

Sydney Water

June 2025

Quakers Hill WRRF Advanced Treatment Upgrade

Review of Environmental
Factors – Traffic and Transport
Impact Assessment

wsp



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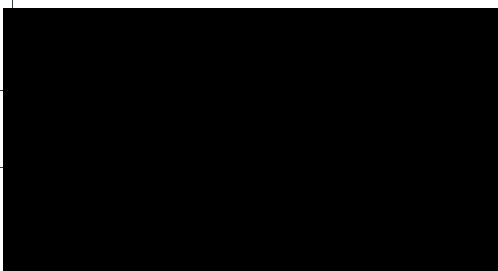
Quakers Hill WRRF Advanced Treatment Upgrade Review of Environmental Factors – Traffic and Transport Impact Assessment

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WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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1 Introduction

1.1 Project overview

Sydney Water is planning to upgrade the existing wastewater treatment process at the Quakers Hill WRRF and introduce an Advanced Water Treatment Plant (AWTP). Secondary wastewater treatment upgrades will increase the average dry weather flow (ADWF) capacity of the WRRF from the current 28 ML/day to 48 ML/day, helping meet increased service demand and support the NSW Government's housing policies. The AWTP will treat water to meet stringent nutrient load limits on the site's Environment Protection Licence (EPL). A new pipeline will be constructed from the Quakers Hill WRRF to the Northern Suburbs Ocean Outfall Sewer (NSOOS) at Seven Hills to transport brine produced by the AWTP.

The main components of the proposal shown in Figure 1.1 include:

- modifications to existing infrastructure at Quakers Hill WRRF
- secondary wastewater treatment process upgrade to increase treatment capacity of the WRRF and provide suitable feedwater for the new AWTP
- AWTP with associated interconnecting pipes, valves and isolation points to treat wastewater to a high quality to achieve EPL compliance
- brine pipeline with associated valves, chambers, barometric loop and maintenance access points to transport brine to the existing wastewater reticulation system.

All components will be located within the existing Quakers Hill WRRF site except for the brine pipeline.

All infrastructure is in the Blacktown Local Government Area (LGA). The WRRF site is owned by Sydney Water (Lot 1 of Deposited Plan (DP) 1029672 at 240 Quakers Road, Quakers Hill).

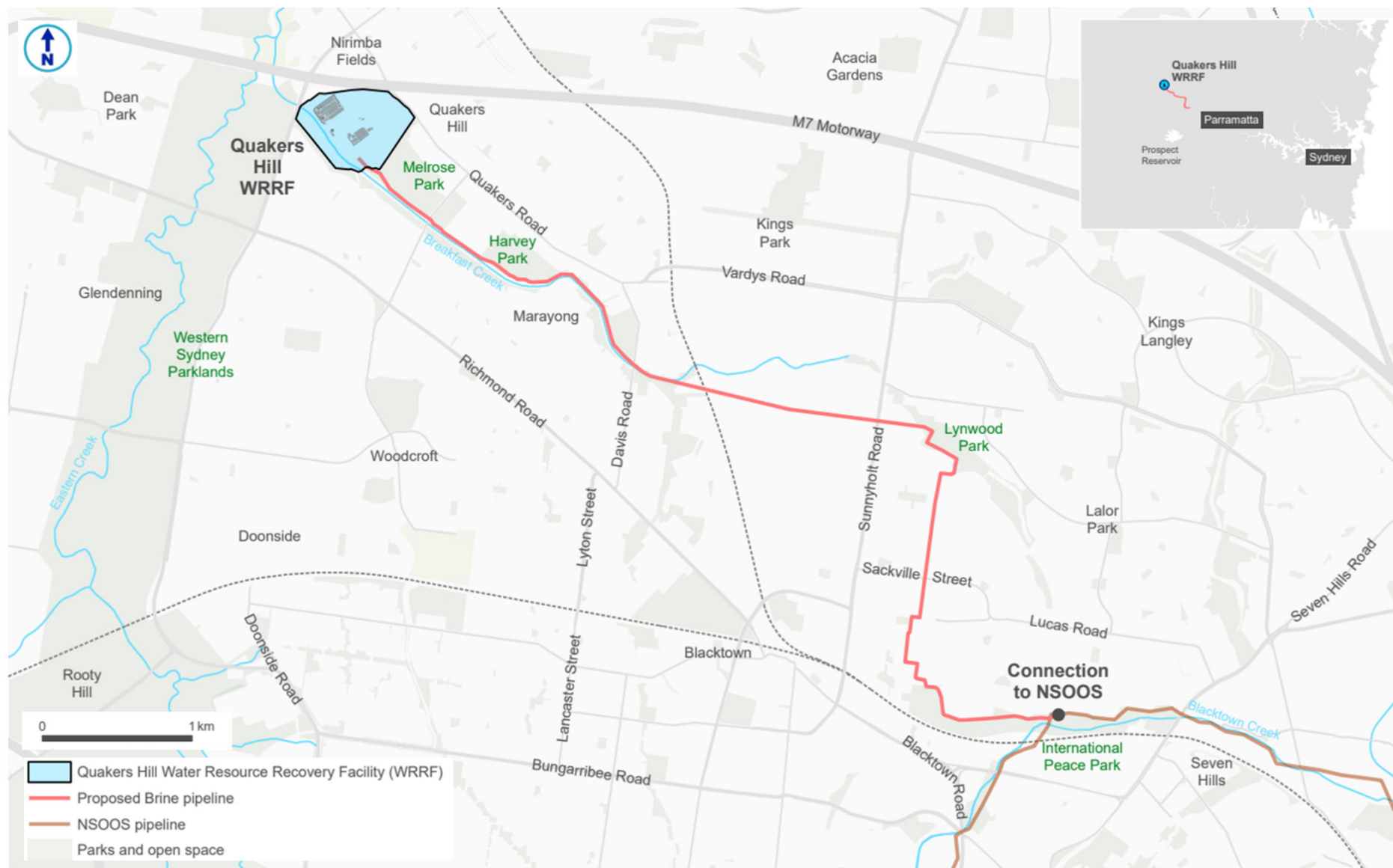


Figure 1.1 Overview of the proposed scheme

1.2 Project objective

Upgrades to Sydney Water's Quakers Hill Water Resource Recovery Facility (WRRF) are required by 2028 to:

- service industry growth and housing policies as current treatment capacity at the plant of 38 ML/day is expected to be exceeded in late 2028
- meet Environment Protection Licence limits that require reduced nutrient loads to the Hawkesbury-Nepean River (Sackville 2 zone)
- provide high quality water treatment that enables a future Purified Recycled Water (PRW) scheme and its introduction into Prospect Reservoir.

The project is in the Blacktown Local Government Area, in largely urbanised areas with a mix of residential, industrial, and recreational land uses.

The key features of the project are shown in Figure 1.1 and include:

- secondary treatment process upgrade from the current 28 ML/day to 48 ML/day
- a new advanced treatment plant, including reverse osmosis, ultrafiltration and stabilisation
- a range of ancillary infrastructure such as new buildings, tanks, pipes, services and chemical storage
- demolition and restoration of previously decommissioned structures
- new brine pipeline to transfer the brine generated as a by-product of the reverse osmosis process into the existing wastewater network. The pipeline would:
 - have flow capacity of up to 12.5 ML/day
 - be about 8 km long and about 500 mm diameter
 - be installed largely along shared paths, public parkland, and road corridors
 - be mostly underground and built using open trench and trenchless methods
 - be connected into Sydney Water's existing Northern Suburbs Ocean Outfall Sewer.

The advanced treatment plant is required to treat the wastewater to meet more stringent nutrient limits. However, it would also produce high quality water that could be further treated to produce PRW.

Sydney Water is preparing a Review of Environmental Factors (REF) for the project. This report has been prepared to support that REF. PRW is not part of the scope of this assessment. Sydney Water is separately assessing the potential introduction of PRW in an Environmental Impact Statement (EIS).

1.3 Purpose of this report

This Traffic and Transport Impact Assessment has been prepared to support the REF by assessing the likely traffic, transport, and access impacts associated with the project during both the construction and operation periods. It also aims to identify mitigation measures to minimise the potential impacts of the project.

1.4 Structure of this report

This traffic impact assessment report comprises the following sections:

- Section 1: Introduction – provides an overview of the project and outlines the scope of the assessment.
- Section 2: The Project – describes the proposed activity, including the site location and details of the construction process.
- Section 3: Assessment methodology – outlines the methodology adopted for this Traffic and Transport Impact Assessment, along with the relevant legislation, standards, and guidelines followed in the report.
- Section 4: Existing environment – describes the current road environment and transport network.
- Section 5: Construction impact assessment – examines the potential impacts on traffic, access, active and public transport, and parking during construction at the Quakers Hill WRRF and along the Brine pipeline.
- Section 6: Operation impact assessment – assesses the potential traffic impacts associated with the operation of the Quakers Hill WRRF site and other related facilities.
- Section 7: Mitigation measures – summarises the proposed mitigation strategies to manage the impacts identified in Sections 5 and 6.

2 The Project

2.1 Proposed construction

All components will be located within the existing Quakers Hill WRRF site except for the brine pipeline. The following upgrade works would be undertaken within the existing Quakers Hill WRRF.

2.1.1 *Existing infrastructure modifications*

Modification of existing infrastructure at the Quakers Hill WRRF is required to facilitate construction and operation of the proposal's other components. This includes modifications to the existing assets including primary treatment plant, clearwater basin, brine tanks and pumps, coagulant and hypochlorite bulk storage, high voltage power supply and Supervisory Control and Data Acquisition (SCADA) system.

2.1.2 *Secondary wastewater treatment*

The secondary wastewater treatment plant would be located near the middle of the existing Quakers Hill WRRF site on vacant land adjacent to existing infrastructure. This location minimises interactions with buried services and surrounding existing processes.

2.1.3 *Advanced water treatment*

The proposed AWTP would be in the west of the existing Quakers Hill WRRF site, within an area currently occupied by two disused Intermittently Decanted Aerated Lagoons (IDALs).

2.1.4 *Brine pipeline*

The proposal's brine pipeline would be linear infrastructure about 7.7 km long located underground between the Quakers Hill WRRF in the west and the International Peace Park (Seven Hills) in the east, where it would connect into the NSOOS. The diameter of the proposed pipeline is about 500 mm, providing a 12.5 ML/day flow capacity.

