial Park. Groundwater in the study area is particularly vulnerable to contamination as a result of the permeability and shallow depth of the aquifer. Groundwater in parts of the study area is known to be contaminated and some areas are subject to a (NSW) Department of Industry Temporary Water Restrictions Order.

Further information on hydrology, flooding and water quality is provided in Chapter 13 and Chapter 14.

Biodiversity

Most of the study area consists of disturbed land, which has been subject to historical vegetation clearing, reclamation, development, landscaping and weed invasion. The main areas of biodiversity value near the project site are located at the Botany Wetlands, towards the southern end of the project site.

The project site crosses the Botany Wetlands to the south of Southern Cross Drive. Within Sydney, the Botany Wetlands is the largest coastal freshwater lakes complex and largest freshwater wetland. It is also a nationally important wetland, listed in the Directory of Important Wetlands in Australia (as regulated by the Commonwealth Department of Environment and Energy).

The project site would also cross through a patch of threatened ecological community (Swamp Oak Floodplain Forest) near Mill Stream in the Botany Wetlands. This community is already dissected by the existing Southern Cross Drive underbridge.

Further information on biodiversity is provided in Chapter 11.

3. APPROVALS AND LEGISLATION

This chapter provides a summary of the project's approval requirements under relevant legislation, and the application and assessment process for the project. An assessment of the consistency of the project with other relevant statutory requirements is also provided.

3.1 Summary of requirements

The project is assessable as SSI and needs approval from the NSW Minister for Planning and Public Spaces in accordance with Part 5, Division 5.2 of the EP&A Act, and by operation of clause 14(1) and Schedule 3 of State Environmental Planning Policy (State and Regional Development) 2011 (NSW Government, 2011a), and clause 79(1) of State Environment Planning Policy (Infrastructure) 2007. This EIS supports an application to carry out the project under section 5.15 of the EP&A Act and clause 192 of the EP&A Regulation. The EIS has also been prepared in accordance with the Secretary's environmental assessment requirements (SEARs) issued by the DPIE on 21 December 2018.

A request for the project be declared Critical State significant infrastructure (Critical SSI) pursuant to section 5.13 of the EP&A Act was also submitted on 29 July 2019. This request was made based on the project being considered to be essential to the State for economic, environmental or social reasons. The declaration was made pursuant to clause 16 of State Environmental Planning Policy (State and Regional Development) 2011. The request for declaration of the project as Critical SSI is currently with the Minister for Planning and Public Spaces for consideration.

The project would also require the following licences under other NSW legislation:

- an environmental protection licence (EPL) under the *Protection of the Environment Operations Act 1997* (POEO Act) to operate the project
- a licence under the *Roads Act 1993*
- a licence under Part 5 of the *Water Act 1912*.

Due to consideration of potential ecological impacts to EPBC listed species, the location of the project adjacent to Commonwealth Land (Sydney Airport) and the proposed temporary use of some Commonwealth Land as a compound site to the south of General Holmes Drive), a Commonwealth referral under the EPBC Act is also proposed to be submitted as part of the project.

The project would also potentially require the following approvals under the Airports Act due to the location of the project site being partially within the Sydney Airport land to the north of Southern Cross Drive:

- a building activity approval under section 99 for temporary works on Sydney Airport land
- a controlled activity approval under section 183 for temporary intrusions into Sydney Airport's prescribed airspace.

Further information on the approval requirements under Commonwealth legislation is provided in section 3.3.

3.2 Planning approvals process

3.2.1 Approval and assessment requirements under the EP&A Act

The EP&A Act and the EP&A regulation provide the primary legislative framework for regulating land use planning and development in NSW. The EP&A Act and the EP&A Regulation include provisions to ensure that the potential environmental impacts of a development are considered in the decision-making process prior to proceeding to construction.

This legislation provides for the create of a range of environmental planning instruments including State environmental planning policies (SEPPs) and local environmental plans (LEPs) which provide the basis for approval requirements for projects (refer to section 3.2.2). The EP&A Regulations also specify requirements such as the form of an EIS and the information requirements to be included (refer to Appendix C).
The information presented in this EIS is consistent with these requirements.

The key steps in the planning approval process for the project are shown in Figure 3.1. The assessment and approval requirements under the EP&A Act are described in section 3.2.

Figure 3.1 NSW planning approvals process for State significant infrastructure

3.2.2 Need for development consent

Clause 79(1) of the State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) permits development for the purpose of a railway or rail infrastructure facilities to be carried out by or on behalf of a public authority without consent, provided the project is not carried out on land reserved under the *NSW National Parks and Wildlife Ac*t 1974 (NPW Act).

As the project would be for the purposes of a freight rail line and would be carried out by or on behalf of ARTC (defined in Clause 5(2) of the Infrastructure SEPP as a public authority), the project could be assessed under Part 5 of the EP&A Act. Part 5 of the EP&A Act defines the assessment process for infrastructure activities that do not need development consent.

In accordance with section 5.1(1), ARTC is the proponent and determining authority for the project. Section 5.5(1) imposes a duty on a determining authority to *'…examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity'.*

Section 5.7(1) provides that a determining authority cannot carry out, or grant an approval in relation to an activity that is likely to significantly affect the environment, unless *'…(a) the determining authority has obtained or been furnished with and has examined and considered an environmental impact statement in respect of the activity'.*

In accordance with the requirements of section 5.7(1) ARTC considers that the project has the potential to significantly affect the environment. As a result, the project would not meet the requirements of an infrastructure activity that does not need development consent, and therefore this EIS has been prepared to assess the potential impacts.

3.2.3 State significant infrastructure

Section 5.12(2) of the EP&A Act provides that a State environmental planning policy may declare any development, or any class or description of development, to be SSI.

Clause 14(1) of the State and Regional Development SEPP (NSW Government, 2011a) provides that development is SSI if it is permissible without development consent by virtue of the operation of a SEPP, and it is specified in the categories of development in Schedule 3 of the State and Regional Development SEPP.

Schedule 3 (clause 3) of the State and Regional Development SEPP defines 'rail infrastructure' as *'development for the purpose of rail infrastructure by or on behalf of the Australian Rail Track Corporation that has a capital investment value of more than $50 million'*.

As the project is permissible without development consent, has a capital investment value of more than $50 million and it is being undertaken by ARTC, it meets the requirements of clause 14(1) of the State and Regional Development SEPP.

On this basis, the project is considered to be SSI.

3.2.4 Approval authority

Division 5.2 of the EP&A Act defines the approval requirements for SSI. Under section 5.14, the approval of the Minister for Planning and Public Spaces is required for SSI.

3.2.5 Assessment process and requirements

Environmental assessment requirements

In accordance with section 5.15(2) of the EP&A Act, an application for SSI needs to describe the infrastructure and contain any other matter required by the Planning Secretary. The SEARs for the project, issued on 21 December 2018, define the matters the Secretary requires this EIS to address. The requirements detailed in the SEARs, together with where they are addressed by this EIS, are provided in Appendix A.

The form and content requirements for this EIS are also defined by Schedule 2 of the EP&A Regulations. These requirements, and how they have been addressed by this EIS, are provided in Appendix C.

Public exhibition and submissions

Once the EIS is considered to meet the SEARs, the DPIE will place it on public exhibition for a period of at least 30 days and invite submissions on the project. The DPIE will provide ARTC with a copy of the submissions and issues raised to which ARTC will respond in a submissions report.

ARTC may also, where possible, modify the project to minimise impacts on the environment if required and practicable in response to submissions received during the public exhibition process. Any material design changes made to the project would be detailed as part of a preferred infrastructure report (as part of the submissions report) to describe the scope of the revised project. The final submissions report (and preferred infrastructure report if required) would also be made public.

Further information on the proposed approach to consultation during the exhibition period is provided in Chapter 4.

Assessment and approval

Following the exhibition period, the Department will, on behalf of the Minister for Planning and Public Spaces, review the EIS and the submissions/preferred infrastructure report. The Department will prepare an assessment report, which is submitted to the Minister for Planning and Public Spaces for consideration. The Minister may refuse the project, or approve the project (including imposing any relevant conditions).

The Minister's decision and the assessment report will be published on the DPIE's Major Projects website following determination.

3.2.6 Land owner's consent/notification requirements

Clause 193 of the Regulation provides the owner's consent and notification requirements for SSI. In accordance with clause 193(1), as the project is SSI being undertaken by a public authority, the consent of individual land owners is not required to make an application. However, notice of the application is needed to be provided in accordance with the requirements of clause 193(4).

3.2.7 Application of relevant environmental planning instruments

Section 5.22(2)(a) of the EP&A Act provides that environmental planning instruments (such as State environmental planning policies and local environmental plans) do not apply to or in respect of SSI, except where 'they apply to the declaration of infrastructure as SSI or as CSSI (and to the declaration of development that does not require consent)'.

The State environmental planning policies relevant to the declaration of the project as SSI and as development that does not require consent have previously been discussed in sections 3.2.2 and 3.2.3.

3.3 Other approval requirements

3.3.1 Requirements under other NSW legislation

Sections 5.23 and 5.24 of the EP&A Act define the legislation that does not apply to State significant development, and the approvals that must be applied consistently. In accordance with these sections and relevant legislation, the other approvals that would be required under NSW legislation are summarised in Table 3.1.

Further information in relation to these requirements is provided in Appendix D.

Table 3.1 Other approval requirements under NSW legislation

LEGISLATION	REQUIREMENT
Biodiversity Conservation Act 2016	The *Biodiversity Conservation Act 2016* (BC Act), together with the Biodiversity Conservation Regulations 2017, provides a mechanism to address impacts on biodiversity from land clearing associated with development. The provisions of the BC Act have been considered as part of the *Biodiversity Development Assessment Report* (Technical Report 4) and assessment of biodiversity impacts in Chapter 11.
Contaminated Land Management Act 1997	The *Contaminated Land Management Act 1997* (CLM Act) outlines the circumstances in which notification of the Environment Protection Authority (EPA) is required in relation to the contamination of land. The provisions of the CLM Act may become relevant during construction and/or operation of the project should contaminated land be impacted. Further consideration of the provisions and requirements of the CLM Act is provided in Chapter 12 and *Technical Paper 5 – Contamination Assessment*.
Heritage Act 1977	The Heritage Council must be notified if a relic is uncovered during construction and if it is reasonable to believe that the Heritage Council is unaware of the location of the relic. The provisions of the *Heritage Act 1977* (Heritage Act) may become relevant during construction should a relic be uncovered during this period. In addition, under section 170A of the Heritage Act, the Heritage Council must be notified where an existing item listed on a section 170 register is proposed to be demolished, prior to the proposed impact occurring. Further consideration of the provisions and requirements of the Heritage Act is provided in Chapter 15 and *Technical Paper 9 – Statement of Heritage Impacts*.
Land acquisition (Just Terms compensation) Act 1991	As discussed in section 6.8, due to the duplication of the line, some sections of the project would require widening of the existing rail corridor, necessitating a limited amount of property acquisition. Under the *Land Acquisition (Just Terms) Act 1991*, RailCorp would be the relevant acquiring authority for the required land acquisition.
Protection of the Environment Operations Act 1997 (POEO Act)	Operation of the project would be a scheduled activity for the purposes of the POEO Act and would require an environment protection licence (EPL). The need to modify ARTC's existing EPL to include the project would be confirmed in consultation with the EPA. Further consideration of the provisions and requirements of the POEO Act is provided in Chapter 10 and *Technical Paper 3 – Air Quality Impact Assessment*.
Roads Act 1993	Approval under section 138 of the Roads Act would be required to undertake works to the bridges located over classified roads (at O'Riordan Street and Southern Cross Drive).
Waste Avoidance and Resource Recovery Act 2001	The *Waste Avoidance and Resource Recovery Act 2001* encourages the most efficient use of resources in order to reduce environmental harm. The provisions of this Act have been considered as part of the assessment of waste, energy and resources management in Chapter 20 of this EIS.

3.3.2 Requirements under Commonwealth legislation

The other approvals that would be required under Commonwealth legislation are summarised in Table 3.2. Further information is provided in Appendix D.

Table 3.2 Approval requirements under Commonwealth legislation

LEGISLATION	REQUIREMENT
Environment Protection and Biodiversity Conservation Act 2016	Due to consideration of potential ecological impacts to EPBC listed species, the location of the project adjacent to Commonwealth Land (Sydney Airport) and the proposed temporary use of some Commonwealth Land as a compound site to the south of General Holmes Drive), a Commonwealth referral under the EPBC Act is also proposed to be submitted as part of the project.
Airports Act 1996	Temporary construction works on Sydney Airport land may require a building activity approval under section 99 of the Airports Act (to be confirmed in consultation with Sydney Airport Corporation Limited (SACL). Temporary intrusions into Sydney Airport's prescribed airspace from the crane used to construct the bridges over Robey and O'Riordan streets would require a controlled activity approval under section 183.

3.3.3 Consideration of other standards

The new track alignment and associated infrastructure works within the vicinity of O'Riordan Street (including a new bridge over O'Riordan Street and retaining walls along Qantas Drive and Joyce Drive) would be constructed within the vicinity of the existing Airport Line. Development within the vicinity of the Airport Line Tunnel is required to consider a number of design standards including:

- *Guidelines for Development Within the Vicinity of the Airport Line'* (Part A and C) (Rail Access Corporation 2000)
- *RailCorp Engineering Specification SPC207 Track Monitoring Requirements for Undertrack Excavation, Version 1.5* (Railcorp, 2013)
- *AMD-EMI-GUI-001: Guide to Working with Sydney Trains (Version 1)* (Sydney Trains, 2018)
- *Rail Interface Access Application Form for External Parties (Sydney Trains, n.d)*
- *Development Near Rail Corridors and Busy Roads – Interim Guideline* (Department of Planning, 2008).

The development of the project within the vicinity of the rail tunnels would be designed and constructed to ensure the protection of existing tunnels and rail infrastructure. The project would not affect rail operations including either the operational capacity or the efficiency of the existing rail network.

ARTC would continue to consult with relevant agencies including Sydney Trains, Transport for NSW and RailCorp regarding specific requirements for development within the vicinity of the existing Airport Line tunnel structure.

4. CONSULTATION

This chapter summarises the community and stakeholder consultation undertaken prior to and during preparation of the EIS, and the consultation proposed to be undertaken during the design and delivery of the project. The key issues relevant to the EIS are summarised below.

4.1 Consultation approach and strategy

4.1.1 Consultation approach and objectives

ARTC's values commit the organisation to active engagement with key stakeholders and the wider community. Effective communication and engagement are important to minimising environmental and community impacts which could occur as a result of the project. ARTC's approach to consultation for the project aims to:

- identify affected (directly and indirectly) stakeholders
- outline the activities and techniques proposed to effectively engage the community and stakeholders
- meet the engagement requirements stipulated in the SEARs and associated guidelines as identified by the DPIE
- ensure that a broad range of the local community and stakeholders are informed about the project and given the opportunity to provide feedback
- effectively and proactively identify and manage issues, demonstrating an understanding of community concerns and values and develop solutions that address community expectations, where possible
- develop relationships and seek to build trust with stakeholders and the community
- manage stakeholder feedback and complaints in a timely and respectful manner
- monitor and evaluate stakeholder feedback to measure success.

4.1.2 Consultation plan

ARTC has developed a Community and Stakeholder Engagement Plan (CSEP) for the Botany Rail Duplication project. This CSEP has built upon the previous Communications and Engagement Strategy which was prepared for the Botany Rail Duplication project and which detailed the high-level stakeholder engagement strategy for the project. The CSEP aligns with the DPIE's *Draft Guidelines: Community and Stakeholder Engagement*, June 2017 (the Guidelines) (DPE 2017a) and was been prepared to comply with the Secretary's Environmental Assessment Requirements (SEARs).

The CSEP has been prepared to guide communications, consultation and engagement activities with stakeholders (including both the community and government agencies) throughout project development, including exhibition of the EIS. The engagement approach that has been undertaken follows ARTC processes for engagement with stakeholders. Key principles to the engagement approach have included:

- communicating early and often
- undertaking proactive, targeted and open communication
- presenting ongoing and visible representation
- seeking feedback and input from stakeholders and community
- explaining how feedback and input is used and ongoing opportunities for participation.

4.1.3 Stakeholder identification

A stakeholder is defined as a person, group, or organisation who has an interest in a project and is directly or indirectly impacted by the project. In addition to the local community, key stakeholders for the project are identified in Table 4.1.

Table 4.1 Key project stakeholders

STAKEHOLDER GROUP	STAKEHOLDERS
Relevant local, NSW and Australian government agencies	• Australian Department of Infrastructure, Transport, Cities and Regional Development • NSW DPIE • NSW Biodiversity and Conservation Division of DPIE (formerly NSW Office of Environment and Heritage) • NSW Environmental Protection Authority • NSW Department of Primary Industries – NSW Office of Water • NSW Ports • Aboriginal Affairs NSW • Bayside Council • Railcorp • Transport for NSW (including Freight and Strategic Planning) • Sydney Trains • Heritage Council of NSW • Fire and Rescue NSW emergency services • State Emergency Services • Infrastructure NSW • Civil Aviation Safety Authority.
Local Aboriginal Land Councils (LALC)	• Metropolitan LALC • La Perouse LALC
Business, education and other land owners	• Sydney Airport Corporation Limited • Qantas • Advertising structure owners • Local hotel operators • Local businesses within the suburbs of Botany and Mascot • Local primary and secondary schools.
Local interest groups	• Transport and freight industry representatives • Community members and local residents • Local interest groups, including the Port Botany Community interest group.
Utility providers	• Ausgrid • APA Group • Jemena • Qenos • Sydney Water • Telstra • Optus.

4.2 Consultation during the EIS process

4.2.1 Initial stakeholder consultation

During 2015–2016, ARTC undertook capacity assessment of the network to determine capacity enhancements required to meet predicted demand for freight accessing Port Botany prior to and as part of the initial concept design stage. During this early concept design stage ARTC consulted with a number of key stakeholders as shown in Table 4.2.

Table 4.2 Stakeholder consultation during design development

STAKEHOLDER	TIMELINE	ENGAGEMENT DETAIL
Department of Infrastructure, Transport, Cities and Regional Development (and its predecessors)	2015–2016 ongoing	• Regular consultation regarding the capacity assessment funding and progress, including regular Project Control Group meetings and consultation regarding milestone commitments.
Bayside Council	Sept 2018 Ongoing	• Initial briefing of Council officers regarding the project and background. • Briefing to Councillors regarding the project and background. • Ongoing consultation including regular meetings, emails and phone discussions to provide project updates. • Meeting(s) to discuss specific project issues including discussion with hydrology officer(s) regarding potential impacts and approach to flooding.
Transport for NSW (TfNSW)	May 2015 June 2015 Ongoing	• Notification of the project and background. • Briefing provided to the Projects and Freight divisions including option concept designs. No objections or issues were raised.
Sydney Trains	May 2015–ongoing	• Notification of the project and background with a briefing provided to executive staff.
Roads and Maritime Services – Airport East Project (Mascot)	Feb 2015–2019	• Various consultation including regular meetings, emails and phone discussions for the new bridge being built at Wentworth Avenue. • Consultation has been to agree works and scope and allow for the future duplication of the track. Design information has been shared between the parties to ensure consistency in planning.
WestConnex Delivery Authority and Roads and Maritime Services	Mid-2015–2018	• Consultation regarding interfaces between the WestConnex Gateway (road re-configuration around Sydney airport) and the rail project. • More recently, ARTC and RMS have been working collaboratively on the Botany Rail Duplication and Sydney Gateway project. Regular consultation has included meetings, site visits, exchange of information, correspondence and phone calls.
Moorebank Intermodal Company / Sydney Intermodal Terminal Alliance	Mid-2014	• Consultation regarding capacity analysis. MIC provided a copy of its data to ARTC, who built on the analysis to conduct our own capacity modelling.

STAKEHOLDER	TIMELINE	ENGAGEMENT DETAIL
Sydney Airports Corporation Ltd	Mid-2015 ongoing	• ARTC was involved in consultation with SACL as part of RMS Airport East consultation. The new bridge at Wentworth Ave requires Civil Aviation Safety Authority (CASA) approval for permanent Obstacle Limitation Surface (OLS) intrusion. The Airport East submission allows for transient intrusions associated with future duplicated track between General Holmes Drive and Southern Cross Drive at Botany.
NSW Ports	Feb 2015 ongoing	• Project briefing provided to NSW Ports representatives. • Consultation included information exchange, meetings, emails etc. NSW Ports and ARTC work together on an ongoing basis to ensure future requirements are planned in conjunction with each other.
Sydney Water	Sept 2015 ongoing	• Project briefing provided identifying potential impacts on Sydney Water assets. Sydney Water provided copies of available as built drawings and confirmed that they will work with ARTC to implement methods of managing service impacts.
Ausgrid	Nov 2015 – 2019	• Project briefing provided identifying potential impacts on Ausgrid assets. Ausgrid provided additional information, layout plans and initial estimates for investigation works. • ARTC have entered in to a Deed with Ausgrid and have met with assigned stakeholder team members to present the status of the design relating to any areas of close proximity to the stakeholder's assets.
Jemena	2015–2016 ongoing	• A number of site visits were held with Jemena representatives regarding investigation and field survey works in the areas where gas services interface with the project.
APA Group	March 2016, 2019	• Site visit held to brief APA representatives of the project and clarify the positioning of the ethane gas pipeline for field investigation works. • ARTC representatives met with APA representatives and presented the status of the design relating to any areas in close proximity to the stakeholders assets.
State Emergency Services (SES)	September 2019	• Notification of the project and offer for a project briefing. • SES requested review of the EIS during the exhibition to allow for comments to be provided.

4.2.2 Stakeholder consultation undertaken prior to and during the preparation of the EIS

Communication with stakeholders is ongoing and has been undertaken through participation in a range of activities including project meetings, community information displays, stakeholder briefings and specific topic meetings with affected stakeholders. Where relevant, these activities were undertaken in parallel or in combination with the consultation activities undertaken for the Sydney Gateway project (currently being undertaken by NSW Roads and Maritime Services).

A summary of the activities and tools used to provide information on the project to date and which have been used to seek input to the EIS is provided in Table 4.3.

Table 4.3 Consultation activities

ACTIVITY	SUMMARY	TIMING
Community contact mechanisms: • toll free community information line (1300 550 402) • project email (enviroline@artc.com.au).	• Obtain feedback and measure awareness of the project. • Provide information and promote channels through which stakeholders can communicate their views, issues, and concerns.	Community contact mechanisms commenced at the beginning of the project with the website commencing on 23 May 2019. All community contact mechanisms will be ongoing throughout the project.
Project website • www.artc.com.au/projects/botany-rail-duplication-project/	• Obtain feedback and measure awareness of the project. • Provide information and promote channels through which stakeholders can communicate their views, issues, and concerns.	The website was published on 23 May 2019. The website will remain live throughout the duration of the project.
Printed information: • fact sheets • project information packs • mail outs.	• Raise awareness and understanding of the project. • Provided to stakeholders to increase understanding of the project. • Provide information on land access guidelines and procedures. • A flyer was distributed to stakeholders the week commencing 24 June 2019 notifying them of the opportunity to attend the community drop-in session/June pop-ups. • A separate letter introducing the project and promoting the community drop-in session and June pop-ups was distributed to businesses around the O'Riordan Street area (approximately 50 letters).	Commenced in early 2019 and will be ongoing throughout the project.
Community information displays	• Provide information on the project to the local community. • Seek local input to inform the design process and EIS. • Project displays at Mascot Station to provide information on the Botany Duplication and Sydney Gateway (October 2018). • A community drop in session was held on 12 June 2019 at JJ Cahill Memorial High School in Mascot to provide information on the project. • Two pop-up community sessions were held on 1 June 2019 (Boralee Park) and 4 June 2019 (Coffee @ 1). These sessions were designed to provide information on the project and seek feedback.	Commenced in October 2018 and will be ongoing throughout the project.
Contact with affected land owners	• Briefings undertaken to provide information on potential impacts of and set up meetings for more detailed discussions.	Commenced in October 2018 will be ongoing throughout the project.

ACTIVITY	SUMMARY	TIMING
Face to face meetings	• Raise awareness of the project and the potential impacts on landowners. • Provide an opportunity for landowners to ask questions and have input into the design and EIS.	Meetings have commenced and will be ongoing throughout the project.
Meetings with local council representatives	• Opportunity to promote awareness of the project. • Opportunity for Bayside Council to provide comments regarding the project.	Meetings have commenced and will be ongoing throughout the project.
Stakeholder meetings and briefings	• Opportunity to address specific questions and issues in person. • Provide an opportunity for stakeholder input to inform the design process and development of the EIS. • Stakeholders included: o Bayside Council and Councillors o Transport for NSW o (former) Roads and Maritime Services o NSW Ports o MP for Heffron o Sydney Airport Corporation Limited o Utility providers o Felix Hotel o REX and the Branksome Hotel and Residences o Port Botany Community Consultative Committee o Stamford Hotel o La Perouse Local Aboriginal Land Council o Metropolitan Local Aboriginal Land Council o Colliers International o Ooh Media o Ovenard Investment.	Meetings have commenced and will be ongoing throughout the project.
Local media: • Advertisements • Media releases.	• Raise awareness and understanding. • Provide information and promote channels through which stakeholders can communicate their views, issues and concerns. • Celebrate project milestones publicly. • A newspaper advertisement was used to promote the community drop-in session/June pop-ups and request feedback on the project. The advertisement was published in the Southern Courier on 28 May 2019.	Commenced in May 2019 and will be ongoing throughout the project (as required).
Social media	• Three social media posts were developed with the intention of promoting the project, encouraging people to attend the consultation events and provide high level project information. • The posts were delivered via ARTC's Facebook and LinkedIn accounts.	Commenced in June 2019 and will be ongoing throughout the project (as required).

