Roads and Maritime Services/Sydney Airport Corporation Limited

Sydney Gateway Road Project

Environmental Impact Statement/ Preliminary Draft Major Development Plan

November 2019

As proponents of the Sydney Gateway road project, Roads and Maritime Services and Sydney Airport Corporation Limited, acknowledge and pay respect to the Kameygal, the traditional custodians of the land on which the project is proposed, and acknowledge their connection to the land and water of this Country.

Environmental Impact Statement / Preliminary Draft Major Development Plan

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Certification

Submission of environmental impact statement and major development plan

Prepared under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (NSW) (environmental impact statement) and section 91 of the *Airports Act 1996* (Cth) (major development plan).

Environmental impact statement and major development plan prepared by:

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Responsible person:	Camilla Drover Executive Director, Motorways Roads and Maritime Services Level 22, 101 Miller street North Sydney NSW 2060	Chris Evans General Manager Construction and Facilities Management Sydney Airport Corporation Nigel Love Building, 10 Arrivals Court Sydney International Airport NSW 2020
Address of the land to which the statement relates:	Land within the Inner West, Bayside and City of Sydney local government areas as described within this document.	
Description of the infrastructure to which this statement relates:	Construction and operation of the Sydney Gateway road project.	
Environmental impact statement:	An environmental impact statement is attached addressing all matters in accordance with Division 5.2 of the *Environmental Planning and Assessment Act 1979* (NSW) and Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (NSW).	
Major development plan:	A preliminary draft major development plan is attached addressing all matters in accordance with section 91 of the *Airports Act 1996* (Cth).	
Declaration	I certify that I have prepared this environmental impact statement in accordance with the Secretary's Environmental Assessment Requirements dated 15 February 2019 and this preliminary draft major development plan in accordance with the requirements of section 91 of the *Airports Act 1996*. This document contains all available information that is relevant to the environmental assessment of the infrastructure to which the statement relates. To the best of my knowledge, the information contained is neither false nor misleading.	
Signature:		
Name:	Amanda Raleigh	
Date:	11 November 2019	

Executive summary

Roads and Maritime Services (Roads and Maritime) and Sydney Airport Corporation are seeking planning approval to build new, direct road connections from the Sydney motorway network at St Peters interchange to Sydney Airport and beyond towards Port Botany.

The Sydney Gateway road project (the project) is a NSW Government priority transport project to improve access for passengers and freight, support the economy, reduce traffic congestion, and improve amenity and liveability in local centres.

The project is a critical element of the NSW Government's long-term strategy to invest in an integrated transport network and make journeys easier, safer and faster. By 2036, the project would provide capacity for an additional 60,000 vehicles per day.

This Environmental Impact Statement/preliminary draft Major Development Plan has been prepared to support project development, inform the community, and meet NSW and Australian Government requirements for an application for planning approval.

What is proposed?

The project comprises new and upgraded sections of road as illustrated in Figure ES.1. The project would connect Sydney Airport Terminal 1 (the International Terminal) and Terminals 2/3 (the Domestic Terminals) with each other and with the Sydney motorway network via St Peters interchange. It would also facilitate the movement of traffic towards Port Botany via General Holmes Drive. The project would provide three main routes for traffic:

- Between the Sydney motorway network and Terminal 1, and towards the M5 motorway and the Princes Highway
- Between the Sydney motorway network and Terminals 2/3, and towards General Holmes Drive, Port Botany and Southern Cross Drive
- Between Terminal 1 and Terminals 2/3.

The project also provides improved access to Sydney Airport land located on both sides of Alexandra Canal and across the Botany Rail Line.

Key features

Key features of the project include:

- New road links between Sydney Airport's terminals and the Sydney motorway network at St Peters interchange, consisting of:
  - A new elevated access viaduct and overpass from Qantas Drive into Terminals 2/3
  - Widening Qantas Drive to three lanes in each direction
  - A new access road to Terminal 1 from the Sydney motorway network via St Peters interchange
  - Four new bridges over Alexandra Canal, and new overpasses across the Botany Rail Line and Canal Road
  - New and upgraded intersections along Qantas Drive and Airport Drive
- New road links to Sydney Airport land:
  - Connecting Sydney Airport land on either side of the Botany Rail line
  - Connecting Sydney Airport's existing and proposed freight facilities on either side of Alexandra Canal
- An active transport link to maintain cycle and pedestrian connections between Tempe, Sydney Airport, the Sydney central business district and Mascot
- Other road operational infrastructure.

Location

The project is located about eight kilometres south of the Sydney central business district, in the suburbs of Tempe, St Peters and Mascot. It is located in the Inner West, City of Sydney and Bayside local government areas.

The majority of the project site is owned by the Australian Government and leased to Sydney Airport Corporation. Other land is owned by the NSW and local governments, and private landowners (including Sydney Airport Corporation).

The project location is shown on Figure ES.1.

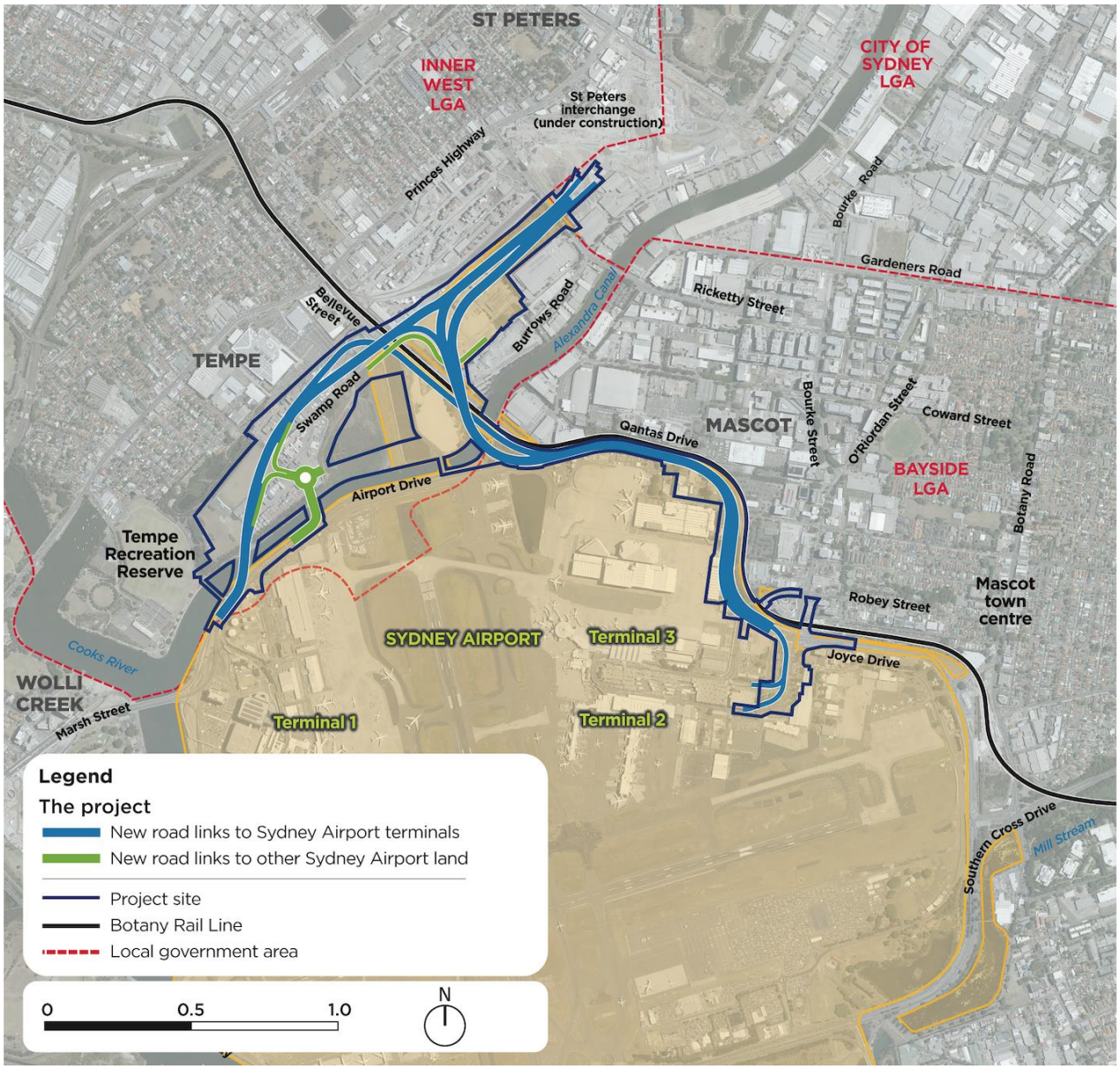


Figure ES.1 The project

What are the project objectives?

The NSW Government has committed to delivering the project to realise the full benefits of its substantial investment in the Sydney motorway network and fulfil the following project objectives:

- Improve connectivity to Sydney Airport terminals by providing high capacity direct road connections that cater for forecast growth in passenger and air freight volumes
- Support the efficient distribution of freight to and from Sydney Airport and Port Botany to logistic centres in Western Sydney
- Improve the liveability of Mascot town centre by reducing congestion and heavy vehicle movements on the local road network.

The project also needs to support the objectives of the *Sydney Airport Master Plan 2039* (the Sydney Airport Master Plan).

Why is the project needed?

The project need was identified in 2012 in the NSW State Infrastructure Strategy. Sydney Airport and Port Botany are two of Australia's most important infrastructure assets, providing essential domestic and international connectivity for people and goods. The Sydney Airport and Port Botany precinct is also the largest employment area in Sydney after the Sydney central business district, with high concentrations of airport and port related businesses that are important to the economy. As a result, high volumes of traffic access Sydney Airport and Port Botany from all over Sydney and NSW. Many of the existing roads surrounding Sydney Airport and Port Botany are already operating near or at capacity in peak periods.

Over the next 20 years, air travel, air freight, container freight and general traffic in and around the Sydney Airport and Port Botany precinct are all expected to grow significantly. This will put more pressure on roads and other infrastructure and impact local communities.

How would the project satisfy this need?

The project is proposed to put in place the necessary infrastructure to address these challenges and keep Sydney moving and growing. The project, together with the Botany Rail Duplication project, the development of the Sydney motorway network (including M4 East, New M5 and M4-M5 Link), and other key road infrastructure projects, would expand transport capacity and assist with meeting the predicted growth in passenger, freight and general traffic movements.

The project would ease congestion on the road network serving Sydney Airport and Port Botany, enhance network capacity, improve access for passengers and freight, and remove heavy vehicle traffic from Mascot's local streets, by providing new direct connections to the Sydney motorway network.

These improvements in road access would support the economy through travel time savings, improved freight efficiency, and improved traveller and visitor experience. Community benefits would include enhanced local amenity through reduction in traffic congestion and a reduction in heavy vehicles using local streets in Mascot. The project would also provide the opportunity to enhance public open space and upgrade active transport links.

The project would not preclude other freight rail and bus service improvements.

The project is consistent with the objectives and future planning needs for ground transport identified in the Sydney Airport Master Plan, and meets Sydney Airport's identified future development, growth and infrastructure needs. In particular, the project meets the Master Plan's objective to 'improve ground access to, from and past the airport'.

What is the approval process for the project?

The project is subject to approval under both NSW and Commonwealth legislation.

Parts of the project located on Commonwealth-owned land leased to Sydney Airport Corporation (Sydney Airport land) are subject to the *Airports Act 1996* (Cth) (Airports Act). In accordance with the Airports Act, these parts of the project are major airport development. A major development plan (MDP) needs to be approved by the Australian Minister for Infrastructure, Transport and Regional Development before a major airport development can be undertaken.

Parts of the project located on other land are State significant infrastructure in accordance with the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). As State significant infrastructure, these parts of the project need approval from the NSW Minister for Planning and Public Spaces. An environmental impact statement (EIS) is needed to support the application for approval for State significant infrastructure under the EP&A Act.

This document considers the potential impacts of the project. It has been prepared to support an application for planning approval of the project in accordance with the requirements of the EP&A Act (for those parts of the project subject to the EP&A Act), and as a major airport development under the Airports Act (for those parts of the project located on Commonwealth-owned land). It also considers the potential for significant impacts to matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), including impacts to Commonwealth land. No significant impacts have been identified.

What options were considered?

Space to build a new road link is limited by existing land uses and the complex operational requirements of key stakeholders, including Sydney Airport, airlines and freight operators, Australian Rail Track Corporation and others. Requirements for the safe operation of aircraft and existing major utilities are also significant constraints to development close to the airport.

A key goal of project development is to minimise impacts to road network operation, airport operations, transport, freight and business services during construction and operation. Sydney Airport must remain accessible for air travellers, employees and freight operators at all times during construction.

Above ground and tunnel road connection options were investigated. Tunnelling was not considered suitable in this location due to soft ground conditions, potential to cause very extensive surface disruption, and the need to pass under Alexandra Canal leading to sub-optimal road gradients.

As a result, six potential surface corridors were investigated. Differences between these six corridors included the location of bridges over Alexandra Canal, one or two main interfaces with the existing road network at Qantas Drive and Airport Drive, and maintaining or closing Airport Drive where it passes between Alexandra Canal and the end of the main runway. The preferred project alignment was selected as it best meets the project objectives, minimises impacts and supports the Sydney Airport Master Plan.

Following identification of the preferred project alignment, further work was carried out to refine the design of key project features. Design features where different options were considered include:

- Location and design of bridges – The project optimises the road network layout and the number of intersections with the existing road network. The current design includes concept bridge designs with no piers in Alexandra Canal. Any significant change to bridge designs, such as including piers, would require further environmental assessment
- Measures to minimise excavation and movement of landfill material – Project construction methods, alignment and pavement designs were optimised to minimise disturbance to the former Tempe landfill
- Route options for relocating the active transport link – The shortest and most direct alignment, along the bank of Alexandra Canal, is proposed following consultation with active transport user groups
- Access from Qantas Drive to Terminals 2/3 – Two grade-separated options to improve access to Terminals 2/3 were investigated.

What are the main community participation outcomes?

Community consultation for the project began in September 2018. Community engagement activities included door knocking, distributing fact sheets to the community, holding three community information sessions, and setting up information booths in Tempe, Wolli Creek, Mascot and Zetland. These activities were in addition to engaging with local stakeholders and government agencies through briefings and face-to-face meetings.

A range of communication channels were also established for the project, to seek input from stakeholders and communities and to support engagement. Key periods of consultation and feedback were:

- Preliminary design and project announcement (September/October 2018)
- Concept design display (May/June 2019).

Feedback and comments from the community and stakeholders were grouped into seven key themes. Active transport and environment were raised the most frequently, as illustrated in Figure ES.2. The majority of environmental issues raised related to noise and vibration, and flora and fauna.

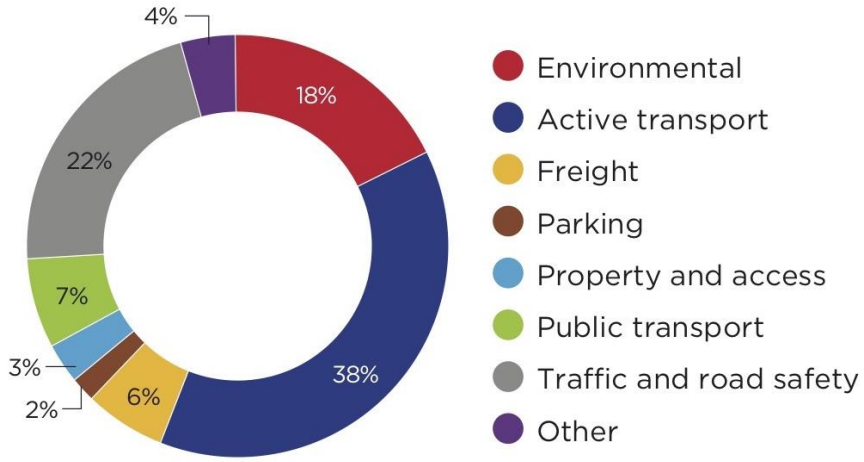


Figure ES.2 Community feedback about the project

What are the main beneficial outcomes expected?

The project alignment, concept design and construction methodology have been developed to maximise benefits and avoid and minimise impacts as far as possible.

The main benefits of the project are related to improved traffic, transport and access, including:

- Improved connectivity, access and faster travel times to and from Sydney Airport and towards Port Botany
- Travel times to Sydney Airport's terminals would substantially reduce as a result of the project. In 2026, travel time improvements of up to 23 minutes are forecast, increasing to up to 30 minutes in 2036 compared to existing alternate routes through Mascot
- Reduced traffic on local streets in Mascot and in the Mascot town centre – daily traffic flows along O'Riordan Street and Botany Road are forecast to reduce by up to 30 per cent with the project
- Travel times to Port Botany would also substantially reduce – in 2026, travel time improvements of up to 17 minutes are forecast, increasing to more than 20 minutes in 2036 compared to existing routes
- The new access roads to Sydney Airport land would facilitate proposed developments under the *Sydney Airport Master Plan 2039* (the Sydney Airport Master Plan).

Other secondary or associated benefits of the project include:

- Potential for increased economic productivity and employment opportunities at Sydney Airport as a result of improved connectivity and access, contributing to the future economic productivity and efficiency of the airport itself, as well as that of businesses on Sydney Airport land
- Facilitating delivery of key planning directions in the Sydney Airport Master Plan by delivering additional road capacity to Sydney Airport. This would have the potential to service and/or facilitate growth of airline services, aviation support facilities, freight and commercial services
- Improved access to Sydney Airport freight terminals for over-height vehicles
- Opportunities to redevelop residual lands (up to about 10 hectares) in Tempe for other uses, including open space and community infrastructure (subject to future planning by Inner West Council).

If the project is not built, the full connectivity benefits of development of the Sydney motorway network would not be realised.

What are the main adverse outcomes expected?

The project has been designed to avoid and/or minimise environmental and social impacts. However, there would still be some temporary and permanent impacts during construction and operation. Key potential impacts are summarised below. With implementation of the mitigation measures identified in this document, none of the identified impacts are considered to be significant.

Construction impacts

Key construction impacts are summarised below for the project as a whole.

Traffic, transport and access

Key potential impacts

The project can be constructed without major reconfiguration of the existing road network. However, there would be substantial works required along Airport Drive, Qantas Drive and Sir Reginald Ansett Drive and to facilitate connection of the new road links to the existing road network. Two lanes would generally be maintained in each direction along Qantas Drive and Airport Drive during Sydney Airport's operating hours when traffic volumes are highest. However, there would be a periods when the number of available lanes would need to reduce to facilitate construction. Where possible, these would be conducted during periods of lower traffic volumes.

There would be impacts to intersection performance within or near the project site, particularly in the vicinity of Terminals 2/3, which would lead to additional congestion and delays for Sydney Airport customers, commuters, public transport (buses) and freight.

Temporary changes to active transport routes, including relocation of the existing Alexandra Canal cycleway, would lead to an increase in travel distance of about 580 metres.

There would also be impacts to some car parks and parking areas on Sydney Airport land.

Key mitigation and management approaches

Prior to the commencement of construction, a Construction Traffic and Access Management Plan would be prepared as part of the Construction Environmental Management Plan (CEMP). The Construction Traffic and Access Management Plan would set out measures to manage the movement of construction-related traffic to minimise traffic and access disruptions in the public road network.

To minimise the potential for traffic and access impacts, short-term road and lane closures would be undertaken during night-time hours as far as possible. However, major crane lifts would occasionally require full weekend closures, with detours established to maintain access to Sydney Airport's terminals

and satisfactory operation of the road network. Measures to manage road and lane closures would be defined by the Construction Traffic and Access Management Plan.

Construction staging and temporary work plans would be prepared to:

- Ensure access to Sydney Airport is maintained at all times during operational hours
- Stage construction on key parts of the network, such as Qantas Drive, Airport Drive and access to Sydney Airport terminals, to enable these roads to continue to function effectively.

Roads and Maritime would continue to work to ensure that construction traffic, transport, and access impacts, including disruptions to customers' travel plans, access to Sydney Airport and delays to road users, are minimised.

Noise and vibration

Key potential impacts

The project includes some works that cannot be safely undertaken while Sydney Airport and the Botany Rail Line are operational. It also includes works with the potential to affect access to Sydney Airport. As a result, while works would be undertaken during the recommended standard construction working hours, there would also be a need to undertake some works during evenings, at night, and on weekends.

The noise and vibration assessment concluded that construction has the potential to impact surrounding noise sensitive receivers. Moderate exceedances of noise criteria were predicted at residential receivers outside standard construction hours, including potential sleep disturbance impacts.

Noise impacts were predicted at the nearest commercial receivers when noise-intensive equipment is used. Some hotels near Sydney Airport may experience noise impacts.

Key mitigation and management approaches

Construction noise impacts would be managed using reasonable and feasible mitigation and management measures, including scheduling of works, noise reduction measures for plant and equipment, and provision of respite periods for sensitive receives. Construction contractors would be required to minimise time and duration of impacts to sensitive receivers and keep them proactively informed of likely timing and impacts of noisy activities.

Location and activity specific noise and vibration impact assessments would be undertaken to confirm the measures that would be implemented at each location to minimise the potential for impacts.

Airport operations

Key potential impacts

Construction would result in temporary intrusions of the protected surfaces that from part of Sydney Airport's prescribed airspace. This would include temporary intrusions into the obstacle limitation surface during the use of large equipment (such as cranes), and temporary intrusions into the high intensity approach lights for the main north–south runway.

Night lighting would be required within the specified minimum light intensity zones around the main north–south runway. This has the potential to lead to light spill and pilot distraction in some areas.

Bodies of standing water within construction areas (such as detention ponds) may attract birds, increasing the risk of wildlife strike for aircraft.

Key mitigation and management approaches

Construction planning would ensure that intrusions of Sydney Airport's prescribed airspace are minimised as far as practicable. Where temporary intrusions of the prescribed airspace cannot be avoided, works

likely to result in such intrusions would be undertaken in accordance with the requirements of relevant stakeholders and any controlled activity approvals for these works. This would include timing works to avoid Sydney Airport's operational hours.

Construction lighting would be selected and located in accordance with the *National Airports Safeguarding Framework Guideline E: Managing the Risk of Distractions to Pilots from Lighting in the Vicinity of Airports*.

Drainage and flood management infrastructure would be managed during construction to minimise the risk of attracting wildlife.

Air quality

Key potential impacts

Construction would have the potential to generate dust, which could affect human health and amenity if inadequately managed. Uncontrolled dust generation has the potential to create visibility issues for aviation operations.

The project would involve works at the former Tempe landfill, which would have the potential to generate odour associated with the exposure and management of waste material. In addition, as the project would involve removing sections of the existing landfill cap at the former Tempe landfill, there is the potential for the release of trapped landfill gases resulting in increased odour potential.

Key mitigation and management approaches

In general, air quality impacts associated with dust are expected to be minor and manageable by implementing established management measures. An odour management strategy would be developed prior to construction and implemented for the duration of works involving ground disturbance at the former Tempe landfill.

An assessment would be undertaken of the potential hazards associated with landfill gas. Where the need for management measures are identified, these will be described in a remediation action plan (described below).

Contamination and soils

Key potential impacts

There is potential for contamination to be encountered in soils and groundwater. If inadequately managed, disturbance of contaminated areas has the potential to:

- Mobilise contaminants, affecting nearby soils, surface water and groundwater
- Increase the migration of contaminants into surrounding areas via leaching, overland flow and/or subsurface flow (water and/or vapour) or dust, with the potential to impact on receiving environments, such as Alexandra Canal and the surrounding community
- Increase the risk of exposure to contaminants (direct contact and/or inhalation) by site workers, visitors and the local community.

The risk of disturbing or encountering contaminated material during construction varies depending on the extent and type of contamination and the work undertaken. The key potential contamination issues identified relate to disturbance of contaminated groundwater, excavation and ground disturbance at the former Tempe landfill, and construction of stormwater outlets at Alexandra Canal.

Other potential impacts to soils include erosion and sedimentation impacts and exposure of acid sulfate soils.

The project has been designed to minimise the disturbance of the Alexandra Canal bed sediments. Structural supports and foundations associated with the bridge crossings have been located outside of the canal walls.

Key mitigation and management approaches

A Construction Soil and Water Management Plan would be prepared as part of the CEMP and implemented during construction. The plan would detail processes, responsibilities and measures to manage potential soil and water quality impacts during construction, including potential impacts associated with the presence of existing contamination, stockpile management, saline soils and acid sulfate soils.

All potentially contaminated sites and activities with the potential to generate and disturb existing contamination would be subject to detailed investigation, remediation and/or management to ensure that risks to the environment, people and future land uses are minimised. Remediation action plans would be developed (as required) outlining the remediation strategies to be implemented during construction.

In accordance with the requirements of the remediation order for Alexandra Canal, and due to the presence of contaminated sediments, a management plan would be prepared for works within the canal. The drainage outlets at Alexandra Canal would be constructed by first constructing coffer dams around the outlet locations.

Flooding

Key potential impacts

The assessment identified the potential for minor adverse impacts on flood behaviour in some areas, particularly associated with works at the St Peters interchange connection and along Qantas Drive, as the construction footprint would occupy areas of flood storage and intercept existing surface water flows from adjacent areas.

Some construction activities, work sites and compounds would be located in areas where there is an existing flood hazard. However, due to the generally small sizes of compounds and work sites relative to the size of the floodplain, there would be minimal impacts on flood hazard.

There is the potential for temporary drainage works to impact overland flow paths. This could divert or concentrate flows, potentially resulting in scouring of downstream areas, particularly where soil has been exposed during construction.

Key mitigation and management approaches

A flood mitigation strategy would be prepared and relevant measures implemented during construction. The strategy would include undertaking additional flood modelling and taking the results into account during construction planning. Detailed flooding assessments would be carried out for all project components (including ancillary facilities) that have the potential to affect flood levels or be affected by flooding. The results of the assessments would inform the flood mitigation strategy.

Surface and groundwater quality

Key potential impacts

Water quality in receiving watercourses (such as Alexandra Canal and Mill Stream) could be affected by changes to overland flows, erosion of exposed soils, runoff from contaminated soils, or discharge of untreated (contaminated) groundwater.

Construction also has the potential to affect water quality by disturbing and mobilising contaminated Alexandra Canal bed sediments, disturbing the existing capping layer at the former Tempe landfill (increasing the rate of leachate generation), and potential migration of existing contaminants in groundwater during dewatering.

The drawdown of groundwater may also lead to ground settlement.

Key mitigation and management approaches

The potential for water quality impacts would be managed by implementing standard erosion and sediment management measures, in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004). These would be guided by the Construction Soil and Water Management Plan. The plan would include a program to monitor potential surface water quality impacts.

Construction wastewater consisting of extracted groundwater and/or contaminated runoff would be sampled prior to discharge to ensure contaminant levels are below the adopted discharge criteria.

Mitigation and management measures would be implemented to reduce or eliminate the risks posed by the existing groundwater regime. These would include measures to manage dewatering of excavations, manage leachate at the former Tempe landfill, and monitor groundwater quality during construction.

Non-Aboriginal heritage

Key potential impacts

The main potential for direct impacts would be to the following items:

- Alexandra Canal (listed on the State heritage register, local environmental plans and a statutory agency section 170 registers) – impacts to the original fabric of the canal walls would occur in some locations during construction of drainage outlets
- Sydney (Kingsford Smith) Airport Group (listed on a local environmental plan and non-statutory registers) – some buildings with minor heritage significance would be removed at the Jet Base
- Cooks River Intermodal Terminal (listed on a local environmental plan and a statutory agency section 170 register) – an area in the south-eastern corner would be impacted to construct a small section of the roadway.

Key mitigation and management approaches

A Heritage Management Plan would be prepared and implemented to manage non-Aboriginal heritage and minimise the potential for impacts during construction. The plan would take into account relevant conservation and heritage management policies in the Alexandra Canal Conservation Management Plan and the Sydney Airport Heritage Management Plan. Heritage specialists would provide input into the development of the detailed design and construction methodologies to avoid or minimise potential impacts to features of heritage significance.

Aboriginal heritage

Key potential impacts

Excavation during construction has the potential to impact two areas with sub-surface Aboriginal archaeological potential (known as Investigation Areas 1 and 2) and any items located in these areas. This would occur during construction of one of the bridges over Alexandra Canal and a drainage culvert connecting to the canal. Although impacts to the investigation areas are unavoidable, it has not been confirmed whether any items of Aboriginal heritage significance are located in these areas.

Key mitigation and management approaches

Staged salvage excavation would be undertaken prior to construction within those parts of Investigation Areas 1 and 2 where deep sediments would be directly impacted by the project. This would be undertaken by qualified archaeologists with the participation of Aboriginal stakeholders. The aim of salvage excavation would be to identify whether Aboriginal heritage objects are present and, if any are found, to remove the objects from the area of potential impact.

Biodiversity

Key potential impacts

The majority of the project site is located on land that has been significantly modified by clearing and development. About 24 hectares of vegetation would be removed during construction, consisting mainly of exotic vegetation that provides limited habitat resources for native fauna. About 0.9 hectares of native vegetation would be removed.

Key mitigation and management approaches

The potential for impacts would be managed in accordance with a project-specific Biodiversity Management Plan, which would be implemented as part of the CEMP.

Land use and property

Key potential impacts

About 69.1 hectares of land would be required for construction, of which about 32.8 hectares of land would only be required temporarily. The temporary land requirements would include about:

- 16.7 hectares of Commonwealth-owned (Sydney Airport) land
- 11.9 hectares of land owned by the NSW or local government (Inner West Council)
- 4.2 hectares of privately owned land.

The project's temporary and permanent land requirements would affect about 16 properties, three parking areas and a number of advertising structures. Property acquisition would occur during the project planning and pre-construction phases.

Key mitigation and management approaches

Impacts on existing land uses and properties would be minimised as far as possible during the detailed design stage. Consultation with landholders would be ongoing to identify opportunities to minimise property impacts where practicable. Acquisition of privately-owned land or land owned by the NSW or local government would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW) and *Determination of compensation following the acquisition of a business* (NSW Government, undated).

Visual amenity

Key potential impacts

Construction would have the potential for visual impacts in the vicinity of work areas and from sensitive viewpoints as a result of visible elements, such as construction work areas, machinery and equipment, fencing, soil stockpiles, waste materials and partially constructed structures.

Trees would need to be removed at various locations across the project site to construct the project. This would have the potential for visual impacts where trees provide screening and contribute to the amenity and character of the local area.

Key mitigation and management approaches

Construction sites would be managed to minimise the potential for visual impacts as far as possible. A tree management strategy would be developed, including measures to offset the loss of trees and achieve a net increase in tree canopy.

Socio-economic impacts

Key potential impacts

The project's land requirements would require relocation or closure of five businesses. It would also result in the loss of empty storage container capacity on land occupied by Tyne Container Services and at the Cooks River Intermodal Terminal.

Construction would affect Tempe Lands, with land that is occupied by two community facilities in Tempe Lands required during construction (Tempe Golf Range and Academy and the off-leash dog exercise area).

Construction also has the potential to affect access, connectivity and amenity for other businesses.

Construction would directly benefit the economy, injecting economic stimulus benefits into the local, regional and NSW economies. The economic benefits of construction would include increased expenditure and direct employment associated with on-site construction activities (ranging from 400 to 1,000 workers during peak periods).

Key mitigation and management approaches

Business management plans would be prepared and implemented for businesses with the potential to be affected by the project. The plans would be developed on a case by case basis and would detail specific measures that are developed in consultation with the business owner.

Ongoing consultation would be undertaken with affected community members and business owners in accordance with the project's communication strategy

A temporary off-leash dog exercise area would be provided as close as possible to the existing area. The exact location of the temporary area would be confirmed in consultation with Inner West Council.

Implementing relevant mitigation and management measures for other potential impacts would also minimise the potential for socio-economic (amenity) impacts. These include the Construction Traffic and Access Management Plan, Construction Noise and Vibration Management Plan, consultation with hotels to confirm facade performance, the Construction Air Quality Management Plan, and the odour management strategy.

Other issues

A number of utilities would have the potential to be affected during construction, requiring adjustment and/or protection works to avoid impacts. Adjustments and/or protection works would be carried out with the involvement of the asset owner. Impacts to utilities would be managed by implementing well established and proven mitigation and management measures.

Summary of key potential construction impacts on Sydney Airport land

A summary of the key potential construction impacts that are specific to Sydney Airport land is provided in the following table. The approaches to managing these impacts are as described above.

Issue	Key potential impacts during construction – Sydney Airport land
Traffic, transport and access	Potential congestion and delays, particularly at the intersections of Qantas Drive/Sir Reginald Ansett Drive/Joyce Drive/O'Riordan Street and Qantas Drive/Seventh Street/Robey Street, due to temporary traffic changes and road works during construction. Impacts on some parking areas with a temporary reduction in the amount of parking available.
Noise and vibration	Potential noise and vibration impacts to amenity within buildings on Sydney Airport land during use of noise-intensive equipment, demolition of buildings and vibration-intensive works. High or moderate worst-case noise impacts may occur when noise-intensive equipment is used outside hotels. High (worst-case) impacts when noise-intensive equipment is used immediately outside the Qantas Flight Training Centre in its existing location adjacent to Qantas Drive.

Issue	Key potential impacts during construction – Sydney Airport land
Airport operations	Temporary intrusions of the protected surfaces that from part of Sydney Airport's prescribed airspace. Night lighting has the potential to lead to light spill and pilot distraction in some areas. Bodies of standing water within construction areas (such as detention ponds) may attract birds, increasing the risk of wildlife strike.
Air quality	Potential dust impacts as a result of the generation of dust during construction. Potential impact to the landfill gas venting system within the Sydney Airport northern lands car park
Contamination and soils	Potential to disturb contamination within the Sydney Airport northern lands car park, land north of the rail corridor and Sydney Airport land along Alexandra Canal and Qantas Drive.
Flooding and water quality	Minor increase in flood inundation of between 10 and 50 millimetres during a large storm event (a one per cent AEP flood event).
Heritage	Direct impacts to elements (buildings) of the Sydney (Kingsford Smith) Airport Group that would be removed by the project. Partial and localised impact to areas with sub-surface Aboriginal archaeological potential (including potential for artefacts).
Biodiversity and trees	About 12.9 hectares of vegetation would be removed from Sydney Airport land, including 0.7 hectares of native vegetation. Trees would need to be removed from various locations on Sydney Airport land.
Landscape character and visual amenity	Potential for landscape character impacts as a result of the loss of vegetation that provides screening and contributes to the amenity and character of the local area.
Land use, property, socio-economic impacts	Temporary land requirements include the use of about 16.7 hectares of Sydney Airport land. The project's land requirements would affect about six properties on Sydney Airport land during construction.

Operation impacts

Key operation impacts are summarised below for the project as a whole.

Traffic, transport and access

Key potential impacts

The project would improve operation of the local and regional road network in the vicinity of Sydney Airport and beyond. It would provide sufficient capacity to safely and efficiently meet the predicted demands for vehicle movements and forecast growth in passenger numbers and freight transport. The beneficial effects on traffic, transport and access are noted above under the heading 'What are the main beneficial outcomes expected?'.

Relocating the Alexandra Canal cycleway would increase the overall length of the cycleway by about 160 metres, which has the potential to result in slight increases in travel time. In addition, the assessment identified a number of connectivity gaps in the active transport network and potential opportunities to more effectively integrate existing and proposed active transport routes.

Key mitigation and management approaches

Roads and Maritime and Sydney Airport Corporation would develop an active transport strategy, with the input of relevant stakeholders, to enhance active transport opportunities and guide the future provision of active transport infrastructure.

Noise and vibration

Key potential impacts

The project has been designed to include traffic noise mitigation measures. Many residential receivers in the study area are subject to relatively high existing road traffic noise. The project would introduce new sources of road traffic noise to some areas, with increases in road traffic noise levels greater than 2 dB predicted in certain areas. Around 231 residential receivers are predicted to experience noise that is higher than the operational road traffic noise criteria, with around 215 receivers predicted to experience noise level increases of greater than 2 dB.

The removal of existing buildings along Qantas Drive (at the Sydney Airport Jet Base) and the removal of containers at the Tyne Container Services site would have the potential to increase noise generated by ground-based airport activities.

Key mitigation and management approaches

Receivers predicted to experience exceedances of noise criteria would be eligible for consideration of reasonable and feasible noise mitigation.

Additional mitigation would be investigated during detailed design to minimise potential impacts where feasible and reasonable. Options to minimise potential impacts include low noise pavement, noise barriers and at-property mitigation. The preferred noise mitigation option would be determined during detailed design, taking into account whole-of-life engineering considerations and the overall social, economic and environmental effects.

Airport operations

Key potential impacts

Depending on the final form and design, the proposed emplacement mounds at Tempe Lands could have the potential for windshear and turbulence effects.

The proposed flood detention basin may attract birds, increasing the risk of wildlife strike for aircraft.

Key mitigation and management approaches

The road infrastructure and final landforms (including of the emplacement mounds) would be reviewed and refined during detailed design to minimise the potential for windshear and turbulence effects in accordance with the *National Airports Safeguarding Framework*.

Drainage and flood management infrastructure would be designed and managed to minimise the risk of attracting wildlife.

Flooding

Key potential impacts

The project has been designed, as far as practicable, to minimise the impact of flooding on adjacent property and assets whilst also providing an appropriate flood immunity for the project. The flooding assessment determined that, once constructed, the project would have only a minor impact on flood behaviour for floods up to the probable maximum flood, with the exception of some areas within Sydney Airport land and at existing low points along Qantas Drive and Airport Drive.

Key mitigation and management approaches

The flood mitigation strategy, which would be prepared based on further design development and flood modelling during detailed design, would include measures to further minimise the potential for flooding impacts during operation.

Non-Aboriginal heritage

Key potential impacts

The main potential for impacts on non-Aboriginal heritage during operation would be as a result of visual impacts associated with the presence of new road infrastructure. The four new bridges over Alexandra Canal would impact the heritage significance of the canal, by changing the existing 'open sky' character of the canal and surrounding landscape, and obstructing view lines towards and along the canal.

The new road infrastructure, and removal of buildings at the Sydney Airport Jet Base, would impact the heritage significance of the Sydney (Kingsford Smith) Airport Group. The buildings that would be removed visually contribute to Sydney Airport's post-war development history. The new road infrastructure, together with the removal of buildings and associated landscape elements (including mature trees), would alter the existing appearance of the Sydney (Kingsford Smith) Airport Group when viewed from Qantas Drive.

Key mitigation and management approaches

Further design refinements would be undertaken to minimise the potential impacts on the Alexandra Canal and the Sydney (Kingsford Smith) Airport Group heritage items as far as possible. The bridges over Alexandra Canal would be designed to be sympathetic to the heritage significance of the canal and minimise physical impacts on the canal.

Land use and property

Key potential impacts

About 36.2 hectares of land would be required for the project's operational footprint. The permanent land requirements would include about:

- 20.6 hectares of Commonwealth-owned (Sydney Airport) land
- 14.1 hectares of land owned by the NSW or local government (Inner West Council)
- 1.5 hectares of privately owned land.

The project would affect about 8.5 hectares of industrial zoned land that is not subject to the Sydney Airport Master Plan, with a permanent change in land use from industrial to transport infrastructure. The project would also affect about 2.7 hectares of land zoned for open space, with a permanent change in land use to transport infrastructure. However, up to about 10 hectares of residual land could be made available for other uses following construction, including recreation and open space uses.

Key mitigation and management approaches

Impacts on existing land uses and property would be minimised as far as possible during detailed design.

Roads and Maritime would continue to consult with Inner West Council regarding the future use of residual land. Roads and Maritime would support and assist Inner West Council with the master planning process for these areas as appropriate, and ensure that the urban design and landscape plan for the project is consistent with the outcomes of this process.

Visual amenity

Key potential impacts

The project would introduce new elevated road infrastructure, including four new bridges over Alexandra Canal, new overpasses over Canal Road and the Botany Rail Line, and a new elevated access viaduct at Terminals 2/3. This new infrastructure would change the landscape and visual environment, and affect views at some viewpoints.

Development of the concept design, including the design of these features, has been influenced by the urban design principles that have been established for the project. These principles include creating and

supporting a sense of place and a memorable sense of arrival and departure that enhances the image of global Sydney, improving multi-modal connectivity and legibility, and achieving a well-designed and sustainable environment. A detailed review and finalisation of the architectural treatment of the project's operational infrastructure would be undertaken during detailed design.

Key mitigation and management approaches

Further design refinements of structures, including bridges, overpasses and the Terminals 2/3 access viaduct, would be undertaken during detailed design to minimise the visual impacts as far as possible, and maximise opportunities for a high quality design outcome.

An urban design and landscaping plan would be prepared to provide a consistent approach to project design and landscaping during detailed design.

Socio-economic impacts

Key potential impacts

The project would generate local and regional socio-economic benefits and opportunities, as a result of improved connectivity and access to Sydney Airport. The project would improve traffic flow and travel times for road users, including local residents, commuters and community members, and travellers accessing Sydney Airport and nearby community infrastructure. Vehicles travelling between St Peters interchange and Sydney Airport terminals via the project would reduce traffic on local streets in Mascot and along Botany Road through the Mascot town centre

The project would benefit regional and Greater Sydney communities by providing faster and more efficient travel to Sydney Airport, Mascot and Port Botany.

Locally, the project would result in the permanent loss of about 2.7 hectares of open space within Tempe Lands. This area includes land currently occupied by the Tempe Golf Range and Academy and the off-leash dog exercise area. However, upon completion of the project, up to 10 hectares of residual land could be made available for use in this area. The delivery of new open space in this area would be subject to future planning and consideration by Inner West Council.

The project also has the potential to generate some amenity changes, including increases to noise in some areas (described above), and changes to visual amenity as a result of the presence of permanent project features. This could affect the visibility of some businesses from passing traffic.

Key mitigation and management approaches

Roads and Maritime would continue to consult with Inner West Council to ensure that impacts on open space and recreational facilities in Tempe Lands are offset.

The business management plans would include measures, developed in consultation with business owners, to minimise the potential impacts of the project where feasible and reasonable.

Sustainability and climate change

Sustainability principles have been incorporated throughout the design development process. Roads and Maritime is committed to achieving a minimum Infrastructure Council of Australia rating of 'excellent' rating for the project as a whole. This would require implementation of sustainability initiatives throughout the governance, design, construction and operation of the project

A preliminary climate change assessment was undertaken to consider climate change risks, opportunities and adaptations to inform the design process. Further consideration of the potential for climate change risks would be undertaken to support detailed design. This would include a detailed climate change risk assessment, considering both direct and indirect risks, conducted in accordance with *AS 5334-2013 Climate change adaptation for settlements and infrastructure – A risk based approach*.

Other issues

Other potential operational impacts that were assessed included biodiversity, contamination and soils, surface and groundwater quality, health, hazards and risks. No issues of major risk or consequence were identified. Notwithstanding this, management and mitigation measures have been identified to minimise any potential impacts.

Summary of key potential operation impacts and benefits on Sydney Airport land

A summary of the key potential operation impacts that are specific to Sydney Airport land is provided in the following table. The approaches to managing these impacts are as described above.

Issue	Key potential operation impacts and benefits – Sydney Airport land
Traffic, transport and access	Increased capacity for an additional 60,000 vehicles per day in 2036. Travel times between St Peters interchange and Sydney Airport's terminals would substantially reduce following implementation of the project. In 2026, travel time improvements of up to 23 minutes are predicted, increasing to up to 30 minutes in 2036 compared with alternative routes Improvements in intersection performance, specifically at the Joyce Drive/O'Riordan Street and Qantas Drive/Robey Street intersections, would reduce vehicle delays and alleviate congestion at the main access points to Terminals 2/3. Provision of access roads to Sydney Airport land west of Alexandra Canal would facilitate proposed future developments in accordance with the Sydney Airport Master Plan.
Noise and vibration	Noise impacts to some hotels on Sydney Airport land from increased road traffic noise levels. Potential increase in aircraft-related ground-based operational noise emissions from Sydney Airport.
Airport operations	Potential for windshear and turbulence effects from the proposed emplacement mounds in Tempe Lands.
Flooding and water quality	Minor increase in inundation levels on Sydney Airport land during a one per cent AEP event. Potential for substantial inundation, in addition to existing substantial flooding, at the Joint User Hydrant Installation area during a very large flood event (probable maximum flood). Minor changes to peak flows and velocities in areas to the south of the existing low points on Qantas Drive and in the vicinity of the Terminals 2/3 connection. Reduction of pollutant loads entering Mill Stream.
Heritage	Changes to the visual appearance of the northern edge of the Sydney (Kingsford Smith) Airport Group as a result of the widening of Qantas Drive and the removal of existing buildings and associated landscape elements.
Landscape character and visual amenity	Changes to the visual environment as a result of the new elevated road infrastructure near Terminals 2/3 would alter views along and from the road corridor.
Land use, property and socio-economic impacts	About 20.6 hectares of Sydney Airport land would be permanently required. The project's land requirements would permanently affect about four properties located on Sydney Airport land. The project would provide socio-economic benefits to Sydney Airport, mainly related to improved connectivity and faster travel times. This could result in increased economic productivity and employment opportunity at Sydney Airport. Changes to the visual environment as a result of the new elevated road infrastructure near Terminals 2/3 would alter views along and from the road corridor. The project would facilitate the delivery of key planning directions in the Master Plan by delivering additional road capacity to Sydney Airport. It would have the potential to service and/or facilitate growth of airline services, aviation support facilities, freight and commercial services on airport land in accordance with the plan. The project would provide enhanced road connections to Sydney Airport, contributing to the future economic productivity and efficiency of the airport itself, as well as that of businesses on Sydney Airport land.

How can I comment on the proposal and/or the EIS/preliminary draft MDP?

Public exhibition

The EP&A Act and the Airports Act require exhibition of an EIS and a preliminary draft MDP for public comment. As this document is a combined EIS and preliminary draft MDP, it will be exhibited as a single document.

The document can be viewed on the NSW Department of Planning, Industry and Environment's website (*www.planningportal.nsw.gov.au/major-projects/projects/on-exhibition*) and the Sydney Airport website (*www.sydneyairport.com.au/sydneygateway*). It will be available in hard copy at:

- Roads and Maritime Services – 20-44 Ennis Road, Milsons Point
- Sydney Airport – Ground Floor, Nigel Love Building, International Terminal
- City of Sydney Council – Town Hall Customer Service Centre, Level 2, 456 Kent Street, Sydney
- Green Square Library – 355 Botany Road, Zetland
- Bayside Council – Rockdale Customer Service Centre, 444-446 Princes Highway, Rockdale
- Eastgardens Library – 152 Bunnerong Road, Eastgardens
- Mascot Library – 2 Hatfield Street, Mascot
- Arncliffe Library – 11 Firth Street, Arncliffe
- Inner West Council – Petersham Customer Service Centre, 2-14 Fisher Street, Petersham
- Marrickville Library – 313 Marrickville Road, Marrickville.

Advertisements will be placed in newspapers to advise of the public exhibition periods, where the document can be viewed, and to provide details of community consultation activities and information sessions.

Further information about exhibition periods and associated consultation activities is provided on the project website: *www.rms.nsw.gov.au/sydneygateway*.

Making a submission

Submissions about the project are invited during the exhibition period from any interested person or organisation. Submissions on the EIS can be made to the Department of Planning, Industry and Environment, and submissions on the preliminary draft MDP can be made to Sydney Airport Corporation.

Details on how to make a submission are provided on the project website and in other communication material. All submissions must be received before the close of the respective exhibition periods (as detailed on the project website, the Department of Planning, Industry and Environment, and Sydney Airport websites).

Consultation activities

To support public exhibition, and provide opportunities for the community and stakeholders to ask questions and find out more before making a submission, a range of consultation tools will be used.

Roads and Maritime will conduct a number of community information sessions. A project information line will be available throughout the exhibition period to answer questions from the community at 1800 654 446 (toll free). Further information on consultation activities is provided on the project website: *www.rms.nsw.gov.au/sydneygateway*.

Glossary of terms and abbreviations

Term / abbreviation	Definition
µg/m^3	micrograms per cubic metre
µm	micrometre
Aboriginal cultural heritage	The tangible (objects) and intangible (dreaming stories, song lines and places) cultural practices and traditions associated with past and present day Aboriginal communities.
Aboriginal object	Any deposit, object or material evidence (not being a handicraft made for sale), including Aboriginal remains, relating to the Aboriginal habitation of NSW.
Aboriginal place	Any place declared to be an Aboriginal place under section 94 of the *National Parks and Wildlife Act 1974* (NSW).
ABS	Australian Bureau of Statistics
Acid sulfate soils	Naturally occurring soils, sediments or organic substrates (eg peat) that are formed under waterlogged conditions. These soils contain iron sulfide minerals (predominantly as the mineral pyrite) or their oxidation products. In an undisturbed state below the water table, acid sulfate soils are benign. However if the soils are drained, excavated or exposed to air by a lowering of the water table, the sulfides react with oxygen to form sulfuric acid.
AEP	annual exceedance probability
Afternoon peak	Trips travelling on the network during the average one hour peak period between 5pm and 6pm on a weekday.
AHIMS	Aboriginal Heritage Information Management System
Airports Act	*Airports Act 1996 (Cth)*
Alignment	The geometric layout (eg of a road or railway) in plan (horizontal) and elevation (vertical).
Annual exceedance probability	The frequency of flood events is generally referred to in terms of their annual exceedance probability (AEP) or average recurrence interval (ARI). For example, for a flood magnitude having a five per cent AEP, there is a five per cent probability (or 1 in 20 chance) that there would be floods of greater magnitude each year.
ANZECC guidelines	*Australian Guidelines for Water Quality Monitoring and Reporting* (ANZECC/ARMCANZ, 2000)
Aquifer	A groundwater bearing formation sufficiently permeable to transmit and yield groundwater or water bearing rock.
ARI	average recurrence interval
ARTC	Australian Rail Track Corporation
Arterial roads	The main or trunk roads of the road network that carry predominantly through traffic between regions
At-grade	A road at ground level, not on an embankment or in a cutting.
Australian Government	Government of the Commonwealth of Australia
Average recurrence interval	An indicator used to describe the frequency of floods. The average period in years between the occurrence of a flood of a particular magnitude or greater. Refer annual exceedance probability.
BAM	Biodiversity Assessment Method
BC Act	*Biodiversity Conservation Act 2016* (NSW)

Term / abbreviation	Definition
BDAR	Biodiversity Development Assessment Report
Biosecurity Act	*Biosecurity Act 2015* (NSW)
Blue Book	*Managing Urban Stormwater: Soils and construction - Volume 1* (Landcom, 2004)
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.
Botany Rail Line	A dedicated freight rail line that forms part of the Sydney Metropolitan Freight Network. The line extends from near Marrickville Station to Port Botany.
Candela	Measure for light intensity. One candela is roughly the equivalent to one common wax candle.
Capping layer	A layer of material with low permeability placed upon (usually) contaminated material or waste to contain the contamination and to minimise the infiltration of water.
Carbon dioxide	A naturally occurring gas, also a by-product of burning fossil fuels from fossil carbon deposits, such as oil, gas and coal, of burning biomass, of land use changes and of industrial processes (eg cement production). It is the principle anthropogenic greenhouse gas that affects the Earth's radiative balance.
Carriageway	The portion of a roadway used by vehicles including shoulders and ancillary lanes.
CASA	Civil Aviation Safety Authority
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.
cd	candela
CEMP	construction environmental management plan
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).
CLM Act	*Contaminated Land Management Act 1997 (NSW)*
CO	carbon monoxide
CO_2	carbon dioxide
Commonwealth land	Land owned by the Commonwealth of Australia. For this project, the majority of the project site consists of Commonwealth-owned land leased to Sydney Airport Corporation for the operation of Sydney Airport. Refer also Sydney Airport land.
Concept design	An initial functional layout of a road/road system or other infrastructure. Used to facilitate understanding of a project, establish feasibility, provide basis for estimating, and determine further investigations needed for detailed design.
Construction	Includes all physical work required to construct the project.
Construction ancillary facilities	Temporary facilities during construction that include, but are not limited to, construction work areas, sediment basins, temporary water treatment plants, pre-cast yards and material stockpiles, laydown areas, parking, maintenance workshops and offices, and construction compounds.
Construction compound	An area used as the base for construction activities, usually for the storage of plant, equipment and materials, and/or 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.
Construction footprint	The construction footprint forms part of the overall project site. It consists of the land required to construct the project, including the location of construction compounds.
CSIRO	Commonwealth Scientific and Industrial Research Organisation

Term / abbreviation	Definition
Cth	Commonwealth
Cumulative impacts	Impacts that, when considered together, have different and/or more substantial impacts than a single impact assessed on its own.
Curfew	See Sydney Airport curfew
dB	Decibels
dBA	Decibels (A-weighted)
DECC	(previous) Department of Environment and Climate Change
DECCW	(previous) Department of Environment, Climate Change and Water
Detailed design	The stage of design where project elements are designed in detail, suitable for construction.
Discharge	The rate of flow of water measured in terms of volume per unit time, for example, cubic metres per second (m^3/s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving (eg metres per second (m/s)).
DITCRD	Australian Department of Infrastructure, Transport, Cities and Regional Development
Diverge	Where a single carriageway splits into two carriageways
Domestic terminals	Terminals 2 and 3 at Sydney Airport, as defined below.
DPI	Department of Primary Industries
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.
Earthworks	All operations involved in loosening, excavating, placing, shaping and compacting soil or rock.
EIS	environmental impact statement
EMP	environmental management plan
Enabling works	Works required to enable the commencement of the main construction works
Environment	Includes all aspects of the surroundings of humans, whether affecting any human as an individual or in his or her social groupings (from the EP&A Act).
Environment Strategy	*Sydney Airport Environment Strategy 2019-2024*
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EP&A Regulation	Environmental Planning and Assessment Regulation 2000 (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
Erosion	A natural process where wind or water detaches a soil particle and provides energy to move the particle.
EVM	excavated natural material
Exposure pathway	The route a substance takes from its source (where it began) to its endpoint (where it ends), and how people can come into contact with (or get exposed) to it. An exposure pathway has five parts: a source of contamination (such as chemical leakage into the subsurface); an environmental media and transport mechanism (such as movement through groundwater); a point of exposure (such as a private well); a route of exposure (eating, drinking, breathing, or touching), and a receptor population (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a completed exposure pathway.

Term / abbreviation	Definition
Feasible and reasonable	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. 'Feasible' relates to engineering considerations and what is practical to build. 'Reasonable' relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community expectations and nature and extent of potential improvements.
Flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences, excluding tsunami.
Flood prone/liable 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).
FM Act	*Fisheries Management Act 1994* (NSW)
Grade	The rate of longitudinal rise (or fall) with respect to the horizontal expressed as a percentage or ratio.
Greenhouse gas	Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. Water vapour (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3) are the primary greenhouse gases in the Earth's atmosphere (CSIRO and BoM, 2015).
Groundwater	Water that is held in rocks and soil beneath the earth's surface.
Groundwater 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.
ha	hectare
Heavy vehicles	A heavy vehicle is classified as a class 3 vehicle (a two axle truck) or larger, in accordance with the Austroads vehicle classification system.
Heritage Act	*Heritage Act 1977* (NSW)
Heritage listed item	Any place, building or object listed on a statutory heritage register.
HIAL	high intensity approach lighting
High intensity approach lights	A series of lights that provide visual guidance to aircraft approaching a runway.
Hydrology	The study of rainfall and surface water runoff processes.
hz	hertz
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007*
IS	infrastructure sustainability
ISCA	Infrastructure Sustainability Council of Australia
JUHI	Joint User Hydrant Installation

Term / abbreviation	Definition
kg	kilogram
kg/yr	kilograms per year
km	kilometres
L_{A90}	The noise level which is exceeded for 90 per cent of the sample period. During the sample period, the noise level is below LA90 level for 10 per cent of the time. This measure is commonly referred to as background noise level.
L_{Aeq}	The equivalent continuous sound level – the energy average of the varying noise over the sample period equivalent to the level of constant noise that contains the same energy as the varying noise environment. A common measure of environmental and road traffic noise.
L_{Amax}	A-weighted, maximum sound level.
Landscape character	The aggregate of built, natural and cultural aspects that make up an area and provide a sense of place. Includes all aspects of a tract of land – built, planted and natural topographical and ecological features.
Landscape character zone	An area of landscape with similar properties or strongly defined spatial qualities, distinct from areas immediately adjacent.
Lane	A portion of the carriageway allotted for the use of a single line of vehicles.
Leachate	Liquid that drains from a landfill or stockpile.
LEP	local environmental plan
Level of service	The standard measure used to assess the operational performance of these intersections. Level of service is ranked from A to F, with A representing the best performance and the worst. It is based on the average delay experienced by vehicles driving through the intersection (in seconds).
m^3	cubic metres
Major development	Development within Commonwealth-owned land leased to an airport lessee company for the operation of an airport, which meets the definitions under section 89 of the Airports Act.
Major development plan	A document required to support the application for approval of a major development under section 90 of the Airports Act, with the required contents defined by section 91 of the Airports Act.
Master Plan	*Sydney Airport Master Plan 2039*
MDP	major development plan
Median	The central reservation that separates carriageways from traffic travelling in the opposite direction.
Merge point	Where two separate carriageways meet to form one carriageway
Methodology	The method for analysis and evaluation of the relevant subject matter.
ML/yr	mega litres per year
mm	millimetre
mm/s	millimetres per second
Morning peak	The average one hour peak period between 8am and 9am on a normal working weekday.
Motorway	Fast, high volume controlled access roads. May be tolled or untolled.
NASF	National Airports Safeguarding Framework
NCA	noise catchment area
NO_2	nitrogen dioxide

Term / abbreviation	Definition
Northern lands	Land leased and owned by Sydney Airport Corporation located to the north-west of Sydney Airport on the western side of Alexandra Canal, between Canal Road and Alexandra Canal.
NOx	oxides of nitrogen
NSW	New South Wales
NSW EPA	NSW Environment Protection Authority
O_3	ozone
Obstruction 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.
OEH	(previous) Office of Environment and Heritage
OLS	obstacle limitation surface
Operational footprint	The operational footprint forms part of the overall project site. It consists of land that would be occupied by permanent project infrastructure
$OU/m^2/s$	odour units per square metre per second
Overbridge	A bridge that conveys a road, rail or pedestrians over the described road.
PAH	polycyclic aromatic hydrocarbon
PANS-OPS	Procedures for Navigational Services – Aircraft Operations Surfaces
Pavement	The portion of a carriageway placed above the subgrade for the support of, and to form a running surface for, vehicular traffic.
PCBs	polychlorinated biphenyls
PCT	plant community types
Per-and poly-fluoroalkyl substances	Manufactured chemicals used in products that resist heat, oil, stains and water. There are many types, with the best-known examples being perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), which were used in some fire-fighting foams.
PFAS	per-and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
Place making	A multi-faceted approach to the planning, design, and management of public spaces, which aims to create public spaces that promote people's health, happiness, and well-being.
PM	particulate matter
PM_{10}	Airborne particulate matter with an aerodynamic diameter of less than 10 micrometre (µm).
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of less than 2.5 micrometre (µm).
PMF	probable maximum flood
POEO Act	Protection of the *Environment Operations Act 1974 (NSW)*
Pre-construction	All work prior to construction.
Prescribed airspace	The airspace above any part of either the OLS or the PANS-OPS surfaces, regulated under the Airports Act.
Probable maximum flood	The flood that occurs as a result of the probable maximum precipitation on a study catchment. The probable maximum flood is the largest flood that could conceivably

Term / abbreviation	Definition
	occur at a particular location, usually estimated from probable maximum precipitation coupled with the worst flood producing catchment conditions.
Procedures for Navigational Services – Aircraft Operations	The Procedures for Navigational Services – Aircraft Operations (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	Construction and operation of the Sydney Gateway road project
Project site	The area that would be directly affected by construction and operation of the project, including the construction footprint and the proposed location of the project's operational infrastructure (the operational footprint).
Proponent	The person or organisation that proposes to carry out the project or activity.
RAP	remediation action plan
RBL	rating background level
Residual land	Acquired land that formed part of the project's construction footprint, but is not required as part of the pro.
Risk	Chance of something happening that will potentially have an undesirable effect. It is measured in terms of consequence and likelihood.
Road reserve	A legally defined area of land within which facilities such as roads, footpaths and associated features may be constructed for public travel.
Roads and Maritime	Roads and Maritime Services
Runoff	The amount of rainfall that ends up as streamflow, also known as rainfall excess.
Salinity	The total soluble mineral content of water or soil (dissolved solids), with concentrations of total salts are expressed as milligrams per litre (equivalent to parts per million).
Scour	The erosion of material by the action of flowing water.
Screenline	Theoretical boundaries specifically designed to collectively analyse directional and two-way traffic volumes.
SEARs	Secretary's Environmental Assessment Requirements
Secretary's environmental assessment requirements	Requirements and specifications for an environmental assessment prepared by the Secretary of the Department of Planning and Environment under section 115Y of the *Environmental Planning and Assessment Act 1979* (NSW).
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.
SO_2	sulfur dioxide
Span	The distance between the centres of adjacent supports of a bridge.
Species credit species	Threatened species that are assessed and require credits and offsets according to section 6.4 of the Biodiversity Assessment Method.
Spoil	Material generated by excavation.
St Peters interchange	A component of the New M5 project, located at the former Alexandria Landfill site at St Peters. In its ultimate configuration it would connect the New M5, the M4-M5 Link and the Sydney Gateway road project with Euston Road and Gardeners Road.
State significant infrastructure	Major transport and services infrastructure considered to have State significance as a result of size, economic value or potential impacts.
Stockpile	Temporary stored materials such as soil, sand, gravel and spoil/waste.

Term / abbreviation	Definition
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.
Surface water	Water flowing or held in streams, rivers and other wetlands in the landscape.
Sustainable development	Development which meets the needs of the present, without compromising the ability of future generations to meet their own needs (Brundtland, 1987).
Sydney Airport curfew	The curfew was established by the *Sydney Airport Curfew Act 1995* (Cth), which limits the operating hours of Sydney Airport between the hours of 11pm and 6am. The Act does not stop all aircraft movements during these hours, but limits movements by restricting the types of aircraft that can operate, the runways they can use, and the number of flights allowed
Sydney Airport land	Commonwealth-owned land leased to Sydney Airport Corporation for the operation of Sydney Airport.
Sydney Airport northern lands	Consists of land leased and owned by Sydney Airport Corporation, located between Canal Road and Alexandra Canal.
Sydney Water	Sydney Water Corporation
tCO_2-e	tonnes of CO2-equivalent
tCO_2-e/year	tonnes of CO2-equivalent per year
Tempe Lands	Consists of land owned by Inner West Council that was formally part of the Tempe landfill site. The land was remediated and now contains a number of open space and recreation facilities (including the Tempe Golf Range and Academy, off-leash dog exercise area and Tempe Wetlands).
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
Terminals 2/3	Sydney Airport's domestic terminals
TEU	twenty foot equivalent units
THC	total hydrocarbons
Twenty foot equivalent units (TEU)	Unit of measure which describes the capacity of container ships and terminals. Measure is based on the volume of a twenty foot shipping container. For example a 40 foot container would be considered to be two TEUs.
Typical cross section	A cross section of a carriageway showing typical dimensional details, furniture locations and features of the pavement construction.
Urban design	The process and product of designing human settlements, and their supporting infrastructure, in urban and rural environments.
Viaduct	Elevated structure convey a road or rail across other infrastructure or landscape features.
Viewpoint	The specific location of a view, typically used for assessment purposes.
Visual amenity	The value of a particular area or view in terms of what is seen.
Visual envelope	Area in which a location (or project) is visible from the surrounding areas, taking into account topography and other structures.
Visual impact	The impacts on the views from residences, workplaces, and public places. This can be positive (ie benefit or an improvement) or negative (ie adverse or a detraction).

Term / abbreviation	Definition
Waste	Waste is defined by the NSW 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 hierarchy	Approach of prioritising waste avoidance and resource recovery (including reuse, reprocessing, recycling and energy recover) before consideration of waste disposal.
Water table	The surface of saturation in an unconfined aquifer, or the level at which pressure of the water is equal to atmospheric pressure.
Windshear and turbulence	Windshear is defined as a change of horizontal wind direction and/or speed with height. Rapid changes in wind velocity encountered during the landing and take-off phases of flight can be hazardous to aircraft. Turbulence is caused by a disruption to smooth air flow. Turbulence in the lower atmosphere is generally created by the flow of air around obstacles such as landforms or buildings. Meteorological conditions such as boundaries between different air masses can also result in turbulence.
Work area	Individual areas within the project site that are subject to construction at any one time.

Part

A

Part A

Introduction, project background and description

1. Introduction

1.1 Sydney Gateway

Sydney Kingsford Smith Airport (Sydney Airport) and Port Botany are two of Australia's most important infrastructure assets, providing essential domestic and international connectivity for people and goods. Together they form a strategic centre, which is set to grow significantly over the next 20 years. To support this growth, employees, residents, visitors and businesses need reliable access to the airport and port, and efficient connections to Sydney's strategic centres.

The NSW and Australian governments are making major investments in the transport network to achieve this vision. New road and freight rail options are being investigated to cater for the forecast growth in passengers and freight through Sydney Airport and Port Botany. Part of this solution is Sydney Gateway, which comprises the following road and rail projects:

- Sydney Gateway road project (the subject of this document)
- Botany Rail Duplication.

Sydney Gateway (shown on Figure 1.1) will expand and improve the road and freight rail networks to Sydney Airport and Port Botany to keep Sydney moving and growing. The Sydney Gateway road project (shown on Figure 1.2) forms part of the NSW Government's long-term strategy to invest in an integrated transport network and make journeys easier, safer and faster.

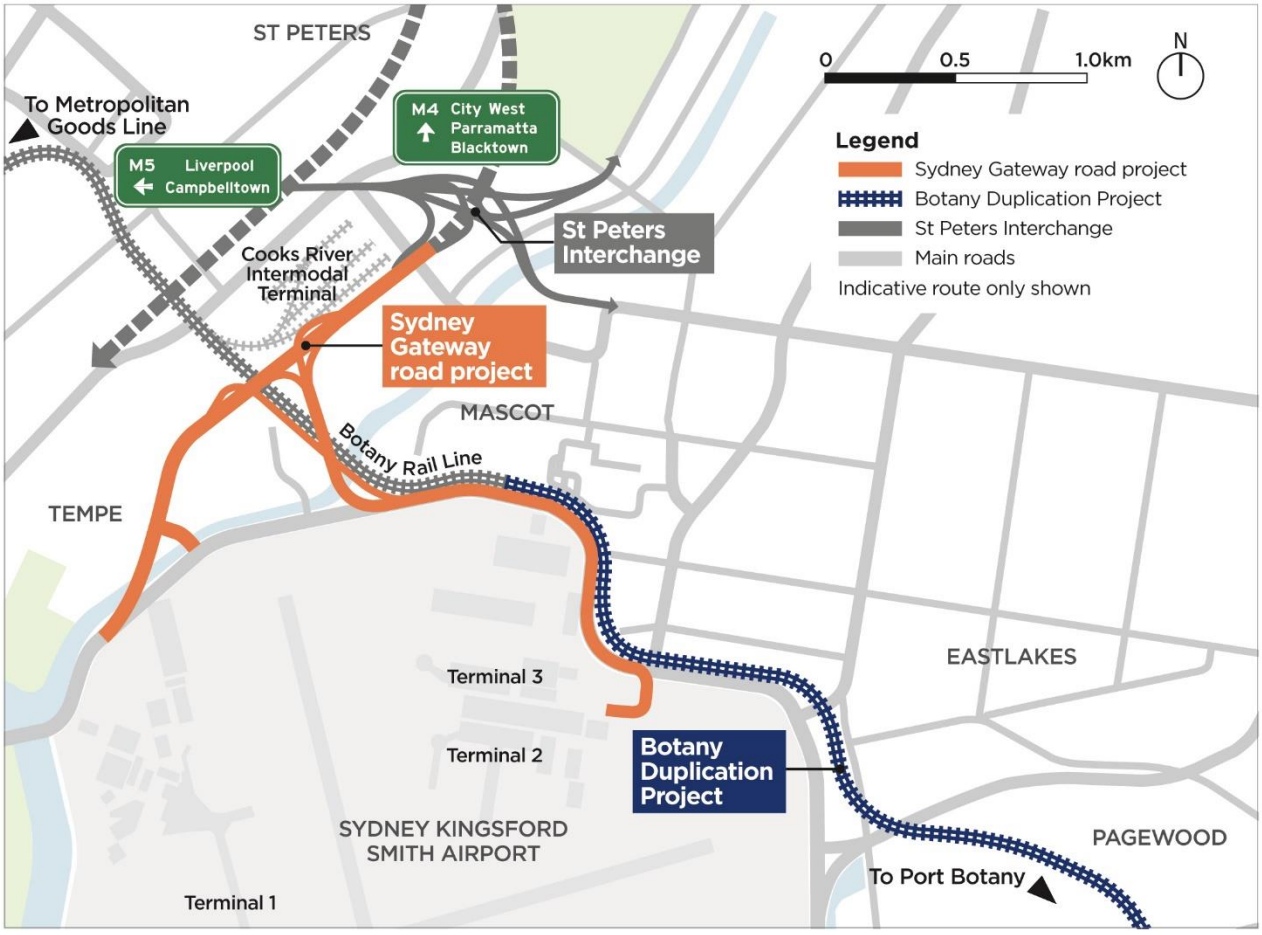


Figure 1.1 Sydney Gateway

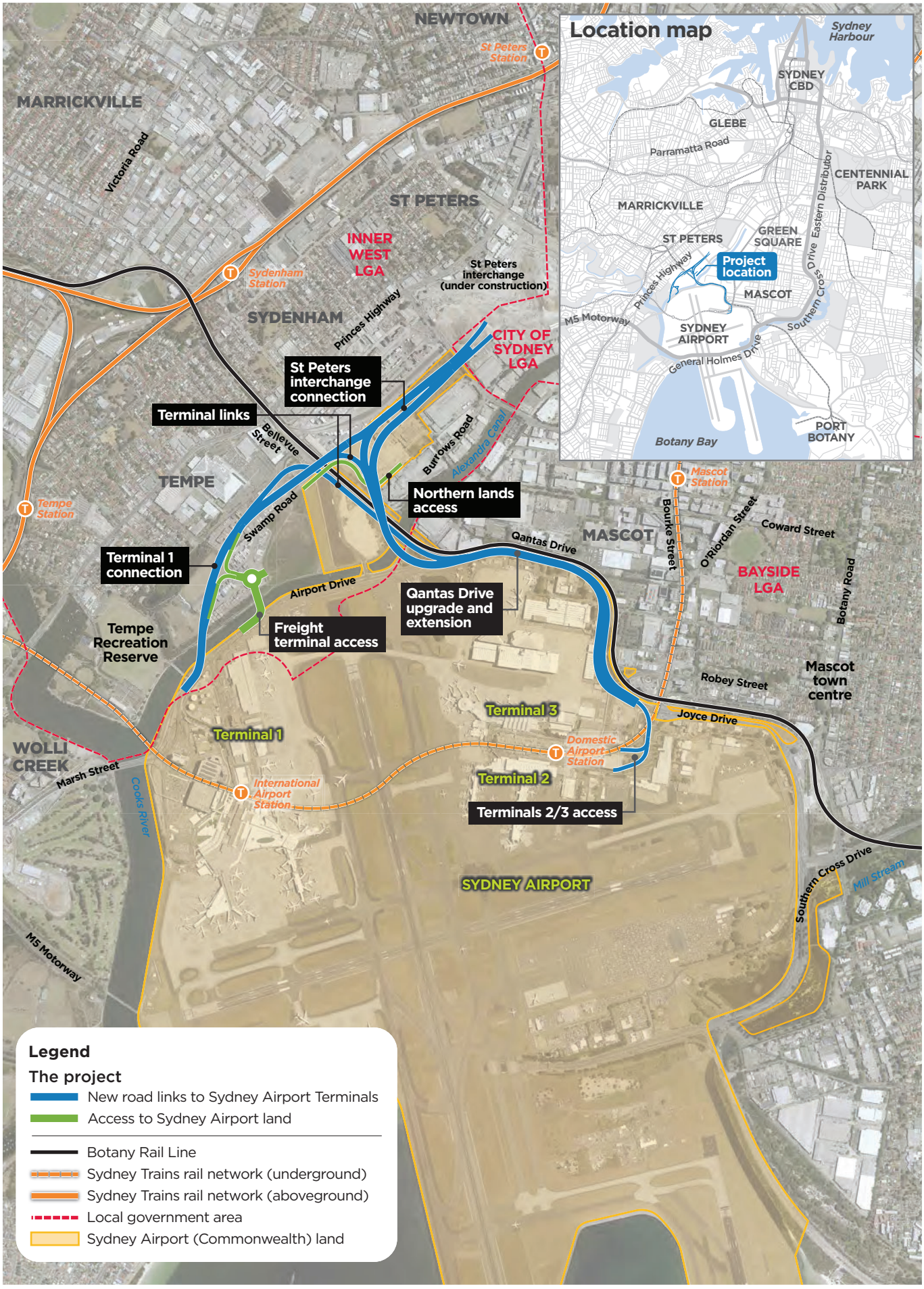


Figure 1.2 **The project**

1.2 Project overview

Roads and Maritime Services (Roads and Maritime) and Sydney Airport Corporation are proposing new direct high capacity road connections linking the Sydney motorway network at St Peters interchange with Sydney Airport's domestic and international terminals and beyond.