The route of the brine pipeline follows the alignment of Breakfast Creek from Quakers Hill WRRF to Marayong Park. From here the pipeline alignment continues east under a railway and the Kings Park Industrial Estate and Blacktown Distribution Centre to Lynwood Park, before tracking south along public road corridors and shared paths to the Blacktown Aquatic Centre car park. The alignment then generally follows a shared path eastwards to connect with the NSOOS at the International Peace Park in Seven Hills. Most of the brine pipeline is within the suburb of Blacktown except for about 90 metres of pipeline at Lynwood Park, which extends into the suburb of Lalor Park.

Figure 1.1 shows the indicative alignment of the brine pipeline, which is predominantly within public land, either along shared paths or along public roads. The central section of the brine pipeline will be constructed by tunnelling under multiple private lots associated with residential and commercial properties, most likely using horizontal directional drilling (HDD). The launch and receival pits for these drilling activities and where the brine pipeline nears the surface are within public spaces or a cul-de-sac within the industrial park.

2.2 Operating details

2.2.1 Quakers Hill WRRF site

The secondary wastewater treatment upgrade and AWTP would operate as an integrated component of Quakers Hill WRRF. Sydney Water expects that about 4 operational jobs would be generated by the proposal.

The proposal would typically operate 24 hours a day, 7 days a week, like the existing Quakers Hill WRRF. There may be times when it is not operational (for example during maintenance or some wet weather conditions). Operational staff are expected to be present only during standard hours of 7:00 am to 3:30 pm weekdays, unless emergency works or maintenance are required.

Access to the secondary wastewater treatment plant and AWTP would be via the existing access to the Quakers Hill WRRF site from Quakers Road. Vehicle movements during operation of the proposal will be related to staff journeys, deliveries and maintenance requirements.

Expected vehicle movements and the purpose associated with the operation of the proposal are provided in Table 2.1.

Table 2.1 Expected vehicle activity at the Quakers Hill AWTP during operation

Vehicle type	Purpose	Frequency
B-double trucks	Chemical deliveries	Every 3–10 days
Articulated trucks	Equipment and lime/chemical deliveries	Monthly
Fixed chassis trucks	Removal of screenings	Weekly – monthly
Mobile crane (Franna)	General maintenance	1–3 months
Long reach mobile crane (with stabilising bars)	Specific maintenance tasks	Annually
Private vehicles/light commercial vehicles	Personnel transport and light maintenance	Daily

2.2.2 Brine pipeline

The brine pipeline would operate as an integrated component of Sydney Water’s pipeline network. No additional operational jobs are expected to be required, but there would be routine inspections and maintenance of the pipeline during operation. A small number of operational vehicle movements would be required for operation and maintenance of the brine pipeline. Vehicle movements would be infrequent and would have negligible impact on the local traffic network.

2.3 Related development

Sydney Water is seeking separate approval for a PRW scheme, including a PRW Treatment Plant at Quakers Hill WRRF. That project (Securing our water supply – Quakers Hill to Prospect) is State significant infrastructure (SSI).

Sydney Water is preparing an Environmental Impact Statement (EIS) to be submitted to the Department of Planning, Housing and Infrastructure, for public exhibition in late 2025. The upgrades at Quakers Hill WRRF outlined in this REF are essential to produce high-quality feedwater for the proposed PRW Treatment Plant.

3 Assessment methodology

3.1 Overview

Relevant information related to the project construction methodology, workforce vehicle movements and logistics for the delivery of plant, equipment and project infrastructure has been provided by Sydney Water to assist in the completion of this assessment. The methodology adopted in this technical paper includes:

- desktop and mapping analysis to identify, describe and qualitatively assess the existing conditions of construction routes, including road classification, lane configuration, speed limit, pedestrian/cyclist facilities, existing heavy vehicle restrictions, crash history, intersection treatment, traffic operating performance, and public transport provisions
- data collection at appropriate locations to understand the existing conditions, traffic demand and traffic patterns to further assess the impact of the project
- site inspections of the project corridor and key access roads to and from the project site, and understand likely impacts on the road network for road users and the local community
- review of the proposed construction activities and methodology to derive the expected traffic generation and traffic distribution during the construction of the project
- assessment of the potential impacts associated with the construction of the project with regards to road capacity, road condition, road safety, efficiency, heavy vehicle access, compound property access, active transport and public transport
- review the operational activities and assess the potential impacts associated with road capacity, road condition, road safety, efficiency, active transport, public transport and property access
- review the cumulative impacts which considers approved changes in the road network and land developments within the study area
- identify mitigation and management measures to be applied to the construction and operation of the project to avoid, minimise and manage the potential traffic and transport impacts of the project, as far as practicable.

3.2 Legislation

3.2.1 Roads Act 1993

The *Roads Act 1993* (Roads Act) aims to establish the rights of members of the public to pass along public roads, the rights of persons who own land adjoining a public road to have access to the public road, and to establish the procedures for the opening and closing of a public road. The Roads Act also aims to provide a structure for the classification of roads, empower public agencies such as Transport for NSW as the road authorities and regulate the carrying out of various activities on public roads, including the transportation of construction materials with heavy vehicles.

This project is consistent with the *Environmental Planning and Assessment Act 1979* and *Roads Act 1993* by ensuring that the appropriate processes, approvals and measures are in place to manage the impacts to users of the public roads, property owners and the opening/closing of public roads.

Part 9 of the Roads Act nominates the requirements for undertaking works within a public road, including the requirement to obtain consent under section 138 for carrying out works in, on or over a public road (this includes the erection of structures), and the digging up or disturbance of the surface of a public road.

3.2.2 *NSW Road Rules, 2014*

The *NSW Road Rules 2014* are a framework for the safe and efficient movement of traffic on NSW roads. The NSW Road Rules are a legislative instrument with the following objectives:

- to consolidate in a single instrument the road rules that are applicable in New South Wales, and
- to provide for road rules that are based on the *Australian Road Rules* to ensure that the road rules applicable in this State are substantially uniform with road rules applicable elsewhere in Australia, and
- to provide for other road rules to be observed in this State in relation to matters that are not otherwise dealt with in the *Australian Road Rules*.

The project would support the objectives of the legislation by ensuring that recommended mitigation measures are aligned with the Road Rules.

3.3 Policy, standards and guidelines

This section outlines government plans, policies and guidelines, including those that identify the methods for assessing the impacts of key matters, and set standards and performance criteria for evaluating the incremental and cumulative impacts of projects.

3.3.1 *Austroads Guide to Traffic Management and Road Design*

The Austroads Guide to Traffic Management comprises thirteen parts and provides comprehensive traffic management guidance for practitioners involved in traffic engineering, road design and road safety. In some circumstances, the guideline adopts state-specific requirements such as Transport for NSW design supplements. It recognises that the management of traffic is to be based on an understanding of road design, the capabilities and behaviour of all road users, and the performance and characteristics of vehicles.

This guide has informed the assessment methodology for the road network performance assessment for the project. This includes intersection performance, mid-block capacity performance and management strategies to minimise the impacts of traffic and transport movements generated by the project.

Austroads Guide to Road Design has seven parts and provides designers with a framework that promotes efficiency in design and construction, economy and both consistency and safety for road users. This guide is referred to in this study when the assessment of road geometry is required to assess the impact of construction and operation of the project.

3.3.2 *Guide to Transport Impact Assessment*

TfNSW *Guide to Transport Impact Assessment* (2024) is a substantial update of the former *Guide to Traffic Generating Developments* which was first released in 1991 and revised in 2001. It provides guidance on a number of matters related to the traffic impacts of land use developments, most notably on matters relating to traffic generation and parking. This includes policies, guidelines on traffic impact studies methodologies, traffic generation, interpretation of traffic impacts, parking requirements, access and parking area design, residential subdivision design and associated cost implications.

This guideline was considered in this study to guide the traffic impact assessment methodology, traffic generation and assessment of property accesses.

3.3.3 *Traffic Control at Work Sites – Technical Manual*

The *Traffic Control at Work Sites – Technical Manual 2022* is a Transport for NSW document that provides the requirements for temporary traffic management at Transport construction and maintenance work sites.

The aim is to protect the safety of all transport mode users (vehicles, pedestrians, cyclists etc.) travelling around or passing through work sites. This manual applies to all persons, including construction site staff and members of the public. It is intended to help personnel comply with the *Work Health and Safety Act 2011* and the *Work Health and Safety Regulation 2017*. It contains:

- guidance to develop, select or design a Traffic Guidance Scheme (TGS) for a range of work activities
- information on how to develop a traffic management plan (TMP) and risk assessment before development of a TGS
- technical requirements for signs and devices used to manage traffic at work sites.

This guide refers to Australian Standards 1742 (Manual of uniform traffic control devices) and 1743 (Road signs – specifications) to have consistent application with the Australian Standards. Temporary works on public roads detailed in this technical paper consider the practices detailed in this guideline.

3.3.4 *2026 Road Safety Action Plan*

The 2026 Road Safety Action Plan is a framework by the NSW Government that seeks to continue the accomplishment of the Road Safety Plan 2021 with new road trauma reduction targets for 2030, setting NSW on a path towards zero road trauma by 2050.

The four elements of the Safe System approach, first used in Scandinavia, are safer people, safer roads, safer speeds and safer vehicles. This strategy highlights the need to improve the safety of all parts of the system so that if one part fails, the other parts would protect people from being killed or seriously injured.

With all of these elements working together as a whole, the system is more forgiving of human or mechanical error and the impact of a mistake made on the road does not result in a fatality or serious injury.

The underlying principles of the Safe System approach are that:

- road safety is a shared responsibility
- the human body can only withstand limited forces in a crash before this results in a fatality or serious injury
- continuous improvements in vehicles, roads and behaviour would reduce fatalities and serious injuries.

The mitigation measures detailed in Chapter 8 of this technical paper consider the principles of the Safe System approach that would provide a safe temporary road environment.

3.3.5 *NSW Heavy Vehicle Access Policy Framework*

The NSW Heavy Vehicle Access Policy Framework 2018 aims to provide a framework for heavy vehicle access in NSW for roads managed by both the State Government and Local Council. As part of the project, heavy vehicles would be required to carry freight, including construction materials, to locations within the study area. This Framework provides a platform to consider areas of priority such as safety and the capacity of road infrastructure (including roads and bridges).

3.4 Study area

The study area for this TTIA has been identified as the transport networks that may be impacted by construction movements. This includes movements to and from the work area via access gates and construction compounds, or by the operation of the project (staff and maintenance movements).

As the construction workforce and origin of materials are expected to be widely distributed across the broader Sydney region, the study area is identified as those roads and associated transport facilities (e.g. parking, active transport, heavy vehicle, public transport networks) that provide access to the construction sites, back to the nearest main road. Beyond this point, the construction traffic is expected to diminish as it is distributed across the broader network to multiple origins and represents no measurable impact.