ACTIVITY	SUMMARY	TIMING
Project consultation database	• Record all correspondence relating to the project, including feedback, concerns, and comments.	Commenced at the beginning of the project and will be ongoing throughout the project.
Door knocks and face-to-face briefings	• Individual meetings and contacts to provide information on Botany Duplication Project (and Sydney Gateway) and seek feedback. • Door knocking undertaken in June 2019 focused on updating the current status of the Botany Duplication Project progress (approximately 250 houses and businesses contacted).	Initial door knocking undertaken in September and October 2018. Second round undertaken in June 2019. Ongoing throughout the project (as required).

4.2.3 Results of consultation relevant to the EIS

A summary of the key issues raised during consultation relevant to the EIS, including the potential impacts to be considered and the information to be provided by the EIS, is provided in Table 4.4.

Table 4.4 Summary of issues raised relevant to the EIS

ISSUE RAISED	ISSUE RAISED BY	WHERE ADDRESSED IN THE EIS
• Concerns regarding noise and vibration during construction and operation of the project. • Question regarding what noise and vibration management measures are proposed? • Community members and hotel operators were particularly keen to know about night-time noise and vibration impacts.	Member for Parliament Local businesses Local community	Construction impacts (including night time impacts) – section 9.3 Operational impacts – section 9.4 Management measures – section 9.6 *Technical Report 2 – Noise and Vibration Impact Assessment*
• Concerns regarding air pollution, odour and fumes (including use of bunker fuels) and dust during construction and operation of the project. • Question regarding what management measures are proposed?	Local community Local businesses	Construction impacts – section 10.3 Operational impacts – section 10.4 Management measures – section 10.6 *Technical Report 3 – Air Quality Impact Assessment*
• Concerns regarding land contamination, in particular use of fuels.	Local community	Section 12.3 and section 12.4 *Technical Report 5 – Contamination Assessment*
• Question regarding construction staging and work hours. • Community members and hotel operators raised specific questions regarding potential night-time work hours.	Government Interest Groups Local community Utility providers Local businesses	Section 7.3 – Construction program and timing Section 7.3.3 – Construction hours Section 7.3.4 – Works during rail possessions

ISSUE RAISED	ISSUE RAISED BY	WHERE ADDRESSED IN THE EIS
• General concern regarding heritage impacts associated with the project.	Indigenous organisations	Construction impacts – section 15.3 Operational impacts – section 15.4 *Technical Report 9 – Statement of Heritage Impacts*
• Concerns regarding impacts on Aboriginal heritage.	Indigenous organisations	Construction impacts – section 16.3 Operational impacts – section 16.4 *Technical Report 10 – Aboriginal Archaeological Survey Report*
• Concerns regarding flooding issues associated with the project, in particular between Bay Street and Myrtle Street.	Local community	Operational impacts – section 13.4 *Technical Report 6 – Flooding Impact Assessment*
• Concerns regarding visual amenity impacts associated with the project.	Local businesses Local community	Construction impacts – section 18.3 Operational impacts – section 18.4 *Technical Report 11 – Landscape and Visual Impact Assessment*
• General concerns regarding potential impacts on biodiversity as a result of the project.	Local community	Construction impacts – section 11.3 Operational impacts – section 11.4 *Technical Report 4 – Biodiversity Development Assessment Report*
• Concern regarding general traffic disturbance during construction. • Question regarding proposed traffic management strategies during construction and operation. • Some local businesses and hotels raised concern about potential reduction in access to their operations and access to and from the airport, in particular during construction.	Bayside Council Government agencies Local businesses Local community	Construction impacts – section 8.3 Operational impacts – section 8.4 Management strategies – section 8.6 *Technical Report 1 – Traffic and Transport Impact Assessment*
• Concern regarding the transportation of hazardous goods on the rail line.	Local community	Section 21.3 – transportation and handling of dangerous goods *Technical Report 14 – Hazard and Risk Assessment*
• Concern regarding impacts of the project on the Cooks River.	Government Interest groups Local community	Construction impacts – section 14.3 Operational impacts – section 14.4 *Technical Report 7 – Groundwater Impact Assessment* *Technical Report 8 – Surface Water Impact Assessment*
• Question regarding potential opportunities to utilise open space in the rail corridor for an active transport route.	Bayside Council Interest groups	*Technical Report 1 – Traffic and Transport Impact Assessment*

ISSUE RAISED	ISSUE RAISED BY	WHERE ADDRESSED IN THE EIS
• Question regarding property acquisition, adjustments and property values.	Bayside Council Interest groups Local community Local businesses	Section 6.8, section 17.3 (property acquisition and adjustment), section 17.4 (property values) and section 17.5
• Concern regarding maintenance and management of land within the rail corridor.	Community	Section 6.9.3 – Maintenance
• General concerns regarding the design of the project.	Utility providers	Chapter 7 – Construction Section 7.2.1 – Early and enabling works
• Concern regarding the potential cumulative impacts of the project and consideration of other projects currently being undertaken/ proposed in the local area.	Bayside Council Local community Interest groups Local businesses	Chapter 23 – Cumulative impacts Chapters 8 to 22 also consider potential cumulative impacts for each specialist discipline.
• Concern regarding train speeds and the applicable speed limits in residential areas.	Local community	Section 6.9.1 – Operational train movements and connections.

4.2.4 Consultation undertaken as an input to the SEARs

A summary of issues raised by government agencies consulted by the DPIE during preparation of the SEARs is provided in Table A.3 in Appendix A, together with a reference to where they are addressed in the EIS.

4.2.5 Consultation with Government agencies during EIS development

Engagement with key agencies was ongoing during EIS development. As an early part of EIS development, and following review of the SEARs, methodologies to address the key issues outlined in the SEARS were prepared and circulated to relevant Government agencies to obtain their feedback and confirm that the methodologies proposed were appropriate to addressing their requirements. Meetings were held with:

- NSW DPIE
- Transport for NSW (including Roads and Maritime Services)
- Biodiversity and Conservation Division of DPIE (formerly Office of Environment and Heritage) (in particular potential impacts on ecology and cultural heritage)
- Bayside Council.

4.2.6 Engagement with Bayside Council

A community engagement briefing was organised with Bayside Council Community Engagement Officers on 22 May 2019. The purpose of the meeting was to provide Council with an overview of the project and early engagement, identify available promotion avenues within Council and seek suggestions regarding local community groups and groups interested in heritage.

Council advised of various promotions avenues for the upcoming engagement and suggested ARTC review Bayside Councils Local Strategic Planning Statement to identify any heritage interest groups.

4.2.7 Engagement with Aboriginal representatives

As part of the development of the project, consultation has been undertaken with representatives of the Aboriginal community. This has included consultation with the La Perouse Local Aboriginal Land Council (LALC) and the Metropolitan LALC. As part of the consultation, representatives from each LALC were involved with an archaeological site survey in September 2016. Further consultation was also undertaken with the La Perouse LALC in May 2019 as part of additional survey undertaken for the project at this time.

ARTC would continue to consult with the Aboriginal community throughout the project. This would include if any Aboriginal archaeological works are required to be carried out should any Aboriginal objects be unexpectedly found during construction.

4.3 Consultation during exhibition of the EIS

The DPIE will place the EIS on public exhibition for a minimum of 30 days. It is proposed that the EIS would be on display in October and November 2019. During this time, ARTC would undertake further consultation with the community and stakeholders using many of the consultation tools implemented prior to and during preparation of the EIS. This would allow the community and other stakeholders to be informed about the project and provide information to allow them to make informed comments regarding the Project.

A summary of the proposed activities to be undertaken during the public notification of the EIS is summarised below and described further in the following sections:

- advertisements in the local media giving information regarding the project and display of the EIS
- issuing of newsletters to the community (Council newsletters, e-newsletter, other)
- briefings to key stakeholders including Councils
- community information sessions.

4.3.1 Display of the EIS

The EIS will be available for viewing as hard copies at the following locations:

- Mascot Library (2 Hatfield Street, Mascot)
- Eastgardens Library (152 Bunnerong Road, Eastgardens)
- St Peters/Sydenham Library (39 Unwins Bridge Rd, Sydenham)

Electronic copies of the document will also be available to be viewed:

- on the DPIE Major Projects website (www.majorprojects.planning.nsw.gov.au)
- at the Service NSW centre at Botany.

During the exhibition period, the community and other stakeholders will be able to review the EIS and make a written submission to the DPIE for consideration in its assessment of the project.

4.3.2 Project newsletters and project updates

To promote the project and EIS exhibition, a project/update newsletter would be distributed to local residents, government agencies and other relevant stakeholders. The update would be in multiple formats including emailed (to the registered email subscription), printed and used as flyers, and loaded to the project webpage.

Separate letters would also be provided to directly affected residents and businesses, informing them of the community information sessions and EIS exhibition and providing contact details for the project.

4.3.3 Project website and information line

Details of the Project information line (1800 654 446) and Project website (www.artc.com.au/projects/botany-rail-duplication-project/) would be included in all documents to allow members of the community to find more information about the project, exhibition period and how to make a submission.

4.3.4 Briefings to key stakeholders

During exhibition of the project, ARTC will continue to undertake project update briefings with key stakeholders including businesses, hotels, local councils, and any interest groups. Stakeholder briefings would focus on further explaining the project, potential impacts and proposed mitigation measures. The briefings would also inform stakeholders about how they can make a formal submission to the DPIE.

4.3.5 Community information sessions

A public community information session is proposed to be held during the display period to enable community members and other stakeholder representatives to ask questions about the project and provide feedback to ARTC project team members. The community information session would be held at the following location:

Where The Alf Kay Eastlake Community Centre
8/16 Florence Avenue, Eastlakes
When 31 October 2019
4 pm to 7 pm

4.3.6 Consideration of community feedback

At the completion of the display period the DPIE will provide ARTC with a copy of all submissions and a summary of issues raised. ARTC will deal with any submissions received in accordance with the Regulation. A submissions report will be prepared responding to the issues raised and will be made available for viewing on the DPIE website. If changes to the project need to be made, a preferred project report would be prepared.

4.4 Consultation during design and delivery of the project

4.4.1 Consultation and community feedback

Consultation with the community and key stakeholders would be ongoing in the lead up to, and during construction. The consultation activities would ensure that:

- the community and project stakeholders have a high level of awareness of all processes and activities associated with the project
- accurate and accessible information is made available
- a timely response is given to issues and concerns raised by the community
- feedback from the community is encouraged
- opportunities for input are provided.

The 1800 phone number and project email address would continue to be available during construction, along with a 24-hour construction response line. Targeted consultation methods, such as letters, notifications, signage and face-to-face communications, would continue to occur. ARTC's project website and social media platforms would also include updates on the progress of the project.

The following communication tools and activities would be used during the construction phase:

- development of a communication plan detailing a complaints handling process
- continued use of the project email address and 1800 phone number
- updates to the project website
- targeted consultation and notifications such as letters, notifications, and face to face communication
- construction signage.

4.4.2 Complaints management

The construction contractor engaged to construct the project would be required to implement a complaints management procedure during construction of the project. This procedure would be defined within the construction environmental management plan (CEMP), which the contractor would be required to prepare and have approved by ARTC prior to construction commencing.

The complaints management procedure would include the following at a minimum:

- contact details for a 24-hour project response line and email address, for ongoing stakeholder contact throughout the project
- provision of accurate public information signs while work is in progress
- staging of works, developed in consultation with relevant stakeholder groups, to minimise disruption and impacts on community activities and functions
- management of complaints in accordance with ARTC's emergency management procedure, specifically:
    - details of all complaints received will be recorded
    - verbal and written responses will be provided within time limits.

5. JUSTIFICATION AND NEED

This chapter provides background information in relation to how the design of the project has developed. The strategic context to the project's development is described, including the key issues, demands and planning driving the need for the project. A summary of the need for the project is included. The chapter also describes the alternatives to the project as a whole, the process of design development to date and the key design options that were considered as part of the development of the project.

5.1 Strategic context

5.1.1 Existing situation and key issues

The importance of Port Botany

Port Botany is one of Australia's and NSW's most important infrastructure assets. It is the largest container port in Australia and NSW's largest bulk liquid and gas port. Port Botany handles 99 percent of NSW's container demand, moving more than 6,000 containers on average every day. The port also handles 98 percent of NSW's consumption of LPG, 90 percent of bulk chemical products, 30 percent of refined petroleum fuels and 100 percent of bitumen products (NSW Ports 2015).

Together, the international gateways of Port Botany and the nearby Sydney Airport directly serve the Greater Sydney area, the largest city region economy in Australia, and wider areas of NSW. Combined, these gateways generate $10.5 billion of economic activity and handle close to $100 billion of freight. Efficient access to and from the port and airport is critical to the economy. The area around Sydney Airport and Port Botany also has high concentrations of airport and port related businesses that are also important to the economy. The Sydney Airport and Port Botany area is the largest employment area in Sydney after the Sydney central business district (Ernst & Young 2011). As described in section 5.1.2, the amount of container freight handled by Port Botany is predicted to significantly increase.

Existing rail line constraints

As described in section 2.2, the Botany Line forms part of the Metropolitan Freight Network and is the only rail connection linking Port Botany to the major freight destinations in western and south western Sydney and beyond. The majority of the existing Botany Line comprises twin tracks, except for the section between Mascot and Botany where there is only one track. This single track section constrains the ability for freight to enter and depart from Port Botany concurrently. It acts as a bottleneck to the movement of freight services to and from the port and affects freight movements during maintenance activities and results in inefficiencies to the existing network.

The single line section of track also represents a major reliability risk to the freight rail network. If a train was to break down or be involved in an incident in this section of track, all services to/from Port Botany would stop, resulting in more freight on the roads until rail freight services could start again. In addition, the existing line is already operating close to capacity, limiting the line's ability to adequately service future demands for rail freight transport to and from the port (described in section 5.1.2).

Some elements of the existing infrastructure along this section of the Botany Line, such as some of the existing bridge structures, are also nearing the end of their current design life.

Other access issues

As noted by the *NSW Freight and Ports Plan 2018–2023* (Transport for NSW, 2018b), access by both road and rail to and from freight facilities such as ports is becoming increasingly constrained due to the increased demand of general road users and the capacity of the existing freight network. Currently, the ability to increase the share and efficiency of freight moved by rail through Port Botany is constrained by a number of issues, including the section of single bi-directional track between Mascot and Botany. One of the goals of the *NSW Freight and Ports Plan 2018-2023* is to improve rail freight access and flows. As part of this, it is identified that improving the efficiency of the existing network through smaller scale interventions, particularly in the medium term. The development of the project would therefore be a key element in meeting this current access issue and providing efficient and reliable freight transport, allowing for an increase in the share of freight moved by rail.

Mascot and Botany town centres

The Mascot town centre is located on Botany Road, about 300 metres to the north of Sydney Airport. The Botany town centre is also located on Botany Road, about 500 metres to the south of the airport and 2.5 kilometres to the north of Port Botany. Botany Road is one of the main access roads to the Port Botany area and an alternative route between the Sydney central business district and Sydney Airport. Botany town centre is affected by traffic accessing Port Botany via Botany Road.

The Mascot area is experiencing significant urban renewal activity in and around the town centre and Mascot Station. A number of new residential apartment buildings, hotels and commercial developments have recently been constructed with additional sites currently being proposed. The suburb of Botany is also experiencing urban renewal, including various residential developments, particularly near the town centre.

The Mascot town centre and surrounding residential areas are substantially affected by traffic accessing Sydney Airport and Port Botany. Mascot is characterised by high volumes of through and local traffic. This contributes to congestion and access issues, and adversely affects local amenity. Increasing the efficiency and capacity of the rail freight network and proportion of rail modal share for freight transport is an important driver in assisting to address traffic issues in the Mascot and Botany town centres and assist with management of current congestion issues.

5.1.2 Future demands

Over the next 20 years, container freight, air freight, air travel and general traffic in and around the Port Botany and Sydney Airport area are expected to grow significantly. This will put more pressure on roads and other infrastructure and impact local communities. The key demands driving the need for the project are outlined below.

Freight growth

By 2036, the amount of freight moved in NSW is projected to increase from around 482 million tonnes (in 2016) to 618 million tonnes (Transport for NSW, 2018b), an increase of around 28 percent. The amount of container freight handled by Port Botany is predicted to significantly increase – from 14.4 million tonnes in 2016 to 25.5 million tonnes in 2036, representing an increase of 77 percent (Transport for NSW, 2018b).

Providing for the forecast freight volumes at Port Botany will include:

- Port infrastructure works – including works to improve the efficiency and use of existing operations and new port infrastructure to facilitate increases in throughput, as defined by the NSW Ports' 30 Year Master Plan (NSW Ports 2015).
- Transport infrastructure works – including works to improve the efficiency and capacity of freight movement to and from the port.

In addition to the growth in container freight, air freight handled by Sydney Airport is predicted to increase by 64 percent – from 615,378 tonnes in 2012 to 1,011,312 tonnes in 2033 (SACL, 2014). Transporting this freight to and from the airport will also place additional demands on the road network in the study area. If rail freight capacity is not increased, this growth will place additional pressure on the road network.

Increasing demands for rail freight transport

The Australian and NSW Governments have identified clear objectives to increase the share of freight moved by rail – from 17.5 percent in 2016 to 28 percent by 2021 (Transport for NSW, 2018b, Infrastructure Australia, 2018a). In addition, NSW Ports has also set a target of 40 percent of total freight volumes to be transported to and from the port by rail. This represents a substantial increase compared with the current 14 percent share of freight moved by rail (NSW Ports, 2015).

NSW Ports recognises that maximising the capacity of Port Botany requires a combined investment in, and optimisation of, both road and rail networks, and that investment in just one mode will not suffice (NSW Ports, 2015).

Port Botany is the centre of operations for NSW's import/export container supply chain. As such, its efficient operation is critical to maintaining an efficient and effective supply chain. Transporting increased freight volumes to and from the port will place additional demands on the existing rail line, with freight that cannot be accommodated on rail placing additional demands on the surrounding congested road network.

As noted in section 2.2.1 of this EIS, the Metropolitan Freight Line provides a connection between Port Botany and a number of key intermodal terminals and logistics centres across the greater Sydney region. These intermodal terminals, in particular the recently developed Moorebank Intermodal Terminal, will also benefit from the upgrade of the duplication of the Botany Line which would allow the terminal to realise its freight handling potential. The terminal was proposed as part of the NSW and Australian's Governments long-term strategy to increase the movement of freight by rail. At full operation, the terminal will have the capacity to shuttle more than one million TEUs (twenty foot equivalent units – a measurement used to describe cargo capacity) annually between Port Botany and Moorebank by rail. In addition, intermodal terminal volumes and growth targets for Chullora, Enfield, Villawood, Yennora, Macarthur and Cooks River, as well as other regional and interstate freight services, need to be catered for.

Infrastructure Australia has also identified the Botany Rail Duplication project as a high priority initiative (Infrastructure Australia, 2018a) to manage predicted increases in demands for rail freight transport.

5.1.3 Strategic planning and policy context

Over the last twenty years, Australia's need for a more strategic approach to managing and investing in land freight networks has become apparent. The project is influenced by industry strategic planning and policies to provide the infrastructure necessary to service demand for freight accessing Port Botany, intermodal terminals and key supply chains in a reliable, safe and efficient manner. If infrastructure cannot service future demands, planning and policies for freight related activities by the NSW government and private industry cannot be met. To adequately cater for future growth and demand, all industries in the freight supply chain need to have cohesive future planning, objectives and goals to deliver a whole logistics solution.

The strategic context for the project is influenced by strategic planning for transport, land use and freight undertaken at the national, state and regional/local levels. The project is consistent with strategies identified below.

National

- Inquiry into National Freight and Supply Chain Priorities (Commonwealth of Australia, 2018)
- *Australian Infrastructure Plan* (Infrastructure Australia 2016) and the Infrastructure Priority List (Infrastructure Australia, 2018a)
- *National Ports Strategy* (Infrastructure Australia and the National Transport Commission, 2011).

NSW

- *Future Transport Strategy 2056* (Transport for NSW, 2018a)
- *State Infrastructure Strategy 2018–2038* (Infrastructure NSW, 2018a)
- *NSW Freight and Ports Plan 2018–2023* (Transport for NSW, 2018b).

Metropolitan/regional

- *Sydney Metropolitan Freight Strategy* 2015–2024 (ARTC, 2015)
- *NSW Ports' 30 Year Master Plan* (NSW Ports, 2015)
- *A Metropolis of Three Cities* – the Greater Sydney Region Plan (Greater Sydney Commission, 2018a)
- *Eastern City District Plan* (Greater Sydney Commission, 2018b)
- *Greater Sydney Services and Infrastructure Plan* (Transport for NSW, 2018c).

Further discussion of these strategies and their relationship to the project is provided in Appendix E.

5.2 Project need and benefits

5.2.1 Project need

The project is needed to address the issues identified in section 5.1.1, respond to the demands listed in section 5.1.2 and meet the strategic policy initiatives outlined in section 5.1.3.

As described in section 5.2, efficient access to Port Botany (and Sydney Airport) is critical to the economic growth and prosperity of Sydney. Over the next 20 years, container freight, air freight, air travel and general traffic in and around the Port Botany and Sydney Airport area are expected to grow significantly. As also identified, the existing rail line is currently operating close to capacity, with inefficiencies experienced due to the single-track nature of the existing line between Botany and Mascot.

In order to address these constraints, ARTC undertook a capacity analysis of the Botany Line as part of the Sydney Metropolitan Freight Strategy 2015–2024 (ARTC 2015). Based on the predicted growth at the time (2014), it was concluded that the Botany Line would reach capacity by 2022. The existing bi-directional single track section between Mascot and Botany acts as a constraint to the current efficiency of the line as well as the ability to increase the number of movements of trains along the line. Additional demand arising from the predicted growth in container freight has the potential to create a bottleneck along this line, impacting on reliability and restricting the efficient movement of freight across the broader Metropolitan Freight Network.

As Sydney's primary container port (supporting a majority of container transport into and out of NSW), it is vital that Port Botany maintains the capacity to meet freight demands over the long term. The project is needed to support improved rail efficiency to and from Port Botany and enable more freight to be moved by rail to meet expected increases in demand.

The project is also needed to allow for the encouragement of shifts towards freight transport from road to rail, and support a reduced rate of growth in truck movements and associated traffic congestion around Sydney Airport and Port Botany. One freight train equates to about 54 trucks. The increased efficiency of the existing line as a result of the project would be a vital part of the solution to encourage freight to be transported by rail, reducing the need to transport freight by road and therefore overall congestion on the roads around Port Botany and Sydney Airport.

In addition, while Sydney Airport is serviced by a passenger rail link, air freight vehicle movements will continue to rely on the road network. The numerous businesses located in the vicinity of Sydney Airport and Port Botany that require access to these gateways depend on the existence of a road network that provides fast and efficient access. Diverting a large percentage of Port Botany's freight transport from road to rail could free up capacity for road-based air freight transfers from the port to the airport and similarly improve other traffic movements around the airport, Port Botany and the local area. Improving efficiency and reliability on the existing freight rail network (alongside other project initiatives such as the Sydney Gateway road project) is expected to allow this shift to occur.

5.2.2 Project benefits

Overall, the project would assist in alleviating an existing constraint within Sydney's existing freight rail network (the Botany to Mascot single section of track) allowing for an increase in the capacity of the network to meet existing and future demands. By 2030, the Botany Duplication Project is expected to allow for increased freight movement on the Botany Line from the current average of about 20 trains per day (per direction) up to around 45 trains per day (per direction) by 2030, based on current and predicted operational requirements identified by ARTC.

Other expected benefits of the Botany Rail Duplication Project would include:

- supporting connection to, and operation of, current and future metropolitan intermodal terminals, including Enfield, Chullora and Moorebank
- encouraging a shift in freight transport from road to rail, and support a reduced rate of growth in truck movements and associated traffic congestion around Sydney Airport and Port Botany
- providing capacity for freight traffic accessing and exiting Port Botany well beyond 2030
- enabling efficient train paths and speeds delivering increased service reliability and productivity to freight rail customers
- improving rail market share
- reduce environmental and other road related externalities.

These benefits are consistent with the key strategic policies driving the need for the project, in particular the *NSW Freight and Ports Plan 2018–2023* (Transport for NSW, 2018b) and *Sydney Metropolitan Freight Strategy* 2015–2024 (ARTC, 2015).

5.3 Alternatives to the project as a whole

This section describes the alternatives to the project as considered by this EIS. These included:

- alternative freight transport solutions
- alternatives to provide additional freight network enhancements
- a 'do nothing' alternative'.

5.3.1 Alternative freight transport solutions

Currently the majority of freight in NSW is transported by road. This is due in part to the historical inequity in the provision of road and rail infrastructure, but is also related to the superior efficiency and flexibility offered by road transport. Road transport of freight offers the following benefits:

- shorter door-to-door transit times than rail
- high reliability (on time), and high flexibility and availability to meet customer's preferred dispatch and receive times.

The NSW Government is currently either delivering or in the detailed planning phase of a number of road projects across Sydney, such as WestConnex, NorthConnex, Western Harbour Tunnel, Beaches Link, the F6 Extension and major road projects to support the future Western Sydney Airport, and across regional NSW through the Bridges for the Bush Program, Fixing Country Roads Program, the Regional Road Freight Corridor Fund and the Pacific, Newell and Great Western highways upgrades. However, while investment in road projects forms part of the solution to meeting and futureproofing Sydney's and the state's freight network needs, improvement of the existing road network as the only freight transport solution is, by itself, insufficient to address the forecast growth in freight demand. It is recognised that an efficient freight transport system also includes consideration of longer distance freight transport by other modes such as rail and ship transport between intermodal and port facilities.