The Sydney Gateway road project (referred to as 'the project' for the purposes of this document) would comprise new and upgraded sections of road connecting to the airport terminals. It would also include four new bridges over Alexandra Canal and other operational infrastructure and road connections. The new connections and increased road capacity would help improve traffic flow to and from Sydney Airport and towards Port Botany, making the movement of people and goods easier, safer and faster.

1.2.1 Location

The project is located in the suburbs of Tempe, St Peters and Mascot, in the Inner West, Bayside and City of Sydney local government areas. The location of the project is shown on Figure 1.2.

The location of the project site, which is defined for the purposes of this report as the area that would be directly affected by construction and the location of project infrastructure, is shown on Figure 1.3. The majority of the project site is located on government-owned land, which mainly consists of Commonwealth-owned land (leased to Sydney Airport Corporation) (shown on Figure 1.3). Further information on the location of the project, land ownership and a description of the project site for the purposes of this document is provided in Chapter 2.

1.2.2 Key features

The key features of the project include:

- Road links to provide access between the Sydney motorway network and Sydney Airport's terminals, consisting of the following components:
  - St Peters interchange connection – a new elevated section of road extending from St Peters interchange to the Botany Rail Line, including an overpass over Canal Road
  - Terminal 1 connection – a new section of road connecting Terminal 1 with the St Peters interchange connection, including a bridge over Alexandra Canal and an overpass over the Botany Rail Line
  - Qantas Drive upgrade and extension – widening and upgrading Qantas Drive to connect Terminals 2/3 with the St Peters interchange connection, including a high-level bridge over Alexandra Canal
  - Terminal links – two new sections of road connecting Terminal 1 and Terminals 2/3, including a bridge over Alexandra Canal
  - Terminals 2/3 access – a new elevated viaduct and overpass connecting Terminals 2/3 with the upgraded Qantas Drive
- Road links to provide access to Sydney Airport land:
  - A new section of road and an overpass connecting Sydney Airport's northern lands on either side of the Botany Rail line (the northern lands access)
  - A new section of road, including a signalised intersection with the Terminal 1 connection and a bridge, connecting Sydney Airport's existing and proposed freight facilities on either side of Alexandra Canal (the freight terminal access)
- An active transport link, about 1.3 kilometres long and located along the western side of Alexandra Canal, to maintain connections between Sydney Airport, Mascot and the Sydney central business district
- Intersection upgrades or modifications
- Provision of operational ancillary infrastructure including maintenance bays, new and upgraded drainage infrastructure, signage and lighting, retaining walls, noise barriers, flood mitigation basin, utility works and landscaping.

Further information on the project's features is provided in Chapter 7.

1.2.3 Timing

Construction is planned to start in mid 2020, subject to approval of the project, and is expected to take about three and a half years to complete. Further information on construction is provided in Chapter 8.

1.3 Overview of approval requirements

The project is subject to approval under NSW and Commonwealth legislation. Parts of the project located on Commonwealth-owned land leased to Sydney Airport Corporation (Sydney Airport land) (shown on Figure 1.3) are subject to the *Airports Act 1996* (Cth) (the Airports Act). In accordance with the Airports Act, these parts of the project are major airport development. A major development plan (MDP), approved by the Australian Minister for Infrastructure, Transport and Regional Development, is required before a major airport development can be undertaken at a leased airport.

Parts of the project located on other land (shown on Figure 1.3) have been declared State significant infrastructure in accordance with the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) and *State Environmental Planning Policy (State and Regional Development) 2011*. As State significant infrastructure, these parts of the project need approval from the NSW Minister for Planning and Public Spaces. An environmental impact statement (EIS) is required to support the application for approval for State significant infrastructure under the EP&A Act. In addition, Roads and Maritime has requested the Minister for Planning and Public Spaces to declare the project as critical State Significant Infrastructure under section 5.13 of the EP&A Act.

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

1.4 Purpose and structure of this EIS and preliminary draft MDP

This document provides a combined EIS and MDP (as a preliminary draft) to support the application for approval of the project in accordance with NSW and Commonwealth legislative requirements. It addresses:

- The environmental assessment requirements of the Secretary of the (then) Department of Planning and Environment (the SEARs) dated 15 February 2019 (refer to Appendix A)
- The EIS form and content requirements of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (refer to Appendix B)
- The requirements of Section 91 of the Airports Act (refer to Appendix C), including establishing the details of the major airport development.

The main EIS/preliminary MDP document is structured in three parts as follows:

Part A Background and project description – including:

- An introduction to the environmental assessment (Chapter 1)
- A description of the project site and the general environment of the study area 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 to date, and the consultation proposed during public exhibition, detailed design and delivery (Chapter 4)
- An overview of the strategic context and need for the project (Chapter 5)
- A summary of the project background and alternatives, and the options and refinements considered and undertaken during the design process (Chapter 6)
- A description of the project's operational features (Chapter 7)

- A description of the indicative construction methodology and activities (Chapter 8).

Part B Environmental assessment – including:

- The results of the assessment of environmental issues identified by the SEARs and MDP requirements, including information on the existing environment, potential construction, operation and cumulative impacts, and the proposed approach to mitigation and management (Chapters 9 to 26).

Part C Synthesis and conclusion – including:

- A summary of the key potential impacts of the project, a description of the proposed approach to environmental management, a compilation of the mitigation measures, the outcomes the proponent will achieve and the uncertainties that still existing (Chapter 27)
- Conclusion and justification for the project, including a succinct description of the project for which approval is sought and the reasons justifying carrying out the project (Chapter 28).

Other volumes provide supporting technical working papers, which provide detailed assessments of the potential impacts of the project as they relate to the key environmental issues.

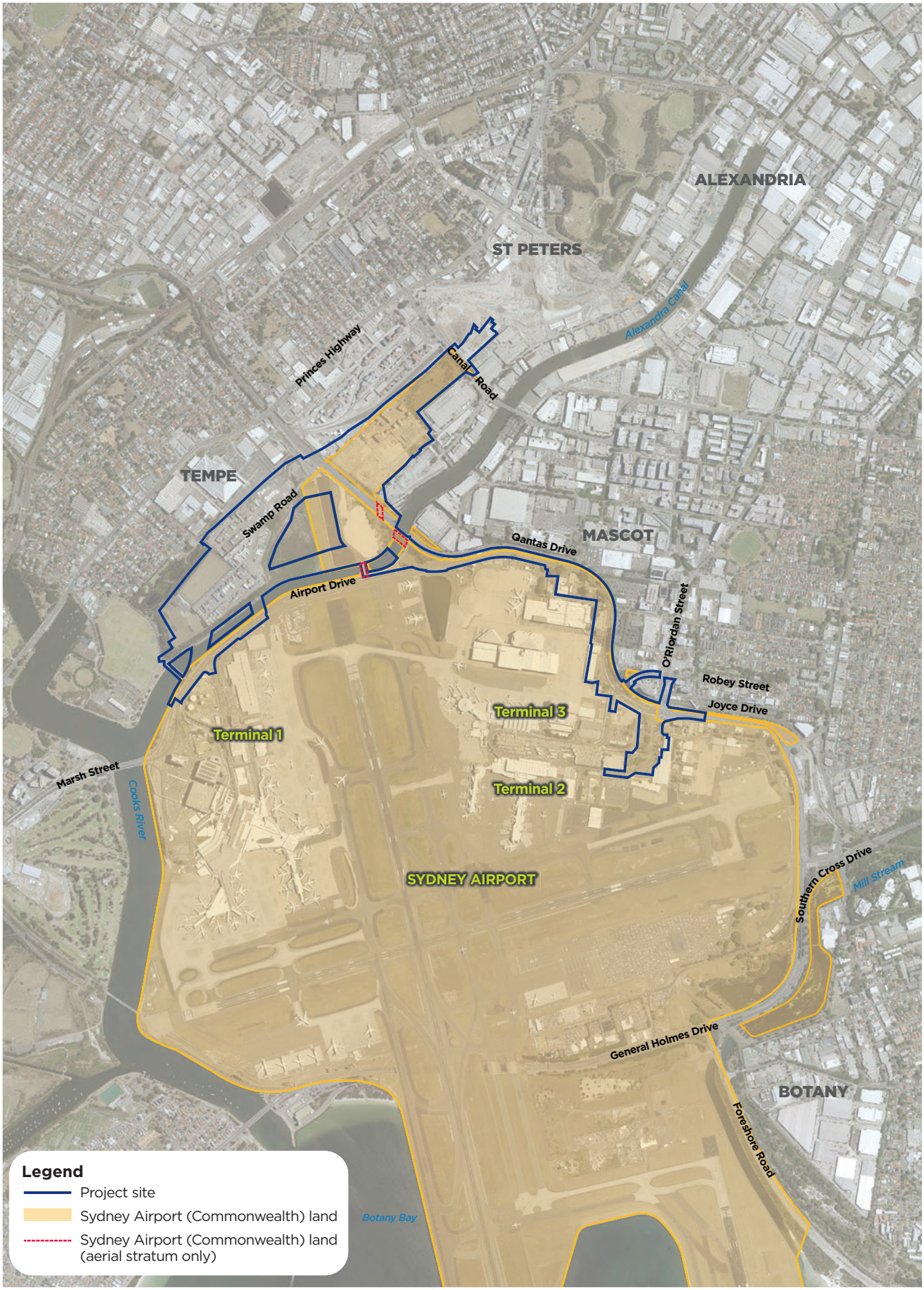


Figure 1.3 **Sydney Airport (Commonwealth) land**

Chapter 2

Location and setting

This document 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 impact assessment, including a summary of its general biophysical and cultural (community, land use and socio-economic) environment. This chapter also defines those parts of the project and project site that are subject to the different approval requirements under the Airports Act and the EP&A Act. Further information on the existing environment as it relates to each individual issue is provided in Part B.

The SEARs addressed in this chapter are listed below. There are no MDP requirements specifically relevant to this chapter. Full copies of the SEARs and MDP requirements, and where they are addressed in this document, are provided in Appendices A and B respectively.

Reference	Requirement	Where addressed
General standard SEARs		
2	**Environmental Impact Statement**	
2.1	The EIS must include, but not necessarily be limited to, the following: (i) a concise description of the general biophysical and socio-economic environment that is likely to be impacted by the proposal (including offsite impacts). Elements of the environment that are not likely to be affected by the proposal do not need to be described.	This chapter

2. Location and setting

2.1 The project site for the purposes of the assessment

2.1.1 General description

The term ‘project site’ is used in this document to refer to the area that would be directly disturbed by construction and operation of the project. It includes the location of construction activities, compounds and work/disturbance areas (the construction footprint), and the location of permanent operational road and associated infrastructure (the operational footprint). The project site is shown on Figure 2.1 to Figure 2.5.

The project site is located about eight kilometres south of the Sydney central business district. The northern extent of the project site is located at St Peters interchange. The project site extends to the south-west in Tempe and crosses Alexandra Canal. The western extent of the project site is located near the entrance to Terminal 1 (the International Terminal) on Airport Drive. The project site also crosses Alexandra Canal further to the north and extends to the east in Mascot. The eastern extent of the project site is located in Joyce Drive near the entrance to Terminals 2/3 (the Domestic Terminals).

2.1.2 Land ownership

The majority of the project site is owned by the Commonwealth and leased to Sydney Airport Corporation. Other land in the project site is owned by the NSW and local governments (including Inner West Council) and private landowners (including Sydney Airport Corporation). Broad patterns of land ownership within the project site are shown on Figure 2.6.

Acquisition or leasing of government-owned land would be required to construct the project and locate some of the operational infrastructure. Further information on the project’s land requirements is provided in sections 7.11 and 8.4.

2.1.3 Parts of project site subject to the Airports Act / EP&A Act

The parts of the project site that are subject to the Airports Act (referred to as ‘Sydney Airport land’ for the purposes of this document) are shown on Figure 2.1 to Figure 2.5. This includes the area between Bellevue Street and Canal Road in St Peters, and the area to the east of Alexandra Canal in Mascot, including Qantas Drive and Airport Drive. The features of the project located in, and the construction activities that would be undertaken in, this area are subject to the Airports Act. The EP&A Act does not apply to these areas.

Other parts of the project site that are not Sydney Airport land are subject to the EP&A Act (referred to as ‘land subject to the EP&A Act’ for the purposes of this document). This includes the area to the north of Canal Road in St Peters and the area to the south of Bellevue Street in Tempe (shown on Figure 2.1 to Figure 2.5). The features of the project located in, and construction activities that would be undertaken in, this area are subject to the EP&A Act.

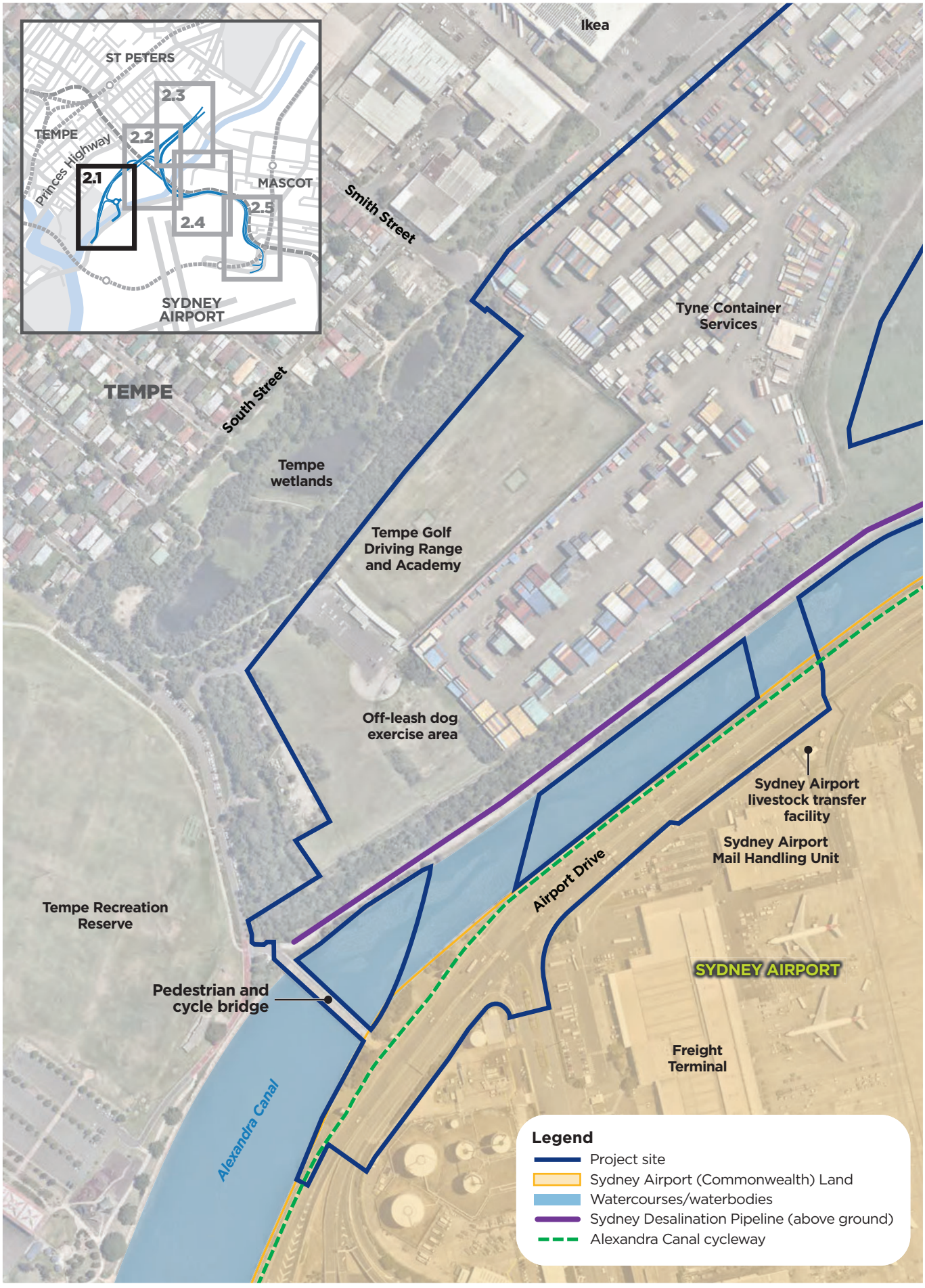


Figure 2.1 **The project site - map 1**

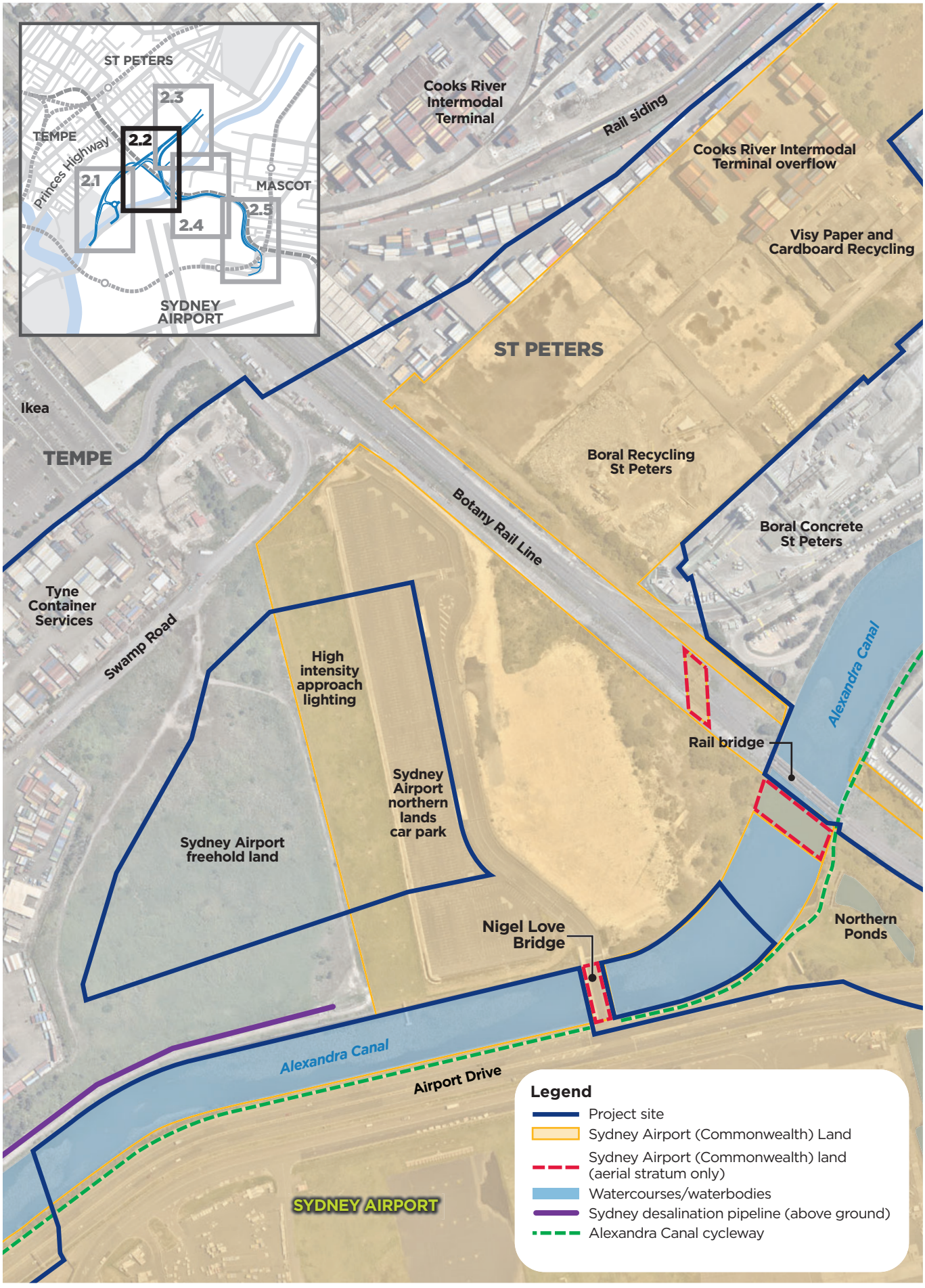


Figure 2.2 **The project site - map 2**

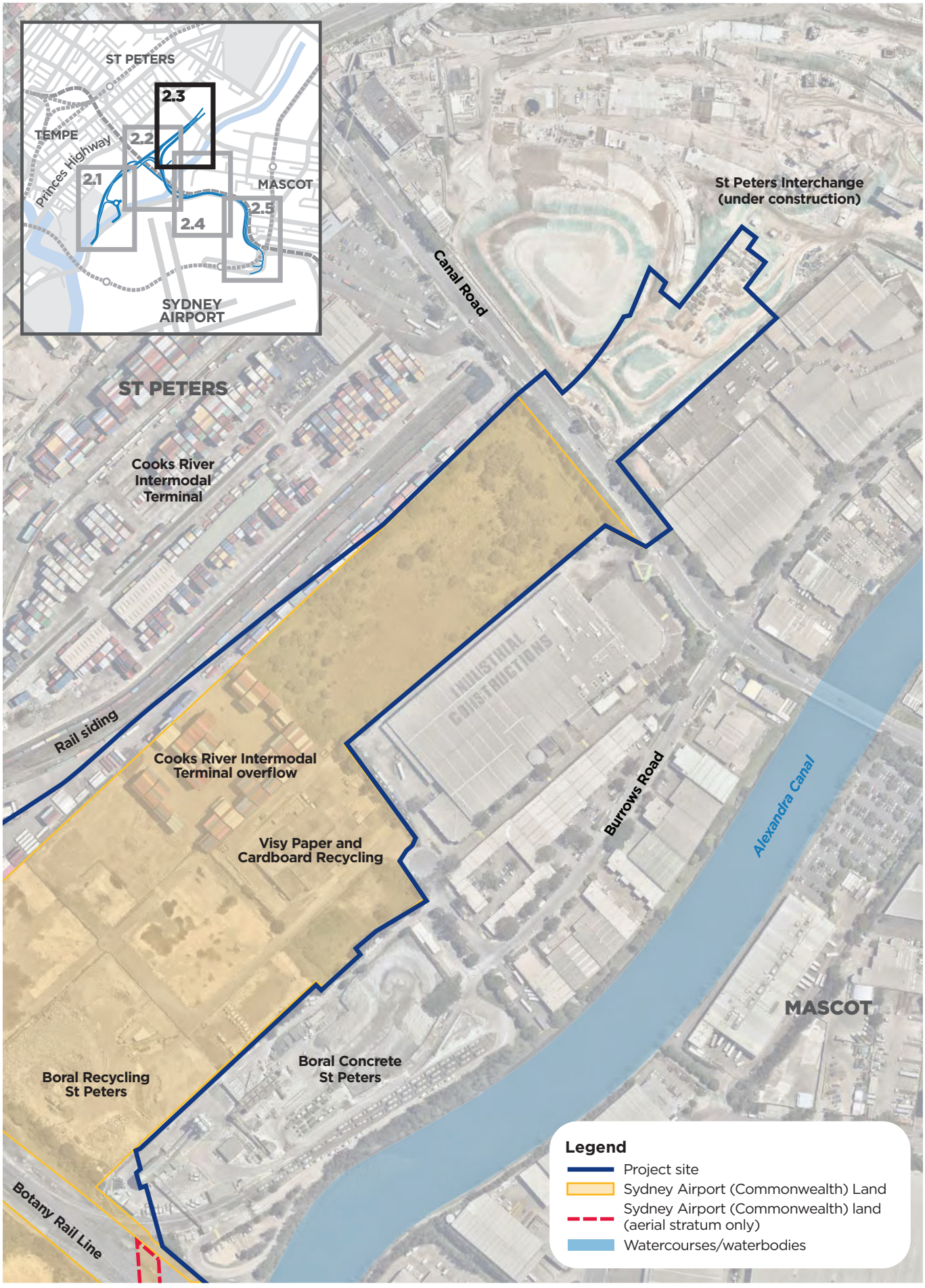


Figure 2.3 **The project site - map 3**

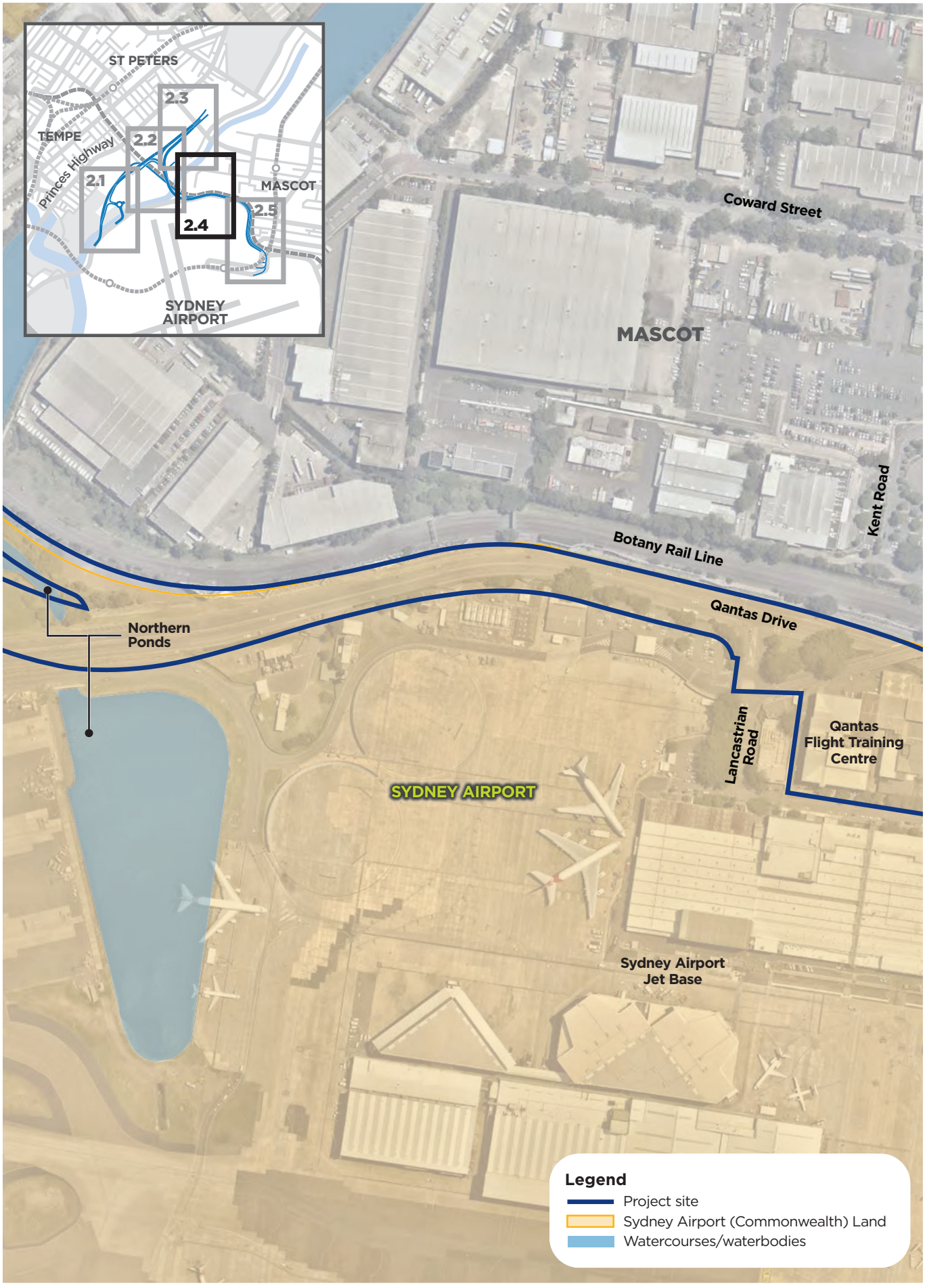


Figure 2.4 **The project site - map 4**

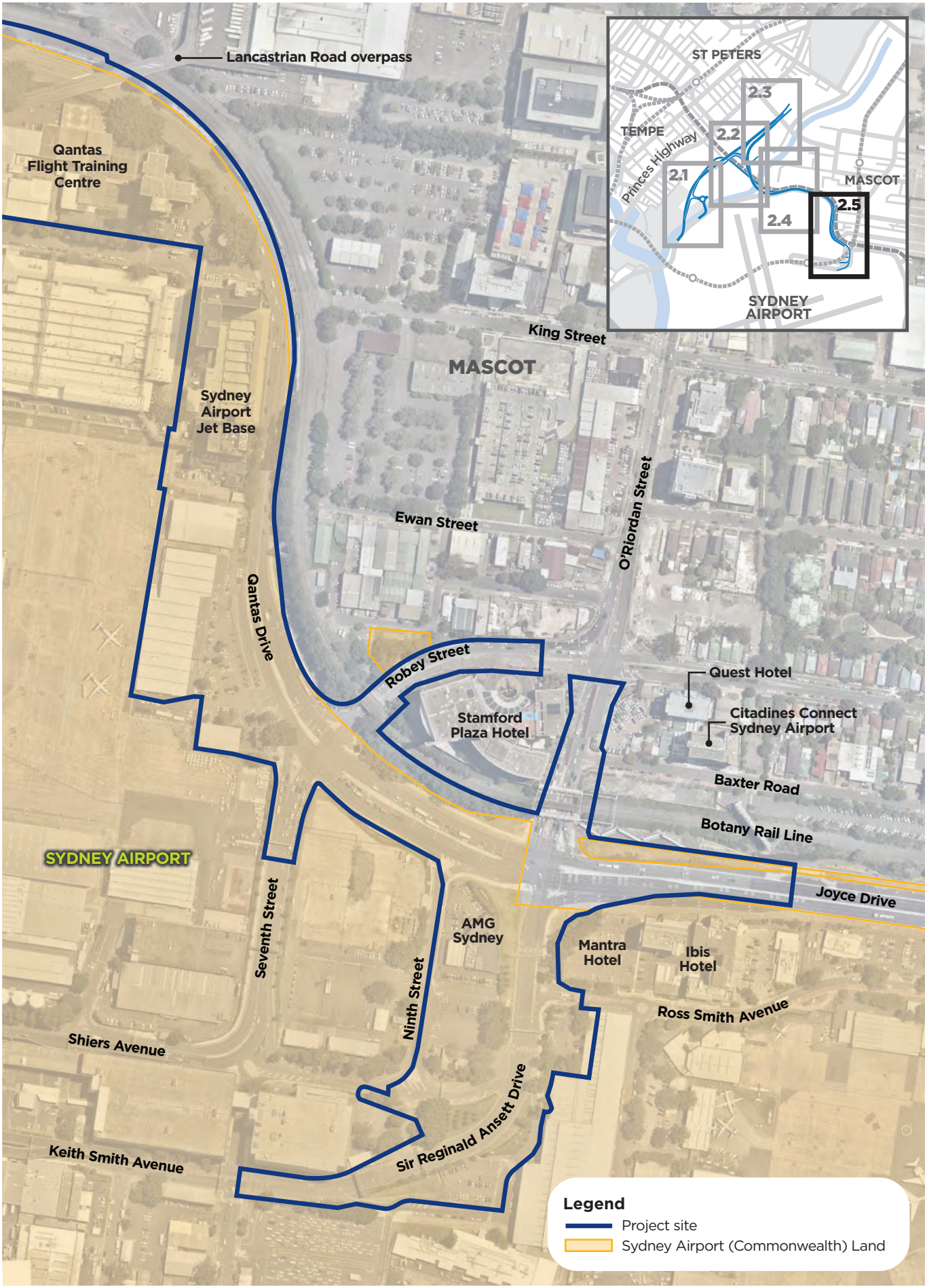


Figure 2.5 **The project site - map 5**

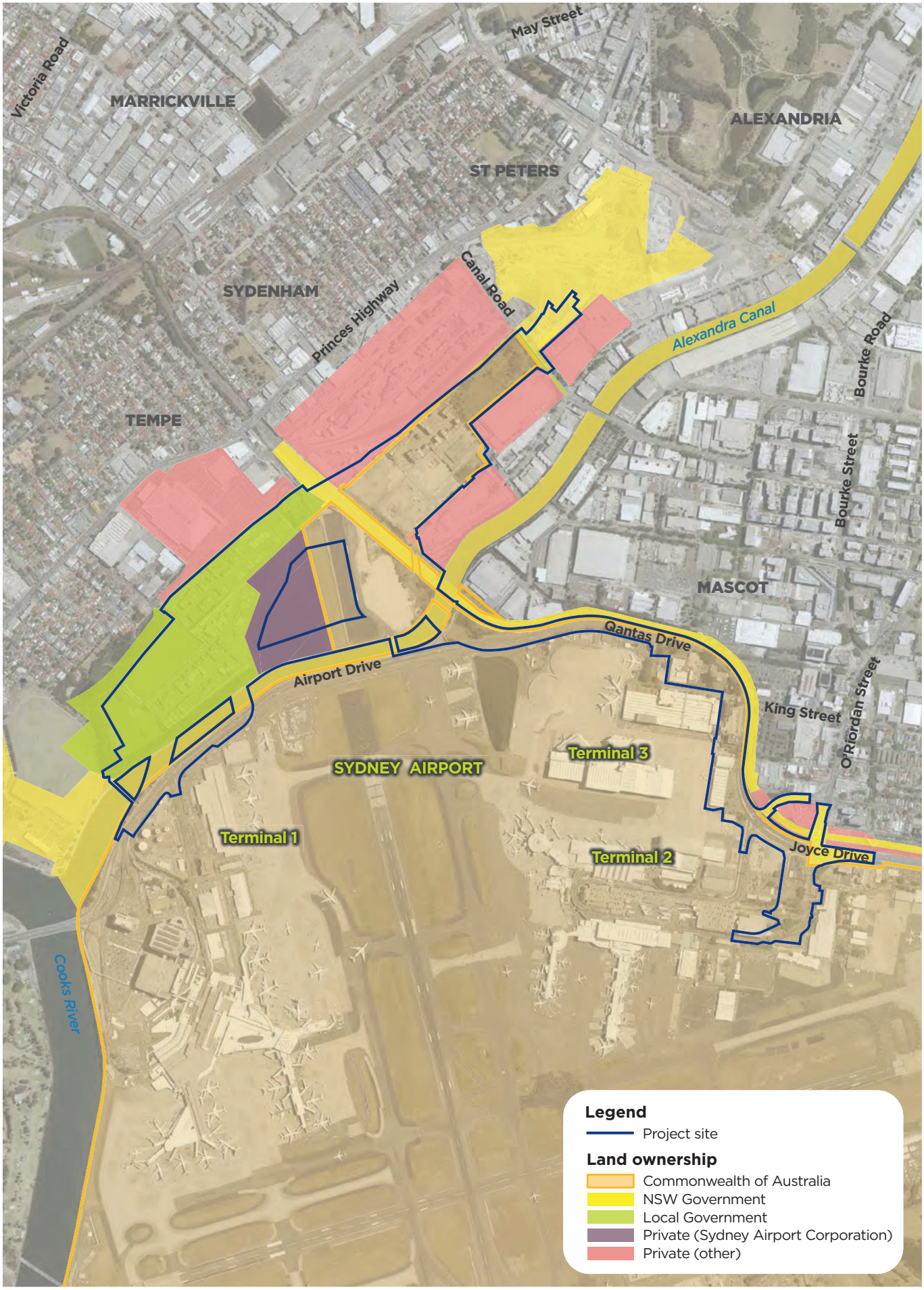


Figure 2.6 **Land ownership**

2.2 Biophysical and socio-economic environment

A general description of the social, cultural and biophysical environment of the project site and surrounding area is provided in sections 2.2.1 and 2.2.2. Key features are shown on Figure 2.1 to Figure 2.5.

2.2.1 General social and cultural environment

Transport infrastructure

The study area includes a variety of significant transport infrastructure. An overview of the key transport features in the vicinity of the project site is provided below.

Sydney Airport

Sydney Airport is one of Australia's most important pieces of transport infrastructure. The Sydney Airport site covers 907 hectares of land in Mascot. The majority of the site (900 hectares) is Commonwealth-owned land leased from the Australian Government. Sydney Airport Corporation owns the other seven hectares.

The airport consists of three main passenger terminals:

- Terminal 1 – Sydney Airport's International Terminal
- Terminal 2 – one of Sydney Airport's two Domestic Terminals, used by a number of domestic and regional airlines including Virgin Australia, Jetstar and Regional Express (Rex)
- Terminal 3 – Qantas's Domestic Terminal.

Associated activities and infrastructure, such as landside access roads, car parking and utilities support the operation of the terminals.

Freight facilities and service providers occupy about 13.7 hectares of the airport site. Freight facilities are operated by various service providers, also known as cargo terminal operators.

The majority of the airport site is occupied by the aircraft movement areas, which include the three runways, taxiways, apron areas and engineering facilities.

A series of high intensity approach lights, which assist with the navigation of planes on approach to the main north–south runway, are located north of the runway on the eastern side of Alexandra Canal and along a strip of land on the western side of the canal to the south of Swamp Road.

Land use and development at Sydney Airport is guided by the *Sydney Airport Master Plan 2039* (SACL, 2019a). Further information on the Master Plan is provided in section 3.6.

The airspace around Sydney Airport is subject to controls (under the Airports Act and the Airports (Protection of Airspace) Regulations 1996) to restrict structures and/or other obstructions and obstacles from affecting the safe operation of aircraft. This protected airspace is formally known as the 'prescribed airspace', and includes:

- The obstacle limitation surface (OLS), which defines the lower limits of an airport's airspace, which should be kept free of obstacles during the initial and final stages of flight or manoeuvring
- The Procedures for Air Navigation Services – Aircraft Operations surface (PANS-OPS), which protects aircraft flying into and out of the airports when the flight is guided solely by instruments in conditions of poor visibility (generally situated above the OLS)
- Navigation aids protected surfaces
- High intensity approach lights protected surfaces – these lights are installed near the approach end of a runway to guides aircraft in to the runway, particularly at night and during poor weather
- Radar terrain clearance chart surfaces.

Further information about the approval requirements under the Airports Act and the aviation safety environment at Sydney Airport are provided in section 3.2 and Chapter 11 (Airport operations) respectively.

Roads

A number of classified main roads are located in the study area, including the M5, General Holmes Drive and Southern Cross Drive (part of the M1), O'Riordan Street, Robey Street, Botany Road and Canal Road.

In addition to providing access to Sydney Airport and Port Botany, the roads around Sydney Airport also play an important role in providing a key east–west link within the regional road network.

Other roads within, and in the vicinity of, the project site include Qantas Drive, Airport Drive and Sir Reginald Ansett Drive, which are located on Sydney Airport land, and Swamp Road and Bellevue Street, which are local roads managed by Inner West Council.

Botany Rail Line

The Botany Rail Line forms part of the Sydney Metropolitan Freight Network, which is a dedicated freight only rail network operated by the Australian Rail Track Corporation (ARTC). The line is an important freight facility in the study area, moving containers between Port Botany, Cooks River Intermodal Terminal and other intermodal terminals in metropolitan Sydney.

The Botany Rail Line is located adjacent to, or in the vicinity of, parts of the project site (with some parts of the rail corridor located in the project site as shown on Figure 2.1 to Figure 2.5).

Freight transport facilities

Sydney Airport is one of Australia's most significant transport and logistics hubs, handling about 643,000 tonnes of air freight per annum in 2017, with this forecast to increase to about one million tonnes by 2039 (SACL, 2019a).

Port Botany, which is located about five kilometres to the south of the southern extent of the project site, plays a major role in terms of the movement of freight (particularly container freight) in Sydney, NSW and Australia.

The other major freight facility in the study area is the Cooks River Intermodal Terminal in St Peters (shown on Figure 2.3). The terminal provides a range of functions. It uses road and rail to transfer containers to and from Port Botany and regional NSW, and provides container storage.

Another freight related facility in the project site is Tyne Container Services. Tyne provides container related services, including repair and storage.

Public and active transport

The Sydney Trains T8 Airport and South Line, which is operated by Sydney Trains, passes through the study area via a tunnel. A number of bus routes operate along key roads within and around the project site, with routes 400 and 420 servicing terminals at Sydney Airport.

Several designated cycleways and shared paths are located within the study area. This includes the Alexandra Canal Cycleway, which is a dedicated off-road shared path that extends along Alexandra Canal adjacent to Airport Drive.

Further information on the local traffic and transport environment in the vicinity of the project site is provided in Chapter 9 (Traffic, transport and access).

Land use and property

The study area includes a varied and relatively dense mix of land uses. Sydney Airport is by far the dominant land use in the study area. In addition to Sydney Airport and the transport uses described above, the study area also includes a range of commercial and industrial land uses located on either side of Alexandra Canal, broadly to the east of the Princes Highway in St Peters and to the west of O'Riordan

Street in Mascot. Commercial and industrial uses in Mascot include a number of airline and freight related businesses and premises, including various Qantas support services. The commercial and industrial area in Mascot extends north through Alexandria towards the Sydney central business district. This area is interspersed with medium density apartment developments.

A range of commercial uses are located along the Princes Highway north of Smith Street in Tempe. These include Ikea, which is located adjacent to the project site.

The main areas of residential land uses are located to the west and east of the project site in Tempe and Mascot. The closest residences are located about 40 and 70 metres from the project site in Tempe and Mascot respectively. Some areas in Mascot to the north of the project site are undergoing urban renewal and redevelopment, with a number of medium density residential and mixed use developments completed and underway. Areas of high density residential development are also located further to the south-west of the project site at Wolli Creek.

A number of hotels are located in Mascot and at Sydney Airport, including in the immediate vicinity of the project site. These include the Stamford Plaza, Ibis Budget Sydney Airport, Mantra, Citadines and Quest hotels, which are located close to the intersection of O'Riordan Street, Qantas Drive and Sir Reginald Ansett Drive.

Open space and recreation facilities are located at the Tempe Recreation Reserve and Tempe Lands in the vicinity of the south-western end of the project site. Tempe Lands consists of land owned by Inner West Council that was part of the former Tempe landfill site (see Figure 2.7). The land was remediated and now contains open space and recreation facilities (including the Tempe Golf Range and Academy, an off-leash dog exercise area, Tempe Wetlands and an open grassed area).

A number of large advertising signs/billboards are located within and adjacent to the project site, along Qantas Drive, Airport Drive, Joyce Drive and Sir Reginald Ansett Drive.

Main land uses within the project site

To the east of Alexandra Canal the majority of the project site is located on land used for transport purposes, including Airport Drive, Qantas Drive, and land occupied by the Jet Base at Sydney Airport on Qantas Drive.

To the west of Alexandra Canal, land within the project site is zoned mainly for industrial and transport related uses. This includes the Sydney Airport 'northern lands', which consists of land leased and owned by Sydney Airport Corporation, located between Canal Road and Alexandra Canal (occupying an area of about 27 hectares). This land is largely undeveloped, with the exception of the Sydney Airport northern lands car park and the high intensity approach lights. Some areas within the northern lands (north of the Botany Rail Line) are leased to private businesses.

There are also some smaller areas of land zoned for recreation within the south-western end of the project site within the Tempe Lands (land owned by Inner West Council).

Further information on land use within and in the vicinity of the project site is provided in Chapter 19 (Land use and property).

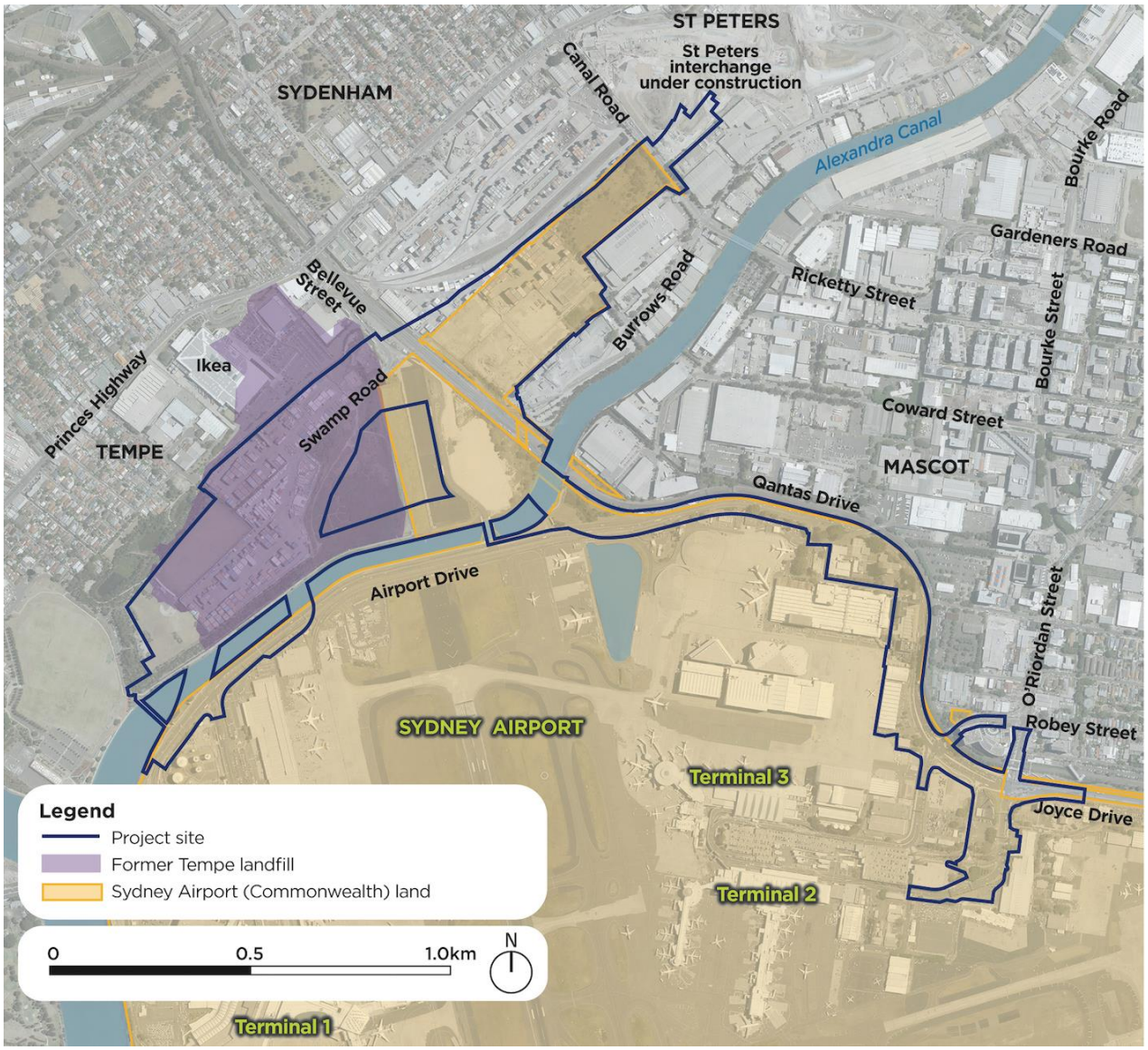


Figure 2.7 Extent of the former Tempe landfill

Social and economic characteristics

The project site is located within three suburbs (St Peters, Tempe and Mascot) in the Inner West, Bayside and City of Sydney local government areas. The three local government areas are characterised by near-city suburbs, with substantial industrial and commercial areas, major transport infrastructure and a wide range of housing styles and densities. A number of suburbs in the local government areas, including Mascot, are undergoing urban renewal.

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, including the predicted growth in passengers, freight and employment driving the need for the project, is provided in Chapter 5 (Strategic context and project need).

Further information on the social, business and economic environment is provided in Chapter 20 (Socio-economic impacts).

Heritage

Non-Aboriginal heritage

The study area has a long history of settlement and development, with significant historical features and activities, including:

- Agriculture
- Residential and industrial development
- Modification of the Cooks River and Sheas Creek
- Dredging and reclamation
- Sydney's drinking water supply
- Development of Sydney Airport and other transport infrastructure.

One listed item of State and local heritage significance, Alexandra Canal, is located within the project site. Four other locally listed items are located within/adjacent to the project site – the 'Cooks River Container Terminal', 'Sydney (Kingsford Smith) Airport Group', 'Mascot (Robey Street) Underbridge' and the 'Mascot (O'Riordan Street) Underbridge'.

Further information on non-Aboriginal heritage is provided in Chapter 17 (Non-Aboriginal heritage).

Aboriginal heritage

There are no listed Aboriginal heritage sites located within or in the vicinity of the project site. Two areas with sub-surface Aboriginal archaeological potential are located within and in the vicinity of the project site.

Further information on Aboriginal heritage is provided in Chapter 18 (Aboriginal heritage).

2.2.2 General biophysical environment

Soils

Reclamation and stabilisation of the Sydney Airport site and surrounding areas have had a significant impact on geology and landforms in the study area. These activities altered the original southern drainage channel networks of Sheas Creek and Cooks River, which were diverted around the airport. Other influences on landform included landfill activities and extensive cut/fill works.

The study area is located in the Botany Basin, which is a subregion of the Sydney Basin. The underlying geology consists of Triassic Hawkesbury Sandstone and Ashfield Shale overlain by Quaternary sediments (the Botany Sands).

Soil landscapes within the study area predominantly consist of disturbed terrain. There are also areas of residual Blacktown soil landscape and the Tuggerah soil landscape. Most of the low-lying areas surrounding Alexandra Canal are mapped as potentially containing acid sulfate soils. Most of the study area is classified as having low salinity potential, although there are areas of high salinity potential.

Further information on soils is provided in Chapter 13 (Contamination and soils).

Water

The study area is located in the Botany Bay catchment area, which includes two river catchments – the Cooks River catchment and the Georges River catchment. Some areas within the Botany Bay catchment also drain directly to the bay.

Alexandra Canal is one of the main tributaries of Cooks River and is the main watercourse in the vicinity of the project site.

A constructed pond is located on Sydney Airport land adjacent to the project site. The pond provides a flood detention/mitigation and spill control function. The project site crosses the channel that connects the pond to Alexandra Canal.

The Tempe Wetlands, located in Tempe Lands, also provide temporary detention for flood waters.

Much of the project site is located above the Botany Sands aquifer which is an unconfined and highly permeable aquifer. The groundwater within the aquifer is relatively shallow (about one to two metres below the ground surface).

Preliminary modelling indicates that a number of low-lying areas within the project site are prone to flooding during a 100 year average recurrence interval storm event.

Further information on hydrology and flooding, groundwater and water quality are provided in Chapters 14 to 16.

Contamination

Three contaminated sites listed by the NSW Environment Protection Authority (EPA) are located within and adjacent to the project site:

- The former Tempe landfill
- Alexandra Canal Sediments
- Cooks River Intermodal Terminal.

Other identified areas of contamination include:

- Areas within the Sydney Airport northern lands, including the existing car park
- Operational areas within Sydney Airport.

Groundwater in the study area is particularly vulnerable to contamination as a result of the permeability and shallow depth of the Botany Sands aquifer. Groundwater in parts of the study area is contaminated and some areas are subject to a Temporary Water Restrictions Order. In addition, the results of sampling within the study area have indicated the presence of contaminants (including per-and poly-fluoroalkyl substances (PFAS)) within groundwater.

Other potentially contaminating activities and land uses are located within or around the project site. Further information on contamination is provided in Chapter 13 (Contamination and soils).

Biodiversity

Most of the study area consists of disturbed land, which has been subject to historical vegetation clearing. The majority of vegetation comprises exotic or planted native species on highly modified landforms. Only a small proportion of the vegetation in the project site (0.91 hectares) comprises native vegetation. This vegetation does not represent a listed threatened community.

No threatened flora species were recorded during field surveys. Two threatened fauna species, the Eastern Bentwing-bat and the Grey-headed Flying-fox, were identified during field surveys within the Tempe Wetlands and also flying over the project site.

Further information on biodiversity is provided in Chapter 22 (Biodiversity).

Chapter 3

Statutory context and approval requirements

This chapter provides a summary of the approval requirements under relevant legislation, including the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) and the *Airports Act 1996* (Cth) (Airports Act), 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, particularly in relation to planning and development at Sydney Airport.

The SEARs and MDP requirements addressed in this chapter are listed below. Full copies of the SEARs and MDP requirements, and where they are addressed in this document, are provided in Appendices A and B respectively. The chapter also addresses relevant the requirements of clause 2.04(1) of the Airports (Building Control) Regulations 1996 (Cth). A full copy of the requirements under the Airports (Building Control) Regulations as they relate to an application for building approval are provided in Appendix C.

Reference	Requirement	Where addressed
General standard SEARs		
2.1	The EIS must include, but not necessarily be limited to, the following: (p) statutory context of the proposal as a whole, including: • how the proposal meets the provisions of the EP&A Act and EP&A Regulation	Section 3.4 and Appendix C
	• a list of any approvals that must be obtained under any other Act or law before the proposal may lawfully be carried out	Sections 3.2 to 3.5
Major development plan requirements		
91(1)	A major development plan, or a draft of such a plan, must set out: (ca) whether or not the development is consistent with the airport lease for the airport;	Section 3.7
	(d) if a final master plan for the airport is in force – whether or not the development is consistent with the final master plan;	Section 3.6.1
5.04[1]	For subsection 91(3) of the Act, a major development plan must address the obligations of the airport-lessee company as sublessor under any sublease of the airport site concerned, and the rights of the sublessee under any such sublease, including: (a) any obligation that has passed to the relevant airport-lessee company under subsection 22(2) of the Act or subsection 26(2) of the Transitional Act (b) any interest to which the relevant airport lease is subject under subsection 22(3) of the Act, or subsection 26(3) of the Transitional Act	Section 3.7

Note: 1. The requirements of clause 5.04 (Contents of a major development plan) of the Airports Regulations 1997 are called up by clause 91(3) of the Airports Act

3. Statutory context and approval requirements

3.1 Overview

The project is subject to approval under NSW and Commonwealth legislation. Parts of the project on Sydney Airport land (shown on Figure 1.3 and Figure 2.6) are major airport development in accordance with the *Airports Act 1996* (Cth) (Airports Act). A major development plan (MDP), approved by the Australian Minister for Infrastructure, Transport and Regional Development, is required before a major airport development can be undertaken at a leased airport.

Parts of the project located on other land (shown on Figure 1.3 and Figure 2.6) have been declared State significant infrastructure in accordance with the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act) and *State Environmental Planning Policy (State and Regional Development) 2011*. As State significant infrastructure, these parts of the project need approval from the NSW Minister for Planning and Public Spaces. An environmental impact statement (EIS) is required to support the application for approval for State significant infrastructure under the EP&A Act. In addition, Roads and Maritime has requested the Minister for Planning and Public Spaces to declare the project as critical State Significant Infrastructure under section 5.13 of the EP&A Act.

The relationship between the different approval processes is shown on Figure 3.1. Further information is provided in the following sections.

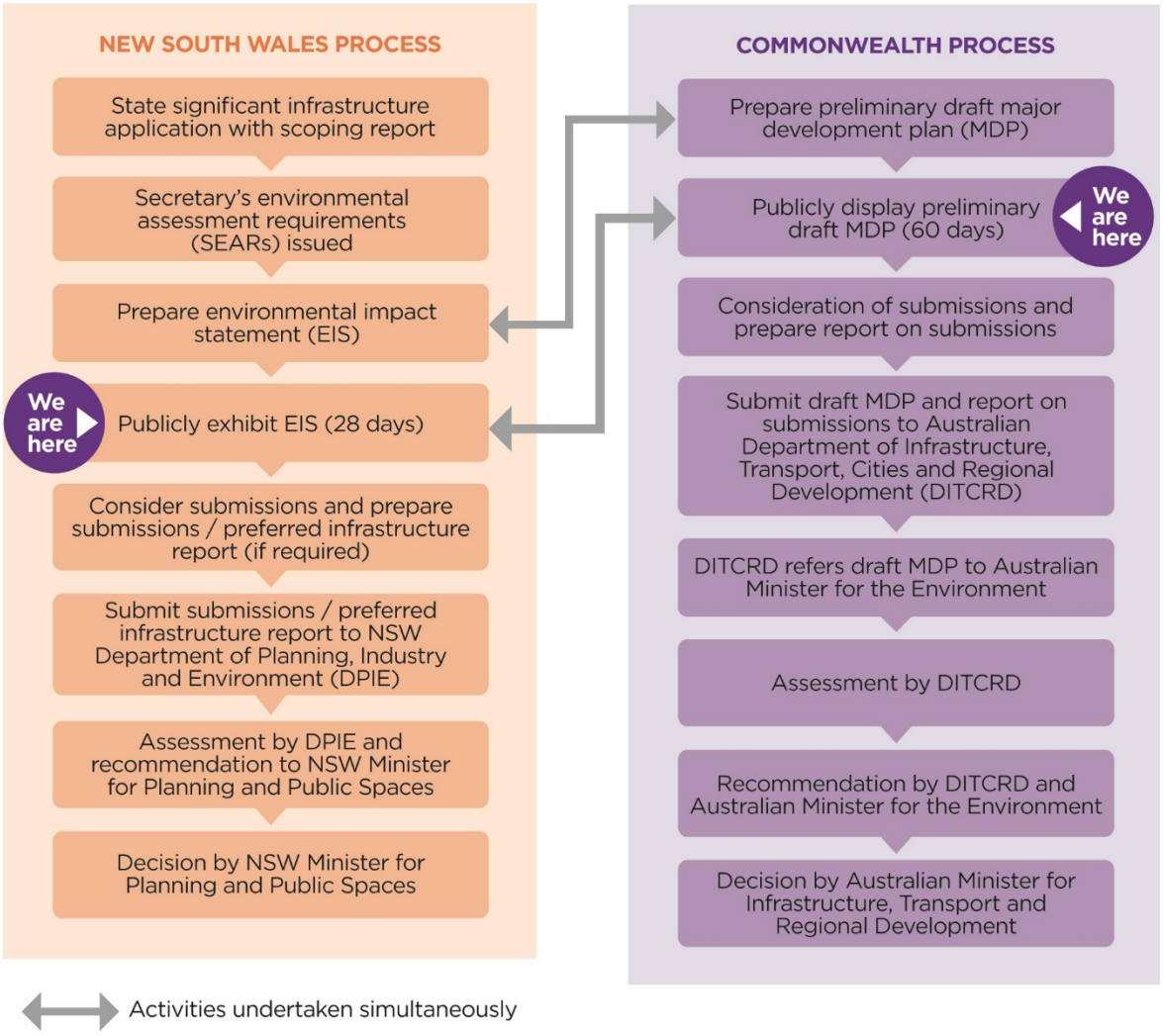


Figure 3.1 Approval processes

3.2 Airports Act 1996

The Airports Act and associated regulations establish a system for the regulation of Australian airports that has due regard to the interests of airport users and the general community. The Airports Act and associated regulations apply to airports formerly owned and operated by the Federal Airports Corporation and provide the regulatory arrangements for airports subject to the Act, including the assessment and approval process for developments at these airports.

The Airports Act applies to Commonwealth-owned land leased to Sydney Airport Corporation for the operation of Sydney Airport (Sydney Airport land). It does not apply to land owned freehold by Sydney Airport Corporation.

3.2.1 Major airport development

The key requirements of the Airports Act in relation to the approval and assessment of those parts of the project located on Sydney Airport land are described below.

Approval requirements

Section 89 of the Act defines major airport development. Under sections 89(1)(h) and (j), major airport developments include constructing or extending a road or vehicular access facility, where:

- The construction significantly increases the capacity of the airport to handle movements of passengers, freight or aircraft; and
- The cost of construction exceeds the threshold amount ($25 million).

One of the reasons the project is being proposed is to enable the airport to handle the projected increases in passengers and air freight, and associated road traffic, predicted over the next 20 years. In addition, the total cost of the project would also exceed $25 million.

Under section 89(1)(na) major airport developments also include development of a kind that is likely to have a significant impact on the local or regional community. The project is considered to have the potential for significant impacts on the community.

As a result of the above, the project is considered to be a major airport development for the purposes of the Airports Act.

Section 90 of the Act provides that major airport development must not be carried out except in accordance with an approved MDP.

As the airport-lessee company under the Airports Act, Sydney Airport Corporation is seeking approval for the project where it is subject to the Airports Act.

Assessment process and requirements

Purpose and contents of an MDP

Section 91(1A) of the Airports Act defines the purpose of an MDP, which is to '*...establish the details of a major airport development that:*

(a) relates to the airport; and

(b) is consistent with the airport lease for the airport and the final master plan for the airport.'

The required contents of a MDP are set out in by section 91(1) of the Airports Act (see Appendix B). These requirements, and how they are addressed in this document, are shown in Appendix B. MDPs are approved (with or without conditions) or refused by the Australian Minister for Infrastructure, Transport and Regional Development.

In deciding whether to approve a MDP, the Minister must have regard to the matters set out in section 94(3) of the Airports Act. These matters, and how they have been addressed in this document, are shown

in Appendix B. The matters set out in section 94(3) include the extent to which the MDP achieves the purpose defined above. As this document establishes the details of the project that relate to Sydney Airport (see section 2.1, Chapter 7 (Project description) and Chapter 8 (Construction)) and demonstrates that the project is consistent with the airport lease (see section 3.7) and the Sydney Airport Master Plan (see section 3.6.1), it achieves the purpose of a MDP.

Public comment and submission of a draft MDP

As the airport-lessee company under the Airports Act, Sydney Airport Corporation is responsible for exhibition and submission of the MDP. The consultation and exhibition requirements are defined by sections 92 and 93 of the Airports and include:

- Advising relevant authorities (as defined by section 92(1A)) of the intention to give the Minister a draft MDP (for this project, relevant authorities include the NSW Minister for Planning and Public Spaces; the NSW Department of Planning, Industry and Environment; and Bayside, Inner West and City of Sydney councils)
- Placing a notice in newspapers and on Sydney Airport's website in accordance with the notice requirements of section 92(1)(a)
- Making copies of the draft MDP available for inspection for a period of 60 business days (or a shorter period if approved by the Australian Minister for Infrastructure, Transport and Regional Development) and inviting comments
- Submitting the draft MDP to the Australian Minister for Infrastructure, Transport and Regional Development with copies of the comments and a report summarising the comments in accordance with the requirements of 92(2)(b)
- When consultation with government agencies, the aviation industry and other stakeholders (as defined by section 93(1)(b)) occurs prior to publication of a notice about the MDP, the draft MDP submitted to the Minister must be accompanied by a written statement providing the names of the persons consulted and a summary of the comments made (in accordance with section 93(2).

In accordance with the Australian Government's *Major Development Plan Assessment Guidelines* (Department of Infrastructure and Transport, 2011), an exposure draft MDP was provided to the Department of Infrastructure, Transport, Cities and Regional Development for review. The exposure draft was referred to the Department of the Environment and Energy for the Australian Minister for the Environment to determine the appropriate environmental assessment methodology. The exposure draft MDP was also provided to Airservices Australia and the Civil Aviation Safety Authority for review and comment.

A summary of the views expressed by stakeholders during this initial consultation stage will be submitted to the Australian Minister for Infrastructure, Transport and Regional Development with the draft MDP (in accordance with the requirements of section 93(2) of the Airports Act).

This combined EIS/preliminary draft MDP will be placed on exhibition in accordance with the above requirements.

Assessment and approval

Once the draft MDP is lodged for approval, DITCRD will review the draft MDP and comments report on behalf of the Australian Minister for Infrastructure, Transport and Regional Development, taking into account the matters defined by section 94(3) of the Airports Act (see Appendix C). DITCRD will also, on behalf of the Minister for Infrastructure, Transport and Regional Development, seek advice from the Australian Minister for the Environment under section 160(1) of the EPBC Act (refer to section 3.3.2).

The Minister for Infrastructure, Transport and Regional Development is also required to consider the views of Airservices Australia and the Civil Aviation Safety Authority.

The Minister for Infrastructure, Transport and Regional Development may approve the draft MDP (with or without conditions) or refuse to approve it.

If the Minister approves the draft MDP, Sydney Airport Corporation is required to advertise the approval and make the final MDP available for inspection by members of the public for at least 180 days.

3.2.2 Other approvals required

Airspace protection

The Airports Act and the Airports (Protection of Airspace) Regulations 1996 (Cth) (the Airspace Regulations) provide for the definition and protection of the airspace at and around airports, which include the OLS and PANS-OPS (see Chapter 2 (Location and setting)). Any activity that intrudes into the prescribed airspace is a 'controlled activity'. Controlled activities, which need to be approved under the Airports Act, include:

- Permanent structures (such as buildings) that intrude into the prescribed airspace
- Temporary structures or other objects (such as cranes) that intrude into the prescribed airspace
- Any activities causing intrusions into the prescribed airspace through glare from artificial light or reflected sunlight, air turbulence from stacks or vents, smoke, dust, steam or other gases or particulate matter.

Intrusions into the PANS-OPS surface are prohibited.

Certain construction activities and/or works in particular locations undertaken as part of the project may result in temporary intrusions into the OLS and other protected surfaces. Further information on these activities and how they would be managed is provided in section 8.2.5. Controlled activity approvals would be obtained for these works.

Short-term controlled activities (less than three months) within the OLS require approval from Sydney Airport Corporation. Short-term controlled activities (less than three months) within the PANS-OPS, and long-term controlled activities (more than three months) within the OLS, require approval from the Secretary of DITCRD. The Civil Aviation Safety Authority and Airservices Australia must be consulted in relation to all controlled activity applications. Where the application relates to a long-term controlled activity the local council must also be consulted. Works that would intrude into the prescribed airspace cannot commence until a controlled activity approval has been obtained. A controlled activity approval cannot be granted for long-term works that intrude into PANS-OPS airspace. The project would not involve any intrusions of the PANS-OPS.

Further information about the potential impacts on the prescribed airspace is provided in Chapter 11 (Airport Operations).

Building activity approvals

The approval process and requirements for building activities are defined by the Airports (Building Control) Regulations 1996 (Cth) (Airports (Building Control) Regulations).

The project is also subject to the submission of an application for a building permit(s) to the Airport Building Controller in accordance with the Airports (Building Control) Regulations. The Airport Building Controller (DITCRD) is the approval authority for building activity approvals. In addition, a corresponding consent must also be granted by Sydney Airport Corporation. Works of a minor nature may be exempted after consultation with the Airport Building Controller. The requirements that must be taken into account when considering an application for consent are defined by clause 2.04 of the Airports (Building Control) Regulations (see Appendix B).

3.3 Environment Protection and Biodiversity Conservation Act 1999

3.3.1 Approval requirements

Under the EPBC Act, proposed actions (ie activities or projects) with the potential to significantly impact matters protected by the EPBC Act must be referred to the Australian Minister for the Environment to determine whether they are controlled actions and require approval from the Minister. The following matters are defined as protected matters by Part 3 of the EPBC Act:

- Matters of national environmental significance
- The environment of Commonwealth land
- The environment in general if they are being carried out by a Commonwealth Government agency.

There are no matters of national environmental significance with the potential to be significantly affected by the project. The project is not being carried out by a Commonwealth Government agency. However, the project has the potential to affect the environment of Commonwealth land directly (for those parts of the project located on Sydney Airport land) or indirectly (for those parts of the project located on other land).

This document has not identified any significant impacts on the environment of Commonwealth land as a result of the project. As a result, a referral in accordance with Part 7 is not considered to be required.

3.3.2 Minister's advice in relation to authorisation of a MDP

Section 160(1) of the EPBC Act requires that before a Commonwealth agency or employee of the Commonwealth gives an authorisation of an action (which includes major airport development), they must obtain and consider advice from the Australian Minister for the Environment. Section 162 provides the requirements for assessment of an action.

In accordance with section 161(1), actions where advice from the Minister is required must be referred to the Australian Minister for the Environment. Section 162 provides the requirements for assessment of an action referred under section 161(1).

Section 163(1) requires the Minister to give the following advice:

(a) whether the agency or employee should give the authorisation;

(b) what conditions (if any) should be attached to the authorisation (if possible) to protect the environment;

(c) any other matter relating to protection of the environment from the action.

As part of the assessment of the draft MDP, DITCRD will, on behalf of the Minister for Infrastructure, Transport and Regional Development, seek advice from the Australian Minister for the Environment under section 160(1) of the EPBC Act.

3.4 Environmental Planning and Assessment Act 1979

3.4.1 Approval requirements

Roads and Maritime is seeking approval for the project where it is subject to the EP&A Act.

Clause 94 of *State Environmental Planning Policy (Infrastructure) 2007* (the Infrastructure SEPP) applies to development for the purpose of a road or road infrastructure facilities and provides that these types of works are permissible without consent if being undertaken by a public authority. The project is appropriately characterised as being for the purpose of a 'road' and 'road infrastructure facilities' under the Infrastructure SEPP.

Clause 14 of *State Environmental Planning Policy (State and Regional Development) 2011* declares development as State significant infrastructure if it is permissible without consent and specified in Schedule 3.

Clause 1 of Schedule 3 of *State Environmental Planning Policy (State and Regional Development) 2011* specifies infrastructure or other development that would be an activity for which the proponent is also the determining authority and would, in the opinion of the proponent, require an environmental impact statement to be obtained under Part 5 of the EP&A Act.

Roads and Maritime formed the opinion that the project is likely to significantly affect the environment and would require preparation of an EIS. Consequently, the project is declared State Significant Infrastructure under Part 5, Division 5.2 of the EP&A Act. In addition, Roads and Maritime has requested the Minister for Planning and Public Spaces to declare the project as critical State Significant Infrastructure under section 5.13 of the EP&A Act.

The project requires approval from the NSW Minister for Planning and Public Spaces under section 5.14 of the EP&A Act.

In November 2018, Roads and Maritime prepared a State significant infrastructure scoping report to support an infrastructure application for the project under section 5.15 of the EP&A Act.

The (then) Department of Planning and Environment issued the SEARs for the project on 15 February 2019. The SEARs identify the assessment requirements for the project. A copy of the SEARs and where they have been addressed in this document is provided in Appendix A.

The form and content requirements for an EIS are defined by Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (NSW) (the EP&A Regulation). These requirements, and how they are addressed by this document, are provided in Appendix C.