As depicted in Figure 3.1, the traffic and transport study area spans across Quakers Hill, Marayong, Blacktown, Lalor Park within the Blacktown Local Government Area.

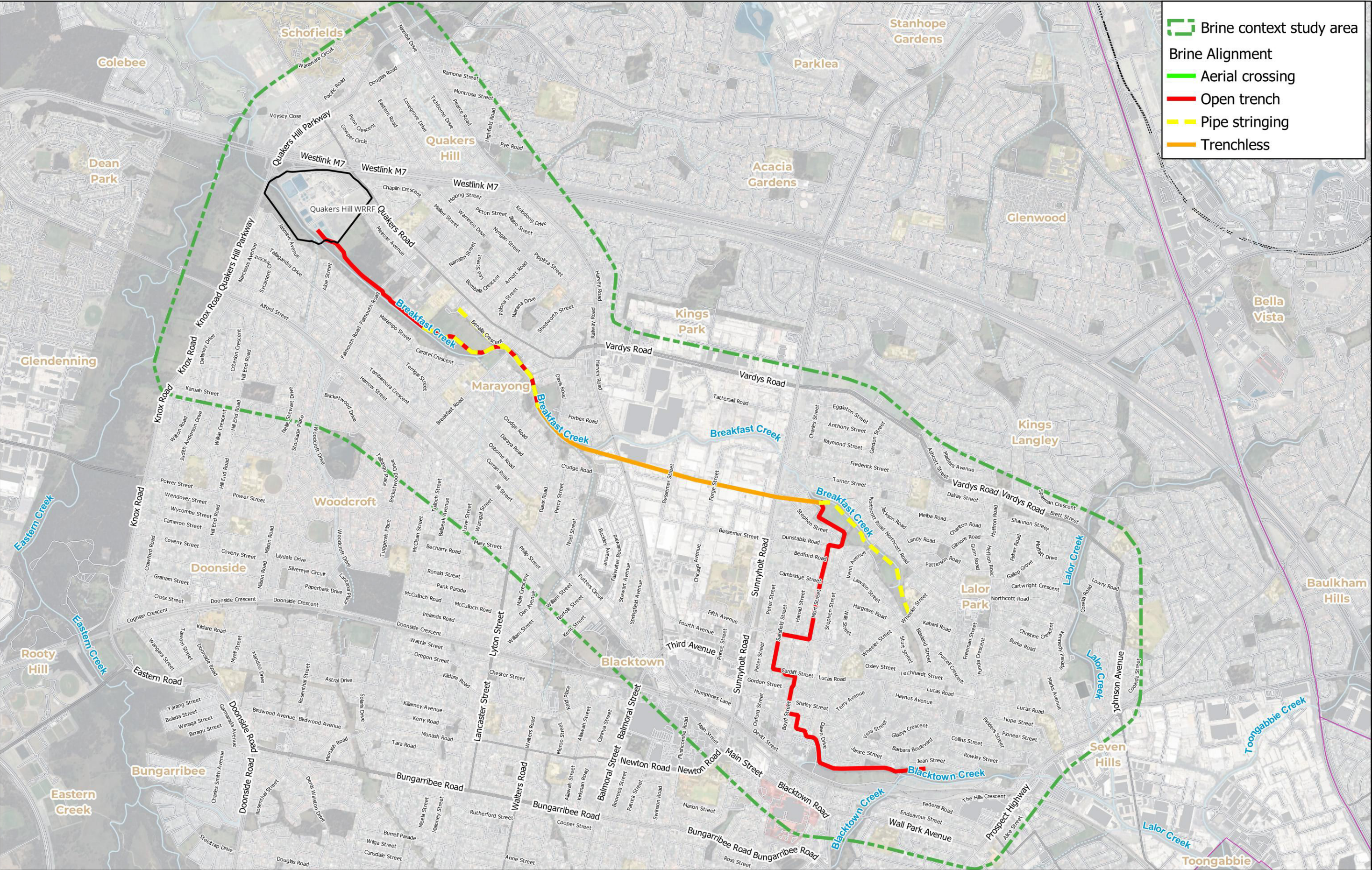


Figure 3.1
Study Area

Coordinate system: GDA2020 / NSW Lambert (EPSG:8058)



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3.5 Existing conditions assessment

3.5.1 Transportation network

The existing conditions assessment involves undertaking both site inspections, desktop and mapping analysis to identify, describe and qualitatively assess the existing conditions of construction traffic routes. This includes road classification, lane configuration, speed limit, pavement type, pedestrian/cyclist facilities, existing heavy vehicle restrictions, crash history, traffic operating performance, and public transport provisions. A number of these items are available as data sets from Transport for NSW's Open Data platform. Traffic data was also collected to understand the existing conditions, traffic demand and patterns to further assess the impact of the project. The methodology and assessed locations are further described in Section 3.5.2.

3.5.2 Data collection

Data collection consisted of a combination of intersection traffic counts and midblock traffic counts to understand the current traffic demands, conditions and travel patterns. The survey locations are shown on Figure 3.2 and summarised in Table 3.1.

Intersection turn count surveys were conducted on Thursday, 20 February 2025, during the morning peak period from 6:30 to 9:30 am and the afternoon peak period from 3:30 to 6:30 pm. These surveys captured the number of light vehicles, heavy vehicles, cyclists, and pedestrians.

Midblock traffic counts were performed over a 24-hour, 7-day period, from Thursday, 13 February 2025, to Wednesday, 19 February 2025.

The identified peak hour periods for each surveyed location are summarised in Table 4.1. Key findings include:

- morning peaks generally occurred between 8 and 9 am, while afternoon peaks varied between 3 and 6 pm across the survey locations
- the highest total daily volumes were recorded on Wednesday at both mid-block count locations; however, the hourly volumes during peak periods remained generally consistent across weekdays.

Table 3.1 Traffic survey location selection

ID	Intersection location	Reason for selection
Midblock Traffic Counts		
M-01	Falmouth Road, Marayong	This is a regional road. Impacts at this road will need to be assessed as there may be potential lane closures in this area. Lane closures may impact nearby roundabouts and signalised intersections. In this regard, traffic impacts measures will need to be assessed.
M-02	Breakfast Road, Marayong	This is a local road near a school. Impacts at this road will need to be assessed as there may be potential lane closures in this area. Lane closures may impact nearby roundabouts and signalised intersections. In this regard, traffic impacts measures will need to be assessed.

ID	Intersection location	Reason for selection
Intersection Turn Counts		
I-01	Quakers Road/Quakers Hill WRRF Site Access, Quakers Hill	This is the main access point to the ancillary work site. The highest number of construction vehicles will be utilising this access point. The worst-case, conservative traffic scenario at this access point will be assessed.
I-02	Sackville Street/Mort Street, Blacktown	Existing traffic conditions need to be observed as there may be potential lane closures at this location. The lane closures will impact existing bus stops (and bus routes) and the existing traffic.
I-03	Gordon Street/Sydney Street/ Boyd Street, Blacktown	Existing situation needs to be observed as lane closures may cause negative traffic impacts due to sight distance issues.

3.5.3 *Crash analysis*

Crash data was sourced from NSW Crash Data, accessible from Transport for NSW's Open Data platform. The 5-year crash data available extended from 2019 to 2023. The crash analysis includes consideration of the available crash data for roads that form part of the project construction routes within the study area. The crash analysis aims to develop an understanding of existing road safety issues which the project may need to be aware of and manage accordingly.

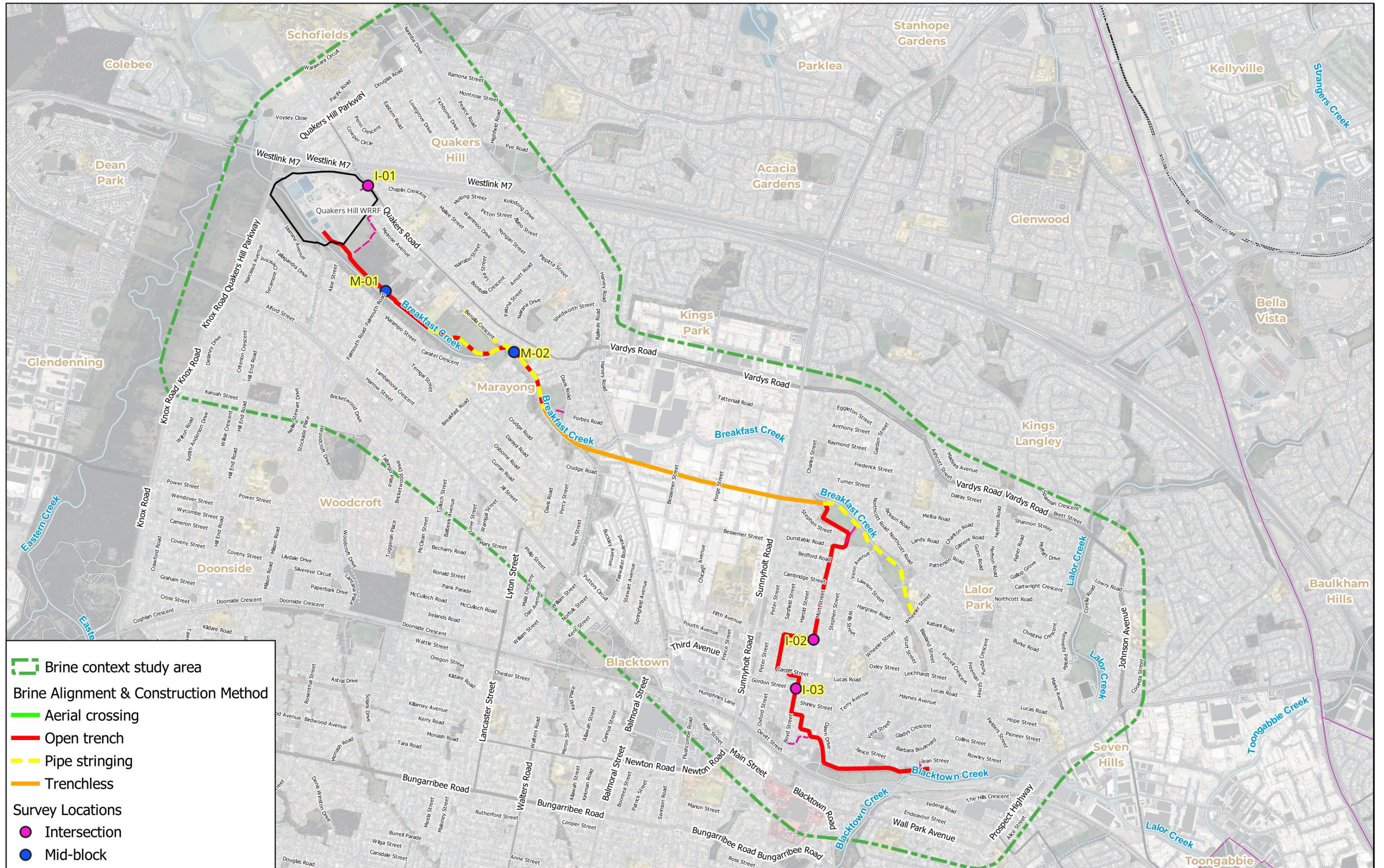


Figure 3.2
Brine Traffic Survey Locations

Coordinate system: GDA2020 / NSW Lambert (EPSG:8058)



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3.6 Construction traffic assessment

The construction impacts of this project include both a quantitative and qualitative assessment. The quantitative assessment focuses on the performance of key road features, while the qualitative assessment looks at the broader transport network. Key factors such as the construction program, staging, staff numbers, site compound locations, and the types, volumes, and routes of construction vehicles have been taken into consideration.

