Appendix J

Transport and Traffic

AECOM

NSWPorts

Port Botany Quayline Equalisation Project

Technical Report: Transport and Traffic

August | 2025

Port Botany Quayline Equalisation Project

Technical Report: Transport and Traffic

Client: Port Botany Operations Pty Ltd as Trustee for Port Botany Unit Trust

ABN: 25 855 834 182

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Table of Contents

List of Tables

List of Figures

Executive summary

Overview

The Port Botany Operations Pty Ltd as Trustee for Port Botany Unit Trust (referred herein as NSW Ports) is seeking approval to undertake works to ensure equitable operational quayline length between the three container stevedore companies operating at Port Botany (the Project). The Project would involve two principal components:

- Construction of an extended quayline (BD12) on the southern side of Brotherson Dock, including dredging of the Brotherson Dock channel and berths to provide material for reclamation of land. This would provide:
  - Extension of the southern side of the Brotherson Dock quayline by around 314 metres to provide a combined quayline length on the southern side of Brotherson Dock of around 1,250 metres to accommodate up to three longer container vessels, commensurate with the quayline length available to stevedore operators in other parts of the port
  - An additional 5.3 hectares of wharf area (wharf hardstand)
- Consequential changes in bulk liquids operations at the port, including demolition of the existing Bulk Liquids Berth 1 (BLB1), construction and operation of a new Bulk Liquids Berth (BLB3) in a more southerly location, and associated changes to pipework and bulk liquids handling infrastructure within the port.

The assessment presented in this technical report, as part of the EIS, addresses the Secretary's Environmental Assessment Requirements (SEARs), in support of the application for the Project.

Existing environment

The Project would be located in Port Botany, with major traffic generators including the port itself, Sydney Kingsford Smith Airport, large industrial and commercial facilities, and residential developments. Current traffic primarily uses Botany Road and Foreshore Road to get to General Holmes Drive providing direct access to the regional road network. Regional road network access is provided by State roads off General Holmes Drive via the Southern Cross Drive, the M1 Pacific Motorway, the M5 East and the new M8 and Sydney Gateway, part of the Sydney Orbital Network. Many of the roads around Port Botany are designated heavy vehicle routes which can accommodate large vehicles, including B-Doubles, and are used to move road freight.

Penrhyn Road, and Bumborah Point Road provide direct access to working port areas that would be required for the Project. Off Bumborah Point Road access would be required by the one-way local port road system via Simblist Road, Charlotte Road and Fishburn Road to access the BLBs. Port Botany also contains three rail terminals at DP World, Patricks and Hutchinsons Terminal, providing direct access to the Port Botany freight rail line, dedicated to transport freight between Port Botany and the broader rail network. Sufficient parking is available within the facilities of Port Botany.

Access to the Project Area would be required via Foreshore Road and Bumborah Point Road. These routes are characterised as heavy vehicle routes, providing access to industrial areas within Port Botany and the surrounding area. Recent traffic surveys for the Project demonstrates that Port Botany handles approximately 934 inbound and 1069 outbound vehicle trips during the peak hour periods in 2025. Of these trips, 530 inbound and 616 outbound are heavy vehicles.

Public transport routes on the surrounding road network are limited to a single bus route which travels along Bumborah Point Road on a route between Port Botany to Redfern Station via Bunnerong Road and Beauchamp Road in Matraville. The nearest light rail station is located in Kingsford approximately five kilometres north of the Project Area, and train station is approximately six kilometres north-west of the Project Area at the Sydney Kingsford Smith Domestic Airport Terminal and Mascot. Cycling infrastructure in the surrounding area is limited, however there is a shared path provided along the eastern side of Prince of Wales Drive which continues to Chifley and Philip Bay and Yarra Bay.

Botany Bay experiences maritime traffic generated by commercial ships and vessels, as well as recreational vessels and smaller commercial vessels. Existing exclusion zones exist within Botany Bay around Sydney Kingsford Smith Airport and Port Botany and Kurnell's port and berthing facilities.

Wharves associated with the Kamay Ferry Wharves project exist at La Perouse and Kurnell which are also used as temporary mooring for non-ferry commercial vessels (such as whale watching vessels) and recreational boating. Recreational and commercial boating activities also have access to Botany Bay via boat ramps located at Foreshore Road north-west of Hutchison, Kyeemagh near Sydney Kingsford Smith Airport and Bonna Point on the southern side of Botany Bay at Kurnell.

Key assessment findings

Construction of the Project would occur within Port Botany, a working port characterised by frequent movement of heavy vehicles. Construction associated with the Project is anticipated to require 30 construction vehicles (12 light and 18 heavy vehicles) generating 60 traffic movements per hour (30 inbound and 30 outbound) during the November 2027 peak construction period. This would represent the peak period for construction related road traffic generation for the Project. Intersection modelling at six key intersections near the Project identified that all intersections would perform at the same level of service as per existing operations. Given that Port Botany handled approximately 934 inbound and 1,069 outbound vehicle trips during the peak hour periods in 2025, construction of the Project is likely to have negligible impact on the surrounding road network.

Construction vessels would operate within the restricted shipping channel and exclusion zones. As such impacts on commercial and recreational boating activities is not anticipated.

Potential impacts on traffic and transport due to the Project would be avoided, minimised or managed through a Construction Traffic Management Plan (CTMP) and a Marine Traffic Management Plan (MTMP) with consultation with relevant agencies prior to construction. With the implementation of mitigation and management measures, the anticipated impact of the Project would be minimal.

Operation of the Project is anticipated to result in minimal to no change in the performance of the road intersections surveyed surrounding the Project Area as traffic numbers not anticipated to increase as a result of the Project. The operation of the Project on vessel movements is unlikely to be significant, given the extended quayline, wharf area and new BLB3 would operate entirely within the existing shipping exclusion zones and use the existing Brotherson Dock swing basins.

Glossary and abbreviations

Term	Description
AADT	Annual average daily traffic
BLB	Bulk liquids berth
CEMP	Construction Environmental Management Plan
CTMP	Construction Traffic Management Plan
DoS	Degree of saturation
DPHI	Department of Planning, Housing and Infrastructure
EIS	Environmental Impact Statement prepared under the EP&A Act
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
facilitated development	The subsequent development facilitated by the Project, being construction and operation of infrastructure for the purposes of container operations, involving: • Installation of up to three new quay cranes • Installation of quay rail sidings • Crane power and control systems. Further details of the facilitated development are provided in Section 3.4 (Facilitated development) of the EIS.
impact	Influence or effect exerted by a development or other activity on the natural, built and community environment
LoS	Level of service
LSCC	Landside construction compound
mitigation	Actions or measures to avoid or reduce the impacts of a development
MTMP	Marine Traffic Management Plan
NSW	New South Wales
NSW Ports	Port Botany Operations Pty Ltd as Trustee for Port Botany Unit Trust
Project	The development for which approval is sought under Division 5.2, Part 5 of the EP&A Act, involving: • Construction of an extended quayline (BD12) on the southern side of Brotherson Dock, including dredging of the Brotherson Dock channel and berths to provide material for reclamation of land • Consequential changes to the bulk liquids berths at the port, including demolition of the existing Bulk Liquids Berth 1 (BLB1), construction and operation of a new Bulk Liquids Berth (BLB3) in a more southerly location, and associated changes to pipework and bulk liquids handling infrastructure within the port. Further details of the Project are provided in Chapter 3 (Project description) of the EIS.
SCATS	Sydney Coordinated Adaptive Traffic System
SEARs	Secretary's environmental assessment requirements issued under the EP&A Act
TTIA	Traffic and transport impact assessment
WSCC	Waterside construction compound

1.0 Introduction

1.1 Project context and overview

The Port Botany Operations Pty Ltd as Trustee for Port Botany Unit Trust (referred herein as NSW Ports) is seeking approval to undertake works to provide equitable operational quayline length between the three container stevedore companies operating at Port Botany (the Project). The Project would involve two principal components (refer to Figure 1-1):

- Construction of an extended quayline (BD12) on the southern side of Brotherson Dock, including dredging of the Brotherson Dock channel and berths to provide material for reclamation of land. This would provide:
  - Extension of the southern side of the Brotherson Dock quayline by around 314 metres to provide a combined quayline length on the southern side of Brotherson Dock of around 1,250 metres to accommodate up to three longer container vessels, commensurate with the quayline length available to stevedore operators in other parts of the port
  - An additional 5.3 hectares of wharf area (wharf hardstand)
- Consequential changes to the bulk liquids berths at the port, including demolition of the existing Bulk Liquids Berth 1 (BLB1), construction and operation of a new Bulk Liquids Berth (BLB3) in a more southerly location, and associated changes to pipework and bulk liquids handling infrastructure within the port. The types and volumes of bulk liquids would remain unchanged.

The extended quayline and associated wharf area would be constructed and made available for further development in future by a stevedore. NSW Ports does not seek approval for this further development, including construction and operation of infrastructure for the purposes of container operations.

A more detailed description of construction and operation of the Project are provided in Chapter 3 (Project description) of the EIS.

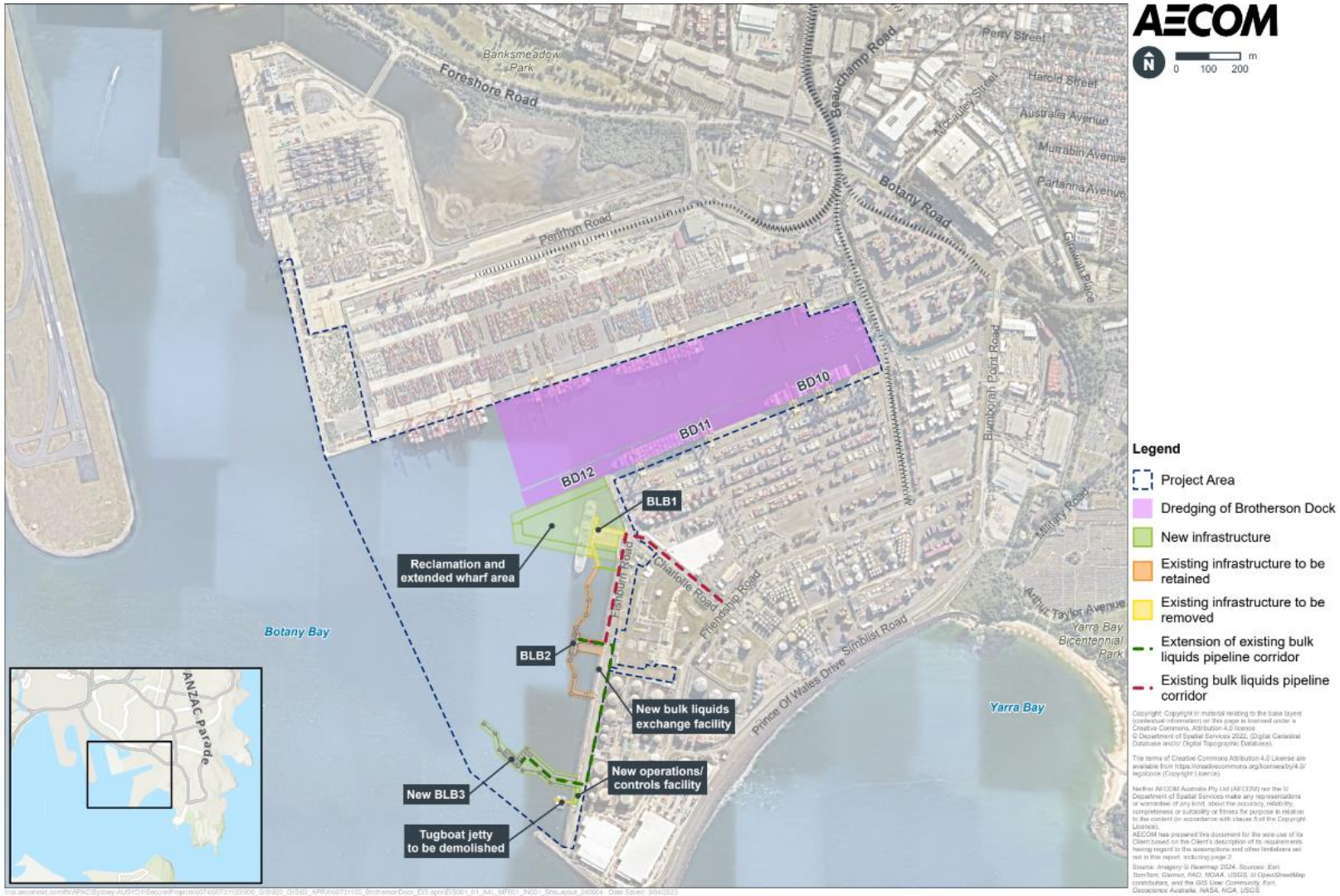

Figure 1-1 Project overview

1.2 The Project

Construction and operation of the Project is summarised in the following sections and described in detail in Chapter 3 (Project description) of the EIS.

1.2.1 Construction of the Project

A high level summary of the key construction activities for the Project is provided in Table 1-1. An indicative construction program for each construction phase is shown in Figure 1-3.

Table 1-1 Key construction activities

Construction phase	Key construction activities
Enabling works and establishment of construction compounds	Site establishment and enabling works would be required to establish four landside construction compounds (LSCCs) and one waterside construction compound (WSCC) (refer to Figure 1-2). Temporary environmental and safety controls, such as erosion and sediment controls, would be implemented.
Construction of the new BLB3	Construction of BLB3 would involve: • Construction of a suspended deck structure, requiring approximately 119 piles • Installation of BLB3 infrastructure and mooring dolphins, new pipeline rack and exchange facility, and electrical services • Construction of a new operations/ control facility and new emergency egress at the existing BLB2.
Decommissioning and removal of BLB1 and tugboat jetty	Decommissioning and demolition activities would involve: • Demolition and removal of the tugboat jetty south of BLB3 • Cessation of operations associated with BLB1, and flushing and pigging (pipe clearing) of pipelines associated with BLB1 • Demolition and removal of BLB1 infrastructure and associated pipelines.
Construction of the extended quayline (BD12) and wharf area	Construction of the extended quayline (BD12) on the southern side of Brotherson Dock would involve two main activities: • Construction of a bund wall, dredging and reclamation works: - Construction of a bund wall including a core, geofabric textile layer, and outer rock armour layer - Progressive dredging of Brotherson Dock, filling behind the bund wall - Compaction of dredged materials within the reclamation area • Piling and wharf deck construction, requiring approximately 380 piles with anticipated lengths of up to 70 metres.
Site demobilisation	Construction sites and compounds would be removed. Disturbance areas would be reinstated to pre-construction conditions. Disturbance areas used for construction would be reinstated to conditions comparable to those existing prior to the commencement of construction.

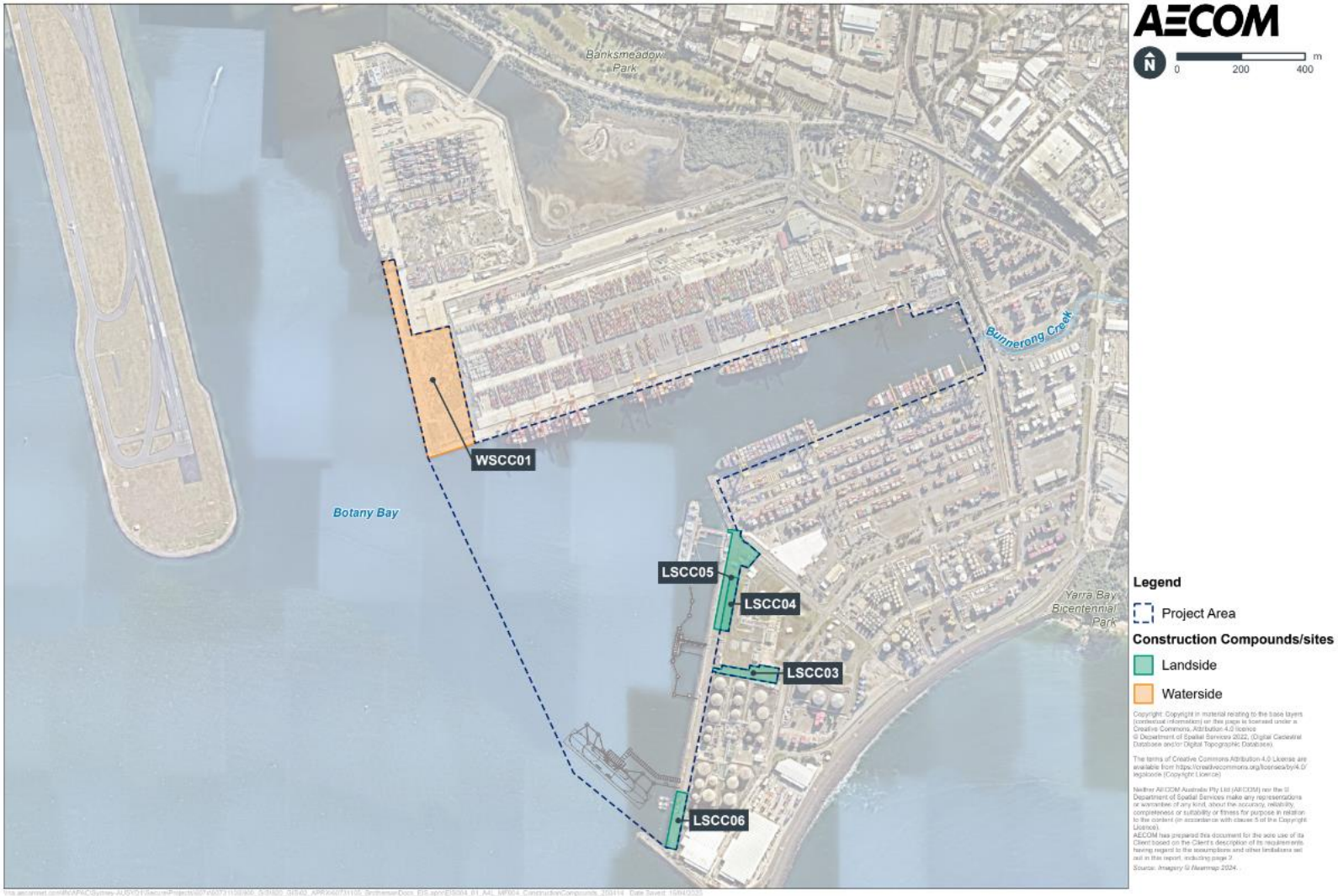

Figure 1-2 Indicative construction compound locations

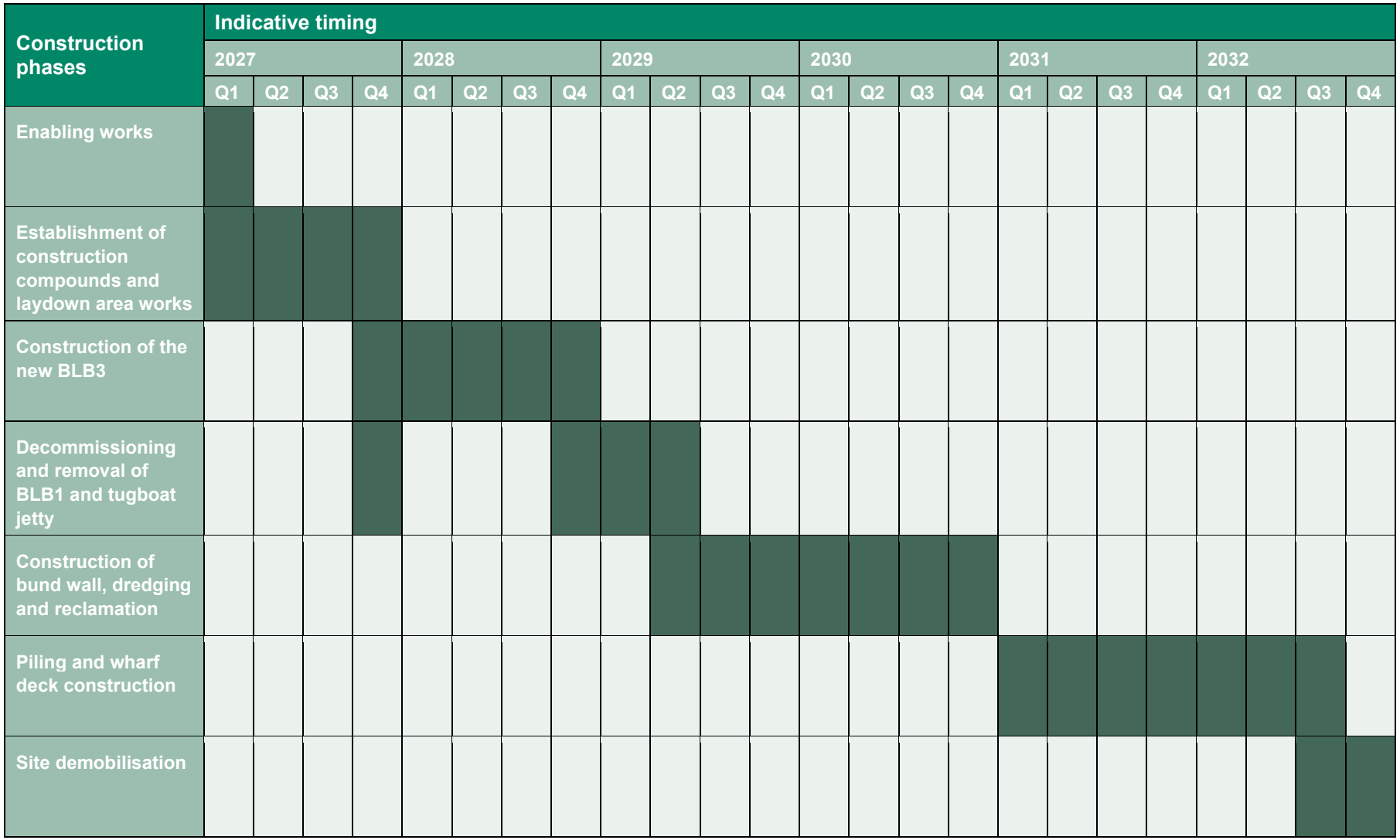

Figure 1-3 Indicative construction phases and timing

1.2.2 Operation of the Project

The key operational components of the Project are shown in Figure 1-1 and summarised in Table 1-2. The extended Brotherson Dock and BLB3 would operate 24 hours a day 7 days a week, consistent with existing operations at Port Botany managed by the stevedores.