The assessment and approval process under Division 5.2 of the EP&A Act is shown in Figure 3.1, and is summarised below. Further information is available on the Department of Planning, Industry and Environment's website (www.planning.nsw.gov.au).

3.4.2 Assessment process

Public exhibition and submissions

If the EIS is considered to meet the SEARs, the Department of Planning, Industry and Environment will place it on public exhibition (for at least 28 calendar days) and invite submissions.

While all submissions received will be posted on the Department of Planning, Industry and Environment's website, if requested, the privacy of submitters will be protected by removing names from submissions.

At the end of the exhibition period, Roads and Maritime will be provided with a copy of the submissions or a report of the issues raised, and may be required to provide a response to the issues raised in submissions. Roads and Maritime may also be required to provide a preferred infrastructure report that outlines any proposed changes to the project to minimise its environmental impact or deal with other issues raised during the assessment of the application. The preferred infrastructure report may be made available to the public.

Further information on the proposed approach to consultation during the exhibition period is provided in section 4.4.1.

Assessment and approval

Following the exhibition period, the Planning Secretary will prepare an assessment report for the purposes of the Minister's consideration of the application for approval.

The Minister may refuse the project, or approve it with conditions. Furthermore, the Minister may grant approval with such modifications of the infrastructure, or on such conditions, as the Minister may determine.

The Minister's decision and the assessment report will be published on the Department of Planning, Industry and Environment's planning portal website following determination.

3.5 Other NSW legislation

A number of approvals are not required for a project approved under Division 5.2 of the EP&A Act (in accordance with section 5.23 of the EP&A Act). Those approvals not required for the project are:

- Permits under sections 201, 205 and 219 of the *Fisheries Management Act 1994*
- Approvals under Part 4 and excavation permits under section 139 of the *Heritage Act 1977*
- Aboriginal heritage impact permits under section 90 of the *National Parks and Wildlife Act 1974*
- Various approvals under the *Water Management Act 2000*, including water use approvals under section 89, water management work approvals under section 90, and activity approvals (other than aquifer interference approvals) under section 91.

Under section 5.24 of the EP&A Act, approvals under other specified NSW legislation that may apply to the project cannot be refused and must be applied consistently with the approval for the State significant infrastructure. Those approvals include:

- An Environment Protection Licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (NSW) (POEO Act). In accordance with section 5.24 of the EP&A Act, such a licence cannot be refused for an approved project and is to be substantially consistent with any approval under Division 5.2 of the EP&A Act
- Consent from the relevant roads authority under section 138 of the *Roads Act 1993* (NSW) including to carry out work in, on or over a public road, dig up or disturb the public surface of a public road or connect a road to a classified road.

Other NSW legislation that would apply to the project includes:

- The *Land Acquisition (Just Terms Compensation) Act 1991* (NSW), which applies to the acquisition of any land by an Authority of the State that is authorised to acquire the land by compulsory process. The land requirements for the project, and the need for acquisition, are considered in section 7.11.2 and Chapter 19 (Land use and property)
- The *Contaminated Land Management Act 1997* (NSW) outlines the circumstances in which notification of the NSW Environment Protection Authority is required in relation to contamination of land. Contamination issues are considered in Chapter 13 (Contamination and soils).

3.6 Consistency with Sydney Airport planning

3.6.1 Sydney Airport Master Plan

As part of the airport planning framework under the Airports Act, leased federal airports are required to prepare a master plan. Section 70(1) of the Airports Act requires airports regulated by the Act to have a final master plan.

The *Sydney Airport Master Plan 2039* (SACL, 2019a) (the Master Plan) provides a 20-year plan for the development and operation of Sydney Airport. In accordance with the requirements of the Airports Act (section 70(2)), the Sydney Airport Master Plan:

- Establishes the strategic direction for efficient and economic development at Sydney Airport over the planning period
- Provides for the development of additional uses of the Sydney Airport site
- Indicates to the public the intended uses of the airport site

- Reduces potential conflicts between uses of the airport site, to ensure that uses of the airport site are compatible with the areas surrounding the airport
- Ensures that operations at Sydney Airport are undertaken in accordance with relevant environmental legislation and standards
- Establishes a framework for assessing compliance at Sydney Airport with relevant environmental legislation and standards
- Promotes continual improvement of environmental management at Sydney Airport.

The consistency of the project with key elements of the Sydney Airport Master Plan is considered in the following sections. Further information on consistency is provided in Chapters 5 (with respect to the strategic need for the project) and 9 to 26 (with respect to the potential impacts of the project).

Consistency with future transport planning

The Master Plan refers to the project (defined as 'Sydney Gateway' in the Master Plan), and notes that Roads and Maritime is preparing a concept design for the project, and is working with Sydney Airport Corporation on all aspects of project planning. The plan was developed with reference to the project potentially being part of the external road network (subject to approval) and it notes that the five year ground transport plan (that forms part of the Master Plan) has been developed to complement the project. The plan notes that:

- A Sydney Gateway connection will complement Sydney Airport's planned infrastructure improvements
- The ground transport solutions proposed at Terminal 1 and Terminals 2/3 recognise the potential changes in traffic volumes and patterns resulting from the opening of WestConnex and any Sydney Gateway road connection
- Sydney Airport Corporation has been working collaboratively with the NSW Government on the development of ground access solutions
- The ground transport plan allows for widening of Qantas Drive and Airport Drive and a partial grade separated road at the entry to the Terminals 2/3 precinct.

The project is consistent with future planning for ground transport as described by the Master Plan's five year ground transport plan. Further information is provided in Chapter 9 (Traffic, transport and access).

Land use zoning

The Master Plan's land use plan provides the community and relevant stakeholders with an understanding of future activities that could be located on different parts of the Sydney Airport site, and guides future development at the airport. It divides the Sydney Airport site into eight zones, and provides objectives and permissible land uses for each zone.

To the west of Alexandra Canal, Sydney Airport land in the project site is zoned AD3 - Airport Logistics and Support. To the east of the canal, Sydney Airport land in the project site is zoned AD2 - Airport Terminal and Support Services, AD3 and BD1 – Business Development.

The Master Plan provides that roads are a permissible land use in all the above zones. Further information on land use within and around Sydney Airport, and the project's consistency with the land use plan, is provided in Chapter 19 (Land use and property).

Environmentally sensitive areas

Environmentally sensitive areas are identified by the EC1 - Environmental Conservation zoning under the Master Plan's land use plan. The Sydney Airport Wetlands (incorporating Engine Ponds East and West, Mill Pond and Mill Stream) are zoned EC1. The project would not directly impact the Sydney Airport Wetlands or land zoned EC1. The potential impacts of the project on environmentally sensitive areas are considered in Chapter 16 (Surface water) and 22 (Biodiversity).

3.6.2 Sydney Airport Environment Strategy

The *Sydney Airport Environment Strategy 2019-2024* (SACL, 2019b) (the Environment Strategy) forms part of the Master Plan. It includes:

- Objectives for environmental management of Sydney Airport
- Areas within the airport site that are considered to be environmentally significant
- Measures to be carried out to prevent or control the environmental impact associated with airport operations.

The Environment Strategy provides environmental action plans for key issues. The project would not affect the environmental action plans defined by the environment strategies. The mitigation and management measures provided in Chapters 9 to 26 are consistent with the actions described in the plans. The design, construction and operation of the project will be informed by and consistent with the plans.

Further information on consistency with the Environment Strategy is provided in Chapters 9 to 26 (with respect to the potential impacts of the project).

3.6.3 Approved MDPs

To date, four MDPs have been approved for developments at Sydney Airport. The consistency of the project with the approved MDPs is considered below.

Commercial office development international terminal MDP

This MDP allows for office development on a site at the northern section of the landside area of Terminal 1. The MDP was approved in May 2002. The first of the two approved office buildings is complete.

The project would not affect access to this site. It is consistent with the development that has been constructed and operated pursuant to this MDP.

Car parking and commercial facilities international terminal precinct MDP

This MDP allows for the construction of two multi-level car parks and two nine-level commercial buildings within the Terminal 1 precinct. It was approved in April 2005 and the facilities are now operational.

The project would not affect these facilities. It would change the way Airport Drive operates, and would improve traffic flows to and from Terminal 1. It is consistent with the developments that have been constructed and operated pursuant to this MDP.

Runway Safety Enhancement (Runway 25) MDP

This MDP allows for the construction of a runway end safety area at the western end of Sydney Airport's east–west runway, also known as Runway 25. It was approved in August 2008. Construction was completed in 2009.

The project would not affect this facility. It is consistent with the development that has been constructed and operated pursuant to this MDP.

T2/T3 ground access solutions and hotel MDP

This MDP allows for a number of works in the Terminals 2/3 precinct:

- Ground access works including new roadways, road widening and road realignment
- Expansion of the P3 car park and redevelopment of the P1 East carpark to provide additional parking for 1,500 vehicles and facilitate development of a pedestrian corridor
- A new ground transport interchange including a ground level bus facility and new multi-storey parking for about 4,000 vehicles

- A new hotel on Qantas Drive between Seventh and Ninth streets.

The MDP was approved in March 2015. The eastern part of the project is located directly adjacent to/within the Terminals 2/3 precinct, and has been designed taking the facilities proposed by the MDP into account. The Terminals 2/3 access has been designed to integrate with access to the carparks and the new ground transport interchange. The project is consistent with the development proposed by this MDP.

3.6.4 Sydney Airport planning objectives

Clause 2.04 of the Airports (Building Control) Regulations requires that consistency with the planning objectives for the airport must be considered as part of the assessment of applications for building approval on airport land.

The Master Plan defines the planning objectives for Sydney Airport. The project is considered to be consistent with these objectives as it would:

- Improve ground access to, from and past the airport
- Not impact Sydney Airport's operations
- Provide for future capacity requirements, and meet airline, passenger and other stakeholder requirements in relation to road access
- Be managed to ensure that potential environmental impacts are minimised and managed appropriately.

A detailed list of the planning objectives, and consideration of the consistency of the project with these objectives, is provided in Appendix D.

3.7 Consistency with the Sydney Airport lease and sub-leases

3.7.1 Consistency with the Sydney Airport lease

The project is consistent with the airport lease for Sydney (Kingsford Smith) Airport between the Commonwealth of Australia and Sydney Airports Corporation Limited (the original name of the airport lessee company), which includes toll-free public road access on Qantas Drive.

3.7.2 Consistency with sub-leases

Section 91(3) of the Airports Act and clause 5.04 of the Airports Regulations require a MDP to address the obligations of the airport lessee company as sub-lessor under any sub-lease of the airport site concerned and the rights of the sub-lessee under any such sub-lease.

The effects of the draft MDP on the obligations of Sydney Airport Corporation as sub-lessor, and the rights of any sub-lessee under any sub-lease of the airport site affected, have been considered and will continue to be addressed as part of the design and development of the project.

Chapter 4
Consultation

This chapter summarises the community and stakeholder consultation carried out before and during preparation of this document, and the consultation proposed to be carried out during the design and delivery of the project. The key issues relevant to the assessment are summarised. Further information is provided in the Community and Stakeholder Consultation Report, included in Appendix E.

The SEARs addressed in this chapter are listed below. There are no specific MDP requirements relevant to consultation. However, section 93 of the Airports Act applies where consultation has been carried out prior to the exhibition of the draft MDP for public comment. The submission requirements under section 93 of the Airports Act are discussed further in section 3.2.1.

Full copies of the SEARs and MDP requirements, and where they are addressed in this document, are provided in Appendices A and B respectively.

Reference	Requirement	Where addressed
General standard SEARs		
4	1. The proposal must be informed by consultation, including with relevant local, State and Commonwealth government agencies, infrastructure and service providers, special interest groups, affected landowners, businesses and the community.	Section 4.1
	2. The Proponent must document the consultation process and demonstrate how the proposal has responded to the inputs received.	Sections 4.2 (consultation process) and 4.3 (how the project has responded to inputs)
	3. The Proponent must describe the timing and type of community consultation proposed during the design and delivery of the proposal, the mechanisms for community feedback, the mechanisms for keeping the community informed, and procedures for complaints handling and resolution.	Section 4.4

4. Consultation

4.1 Consultation approach and strategy

4.1.1 Overall approach and objectives

Consultation plays an important role in project development. It is undertaken to raise awareness of a project, understand community and stakeholder issues, and obtain the feedback of community and other key stakeholders to inform project design and construction planning.

For the project, effective communication and stakeholder engagement are fundamental to reducing risk, minimising social and environmental impacts, and considering the needs of the community, customers and stakeholders. Effective communication and engagement with stakeholders is critical to the successful delivery of the project.

Roads and Maritime is working closely with Sydney Airport Corporation to deliver the project. The approach to consultation for the project aims to:

- Build relationships with key stakeholders and the community
- Establish a broad understanding of the need for the project
- Provide clear, concise and targeted information, which is readily accessible to all stakeholder groups
- Establish channels for feedback and ongoing dialogue
- Understand community and stakeholder issues
- Inform project development, construction planning and environmental assessment
- Create opportunities to raise awareness the project.

4.1.2 Consultation strategy

In early 2018, a high-level stakeholder and communication strategy was prepared as part of the strategic business case for the project to guide early communication and engagement with stakeholders and the community. In mid-2018, a Stakeholder Engagement and Communication Plan was developed to guide implementation of community and stakeholder consultation activities undertaken in parallel with the environmental assessment process.

The communication and engagement activities in the plan are tailored for each phase of consultation, and generally involve:

- Meetings and briefings
- Invitations to project displays
- Phone, email and written correspondence
- Project website and digital tools
- Distribution of information, including mail outs and promotion on social media.

A full list of the communication and engagement activities for the project is provided in the Community and Stakeholder Consultation Report (see Appendix E).

4.1.3 Stakeholder identification

A stakeholder is defined as a person, group, or organisation who has an interest in, and/or is directly or indirectly impacted by, a project. Consultation was carried out with four key stakeholder groups to better understand their views, provide information about the project and, where possible, enable opportunities for collaboration on project design:

- Group 1: Government organisations (NSW and Australian governments) and local councils
- Group 2: Land owners, leaseholders and utility companies (directly impacted)
- Group 3: Peak bodies, local businesses and interest groups (including businesses in the Sydney Airport precinct, ARTC freight industry associations and active transport groups)
- Group 4: General public/local community (including people accessing Sydney Airport for work and travel).

A full list of the stakeholders within each group is provided in the Community and Stakeholder Consultation Report (Appendix E).

Consultation with Aboriginal groups and utility service providers was also carried out and is discussed in other chapters of this document, including sections 18.1.2 and 8.7 respectively.

4.2 Consultation before and during preparation of the EIS/preliminary draft MDP

Engagement with the community and key stakeholders was carried out as part of the following two periods of consultation:

- Preliminary design and project announcement (September to October 2018)
- Concept design display (May to June 2019).

The purpose of consultation was to raise awareness of the project, understand community and stakeholder questions and concerns, and obtain important feedback to help shape the design of the project and the environmental assessment. Outside of these formal periods, consultation was ongoing with all Group 2 organisations and businesses in the Sydney Airport precinct.

A summary of the activities and tools employed during the above stages is provided in Table 4.1. Further information is provided in Appendix E.

Table 4.1 Consultation activities

Activity	Summary	Outcome	Date
Community contact mechanisms: ■ Toll free community information line (1800 654 446) ■ Project email (sydneygateway@rms.nsw.gov.au)	■ Provide direct contact to the project team ■ Obtain feedback, measure awareness and provide opportunities for input	■ 12 email submissions were received between September and October 2018 ■ 45 email submissions were received between May and June 2019	Started in September 2018 and ongoing

Activity	Summary	Outcome	Date
Project website and interactive portal including: ■ Community update ■ Project animation ■ Online community consultation feedback mapping tool ■ Concept design project overview	■ Provide information and promote channels through which people can communicate their views, questions and concerns ■ Community updates were uploaded in September 2018 and May 2019 ■ A detailed project overview document was made available uploaded in May 2019	■ A total of 4,000 visits to the project website between September and October 2018 ■ 8,500 visits to the interactive project portal between May and June 2019 ■ 130 comments were made on the online 'have your say' map between September and October 2018 ■ 246 comments were made on the map between May and June 2019 ■ 68 per cent of all comments were positive or neutral towards the project	Started in September 2018 and ongoing
Social media campaign (Roads and Maritime and Sydney Airport Facebook pages)	■ Provide information and promote channels for people to communicate their views, questions, and concerns, including local information sessions and pop-ups ■ Two social media posts in October 2018 ■ Four social media posts between 27 May and 23 June 2019	■ Social media posts reached an audience of 94,021 people via Facebook in May/June 2019	October 2018 and June 2019
Printed information: ■ Community and business update ■ Concept design project overview ■ Active transport fact sheet	■ Raise awareness and increase project understanding ■ Provide information on the community information session and contact mechanisms	■ Community updates were delivered to 27,000 residents and businesses in Mascot, Botany, Tempe and Wolli Creek ■ Community and business updates were delivered to 22,000 residents and businesses in Mascot, Tempe and Wolli Creek ■ Factsheets and project overview available at all information and pop-up sessions	September/ October 2018 May/June 2019
Door knocking	■ Raise awareness of the project and the potential impacts on residents/businesses ■ Seek and encourage feedback on the project	■ Door knocked 139 residences and businesses in Tempe and Mascot to provide a short project briefing and/or answer questions ■ Door knocked over 470 local residences and businesses in Tempe and Mascot to provide a short project briefing and answer questions	September/ October 2018 May/June 2019

Activity	Summary	Outcome	Date
Stakeholder briefings	■ Opportunity to address specific questions and issues in person ■ Provide an opportunity for stakeholder input to inform the design and impact assessment process	■ 17 one to one briefings with businesses in the Sydney Airport precinct in 2019 ■ Presented at six Sydney Airport stakeholder forums with airline operator, taxi industry, booking service industry, active transport and community planning forum ■ Eight briefings and webinars with freight related companies and associations in November 2018 and June/July 2019 ■ Three workshops and briefings with active transport groups and councils in relation to the preferred option for the new active transport link	Ongoing since September 2018
Landowner and leaseholder face to face meetings	■ Raise awareness of the project and the potential impacts on landowners and leaseholders ■ Provide an opportunity for landowners to ask questions and input to the design and assessment process	■ Ongoing engagement with impacted landowners and leaseholders since September 2018 to secure negotiated outcomes ■ Working groups established with several impacted landowners/leaseholders as and when requested	Ongoing since September 2018
Sydney Airport interactive display and drop-in session	■ Provide project information and promote channels for people to communicate their views, issues, and concerns ■ Provided a large touch screen to allow airport workers and travellers to find out more through the Sydney Gateway online portal and have your say map ■ In September 2018, airport visitors and employees provided their feedback through a project map on iPads at a Sydney Airport display	■ 2,792 visits to the interactive portal from Sydney Airport displays	May/June 2019 September 2018
Community information sessions and information booths	■ Raise awareness and understanding ■ Seek local input to the design and assessment process ■ Information booths were established at Sydney Airport in May/June 2019	■ Information displays were stationed at Mascot, Wolli Creek and Sydney Airport in September 2018 and 300 people attended ■ A community information session in Tempe in December 2018 engaged 29 people ■ Community information sessions in Tempe, Mascot and Wolli Creek engaged 101 people ■ Information booths at five key locations across Tempe, Wolli Creek, Mascot and Zetland in May and June 2019 engaged 387 people	September 2018, December 2018 and May/June 2019

During consultation, feedback and comments from the community and stakeholders were grouped into seven key themes:

- Environment
- Traffic and road safety
- Shared cycle and pedestrian pathways (active transport)
- Freight
- Parking
- Property and access
- Public transport.

The level of interest related to each key theme identified during the concept design display (in May to June 2019) is shown on Figure 4.1. As shown by this figure, the major issues raised from the 291 responses received related to active transport (38 per cent), traffic and road safety (22 per cent) and the environment (18 per cent).

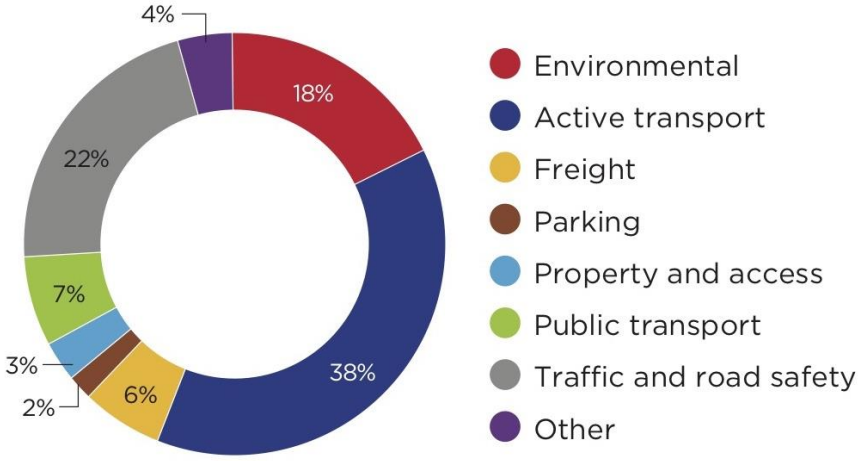


Figure 4.1 Key engagement themes during the concept design display

Figure 4.2 lists the categories identified within the environment theme. As shown by this figure, the main environmental issues raised related to noise and vibration (23 per cent) and flora and fauna (22 per cent). A summary of the main issues raised, and references to where they have been addressed in this document, are provided in Table 4.2.

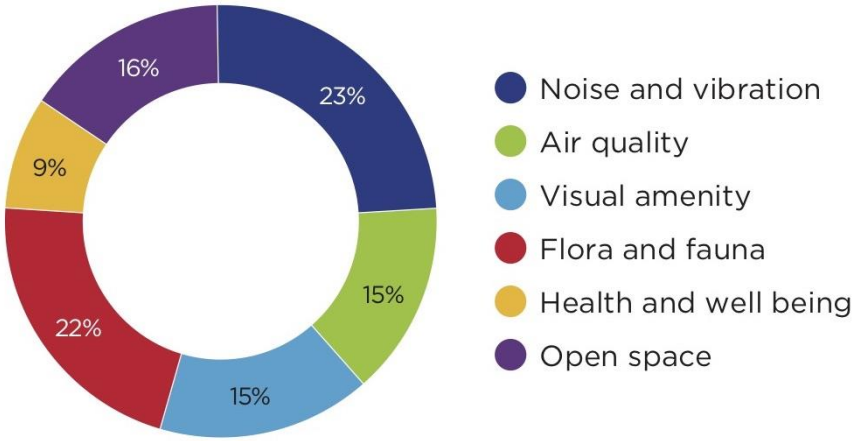


Figure 4.2 Environmental issues identified during the concept design display

4.3 Issues raised and responses to feedback received

4.3.1 How the project has responded to the inputs received

The project route alignment, concept design and construction methodology has been developed to avoid and minimise impacts on the local and regional environment, and impacts on the local community and local businesses as far as possible. The consultation that has been undertaken to date has contributed to the project team's understanding of the potential impacts, and has enabled the design to respond to and minimise potential impacts as far as possible. Measures to minimise and manage impacts that cannot be avoided have been developed as an outcome of the environmental assessment process, as described in Part B of this document. Impacts would continue to be minimised through the detailed design and construction planning phases, taking into account the input of stakeholders and the local community.

The corridor selection process (see Chapter 6 (Project alternatives and options)) included consideration of environmental and social issues, including issues raised during early consultation. Further information on the options considered and key design refinements undertaken in response to the identified issues is provided in Chapter 6.

As described in section 7.2, the concept design evolved over a period of about 18 months and involved many iterations and refinements, incorporating a range of considerations at each stage. Key environmental issues were examined throughout the design development process. Consultation has been carried out with affected stakeholders to identify key potential impacts at an early stage. Where possible, impacts have been avoided or appropriate mitigation measures developed in response to this input. This has resulted in a number of design changes that have mitigated some of the potentially significant impacts.

Examples of design refinements and construction commitments that have been adopted for the project based on feedback received include:

- Refining the concept design for the new shared cycle and pedestrian pathway (the active transport link) to provide a shared path on the western side of Alexandra Canal
- Providing a temporary off-leash dog exercise area during construction
- Reducing the amount of waste material excavated from the former Tempe landfill by keeping the new section of road as high as possible
- Minimising the land acquisition at Cooks River Intermodal Terminal.

More detailed information on the issues raised by individual stakeholders, including detailed responses, is provided in Appendix E.

4.3.2 Where issues relevant to the assessment of impacts have been addressed

A summary of other issues raised during consultation relevant to the environmental impact assessment process, including where the issue has been addressed in this document, is provided in Table 4.2.

Table 4.2 Summary of issues raised relevant to the environmental impact assessment process

Stakeholder	Issues raised	Where addressed
Community		
Residents and businesses in Tempe	Requests to keep cycle routes open and flowing during construction.	Sections 8.6.4 and 9.3.5
	Protection of the Tempe Recreation Reserve, Wetlands and the Tempe Dog Park.	Sections 19.3.1, 19.4.3 and 20.3.1
	Encouraging a variety of uses for open and green space on Tempe Lands after completion.	Sections 19.4.3 and 20.4.1

Stakeholder	Issues raised	Where addressed
	Concerns about noise and vibration from construction, and information about noise modelling.	Chapter 10 (Noise and vibration)
	Recommendations for noise walls in Tempe close to construction.	Section 10.7
	Concerns about air quality during construction and operation, and information about air quality modelling.	Chapter 12 (Air quality)
	Concerns about contamination from excavation in the former Tempe landfill.	Section 13.3
	Concerns about the impact of construction vehicles on road access and local parking.	Sections 8.6, 9.3.6 and 9.3.7
	Concerns regarding impacts to flora and fauna.	Chapter 22 (Biodiversity)
	Concerns regarding health risks due to construction and operation.	Chapter 23 (Health, safety and hazards)
	Information regarding measures to minimise the visual impact of the project.	Section 21.6
	Concerns about street access during construction and local roads being used by construction traffic.	Sections 8.6 and 9.3
Residents and businesses in Mascot and surrounding suburbs	Concerns about the project increasing congestion around Marsh Street M5 exit both during and after construction.	Chapter 9 (Traffic, transport and access)
	Requests for protection of pedestrian footpaths in Mascot and Tempe during construction.	Sections 8.6.5 and 9.6.2
	Concerns about potential traffic conflicts created from traffic leaving Terminal 1 heading north and associated traffic risks.	Appendix E
	Recommendations for noise walls around Mascot in streets close to the construction areas affected by noise and vibration.	Sections 10.5.1 and 10.7
	Impacts to road safety during construction and operation.	Sections 7.2.2, 23.3.2 and 23.4.2
	Changes/modifications to surrounding road network due to the project.	Chapter 7 (Project description)
	Improvement of public transport.	Section 9.4.6
Government agencies		
Department of Planning, Industry and Environment (Heritage Division), Department of Premier and Cabinet	Sought to understand the options considered for bridging over and stormwater channels connecting to Alexandra Canal.	Sections 6.5.2 and 6.5.6
NSW EPA	Recognised that out-of-hours work is required to maintain the safe operation of the airport, road network and rail line.	Section 8.3.3
	Out-of-hours work to be consistent across jurisdictional boundaries and based on the construction activity and affected receivers.	Section 8.3.3
	Consideration of the need for an environmental protection licence in relation to out-of-hours work, regulating activities at the former Tempe landfill, and material movement between State and Commonwealth jurisdictions.	Section 3.5

Stakeholder	Issues raised	Where addressed
	Recognised the temporary nature of works (construction only) and the highly disturbed nature of the receiving waterway (Alexandra Canal).	Sections 16.1.4 and 16.6.1
	Application of the Solid Waste Landfill Guidelines is required with respect to project infrastructure at the former Tempe landfill.	Section 13.6.2
Department of Planning, Industry and Environment (Water)	Recognised the extensive program of hydrogeological investigations, shallow groundwater and varying groundwater quality.	Section 15.2
	Recommend investigating alternative management measures other than discharge into surface water (Alexandra Canal).	Section 15.6
Department of the Environment and Energy	Interest in the salvage excavation methodology for Aboriginal heritage investigation areas.	Section 18.6
	Interest in the Green and Golden Bell frog survey results.	Section 22.2.3
Airport Environment Officer	Out-of-hours work to be consistent across jurisdictional boundaries and based on the construction activity and affected receivers.	Section 8.3.3
	Prior to importing material onto Sydney Airport land it needs to be tested to ensure it does not exceed the Airport (Environment Protection) Regulations 1997.	Section 13.6
Civil Aviation Safety Authority	Potential turbulence along runway approaches due to project features.	Section 11.4.2
	Potential impacts to airport navigational and safety surfaces.	Sections 11.3 and 11.4
	Compliance with the National Airports Safeguarding Framework (NASF).	Chapter 11 (Airport operations)
Airservices Australia	Requirement for airport operations during normal operating hours (6am to 11pm) to be maintained.	Section 11.6.2
	Requirement for the north–south runway to be kept open at all times, acknowledging construction work that would intrude into prescribed airspace would occur outside normal operating hours (ie from 11pm to 6am).	Sections 8.2.5 and 11.3
Sydney Water	Potential impacts to Sydney Water assets, including ongoing access for maintenance.	Sections 8.7 and 23.3.3
	New outlets to Alexandra Canal, including impacts to heritage fabric, and stormwater discharge rates.	Sections 7.10.7, 16.3, 16.4 and 17.3
	Potential disturbance of Alexandra Canal sediments.	Sections 13.3.1 and 16.3
	Discharge of construction water to Alexandra Canal.	Sections 16.3.2, 15.3.2, 15.6 and 16.6
Local councils		
Inner West Council	Safeguarding Tempe Wetlands and Tempe Reserve during construction and operation to maintain biodiversity and protect ecology.	Sections 22.6
	Preservation of valuable wildlife habitats and coastal fauna.	Sections 22.3, 22.4 and 22.6
	Relocation of council's depot to a mutually agreed site of similar size in the local government area.	Section 19.6.2

Stakeholder	Issues raised	Where addressed
	Loss of investment land currently leased to Tyne Container Services and Tempe Golf Range and Academy.	Section 20.4.4
	Concern that the proposed alignment will create a series of isolated pockets of residual land that will not be very usable.	Section 19.4.3
	Concerns about environmental management in the former Tempe landfill and of Council's leachate plant.	Sections 13.3 and 13.6
	Construction of the project must consider and mitigate impacts including noise, vibration, air quality for residents, impacts on open space, environmental areas, businesses and Council facilities.	Chapters 10, 12, 19 and 20
Bayside Council	Mitigate the impacts of heavy vehicles and road freight upon the approach and exit of the project at Qantas Drive.	Section 9.6
	Preservation of the Alexandra Canal cycleway and connectivity of pedestrian and cycleways to existing cycle network.	Section 7.9
	Seek excellence in architectural design to minimise visual impact of the flyover structure.	Sections 7.12.4 and 21.6
	Appropriate management of environmental impacts with priority on noise, vibration, visual amenity, heat island effect, socio-economic impact, land use and property.	Chapter 27 (Approach to environmental management and mitigation)
City of Sydney	An active transport connection between the new M5 St Peters interchange and the Alexandra Canal shared path.	Appendix E
	Direct connections between the T1, T2 and T3 airport terminals, the Alexandra Canal shared path and the Bayside Council active transport network.	Appendix E
	The development and maintenance of safe active transport connections during construction.	Section 8.6.4
Landowners and leaseholders		
Tyne Container Services Tempe Golf Driving Range and Academy Boral Concrete Boral Recycling Qube NSW Ports Port Botany Lessors oOh! Media Tempe Tyres Visy Cardboard and Paper Recycling	Amendments to the road design to minimise permanent land acquisition and temporary land requirements during construction.	Section 6.4
	Establishment of working groups between third parties and Roads and Maritime to explore options to minimise impacts to commercial property owners and tenants.	Section 20.6

Stakeholder	Issues raised	Where addressed
Freight Industry		
Port Botany Community Consultative Committee Road Freight NSW	Concerns about the impact of the project on empty container storage at Tyne Containers and the Cooks River Intermodal Terminal.	Sections 20.3.1 and 20.3.4
Goodman Group NSW Ports TOLL Group	Questions about the land availability at the Cooks River Intermodal Terminal to cater for fluctuations in container trade.	Sections 20.3.1 and 20.3.4
Freight and Trade Alliance Container Transport Alliance Australia Australian Peak Shipping Associations	Requests to include ramps for heavy vehicles on/off the project from Canal Road	Appendix E
Sydney Airport precinct		
Sydney Airport Corporation	Impacts to Sydney Airport operations during construction: ■ Access for customers and staff ■ Customer experience ■ Wayfinding ■ Potential delays.	Sections 9.3.8 and 20.3.5
	Interface with Sydney Airport's proposed Ground Transport Interchange.	Sections 7.1, 7.7.2 and 19.4.4
Business and leisure travellers	Delays and congestion during construction, wayfinding.	Sections 9.4 and 9.6.2
Qantas Airways Limited	Construction impacts, particularly increases in congestion creating potential delays for cabin crew and operations getting to, and moving between terminals.	Sections 9.3.8 and 20.3.2
	Impacts to existing facilities along Qantas Drive and Qantas Flight Training Centre.	Section 20.3
	Changes to traffic conditions at Lancastrian Road including removal of right turns into/out of the Jet Base, will create confusion and more congestion.	Section 9.4.8
SNP Security	Delays and congestion during construction impacting staff arriving to work on time and movement between terminals.	Sections 9.3, 9.6 and 20.3.2
AMG Sydney (Mercedes-Benz)	Proximity of the flyover to the AMG building.	Sections 20.3.3 and 20.4.3
	Impacts to visual amenity during and after construction. Brand visibility will be reduced and currently have high exposure.	Sections 20.3.3 and 20.4.3
	Noise and vibration	Section 10.4
Virgin Australia Singapore Airlines Air Canada Delta Air Lines Emirates All Nippon Airways Etihad Airways	Delays and congestion during construction impacting: ■ Pilots, cabin crew, freight and catering arriving on time ■ Passengers making flights on time.	Sections 9.3 and 20.3.2
Avis Car Rental Europcar	Delays and congestion during construction impacting access to and from Sydney Airport.	Sections 9.3.8 and 20.3.5

Stakeholder	Issues raised	Where addressed
Emirates Leisure Centre Heinemann Kentucky Fried Chicken (KFC)	Wayfinding and access	Sections 9.3 and 9.4
	Delays and congestion during construction leading to less time for customers to spend in retail stores.	Section 20.3.2
	Staff may be delayed during their commute.	Section 20.3.2
DHL Dnata	Ability to service airport operations on time due to increased congestion and changes to access during construction.	Section 20.3.2
	Efficient connectivity to the wider network.	Section 9.4
	Parking	Sections 9.3.7 and 9.4.9
	Noise and vibration	Chapter 10
JC Decaux	Loss of revenue	Sections 20.3 and 20.4
	Reduced exposure on current billboards and signage as a result of changes in the local traffic movements.	Section 20.4.3
JJ Lawson Customs & Freight Brokers	Access to office during construction as a result of congestion.	Sections 9.3 and 20.3.2
	Potential power outages	Section 23.3.3
	Noise and vibration	Chapter 10
Stamford Plaza Branksome Hotel Felix Hotel Quest Mascot Travelodge Mantra Hotel Ibis Hotel	Night works – providing efficient notifications of when works will take place.	Sections 8.3.3, 10.4 and 10.7
	Noise, vibration, dust and odour	Chapters 10 and 12
	Congestion on local roads, impacting accessibility and wayfinding.	Sections 9.3.1, 9.4.8 and 9.6.2
	Loss of revenue	Sections 20.3 and 20.4
Sydney Airport Community Forum	Clarification of where the new flyover into the Terminals 2/3 precinct begins on Qantas Drive Confirmation that all the roads connecting the airport to St Peters interchange are above ground Whether the project will link to Gardeners Road	Chapter 7 and Appendix E
	How Port Botany traffic will enter and exit the new M4/M5 motorway. Concerns that the project currently proposed will not resolve traffic congestion to the east of the airport, particularly port-related congestion. Access to the airport from the north.	Chapter 9 and Appendix E
	Need to expand mass transit connections to the airport (ie rail and bus).	Sections 5.1.4 and 9.4.6
Active transport		
Bicycle NSW	Integration with existing cycle and pedestrian pathways.	Section 7.9
BIKEast Walk Sydney	Safety for users – gradients, separation to traffic, air pollution.	Sections 7.9, 20.4.3 and 23.4.2
Sydney Orbital St George BUG	An active transport connection between the new M5 St Peters interchange and the Alexandra Canal shared path.	Appendix E

Stakeholder	Issues raised	Where addressed
	Direct connections between Terminal 1 and Terminals 2/3, the Alexandra Canal cycleway and Bayside Council's active transport network.	Appendix E
Utilities		
Sydney Water Ausgrid Jemena Qenos Telstra Sydney Desalination Plant Viva Energy Caltex Optus TPG/APPT Vocus AARNet Uecomm NBN	Maintaining integrity and operation of critical assets, including high pressure gas main, substation and transmission assets and NBN network. Development of interface agreements prior to works commencing.	Section 8.7

4.4 Future consultation

4.4.1 Consultation during exhibition of this document

As described in Chapter 3 (Statutory context and approval requirements), the EP&A Act requires exhibition of an EIS and the Airports Act requires exhibition of a draft MDP for public comment. As this document is a combined EIS/preliminary draft MDP, the document will be exhibited as a single document and the requirements for consultation during the exhibition for both Acts will need to be met, as described in Chapter 3 (Statutory context and approval requirements).

To support the public exhibitions and provide opportunities for the community and stakeholders to ask questions and find out more before making a submission, a range of consultation tools will be used, including:

- Dedicated phone number, email address and project website:
  - 1800 654 466
  - sydneygateway@rms.nsw.gov.au
  - rms.nsw.gov.au/sydneygateway
- A detailed project overview which provides summary information about the design of the project, potential construction and operational impacts and the measures that will be put in place to manage these impacts
- An interactive portal on the project website
- Stakeholder briefings
- Doorknocks with the community
- Community information sessions and information booths
- Fact sheets with key environmental and project information
- Distribution of community and business updates, in hard copy and electronically

- Media releases
- Newspaper advertising
- Social media.

4.4.2 Consultation during design and delivery of the project

If the project is approved, a construction contractor(s) would be engaged to carry out detailed design and construct the project. Roads and Maritime, Sydney Airport Corporation and the construction contractor(s) would continue to engage with stakeholders and the community in the lead up to, and during, construction.

A communications strategy would be developed for the construction phase of the project and would ensure that:

- The community and stakeholders have a high level of awareness and notification of 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. Other communication tools and activities that would be used in the lead up to and during construction include:

- A community complaints and response management system
- Notifications regarding work outside standard working hours and work that might impact residents, businesses and stakeholders
- Email/SMS updates
- Newsletters, information brochures and fact sheets
- Regular community and business updates on the progress of the construction program
- Meetings with key stakeholders as needed
- Traffic alerts
- Site signage around construction and ancillary facilities
- Media including media releases, social and advertisements
- Community Engagement Managers who would act as a single point of contact for the community
- Translator interpreter services.

Complaints management

The construction contractor(s) would be required to implement a community complaints and response management system. This procedure would be defined within the Construction Environmental Management Plan (CEMP), which the contractor(s) would prepare and have approved by appropriate regulatory authorities as set out in the conditions of approval.

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

- Contact details for a 24-hour, seven days a week project response line, for ongoing stakeholder contact throughout the project. A dedicated email address would be staffed 9am to 5pm Monday to Friday.
- 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 to community activities and functions
- Management of complaints in accordance with Roads and Maritime's complaints management procedure, specifically:
  - Steps to receive, manage and take appropriate action in relation to community enquiries and complaints
  - Procedure to record all enquiries, complaints and contact with community members and stakeholders in the contacts database
  - Verbal and written responses will be provided within eight working days.

A Community Advocate, who is an independent specialist, would oversee the system and would follow-up on any complaint where the public is not satisfied with the response.

Chapter 5

Strategic context and project need

This chapter describes the strategic context to the project's development, including the key issues, demands and strategic planning driving the need for the project. The chapter also describes other projects (outside the scope of this assessment) that are proposed/underway to address some of the issues identified. A summary of the need for the project is provided, including the extent to which Sydney Airport's future needs would be met by the project. The chapter also provides the project objectives.

The SEARs and MDP requirements addressed in this chapter are listed below. Full copies of the SEARs and MDP requirements, and where they are addressed in this document, are provided in Appendices A and B respectively.

Reference	Requirement	Where addressed
General standard SEARs		
2.1	The EIS must include, but not necessarily be limited to, the following: (c) statement of the objective(s) of the proposal	Section 5.3
	(d) a summary of the strategic need for the proposal with regard to its State significance and relevant State and Australian Government policy including transport, infrastructure and land use strategies and policies, and district plans	This chapter
Major development plan requirements		
91(1)	A major development plan, or a draft of such a plan, must set out: (b) the airport-lessee company's assessment of the extent to which the future needs of civil aviation users of the airport, and other users of the airport, will be met by the development	Section 5.2.2

5. Strategic context and project need

5.1 Strategic context

5.1.1 The existing situation and key issues

The importance of Sydney Airport and Port Botany

Sydney Airport and Port Botany are among the busiest and most important air and sea freight terminals in Australia. Together, they are known as the State's trade gateways, generating over $10 billion of economic activity and handling close to $100 billion of freight per year (Ernst & Young, 2011).

Sydney Airport caters for around 40 per cent of Australia's international passenger movements, 46 per cent of domestic/regional passenger movements and 50 per cent of air freight (SACL, 2019a; Department of Infrastructure, Regional Development and Cities, 2018a). Sydney Airport and associated businesses are also significant employers, with around 32,700 jobs located at the airport itself (SACL, 2019a).

Port Botany handles 99 per cent of NSW's container demand, moving more than 6,000 containers on average every day. Port Botany also handles 98 per cent of NSW's consumption of liquid petroleum gas (LPG), 90 per cent of bulk chemical products, 30 per cent of refined petroleum fuels and 100 per cent of bitumen products (NSW Ports, 2015).

Together, the international gateways of Sydney Airport and Port Botany directly serve the Greater Sydney area, the largest city region economy in Australia, wider areas of NSW and Australia. These gateways are also amount the main entry and exit points to international markets within Australia. Efficient access to and from Sydney Airport and Port Botany is critical to the NSW and Australian economies (Ernst & Young, 2011).

A study into the economic contribution of Sydney Airport (Deloitte Access Economics, 2018) quantified the importance of Sydney Airport to the NSW and Australian economy. Key findings of the study indicated that, in 2017, Sydney Airport generated or facilitated (directly and indirectly):

- A direct economic contribution of $6.2 billion
- 338,500 full time equivalent jobs, equivalent to 10.1 per cent of NSW employment (an increase of more than 1,800 since 2014)
- Total economic activity of $38 billion, equivalent to 6.8 per cent of the NSW economy and 2.2 per cent of the Australian economy (an increase of $7.2 billion since 2014)
- Household income of $19.9 billion (an increase of $5.2 billion since 2014).

The area around Sydney Airport and Port Botany also has high concentrations of airport and port related businesses that are 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).

Access issues

High volumes of traffic access Sydney Airport and Port Botany from all over Sydney and NSW. The location of this area, around eight kilometres from Australia's most important central business district, offers the airport and port significant advantages. However, this location is also a key challenge.

Some of the key access challenges are shown on Figure 5.1 and described in this section.

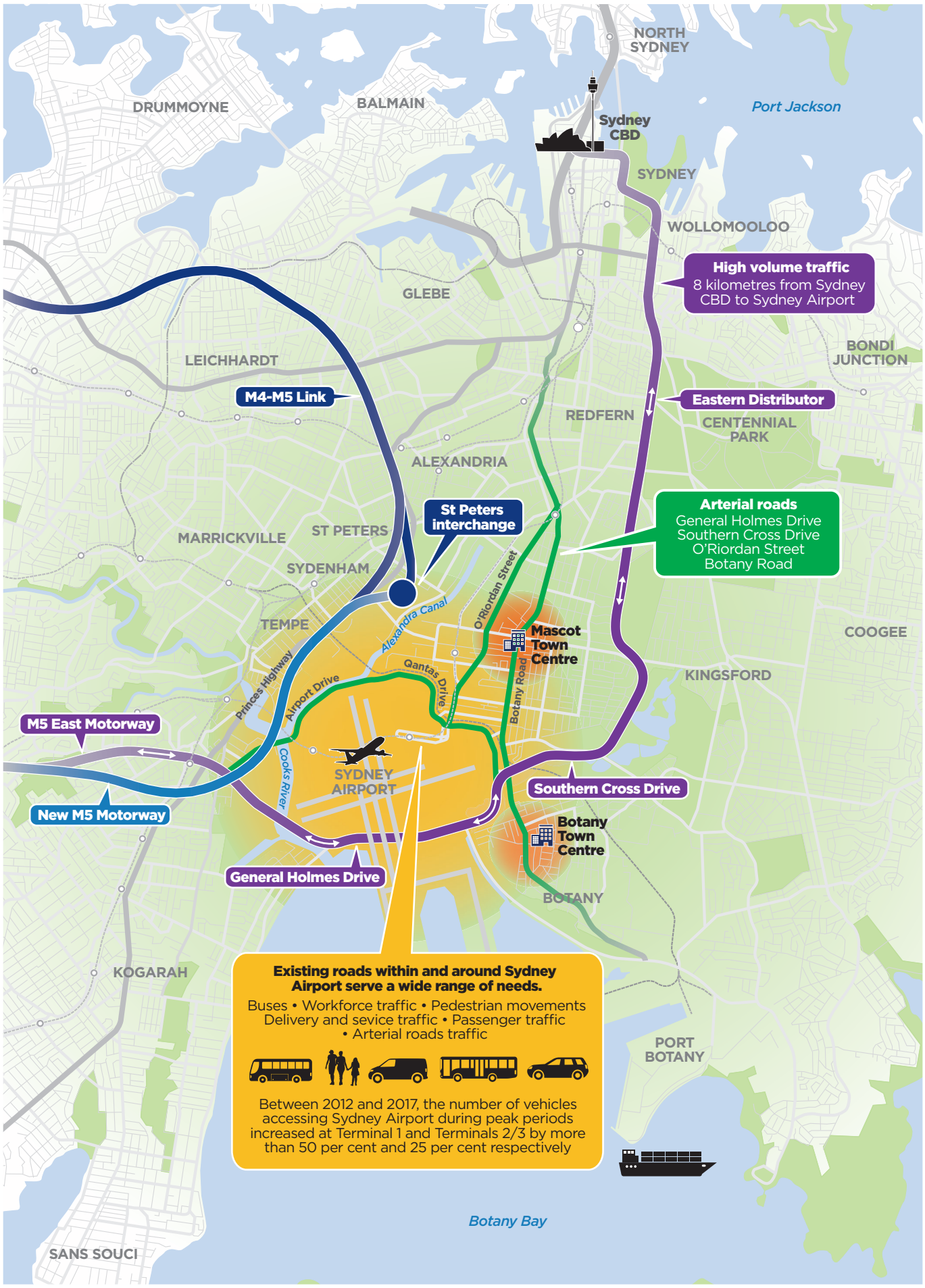


Figure 5.1 **Access challenges**

A number of arterial roads pass through the area (including Qantas Drive, Airport Drive, the M5 Motorway (M5 East), Southern Cross Drive (M1), General Holmes Drive, O'Riordan Street and Botany Road), increasing traffic volumes and mixing through traffic with traffic servicing Sydney Airport, Port Botany and surrounding land uses.

The existing roads within and around Sydney Airport serve a wide range of airport related needs, as well as non-airport related uses, including:

- Traffic accessing Sydney Airport terminals for passengers (including taxis, rental and hire cars, buses and private vehicles) and freight transport
- Airport-based workforce traffic, including cars, motorcycles, cyclists and pedestrians
- Other bicycle and pedestrian movements
- Delivery and service traffic supporting the operation of Sydney Airport and businesses on Sydney Airport land, including the air freight depots, general aviation operators and maintenance activities
- Traffic travelling past or around Sydney Airport to access surrounding areas, Port Botany and other destinations.

All the above results in a complex ground transport task in a relatively constrained land area.

The roads around Sydney Airport and Port Botany are becoming increasingly congested due to the increasing numbers of passenger, freight and commuter vehicles. This increase will continue, along with residential and employment growth and urban renewal activities, particularly in Mascot and Botany. Between 2012 and 2017, the number of vehicles accessing Sydney Airport during peak periods increased at Terminal 1 and Terminals 2/3 by more than 50 per cent and 25 per cent respectively (SACL, 2019a).

The roads surrounding Sydney Airport and Port Botany are already operating near capacity. Strategic modelling as an input to planning for the project indicates that the lack of spare road capacity will become more of an issue once St Peters interchange is operational in 2020. The lack of spare road capacity is evident with travel times along key routes near Sydney Airport predicted to increase into the future. Further information about predicted travel times without the project is provided in section 9.4.

Congestion contributes to the cost of moving freight. The cost of avoidable congestion in Sydney was estimated to be $6.1 billion in 2015 and is projected to increase to between $9.5 billion and $12.6 billion by 2030 (Transport for NSW, 2018a).

Infrastructure NSW notes that maintaining the efficiency of infrastructure networks and access to the gateways of Sydney Airport and Port Botany will be critical to meet existing and future needs and supporting the ongoing competitiveness of Sydney and NSW (Infrastructure NSW, 2018).

Impact on the Mascot town centre

Mascot's town centre is located on Botany Road, about 300 metres to the north of Sydney Airport. Botany Road is one of the main access roads to the Port Botany area and is an alternative route between Sydney's central business district and Sydney Airport. Mascot's 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, which contribute to congestion and access issues, and adversely affect local amenity.

Providing direct connections between the Sydney motorway network, Sydney Airport and towards Port Botany will assist in separating airport and freight traffic from local traffic. The benefits of diverting traffic away from the town centre on traffic flows and travel times is discussed in section 9.4.2.

5.1.2 Future demands

Over the next 20 years, container freight, air freight, air travel and general traffic in and around the Sydney Airport and Port Botany area are expected to grow significantly. This will put more pressure on roads and other infrastructure and impact local communities. The key future demands driving the need for the project are shown on Figure 5.2 and outlined in the following sections.

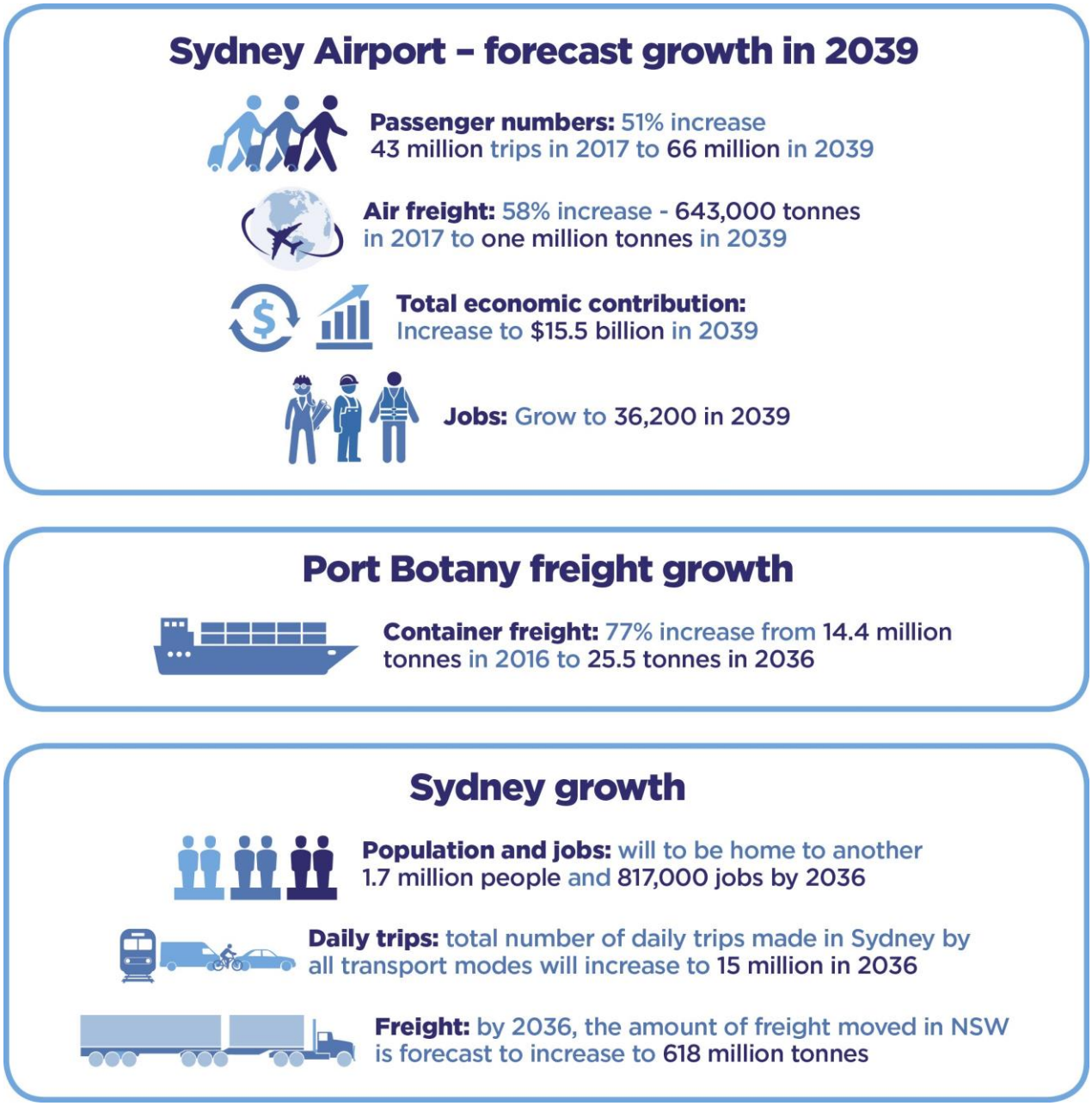


Figure 5.2 Future demand forecasts

Sydney Airport passenger movements and freight growth

By 2039, Sydney Airport's passenger numbers are forecast to grow by 51 per cent, from 43.3 million trips in 2017, to 65.6 million in 2039 (SACL, 2019a). The Australian Government has indicated that the Western Sydney Airport at Badgerys Creek will open by 2026; however, Sydney Airport will continue to be the major airport for both passengers and freight. This will place increasing demands on the roads surrounding Sydney Airport.

By 2036, the amount of freight moved in NSW is forecast to increase to 618 million tonnes (Transport for NSW, 2018b). Air freight handled by Sydney Airport is predicted to increase by about 58 per cent – from 643,000 tonnes in 2017 to around one million tonnes in 2039 (SACL, 2019a). Transporting this freight to and from the airport will place additional demands on the road network in the study area.

Access to Sydney Airport's terminals and freight facilities needs sufficient capacity to safely and efficiently meet the predicted demands for vehicle movements and forecast growth in passenger numbers and freight transport.

To support the growth in air freight, a range of constraints will need to be addressed, including congestion on the road network around Sydney Airport. In the *Sydney Airport Master Plan 2039* (the Master Plan) (SACL, 2019a), Sydney Airport Corporation has defined transport and access solutions within Sydney Airport to meet the demands of passenger and freight growth. For these proposed solutions to function at an optimal level, road and access upgrades are required, both inside and outside the airport's boundary.

As traffic volumes continue to grow, measures are needed to mitigate congestion and ensure reasonable journey times for travellers to and from Sydney Airport and for other road users on the surrounding road network.

Port Botany freight growth

The amount of container freight handled by Port Botany is predicted to significantly increase over the next 15 years or so – from 14.4 million tonnes in 2016 to 25.5 million tonnes in 2036 (77 per cent increase) (Transport for NSW, 2018a).

Similar to the growth in air freight, transporting container freight to and from Port Botany will place additional demands on the road network in the study area. Increased use of rail for freight transport, supported by a range of projects including the Botany Rail Duplication project, will assist in managing the growth in truck volumes. However, arterial roads will continue to be an important means of moving freight between Port Botany and the industrial areas in Sydney and beyond.

Population and jobs growth

Greater Sydney is one of the top 10 fastest growing regions in the world. By 2036, it is projected to be home to another 1.7 million people and 817,000 jobs (Greater Sydney Commission, 2018a).

Based on forecast population and job growth, the total number of daily trips made in Sydney by all transport modes will increase to 15 million in 2036 (Transport for NSW, 2018b). These statistics indicate a strong growth in demand for road travel on a network that is already constrained. The NSW Government is investing in light rail, rail and other public transport solutions to address population and employment growth; however, public transport cannot service all trips to and from Sydney Airport and Port Botany.

As a result of predicted growth in passenger numbers and air freight, the total economic contribution of the airport precinct is projected to increase to $15.5 billion in 2039. The value of economic activity generated or facilitated (by freight or tourism) by Sydney Airport is projected to increase to $52.6 billion in 2039, and the number of jobs at Sydney Airport is forecast to grow to 36,200 in 2039 (Deloitte Access Economics, 2018).

As a result of the above, the number of passenger, staff and associated employment related journeys to Sydney Airport and the surrounding area is likely to significantly increase over the next 15 years.

5.1.3 Strategic planning and policy framework

The strategic context for the project is influenced by strategic planning for transport, land use and freight at the national, state, metropolitan and local levels. The project is consistent with the strategies shown in Figure 5.3.

Figure 5.3 Strategic planning context – key strategies

A description of each of these strategies and plans, and their relationship to the project, is provided in Appendix F.

In line with these strategies and plans, and to support the implementation of other recent projects, the project would:

- Contribute to achieving the vision of the *Future Transport Strategy 2056* for transport links to form part of an integrated and connected network across the Greater Sydney region – the project is a key part of this strategy, supporting safe, efficient and reliable journeys for people and freight
- Contribute ensuring Sydney's strategic centres, as defined by *A Metropolis of Three Cities,* are connected by an effective, integrated transport network, which is fundamental to supporting growth, providing access to jobs, housing, recreation activities and business interactions
- Expand road capacity and improve connections to Sydney Airport and towards Port Botany, assisting with growth in passenger, freight and commuter movements
- Contribute to improved connections between Western Sydney, Sydney Airport and Port Botany, south and south-western Sydney and northern Sydney, as well as better connectivity between the important economic centres along Sydney's Global Economic Corridor
- Complement existing and future transport upgrades taking place within and around Sydney Airport, improving traffic flow and helping to reduce congestion on nearby roads
- Better connect Port Botany and freight precincts in Western Sydney by providing more efficient connectivity between the Sydney motorway network towards the port
- Improve road safety by reducing traffic congestion on roads surrounding Sydney Airport

- Enhance the benefits of the New M5 and M4-M5 Link projects, by reducing traffic volumes on local roads in St Peters, Tempe and Mascot
- Facilitate opportunities for future urban renewal by reducing the growth in road traffic on Botany Road, O'Riordan Street and local roads, creating opportunities for improved connectivity, active transport links and public transport improvements, and improved urban design outcomes and local amenity.

5.1.4 Related and complementary projects

The project would operate as part of Sydney's arterial road network, strengthening connections for both general and freight traffic between Sydney Airport and other areas in Sydney. The project would directly connect the Sydney motorway network with Sydney Airport's terminals via St Peters interchange. St Peters interchange, which is currently being constructed as part of the New M5 project, will provide access to the M4 and M5. The project would also:

- Connect Sydney's motorway network (the M4 and M5) and Port Botany via Joyce Drive, General Holmes Drive and Foreshore Road
- Connect to the M1 via Joyce Drive, General Holmes Drive and Southern Cross Drive
- Connect to the M5 East via the Terminal 1 connection and Marsh Street.

The project would complement other projects proposed and underway in the vicinity of the project. The NSW Government and Sydney Airport Corporation have been progressively upgrading roads around Sydney Airport to help improve traffic flow and access around Sydney Airport and to Port Botany. The project would complement these upgrades (described below), improving traffic flow and helping to reduce congestion on nearby roads.

Sydney Airport Corporation has also proposed a number of access improvements and transport facilities within Sydney Airport land, including the proposed ground transport interchange. The project would also connect the Sydney motorway network with the planned aviation support precinct at Sydney Airport (including freight and logistics facilities on the western side of Alexandra Canal) and existing air freight facilities at Terminal 1.

The project would complement and enhance the proposed and completed road, access and transport improvements at Sydney Airport, working together to improve access to Sydney Airport.

These other projects, which are shown on Figure 5.4 and outlined below, have also been proposed in response to some of the issues and demands described in sections 5.1.1 and 5.1.2.

Road upgrades around Sydney Airport

Roads and Maritime is carrying out a number of road upgrade projects around Sydney Airport to:

- Improve access to Sydney Airport, Mascot and the eastern suburbs
- Support future growth and access to Sydney Airport
- Improve traffic flow around Sydney Airport and to Port Botany
- Reduce congestion and improve safety for road users in Mascot.

Projects being carried out in the vicinity of the project site are described below.

Airport North Precinct Upgrade

The Airport North Precinct Upgrade, which is being carried along O'Riordan Street between Joyce Drive and Bourke Road in Mascot, involves upgrading roads north of Sydney Airport. This upgrade is intended to tie in to the recently completed, reconfigured Robey and O'Riordan streets as one-way streets. This reconfiguration was carried out in 2017 to accommodate upgrades to the new one-way road system through Terminals 2/3 and improve traffic flow around Sydney Airport.

Work on the O'Riordan Street upgrade started in July 2018, with works anticipated to be completed by the end of 2020.

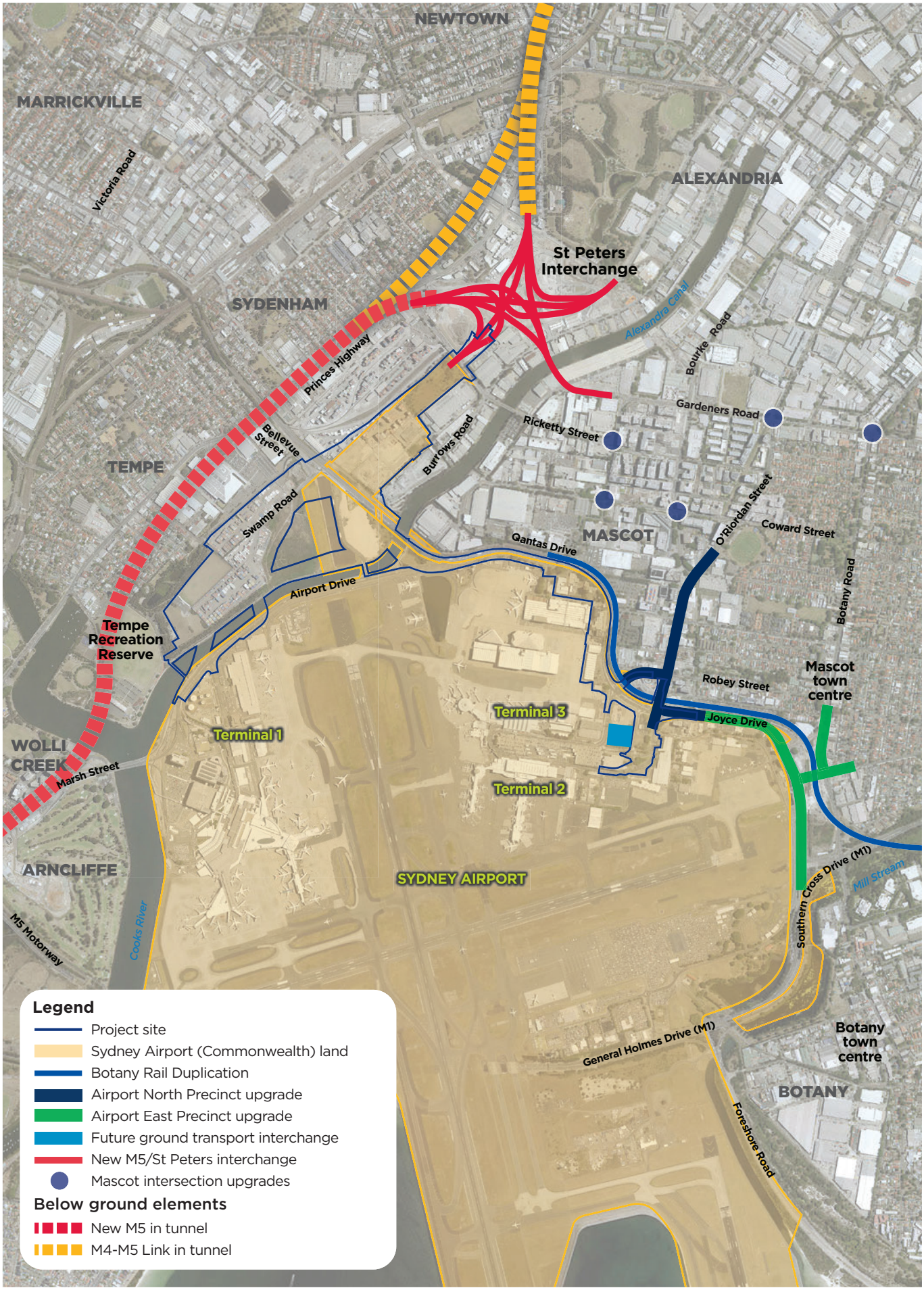


Figure 5.4 **Related and complementary projects**

Airport East Precinct Upgrade

The Airport East Precinct Upgrade is being carried out around Wentworth Avenue, Botany Road, Mill Pond Road, Joyce Drive and General Holmes Drive in Mascot. It involves upgrading roads east of Sydney Airport and replacing the rail level crossing at General Holmes Drive with a new rail bridge over a new section of Wentworth Avenue.

The upgrade started in February 2017 and is targeted to be completed in late 2019.

Mascot intersection upgrades

Roads and Maritime is proposing to upgrade a number of intersections in Mascot to help improve traffic flow and safety, and better manage heavy vehicle movements in the area. The intersections upgrade project would be delivered in stages and include lane realignments, changes to median strips and footpaths, new pedestrian crossings, and changes to turning arrangements, traffic lights and signs. The following intersections would be upgraded:

- Gardeners Road and O'Riordan Street
- Gardeners Road and Botany Road
- Kent Road and Ricketty Street
- Coward Street and Kent Road
- Bourke Street and Coward Street.

Construction is due to start in mid-2020 and be delivered in stages for each intersection.

Road and access upgrades within Sydney Airport

In the last few years, Sydney Airport Corporation has proposed and carried out a number of projects to improve road access and traffic flow in and out of Terminal 1 and Terminals 2/3. These projects were consistent with the previous *Sydney Airport Master Plan 2033* and the *Sydney Airport T2/T3 Ground Access Solutions and Hotel Major Development Plan* (SACL, 2015).

Works at Terminal 1 sought to improve the capacity of roads via lane and road widening, adjusting entry and exit points from adjacent land uses, and minimise the number of merge points. These works have been completed.

Works at Terminals 2/3 included implementing a one-way loop road with traffic entering Terminals 2/3 via Sir Reginald Ansett Drive and exiting via Seventh Avenue onto Qantas Drive at Robey Street. These works have been completed. Other works include additional car parking, improvements to pedestrian access and improvements to taxi storage capacity.

A new multi-level ground transport interchange, with a bus and coach pick-up/drop-off facility at ground level and parking/storage for about 4,000 vehicles, is also proposed adjacent to Terminals 2/3. The Sydney Gateway road project includes a connection to this facility.

The Master Plan also includes other ground transport solutions as part of its five-year ground transport plan and 20-year ground transport strategy.

Rail projects

Botany Rail Duplication

ARTC's Sydney Metropolitan Freight Strategy (ARTC, 2015) considers existing rail freight capacity issues and identifies priority actions to respond to rail freight demands on Sydney's rail freight network, including the Botany Rail Line. ARTC proposes to duplicate a section of the Botany Line between Mascot and Botany consistent with these objectives and strategies.

The primary objective of the Botany Rail Duplication project is to increase capacity to meet the forecast demand for container freight transport to and from Port Botany. It is intended that the project would:

- Alleviate constraints and increase the capacity of Sydney's freight rail network to meet existing and future demands
- Support the operation of intermodal terminals, including Enfield, Chullora and Moorebank
- Encourage 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.

The Botany Rail Duplication is predominantly located within the existing rail corridor. The north-western extent of the Botany Rail Duplication project is located in the vicinity of Qantas Drive, to the west of the Qantas overbridge. The south-eastern extent is located between the Banksia Street pedestrian overbridge and the Stephen Road overbridge in Botany. The Botany Rail Duplication project includes the following features:

- Track duplication, realignment and upgrading, including a new rail track within the rail corridor for a distance of 2.9 kilometres
- Bridge works, including new rail overbridges at O'Riordan and Robey streets
- Embankment/retaining structures, including a new embankment and retaining structure adjacent to Qantas Drive between Robey and O'Riordan streets.

The site for the Botany Rail Duplication project directly adjoins the project site for part of the Sydney Gateway road project. The Qantas Drive upgrade and extension is located to the south of, and directly next to, the project site for the western end of the Botany Rail Duplication project (to the west of O'Riordan Street). The Terminals 2/3 access is located close to the western end of the project site.

Public transport

The following improvements to public transport for Sydney Airport are planned or are being implemented.

Passenger trains

Transport for NSW's 'More Trains, More Services' program provides for an increase in service numbers on the Sydney Trains network, including along the T8 Airport and South Line. The NSW Government recently increased the number of services to Sydney Airport's train stations. Funding was provided in the NSW 2018 budget for technology improvements to the T8 Airport and South Line, to allow eight more services an hour at the International, Domestic, Mascot and Green Square stations.

Public bus services

Transport for NSW's 'Sydney's Bus Future' program provides for improved bus access to Sydney Airport, including better east–west and southern links. This will include a new suburban route between Miranda and Sydney Airport via St George to meet the high customer demand for travel from southern Sydney to Sydney Airport by bus.

In the *Future Transport Strategy 2056*, the NSW Government has also indicated that Sydney Airport would be connected via high capacity 'turn-up-and-go' services.

The proposed ground transport interchange at Terminals 2/3 (to be developed by Sydney Airport Corporation) will provide faster and more direct access for buses and allow for an increase in in the number of public bus services to and from Sydney Airport.

Transport for NSW and Roads and Maritime would continue to implement the bus priorities defined by Sydney's Bus Future program and the *Future Transport Strategy 2056*. The project offers a flexible design which does not preclude the inclusion of bus priority measures.

Further information on public transport alternatives to the project is provided in section 6.3.1.

Active transport

In addition to the active transport links proposed as part of the project, Sydney Airport Corporation is committed to improving active transport infrastructure in the airport precinct. A number of initiatives to improve active transport access outlined in the Sydney Airport Master Plan have been implemented. These include the footbridge and cycleway connection linking the Alexandra Canal shared use path to Terminal 1, and provision of storage facilities and change rooms.

5.2 Project need summary

5.2.1 Summary of the need for the project

The project is needed to address the issues identified in section 5.1.1 and to respond to the demands listed in section 5.1.2. The project has been developed in the context of the strategic plans and strategies listed in section 5.1.3, and complements other projects (summarised in section 5.1.4) proposed or being carried out to respond to the identified issues and demands.

Sydney Airport and Port Botany are two of Australia's most important infrastructure assets, providing essential domestic and international connectivity for people and goods. Efficient access to Sydney Airport and towards Port Botany is critical to the economic growth and prosperity of Sydney. Over the next 20 years, air travel, air freight, container freight and general traffic in and around the Sydney Airport and Port Botany area are expected to grow significantly. This will put more pressure on roads, which are already congested and other infrastructure and impact local communities.

Without significant infrastructure investment, existing transport constraints and challenges will worsen. The project has been proposed to put in place the necessary infrastructure to address these challenges and keep Sydney moving and growing.