The quantitative assessment was carried out by evaluating the performance of intersections and mid-block road capacity impacted by the project. The following assessments were considered, using the criteria outlined in Section 3.6.2:

- **Performance at the Quakers Hill WRRF Access Road and Quakers Road Intersection:** This is the primary route for construction traffic, as most vehicles will travel to and from the Quakers Hill WRRF site. The highest volume of construction vehicles is expected in the final construction year (2028). The intersection's performance during the weekday AM and PM peak hours was analysed, both with and without the estimated construction traffic volumes.
- **Mid-block Crossing Point:** Daily construction vehicle volumes are expected to reach up to 50 light vehicles and 8 heavy vehicles per day during the peak construction period. The open trench pipeline construction, which typically occurs in residential areas, will have minimal additional impact compared to the background traffic volume. The primary impact is expected when the open trench construction crosses the road corridor, requiring lane closures. However, two-way traffic will be maintained with a contra-flow arrangement. SIDRA modelling was used to assess the performance of these arrangements, with traffic management measures allowing one direction of travel at a time.

These assessments provide an understanding of the project's impact and help identify appropriate mitigation measures, considering the type of work and the applicable period of intervention.

Due to the size of the impact area and nature of construction works, which are not static, the quantitative assessment involves forecasting construction traffic movement which would represent the highest traffic demand likely to be experienced along the construction routes within the study area (i.e. worst-case scenario).

3.6.1 Background traffic growth

All construction activities associated with the project will take place within the Blacktown Local Government Area (LGA). The assessed intersection and road mid-block sections are generally located in well-established areas, where no significant traffic growth is expected until the completion of project construction. Between 2021 and 2046, the population for Blacktown City Council is forecast to increase at an average annual change of 1.45%¹. Accordingly, a conservative annual traffic growth rate of 2% has been applied to regional and local roads to estimate future background traffic volumes during the peak construction year.

¹ Blacktown City Estimated Resident Population (ERP), <https://forecast.id.com.au/blacktown/population-summary#:~:text=Between%202021%20and%202046%2C%20the,average%20annual%20change%20of%201.45%25>. Accessed on 22 May 2025.

3.6.2 Assessment criteria

3.6.2.1 Intersection performance metrics

Level of Service

Level of Service (LoS) is a basic performance parameter used to describe the operation of an intersection. Levels of Service range from A (indicating good intersection operation) to F (indicating over-saturated conditions with long delays and queues). At signalised intersections, the LoS criteria are related to average intersection delay (seconds per vehicle). At priority controlled (give-way and stop controlled) and roundabout intersections, the LoS is based on the modelled delay (seconds per vehicle) for the most delayed movement.

Table 3.2 outlines the Transport for NSW LoS criteria for intersections used in this assessment.

Table 3.2 Level of Service criteria for intersections

Level of Service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Give-way and stop signs
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 would cause excessive delays. Roundabouts require other control modes	At capacity, requires other control modes
F	Greater than 70	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; requires other control modes

Source: *Guide to Traffic Generating Developments (Transport for NSW, 2002)*

Degree of Saturation

The Degree of Saturation (DoS) is the ratio of demand flow to capacity. As DoS approaches 1.0, extensive queues and delays could be expected. In a satisfactory situation, DoS should be less than the nominated practical degree of saturation, usually 0.9. The intersection DoS is based on the movement with the highest value.

According to Austroads, in practice, the target degrees of saturation (known as the practical degree of saturation) for signal, roundabout and priority-controlled intersections are 0.90, 0.85 and 0.80 respectively.

Average vehicle delay

Average vehicle delay is the difference between interrupted and uninterrupted travel times through an intersection and is measured in seconds per vehicle. At signalised intersections, the average intersection delay is usually reported. At roundabouts and priority-controlled intersections, the average delay for the most delayed movement is usually reported.

Queue length

Queue length is measured in metres reflecting the number of vehicles waiting at the stop line. Queue length is usually quoted as the 95th percentile back of the queue, which is the value below which 95% of all observed queue lengths fall. It reflects the number of vehicles per traffic lane at the start of the green period when traffic starts moving again after a red signal. The intersection queue length is usually taken from the movement with the longest queue length.

3.6.2.2 Mid-block assessment for lane closure

The mid-block assessment for the contra-flow traffic operation was conducted using SIDRA. While traffic in reality would be managed by a traffic controller using a stop-and-go panel, it was modelled as signalised operation in SIDRA, allowing one traffic movement at a time and accounting for vehicle travel time between the two stop lines crossing the open trench construction site.

Traffic flow was modelled assuming a speed of 30 km/h. Based on the distance between stop lines, all-red signal timings were considered, ranging from 6 to 9 seconds.

3.7 Operational traffic assessment

The operation of the project generally involves maintenance works (i.e. maintenance of proposed pipelines and building facilities) which would be completed several times in a year. During operation, project-generated movements would be associated with maintenance and are likely to be low in volume.

The operational traffic assessment aims to qualitatively assess the impacts associated with road capacity, road condition, road safety, efficiency, active transport, public transport and property access.

The operational impacts of the project are discussed in Section 6.

3.8 Cumulative traffic assessment

The cumulative impact assessment approach involves considering the impacts of the project together with the impacts of other relevant future projects on traffic and transport matters. Relevant projects with the potential for cumulative traffic impacts with the project were identified through a review of publicly available information and environmental impact assessments.

The cumulative impacts of the project are discussed in Section 5.6.

4 Existing environment

4.1 Existing road characteristics

4.1.1 Road hierarchy

For management purposes, there are three administrative road classifications in NSW (State, Regional and Local roads) by the agreement under the Roads Act 1993. These are described below and mapped in Figure 4.1.

- **State Roads** – Major arterial roads through NSW and within major urban areas which are key in carrying traffic on the roads which are completely controlled by the Transport for NSW. These types of roads include Tollways, Freeways and Transitways and all or part of a Main Road, Tourist Road or State Highway.

Within the study area, roads that are classified as State Roads include Westlink M7, Sunnyholt Road, Richmond Road, Blacktown Road, Main Street, Prospect Highway, Wall Park Avenue, Balmoral Road and Third Avenue, which are shown in black in Figure 4.1.

- **Regional Roads** – Regional Roads support State Roads by connecting smaller towns to the NSW road network and with each other. Local councils manage Regional Roads. In recognition of their role as routes of secondary importance, Regional Roads are eligible to receive financial assistance from the State Government. Within the study area, roads that are classified as Regional Roads include Quakers Road, Vardys Road, Johnson Avenue, Falmouth Road, Davis Road, Knox Road and Lyton Street, which are shown in purple in Figure 4.1.
- **Local Roads** – These roads are controlled by councils and the funding allocated to them. Transport for NSW may fund some portion of maintenance and improvements such as urban bus routes and road safety programmes), which are shown in white in Figure 4.1.
- **Crown Roads** – Crown land and Crown roads are public lands owned and managed by the State Government, rather than by a local council or private landowner. An area of Crown land is located at the southern end of the Brine pipeline route within the International Peace Park. Additionally, the section of the access road to the park via Jean Street that provides access to Compound Site C20 is Crown road, as shown in yellow in Figure 4.1.