While providing an increased capacity in the existing road network (through additional road corridors) would provide a viable option for supporting the existing and predicted freight capacity requirements within Sydney, there would be a number of environmental and safety impacts associated with the road transport of freight (when compared to alternative transport solutions including rail). These include:

- higher transport costs
- increased road congestion
- increased potential for traffic accidents
- greater road traffic noise affecting sensitive receivers nearby.

To meet the forecast growth in freight demand while minimising the environmental and social impacts associated with the use of road for freight transport, the NSW Government has highlighted the need to significantly increase the share of freight transported by rail. This is reflected in a number of existing policies, in particular the *NSW Freight and Ports Plan 2018–2023* (Transport for NSW, 2018b) and *Sydney Metropolitan Freight Strategy* 2015–2024 (ARTC, 2015) (refer to section 5.1.3. and Appendix E for details). NSW Ports has also recognised that maximising the capacity of Port Botany will require a combined investment in both road and rail networks, and that investment in just one mode will not be sufficient to meet future demand (NSW Ports, 2015).

While increasing the existing road network would provide a viable option for supporting the existing and predicted freight capacity requirements, the potential impacts associated with this alternative necessitated the need to consider alternative investment options, including upgrade to the existing rail freight network.

5.3.2 Alternative and complementary freight network enhancement options

As described in section 2.2.1, access to Port Botany and Sydney's main intermodal terminals is via the Metropolitan Freight Network, including existing lines such as the Botany Line and Southern Sydney Freight Line. Therefore, to support transporting increased freight volumes to and from Port Botany and the main intermodal terminals, enhancement options needed to focus on constraints identified on this network. In conjunction with the Federal Government, ARTC has developed a program of works to meet growing demand for container transport by rail to and from Port Botany.

These are described as follows:

- **Phase 1 works** – Botany Yard Reconfiguration. Reconfiguration and upgrade of signalling within the Port Botany Rail Yard, which is the interface between the rail network and the Stevedore port loading facilities.
- **Phase 2 works** – Re-signalling. New staging works at Enfield Yard and new signalling systems along with signal control separation from Sydney Trains along the Botany Line route. This provided train control of the of the full Port Botany rail line route by ARTC's Network Control Centre at Junee.
- **Phase 3A works** – Track Upgrading. Upgrade the existing condition of the Botany Line between Botany and Sefton.
- **Phase 3B works** – Port Botany Capacity Project. Analysis and design of enhancement options to the Metropolitan Freight Network (including this project).

While each of the options identified would provide specific improvements, each individual phase of work would not be sufficient to improve the capacity and efficiency of the existing freight network alone. As such, the Phase 3B works (the subject of this EIS) were considered as part of a range of enhancement options to fulfil the following planning principles:

- connectivity – located in areas providing effective capacity benefit and consideration of operational requirements and external impacts
- efficiency – better use of the existing network could release capacity and improve service levels
- flexibility – infrastructure and operations should be responsive to customer needs and predicted demand
- staging –timing of construction is a significant consideration to meet predicted demand
- environment – reduce impacts on the environment and community (where possible)
- property – reduce impacts on property or land acquisition (where possible).

Desktop analysis was undertaken that identified a number of potential locations and solutions available to provide enhancement opportunities (as part of the Phase 3B works described above) including:

- a number of passing loop options along the Southern Sydney Freight Line at locations including Cabramatta, Minto South, Leightonfield, Cabramatta, Minto North and Casula
- modifications to the existing Botany Yard
- track extension and duplication options along the Botany Line.

Key criteria used to model and assess the above enhancement opportunities included:

- maximum normal operating speeds based on track parameters, gradient and train operator requirements
- where loops were considered, the simultaneous entry loop standard was used to reduce track infrastructure requirements, increase operational performance and satisfy commercial rigour
- provision of bi-directional signalling to increase capacity, flexibility and reliability to the network and customers
- consultation with nearby Intermodal Terminal operators.

The modelling identified which enhancement opportunities provided the greatest capacity benefit and when they would be required, based on predicted demand. The desktop analysis identified two preferred infrastructure enhancement options as requiring further concept design work:

- a passing loop on the Southern Sydney Freight Line at Cabramatta (refer to section 5.5)
- provision of capacity improvement along the Botany Line.

This EIS addresses the proposed alternative to provide capacity improvement along the Botany Line. Refinement of the preferred capacity improvement option is provided in section 5.4.1.

5.3.3 The 'do-nothing' alternative

In addition to the alternative transport options considered above, a 'do nothing' alternative was also considered. The 'do nothing' alternative would involve operating the existing rail line in its existing configuration. Under this alternative, the section of line between Mascot and Botany would continue to operate as a single track with passing loops. While this option would continue to meet the current freight demand from Port Botany, this option would not provide a suitable outcome to meet future predicted demand or support a modal shift for freight transport from road to rail. It was therefore concluded that a 'do nothing alternative was not feasible and not considered further.

5.4 Project options considered

The SEARs define options as variations of the same project, such as the design or location of an intersection or bridge. The followings section describes the options that were considered as part of the design development process including overall alignment options (section 5.4.1) as well as options considered for individual components of the project (section 5.4.2).

5.4.1 Alignment options

Following identification of capacity improvement along the Botany Line as the preferred alternative to meet the project needs, the identified alternatives were then further considered. This was undertaken in two general phases including:

- Feasibility design – which considered three identified sub-alternatives along the Botany Line.
- Concept design – which undertook further design refinement of the preferred concept option.

The considerations undertaken during each of these phases is provided below.

Feasibility design

The feasibility design phase considered three main project alignment options. These options included:

- Option 1 – a 900 metre track extension at the south-eastern (Botany) end to reduce the length of the single line section.
- Option 2 – a 800 metre track extension at the north-western (Mascot) end to reduce the length of the single line section.
- Option 3 – duplication of the single-track section for the entire 2.9 kilometre length between Mascot and Botany.

Initial operational modelling was also undertaken in mid-2014. Preparation of the feasibility design included investigation of a number of sub-options within the options listed above. The outcome of the studies undertaken as part of the feasibility design identified that while all three options would be technically feasible, each would present a varying degree of asset or infrastructure relocation, environmental impact, inherent major project coordination risk and a number of minor land takes and services easement adjustment requirements.

As a result, it was recommended that concept design of the three options proceed to identify a preferred option.

Concept design

In 2015–2016, ARTC prepared a concept design for the project to build on the previous feasibility design. Further analysis using updated information was undertaken as part of this process. The performance of the three options was assessed in terms of cost, capacity and potential impacts on reliability and service frequency. Each of the options were also further considered against measures including compliance with project objectives, constructability and staging, environmental impacts, compliance with ARTC and other standards and general consideration of impacts such as land take/impact to road reserve, waterways and private or commercial land.

ARTC considered the following items for the concept design:

- vertical and horizontal alignment to accommodate operational requirements
- impacts on existing bridge and culvert structures, with particular attention to the Robey Street bridge at the interface with Sydney Gateway Project
- retaining wall locations and heights
- interaction between the proposed rail line and existing high pressure gas mains in and adjacent the project site
- drainage, other service utilities and signalling.

The completion of the concept assessment concluded that option three (full duplication between Botany and Mascot) performed best, from both a capacity perspective (well beyond 2030) and based on a proportionate additional cost to reduce the remaining risk. While the two remaining options (ie upgrading smaller, discrete sections of the existing single track) would result in some benefits (typically reduced environmental impacts due to shorter sections of track to be constructed), these options would still not completely resolve the issue of the existing configuration. These options would still require freight trains to wait to pass the single-track pinch point (generally between Mill Street and north of General Holmes Drive). These options would therefore not meet the main objective of the project to improve the efficiency and reliability of the Botany Line in order to encourage a modal shift for the transport of freight from road to rail.

The full duplication between Botany and Mascot therefore presented the best option to meet the objectives for the project, and was considered to be the preferred alignment option.

5.4.2 Options considered for the preferred alignment

Following identification of the preferred alignment for the project, the project continued to evolve as a result of future consideration of potential engineering, traffic, financial, economic and environmental impacts. The outcomes of this ongoing design development is presented in the following sections.

Approach to the option development and design process

Option development has been an integral part of the overall design process for the project. An iterative process of option selection, design development and evaluation has been undertaken to define the project to date. The option selection and design process has also taken into account the issues raised during consultation with relevant stakeholders (refer to Chapter 4), and the findings of ongoing environmental investigations. Options assessments have been undertaken for the following features of the project:

- rail alignment between Robey and O'Riordan streets
- bridges over Robey and O'Riordan streets
- ground treatment near Mill Stream
- bridge over Botany Road
- bridge over Mill Stream
- rail alignment between Mill Stream and Banksia Street.

In general, the assessments involved the following tasks:

- confirm requirements
- identify options to be assessed
- review potential impacts, constraints, risks and opportunities associated with each option
- agree on evaluation criteria
- assess the options against the criteria using a multi-criteria analysis
- identify the preferred option.

Options assessment outcome

A summary of the outcomes of the options assessments for these features is provided in Table 5.1. A detailed description of the option assessment process, including the key issues driving the options, the options considered, assessment process and criteria, and assessment results is provided in Appendix F.

Table 5.1 Options considered and preferred option

PROJECT FEATURE	OPTIONS CONSIDERED	PREFERRED OPTION	ADVANTAGES/JUSTIFICATION OF PREFERRED OPTION
Rail alignment between Robey and O'Riordan streets	• Duplication on the south (down) side • Duplication on the north (up) side	• Duplication on the south (down) side	• The majority of works to construct this option could be undertaken while trains continue to operate. • Located further from existing buildings (including the Stamford Plaza hotel) and maintains the existing separation distance between the buildings and nearest track. • Lower constructability risks. • Significantly less temporary construction works required.

PROJECT FEATURE	OPTIONS CONSIDERED	PREFERRED OPTION	ADVANTAGES/JUSTIFICATION OF PREFERRED OPTION
Bridges over Robey and O'Riordan streets	• Individual bridges and retaining walls • Viaduct	• Individual bridges and retaining walls	• Individual bridges o enable rail operations to proceed during construction o fewer enabling works and less reliance on short term possessions, with less risk to the construction program o fewer temporary works required.
Ground treatment near Mill Stream	• Do nothing • Remove and replace compressible soils • Dynamic compaction • Surcharging • Ground improvement by continuous modulus columns	• Installation of continuous modulus columns	• The preferred option would minimise impact to Mill Stream with minimal post construction settlement. • Minimises ground disturbance and impacts on the ethane pipeline.
Bridge over Botany Road	• Do nothing other than light refurbishment works • Replace bridge • Minor modification to existing walls	• Do nothing other than light refurbishment works	• The preferred option would retain the existing bridge in situ and would only require minor modifications or refurbishment to accommodate the new track alignment.
Bridge over Mill Stream	• Single span • Two span with pier adjacent to northern side of the Mill Street embankment	• Two span with pier adjacent to northern side of the Mill Street embankment	• The preferred option would result in a smaller overall construction footprint required to construct the project (for proposed construction equipment to construct the bridge). • The preferred option is also required to meet the structural needs of the proposed bridge (weight of the supporting structural bridge beams).
Rail alignment between Mill Stream and Banksia Street	• Duplication on the south (down) side • Duplication on the north (up) side	• Duplication on the south (down) side	The preferred option would have the following advantages: • a shorter overall length of track would be required • minimal works to tie into existing tie-in point • reduced impact on the existing ethylene and ethane gas pipeline and drainage channel • reduced impacts on sensitive land uses including no direct land property impacts on the Eastlake Golf Course.

Consideration of alternative construction methodologies

Given the constrained nature of the existing rail corridor, limited options were available for consideration of alternative construction methodologies for the main track works. However, where opportunities were identified as part of the options assessment undertaken for the options identified above, consideration of alternative construction methods was included as part of the overall options assessment (for example, the options for the Mill Stream bridge alternatives considered the alternative construction methods for constructing the new bridge).

Additionally, as discussed in section 8.3.3, the impact of alternative construction methods on potential traffic impacts have been considered as part of the proposed additional bridge structure over Southern Cross Drive.

5.5 Related and complementary projects

In addition to the Botany Duplication project, a number of other projects are currently being undertaken, or are currently proposed, which will assist in improving the movement of freight to and from Port Botany or contribute to addressing the issues and demands described in section 5.2. These projects are currently being undertaken (or proposed by other proponents) and include:

- rail projects:
    - Cabramatta passing loop project.
    - other upgrades to the Botany Line
- road projects:
    - Sydney Gateway road project
    - Sydney Airport precinct road upgrades including:
    - Mascot intersection upgrades.

These proposed developments and their relationship to the current project are briefly summarised below.

5.5.1 Rail projects

Cabramatta Loop project

In addition to the project, ARTC is proposing to construct a new passing loop at Cabramatta (the Cabramatta Loop project) to improve the movement of trains between intermodal terminals in Western Sydney and Port Botany. The Cabramatta Loop project includes the following key features:

- construction of new track approximately 1.3 kilometres long to enable carriages to simultaneously pass each other through the ‘loop track’ from both directions. This track would run parallel to, and form part of, the Southern Sydney Freight Line
- two new rail bridges to be constructed over Sussex Street and Cabramatta Creek/Railway Parade
- adjustment to the road alignment and parking configuration of Broomfield Street, Cabramatta.

Similar to this project, the Cabramatta Loop project would assist in responding to anticipated growth in demand for freight by providing additional freight transport infrastructure to improve overall freight rail efficiency for the Metropolitan Freight Network.

At the time of preparing this EIS, this project was still in the planning approval process.

Other upgrades to the Botany Line

These projects involved reconfiguring freight rail operations at the Botany rail yard, separating urban rail and freight train control and signalling interfaces for centralised control by the ARTC, and increasing freight train staging capacity (refer to section 5.3.2 above). In addition, track upgrade works will replace remaining timber sleepers with concrete sleepers, installed heavier weight rail and improved ballast.

These upgrades complement the project by providing for increased capacity and efficiency of operations on the line. Each of these proposed developments are currently being considered and are at various stages of development.

5.5.2 Road projects

A number of road projects are also currently being undertaken (or are proposed) which are aimed at (among other objectives) improving traffic flow around Sydney Airport and to Port Botany, and supporting the efficient distribution of freight to and from Port Botany and Sydney Airport to logistic centres in Western Sydney. These projects include:

- Sydney Gateway road project
- Sydney Airport precinct road upgrades including:
  - Airport North Precinct Upgrade
  - Airport East Precinct Upgrade
- Mascot intersection upgrades.

While these projects do not directly connect with the Botany Rail Duplication project, some of the overarching objectives of these road projects are consistent with the proposed objectives of the current project. One of the overall objectives of these projects is to support the efficient distribution of freight to and from Port Botany and Sydney Airport to logistic centres in Western Sydney and improve the movement of freight to and from Port Botany.

Similar to the proposed need for the Botany Duplication project, the identified road projects would also assist in improving efficiency and reliability of the wider existing freight network from a road transport perspective, by improving and traffic movements around the airport, Port Botany and the local area.

6. PROJECT FEATURES AND OPERATION

This chapter provides a description of the project's features and operation for the purposes of the EIS. It includes a description of the approach to avoiding/minimising impacts during the design process, the infrastructure proposed as part of the project, land requirements and how the project would operate. The proposed approach to construction of the project is described in Chapter 7.

6.1 Overview

6.1.1 The project

The project would involve construction and operation of a new second rail track predominately within the existing ARTC rail corridor for a distance of about three kilometres between Mascot and Botany. This section of the existing Botany Line would be converted from one rail track to two parallel rail tracks. The proposed new second track would be located on the southern side of the existing track for the length of the duplication. Some sections of the existing single track would also be upgraded with sections proposed to be moved sideways (slewed) within the rail corridor to make room for the new second track.

The project would also involve upgrading existing rail bridges to meet necessary standards and provide for the new second track as well as other ancillary infrastructure upgrades such as signalling and drainage.

Table 6.1 provides a summary of the key project elements which make up the project.

Table 6.1 Summary of the project

PROJECT ELEMENT	SUMMARY OF PROJECT ELEMENT
Track infrastructure	
Track works	• A new track would be installed predominately within the rail corridor for the entire length of the project site on the southern side of the existing track. • The new track would include the track formation, ballast and associated rail infrastructure. • The existing track would be upgraded (where required) including raising/realigning (slewing) within the existing rail corridor. • Four new crossovers would be constructed within the existing rail corridor at two locations. • Existing track drainage within the rail corridor would be adjusted as required to suit the new or revised track levels.
Rail bridges	
Robey Street Bridge	• Construction of two single span bridge structures. One of the new structures would be located on the southern side of the existing bridge, while the other would be constructed in the position of the existing bridge (which would be removed as part of the project).
O'Riordan Street Bridge	• Construction of two single span structures. One of the new structures would be located on the southern side of the existing bridge, while the other would be constructed in the position of the existing bridge (which would be removed as part of the project).
Botany Road Bridge	• Some minor remediation works may be required to the abutments and headstock of the existing bridge. The existing bridge would be retained as part of the project.

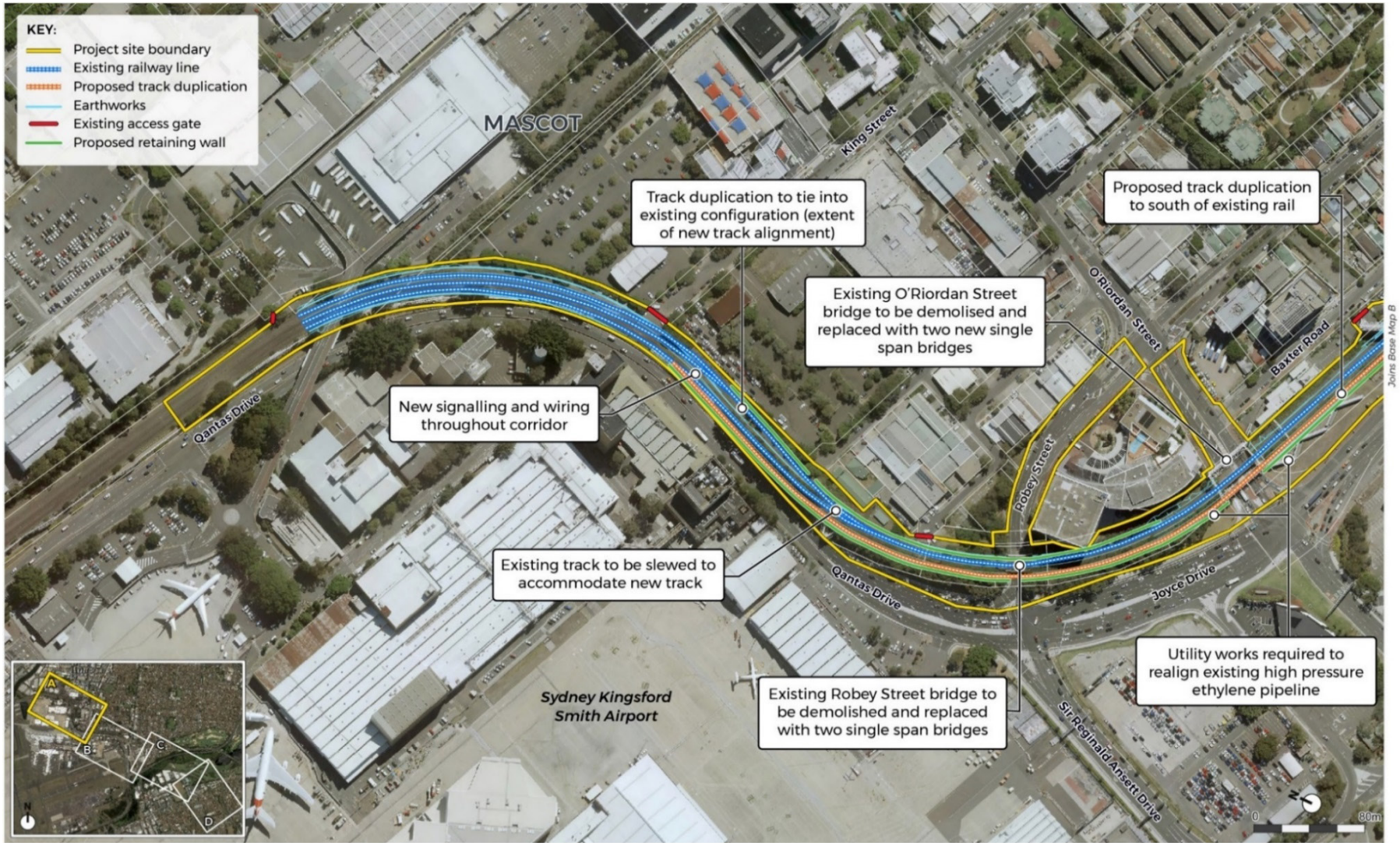
PROJECT ELEMENT	SUMMARY OF PROJECT ELEMENT
Southern Cross Drive bridge	• Construction of a new two-span bridge structure to be located to the south of the existing bridge. • The existing bridge would be retained.
Mill Stream Bridge	• The proposed bridge works at Mill Stream would involve a new two-span bridge structure to be located south of the existing bridge. The proposed bridge pier would be sited outside the banks of Mill Stream. • The existing bridge would be retained.
Other structures	
Embankments, cuttings and retaining walls	• New embankments, embankment widening and minor cuttings would be required along the following sections of the corridor: o between Southern Cross Drive and Botany Road (within the 'Botany triangle') on the southern side of the existing track o between the eastern side of Mill Stream and Southern Cross Drive on the southern side of the existing track o between Bay Street and the western side of Mill Stream on the southern side of the existing track. • New retaining walls would likely be required in areas along the length of the project. The largest retaining walls, would likely be located between O'Riordan Street and west of Robey Street on the southern side of the rail corridor and, subject to detailed design, are not anticipated to exceed around 4.5 metres from road level.
Utilities relocation and protection	• Impacted utilities would be relocated or protected in line with the requirements of the utility providers and potential site constraints. • Key utility works that would be required as part of the project include: o relocation or protection of the existing Qenos high pressure ethylene pipeline o protection of the existing APA group ethane pipeline o protection or relocation of the existing Jemena gas mains o protection or relocation of other minor utilities as required (to be determined during detailed design) o protection or relocation of existing Ausgrid high voltage (HV) cables.
Billboard adjustments	• Temporary removal of a number of existing billboards during construction to allow for construction of the new second track and associated structures. • Replacement of impacted billboards following completion of construction works. Where billboards cannot be relocated within their original location due to space constraints, replacement billboards would be installed within other sections of the corridor. If opportunities for replacement or relocation are not available, the affected parties would be appropriately compensated under the *Land Acquisition (Just Terms Compensation) Act 1991*.
Land acquisition	
Land acquisition	• A series of minor, partial property acquisitions would be required adjacent to the existing corridor, generally between a point west of King Street and east of O'Riordan Street, Mascot. The land which would require acquisition to accommodate a wider rail corridor would consist of small portions of existing commercially-owned land parcels adjacent to the existing corridor.

PROJECT ELEMENT	SUMMARY OF PROJECT ELEMENT
Operation of the project	
Train movements	• Expected train movements (per day, per direction) during operation are: o 2020 – 32 trains o 2025 – 38 trains o 2030 – 45 trains.
Operational management	• The line would continue to operate during the existing operational hours which currently includes 24 hour a day operation.
Maintenance	• Standard ARTC maintenance activities would be undertaken during operations. • Typically, activities would include minor maintenance works, such as bridge and culvert inspections, rail grinding and track tamping, through to major maintenance, such as reconditioning of track and topping up of ballast, as required.

It is noted that the project scope described in this chapter is based on the current level of design development which has occurred to date. Detailed design would include further engineering, construction planning and detailed assessment work, and would be subject to further input from key stakeholders and the community.

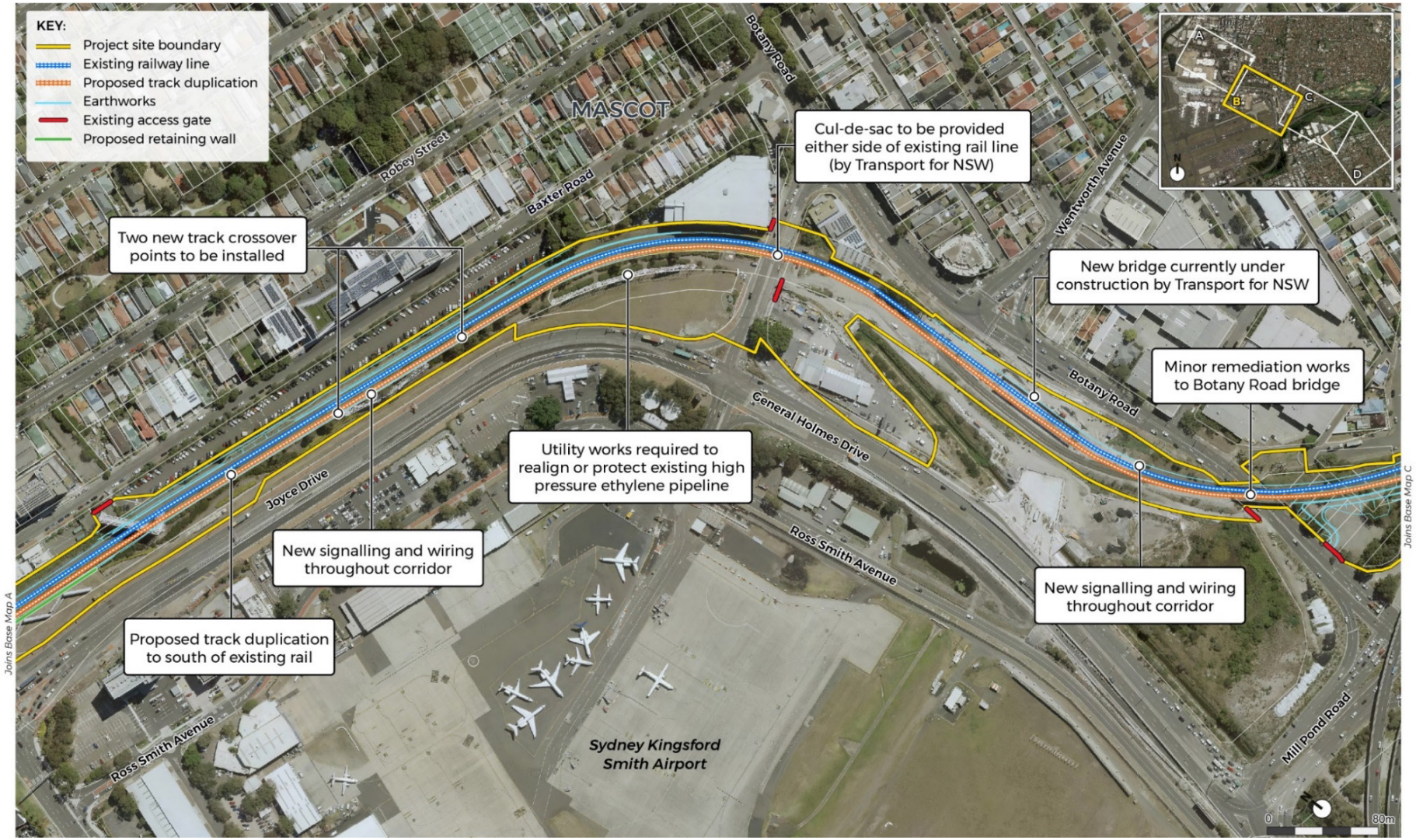
A description of how the design for the project (as described in this chapter) was developed has been provided in Chapter 5. Any design modifications that occur as a result of matters arising during the exhibition of this EIS would be identified in a submissions report or a preferred infrastructure report.