Air freight vehicle movements at Sydney Airport will continue to rely on the road network, with no connection for rail freight available at the airport. The movement of sea-based freight to and from Port Botany will also continue to require access to the arterial road network as not all container freight can be transported via rail. The numerous businesses located in the vicinity of Sydney Airport and Port Botany that require access to these gateways depend on a road network that provides efficient connections to each of these gateways. A significant proportion of passengers will continue to rely on road transport to and from the airport.

To meet these challenges, the NSW Government is proposing to build new direct high capacity road connections linking the Sydney motorway network at St Peters interchange with Sydney Airport's domestic and international terminals and beyond. The new connections and increased road capacity would help improve traffic flow to and from Sydney Airport, Port Botany and beyond, making the movement of people and goods easier, safer and faster.

The project, together with the Botany Rail Duplication project, the development of the Sydney motorway network (eg M4 East, New M5 and M4-M5 Link), and other key road infrastructure projects, would expand capacity and support connections to Sydney Airport and Port Botany. This would assist with meeting the predicted growth in passenger, freight and employee traffic movements.

Infrastructure NSW recognises that the project would provide a valuable connection between the Sydney motorway network, Sydney Airport and towards Port Botany. The *State Infrastructure Strategy* notes that 'planning for this link has consistently demonstrated that it returns a high benefit relative to its cost, commensurate with the high value of the productive traffic that is expected to use it.' (Infrastructure NSW, 2018).

The project would also assist in reducing the movement of heavy traffic on the local road network in Mascot and along Botany Road.

5.2.2 Meeting Sydney Airport's future needs

The project is being driven by a need to expand capacity and improve connections to Sydney Airport to assist with meeting the predicted growth in passenger, freight, employee and general traffic movements. In doing so, it has been designed to meet Sydney Airport's future transport needs.

The need for the project is recognised by the Master Plan. To provide capacity for Sydney Airport's forecast growth and an enhanced passenger experience, the Master Plan identifies that ground transport solutions are required to improve the performance of the roads and intersections in and around the airport. The plan notes that significant improvements will be required to road traffic flows in and around Sydney Airport's terminals to facilitate and complement the reconfiguration and expansion of the terminal facilities as proposed by the Master Plan. For these proposed solutions to function at an optimal level, work will be required both within and outside the airport boundary.

The Master Plan was developed with reference to the project. The Master Plan's five-year ground transport plan (2019–2024) notes that a 'Sydney Gateway connection will complement Sydney Airport's planned infrastructure improvements'. The plan notes that:

- The proposed ground transport solutions at Sydney Airport recognise the potential changes in traffic volumes and patterns resulting from the opening of new components of the Sydney motorway network (ie New M5 and M4-M5 Link) and any Sydney Gateway connection
- The ground transport plan allows for widening of Qantas Drive and Airport Drive and a grade separated road at the entry to Terminals 2/3.

One of the objectives of the Master Plan is to 'improve ground access to, from and past the airport'. The needs defined by the plan, which would be met by the project, include access improvements to Sydney Airport terminals, and to Sydney Airport's northern lands for the planned aviation support precinct (including freight and logistics facilities). The plan identifies that these improvements may include new roads and a bridge over Alexandra Canal, Airport Drive and the existing rail corridor, which are proposed as part of the project.

The project is consistent with future planning for ground transport as described by the Master Plan, and meets Sydney Airport's development, growth and infrastructure needs as defined in these plans.

5.3 Project objectives

The primary objective of Sydney Gateway is to support sustainable growth in the economy and cater for projected increases in passengers and freight demand. This will be achieved by improving connectivity between the regional growth and freight distribution centres in western Sydney and the Sydney Airport and Port Botany area.

The objectives of the Sydney Gateway road project are to:

- Improve connectivity to Sydney Airport terminals by providing high capacity direct road connections that cater for forecast growth in passenger and air freight volumes
- Support the efficient distribution of freight to and from Sydney Airport and Port Botany to logistic centres in Western Sydney
- Improve the liveability of Mascot town centre by reducing congestion and heavy vehicle movements on the local road network.

Chapter 6

Project alternatives and options

This chapter describes the strategic alternatives, options and design refinements that were considered during project development. It provides a summary of how the project has developed to date, describes alternatives to the project as a whole, and the options and design refinements considered as part of the design and construction planning process.

The SEARs addressed in this chapter are listed below. Full copies of the SEARs, and where they are addressed in this document, are provided in Appendix A. There are no MDP requirements relevant to project alternatives and options.

Reference	Requirement	Where addressed
General standard SEARs		
2.1	The EIS must include, but not necessarily be limited to, the following:	
	(e) an analysis of any feasible alternatives to the proposal	Section 6.3
	(f) a description of feasible options within the proposal, including the placement of any bridge piers within or in close proximity to Alexandra Canal	Section 6.5
	(g) a description of how alternatives to and options within the proposal were analysed to inform the selection of the preferred alternative / option. The description must contain sufficient detail to enable an understanding of why the preferred alternative to and options(s) within the proposal were selected	This chapter
	(h) a concise description of alternative construction methods that were analysed and preferred methods	Section 6.4.3

6. Project alternatives and options

6.1 Methodology

Design development and environmental assessment was undertaken in an integrated manner to ensure that the concept design and construction planning has been informed by consideration of potential environmental and social impacts. This approach facilitates ongoing improvements to the design throughout project development to avoid or minimise adverse impacts.

Project development included the following steps:

- Identify overarching project need/s
- Develop project objectives that meet those need/s
- Identify and consider a broad range of potential options to meet the need/s and satisfy project objectives
- Identify a preferred mode or method
- Consider route options, construction options and design options
- Identify and consider environmental and social constraints and potential impacts
- Undertake an iterative process of options consideration and review to identify optimal project solutions.

Multi-criteria analysis was used to compare options and support decision making. Multi-criteria analysis involves specialists from different technical and project development disciplines working together to consider and compare benefits and disadvantages of different options. This generates a balanced assessment of how well each option satisfies project objectives and/or various site specific design, environmental, social and constructability constraints.

The project development process is shown on Figure 6.1.

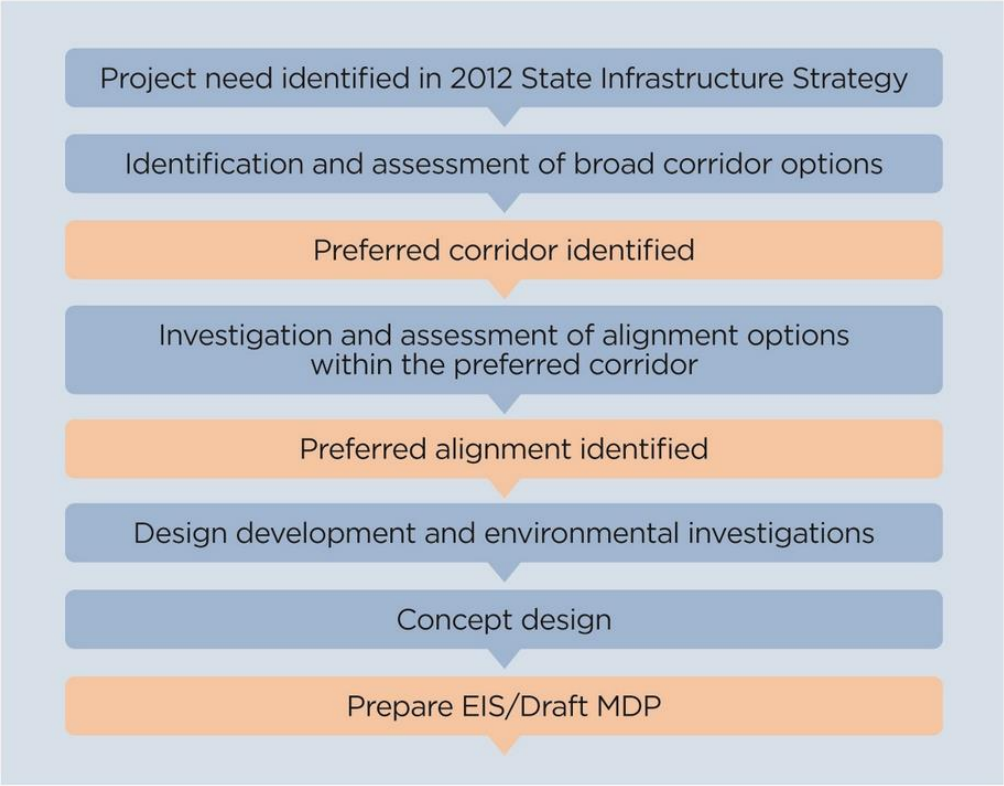


Figure 6.1 Project development process

6.2 Summary of project background and objectives

The *NSW State Infrastructure Strategy* (Infrastructure NSW, 2012) identified investments and reforms likely to have the greatest positive impact on NSW over the next 20 years. The strategy's vision for 2032 included completing Sydney's strategic road network to improve connections between Western Sydney, Sydney Airport and Port Botany, south and south-western Sydney, and other centres along Sydney's global economic corridor.

The opportunity to create a new road connection to Sydney Airport was identified during early planning for the WestConnex program of motorways. During this process it was identified that a new interchange at St Peters would create an opportunity to improve access to Sydney Airport and Port Botany. In 2015, the WestConnex Updated Strategic Business Case (Sydney Motorway Corporation, 2015) identified 'Sydney Gateway' as a proposed new road link from the proposed new St Peters interchange to the Sydney Airport and Port Botany precinct. The Updated Strategic Business Case identified that this new link was needed to fully achieve the enhanced transport connectivity, social and economic benefits of the NSW Government's substantial investment in developing the WestConnex program of works.

The NSW Government has committed to delivering the Sydney Gateway road project to realise the full benefits of its substantial investment in new Sydney motorways. The following project objectives have been identified:

- Objective 1: Improve connectivity to Sydney Airport terminals by providing direct high capacity road connections that will cater for forecast growth in passenger and air freight volumes
- Objective 2: Support the efficient distribution of freight to and from Sydney Airport and Port Botany to logistic centres in Western Sydney
- Objective 3: Improve the liveability of Mascot town centre by reducing congestion and heavy vehicle movements on the local road network.

The project also needs to support the planning objectives for Sydney Airport as defined by the *Sydney Airport Master Plan 2039* (the Master Plan) (see section 3.6.4). Further information on the strategic context and need for the project is provided in Chapter 5 (Strategic context and project need).

6.3 Consideration of strategic alternatives

Six potential strategic alternatives were considered:

1. Improvements to public transport
2. Improvements to the road network
3. Improvements to rail freight
4. Demand management
5. Do nothing/do minimum
6. New high capacity road link/s (the project).

Each alternative was analysed to assess how well it could meet the project objectives. The outcome of these considerations is discussed below.

6.3.1 Alternative 1 – Improvements to public transport

Buses

Sydney has a large bus network, but only three bus routes (400, 420 and 420N) directly service Sydney Airport. Shuttle buses are used for access between the airport, hotels and parking stations. Bus journey times in and around Sydney Airport are heavily influenced by general traffic congestion. This makes buses a less desirable option for airport access than other modes, including rail and active transport (for airport

employees) that are more consistent in their journey time. In addition, public buses that access Sydney Airport do not cater for passengers with luggage, making them a less attractive option for travellers.

Even with a substantial increase in bus services and bus patronage to the airport, the three project objectives would not be fully satisfied as bus services cannot address freight and distance transport needs. Bus service improvements alone would not address the congestion issues associated with the projected growth and expansion of Sydney Airport and Port Botany. Accordingly, bus service improvements alone are not a viable alternative to the project.

However, bus access is an important part of an overall transport strategy for the precinct. Transport for NSW's Sydney's Bus Future program and the *Future Transport Strategy 2056* (Transport for NSW, 2018c), provides for improved bus access to Sydney Airport, with improved east–west and southern links. The Sydney Airport Master Plan also provides for improved infrastructure for buses, including improvements to terminal access roads, and a proposed new ground transport interchange near Terminals 2/3. A description of planned improvements to bus services in the vicinity of Sydney Airport is provided in section 5.1.4.

Proposed improvements to bus network and interchange facilities would complement the project in meeting future transport needs for passengers and airport employees. As part of the overall transport solution, the project would also support improved bus access by improving bus travel times and reliability on existing routes and improving traffic flows on arterial roads.

Passenger trains

The rail network is a key component of the vision for Sydney's future metropolitan planning and transport network as outlined in *Future Transport Strategy 2056* (Transport for NSW, 2018c). The number of passengers on the rail network is expected to almost double over the next 20 years.

Sydney Airport already has excellent rail access via an underground airport rail line (the T8 Airport and South Line) introduced into Sydney's suburban rail network in 2000. This line services both Terminal 1 and Terminals 2/3, has frequent services and is well patronised. It provides a direct link between Sydney Airport, Mascot, Green Square, the Sydney central business district and south-western Sydney. As described in section 5.1.4, Transport for NSW's *More Trains, More Services* program provides for an increase in rail services on the Sydney Trains network, including along the T8 Airport and South Line.

While an increase in rail services will not satisfy the project objectives, future rail improvements (both passenger and freight) would be complementary to the project and will form part of a strong multimodal solution to Sydney's transport needs.

Analysis of public transport as an alternative to the project

The key customer markets identified for the project include dispersed and long distance passenger movements, air and container freight, and commercial services and businesses. The travel patterns and needs of these customers are highly dispersed and diverse. These customers have highly varied requirements when it comes to the transfer of goods and services, including transporting containerised freight by rigid and articulated trucks, and transporting air freight by light trucks, vans, utility vehicles and cars. Public transport is not a viable solution for freight transport.

No combination of feasible public transport alternatives, such as heavy or light rail options, bus corridor enhancements and/or additional services, were identified that would meet the diverse range of customer needs and predicted growth for travel associated with Sydney Airport and Port Botany, or address the project objectives as effectively as the project itself.

6.3.2 Alternative 2 – Improvements to rail freight

By 2036, freight moved in NSW is forecast to increase to 618 million tonnes (see section 5.1.2). Air freight handled by Sydney Airport is predicted to increase by about 58 per cent, from 643,000 tonnes in 2017, to around one million tonnes in 2039. The amount of container freight handled by Port Botany is predicted to significantly increase over the next 15 or so years, from about 14.4 million tonnes in 2016, to about 25.5 million tonnes in 2036.

To manage the increased freight volumes, the Australian and NSW Governments have identified clear objectives to increase the share of freight moved by rail, from 17.5 per cent in 2016 to 28 per cent by 2021 (Transport for NSW, 2018a; Infrastructure Australia, 2019). In addition, NSW Ports has set a target of 40 per cent of total freight volumes to be transported to/from the port by rail by 2036. This represents a substantial increase compared with the current 14 per cent share of freight moved by rail (NSW Ports, 2015).

The Botany Rail Line forms part of the metropolitan rail freight network, which links to regional and national networks. The existing line has a section of single-track between Mascot and Botany that forms a bottleneck limiting the number of rail movements per day and preventing use during track maintenance.

A project to duplicate this section of track is being progressed by ARTC under a separate planning application (the Botany Rail Duplication project). This would remove the bottleneck, facilitating an increase in the volume of rail freight that could be moved to Port Botany. Other projects that will facilitate an increase in freight rail transport include a new intermodal freight terminal at Moorebank (Moorebank Intermodal Terminal) and the proposed upgrading of the Southern Sydney Freight Line at Cabramatta (the Cabramatta Loop project). In addition, the NSW Government is investigating, or has committed to, projects to improve rail freight capacity through segregation of freight and passenger lines. These projects will address bottlenecks and competition for rail space in those areas of the network where freight and passenger rail share the same tracks. These projects are described in the *NSW Freight and Ports Plan 2018–2023* (Transport for NSW, 2018a).

Analysis of rail freight transport as an alternative to the project

The rail freight network does not support the needs of air freight transport through Sydney Airport. Air freight is currently transported by road and there is no facility to load air freight onto the freight rail network. In addition, around 90 per cent of freight entering Port Botany has a destination within 60 kilometres of the port, and the volume of freight moving through the port exceeds the capacity of the rail network. Even with further upgrades to the rail freight network it would be impossible to transfer all freight to rail.

While rail is cost effective for long distance transport of goods to regional centres, Sydney's freight, service and business task relies extensively on a dispersed point-to-point transport connection to customers within the metropolitan area. This task is best addressed by road transport.

Ongoing improvements to the rail freight network, including the Botany Rail Duplication project, will enhance the movement of freight by rail, but will not be sufficient to meet the identified project objectives, or to supplement rail freight transport by road. The Sydney Gateway road project and the Botany Rail Duplication project are complementary, and both projects are needed to support the diverse freight transport requirements through this precinct as well as predicted future growth. Accordingly, improvements to rail freight alone would not be a feasible alternative to the project.

6.3.3 Alternative 3 – Improvements to the existing road network

The arterial road network around Sydney Airport serves a mix of established land uses, including aviation, commercial, industrial and residential. A substantial program of road works has recently been undertaken in this area, including the Airport East and Airport North precinct upgrade projects (see section 5.1.4). Limited road reservations and the proximity of existing developments constrain the ability to provide additional widening and upgrades. Further incremental improvements to the surrounding arterial road network may assist in the short term; however, overall reductions in congestion are likely to be comparatively minor and potentially short term.

Analysis of improvements to the existing road network as an alternative to the project

Further arterial road improvements would potentially improve some of the congestion issues in the area in the short term and assist with improving amenity in Mascot (including in the town centre). However, incremental improvements to the existing network would not fully address existing or future congestion issues and would not satisfy all project objectives. Importantly, improving the existing arterial road network would not improve access and connections to/from Sydney Airport and Port Botany into Sydney's motorway network.

Accordingly, further improvements to the existing road network in the vicinity of Sydney Airport would not provide a feasible alternative to the project.

6.3.4 Alternative 4 – Demand management

Demand management is the application of management measures to reduce transport demand. This can include measures to reduce trip lengths, reduce trip frequency and make various other transport mode options more attractive than use of the road network. Demand management initiatives may include:

- Land use planning policies that promote urban consolidation and the establishment/development of centres to reduce the need for travel
- Policies that restrict parking in new developments to encourage use of alternative transport
- Intelligent transport systems that improve transport operation and management of clearways and transit lanes, and provide greater priority to public transport over general traffic
- Pricing of transport options to reduce travel demand.

Sydney Airport, Port Botany and surrounding commercial areas are important travel demand generating precincts. Population growth, combined with the growing freight task in the Sydney metropolitan area, will result in a continued demand for use of roads providing access to these important areas. If nothing is done, the continued demand for access to these precincts, through and around these precincts would result in additional, prolonged congestion as population and freight movements both increase.

Demand management measures may help to reduce general traffic congestion and spread the demand for peak travel to less congested time periods. However, demand management measures alone are unlikely to directly impact the volume or time of movement of passengers catching scheduled flights.

Analysis of demand management as an alternative to the project

Demand management could help to spread the demand for peak travel to less congested periods. However its effectiveness is likely to be limited by constraints such as:

- The availability and proximity of other travel modes to the user's origin and destination
- Limited opportunity (for many) to access flexible working arrangements needed to take advantage of 'time of day' tolling and transport pricing signals
- Travel time of day being dictated by flight schedules.

Although the introduction of demand management measures could contribute to relieving traffic congestion, the implementation of demand management measures alone would not satisfy any of the project objectives. Accordingly, demand management initiatives are not a feasible alternative to the project.

6.3.5 Alternative 5 – Do nothing/do minimum

A do nothing/do minimum approach would involve operating the existing road network around Sydney Airport in its existing configuration (including completing the current road upgrade projects described in section 5.1.4). This approach assumes that other recently approved components of the Sydney motorway network (including the M4 East, the M4-M5 Link and the New M5) are completed, but that the Sydney Gateway road project would not proceed.

Analysis of do nothing/do minimum as an alternative to the project

As a result of population, employment and urban growth, Sydney can expect worsening road network and traffic conditions if nothing is done. Doing nothing would also mean that the full benefits of the WestConnex program of works and other projects to enhance Sydney's motorway network would not be realised. These benefits include linking major employment centres in the 'global economic corridor' to each other and to the wider city. Linking these employment and business centres is critical in supporting the ongoing creation of jobs. Sydney Airport and Port Botany are both key locations in this important economic corridor.

Not addressing Sydney's future transport requirements is not a feasible alternative, as Sydney is home to two-thirds of NSW's manufacturing sector, with many of the state's major aviation, pharmaceuticals, biotechnology, electronics and automotive industries based in Western Sydney. These businesses and the State economy require efficient road network connectivity between the Sydney Airport and Port Botany precincts and Western Sydney.

A do nothing or do minimum alternative would lead to worsening congestion and would not address existing and future transport needs (see Chapter 5 (Strategic context and project need)) and the project objectives. Accordingly, this is not considered to be a feasible alternative to the project.

6.3.6 Alternative 6 – The Sydney Gateway road project

The project, as part of the ongoing improvements to the Sydney motorway network, is a key part of a broader strategy to meet NSW transport needs and address congestion pressures. It would deliver new high capacity road connections between Sydney's motorway network and Sydney Airport and would meet the identified project objectives set out below:

Objective 1: Improve connectivity to Sydney Airport terminals by providing high capacity direct road connections that cater for forecast growth in passenger and air freight volumes

The project would enhance connections and access to Terminals 1 and 2/3 and improve access to Sydney Airport's freight handling facilities. It would cater for current and future traffic growth, supporting passenger and freight movements to and from the airport.

Objective 2: Support the efficient distribution of freight to and from Sydney Airport and Port Botany to logistic centres in Western Sydney

The project would deliver a new high capacity road connection between the Sydney motorway network and Sydney Airport and towards Port Botany. By linking directly to the enhanced Sydney motorway network, the project would improve travel times to Western Sydney and other important freight destinations.

Objective 3: Improve the liveability of Mascot town centre by reducing congestion and heavy vehicle movements on the local road network

By providing extra capacity on the arterial road network, improving intersection performance, and creating a direct link to the Sydney motorway network, the project would reduce congestion and provide improved routes for freight traffic. This would reduce congestion and heavy vehicle movements on the local road network and through the Mascot town centre, improving amenity and liveability.

Forecast benefits associated with completing the project include:

- Faster trips on non-arterial roads in the study area – with daily average speed forecast to increase and vehicle distance travelled forecast to reduce
- Improved road network productivity
- Reduced travel times on key corridors
- Reduced traffic on sections of the arterial road network
- Reduced traffic on roads in Mascot.

Analysis of the Sydney Gateway road project

Constructing and operating the project would meet the strategic needs identified in the project objectives. Of all the alternatives considered, constructing a new high capacity road link (the Sydney Gateway road project) is the only one that satisfies all of the project objectives set by the NSW Government. It also supports the Master Plan.

6.3.7 Summary comparison

A summary comparison of strategic alternatives is provided in Table 6.1.

Table 6.1 Comparison of strategic alternatives

Alternatives	Objective 1 *Improve connectivity to Sydney Airport terminals by providing high capacity direct road connections that cater for forecast growth in passenger and air freight volumes*	Objective 2 *Support the efficient distribution of freight to and from Port Botany and Sydney Airport to logistic centres in Western Sydney*	Objective 3 *Improve the liveability of Mascot town centre by reducing congestion and heavy vehicle movements on the local road network*	Supports the Sydney Airport Master Plan
1. Improvements to public transport	🔴	🔴	🔴	🟡
2. Improvements to rail freight	🔴	🟡	🟡	🔴
3. Improvements to the road network	🔴	🟡	🟡	🟡
4. Demand management	🔴	🔴	🟡	🟡
5. Do nothing/do minimum	🔴	🔴	🔴	🔴
6. Sydney Gateway road project	🟢	🟢	🟢	🟢

KEY: 🟢 Achieves project objective 🟡 Partially achieves project objective 🔴 Does not achieve project objective

6.4 Project corridor and alignment options

6.4.1 Design constraints

The Sydney Airport and Port Botany precincts are highly developed and space for a new road link is limited by existing land uses and the complex operational requirements of key stakeholders including Sydney Airport, airlines and freight operators, NSW Ports, ARTC and others. Areas required for the safe operation of aircraft are also a significant constraint to development in areas close to the airport.

Sydney Airport, Port Botany and many of the businesses in this precinct provide services that are critical to the economy and are highly sensitive to the disruptive effects of infrastructure construction.

A key goal of project development is to minimise impacts on road network operation, transport, freight and business services in this precinct during both construction and operation. Sydney Airport and Port Botany must also remain readily accessible for air travellers, passengers and freight during project construction.

Careful consideration of site specific constraints, along with other engineering and environmental constraints, have been key to developing a feasible concept design. Key site-specific constraints are briefly outlined below.

- Alexandra Canal:
  - Contamination – 'Alexandra Canal Sediments' is a listed contaminated site under the *Contaminated Land Management Act 1997* (NSW). Construction within the canal would have the potential to disturb contaminated canal bed sediments and may impact water quality. The former

Tempe landfill area and other historic contamination of land and groundwater poses challenges for excavation and tunnelling.

  - Flooding – The canal is tidally influenced and is the major floodway draining areas in and around the study area, including Tempe, St Peters, Alexandria, Mascot and Sydney Airport. Potential minor obstructions of the lower reaches of the canal may result in substantial upstream flooding impacts.
  - Heritage – The canal is a significant historical feature and is subject to a number of heritage listings, including on the State heritage register. Heritage considerations include the fabric of the canal walls in certain sections and the 'open sky' character of the canal.
- Hazards to aviation operations – The airspace, and other systems required for safe aircraft operation at Sydney Airport, are defined by exclusion zones (known as the prescribed airspace), which limit the maximum height and location of structures in defined areas around the airport. Additionally, there are limits on proposed developments in the vicinity of runways to minimise potential air turbulence that could adversely affect aircraft, particularly on take-off and landing.
- Botany Rail Line – Minimum vertical and horizontal clearances to the rail tracks are required to maintain satisfactory levels of safety and safeguard the line for future expansion. This affects the elevation of bridge crossings as well as the location of bridge piers and clearances in key locations.
- Former Tempe landfill – On-going management of land previously used for waste disposal at Tempe relies on the continued functioning of specific infrastructure to manage leachate, landfill gas and other environmental issues. The integrity of installed management systems needs to be maintained during and after construction. Minimising the extent of project interfaces with the landfill would reduce geotechnical and environmental risks as well as waste management issues.
- Business impacts – The study area contains a number of established businesses that service the airport and port and are located to be close to these facilities. With the limited availability of industrial land in the area, these businesses may be difficult to relocate.
- Utilities – The project site contains a number of areas where utilities are prevalent, including utilities that are critical to airport operations and trunk gas mains servicing large areas of Sydney and Port Botany.
- Open space and recreation areas – The study area contains important recreational and open areas that are highly valued by the community, including Tempe Recreation Reserve, Tempe Wetlands, the off-leash dog exercise area in Tempe Lands, and the Tempe Golf Range and Academy.

6.4.2 Corridor study area

To facilitate access to Sydney Airport, and beyond to Port Botany, the project needs to:

- Connect to the road and tunnel infrastructure being constructed for the New M5 and M4-M5 Link at St Peters interchange
- Cross Alexandra Canal
- Link with the existing road network surrounding the airport at appropriate locations.

The corridor study area is shown on Figure 6.2. The study area can be broadly divided into two areas by Alexandra Canal:

- Land to the east of Alexandra Canal and north of Qantas Drive in Mascot (coloured pink in Figure 6.2)
- Land to the west of Alexandra Canal in Tempe and St Peters (coloured green in Figure 6.2).

The area to the east of the canal in Mascot (the pink area in Figure 6.2) is characterised by the following:

- Road congestion due to a mix of local and through traffic, including freight vehicles
- Large number of significant business operations that cannot be disrupted and are not easily relocated (including the Qantas headquarters)
- Significant future development opportunity and high value land.

Locating the project in this area would result in significant business impacts and higher cost compared to locating the project to the west of Alexandra Canal (the green area in Figure 6.2). Locating the project in the area to the north of Qantas Drive would also:

- Have more substantial impacts on the functioning of the local road network during construction
- Present constructability challenges, including a requirement for a complicated interchange in the constrained area around Robey and O'Riordan streets and the Botany Rail Line
- Deliver a poor alignment for connection to the new St Peters interchange.

Locating the project to the west of Alexandra Canal would also impact businesses of economic and strategic importance (particularly empty container storage) and impact recreation and open space areas. However, it was considered that there would be less potential for business impacts in this area compared to east of Alexandra Canal. It was also considered that, while there would be impacts on open space during construction, there would be an opportunity for the long-term enhancement of open space once the project is completed.

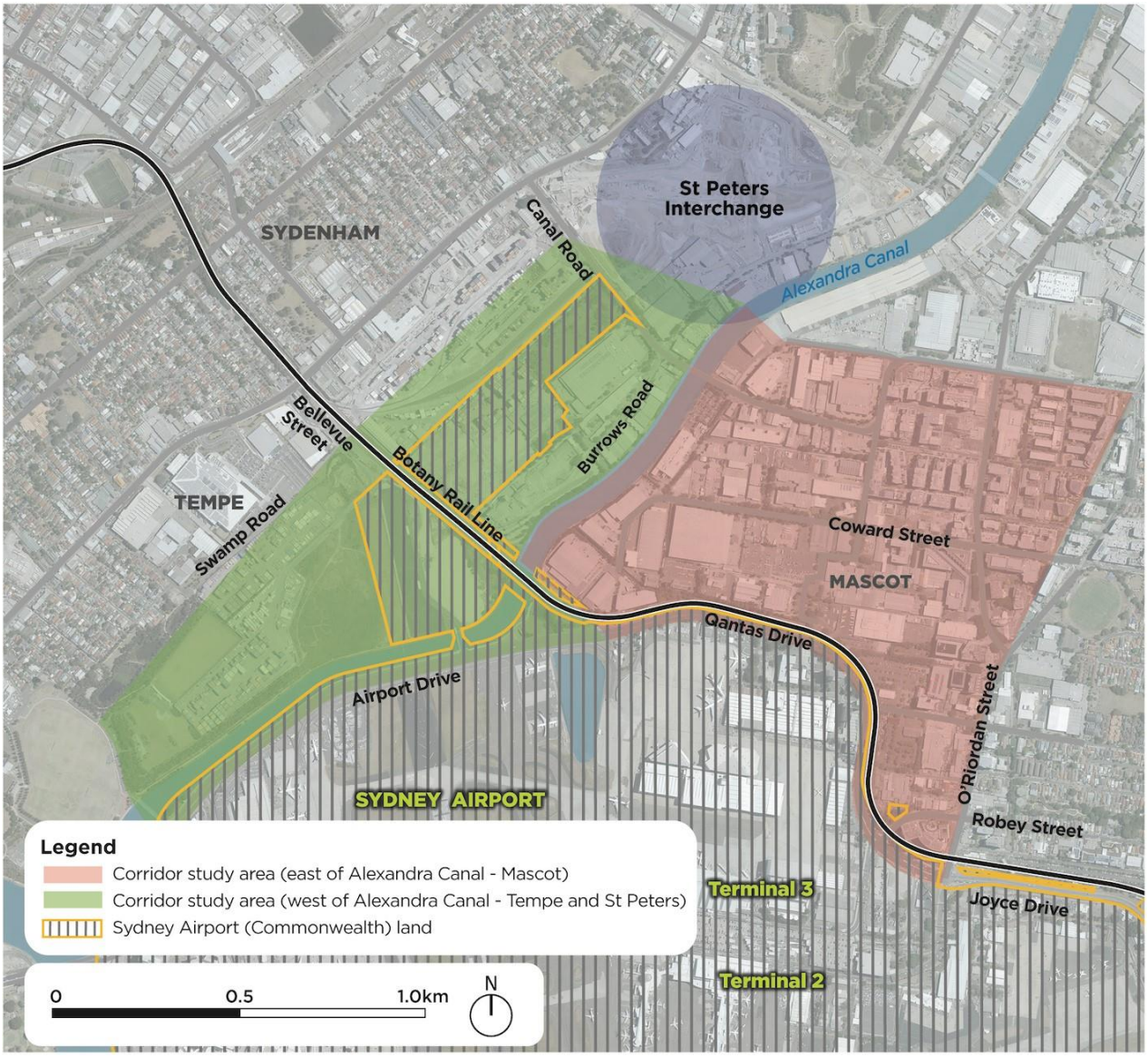


Figure 6.2 Corridor study area

6.4.3 Construction method – consideration of surface and tunnel options

Surface and tunnel solutions were both considered. Surface alignments would be difficult and challenging to construct due to the need to:

- Cross the Botany Rail Line, potentially at a number of locations, without disrupting freight rail movements
- Cross Alexandra Canal at least once, while minimising heritage and environmental impacts
- Avoid impacts on Sydney Airport and aviation operations
- Minimise impacts on the existing road network and essential utilities
- Avoid or minimise environmental, social and flooding impacts.

Tunnel solutions would avoid or reduce most of the above issues and reduce long-term visual impacts. However, there are many challenges associated with tunnelling in this location. Due to the very deep sandy sediments and high groundwater table in this area, geotechnical conditions are not ideal for tunnelling and geotechnical risks would be significant. Open cut excavation would be required causing significant surface disruption along the full tunnel length during construction. Extensive land acquisition would also be required, increasing the likelihood of substantial business disruption.

Environmental impacts of cut and cover tunnelling would include impacts on Alexandra Canal, excavation, transport and disposal of large volumes of excavated spoil material, and the need to treat and dispose of large volumes of potentially contaminated groundwater. Tunnels would also be significantly more expensive, and require more energy to construct and operate over the life of the infrastructure.

On balance, tunnel options are not preferred for the following reasons:

- The short length and comparatively steep gradients required to pass under Alexandra Canal would result in sub-optimal road gradients
- The soft sands and high groundwater table present in the area provide poor geological conditions for tunnelling
- Parts of the area are flood prone area making it difficult to protect tunnels from flooding during construction and operation
- Shallow open cut tunnelling in poor ground conditions would require acquisition of significant land for tunnel construction and management of large volumes of soil and groundwater
- Achieving optimal vertical and horizontal alignment connections to St Peters interchange and into the existing road network would be difficult
- The comparatively high cost, higher risk (compared to surface construction) and long term energy use required to operate a tunnel
- The potential environmental and heritage impacts associated with open cut excavation across Alexandra Canal.

A similar decision that tunnelling would not be preferred was also been made prior to finalising the design of St Peters interchange. Accordingly, the design for St Peters interchange allows for a surface road connection linking the Sydney Gateway road project into the new M4-M5 Link tunnels. This decision was reviewed and confirmed during development of the concept design for the Sydney Gateway road project. If a tunnelling solution had been preferred for the Sydney Gateway road project, a redesign of St Peters interchange would be required.

Both surface and tunnel options would have construction challenges. However, on balance, a surface road is considered to be easier and safer to construct. A surface roadway is preferred as it would:

- Reduce heritage and environmental impacts
- Avoid generating large quantities of spoil
- Minimise exposure to contaminated land and groundwater associated with open cut excavation

- Deliver superior road network connections and road geometry
- Reduce operational energy requirements
- Have a relatively lower cost and construction risk.

A summary comparison of tunnelling and surface construction methods is provided in Table 6.2.

Table 6.2 Comparison of tunnel and surface construction methods – support for project goals

Design/project goals	Tunnels	Surface construction
Optimise connection to St Peters interchange	Moderate support	Strong support
Optimise transport outcomes (network interfaces, gradient and alignment)	Poor support	Strong support
Support airport operations and Airport Master Plan	Moderate support	Strong support
Minimise environment and heritage impacts	Poor support	Moderate support
Minimise business impacts	Poor support	Moderate support
Optimise constructability	Poor support	Moderate support

KEY: Strong support Moderate support Poor support

6.4.4 Surface corridor options

Options considered

Six surface corridor options were considered as shown on Figure 6.3.

The light blue and purple corridor options were not preferred as they do not optimise connections into St Peters interchange (as currently designed and being constructed), would impact a large number of difficult to relocate businesses, and adversely impact the banks of Alexandra Canal.

The green corridor option was not preferred as it would also impact a large number of businesses in the established Mascot business precinct to the north of Qantas Drive, as well as in St Peters and Tempe.

The red corridor option was not preferred due to its relatively poor alignment and the potential impacts on Sydney Airport land and operations. In particular, the need to construct a large interchange at the connection with Airport Drive and Qantas Drive would adversely impact land used for aircraft maintenance operations.

The dark blue corridor option performs reasonably well except for a poor level of support for airport operations and future land uses under the Master Plan. This is because it would require a single, large road network interchange, which would take up substantial airport land in close proximity to the main north–south runway.

All options could include upgrading Qantas Drive and the access to Terminals 2/3 so this was not a deciding factor. All options would result in some unavoidable environmental and social impacts, particularly during construction, due to the size of the project footprint and extent of construction activity required to build a major new road link in a constrained urban area. All options also have potential heritage impacts due to the close proximity to Alexandra Canal, which is listed on the State heritage register.

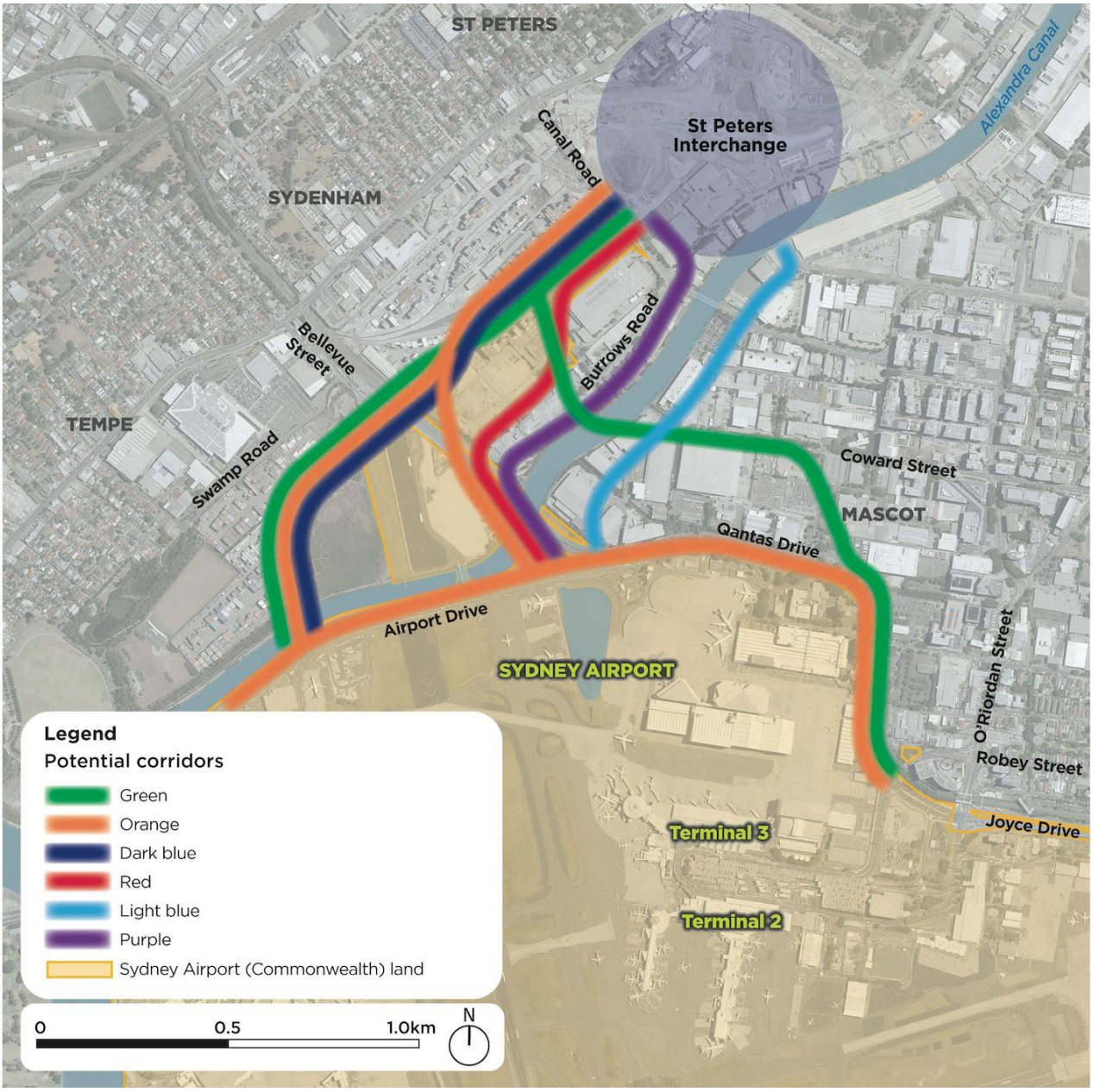


Figure 6.3 Potential corridor options

Preferred corridor option

In the comparative assessment, it was considered that the light blue and purple corridor options performed slightly worse than other options against the goal of minimising environmental and social impacts. This is because their alignment follows the bank of Alexandra Canal for a considerable distance, increasing the likelihood of more substantial impacts to the canal (including visual and heritage impacts) than for other options.

Overall, the orange corridor option was preferred as this option would provide:

- Superior road geometry and transport outcomes
- Reasonable support for Sydney Airport operations and future planning in accordance with the Master Plan
- Good connectivity with the existing design of St Peters interchange
- Moderate potential business, flooding, environmental and social impacts.

The orange corridor option was carried forward for further design development.

A summary comparison of issues associated with the surface corridor options is provided in Table 6.3.

Table 6.3 Comparison of surface corridor options – support for project goals

Corridor option	Support the Sydney Airport Master Plan and airport operations	Optimise road alignment and driver experience	Connect with St Peters interchange	Minimise potential business impacts	Minimise potential flooding impacts	Minimise potential environment and social impacts
Light blue	🔴	🟡	🔴	🔴	🔴	🔴
Green	🟢	🟡	🟢	🔴	🟡	🟡
Purple	🔴	🟡	🔴	🔴	🔴	🔴
Red	🔴	🔴	🟢	🟡	🔴	🟡
Dark blue	🔴	🟡	🟢	🟡	🟡	🟡
Orange	🟢	🟢	🟢	🟡	🟡	🟡

KEY: 🟢 Strong support 🟡 Moderate support 🔴 Poor support

6.4.5 Potential alignment options

Further design development was undertaken to identify potential alignment options broadly within the preferred orange project corridor. All options would include improved access to Terminals 2/3.

Alignment options within the preferred corridor

Four alignment options were developed to explore differences between:

- Having one or two connections to the existing road network (at Airport Drive/Qantas Drive)
- Continuing to use or bypass Airport Drive
- Potential project footprints, including the number of bridges over Alexandra Canal, and associated impacts on Sydney Airport facilities and other land, existing businesses, open space and the former Tempe landfill.

Different locations for crossing the Botany Rail Line and Alexandra Canal, and different aspects of network functionality, were explored as different potential alignment options were developed.

Two options (options 2 and 4) allow for only one connection to the existing road network. This would require a larger interchange area to accommodate all traffic movements. These options are shown on Figure 6.4.

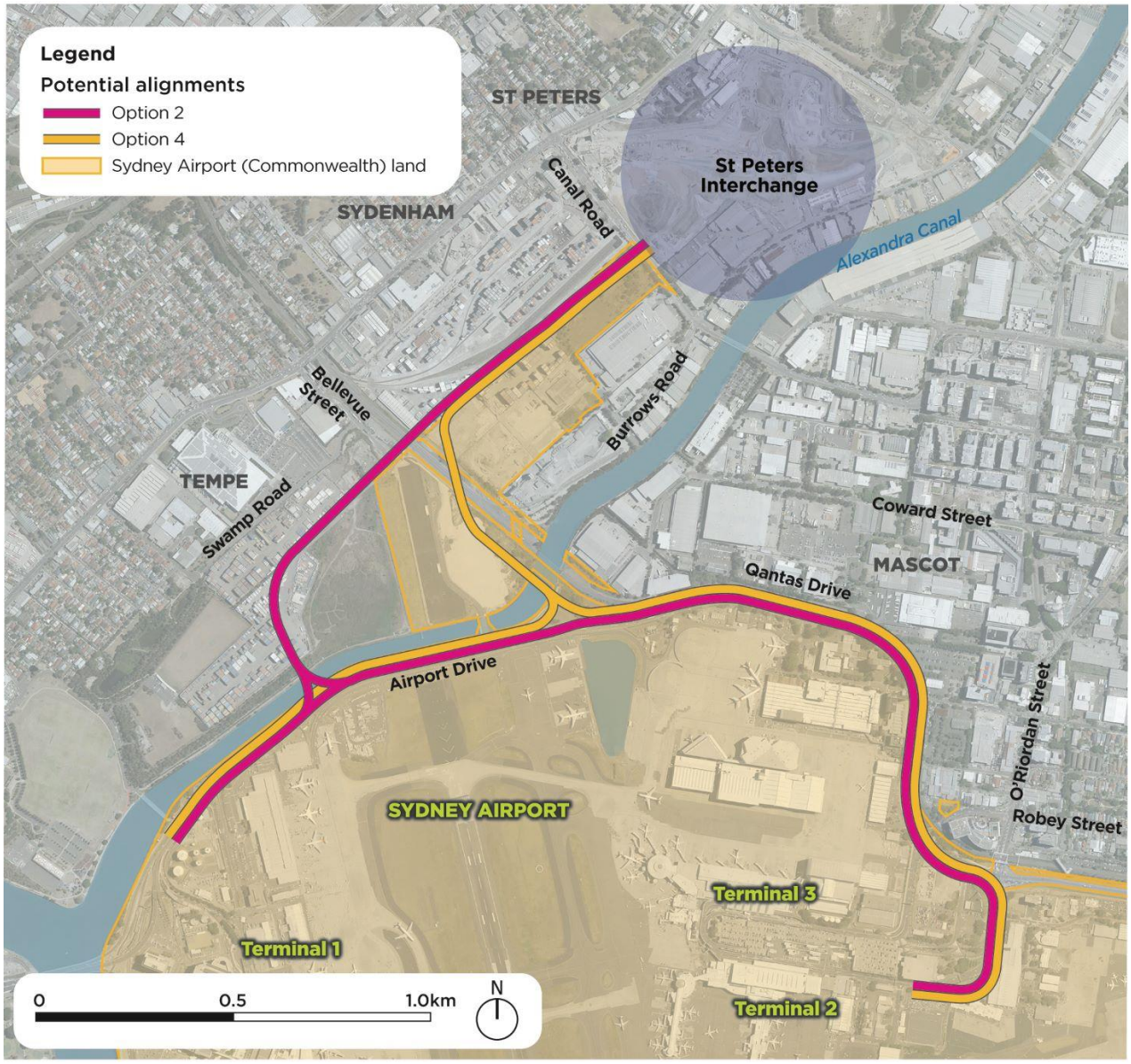


Figure 6.4 Potential alignment options with one connection to the existing road network

Two options (options 1 and 3) have two connection points with the existing road network. This would reduce the footprint of each intersection and separate traffic accessing Terminal 1 and Terminals 2/3. These options are shown on Figure 6.5.

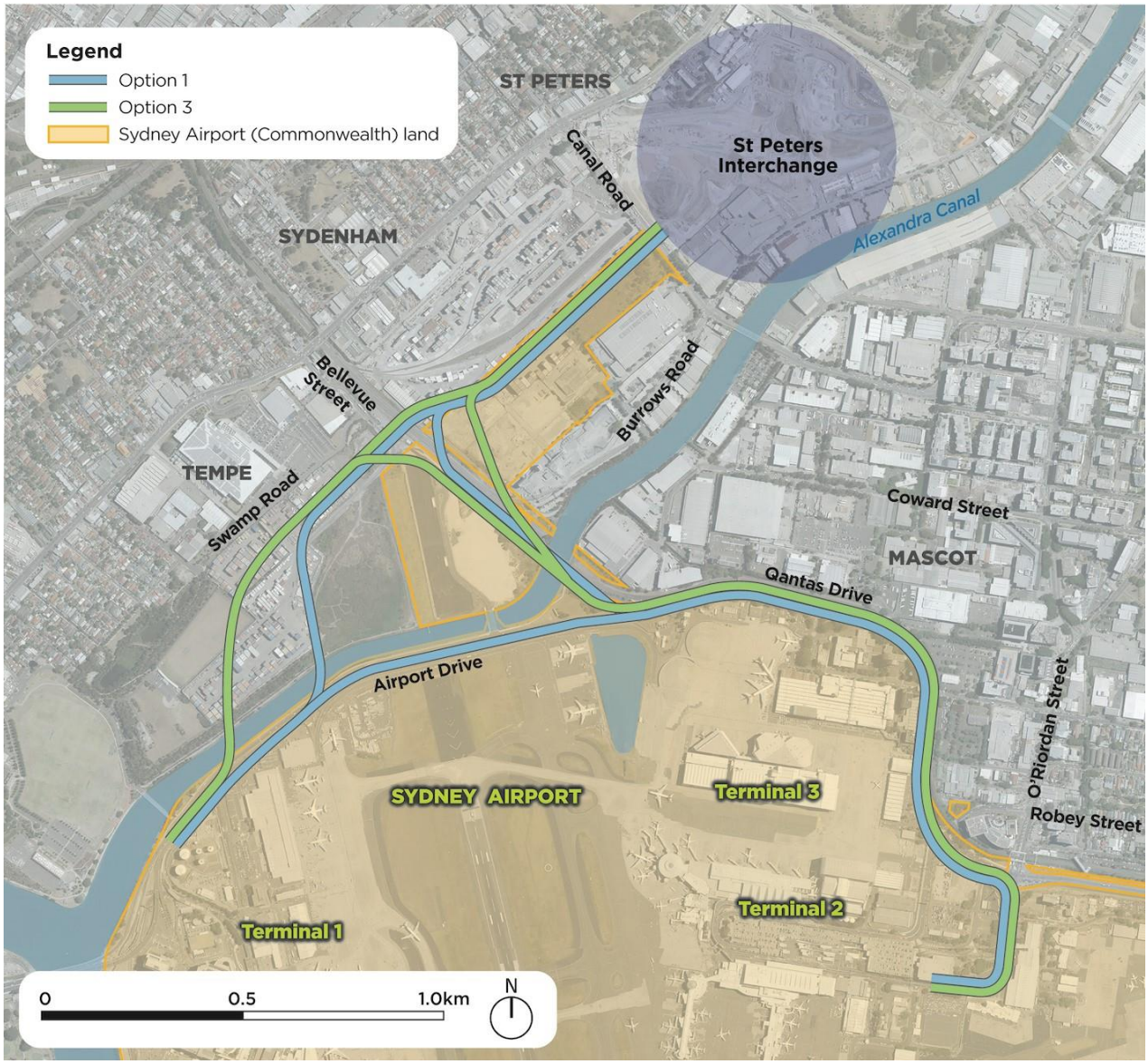


Figure 6.5 Potential alignment options with two connections to the existing road network

A summary comparison of the alignment options is provided in Table 6.4.

Table 6.4 Comparison of alignment options within the preferred corridor

Feature/alignment	Option 1 (light blue)	Option 2 (pink)	Option 3 (light green)	Option 4 (yellow)
Bypass Airport Drive	No	No	Yes	No
Connections to road network	Two	One	Two	One
Impacts to public open space	No	No	Yes	No
Impacts on former Tempe landfill	Yes	Yes	Yes	No
Business impacts	Yes	Yes	Yes	Yes
Number of canal crossings	Two	One	Two	One
Environment, social and heritage impacts	Yes – management required	Yes – management required	Yes – management required	Yes – management required

Connection to the existing road network

The key difference between these alignment options is whether the project would link into the existing road network at a single large interchange, or whether traffic would be split between two connections. This choice affects road network functioning, project footprint and driver experience.

Options 2 and 4 have one connection to the existing road network. This would be a single, large interchange to cater for all traffic movements accessing Terminal 1, Terminals 2/3 and towards Port Botany. This would require substantially more Sydney Airport land. It would also be more difficult to construct, with more disruption of existing traffic during construction.

Providing two separate connections to the existing road network (options 1 and 3) allows for different routes to access Terminal 1 and Terminals 2/3. This allows for simplified intersection footprints, thereby reducing land requirements, improving constructability and reducing traffic disruption during construction. Splitting traffic between separate network interfaces serving the two terminal precincts would also simplify wayfinding for drivers and deliver improved long-term transport capacity.

Providing two connections to the existing road network is preferred because it would:

- Enable a better long term transport outcome
- Simplify wayfinding
- Improve the driver experience
- Simplify construction and staging of temporary road network adjustments during construction
- Reduce the complexity of network interfaces
- Reduce the area of airport land required for network interface construction and operation.

However, it is a more expensive solution due to the need for additional pavement and separate bridge connections.

Options 1 and 3, which provide two network connections, were shortlisted for further design development and consideration.

6.4.6 Preferred alignment

Assessment of shortlisted alignment options

The two shortlisted alignment options (options 1 and 3) are shown on Figure 6.5. These two alignments were compared against the desired project outcomes, including:

- Optimise traffic/transport outcomes (promoting efficient transport of freight, minimising impacts on Mascot town centre, and minimising impact on the existing road network)
- Optimise safety
- Optimise connections to Sydney Airport
- Minimise impacts on airport operations and future airport expansion opportunities
- Minimise impacts on businesses and acquisition of private land
- Minimise impacts on the environment and community
- Maximise the opportunity to create a positive 'Gateway to Sydney' urban design experience
- Improve constructability and reduce traffic impacts during construction.

A key difference between the two shortlisted options is whether Airport Drive remains in use for general traffic (option 1) or whether a bypass is created (option 3). Important considerations regarding whether to retain or bypass Airport Drive for general traffic use include:

- Large trucks passing near the end of the north–south runway on Airport Drive currently conflict with Sydney Airport's prescribed airspace, introducing a hazard to aviation operations and the general public
- Airport Drive is owned by the Commonwealth and the NSW Government has no power to acquire this land without agreement
- The Master Plan includes reference to converting Airport Drive to airport operations only.

Both options 1 and 3 enhance connections to Sydney Airport by providing dedicated routes to Terminal 1 and Terminals 2/3. With respect to the route between Terminal 1 and Terminals 2/3, option 3 requires vehicles to traverse a longer route. However, the additional journey length and duration is considered to be relatively minor.

With respect to safety outcomes, there is a significant difference between the two options. Bypassing Airport Drive removes public safety risks associated with incursions into Sydney Airport's prescribed airspace caused by large trucks on Airport Drive. While a significant incident has not occurred in this area, the current alignment of Airport Drive places a large number of vehicles in close proximity to the public safety area at the end of the runway. The potential outcome of an adverse safety incident in this location would be extremely serious. There is an opportunity to address this issue as part of the project by adopting option 3, which creates a bypass of this section of Airport Drive. Accordingly, a design which avoids ongoing intrusions into the prescribed airspace and diverts traffic away from close proximity to the end of the runway is preferred, as it provides the most desirable safety outcome.

Option 1 does not support the Master Plan. It does not allow for the section of Airport Drive at the end of the north–south runway to be closed to general traffic. This is an important consideration for Sydney Airport, as this is a key factor for future airport planning and operations.

Both options would have similar land requirements for construction and operation, and similar levels of impacts on businesses, the environment and the community. Measures to minimise and mitigate these impacts are provided in Part B of this document.

The opportunity to enhance public open space and the simplification of routes and wayfinding provided by option 3 was considered to offer improved 'Gateway to Sydney' urban design opportunities compared to option 1. Option 3 was also considered to offer improved constructability outcomes compared to option 1. This is a result of the greater height of the prescribed airspace above the Terminal 1 access bridge and the

opportunity to construct most of the Terminal 1 connection and Qantas Drive extension off line, maximising traffic staging opportunities, and minimising disruption to the traffic network.

Earlier design schemes included additional road connections to/from Canal Road for both cars and trucks. However, traffic modelling indicated that such ramps would provide minimal traffic benefits compared with the estimated cost. Based on these investigations, a decision was made that the ramps would not form part of the reference design. Following feedback from the freight industry in 2019, Transport for NSW and Roads and Maritime have been working with industry to explore options for dedicated heavy vehicle access onto the project at Canal Road. While these ramps do not form part of the reference design, there is sufficient space for ramps in this location in future should this be required.

Preferred alignment option

A comparative analysis of options 1 and 3 is summarised in Table 6.5.

Table 6.5 Comparison of shortlisted alignment options – support for design goals

Design/project goals	Option 1 (blue)	Option 3 (light green)
Optimise traffic and transport outcomes	🟢	🟢
Optimise safety	🔴	🟢
Optimise connections to Sydney Airport	🟢	🟢
Minimise impacts on Sydney Airport operations and support the Sydney Airport Master Plan	🔴	🟢
Minimise impacts on businesses and acquisition of private land	🟡	🟡
Minimise impacts on the environment and community	🟡	🟡
Maximise opportunity to create a 'Gateway to Sydney' urban design experience	🟡	🟢
Optimise constructability (including minimising traffic impacts during construction)	🟡	🟢

KEY: 🟢 Strong support 🟡 Moderate support 🔴 Poor support

On balance, option 3, which bypasses the section of Airport Drive close to the end of the north–south runway, is preferred. This option removes an existing safety conflict, supports the Master Plan, provides improved constructability, and provides simpler operational wayfinding and connections. The preferred option is shown on Figure 6.6.

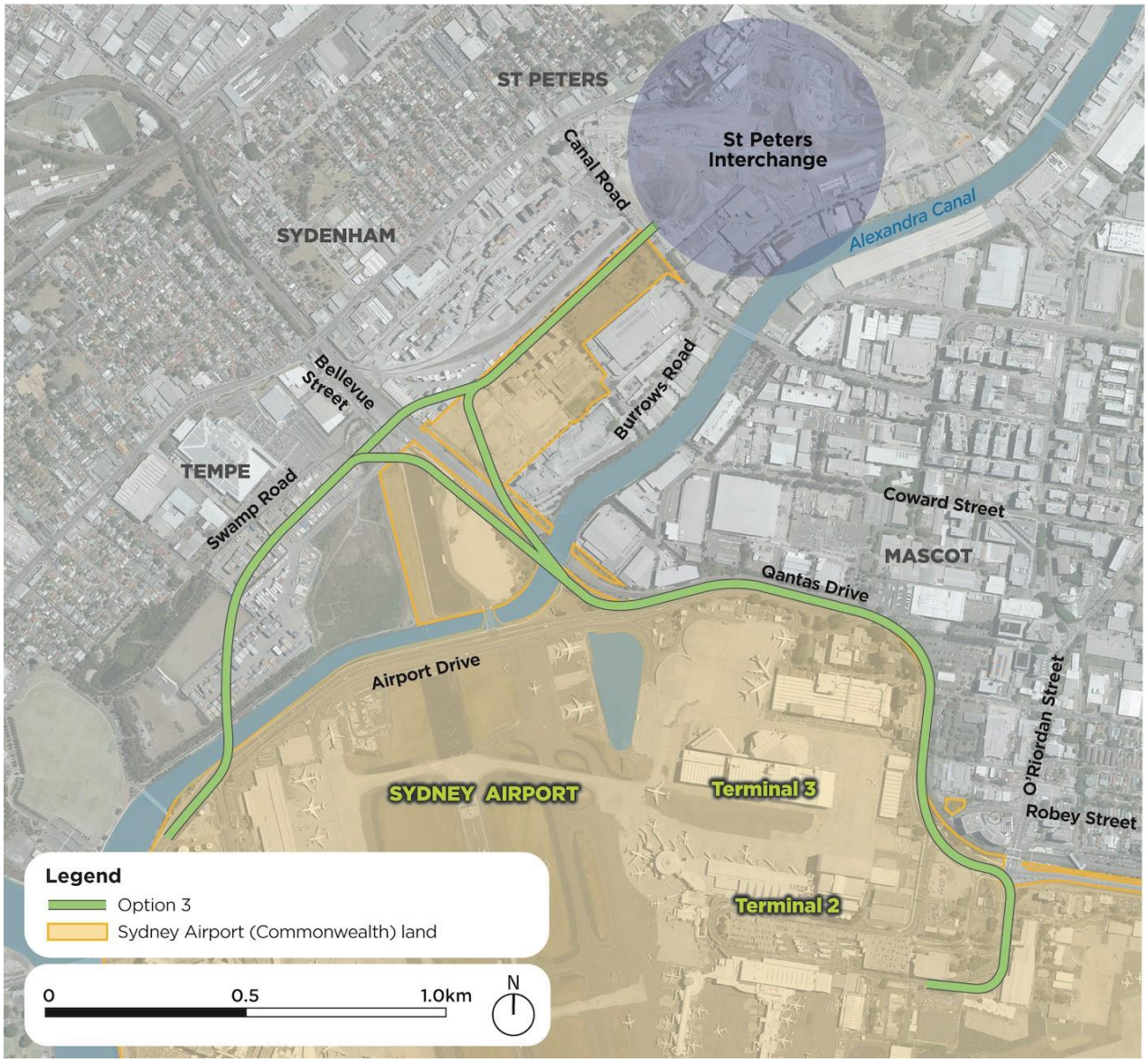


Figure 6.6 Preferred alignment option

6.5 Refining the design of key project features

Following identification of the preferred alignment, further design work was carried out to refine the design of key project features.

This section describes options considered as part of the design development process for:

- Locating a bridge across Alexandra Canal to connect to Terminal 1
- Designing the bridges over Alexandra Canal
- Minimising excavation into the former Tempe landfill
- Managing excavated landfill material
- Relocating the active transport link
- Drainage outlets at Alexandra Canal
- Access to Terminals 2/3.

6.5.1 Location of the bridge to Terminal 1

The prescribed airspace around Sydney Airport limits the height of structures in certain areas (see section 2.2.1). This creates a significant constraint for the design and operation of new overpasses and bridges, including those crossing the Botany Rail Line and Alexandra Canal in close proximity to the end of the north–south runway.

The location and alignment of the bridge to Terminal 1 (the Terminal 1 connection bridge) was moved to a more southerly location to:

- Avoid impacts on the prescribed airspace
- Improve constructability
- Maintain the existing Link Road access to the international freight terminal
- Minimise disruption to existing traffic
- Minimise construction time.

A more southerly alignment for the bridge provides more height for cranes to operate without penetrating the prescribed airspace. It also allows an improved road geometry, with a higher vehicle speed and a better driver experience, compared to a location further north or perpendicular to the canal. A more southerly alignment also creates sufficient space to construct a dedicated access link to Sydney Airport's freight terminal near Terminal 1 and the proposed location of additional freight facilities on the western side of Alexandra Canal.

A more southerly alignment was identified as the preferred alignment as it provides:

- Superior constructability
- Reduced traffic impacts during construction
- Improved road geometry and customer experience
- Superior freight transport outcomes.

Disadvantages of a more southerly bridge alignment include closer proximity to sensitive receivers and more impact on public open space, Tempe Lands and the former Tempe landfill.

6.5.2 Design of the bridges over Alexandra Canal

The preferred corridor and alignment options described in section 6.4 includes new bridges over Alexandra Canal, providing connections to Terminal 1, Qantas Drive and the international freight terminal.

The location (spacing) of bridge piers is an important consideration in the development of cost-effective bridge designs, in addition to other constraints (see section 6.4.1). An important consideration for this project was whether to locate piers within Alexandra Canal. The length of the bridge spans required to pass over the canal range from about 55 metres (for the freight terminal access bridge) to 90 metres (for the Terminal 1 connection, Qantas Drive and terminal link bridges).

Placing bridge piers within the canal would reduce the bridge deck thickness and reduce cost. However, flood modelling undertaken to support the concept design identified that placing piers within the canal would cause an unacceptable increase in flood levels. To mitigate this potential impact, a large amount of land would be required to provide floodwater storage. This would result in additional land requirements.

Locating bridge piers in the canal would also have heritage impacts, and could mobilise contaminants in the canal bed sediments during construction and operation. To avoid and minimise these potential impacts, bridges have been designed without supporting piers in the canal. If this were to change as a result of further design development, additional assessment would be required.

Assessment of bridge design options

A series of bridge options were identified and considered for each crossing location. Each option was ranked using a multi-criteria assessment against agreed engineering, construction, environmental and cost criteria. The assessment criteria included:

- Functional performance (including impacts on utilities and other infrastructure)
- Environmental impacts and urban design outcomes
- Constructability (including safety and staging considerations)
- Implementation and delivery risk
- Estimated whole of life cost.

A multi-disciplinary workshop was held to review each bridge design option and collaboratively score the relative performance of each option against the assessment criteria. A summary of the options considered, and the reasons for selection of the preferred bridge option for each crossing, are provided in the following sections.

Terminal 1 connection bridge

The Terminal 1 connection bridge provides access to Terminal 1. It is located near the south-western end of the project site. It needs to span over Alexandra Canal and the Sydney Water desalination pipeline, connect with Airport Drive, and provide eight traffic lanes (four lanes in each direction).

The following options were considered:

- Option 1: Twin, tied arch steel bridges with bridge decks suspended from concrete-filled steel tubes
- Option 2: V-tower cable-stayed bridge (with thin eight lane deck)
- Option 3: Cable-stayed bridge (with thicker eight lane deck)
- Option 4: Twin balanced cantilever concrete bridges (with four lanes on each deck). This option would not require any elevated supporting structures but would require piers to be installed on the western side of the canal between the canal wall and the desalination pipeline.

The key differences between the options in relation to the assessment criteria are summarised below:

- Functional performance: Options 2 and 3 have had limited previous Australian application. Option 4 would provide the desired clearance of the desalination pipeline.
- Environmental impacts: All options would avoid piers in Alexandra Canal. All options would require some excavation within the former Tempe landfill.
- Constructability: Option 4 would be the simplest and quickest to construct and involve standard construction methodologies widely used in NSW and Australia. Options 1, 2 and 3 would be more complex to construct. Options 2 and 3 would be the most difficult to construct with additional time and cost risk.
- Constructability (staging): Option 4 involves constructing two bridges, allowing each bridge to be completed separately, providing greater flexibility to stage traffic movements during construction (discussed in section 8.4.3).
- Implementation: Option 1 would require temporary support towers to install the arches. Additionally, assembly of the bulk steel elements for option 1 would potentially result in greater delivery risk relative to the other options.
- Whole of life cost: Options 2 and 3 would be relatively more expensive compared with other options. Option 4 would have the lowest whole of life cost.

Option 4 (twin balanced cantilever concrete bridges) performed strongly in the areas of functional performance advantages, constructability benefits, and lowest whole of life costs. Option 4 was selected as preferred as it performed best against the identified assessment criteria.

Figure 6.7 illustrates the preferred bridge option for the Terminal 1 connection bridge (option 4).

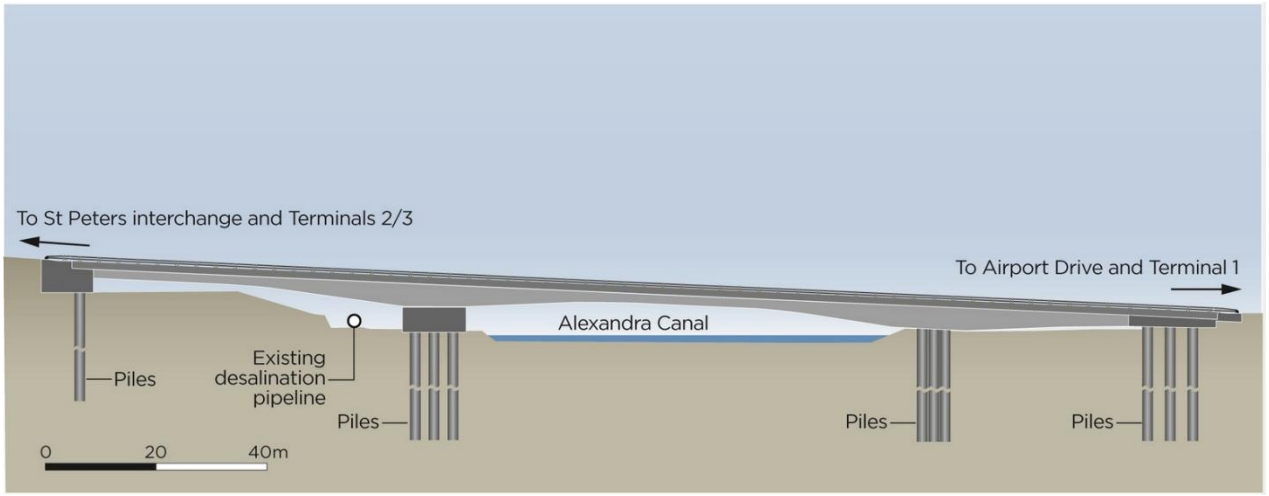


Figure 6.7 Preferred balanced cantilever concrete bridges for the Terminal 1 connection bridge

Freight terminal access bridge

This bridge forms part of the freight terminal access located to the north of the Terminal 1 connection bridge. It needs to cross Alexandra Canal and the desalination pipeline, connect to Airport Drive, and provide four traffic lanes and a shared path.

The following options were considered:

- Option 1: Two span, steel box girder and pre-stressed plank bridge – consisting of a single box girder bridge over the canal and desalination pipeline, with a plank and girder span on the western side of the canal
- Option 2: Two span, continuous steel box girder bridge.

Cable-stayed bridge options were also considered but not shortlisted, as they would be significantly more expensive to construction and ensure they conform to aviation safety requirements. The key differences between options 1 and 2 in relation to the assessment criteria are summarised below:

- Functional performance: Option 2 would provide the desired clearance to the desalination pipeline required by the asset owner
- Environmental impacts: Option 2 would result in less excavation from the former Tempe landfill.

No significant differences were identified in constructability, implementation or whole of life cost. On balance, Option 2 (two span, continuous steel box girder bridge) was selected as preferred as it performed best against the assessment criteria.

Figure 6.8 illustrates the preferred bridge option for the freight terminal access bridge (option 2).

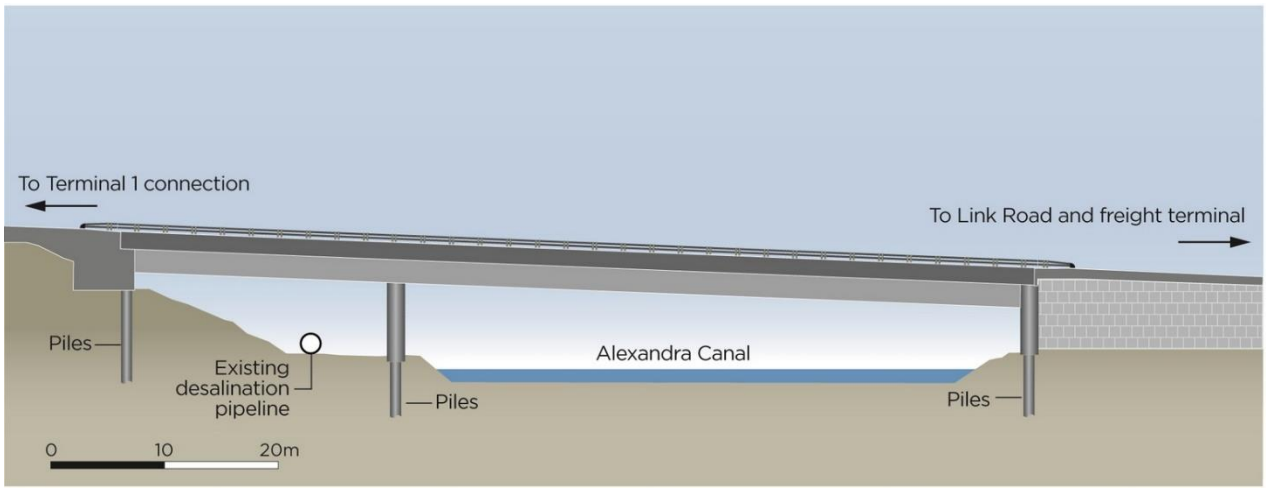


Figure 6.8 Preferred steel box girder bridge for the freight terminal access bridge

Qantas Drive bridge

This bridge forms part of the Qantas Drive upgrade and extension. It needs to cross Alexandra Canal, pass over the eastbound terminal link and the Botany Rail Line, and provide six traffic lanes.