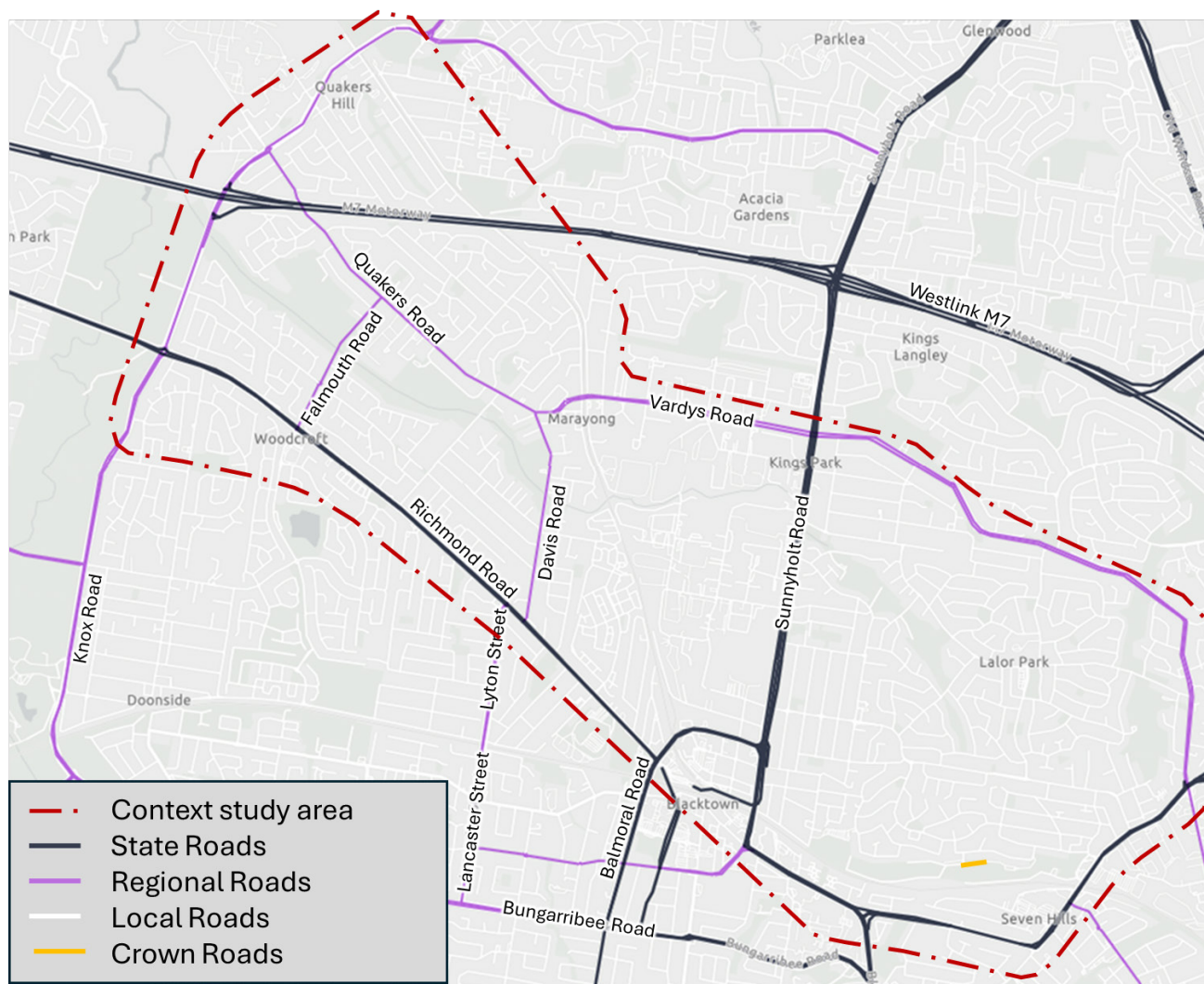


Figure 4.1 Key surrounding road network

4.1.2 Traffic data collection summary

As discussed in Section 3.5.2, traffic surveys were conducted on specific roads (mid-block counts) and key intersections (intersection turn counts) within the study area. The mid-block tube count surveys were conducted over a continuous 24-hour, 7-day period from Thursday 13 February to Wednesday 19 February 2025, to identify hourly and daily traffic patterns. Intersection turning movement counts were undertaken on Thursday 20 February 2025 during the AM peak period (6:30 am to 9:30 am) and the PM peak period (3:30 pm to 6:30 pm).

The identified peak hour period for each of the surveyed mid-block section and intersection are summarised in Table 4.1. Intersection turning movement diagrams for the peak hours, along with the corresponding traffic survey data, are provided in Appendix B.

Table 4.1 Traffic survey location selection

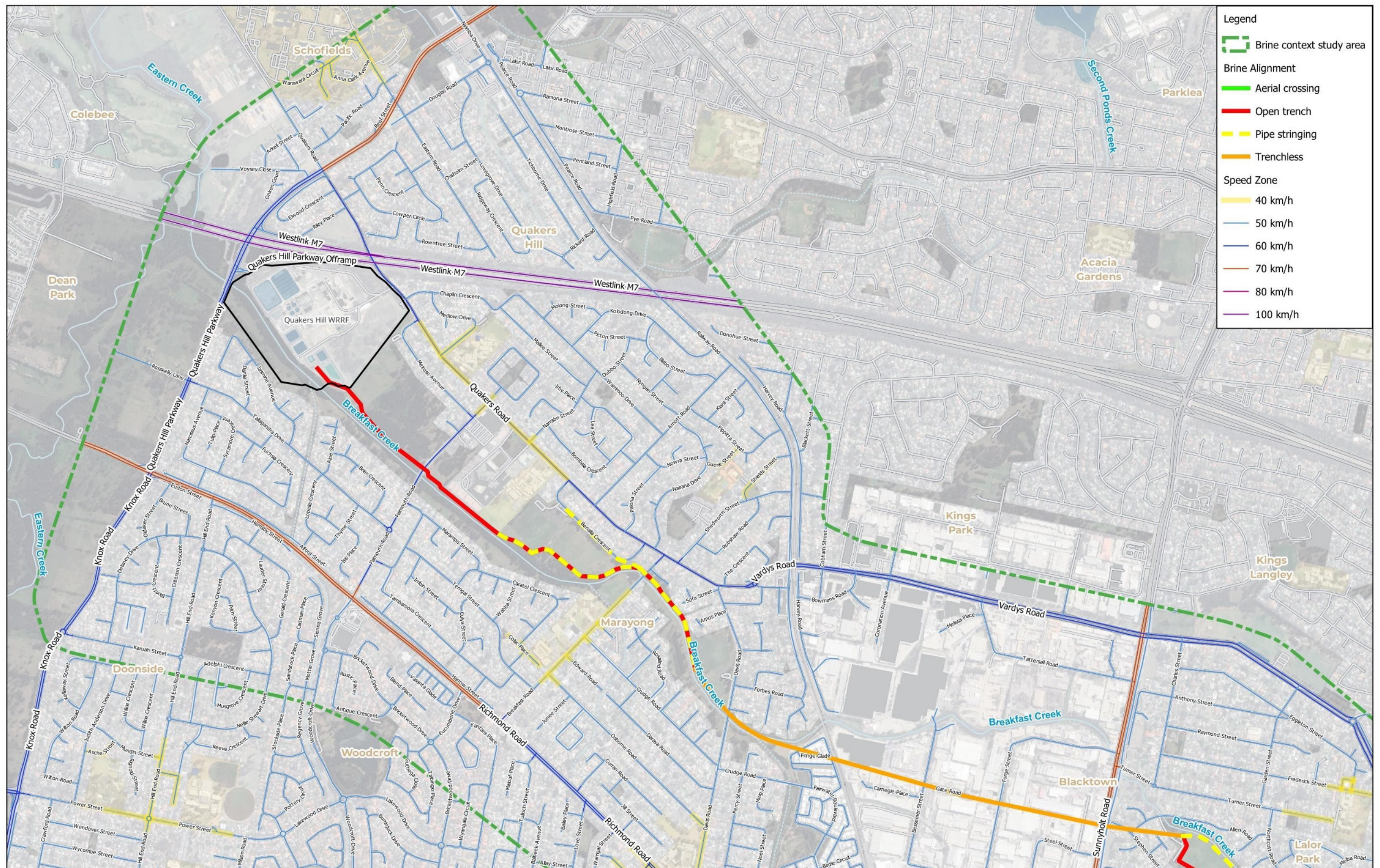
ID	Intersection location	Weekday peak hour period	
		AM	PM
M-01	Falmouth Road near the Breakfast Creek, Marayong	8:00 – 9:00 am	3:00 – 4:00 pm
M-02	Breakfast Road near the Breakfast Creek, Marayong	8:00 – 9:00 am	3:00 – 4:00 pm
I-01	Quakers Road/Quakers Hill WRRF Site Access, Quakers Hill	8:15 – 9:15 am	3:30 – 4:30 pm
I-02	Sackville Street/Mort Street, Blacktown	8:00 – 9:00 am	5:00 – 6:00 pm
I-03	Gordon Street/Sydney Street/Boyd Street, Blacktown	8:00 – 9:00 am	5:15 – 6:15 pm

4.2 Speed limit

Existing posted speed limit data for the study area has been obtained from Transport for NSW's Speed Zone dataset available in the Open Data. These are plotted across the study area in Figure 4.2 and Figure 4.3 to understand the current road environment and operation which will need to be considered when planning for temporary or permanent measures which may be required during construction and operation.

The open trench section of brine pipeline alignment west of Davis Street, generally follows the alignment of Breakfast Creek, which passes through local roads within the suburbs of Quakers Hill and Marayong. Most of the surrounding roads are posted at 50 km/h, with several posted at 60 km/h (Quakers Road, Quakers Hill Parkway). 40 km/h School Zone are present on Quakers Road nearby the Quakers Hill WRRF site and Breakfast Road.

The open trench section of brine pipeline alignment east of Sunnyholt Road generally traverses on local roads such as Mort Street, Boyd Street, the Blacktown Aquatic Centre car park and along the alignment of Blacktown Creek. Most of these roads are sign posted at 50 km/h. There are a number of sections which 40 km/h School Zone apply, including on Sunnyholt Road, Sackville Street and Wheeler Street.



Legend

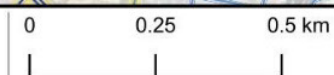
- Brine context study area
- Brine Alignment**
 - Aerial crossing
 - Open trench
 - Pipe stringing
 - Trenchless
- Speed Zone**
 - 40 km/h
 - 50 km/h
 - 60 km/h
 - 70 km/h
 - 80 km/h
 - 100 km/h

Figure 4.2
Posted speed limits on roads within study area - Page 1

Coordinate system: GDA2020 / NSW Lambert (EPSG:8058)