The key features of the project showing the new second track in relation to the existing track configuration is shown on Figure 6.1a to Figure 6.1d.



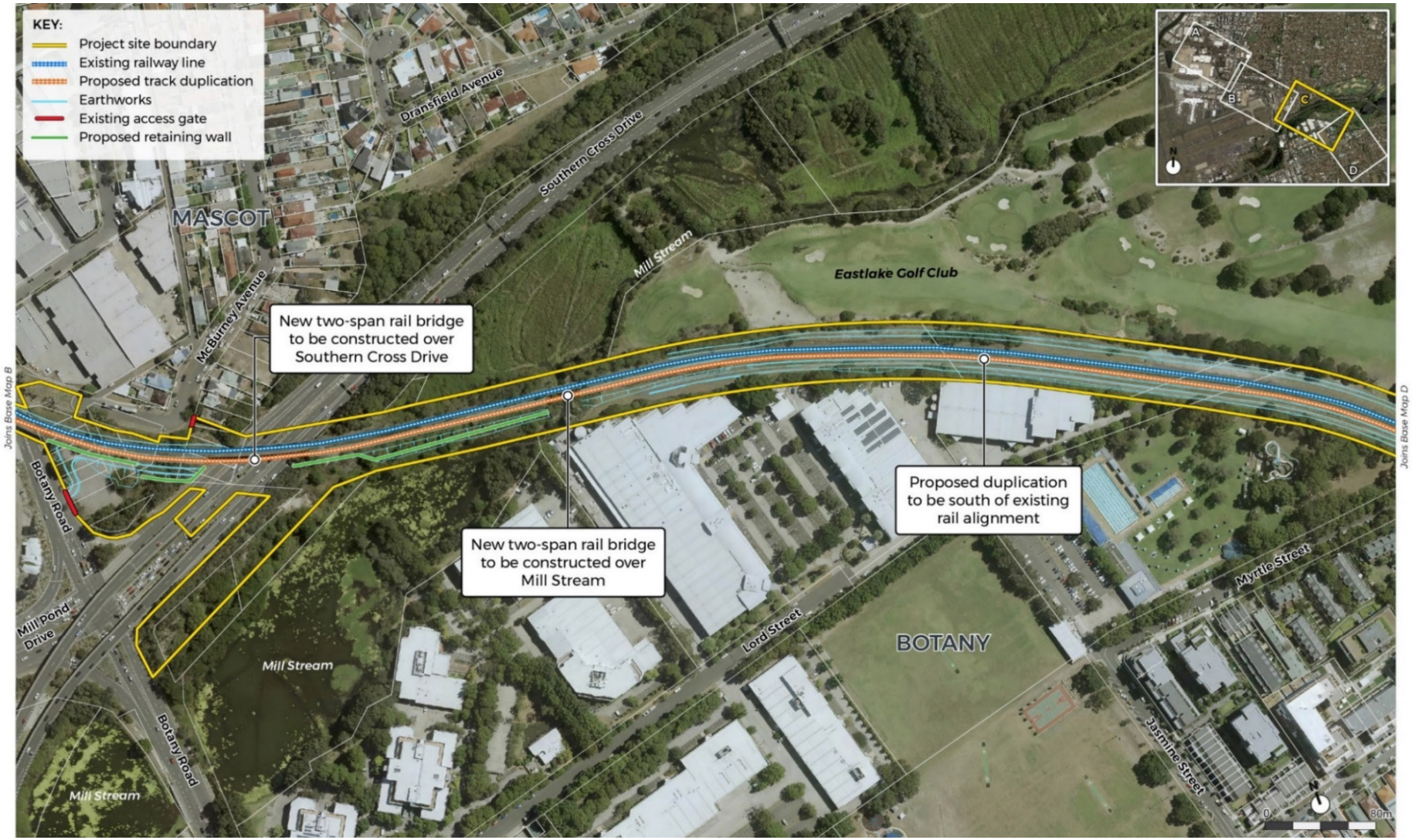
Note: Indicative, subject to detailed design

Figure 6.1a Key features of the project



Note: Indicative, subject to detailed design

Figure 6.1b Key features of the project



Note: Indicative, subject to detailed design

Figure 6.1c Key features of the project

Note: Indicative, subject to detailed design

Figure 6.1d Key features of the project

6.1.2 Approach to avoiding or minimising impacts

The approach to design development has included a focus on avoiding or minimising the potential for impacts during all key phases of the project. As described in Chapter 5, the multi-criteria assessments undertaken during the option selection and design process for key infrastructure included consideration of environmental and social impacts. Various option assessments have been undertaken and the preferred option chosen based on the outcome of these. The options assessment process also included assessment of opportunities and risks.

The key constraints that have influenced the design of the project as described in this chapter are summarised in Table 6.2 together with how the project has developed to date to avoid or minimise potential impacts. Further approaches to minimising impacts are also identified.

Table 6.2 Key constraints and how the design has avoided/minimised environmental impacts to date

KEY CONSTRAINT	APPROACH TO AVOIDING/MINIMISING IMPACTS
Sydney Airport's prescribed airspace	The design of the track form through Sydney Airport's prescribed airspace has been developed to mitigate any additional permanent encroachment into the existing OLS zone, where possible. Ongoing detailed design would seek to further reduce any potential permanent encroachment into the existing OLS zone.
Operation of the surrounding road network and access to Sydney Airport	Initial assessments of the Botany Road bridge have been undertaken which have mitigated the need for demolition and replacement of the existing bridge structures. This removes the need for any full road closures of Botany Road to undertake works on the bridge.
Watercourses and hydrology	The current design of the Mill Stream bridge has been developed to avoid the need for instream structures within Mill Stream. The detailed design of Mill Stream bridge would be optimised to minimise upstream or downstream scour effects on the existing watercourse.
Heritage	Works required on the Botany Road bridge (including potential removal of existing bridge structures) were altered so the heritage listed bridge didn't need to be removed.
Significant ecological communities/species	Operational aspects of the project would be positioned within the existing rail corridor to minimise impacts on vegetation, where possible.
Contamination	Where areas of known soil contamination have been identified, detailed design would seek to optimise allowance for capping of this material to reduce generation of contaminated waste (due to excavation during construction) and reduced ongoing risk from potential disturbance during operations).
Land use	Operational aspects of the project would be designed to be located within the existing rail corridor to minimise permanent impacts on any private residential or commercial properties or adjacent lands (where possible).
Utilities	Operational aspects of the project have been designed or positioned, where possible, to avoid existing utilities. Where utilities cannot be avoided, the design has been developed to provide additional elements in order to protect these utilities (such as provision of a protection slab).

KEY CONSTRAINT	APPROACH TO AVOIDING/MINIMISING IMPACTS
Billboards	The current track alignment has been developed to mitigate the effects of associated civil and structural elements on the existing billboards, where possible. This design would be further refined during detailed design in order to further reduce impacts on existing billboards where practicable. The final track alignment has been designed to allow for permanent reinstatement of the same number of billboards as currently exist, noting that some billboards may need to be relocated to other locations due to space constraints within the rail corridor. If opportunities for replacement or relocation are not available, the affected parties would be appropriately compensated under the *Land Acquisition (Just Terms Compensation) Act 1991*.
Safety	New access gates have been located in order minimise interaction with rail traffic and impact on existing road network.
Rail operations	The location of new crossovers will be refined through detailed design to mitigate the impacts on adjacent receivers.

6.2 Track infrastructure

6.2.1 Track duplication

A new section of track would be installed within the rail corridor for the entire length of the project site. The new track would commence around 80 metres north of King Street at Mascot and traverse the existing corridor on the southern (Down) side of the existing rail line until connecting with the existing duplicated section of track to the south of Banksia Street at Pagewood. The new second track would become the Down Botany Line (the track heading away from Port Botany) with the existing track becoming the Up Botany Line (the track heading towards Port Botany). The location of the new second track and its relation to the existing track is shown in Figure 6.1.

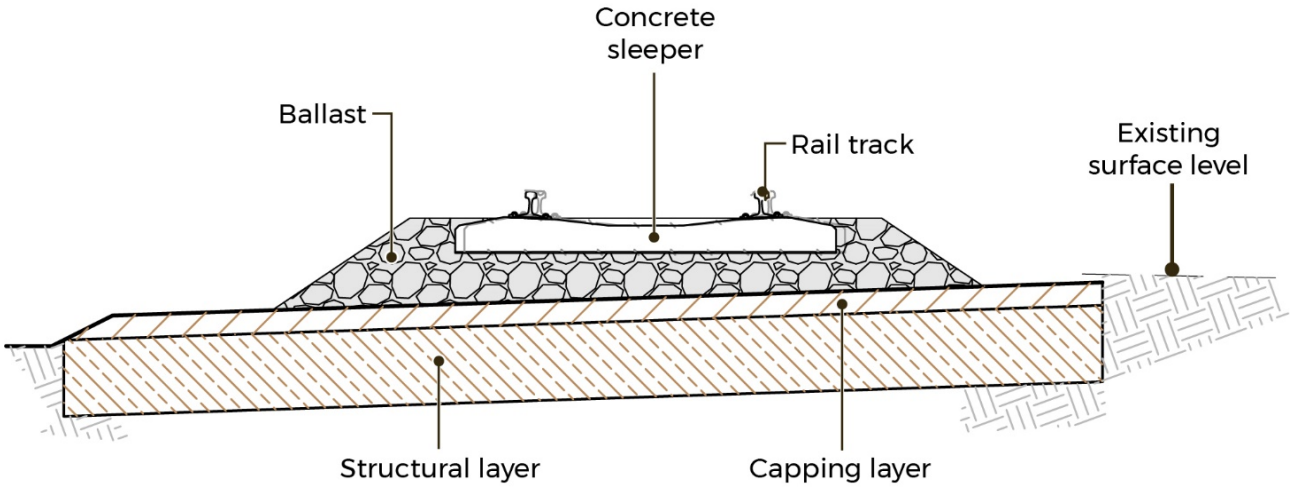
The new second track would traverse a series of different terrains adjacent to the existing track, from flat to varying undulating terrain, resulting in the need for the new track to be located on a range of embankment types and retaining wall structures (refer to section 6.4). The vertical alignment of the duplicated track would generally match that of the existing track.

In some locations, the existing track alignment would need to be moved or realigned to provide space for the new second track to be installed. Further information on this is provided in section 6.2.2.

New track formation

The track formations for the project would be consistent with ARTC's current engineering standards. The new track formation would be consistent with the existing track and would consist of ballast and concrete sleepers. The ballast would overlay a capping and structural layer consisting of quarry materials. A schematic design for this form of treatment is provided in Figure 6.2. The track formation for the proposed bridges would also include ballasted track with concrete sleepers supported on a concrete bridge deck.

Some existing track may also require reconstruction or extension in combination with other structures such as retaining walls (refer to section 6.4). A maintenance access track would also be provided wherever possible along the length of the project to provide access for maintenance personnel during construction and operations.



Note: Indicative, subject to detailed design

Figure 6.2 Typical new track formation

6.2.2 Existing track upgrade

The existing track would either be retained in situ or, raised or moved/realigned (slewed) sideways within the existing rail corridor as required to make room for the new second track (described in section 6.2.1).

Track upgrading (where required) would generally be undertaken in the north-western (Cooks Loop) and south-eastern (Botany and Pagewood) portions of the project site, typically where tie in of the existing and new tracks is required. This would consist of work similar to typical maintenance activities routinely undertaken by ARTC, however given the works required for the proposed tie ins, these works have been deferred to be included during construction of the overall project.

Track upgrade works would typically involve:

- preparing new (or upgrading existing) track formation (the material on which the ballast and tracks are laid)
- placing new (or reconditioned) track ballast on the formation
- installing new (or reusing existing) concrete sleepers and rail track.

In addition, the existing level crossing at General Holmes Drive would require removal. This work is outside the scope of the current project and will be removed as part of the Airport East Precinct works.

The location of the sections of existing track to be retained or moved are shown in Figure 6.1.

6.2.3 New crossovers

Four new crossovers would be constructed within the existing rail corridor at two locations. The crossovers would be provided to enable trains to change direction or move from one track to another where operational circumstances require. Two crossovers would be located about midway between O'Riordan Street and General Holmes Drive, Mascot. Two crossovers would be located generally between Bay Street and Banksia Street, Botany.

The location of the proposed track crossovers is shown in Figure 6.1.

6.2.4 Track drainage

The existing rail corridor contains a number of existing stormwater drainage systems including sub surface box culverts, reinforced concrete pipes and formation level cess drains adjacent to the track to convey overland flows.

The existing track drainage system within the rail corridor would be adjusted as required to suit the new or revised track levels and address any drainage issues identified. The existing cess drains would, where possible, be retained to ensure that the performance of track formation is maintained. Some changes to this drainage would potentially be required including:

- extension of existing drainage to accommodate the new second track
- the construction of drainage systems to accommodate additional drainage impacts as a result of the project.

Overland flow from the new second track would generally drain to new cess drains located on the south of the corridor. These drains would then drain to new sub-surface cross or longitudinal drainage systems and connect into existing drainage systems.

Scour protection would also be provided in cess drains and at the outlets of new drainage structures as required.

The overall track drainage system would drain to either existing drainage systems surrounding the project with existing discharge points to be used (including within Mill Stream) or an open channel which would be located in the corridor and drain to the receiving waterway.

Drainage design for the project would be developed further during detailed design. New track drainage would be designed for an average recurrence interval (ARI) flood event of 50 years and be compliant with relevant legislation and ARTC drainage standards. The detailed design would consider the hydraulic capacity of all affected drainage, including consideration of potential climate change impacts.

6.3 Rail bridges

Six rail bridges currently pass over roads or watercourses within the project site. Six new bridge structures are required as part of the project. These bridges are located over Robey Street, O'Riordan Street, Southern Cross Drive and Mill Stream. Minor remediation works would also be required to the existing Botany Road bridge. Sections 6.3.1 to 6.3.5 provide a description of each of the bridges and the works required to be undertaken to each of these structures as part of the project.

In addition to the above structures, a new road underpass/rail over bridge is currently being constructed as part of the extension of Wentworth Avenue. This structure will allow for two tracks to run across the bridge above the level of new alignment of Wentworth Avenue. These works are being undertaken as part of the Airport East Precinct works being undertaken by Roads and Maritime and are not part of the current project.

6.3.1 Robey Street bridge

The proposed bridge works at Robey Street would involve the construction of two single span concrete bridges. One of the new structures would be located on the southern side of the existing bridge, while the other would be constructed in the position of the existing bridge (which would be removed as part of the project). Each bridge would carry a single ballasted track.

The new bridge structures would have an overall length of about 30 metres and widths of between about 6.4 metres (for the Down Botany Line) and 7.6 metres (for the Up Botany Line). The bridge superstructures would comprise a steel or concrete through girder. Reinforced concrete deflection walls would be installed on the bridge to protect the superstructure. Approach slabs would be constructed on both sides of the new bridges. The bridge abutment would be supported on piled foundations with abutment spill retaining walls.

6.3.2 O'Riordan Street bridge

The proposed bridge works at O'Riordan Street would involve the construction of two single span structures. One of the new structures would be located on the southern side of the existing bridge, while the other would be constructed in the position of the existing bridge (which would be removed as part of the project). Each bridge would carry a single ballasted track.

The new bridge structures would have a length of about 38 metres and a width of about 6.5 metres (for the Down Botany Line) and 7.7 metres (for the Up Botany Line). The bridge superstructures would comprise a steel or concrete through girder. Reinforced concrete deflection walls would be installed on the bridge to protect the superstructure. Approach slabs would be constructed on both sides of the new bridges.

6.3.3 Botany Road bridge

The existing Botany Road bridge consists of two single span bridges, with a single track currently provided across each bridge. The existing Botany Road bridge would generally be retained in its current state as part of the project. Some minor remediation works to the abutments, headstock and deck of the existing bridge may be required as part of the project.

6.3.4 Southern Cross Drive bridge

The proposed bridge works at Southern Cross Drive would involve the construction of a new two-span bridge to be located to the south of the existing bridge. The existing bridge would be retained as part of the project. The new bridge would be positioned to provide about nine metres between the new track and the track on the existing bridge. The new bridge would carry a single ballasted track.

The new bridge would be about 66 metres long and about 6.6 metres wide. The new bridge would allow for a minimum vertical clearance above Southern Cross Drive to be no lower than the existing adjacent bridge (current marked clearance of 5.0 metres). The bridge superstructure would comprise a precast post-tensioned, in situ concrete through girder. The superstructure would be placed on new reinforced concrete abutments at both ends of the new bridge structure, as well as a new central pier between the two carriageways of Southern Cross Drive. Reinforced concrete deflection walls would be installed on the new bridge to protect the superstructure.

Both abutments of the new bridge structure would likely consist of headstocks supported on bored piles with abutment spill retaining walls. No works are currently proposed to occur on the existing bridge that crosses Southern Cross Drive.

6.3.5 Mill Stream bridge

The proposed bridge works at Mill Stream would involve a new two-span bridge to be located south of the existing bridge. The existing bridge would be retained as part of the project. The new bridge would be positioned to provide about eight metres between the centrelines of the new track and the track on the existing bridge. It would carry a single ballasted track.

The new bridge would be about 25 metres long and about 4.4 metres wide. The eastern span of the bridge would be about 15.3 metres wide to allow the proposed bridge pier to be sited outside of the banks of Mill Stream. The western span would be about 8.6 metres wide. The bridge superstructure would comprise beams and planks (likely precast) which would be supported on in situ piers and abutments on piles.

New retaining walls would also be constructed between the two bridges on the eastern and western banks of Mill Stream. Some minor material within Mill Stream would be excavated and scour protection would also be constructed along the eastern and western banks of Mill Stream, where required (subject to detailed hydrology and flood modelling).

A walkway is proposed to be provided between the new bridge and the existing bridge. No new works (other than connection of the proposed walkway) would be undertaken to the existing bridge.

6.4 Other structures and earthworks

6.4.1 Embankments, cuttings, capping and retaining walls

The topography of the existing Botany Line corridor between Mascot and Pagewood is relatively flat and low lying, with gentle undulations ranging in elevation. The top of the proposed track ranges between relative level (RL) 2.7 metres for adjacent Mascot (western end) to RL 12.1 metres at the highest point above Southern Cross Drive. Much of the existing track alignment currently sits on natural ground level of minor raised embankments. In some locations, retaining walls may be required to ensure landform stability or due to site constraints, including for the embankments either side of bridge structures.

Embankments and cuttings

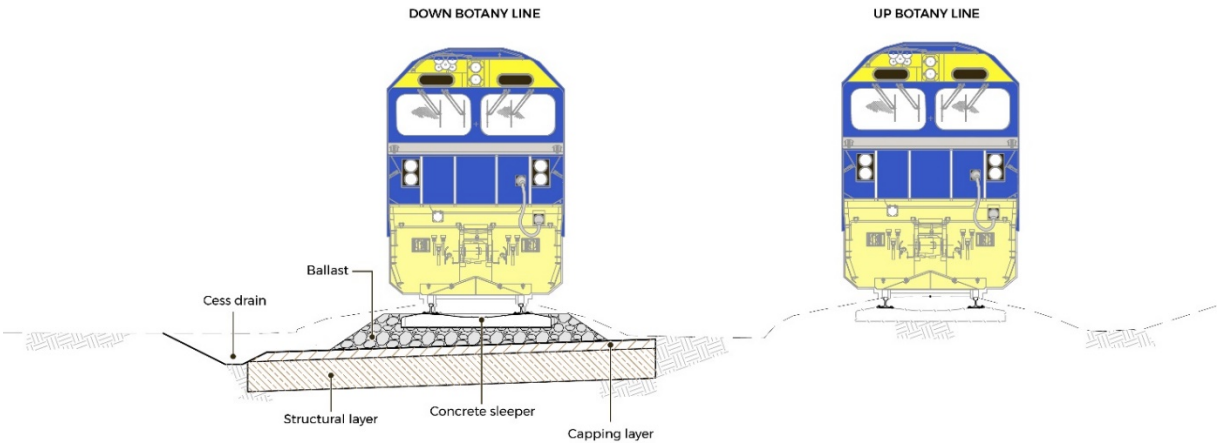
Due to the elevation of the existing track and associated topography to the south of the current alignment, the new second track would typically require sections of the existing corridor to the south to be built up to allow construction of the new tracks at generally the same level as the existing track. Some minor areas of excavation (as shallow cuttings) would also be required, however these would typically be restricted to the northern and southern extents of the project.

Key new embankments would be required along the following sections of the corridor:

- between Southern Cross Drive and Botany Road (within the ‘Botany triangle’) on the southern side of the existing track. This would generally be required to accommodate the proposed new track due to the existing sloped topography at this relocation
- between the eastern side of Mill Stream and Southern Cross Drive on the southern side of the existing track. This would generally be required to accommodate the proposed new track due to the existing sloped topography at this relocation
- between Bay Street and the western side of Mill Stream on the southern side of the existing track. This would generally be required to accommodate the proposed relocation of the existing access track between the Banksia Street access gate and Mill Stream.

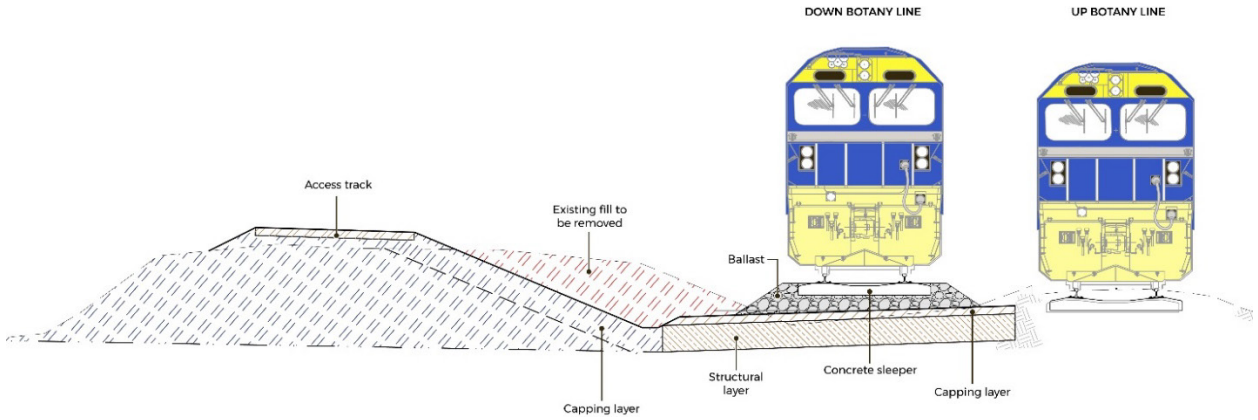
A number of existing embankments would also require some minor amendments along the corridor, subject to ongoing detailed design.

A typical cross section of the proposed second track adjacent to the existing alignment is shown in Figure 6.3 with an indicative design for a section of track formation showing an access track and minor cutting provided in Figure 6.4.



Note: Indicative, subject to detailed design

Figure 6.3 Indicative new track formation



Note: Indicative, subject to detailed design

Figure 6.4 Indicative track formation minor cutting (with adjacent access track)

Contaminated material capping layer

As described in section 12.2, an area of existing asbestos containing material (ACM) has been identified within the existing rail corridor, generally between Bay Street, Botany and the existing Mill Stream bridge. In order to allow for the additional track at this location, some of this material is proposed to be removed with the remaining portion of the material to remain in-situ and be capped with a layer of capping material (refer to Figure 6.4).

The amount of material to be removed would comprise around 4,000 cubic metres of ACM (subject to detailed design). The capping layer to be placed over the remaining ACM would consist of a layer of clean fill material (virgin excavated natural material – VENM) consisting of around 350 millimetres thick with an additional 150 millimetres of topsoil. Based on the current design, this would require around 5,700 cubic metres of VENM for capping material.