The following options were considered:

- Option 1: Single concrete box girder bridge with plank and girder spans over the Botany Rail Line and the northern lands access
- Option 2: Twin, steel box girder bridges.

Balanced cantilever concrete and cable-stayed bridge options were also considered, but not shortlisted, as they would be significantly more expensive. The key differences between options 1 and 2 are summarised below:

- Environmental impacts: Option 2 would generate less spoil (which could potentially be contaminated) and would be aesthetically similar along its entire length providing a better urban design and visual outcome. In contrast, option 1 would appear as a combination of different structures leading to poorer urban design outcome and greater visual impact.
- Constructability (footprint): Option 1 would require access to and use of more construction work areas compared with option 2. Some of these additional areas would be required to be located within adjacent facilities, further extending the project construction footprint. Option 1 may also take longer to construct than option 2.
- Implementation: Option 2 would have a lower delivery risk as it would require a more limited site area and not require access to adjacent properties.

On balance, option 2 (twin, steel box girder bridges) performed best against the identified assessment criteria. Option 2 was selected as preferred as it performed strongly in the areas of implementation risk, constructability. It would also be would be more consistent visually along its length leading to improved urban design outcomes.

Terminal link bridge

This bridge forms part of the eastbound terminal link. It is located below, and to the north of, the Qantas Drive bridge. It needs to cross over Alexandra Canal and provide two traffic lanes.

The following options were considered:

- Option 1: Cable-stayed bridge
- Option 2: Truss bridge
- Option 3: Twin, tied arch bridges – with bridge decks suspended from concrete filled steel tubes.

The key differences between the options in relation to the assessment criteria are summarised below:

- Environmental impacts: Option 2 would be the best fit within the landscape and provide the greatest consistency with other bridges
- Constructability: Options 2 and 3 would be the only options that would facilitate the continued use of the section of shared user path east of Nigel Love bridge during construction
- Constructability: Option 1 would be most difficult to construct with higher cost and program risks
- Whole of life costs: Option 1 would be most expensive. Option 3 would have the lowest whole of life cost.

Options 2 and 3 performed similarly in the assessment. Overall Option 3 was preferred due to its lower whole of life costs and visual appearance relative to the two adjacent bridges.

Figure 6.9 illustrates the preferred bridge option for the terminal link bridge (option 3).

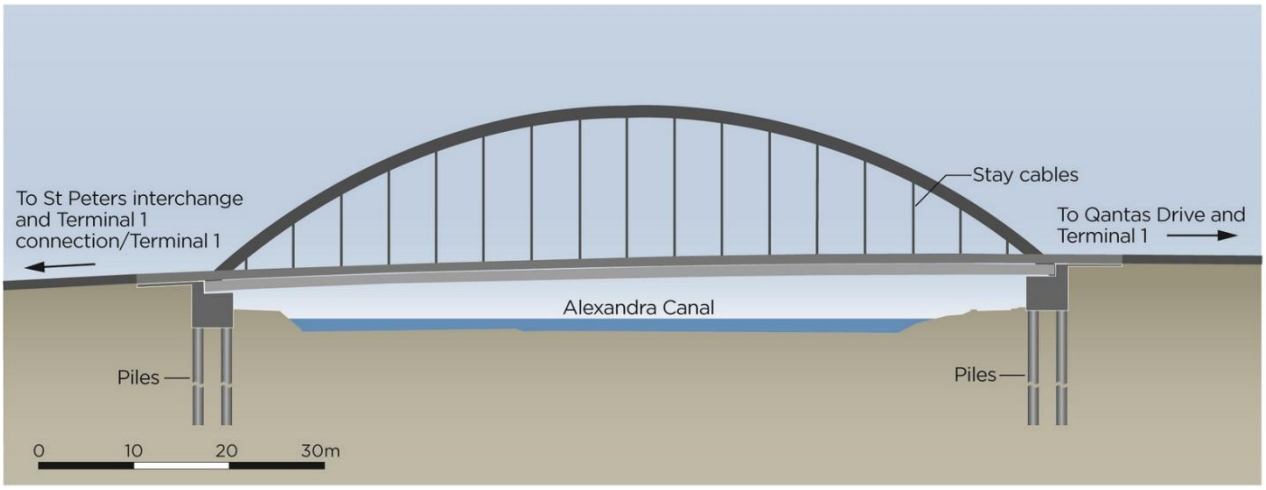


Figure 6.9 Preferred tied arch bridge for the terminal link bridge

6.5.3 Minimising excavation into the former Tempe landfill

The project crosses the former Tempe landfill. To construct the Terminal 1 connection, about 90,000 cubic metres of waste material would need to be excavated, with a new landfill cap and new road infrastructure placed over the top.

Design refinements to minimise the amount of waste excavation included:

- Raising the northern approach to the freight terminal bridge
- Raising the northern approach to the Terminal 1 connection bridge
- Using an innovative foundation design that acts as both the foundation for the road and a new cap for leachate and landfill gas.

To minimise the potential for environmental impacts, the road alignment was kept as high as possible. This would reduce excavation into the former Tempe landfill, while still providing adequate clearance to prevent vehicles penetrating Sydney Airport's prescribed airspace.

6.5.4 Management of excavated landfill material

Two options were considered for managing excavated landfill materials:

- Option 1: Remove for disposal at a landfill
- Option 2: Retain on site in new waste ‘cells’.

The location of the project on a former landfill site provides an opportunity to reduce the project’s total environmental impact by re-emplacing waste material on the project site.

Re-emplacing excavated waste material on site could avoid up to around 4,500 truck movements associated with disposal and save limited space in other licenced landfill sites.

Re-emplacement would also create opportunities for new landscaping features such as mounds, lookouts, and new areas for active and passive recreation. To reduce the overall project environmental impacts, retaining and re-emplacing some of the excavated waste materials on site in the form of one or more emplacement mounds is proposed. Final decisions on the location and size of the mound(s) would be made with reference to aviation safety considerations, including potential impact on air movements and windshear, and Council’s requirements for future use and design of open space.

It is anticipated that a combination of retaining some excavated landfill material in mounds on site and removing the rest to an offsite landfill would be required.

6.5.5 Relocation of the active transport link along Alexandra Canal

Location and key design constraints

The project would impact the existing off-road shared cycle and pedestrian path adjacent to Airport Drive and Alexandra Canal (the Alexandra Canal cycleway). This path is part of a popular regional cycle route extending from Wolli Creek Station to Coward Street, Mascot, where it connects to shared paths on Bourke Street, Bourke Road and Gardeners Road.

Part of the shared path adjacent to Airport Drive and Alexandra Canal would need to be relocated because the section of Airport Drive to the north of the freight terminal access would be closed to non-airport traffic on completion of the project in accordance with the Master Plan.

Four potential options relocate the active transport link were considered as shown on Figure 6.10.

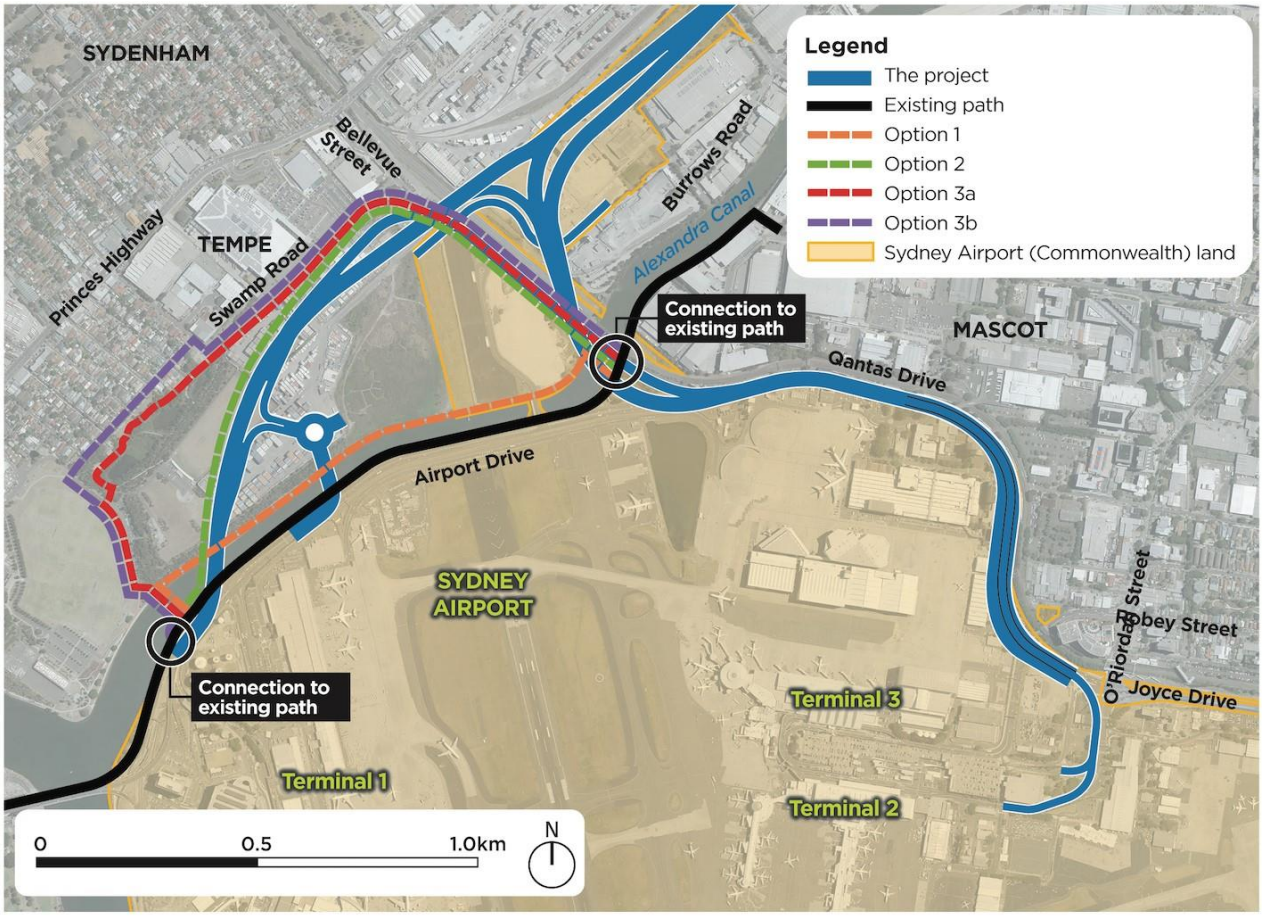


Figure 6.10 Options for relocating the active transport link

The following options for relocating the active transport line were developed and considered during 2018 and 2019, with input from relevant stakeholders, bike users and the community:

- Option 1 – on the western side of Alexandra Canal, along the desalination pipeline easement. Underpasses of the Terminal 1 connection, freight terminal access and Nigel Love bridges would be required.
- Option 2 – along the Terminal 1 connection and the eastbound terminal link roads
- Option 3a – via the eastern edge of the Tempe Recreation Reserve and through the Tempe Wetlands, connecting to Swamp Road in Tempe and the eastbound terminal link
- Option 3b – similar to option 3, via the eastern edge of the Tempe Recreation Reserve, connecting to the southern end of South Street in Tempe, and via Swamp Road and the eastbound terminal link.

All options would be longer than the existing route.

Selecting the preferred route was influenced by consideration of the following functional requirements:

- Existing shared path at Coward Street – the route needs to connect to the existing shared path
- Alexandra Canal – the route needs to cross the canal at one or more locations
- A positive user experience – noting that a shorter route, lower inclines and canal views contribute to a positive user experience.

The following constraints were also considered:

- The Sydney desalination pipeline – access requirements and maintenance clearances around the pipeline on the western bank of Alexandra Canal need to be maintained

- Land ownership and access issues – including compensation to acquire land or amend existing easements and ensuring sufficient access is available for future maintenance activities
- Safety – including crime prevention through environmental design (CPTED) principles (particularly opportunities for passive surveillance) to provide adequate levels of safety for users.

Consultation was undertaken with stakeholders and the community, including bike groups, local councils, residents and community groups. Following consideration of bike users' needs and requests, option 1 (western side of Alexandra Canal) was selected as the preferred route. This option would provide the shortest, flattest route, and a similar level of amenity to the existing route. This route would be suitable for commuters and leisure users, and would maximise the experience of canal views, which was strongly requested by all user groups.

6.5.6 Drainage outlets in Alexandra Canal

The efficient removal of stormwater from the roadway is necessary to provide safe driving conditions for motorists. The drainage design for the project is principally governed by the location and geometry of the new road infrastructure and the ability to either connect to existing stormwater drainage or a receiving watercourse.

Within the project site, Alexandra Canal is the main floodway for catchment stormwater. Investigations were undertaken of the capacity of drainage infrastructure both within and adjacent to the canal catchment. The investigations concluded that there was limited capacity within adjacent catchments without substantial network augmentation, which would not be cost-effective. Additionally, to either divert stormwater to another catchment or to connect to these networks, would require a large land area and long lengths of new stormwater drainage infrastructure, which would be impractical and prohibitively expensive.

Given it is not feasible to drain local stormwater to adjacent catchments, two options were considered to use the existing local drainage network, including existing outlets into Alexandra Canal:

- Option 1 – augment existing stormwater outlets in their current location, and if augmentation is not possible, provide additional (new) outlets
- Option 2 – consolidate existing outlets and, where possible, remove surplus outlets.

In reviewing these options, consideration was given to a range of construction, engineering and environmental issues, including:

- The heritage significance of the canal, particularly the original sandstone fabric of the canal walls in some locations
- Potential (additional) flooding impacts
- Disturbance of contaminated sediments in the canal due to stormwater discharges during operation (energy dissipating structures may be required)
- Construction methods and the potential to temporarily disturb sediments during construction.

Based on the results of flood and drainage modelling of the catchment, option 1 was identified as a feasible solution because the existing drainage system is already near capacity.

The proposed drainage design would involve enlarging and reusing four existing drainage outlets, constructing five new outlets and reusing one existing outlet. Some disturbance within the canal would be necessary during construction.

6.5.7 Access to Terminals 2/3

Improving vehicle access to Terminals 2/3 is critical to the success of the project. The existing intersections on Qantas Drive used to access Terminals 2/3 are capacity constrained and located in areas where opportunity for further expansion is limited by the adjacent Botany Rail Line.

Two grade-separated 'flyover' options to improve access to Terminals 2/3 were investigated and are described below.

Option 1 - A central flyover

Option 1 comprises a new two lane flyover, from Qantas Drive into Sir Reginald Ansett Drive, linking to the existing elevated access to the departure areas at Terminals 2/3. Traffic accessing Terminals 2/3 from the west would be grade-separated on a viaduct, passing over other traffic on Qantas Drive, avoiding the need to travel through the existing at-grade intersection. This option is shown on Figure 6.11.

As the flyover enters the airport, additional lanes and ramps would be added to distribute traffic to departures, arrivals and the future new ground transport interchange. This flyover has two sub-options that differ according to where they enter the proposed new transport interchange.

Advantages of option 1 include:

- Shortest and most direct link to Terminals 2/3 for traffic using the project
- Allows the majority of traffic to access Terminals 2/3 under free flow conditions
- Least expensive.

Disadvantages include:

- Limited space for vehicle queuing and management within the Terminals 2/3 precinct
- More difficult to construct under traffic.

Option 2 - Joyce Drive flyover

Option 2 is a flyover loop linking Joyce Drive to the eastern end of Ross Smith Avenue. Entry to Terminals 2/3 would be via a flyover and ramp to ground level on Ross Smith Avenue. There would also be a possible future opportunity to extend a viaduct along Ross Smith Avenue for additional capacity. This option would make Ross Smith Avenue a main airport entry route that could support a range of services and provide enhanced opportunities for vehicle and queue management. Option 2 is shown on Figure 6.11.

An enhanced entry along Ross Smith Avenue would also support traffic access from General Holmes Drive. Traffic from O'Riordan Street would be provided with a free left turn at Joyce Drive. A separate lane would connect with the viaduct.

Advantages of option 2 include:

- Enhanced capacity to accommodate future vehicle management and volume growth
- Lower risk of vehicle queues extending onto the external road network.

Disadvantages include:

- Traffic on the Sydney Gateway road project would not be removed from the existing capacity-constrained intersections on Qantas Drive
- Larger project footprint
- More expensive
- Increased travel distance for vehicles travelling to/from the airport via the Sydney Gateway road project.

Despite being more difficult to construct under traffic, option 1 is preferred as it:

- Provides the quickest travel time for vehicles accessing Terminals 2/3 to/from western Sydney
- Removes traffic from the existing constrained at-grade airport access intersections on Qantas Drive
- Provides traffic light free access for the majority of vehicles.

Option 1b was selected as the preferred option for the project as it would facilitate superior internal movements within the future transport interchange.

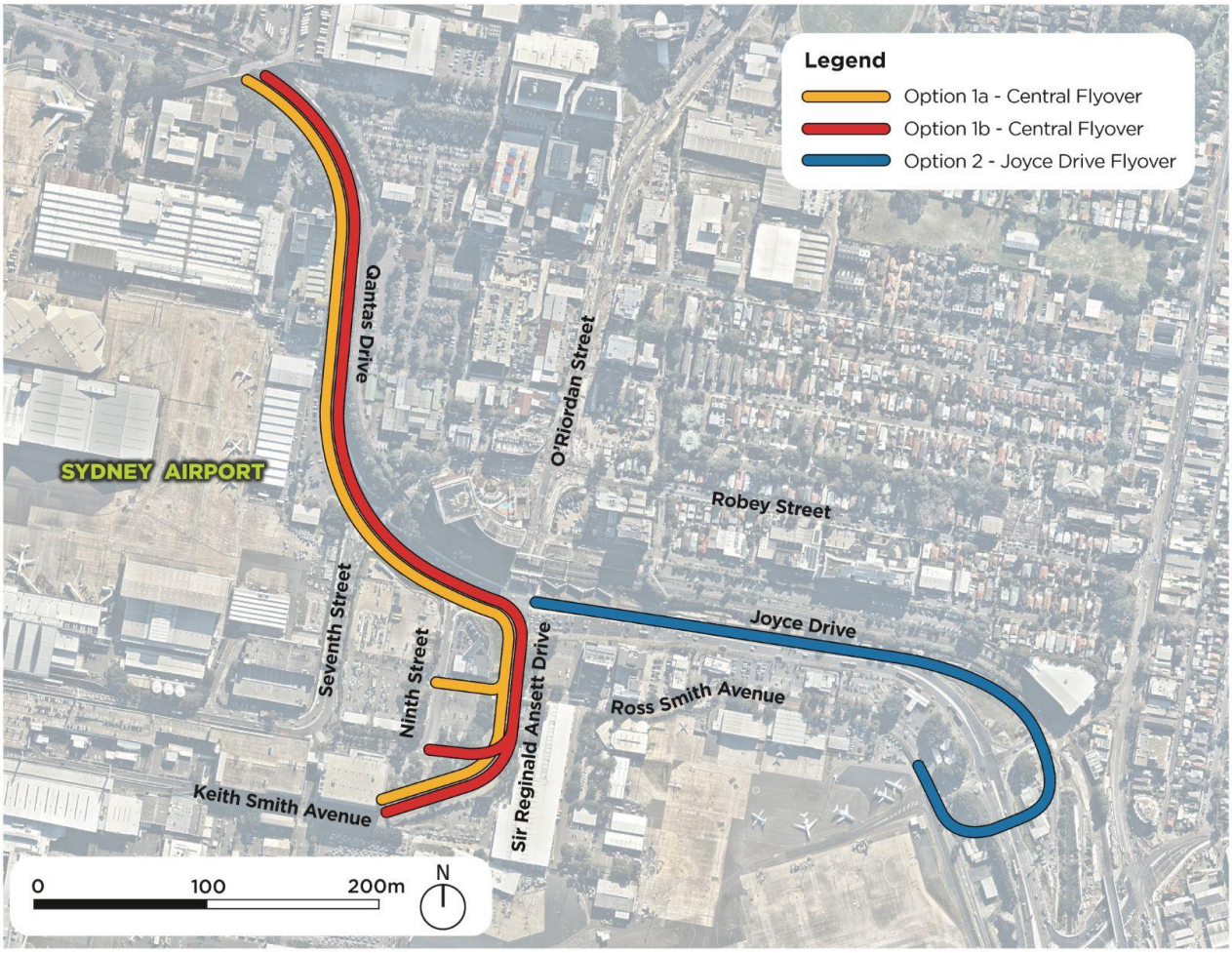


Figure 6.11 Terminals 2/3 flyover access options

Chapter 7

Project description

This chapter provides a description of the project's design features. It includes a description of the main infrastructure proposed, ancillary infrastructure, land requirements and proposed access changes. It also describes the approach to urban design and place making, and how this has, and will continue to be, integrated in the design process.

The project is located on Sydney Airport land and on land subject to the EP&A Act. As it is not always possible to meaningfully separate the individual components of each project feature according to the approval pathway, the features are described as a whole in this chapter, with additional information provided where possible to define the elements that are located on each type of land.

The project described in this chapter is based on a concept design. Flexibility has been provided in the concept design to allow for refinement during detailed design in response to submissions received following exhibition and/or if opportunities arise to minimise environmental impacts. The final design may therefore vary from the concept design described in this chapter. Further refinements may be identified in the preferred infrastructure report and the project approval.

The SEARs and MDP requirements addressed in this chapter are listed below. Full copies of the SEARs and MDP requirements, and where they are addressed in this document, are provided in Appendices A and B respectively.

Reference	Requirement	Where addressed
General standard SEARs		
2.1	The EIS must include, but not necessarily be limited to, the following: (b) a description of the proposal, including key components and activities (including ancillary components and activities) required to construct and operate it, including:	This chapter describes the components required to operate the project. The activities required to construct the project are described in Chapter 8 (Construction)
	• the proposed route	Section 7.1.1
	• all surface road work upgrades including road widening, intersection treatments, partial or full road closures and bridges	Sections 7.3 to 7.8
	• pedestrian and cyclist facilities including any temporary changes resulting from construction activities	Section 7.9 (proposed facilities)
	• construction and operational ancillary facilities and infrastructure	Section 7.10 (operational ancillary facilities)
	• the relationship of the proposal with existing and proposed road and freight transport services	Chapter 5 (Strategic context and project need)
	• all utility undertakings (relocations, augmentations, adjustments and protection works) which will be undertaken as part of the proposal	Sections 7.10.11 and 8.7
	• land use changes and acquisition of privately owned, council and crown land	Section 7.11 (land requirements) and Chapter 19 (Land use and property) (land use changes)
	(j) a demonstration of how the proposal design has been developed to avoid or minimise likely adverse impacts	Chapter 6 (Project alternatives and options)

Reference	Requirement	Where addressed
Key issue SEARs		
4	**Place making and urban design**	
4.1	The Proponent must identify how functional 'place' outcomes of public benefit will be achieved, including design principles and strategies that: (a) consider areas identified for future urban renewal;	Section 7.12.2
	(b) identify areas of reduced traffic volumes and reduction of traffic permeation, particularly in and around commercial and community centres;	Section 7.12.2, Chapter 9
	(c) avoid locating infrastructure, including ancillary facilities, adjoining residential areas and other sensitive receivers, and justify where this cannot be achieved;	Section 7.12.2
	(d) achieve high quality landscape design, streetscapes, architecture and design;	Section 7.12.2
	(e) identify and incorporate urban design strategies and identify opportunities that will enhance healthy, cohesive and inclusive communities, including in relation to accessibility and connectivity;	Section 7.12.2
	(f) consider residual land treatments, and demonstrate how the proposed hard and soft urban design elements of the proposal would be consistent with the existing and desired future character of the area traversed or affected by the proposal;	Sections 7.12.2 to 7.12.4
	(g) identify opportunities to utilise surplus or residual land, particularly for the provision of community space (passive and recreational) and the process for determining ongoing maintenance of the lands; and	Section 7.12.4
	(h) explore the use of Crime Prevention Through Environmental Design (CPTED) principles during the design development process, including natural surveillance during the design development process, including natural surveillance, lighting, walkways, signage and landscape.	Section 7.12.2
MDP requirements		
91(1)	A major development plan, or a draft of such a plan, must set out: (c) a detailed outline of the development	This chapter

7. Project description

7.1 Overview

7.1.1 The project and its alignment

The project would comprise new and upgraded sections of road linking the Sydney motorway network at St Peters interchange with Sydney Airport's terminals. It would also provide improved links to the surrounding road network, including Marsh Street, O'Riordan Street, Joyce Drive and beyond. Overall, about 6.6 kilometres of road would be constructed or upgraded as part of the project.

The project provides a number of linked road connections to facilitate the movement of traffic between the Sydney motorway network, Terminal 1 (the International Terminal) and Terminals 2/3 (the Domestic Terminals). The project would connect Terminal 1 and Terminals 2/3 with each other and with the Sydney motorway network (ie the New M5 and M4-M5 Link) at St Peters interchange. The project would also facilitate the movement of traffic towards Port Botany via Joyce Drive and General Holmes Drive.

The project would provide three main routes for traffic:

- Between the Sydney motorway network and Terminal 1, and towards the M5 motorway and the Princes Highway
- Between the Sydney motorway network and Terminals 2/3, and towards General Holmes Drive, Port Botany and Southern Cross Drive
- Between Terminal 1 and Terminals 2/3.

Figure 7.1 provides an overview of the primary connections the project would provide as well as the secondary connections the project would also facilitate.

The project would also provide access to Sydney Airport land on both sides of Alexandra Canal.

Key features

For the purpose of the impact assessment, the project has been divided into key components or features based on the location and functionality of each. The key components or features include:

- Road links to provide access between the Sydney motorway network and Sydney Airport's terminals, consisting of the following components:
  - St Peters interchange connection – a new elevated section of road extending from St Peters interchange to the Botany Rail Line, including an overpass over Canal Road
  - Terminal 1 connection – a new section of road connecting Terminal 1 with the St Peters interchange connection, including a bridge over Alexandra Canal and an overpass over the Botany Rail Line
  - Qantas Drive upgrade and extension – widening and upgrading Qantas Drive to connect Terminals 2/3 with the St Peters interchange connection, including a high-level bridge over Alexandra Canal
  - Terminal links – two new sections of road connecting Terminal 1 and Terminals 2/3, including a bridge over Alexandra Canal
  - Terminals 2/3 access – a new elevated viaduct and overpass connecting Terminals 2/3 with the upgraded Qantas Drive

- Road links to provide access to Sydney Airport land:
  - A new section of road and an overpass connecting Sydney Airport's northern lands on either side of the Botany Rail line (the northern lands access)
  - A new section of road, including a signalised intersection with the Terminal 1 connection and a bridge, connecting Sydney Airport's existing and proposed freight facilities on either side of Alexandra Canal (the freight terminal access)
- An active transport link, about 1.3 kilometres long and located along the western side of Alexandra Canal, to maintain connections between Sydney Airport, Mascot and the Sydney central business district
- Intersection upgrades or modifications at:
  - Link Road/Airport Drive
  - Lancastrian Road/Qantas Drive
  - Robey Street/Seventh Street/Qantas Drive
  - Qantas Drive/O'Riordan Street/Joyce Drive/Sir Reginald Ansett Drive
  - Ross Smith Avenue/Sir Reginald Ansett Drive
  - Shiers Avenue/Sir Reginald Ansett Drive
- Operational ancillary infrastructure, including maintenance bays, new and upgraded drainage infrastructure, signage and lighting, retaining walls, noise barriers, flood mitigation basin, utility works and landscaping.

The key features of the project are shown on Figure 7.2 to Figure 7.7 and described in sections 7.3 to 7.10.

As part of the above, the project includes four new bridges over Alexandra Canal and six overpasses over roads and the Botany Rail Line (the rail corridor). The proposed bridges and overpasses are described in sections 7.3 to 7.8. The names used in those sections are indicative reference names applied for the purposes of the impact assessment.

Preparatory investigations, surveys and notifications

The project would not include some preliminary works, including surveys, test drilling, test excavations, geotechnical or contamination investigations or other tests, sampling or investigations undertaken for the purposes of the design or assessment of the project.

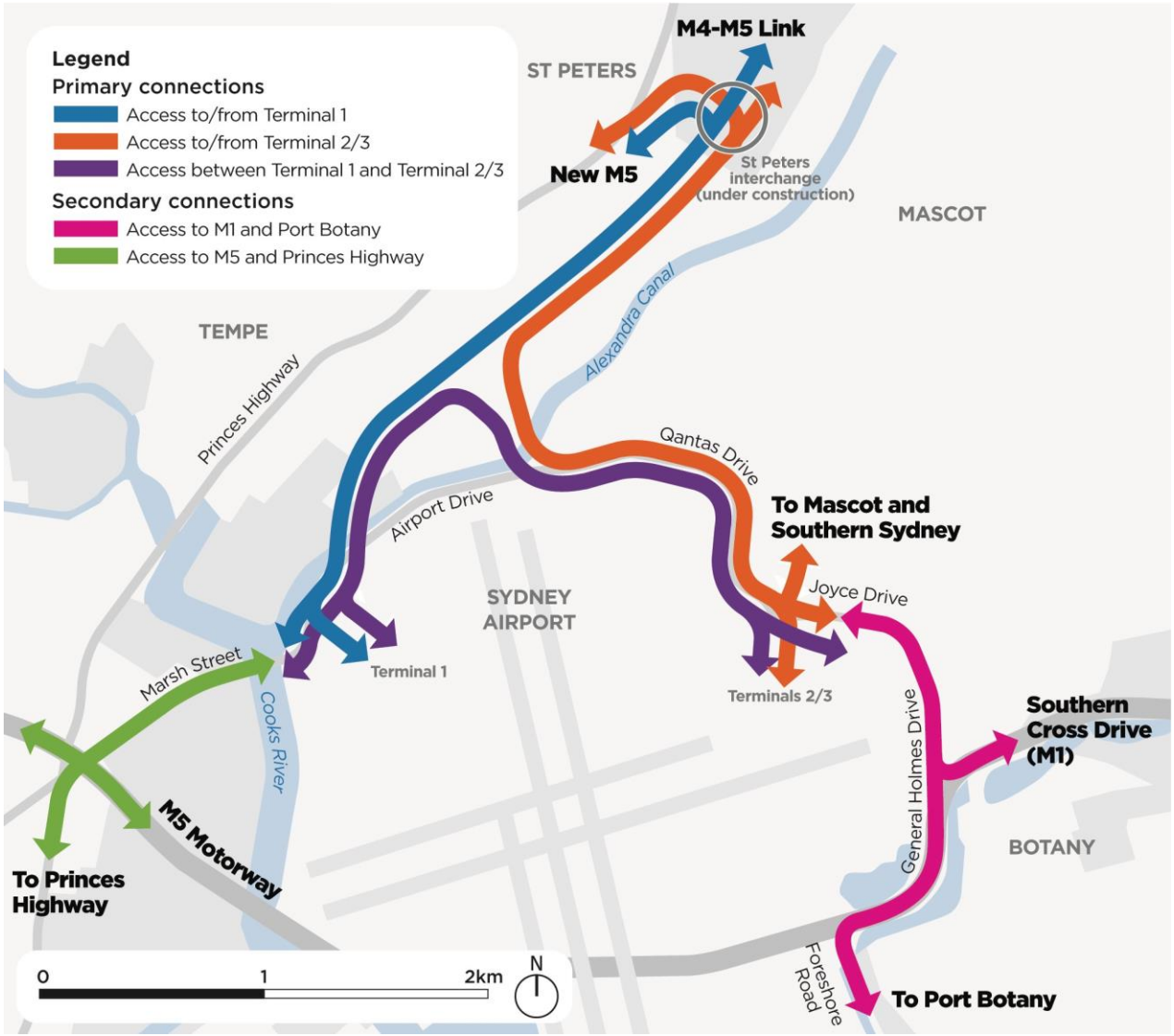


Figure 7.1 Connectivity provided by the project

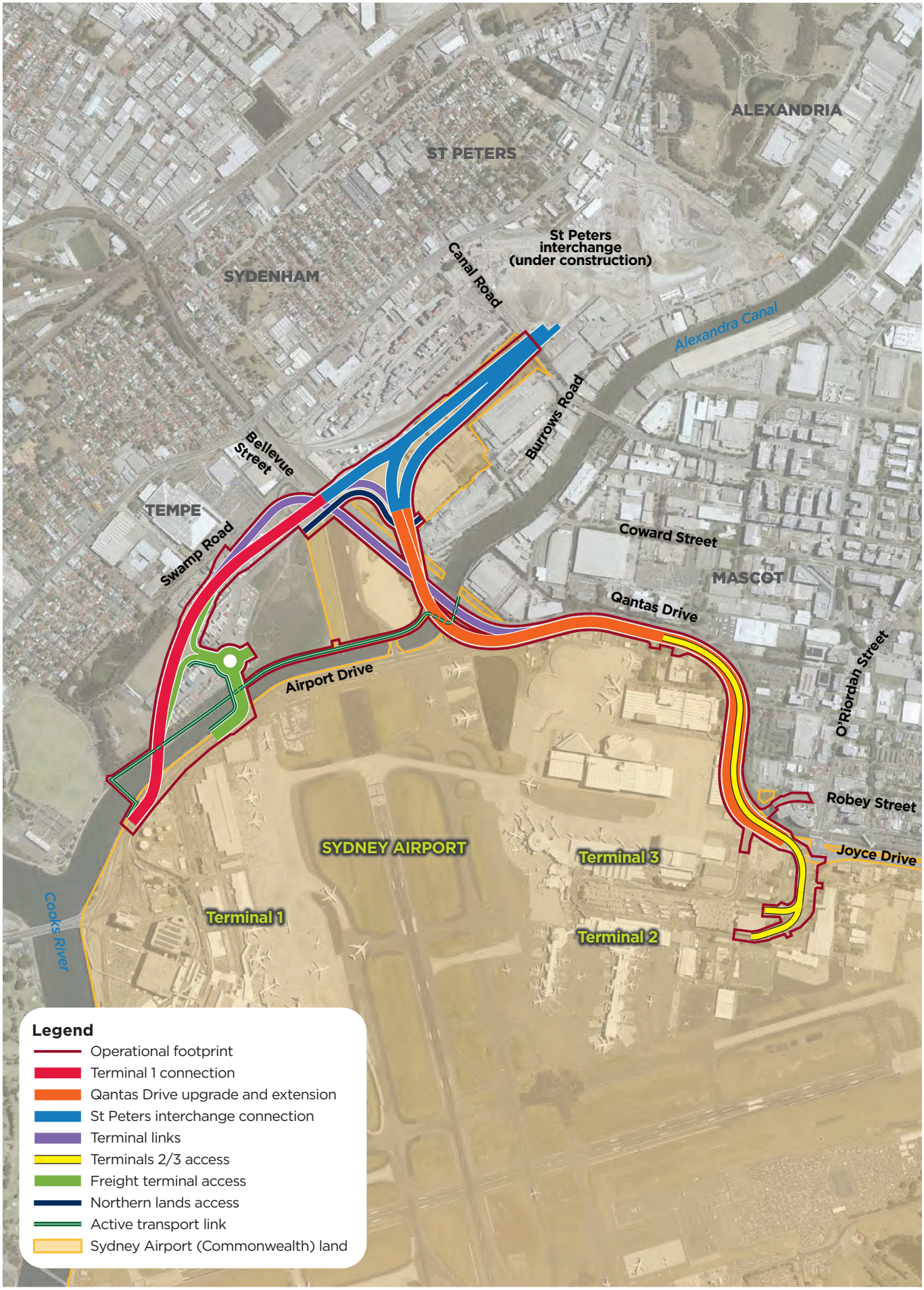


Figure 7.2 **Project layout - overview**

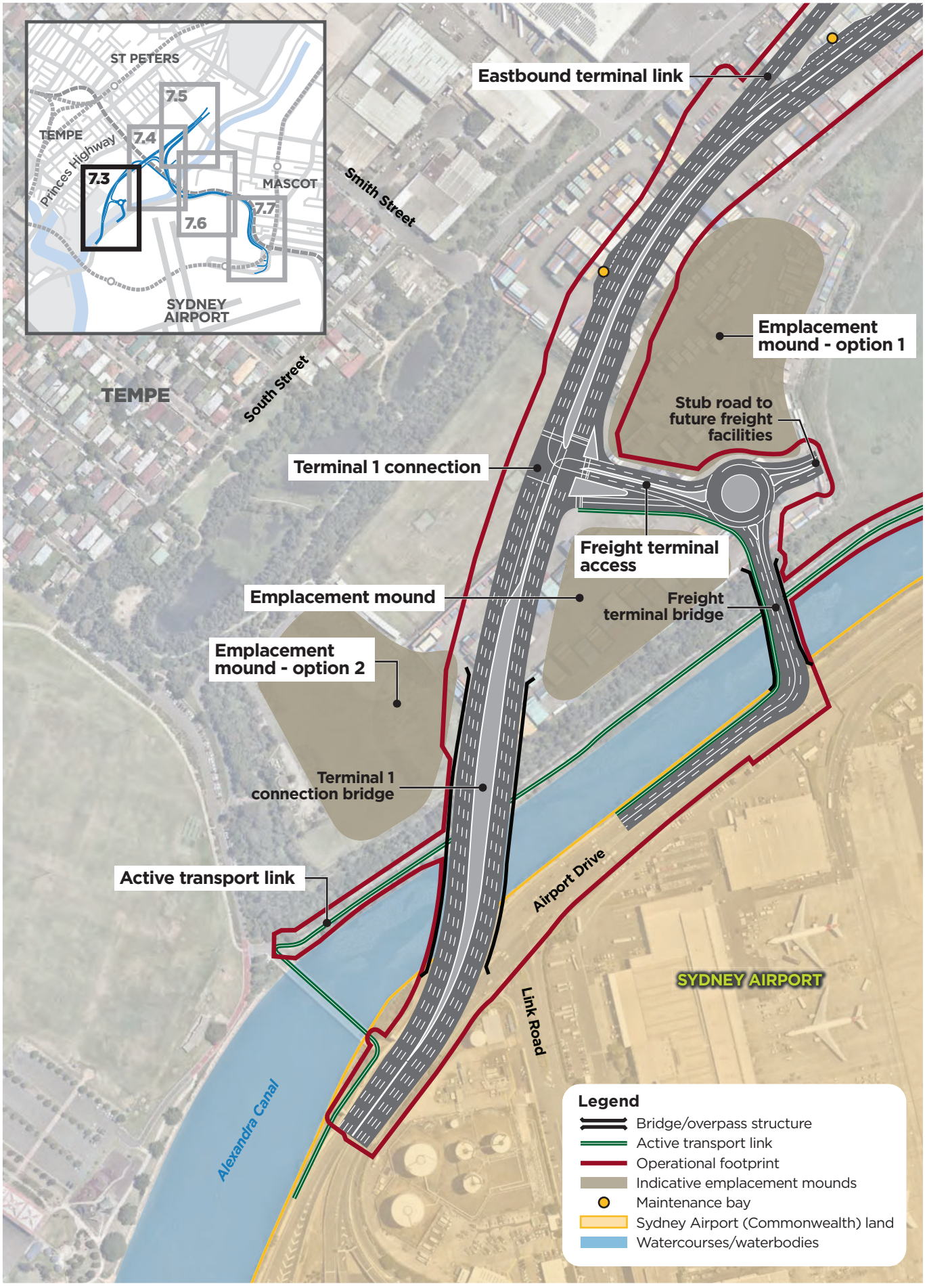


Figure 7.3 **Project layout - map 1**

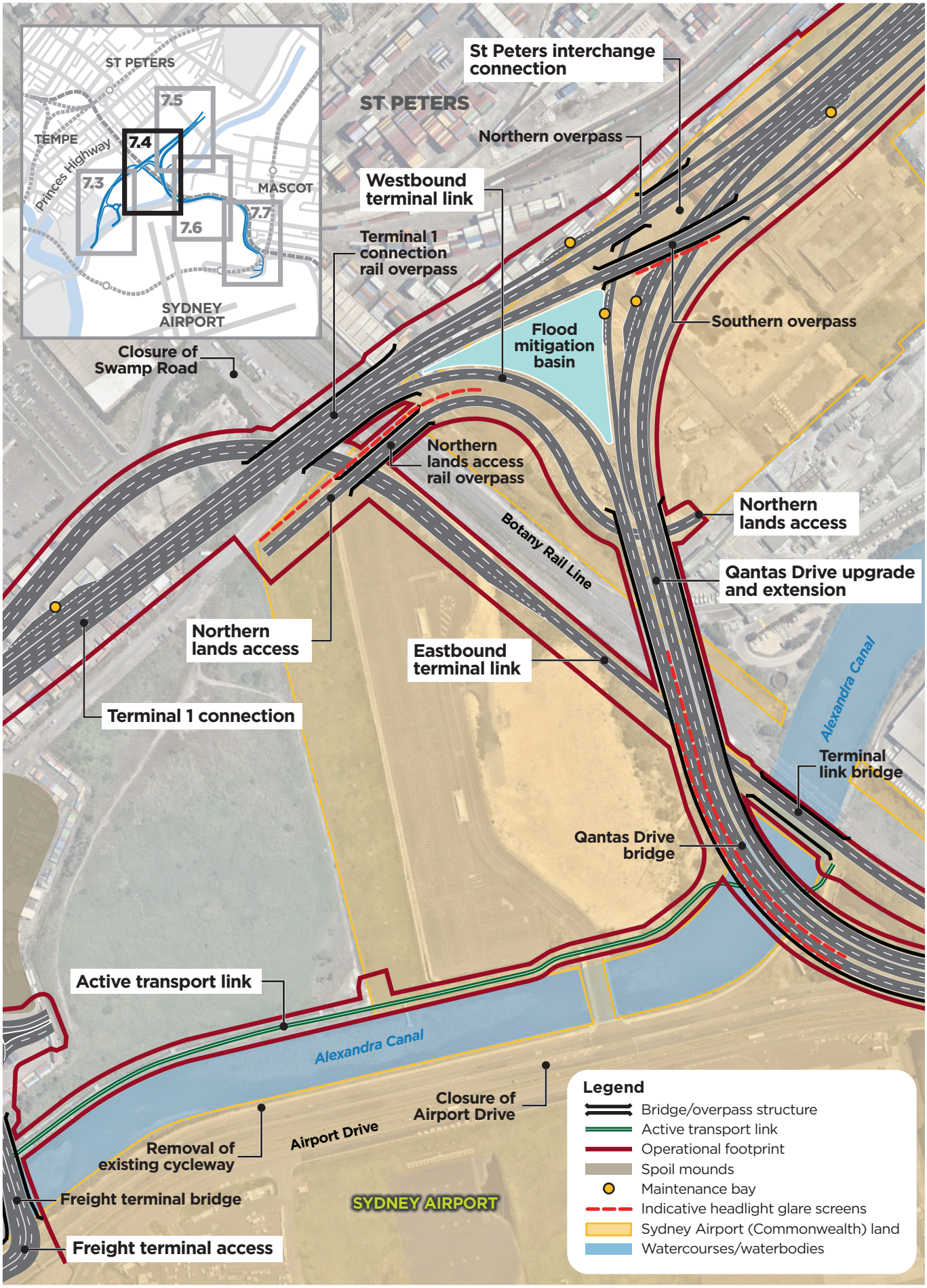


Figure 7.4 **Project layout - map 2**

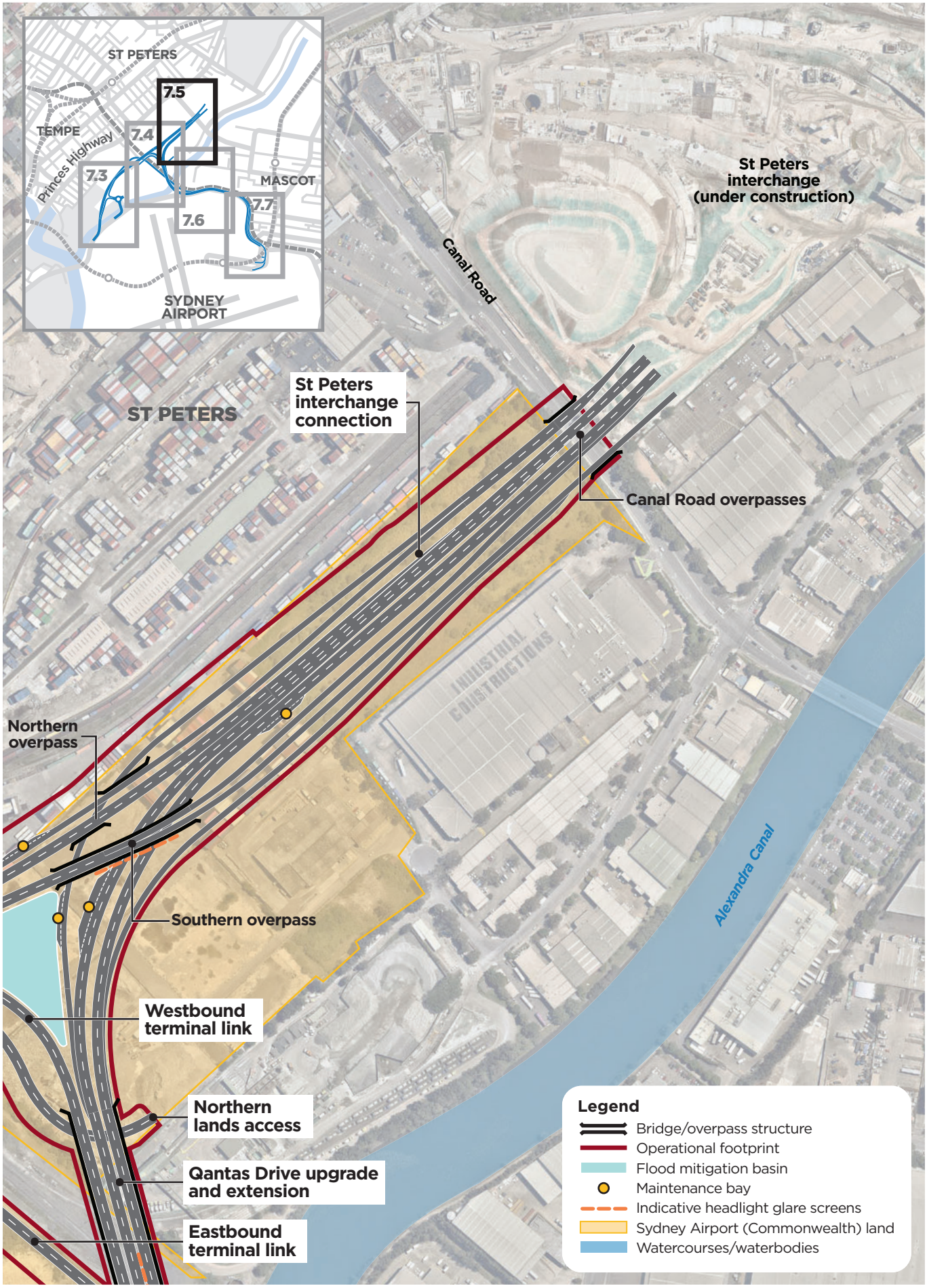


Figure 7.5 **Project layout - map 3**

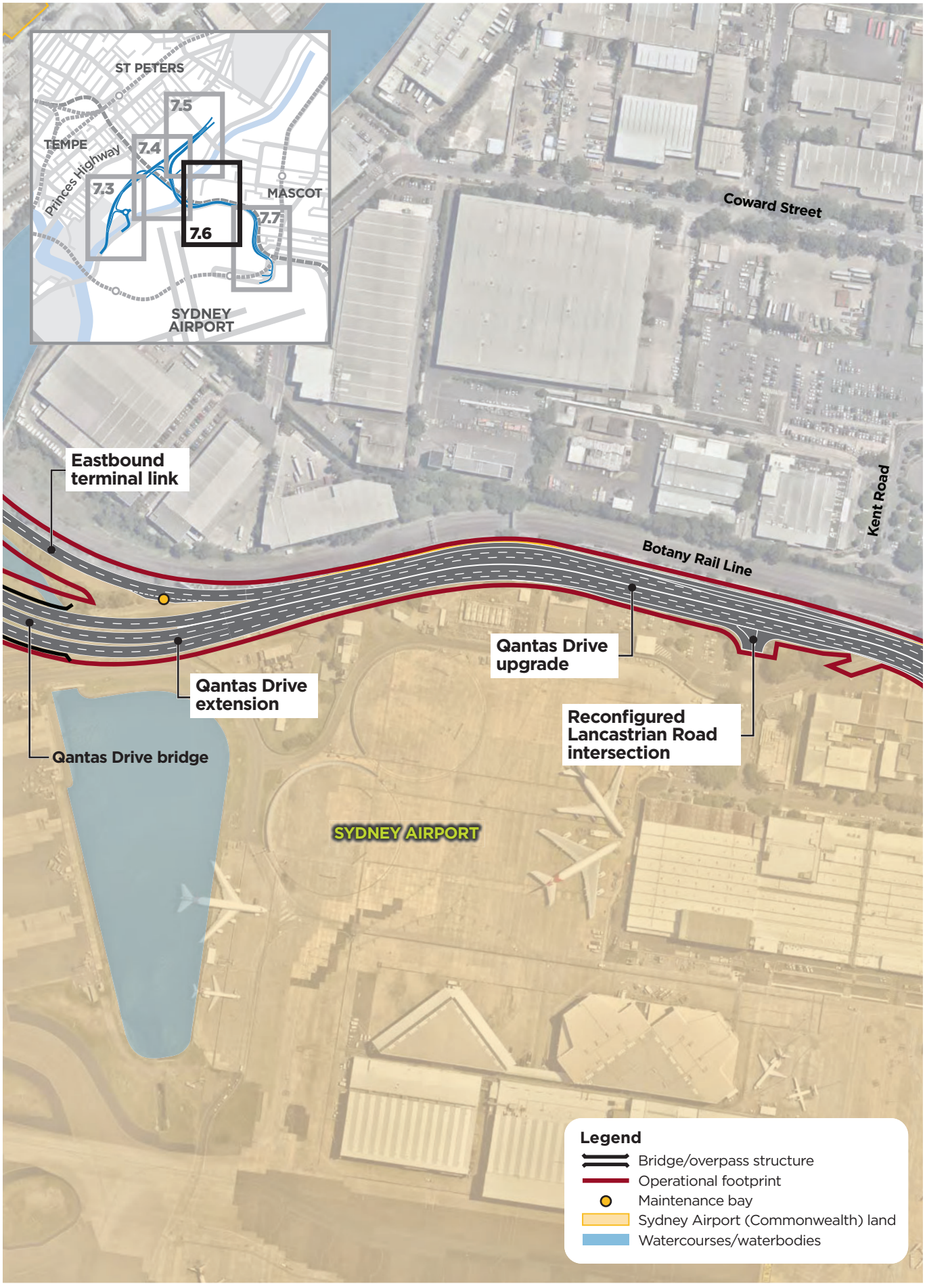


Figure 7.6 **Project layout - map 4**

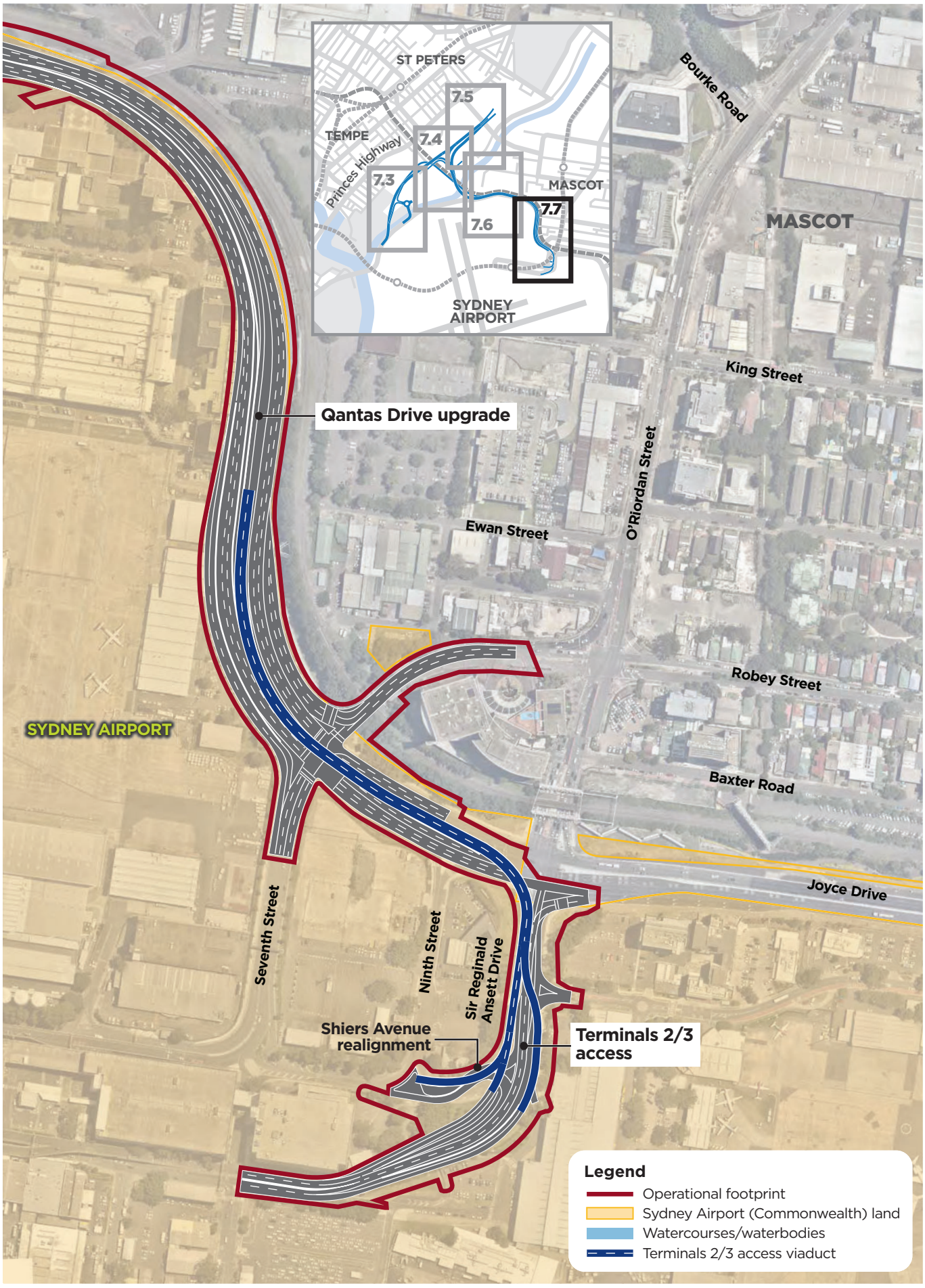


Figure 7.7 **Project layout - map 5**

Project alignment

The following sections describe the project's alignment along the main travel routes (as shown on Figure 7.1), according to the main routes and features described above.

Between the Sydney motorway network and Terminal 1

The project would extend south from its tie-in with St Peters interchange, cross Canal Road and continue south-west across industrial land adjacent to the Cooks River Intermodal Terminal. It would then split into two separate alignments – the western alignment, which would provide access to Terminal 1, and the eastern alignment, which would provide access to Terminals 2/3.

The access to Terminal 1 would cross the rail corridor and the eastbound terminal link via a new overpass. About 400 metres south of the rail corridor, the alignment would turn to the south, and would continue across industrial land and open space, where it would connect with the freight terminal access via a three-way intersection. The alignment would continue south from this intersection across industrial land and would cross Alexandra Canal via a new bridge. East of the canal, the alignment would continue to the south-west and would tie into Airport Drive near the access to Terminal 1 (to the east of Link Road).

Between the Sydney motorway network and Terminals 2/3

The project would extend south from its tie-in with St Peters interchange, cross Canal Road and continue south-west across industrial land adjacent to the Cooks River Intermodal Terminal. It would then turn to the south-east and cross the rail corridor, the eastbound terminal link and Alexandra Canal via a new bridge. The project would continue to the east along the existing Qantas Drive corridor, with Qantas Drive upgraded and widened.

Between Lancastrian Road and Seventh Street, the alignment would continue along the existing alignment of Qantas Drive, with the road widened to the south within Sydney Airport land. In the vicinity of King Street, the eastbound and westbound carriageways would move to the outside edge of the road corridor to allow the Terminals 2/3 access to be constructed between the two carriageways.

The project would provide access to Terminals 2/3 via a new elevated road structure (the Terminals 2/3 access). From the west, the alignment would commence near Ewan Street and extend generally in an easterly direction along the centre of the widened Qantas Drive (generally along the alignment of the existing central road median). Near the existing intersection of Qantas Drive, O'Riordan Street, Joyce Drive and Sir Reginald Ansett Drive, the alignment would extend south into the Terminals 2/3 precinct along Sir Reginald Ansett Drive. North of the intersection at Ross Smith Avenue, the alignment would split into a western and eastern viaduct.

The western viaduct would connect with the proposed Sydney Airport ground transport interchange (to the west) and would tie into Sir Reginald Ansett Drive's western lane providing access to the Terminals 2/3 departures road located on the upper deck of the grade-separated Keith Smith Avenue. The eastern viaduct would cross over Sir Reginald Ansett Drive and tie into Sir Reginald Ansett Drive's eastern lane providing access to the Terminals 2/3 arrivals road located on the lower deck of the grade-separated Keith Smith Avenue. The two central lanes of Sir Reginald Ansett Drive would continue to provide access from the Qantas Drive/O'Riordan Street/Joyce Drive/Sir Reginald Ansett Drive intersection to the Terminals 2/3 departure and arrival roads.

The viaduct would provide an overhead clearance of about 5.4 metres above Qantas Drive and Sir Reginald Ansett Drive and would gradually descend to meet Sir Reginald Ansett Drive and Keith Smith Avenue.

Between Terminal 1 and Terminals 2/3

From the north-western side of the Terminal 1 connection the project would continue to the north (via the eastbound terminal link) towards the rail corridor and across industrial land near the existing corridor for Swamp Road. It would continue to the east below the Terminal 1 connection and northern lands access overpasses and adjacent to the rail corridor, and would cross Alexandra Canal via a new bridge. The eastbound terminal link would merge with Qantas Drive to the east of Alexandra Canal.

The westbound terminal link would commence from the Qantas Drive upgrade and extension on the western side of Alexandra Canal to the north of the rail corridor. From here, it would continue across the rail corridor and merge with the northern end of the Terminal 1 connection.

Access to Sydney Airport land east and west of Alexandra Canal

The freight terminal access would connect with the Terminal 1 connection about 200 metres north of Alexandra Canal via a three-way signalised intersection. The alignment would extend about 100 metres east of the intersection with the Terminal 1 connection to the proposed roundabout (as the western leg of roundabout). One leg of the roundabout would extend to the east, a short stub road would be constructed to provide access to freight facilities proposed on Sydney Airport land and another short stub road would be constructed to provide access to land owned by Inner West Council. The southern leg of the roundabout would cross Alexandra Canal via a new bridge.

On the southern side of the canal, the road would turn west where it would tie into the existing alignment of Airport Drive near the existing Link Road intersection.

The alignment of the northern lands access would commence about 80 metres north of the rail corridor, on the north-eastern side of the proposed Qantas Drive bridge. The alignment would continue below the Qantas Drive bridge, and would extend to the north across industrial land and then turn to the south-west to cross the rail corridor and the eastbound terminal link via the northern lands access rail overpass. From here, it would continue to the south-west into the northern lands to provide access to the proposed future freight facilities on Sydney Airport land.

7.1.2 Parts of the project subject to the Airports Act and the EP&A Act

The project is located on land subject to the Airports Act as well as land subject to the EP&A Act. The parts of the project located on Sydney Airport land (as shown on Figure 1.3 and in more detail on Figure 7.3 to Figure 7.7) are subject to the assessment and approval process of the Airports Act. Other parts of the project, which are not located on Sydney Airport land (as shown on Figure 1.3 and in more detail on Figure 7.3 to Figure 7.7), are subject to the assessment and approval process of the EP&A Act. For completeness and readability, the project is described as a whole in this chapter.

7.1.3 Operational footprint

The operational footprint forms part of the overall project site described in Chapter 2 (Location and setting). It consists of land that would be occupied by permanent project infrastructure. The operational footprint has an area of about 37 hectares and includes about 21 hectares of Sydney Airport land. The operational footprint is shown on Figure 7.3 to Figure 7.7.

7.2 Design development

7.2.1 Design process

The concept design evolved over a period of about 18 months and involved many iterations and refinements, incorporating a range of considerations at each stage. Key considerations included:

- Environmental features and constraints, surrounding land use and key infrastructure, including Sydney Airport and the Botany Rail Line (described in Chapter 2 (Location and setting))
- Sydney Airport's prescribed airspace (described in Chapter 2)
- Urban design and place making considerations
- The needs and objectives of Sydney Airport Corporation, ARTC and other stakeholders
- The ability to construct the project, including the indicative construction methodology
- Design issues and constraints, including opportunities to safeguard future expansion and flexibility

- Potential alternative design solutions and innovations
- Cost and program.

The approach to design development has included a focus on avoiding or minimising the potential for impacts during all key phases of the process. In this regard, a feedback process has enabled findings from the various technical specialist studies to be captured and shared, allowing a collective understanding of the receiving environment to be built up, and leading to elements of the design being refined or changed to respond to these findings (see Chapter 6 (Project alternatives and options)).

As described in Chapter 6, the multi-criteria assessments carried out during the option selection and design process for corridor locations and key pieces of infrastructure included consideration of environmental and social issues. The options assessment process also included assessment of opportunities and risks. Further information on the options considered and key design refinements is provided in Chapter 6.

Prior to construction commencing, a detailed design process would be undertaken to prepare designs suitable for construction based on the concept design and project approval conditions.

7.2.2 Design standards

The design has been prepared in accordance with all relevant standards and design requirements for roads and bridges, including the following:

- Austroads Guide to Road Design and other relevant publications
- Roads and Maritime supplements to Austroads
- Other Roads and Maritime specifications, standards, guidelines and technical directions
- Australian Standards
- National Airports Safeguarding Framework and Sydney Airport Corporation design standards
- ARTC's Code of Practice for track and civil infrastructure
- CASA Manual of Standards
- Utility authority design standards.

Additional legislation and guidelines that have been used to ensure equality of access is integrated into the design of footpath upgrades and the provision of the active transport link:

- *Disability Discrimination Act 1992*
- Building Code of Australia
- Relevant Australian Standards.

7.2.3 Urban design and place making

Urban design and place making were key considerations in the design process. This is consistent with the NSW Government's policy directions, recognising the importance of good design in making cities and towns appealing, liveable and successful for the communities that live there. It is also consistent with Roads and Maritime's urban design policy, *Beyond the Pavement* (Roads and Maritime, 2014), which requires the design process to incorporate urban design and achieve quality design outcomes for the community.

The design was developed recognising that integration of urban design and place making considerations into the design process assists in maximising the benefits of new infrastructure, ensuring it improves existing places and spaces, and delivers greater returns for the community. The quality of built outcomes in the public domain is important and incorporating design methodologies early in the process will support well-considered and integrated outcomes. By commencing the urban design and place making assessment early in the project development process, potential impacts can be identified early and resolved through appropriate design to optimise project outcomes.

The urban design vision and objectives for the project (see Figure 7.8) were framed consistent with key guidelines and policies, including *Beyond the Pavement*. The project described in the following sections (7.3 to 7.10) has been developed in line with this vision and objectives.

Further information about how the design presented in the following sections has been, and will continue to be, developed taking into account urban design and place making principles is provided in section 7.12.

The urban design and place making concept for the project is described in Technical Working Paper 13 (Urban Design, Landscape Character and Visual Impact Assessment).

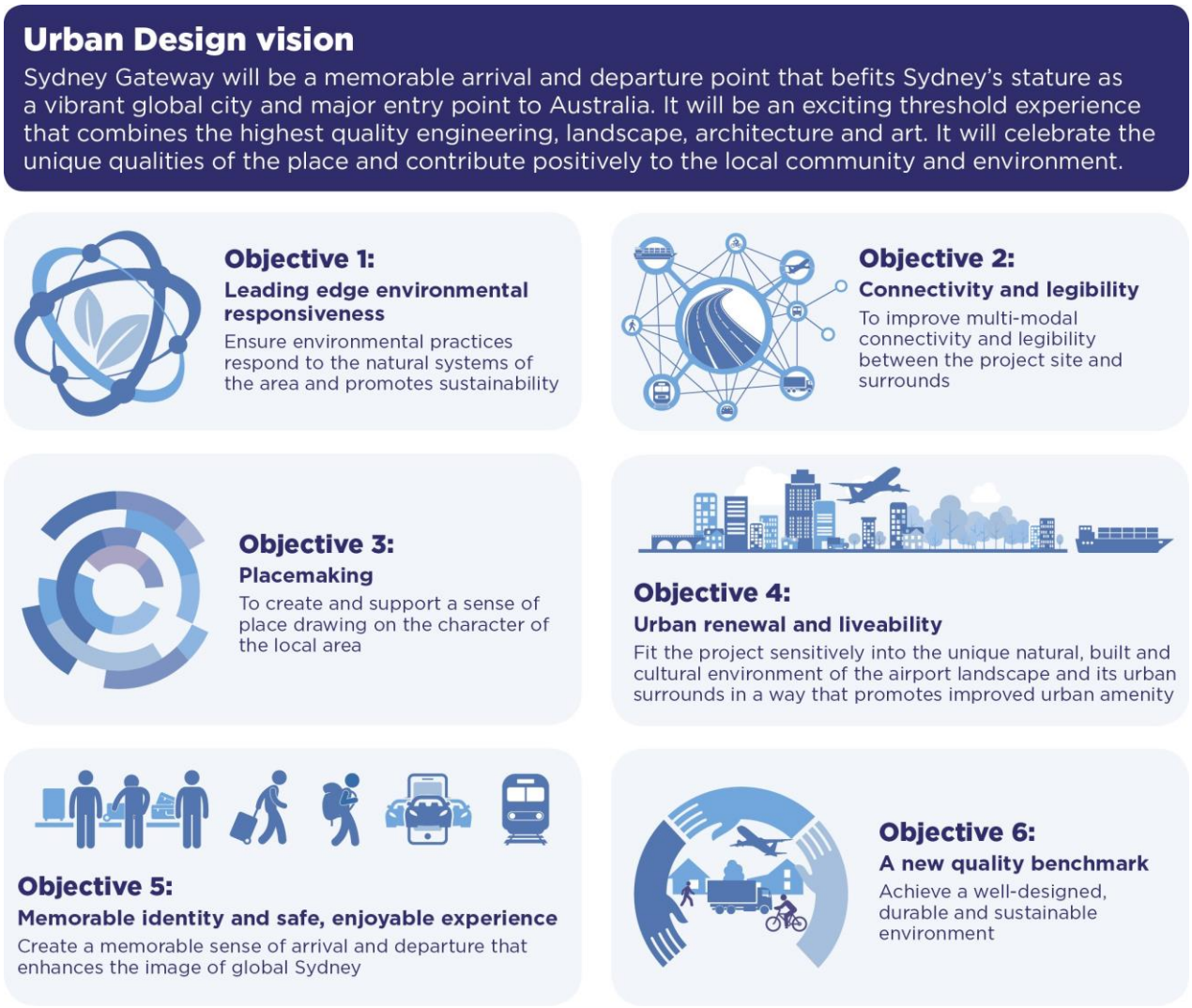


Figure 7.8 Design vision and objectives for the project

7.3 Terminal 1 connection

7.3.1 Overview

The Terminal 1 connection would consist of a new section of road to connect Terminal 1 with the Sydney motorway network. It would also connect Terminal 1 to Terminals 2/3 via the terminal links and the Qantas Drive upgrade and extension.

This new road would replace the existing access to Terminal 1 from the east via Airport Drive. Once the project is operational, Airport Drive would be closed to the east of the freight terminal access.

The Terminal 1 connection would include:

- Two carriageways with generally four lanes in each direction
- A tie-in to Airport Drive just north of the existing access to Terminal 1
- A new bridge over Alexandra Canal (see section 7.3.3)
- An overpass over the rail corridor (see section 7.3.4)
- An intersection with the freight terminal access (see section 7.8.1).

The Terminal 1 connection and its location with respect to land type (Sydney Airport land or land subject to the EP&A Act) is shown on Figure 7.3 and Figure 7.4.

7.3.2 Lane configuration

The Terminal 1 connection would generally comprise four lanes in each direction. The lanes would generally be 3.5 metres wide, with outside shoulder widths of about one metre, and inside shoulder widths of about 0.5 metres. A typical cross-section is shown on Figure 7.9.

North of the starting point for the eastbound terminal link (see section 7.6), the northbound carriageway of the Terminal 1 connection would comprise two lanes (see Figure 7.3 and Figure 7.4). Additional lanes would be provided on both carriageways at the intersection with the freight terminal access to facilitate turning movements into the freight terminal access.

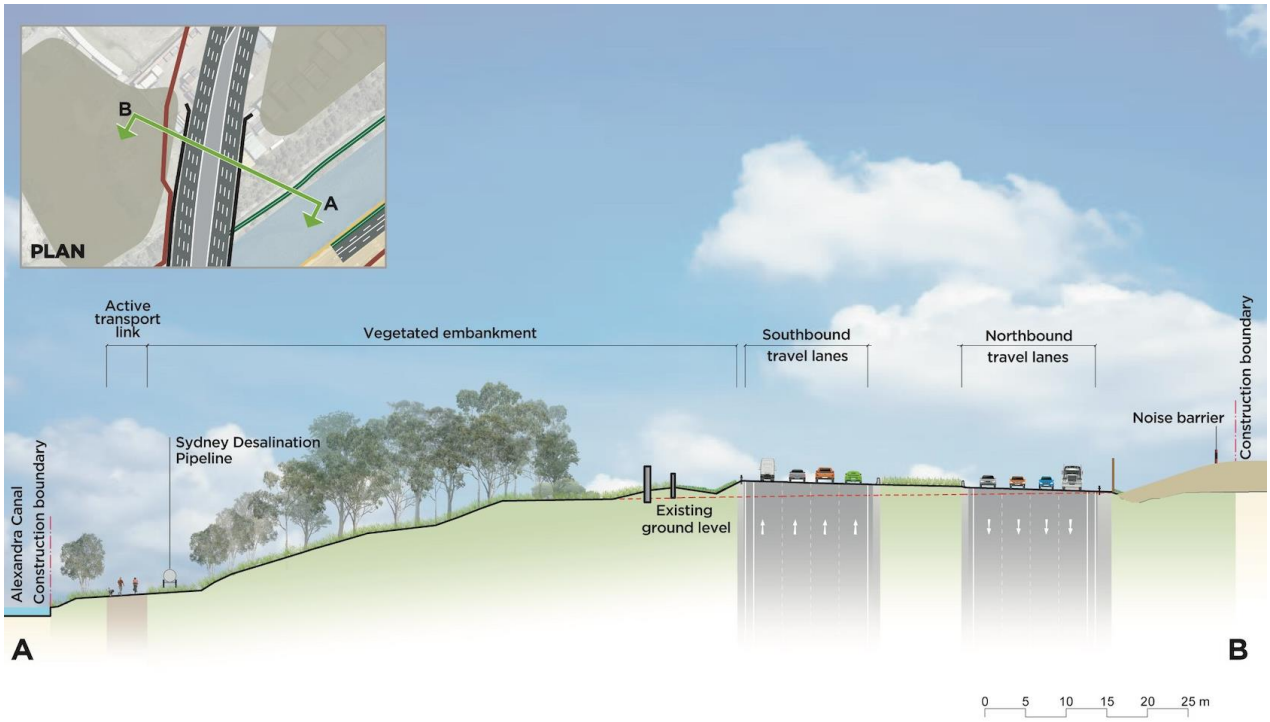


Figure 7.9 Terminal 1 connection – typical cross-section (looking south)

7.3.3 Terminal 1 connection bridge

The Terminal 1 connection bridge would cross Alexandra Canal about 500 metres north of the Giovanni Brunetti Bridge. It would consist of twin balanced cantilever concrete structures, located adjacent to each other. Both structures would be about 17 metres wide, consist of three spans, and have a total length of about 180 metres. The central span, which would cross the canal, would be about 90 metres long. The bridge structure would be elevated to about 13 metres above the canal. The bridge piers would be set back from the top of the banks of the canal to minimise impacts on the canal wall. The alignment of the bridge is shown on Figure 7.3. A visual representation is shown on Figure 7.10.