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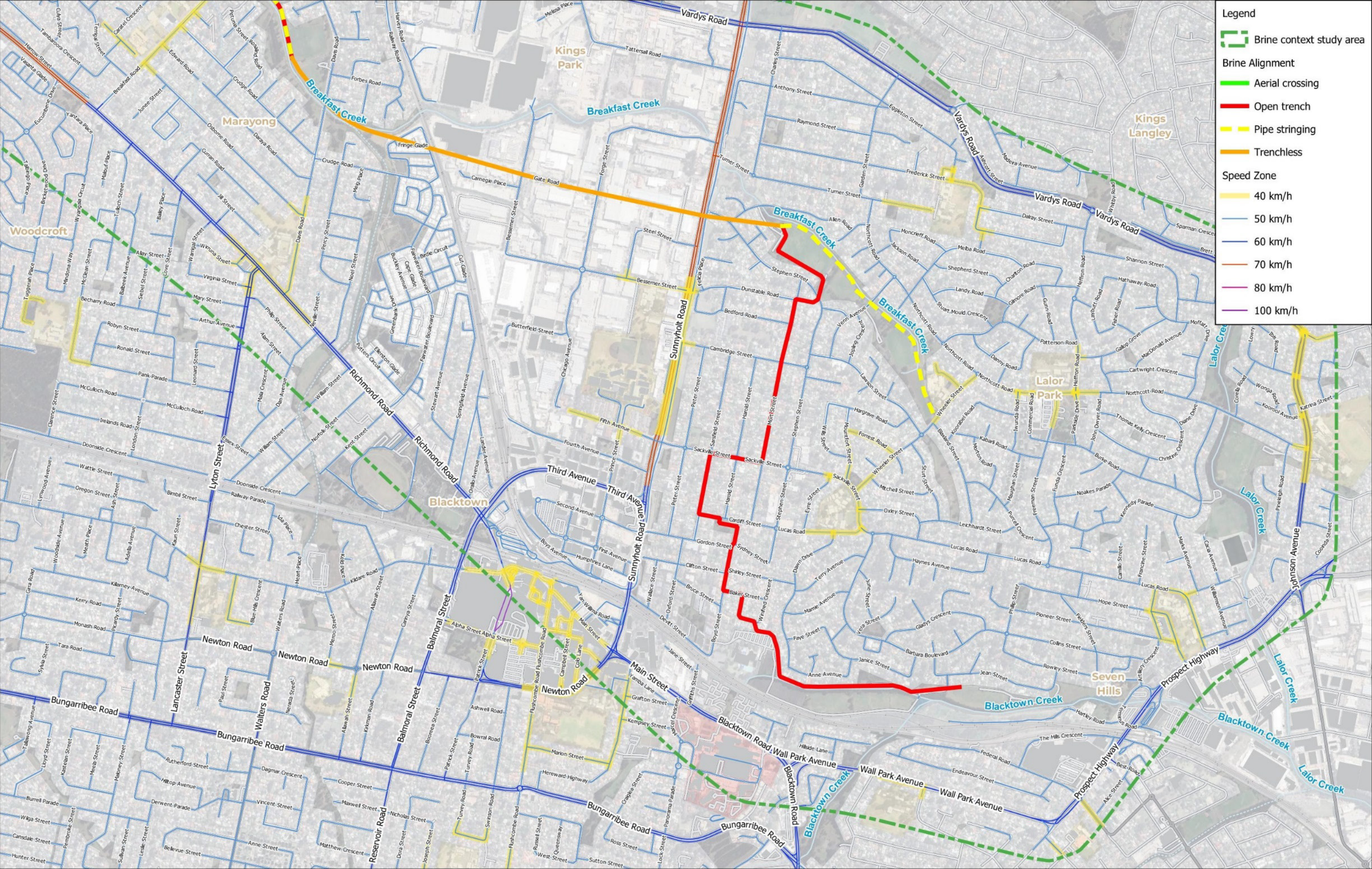
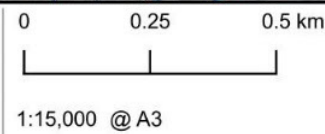


Figure 4.3
Posted speed limits on roads within study area - Page 2

Coordinate system: GDA2020 / NSW Lambert (EPSG:8058)

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4.3 Public transport

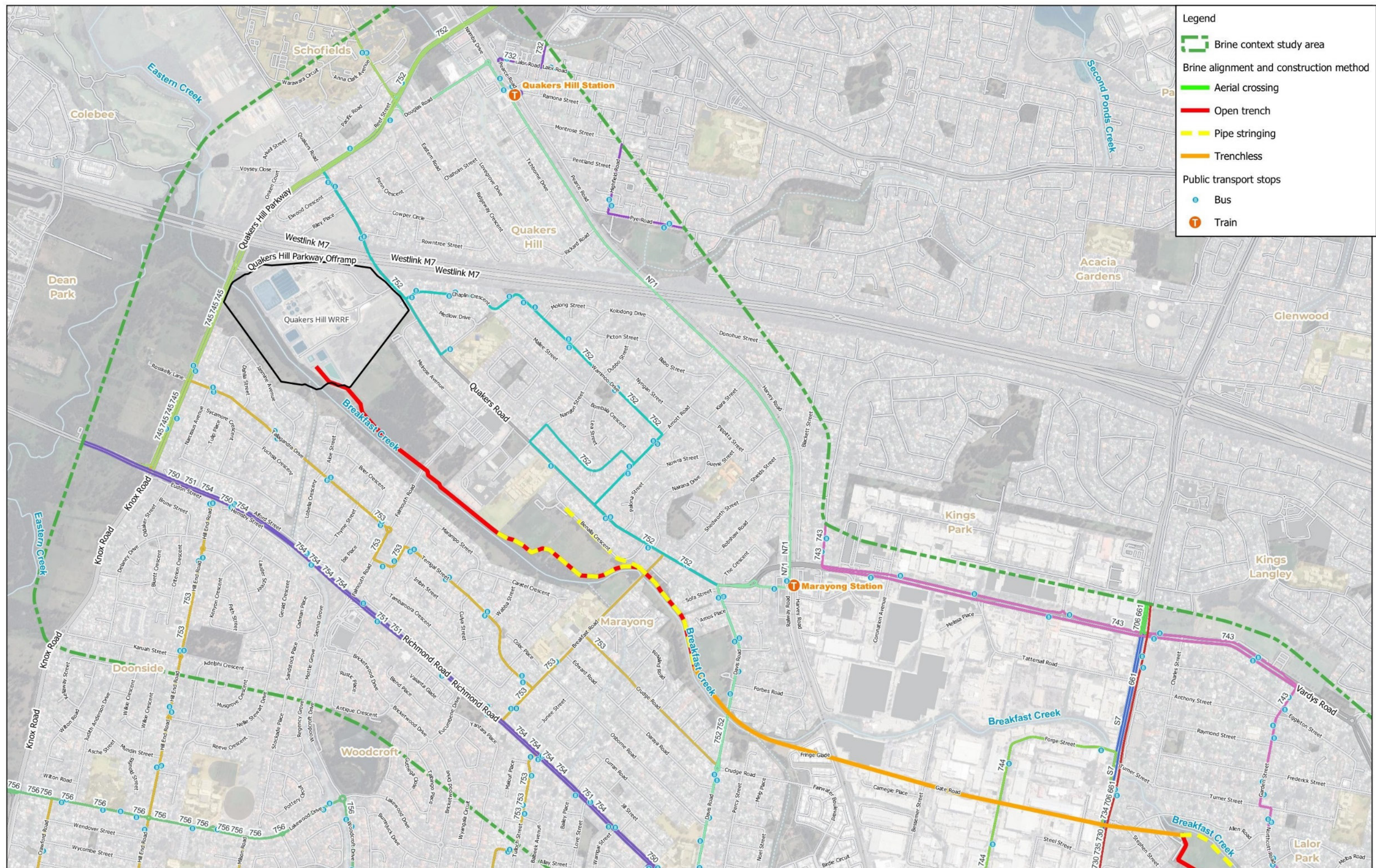
Existing public transport routes and stops for the study area has been obtained from Transport for NSW's Bus Routes and Sydney Trains dataset available in the Open Data. These are plotted across the study area in Figure 4.4 and Figure 4.5 to understand the current public transport services and routes which will need to be considered when planning for temporary or permanent measures which may be required during construction and operation.

Bus services within the study area (from west to east) are listed in Table 4.2 below. Regular bus services typically run from approximately 5 am–10 pm on weekdays and 8 am–8 pm on weekends, further details are provided with discussions of construction impacts to public transport in Section 5. Bus frequency varies between services, however typically found to operate with 30-minutes gap on weekdays and 1-hour gap on weekends.

Late night services buses (e.g. N71) typically operates from approximately 1 am–5:30 am in lieu of other train and bus services.

Table 4.2 Summary of bus services in the study area

No	Services	Affected roads
745	St Marys to Norwest Private Hospital via Stanhope Gardens	Quakers Hill Parkway
752	Blacktown to Rouse Hill Station via Quakers Hill	Quakers Road, Davis Road
753	Blacktown to Doonside (Loop Service)	Falmouth Road, Breakfast Road, Davis Road
N71	City Town Hall to Richmond via Parramatta (Night Service)	Davis Road
744	Blacktown to Blacktown Industrial Area	Forge Street, Bessemer Street, Sunnyholt Road
S7	Blacktown to Myrtle Glen Stanhope Gardens	Sunnyholt Road
735	Rouse Hill to Blacktown (Loop Service)	Sunnyholt Road
734	Blacktown to Riverstone via Schofields	Sunnyholt Road
732	Blacktown to Rouse Hill Station via The Ponds	Sunnyholt Road
731	Blacktown to Rouse Hill Station via Stanhope Gardens	Sunnyholt Road
730	Blacktown to Castle Hill via Glenwood and Norwest	Sunnyholt Road
706	Parramatta to Blacktown via Kings Langley and Winston Hills	Sunnyholt Road
661	Parramatta to Blacktown via North West Tway and Kings Langley	Sunnyholt Road
743	Blacktown to Kings Langley	Venn Avenue, Stephen Street, Gordon Street, Sydney Street, Sackville Street
711	Parramatta to Blacktown via Constitution Hill	Sackville Street, Barbara Boulevard
705	Parramatta to Blacktown via Pendle Hill	Sackville Street



4.4 Active transport

Active transport facilities refer to those designated for people walking and cycling, which includes footpaths, off-road cycling facility and on-road cycling facility. Some of these facilities are shared for both walking and cycling.

The study area consists of established walking and cycling routes such as the **Great West Walk**, a 140 km walking route from Parramatta to Katoomba traverses through Blacktown City Council, Blue Mountains City Council, City of Parramatta Council, Penrith City Council, NSW National Parks and Wildlife Service, and the Western Sydney Parklands Trust.

In addition to the above, facilities for people walking also include crossing facilities and footpaths. Footpaths are essential part of the road network to provide people with accessibility, enhance liveability and promote sustainable and environmentally friendly travel. The footpath network have not been included in the figures below, as they are typically available on most roads, placed in the verge area between the property boundary and kerb alignment.

The alignment of brine pipeline west of Davis Road will largely be along Breakfast Creek, which currently consists of a shared use path facility which form part of the Great West Walk. The facility along Breakfast Creek also provides connection to the shared use path within the Western Sydney Parklands to the west of the study area and designated on-road cycling facility on local roads within Marayong (e.g. Noel Street) which connects to the shared use path facility on Richmond Road. These facilities are depicted in Figure 4.6.

In the eastern section of the study area, shared use path is currently provided along Sunnyholt Road in the north-south direction and along Devitt Street and Blacktown Creek (forms part of the Great West Walk) in the east-west direction. Parking lane along Sackville Street and Wheeler Street have noted to also be available for cycling generally in the east-west direction. These facilities are depicted in Figure 4.7.