Retaining walls

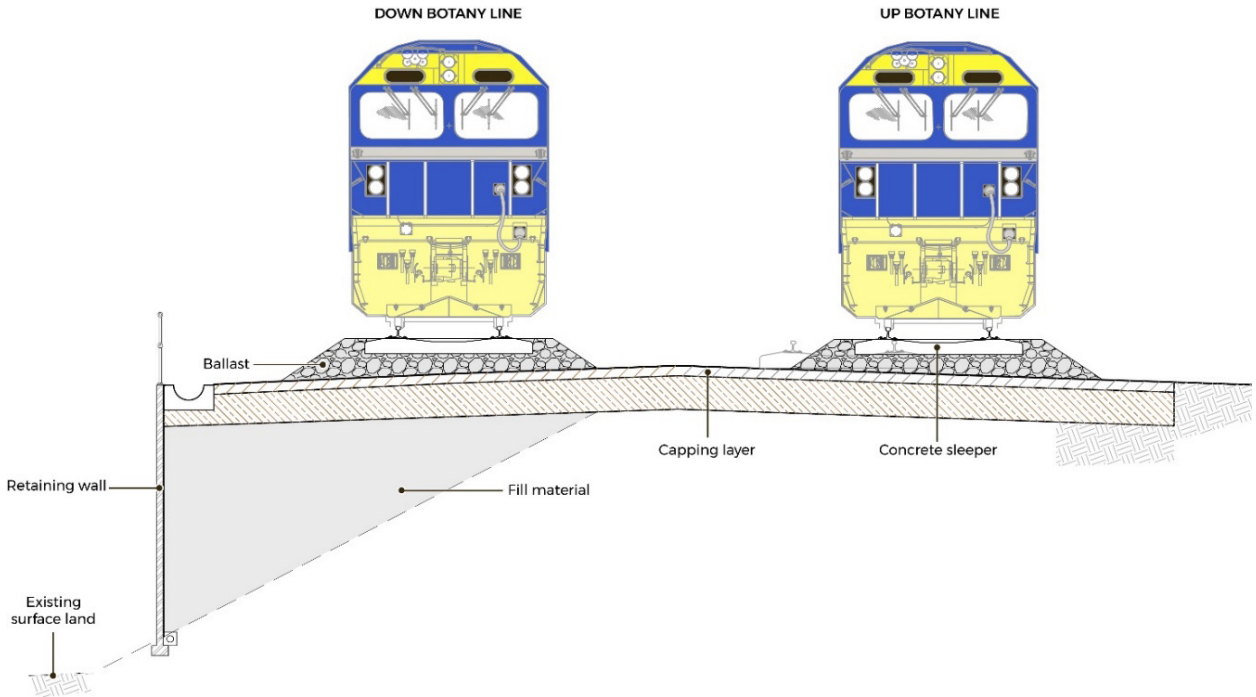
In some locations, due to land availability along the existing rail corridor, or where there are site constraints such as utilities, there would be a need for some sections of the new track formation to be retained with retaining walls. The type of retaining wall to be used would depend on a number of factors including geometry and access. The type of retaining wall and material finishes would be confirmed during detailed design.

Table 6.3 outlines indicative locations and geometry of the retaining walls currently proposed to be constructed as part of the project. Locations of the proposed retaining walls are shown in Figure 6.1.

Table 6.3 Proposed retaining wall structure

NO.	LOCATION	LENGTH (APPROX.)	HEIGHT (APPROX.)
1	Cooks Loop (south side) generally between King Street and Robey Street	260 metres	Between 0.8 metres and 4.2 metres
2	Cooks Loop (north side) generally between King Street and Robey Street	220 metres	Between 0.7 metres and 1.2 metres
3	Between Robey Street and O'Riordan Street (southern side)	150 metres	Between 2.7 metres and 4.2 metres
4	Between Robey Street and O'Riordan Street (north side)	70 metres	Between 0.7 metres and 1.2 metres
5	East of O'Riordan Street on the southern side of the existing corridor, adjacent to Joyce Drive	115 metres	Between 1.0 metres and 3.5 metres
6	Between Southern Cross Drive and Botany Road	50 metres	Between 0.25 metres and 0.5 metres
7	Between Southern Cross Drive bridge and Botany Road bridge	60 metres	Between 1.5 metres and 5 metres
8	Between Southern Cross Drive and Mill Stream, to the south of the new second track	190 metres	Between 1.0 metres and 3.5 metres
9	North of Bay Street, Pagewood, located between the access track and new second track	145 metres	Between 0.5 metres and 1.5 metres

An indicative design for a section of track formation with a retaining wall structure is provided in Figure 6.5.



Note: Indicative, subject to detailed design

Figure 6.5 Indicative track formation with retaining wall

6.4.2 Noise mitigation infrastructure

As discussed in Chapter 8, a series of locations along the project alignment would have the potential to receive additional noise impacts as a result of the project. In order to mitigate potential impacts, noise mitigation infrastructure options have been investigated to reduce potential impacts. These include:

- track lubrication system
- affected receiver abatement/treatments.

A brief description of each of the mitigation infrastructure is provided in the following sections.

Track lubrication system

Train motions through curves can cause major damage to wheels and rail, causing a series of impacts such as noise pollution and resulting in increased maintenance requirements and costs. In order to reduce the impact of rail curve damage, track lubricators can be placed ahead of rail curves in the track in order to lubricate the track as a train passes through.

The system would include a small device attached to a rail track which distributes grease on the internal side of the track when a train passes over it. The device would also be attached by a cable to a small solar panel to provide power to the lubricator. The final locations of any proposed track lubricators would be determined during detailed design.

Affected receiver abatement/treatment

Where track lubrication for noise mitigation treatment would not result in suitable noise mitigation, at receiver treatment measures would be implemented. This would include potential replacement of windows with improved glazing or other treatments to be determined during detailed design.

The final application of appropriate noise mitigation infrastructure would be determined during detailed design.

6.4.3 Utilities relocation and protection

Various utilities (both rail and non-rail related) have been identified in the vicinity of the proposal which could potentially be affected. These services are owned by a range of providers such as Qenos, APA Group, AusGrid, Sydney Water, Jemena and Telstra. Initial Dial Before You Dig and pothole surveys have been undertaken, however the exact location of the identified services would be determined during design development.

Initial consultation with public utility authorities has also being undertaken as part of the design process to identify and locate existing utilities, and incorporate utility authority requirements for relocations or adjustments into the current design.

The preliminary investigations have indicated that a number of utilities would need to be relocated or adjusted as part of the project. This would be undertaken in consultation with the utility authorities during design development. Where possible, impacted utilities would be relocated or protected in line with the requirements of the utility provider or potential site constraints (eg protect utilities where existing conditions will not allow for relocation).

Key utility works that would be required as part of the project include:

- the Qenos high pressure ethylene pipeline – This pipeline is located adjacent to much of the existing rail corridor and crosses the existing (and proposed new section track) alignment at a series of locations. This pipeline require protection near Mill Stream and at other locations along the project
- APA group ethane pipeline – This pipeline would require protection at a series of locations along the project.

Other minor utilities are also expected to require relocation or protection as part of the project. The extent of utility works for the project would be determined during design development. Consultation is also proposed to continue throughout the ongoing design stages with impacted utility providers.

6.5 Other operational infrastructure

6.5.1 Signals/wiring

The system and control network for the project system would require new or upgraded signalling, power and communications (including local and backbone network upgrades) to be provided along the project site as required. These works, which would mainly be undertaken within the existing rail corridor, would involve providing both under and above ground services, including new and combined services routes (CSRs) within the existing corridor.

The altered signalling system would enable trains to travel on the Up or Down Botany Line in either direction. In general, new signals would be installed near the following locations:

- the turnout at Cooks River Loop
- the proposed crossovers between O'Riordan Street and General Holmes Drive
- the proposed crossovers at Banksia Street.

The design of the project has also allowed for the future electrification of the line, however the installation of any infrastructure associated with the electrification of the line does not form part of the project. These works would be subject to future approvals.

6.5.2 Corridor access

Table 6.4 outlines the new corridor access roads which are proposed to be used for maintenance access within the corridor. These three new access roads would be used as well as one existing road which is accessed off Banksia Street and provides access along the corridor to the Mill Stream bridge.

Table 6.4 New corridor access roads

NO.	SIDE OF CORRIDOR	LOCATION OF ACCESS GATE	SECTION OF CORRIDOR SERVICED
1	Northern	Coleman Street	Coleman Drive to about 20 metres west of Ewan Street
2	Northern	General Holmes Drive	General Holmes Drive to about 235 metres west of General Holmes Drive
3	Southern	Botany Road	Botany Road bridge to Southern Cross Drive bridge

In addition to the proposed access locations for the new access roads, existing corridor access gates would continue to provide access to the corridor. One new access gate is also proposed on the northern side of the corridor, west of the Lancastrian Road bridge.

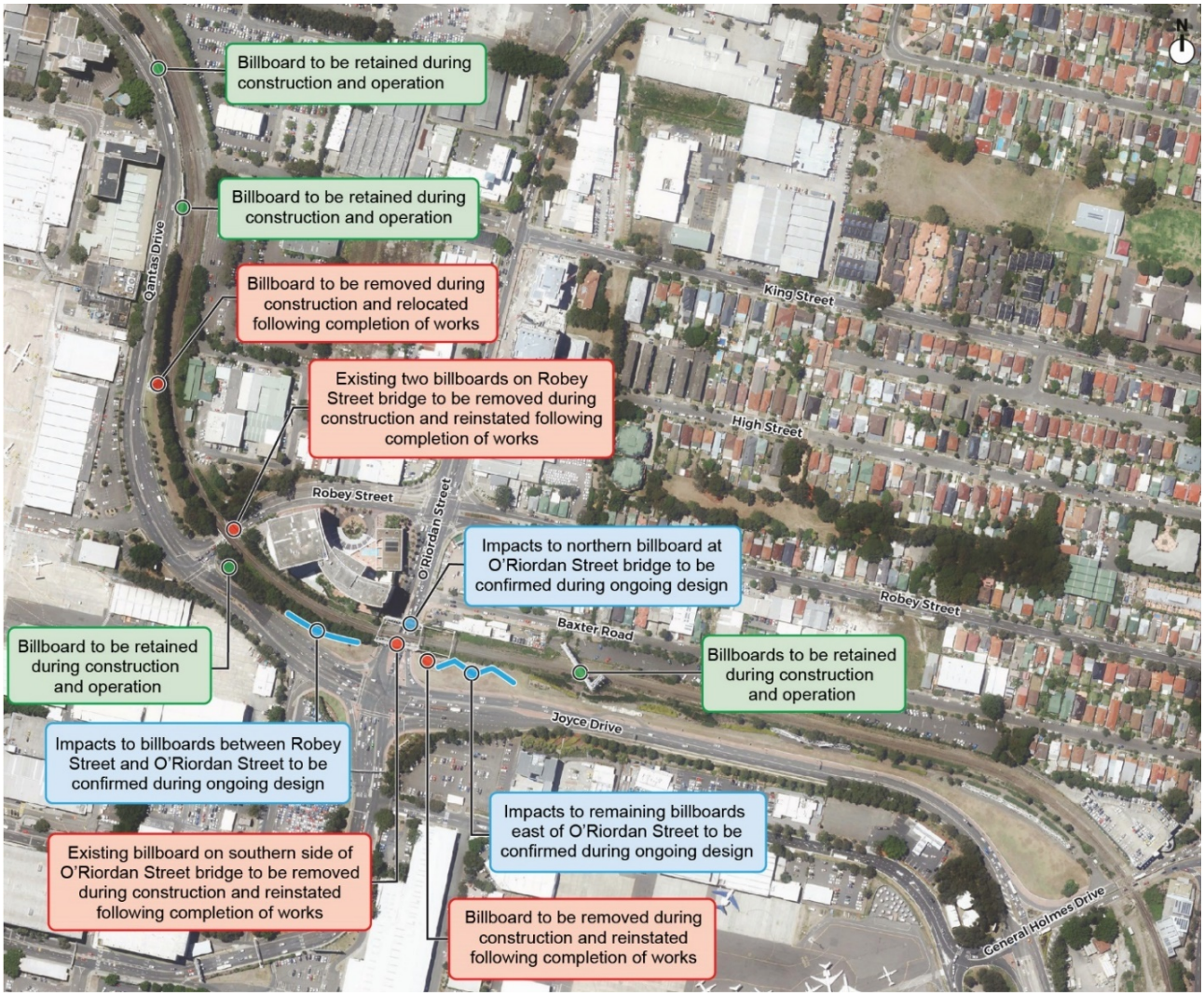
6.6 Billboards/signage

A number of large advertising billboards are currently located adjacent to the existing rail line near Sydney Airport between Qantas Drive and Joyce Drive. Subject to the development of the final construction methodology and detailed design of the proposed track alignment, the construction of the project would require the temporary removal of a number of the billboards to allow for construction of the new second track.

The billboards which have been identified as being potentially affected by the project, and the likely extent of impact to each billboard are shown in Figure 6.6.

Following completion of the construction for the project, all of the impacted billboards would be reinstated generally within the same location as they are currently positioned.

Due to site constraints, some the impacted billboards may be required to be relocated to a different location than their current positions. ARTC would consult with the current lessees of potentially affected billboards to agree an appropriate location for these structures during detailed design. Where opportunities for replacement or relocation are not available, the affected parties would be appropriately compensated under the *Land Acquisition (Just Terms Compensation) Act 1991*.



Note: Indicative, subject to detailed design

Figure 6.6 Potential billboard impacts

6.7 Urban design and landscape

6.7.1 Urban design and landscaping principles

While the engineering and rail systems are important elements in the design of project infrastructure, integration with the surrounding land uses is also considered an important factor for the project. In order to support and guide the final design for the project, a series of urban design and landscaping principles have been developed. These principles are:

- minimise visual and urban design impacts as much as possible
- enhance the local character, reflecting the character of the landscape through which the new track alignment would pass
- encourage design of creek crossing structures that fit sensitively within the existing urban environment
- encourage design of creek crossing structures that would enable the linkage of vegetation communities and wildlife access
- encourage careful design of noise walls, landscaping and fencing to creates a uniform approach, with specific design responses to the local precinct
- select all materials for their robustness and durability.

Further detail regarding the urban design and landscaping principles that would apply to the project are outlined in Chapter 18.

6.8 Land requirements for operational facilities

The existing rail corridor is owned by the NSW Government (RailCorp) and leased by ARTC. The majority of the project would be undertaken within the existing rail corridor or on land for which ARTC has existing access agreements.

However, due to the duplication of the line, some sections of the project would require widening of the existing rail corridor, necessitating a limited amount of property acquisition.

Table 6.5 gives an indication of the properties which would be subject to acquisition as a result of the project. The areas of acquisition are also shown in Figure 6.7.

Table 6.5 Operational land requirements for the project

LOT/DP	TYPE OF ACQUISITION (FULL/PARTIAL)	OWNER	EXISTING USE	EXISTING LAND ZONING (BOTANY LEP)
Lot 201 DP 777213	Partial	Private	Land located above, and on either side of, Robey Street.	B5 – Business Development
Lot 1 DP 1039806	Partial	Private	Vacant part of the land severed by the rail corridor on the southern side of existing rail corridor at rear of Stamford Hotel	B5 – Business Development
Lot 2 DP 1039806	Partial	Private	Vacant part of the land severed by the rail corridor on the southern side of existing rail corridor at rear of commercial office building.	B5 – Business Development

LOT/DP	TYPE OF ACQUISITION (FULL/PARTIAL)	OWNER	EXISTING USE	EXISTING LAND ZONING (BOTANY LEP)
Lot 401 DP 1215182	Partial	Private	Largely unused, however some infrastructure for billboard contained in this area. Part of this property (stratum) is also located above the Lot 55 DP 648871.	B5 – Business Development
Lot 52 DP 1097377	Partial	Private	Landscaped area and billboards	B5 – Business Development

The land which would be required to be acquired to accommodate a wider rail corridor would consist of small portions of existing commercially-owned land parcels adjacent to the existing corridor. The extent of property impacts would be refined and confirmed during detailed design in consultation with property owners.

Under the *Land Acquisition (Just Terms) Act 1991*, RailCorp would be considered the relevant acquiring authority for the required land acquisition. For each of the partial acquisitions required, property adjustment plans would be developed in consultation with the property owner. Following finalisation of the required parcels of land, RailCorp would acquire the land on behalf of ARTC.

Land requirements during construction (ie leasing) are discussed in section 7.5.6.

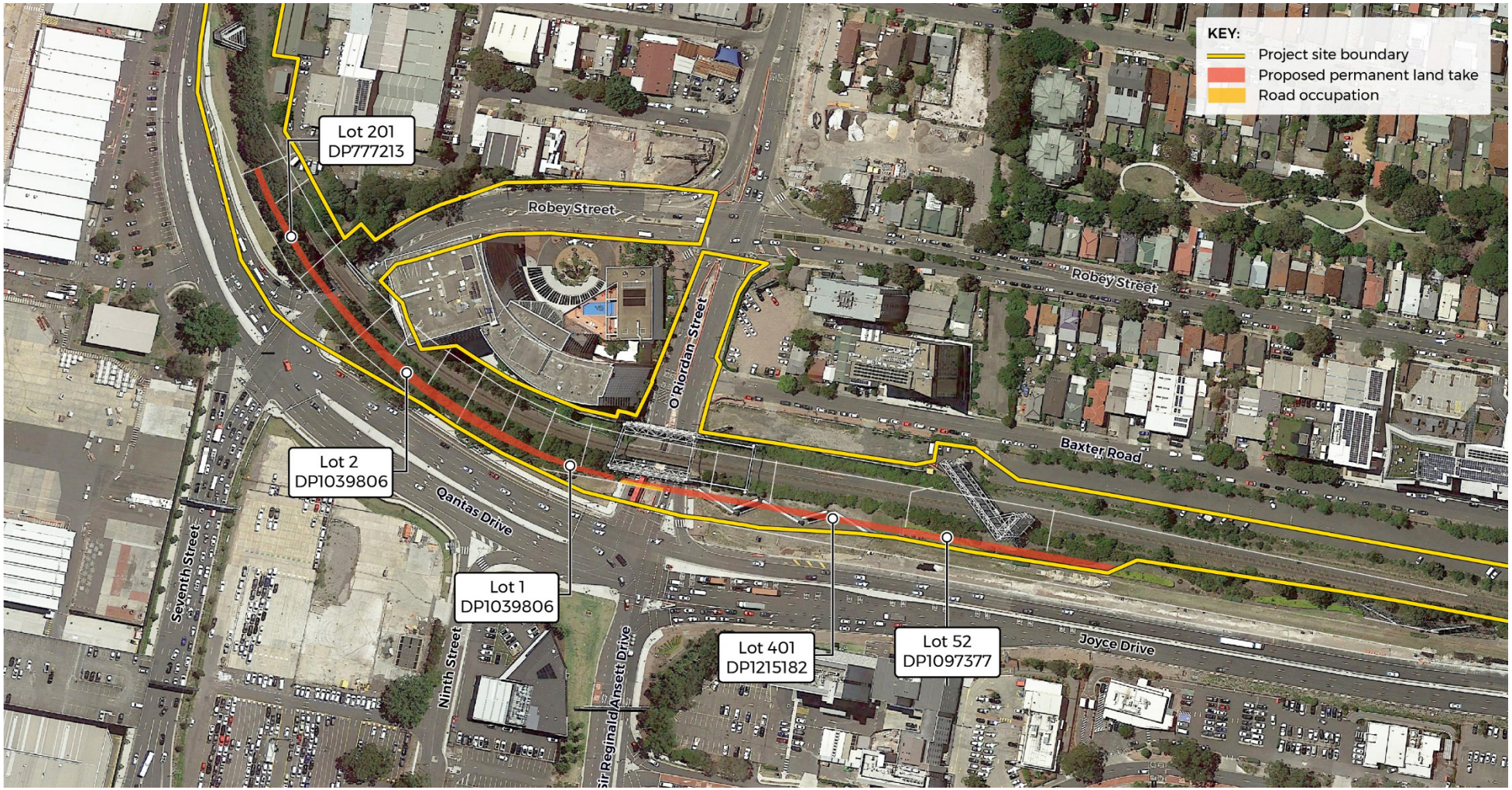


Figure 6.7 Operational property acquisition

6.9 Operation of the project

As Sydney's only container port, it is vital that Port Botany maintains the capacity to meet freight demands over the long term. The project would support an increased number of operational train movements and connections to Port Botany, enabling more freight to be moved by rail. Port Botany handles 99 percent of NSW's container demand, moving more than 6,000 containers on average every day. The port also handles 98 percent of NSW's consumption of LPG, 90 percent of bulk chemical products, 30 percent of refined petroleum fuels and 100 percent of bitumen products (NSW Ports 2015). ARTC has a key role in maintaining and operating the Metropolitan Freight Network and ensuring that the network is sufficient to meet the existing and future predicted demand.

The following sections outline the key operational aspects of the project.

6.9.1 Operational train movements and connections

The project would form part of the existing rail network managed and maintained by ARTC for freight movements within NSW. Operational train services would be provided by a variety of operators (such as Aurizon and Pacific National) as currently occurs on the existing Botany Line.

The operation of the project would also allow for the improvement of freight rail connections between major freight activity precincts and intermodal distribution centres currently located across Sydney. The key intermodal terminals and logistics centres that connect with Port Botany include:

- Cooks River Intermodal Terminal
- Yennora Intermodal Terminal
- Enfield Intermodal Logistics Centre
- Chullora Intermodal Terminal
- Macarthur Intermodal Shipping Terminal
- Villawood Intermodal Terminal
- Moorebank Intermodal Terminal (currently under construction).

Changes in operations from existing situation

The project would allow trains to run in both directions along the length of the Botany Line. The project would include bi-directional signalling for the tracks within the project site to provide flexibility for operations.

The provision of an additional track would reduce some operational activities required within the vicinity of Cooks Loop and the existing turn out near Banksia Street. This would include some existing shunting and other operational activities which occur at these locations.

Train numbers

Table 6.6 outlines the number of train movements which are proposed in each direction (per day) in the years 2020, 2025 and 2030 after the commissioning of the project. Table 6.6 also outlines the current operational train movements along the Botany Line.

Table 6.6 Expected operational train numbers (per day, per direction)

YEAR	CURRENT	2020	2025	2030
Train movements	20	32	38	45

A maximum of six trains per hour per direction are proposed at the completion of the project. Trains are expected to run on average every 10 minutes as a maximum in order to meet the above six trains per hour per direction.

Train types and operating speeds

The design of the project (including signalling) allows for the operation of both 650 metre container service trains and trains up to 1,300 metres in length (for extended container and intrastate services), operating at speeds of up to 50 kilometres per hour.

The trains (rolling stock) that are expected to use the line once the project is operational would be similar to those that currently use the Botany Line.

Hours of operation

The Botany Line would continue to operate during the existing operational hours. This includes 24 hours per day along the existing Botany Line.

Integration with the existing Metropolitan Freight Network

As per the current arrangement, trains using the Botany Line within the project site would continue to travel along the line between the existing Botany Yard to the east of the project and the Metropolitan Goods Line to the south west of the project where the Botany Line connects with the goods line near Marrickville Station.

This represents no operational change to the current integration with the existing Metropolitan Freight Network.

6.9.2 Operational management and coordination

Operations along the line would continue to be controlled from ARTC's Network Control Centre South which is located in Junee.

This represents no change to the operation of the ARTC network.

6.9.3 Maintenance

As per the current arrangement, standard ARTC maintenance activities would be undertaken during operations. Typically, these activities include minor maintenance works, such as bridge and culvert inspections, rail grinding and track tamping, through to major maintenance, such as reconditioning track and topping up ballast as required.

This would represent no change to the operational maintenance currently undertaken by ARTC for the existing network.

7. CONSTRUCTION

This chapter provides the indicative approach to construction of the project. It includes a summary of the proposed timing, an indicative construction methodology, likely resources and proposed access arrangements. This information is preliminary only and is based on the current level of design which has been developed for the project. The final construction methodology would be refined as the design of the project progresses and once a construction contractor has been engaged.

7.1 Overview of construction strategy

Construction of the project would commence once all necessary approvals are obtained (anticipated to be in mid-2020). It is estimated that construction would take around three and half years. The construction program has been developed (and would continue to be developed) to factor in the restrictions of when work can occur due to constraints such as the operation of Sydney Airport (refer to section 7.1.1), maintenance of traffic along adjacent arterial roads and maintaining continued train operations along the Botany Line. These restrictions have therefore limited the periods in which some work would be able to be undertaken (ie outside the standard construction hours and during rail possession periods).

The majority of land affected by construction is located within the existing Botany Line corridor which is owned by RailCorp and leased by ARTC. Additional land requirements (ie outside the corridor) would relate mainly to the need for temporary construction compounds and some work areas (particularly associated with bridge work and utility adjustments) as described in section 7.4.

7.1.1 Key construction constraints

Design development has included a focus on avoiding or minimising the potential for impacts during all key stages of construction. The project site and broader study area have a number of constraints and characteristics that have influenced development of the construction methodology to date. The indicative construction methodology described in this chapter has been developed with consideration given to the constraints associated with the study area (including key environmental features and land uses) and other issues which were identified during the early stages of the design and environmental assessment process. As noted above, construction planning must consider three key constraints for when and where work can occur. These include:

- *Active rail environment* – train operations along the Botany Line facilitate freight transport to and from Port Botany, which is currently operational 24 hours per day. Around 14.4 million tonnes of container freight is transported by rail from Port Botany.
- *Sydney Airport constraints* – The east–west runway and its associated OLS lies adjacent to the project site. Sydney Airport prescribed airspace provides for an operational zone around the airport on a 24-hour basis, despite the curfew on flights into and out of the airport between 11 pm and 6 am.
- *Road constraints* – A majority of the site is surrounded by a heavily trafficked road network and, as such, the final construction methodology would need to consider peak travel periods for this area.