Table 1-2 Project operation

Key operational component	Description
Extended quayline (BD12) and wharf area	The extended quayline would allow for the southern side of Brotherson Dock to accommodate longer ships, consistent with the longer quaylines available to other stevedores operating within the port. The key operational components would include: • An extended BD12 wharf area within the reclaimed area along and behind the extended quayline • A hardstand area around 5.3 hectares in area, composed of the reclaimed area (4 hectares) and suspended deck (1.3 hectares) • Forty-eight fenders along the BD12 quayline to absorb the impact of ships and provide secure points for vessels to tie up their mooring lines • Supporting services, including drainage and security.
BLB3 to replace BLB1 including associated pipeline infrastructure	The new BLB3 would operate similarly to the current BLBs, but would be located further south. BLB3 would be connected to the existing pipeline network or directly into the existing bulk liquids and gas tenancies that use this berth. The key operational components of the BLB3 would include: • A central working platform, including (but not limited to) three marine loading arms to transfer bulk liquids from ships to shore facilities, and provision for up to five additional arms • Access bridges connecting shore to the central working platform to the vessels, providing vehicle and pedestrian access, as well as a pipeline corridor • Additional emergency egress from BLB2 to shore. • Pipeline infrastructure including: - Extension of the existing bulk liquids pipeline corridor along Fishburn Road from the BLB3 pipe manifold to existing Vopak and Elgas bulk liquids storage locations - An additional pipeline along Fishburn Road to the existing BLB2 exchange facility, replacing the existing BLB1 bitumen pipelines - An additional bulk liquids exchange facility located on Fishburn Road • Utilities including power, lighting, security, water, sewer, communications.

1.3 Purpose of this report

This report is one of a number of technical assessments that forms part of the EIS. The purpose of this technical report is to demonstrate the environmental acceptability of the Project with regard to potential impacts on transport and traffic and in response to the Secretary Environmental Assessment Requirements (SEARs) (refer to Section 1.3.1).

1.3.1 Assessment requirements

The SEARs issued by the NSW Department of Planning, Housing and Infrastructure (DPHI), relating to transport and traffic and where these requirements are addressed in this technical report are outlined in Table 1-3.

Table 1-3 Secretary's environmental assessment requirements – transport and traffic

Issue and desired performance outcome	Requirement	Section where addressed in report
Transport and traffic Network connectivity, safety and efficiency of the transport system in the vicinity of the Project are managed to minimise impacts. The safety of transport system customers is maintained. Impacts on network capacity and the level of service are effectively managed. Works are compatible with existing infrastructure and future transport corridors.	Provide a Transport and Traffic Assessment as outlined in Section 6.2.8 of the Scoping Report.	Refer to Chapter 4.0 and Chapter 5.0.
	The assessment must include construction and operational marine traffic impacts, including navigational impacts of new infrastructure on the movement, berthing and operation of all vessels utilising the area, including ships entering and leaving Port Botany, and other commercial and recreational vessels.	Refer to Section 4.2 and Section 5.2.

1.3.2 Agency engagement

During preparation of the EIS, consultation was carried out with various agencies (refer to Chapter 5 (Stakeholder and community engagement) of the EIS). Those relevant to transport and traffic include:

- Randwick City Council and Bayside Council
- Port Authority of NSW and Harbour Master (approval authority for vessel movements).

Randwick City Council requested details regarding the scope of the traffic study and whether it would cover construction only. It was discussed that operational activities are anticipated to remain at a similar level to the existing situation. As such, construction traffic has been the primary focus of the assessment (refer further to Section 2.2). It was also noted that the transport and traffic impact assessment would outline the proposed construction traffic routes, as detailed in Figure 4-1 and Figure 4-2.

2.0 Assessment approach

2.1 Legislation, policy, guidelines and standards

This transport and traffic impact assessment has been undertaken in accordance with:

- *Guide to Traffic Management – Part 3 Traffic Studies and Analysis* (Austroads, 2020)
- *Guide to Transport Impact Assessment Version 1.1* (Transport for NSW, 2024)
- *Traffic Modelling Guidelines* (Transport for NSW, 2013).

2.2 Methodology

This section describes the framework used to assess potential transport and traffic impacts associated with the Project.

Key steps in the assessment of transport and traffic impacts from the Project has included:

- Assessing the existing transport and traffic conditions within the study area informed by:
  - A desktop review of typical heavy vehicle routes and annual average daily traffic accessing Port Botany and the existing DP World container operations
  - Traffic and queue length and turning movements surveys undertaken for six intersections along Botany Road and Foreshore Drive, supplemented by Sydney Coordinated Adaptive Traffic System (SCATS) phasing data
- Intersection modelling using the SIDRA Intersection software to understand the Project's potential road transport impacts during construction
- High level analysis of vessel movements during construction
- Qualitative discussion of transport and traffic impacts during operation of the Project
- Identifying mitigation and management measures to address the identified impacts.

The following sections outline the detailed methodology applied to the preparation of this transport and traffic impact assessment. This methodology has been used for the construction assessment of the Project. Operational phase transport and traffic impacts have also been considered at a high level given the minimal change in transport and traffic movements that would eventuate from operation of the Project.

2.2.1 Study area

The study area has been defined to include locations that may be potentially impacted by changes to the transport network due to the Project. The study area encompasses the six intersections identified as relevant for the assessment of the Project (refer to Figure 2-1) and has been determined taking into account:

- The construction and operational footprints of the Project, including the extended quayline and wharf area, and consequential changes in bulk liquids operations
- The nature of the existing environment, including:
  - Transport and traffic patterns on the surrounding road network
  - Transport and traffic accessing Port Botany and the existing DP World container operations
  - The use of public transport and active transport in the area
  - Marine traffic within Brotherson Dock and Port Botany.

The six intersections considered in the construction traffic modelling analysis (refer to Figure 2-1) have included:

1. Foreshore Road/ General Holmes Drive
2. Foreshore Road/ Ulm Avenue
3. Foreshore Road/ Sirius Road
4. Foreshore Road/ Botany Road/ Penrhyn Road
5. Botany Road/ Beauchamp Road
6. Botany Road/ Bumborah Point Road.

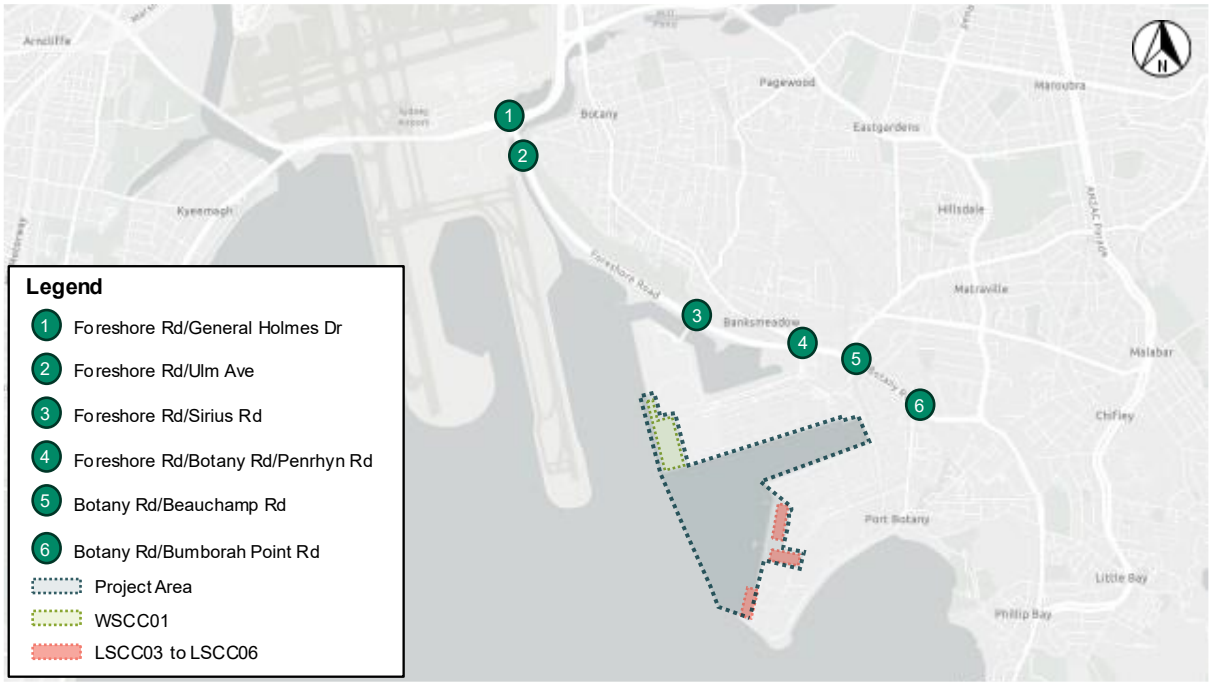

Figure 2-1 Study area and assessed intersections

2.2.2 Data sources

A range of data has been used in determining the existing environment and setting up the SIDRA model. These data sources are summarised in Table 2-1.

Table 2-1 Data sources

Data type	Date(s) covered	Use in assessment
2017 and 2024 annual average daily traffic (AADT) data on Southern Cross Drive near Gardeners Road (Transport for NSW, 2023)	2017 and 2024	Background traffic growth analysis
2024 intersection turning movement counts (Matrix, 2024)	12 November 2024	Base year SIDRA Intersection modelling
2025 intersection turning movement counts (Matrix, 2025)	4 March 2025 and 11 March 2025	Base year SIDRA Intersection modelling
SCATS phasing data	12 November 2024 and 4 March 2025	Base year SIDRA Intersection modelling

2.2.3 Land transport assessment

Road network modelling

SIDRA Intersection modelling has been conducted on both the existing (without the Project) and construction phase (with construction of the Project) conditions to assess potential road transport impacts, including road network performance and heavy vehicle impacts. SIDRA Intersection is a micro-analytical modelling software package, capable of analysing isolated and coordinated intersections.

The weekday AM and PM peak hour operation of key intersections near the Project Area have been assessed using the SIDRA version 9.1 software. The SIDRA Intersection models have been calibrated using SCATS phasing and queue lengths surveys including assessment through survey video footage observations during the AM and PM peak hours. In NSW, signal phasing is influenced via triggers under the road that consider traffic capacity of the road. As such, the SIDRA Intersection models have been optimised by the adjustment of signal phasing timing (within a 10% margin) to reduce the total vehicle delay across signalised intersections.

Modelled peak hour construction heavy and light vehicle volumes have been calculated based on the peak average daily construction vehicle movements distributed over the established 11-hour construction working hours of 7am – 6pm. Due to a review of recent traffic trends on the aforementioned roads indicating a decline in traffic numbers, no traffic growth factor has been applied to the 2027 peak road traffic construction year in the SIDRA Intersection models.

Modelled peak hour construction volumes have been distributed across the study area intersections (refer to Figure 2-1) based on the origin and destination of the trips anticipated during construction of the Project (Annexure C), with consideration of the distribution of vehicles accessing and departing the Project road network determined in the Port Botany Freight Study (Aurecon, 2017).

Key metrics used in the SIDRA Intersection model are summarised in Table 2-2. The standard measure of intersection performance is vehicle delay, which is used to assess the efficiency of an intersection. SIDRA Intersection adopts the Transport for NSW Traffic Modelling Guidelines which categorises average intersection delay into six bands of average delay per vehicle (seconds per vehicle). These bands are determined based on criteria outlined in Table 2-3. By analysing the average delay, SIDRA Intersection determines the level of service (LoS) for the intersection, a measure of the intersection performance.

Table 2-2 SIDRA Intersection modelling outputs

Output	Description
Degree of saturation (DoS)	Ratio of the arrival (demand) flow rate to the capacity of the approach or intersection during a given flow period. Where DoS is close to 1.00, the traffic demand is effectively equal to the capacity of the approach or intersection
95th percentile vehicle queue (metres)	A statistical value which represents the queuing experienced on an approach to an intersection
Average delay (seconds) and level of service (LoS)	Average delay is commonly used to assess the operational performance of intersections, with LoS used as an index.

A summary of the intersection LoS criteria is shown in Table 2-3. Transport for NSW guidance requires a target intersection performance of LoS D or better. Investigations should be initiated to determine if suitable remediation can be provided if intersection performance falls below LoS D.

Table 2-3 LoS criteria for intersections

LoS	Average delay per vehicle (seconds per vehicle)	Traffic signals and roundabouts	Give way and stop sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Source: (Transport for NSW, 2024)

Road network assessment scenarios (construction and operation)

According to the anticipated vehicle movement profile for construction of the Project (refer to Annexure C), it has been identified that November 2027 would generate the highest construction traffic demands and thus has been selected as the 'worst-case' construction traffic scenario to model in SIDRA.

Additionally, a qualitative assessment has been undertaken to assess the surrounding road network during the operation stage of the Project. The Project is not expected to result in any material changes to the performance of the road network during operation, noting that:

- The new BLB3 would provide a replacement of the existing BLB1
- The extended quayline and wharf area would not by themselves generate additional operational traffic volumes over that which occurs with current operations.

To assess the construction and operational impacts of the Project on the surrounding road network, three scenarios have been considered as summarised in Table 2-4.

Table 2-4 Road network assessment scenarios (construction and operation)

Key features	2024	2027	2032
	Base case	With construction	With operation
Existing road geometry	✓	✓	✓
With the Project (construction - quantitative)		✓	
With the Project (operation - qualitative)			✓

Road traffic growth assumptions

An analysis of historical traffic data along General Holmes Drive near the Project was conducted to determine the background traffic growth of the study intersections.

Historical AADT data has been sourced from Transport for NSW to establish appropriate traffic growth rates for General Holmes Drive. The nearest AADT traffic count station is located further north along Southern Cross Drive near Gardeners Road. The data from this station indicates there has been a -0.3 per cent per annum decrease in traffic volumes since 2017. This reduction in traffic volumes along Southern Cross Drive and likely in turn General Holmes Drive may be due to the opening of the M4-M8 Link, Sydney Gateway and St Peters and Rozelle interchanges which impacted how people travel particularly around Sydney Kingsford Smith Airport.

Additionally, the number of developmental applications and state significant projects around Botany has reduced significantly since 2017 and thus decreased the vehicle demand in the surrounding road network.

Therefore, despite the negative traffic growth along General Holmes Drive over recent years and the decline in infrastructure development within Botany, the assessment has not applied a traffic growth factor to the peak construction year for road traffic (2027) in the impact assessment scenario.

Parking assessment

The Project's impacts on car parking have been qualitatively assessed. This has included consideration of the typical and peak numbers of parking spaces required during construction and operation, and the potential implications for existing public parking availability.

Public and active transport assessment

The public and active transport assessment has included qualitative examination of the construction and operational impacts of the Project on public transport services and active transport provisions. Consideration has been given to transport networks that may be relied on by public transport services.

2.2.4 Marine transport assessment

A qualitative consideration of marine traffic has been applied to this assessment.

In contrast to road traffic, marine traffic through ports in NSW, including Port Botany, is strictly regulated by the relevant Harbour Master under the *Marine Safety Act 1998*. In particular, under section 88 of that Act, the Harbour Master is responsible for directing and controlling the time and manner in which any vessel may enter or leave the port, and the navigation and other movements of any vessel within the port. These powers and functions lie outside the environmental planning and assessment framework of the EP&A Act.

Both the Project and the facilitated development would support changes in marine traffic over time, particularly through contributions to equitable provision of quaylines to Port Botany stevedores with capacity to accommodate larger vessels. Any changes in marine traffic would, however, be subject to approval of the Harbour Master and its specific requirements, including in relation to marine traffic capacity and safety.

As noted in Section 1.3.2, the Harbour Master has been engaged in relation to the Project and has not raised any objection to the progression of the environmental impact assessment and approval process for the Project. Engagement with the Harbour Master would continue, as required under the *Marine Safety Act 1998*, during construction and operation of the Project, to ensure that marine traffic associated with the Project and its contribution to Port Botany more broadly, is managed consistent with the Harbour Master's requirements.

2.2.5 Avoidance and minimisation

The Project would be located within an existing port environment and the potential for and value of avoiding or minimising transport and traffic impacts from the Project have been considered in the context of the ongoing transport and traffic impacts of existing port infrastructure.

Specific avoidance and minimisation strategies for the Project would be enabled through mitigation measures, particularly for management during construction. Following on from the assessment of transport and traffic impacts, a set of mitigation measures have been developed to avoid or minimise adverse transport and traffic impacts. Mitigation measures to manage the impacts of the construction and operation of the Project are discussed in Chapter 7.0.

2.2.6 Cumulative impact assessment

Cumulative impacts have the potential to occur when benefits or impacts from a development overlap or interact with those of other developments, potentially resulting in a larger overall impact (positive or negative) on the environment or local communities. Cumulative impacts may occur when developments are constructed or operated concurrently or consecutively, within the same area.

The extent to which another development or activity could interact with the construction and/ or operation of the Project would depend on its location, scale, and/ or timing of construction or operation. A screening assessment was undertaken to identify projects that may contribute to potential cumulative impacts. Refer to Chapter 18 (Cumulative and facilitated impacts) of the EIS for details of the full cumulative impact assessment methodology adopted for the Project. Based on this screening, the following four developments have been identified to have potential for cumulative impacts with the Project:

- CP Group and KLF Group Waste Management Facility, Botany
- Modification of Orica Chlor-Alkali Plant, Botany Industrial Park
- Orica Southlands Warehouse Estate
- Stephen Road Multi-level Warehouse, Banksmeadow.

The location of these projects is shown in Figure 2-2.

An assessment of potential cumulative impacts between these screened developments and the Project on transport and traffic during construction and operation is presented in Section 6.2.

2.2.7 Facilitated impact assessment

Although the Project would involve construction of an extended quayline (BD12) and wharf area, it would not include the subsequent construction or operation of infrastructure for the purposes of container operations. Any future development of such infrastructure would be separately progressed by the stevedore.

Although installation and operation of infrastructure for the purposes of container operations does not form part of the Project, this would only be possible once the Project is completed and therefore are considered to be reasonably foreseeable outcomes of the Project's development.

Construction and operation of infrastructure for the purposes of container operations on the extended quayline and wharf area has been considered, where relevant, as a facilitated development. Consideration of potential facilitated impacts on transport and traffic associated with the facilitated development on the extended quayline and wharf area is presented in Section 6.3.

2.2.8 Limitations, uncertainties and assumptions

The Project has been assessed using a combination of modelling to assess road transport and traffic impacts during construction and qualitative analysis for vessel movements during construction and operation of the Project.

The SIDRA Intersection model of the construction scenario has been calibrated using traffic signal phasing and timings extracted from Transport for NSW data, video footage and Project Area observations.

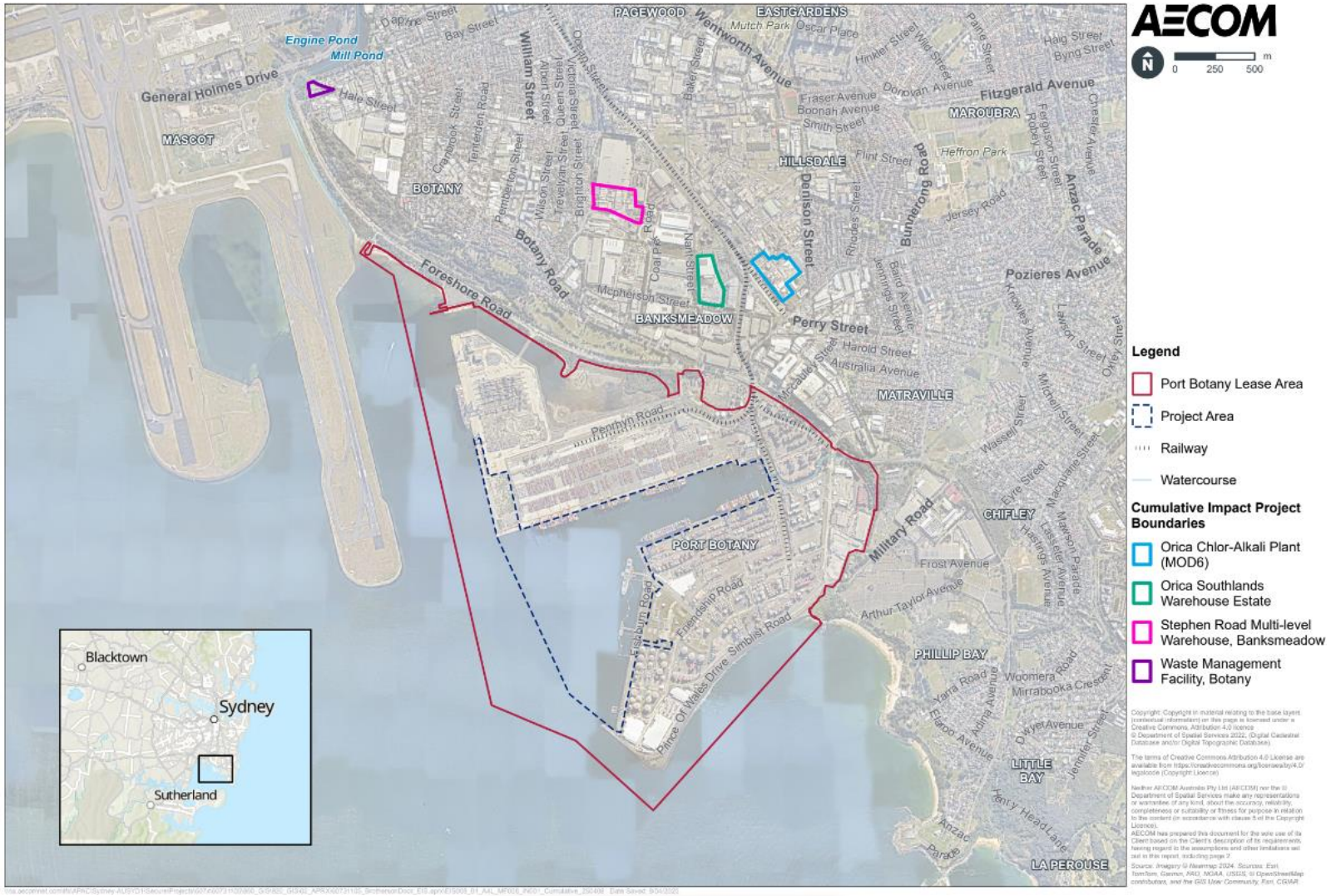

Figure 2-2 Developments identified for consideration of potential cumulative impacts with the Project

3.0 Existing environment

3.1 Road network

Roads in NSW are separated into functional classification systems such as arterial, sub-arterial, collector and local roads, depending on traffic volumes. The existing road network (refer to Figure 3-4) is surrounded by arterial roads which include Foreshore Road, Botany Road, Southern Cross Drive, Beauchamp Road and Wentworth Road. Sub-arterial roads surrounding the Project include Bumborah Point Road, Prince of Wales Drive, Simblist Road, Friendship Road, and Fishburn Road. The key roads near the Project Area include Botany Road, Foreshore Road, and Bumborah Point Road.