Figure 7.10 Terminal 1 connection bridge from Link Road – visual representation

7.3.4 Terminal 1 connection rail overpass

The Terminal 1 connection rail overpass would cross over the rail corridor, the existing alignment of Swamp Road and the eastbound terminal link (see Figure 7.4). The overpass would comprise six spans and have a total length of about 110 metres. As a result of the length, existing infrastructure and land use constraints, a set of bridge piers would need to be located within the rail corridor.

The height of the overpass structure would be about six metres above ground level, which would achieve the minimum 5.4 metre high clearance required over the Botany Rail Line whilst remaining below Sydney Airport's prescribed airspace at this location. The maximum height would be about 7.5 metres above ground level including roadside barriers and anti-throw screens.

7.4 Qantas Drive upgrade and extension

7.4.1 Overview

The Qantas Drive upgrade and extension would consist of a new and upgraded section of road and a bridge to connect Terminals 2/3 with the Sydney motorway network. It would also connect:

- Terminals 2/3 and Terminal 1 (via the terminal links and the Terminal 1 connection)
- The Sydney motorway network (at St Peters interchange) and Port Botany (via Joyce Drive, General Holmes Drive and Foreshore Road).

Qantas Drive would be upgraded from about 220 metres east of Alexandra Canal (about 400 metres west of Lancastrian Road) to the intersection of O'Riordan Street, Sir Reginald Ansett Drive and Joyce Drive. This would include:

- Widening the road to provide three lanes in each direction (compared with the existing two lanes)
- Realigning the eastbound and westbound carriageways to provide space for the Terminals 2/3 access viaduct between the two carriageways
- Modifying the intersections with Lancastrian Road, Robey and Seventh streets, O'Riordan Street, Sir Reginald Ansett Drive and Joyce Drive
- Tie-ins to the existing sections of Joyce Drive, Robey Street and O'Riordan Street at the eastern end.

A new section of road would extend across Alexandra Canal, over the eastbound terminal link and rail corridor, to the St Peters interchange connection. This would include:

- Three carriageways with two lanes in each direction, providing four lanes in the northbound direction and two lanes in the southbound direction
- A new bridge over Alexandra Canal (see section 7.4.3).

The Qantas Drive upgrade and extension, and its location with respect to land type, is shown on Figure 7.3, Figure 7.6 and Figure 7.7. A visual representation is shown on Figure 7.11.

7.4.2 Lane configuration and intersection upgrades

Westbound lanes

West of the O'Riordan Street/Sir Reginald Ansett Drive intersection, three westbound lanes would extend along Qantas Drive and two westbound lanes would extend from the left turn out of Seventh Street. To the west of the Robey Street/Seventh Street intersection, the three westbound lanes along Qantas Drive would merge to become two lanes and the two lanes out of Seventh Street would merge to one lane (see Figure 7.7). In addition to the three westbound lanes between the O'Riordan Street/Sir Reginald Ansett Drive and Robey Street/Seventh Street intersections, two right turn lanes would be provided into Robey Street (see Figure 7.15).

There would be three westbound lanes until about 400 metres west of Lancastrian Road. At this location (see Figure 7.6), the lanes would diverge, and an additional lane would be added, to form two dual-lane carriageways. The two carriageways would cross the canal via the Qantas Drive bridge (see Figure 7.4). The eastern carriageway would extend to the north to St Peters interchange. The western carriageway would extend to the west towards Terminal 1 via the westbound terminal link.

Eastbound lanes

East of Alexandra Canal, the two eastbound lanes from the St Peters interchange connection would merge with the two lanes from the eastbound terminal link to form four lanes (see Figure 7.6). The four eastbound lanes would then converge to become three lanes.

Further to the south-east (see Figure 7.7), one lane would diverge onto the Terminals 2/3 viaduct and two lanes would continue east. A third lane would be added to the two eastbound lanes, and the three lanes would continue to the east. Two left turning lanes into Robey Street would be provided, which would diverge from the eastbound lanes. An additional left turning lane would be added, and the three lanes would turn left into Robey Street.

All lanes would generally be a minimum of 3.3 metres wide.

Typical cross-sections are shown on Figure 7.12 to Figure 7.14.

Intersection upgrades

The following intersection works would be undertaken:

- Qantas Drive/Lancastrian Road – existing traffic signals would be removed and turning movements would be limited to left-in and left-out from the westbound carriageway of Qantas Drive (shown on Figure 7.6)
- Qantas Drive/Robey Street/Seventh Street – the intersection would be upgraded with the addition of a left turn lane into Robey Street northbound and a left turn out of Seventh Avenue westbound (shown on Figure 7.15)
- Qantas Drive/O'Riordan Street/Sir Reginald Ansett Drive – the existing median would be removed and an additional through lane provided to Joyce Drive in the eastbound direction. The right turn lanes into Sir Reginald Ansett Drive would be removed (shown on Figure 7.7).

Figure 7.11 Qantas Drive upgrade and extension west of King Street – visual representation

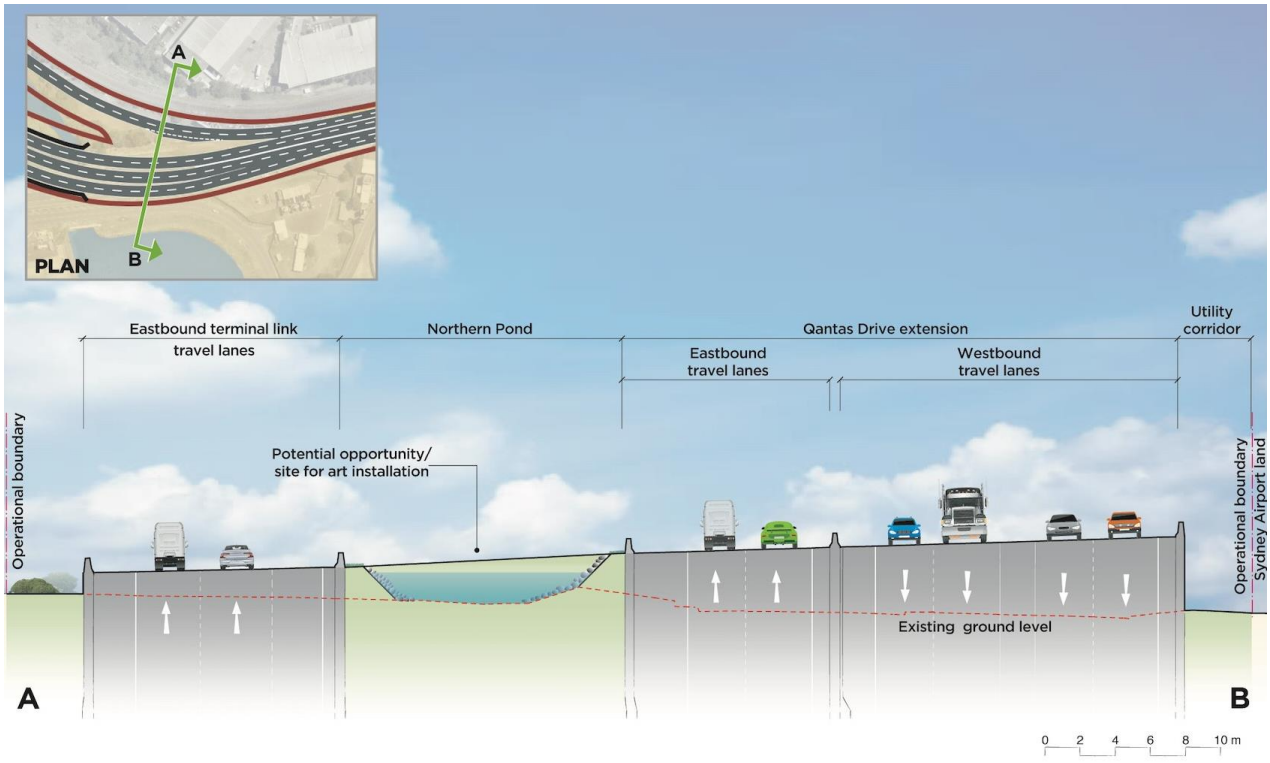


Figure 7.12 Qantas Drive upgrade and extension east of Alexandra Canal – typical cross-section (looking south)

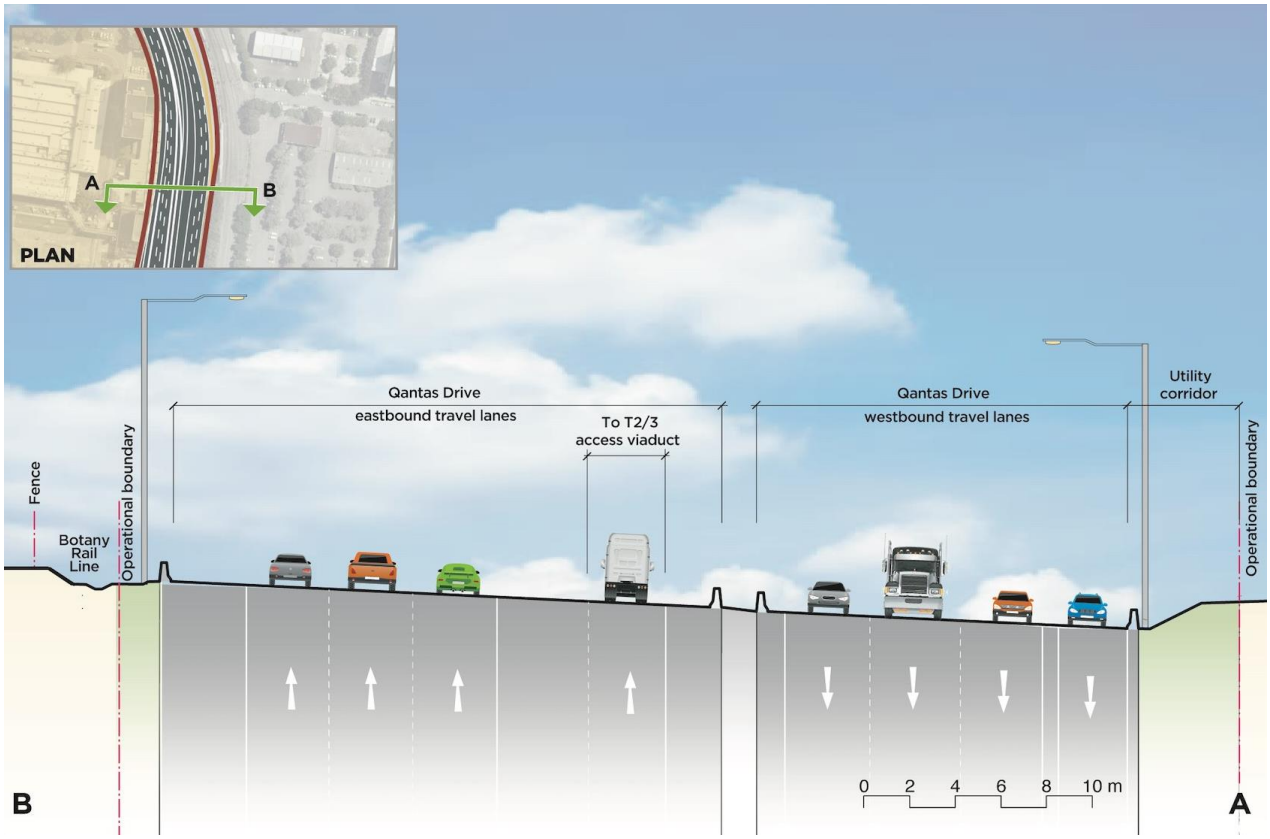


Figure 7.13 Qantas Drive upgrade and extension between King Street and Ewan Street – typical cross- section (looking south)

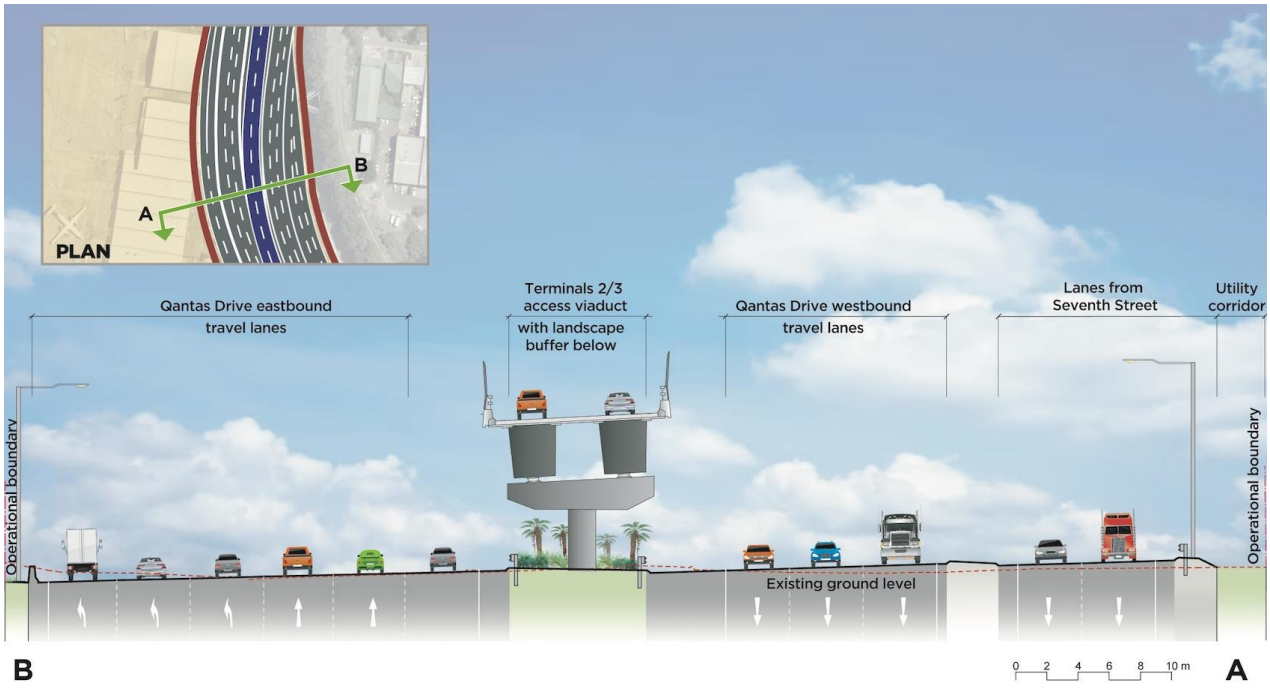


Figure 7.14 Qantas Drive upgrade and extension with Terminals 2/3 viaduct west of Robey Street – cross- section (looking south)

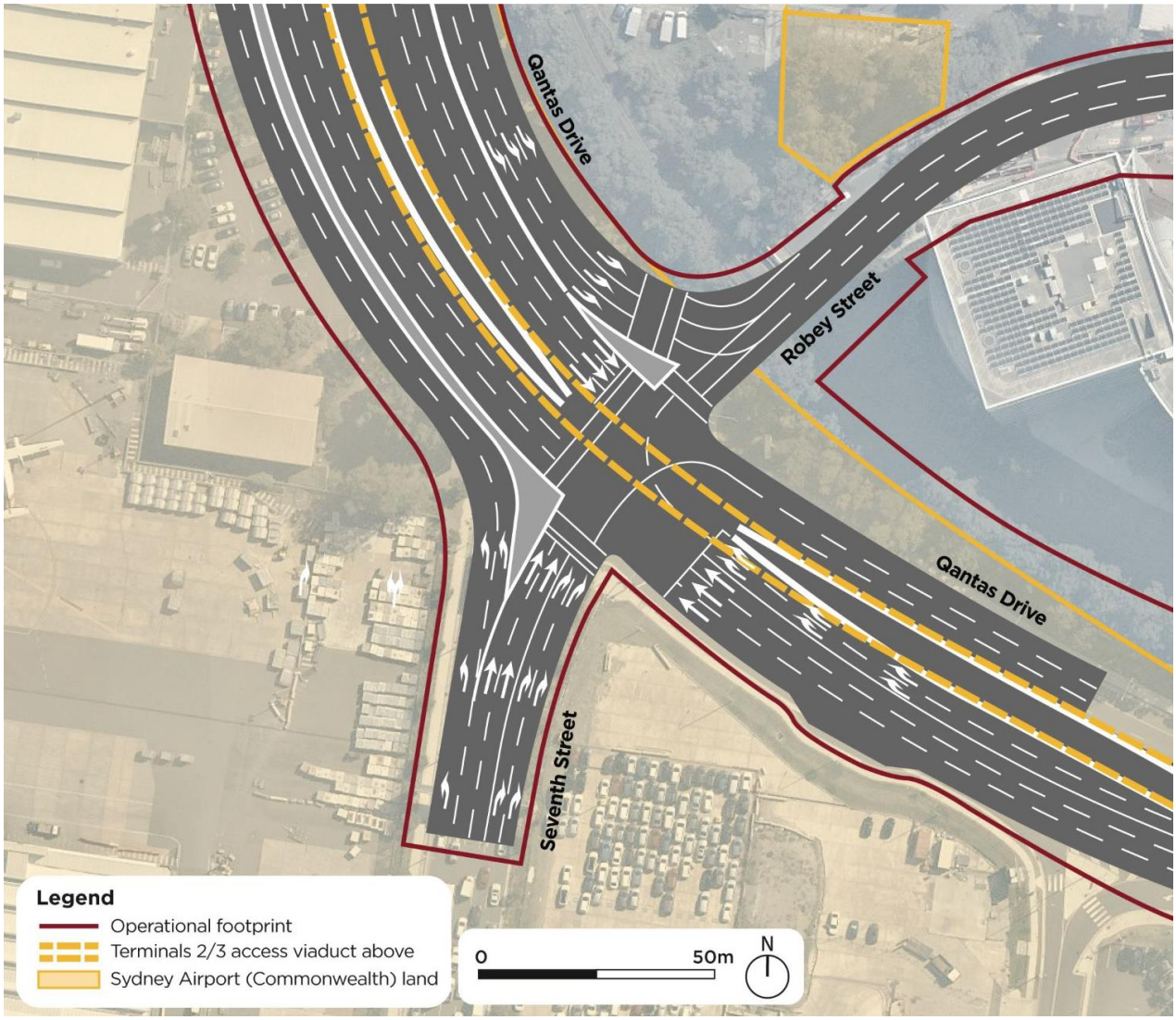


Figure 7.15 Qantas Drive/Robey Street/Seventh Street intersection upgrade and lane configuration

7.4.3 Qantas Drive bridge

The new bridge would cross Alexandra Canal about 70 metres south of the existing rail bridge. It would consist of twin box girder structures located adjacent to each other. The northern structure would carry the lanes providing access to and from St Peters interchange, while the southern structure would carry the lanes connecting towards Terminal 1 via the westbound terminal link.

The structures would have a total length of about 410 metres and would consist of eight spans. A single span, about 90 metres long, would cross Alexandra Canal. This span would be supported on piers set back from the banks of the canal. Piers would also be located within the Botany Rail Line corridor. These would be set back from the rail lines in accordance with ARTC's requirements.

The bridge structure would be elevated about 12 metres above the canal.

The alignment of the bridge is shown on Figure 7.3. A visual representation is shown on Figure 7.16.

Figure 7.16 Qantas Drive bridge – visual representation

7.5 St Peters interchange connection

7.5.1 Overview

The St Peters interchange connection would comprise a number of multi-lane road carriageways that would facilitate movements from the Sydney motorway network at St Peters to either Terminal 1 or Terminals 2/3 (as shown on Figure 7.1). The number of carriageways/lanes would vary moving southward away from the interchange. The carriageways would be grade-separated to provide the various connections required.

The St Peters interchange connection and its location with respect to land type is shown on Figure 7.4 and Figure 7.5.

The majority of the St Peters interchange connection would be constructed on fill about eight metres above the existing ground level.

7.5.2 Lane configuration

The carriageways would generally consist of one or two lanes, with the lanes and carriageways merging or diverging depending on the location and connections provided. The carriageway and lane configurations are shown on Figure 7.18. The configuration of lanes within the St Peters interchange connection allows specific carriageways (ie those travelling to the New M5 or M4-M5 Link) to connect directly into the corresponding lanes within St Peters interchange.

The lanes would be generally about 3.5 metres wide. A typical cross-section is shown on Figure 7.17.

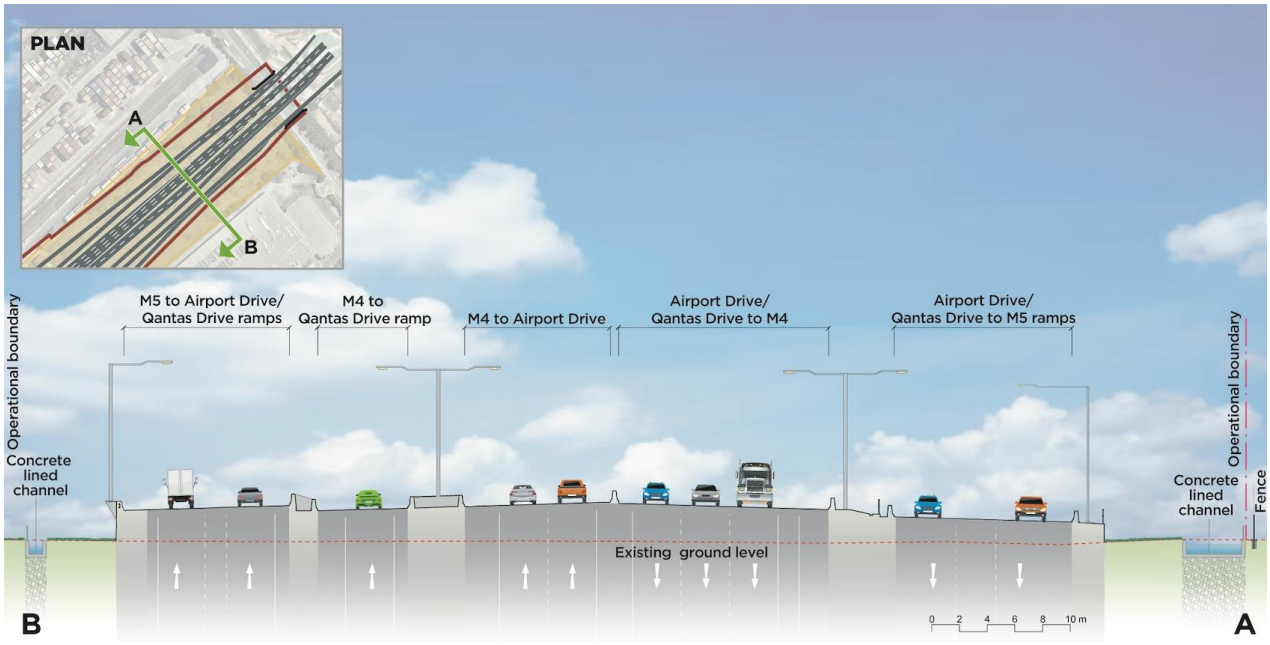


Figure 7.17 St Peters interchange connection south of Canal Road – typical cross-section (looking south)

7.5.3 Canal Road overpasses

Four overpasses about 35 metres long would be used to convey traffic from St Peters interchange over Canal Road. The total width of the structures would be up to about 51 metres. A clearance of 5.4 metres above Canal Road would be provided.

The alignment of the overpasses is shown on Figure 7.5.

7.5.4 Northern and southern overpasses

Two overpass structures would be used to carry two of the carriageways providing access to/from Terminal 1 over the carriageways providing access to/from Terminals 2/3. Both of these structures are located north of the Botany Rail Line, with the alignment of the overpasses shown on Figure 7.5.

The northern overpass would be a single span about 20 metres long and 45 metres wide, supported on retaining walls located on either side of the carriageways below. It would be about 4.5 to eight metres above ground level, and would allow for a minimum clearance of 5.4 metres over the carriageways below.

The southern overpass would consist of a five-span structure, which would be about 150 metres long and between 9.5 and 14 metres wide. The maximum height of the overpass deck would be about eight metres above the road below (or 12 metres above existing ground level). This would provide the required minimum clearance of 5.4 metres over the carriageways below while remaining below the OLS at this location. The overall height would be about 13 metres above the road below, including roadside barriers and anti-throw screens.

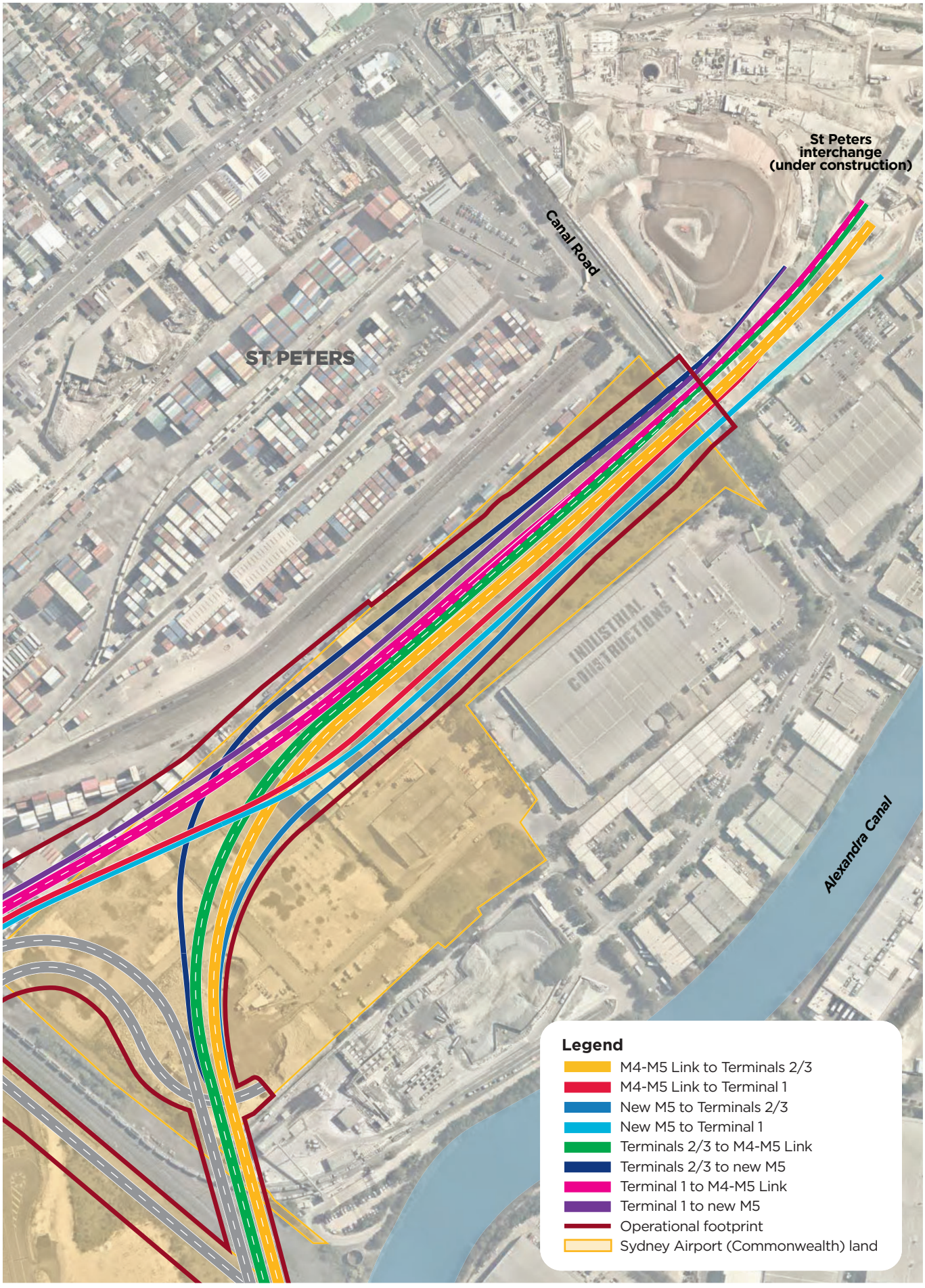


Figure 7.18 **St Peters interchange connection – lane configuration**

7.6 Terminal links

7.6.1 Overview

The terminal links would consist of two new sections of road to facilitate access between Terminal 1 and Terminals 2/3. The westbound terminal link would facilitate access to Terminal 1 from Terminals 2/3. It would consist of a short, one-way section of road, which would extend between the north-western end of the Qantas Drive upgrade and extension and the north-eastern end of the Terminal 1 connection.

The eastbound terminal link would facilitate access to Terminals 2/3 from Terminal 1. It would diverge from the north-western side of the Terminal 1 connection and would merge with the north-eastern side of the Qantas Drive upgrade and extension. The eastbound terminal link would include a new bridge over Alexandra Canal (see section 7.6.3).

The terminal links and their locations are shown on Figure 7.3, Figure 7.4 and Figure 7.6.

7.6.2 Lane configuration

The terminal links would generally consist of two lanes about 3.5 metres wide each. Road shoulders would vary from about 0.5 to one metre wide. The eastbound terminal link would include a three-lane section of roadway near Bellevue Street in Tempe.

7.6.3 Terminal link bridge

A new bridge would carry the eastbound terminal link over Alexandra Canal. It would be located about 10 metres south of the existing rail bridge and about 60 metres north of the proposed Qantas Drive bridge. The bridge would comprise a single-arch steel structure with one span. It would be about 90 metres long and about 12 metres wide.

The bridge deck would be about 7.5 metres above the canal. The overall height of the bridge would be about 20 metres above the canal.

A visual representation of the bridge is shown on Figure 7.19.

Note: The piers shown near the proposed terminal link bridge are those that support the existing Botany Rail Line bridge

Figure 7.19 Terminal link bridge – visual representation

7.7 Terminals 2/3 access

7.7.1 Overview

The Terminals 2/3 access would consist of a new elevated road (viaduct) structure providing access from Qantas Drive to Terminals 2/3. It would separate eastbound traffic travelling to Terminals 2/3 from through traffic, including east–west traffic travelling along Joyce Drive and Qantas Drive, and north–south traffic accessing and leaving Terminals 2/3 via Sir Reginald Ansett Drive and Seventh Street respectively.

The Terminals 2/3 access would extend from Qantas Drive (opposite the western end of Ewan Street) into Terminals 2/3. It would include:

- A new ramp from the western-most eastbound lane connecting to an elevated viaduct structure into the Terminals 2/3 precinct
- Adjustments to intersections along Sir Reginald Ansett Drive at Ross Smith Avenue and at Shiers Avenue (see section 7.7.2).

The new viaduct structure would be about 660 metres long and provide a clearance of 5.4 metres to Qantas Drive and Sir Reginald Ansett Drive. A visual representation is shown on Figure 7.20.

The Terminals 2/3 access is shown on Figure 7.7.

Figure 7.20 Terminals 2/3 access from Qantas Drive at O'Riordan Street – visual representation

7.7.2 Lane configuration and road adjustments

Viaduct structure

The majority of the new section of road would consist of two lanes. A third lane would be added where it turns to the south into the Terminals 2/3 precinct. North of the intersection at Ross Smith Avenue, the structure would split into a western and eastern viaduct. The western viaduct would then split into two lanes, with one lane turning west into the proposed ground transport interchange and the other crossing Shiers Avenue and descending via a ramp to merge with Sir Reginald Ansett Drive. At this location it would

provide access to the departures ramp at Terminals 2/3. The ramps on Sir Reginald Ansett Drive are shown on Figure 7.22.

The eastern viaduct would consist of one single lane, which would merge with Sir Reginald Ansett Drive towards the arrivals road at ground level on Keith Smith Avenue.

The lanes would be about 3.3 metres wide. A typical cross-section is shown on Figure 7.21.

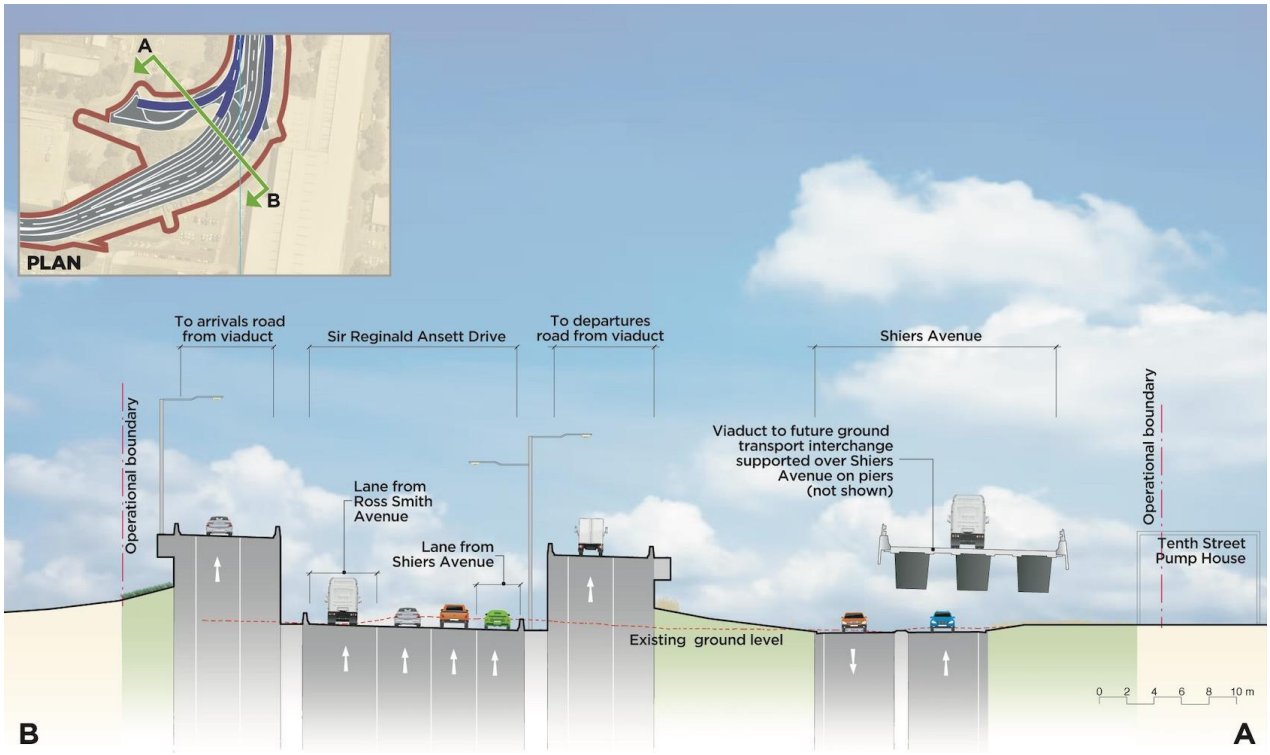


Figure 7.21 Terminals 2/3 access at ramp structure along Sir Reginald Ansett Drive north of Shiers Avenue – typical cross-section (looking south)

Sir Reginald Ansett Drive and Shiers Avenue adjustments

Sir Reginald Ansett Drive would comprise two lanes at the intersection with Qantas Drive and O'Riordan Street, with in-bound traffic coming from O'Riordan Street and Joyce Drive.

South of the turning lanes from Joyce Drive to Sir Reginald Ansett Drive, a third lane would be provided along the eastern edge of Sir Reginald Ansett Drive. This lane would provide access into and out of Ross Smith Avenue, where it would then merge with the lanes located between the ramps from the Terminals 2/3 access viaduct. An additional lane would diverge from this lane south of Ross Smith Avenue to access the taxi staging area.

An additional lane would diverge off the western edge of Sir Reginald Ansett Drive at Shiers Avenue. This lane would provide access into Ninth Avenue via an adjusted alignment of Shiers Avenue with a new intersection from Sir Reginald Ansett Drive. The existing eastbound Shiers Avenue lane, which provides for internal circulation, would be realigned north. A merge lane would also be provided from the eastbound Shiers Avenue lane onto Sir Reginald Ansett Drive, where it would merge with the two Sir Reginald Ansett Drive lanes located between the ramps from the Terminals 2/3 access viaduct. The proposed arrangement at Shiers Avenue is shown on Figure 7.22.

As part of the works along Sir Reginald Ansett Drive, the intersection at Ross Smith Avenue would be modified with the existing signals removed. The intersection would be reconfigured to suit the changes along Sir Reginald Ansett Drive while maintaining the existing movements and pedestrian crossing.

Figure 7.23 shows the lane configuration of Sir Reginald Ansett Drive including the location of the Terminals 2/3 access viaduct.

Figure 7.22 Terminals 2/3 access along Sir Reginald Ansett Drive (at the adjusted Shiers Avenue intersection) – visual representation

7.8 Accesses to Sydney Airport land

7.8.1 Freight terminal access

The freight terminal access would consist of a new section of road and a bridge to provide access to Sydney Airport's existing and proposed air freight facilities on either side of Alexandra Canal. It would extend between the Terminal 1 connection, land proposed (by the *Sydney Airport Master Plan*) for future freight facilities on the western side of Alexandra Canal, and existing freight facilities at Link Road near Terminal 1 on the eastern side of the canal. The new access would include:

- A single carriageway with two lanes in each direction
- A signalised intersection with the Terminal 1 connection
- A roundabout east of the Terminal 1 connection
- A stub road off the roundabout to provide access to future freight facilities
- A tie-in to Airport Drive to the east of the Terminal 1 connection
- Adjustments to the existing intersection of Airport Drive and Link Road
- A new bridge over Alexandra Canal (described below)
- A shared pedestrian and cycle path (see section 7.9).

The freight terminal access is shown on Figure 7.3 and Figure 7.4.

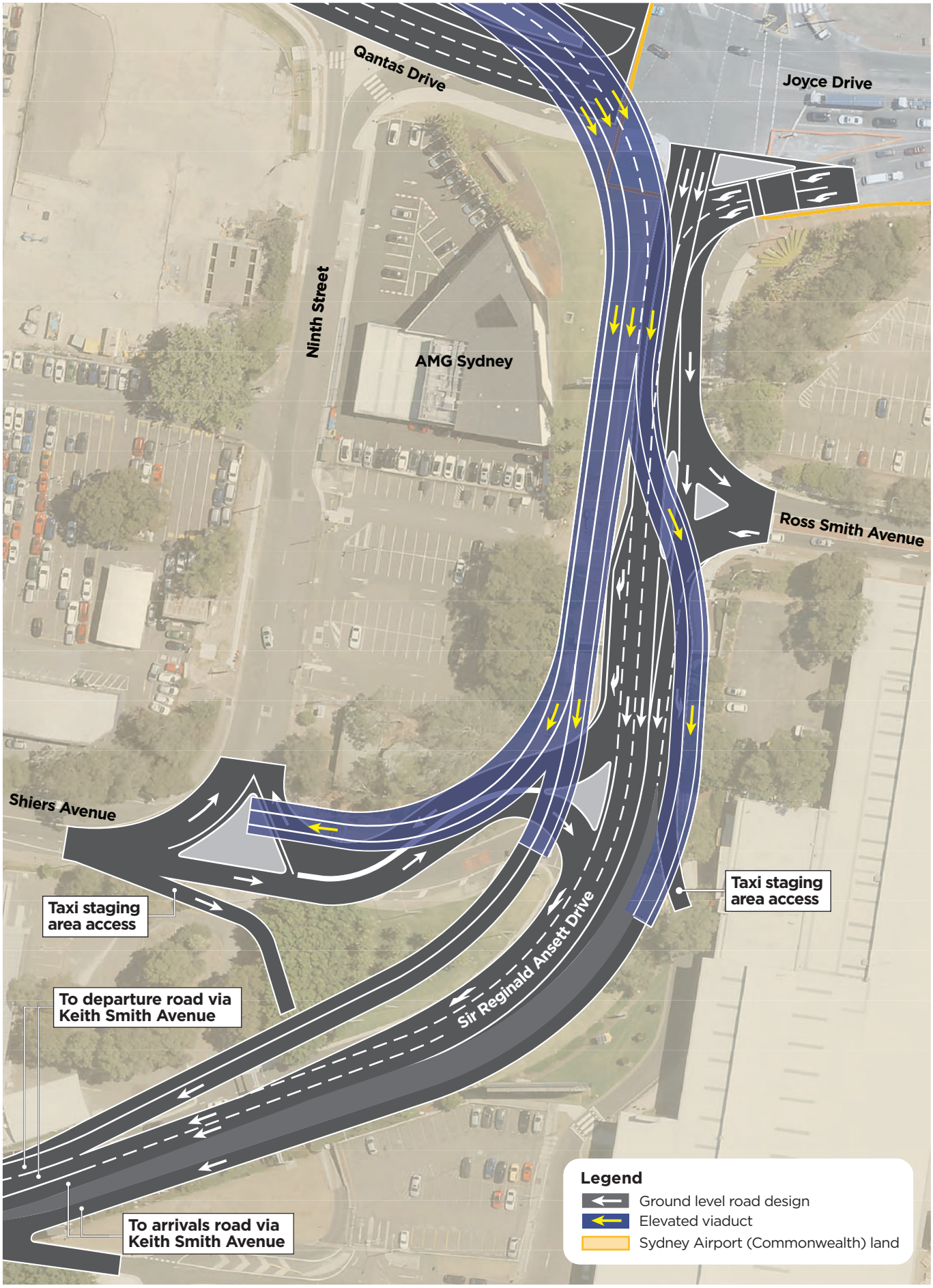


Figure 7.23 **Sir Reginald Ansett Drive and Shiers Avenue intersection upgrade and lane configuration**

Lane configuration

At the intersection with the Terminal 1 connection, two lanes would be provided. The lanes would be about 3.5 metres wide; however, the width would change at some locations to provide space for heavy vehicles to make turning movements. Two lanes would be provided in both directions (including on the roundabout).

As part of the works for the freight terminal access, the existing traffic signals at Airport Drive and Link Road would be removed to provide free flow from the freight terminal access into and out of Link Road.

Freight terminal bridge

The new bridge would cross Alexandra Canal about 250 metres to the north of the proposed Terminal 1 connection bridge. It would consist of a single structure with two spans, including a short back span to cross the desalination water pipeline, and a total length of about 80 metres. One span would cross the canal and would be about 55 metres long. The piers on either side of this span would be set back from the banks of the canal to minimise impacts on the canal and adjacent infrastructure. The maximum height of the bridge would be about 15 metres above the canal.

A visual representation of the bridge is shown on Figure 7.24.

Figure 7.24 Freight terminal bridge from proposed active transport link – visual representation

7.8.2 Northern lands access

The northern lands access would consist of a new section of road and overpass to provide access between Sydney Airport land located on either side of the rail corridor to the west of Alexandra Canal. The new access would extend between land accessed from Burrows Road on the northern side of the rail corridor and land on the southern side of the corridor. It would include:

- A single carriageway with two lanes in each direction
- A new overpass over the rail corridor.

The northern lands access is shown on Figure 7.4.

Lane configuration

Two 3.5 metre wide lanes would be provided, with one lane in each direction.

Northern lands access rail overpass

The new overpass would cross over the rail corridor and the eastbound terminal link about 40 metres to the east of the proposed Terminal 1 connection rail overpass (see section 7.3.4).

The maximum height of the overpass deck would be about eight metres above ground level. This would provide for the required minimum clearance of 5.4 metres over the Botany Rail Line and the eastbound terminal link, while remaining below the OLS and high intensity approach lighting surfaces at this location. The overall height would be about 12 metres above ground level including roadside barriers and anti-throw screens.

7.9 Active transport link

A new active transport link would be provided along the western side of Alexandra Canal in the form of a shared pedestrian and cycle path. The proposed alignment is shown on Figure 7.3 and Figure 7.4.

The new link would be about 160 metres longer than the existing and would replace the existing shared path located along the eastern side of Alexandra Canal adjacent to Airport Drive. The new link would maintain access for cyclists between existing cycle paths and areas to the south, Tempe, Mascot and towards Alexandria and the Sydney central business district. The existing path needs to be closed to:

- Maintain a safe route for cyclists and pedestrians during construction, which includes work areas along Airport Drive (described in Chapter 8 (Construction))
- Maintain the connectivity and function of the existing route which in the future, will become unavailable and part of Sydney Airport's future operating area.

The south-western end of the new active transport link would connect to the existing shared path on the eastern side of Alexandra Canal, near the southern end of the proposed Terminal 1 connection bridge. The link would cross to the western side of Alexandra Canal near Tempe Recreation Reserve via the existing (unnamed) pedestrian/cyclist bridge, which is located near the intersection of Link Road and Airport Drive. The alignment would then head to the north-east along the western side of Alexandra Canal adjacent to the desalination pipeline (see Figure 7.3).

The alignment would continue along the western edge of the canal, passing under the proposed Terminal 1 connection bridge, the freight terminal bridge and the existing Nigel Love bridge. The link would then cross to the eastern side of the canal, passing over the canal via a new bridge, which would be located beneath the proposed Qantas Drive bridge. On the eastern side of the canal the link would connect to the existing cycle path near the proposed Terminal link bridge (see Figure 7.4).

A new section of shared path would also be provided as part of the freight terminal access. The path would extend from Airport Drive to the Terminal 1 connection, passing over Alexandra Canal via the freight terminal bridge (see Figure 7.3).

The active transport link and shared path would be about three metres wide and would have a grade of no more than five per cent. The proposed new route has been designed to ensure suitable gradients are achieved. The new route would also provide separation from adjacent roadways and improved air quality compared to that experienced along the existing route. The link has also been designed with reference to the principles of crime prevention through environmental design (CPTED) (see section 7.12).

Roads and Maritime are continuing consultation with local councils, Sydney Airport and Transport for NSW about cyclist and pedestrian connections to Sydenham and St Peters interchange, and further enhancements around Sydney Airport. However, these are not included in the current design and do not form part of the project for which approval is being sought.

7.10 Other (ancillary) infrastructure

7.10.1 Maintenance bays

Maintenance bays would be provided near infrastructure that would require regular access for maintenance purposes, such as drainage channels, gross pollutant traps and variable message signs. Eight maintenance bays are proposed in various locations. Four of the proposed maintenance bays would also function as breakdown bays. The maintenance bays are shown on Figure 7.3 to Figure 7.7.

7.10.2 Emplacement areas and mounds

The project would involve excavating about 90,000 cubic metres of waste material from the former Tempe landfill. It is proposed to retain and re-emplace some of this material within the boundary of the former Tempe landfill site (see Figure 7.3). This would reduce the need for disposal at an off-site location and associated truck movements, although some material may still need to be moved off site if it is not able to be reused.

It is proposed to re-emplace a portion of this material within the project site in the form of mounds, located as follows:

- One mound is proposed in the area bounded by the Terminal 1 connection, the freight terminal access and the western side of Alexandra Canal
- Two options are being considered for the location of the other mound – either north of the freight terminal access or west of the Terminal 1 connection (see Figure 7.3).

The mounds would have a maximum height of about 15 metres above sea level and would occupy an area of about three hectares. The mounds would be integrated into the capping and underlying waste materials in accordance with the *Environmental Guidelines: Solid waste landfills* (NSW EPA, 2016a).

The design of the emplacement mounds would need to:

- Address aviation hazard issues according to the ‘as low as reasonably practicable’ principle
- Minimise the volume of material excavated from the former Tempe landfill
- Avoid disturbance outside the project boundary
- Not be located on Sydney Airport land
- Enable compatible uses for remaining land within the project area.

The proposed mounds would be designed to ensure compliance with the *National Airports Safeguarding Framework Guideline B: Managing the Risk of Building Generated Windshear and Turbulence at Airports* (Department of Infrastructure, Regional Development and Cities, 2018b) and other relevant aviation guidelines (see Chapter 11 (Airport operations)). This would include locating and optimising the mounds to minimise the effects of windshear and turbulence on aircraft (see section 11.4.2). The optimisation process would address Sydney Airport’s operational requirements, and would occur in consultation with Sydney Airport Corporation, aviation stakeholders, and relevant Australian, NSW and local government agencies.

The selection of the preferred location for the mounds would be subject to detailed design and consideration by a range of stakeholders. The design, landscaping and future uses for the mounds would be co-ordinated with Inner West Council and other relevant stakeholders, and would be refined as part of the landscaping for the project, which would also consider the future use of residual land (see section 7.12).

7.10.3 Gas collection and venting

A new gas collection and venting system would be installed as required below the mounds (and road infrastructure excavated into the former landfill) to allow landfill gas to be collected and vented. The gas collection system would also include bentonite seals around any other perforations of the capping layer (eg for bridge piles or other structures) to minimise preferential pathways for gas movement. The gas collection and venting system and capping layer would be designed in accordance with the requirements of the *Environmental Guidelines: Solid waste landfills*. Further information on the potential impacts of the project on the former Tempe landfill is provided in Chapter 13 (Contamination and soils).

7.10.4 Landscaping

Landscaping would be provided in two main areas:

- Open space areas at Tempe Lands and the former Tempe landfill, including the emplacement mounds described above
- Roadside landscaping.

Landscaping would consist of a range of elements and vegetation, and would be confirmed during detailed design, guided by the master plan for open space areas at Tempe Lands and the urban design and landscape plan for the project.

The provision of landscaping would be a key element in achieving the overall urban design objectives for the project. Further information is provided in section 7.12.

7.10.5 Retaining walls

Retaining walls would be required in a number of locations, generally to support the road across elevation changes and at bridge abutments. The majority of retaining walls are needed to support:

- The southern end of the Terminal 1 connection and freight terminal access at Airport Drive
- The St Peters interchange connection
- The terminal links.

The walls would generally consist of reinforced soil, with a maximum height ranging from about two to eight metres, depending on location.

The final treatment used on the outside surface of the walls would be confirmed during detailed design in accordance with the project's urban design and landscape plan (see section 7.12.3).

The indicative locations and heights of retaining walls are shown on Figure 7.25.

7.10.6 Noise attenuation

The project would require measures to minimise the levels of operational road traffic noise experienced at residences and other sensitive receivers.

Based on preliminary noise modelling undertaken, a noise attenuation barrier is proposed as part of the project. Figure 7.25 shows the proposed location of the barrier. The noise attenuation barrier would be located adjacent to the Terminal 1 connection (near South Street) would be about five metres high and about 400 metres long.

The location and height of this barrier would be confirmed during detailed design.

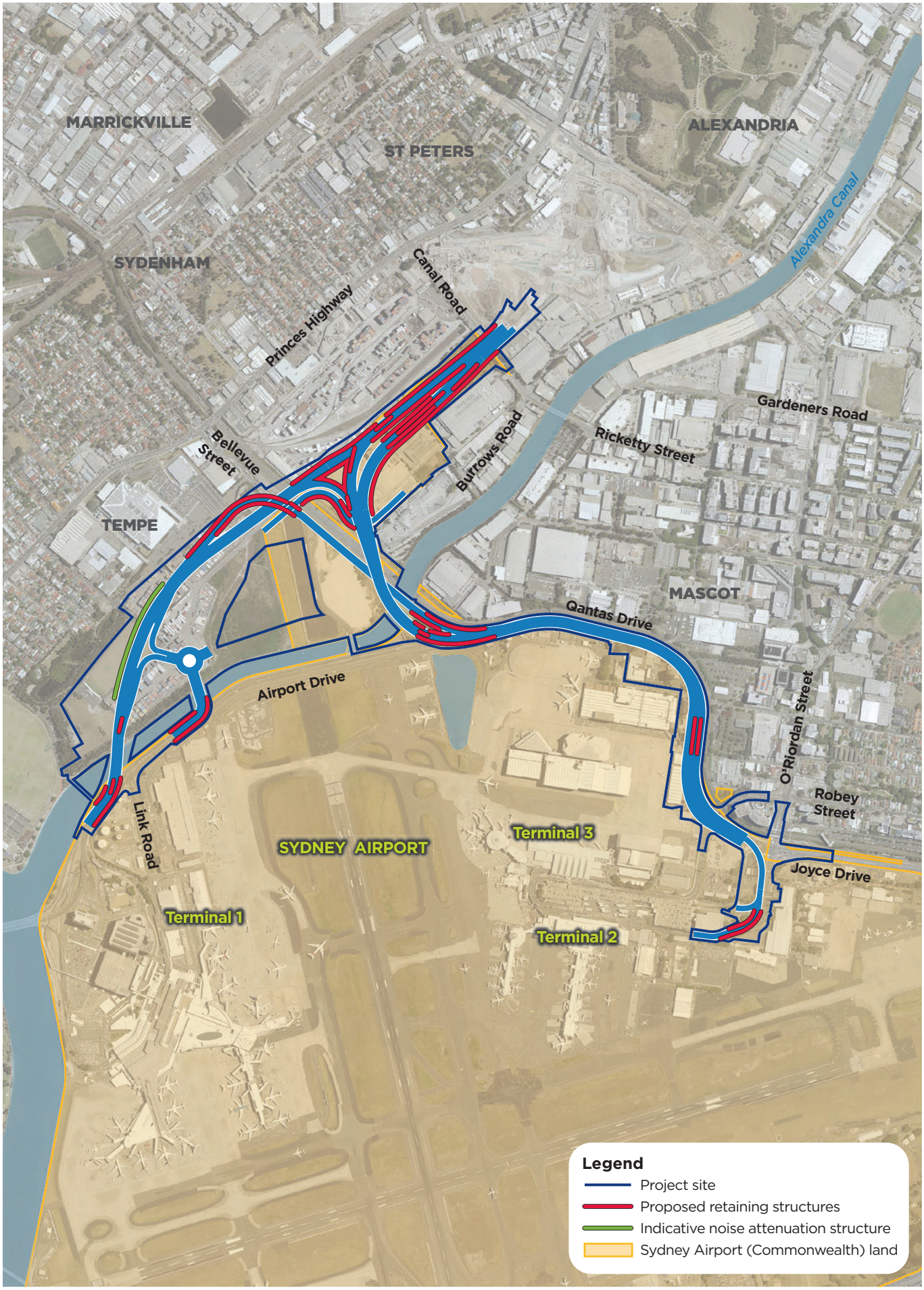


Figure 7.25 **Indicative location of retaining structures and noise attenuation structure**

7.10.7 Headlight glare and anti-throw screens

Anti-glare screens would be installed at the following locations to minimise headlight glare from vehicles:

- Qantas Drive bridge
- Southern overpass
- Northern lands access on the southern side of the Botany Rail Line.

The screens would be typically between 1.4 and 3.3 metres high. The height and location of the screens would be confirmed during detailed design. Indicative locations of headlight glare screens are shown on Figure 7.4.

Anti-throw screens would generally to be attached to all bridges and overpasses constructed as part of the project. The screens would have a height of about three metres above the roadway.

7.10.8 Drainage

An overview of the main drainage infrastructure proposed is provided below. The design of the drainage infrastructure would continue to be developed during detailed design. Other drainage works (including some adjustment to existing drainage systems) are proposed and would be developed further during detailed design.

Road drainage

To the east of Alexandra Canal, existing drainage infrastructure would be reused as far as possible. In some locations, existing infrastructure would need to be upgraded to ensure it can manage the changes in stormwater flows that would occur as a result of the project. In general, upgrades to existing infrastructure would include replacing existing pipes with larger pipes or minor adjustments to pipe alignments to improve efficiency. Where existing infrastructure cannot meet the project's drainage needs, new infrastructure would be constructed. In general, this would involve providing new drainage pipes that would connect to the surrounding drainage network.

West of Alexandra Canal, the key drainage infrastructure would comprise a cut-off channel to collect surface water upstream from the Cooks River Intermodal Terminal around the St Peter interchange connection. This channel would connect with an existing open channel along the northern side of the rail corridor before entering culverts and discharging into Alexandra Canal. A second channel would collect surface water flows from the corner of Swamp Road and Bellevue Street running east along the southern side of the Botany Rail corridor into Alexandra Canal.

The majority of drainage infrastructure would consist of pipes and stormwater channels generally located on either side of the new or upgraded roadways. Drainage infrastructure would include new stormwater channels/culverts to which the road drainage systems would generally drain. The drainage network would generally drain to the proposed channels/culverts; however, some piped drainage would discharge directly to the receiving waters (including Alexandra Canal) or discharge off site to existing drainage infrastructure, such as the existing infrastructure located along Qantas Drive. Areas located along Sir Reginald Ansett Drive would connect to existing drainage, which drains to Mill Stream.

The Terminals 2/3 access would have its own drainage system, which would drain to either end of the viaduct structure where it would connect with existing and proposed drainage systems.

Water would be captured from the base of retaining walls and emplacement mounds by catch drains. It would then be diverted to the project's drainage system, existing drainage infrastructure, or directly to receiving waters.

For parts of the project elevated above the ground, drainage in the form of bridge 'scuppers' would be used to intercept the flow of water from the road pavement and convey it to the proposed discharge locations described below.

Alexandra Canal outlets

Based on the concept design, the project includes nine drainage outlets at Alexandra Canal. As shown on Figure 7.26, this would consist of:

- Upgrading four existing outlets on the eastern side of the canal
- Providing four new outlets on the western side of the canal
- Providing one new outlet on the eastern side of the canal.

A preliminary study of outlet discharges has identified that a number of the outlets would require energy dissipaters to minimise scour in the canal. This would be reviewed during detailed design and the necessary measures at outlets confirmed in conjunction with relevant stakeholders, including Sydney Water.

Flood mitigation basin

A flood mitigation basin is proposed between the lanes of the St Peters interchange connection and Botany Rail line as shown on Figure 7.26. This basin would capture any stormwater flows upstream of the St Peters interchange connection to minimise the flooding impacts of stormwater flows on downstream areas. The basin would be designed to be 'dry' under normal conditions (to minimise attracting birds), and would only operate during large storm events.

Further information on the management of flooding is provided in Chapter 14 (Hydrology and flooding).

Adjustment of Sydney Airport northern ponds

The northern ponds are two ponds which are located either side of Qantas Drive and provide flood mitigation and stormwater detention functions for Sydney Airport.

Constructing the piers for the Qantas Drive bridge would result in a small loss of storage in the northern most of these ponds located immediately adjacent to Alexandra Canal. The project includes enlargement of the pond to ensure this storage loss is offset. The volume of offset required would be confirmed during detailed design in consultation with Sydney Airport Corporation. The southern pond would not be affected.

7.10.9 Water quality measures

The project includes measures to reduce the potential for impacts on water quality. Generally, treatment devices would be installed near connections to the existing drainage network and/or the outlets at Alexandra Canal. These devices would include gross pollutant traps and other separators designed to remove waste matter, hydrocarbons, nutrients and suspended solids from stormwater runoff. The size and type of devices installed would be confirmed during detailed design. A preliminary sizing of these devices has been undertaken based on a three month design storm event.

In other locations, alternative drainage measures may be possible such as grassed swales. All water quality measures would be developed in accordance with the principles of water sensitive urban design and with the aim of achieving the water quality targets in the *Botany Bay and Catchment Water Quality Improvement Plan* (Sydney Metropolitan Catchment Management Authority, 2011) subject to feasibility during the detailed design stage.

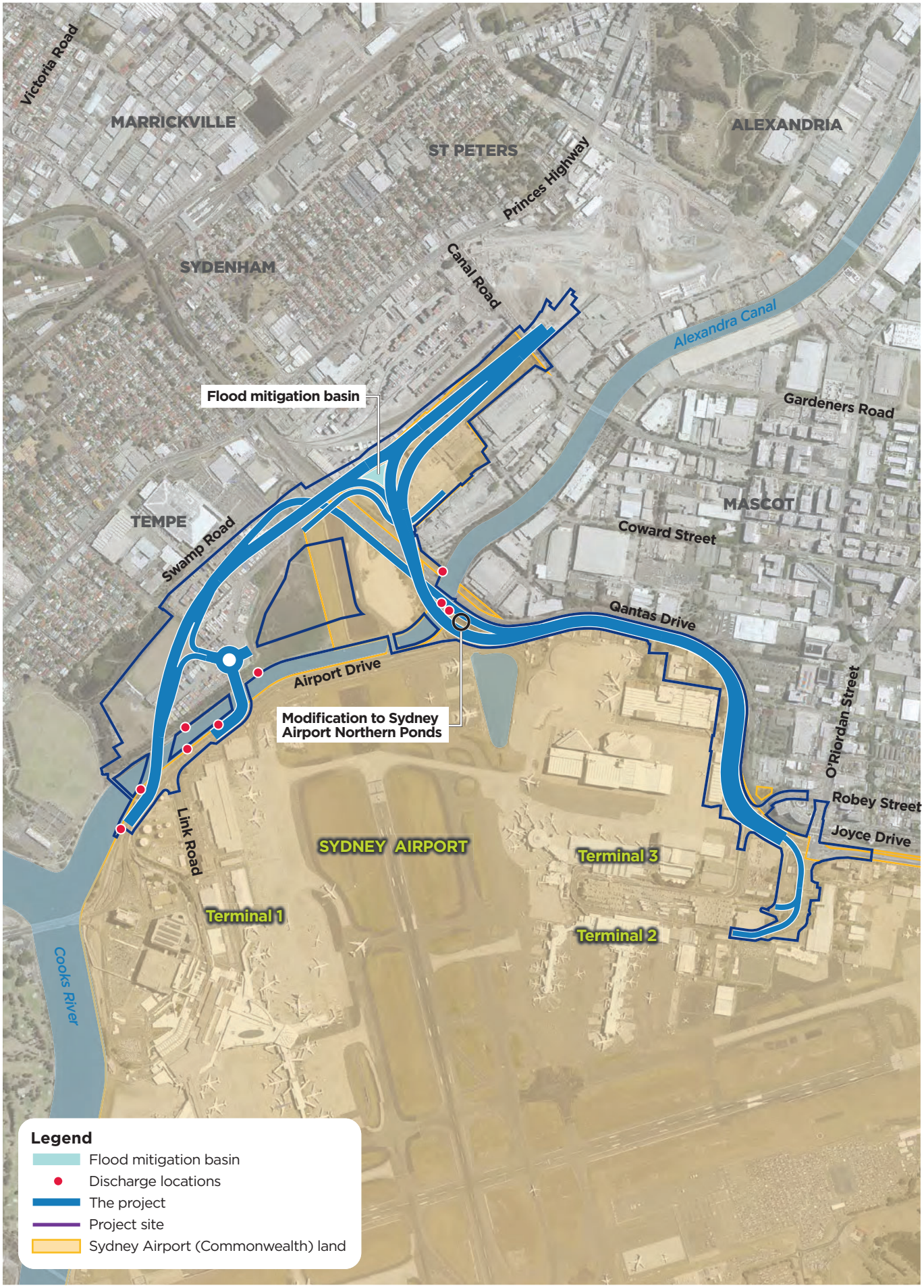


Figure 7.26 **Indicative location of key drainage infrastructure**

7.10.10 Lighting and road signs

Lighting

Lighting would be provided as part of the project, including along roadways, at interchanges, ramps, intersections and along the active transport link. Lighting would be designed in accordance with *AS/NZS 1158.6 – Lighting for roads and public spaces* and CASA's requirements as defined by the *Manual of Standards Part 139 – Aerodromes* (CASA, 2017).

Aviation hazard lighting would be provided in accordance with the *Manual of Standards Part 139 – Aerodromes*.

Signs

Traffic, locational, directional, warning and variable message signs would be provided across the project. Directional signs would be installed in accordance with Austroads and Roads and Maritime standards, with a focus on providing clear and unambiguous directions to motorists.

Variable message signs (see Figure 7.27) would be mounted on gantries along roads and would be used to advise motorists of prevailing traffic conditions. These signs would generally display the regulatory speed limit and would be modified where required to display variable speed limits in response to incidents and congestion.

Variable message and integrated speed and lane use signs would be sized and located to achieve a safe and well guided road environment, while minimising impacts on existing land uses and visual amenity, and avoiding intrusions into protected airspace. Final locations would be determined during detailed design.

Some signage (including variable message signs) may need to be located outside the project site to provide information about movements and incidents within the project site. The location of this signage would be confirmed during detailed design.

Figure 7.27 Typical variable message sign

7.10.11 Utility connections

Utilities and services located within and close to the project site may need to be protected, adjusted or augmented during construction, particularly where excavation is required as part of the project. These services include electricity, telecommunications, sewer, water and gas services.

The locations of existing utility services and any changes required would be confirmed by the construction contractor during detailed design, in consultation with the relevant utility providers.

The project would also involve connections to existing electricity, water and wastewater/sewer utilities.

Further information is provided in section 8.7.

7.11 Access changes and permanent land requirements

7.11.1 Access changes

The proposed changes to existing access arrangements are outlined in Table 7.1. Further information, including an assessment of the potential impacts of the proposed changes, is provided in Chapter 9 (Traffic, transport and access) and Technical Working Paper 1 (Transport, Traffic and Access).

Table 7.1 Proposed changes to access arrangements

Location	Proposed changes
Airport Drive	Airport Drive would be closed to the public between the freight terminal access and Qantas Drive upgrade and extension, with access between Terminal 1 and Terminals 2/3 as described in section 7.1.1.
Northern lands – Sydney Airport employee car park	The closure of the section of Airport Drive mentioned above would remove the existing access to Sydney Airport's staff car park located west of Alexandra Canal from the surrounding road network (and the Nigel Love bridge). Access to this car park would be adjusted by Sydney Airport as part of a separate approval.
Swamp Road and Bellevue Street	Swamp Road would be closed, and access to properties in this area (including the northern lands and those to be acquired as part of the project) would be via the northern lands access and the freight terminal access. A cul-de-sac would be installed at the southern end of Bellevue Street to the north of the project site.
Lancastrian Road	Access to Lancastrian Road would be left-in and left-out via the upgraded Qantas Drive.
Freight terminal at Terminal 1	The freight terminal at Terminal 1, which is currently accessed via Airport Drive and Link Road, would be accessed via the freight terminal access.
Active transport link	Closure of the existing active transport link along eastern side of Alexandra Canal, with a new link provided on the western side of Alexandra Canal (see section 7.9).

7.11.2 Permanent land requirements

The anticipated permanent land requirements associated with the project's operational footprint are listed in Table 7.2. In total, it is anticipated that about 36.2 hectares of land within the project site would be permanently required for the project. The permanent land requirements are anticipated to include:

- 20.6 hectares of Commonwealth-owned land
- 14.1 hectares of land owned by the NSW or local government
- 1.5 hectares of privately-owned land.

No residential land would be required.

Land acquisition (for land other than Commonwealth-owned land) would be undertaken in accordance with the *Land Acquisition (Just Terms Compensation) Act 1991* (NSW), the *Land Acquisition Information Guide* (NSW Government, 2014), and the land acquisition reforms announced by the NSW Government in 2016, which can be viewed online at: *https://www.finance.nsw.gov.au/land-property/land-acquisition-reform-2016.*

Commonwealth-owned land required for the project would be leased by the NSW Government under a long-term lease agreement, subject to compliance with any requirements of relevant Australian Government agencies.

Relocation and some other categories of expenses would be claimable under the *Land Acquisition (Just Terms Compensation) Act 1991* and related policies.

Further information about the project's land requirements, including property details, is provided in Chapter 19 (Land use and property).

Table 7.2 Anticipated permanent land requirements

Location	Property title	Ownership	Estimate of area (hectares) and proportion of lot required[1]
Private land			
25 Burrows Road, St Peters	Lot 1 DP 866946	Private	0.1 (2%)
Swamp Road, Tempe	Lot 725 DP 48012	Private	0.2 (4%)
	Lot 2 DP 869306	Private	0.2 (31%)
	Lot 723 DP 48012	Private	0.1 (2%)
Talbot Street and 20 Canal Road, St Peters	Lot A DP 1188682	Private	0.3 (23%)
	Lot 2 DP 454156	Private	0.2 (41%)
	Lot 22 DP 1069118	Private	0.4 (3%)
Private total			**1.5 hectares**
Commonwealth-owned land			
Sydney Airport, Mascot	Lot 8 DP 1050923	Commonwealth of Australia	11 (2%)
30 Canal Road, St Peters	Lot 4 DP 555771	Commonwealth of Australia	1.8 (85%)
	Lot 3 DP 825649	Commonwealth of Australia	0.5 (45%)
6-10 Burrows Road, St Peters	Lot 3 DP 555771	Commonwealth of Australia	1.3 (100%)
	Lot 2 DP 802342	Commonwealth of Australia	3.6 (48%)
Swamp Road and Bellevue Street, St Peters	Lot 1 DP 186164	Commonwealth of Australia	0.1 (20%)
	Lot 2 DP 830952	Commonwealth of Australia	0.2 (22%)
	Lot 1 DP 830952	Commonwealth of Australia	<0.1 (93%)
Swamp Road, St Peters (car park)	Lot 12 DP 825649	Commonwealth of Australia	0.4 (52%)
	Lot 643 DP 727045	Commonwealth of Australia	0.2 (9%)
	Lot 2 DP 790186	Commonwealth of Australia	0.1 (12%)
	Lot 1 DP 826101	Commonwealth of Australia	1.1 (27%)

Location	Property title	Ownership	Estimate of area (hectares) and proportion of lot required[1]
Swamp Road, St Peters (HIAL)	Lot 5 DP 107811	Commonwealth of Australia	<0.1 (100%)
	Lot 724 DP 481012	Commonwealth of Australia	0.2 (35%)
	Lot 1 DP 869306	Commonwealth of Australia	0.1 (27%)
Commonwealth-owned land total			**20.6 hectares**
Land owned by the NSW or local government			
Various (rail corridor)	Lot 1 DP 1063121	NSW Government	<0.1 (87%)
	Lot 2 DP 1054373	NSW Government	0.3 (31%)
	Lot 1 DP 450245	NSW Government	<0.1 (9%)
	Lot 2 DP 963240	NSW Government	0.1 (32%)
	Lot 21 DP 1069118	NSW Government	0.1 (15%)
	Lot 5 DP 1184446	NSW Government	<0.1 (34%)
	Lot 1 DP 621535	NSW Government	0.1 (21%)
	Lot 11 DP 213317	NSW Government	0.5 (26%)
	Lot 17 DP 217443	NSW Government	<0.1 (2%)
	Lot 95 DP 1157632	NSW Government	0.2 (41%)
	Lot 6 DP 209847	NSW Government	<0.1 (29%)
	Lot 9 DP 747022	NSW Government	0.1 (9%)
	Lot 1 DP 1054373	NSW Government[2]	0.1 (100%)
1-3 Swamp Road, Tempe	Lot 202 DP1097238	Local Government	0.8 (83%)
2 and 5-15 Swamp Road, Tempe	Lot 303 DP 1136081	Local Government	3.2 (67%)
	Lot 304 DP 1136081	Local Government	3.7 (60%)
South Street, Tempe (open space)	Lot 25 DP 227132	Local Government	1.9 (23%)
South Street, Tempe (golf driving range)	Lot 305 DP 1136081	Local Government	0.9 (32%)
Alexandra Canal, Mascot/St Peters/ Tempe	Lot 11 DP 1050464	NSW Government[2]	0.1 (61%)
	Lot 6 DP 1184447	NSW Government	0.1 (22%)
	Lot 13 DP 1050464	NSW Government	1.9 (8%)
5 and 5A Canal Road, St Peters	Lot A DP 391775	NSW Government	<0.1 (2%)
	Lot 14 DP 606737	NSW Government	<0.1 (<1%)
Holbeach Avenue, Tempe	Lot 400 DP 1233792	NSW Government	<0.1 (<1%)
Other publicly-owned land total			**14.1 hectares**

Notes: 1. The estimate of land required is based on a concept design that is subject to refinement during detailed design, and the final area required may vary from that shown

2. The Commonwealth of Australia has aerial title above some of the lots identified

7.12 Urban design and place making

7.12.1 Urban design and place making strategy and concept for the project

As discussed in section 7.2.3, an urban design and place making strategy and concept was developed as part of the project concept design and is described in Technical Working Paper 13 (Urban Design, Landscape Character and Visual Impact Assessment).