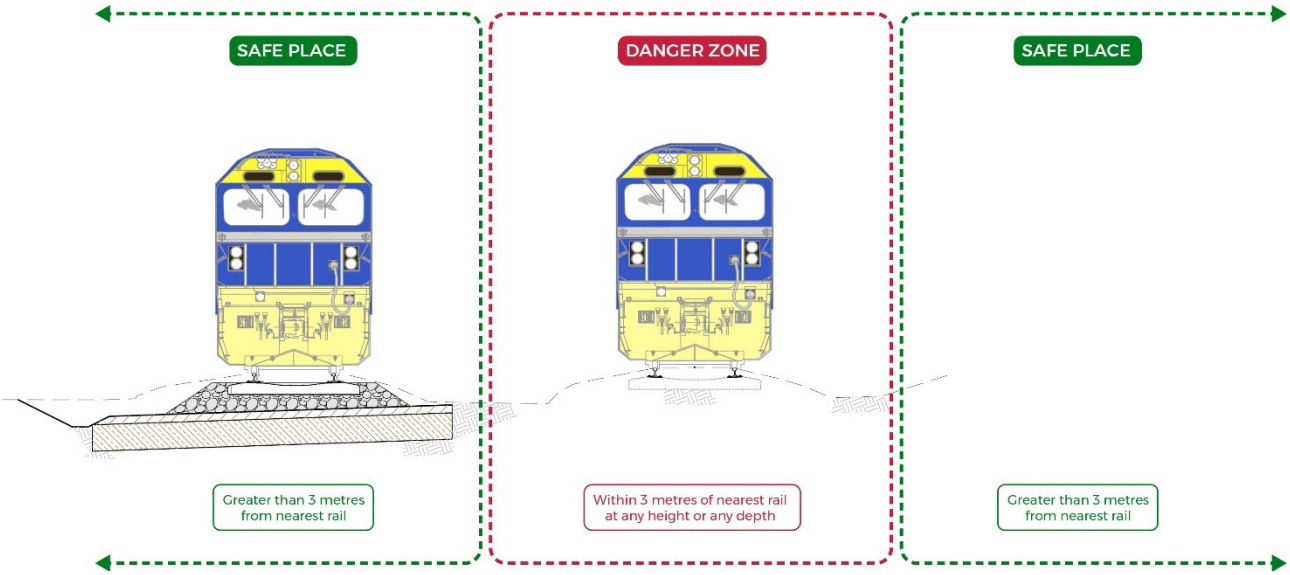
A number of other constraints have also been considered in the development of the construction methodology.

Working within a rail environment

A large portion of work as part of this project would be undertaken within the existing rail corridor. Some construction work would only be able to be undertaken where adjacent rail operations are stopped. This may be where work would be physically impossible to undertake adjacent to moving trains, as this may cause significant risks to worker and driver safety (ie within the danger zone, described below), or where there is potential to compromise operational infrastructure.

Any work within three metres of the nearest active rail track (at any height above or below the rail corridor) is considered to be the work in the rail danger zone. Due to the dynamic nature of the activities proposed, there would typically be no fence at the limit of the danger zone during the construction of the project.

In addition, due to the staging of the project, the danger zone would shift at various stages. Examples of this is shown in Figure 7.1.



Note: The above diagram illustrates the potential danger zone where the rail track on the right is the live/active rail corridor while the track on the left hand side is being constructed.

Figure 7.1 Example of rail danger zone during construction

Worksite protection

A number of worksite protection arrangements can be utilised to create a safe environment to undertake these activities. Worksite protection options include:

- *Weekend possessions* – ARTC currently schedules routine maintenance possessions on four weekends each calendar year. Each of these shutdowns are around 48 hours and start at about 2 am on a Saturday and end at 2 am on a Monday.
- *Morning possessions* – shutdown during the low utilisation morning period (where access is limited due to capacity prioritised for commuter trains elsewhere in the network) is typically from 4 am to 9 am.
- *Controlled signal block (CSB)* – where trains are stopped for short periods between two signals (typically in the order of an hour).

Sydney Airport prescribed airspace

The Sydney Airport OLS is a defined airspace surrounding the airport that is protected under the Airports Act and Airports (Protection of Airspace) Regulation 1996. It controls permanent and temporary activities and development within the airspace outside the vicinity of the airport.

The project would involve activities that would intrude the OLS which would need to be assessed and approved. The application for an assessment would be through Sydney Airport. Factors such as the length of time and severity of the encroachment into the OLS would determine the approval and conditions.

Based on the current design and construction work required, the area of the project site between Mill Stream and Botany Road would be constrained by the OLS. The OLS range within this area is about 10 metres to 20 metres above the Australian Height Datum (AHD).

As freight trains are currently operating within the OLS at Botany Road underbridge, it is anticipated that some construction work would impact the OLS. This would include activities such as piling, embankment/retaining wall works and cranes required for bridge construction, as well as any other construction activity where plant and equipment is required to be placed within the OLS zone. The track work and backfilling of the retaining walls would require plant (hi-rail dump trucks, excavators, cranes) that would encroach the OLS. Dump trucks would also be required to operate at full lift while excavators can be operated with height restrictors.

At this stage, it is assumed that activities that intrude OLS would be required to be undertaken during the scheduled curfew hours for Sydney Airport (between 11 pm and 6 am), noting that a permit/approval exemption would still be required during these periods. Where work is required to be undertaken outside of this time, it is expected that ARTC and the construction contractor would consult with Sydney Airport to seek relevant approval exemptions and crane permits (as required) to intrude within the OLS.

Road network

The road network surrounding the project site is a highly utilised road network providing access to a number of key land uses within the local area, including Sydney Airport, as well as being a major connection point between southern Sydney, south western Sydney and the CBD.

Although the duplication of the rail line would not have operational impacts on the road network, construction activities would have the potential to cause substantial impacts, such as increased traffic on arterial roads, heavy vehicle movements through suburban areas and parking on local streets by the construction workforce. Due to the nature of the local traffic network, it is anticipated that some impacts would occur during peak periods, however these impacts would be minimised where possible. In addition, it is expected that traditional peak periods may vary somewhat due to passengers accessing the airport outside of typical peak periods.

Other constraints

These and other constraints that have influenced development of the construction methodology are summarised in Table 7.1 together with how the construction method to date has been developed to avoid/minimise potential impacts.

Table 7.1 Key constraints and how potential construction impacts have been avoided/minimised to date

KEY CONSTRAINT	APPROACH TO AVOIDING/MINIMISING IMPACTS
Significant ecological communities/species	Construction compounds and other construction areas have been selected to avoid impacts on area of significant ecological communities and species. Where possible these areas have been positioned within previously disturbed areas; this may include the use of the current (Roads and Maritime Services) Airport East project site located adjacent to General Holmes Drive.
Land use	Construction compounds and other construction areas have been selected to be positioned within the existing rail corridor wherever possible in order to minimise impacts on non-RailCorp owned land. Where construction compounds and other construction areas have been identified outside the rail corridor, these sites have been selected to be positioned within public land wherever possible or areas which have previously been disturbed.
Utilities	The current design for the project has adopted a risk-based approach to avoiding or minimising impacts associated with the relocation or adjustment of public utilities affected by the project. The framework approach includes a hierarchy of: • avoiding impacts • protecting utilities in their current location • utilities relocation/adjustment.
Billboards	The current construction methodology for the project, in combination with the rail alignment for the project (refer to Chapter 6) has sought to minimise impacts on existing billboards during construction. Where possible the following approach has been implemented in order to avoid impacts on billboards: • use existing access points along the project alignment where possible • provide access and crane pads in existing open spaces away from existing billboards where possible • limit the timing of construction work that require billboard removal, where possible, and reinstate the billboards as soon as practicable following completion of works • reinstate permanently impacted billboards to an appropriate location • where opportunities for replacement or relocation are not available, the affected parties would be appropriately compensated under the *Land Acquisition (Just Terms Compensation) Act 1991*.
Businesses, residents and other sensitive land use adjacent to the project	Where possible, the construction access points and construction traffic routes would be directed away from sensitive areas and would consider these land uses when defining the use and operation of specific compounds.

7.1.2 Construction environmental management

Mitigation and management measures applicable to the design, pre-construction and construction stages would be implemented to avoid or minimise the construction impacts described in Chapters 8 to 23. Mitigation measures are provided in each chapter in Part B and are summarised in Chapter 24. The measures include preparing and implementing a construction environmental management plan (CEMP) and detailed sub-plans.

The CEMP would be prepared for the main construction phase of the project by the responsible construction contractor. The CEMP would provide a centralised strategy through which all potential environmental impacts would be managed during construction and would include detailed management measures to avoid or minimise potential impacts. Site EMPs would also be prepared for the proposed enabling works. The requirements for the CEMP (and site EMPs) are described in Chapter 24.

In the absence of a CEMP and detailed sub-plans, the measures provided in each chapter in Part B and summarised in Chapter 24 have been designed to be implemented to minimise potential impacts for all early and enabling construction work described in section 7.2.1. This may include development of activity specific plans where appropriate.

7.2 Indicative construction methodology

Construction of the project would broadly involve the following key steps:

- early and enabling work (pre-construction; section 7.2.1)
- main construction and commissioning works including track and bridge work (section 7.2.2)
- finishing and rehabilitation work (section 7.2.3).

It is noted that the methodology and information presented in this chapter is indicative and would continue to be modified and refined as the design process continues. A final construction methodology and program would be developed by the construction contractor when appointed. Further information on the construction program and staging is provided in section 7.3.

7.2.1 Early and enabling work

Early and enabling work would be required to start prior to commencement of the main civil and track work associated with the duplication of the rail line. These early and enabling work would include:

- track realignment/slewing track
- utility service relocation and/or protection
- billboard removal
- general site establishment including activities such as:
    - de-vegetation, clearing and grubbing
    - site compound set up
    - property adjustments.

The following sections provide further detail for each of the proposed early and enabling work. The impact assessment presented in Part B of this EIS includes an assessment of potential impacts (and where relevant mitigation measures) for each of the activities described below.

Track slewing

Track slewing is the movement of an existing track sideways from its original location to a new location (typically no more than a few metres at any one location). For the project, two sections of the existing Botany Line would require slewing in order to provide sufficient space to construct the new second track.

Track slewing would generally be undertaken at the following locations:

- at the northern end of the project, the existing alignment would be slewed to the north of the existing alignment of the Botany Line along Cooks Loop (generally west of Robey Street) and the associated tie-in point into existing track alignment north of King Street
- between General Holmes Drive and O'Riordan Street the existing alignment would be slewed to the north of the existing track alignment
- at the southern end of the project, the existing alignment would be slewed to the north of the existing alignment of the Botany Line generally between Myrtle Street and the connection to the existing Gelco siding.

Track slewing is typically undertaken during standard ARTC rail maintenance work. Slewing of operational track, required as part of the project, would be undertaken during scheduled 48-hour weekend possession periods (refer to section 7.3.4). The typical construction methodology for track slewing work would include:

- materials would be delivered to the site in the week approaching the possession during standard construction hours (utilising the General Holmes Drive and Banksia Street compound sites)
- access to the corridor would generally occur via the existing ARTC rail corridor access gates
- the following typical works would be undertaken predominantly during the weekend possession periods:
    - survey and mark out proposed work areas
    - cut rail at connection locations and remove sleepers for re-use
    - construct new formation and expose ballast shoulder
    - place and compact new capping and ballast
    - re-lay sleepers, re-position rail track and clamp new rail to existing at cut positions
    - place top ballast, level and position with tamper track machine
    - weld rail at cut positions
    - correct ballast profile (with excavators or regulator track machine)
    - remove any excess spoil or store for reuse.

Utility relocation and protection

Utilities identification

A number of utilities and services have been identified within the project site that would be required to be adjusted, relocated or protected. This would be undertaken prior to construction to facilitate efficient delivery of the main construction work. The majority of the utilities and services are buried in the vicinity of the project; however, some include above ground components.

Utilities such as water, drainage, sewer, electrical, gas, telecommunications and signalling infrastructure located within or crossing the rail corridor may need to be adjusted depending on the design and in accordance with the requirements of the relevant asset owner.

As the detailed design progresses and additional consultation is undertaken with asset owners, details of the need for relocation would be confirmed with alternatives such as adjustments and protection of assets to be considered. This would include temporary utility works required to protect or relocate utilities during construction only, or potentially permanent diversions where the project would result in a direct impact on a utility.

The key utilities which have currently been identified as requiring relocation or protection are identified in section 6.4.3.

Methodology for relocation and protection

The relocation and/or protection of utilities would form a critical and complex part of the construction process. Details regarding the proposed relocations/protections are currently being developed as both the design and consultation with utility and service providers progress.

Ongoing access arrangements to public and private utilities and services along the rail corridor are also a key issue for utility providers for their maintenance and future development needs.

Interface agreements with utility providers, where there is a known or identified interface, are currently being developed. Once finalised, these agreements would be incorporated into the design and delivery of the project. Management of this interface would help ensure relocation and/or protection of utilities can be designed, agreed and constructed in an efficient manner, and ongoing maintenance and access arrangements can be agreed for the construction and operation phases. These agreements would also clarify responsibility for affected assets.

Where it is identified that a public utility requires relocation or adjustment, the general methodologies would be undertaken:

- For utility relocation, the typical methodology would generally include:
    - location of service and setting out extent of relocation
    - excavation of trench around the existing utility and for the proposed relocation alignment. For the proposed relocation work for the Qenos pipeline between Robey Street and east of O'Riordan, the proposed work would require underboring of O'Riordan Street. These works would be undertaken during out of hours road possessions of O'Riordan Street
    - installation of a bedding material in the new trench location
    - installation of new pipeline or conduit in the new trench location
    - excavation and installation of pits or junctions at cutover locations
    - installation of valves, switches or other infrastructure to allow the cutover of the utility to its new alignment
    - testing and commissioning of relocated utility
    - backfilling and compaction of trenches and around pits and reinstatement of existing ground surfaces.
- For utility protection, the typical methodology would generally include:
    - location of and setting out the extent of service protection
    - excavation around asset (if required)
    - remediation work to assets (if required)
    - backfilling and compaction fill around asset to be protected
    - installation of concrete protection slab or similar
    - completion of backfilling and reinstatement of existing ground surfaces.

Billboard signs removal

A number of billboards located along Qantas Drive, Joyce Drive, Robey Street and O'Riordan Street are located within the project site to the south of the Botany Line. Preliminary investigations have identified in some locations, the billboard or its supporting structure would inhibit access to key areas of the rail corridor that would be required for construction. Where required, some existing billboards may need to be temporally or permanently removed prior to construction starting to allow for construction or access for construction vehicles. Details of the work associated with these billboards are outlined in section 6.6.

The typical construction methodology for the removal of billboards would generally include:

- set up safety measures including appropriate traffic control, work site barriers, etc.
- mobilise cranes and install temporary props/braces
- where required, install temporary protection measures to protect existing embankments
- disassemble advertising panels and associated frame structures/gantries and remove from site (or remove billboards from existing bridge structures over Robey Street and O'Riordan Street)
- where required, remove existing billboard support piles and remove waste materials from site
- remove/discontinue safety measures and reinstate normal traffic measures.

Site establishment

A number of activities would be required for site establishment in order to facilitate construction. These activities would generally include:

- consultation with landowners/occupants (where required) for activities such as access
- undertaking a dilapidation survey (where required) prior to commencement of work
- where property adjustments are proposed as part of the project, the existing fence line would be amended as part of the establishment of the project site
- installation of site environment management and traffic controls (including pedestrian and cyclist management) in accordance with the CEMP
- establishment of construction compounds/work areas including the installation of fencing, safe work barriers (within the corridor adjacent to the operational Botany Line) and hoardings in public areas
- establishment of access gates, roads and ramps to facilitate access to work areas
- supply of power, water and other utilities to construction compounds and other areas within the construction work area (whether temporary or permanent supplies)
- the de-vegetation, clearing and grubbing of the project site (where required) to enable construction of the new second track and associated bridge structures. Where required, this work would be done using appropriate worksite protection from the existing track (where clearing is required within the rail corridor) or appropriate traffic control measures (where clearing is required adjacent to a road corridor). Felled trees and vegetation would either be chipped on or offsite depending on location along the alignment.

7.2.2 Main construction activities

As described in Chapter 6, the project would involve the installation of new track, upgrade of existing track (including some minor slewing of existing track), installation of new crossovers, construction of a series of new bridges and associated signalling and electrical work. The following sections outline the indicative construction methods for each of the main construction work required as part of the project.

New track

The installation of new track would typically follow this methodology:

- excavate to subgrade level, backfill and compact the formation layer
- place and compact the capping and bottom ballast layers
- install concrete sleepers, rail, fastenings and top ballast and tamp track to final height and alignment
- connect longitudinal rail sections by welding
- install new signalling equipment or upgrade of existing (where required).

Track upgrading and minor adjustments

The upgrade of sections of the existing track for the Botany Line would typically follow this methodology:

- remove existing track infrastructure, including rail, sleepers and fastenings
- excavate the existing landform to the required design levels and construct new formation layer
- place and compact the capping and bottom ballast layers
- install concrete sleepers, rail, fastenings and top ballast and tamp track to final height and alignment
- connect longitudinal rail sections by welding
- install new signalling equipment or upgrade of existing (where required).

Installation of track components

The installation of crossovers, turnouts and catchpoints would typically follow this methodology:

- construct new turnouts on site in close proximity to turnout/crossover location
- cut existing track in location of new turnout/crossover
- excavate the landform to the required design levels
- backfill and compact the formation layer
- place and compact the capping and bottom ballast
- install the new turnout/crossover infrastructure
- install top ballast and tamp track to final height and alignment
- connect longitudinal rail sections by welding
- install control/points infrastructure for new turnout/crossover
- test and commission new turnout/crossover.

Bridge work

As described in section 6.3, six new bridges would be constructed along the project alignment at Robey and O'Riordan Streets, Southern Cross Drive and over Mill Stream. The removal of two existing bridge structures at O'Riordan Street and Robey Street would also be required.

The project would utilise the newly constructed bridge structure above the new alignment of Wentworth Avenue. These works are being undertaken as part of the Airport East Precinct work being undertaken by Roads and Maritime Services and are not part of the current project.

Construction of new bridges

The construction of each bridge would typically follow this methodology:

- installation of temporary traffic control, rail safety protection measures and environmental protection measures for working adjacent to stormwater and waterways
- construct access ramps to the bridge work areas for piling rigs
- install sheet piles
- construct piling pads
- undertake piling work
- construct crane pad or build-up of retaining walls (where required such as at O'Riordan Street and Robey Street bridges)
- mobilise cranes
- construct abutments, piers and install bridge girders. For construction of the Southern Cross Drive and Mill Stream bridges, this would also include the construction of a mid-span pier to support each bridge structure
- install headstocks, form bridge deck slab and install new track (as per above methodology).

Demolition of existing bridges

The removal of the existing bridge structures at O'Riordan Street and Robey Street would typically follow this methodology:

- protect/relocate services
- relocate existing rail operations to the new bridge to allow the demolition of the existing bridge
- during a full road and rail possession at each intersection, cut and removed the existing bridge structure off site for disposal.

In order to maintain rail operations to and from Port Botany, the construction of the O'Riordan Street and Robey Street bridges are currently proposed to be staged with a new bridge structure to be constructed to the south of each of the existing bridges. Following construction of the new bridge, the existing tracks would be relocated to the new bridge and commissioned for operation. Following this, the existing northern bridge would be demolished and the new bridge would then be constructed in the position of the existing bridge.

The construction of the Mill Stream bridge and Southern Cross Drive bridge would be staged with new bridge structures to be constructed to the south of each of the respective existing bridges. Works at the Mill Stream bridge would also include the installation of scour protection as necessary. Further discussion regarding the proposed construction staging is provided in section 7.3.

Retaining wall work

The construction of the major retaining wall structures would typically follow this methodology:

- install temporary work to protect existing rail line including sheet piling (where needed)
- excavate and prepare the footing for the new wall
- construct retaining walls
- backfill and compact spoil behind retaining walls (as required). Where a retaining wall is proposed adjacent to a new or existing bridge, undertake work to tie into existing/proposed bridge abutments
- continue backfilling, construction of reinforcement layer and compaction (until final retaining wall height is achieved)
- install drainage and fall protection along top of retaining wall (as required).

Drainage

The general methodology for drainage construction would typically follow this methodology:

- prepare survey control points for planned excavation of cess drains
- for open drainage lines, excavate earth material from the side of the existing track formation, trim and compact base and sides of the drain and form spoil mounds
- where underground drainage is required, excavate, install new drainage pipes installed, then backfill prior to surface restoration.

Combined services routes and signalling work

A combined services route (CSR) is a route for a series of conduits which house ARTC services such as electrical and signal cables. It typically runs parallel to the track and may be buried, located at ground level encased in concrete (ground level troughing – GLT) or raised above ground within a galvanised steel trough about a metre high, on posts or fixed to a fence (galvanised steel trough – GST).

The installation of new CSR and associated signalling would typically follow this methodology:

- prepare ground and excavate existing ground surface for the CSR route (clearing or trenching etc)
- install bedding material at the base of the trench
- install conduits on/within prepared ground surface
- install cabling within the conduits
- excavate and install pits at the locations between new and existing infrastructure (where required)
- install signalling equipment and associated infrastructure
- test and commission new infrastructure
- backfill trenches and pits with spoil and compaction prior to re-establishment of ground surface.

Noise mitigation infrastructure

As described in section 6.4.2, a series of noise attenuation infrastructure may be implemented as part of the project to minimise noise impacts. Types of mitigation include:

- lubrication
- affected receiver abatement/treatment.

Lubrication

Track lubrication systems would consist of installation of the lubricator along the require track. A small solar panel would also be constructed to the side of the track and connected via a small cable.

The final locations of any proposed track lubricators would be determined during detailed design.

Affected receiver abatement/treatment

Where track lubrication for noise mitigation treatment would not result in suitable noise mitigation, other treatment measures would be considered for implementation. This could include replacement of windows with improved glazing or other treatments to be determined during detailed design. The final methodology for any at-receiver treatment would be determined during detailed design, as required.

7.2.3 Finishing and rehabilitation

Finishing work

At the end of the construction phase, the contractor would remove construction equipment from within the project site. Where relevant, areas that were occupied temporarily and do not form part of the operational footprint would be rehabilitated (in consultation with the relevant landowner). All construction work areas, compounds and access routes would be returned to the same or better condition than prior to commencement of construction where required.

Site reinstatement and rehabilitation would be undertaken progressively during the work, and would include the following activities:

- demobilise construction compounds and work areas
- remove materials, waste and redundant structures from the work areas
- decommission temporary work area signs
- remove any temporary fencing and establish permanent fencing
- decommission site access roads that are no longer required
- restore disturbed areas as required, including revegetation and landscaping activities
- restore billboards and signage infrastructure. As discussed in section 6.6, due to site constraints, some impacted billboards may need to be relocated to a different location than their current positions. ARTC would consult with the current lessees of potentially affected billboards to agree an appropriate location for these structures during detailed design.

Testing and commissioning

Testing and commissioning (checking) of the rail line and communication/signalling systems would be undertaken to ensure that all systems and infrastructure are designed, installed, and operating according to ARTC's operational requirements. Testing and commissioning of the project would be undertaken in stages to ensure that infrastructure is suitable for use as they are progressively operated, for example, where operations would shift to the new track at Robey and O'Riordan Street bridges to facilitate replacement of the existing bridges.

Commissioning for the following aspects of the project would generally occur in the following key stages:

- Down Main (new second track), including the new bridges on the western side of the corridor
- Up Main (realigned existing Botany Line), including the replacement of new bridges on the eastern side of the corridor at Robey Street and O'Riordan Street
- the connection into the existing Cooks Loop.

Signalling infrastructure would be tested and commissioned as work progressed and new infrastructure is installed.

7.3 Construction program and timing

7.3.1 Program

Early and enabling work outlined in section 7.2.1 are anticipated to be undertaken over a period of about one year. The main construction work outlined in section 7.2.2 would be completed over a period of about three years. The commissioning and finishing work would be undertaken at the end of the main construction work and would take about half a year to complete. Figure 7.2 outlines the indicative construction program of the project.

Figure 7.2 Indicative construction program

7.3.2 Project staging

The project would be staged, with the program (as outlined in Figure 7.2) primarily driven by the need for a number of project works to be undertaken during rail possession periods (discussed in section 7.3.4) where the track is not operational, to minimise the potential for safety and operational impacts.

Due to the limited availability of rail track possessions (only four 48-hour periods per year) the construction program would need to be carefully planned around these possessions. While some work needs to be undertaken during these periods, other work, located outside the danger zone of the operational tracks (refer to section 7.4.1), would occur outside these possession periods (ie non-possession critical works).

Due to the staging of these works to limited periods of the year, construction activities would be intensified during these periods to ensure works required with no train services operating can be completed.

In general, all possible construction works would potentially commence from the start of the project, however some work (such as bridge works at Robey Street and O'Riordan Street) would only commence once the early and enabling work have been completed in that area (refer to section 7.2.1).

Table 7.2 outlines the main construction work that would generally be undertaken in the following stages (subject to confirmation during detailed design and development by the construction contractor).