Roads in NSW are also split into categories based on the authority that manages them. Botany Road and Foreshore Road are classified State Roads (managed by Transport for NSW) while Bumborah Point Road is a local road (managed by the local council) that provides a connection into Port Botany.

Botany Road and Foreshore Road are aligned in an east-west direction along the northern side of Port Botany. They are two-way roads generally configured with two to three lanes in each direction. Botany Road generally has a posted speed limit of 70 kilometres per hour, while Foreshore Road has a posted speed limit of 80 kilometres per hour.

Bumborah Point Road is a two-way road configured with one lane in each direction and has a posted speed limit of 60 kilometres per hour. Botany Road, Foreshore Road and Bumborah Point Road are shown in Figure 3-1 to Figure 3-3.

Figure 3-1 Botany Road, east of Bumborah Point Road (looking west) Source: Google Maps, 2024

Figure 3-2 Foreshore Road, west of Penrhyn Road (looking west) Source: Google Maps, 2024

Figure 3-3 Bumborah Point Road, south of Botany Road (looking north) Source: Google Maps, 2024

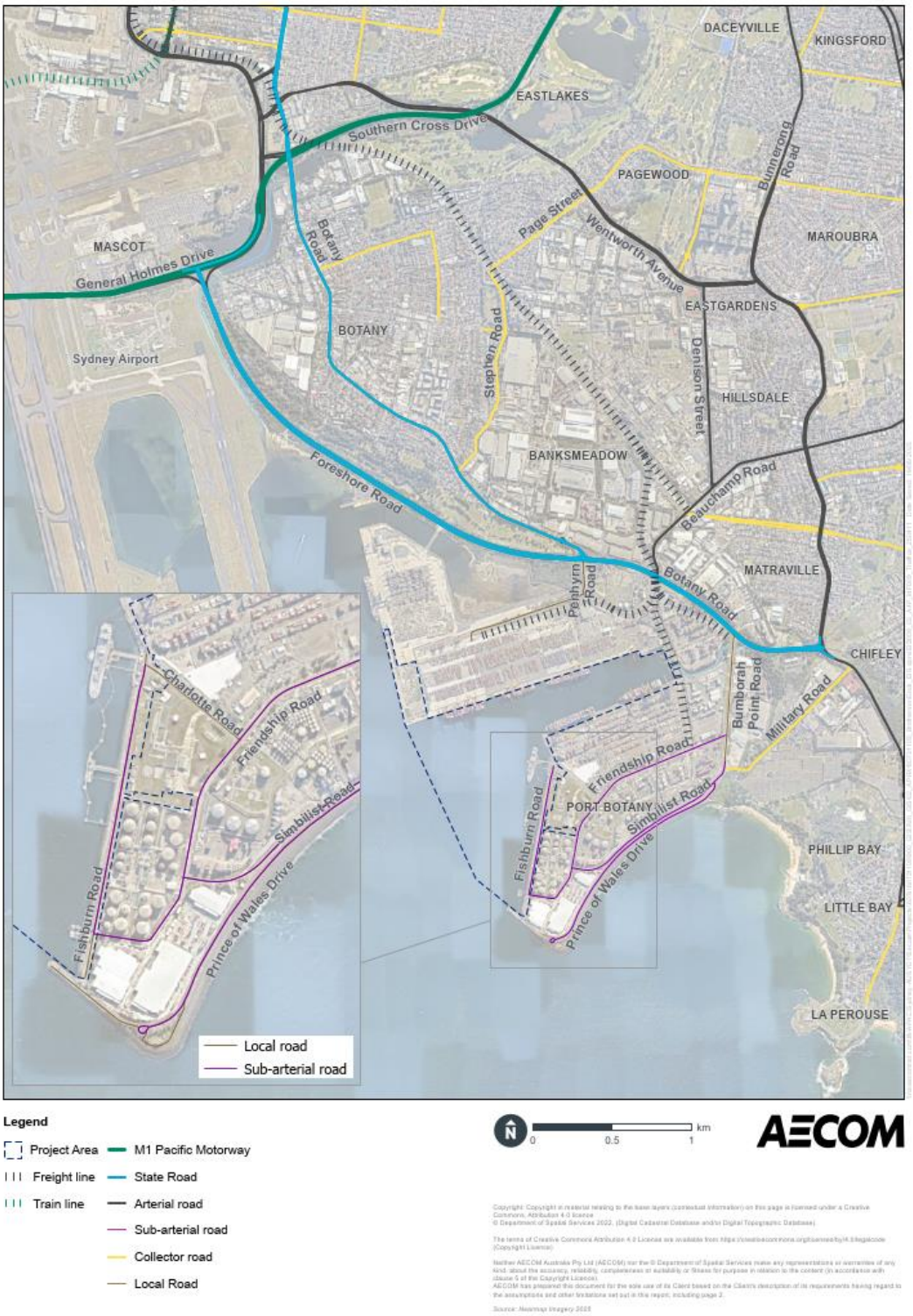

Figure 3-4 Existing road network around Port Botany

3.1.1 Heavy vehicle routes and freight line

Many of the roads around Port Botany are designated heavy vehicle routes which can accommodate large vehicles, including B-Doubles, and are used to move road freight. These include routes to and from Port Botany and Sydney Kingsford Smith Airport such as the M5 Motorway, General Holmes Drive, Southern Cross Drive and Foreshore Road.

Heavy vehicles accessing the Port Botany road network typically enter Foreshore Road from General Holmes Drive. Heavy vehicles are likely to access the road network from the west via a right turn at General Holmes Drive/Foreshore Road and from the east via the General Holmes Drive off-ramp (Aurecon, 2017). Heavy vehicles leaving the Port Botany travelling west are likely to utilise the General Holmes Drive on-ramp that leading to the M5 Motorway. Those travelling east are likely to use the right turn on Foreshore Road that leads to Southern Cross Drive (Aurecon, 2017). Heavy vehicles may also access Port Botany via the Beauchamp Road, Denison Street, and Wentworth Avenue.

Port Botany is also serviced by a freight rail line. This freight line was recently upgraded to duplicate the remaining 2.9-kilometre section of single line track into Port Botany, allowing freight to be moved more efficiently. The upgrade freight rail line has increased capacity on the Botany Line and wider Metropolitan Freight Network, with the potential to encourage a shift in freight from road to rail, helping to reduce the growth truck movements and associated traffic congestion.

3.1.2 Project Area access

Roads that are used to access the Project Area include Fishburn Road, Friendship Road, Charlotte Road and Simblist Road (refer to Figure 3-4). All roads are classified as privately owned port roads managed by NSW Ports. No formal parking is allowed along any of these roads.

Port operating vehicles can access Simblist Road via Bumborah Point Road. Access to Charlotte Road is provided via Bumborah Point Road and then Simblist Road before turning onto Friendship Road. Vehicles travelling to Fishburn Road follow the one-way road network provided by the aforementioned route via Charlotte Road, Bumborah Point Road, or Simblist Road, and directly turn off Friendship Road. Heavy vehicles would depart via Fishburn Road/ Charlotte Road and then onto Friendship Road, turning left onto Bumborah Point Road.

3.1.3 Parking

Within the surrounding road network, kerbside parking is not permitted on either side of Botany Road or Foreshore Road. It is permitted on both sides of Bumborah Point Road for vehicles under six metres in length.

Within Port Botany parking is provided at various locations and comprises staff and visitor car parks. A review of historical Nearmap aerial imagery indicates that most car parks across Port Botany have spare capacity on weekdays and weekends. A total of 11 formal car parking spaces are located within the Project Area, with four located at the northern end of Fishburn Road and seven located at the southern end of Fishburn Road.

3.2 Road network performance

3.2.1 Intersection performance

SIDRA Intersection modelling has been undertaken for existing conditions at the intersections listed in Section 2.2.1. Table 3-1 summarises the modelled existing performance of the intersections, with full results presented in Annexure B. SCATS phasing for the same day as the traffic surveys along with queue length surveys have been used to calibrate the SIDRA Intersection models to existing conditions.

Table 3-1 Modelled intersection performance – existing conditions

Intersection	Peak	DoS	Average delay (seconds)	95th percentile queue (metres)	LoS
Foreshore Road/ General Holmes Drive	AM	0.99	27	466	B
	PM	0.63	7	72	A
Foreshore Road/ Ulm Avenue	AM	0.76	12	90	A
	PM	0.53	11	61	A
Foreshore Road/ Sirius Road	AM	0.57	4	81	A
	PM	0.57	9	162	A
Foreshore Road/ Botany Road	AM	0.99	49	486	D
	PM	0.95	42	223	C
Botany Road/ Beauchamp Road	AM	0.86	24	187	B
	PM	0.77	23	168	B
Botany Road/ Bumborah Point Road	AM	0.61	21	69	B
	PM	0.54	24	94	B

Table 3-1 indicates that all intersections are currently operating satisfactorily at a level of service (LoS) D or better in the AM and PM peak hours, with most operating at LoS B or better. The Foreshore Road/ General Holmes intersection is operating at capacity during the AM peak (degree of saturation (DoS) of 0.99) and the Foreshore Road/ Botany Road intersection is operating at capacity during both peak hours (DoS of 0.99 and 0.95, respectively). This is likely due to the traffic volumes through both intersections being high with respect to the available signal phase times.

Additionally, at Foreshore Road/Botany Road, the 95th percentile queue lengths for the right turn movement on Botany Road (eastern approach) surpasses the available storage length in the right turn lane in both AM and PM peak hours.

3.2.2 Peak traffic period

Traffic turning movement counts have been undertaken at the following key intersections on 12 November 2024 between 5:00 am and 10:00 am, and between 4:00 pm and 6:00 pm:

- Foreshore Road/ General Holmes Drive
- Foreshore Road/ Botany Road/ Penrhyn Road
- Botany Road/ Beauchamp Road
- Botany Road/ Bumborah Point Road.

Additional traffic turning movement counts have also been undertaken at the intersection of Foreshore Road/ Sirius Road and Foreshore Road/ Ulm Avenue on 4 March 2025 and 11 March 2025 respectively, between 5:00 am and 10:00 am, and between 4:00 pm and 6:00 pm.

Data from these traffic surveys (refer Annexure A) indicates that the AM and PM peak hours occur from 8:00 am to 9:00 am and 4:30 pm to 5:30 pm respectively, with traffic volumes summarised in Annexure A. The network peak hours have been calculated by summing total vehicle volumes across all intersections.

However, it should be noted that at Foreshore Road/General Holmes Drive traffic volumes peaked during 6:00 am to 7:00 am, with 7,016 total vehicles compared to 8:00 am to 9:00 am which had 6,740 total vehicles. This is due to General Holmes Drive being a motorway and having consistently higher

traffic volumes across a larger peak period. The 8:00 am to 9:00 am peak hour applied to this assessment still accounts for the worst-case network AM peak period.

3.2.3 Port Botany traffic

Traffic counts undertaken for the Project in 2025 identified approximately 883 inbound and 1,008 outbound vehicle trips during the peak hour periods in 2025. Of these trips, 495 inbound and 577 outbound are heavy vehicles. A breakdown of these trips is provided in Table 3-2.

Table 3-2 Traffic counts for inbound and outbound heavy vehicles

Access Roads	Inbound (AM)	Inbound (PM)	Outbound (AM)	Outbound (PM)
Penrhyn Road	65	74	72	73
Bumborah Point Road	197	159	230	202
Total	**495**		**577**	

3.3 Public transport

Public transport services in the area around Port Botany are limited, with only one bus route (route 309) operating in the vicinity. This bus route provides connection between Redfern and Port Botany, with the closest bus stops located on Botany Road near Penrhyn Road and the midblock along Bumborah Point Road. Bus services operate at around five-minute frequencies during peak hours, and around 10 to 20 minute frequencies outside of peak hours. The 309 bus route near Port Botany is shown in Figure 3-5.

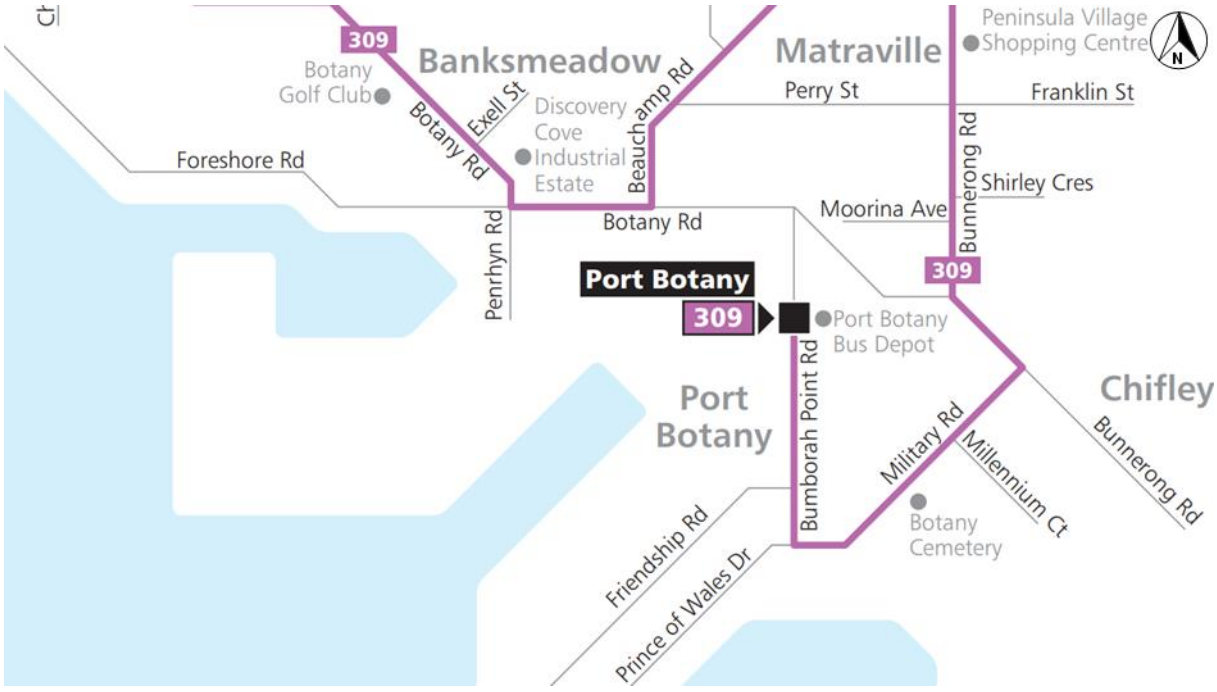

Figure 3-5 Surrounding public transport network (Transport for NSW, 2025)

3.4 Active transport infrastructure

Walking infrastructure around Port Botany is somewhat limited by restricted access areas associated with the working port. Outside of the restricted working port areas, pedestrian paths are generally only provided on one side of most nearby roads, or not provided at all. Key walking infrastructure includes:

- Botany Road north of Foreshore Road: Both sides of the road
- Botany Road east of Penrhyn Road: Northern side of the road only
- Penrhyn Road: Western/ southern side of the road only
- Bumborah Point Road: Eastern side of the road only.

Cycling infrastructure is similarly limited (refer to Figure 3-6), however there is a shared path provided along the eastern side of Prince of Wales Drive which continues to Chifley via Military Road and Wassell Street. The shared path along Prince of Wales Drive also forms part of the Coastal Sydney Walk which continues east around the coastline.

No pedestrian or cycle paths are provided along Foreshore Road. Similarly, most NSW Ports roads within Port Botany do not have footpaths, with vehicles being the predominant mode of transport to get around Port Botany given the vast size of the area.

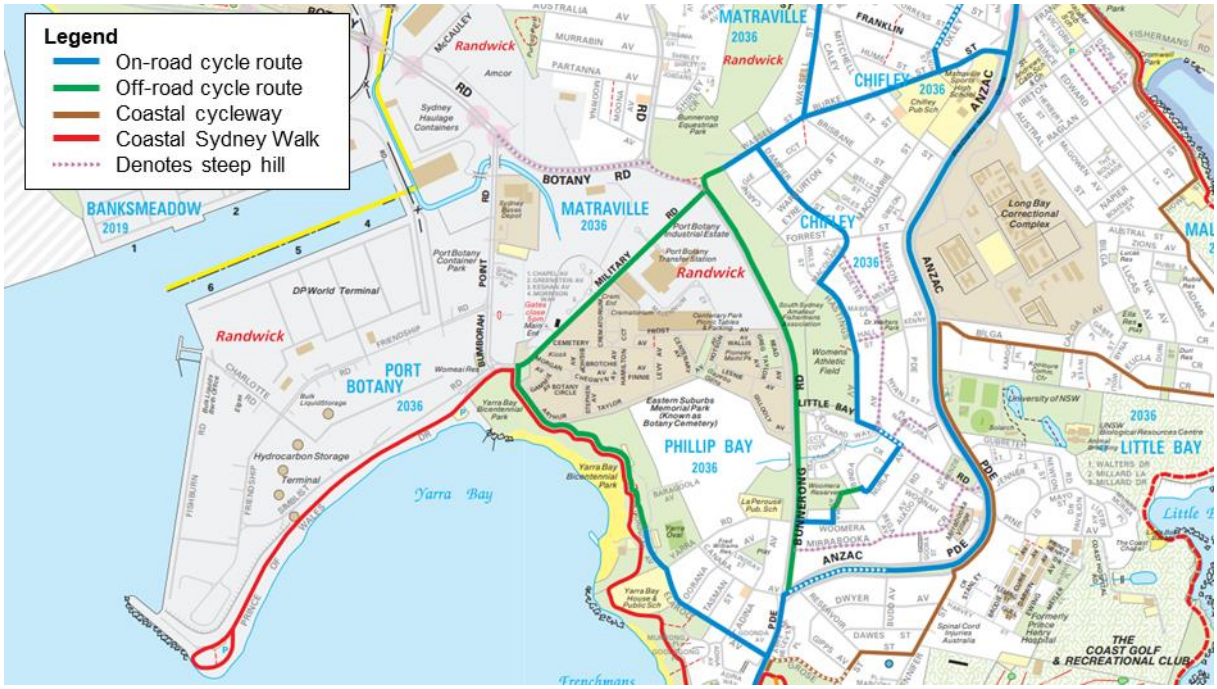

Figure 3-6 Surrounding cycling network (Transport for NSW, 2024)

3.5 Marine transport environment

3.5.1 Shipping operations

Botany Bay experiences maritime traffic generated by commercial ships and vessels, as well as recreational vessels and smaller commercial vessels. Existing exclusion zones exist within Botany Bay around the airport as well as Port Botany and Kurnell's port and berthing facilities (refer to Figure 3-7). The exclusion zones prohibit access to the public, such as recreational vessels, for safety and security reasons. Penalties apply for unauthorised entry into exclusion zones.

On the northeastern side of Botany Bay, Port Botany services both container and bulk liquids vessels, as the primary container port in NSW and Australia's largest common user bulk liquids facility. On the southern side of Botany Bay, Kurnell's port and berthing facilities service the Kurnell Terminal operated by Ampol. The fixed berths are used to import and export finished fuel products and distribute them across NSW and Australia.

The port and berthing facilities at both Port Botany and Kurnell are serviced by an existing deep-water shipping channel, which provides a pathway for large vessels to travel between the open sea and the port (refer to Figure 3-7). Existing swing basins around Botany Bay's port and berthing facilities, provide areas for large vessels to turn around or change direction. The swing basin in closest proximity to the Project Area is located south of extended quayline and wharf area.

Transport for NSW has recently developed a ferry service and associated wharves at La Perouse and Kurnell (shown in Figure 3-7). The wharves also provide supplementary temporary mooring for non-ferry commercial vessels (such as whale watching vessels) and recreational boating. Recreational vessels have access to Botany Bay via boat ramps located at Foreshore Road north-west of the existing Hutchison container operations, Kyeemagh near Sydney Kingsford Smith Airport and Bonna Point on the southern side of Botany Bay at Kurnell.

3.5.2 Commercial boating activities

The following commercial and charter vessels are known to operate in Botany Bay:

- 'Hire and drive' vessel operators
- Whale watching vessels
- Fishing charter boat operators
- River Cruises.

3.5.3 Recreational boating activities

Botany Bay is used by a variety of recreational boat users. Some of these recreational users include:

- Rowing, sailing, and boat racing activities associated with Botany Bay Yacht Club, Georges River Sailing Club, Yarra Bay Sailing Club, Kurnell Catamaran Club, St George Sailing Club, St George Motor Boat Club
- Recreational fishing
- Kite surfers, typically on the southern side of Botany Bay
- Personal watercraft users (such as jet skis)
- Diving and snorkelling activities
- Other recreational events including swimming races and triathlons which predominantly take place on the western side of Botany Bay.

Courtesy and emergency moorings are located at various locations within Botany Bay. Courtesy moorings are freely available for use by recreational or commercial vessels for up to 24 hours unless other restrictions are specified. Emergency moorings are available for use by Transport for NSW, or the NSW Police to store vessels in emergencies and are not for public use.