The strategy and concept identifies four main project elements and includes guiding principles for each:

- Structures (bridges and viaducts, retaining walls, noise walls)
- Place making elements (eg feature lighting, pedestrian and active transport connections, heritage interpretation features, public art opportunities, indigenous design approach)
- Landscape elements (public open space, roadside landscaping, vegetation, drainage structures)
- Roadside elements (headlight screens, signage gantries, other roadside furniture).

Key recommendations of the strategy have been incorporated into the project's concept design and/or will be investigated further as part of detailed design.

7.12.2 Consideration of key urban design and place making issues in the concept design

The concept design for the project has been developed taking into account the urban design vision and objectives (see Figure 7.8) and the urban design and place making strategy (see chapter 6 of Technical Working Paper 13 (Urban Design, Landscape Character and Visual Impact Assessment)). A summary of how key urban design and place making issues have been addressed during the concept design process is provided below.

Considering urban renewal areas and existing issues and constraints

As described in chapter 6, the project has been developed with regard to a range of engineering and environmental constraints, including an extremely tight operational project boundary, existing land uses and ownership, sensitive receivers, large areas of historically contaminated and saline soils, and Sydney Airport operational issues. Much of the project is located in existing brownfield areas to minimise impacts on existing sensitive receivers, existing urban renewal areas (particularly in Mascot) and urban amenity.

Alexandra Canal is one of the major heritage items in the area and links Mascot with the Wolli Creek urban renewal areas, which are located in close proximity to the project site. The landscape and urban design concept plan integrates the canal as a central element of the urban design and place making strategy and ensures continued community access to and along the canal, strengthening existing linkages. It also identifies opportunities for meaningful interpretation experiences, such as a heritage interpretive trail and locations for site-specific artworks to complement and reinforce the indigenous heritage of the area. The strategy includes an art strategy that provides opportunities for cultural expression by a wide range of artists. Both the artworks and process of creating the artworks would contribute to fostering a sense of local community cohesion and inclusiveness.

Infrastructure has been located to minimise impacts on sensitive receivers within the constraints of the project site. Much of the project is located in commercial and industrial areas, or within existing road corridors.

Sensitive areas that were not able to be avoided include existing open space within Tempe lands and Alexandra Canal. The project impacts on areas in and around Tempe Lands and the canal. This affects existing open space and the landscape setting of the heritage-listed Alexandra Canal. These sensitive areas were not able to be avoided, due to the need to incorporate areas east of Alexandra Canal, including the existing Airport Drive, into Sydney Airport land. Both of these are areas are proposed to be a focus of future design development and master planning processes.

Reduction of traffic in and around commercial and community centres

Commercial and community centres surrounding the project include Mascot, St Peters, Tempe and Wolli Creek. They include employment, warehousing, light industrial, bulky goods retailing areas, hospitality and other commercial businesses, as well as residential communities. Open space areas are also important community destinations.

By providing a direct connection to the Sydney motorway network, the project would result in a reduction of through traffic volumes in Mascot, as well as along the Princes Highway, benefiting local centres in Mascot, Tempe and Wolli Creek. This will improve the amenity of these centres and improve safety for pedestrians and active transport users wanting to access community facilities and areas of open space in Tempe. The project would provide for ongoing pedestrian and cyclist connectivity, wayfinding and amenity, with facilities fully integrated with the project. This will include ensuring continued access to open space and local footpaths in Mascot accessed via the relocated active transport link along Alexandra Canal.

High quality design, including enhancement of healthy, cohesive and inclusive communities

The urban design and landscape concept plan (see Technical Working Paper 13) has sought to maximise high quality design of the landscape, streetscape and project elements by:

- Promoting the use vegetation as a unifying element, and to provide visual relief and reduce heat, to deliver a memorable arrival and departure experience supporting the project's 'gateway' function
- Creating new open space beyond the project's operational boundary, which would be experienced by recreational users from surrounding communities, as well as by motorists
- Integrating the design of all project elements, to ensure that:
  - Forms and detailed resolution are elegant and refined to create a unified and well composed journey experience that sets a new quality benchmark
  - The night-time experience is considered and integrated, as many visitors will view the project at night and during dawn and dusk
  - Engineering, architecture and art are fully integrated.

In conjunction with the above, the project's residual land (see section 7.12.4) would provide opportunities for future areas of open space/recreation in accordance with community needs, including the need for inclusive facilities and accessibility by all community members. Future new areas of open space would contribute to an open space link from inner city areas via Sydney Park, St Peters interchange and the former Tempe landfill to connect to Botany Bay through existing open space south of the Cooks River. Due to its location immediately adjoining existing open space in Tempe Recreation Reserve and its proximity to residential areas, potential use of residual land as public open space would be consistent with the existing and desired future character of the area.

Future new open space areas and the proposed active transport link would contribute to achieving healthy, cohesive and inclusive communities.

The design of the project's hard and soft urban design elements would seek to ensure consistency with the existing and desired future character of the area. Key strategies to realise a meaningful, unique and cohesive experience of arriving and departing from Sydney Airport are:

- Ensuring that the forms and detailed resolution of the built elements are elegant, refined and work together to create a unified and well composed journey experience
- Designing road elements to provide legible and self-explanatory wayfinding to reduce visual clutter
- Responding to identified heritage values and providing meaningful interpretation at appropriate locations
- Integrating art and interpretation with the design of project elements
- Using a palette of materials and finishes that respond to and celebrate the landscape, urban and historical context

- Framing views to the surrounding landscape and landmarks to provide a unique travel experience steeped in the sense of place and to foster a sense of anticipation
- Preparing a master plan in conjunction with Inner West Council for the residual land adjacent to the Terminal 1 connection and open space areas as outlined above.

Crime prevention through environmental design

The project would also provide for ongoing pedestrian and cyclist connectivity, through the relocated shared path along the western side of Alexandra Canal, including continued access to open space as part of the master planning process to be undertaken with Inner West Council for the Tempe Lands area.

Reflecting the consideration of crime prevention through environmental design principles, and in accordance with the requirements of the *Disability Discrimination Act 1992* (Cth), integrating lighting with the proposed active transport link would create a more memorable active transport experience as well as improving passive surveillance and safety. All new shared paths and connections would be fully accessible and meet relevant design standards and guidelines.

7.12.3 Urban design and landscape plan

An urban design and landscape plan would be prepared during detailed design in accordance with the urban design and place making strategy and concepts presented in Technical Working Paper 13. The plan would present an integrated urban and landscape design for the project and would include:

- Design objectives, principles and standards based on:
  - Local environmental and heritage values
  - Urban design context
  - Sustainable design and maintenance
  - Community safety, amenity and privacy
  - Relevant design standards and guidelines
  - Minimising the footprint of the project
- A description of the project's design features, including graphics such as sections, perspective views and sketches
- Landscaping and structural design opportunities to mitigate the visual impacts of road infrastructure and operational fixed facilities
- Details of proposed landscaping (as described below)
- Details of disturbed areas (including compounds) and the strategies to progressively rehabilitate, regenerate and/or revegetate these areas
- The timing for implementation
- Monitoring and maintenance procedures for built elements, vegetation and landscaping.

The plan would be prepared in consultation with relevant stakeholders, including local councils and the community.

Landscaping

The provision of landscaping would be a key element in achieving the overall urban design visual and objectives for the project (see Figure 7.8). Areas available to be landscaped would be landscaped where there is the opportunity to do so. The design of landscaping areas would:

- Maximise retention of existing mature trees where possible
- Replace trees that would need to be removed with new trees as far as possible, including planting mature vegetation to provide a more immediate effect at project completion

- Provide a generous landscape curtilage for vegetation (including tree cover), landform and public art to create a memorable landscape setting for the motorway
- Create a continuous 'green edge' to the roadway, comprised vegetation at differing heights
- Take into consideration important views and sight line requirements
- Take into consideration Sydney Airport's airport operational constraints, particularly in terms of the airport's prescribed airspace and minimising the risk of wildlife strike
- Install trees in verges wherever possible to minimise the visual scale of the road infrastructure, mitigate heat generated by large pavements, and assist in the absorption of dust and noise to enhance the amenity of both the road corridor and adjoining areas
- Provide shade and maximise amenity for users of the active transport link
- Investigate opportunities for feature landforms to create visual interest and provide deep soil to support the growth of feature trees (subject to Sydney Airport's operational requirements)
- Provide visual separation to the Botany Rail Line, including a green interface to replace existing mature vegetation that would need to be removed to construct the project (see Chapter 21 (Landscape character and visual amenity)).

Preparing the plan

The urban design and landscape plan would be prepared by a suitably qualified consultant, in consultation with relevant stakeholders (including Inner West Council, the community and Sydney Airport Corporation), and with consideration of:

- The concept plans for the project
- The master plan being developed by Inner West Council for land located within the Tempe Lands (including former industrial lands located on Inner West Council land)
- The urban design and place making principles described in Technical Working Paper 13 (Urban Design, Landscape Character and Visual Impact Assessment)
- Relevant mitigation measures (particularly those in Chapters 11 (Airport operations), 17 (Non-Aboriginal heritage), 21 (Visual amenity) and 22 (Biodiversity))
- The tree replacement strategy (see Chapter 21)
- The conditions of approval for the project
- Relevant guidelines and policies (see below).

The plan would be approved by the Secretary of the Department of Planning, Industry and Environment.

Design guidelines

The plan will be prepared in accordance with relevant guidelines, policies and strategies, including:

- *Beyond the Pavement: Urban design policy, procedures and design principles* (Roads and Maritime, 2014)
- *Bridge Aesthetics: Design guideline to improve the appearance of bridges in NSW* (Roads and Maritime, 2019a)
- *Better Placed. An integrated design policy for the built environment of New South Wales* (Government Architect New South Wales, 2017)
- *Crime Prevention through Environmental Design* (Queensland Government, 2007)
- *Technical Guidelines for Urban Green Cover in NSW* (OEH, 2015a)
- *Sustainable Design Guidelines Version 4.0* (Transport for NSW, 2017)
- *Australian Standard AS4282-1997 Control of the obtrusive effects of outdoor lighting*
- *Sydney Airport Master Plan 2039* (SACL, 2019a)

- *Sydney Airport Environment Strategy 2019-2024* (SACL, 2019b)
- *Landscape Guideline: Design guideline to improve the quality, safety and cost effectiveness of green infrastructure in road corridors* (Roads and Maritime, 2018a)
- *Noise wall design guideline. Design guideline to approve the appearance of noise walls in NSW* (Roads and Maritime, 2016a)
- *NSW Bicycle Guidelines* (Roads and Traffic Authority, 2005)
- *Water Sensitive Urban Design Guideline* (Roads and Maritime, 2017a).

Urban design refinements

Additional opportunities for enhancement of the concept plan and design refinements to be explored during detailed design would include:

- Increasing the horizontal setback of all bridge abutments from the top edge of Alexandra Canal to maintain the integrity of the heritage curtilage and allow for public enjoyment of the canal within a safe and attractive environment set in the landscape
- Maximising 'openness' under the bridges through slender bridge design to maintain clear sight lines along the canal
- Retaining uncluttered views along Alexandra Canal and maximising retention of the 'big sky' landscape of Sydney Airport, including sweeping views across the open airport landscape and of aircraft movements
- Additional connectivity measures and opportunities to strengthen links between communities surrounding the project site
- Opportunities for additional vegetation, in particular tree cover in open space areas, to ensure user amenity through thermal comfort and provide spatial definition and interest
- Innovative responses to the design of 'under viaduct' spaces
- Design refinements of major project elements, including bridges and the Terminals 2/3 access viaduct, to achieve a high standard of architectural design and finish
- Emphasising the nightscape environment.

7.12.4 Residual land

Following construction, it is expected that some of the land required to construct the project in Tempe (including land within the Tempe Lands and other areas on the former Tempe landfill) would be available for other uses. This land is referred to as 'residual land' for the purpose of this document. Potential future uses of residual land could include open/space recreation, or other future uses in accordance with the priorities of local and regional strategic planning documents, Inner West Council (the landowner) and the community.

Council is developing a master plan to identify how this land could be used, which will consider council's Recreation Needs Study (Cred Consulting, 2018). The future use of this land would be subject to a separate assessment and approval process.

Roads and Maritime would provide support to Inner West Council with the master planning process for these areas and ensure that the urban design and landscape plan for the project is consistent with the outcomes of this process.

Further information on residual land is provided in section 19.4.3.

Chapter 8

Construction

This chapter describes the proposed approach to construction, including the indicative construction strategy, methodology, program and working hours, temporary construction facilities, workforce and site access arrangements.

The project consists of infrastructure and components located on Sydney Airport land and on land subject to the EP&A Act. The activities required to construct the project are described as a whole, with figures provided to show the areas of Sydney Airport land.

The SEARs and MDP requirements addressed in this chapter are listed below. Full copies of the SEARs and MDP requirements, and where they are addressed in this document, are provided in Appendices A and B respectively.

Reference	Requirement	Where addressed
General standard SEARs		
2.1	1. The EIS must include, but not necessarily be limited to, the following: (b) A description of the proposal, including key components and activities (including ancillary components and activities) required to construct and operate it, including: • pedestrian and cyclist facilities including any temporary changes resulting from construction activities	This chapter provides a description of the activities required to construct the project. Section 8.6.4
	• construction and operational ancillary facilities and infrastructure	Section 8.4 (construction ancillary facilities)
	• all utility undertakings (relocations, augmentations, adjustments and protection works) which will be undertaken as part of the proposal	Section 8.7
	• land use changes and acquisition of privately owned, council and crown land	Section 8.4.1 (land requirements) and Chapter 19 (Land use and property) (land use changes)
MDP requirements		
91(1)	A major development plan, or a draft of such a plan, must set out: (c) a detailed outline of the development	This chapter provides a description of the activities required to construct the project.

8. Construction

8.1 Overview

8.1.1 Construction overview

Construction would generally involve four main phases of work:

- Enabling works
- Site establishment
- Main construction works
- Finishing and post-construction rehabilitation.

The indicative approach to construction during these work phases is described in section 8.2. Detailed construction planning, including timing, staging and work sequencing, would be confirmed once construction contractors have been engaged. Further information on the construction program and timing is provided in section 8.3.

Ancillary facilities and compounds required to support construction are described in section 8.4. Indicative construction resources, workforce, transport and access arrangements, and utility works are described in sections 8.5 to 8.6.4.

This chapter provides an indicative construction methodology that retains flexibility for the successful contractor(s) to refine and optimise aspects of the approach. A final construction methodology and program would be developed by the construction contractor(s) based on the conditions of approval and the mitigation and management measures provided in this document.

General principles of the construction strategy

The approach to construction has been developed based on the following general principles:

- Design and plan efficient site layouts that ensure the safety of the workforce and community
- Minimise the potential for community and environmental impacts
- Eliminate potential aviation safety hazards by undertaking works with the potential to intrude into the prescribed airspace (such as the use of cranes and piling equipment) outside Sydney Airport's operational hours
- Minimise potential impacts on access to Sydney Airport terminals for passengers, visitors and employees
- Minimise potential impacts on the safe operation of the Botany Rail Line by primarily undertaking works within/over the rail corridor during possession periods
- Maintain the safety and operation of the road network for all users, including freight transport to Port Botany
- Make construction staging and sequencing as safe and efficient as possible, providing a simplified construction process (where practicable), minimising the duration and significance of impacts on nearby receivers
- Minimise the length of the overall construction period and the duration of individual construction activities to minimise potential noise impacts on nearby receivers during construction
- Locate construction compounds and other temporary facilities in areas which are already cleared or disturbed
- Provide safe, efficient and convenient access for construction vehicles, plant and equipment, while minimising impacts on the road network and surrounding land uses.

8.1.2 Parts of the project subject to the Airports Act and the EP&A Act

The project consists of infrastructure and components located on land subject to the Airports Act as well as on land subject to the EP&A Act. The parts of the project located on Sydney Airport land (as shown on Figure 1.3 and in more detail on Figure 8.2 to Figure 8.6) are subject to the assessment and approval process of the Airports Act. Other parts of the project (as shown on Figure 1.3 and in more detail on Figure 8.2 to Figure 8.6) are subject to the assessment and approval process of the EP&A Act. For completeness and readability, construction is described as a whole in this chapter.

8.1.3 Construction footprint and work areas

The land required to construct the project (the construction footprint) is shown on Figure 8.1 to Figure 8.6. The construction footprint has an area of about 69.1 hectares, including about 37.3 hectares of Sydney Airport land. The areas of Sydney Airport land within the footprint are shown on Figure 8.2 to Figure 8.6.

The construction footprint includes land required to construct the proposed roadways, bridges and ancillary infrastructure, and land required for the proposed construction compounds. Utility and drainage works to support the project, and works to implement the temporary active transport link (see section 8.6.4), would generally occur within the construction footprint. However, some works, such as connections to existing infrastructure, may be required outside the footprint.

For the purposes of preliminary construction planning, the construction footprint has been divided into six work areas to facilitate construction of the main infrastructure:

- St Peters interchange connection work area
- Terminal 1 connection and western bridges work area
- Eastern bridges work area
- Airport Drive work area
- Qantas Drive work area
- Terminals 2/3 access work area.

The work areas are shown on Figure 8.1.

8.2 Indicative construction methodology

8.2.1 Enabling works

Enabling works for major infrastructure are typically carried out before the start of substantial construction to manage specific features and issues within the project site (such as access requirements). The following enabling works are proposed:

- Utility works, including the protection, adjustment and augmentation of utilities within the project site (see section 8.7 for further detail of these works)
- Adjustments to existing transport networks, including active transport links and intersections, to ensure that existing networks are able to operate during construction.

Works to be undertaken as enabling works would be confirmed by the construction contractor as part of detailed design and construction planning.

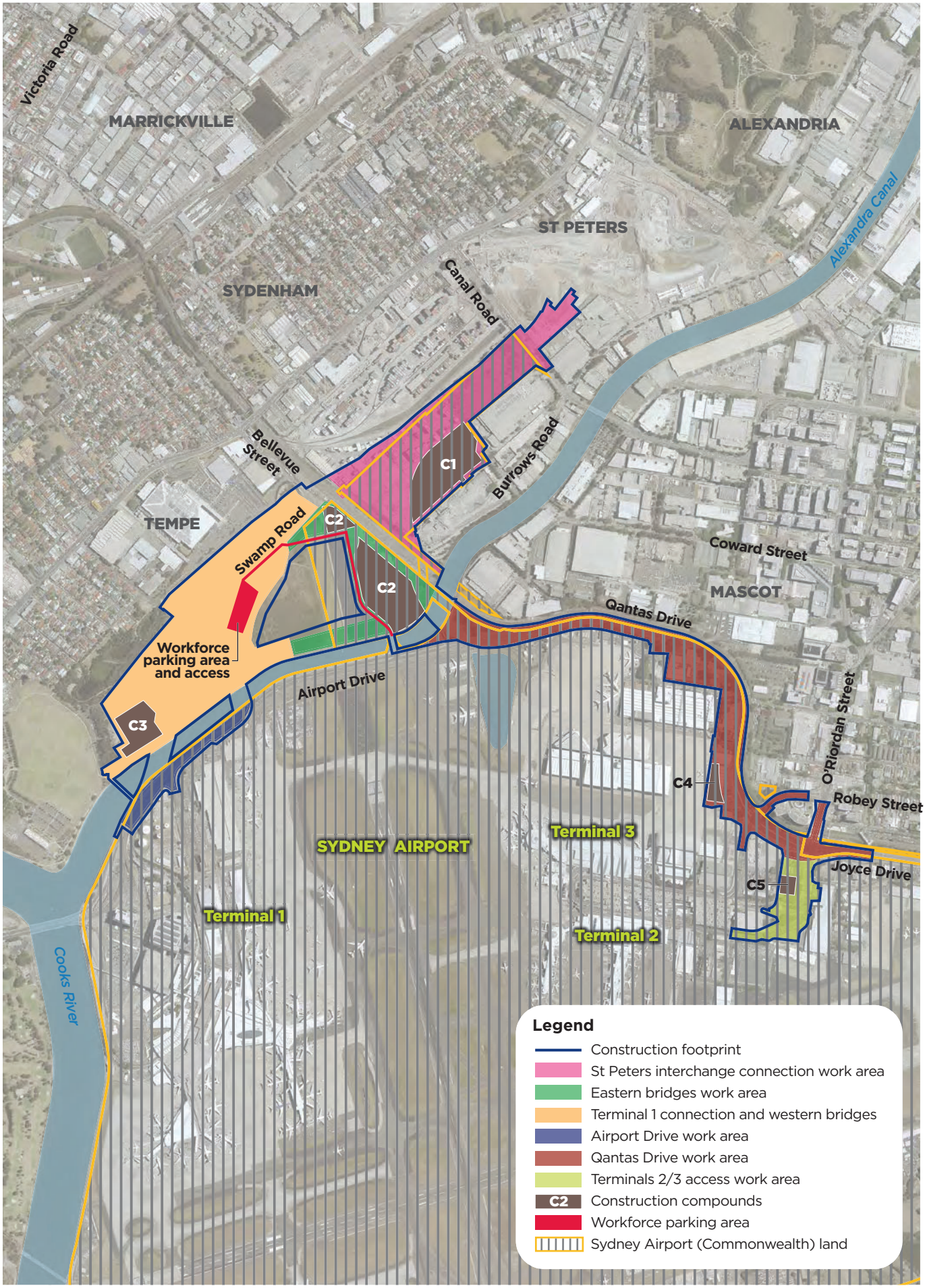


Figure 8.1 **Construction footprint, work areas and facilities – overview**

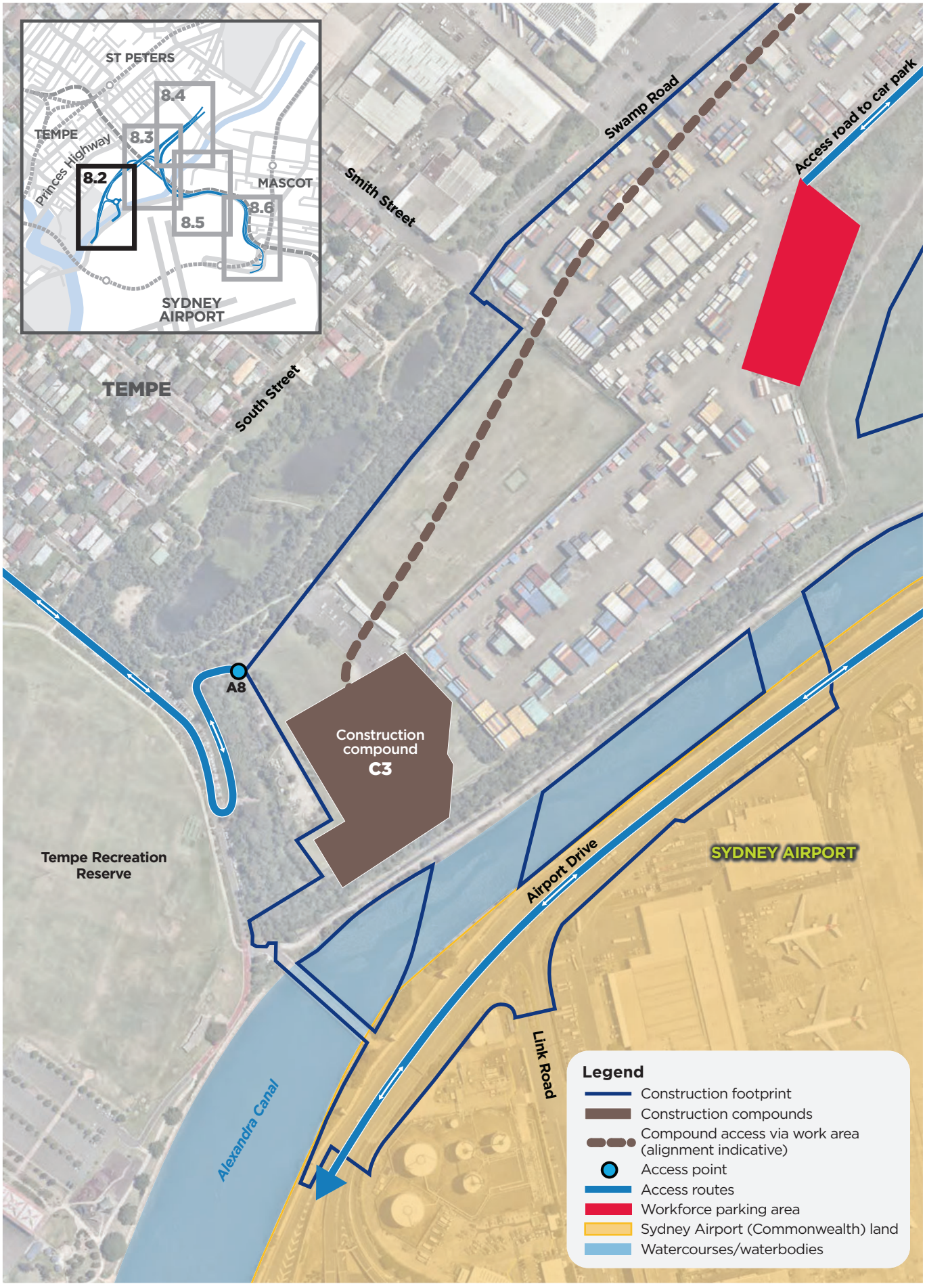


Figure 8.2 **Construction footprint, work areas and facilities - map 1**

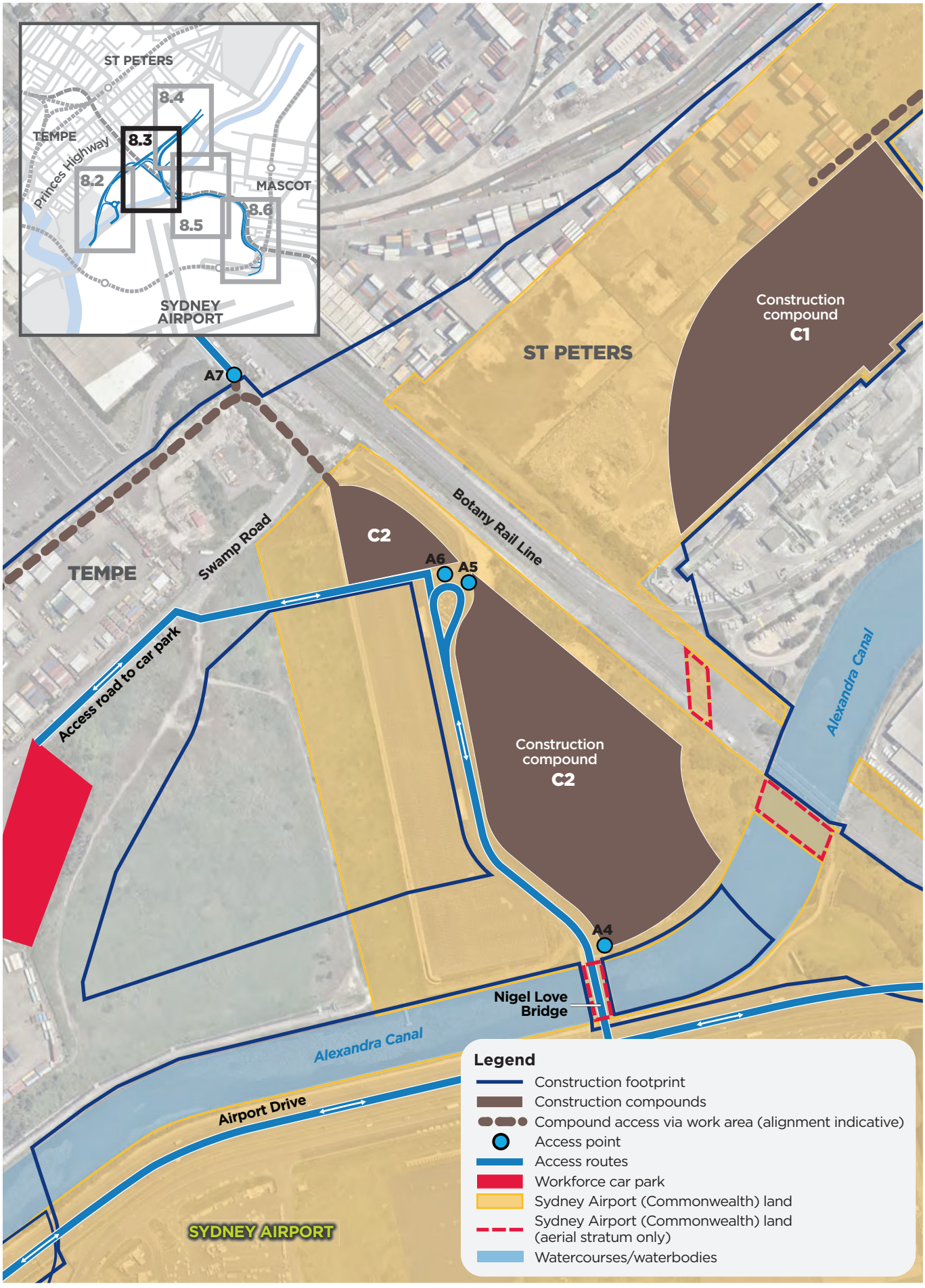


Figure 8.3 **Construction footprint, work areas and facilities - map 2**

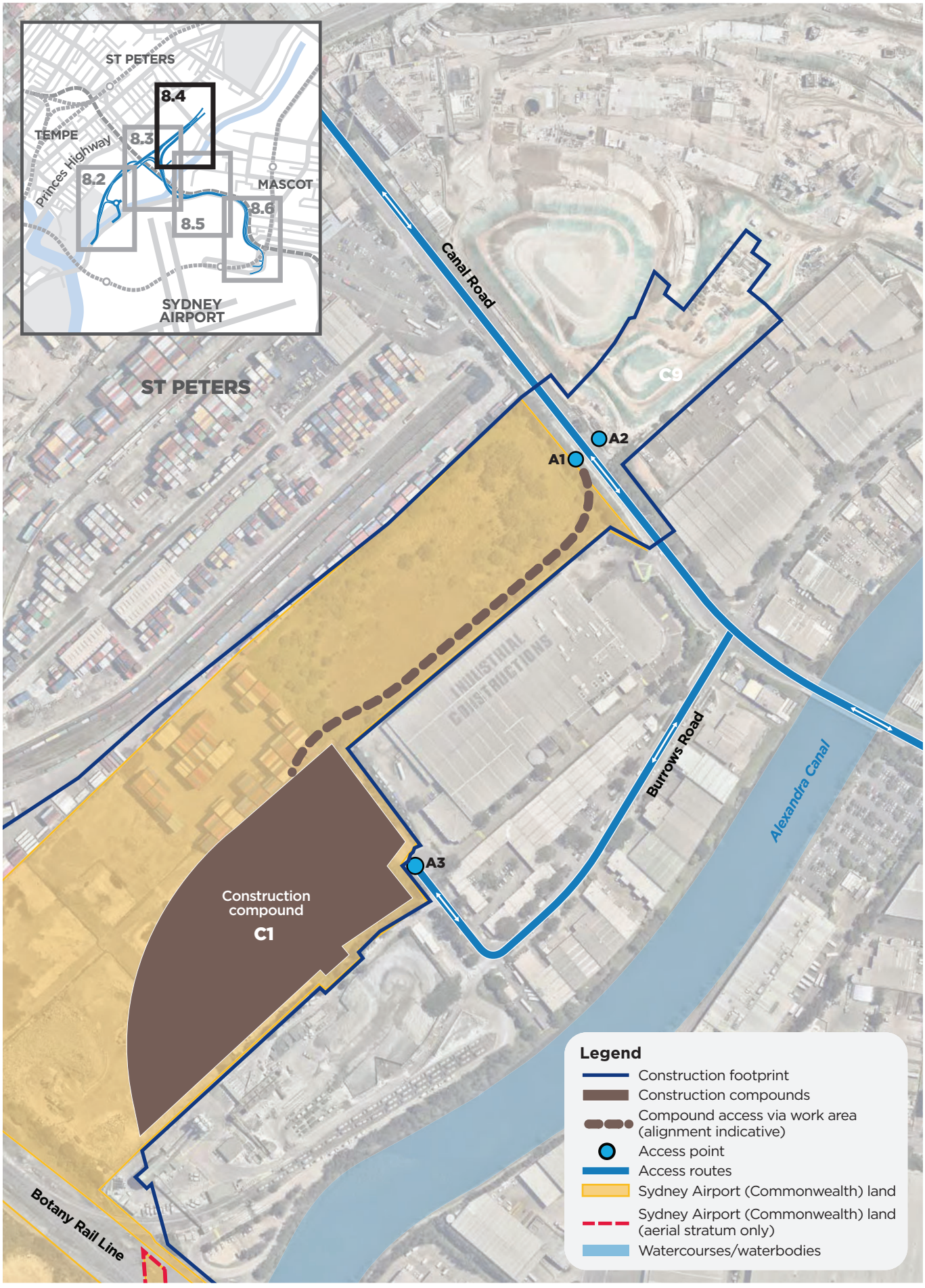


Figure 8.4 **Construction footprint, work areas and facilities - map 3**

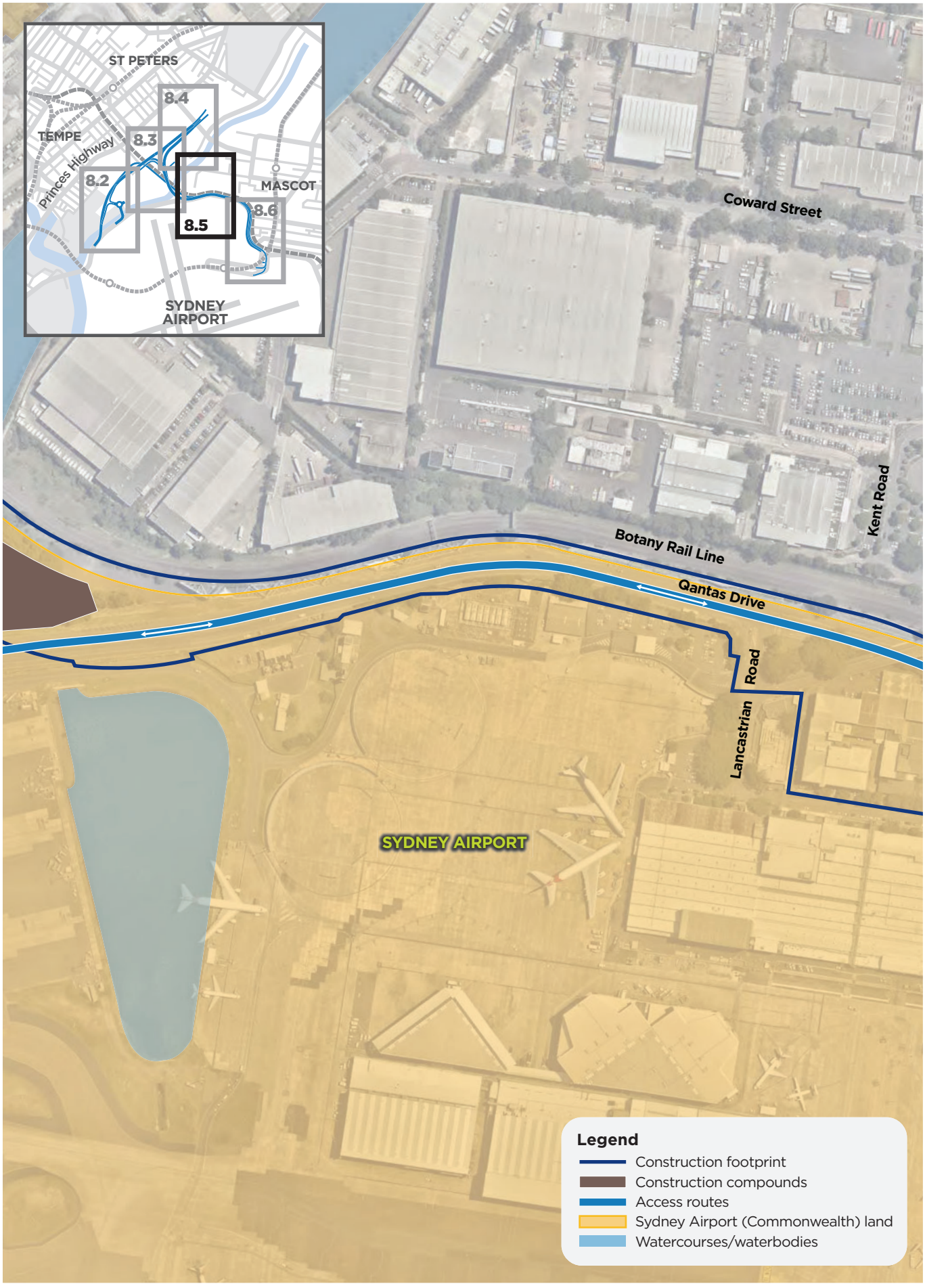


Figure 8.5 **Construction footprint, work areas and facilities - map 4**

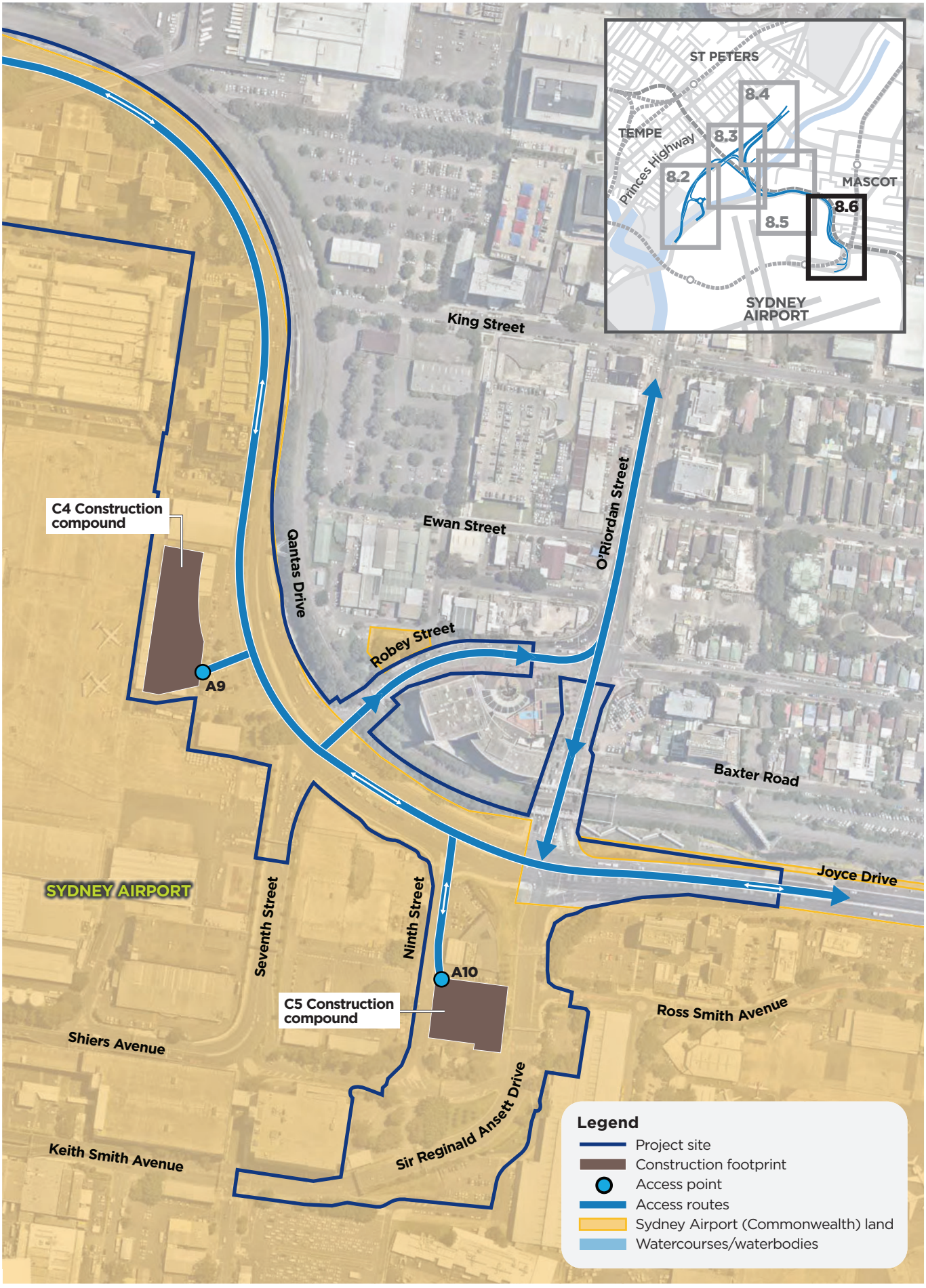


Figure 8.6 **Construction footprint, work areas and facilities - map 5**

8.2.2 Site establishment

Site establishment would generally include the following activities:

- Installing site fencing, hoarding and signage
- Installing site environment management controls, including sediment and erosion control, screening and noise attenuation
- Adjusting the Sydney Airport airside fence and other security fences
- Installing traffic management measures
- Establishing work areas, construction compounds and site access arrangements
- Establishing workforce parking areas
- Clearing/trimming of vegetation
- Providing services (including power and water) to construction compounds and work areas
- Establishing temporary road, pedestrian and cyclist diversions where required.

8.2.3 Main construction works

Removing buildings and structures

A number of existing buildings and structures would need to be fully or partially removed to facilitate construction. Table 8.1 provides an indicative list of the buildings and structures proposed to be removed.

Further information about potential property impacts is provided in Chapter 19 (Land use and property).

Table 8.1 Indicative list of buildings and structures proposed for removal

Location	Building/structure type
Sydney Airport land	
Northern lands (at Burrows Road South)	Visy recycling facility structures
	Boral concrete recycling facility structures
Jet Base	Workshops 171 and 167
	Services control plant/boiler house (buildings 151/203)
	Administration building 2 (AB2) (building 133)
	Pump house and water storage tank (backup reservoir) (building 166)
	Administration building 1 (AB1) (building 217)
	Qantas flight training centre building 148 (northern training and classrooms)
	Hazmat store and flammable liquids store (building 272 annex) along northern edge of building
	Substation C (building 155 and adjacent liquids pump station)
	Store shed (building 601)
	Fuel store office (building 311)
Qantas Drive, Airport Drive and Sir Reginald Ansett Drive	Advertising and wayfinding structures and gantries

Location	Building/structure type
Land subject to the EP&A Act	
Boral Concrete St Peters	Sheds and vehicle wash facilities located at the south-western corner of the site
Cooks River Intermodal Terminal	Part of warehouse and minor shed located at the south-eastern corner of the site
Tyne Container Services	All structures and containers at the Tyne Container Services site
Tempe Lands	Office and driving range netting and lighting structures at the Tempe Golf Driving Range and Academy
Inner West Council depot	Removal of all material and any structures
Qantas Drive	Advertising structures

The process for removing buildings or other structures would typically involve:

- A hazardous materials survey
- Installing hoarding, scaffolding and protection barriers around the perimeter of the site or building
- Adjusting the Sydney Airport airside security fence
- Decommissioning/terminating building services
- Temporary propping and/or waterproofing to ensure the structural integrity of adjacent structures
- Removing materials inside buildings
- Demolishing the main structure using an excavator, bobcat, cranes or other conventional methods, following a 'top-down' approach, with no use of explosive demolition techniques
- Removing materials from the site for recycling or disposal.

Hazardous materials would be removed and disposed of in accordance with relevant legislation, codes of practice and Australian Standards. Where practicable, materials such as bricks, tiles, concrete, timber, plastics and metals would be sorted and sent to a waste facility with recycling capabilities.

Earthworks

Earthworks would be required to construct key project infrastructure, including:

- Piling for bridge and overpass abutments
- Roadways and the active transport link, including excavation and filling to the required level
- Drainage infrastructure
- Retaining walls
- Utility works.

The estimated quantities of materials associated with earthworks are provided in Table 8.2. These estimates indicate that fill material would need to be imported to the project site, which is consistent with the elevated nature of many of the project's features.

Of the quantities shown, about 67,000 cubic metres of material would need to be removed from Sydney Airport land, and about 459,000 cubic metres of clean fill would need to be imported onto Sydney Airport land. This material would be subject to testing prior to importation to confirm its suitability for use on the site.

The majority of fill material is needed at the St Peters interchange connection work area for the elevated roadways crossing this area. The importation of fill is required early in the construction program to consolidate the underlying alluvial soil layers. Other ground improvement methods may also be used, in the form of dynamic compaction or concrete injected columns to ensure a stable foundation for the proposed roadway.

Table 8.2 Estimated quantities of materials generated/required for earthworks

Key feature	Amount to be removed (m^3)[1]	Amount to be imported (m^3)[1]
Terminal 1 connection (includes emplacement mounds)	64,000	213,000
Freight terminal link	4,000	22,000
St Peters interchange connection	7,000	280,000
Qantas Drive upgrade and extension	50,000	36,000
Terminal links	34,000	46,000
Terminal 2/3 access	3,000	14,000
Northern lands access	1,000	30,000
Allowance for unsuitable material[2]	-	65,000
Total for project as a whole	**163,000**	**706,000**
Total for Sydney Airport land	**67,000**	**459,000**

Notes: 1. Numbers rounded to the nearest 1,000 cubic metres
2. This allows for additional material that may need to be imported to compensate for material that cannot be reused on site (eg contaminated material)

The following hierarchy would be applied to the management of excavated materials:

- Material with suitable engineering properties that meets soil quality requirements (including no contamination) would be reused within the project site as fill
- Waste material excavated from the former Tempe landfill would be re-emplaced within the boundary of the site in the form of emplacement mounds, reducing the need to dispose of this material off site (see section 7.10.2)
- Excess material that is unable to be reused within the project site (eg contaminated material and excess landfill waste) would be transported off site for reuse, recycling or disposal at an appropriately licensed facility (to be determined based on the waste classification).

Further information on waste management is provided in Chapter 24 (Waste management).

Road construction and widening

The project includes construction of new sections of road and upgrading/widening an existing section of Qantas Drive. These works would be undertaken using conventional road construction/widening processes and would include the activities listed below.

Preparatory works

- Clearing any vegetation
- Removing and stockpiling topsoil
- Removing existing kerbs and other road elements/furniture (for road upgrade/widening)
- Earthworks
- Managing contaminated material where it is encountered, including material from within the former Tempe landfill site
- Adjusting adjacent properties and accesses where required.

Road works

- Constructing retaining walls to design levels
- Installing new or adjusting existing drainage and other utilities
- Constructing new pavement, including placing and compacting select fill, sub-base and asphalt wearing surface
- Installing new kerb and gutter
- Installing new concrete medians
- Finishing work, including line marking, installing safety barriers, lighting, signage and landscaping.

Bridge and overpass construction

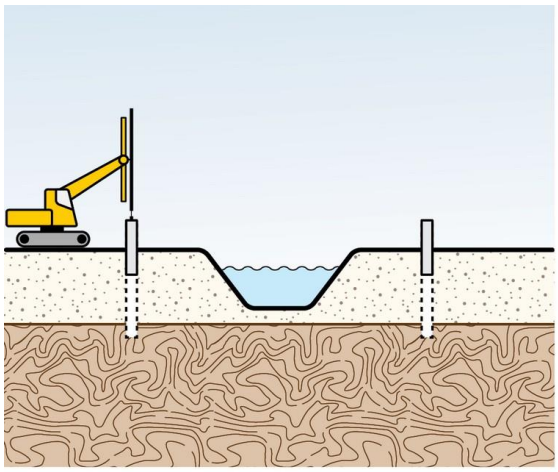
As described in Chapter 7 (Project description), three main types of bridge structure are proposed - balanced cantilever, super-T or box girder and steel tied arch. The indicative construction methods for these structure types are summarised in Table 8.3. Following construction of the bridge structures, each bridge would be fitted out with decking and road pavement, drainage scuppers, edge barriers, anti-throw and headlight glare screens (as required), lighting, signage and line marking.

Construction of bridge abutments and piers would be common for all bridge types. Crane pads would potentially be required at a number of bridge work areas to ensure that material can be safely lifted.

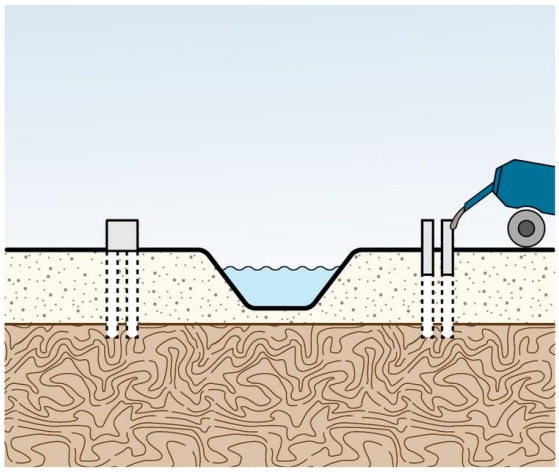
To minimise the potential for aviation hazards, activities involving the use of tall machinery and equipment (such as cranes) would be subject to approval by Sydney Airport Corporation. The use of this equipment would generally be undertaken when flights are not operating; this would generally occur during Sydney Airport's curfew hours. Further information is provided in section 8.2.5.

Table 8.3 Indicative construction methods for bridge/overpass superstructures

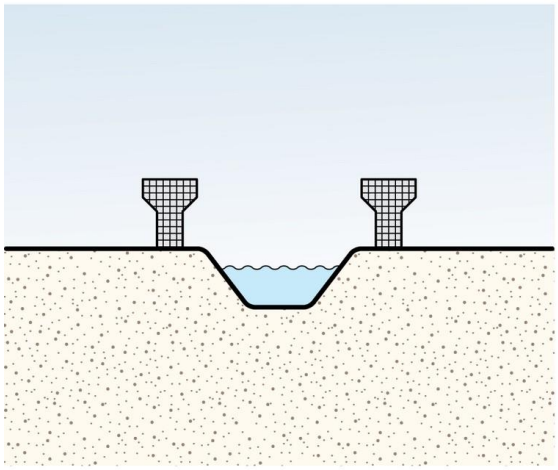
Type	Applicable bridges/overpasses	Indicative construction method
Balanced cantilever	Terminal 1 connection bridge Qantas Drive bridge	Two alternative methods are available: lifting pre-cast concrete segments into place using a crane; or casting sections in situ using mobile formwork. By constructing the bridge outwards in both directions from each pier at the same rate, each structure maintains an overall load 'balance' until it meets the opposite structure in the middle of the span. Figure 8.7 shows the typical process used to construct a balanced cantilever bridge.
Super-T or box girder (overpass/ viaduct)	Canal Road overpasses St Peters interchange connection overpasses Terminal 1 connection rail overpass Northern lands access rail overpass Terminal 2/3 access viaduct Freight terminal bridge	Precast concrete and/or steel beams would be lifted onto piers using cranes. Figure 8.8 shows the typical process used to construct an overpass/viaduct.
Steel tied arch	Terminal link bridge	The steel arch would be launched from one side of the canal using a launching gantry and counterweights to offset the load as the arch is pushed across Alexandra Canal. Once the arch is in place, other beams and deck slabs would be cast on temporary formwork and post-tensioned.



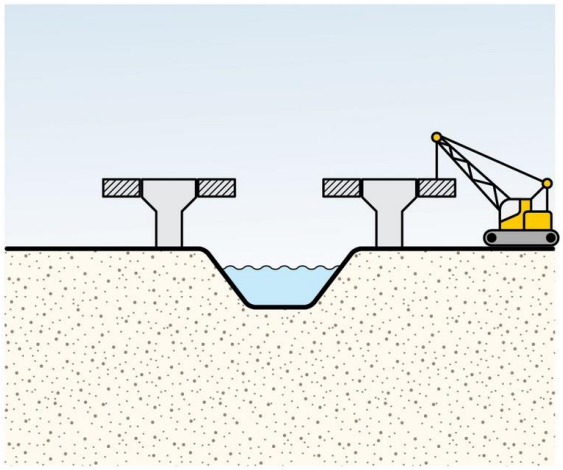
1. Drill and install piles



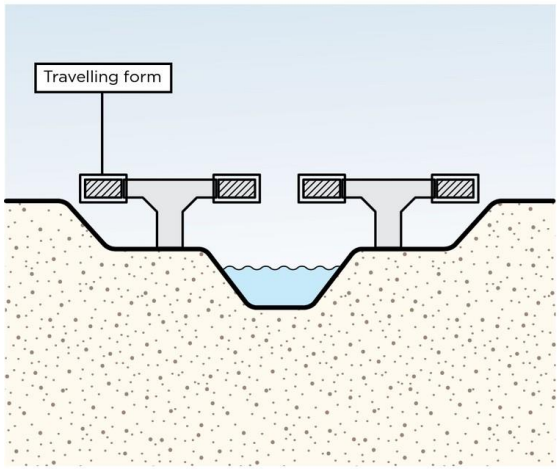
2. Form and pour columns



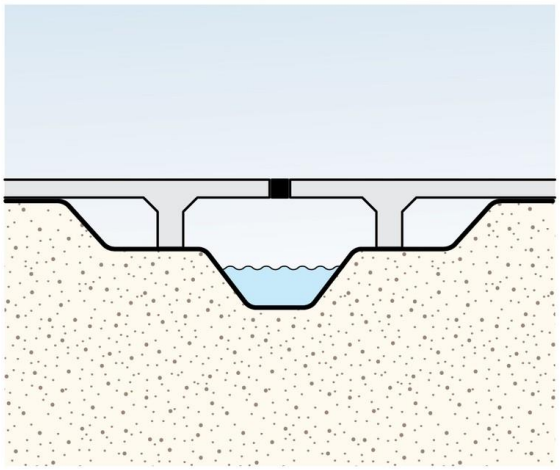
3. Form and pour headstocks



4. Lift segments into place at each end

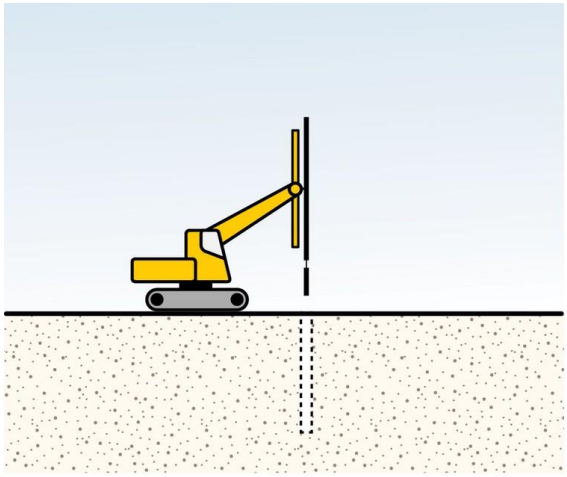


5. Travelling form used to install and fix segments in place

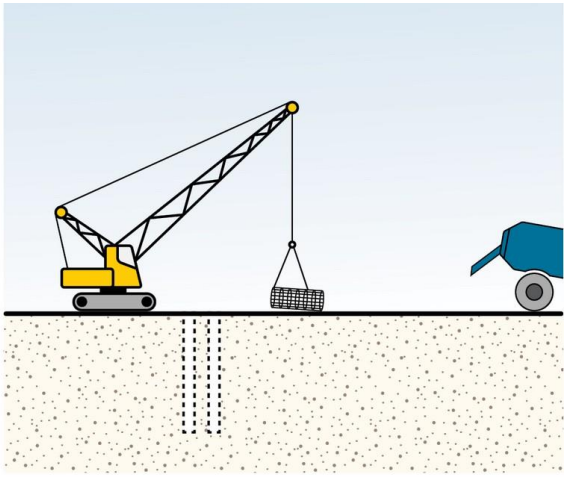


6. Individual spans meet at centre with final segment placed

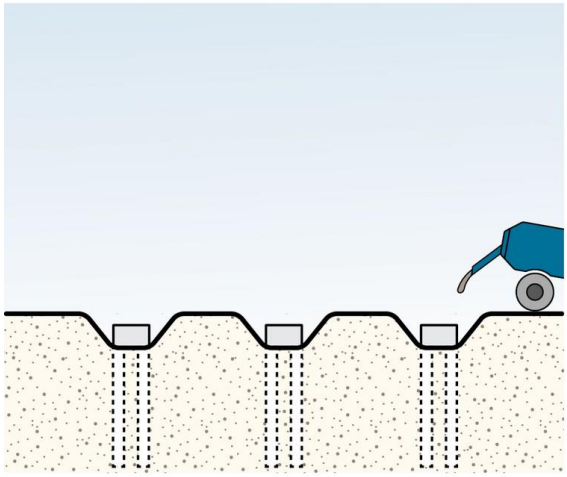
Figure 8.7 Typical construction process for a balanced cantilever concrete bridge



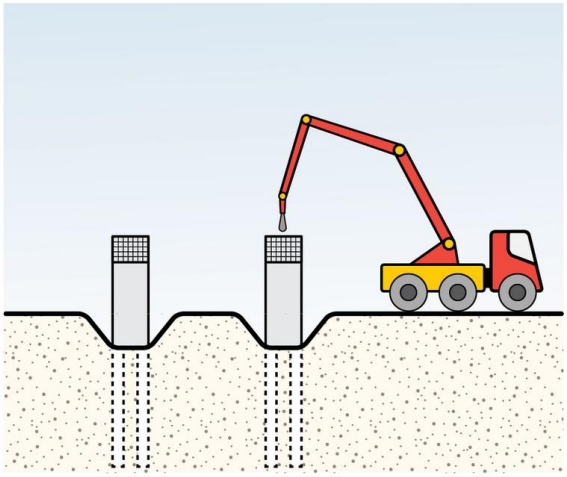
1. Drill holes with rotary piling rig



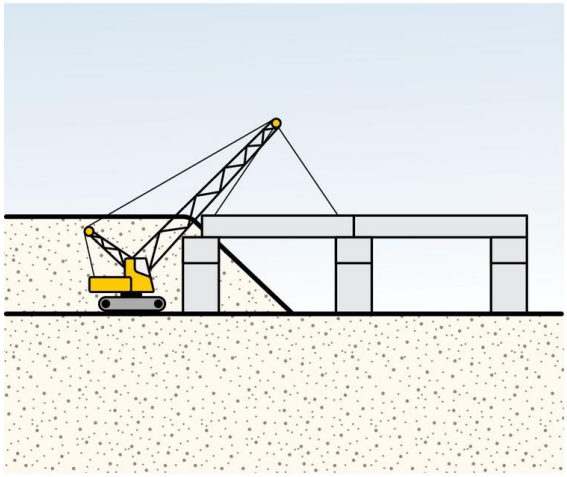
2. Install reinforcing cage and pour concrete



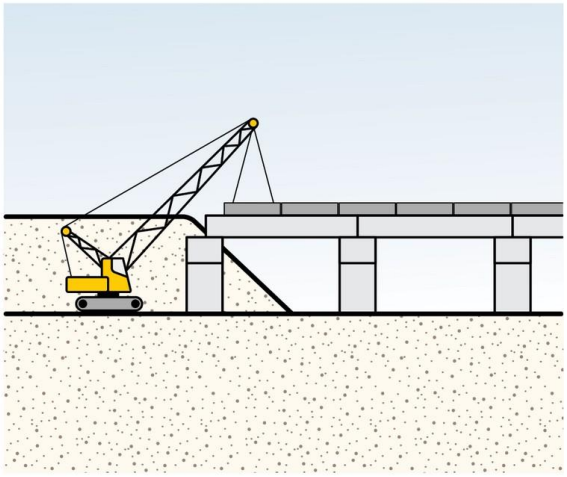
3. Form and pour pilecaps



4. Extend and complete headstocks



5. Install superstructure beams with mobile crane



6. Pour bridge deck and install side barriers, finishes etc

Figure 8.8 Typical construction process for a concrete overpass/viaduct

Working platform at the part of Sydney Airport's northern ponds located at Alexandra Canal

A temporary working platform would be constructed over that part of the northern ponds that is located adjacent to Alexandra Canal. The working platform would be used mainly to facilitate construction of the new section of Qantas Drive and the Qantas Drive and terminal link bridges. To minimise impacts on the function of the pond and wider flooding impacts, the platform would be constructed above the five per cent annual exceedance probability flood level and would not impact the capacity or operation of the pond. The temporary working platform would be removed at the completion of construction.

Retaining walls

The methodology for constructing retaining walls would generally involve:

- Excavating below the existing ground surface for foundations
- Installing drainage
- Installing steelwork/formwork and concrete pouring (for cast in situ walls)
- Installing precast segments and retaining straps for reinforced earth retaining walls
- Backfilling and compacting soil behind the retaining wall panels
- Installing capping or edge beams for the retaining wall panels.

Figure 8.9 shows the typical process used to construct a reinforced soil retaining wall.

Drainage

Constructing the proposed drainage infrastructure would generally involve:

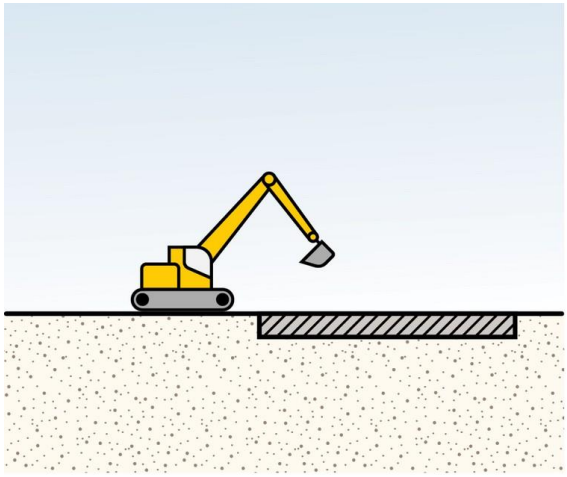
- Removing and reconstructing/altering existing pits and pipes
- Installing new pits and pipes
- Connecting new drainage infrastructure to the existing drainage network
- Constructing new drainage outlets and scour protection at Alexandra Canal
- Constructing the flood detention basin for use during construction and operation.

New drainage outlets

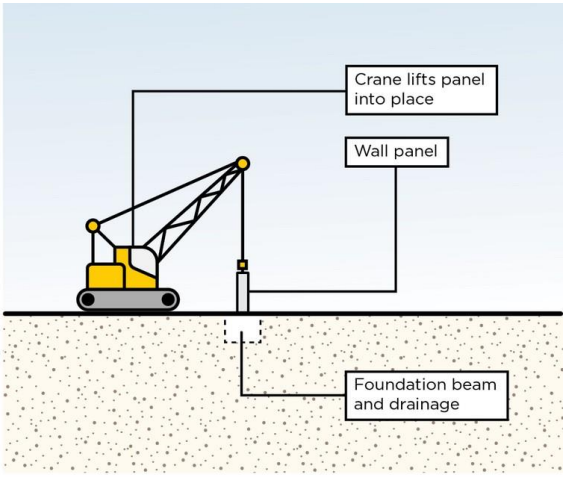
Constructing the drainage outlets at Alexandra Canal would require installation of silt curtains around each outlet location. Where works are required below the water level in Alexandra Canal, works would generally involve:

- Establishing coffer dams, within the area protected by silt curtains, to provide a dry working environment and minimise mobilisation of disturbed sediments
- Constructing the new outlets and scour protection in the canal wall within the area protected by the coffer dams
- Removing the coffer dams once outlets are constructed.

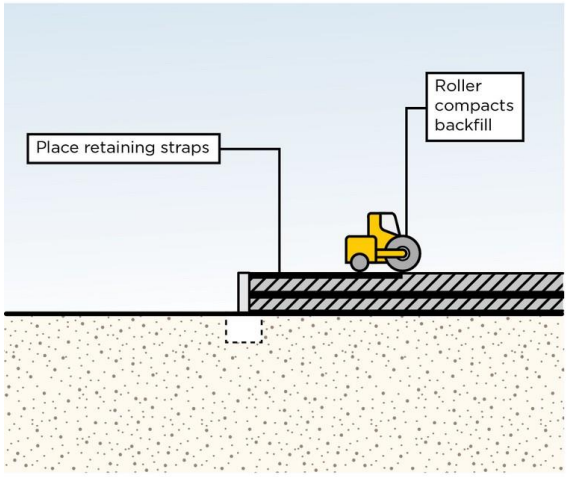
As a result of the presence of contaminated sediments and the existing remediation order for Alexandra Canal, all works associated with the outlets would be undertaken in accordance with a management plan approved by Department of Planning, Industry and Environment in consultation with the NSW EPA and Sydney Water (the owner of the canal). Further information on potential contamination and water quality impacts during construction is provided in Chapters 13 (Contamination and soils) and 16 (Surface water).



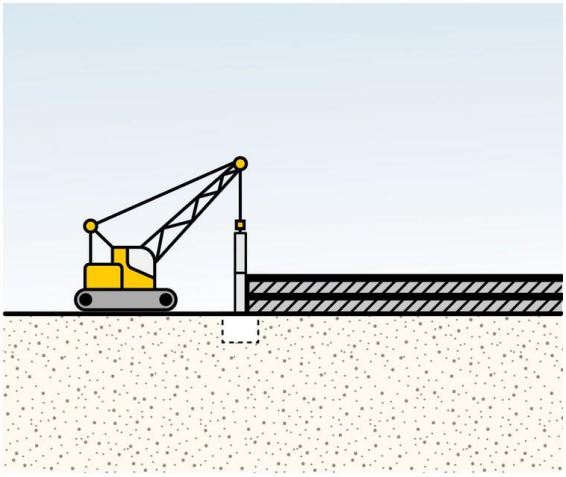
1. Excavate and install foundation and drainage



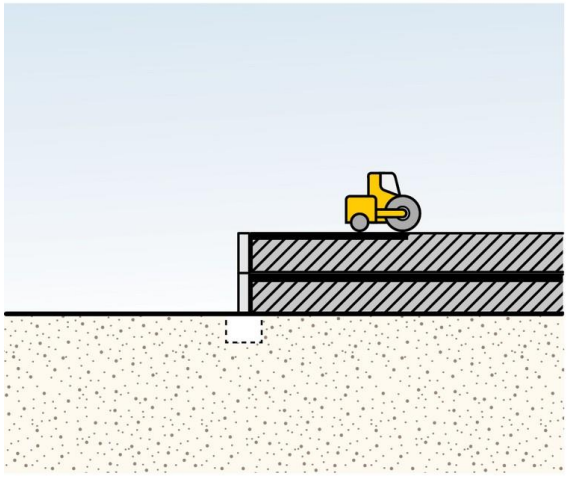
2. Install bottom panels



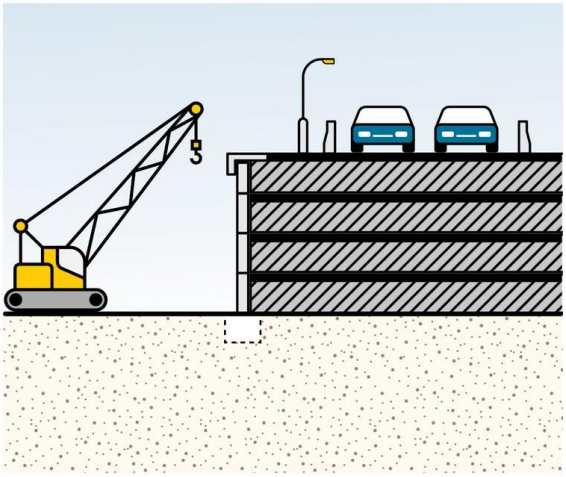
3. Backfill and place retaining straps



4. Install next panel row



5. Backfill next layer, place retaining straps and compact



6. Place edge beam, complete construction

Figure 8.9 Typical construction process for a reinforced soil wall

8.2.4 Finishing and post-construction rehabilitation

Finishing works would be undertaken at the completion of construction and would generally include:

- Erecting directional and other signage, and roadside furniture such as street lighting
- Landscaping and revegetation
- Site demobilisation
- Removing site fencing and construction compounds
- Rehabilitating work and construction compound areas.

8.2.5 Key site-specific construction requirements

Specific construction approaches are required at a number of locations to manage the constraints associated with existing site conditions. These approaches are outlined below.

Sydney Airport's prescribed airspace

Sydney Airport's prescribed airspace, which is described in Chapter 2 (Location and setting), extends over much of the project site. Construction activities involving the use of tall plant and equipment (such as piling rigs used to construct piles and cranes used to lift bridge segments) would require temporary intrusions into the prescribed airspace. The location of activities with potential to intrude into the prescribed airspace are shown on Figure 8.10.

Works with the potential to intrude into the prescribed airspace would need to be undertaken during periods when aircraft are not operating. Generally, such works would be undertaken during Sydney Airport's curfew hours (ie between 11pm and 6am).

The approval requirements for works that may affect the prescribed airspace are described in section 3.2.2. Proposed working hours are outlined in section 8.3.3.

Botany Rail Line corridor

Constructing the Qantas Drive upgrade and extension (including the Qantas Drive bridge), the Terminal 1 connection rail overpass, and the northern lands access rail overpass would involve works within and over the corridor for the Botany Rail Line (the rail corridor). The Botany Rail Line and sidings associated with the Cooks River Intermodal Terminal and Boral Concrete St Peters are generally used 24 hours a day, seven days a week. The exceptions to this are during rail maintenance possession periods, which are generally scheduled on four weekends each year. Each possession period starts around 2am on Saturday and ends at 2am on Monday.

Any works that encroach into the rail corridor's 'danger zone' can only be undertaken during the scheduled possession periods (or between train movements under worksite protection as agreed by ARTC). The danger zone is defined as those areas within three metres of the nearest rail and includes the airspace above and the land below the corridor in this zone. Works that may enter the danger zone include:

- Site establishment activities such as erection of barrier fencing within the rail corridor
- Construction of bridge foundations and piers
- Moving large components (such as bridge/overpass girders) into place above the rail corridor
- Drainage and service and utility crossings of the rail corridor (eg lighting and low voltage electrical services).

The programming of works within the possession periods would be confirmed in conjunction with ARTC.

Further information on working hours and out-of-hours work is provided in section 8.3.3.