Table 7.2 Summary of construction staging

STAGE	MAIN ACTIVITIES	RAIL TRAFFIC MOVEMENT
Stage 1A Construct new track (refer to Figure 7.3)	• Construction of the new track (Down Botany Line) adjacent to the existing Botany Line including new embankments, track formation, combined service routes and signalling infrastructure. • Construction of new bridges at: o Mill Stream o Southern Cross Drive o O'Riordan Street o Robey Street. • Construction of retaining walls. • Construction of noise mitigation measures (as required, subject to detailed design).	Rail operations would continue on the existing Botany Line.
Stage 1B Cut over and head shunt (refer to Figure 7.4)	• Connection (cut-over) of the new track (Down Botany Line) to the existing track at Banksia Street and Cooks Loop. • Construct new crossovers between General Holmes Drive and O'Riordan Street. • Construct new crossovers between Banksia Street and Mill Stream. • Construction of temporary head shunt to allow for ARTC shunting operations via existing Botany Line and Cooks Loop. • Cut over and commission new second track at Banksia Street and Cooks Loop.	Rail operations would continue on the existing Botany Line. Following construction work and connection work, rail operations would switch to operating on the new track (Down Botany Line).
Stage 2A Demolition of existing bridges (refer to Figure 7.5)	• Demolition of the existing O'Riordan Street and Robey Street bridges. • Civil work on the existing Botany Line.	Rail operations would continue on the new track (Down Botany Line).
Stage 2B New O'Riordan Street and Robey Street bridges (refer to Figure 7.6)	• Construction of the new O'Riordan Street and Robey Street bridges. • Re-construct track for new O'Riordan Street and Robey Street bridges. • Track, signalling and civil work on the existing Botany Line. • Reinstate billboards and signage infrastructure.	Rail operations would continue on the new track (Down Botany Line).
Stage 3 Commissioning and testing	• Remove temporary head shunt. • Connection of the existing Botany Line (up line) into existing track at Banksia Street and Cooks Loop. • Slew tracks at Cooks Loop. • Commissioning and testing.	Rail operations would continue on the new second track (Down Botany Line). Following commissioning and testing, rail operations would commence operation on both the existing Botany Line and the new second track.

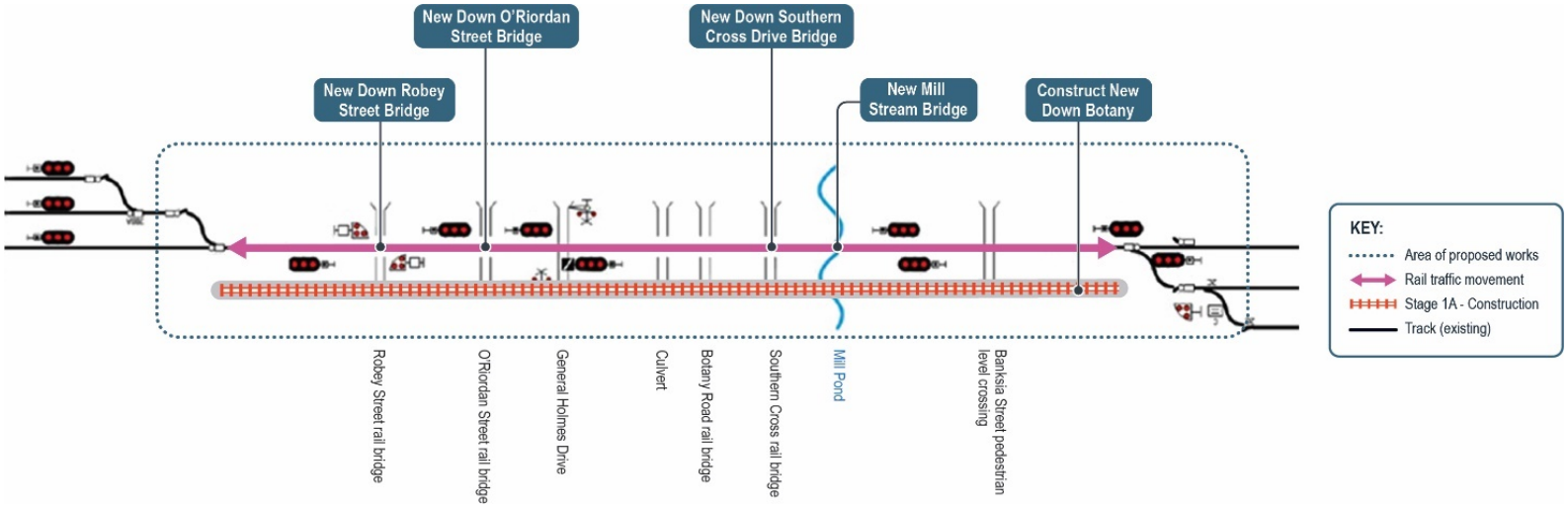


Figure 7.3 Indicative construction staging – Stage 1A: Construction of new down Botany Line

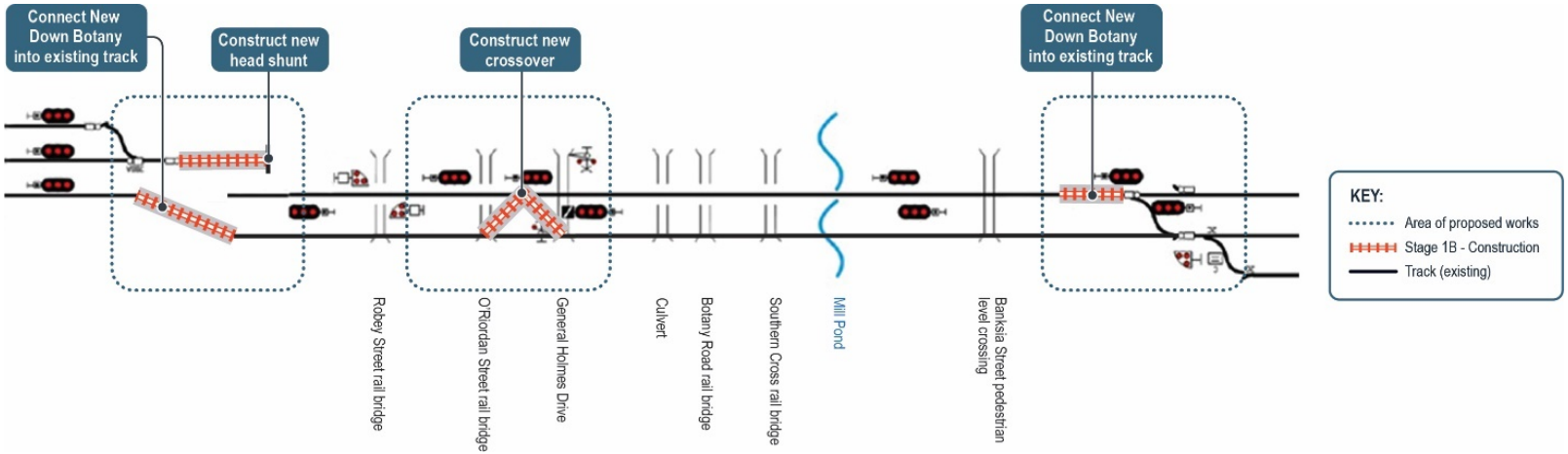


Figure 7.4 Indicative construction staging – Stage 1B: Cut over and head shunt

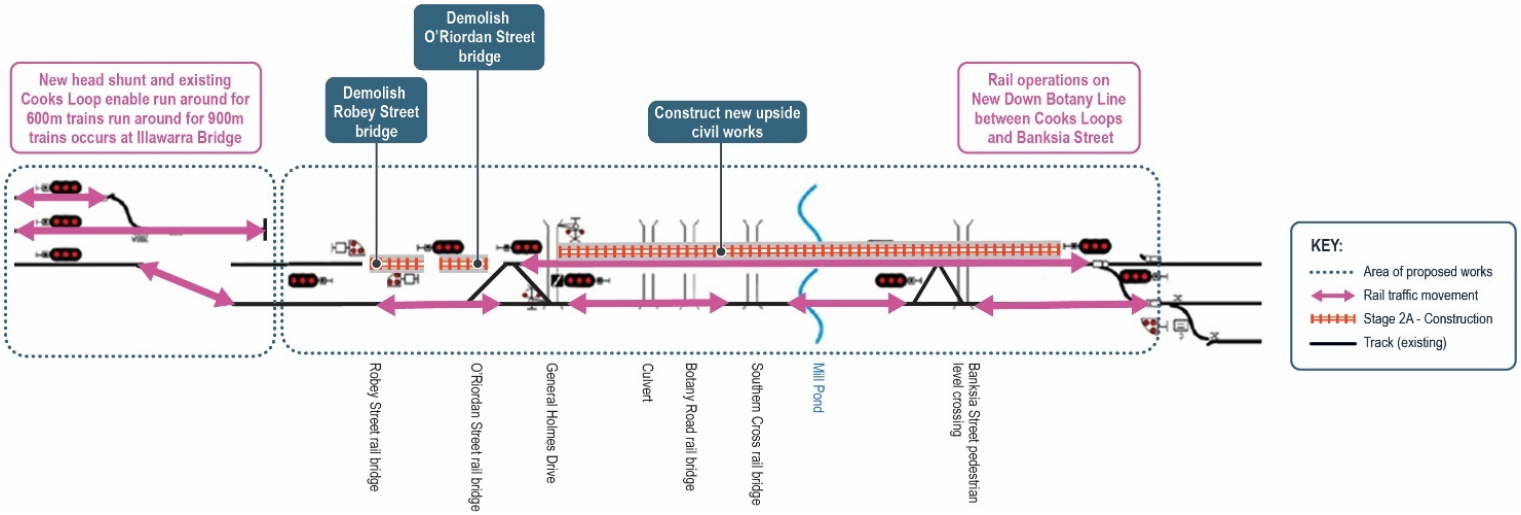


Figure 7.5 Indicative construction staging – Stage 2A: Demolish existing O'Riordan Street and Robey Street bridges

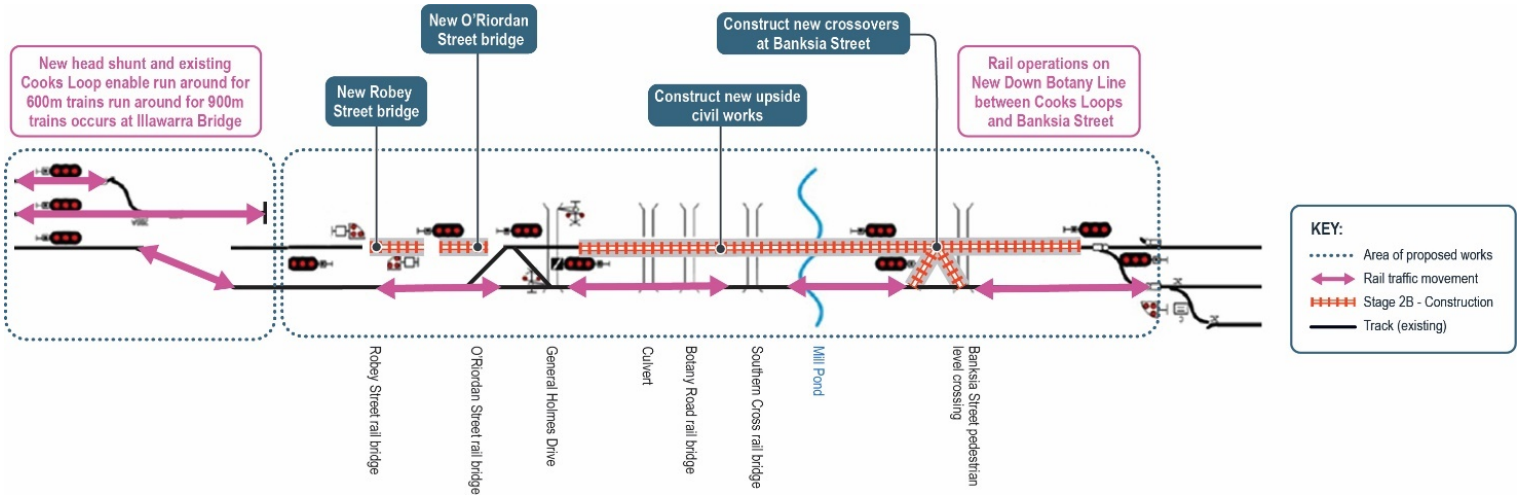


Figure 7.6 Indicative construction staging – Stage 2B: Construct new O'Riordan Street and Robey Street bridges

7.3.3 Construction hours

The scale and complexity of work and the operational constraints within proximity of the project would mean that the construction of the project would need to be undertaken during recommended standard working hours as well as at other times including weekends, public holidays, evening and night time periods.

Construction during standard work hours

The majority of work would be undertaken during recommended standard construction work hours as defined by the *Interim Construction Noise Guideline* (DECC, 2009) which are:

- Monday to Friday: 7 am to 6 pm
- Saturday: 8 am to 1 pm
- Sundays and public holidays: no work.

Work outside of recommended standard work hours

As discussed in Section 7.1.1 above, due to the positioning of the project site in an operational rail corridor, over busy roadways and adjacent to Sydney Airport, a number of project elements would be required to be undertaken outside the abovementioned hours. These works would likely include the following:

- delivery of materials and plant required by authorities for logistical or safety reasons (typically oversized vehicle movements would occur between 12 am and 6 am)
- work required to occur through a worksite protection arrangement, including:
  - work next to rail track such as earthworks and civil works
  - work above the rail track such as craning, lifting and shifting material over the rail track
  - work beneath the rail track such as drainage and services installation
  - work where traffic impacts could occur as a result of lane or road closures required to provide space or could compromise vehicle, pedestrian or cyclist safety (for example, bridge works)
  - work required where the OLS of Sydney Airport would be compromised, which are therefore required to occur outside the operational hours of the airport (ie 11 pm to 6 am).

The above list of works is not exhaustive and other works would potentially be required to be undertaken outside the recommended standard hours. Any additional works required outside standard hours would be determined by the construction contractor, in consultation with ARTC. All out of hours works would be undertaken in accordance with an out-of-hours work protocol which would be developed for the project by the construction contractor in consultation with ARTC (refer to section 9.6).

7.3.4 Work during rail possessions

As above, some construction work would need to be undertaken during rail possession periods when trains are not operating along the Botany Line. Work likely to be undertaken during possession periods includes, but would not be limited to:

- delivery of rail by train and storage of rail along the corridor
- site establishment activities such as erection of barrier fencing
- upgrade of the existing track
- installation of new track that affects operational line or connection of new tracks to existing tracks
- bridge and retaining wall construction in the close proximity to the operational tracks
- signalling work
- undertrack crossings such as drainage and signal routes
- testing and commissioning of rail systems.

The sections below outline the possession periods which would be utilised as part of the project.

7.3.5 Interface with the construction of the Sydney Gateway Motorway and other nearby projects

The construction of the project would be delivered in consultation with other infrastructure projects in the area. The construction timing will be carefully planned to consider the following infrastructure projects which are under development or under construction:

- Sydney Gateway road project (Roads and Maritime)
- Airport North and Airport East Precinct Upgrade (Roads and Maritime)
- WestConnex New M4-M5, St Peters (Roads and Maritime).

Further discussion of these projects is provided in section 24.1.

ARTC meets regularly with RMS to discuss the development of the Gateway motorway project. ARTC and RMS are working together to minimise environmental impacts. The work would occur concurrently with the Gateway motorway project, with the majority of the work occurring within the existing rail corridor. The following key cumulative impacts have been identified:

- traffic
- noise
- flooding
- visual impacts.

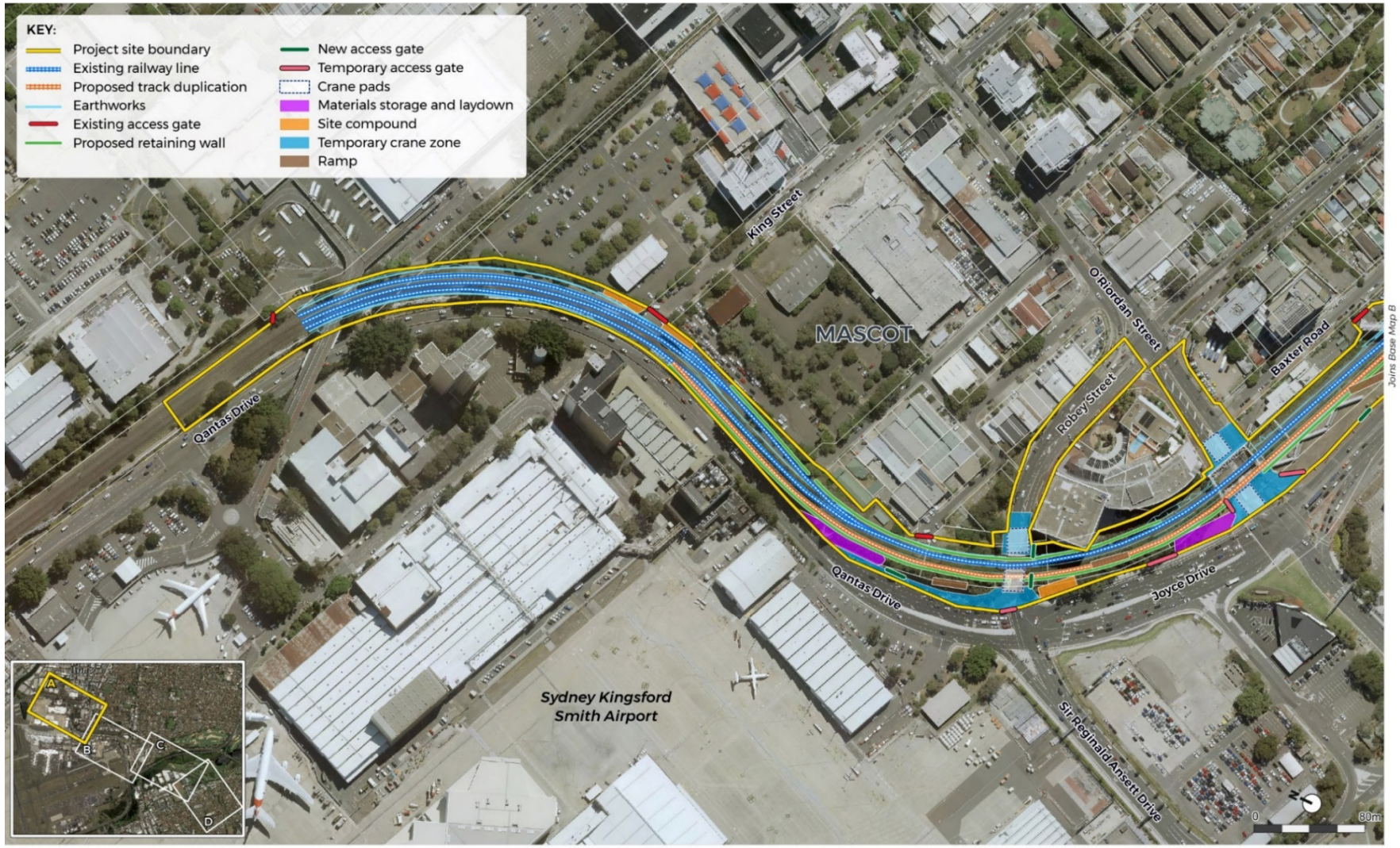
Potential cumulative impacts as a result of the project and surrounding projects are discussed in Chapter 23.

7.4 Construction work areas and compounds

7.4.1 Work areas

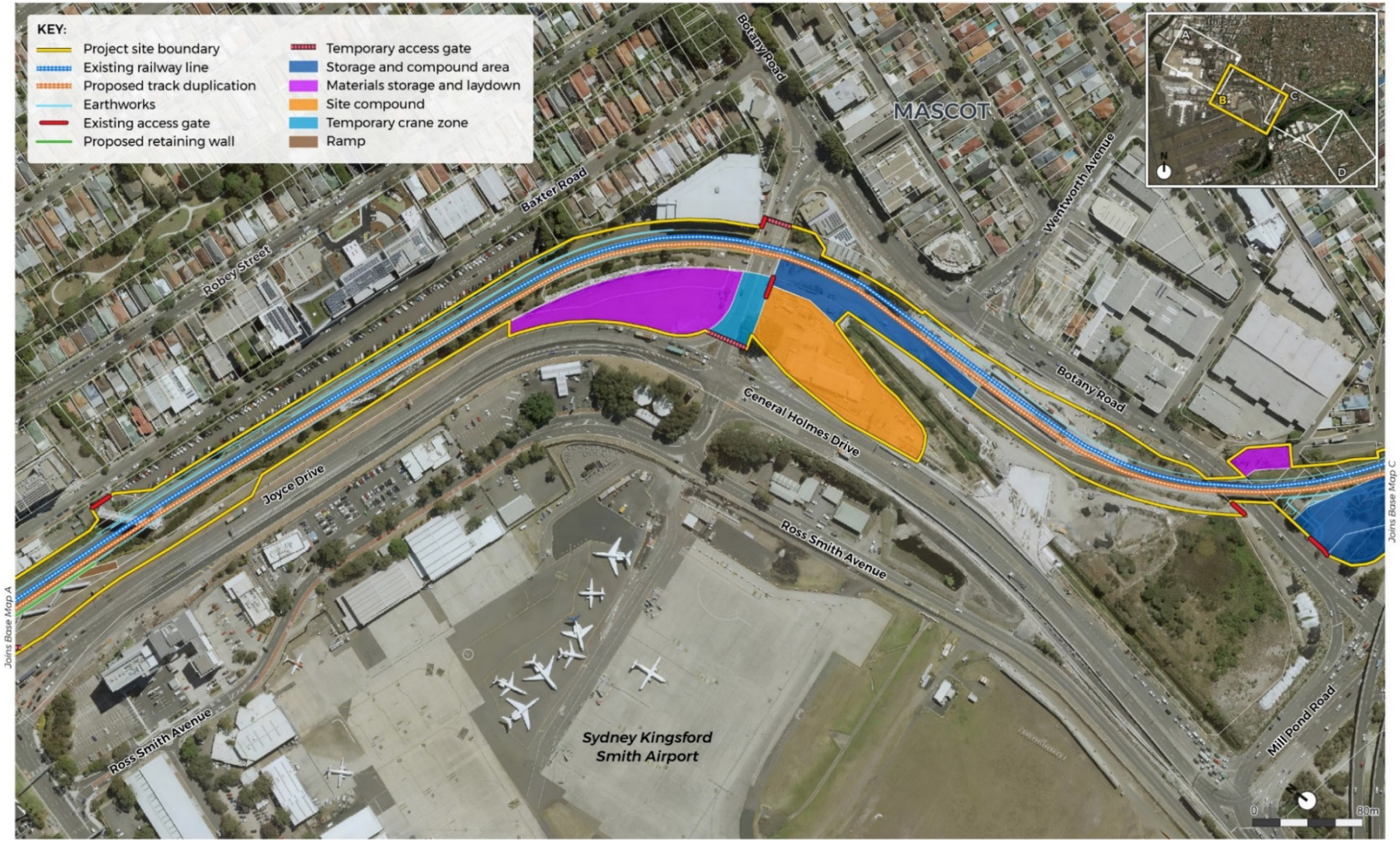
Work areas are defined as areas where construction work would be undertaken. As construction will occur along the entire project alignment between Kent Road in Mascot and Stephen Road in Botany (refer to Figure 7.7), the entire existing rail corridor is considered to be a work area for the purpose of the project. In addition to the existing rail corridor, some areas outside the rail corridor are also required for construction (for activities such as minor civil work, minor signal infrastructure installation, minor cabling/conduit installation or utility relocation).

Figure 7.7 shows the location of the project site including the areas required during construction that are located outside the existing rail corridor. For the purpose of construction planning and assessment of potential impacts as part of this EIS, the project site has been divided into a series of five key project work areas which are outlined in Table 7.3. Each work area contains a different selection of activities that would need to occur in each area. These work areas are generally contained within a particular section of the rail corridor as a result of access not being available along the entire corridor due to the presence of the existing bridges along the corridor.



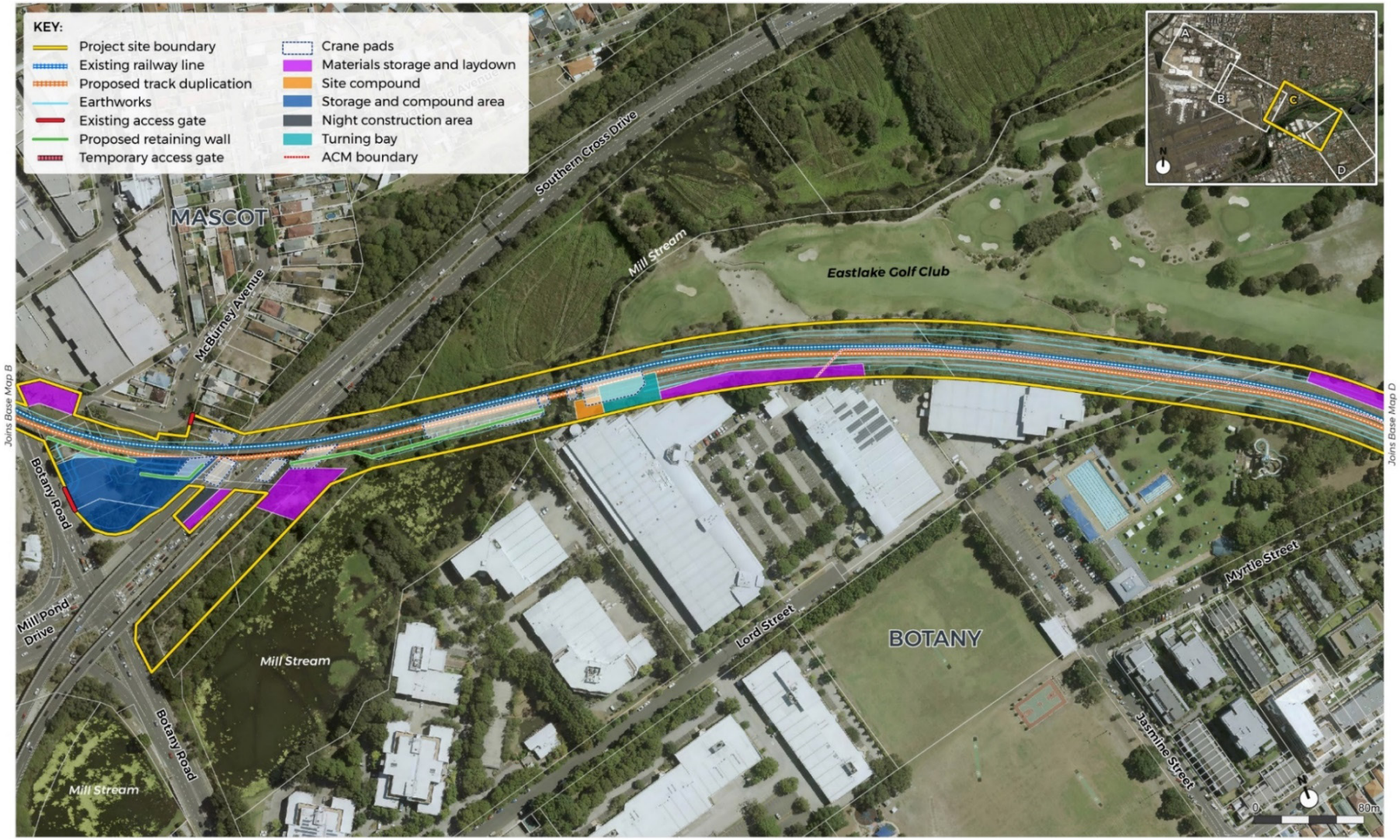
Note: Indicative, subject to detailed design

Figure 7.7a Project site – Construction footprint and proposed work areas



Note: Indicative, subject to detailed design

Figure 7.7b Project site – Construction footprint and proposed work areas



Note: Indicative, subject to detailed design

Figure 7.7c Project site – Construction footprint and proposed work areas

Note: Indicative, subject to detailed design

Figure 7.7d Project site – Construction footprint and proposed work areas

The sub work areas have been identified where possible to meet construction requirements. Following the appointment of the construction contractor, additional work areas may be required to support construction. Further assessment of these areas would be undertaken by the contractor.