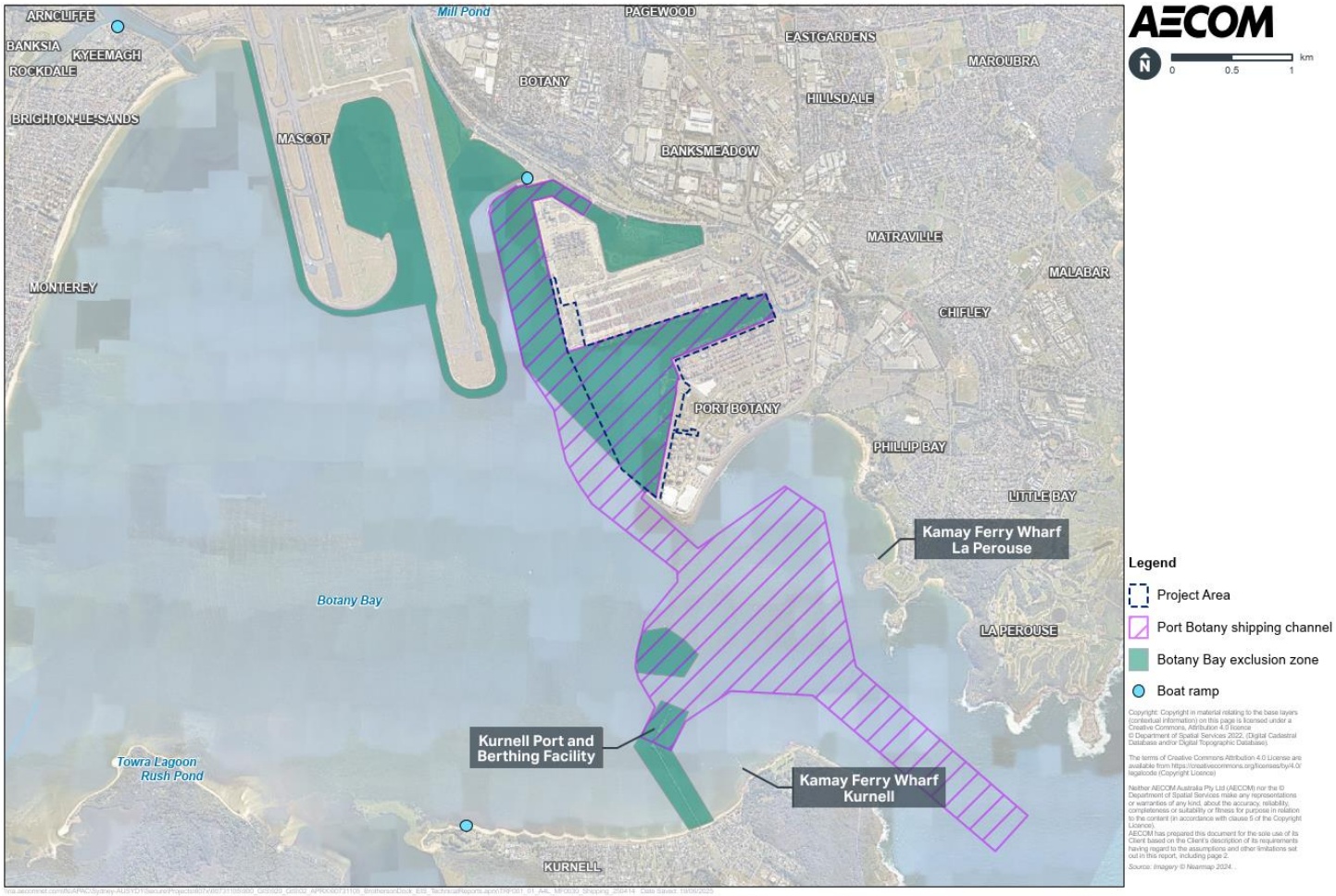

Figure 3-7 Botany Bay marine transport environment

3.5.4 Marine traffic

Port Botany currently attracts an average of 12 marine vessel movements per day, consisting of three larger ships (container vessels and bulk liquid vessels), six tugboats, and three pilot boats. Larger ships and tugboat vessels each make an inbound and outbound trip to Port Botany, producing two movements each. On the other hand, pilot boats only trips within Port Botany by transporting the pilot to and from Brotherson House and the ship, hence still producing two movements within the port. A breakdown of the average number of vessels and movements per day is provided in Table 3-3.

Table 3-3 Existing average marine vessel traffic for Brotherson Dock

Type	Average number of vessels per day	Average number of movements per day
Larger ships (container vessels, bulk liquids vessels)	3	6
Tugboat	6	12
Pilot boat	3	6
Total	**12**	**24**

4.0 Assessment of construction impacts

The following sections outline the anticipated traffic impacts of constructing the Project on the surrounding transport network, including:

- Enabling works and establishment of construction compounds
- Consequential changes in bulk liquids operations at the port, including:
  - Construction of the new BLB3
  - Decommissioning and removal of the existing BLB1 and tugboat jetty
- Construction of an extended quayline (BD12) on the southern side of Brotherson Dock, including:
  - Construction of the bund wall, dredging and reclamation
  - Piling and wharf construction
- Site demobilisation.

Potential cumulative transport and traffic impacts, and impacts associated with the facilitated development are considered in Chapter 6.0.

Construction of the Project is anticipated to occur in phases over a period of around six years commencing in 2027, and subject to timing of Project approvals. The duration of each construction stage is outlined in Section 1.2.1. Further details on the construction strategy for the Project is provided in Chapter 3 (Project description) of the EIS.

Proposed construction hours for the Project are outlined in Table 4-1. Given the nature of dredging and land reclamation works, including laying and spreading of reclaimed materials, these activities would be required to be conducted 24 hours a day, seven days a week. Other general construction activities would be carried out during standard construction hours:

- 7 am to 6 pm Monday to Friday
- 8 am to 1 pm Saturdays
- No work on Sundays or public holidays.

In some limited cases, including large concrete pours, delivery of wide loads and hydro pipeline testing, construction activities may be required outside these standard construction hours. Any such activities would be subject to activity-specific management and mitigation measures, particularly to control potential noise impacts.

Table 4-1 Project construction hours

Work hours	Activity
24 hours a day, up to seven days a week	• Dredging activities
Standard construction hours: • 7 am to 6 pm Monday to Friday • 8 am to 1 pm Saturdays • No work on Sundays or public holidays	• Enabling works and establishment of construction compounds • Construction of the new BLB3 • Decommissioning and removal of the existing BLB1 and tug boat jetty • Decommissioning and removal of bulk liquids transfer pipelines • Piling and wharf deck construction • Site demobilisation

4.1 Impacts of construction on land transport

4.1.1 Construction routes and Project Area access

Figure 4-1 and Figure 4-2 show the anticipated construction heavy vehicle routes to/ from the Project Area. Based on previous studies, it is assumed that majority of heavy vehicles (75 per cent) would access Foreshore Drive from the west via a right turn at General Holmes Drive/ Foreshore Road. Remaining vehicles (25 per cent) would access Foreshore Drive from the east via the General Holmes Drive off-ramp (Aurecon, 2017). Heavy vehicles leaving the Port Botany road network would typically exit towards the west via the General Holmes Drive on-ramp that leads to the M5 Motorway (77 per cent) or towards the east via the right turn on Foreshore Road that leads to Southern Cross Drive (23 per cent). (Aurecon, 2017). Construction heavy vehicle movements would be restricted to designated heavy vehicle routes and confined to the arterial road network wherever feasible. Truck routes to/ from the Project Area have been identified with the aim of providing the most direct routes to/ from the Project Area as well as minimising the impact of heavy vehicles on local roads.

Construction heavy vehicles would access the WSCC off Penrhyn Road and the four LSCCs off Bumborah Point Road. All construction heavy vehicles are expected to approach from either Southern Cross Drive or the M5 Motorway, General Holmes Drive, and then Foreshore Road. Construction heavy vehicles travelling to WSCC01 would access Penrhyn Road via Foreshore Road. Construction heavy vehicles travelling to the Project Area would continue along Foreshore Road, Botany Road, Bumborah Point Road, Simblist Road and Friendship Road.

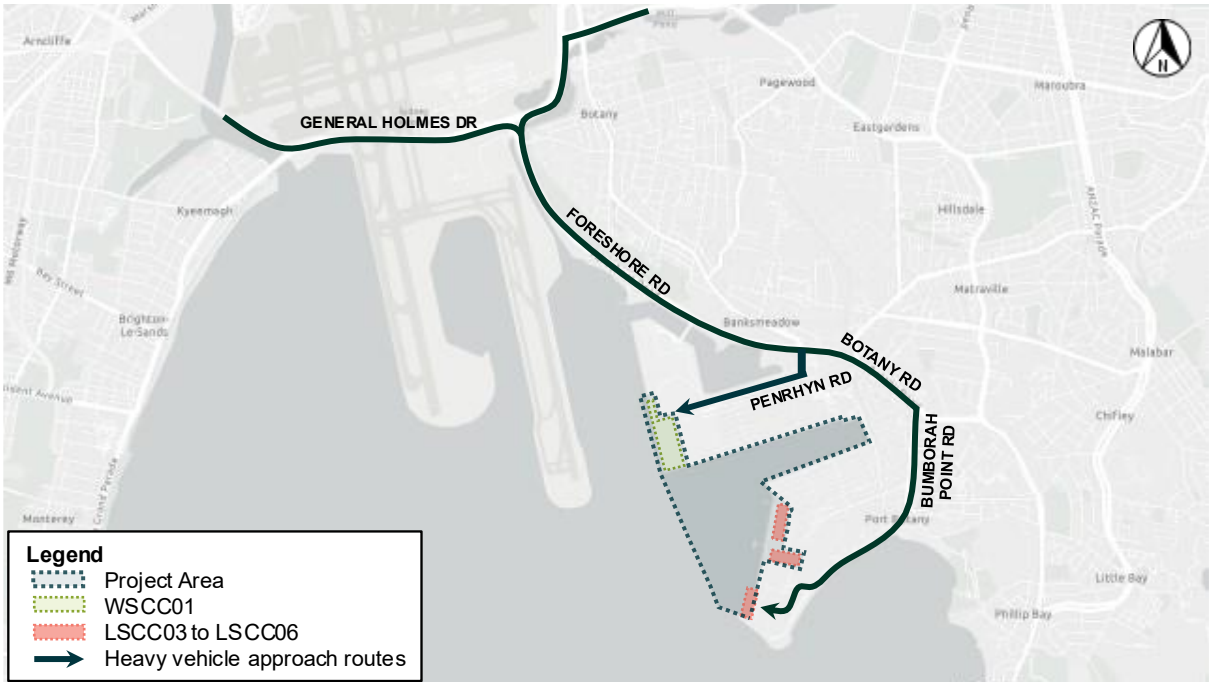

Figure 4-1 Construction heavy vehicle approach routes

On departure, construction heavy vehicles travelling from the LSCCs would use Friendship Road, Bumborah Point Road, Botany Road, Foreshore Road, General Holmes Drive and either Southern Cross Drive or the M5 Motorway. Construction heavy vehicles from WSCC01 would use Penrhyn Road, Foreshore Road, General Holmes Drive and either Southern Cross Drive or the M5 Motorway. Heavy vehicle drivers would be advised of the designated heavy vehicle routes to/ from the Project Area.

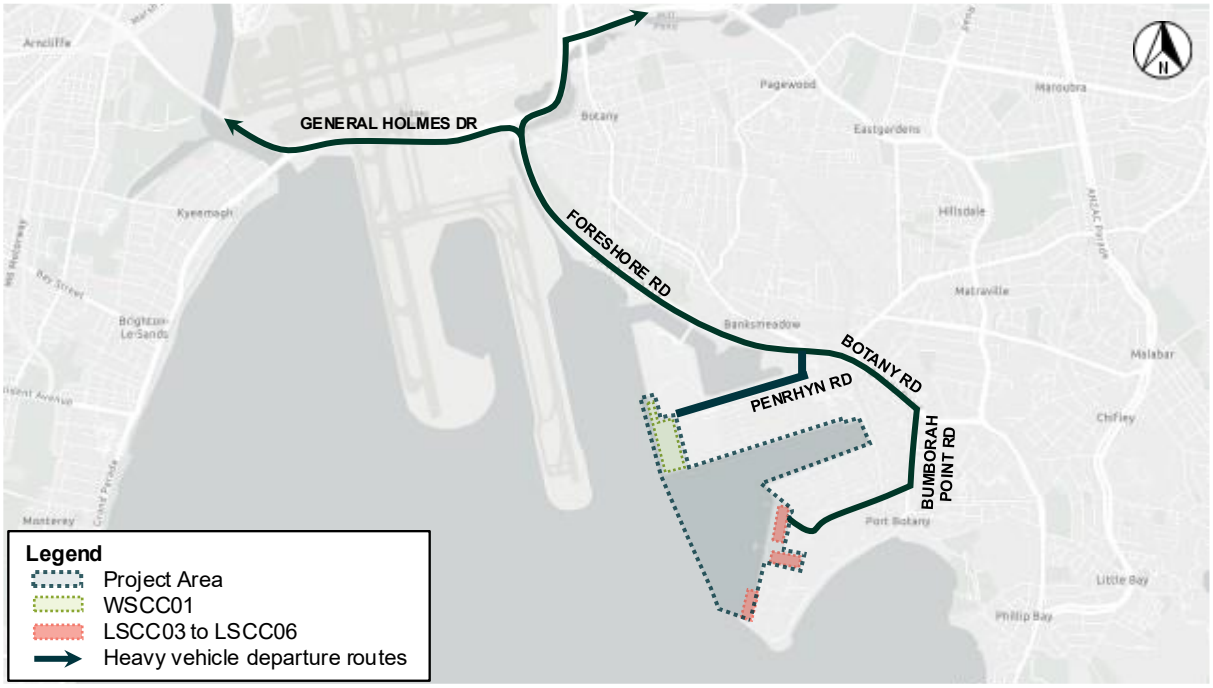

Figure 4-2 Construction heavy vehicle departure routes

Construction vehicle access to the Project Area, in particular the LSCCs, would be provided via Simblist Road and then onto Charlotte Road or Fishburn Road (refer to Section 3.1.2 and Figure 3-4). All loading/ unloading of construction vehicles is expected to take place within designated areas within areas of restricted access to the public. Existing vehicle access to other buildings along Charlotte Road and Friendship Road would be maintained during the construction works. Charlotte Road and Friendship Road would remain open for Port vehicles as per existing operations during construction.

Fishburn Road is an internal Port Botany bulk liquids berth access road and is used by existing staff within the restricted area. It would be required to be either partially or completely closed during construction works near BLB1 and BLB3.The partial or full closure of Fishburn Road during the construction works would not impact existing access arrangements within the Port. Access arrangements for BLB operations would be considered during development of the Construction Environmental Management Plan(s) (CEMP(s)) for the Project in order to maintain access as required.

Additionally, the Project would utilise WSCC01 as a laydown yard for the manufacturing/ assembly of components, equipment, and items. The laydown yard would inevitably reduce overall on-site construction time and hence reduce number of deliveries to the southern part of the Project Area by optimising assembly works and reducing disruption to the existing operating businesses within the Port Botany precinct.

A Traffic Management Plan (TMP) would be prepared prior to the commencement of construction works. As part of the TMP, Traffic Guidance Schemes would be prepared in accordance with the principles of the Traffic Control at Work Sites manual (Transport for NSW, 2022). The Traffic Guidance Schemes would primarily show where construction signs would be located at specific locations (such as uncontrolled intersections) within Port Botany to warn other road users of the increase in construction vehicle movements.

Access by emergency vehicles would be maintained during the construction works. Emergency protocols within the Project Area would include a requirement for personnel to assist with emergency access as required. All truck movements to the Project Area and/ or incident point would be suspended and cleared.

4.1.2 Impacts on the road network

Over the six-year construction period, traffic generation would vary depending on the construction activity being undertaken. Figure 4-3 illustrates the anticipated construction traffic generation profile over the Project construction period.

The peak construction stage for road traffic generation would occur in November 2027 when the Project would generate up to 572 vehicle movements per day. It should be noted that traffic movements are calculated for inbound and outbound trips. Table 4-2 summarises the AM and PM peak hour construction vehicle movements for the Project.

Table 4-2 Anticipated hourly construction vehicle volumes

Weekday period	Light vehicles (inbound)	Heavy vehicle (inbound)	Light vehicles (outbound)	Heavy vehicle (outbound)	Total vehicle (inbound and outbound)
AM peak hour	12	18	12	18	**60**
PM peak hour	12	18	12	18	**60**

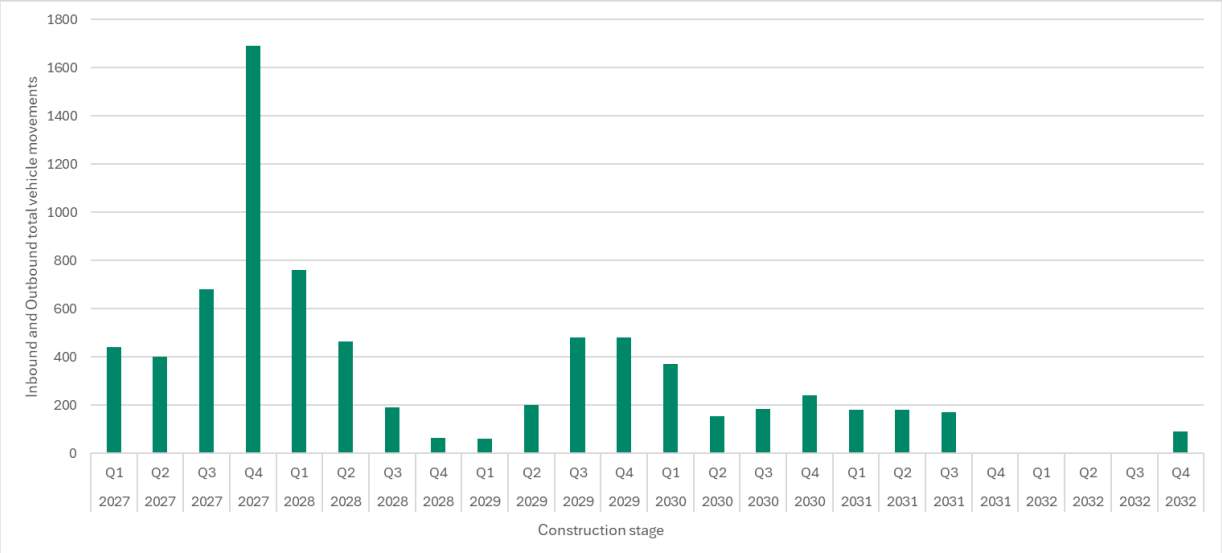

Figure 4-3 Total traffic generation over the six-year construction period

SIDRA Intersection modelling has been undertaken for the AM and PM peak hours during the busiest construction period to assess the worst-case impact of construction traffic volumes at key intersections. Construction traffic has been distributed across the Project Area based on the indicative traffic numbers for each Project construction element and appropriate compound destinations (refer to Annexure C for the anticipated distribution of peak construction vehicle numbers at each compound location). On the wider road network, the distribution split of vehicles accessing and egressing the road network via General Holmes Drive has been based on patterns identified in the Port Botany Freight Study (Aurecon, 2017) (refer to Figure 4-4 and Figure 4-5).

The SIDRA Intersection modelling has been based on the existing 2024 AM and PM peak hour traffic volumes obtained from the traffic surveys mentioned in Section 3.2.2. Peak construction traffic numbers associated with the Project have been applied in the model to predict conservative worst-case traffic volumes during construction.

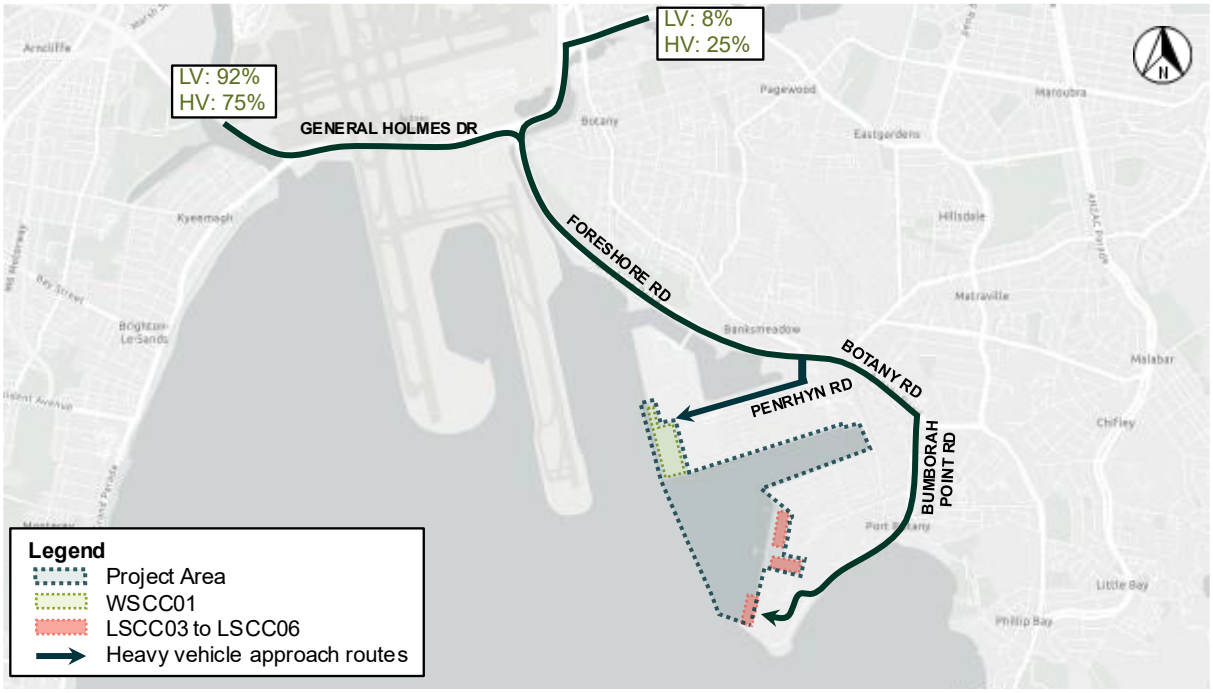

Figure 4-4 Construction traffic distribution across the road network – AM peak

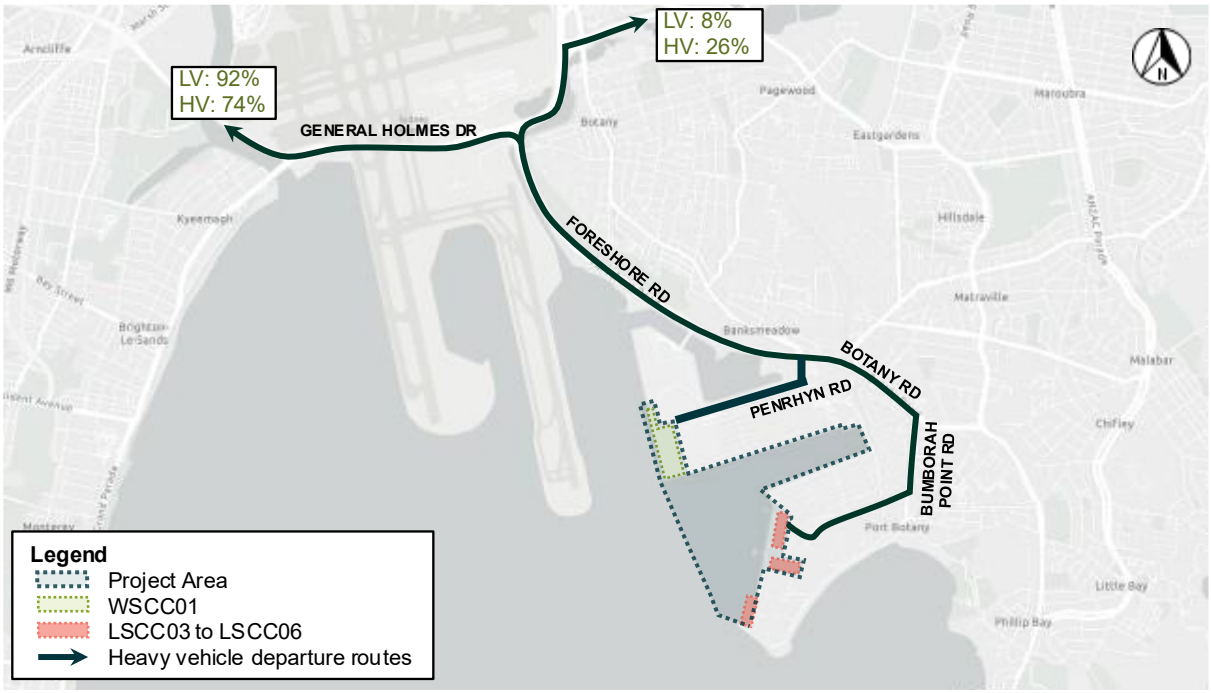

Figure 4-5 Construction traffic distribution across the road network – PM peak

Table 4-3 provides a summary of the SIDRA Intersection model outputs for key intersections during construction of the Project during the weekday AM and PM peak hours in 2027. This is anticipated to be the peak land transport construction period. Full results of the SIDRA modelling is presented in Annexure B.