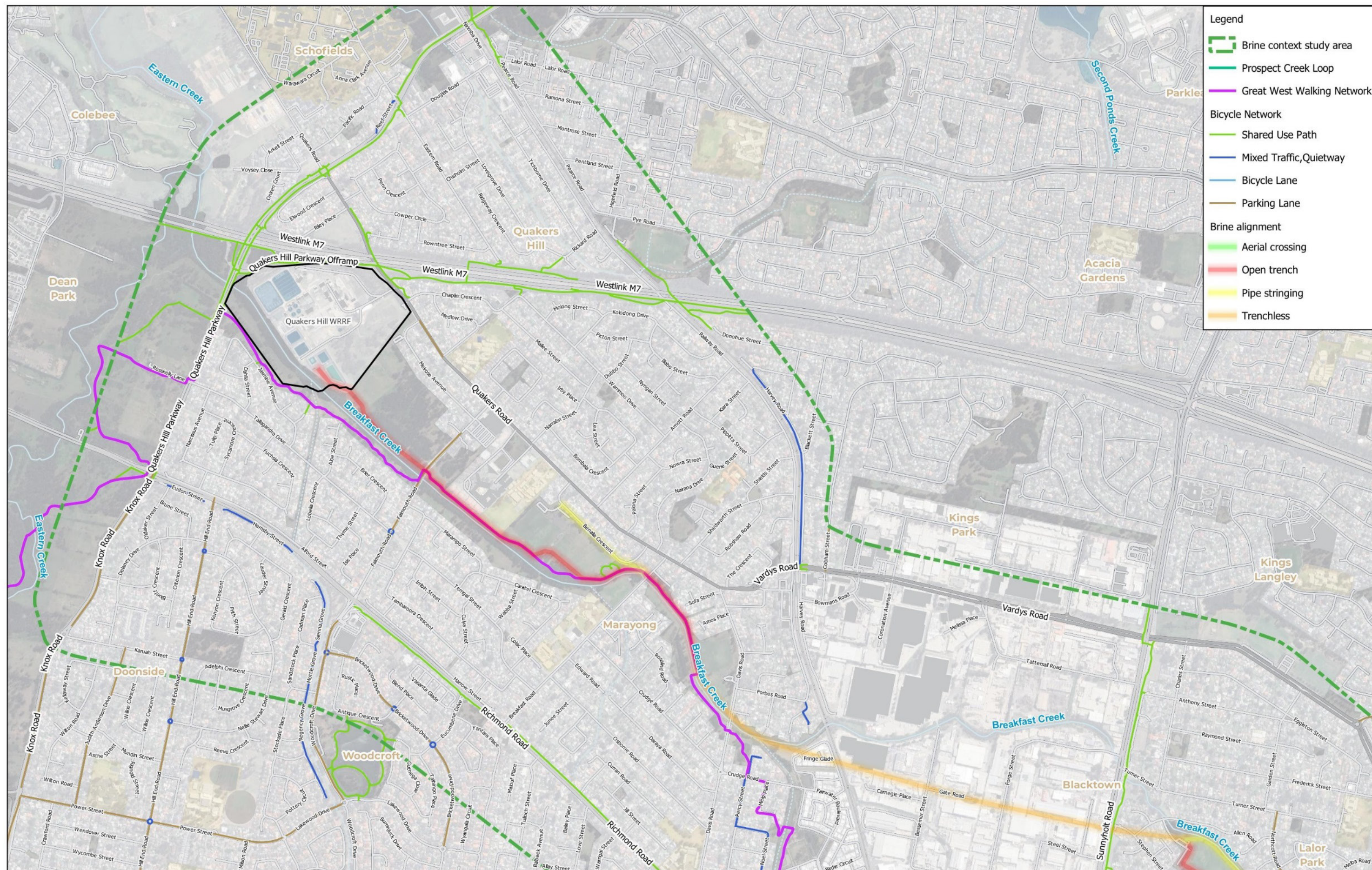


Figure 4.6
Walking and cycling routes within study area - Page 1

Coordinate system: GDA2020 / NSW Lambert (EPSG:8058)

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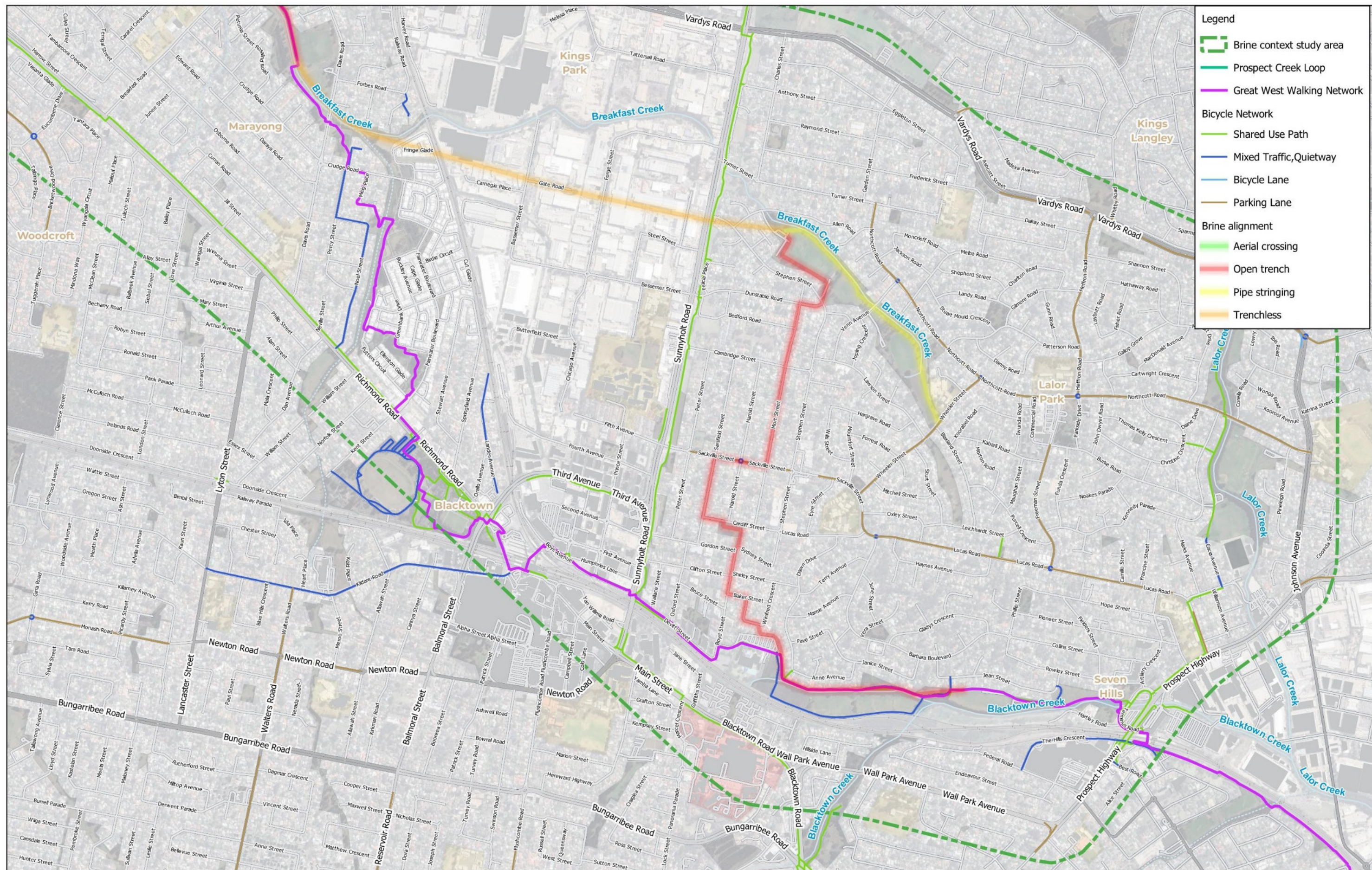
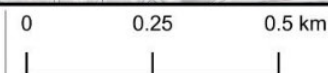


Figure 4.7
Walking and cycling routes within study area - Page 2

Coordinate system: GDA2020 / NSW Lambert (EPSG:8058)

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4.5 High pedestrian activity areas

This section outlines locations that are expected to experience high levels of pedestrian activity along the proposed pipeline construction impact area. These include sensitive land uses such as school zones, parks, and community facilities, where pedestrian movements are concentrated throughout the day. Particular attention will be required in these areas to manage construction activities in a way that ensures the safety of pedestrians and maintains access for residents, students, and other vulnerable users:

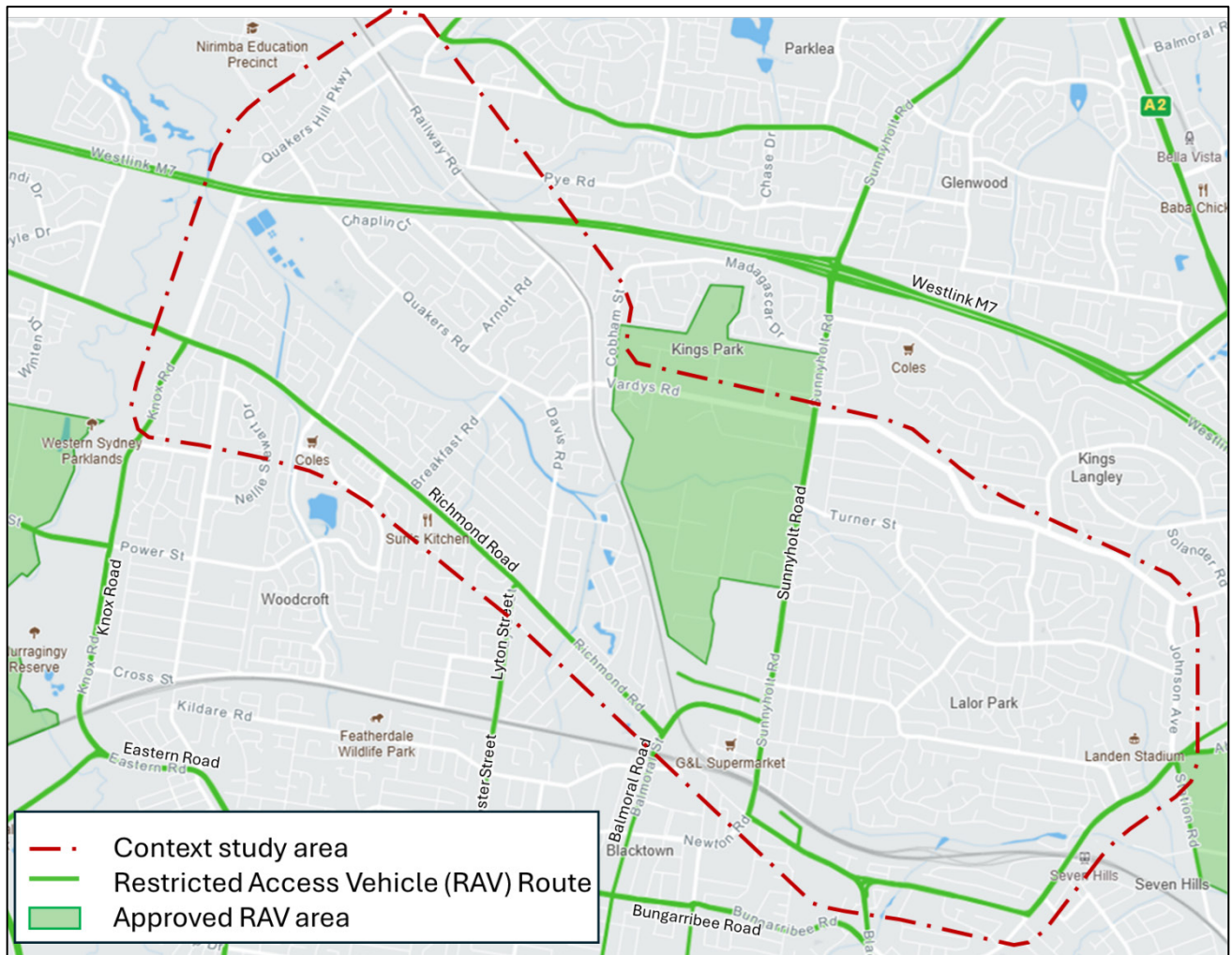
- Skate park in Harvey Park, south of Benalla Crescent, Quakers Hill
- Breakfast Road, north of St Andrew The Apostle Catholic School, Marayong
- Lynwood Park in Blacktown.