Further information on the activities that would be undertaken in the work areas is provided in section 7.2.

Table 7.3 Summary of sub work areas

PROJECT WORK AREA	MAIN ACTIVITIES	SECONDARY ACTIVITIES
Cooks Loop	• site establishment • track formation earthworks and track installation • track upgrading work • signalling work • billboard work • Robey Street bridge construction and demolition • retaining wall construction • site restoration.	• construction access • stockpiling • access ramps • limited construction parking • construction plant/equipment storage • construction haulage route.
Robey Street to General Holmes Drive	• billboard work • site establishment • retaining wall and embankment construction • access ramp and piling pad construction • O'Riordan Street and Robey Street bridge construction and demolition • access ramp and piling pad construction • track installation and drainage work • track crossover installation • utility work to Qenos pipeline • site restoration.	• construction access • construction access ramp • temporary stockpiling • construction parking • construction plant/equipment storage • construction haulage route.
General Holmes Drive to Botany Road	• site establishment including main site office and stockpiling area • track installation and drainage work • signalling work • site restoration.	• construction access • major and temporary stockpiling • major construction workforce parking • construction plant/equipment storage • construction haulage route.
Botany Road Southern Cross Drive	• retaining wall construction • access road and piling pad construction • Southern Cross Drive bridge construction • track installation • signalling work • site restoration.	• construction access • temporary stockpiling • limited construction parking • construction plant/equipment storage • satellite compound.

PROJECT WORK AREA	MAIN ACTIVITIES	SECONDARY ACTIVITIES
Southern Cross Drive to Banksia Street	• site establishment • access road and piling pad construction • retaining wall construction • civil and drainage • Mill Stream and Southern Cross Drive bridge construction • track formation construction, track installation and drainage work • CSR relocation • excavation and capping of the existing asbestos containing material and earthworks associated with cutting widening/mound removal • signalling work • site restoration.	• construction access • construction parking • major and temporary stockpiling and materials storage area • work compounds • limited construction parking • construction plant/equipment storage • internal haulage route between Banksia Street and Mill Stream.

7.4.2 Construction compounds

Construction compounds are areas used as the base for construction activities, usually for the storage of plant, equipment and materials, deliveries, construction site offices and worker facilities. The compounds would contain at least some of the following:

- site offices (requiring 24-hour access for project staff)
- toilets, showers and change rooms
- meal rooms and first aid facilities
- areas for plant, equipment and material storage (noting some designated material storage areas are proposed as outlined in section 7.4.3)
- fencing and security facilities
- worker parking.

It is proposed that two main compound areas would be established for the construction of the project to ensure sufficient access and storage within proximity of proposed construction work.

The first main compound may be located off General Holmes Drive near where the level crossing is proposed to be removed as part of the Airport East Precinct Upgrade project (described in section 5.5.1). The location of this compound is shown in Figure 7.7. This compound may contain the main site office and worker facilities for the project. This facility, would be in use 24 hours a day during construction and would be set up and utilised at the commencement of the early and enabling work. This compound is currently being used as a compound area/site office for the Airport East Precinct Upgrade project.

The second main compound would be located within the existing cleared area of rail corridor generally between Banksia Street and the Stephen Road overbridge at Botany. This site would be a major compound site typically servicing the southern end of the project. The site would be utilised for out of hours and possession period coordination and would also be used in standard hours for compound, materials delivery, laydown, stockpiling and storage as well as site offices. This area would also operate in conjunction with the Gelco siding to provide access for Hi-rail plant and track machine stabling and parking.

To support the main compounds and the work areas described in section 7.4.1, a number of smaller compounds (satellite facilities, refer to section 7.4.4) would also be established along the project site and accessed from either existing or proposed access gates. These compounds are shown in Figure 7.7. Location of compounds would be further refined by the construction contractor and where changes result in significant changes, revised locations would aim to minimise potential impacts on the surrounding environment by being situated:

- more than 40 metres from waterways
- in areas of low ecological and heritage conservation value
- in areas requiring no significant clearing of native vegetation
- remote from sensitive receivers (unless a negotiated agreement is in place)
- on relatively level ground.

It is preferable that the compound sites would be located on cleared areas within the rail corridor. In the event that new compound sites are identified and those impacts are not consistent with those outlined in this EIS, additional environmental impact assessment may be required.

7.4.3 Material laydown and storage areas

A number of designated material laydown areas have been identified along the project site, as shown in Figure 7.7. Major stockpiling, materials storage and laydown facilities may be located at the General Holmes Drive compound (at the corner of Joyce Drive and General Holmes Drive) and at the Banksia Street compound. These areas would typically be used for the storage of materials and equipment only. This would include the storage of precast component of proposed bridges.

Materials storage, laydown and stockpiling would be required throughout the ARTC rail corridor for the duration of the project.

7.4.4 Satellite facilities

In order to support localised activities, satellite facilities would be situated throughout the project footprint for the duration of construction work (such as within the Botany triangle, within the grassed reserve at the intersection of Botany Road and McBurney Street, and along O'Riordan Street near Joyce Drive – refer to Figure 7.7a to Figure 7.7d). They would be established on an as-needed basis during construction and would be further defined during detailed design and following engagement of the construction contractor. The satellite facilities would provide basic facilities for crews throughout the work area including:

- demountable cribbing
- generator fed electricity
- portable septic toilets
- parking
- materials delivery receiving.

7.4.5 Temporary crane zones

A number of temporary crane zones would be established where large cranes are required to work areas. These locations are shown on Figure 7.7 at the Robey Street, O'Riordan Street bridge, Southern Cross Drive and Mill Stream work locations and also at the General Holmes Drive work area. These areas would only be in use during short periods when cranes are required. These would generally coincide with possession periods.

7.5 Construction resources

7.5.1 Estimated workforce requirements

During non-possession periods, it is estimated that a peak workforce of about 270 people would be required during standard construction periods. During possession periods, it is estimated that a peak workforce of about 405 people may be required. This increase in workforce numbers during possession periods are a result of the need to ensure any work required near the operational Botany Line tracks can be undertaken during the short possession periods which are limited to four 48 hours periods throughout each year.

Table 7.4 outlines the estimated workforce numbers for each of the construction compounds. Table 7.4 provides a breakdown on the numbers during possessions and outside possessions and also provides a peak number which would only be experienced during busy periods and an average which would generally be on site day to day.

Table 7.4 Estimated workforce requirements by compound

COMPOUND	NON-POSSESSION		POSSESSION	
	Peak	Average	Peak	Average
King Street	24	14	65	65
Joyce Drive	88	74	115	115
General Holmes Drive	24	16	65	65
Botany Road	70	45	70	70
Mill Stream	21	14	20	20
Banksia Street	45	14	70	70
Total	**272**	**177**	**405**	**405**

7.5.2 Plant and equipment

An indicative list of the plant and equipment expected to be used during construction is provided in Table 7.5. The actual plant and equipment used at each work area would be further refined during the detailed design stage and upon appointment of the construction contractor.

Table 7.5 Indicative construction plant and equipment

PLANT AND EQUIPMENT	CONSTRUCTION SCENARIO REQUIRED (INDICATIVE)					
	SITE ESTABLISHMENT	BRIDGE WORK	RETAINING WALLS	TRACK AND DRAINAGE WORK	CSR AND SIGNALLING WORK	TESTING COMMISSIONING AND FINISHING
Articulated Dumpers		✓	✓	✓		
Concrete truck (and pump)	✓	✓	✓		✓	
Crane truck	✓	✓	✓	✓	✓	✓
Daymaker portable light	✓	✓	✓	✓	✓	

PLANT AND EQUIPMENT	CONSTRUCTION SCENARIO REQUIRED (INDICATIVE)					
	SITE ESTABLISHMENT	BRIDGE WORK	RETAINING WALLS	TRACK AND DRAINAGE WORK	CSR AND SIGNALLING WORK	TESTING COMMISSIONING AND FINISHING
Dewatering pumps and equipment	✓	✓	✓	✓	✓	
Dozer or drott		✓	✓	✓		
Site Dumper		✓	✓	✓	✓	✓
Excavators (5–8 tonnes)		✓	✓	✓	✓	✓
Excavators (15–20 tonnes)	✓	✓	✓	✓		✓
Excavators (30 tonnes)	✓	✓	✓	✓		
Front end loader	✓	✓	✓	✓		✓
Franna Cranes	✓	✓	✓	✓	✓	
Generators	✓	✓	✓	✓	✓	✓
Grader				✓		
Mobile crane <100t	✓	✓	✓			
Mobile crane 100–200t	✓	✓	✓			
Mobile crane 200–500t	✓	✓	✓			
Piling rig		✓	✓			
Pneumatic hammer	✓	✓	✓			
Post stressing jacks. Hydraulic pumps and tendon coil frames		✓	✓			
Rockbreakers		✓	✓	✓		
Saws (concrete, rail, chain)	✓	✓	✓	✓		
Semi-trailers	✓	✓	✓	✓		
Skidsteer loader	✓	✓	✓	✓		✓
Small compaction equipment	✓	✓	✓	✓	✓	✓
Temporary barriers/fencing	✓	✓	✓	✓	✓	
Tipper trucks and trailers	✓	✓	✓	✓	✓	✓
Track tamping machine				✓		
Vacuum sucker truck	✓	✓	✓	✓	✓	
Water Cart	✓	✓	✓	✓	✓	✓
Welding and Oxy cutting equipment	✓	✓	✓	✓		✓
Vibratory Rollers (10–16 tonnes)		✓	✓	✓		

7.5.3 Materials

A variety of materials would be required to construct the project. The main materials and indicative quantities for each key component of the work is outlined in Table 7.6.

Table 7.6 Indicative material usage estimates

CONSTRUCTION ACTIVITY	MATERIALS	QUANTITIES (INDICATIVE BASED ON CURRENT DESIGN)
Track work	Structural/embankment fill material	14,400 cubic metres
	Capping material	5,700 cubic metres
	Concrete sleepers	About 5,000 sleepers
	Ballast	9,370 cubic metres
	Rail	55 rail lengths at 110 metres per length
Bridge work	Steel – reinforcing steel and structural steel	1,500 tonnes
	Concrete	7,000 cubic metres
	Precast elements	12 beams 12 thru-girders
Retaining walls	Precast elements for panels	3,000 square metres
	Concrete	1,000 cubic metres
	Reinforcing steel	200 tonnes
Drainage	Concrete drainage pipes and pits	Reinforced Concrete Pipe (RCP) – 415 lineal metres Reinforced Concrete Pits – 22

Hazardous materials and dangerous goods

In addition to the main construction materials identified in Table 7.6, a number of hazardous/dangerous goods may be required during the construction of the project. Hazardous materials and dangerous goods used and stored on the project would be those typically expected for a civil/rail construction site. These would include, but not be limited to:

- oxy/acetylene gas for metal/rail cutting and welding
- rail weld kits (Thermit)
- rail grease (grease pots, track lubricators)
- fuels (diesel, petrol, two-stroke, etc)
- mechanical fluids for plant and equipment (oils, lubricants, grease, degreaser, coolants, etc)
- cement, grout, ready-mix concrete, etc
- concrete curing compounds and formwork de-bonding
- epoxy and resin based concrete repair and adhesives
- sealants and joint fillers
- safe-working detonators (for worksite protection)
- spray paint, marker paint
- cleaning products.

Where these materials are required to be kept on site, the hazardous materials and dangerous goods would be appropriated stored within designated construction compounds within the project work area.

7.5.4 Earthworks and waste management

Earthworks

Based on the current design, the project would require about 31,600 cubic metres of spoil to be excavated (cut) due to expansion of cuts along the project site. About 29,500 cubic metres of combined fill and structural material would also be required to allow for elements such as expanded embankments and to support new retaining walls. Wherever possible, and subject to testing for contaminants, this material is planned to be sourced from the cut material for the project and reused. Where spoil material is not fit for re-use, suitably sourced material would be imported for use.

A summary of the current earthwork requirements is provided in Table 7.7.

Table 7.7 Key earthwork requirements

EARTHWORK REQUIREMENT	APPROXIMATE VOLUME
Spoil (cut)	31,600 cubic metres
Fill	15,120 cubic metres
Asbestos removal (cut)	4,000 cubic metres
Structural fill	14,400 cubic metres
Capping material	5,700 cubic metres

Based on the current design, up to around 35,220 cubic metres of combined fill, structural fill and capping material would be required for the project. Based on the current proposed cut for the project, this would result in a small excess of spoil material, subject to confirmation of the reusability of the cut material (around 380 cubic metres). Spoil excavated as part of the project would be tested and classified.

Where suitable, this material would be re-used for earthworks and backfill. Where material is deemed as unsuitable for reuse, this would be disposed at an appropriately licenced facility. Where spoil material is not fit for re-use, suitably sourced material would be imported for use.

Waste management

During the construction phase, key waste sources would include:

- green waste from vegetation clearance (including topsoil)
- excess spoil from excavations (where this cannot be reused on site as fill material)
- construction and general waste
- solid waste such as concrete and steel materials from the removal of the existing Robey Street and O'Riordan Street bridges
- ballast material from existing tracks (where this cannot be reused on site as part of the construction of the project)
- asbestos containing materials from remediation area
- liquid wastes such as oils and used chemicals from equipment maintenance
- domestic waste from site personnel including food scraps, glass and plastic bottles
- paper and plastic containers
- site sewage and other wastewater run-off including water utilised for dust suppression.

Overall, the quantities of waste generated by the project are expected to be typical of similar sized rail projects and are therefore considered to be manageable. Additionally, there are a number of practical options for reusing/recycling surplus materials, which would be implemented for the project.

All waste requiring off-site disposal would be classified in accordance with the NSW Environment Protection Authority *Waste Classification Guidelines* (2014a) prior to disposal.

A waste management plan would be prepared as part of the construction environmental management plan (CEMP). Construction waste would be managed through the waste hierarchy established under the *Waste Avoidance and Recovery Act 2001*, which comprises the following principles:

- Avoidance of waste: minimising the amount of waste generated during construction by avoiding unnecessary resource consumption (ie avoiding the use of inefficient plant and construction equipment and avoiding materials with excess embodied energy, waste and excessive packaging).
- Resource recovery: reusing, reprocessing and recycling waste products generated during construction to minimise the amount of waste requiring disposal.
- Disposal: where resources cannot be recovered, disposing of them appropriately to minimise the potential adverse environmental impacts. This would include areas such as where waste is generated from excavation activities within the project site that have been identified as contaminated with asbestos containing materials and other contaminants of potential concern (refer to Chapter 12).

Opportunities for proposed reuse options for potential waste materials are outlined in Table 7.8. The CEMP would also take into account the resource recovery order and resource recovery exemption that ARTC currently have with respect to recovered soils.

Table 7.8 Reuse options for key waste streams

WASTE STREAM	POTENTIAL REUSE OPTIONS
Vegetation waste from clearing activities (including topsoil)	• Reuse on site through chipping and mulching for use in rehabilitation work (to be stockpiled for use at later date). • Reuse of topsoil in rehabilitation work. • Transfer of material to other Roads and Maritime project such as WestConnex (where not able to be reused on site).
Ballast material from existing tracks	• Reused elsewhere on ARTC network or within the project site as: o bottom ballast for track work o capping on access tracks.
Plain track concrete sleepers removed for crossover/turnout bearers	• Reused elsewhere on ARTC network.

7.5.5 Erosion and sedimentation

A soil and water management plan would be prepared as part of the CEMP. Specific measures would be identified in consultation with relevant government agencies and would be consistent with the principles and practices detailed in Landcom's (2004) *Managing Urban Stormwater: Soils and Construction 'Blue Book'*. Additional soil and water management procedures are discussed in Chapter 14.

7.5.6 Land requirements

As described in section 6.8, a majority of the project would be constructed and operated within the existing rail corridor or on land for which ARTC has existing access agreements. However, during construction some areas of land would be required to be temporarily accessed outside of the current rail corridor to allow for construction of certain aspects of the project.

These include areas for:

- temporary construction compounds (such as the construction compound currently being utilised for the Airport East Project adjacent to General Holmes Drive)
- crane pads
- billboard removal (and replacement) activities.

The areas of land that would temporarily be required would be typically located adjacent to the existing rail corridor and be generally cleared areas. The final extent of temporary land requirements during construction would be determined during detailed design in consultation with the construction contractor.

7.5.7 Site servicing requirements

Utilities such as water, power, sewerage and telecommunications would need to be supplied to work areas and compounds. Generally, these utilities are located close to the sites (such as the adjacent footpath) and the supply is considered 'business as usual' for utility companies.

7.6 Transport, access and haulage

7.6.1 Routes for the movement of construction equipment and materials (haul routes)

Preliminary identification of haulage routes has been undertaken with consideration to the sensitive nature of surrounding areas. Two types of haulage routes have been identified:

- General construction traffic – to be used by construction vehicles including light vehicles and low volume heavy vehicle movements (refer to Figure 7.8)
- Heavy vehicle haulage routes – to be used by heavy vehicles for spoil removal where volumes would be high during a relatively short period of time (refer to Figure 7.9). Haulage and plant movements would occur throughout the duration of the project. Haulage vehicles are required for:
    - materials delivery – earthworks, ballast, steel reinforcement, sleepers, etc
    - concrete delivery
    - spoil and waste removal
    - plant and equipment delivery
    - oversize plant delivery
    - mobile crane mobilisation to site
    - oversize precast concrete components – bridge beams, girders, retaining wall panels, etc.

The routes have been developed to minimise impacts on residential streets as far as possible, while providing the most direct route to the arterial road network and meeting specific road requirements (such as specified routes for heavy vehicles). These preliminary haulage routes would be reviewed during detailed design and confirmed following appointment of the construction contractor. In general, vehicle movements would be scheduled outside peak periods. However, there would be a need for some vehicle movements during these periods. Worker vehicle movements would also be required in both the morning and afternoon peak hour periods.

Note: Indicative, subject to detailed design

Figure 7.8 Construction vehicle routes – general work vehicles

Note: Indicative, subject to detailed design

Figure 7.9 Construction vehicle routes – heavy vehicles

7.6.2 Access to work areas

Access to the project site would be via a combination of existing and new access gates to the rail corridor. Some of these new gates would be temporary and would only be used during construction. These gates are shown in Figure 7.7.

Where new access points are proposed, these locations may require some vegetation clearance (subject to final siting along the corridor) and would include construction of new driveway access from the adjacent road network. Some kerb adjustments or temporary lane or road network impacts may also occur for the duration of work. Each new access point would include installation of a secure gate to restrict access by the general public.

7.6.3 Construction traffic generation

Construction traffic would include heavy and light vehicles associated with spoil and waste removal, material deliveries, and the arrival and departure of construction workers. The indicative construction traffic volumes are based on the following vehicle types:

- light vehicles – up to 4.5 tonnes
- heavy vehicles – 12.5 metres long, greater than 4.5 tonnes including truck and dog trailers, semi-trailers, concrete trucks and specialist truck and trailers for oversized vehicles.

Table 7.9 outlines the estimated construction workforce vehicle numbers (peak and average) for both possession and non-possession periods.

Table 7.9 Estimated construction workforce vehicle numbers

LOCATION	NON-POSSESSION		POSSESSION (APPROX. 4 TIMES PER YEAR)	
	Peak	Average	Peak	Average
Banksia Street	45	14	70	70
Mill Stream	21	14	21	21
Botany Road	70	45	70	70
Joyce Drive	88	74	114	114
General Holmes Drive	24	16	64	64
King Street	24	14	64	64
	272	**177**	**403**	**403**

Table 7.10 also outlines the indicative breakdown on the number of mass haul vehicles required for construction.

Table 7.10 Indicative mass haulage trucks movements

		ESTIMATE MOVEMENTS						
				MASS HAUL – IMPORT/EXPORT				
				WORK DURATION (TOTAL)	TRUCKS PER SHIFT	TRUCKS PER HOUR	MOVEMENTS PER PEAK HOUR	
Access gate	**Proposed truck type**	**No. of trucks**	**Number of movements (in/out)**	**Days**	**Movements per shift**	**Per hr/shift (based on 8hr driver working shift)**	**Peak hour scale factor**	**Movements per peak hour**
King Street	Tipper	1,080	2,160	60	40	5	1	**5**
Joyce Drive/Qantas Drive	Tipper	1,260	2,520	60	50	6	1	**7**
Joyce/Qantas Drive	Truck and dog	350	700	40	20	3	1	**3**
Joyce Drive	Truck and dog	460	920	40	30	4	1	**4**
General Holmes Drive	Truck and dog	400	800	40	20	3	1	**3**
Botany Road – Botany Triangle	Tipper	250	500	60	10	1	1	**2**
Botany Road – East (Mill Stream Access)	Tipper	720	1,440	40	40	5	1	**5**
Banksia Street	Truck and dog	1,510	3,020	40	80	10	1	**10**

7.6.4 Diversions and temporary transport arrangements

Road traffic

To support construction, a number of changes to the surrounding road network would be required. These changes to the road network are required to:

- facilitate the movement of construction vehicles in and out of compounds and work areas
- ensure safe movement of pedestrians and cyclists around the project
- optimise on and off-street parking.

Road closures would also be required for certain periods throughout the construction period. These would include:

- partial closure of some streets to allow large construction vehicles to enter and leave access gate
- temporary lane closures to allow for major construction movements (such as large equipment including cranes etc)
- temporary night-time lane closures to enable the safe construction and site establishment adjacent to existing roadways
- closure of Robey Street, O'Riordan Street and Southern Cross Drive for activities such as:
    - construction of new bridges and demolition of existing bridges
    - utility relocations.

Where these closures require diversions, these would be identified as part of the ongoing development of the project. The final extent of closures would be confirmed during detailed design and construction planning in consultation with the final construction methodology developed by the construction contractor.

A number of the proposed access gates would be located off main roads and close to intersections. Traffic control would likely be required at access gates to smoothly and safely facilitate truck and construction workforce movements in and out of the worksites during average to peak periods throughout the duration of the project.

In general, it is assumed that the Road Occupancy License for the required closures of the main and arterial roads would not be granted outside night time hours between 11 pm to 4 am due to the significant impact on traffic flows to and from the airport precinct, Port Botany and the city.

Further discussion regarding the potential impacts of the project with respect to traffic management is provided in Chapter 8.

Rail traffic

Given the limited alternatives for freight transport via rail to and from Port Botany, impacts on rail traffic along the Botany Line would be kept to a minimum with disruptions to services limited to rail possessions outlined in section 7.3.4. The majority of these possessions would be 48 hour possessions which are currently utilised by ARTC to undertake maintenance of the line. The use of these possessions is therefore not considered to differ from the existing operations.

In addition to the rail possessions outlined in section 7.3.4, it is proposed that worksite protection arrangements would be put in place including control signal blocking and Track Occupancy Authorities. These arrangements would ensure that work in the rail corridor (within danger zone) can occur while trains continue to operate along the Botany Line.

Pedestrian/cycle traffic

Due to the positioning of the work largely within the Botany Line rail corridor, impacts on pedestrian and cyclist infrastructure is considered minimal. The following impacts have been identified:

- closure of the footpath along the northern side of Qantas Drive between Robey and O'Riordan streets for the duration of retaining wall work. A detour would be put in place (to be determined during construction planning)
- closure of adjacent pedestrian paths along Robey Street for a period of about 14 months throughout the demolition and rebuild of existing abutments, pedestrian to be redirected to Robey Street or Wentworth Street as required
- closure of adjacent pedestrian paths along O'Riordan Street for the duration of the bridge replacement work
- adjustments to pathways in the vicinity of access points.

Further discussion regarding the potential impacts of the project on pedestrians is provided in Chapter 8.

7.6.5 Construction workforce parking

Where space is available, parking would be provided for construction workers within the construction compounds and work areas within the existing rail corridor. Where possible, parking would generally be provided at the main construction compounds with carpooling (or other forms of shuttle transportation) used between to move construction workers to the smaller compounds and individual work areas.

Due to the positioning of the project in the vicinity of a number of transport corridors (rail and bus) construction workers would also be encouraged to use public transport to provide access to and from site, reducing the overall need for parking.

Further development of proposed areas for parking would be determined during detailed design by the construction contractor. Further discussion regarding potential parking impacts is provided in section 8.3.