Table 4-3 demonstrates that the additional construction traffic associated with the Project is expected to have a negligible impact on the surrounding road network, with all intersections expected to continue to operate similarly to existing conditions. Specifically, the additional construction traffic associated with the Project would result in an increase in average delay of up to seven seconds overall at all key intersections, with no change to the intersection LoS from existing conditions. As detailed in Section 3.1, traffic volumes have decreased by -0.3 per cent per annum since 2017, likely associated with the opening of the M4-M8 Link, Sydney Gateway, and St Peters and Rozelle interchanges. Specifically, it is expected that the additional construction traffic associated with the Project would not result in a significant change to the overall vehicle delay or LoS at all key intersections compared to existing conditions.

Table 4-3 Summary of intersection performance with construction of the Project

Intersection	Peak period	DoS		Average delay (seconds)		95th percentile queue (metres)		LoS	
		Existing	With Project (2027)	Existing	With Project (2027)	Existing	With Project (2027)	Existing	With Project (2027)
Foreshore Road/ General Holmes Drive	AM	0.99	0.96	27	20	466	391	B	B
	PM	0.63	0.63	7	7	72	65	A	A
Foreshore Road/ Ulm Avenue	AM	0.76	0.77	12	11	90	90	A	A
	PM	0.53	0.53	11	11	61	65	A	A
Foreshore Road/ Sirius Road	AM	0.57	0.58	4	4	81	84	A	A
	PM	0.57	0.58	9	10	162	170	A	A
Foreshore Road/ Botany Road	AM	0.99	1.00	49	52	486	517	D	D
	PM	0.95	0.96	42	42	223	223	C	C
Botany Road/ Beauchamp Road	AM	0.86	0.86	24	24	187	187	B	B
	PM	0.77	0.77	23	23	168	168	B	B
Botany Road/ Bumborah Point Road	AM	0.61	0.61	21	21	69	72	B	B
	PM	0.54	0.54	24	24	94	98	B	B

4.1.3 Impacts on parking

The construction workforce would comprise trades and construction personnel, subcontract construction personnel and engineering, functional and administrative staff. The size of the workforce would vary depending on the construction activities being undertaken.

The average number of employees and contractors onsite during construction would be around 30 people per day. Workforce numbers are expected to peak during piling and wharf construction, with an anticipated peak construction employment of 60 people per day.

Parking for construction personnel would be provided within construction compounds for the Project, and where necessary, along existing internal port access roads. Construction parking requirements would be managed within Port Botany without any impact on or loss of offsite public parking spaces.

4.1.4 Impacts on public and active transport

Construction of the Project would not affect existing public transport services. The relatively small number of additional vehicles using roads relied on by public transport services, such as Botany Road and Bumborah Point Road, would not affect the performance of those roads or the quality or timeliness of associated public transport services.

The Project Area is separated from existing walking and cycling infrastructure. As such, the construction works would not impact existing walking and cycling routes.

4.2 Impacts of construction on marine transport

Construction of the Project would require the use of construction vessels, including during:

- The construction of the new BLB3 which would require approximately 20 heavy and 10 light marine vessel movements per day (two-way movement) during a five- to seven-month period. This would result in a total of around 200 marine vessel movements
- Demolition and decommissioning of BLB1 which would require approximately seven heavy and 15 light marine vessel movements per day during a five-month period. This would result in a total of around 110 marine vessel movements
- The reclamation bund construction which would require approximately 20 heavy and 20 light marine vessel movements per day, and wharf construction at the extended quayline which would require approximately 50 heavy and 30 light marine vessel movements per day during a six-month period. This would result in a total or around 450 marine vessel movements.

Existing marine vessel movements average 24 movements per day for container ships, bulk liquid ships, tug boats and pilot boats (refer to Section 3.5.4). During construction of the Project, an additional 26 heavy and 18 light marine vessel movements per day would typically be anticipated. Peak construction activities may result in up to 80 construction vessel movements per day.

As outlined in Section 2.2.4, marine traffic through ports in NSW, including Port Botany, is strictly regulated by the relevant Harbour Master under the *Marine Safety Act 1998*. The Harbour Master is responsible for directing and controlling the time and manner in which any vessel may enter or leave the port, and the navigation and other movements of any vessel within the port. A detailed Marine Traffic Management Plan (MTMP) would be developed for the approval of the Harbour Master before authorisation of marine vessel movements associated with construction of the Project. Early engagement has commenced with the Harbour Master to inform development of a broad strategy for the safe coordination of construction vessel movements while minimising potential disruptions to ongoing port shipping. As part of that engagement, an initial strategy for the safe management of construction vessels has been development, as outlined in Table 4-4. The marine transport management approach would ensure that construction vessel movements avoid interference with existing marine traffic associated with the Ports operations.

Table 4-4 Initial strategy for the safe management of construction vessels

Construction activity/ phase	Marine transport management approach
Construction of the new BLB3	• Movement of Project marine construction vessels between WSCC01 (northern side of Brotherson Dock) and the BLB3 construction site (southern side of Brotherson Dock) would occur multiple times per day • Project marine construction vessels would pass through the main swing basin (685 metre diameter) at the western end of the dock • Movement of Project marine construction vessels and use of the main swing basin would be timed to avoid port operations • Marine construction vessels would moor at one of two identified safe mooring locations adjacent to the BLB3 construction site, outside of the shipping channel and separated from ongoing port operations.
Demolition and decommissioning of BLB1	• Movement of Project marine construction vessels between WSCC01 (northern side of Brotherson Dock) and the BLB1 demolition site (southern side of Brotherson Dock) would occur multiple times per day • Project marine construction vessels would pass through the main swing basin (685 metre diameter) at the western end of the dock • Marine construction vessels would moor at one of two identified safe mooring locations adjacent to the BLB1 demolition site, outside of the shipping channel and separated from ongoing port operations.
Dredging and reclamation works	• The trailer suction hopper dredge would travel between dredge areas and the land reclamation site, and would moor on the southern side of the reclamation area (away from Brotherson Dock and active shipping) • While not involved in dredging or reclamation activities, the dredge would berth at any vacant berth along an existing quayline within Brotherson Dock, at the southern end of the Hutchison Hays Dock, or adjacent to the pump barge on the southern side of the reclamation area.
Construction of the extended quayline and wharf areas	• A temporary berth would be established along the northern side of the reclamation area • Project marine construction vessels would moor at the temporary berth during piling works, and would remain at the temporary berth whilst ships travel into or out of Brotherson Dock • Safe mooring spots would be established on the western and southern sides of the reclamation area, away from Brotherson Dock and active shipping.

5.0 Assessment of operational impacts

At the completion of construction, remaining operational elements of the Project would include:

- An extended quayline and around 5.3 hectares of new wharf area (hardstand)
- A new bulk liquids berth (BLB3) and associated pipelines and bulk liquids handling infrastructure.

5.1 Impacts on land transport

5.1.1 Impacts on the road network

Operation of the Project would not result in any impacts to the surrounding road network, noting that:

- The new BLB3 would be a replacement of the existing BLB1, with similar operation vehicle generation, and therefore no material change in operational impacts on the surrounding road network
- The extended quayline and wharf area would not in itself generate operational traffic, except for vehicles associated with potential maintenance activities and occasional visitors. The potential operational traffic implications of the facilitated development are discussed separately in Section 6.3.1.

5.1.2 Impacts on parking

During operation of the Project, parking would operate similar to existing conditions. Additional parking would be provided near the new BLB operations building on Fishburn Road. No additional parking would be required or provided on the extended quayline and wharf area.

5.1.3 Impacts on public and active transport

As outlined in Section 3.3, there are limited public transport and active transport corridors within the vicinity of the Project Area. The provision of public or active transport infrastructure is the responsibility of Transport for NSW and the relevant local government authority as part of broader transport network planning.

Access within the Project Area is restricted to the public, consistent with its industrial land zoning and use as an active port. Transport and traffic would operate similarly to existing operations, which currently do not impact public or active transport. As such, it is anticipated that there would be no impact to public or active transport networks and services during the operation of the Project.

5.2 Impacts on marine transport

Operation of the Project would not result in any impacts marine transport, noting that:

- The new BLB3 would be a replacement of the existing BLB1, with similar vessel movements, and therefore no material change in operational marine transport impacts. Slight changes in the locations of vessel movements (in a location slightly further south than the existing BLB1) would be managed to meet the requirements of the Harbour Master
- The extended quayline and wharf area would not in itself generate operational marine traffic. The potential operational marine traffic implications of the facilitated development are discussed separately in Section 6.3.2.

The Project would support changes in marine traffic over time, particularly through contributions to equitable provision of quaylines to Port Botany stevedores with capacity to accommodate larger vessels. Any changes in marine traffic would, however, be subject to approval of the Harbour Master (as part of the Port Authority of NSW) and its specific requirements, including in relation to marine traffic capacity and safety. These powers and requirements are set under the *Marine Safety Act 1998*, and in relation to the operation of Port Botany, the *Harbour Masters Directions: Sydney Harbour and Port Botany* (in force from June 2024).

In relation to longer ships accessing Port Botany in the future, the Port Authority of NSW has confirmed that recently completed works to the Port Botany shipping channel and channel markers have provided sufficient capacity to safely accommodated longer vessels anticipated to access the port.

Preliminary marine traffic navigation simulations have been undertaken to confirm that vessels can safely navigate to, from, and past BLB3, as well as to the extended quay line. This includes both the existing swing basin (used for vessel turning) at BD12 and the proposed new swing basin for BLB3. These simulations would be further refined during the detailed design phase of the Project.

The Port Authority of NSW (including the Harbour Master) has been engaged in relation to the Project. This engagement would, as required under the *Marine Safety Act 1998*, during construction and operation of the Project, to ensure that marine traffic associated with the Project and its contribution to Port Botany more broadly, is managed consistent with the Harbour Master's requirements.

6.0 Assessment of cumulative and facilitated impacts

6.1 Overview

In addition to impacts that are wholly and directly related to its construction and operation, the Project has the potential to:

- Directly contribute to **cumulative impacts** with other developments or activities that coincide spatially or temporally with the Project
- Indirectly contribute to **facilitated impacts** as a consequence of enabling or encouraging subsequent development or activities.

As described in Section 2.2, this chapter considers these two types of potential impacts to help form a view on the acceptability of the Project and its contributions to those potential impacts. Where relevant, it also identifies environmental mitigation and management measures within the control and responsibility of the Project to address the Project's contributions to cumulative and facilitated impacts.

6.2 Cumulative impacts

There is the potential for there to be cumulative construction transport and traffic impacts, if concurrent construction activities between numerous projects occurs. Operational transport and traffic arrangements are not expected to materially change as a result of the Project. As a result, cumulative operational impacts are not expected to be materially different from exiting environmental conditions.

Available relevant transport and traffic information on the other developments identified in Section 2.2.6 is summarised in Table 6-1. Based on this information, potential construction transport and traffic impacts include:

- CP Group and KLF Group Waste Management Facility, Botany – This development is unlikely to significantly affect the performance of the surrounding road network, and is unlikely to generate a cumulative impact with the Project
- Modification of Orica Chlor-Alkali Plant, Botany Industrial Park – This development would generate only very small volumes of road traffic, and is unlikely to generate a cumulative impact with the Project
- Orica Southlands Warehouse Estate – Traffic generated by this development has been modelled to have a material impact on the performance of the Botany Road/ Foreshore Road intersection. Traffic generated by the Project during construction would also affect this intersection, as summarised in Section 4.1.2 and Table 4-3
- Stephen Road Multi-level Warehouse, Banksmeadow – This development is unlikely to significantly affect the performance of the surrounding road network, and is unlikely to generate a cumulative impact with the Project.

The Botany Road/ Foreshore Road/ Penryn Road intersection is a critical point in the road network supporting operation of Port Botany, particularly in relation to transport to and from the existing container operations on the northern side of Brotherson Dock. Both the Project, during construction, and the Orica Southlands Warehouse Estate, during construction and operation, would contribute road traffic to this intersection. SIDRA Intersection modelling carried out for both the Project and the warehouse estate reinforce that the intersection is already operating at high degrees of saturation during the AM and PM peak. Although the intersection currently operates with an acceptable level of service, future traffic growth may place additional pressure on the performance of the intersection, particularly during peak periods.

The Project would only contribute relatively minor additional traffic to the Botany Road/ Foreshore Road/ Penrhyn Road intersection, and only temporarily during construction. The modelling results presented in Section 4.1.2 support the conclusion that these short term impacts would be minor and would not adversely affect the operation of the surrounding road network, including the Botany Road/ Foreshore Road/ Penryn Road intersection.

The broader issue of landside transport network capacity to support current and future trade through Port Botany is a strategic transport planning issue that is managed through ongoing engagement between NSW Ports and Transport for NSW. The strategic framework for transport planning to support Port Botany is included in *2063 Our 40-year master plan for sustainable growth* (NSW Ports, 2023), the *Future Transport Strategy* (Transport for NSW, 2020) and the *NSW Freight and Ports Plan 2018-2023* (Transport for NSW, 2018) (and updates to those strategic plans over time).

Table 6-1 Summary of available relevant transport and traffic information (potential cumulative developments)

Development with potential cumulative impacts	Available information
CP Group and KLF Group Waste Management Facility, Botany	*Traffic Impact Assessment (TIA): Proposed Waste Facility, 2-4 Hale Street, Botany* (Traffix, 6 June 2024) indicates that: • Operational heavy vehicle routes would be via General Holmes Drive/ Foreshore Road/ Hale Street • Operational traffic generation is estimated to include 94 articulated vehicle trips per day (i.e. 47 in and 47 out), 318 rigid vehicle trips per day, and nine passenger vehicle trips in the AM and PM peak periods • SIDRA Intersection modelling indicates that the Hale Street/ Foreshore Road intersection operates with a LoS A during both AM and PM peak periods. The modelled existing DoS is 0.854 in the AM peak and 0.714 in the PM peak • Inclusion of operational traffic would not alter the modelled LoS and would lead to only a small increase in DoS (0.862 in the AM peak and 0.747 in the PM peak).
Modification of Orica Chlor-Alkali Plant, Botany Industrial Park	*Chlorine Liquefaction Plant: Modification to State Significant Development Consent – Scoping Report* (Element Environment, 27 May 2024) indicates that: • Estimates of construction traffic volumes are currently not known and would be developed as part of the Modification Report • During operation, the modified development would generate a further six trips (i.e. three in and three out) by 13 tonne bulk liquid tankers per week.
Orica Southlands Warehouse Estate	*Modification Report Section 4.55(1A) Modification – Orica Southlands Warehouse Estate – SSD 9691 Mod 3* (Keylan Consulting Pty Ltd, January 2023) indicates that: • Construction of the development was anticipated to commence in 2023. Based on this and the anticipated timeframe for construction of the Project, it is expected that operational traffic from the Orica Southlands Warehouse Estate would be relevant in the context of potential cumulative impacts. • During operation, the development is predicted to generate 102 vehicles/ hours during the AM peak and 110 vehicles/ hour during the PM peak. *Traffic Impact Assessment: Orica Southlands Warehouse Estate, 28 McPherson Street, Banksmeadow* (Traffix, February 2019) indicates that: • Vehicle trips are estimated to be 85% light vehicles and 15% heavy vehicles • Access to/ from the site would be via McPherson Street, Hills Street/ Exell Street, Botany Road and Foreshore Road

Development with potential cumulative impacts	Available information
	• The SIDRA Intersection modelling for the development indicates that operational traffic would lead to a deterioration in LoS at the Botany Road/ Foreshore Road intersection from LoS B to LoS C in both the AM and PM peak periods. DoS would also deteriorate from 0.879 to 0.919 in the AM peak, and 0.763 to 0.792 in the PM peak. The assessed year is not clearly indicated in the assessment, but it has been assumed to be around 2020/2021 based on the date of the original Environmental Impact Statement for the development.
Stephen Road Multi-level Warehouse, Banksmeadow	*Traffic Impact Assessment: Proposed Industrial Development, 49-61 Stephen Road, Banksmeadow (SSD-65924461*) (Traffix, November 2024) indicates that: • Operational heavy vehicle routes would be via Stephen Road to the north and south of the site, and vial Coal Pier Road to the south of the site. Vehicles travelling to/ from the site to/ from the south would pass through the Botany Road/ Foreshore Road intersection • The SIDRA Intersection modelling for the development indicates that operational traffic would not materially affect the LoS or DoS of the Botany Road/ Foreshore Road intersection.

6.3 Facilitated impacts

The Project would facilitate future container operations within the extended quayline and wharf area, which would be separately progressed by the stevedore. The facilitated development is anticipated to include:

- Installation of up to three new quay cranes
- Installation of quay rail sidings
- Crane power and control systems
- Supporting services, including drainage, power supply, lighting, firefighting systems, security, water supply and sewerage, and telecommunications.

The facilitated development has the potential to affect both land and marine transport and traffic during both construction and operation.

6.3.1 Impacts on the land transport network

Impacts on the road network

The nature of construction activities required to install infrastructure for the purposes of container operations on the extended quayline and wharf area would be determined by the stevedore as part of a separate project (the facilitated development). It is anticipated that traffic construction activities would be comparable or lesser in scale than the construction traffic impacts assessed for the Project. Traffic and transport related impacts for the facilitated development would also likely be limited to installation and fit out of a smaller footprint within the port (i.e. the footprint of the extended quayline and wharf area). On the basis that the assessment presented in Section 4.1 has demonstrated that the Project would not significantly affect transport or traffic during construction, the facilitated development is also likely to have an insignificant impact on the surrounding road network during construction.

Operational road traffic volumes associated with container trade through Port Botany is a direct function of the import and export markets serviced by the port. Data published by Transport for NSW through its Freight Performance Dashboard shows that total import and export volumes are variable from month to month, but have typically been in the range of 180,000 to 240,000 TEU per month for the period January 2022 to February 2025. It is expected that this monthly volume would increase over time as import and export markets grow (and equally, would decrease in response to market reductions that may occur), and this would influence landside transport requirements (both road traffic volumes and rail freight movements). Changes in landside transport requirements are managed at a whole-of-port level, with the distribution of landside transport movements also a function of market share serviced by each of the port's stevedores. The facilitated development would not by itself generate additional landside transport requirements (including road traffic movements), but may result in a redistribution of that transport task subject to competition between the port's stevedores. The facilitated development would not change existing operational road traffic volumes to or from Port Botany.

While not a direct consequence of the facilitated development, NSW Ports is aligned with the Freight Policy Reform Consultation Paper (Transport, 2024) which seeks a general shift from road to rail transport for goods moving through the port. Nonetheless, the movement of trucks for the purposes of ensuring efficient freight delivery for the NSW economy is protected in accordance with section 32 of the *Ports Assets (Authorised Transactions) Act 2012*.

Impacts on parking

It is expected that all construction and operational parking requirements for the facilitated development would be contained within the existing and/ or expanded footprint of the Project. No impacts to public parking availability are anticipated.

Impacts on public and active transport

As with the assessment of potential impacts from the Project (refer to Section 4.1.4 and Section 5.1.3), the limited availability of public and active transport around Port Botany and the location of the facilitated development on operational port land would result in no impact to public and active transport infrastructure or services.

6.3.2 Impacts on marine transport

As discussed in Section 2.2.4, marine traffic through ports in NSW, including Port Botany, is strictly regulated by the relevant Harbour Master under the *Marine Safety Act 1998*, outside of the environmental planning and assessment framework of the *EP&A Act.*

Both the Project and the facilitated development would support changes in marine traffic over time, particularly through contributions to equitable provision of quaylines to Port Botany stevedores with capacity to accommodate larger vessels. Any changes in marine traffic would, however, be subject to approval of the Harbour Master and its specific requirements, including in relation to marine traffic capacity and safety. The operator of the facilitated development would engage with the Harbour Master as part of planning and delivery of that development, to ensure that marine traffic requirements are satisfied consistent with the existing marine traffic management at Port Botany.

As discussed in Section 5.2, any changes in marine traffic would be subject to approval of the Harbour Master (as part of the Port Authority of NSW) and its specific requirements, including in relation to marine traffic capacity and safety. These powers and requirements are set under the *Marine Safety Act 1998*, and in relation to the operation of Port Botany, the *Harbour Masters Directions: Sydney Harbour and Port Botany* (in force from June 2024). In relation to longer ships accessing Port Botany in the future, the Port Authority of NSW has confirmed that recently completed works to the Port Botany shipping channel and channel markers have provided sufficient capacity to safely accommodated longer vessels anticipated to access the port.

7.0 Mitigation and management of impacts

7.1 Overview

This section outlines how potential traffic impacts associated with the Project would be mitigated and managed. These mitigation and management measures relate specifically to the Project, and include consideration of the facilitated development to the extent necessary to minimise potential inconsistency between the approach taken for the Project and the facilitated development.

The facilitated development would be subject to a separate assessment under the EP&A Act, including development of mitigation and management measures specific to that development, as required.

7.2 Mitigation and management measures

Mitigation and management measures for potential transport and traffic impacts during construction and operation of the Project are outlined in Table 7-1.