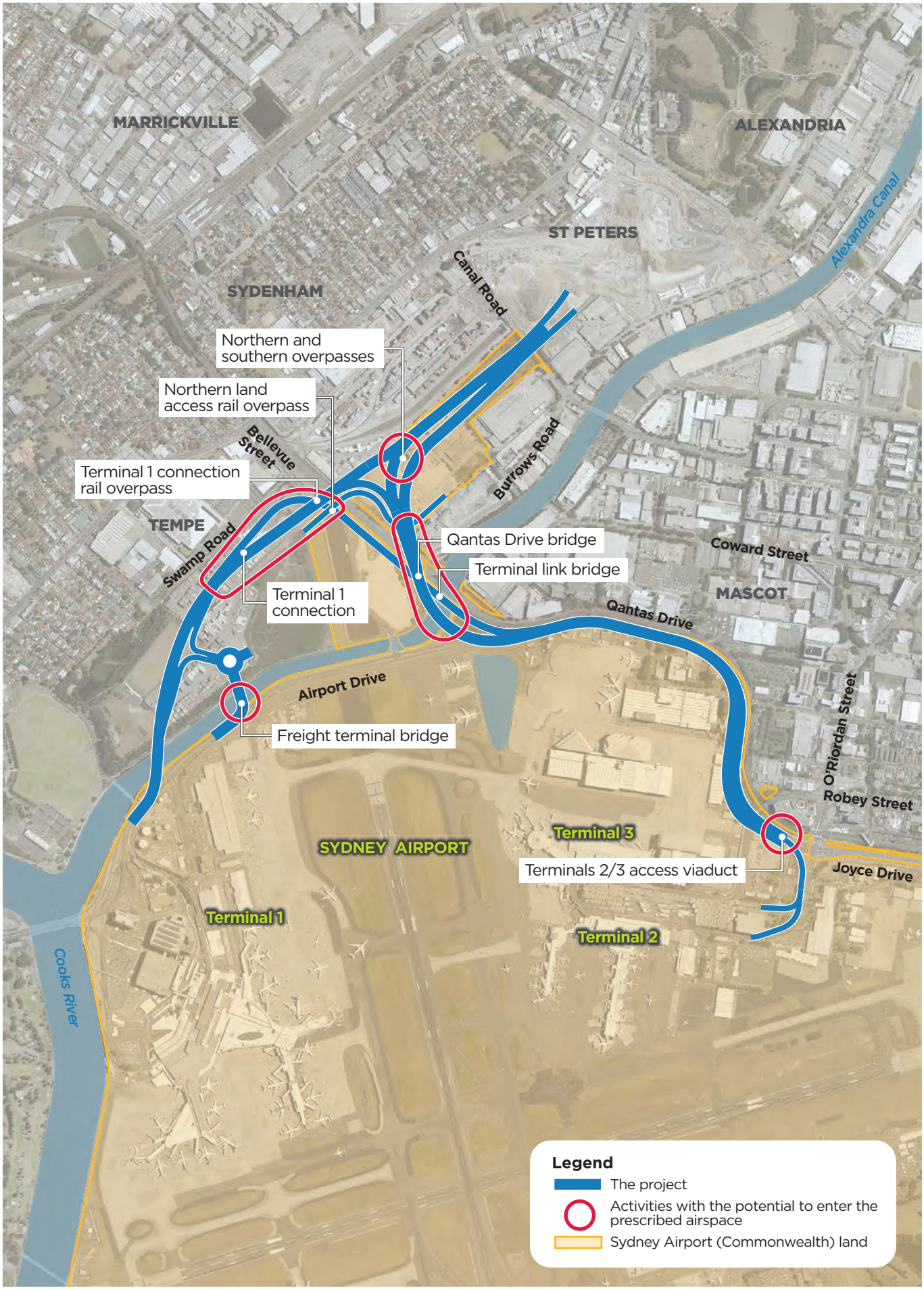


Figure 8.10 **Location of intrusions into the prescribed airspace at Sydney Airport**

T8 Airport and South Line tunnels

Constructing the Terminals 2/3 access would involve works over the T8 Airport and South Line tunnels, including piling works, which would be located within the protection zone for the tunnels. Consultation with Sydney Trains (as operator of the line) would be undertaken to seek details of specific requirements and any approvals required before works commence to ensure the rail tunnels are protected.

The former Tempe landfill

Although the project has been designed to minimise disturbance at the former Tempe landfill, construction would involve excavating some of the waste materials at the site. It is proposed to retain some of the excavated waste material on site where possible, encapsulated with new capping, in the form of emplacement mounds (see section 7.10.2). Some waste material would also need to be disposed off site.

The former Tempe landfill comprises various waste management infrastructure, which includes a leachate collection system, a bentonite cut-off wall around the perimeter of the site, and a gas venting system. The project would seek to avoid impacts on this infrastructure as far as possible. However, should this not be achievable, new infrastructure would be installed. Details of any changes necessary to these existing systems would be confirmed during detailed design.

The existing landfill capping layer, which forms a seal between the buried waste and the surrounding environment, would need to be removed within the construction footprint and replaced following construction. The location of compounds within the former Tempe landfill area would consider the potential for ingress of landfill gas and related work, health and safety issues (eg confined spaces).

Construction at the former Tempe landfill, and any changes to existing waste management infrastructure, would be undertaken in accordance with any requirements in the existing Environmental Management Plan for the site, the *Environmental Guidelines: Solid waste landfills* (NSW EPA, 2016a) and any license conditions that apply to the site. Further information is provided in Chapter 13 (Contamination and soils).

Transfer of excavated contaminated material across jurisdictional boundaries

During construction, excavated material would be temporarily stockpiled at its point of origin, wherever practicable. In the event material excavated from land subject to the EP&A Act (State jurisdiction) needs to be temporarily stockpiled on Sydney Airport land (Commonwealth jurisdiction), or vice versa, the following would occur:

- A conceptual site model would be developed in accordance with the National Environmental Protection (Assessment of Site Contamination) Measure and the *PFAS National Environment Management Plan* (HEPA, 2018) to assess potential soil characteristics prior to excavation. The conceptual site model would inform the sampling to be undertaken, and the assessment of potential risks that would determine if the excavated material is suitable for reuse
- Excavated material would be placed back into the excavation where the conceptual site model indicates that replacing the material would not exacerbate existing contamination and would not pose an ongoing risk to human or environmental receptors
- Excavated material would be disposed of off site at an appropriately licensed waste facility where the conceptual site model indicates reusing the excavated material would exacerbate existing contamination.

When excavated material from one jurisdiction (State or Commonwealth) needs to be stored temporarily in the other jurisdiction, the excavated material would be:

- Segregated from any other excavated material and appropriately identified
- Isolated from underlying soil and surface water runoff, and protected from erosion, to prevent cross-contamination of soil and water and prevent potential exposure to human or environmental receptors.

8.3 Construction program and timing

8.3.1 Program

It is anticipated that construction would start in mid-2020 and take about 3.5 years to complete. The indicative timing of the main work phases is shown on Figure 8.11.

	2020				2021				2022				2023			
Work phase	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Enabling works																
Site establishment																
Main construction works																
Finishing and post - construction rehabilitation																

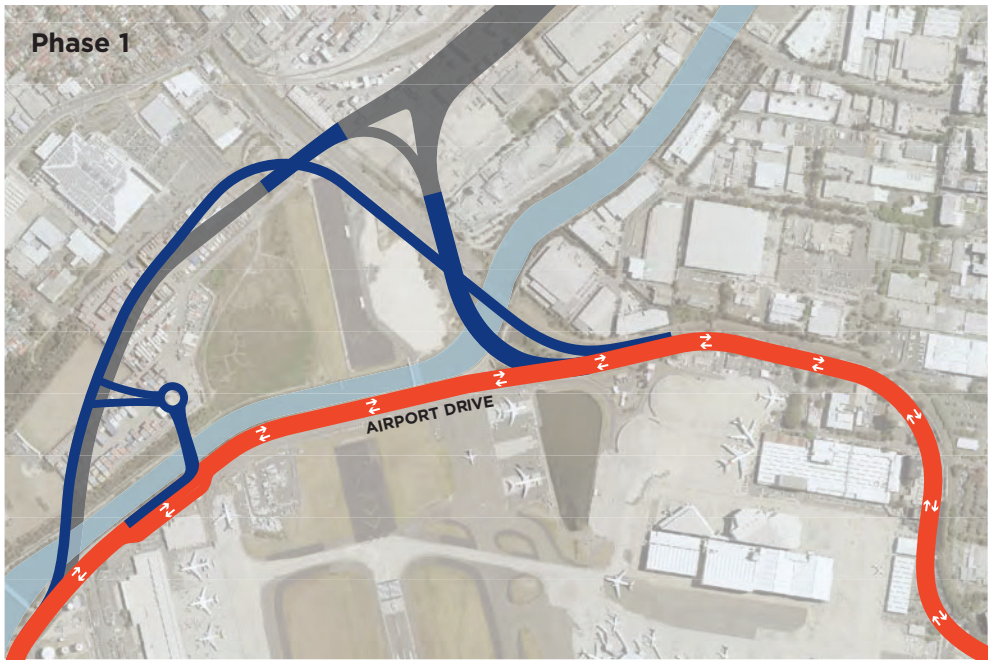
Figure 8.11 Indicative construction program

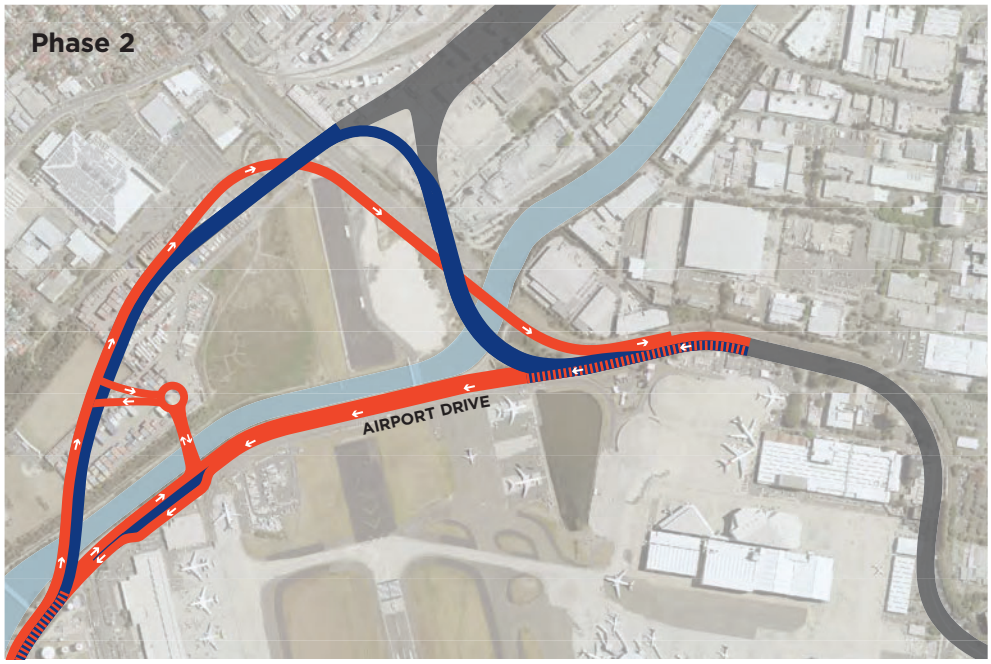
8.3.2 Phased delivery

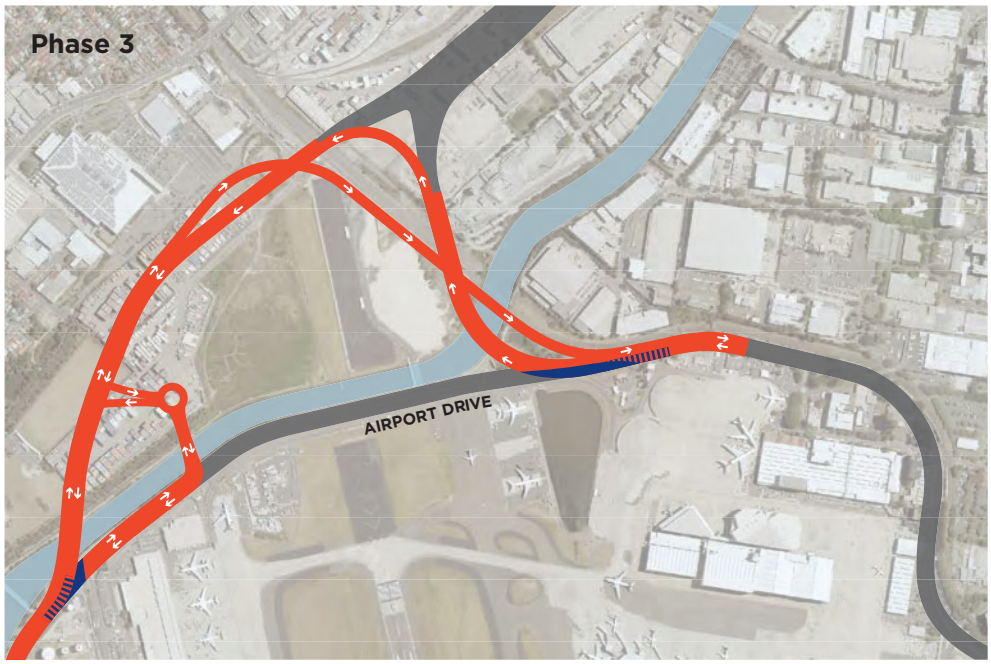
The project would be delivered in phases as shown on Figure 8.12. The phased delivery approach is proposed to:

- Maintain access to Sydney Airport, Port Botany and surrounding areas (particularly along Airport Drive)
- Facilitate construction in existing roadway areas where there is limited space.

Traffic would be diverted onto new sections of roadway at each phase, which would allow access and work to be undertaken in other areas while maintaining traffic flows.







Legend

- Under construction
- Live traffic
- Night works – Construction under traffic

CONCEPTUAL ONLY

NOT TO SCALE

Figure 8.12 **Phase delivery of the project**

8.3.3 Working hours and out-of-hours work

The project would include work undertaken during recommended standard hours as defined by the *Interim Construction Noise Guideline* (DECC, 2009):

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

It would also include work outside these hours (out-of-hours work), described below.

Out-of-hours work

Out-of-hours work would be required at some locations to eliminate the potential for aviation and rail safety hazards. The following work would need to be undertaken out of hours:

- Works with the potential to intrude into Sydney Airport's prescribed airspace (such as the use of cranes and piling rigs in certain locations) would need to be undertaken during the Sydney Airport curfew (11pm to 6am)
- Works with the potential to affect the rail corridor danger zone would need to be undertaken during scheduled weekend maintenance possession periods (24 hours a day during these periods).

Out-of-hours work would also be required to maintain operation of the existing road network and minimise disruptions of access to Sydney Airport, including consideration of the extended peak periods that occur on roads in the vicinity of Sydney Airport.

Table 8.4 provides an indicative list of the proposed out-of-hours work and the justification for these works, including an estimate of the number of nights that out-of-hours works would be required. The locations where out-of-hours work are proposed are shown on Figure 8.13. Out-of-hours works would be timed, where possible, to occur in parallel with other such works to minimise the total number of nights that would be required. However, due to the nature of the works, some activities would not be able to be undertaken in parallel. The estimated number of nights may change as the detailed construction methodology is developed.

Out-of-hours work would need to be completed by 5am unless specific exemptions have been granted by Sydney Airport Corporation.

In addition, the following activities may also need to occur outside standard working hours:

- Activities authorised by an environment protection licence
- Emergency or directed activities, such as activities directed by a relevant authority and activities required to prevent loss of life or environmental damage
- Alteration of traffic management arrangements on active roads
- Utility works that require carriageway closures
- Delivery of oversized plant or structures in accordance with the requirements of police or other authorities.

The potential impact of out-of-hours work, and the measures that would be implemented to manage these impacts, are described in Chapter 10 (Noise and vibration).

Table 8.4 Indicative list of proposed out-of-hours works

Project feature/location	Works required	Reason for out-of-hours work			Estimated number of nights
		Sustain operation of road network	Aviation safety	Rail safety	
Qantas Drive upgrade and extension – along Qantas Drive	Drainage and pavement works	✓			60
Qantas Drive upgrade and extension – west of Lancastrian Road	Drainage and utility works	✓			80
Qantas Drive upgrade and extension – general	Traffic switches	✓			30
Qantas Drive upgrade and extension – Sir Reginald Ansett Drive	Drainage, utility and pavement works	✓			100
Qantas Drive upgrade and extension – works in Robey Street, O'Riordan Street and Joyce Drive	Drainage, utility and pavement works	✓			60
Qantas Drive bridge	Bridge works		✓		110
Qantas Drive upgrade and extension – work within the rail corridor	Drainage works			✓	10
Terminal link bridge	Bridge works		✓		60
St Peters interchange connection, Canal Road	Utility works	✓			30
St Peters interchange connection, Canal Road overpasses	Bridge works		✓		6
St Peters interchange connection, northern overpass	Bridge works		✓		4
Northern lands access rail overpass	Bridge works		✓	✓	145
Terminal 1 connection, Airport Drive	Drainage and pavement works	✓			30
Terminal 1 connection rail overpass	Bridge works		✓		145
Freight terminal access (eastern side of Alexandra Canal)	Temporary roadway construction	✓			30
	Road works (including retaining wall and drainage works)	✓			50
	Tie-in works	✓			30
Freight terminal access bridge	Bridge works		✓		6

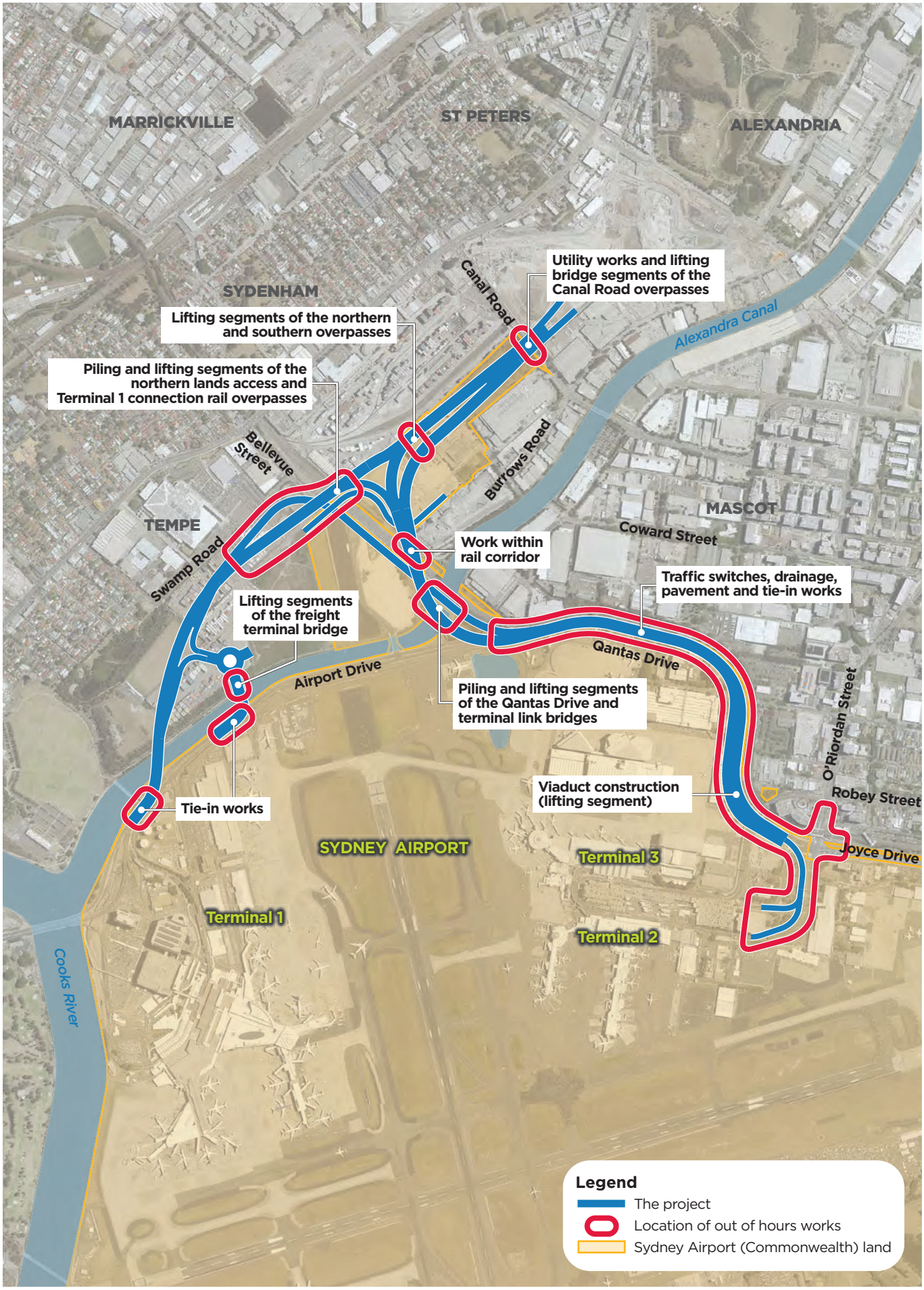


Figure 8.13 **Proposed locations of out-of-hours work**

8.3.4 Integration with construction of the Botany Rail Duplication project

The western extent of the proposed Botany Rail Duplication project is located in the vicinity of Qantas Drive, with the western end of the project site for the Botany Rail Duplication located to the west of the Lancastrian Road overbridge. This directly adjoins the eastern extent of the project site for the Sydney Gateway road project, with the eastern end of the project site located in Joyce Drive to the east of the intersection with Qantas Drive, O'Riordan Street and Sir Reginald Ansett Drive. The two projects would be constructed adjacent to one another over a distance of about 950 metres.

Based on the indicative programs for both projects, it is likely that construction activities would be undertaken concurrently over a period of about 36 months.

Works in the Qantas Drive area would be coordinated by Roads and Maritime, Transport for NSW, ARTC and the Airport Precinct Infrastructure Coordination Group (consisting of the Transport Management Centre, Sydney Coordination Office, Sydney Airport Corporation, emergency services, and any contractors working in the vicinity of the airport)). Coordination would be undertaken to minimise potential impacts on road network operations, access to Sydney Airport, through traffic (including traffic to Port Botany), and cumulative construction impacts on the operation of the road network.

8.4 Construction ancillary facilities

8.4.1 Temporary land requirements

In addition to the project's anticipated permanent land requirements (see section 7.11.2), the temporary use of land would be required to construct the project. It is estimated that around 32.8 hectares of land would be required temporarily. The temporary land requirements are anticipated to include:

- 16.7 hectares of Commonwealth-owned land
- 11.9 hectares of land owned by the NSW or local government (Inner West Council)
- 4.2 hectares of privately owned land.

These areas, which are listed in Table 8.5, would be required for construction compounds, to provide access to construction work areas, and to facilitate the manoeuvring of construction plant and machinery.

All areas required during construction would be subject to lease agreements to be developed following further consultation with landowners. Further information on the project's land requirements is provided in Chapter 19 (Land use and property).

Table 8.5 Anticipated temporary land requirements

Location	Property title	Ownership	Estimate of area (hectares) and proportion of lot required[1]
Private land			
25 Burrows Road, St Peters	Lot 1 DP 866946	Private	<0.1 ha (0.9%)
Swamp Road, Tempe	Lot 725 DP 48012	Private	0.8 ha (22%)
	Lot 2 DP 869306	Private	0.5 ha (65%)
	Lot 723 DP 48012	Private	2.3 ha (89%)
Robey Street, Mascot	Lot 201 DP 777213	Private	<0.1 ha (2%)
241 O'Riordan Street, Mascot	Lot 1 DP1039806	Private	<0.1 ha (0.6%)
241a O'Riordan Street, Mascot	Lot 2 DPa1039806	Private	<0.1 ha (2%)

Location	Property title	Ownership	Estimate of area (hectares) and proportion of lot required[1]
Talbot Street and 20 Canal Road, St Peters	Lot A DP 118682	Private	<0.1 ha (6%)
	Lot 2 DP 454156	Private	<0.1 ha (8%)
	Lot 22 DP 1069118	Private	0.3 ha (3%)
Private total			**4.2 hectares**
Commonwealth-owned land			
Sydney Airport, Mascot	Lot 8 DP 1050923	Commonwealth of Australia	5.8 ha (1%)
30 Canal Road, St Peters	Lot 3 DP 825649	Commonwealth of Australia	0.6 ha (55%)
	Lot 4 DP 555771	Commonwealth of Australia	0.3 ha (15%)
6-10 Burrows Road, St Peters	Lot 2 DP 802342	Commonwealth of Australia	3.9 ha (52%
Swamp Road, St Peters (car park)	Lot 12 DP 825949	Commonwealth of Australia	0.3 ha (49%)
	Lot 643 DP 727045	Commonwealth of Australia	0.9 ha (45%)
	Lot 2 DP 790186	Commonwealth of Australia	0.8 ha (59%)
	Lot 1 DP 826101	Commonwealth of Australia	3 ha (73%)
1008C Botany Road, St Peters	Lot 15 DP787029	Commonwealth of Australia	0.2 ha (2%)
Swamp Road, St Peters (HIAL)	Lot 724 DP 48012	Commonwealth of Australia	0.2 ha (34%)
	Lot 1 DP 869306	Commonwealth of Australia	0.2 ha (53%)
Swamp Road and Bellevue Street, St Peters	Lot 1 DP 186164	Commonwealth of Australia	0.2 ha (80%)
	Lot 2 DP 186164	Commonwealth of Australia	0.03 ha (100%)
	Lot 1 DP 830952	Commonwealth of Australia	<0.1 ha (7%)
	Lot 2 DP 830952	Commonwealth of Australia	0.3 ha (44%)
Commonwealth-owned land total			**16.7 hectares**
Land owned by the NSW or local government			
1-3 Swamp Road, Tempe	Lot 202 DP 1097238	Local government	0.2 ha (17%)
2 and 5-15 Swamp Road, Tempe	Lot 303 DP 1136081	Local government	1.6 ha (33%)
	Lot 304 DP 1136081	Local government	2.4 ha (40%)
South Street, Tempe (open space)	Lot 25 DP 227132	Local government	2.6 ha (32%)
South Street, Tempe (golf driving range)	Lot 305 DP 1136081	Local government	1.9 ha (68%)
Holbeach Avenue, Tempe	Lot 400 DP 1233792	NSW Government	<0.1 ha (0.02%)
Alexandra Canal, Mascot/ St Peters/Tempe	Lot 13 DP 1050464	NSW Government	0.3 ha (1%)
5 and 5A Canal Road, St Peters	Lot A DP 391775	NSW Government	0.4 ha (7%)
	Lot 14 DP 606737	NSW Government	0.3 ha (6%)
	Lot X DP 421363	NSW Government	0.01 ha (10%)
9 Canal Road, St Peters	Lot 2 DP 1168612	NSW Government	0.6 ha (0.4%)

Location	Property title	Ownership	Estimate of area (hectares) and proportion of lot required[1]
Various (rail corridor)	Lot 1 DP 1063121	NSW Government	<0.1 ha (12%)
	Lot 2 DP 1054373	NSW Government	0.7 ha (69%)
	Lot 1 DP 450245	NSW Government	0.2 ha (91%)
	Lot 2 DP 963240	NSW Government	0.2 ha (68%)
	Lot 21 DP 1069118	NSW Government	<0.1 ha (8%)
	Lot 5 DP 1184446	NSW Government	<0.1 ha (66%)
	Lot 1 DP 621535	NSW Government	<0.1 ha (15%)
	Lot 11 DP 213317	NSW Government	<0.1 ha (0.4%)
	Lot 17 DP 217443	NSW Government	<0.1 ha (6.7%)
	Lot 95 DP 1157632	NSW Government	<0.1 ha (0.6%)
	Lot 6 DP 209847	NSW Government	<0.1 ha (71%)
	Lot 9 DP 747022	NSW Government	<0.1 ha (2%)
	Lot 55 DP 648871	NSW Government	0.1 ha (100%)
	Lot 57 DP 648871	NSW Government	<0.1 ha (2%)
Alexandra Canal, Mascot/St Peters/Tempe	Lot 11 DP 1050464	NSW Government[2]	<0.1 ha (39%)
	Lot 12 DP 1050464	NSW Government[2]	<0.1 ha (59%)
	Lot 13 DP 1050464	NSW Government	0.3 ha (0.2%)
Other publicly-owned land total			**11.9 hectares**

Notes: 1. The estimate of land required is based on a concept design that is subject to refinement during detailed design, and the final area required may vary from that shown

2. The Commonwealth of Australia has aerial title above some of the lots identified

8.4.2 Construction compounds

Overview

Five construction compounds are proposed to support construction works in surrounding work areas. All compounds would include the following facilities:

- Site offices
- Staff and workforce amenities
- Stores and laydown areas
- Workshops and maintenance facilities
- Workforce parking.

The proposed locations of the compounds are shown on Figure 8.1 to Figure 8.6. All compounds would be located on Sydney Airport land with the exception of compound C3. Further information on each compound, including indicative layouts, is provided below.

St Peters interchange connection compound (C1)

The St Peters interchange connection compound (C1) would support construction within the St Peters interchange connection work area. It would be located within Sydney Airport land north of the rail corridor at the western end of Burrows Road South, and would have an area of about 35,000 square metres. In addition to the facilities outlined above, the compound may also contain a crushing and grinding facility to process materials sourced from both with and outside the project site to ensure they are suitable for potential use. An indicative site layout is shown on Figure 8.14.

Access to the compound would be provided via A1 at Canal Road and A3 at Burrows Road South. Access from Canal Road would be limited to left in/left out movements with vehicles required to access the compound via an access road located within the work area. Vehicles leaving the compound would exit via A1 (to Canal Road and the Princes Highway) or A3 to Canal Road towards either the Princes Highway or Gardeners Road.

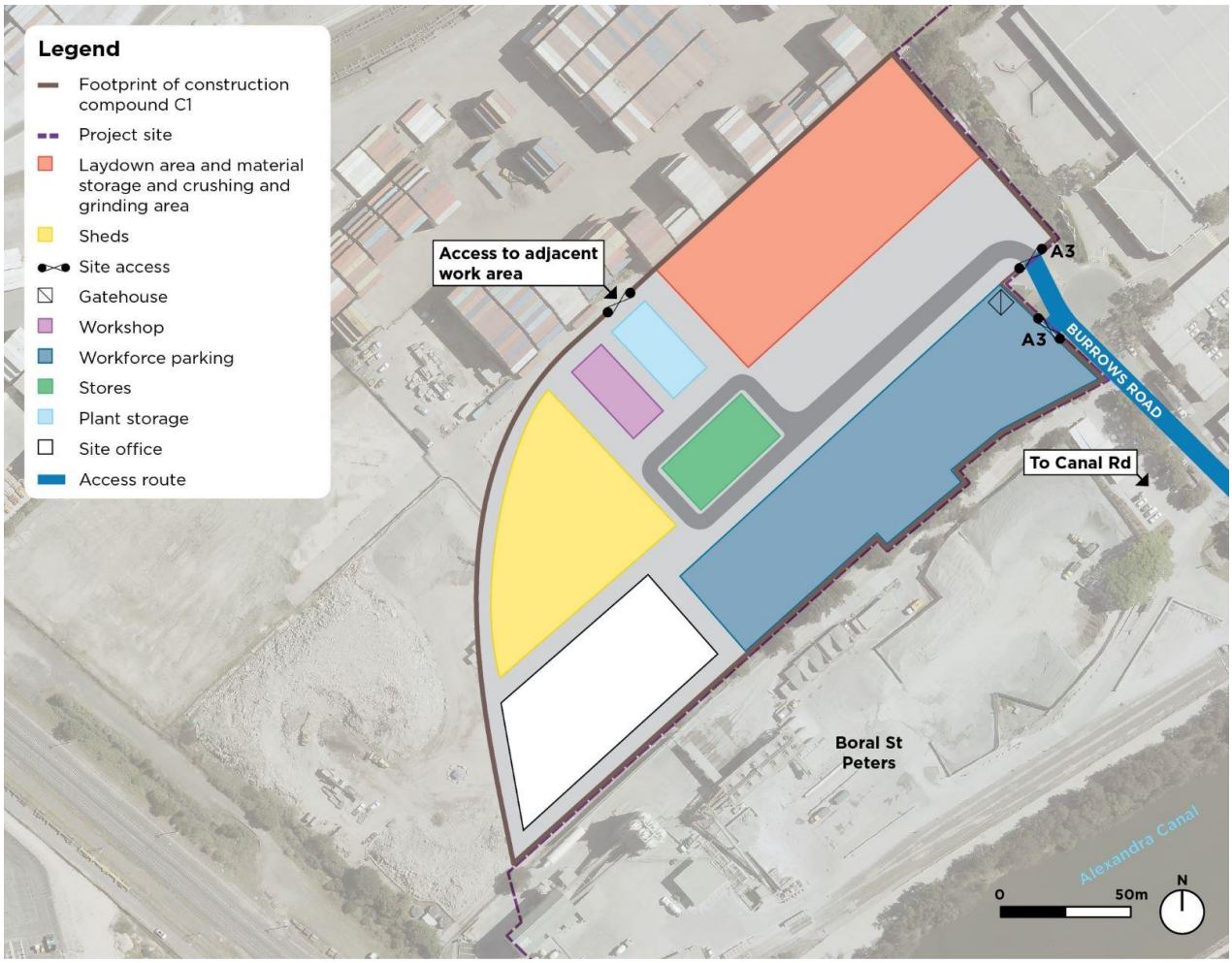


Figure 8.14 Indicative layout of the St Peters interchange connection compound (C1)

Eastern bridges compound (C2)

The eastern bridges compound (C2) would support construction within the eastern bridges work area. It would be located within Sydney Airport land between the road to the east of the Sydney Airport employee car park and the rail corridor, and would have an area of about 39,000 square metres. An indicative site layout is shown on Figure 8.15.

Access to the compound would be generally via the Nigel Love bridge from Airport Drive and would share use of the Northern Precinct Road with traffic utilising the employee car park. Access would be available from both the eastbound and westbound directions along Airport Drive via existing turning facilities.

Temporary access for vehicles would also be available from Bellevue Street (at access point A7) until the commencement of phase 2 as outlined in section 8.3.2. A temporary access route would be provided from A7 to the compound via the work area, as shown on Figure 8.3 and Figure 8.15.

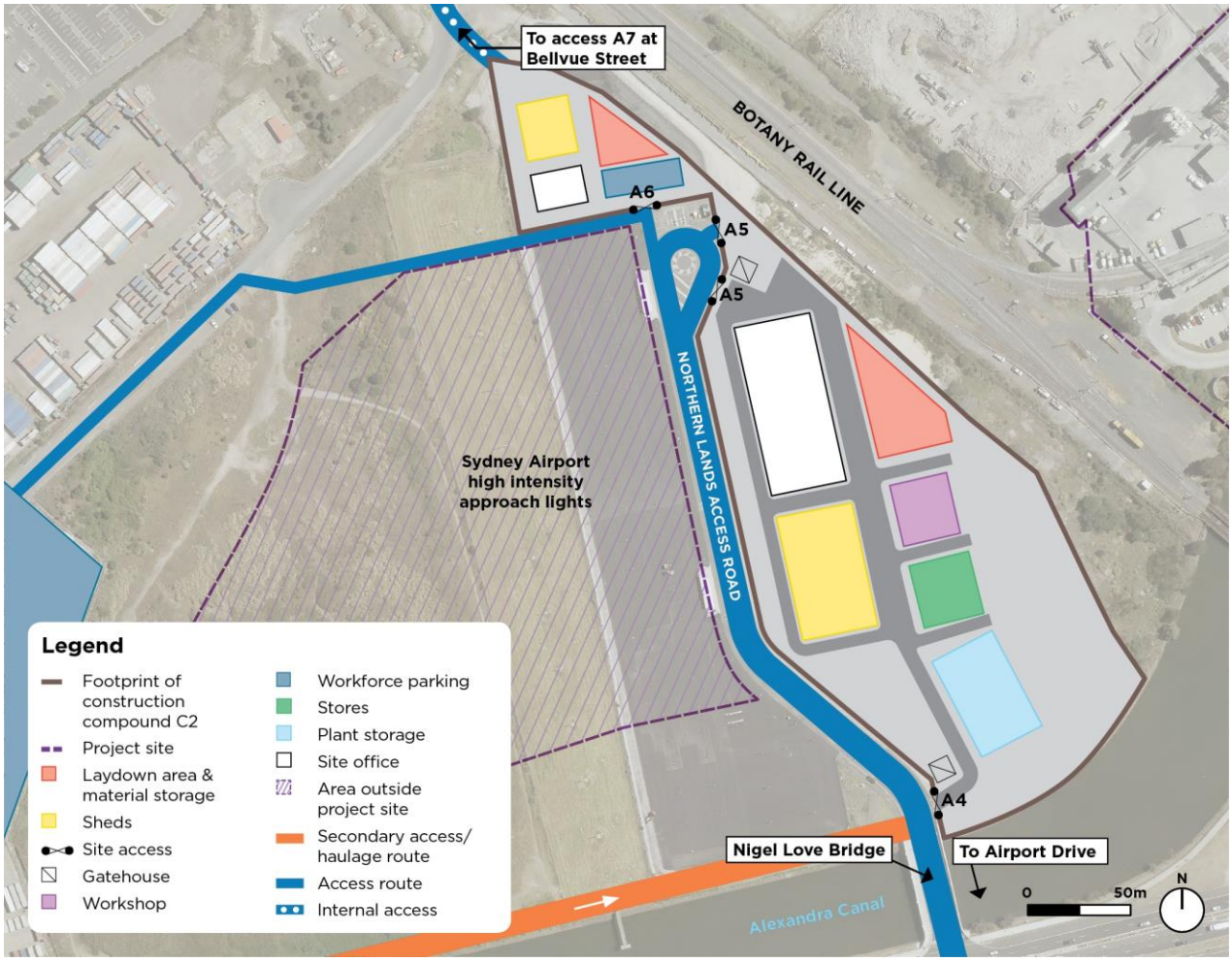


Figure 8.15 Indicative layout of the eastern bridges compound (C2)

Western bridges compound (C3)

The western bridges compound (C3) would support construction within the Terminal 1 connection and western bridges work area. It would be located within the Tempe Lands north of Alexandra Canal. The compound would have an area of about 17,000 square metres. An indicative site layout is shown on Figure 8.16.

Access to the compound would primarily be through the Terminal 1 connection work area via an internal access road from access point A7 located on Bellevue Street (show on Figure 8.3). Access via access A7 would be the primary access for both heavy and light vehicles. Light vehicle access would also be available via access point (A8) from the local road network (as shown in Figure 8.16). Heavy vehicles would also use access A8 occasionally.

Temporary off-leash dog exercise area

The compound includes land that is currently occupied by the off-leash dog exercise area. A temporary off-leash dog exercise area would be provided, in consultation with Inner West Council, as close as possible to the existing off-leash dog exercise area.

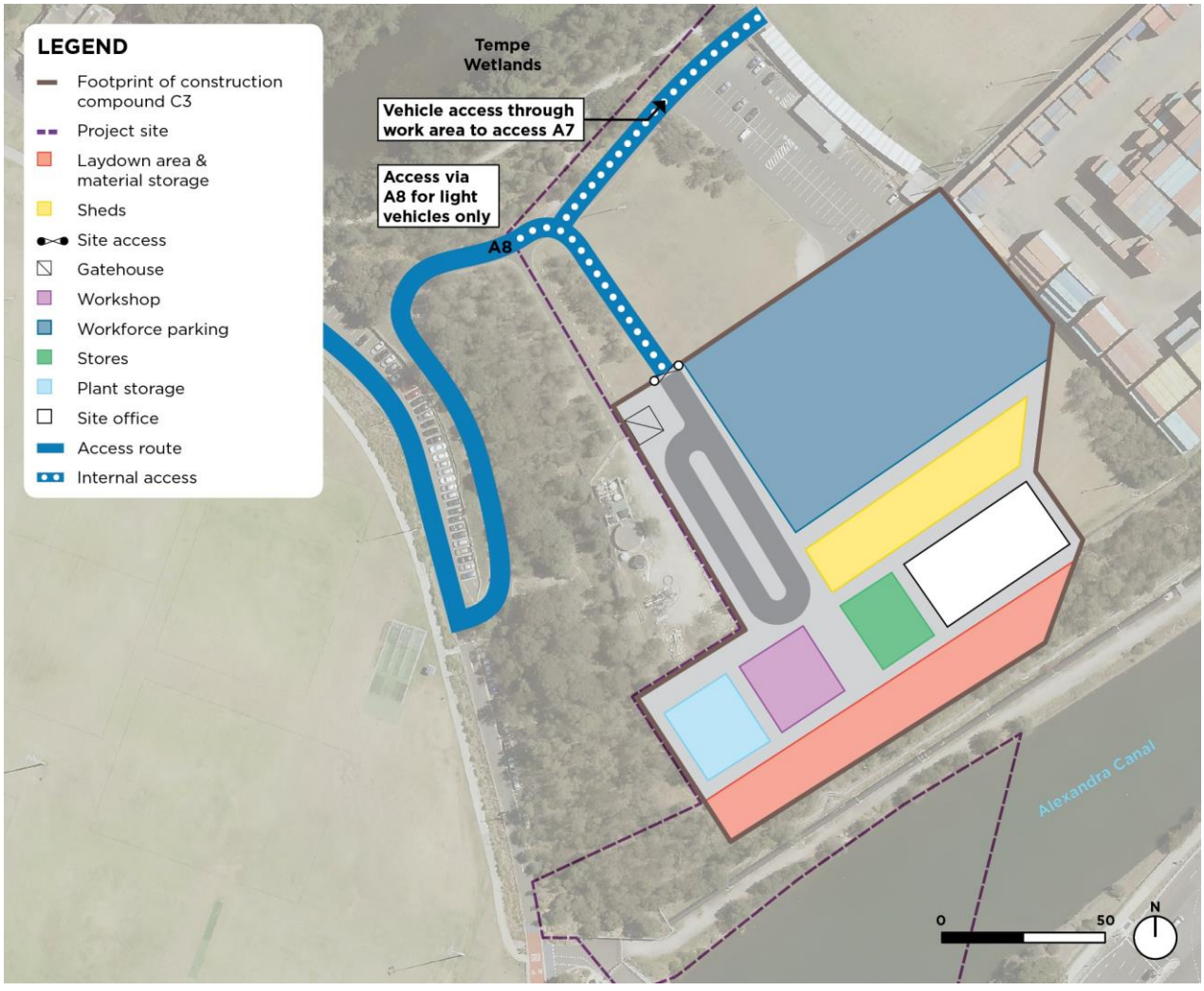


Figure 8.16 Indicative layout of the western bridges compound (C3)

Qantas Drive compound (C4)

The Qantas Drive compound (C4) would support construction activities for the Qantas Drive upgrade and extension and the Terminals 2/3 access. It would be located within Sydney Airport land west of Qantas Drive within land currently occupied by part of the Sydney Airport Jet Base. The buildings that are currently in this location would be removed as part of the project. The compound would have an area of about 5,000 square metres. An indicative site layout is shown on Figure 8.17.

Access to the compound would be via access point (A9) off Qantas Drive. All vehicles accessing this compound would be required to approach the compound from the east via the westbound carriageway of Qantas Drive. All vehicles leaving the compound would need to turn left onto Qantas Drive.

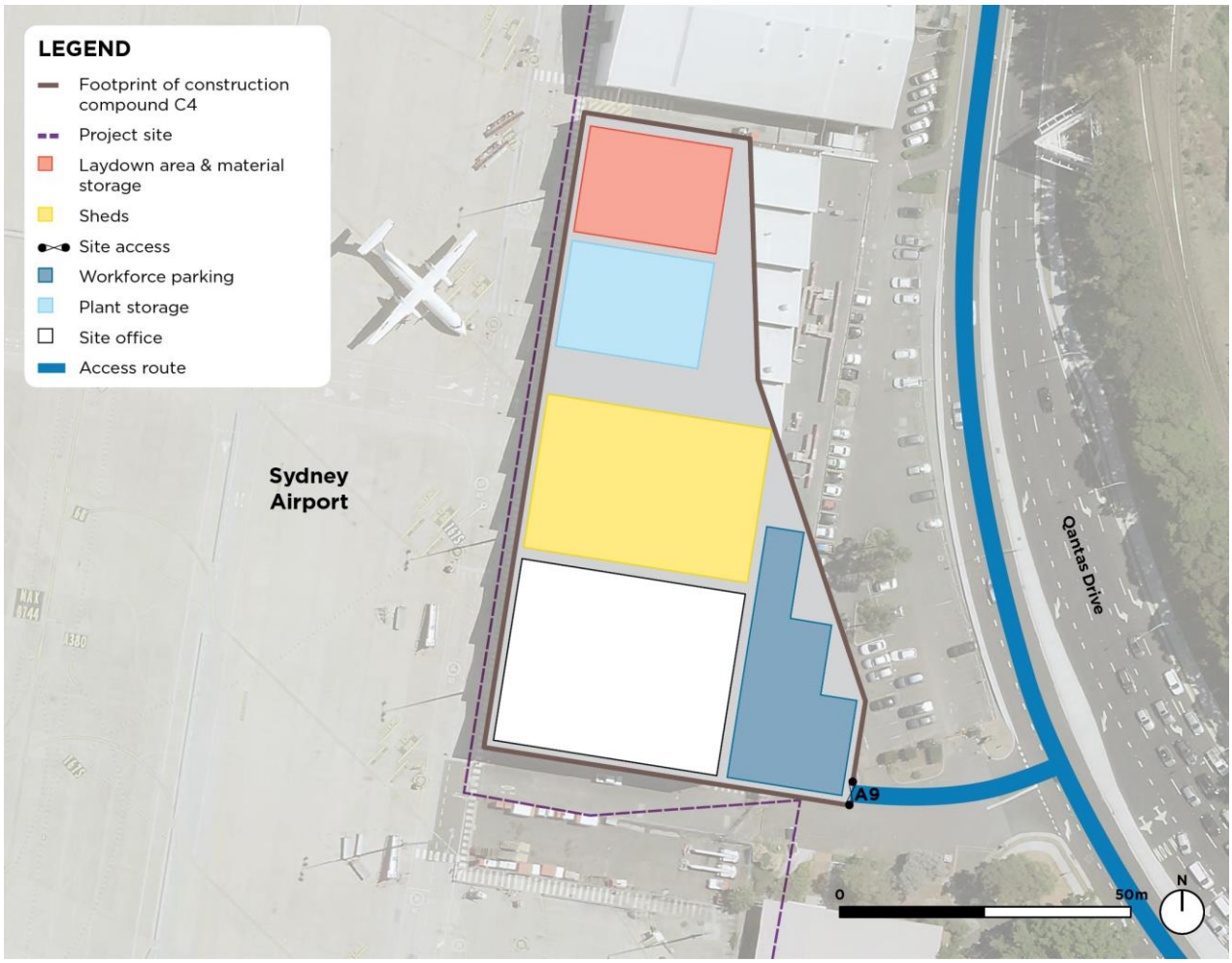


Figure 8.17 Indicative layout of the Qantas Drive compound (C4)

Ninth Street compound (C5)

The Ninth Street compound (C5) would mainly support construction within the Terminals 2/3 access work area. It would also provide support for works along Qantas Drive. The compound would be located within Sydney Airport land between Sir Reginald Ansett Drive and Ninth Street in an existing car park area. It would have an area of about 2,500 square metres. An indicative site layout is shown on Figure 8.18.

Access to the compound would be via an access point (A10) on Ninth Street. Access to and from this compound via Ninth Street at Qantas Drive would be left-in and left-out movements (as shown on Figure 8.19).

Figure 8.18 Indicative layout of the Ninth Street compound (C5)

Other support facilities and additional construction compounds

In addition to the proposed compounds, other construction support facilities would also be required, including laydown areas, worker parking (as required), mobile site sheds/offices, toilets and storage facilities.

Although every endeavour has been made to identify the land areas likely to be required for construction, the construction contractor(s) may require additional compounds and/or support facilities. Alternative or additional sites (if required outside the construction footprint) may be added, and would be subject to further assessment and approval.

The following criteria would be considered for any additional compounds:

- Ready access to the road network – located to minimise the need for heavy vehicles to travel on local streets and/or through residential areas
- Located on relatively level land
- Separated from the nearest residences by at least 200 metres, unless feasible and reasonable noise and light spill mitigation measures are implemented
- Not requiring native vegetation clearing beyond that already required
- Minimise impacts (eg noise and dust) on any adjacent properties, in particular residential dwellings
- Above the 20 year average recurrence interval flood level, unless a contingency plan to manage flooding is prepared and implemented
- Sufficient space to store construction materials to minimise the number of deliveries required
- Avoid impacts on the operation of Sydney Airport.

8.5 Construction workforce and resources

8.5.1 Estimated workforce

The construction workforce requirements would vary over the construction period in response to the activities underway and the number of active work areas. The workforce is expected to peak at about 1,090 workers for a period of about 13 months, indicatively from the fourth quarter of 2021. Either side of this peak, workforce numbers are expected to reduce by about a third. A smaller start-up/close-out workforce (fewer than 400 workers) would be on site for the initial and final months of the program. Final construction workforce requirements would be confirmed by the construction contractor(s).

8.5.2 Plant and equipment

A variety of plant and equipment, typical of road construction projects, would be used during construction. This would include a range of large machinery, such as trucks, cranes, piling rigs, concrete trucks and pumps, excavators, compactors, sprayers, and sweepers. Smaller plant and equipment would include generators, welding equipment, jackhammers and personal tools. A full list of plant and equipment is provided in Technical Working Paper 2 (Noise and Vibration).

8.5.3 Materials and resources

A variety of materials would be required to construct the project. The main materials and indicative quantities required are listed in Table 8.6.

Table 8.6 Indicative material requirements

Material	Quantity required	Indicative source
Concrete	121,000 cubic metres	Local suppliers (Sydney)
Precast concrete (bridge components)	16,000 tonnes	NSW suppliers
Precast concrete (roadway components)	19,000 square metres	NSW suppliers
Structural steel	17,000 tonnes	Manufactured within Australia
Reinforcing steel	15,000 tonnes	Manufactured within Australia
Asphalt	91,000 tonnes	Local suppliers (Sydney)
Road base	32,000 cubic metres	Local suppliers (Sydney)

Material	Quantity required	Indicative source
Water	87,000 kilolitres	Recycled construction water and mains water
Petrol	38 kilolitres	Local suppliers (Sydney)
Diesel	35,000 kilolitres	Local suppliers (Sydney)

8.6 Transport and access

An outline of the proposed transport and access arrangements during construction is provided below. The potential impacts on traffic, transport and access during construction, and the measures and traffic management arrangements that would be implemented as part of the CEMP, to manage these impacts, are described in Chapter 9 (Transport, traffic and access).

8.6.1 Haulage routes

Route identification and scheduling of movements

Preliminary routes for the movement of construction vehicles, including heavy vehicles, have been proposed and are shown on Figure 8.19. Construction would result in additional movements of the following vehicle categories on the road network:

- Heavy vehicles associated with the transport (import or export) of excess soil, fill or waste materials
- Heavy vehicle deliveries of construction plant, supplies and infrastructure components
- Light vehicle movements, typically associated with workers and general construction activities.

Haulage routes have been proposed to allow these vehicles to access and egress the arterial road network in a safe and efficient manner and, wherever possible, to avoid or minimise impacts on local roads and residential areas. The access arrangements for each work compound (see Figure 8.14 to Figure 8.18) have been developed to minimise the number of heavy vehicles travelling through Mascot. The majority of the proposed routes are restricted access vehicle routes, which are suitable for the movement of heavy vehicles (including B-doubles). The proposed haulage routes would be subject to confirmation by the construction contractor(s).

Construction vehicle movements would be scheduled to occur outside peak periods as far as practicable. Scheduling would take into account the peak period associated with both the operation of Sydney Airport and the road network peak, with these peaks generally be as follows:

- Morning – between 5am and 10am along Airport Drive, Qantas Drive and Sir Reginald Ansett Drive
- Afternoon – between 3pm and 10pm along Airport Drive and Qantas Drive, and between 3pm and 11pm along Sir Reginald Ansett Drive.

Work force shifts would be scheduled to avoid workers arriving and departing along these roads during these peak periods as far as practicable. Details of the planning of workers accessing the compounds and work sites would be outlined in the worker transport strategy to be developed by the construction contractor(s). Over-sized loads and activities immediately adjacent to arterial roads where would be delivered/undertaken outside peak traffic periods.

The movement of workers to and around the project site would be defined by a worker transport strategy to be prepared by the contractor(s). One of the objectives of the strategy would be to minimise movements during peak traffic periods. The transport of over-sized loads and works immediately adjacent to arterial roads would need to be delivered/undertaken outside peak traffic periods.

Changes to access points during construction

The proposed site access points are shown on Figure 8.19.

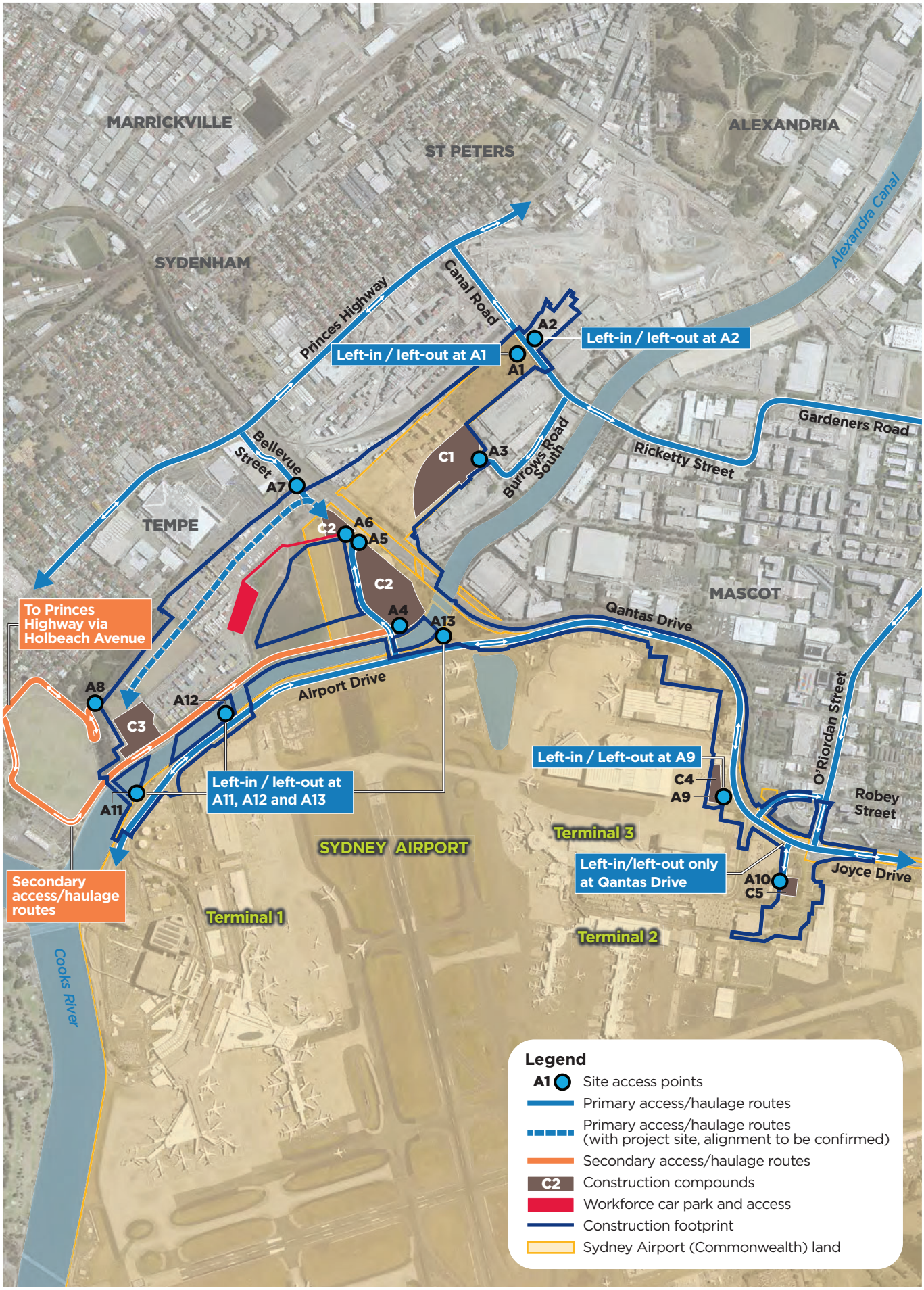


Figure 8.19 **Preliminary site accesses and haulage routes**

West of Alexandra Canal, access to work areas would be via the indicated access points, while east of Alexandra Canal, the project would be built within the existing road corridor and access would be directly from the adjacent roadways. Where possible, designated access points to work areas along Qantas Drive, Airport Drive and Sir Reginald Ansett Drive would be established.

The proposed access points and haulage routes would be used for the majority of the construction period; however, the phased delivery of the project (see section 8.3.2) would necessitate some changes.

Following the closure of the Bellevue Street access point (A7), construction vehicles would be required to access the site from the west (ie via Marsh Street/Airport Drive and the new Terminal 1 connection bridge) and use the proposed freight terminal bridge to access land on the western side of Alexandra Canal. At the same time, the secondary access proposed via Tempe Recreation Reserve would not be available anymore, and vehicles would be required to use the Nigel Love bridge to access the area.

Management and co-ordination

Works in the Tempe and St Peters areas would be co-ordinated with the Sydney Co-ordination Office and Transport Management Centre, and with relevant councils.

For road works on Sydney Airport land, co-ordination would be led by the Airport Precinct Infrastructure Co-ordination Group comprising representatives from Transport for NSW, Sydney Airport and the Transport Management Centre. All road works would be conducted in accordance with road occupancy licenses, granted by the Sydney Co-ordination Office.

8.6.2 Construction traffic volumes

General construction movements

Construction traffic would include heavy and light vehicles associated with material and equipment deliveries, and the arrival and departure of the construction workforce. Table 8.7 provides estimated vehicle volumes for each work area during the morning and afternoon peaks, excluding earthworks movements. Vehicle movements would be via the haulage routes described in section 8.6.1.

Table 8.7 Indicative construction traffic volumes

Work area	Access points	Morning peak vehicle volumes (vehicles per hour)		Afternoon peak vehicle volumes (vehicles per hour)	
		Light	Heavy	Light	Heavy
St Peters interchange connection, including compound C1	A1	0	20	330	20
	A2	10	10	10	10
	A3	330	20	0	20
Eastern bridges, including compound C2	A4, A5, A6 and A7	330	20	330	20
Terminal 1 connection and western bridges, including compound C3	A8	10	20	10	20
	A7	250	0	250	0
Qantas Drive, including compound C4	A9 for access to compound	50	20	50	20
Terminals 2/3 access, including compound C5	A10	100	20	100	20

Work area	Access points	Morning peak vehicle volumes (vehicles per hour)		Afternoon peak vehicle volumes (vehicles per hour)	
		Light	Heavy	Light	Heavy
Airport Drive	A11	10	10	10	10
	A12	10	10	10	10
Qantas Drive	A13	30	20	30	15

Earthworks movements

The project would also include truck movements to transport fill and unsuitable material to and from the project site. Such movements would generally only be required for specific periods during construction. Table 8.8 provides the estimated vehicle volumes associated with earthworks movements. These movements would be in addition to those outlined in Table 8.7. Vehicle movements would be via the haulage routes described in section 8.6.1.

Table 8.8 Indicative earthworks traffic volumes

Work area	Access points	Direction of movement	Total movements
St Peters interchange connection, including compound C1	A1 or A3	Inbound	27,600
Terminal 1 and western bridges, including compound C3	A7	Inbound	10,200
Terminals 2/3 access, including compound C5	Off Sir Reginald Ansett Drive or A10	Inbound	1,700
		Outbound	300

8.6.3 Construction workforce parking

Parking for the construction workforce would be provided within the construction footprint. Table 8.9 lists the indicative amount of parking that would be provided at each construction compound, based on the estimated workforce. As indicated by the table, there would be an estimated shortfall in parking of 110 spaces in the worst case.

The location of proposed workforce parking is shown on Figure 8.14 to Figure 8.18. Shuttle buses would also be used to transfer workers between areas where required. The provision of parking would be reviewed by the construction contractor(s) prior to work commencing.

In addition, a worker parking strategy would be developed to include measures to encourage staff to use alternative transport arrangements, including public transport.

Potential traffic and access impacts and measures to manage and minimise these impacts are considered in Chapter 9 (Transport, traffic and access).

Table 8.9 Indicative workforce parking provision

Compound	Indicative workforce parking numbers
St Peters interchange connection (C1)	250
Eastern bridges (C2)	330
Western bridges (C3)	250
Qantas Drive (C4)	50
Terminals 2/3 access (C5)	100
Total	**980**

8.6.4 Temporary active transport link

To minimise potential safety impacts during construction, and as a result of the proposed closure of Airport Drive, the existing cycle route along Airport Drive would be closed.

A temporary active transport link would be provided on the western side of Alexandra Canal to maintain connectivity for pedestrians and cyclists while the permanent link is being constructed. Proposed routes for the temporary active transport link are shown on Figure 8.20. Only one of the routes shown would be used at any one time. The route used would vary according to the stage of construction.

The temporary active transport link would cross Alexandra Canal via the existing pedestrian and cycle bridge located west of Link Road. The link would then follow or be located adjacent to the existing access road along the eastern edge of Tempe Recreation Reserve and along the southern edge of the Tempe Wetlands. The temporary active transport link would turn south-east and cross the work area for the Terminal 1 connection, the Sydney Airport high intensity approach lights and the Sydney Airport employee car park, before crossing Alexandra Canal at the Nigel Love bridge and rejoining the existing cycleway.

User safety along the link would be maintained by using box culverts. The link would pass through these culverts where works above the link are required.

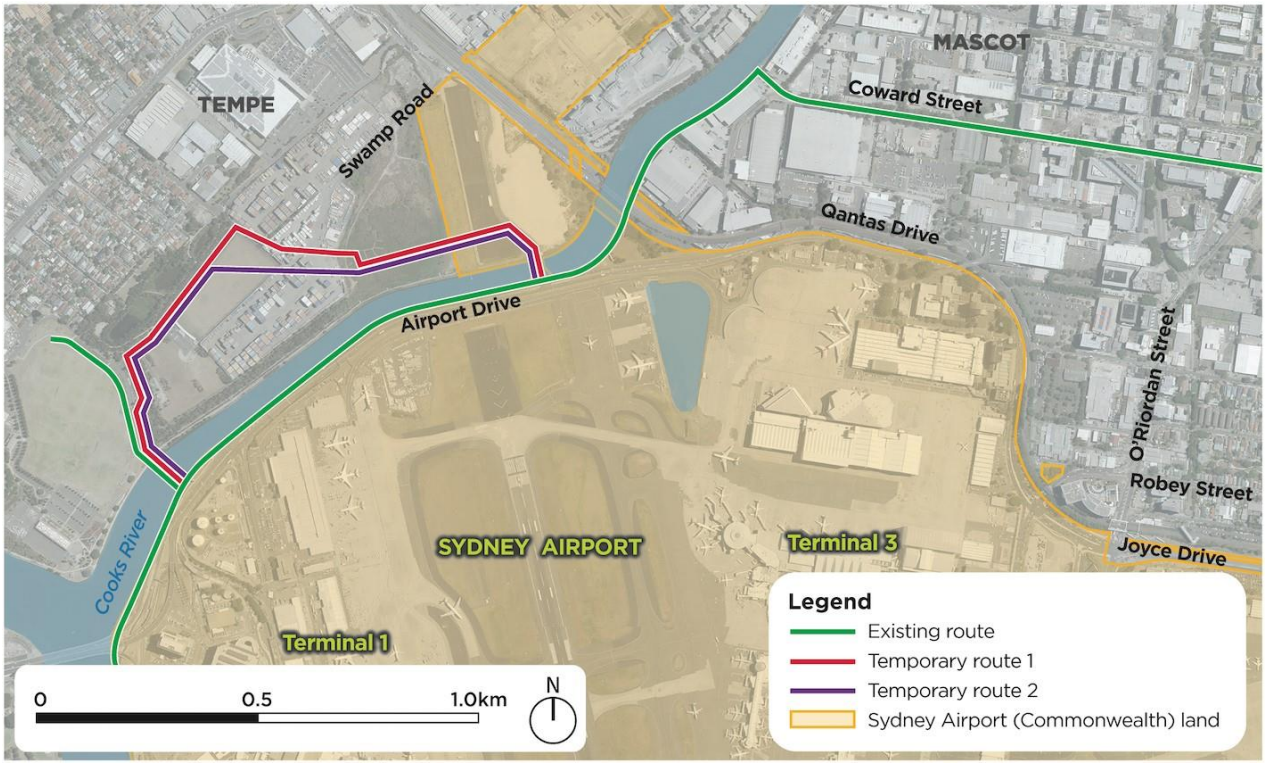


Figure 8.20 Temporary active transport link

8.6.5 Changes to transport networks during construction

The following sections outline indicative changes to pedestrian/cyclist, road and public transport networks in the vicinity of the project site during construction. These changes, and any others identified, would be addressed in the Construction Traffic and Access Management Plan (see Chapter 9 (Traffic, transport and access). The need for any additional assessment would be identified at this time.

Pedestrian/cycle traffic

The majority of the project site is located away from existing pedestrian and cycle facilities and therefore limited impact on existing facilities is expected. Table 8.10 outlines the indicative changes to pedestrian and cyclist networks in the vicinity of the project site during construction. All pedestrian and cyclist facilities and adjustments would be conducted in accordance with relevant accessibility requirements and legislation, including the *Disability Discrimination Act 1992*.

Table 8.10 Indicative changes to pedestrian and cyclist networks

Location	Changes
Canal Road	Short-term closures to footpaths on both sides of the road to facilitate construction. Closures would only occur on one side of the road at a time, with pedestrians redirected to the other side during each closure.
Alexandra Canal cycleway	Permanent closure of the existing cycleway on the eastern side of Alexandra Canal, between the existing pedestrian bridge and the Nigel Love bridge. During construction, a temporary alternate route would be used, as described in section 8.6.4.
	Temporary short-term closures of the shared path/cycleway east of Nigel Love bridge during some construction activities (such as major crane lifts for the Qantas Drive and terminal link bridges).
Qantas Drive	Permanent removal of the pedestrian crossing at Lancastrian Road.
	Permanent removal of the concrete path (informal footpath) located on the northern side of Qantas Drive between Robey Street and west of Lancastrian Road.
	Temporary removal of the pedestrian footpath located on the northern side of Qantas Drive, between Robey and O'Riordan streets, to facilitate construction of the Terminals 2/3 access viaduct.
Robey Street	Adjustment of the pedestrian footpath on the northern side of Robey Street (extending north from Qantas Drive) to facilitate revised kerb alignment.
Link Road	Removal of the pedestrian crossing at Link Road, with access to the freight facilities provided by existing paths located within the Terminal 1 area.

Road traffic

Some changes to the surrounding road network and public transport facilities would be required during construction to facilitate access to compounds, to occupy lanes during some works, or as a result of construction works generally. The proposed adjustments to the road network and public transport facilities are outlined in Table 8.11. These and other closures would be confirmed during detailed construction planning with the potential for additional closures identified.

In addition to the changes in Table 8.11, traffic management measures would be implemented to manage traffic through or adjacent to work areas to ensure that the functionally of roads is not affected and access is maintained.

Table 8.11 Changes to roads and public transport facilities

Location	Changes
Canal Road	Short-term lane closures to establish new left-in, left-out access and egress lanes, and new entry points on both sides of the road. Lane closures would only occur on one side of the road at a time.
	Temporary road closures to allow the new overpass structures to be lifted into place.
Airport Drive	Carriageway modifications to retain two lanes during construction, extending from Lancastrian Road to west of Link Road.
	Short-term lane closures to tie in the new sections of roadway to the existing roadway.
	Nightly closures of a single lane in each direction to facilitate establishment of work sites for bridges and installation of utilities and drainage.
Qantas Drive	Nightly closures of a single lane of traffic in each direction to facilitate widening of Qantas Drive and the installation of utilities and drainage.
	Closure of lanes at the Lancastrian Road intersection to facilitate modifications along the widened Qantas Drive, including removal of existing traffic signals.
	Removal of bus stops either side of the Lancastrian Road entry to the Jet Base.

The night time closures outlined in Table 8.11 would require traffic diversions onto adjacent carriageways at different stages of construction. This would be undertaken to maintain capacity along Qantas Drive and Airport Drive while providing space for construction. A summary of the proposed traffic changes along Qantas Drive is provided in Table 8.12.

Table 8.12 Indicative traffic changes along Qantas Drive

Location	Overview of traffic staging
Qantas Drive west of Seventh Street	During the early stages of construction, traffic along Qantas Drive would remain on its existing alignment while additional new westbound lanes are constructed on the western side of Qantas Dive to the south of King Street. Once the additional new westbound lanes are completed, westbound traffic would be moved to this new alignment, to provide space to construct the Terminals 2/3 viaduct approach ramp between the two carriageways. Once the existing Flight Training Centre is vacated, the remainder of the westbound carriageway would be constructed. Once this is complete, all westbound travel would be moved to the new sections of roadway.
Qantas Drive between Robey and O'Riordan streets	Similar to the above, new eastbound lanes would be constructed to enable eastbound traffic to be moved to a temporary alignment to facilitate construction of the viaduct between the two carriageways. Following construction of the viaduct, the eastbound lanes would be relocated to their final alignment.

8.7 Utility works

Utilities infrastructure, such as water supply, stormwater drainage, wastewater, electricity, gas, fuel and telecommunications, are located within the project site. These utilities may need to be protected, adjusted or augmented based on the final design and in accordance with the requirements of the relevant asset owner.

Broadly, there are three areas with a high density of utilities where works would be required (shown on Figure 8.21):

- Airport Drive/Qantas Drive
- Sir Reginald Ansett Drive and Shiers Avenue
- Sydney Airport internal services.

Figure 8.21 **Key utility work areas**

Table 8.13 provides an overview of key utilities identified to date, and the proposed treatment of these utilities during construction. The majority of these utilities are located underground; however, some have above ground components. Consultation with utility providers has been carried out and is ongoing. The nature and extent of utility changes would be confirmed during detailed design in consultation with the utility providers. This might identify the need to carry out utility works outside the construction footprint.

Table 8.13 Indicative key utility treatment during construction

Utility	Location	Proposed treatment
Jemena primary gas main	Airport Drive and Qantas Drive	Relocation
Jemena primary gas main	Robey Street	Protection
Jemena secondary gas main	Qantas Drive	Relocation
Qenos ethylene pipeline	Qantas Drive	Possible relocation
Ausgrid 33kV cables	Qantas Drive, Airport Drive	Protection and relocation
Ausgrid 11kV cables	Rail corridor, Canal Road and Airport Drive	Relocation
Ausgrid low voltage cables	Canal Road	Relocation
Telstra and other communications carrier cables	Qantas Drive, Airport Drive & Canal Road	Relocation
Sydney Airport fuel lines (Caltex and Viva Energy)	Airport Drive	Retained and protected, relocate cathodic protection point
Sydney Airport water supply pipeline	Airport Drive west of Link Road	Protection and relocation
Sydney Airport internal communications, gas, water and power, sewer	T2/T3 Terminal and Jet Base precinct, Airport Drive, Link Road	Protection and relocation
Sydney desalination pipeline	Western side of Alexandra Canal	Retained and protected, relocate air valve
Sydney Water sewer and potable water	Qantas Drive and Swamp Road	Relocation

The general methodology for relocating and protecting utilities is as follows:

- Excavate to expose the utility (for protection works or new trench for relocation works)
- Install appropriate bedding material and pipeline/conduit/utility (for relocation works)
- Undertake remedial works on existing utilities if required (for protection works)
- Excavate and install pits at cutover locations, including any new infrastructure (for relocation works)
- Backfill and compact trenches and pits
- Install protection slab or other infrastructure (for protection works)
- Undertake testing and commissioning.

Before works begin, utility owners would be consulted to confirm the location of their assets and the appropriate management and treatment strategy. Investigations such as electronic tracing, ground penetrating radar and/or potholing would also be undertaken to confirm the location of utilities on site.