Table 7-1 Mitigation and management measures – transport and traffic impacts

ID	Issue	Mitigation measure	Timing
TT1	Management of construction traffic	A Traffic Management Plan(s) (TMP(s)) will be prepared and implemented as a sub-plan to the CEMP(s) for the Project. The TMP(s) will be developed to: • Manage construction traffic in and around Project construction sites • Detail site access arrangements, haulage routes and parking arrangements • Provide for monitoring of construction traffic flows to avoid or minimise the need for queuing on public roads • Consider road safety in and around Project construction sites.	Construction
TT2	Management of marine traffic during construction	A Marine Traffic Management Plan (MTMP) will be prepared and implemented in consultation with the Port Authority of NSW (including Harbour Master) manage marine traffic during construction of the Project. The plan will define exclusion zones, methods of marking the zones, clearance distances, mooring plans, communication protocol, emergency and incident response procedures, vessel movements, contact details of all parties and responsible persons, and transit routes.	Construction

8.0 Conclusion

This report has assessed the potential traffic and transport impacts associated with construction and operation of the Project, and has included consideration of the potential impacts that may be associated with facilitated development following completion of the Project. The assessment concludes that the Project would have a negligible impact on the internal and external road and marine traffic network. Transport and traffic impacts associated with construction of the facilitated development would be likely similar to the projected impacts in this impact assessment or lesser. Mitigation and management measures have been identified for the Project to avoid and minimise residual impacts on road and marine transport and traffic, with particular emphasis on construction related impacts.

The assessment also comments on the facilitated development on the extended quayline and wharf, facilitated by the Project, which would likely have a similarly negligible impact on surrounding transport and traffic. This facilitated development would be separately progressed by the stevedore.

The Project would be constructed within Port Botany, which is characterised by an established port and industrial setting. Construction associated with the Project is anticipated to require 30 construction vehicles (12 light and 18 heavy vehicles) generating 60 traffic movements per hour (30 inbound and 30 outbound) during the November 2027 peak construction period. This is a negligible increase to existing road network movements (2003 movements per peak hour in 2025, of which 1146 are heavy vehicles) (Aurecon, 2017). Intersection modelling at six key intersections near the Project also identified that during construction of the Project all intersections would perform at the same level of service. Construction of the facilitated development would likely result in minimal changes to the surrounding road network, given the scale of the changes against the existing port operations.

Marine vessel traffic is ultimately subject to the existing approvals and regulations from the Port Authority of NSW in liaison with the Harbour Master. Construction vessels would operate within the restricted shipping channel and exclusion zones, with scheduling ultimately determined by the Harbour Master. As such during construction of the Project, impacts on commercial and recreational boating activities is not anticipated. During operation of the Project, the bulk liquids berth location would result in slightly different vessel movements, given its new southern location, however this would be within existing Brotherson Dock swing basins. During operation of the facilitated development, marine vessels would berth at the extended quayline and wharf area.

Overall, the potential transport and traffic impacts of the Project have been assessed to be negligible, and broadly consistent with impacts from the existing port. Notwithstanding, mitigation and management measures focused on traffic management during construction of the Project have been recommended to minimise potential residual impacts on these areas.

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Annexure A

Turning movement diagrams

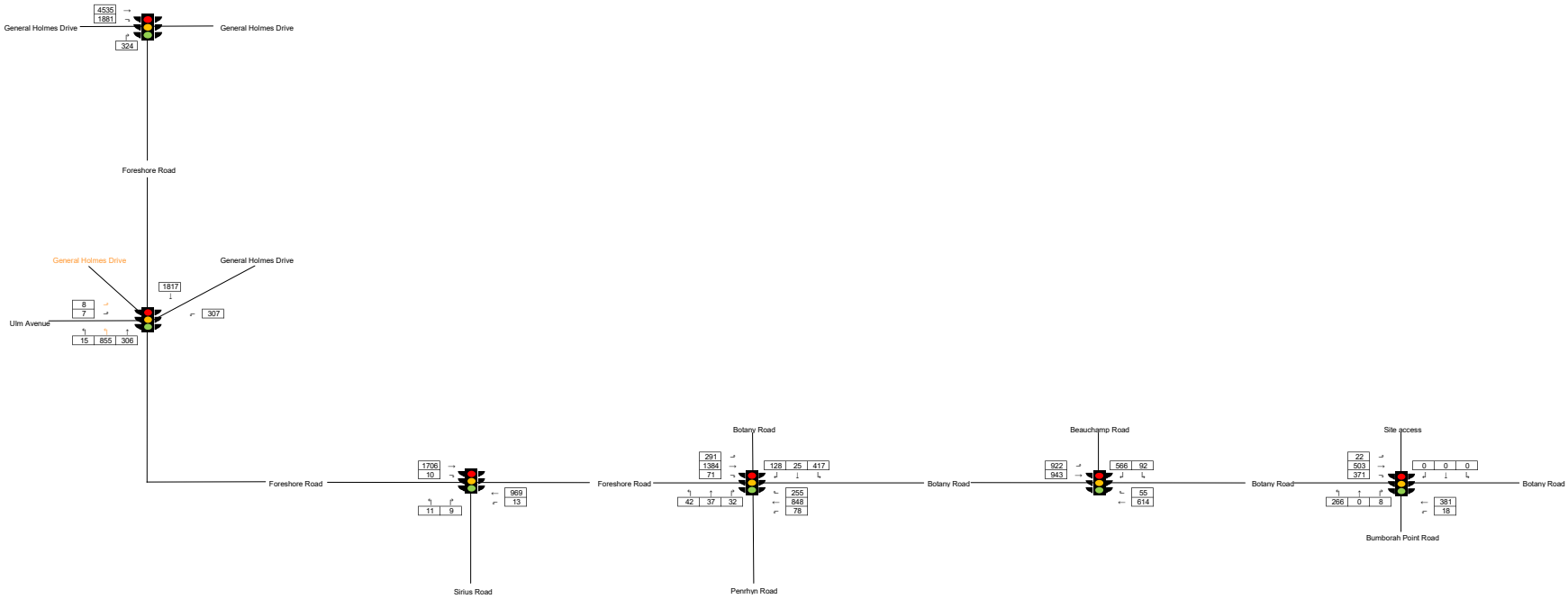
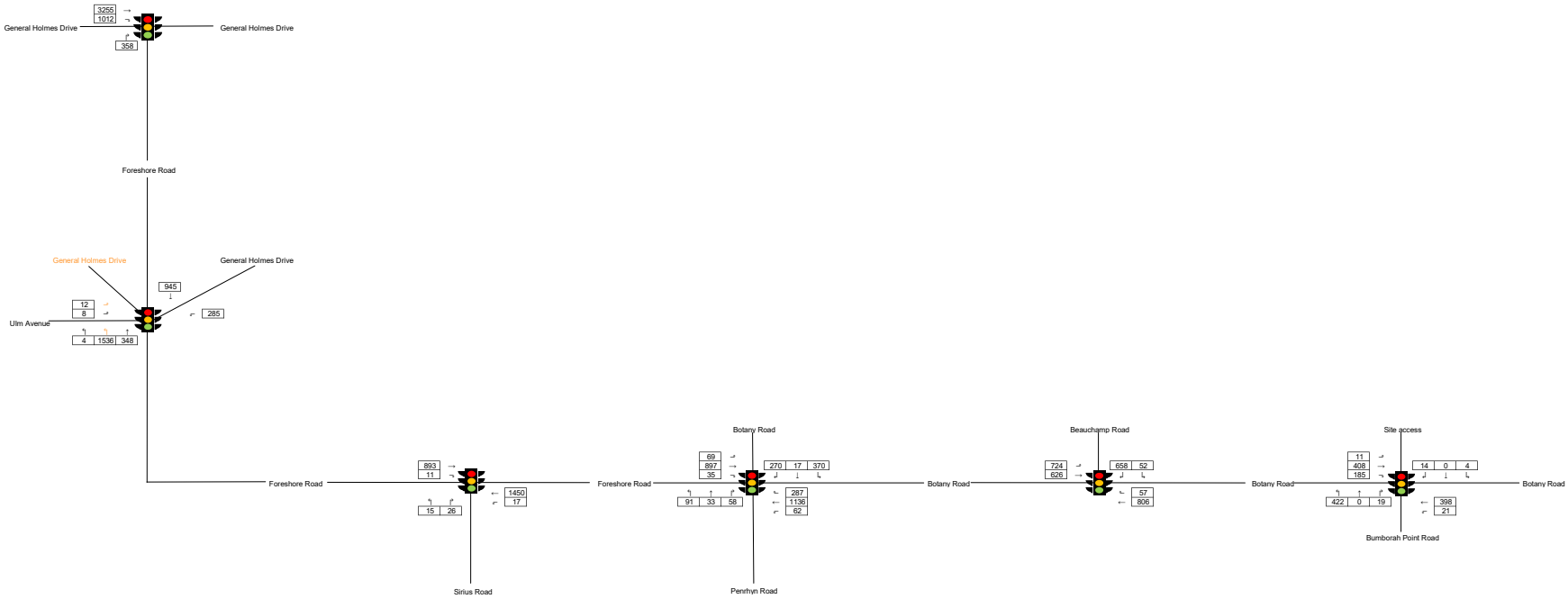


Figure 2024 AM Peak

Print Date: 19/08/2025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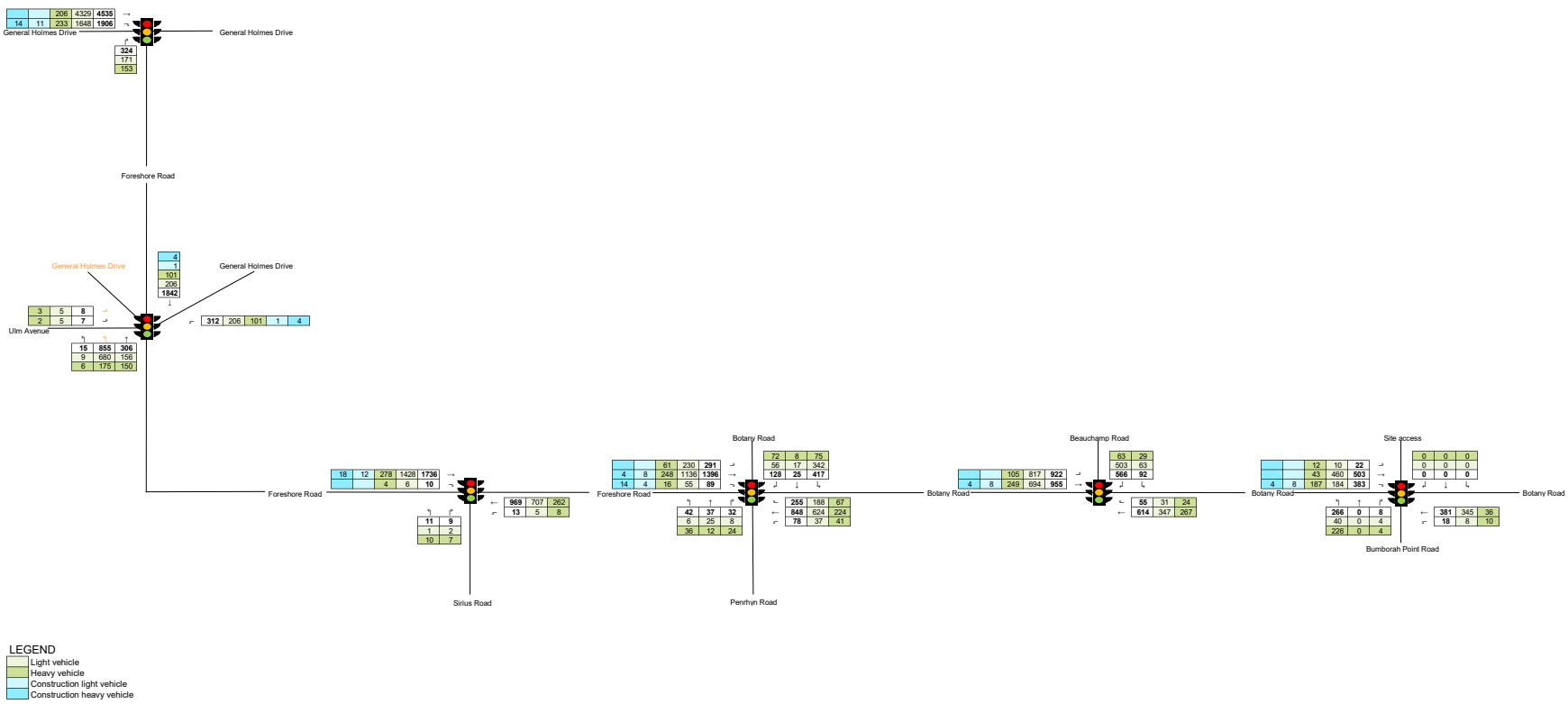
General Holmes Drive
Foreshore Road
General Holmes Drive
General Holmes Drive
Ulm Avenue
Foreshore Road
Sirius Road
Botany Road
Foreshore Road
Penrhyn Road
Botany Road
Beauchamp Road
Botany Road
Site access
Botany Road
Bumborah Point Road


General Holmes Drive
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Foreshore Road
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Ulm Avenue
Foreshore Road
Sirius Road
Botany Road
Foreshore Road
Penrhyn Road
Beauchamp Road
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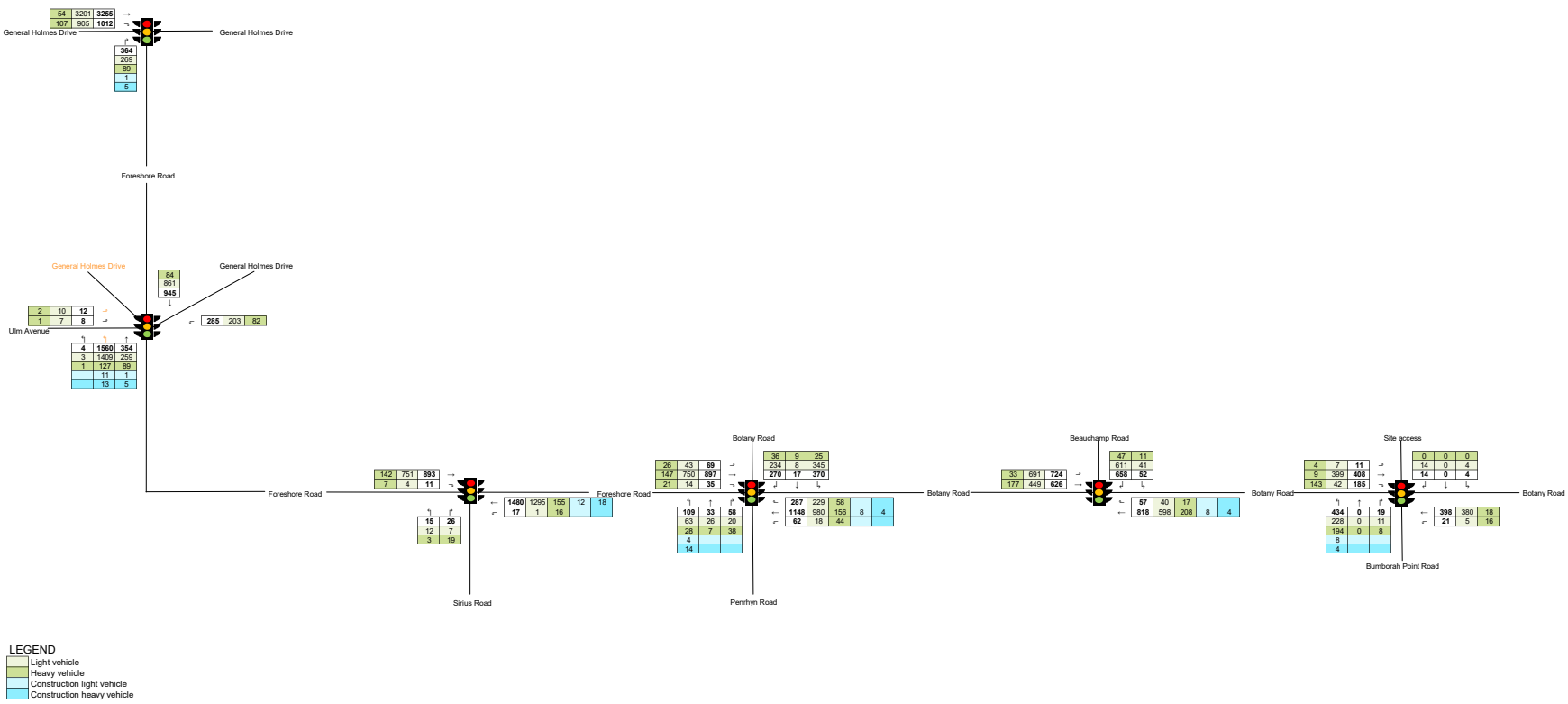
Site access
Botany Road
Botany Road
Bumborah Point Road
LEGEND
Light vehicle
Heavy vehicle
Construction light vehicle
Construction heavy vehicle


General Holmes Drive
General Holmes Drive
Foreshore Road
General Holmes Drive
General Holmes Drive
Ulm Avenue
Foreshore Road
Sirius Road
Foreshore Road
Botany Road
Penrhyn Road
Botany Road
Beauchamp Road
Botany Road
Site access
Botany Road
Bumborah Point Road
LEGEND
Light vehicle
Heavy vehicle
Construction light vehicle
Construction heavy vehicle

Annexure B

SIDRA Outputs

MOVEMENT SUMMARY

Site: 1524 [1 General Holmes Dr/Foreshore Rd AM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [AM-Peak (Network Folder: Base)]

1524
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Foreshore Road															
3	R2	All MCs	341	47.2	341	47.2	* 0.865	75.3	LOS F	8.6	84.3	1.00	0.91	1.19	17.7
Approach			341	47.2	341	47.2	0.865	75.3	LOS F	8.6	84.3	1.00	0.91	1.19	17.7
West: General Holmes Drive															
11	T1	All MCs	4774	4.5	4774	4.5	0.640	0.3	LOS A	0.0	0.0	0.00	0.01	0.00	69.2
12	R2	All MCs	1980	12.4	1980	12.4	* 0.994	81.4	LOS F	60.2	465.8	1.00	1.11	1.30	18.4
Approach			6754	6.8	6754	6.8	0.994	25.0	LOS B	60.2	465.8	0.29	0.33	0.38	44.9
All Vehicles			7095	8.8	7095	8.8	0.994	26.5	LOS B	60.2	465.8	0.33	0.36	0.42	42.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1616 [2 Foreshore Rd/Ulm Avenue AM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [AM-Peak (Network Folder: Base)]

TCS1616
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Foreshore Road															
1b	L3	All MCs	16	40.0	16	40.0	0.014	9.6	LOS A	0.0	0.0	0.00	0.62	0.00	53.5
1a	L1	All MCs	900	20.5	900	20.5	0.326	7.2	LOS A	2.3	19.2	0.13	0.64	0.13	59.0
2	T1	All MCs	322	49.0	322	49.0	0.326	3.1	LOS A	2.2	18.6	0.13	0.38	0.13	70.6
Approach			1238	28.1	1238	28.1	0.326	6.1	LOS A	2.3	19.2	0.13	0.57	0.13	60.5
NorthEast: General Holmes Drive															
24a	L1	All MCs	323	32.9	323	32.9	* 0.591	61.2	LOS E	6.3	56.4	0.96	0.82	0.96	28.3
Approach			323	32.9	323	32.9	0.591	61.2	LOS E	6.3	56.4	0.96	0.82	0.96	28.3
North: Foreshore Road															
8	T1	All MCs	1913	11.7	1913	11.7	* 0.759	6.6	LOS A	11.7	90.0	0.50	0.47	0.50	56.1
Approach			1913	11.7	1913	11.7	0.759	6.6	LOS A	11.7	90.0	0.50	0.47	0.50	56.1
SouthWest: Ulm Avenue															
30	L2	All MCs	8	37.5	8	37.5	0.223	84.6	LOS F	0.4	3.6	1.00	0.67	1.00	23.0
30a	L1	All MCs	7	28.6	7	28.6	0.131	84.3	LOS F	0.2	1.7	1.00	0.64	1.00	15.3
Approach			16	33.3	16	33.3	0.223	84.5	LOS F	0.4	3.6	1.00	0.66	1.00	19.9
All Vehicles			3489	19.6	3489	19.6	0.759	11.8	LOS A	11.7	90.0	0.41	0.54	0.41	50.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 101 [3 Foreshore Rd/Sirius Rd AM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TCS4302
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 190 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Sirius Road															
1	L2	All MCs	12	90.9	12	90.9	0.065	92.3	LOS F	0.5	6.3	0.94	0.67	0.94	16.3
3	R2	All MCs	9	77.8	9	77.8	0.356	115.1	LOS F	1.0	11.3	1.00	0.69	1.00	14.7
Approach			21	85.0	21	85.0	0.356	102.5	LOS F	1.0	11.3	0.97	0.68	0.97	15.5
East: Foreshore Road (E)															
4	L2	All MCs	14	61.5	14	61.5	* 0.465	118.6	LOS F	1.4	15.0	1.00	0.71	1.02	16.6
5	T1	All MCs	1020	27.0	1020	27.0	0.385	6.4	LOS A	9.4	80.9	0.22	0.52	0.22	56.1
Approach			1034	27.5	1034	27.5	0.465	7.9	LOS A	9.4	80.9	0.23	0.52	0.23	54.8
West: Foreshore Road (W)															
11	T1	All MCs	1796	16.3	1796	16.3	* 0.568	0.7	LOS A	10.0	80.1	0.14	0.12	0.14	78.8
12	R2	All MCs	11	40.0	11	40.0	0.171	106.9	LOS F	1.0	9.3	0.99	0.69	0.99	17.8
Approach			1806	16.4	1806	16.4	0.568	1.3	LOS A	10.0	80.1	0.14	0.13	0.14	77.7
All Vehicles			2861	20.9	2861	20.9	0.568	4.4	LOS A	10.0	80.9	0.18	0.27	0.18	66.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Sirius Road												
P1	Full	3	3	89.1	LOS F	0.0	0.0	0.97	0.97	255.8	200.0	0.78
P1B	Slip/ Bypass	3	3	89.1	LOS F	0.0	0.0	0.97	0.97	255.8	200.0	0.78
East: Foreshore Road (E)												
P2B	Slip/ Bypass	3	3	89.1	LOS F	0.0	0.0	0.97	0.97	255.8	200.0	0.78
All Pedestrians		9	9	89.1	LOS F	0.0	0.0	0.97	0.97	255.8	200.0	0.78

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1525 [4 Foreshore Rd/Botany Rd AM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Penrhyn Road															
1	L2	All MCs	44	85.7	44	85.7	0.232	53.5	LOS D	2.5	30.2	0.89	0.70	0.89	20.3
2	T1	All MCs	39	32.4	39	32.4	0.164	51.4	LOS D	2.2	19.4	0.90	0.68	0.90	16.5
3	R2	All MCs	34	75.0	34	75.0	0.203	57.0	LOS E	1.9	22.2	0.91	0.72	0.91	19.5
Approach			117	64.9	117	64.9	0.232	53.8	LOS D	2.5	30.2	0.90	0.70	0.90	19.1
East: Botany Road															
4	L2	All MCs	82	52.6	82	52.6	0.080	8.2	LOS A	0.6	5.7	0.17	0.61	0.17	47.8
5	T1	All MCs	893	26.4	893	26.4	0.339	20.7	LOS B	9.9	85.2	0.57	0.51	0.57	53.1
6	R2	All MCs	268	26.3	268	26.3	* 0.992	122.5	LOS F	24.4	209.0	1.00	1.18	1.57	15.7
Approach			1243	28.1	1243	28.1	0.992	41.9	LOS C	24.4	209.0	0.64	0.66	0.76	35.8
North: Botany Road															
7	L2	All MCs	439	18.0	439	18.0	0.282	4.5	LOS A	0.0	0.0	0.00	0.45	0.00	44.3
8	T1	All MCs	26	32.0	26	32.0	0.110	78.9	LOS F	1.4	12.9	0.89	0.68	0.89	16.5
9	R2	All MCs	135	56.3	135	56.3	* 0.864	104.1	LOS F	9.8	101.5	1.00	1.02	1.33	18.3
Approach			600	27.2	600	27.2	0.864	30.2	LOS C	9.8	101.5	0.26	0.59	0.34	29.1
West: Foreshore Road															
10	L2	All MCs	306	21.0	306	21.0	0.202	8.0	LOS A	0.0	0.0	0.00	0.56	0.00	53.4
11	T1	All MCs	1457	17.9	1457	17.9	* 0.984	68.7	LOS E	60.1	485.6	1.00	1.20	1.30	31.6
12	R2	All MCs	75	22.5	75	22.5	0.382	67.8	LOS E	4.3	36.2	0.93	0.77	0.93	24.1
Approach			1838	18.6	1838	18.6	0.984	60.1	LOS E	60.1	485.6	0.83	1.07	1.07	30.5
All Vehicles			3798	24.5	3798	24.5	0.992	48.5	LOS D	60.1	485.6	0.68	0.85	0.85	31.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Penrhyn Road												
P1B	Slip/ Bypass	1	1	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89
West: Foreshore Road												

P4	Full	1	1	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89
All Pedestrians		2	2	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1526 [5 Botany Rd/Beauchamp Rd AM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Botany Road															
5	T1	All MCs	646	43.5	646	43.5	0.234	8.5	LOS A	5.2	49.5	0.41	0.35	0.41	59.7
6	R2	All MCs	58	43.6	58	43.6	0.458	69.8	LOS E	3.7	35.2	0.98	0.77	0.98	26.8
Approach			704	43.5	704	43.5	0.458	13.6	LOS A	5.2	49.5	0.46	0.39	0.46	54.2
North: Beauchamp Road															
7	L2	All MCs	97	31.5	97	31.5	* 0.859	51.5	LOS D	23.3	186.5	1.00	0.97	1.17	25.8
9	R2	All MCs	596	11.1	596	11.1	0.859	65.9	LOS E	23.8	186.5	1.00	0.97	1.17	26.3
Approach			693	14.0	693	14.0	0.859	63.9	LOS E	23.8	186.5	1.00	0.97	1.17	26.2
West: Botany Road															
10	L2	All MCs	971	11.4	971	11.4	0.587	7.0	LOS A	0.0	0.0	0.00	0.56	0.00	55.3
11	T1	All MCs	993	26.4	993	26.4	* 0.404	19.4	LOS B	12.4	106.3	0.64	0.56	0.64	50.4
Approach			1963	19.0	1963	19.0	0.587	13.3	LOS A	12.4	106.3	0.32	0.56	0.32	52.7
All Vehicles			3360	23.1	3360	23.1	0.859	23.8	LOS B	23.8	186.5	0.49	0.61	0.53	43.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1528 [6 Botany Rd/Bumborah Point Rd AM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Bumborah Point Road															
1	L2	All MCs	280	85.0	280	85.0	0.361	10.4	LOS A	4.9	59.9	0.30	0.66	0.30	47.1
2	T1	All MCs	1	0.0	1	0.0	* 0.129	68.3	LOS E	0.6	5.9	0.99	0.67	0.99	27.5
3	R2	All MCs	8	50.0	8	50.0	0.129	74.4	LOS F	0.6	5.9	0.99	0.67	0.99	22.2
Approach			289	83.6	289	83.6	0.361	12.5	LOS A	4.9	59.9	0.32	0.66	0.32	45.7
East: Botany Road															
4	L2	All MCs	19	55.6	19	55.6	0.016	9.5	LOS A	0.0	0.0	0.00	0.50	0.00	49.8
5	T1	All MCs	401	9.4	401	9.4	* 0.610	65.0	LOS E	8.3	62.8	1.00	0.80	1.00	26.8
Approach			420	11.5	420	11.5	0.610	63.1	LOS E	8.3	62.8	0.95	0.79	0.95	26.0
North: Site access															
7	L2	All MCs	1	0.0	1	0.0	0.042	72.5	LOS F	0.2	1.4	0.98	0.63	0.98	24.0
8	T1	All MCs	1	0.0	1	0.0	0.042	66.9	LOS E	0.2	1.4	0.98	0.63	0.98	27.9
9	R2	All MCs	1	0.0	1	0.0	0.042	72.5	LOS F	0.2	1.4	0.98	0.63	0.98	27.4
Approach			3	0.0	3	0.0	0.042	70.6	LOS F	0.2	1.4	0.98	0.63	0.98	26.5
West: Botany Road															
10	L2	All MCs	23	54.5	23	54.5	0.120	7.3	LOS A	1.5	11.7	0.15	0.19	0.15	53.7
11	T1	All MCs	529	8.5	529	8.5	0.120	1.1	LOS A	1.6	12.0	0.15	0.14	0.15	58.5
12	R2	All MCs	391	50.4	391	50.4	* 0.423	11.2	LOS A	6.9	69.4	0.37	0.69	0.37	47.8
Approach			943	27.0	943	27.0	0.423	5.5	LOS A	6.9	69.4	0.24	0.37	0.24	52.8
All Vehicles			1656	32.9	1656	32.9	0.610	21.3	LOS B	8.3	69.4	0.44	0.53	0.44	41.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1524 [1 General Holmes Dr/Foreshore Rd PM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N102 [PM-Peak (Network Folder: Base)]

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 90 seconds (Network Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Foreshore Road															
3	R2	All MCs	377	24.9	377	24.9	* 0.496	35.3	LOS C	4.7	39.9	0.88	0.81	0.88	28.5
Approach			377	24.9	377	24.9	0.496	35.3	LOS C	4.7	39.9	0.88	0.81	0.88	28.5
West: General Holmes Drive															
11	T1	All MCs	3426	1.7	3426	1.7	0.447	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.6
12	R2	All MCs	1065	10.6	1065	10.6	* 0.627	19.5	LOS B	9.4	71.5	0.70	0.81	0.70	40.5
Approach			4492	3.8	4492	3.8	0.627	4.7	LOS A	9.4	71.5	0.17	0.19	0.17	63.4
All Vehicles			4868	5.4	4868	5.4	0.627	7.1	LOS A	9.4	71.5	0.22	0.24	0.22	59.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1616 [2 Foreshore Rd/Ulm Avenue PM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N102 [PM-Peak (Network Folder: Base)]

TCS1616
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 90 seconds (Network Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Foreshore Road															
1b	L3	All MCs	4	25.0	4	25.0	0.003	9.4	LOS A	0.0	0.0	0.00	0.63	0.00	56.7
1a	L1	All MCs	1617	8.3	1617	8.3	* 0.531	7.8	LOS A	5.3	39.6	0.27	0.68	0.27	61.6
2	T1	All MCs	366	25.6	366	25.6	0.272	3.4	LOS A	1.7	14.5	0.19	0.41	0.19	70.3
Approach			1987	11.5	1987	11.5	0.531	7.0	LOS A	5.3	39.6	0.25	0.63	0.25	62.4
NorthEast: General Holmes Drive															
24a	L1	All MCs	300	28.8	300	28.8	0.512	40.5	LOS C	3.7	32.6	0.94	0.80	0.94	34.0
Approach			300	28.8	300	28.8	0.512	40.5	LOS C	3.7	32.6	0.94	0.80	0.94	34.0
North: Foreshore Road															
8	T1	All MCs	995	8.9	995	8.9	0.417	10.5	LOS A	8.0	60.6	0.65	0.46	0.65	51.0
Approach			995	8.9	995	8.9	0.417	10.5	LOS A	8.0	60.6	0.65	0.46	0.65	51.0
SouthWest: Ulm Avenue															
30	L2	All MCs	13	16.7	13	16.7	* 0.180	53.9	LOS D	0.4	2.9	0.99	0.68	0.99	29.9
30a	L1	All MCs	8	12.5	8	12.5	0.056	51.2	LOS D	0.1	0.9	0.98	0.63	0.98	21.0
Approach			21	15.0	21	15.0	0.180	52.8	LOS D	0.4	2.9	0.99	0.66	0.99	27.0
All Vehicles			3303	12.3	3303	12.3	0.531	11.4	LOS A	8.0	60.6	0.44	0.60	0.44	54.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 101 [3 Foreshore Rd/Sirius Rd PM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TCS4302
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 140 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Sirius Road															
1	L2	All MCs	16	20.0	16	20.0	0.034	59.5	LOS E	0.5	3.8	0.88	0.66	0.88	24.2
3	R2	All MCs	27	73.1	27	73.1	* 0.335	75.5	LOS F	1.9	21.6	0.98	0.73	0.98	19.1
Approach			43	53.7	43	53.7	0.335	69.6	LOS E	1.9	21.6	0.94	0.71	0.94	20.7
East: Foreshore Road (E)															
4	L2	All MCs	18	94.1	18	94.1	0.247	79.3	LOS F	1.2	15.7	0.97	0.72	0.97	22.0
5	T1	All MCs	1526	10.7	1526	10.7	* 0.567	10.7	LOS A	21.2	161.7	0.45	0.64	0.45	52.5
Approach			1544	11.7	1544	11.7	0.567	11.5	LOS A	21.2	161.7	0.46	0.64	0.46	51.9
West: Foreshore Road (W)															
11	T1	All MCs	940	15.9	940	15.9	0.329	2.3	LOS A	6.5	51.7	0.23	0.20	0.23	76.2
12	R2	All MCs	12	63.6	12	63.6	* 0.245	85.4	LOS F	0.8	9.1	1.00	0.69	1.00	20.8
Approach			952	16.5	952	16.5	0.329	3.3	LOS A	6.5	51.7	0.23	0.21	0.23	74.5
All Vehicles			2539	14.2	2539	14.2	0.567	9.4	LOS A	21.2	161.7	0.38	0.48	0.38	57.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Sirius Road												
P1	Full	1	1	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
P1B	Slip/ Bypass	1	1	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
East: Foreshore Road (E)												
P2B	Slip/ Bypass	1	1	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
All Pedestrians		3	3	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1525 [4 Foreshore Rd/Botany Rd PM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Penrhyn Road															
1	L2	All MCs	96	30.8	96	30.8	0.350	52.9	LOS D	5.4	47.5	0.90	0.74	0.90	23.6
2	T1	All MCs	35	21.2	35	21.2	0.083	38.8	LOS C	1.7	13.7	0.79	0.59	0.79	19.5
3	R2	All MCs	61	65.5	61	65.5	0.219	45.3	LOS D	3.1	34.0	0.83	0.72	0.83	22.1
Approach			192	40.1	192	40.1	0.350	47.9	LOS D	5.4	47.5	0.86	0.71	0.86	22.6
East: Botany Road															
4	L2	All MCs	65	71.0	65	71.0	0.067	8.1	LOS A	0.4	4.2	0.12	0.59	0.12	48.1
5	T1	All MCs	1196	13.7	1196	13.7	0.494	28.5	LOS C	17.5	136.9	0.72	0.65	0.72	47.6
6	R2	All MCs	302	20.2	302	20.2	* 0.954	104.3	LOS F	25.0	205.5	1.00	1.13	1.43	18.0
Approach			1563	17.4	1563	17.4	0.954	42.3	LOS C	25.0	205.5	0.75	0.74	0.83	36.1
North: Botany Road															
7	L2	All MCs	389	6.8	389	6.8	0.225	4.4	LOS A	0.0	0.0	0.00	0.46	0.00	44.5
8	T1	All MCs	18	52.9	18	52.9	0.054	72.1	LOS F	0.8	8.6	0.78	0.62	0.78	19.4
9	R2	All MCs	284	13.3	284	13.3	* 0.887	102.6	LOS F	20.6	160.3	1.00	1.02	1.26	21.2
Approach			692	10.7	692	10.7	0.887	46.6	LOS D	20.6	160.3	0.43	0.70	0.54	25.4
West: Foreshore Road															
10	L2	All MCs	73	37.7	73	37.7	0.055	8.2	LOS A	0.0	0.0	0.00	0.55	0.00	52.0
11	T1	All MCs	944	16.4	944	16.4	* 0.833	38.9	LOS C	27.9	222.8	0.94	0.89	1.01	39.3
12	R2	All MCs	37	60.0	37	60.0	0.250	61.4	LOS E	2.1	22.3	0.90	0.74	0.90	24.1
Approach			1054	19.4	1054	19.4	0.833	37.6	LOS C	27.9	222.8	0.88	0.86	0.94	39.2
All Vehicles			3500	17.9	3500	17.9	0.954	42.0	LOS C	27.9	222.8	0.73	0.77	0.81	34.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Penrhyn Road												
P1B	Slip/ Bypass	1	1	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89
West: Foreshore Road												

P4	Full	1	1	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89
All Pedestrians		2	2	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1526 [5 Botany Rd/Beauchamp Rd PM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Botany Road															
5	T1	All MCs	848	25.8	848	25.8	0.289	11.5	LOS A	8.0	68.0	0.48	0.42	0.48	56.9
6	R2	All MCs	60	29.8	60	29.8	0.504	71.8	LOS F	3.9	33.9	1.00	0.77	1.00	26.4
Approach			908	26.1	908	26.1	0.504	15.4	LOS B	8.0	68.0	0.52	0.44	0.52	52.8
North: Beauchamp Road															
7	L2	All MCs	55	21.2	55	21.2	* 0.765	39.2	LOS C	22.2	167.7	0.97	0.88	1.01	29.0
9	R2	All MCs	693	7.1	693	7.1	0.765	53.0	LOS D	22.5	167.7	0.98	0.88	1.02	29.3
Approach			747	8.2	747	8.2	0.765	52.0	LOS D	22.5	167.7	0.98	0.88	1.02	29.3
West: Botany Road															
10	L2	All MCs	762	4.6	762	4.6	0.430	6.8	LOS A	0.0	0.0	0.00	0.57	0.00	57.2
11	T1	All MCs	659	28.3	659	28.3	* 0.289	20.2	LOS B	8.0	69.9	0.62	0.53	0.62	49.8
Approach			1421	15.6	1421	15.6	0.430	13.0	LOS A	8.0	69.9	0.29	0.55	0.29	53.5
All Vehicles			3077	16.9	3077	16.9	0.765	23.2	LOS B	22.5	167.7	0.52	0.60	0.53	44.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1528 [6 Botany Rd/Bumborah Point Rd PM (Site Folder: Base)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Bumborah Point Road															
1	L2	All MCs	444	46.0	444	46.0	* 0.460	11.4	LOS A	9.6	94.1	0.38	0.70	0.38	47.5
2	T1	All MCs	1	0.0	1	0.0	0.192	63.6	LOS E	1.3	12.4	0.97	0.71	0.97	28.4
3	R2	All MCs	20	42.1	20	42.1	0.192	69.7	LOS E	1.3	12.4	0.97	0.71	0.97	23.1
Approach			465	45.7	465	45.7	0.460	14.0	LOS A	9.6	94.1	0.40	0.70	0.40	45.7
East: Botany Road															
4	L2	All MCs	22	76.2	22	76.2	0.022	8.6	LOS A	0.0	0.0	0.00	0.49	0.00	49.1
5	T1	All MCs	419	4.5	419	4.5	* 0.541	62.1	LOS E	8.4	61.4	0.98	0.79	0.98	27.5
Approach			441	8.1	441	8.1	0.541	60.0	LOS E	8.4	61.4	0.93	0.77	0.93	26.8
North: Site access															
7	L2	All MCs	4	0.0	4	0.0	0.196	69.5	LOS E	1.3	8.8	0.97	0.71	0.97	24.2
8	T1	All MCs	1	0.0	1	0.0	0.196	63.9	LOS E	1.3	8.8	0.97	0.71	0.97	28.2
9	R2	All MCs	15	0.0	15	0.0	0.196	69.5	LOS E	1.3	8.8	0.97	0.71	0.97	27.7
Approach			20	0.0	20	0.0	0.196	69.2	LOS E	1.3	8.8	0.97	0.71	0.97	27.0
West: Botany Road															
10	L2	All MCs	12	36.4	12	36.4	0.093	7.9	LOS A	1.5	11.3	0.19	0.19	0.19	53.9
11	T1	All MCs	429	2.2	429	2.2	0.093	1.9	LOS A	1.6	11.4	0.19	0.17	0.19	57.6
12	R2	All MCs	195	77.3	195	77.3	0.264	11.7	LOS A	3.9	45.4	0.36	0.65	0.36	46.7
Approach			636	25.8	636	25.8	0.264	5.0	LOS A	3.9	45.4	0.24	0.31	0.24	53.1
All Vehicles			1562	26.4	1562	26.4	0.541	23.9	LOS B	9.6	94.1	0.49	0.56	0.49	40.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1524 [1 General Holmes Dr/Foreshore Rd AM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [AM-Peak (Network Folder: With Construction)]

1524
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Foreshore Road															
3	R2	All MCs	341	47.2	341	47.2	* 0.865	75.3	LOS F	8.6	84.3	1.00	0.91	1.19	17.7
Approach			341	47.2	341	47.2	0.865	75.3	LOS F	8.6	84.3	1.00	0.91	1.19	17.7
West: General Holmes Drive															
11	T1	All MCs	4774	4.5	4774	4.5	0.640	0.3	LOS A	0.0	0.0	0.00	0.01	0.00	69.2
12	R2	All MCs	2006	13.0	2006	13.0	* 0.963	58.7	LOS E	50.3	391.4	0.90	0.97	1.09	24.2
Approach			6780	7.0	6780	7.0	0.963	18.3	LOS B	50.3	391.4	0.27	0.29	0.32	49.6
All Vehicles			7121	9.0	7121	9.0	0.963	20.4	LOS B	50.3	391.4	0.30	0.32	0.36	46.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1616 [2 Foreshore Rd/Ulm Avenue AM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N101 [AM-Peak (Network Folder: With Construction)]

TCS1616
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 140 seconds (Network Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Foreshore Road															
1b	L3	All MCs	16	40.0	16	40.0	0.014	9.6	LOS A	0.0	0.0	0.00	0.62	0.00	53.5
1a	L1	All MCs	900	20.5	900	20.5	0.326	7.2	LOS A	2.3	19.2	0.13	0.64	0.13	59.0
2	T1	All MCs	322	49.0	322	49.0	0.326	3.1	LOS A	2.2	18.6	0.13	0.38	0.13	70.6
Approach			1238	28.1	1238	28.1	0.326	6.1	LOS A	2.3	19.2	0.13	0.57	0.13	60.5
NorthEast: General Holmes Drive															
24a	L1	All MCs	328	33.7	328	33.7	* 0.602	61.5	LOS E	6.4	57.8	0.97	0.82	0.97	28.2
Approach			328	33.7	328	33.7	0.602	61.5	LOS E	6.4	57.8	0.97	0.82	0.97	28.2
North: Foreshore Road															
8	T1	All MCs	1939	12.3	1939	12.3	* 0.772	5.0	LOS A	11.6	90.0	0.44	0.41	0.44	58.5
Approach			1939	12.3	1939	12.3	0.772	5.0	LOS A	11.6	90.0	0.44	0.41	0.44	58.5
SouthWest: Ulm Avenue															
30	L2	All MCs	8	37.5	8	37.5	0.223	84.6	LOS F	0.4	3.6	1.00	0.67	1.00	23.0
30a	L1	All MCs	7	28.6	7	28.6	0.131	84.3	LOS F	0.2	1.7	1.00	0.64	1.00	15.3
Approach			16	33.3	16	33.3	0.223	84.5	LOS F	0.4	3.6	1.00	0.66	1.00	19.9
All Vehicles			3521	20.0	3521	20.0	0.772	11.0	LOS A	11.6	90.0	0.38	0.51	0.38	51.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 101 [3 Foreshore Rd/Sirius Rd AM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TCS4302
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 190 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Sirius Road															
1	L2	All MCs	12	90.9	12	90.9	0.065	92.3	LOS F	0.5	6.3	0.94	0.67	0.94	16.3
3	R2	All MCs	9	77.8	9	77.8	0.356	115.1	LOS F	1.0	11.3	1.00	0.69	1.00	14.7
Approach			21	85.0	21	85.0	0.356	102.5	LOS F	1.0	11.3	0.97	0.68	0.97	15.5
East: Foreshore Road (E)															
4	L2	All MCs	14	61.5	14	61.5	* 0.465	118.6	LOS F	1.4	15.0	1.00	0.71	1.02	16.6
5	T1	All MCs	1020	27.0	1020	27.0	0.385	6.4	LOS A	9.4	80.9	0.22	0.52	0.22	56.1
Approach			1034	27.5	1034	27.5	0.465	7.9	LOS A	9.4	80.9	0.23	0.52	0.23	54.8
West: Foreshore Road (W)															
11	T1	All MCs	1827	17.1	1827	17.1	* 0.580	0.7	LOS A	10.5	84.0	0.14	0.13	0.14	78.4
12	R2	All MCs	11	40.0	11	40.0	0.171	106.9	LOS F	1.0	9.3	0.99	0.69	0.99	17.8
Approach			1838	17.2	1838	17.2	0.580	1.4	LOS A	10.5	84.0	0.14	0.13	0.14	77.3
All Vehicles			2893	21.4	2893	21.4	0.580	4.4	LOS A	10.5	84.0	0.18	0.27	0.18	66.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Sirius Road												
P1	Full	3	3	89.1	LOS F	0.0	0.0	0.97	0.97	255.8	200.0	0.78
P1B	Slip/ Bypass	3	3	89.1	LOS F	0.0	0.0	0.97	0.97	255.8	200.0	0.78
East: Foreshore Road (E)												
P2B	Slip/ Bypass	3	3	89.1	LOS F	0.0	0.0	0.97	0.97	255.8	200.0	0.78
All Pedestrians		9	9	89.1	LOS F	0.0	0.0	0.97	0.97	255.8	200.0	0.78

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1525 [4 Foreshore Rd/Botany Rd AM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Penrhyn Road															
1	L2	All MCs	44	85.7	44	85.7	0.232	53.5	LOS D	2.5	30.2	0.89	0.70	0.89	20.3
2	T1	All MCs	39	32.4	39	32.4	0.164	51.4	LOS D	2.2	19.4	0.90	0.68	0.90	16.5
3	R2	All MCs	34	75.0	34	75.0	0.203	57.0	LOS E	1.9	22.2	0.91	0.72	0.91	19.5
Approach			117	64.9	117	64.9	0.232	53.8	LOS D	2.5	30.2	0.90	0.70	0.90	19.1
East: Botany Road															
4	L2	All MCs	82	52.6	82	52.6	0.081	8.4	LOS A	0.7	6.6	0.18	0.61	0.18	47.6
5	T1	All MCs	893	26.4	893	26.4	0.339	20.7	LOS B	9.9	85.2	0.57	0.51	0.57	53.1
6	R2	All MCs	268	26.3	268	26.3	* 0.992	122.5	LOS F	24.4	209.0	1.00	1.18	1.57	15.7
Approach			1243	28.1	1243	28.1	0.992	41.9	LOS C	24.4	209.0	0.64	0.66	0.76	35.8
North: Botany Road															
7	L2	All MCs	439	18.0	439	18.0	0.282	4.5	LOS A	0.0	0.0	0.00	0.45	0.00	44.3
8	T1	All MCs	26	32.0	26	32.0	0.110	78.9	LOS F	1.4	12.9	0.89	0.68	0.89	16.5
9	R2	All MCs	135	56.3	135	56.3	* 0.864	104.1	LOS F	9.8	101.5	1.00	1.02	1.33	18.3
Approach			600	27.2	600	27.2	0.864	30.2	LOS C	9.8	101.5	0.26	0.59	0.34	29.1
West: Foreshore Road															
10	L2	All MCs	306	21.0	306	21.0	0.202	8.0	LOS A	0.0	0.0	0.00	0.56	0.00	53.4
11	T1	All MCs	1469	18.1	1469	18.1	* 0.997	76.4	LOS F	64.0	517.4	1.00	1.25	1.35	29.7
12	R2	All MCs	94	33.7	94	33.7	0.504	69.9	LOS E	5.6	50.7	0.96	0.78	0.96	23.7
Approach			1869	19.3	1869	19.3	0.997	66.6	LOS E	64.0	517.4	0.83	1.11	1.11	28.7
All Vehicles			3829	24.8	3829	24.8	0.997	51.6	LOS D	64.0	517.4	0.68	0.87	0.87	30.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Penrhyn Road												
P1B	Slip/ Bypass	1	1	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89

West: Foreshore Road											
P4 Full	1	1	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89
All Pedestrians	2	2	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1526 [5 Botany Rd/Beauchamp Rd AM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Botany Road															
5	T1	All MCs	646	43.5	646	43.5	0.234	8.5	LOS A	5.2	49.5	0.41	0.35	0.41	59.7
6	R2	All MCs	58	43.6	58	43.6	0.458	69.8	LOS E	3.7	35.2	0.98	0.77	0.98	26.8
Approach			704	43.5	704	43.5	0.458	13.6	LOS A	5.2	49.5	0.46	0.39	0.46	54.2
North: Beauchamp Road															
7	L2	All MCs	97	31.5	97	31.5	* 0.859	51.5	LOS D	23.3	186.5	1.00	0.97	1.17	25.8
9	R2	All MCs	596	11.1	596	11.1	0.859	65.9	LOS E	23.8	186.5	1.00	0.97	1.17	26.3
Approach			693	14.0	693	14.0	0.859	63.9	LOS E	23.8	186.5	1.00	0.97	1.17	26.2
West: Botany Road															
10	L2	All MCs	971	11.4	971	11.4	0.587	7.0	LOS A	0.0	0.0	0.00	0.56	0.00	55.3
11	T1	All MCs	1005	26.5	1005	26.5	* 0.409	19.4	LOS B	12.6	108.1	0.64	0.56	0.64	50.3
Approach			1976	19.1	1976	19.1	0.587	13.3	LOS A	12.6	108.1	0.33	0.56	0.33	52.6
All Vehicles			3373	23.1	3373	23.1	0.859	23.8	LOS B	23.8	186.5	0.49	0.61	0.53	43.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1528 [6 Botany Rd/Bumborah Point Rd AM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Bumborah Point Road															
1	L2	All MCs	280	85.0	280	85.0	0.361	10.4	LOS A	4.9	59.9	0.30	0.66	0.30	47.1
2	T1	All MCs	1	0.0	1	0.0	* 0.129	68.3	LOS E	0.6	5.9	0.99	0.67	0.99	27.5
3	R2	All MCs	8	50.0	8	50.0	0.129	74.4	LOS F	0.6	5.9	0.99	0.67	0.99	22.2
Approach			289	83.6	289	83.6	0.361	12.5	LOS A	4.9	59.9	0.32	0.66	0.32	45.7
East: Botany Road															
4	L2	All MCs	19	55.6	19	55.6	0.016	9.5	LOS A	0.0	0.0	0.00	0.50	0.00	49.8
5	T1	All MCs	401	9.4	401	9.4	* 0.610	65.0	LOS E	8.3	62.8	1.00	0.80	1.00	26.8
Approach			420	11.5	420	11.5	0.610	63.1	LOS E	8.3	62.8	0.95	0.79	0.95	26.0
North: Site access															
7	L2	All MCs	1	0.0	1	0.0	0.042	72.5	LOS F	0.2	1.4	0.98	0.63	0.98	24.0
8	T1	All MCs	1	0.0	1	0.0	0.042	66.9	LOS E	0.2	1.4	0.98	0.63	0.98	27.9
9	R2	All MCs	1	0.0	1	0.0	0.042	72.5	LOS F	0.2	1.4	0.98	0.63	0.98	27.4
Approach			3	0.0	3	0.0	0.042	70.6	LOS F	0.2	1.4	0.98	0.63	0.98	26.5
West: Botany Road															
10	L2	All MCs	23	54.5	23	54.5	0.120	7.3	LOS A	1.5	11.7	0.15	0.19	0.15	53.7
11	T1	All MCs	529	8.5	529	8.5	0.120	1.1	LOS A	1.6	12.0	0.15	0.14	0.15	58.5
12	R2	All MCs	403	49.9	403	49.9	* 0.434	11.3	LOS A	7.2	71.5	0.38	0.70	0.38	47.7
Approach			956	27.1	956	27.1	0.434	5.6	LOS A	7.2	71.5	0.24	0.38	0.24	52.7
All Vehicles			1668	32.9	1668	32.9	0.610	21.2	LOS B	8.3	71.5	0.44	0.53	0.44	41.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1524 [1 General Holmes Dr/Foreshore Rd PM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N102 [PM-Peak (Network Folder: With Construction)]

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 90 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Foreshore Road															
3	R2	All MCs	383	25.8	383	25.8	* 0.633	40.7	LOS C	5.2	44.7	0.95	0.82	0.96	26.5
Approach			383	25.8	383	25.8	0.633	40.7	LOS C	5.2	44.7	0.95	0.82	0.96	26.5
West: General Holmes Drive															
11	T1	All MCs	3426	1.7	3426	1.7	0.447	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.6
12	R2	All MCs	1065	10.6	1065	10.6	* 0.617	16.7	LOS B	8.5	64.7	0.64	0.80	0.64	43.1
Approach			4492	3.8	4492	3.8	0.617	4.1	LOS A	8.5	64.7	0.15	0.19	0.15	64.3
All Vehicles			4875	5.5	4875	5.5	0.633	6.9	LOS A	8.5	64.7	0.21	0.24	0.21	59.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1616 [2 Foreshore Rd/Ulm Avenue PM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Network: N102 [PM-Peak (Network Folder: With Construction)]

TCS1616
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 90 seconds (Network User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Foreshore Road															
1b	L3	All MCs	4	25.0	4	25.0	0.003	9.4	LOS A	0.0	0.0	0.00	0.63	0.00	56.7
1a	L1	All MCs	1642	9.0	1642	9.0	* 0.528	7.3	LOS A	4.6	34.3	0.23	0.67	0.23	61.8
2	T1	All MCs	373	26.6	373	26.6	0.271	3.0	LOS A	1.4	12.4	0.16	0.39	0.16	71.0
Approach			2019	12.3	2019	12.3	0.528	6.5	LOS A	4.6	34.3	0.21	0.62	0.21	62.6
NorthEast: General Holmes Drive															
24a	L1	All MCs	300	28.8	300	28.8	0.439	37.3	LOS C	3.6	31.0	0.90	0.79	0.90	35.0
Approach			300	28.8	300	28.8	0.439	37.3	LOS C	3.6	31.0	0.90	0.79	0.90	35.0
North: Foreshore Road															
8	T1	All MCs	995	8.9	995	8.9	0.439	12.4	LOS A	8.6	64.9	0.70	0.51	0.70	48.8
Approach			995	8.9	995	8.9	0.439	12.4	LOS A	8.6	64.9	0.70	0.51	0.70	48.8
SouthWest: Ulm Avenue															
30	L2	All MCs	13	16.7	13	16.7	* 0.361	59.5	LOS E	0.4	3.1	1.00	0.68	1.00	28.6
30a	L1	All MCs	8	12.5	8	12.5	0.112	56.3	LOS D	0.1	1.0	1.00	0.63	1.00	19.9
Approach			21	15.0	21	15.0	0.361	58.3	LOS E	0.4	3.1	1.00	0.66	1.00	25.7
All Vehicles			3335	12.8	3335	12.8	0.528	11.4	LOS A	8.6	64.9	0.43	0.60	0.43	54.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Override Site Data tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 101 [3 Foreshore Rd/Sirius Rd PM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

TCS4302
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 140 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Sirius Road															
1	L2	All MCs	16	20.0	16	20.0	0.034	59.5	LOS E	0.5	3.8	0.88	0.66	0.88	24.2
3	R2	All MCs	27	73.1	27	73.1	* 0.335	75.5	LOS F	1.9	21.6	0.98	0.73	0.98	19.1
Approach			43	53.7	43	53.7	0.335	69.6	LOS E	1.9	21.6	0.94	0.71	0.94	20.7
East: Foreshore Road (E)															
4	L2	All MCs	18	94.1	18	94.1	0.247	79.3	LOS F	1.2	15.7	0.97	0.72	0.97	22.0
5	T1	All MCs	1558	11.7	1558	11.7	* 0.582	10.8	LOS A	22.0	169.8	0.46	0.64	0.46	52.4
Approach			1576	12.6	1576	12.6	0.582	11.5	LOS A	22.0	169.8	0.47	0.64	0.47	51.9
West: Foreshore Road (W)															
11	T1	All MCs	940	15.9	940	15.9	0.329	2.3	LOS A	6.5	51.7	0.23	0.20	0.23	76.2
12	R2	All MCs	12	63.6	12	63.6	* 0.245	85.4	LOS F	0.8	9.1	1.00	0.69	1.00	20.8
Approach			952	16.5	952	16.5	0.329	3.3	LOS A	6.5	51.7	0.23	0.21	0.23	74.5
All Vehicles			2571	14.7	2571	14.7	0.582	9.5	LOS A	22.0	169.8	0.39	0.48	0.39	57.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Sirius Road												
P1	Full	1	1	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
P1B	Slip/ Bypass	1	1	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
East: Foreshore Road (E)												
P2B	Slip/ Bypass	1	1	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87
All Pedestrians		3	3	64.1	LOS F	0.0	0.0	0.96	0.96	230.8	200.0	0.87

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1525 [4 Foreshore Rd/Botany Rd PM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Penrhyn Road															
1	L2	All MCs	115	38.5	115	38.5	0.431	54.9	LOS D	6.5	60.7	0.92	0.78	0.92	24.9
2	T1	All MCs	35	21.2	35	21.2	0.083	38.8	LOS C	1.7	13.7	0.79	0.59	0.79	19.5
3	R2	All MCs	61	65.5	61	65.5	0.219	45.3	LOS D	3.1	34.0	0.83	0.72	0.83	22.1
Approach			211	43.5	211	43.5	0.431	49.5	LOS D	6.5	60.7	0.87	0.73	0.87	23.4
East: Botany Road															
4	L2	All MCs	65	71.0	65	71.0	0.067	8.1	LOS A	0.4	4.2	0.12	0.59	0.12	48.1
5	T1	All MCs	1208	13.9	1208	13.9	0.500	28.7	LOS C	17.8	139.5	0.72	0.66	0.72	47.5
6	R2	All MCs	302	20.2	302	20.2	* 0.956	105.2	LOS F	25.2	206.6	1.00	1.14	1.43	17.9
Approach			1576	17.5	1576	17.5	0.956	42.5	LOS C	25.2	206.6	0.75	0.75	0.83	36.1
North: Botany Road															
7	L2	All MCs	389	6.8	389	6.8	0.225	4.4	LOS A	0.0	0.0	0.00	0.46	0.00	44.5
8	T1	All MCs	18	52.9	18	52.9	0.054	72.1	LOS F	0.8	8.6	0.78	0.62	0.78	19.4
9	R2	All MCs	284	13.3	284	13.3	* 0.887	102.6	LOS F	20.6	160.3	1.00	1.02	1.26	21.2
Approach			692	10.7	692	10.7	0.887	46.6	LOS D	20.6	160.3	0.43	0.70	0.54	25.4
West: Foreshore Road															
10	L2	All MCs	73	37.7	73	37.7	0.055	8.2	LOS A	0.0	0.0	0.00	0.55	0.00	52.0
11	T1	All MCs	944	16.4	944	16.4	* 0.833	38.9	LOS C	27.9	222.8	0.94	0.89	1.01	39.3
12	R2	All MCs	37	60.0	37	60.0	0.250	61.4	LOS E	2.1	22.3	0.90	0.74	0.90	24.1
Approach			1054	19.4	1054	19.4	0.833	37.6	LOS C	27.9	222.8	0.88	0.86	0.94	39.2
All Vehicles			3532	18.3	3532	18.3	0.956	42.2	LOS C	27.9	222.8	0.73	0.77	0.81	34.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Penrhyn Road												
P1B	Slip/ Bypass	1	1	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89

West: Foreshore Road											
P4 Full	1	1	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89
All Pedestrians	2	2	59.1	LOS E	0.0	0.0	0.95	0.95	225.8	200.0	0.89

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1526 [5 Botany Rd/Beauchamp Rd PM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Botany Road															
5	T1	All MCs	861	25.9	861	25.9	0.293	11.5	LOS A	8.1	69.3	0.49	0.42	0.49	56.8
6	R2	All MCs	60	29.8	60	29.8	0.504	71.8	LOS F	3.9	33.9	1.00	0.77	1.00	26.4
Approach			921	26.2	921	26.2	0.504	15.4	LOS B	8.1	69.3	0.52	0.45	0.52	52.8
North: Beauchamp Road															
7	L2	All MCs	55	21.2	55	21.2	* 0.765	39.2	LOS C	22.2	167.7	0.97	0.88	1.01	29.0
9	R2	All MCs	693	7.1	693	7.1	0.765	53.0	LOS D	22.5	167.7	0.98	0.88	1.02	29.3
Approach			747	8.2	747	8.2	0.765	52.0	LOS D	22.5	167.7	0.98	0.88	1.02	29.3
West: Botany Road															
10	L2	All MCs	762	4.6	762	4.6	0.430	6.8	LOS A	0.0	0.0	0.00	0.57	0.00	57.2
11	T1	All MCs	659	28.3	659	28.3	* 0.289	20.2	LOS B	8.0	69.9	0.62	0.53	0.62	49.8
Approach			1421	15.6	1421	15.6	0.430	13.0	LOS A	8.0	69.9	0.29	0.55	0.29	53.5
All Vehicles			3089	16.9	3089	16.9	0.765	23.2	LOS B	22.5	167.7	0.52	0.60	0.53	44.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 1528 [6 Botany Rd/Bumborah Point Rd PM (Site Folder: With Construction)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: NA
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Bumborah Point Road															
1	L2	All MCs	457	45.6	457	45.6	* 0.471	11.5	LOS A	10.1	97.9	0.38	0.70	0.38	47.5
2	T1	All MCs	1	0.0	1	0.0	0.192	63.6	LOS E	1.3	12.4	0.97	0.71	0.97	28.4
3	R2	All MCs	20	42.1	20	42.1	0.192	69.7	LOS E	1.3	12.4	0.97	0.71	0.97	23.1
Approach			478	45.4	478	45.4	0.471	14.0	LOS A	10.1	97.9	0.41	0.70	0.41	45.8
East: Botany Road															
4	L2	All MCs	22	76.2	22	76.2	0.022	8.6	LOS A	0.0	0.0	0.00	0.49	0.00	49.1
5	T1	All MCs	419	4.5	419	4.5	* 0.541	62.1	LOS E	8.4	61.4	0.98	0.79	0.98	27.5
Approach			441	8.1	441	8.1	0.541	60.0	LOS E	8.4	61.4	0.93	0.77	0.93	26.8
North: Site access															
7	L2	All MCs	4	0.0	4	0.0	0.197	69.5	LOS E	1.3	8.8	0.97	0.71	0.97	24.2
8	T1	All MCs	1	0.0	1	0.0	0.197	64.0	LOS E	1.3	8.8	0.97	0.71	0.97	28.2
9	R2	All MCs	15	0.0	15	0.0	0.197	69.6	LOS E	1.3	8.8	0.97	0.71	0.97	27.6
Approach			20	0.0	20	0.0	0.197	69.3	LOS E	1.3	8.8	0.97	0.71	0.97	27.0
West: Botany Road															
10	L2	All MCs	12	36.4	12	36.4	0.093	7.9	LOS A	1.5	11.3	0.19	0.19	0.19	53.9
11	T1	All MCs	429	2.2	429	2.2	0.093	1.9	LOS A	1.6	11.4	0.19	0.17	0.19	57.6
12	R2	All MCs	195	77.3	195	77.3	0.264	11.7	LOS A	3.9	45.4	0.36	0.65	0.36	46.7
Approach			636	25.8	636	25.8	0.264	5.0	LOS A	3.9	45.4	0.24	0.31	0.24	53.1
All Vehicles			1575	26.5	1575	26.5	0.541	23.8	LOS B	10.1	97.9	0.49	0.57	0.49	40.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Annexure C

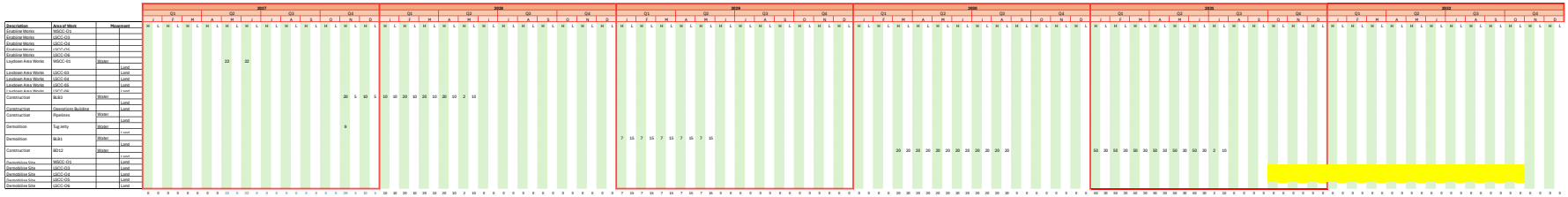
Construction vehicle movement profile

No.	Intersections
1	General Holmes Dr/Foreshore Rd
2	Foreshore Rd/Ulm Ave
3	Foreshore Rd/Sirius Rd
4	Foreshore Rd/Botany Rd
5	Botany Rd/Beauchamp Rd
6	Botany Rd/Bumborah Point Rd

				Per Day		Hourly			
Description	Area of Work	Movement		H	L	H	L	Access Routes	Int No.
Laydown Area Works	WSCC-01	Water							
			Land	150	40	14	4	Foreshore Rd/Botany Rd	4
Laydown Area Works	LSCC-03		Land	2	10	1	1	Botany Rd/Bumborah Point Rd	6
Laydown Area Works	LSCC-04		Land	2	10	1	1	Botany Rd/Bumborah Point Rd	6
Laydown Area Works	LSCC-05		Land	2	10	1	1	Botany Rd/Bumborah Point Rd	6
Laydown Area Works	LSCC-06		Land					Botany Rd/Bumborah Point Rd	6
Construction	BLB3	Water							
			Land		10		1	Botany Rd/Bumborah Point Rd	6
Construction	Operations Building		Land						
Construction	Pipelines	Water							
			Land	10	30	1	3	Botany Rd/Bumborah Point Rd	6
Demolition	Tug Jetty	Water							
			Land		10		1	Botany Rd/Bumborah Point Rd	6
Demolition	BLB1	Water							
			Land						
Construction	BD12	Water							
			Land						
Demobilise Site	WSCC-O1		Land						
Demobilise Site	LSCC-O3		Land						
Demobilise Site	LSCC-O4		Land						
Demobilise Site	LSCC-O5		Land						
Demobilise Site	LSCC-O6		Land						
			Total	166	120	18	12		

Annexure D

Construction vessel movement profile



Description	Area of Work	Movement	
Dredging Works	WADC-C1		
Dredging Works	UDCC-C2		
Dredging Works	UDCC-C4		
Dredging Works	UDCT-C5		
Dredging Works	UDCC-C6		
Laydown Area Works	WADC-01	Water	
			Land
Laydown Area Works	UDCC-02		Land
Laydown Area Works	UDCC-04		Land
Laydown Area Works	UDCC-05		Land
Laydown Area Works	UDCT-06		Land
Construction	BUI3	Water	
			Land
Construction	Classrooms Building		Land
Construction	Pipelines	Water	
			Land
Demolition	Tug Jetty	Water	
			Land
Demolition	BUI1	Water	
			Land
Construction	BD12	Water	
			Land
Demolition Site	WADC-01		Land
Demolition Site	UDCC-02		Land
Demolition Site	UDCC-04		Land
Demolition Site	UDCT-05		Land
Demolition Site	UDCC-06		Land

Year	Month	Water	
		M	L
2027	Q1	0	0
2027	Q2	44	0
2027	Q3	0	0
2027	Q4	44	44
2028	Q1	50	30
2028	Q2	20	20
2028	Q3	0	0
2028	Q4	0	0
2029	Q1	21	45
2029	Q2	54	69
2029	Q3	0	0
2029	Q4	0	0
2030	Q1	20	20
2030	Q2	60	60
2030	Q3	40	40
2030	Q4	0	0
2031	Q1	150	90
2031	Q2	150	90
2031	Q3	2	10
2031	Q4	0	0
2032	Q1	0	0
2032	Q2	0	0
2032	Q3	0	0
2032	Q4	0	0