4.6 Heavy vehicle travel restrictions

Figure 4.8 below depicts the roads currently permitted for use by Restricted Access Vehicles (RAV). RAVs are vehicles exceeding the General Access Vehicle limit of 19 metres long and 2.5 m wide (i.e. a semi-trailer dimension), which includes B-Double vehicles of up to 25/26 metre length.

While the project is likely to require mostly rigid trucks (up to 12.5 m trucks), it is important to understand the existing RAV routes as these roads are typically planned to accommodate the movements of heavy vehicles, which would influence the planning of construction vehicle routes for this project to minimise the impacts to residents and businesses.

Within the study area, RAVs are permitted to travel on the Westlink M7 Motorway, Richmond Road, Knox Road, Sunnyholt Road, Fourth Avenue, Third Avenue, Blacktown Road, Wall Park Avenue and Prospect Highway.



Source: National Heavy Vehicle Regulator (2025)

Figure 4.8 Restricted access vehicle – approved 25 m/26 m B-Double route

4.7 Crash analysis

The latest five-year crash data (2019-2023) has been analysed for the road network surrounding the impact area of the project to understand current road safety issues where construction works are proposed or where traffic management are potentially required to manage safe movements of road users. The analysis has been conducted on the road network approximately within 150 metres from the proposed site compound and pipeline alignment as these roads will be impacted most by the proposed construction works. The location of recorded crashes have been plotted along the study area depicted in Figure 4.9 and Figure 4.10.

Table 4.3 summarises the crash history on roads nearby the Brine pipeline alignment, classified based on the crash severity and types/road user involvement. Overall, 67 crashes were reported including a fatality, 27 injury crashes and 39 tow-away crashes. The fatality crash reported occurred on Quakers Road east of Arnott Road, which was a mid-block crash involving vehicle losing control at this section.

Table 4.3 Crash analysis along proposed Brine pipeline alignment

Crash severity	Pedestrians	Adjacent	Opposing	Same direction	Manoeuvring	Overtaking	Loss of control	Others	SUM
Fatal	0	0	0	0	0	0	1	0	1
Serious Injury	1	3	3	0	0	0	1	0	8
Moderate Injury	1	1	2	1	3	0	4	0	12
Minor/Other Injury	1	1	1	1	3	0	0	0	7
Non-casualty (towaway)	0	5	9	3	7	0	15	0	39
TOTAL	3	10	15	5	13	0	21	0	67

Several locations which present crash clusters in the assessed area include:

- Falmouth Road between Melrose Park and Quakers Road (5 injury crashes and 4 tow-away), involving right-through crashes at Quakers Road/Falmouth Road and Falmouth Road/Melrose Avenue intersections. Loss of control crashes were also reported at this location
- Quakers Road/Narrabri Street (2 injury and a tow-away crashes) indicating intersection crash
- Quakers Road/Breakfast Road (2 injury crashes and 4 tow-away crashes), involving right-through crashes at the intersection
- Davis Road/Quakers Road (1 injury and 3 tow-away crashes), involving intersection and rear-end crashes
- Mort Street/Dunstable Road (1 injury and 3 tow-away crashes), involving cross-traffic crashes at the intersection
- Sackville Street/Sarsfield Street (3 injury crashes), involving pedestrian and loss of control crashes.

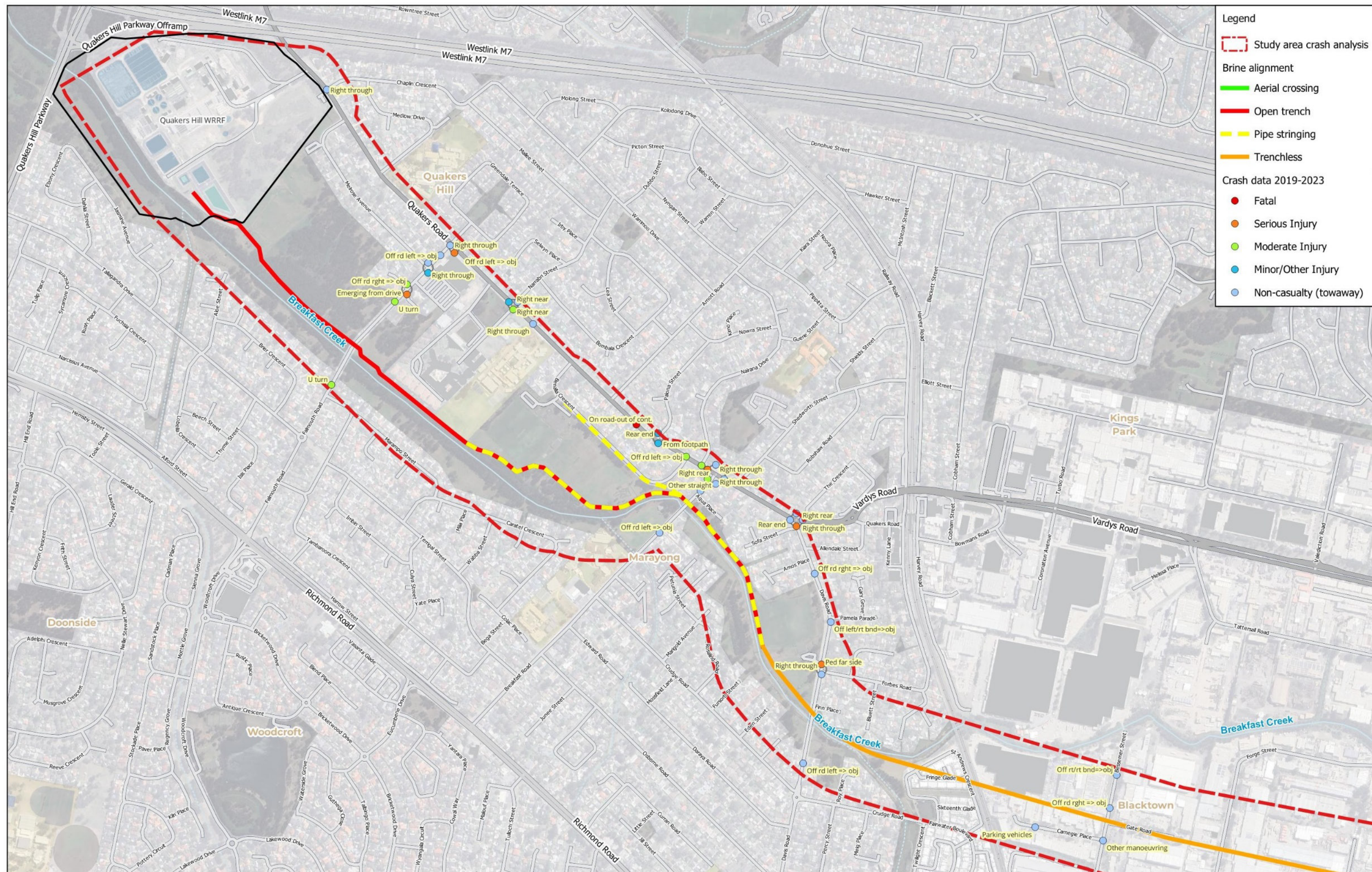


Figure 4.9
Crash data analysis - Page 1

Coordinate system: GDA2020 / NSW Lambert (EPSG:8058)

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5 Construction impact assessment

5.1 Construction details

All construction works including the secondary wastewater upgrades and the Advanced Water Treatment Plant (AWTP) would be undertaken within the existing Quakers Hill WRRF site except for the brine pipeline.

5.1.1 Construction program

The construction phase of the project is scheduled to commence in 2027 and is expected to take approximately two years to complete. Early civil works, including the demolition of the existing facility within the Quakers Hill WRRF site, may begin in 2026, subject to obtaining the necessary approvals. Table 5.1 outlines the expected start dates and anticipated duration of works for each component of the proposal.

The staging of construction will be determined once a contractor or contractors have been engaged. It is expected that Brine pipeline construction will occur throughout the entire construction phase, with work likely to be staggered across different sections of the project alignment.

Table 5.1 Expected start and duration of construction for each component

Proposal component	Expected start	Duration
Early civil works (e.g. earthworks, demolition) and high voltage works	Early 2026	About 12 months
Existing infrastructure modifications and secondary wastewater treatment upgrades	Early 2027	About 15 months
Advanced water treatment plant	Mid-2027	About 18 months
Brine pipeline	Early 2027	About 24 months

5.1.2 Construction hours

Construction work and deliveries will typically be scheduled and carried out during standard daytime hours of:

- Monday to Friday – 7 am to 6 pm
- Saturdays – 8 am to 1 pm
- Sunday and public holidays (no work).

At this stage, minimal night works are planned. However, certain compounds or sections will require work outside standard hours, including night works, for activities such as:

- truck deliveries
- trenchless construction techniques, including Horizontal Directional Drilling (HDD) activities
- activities requiring continuous work, e.g. concrete pours, commissioning and performance testing
- excavations (trenching) and pipe installation in busy public roads
- connections to operational assets within the WRRF site
- works requiring low wastewater flows, such as connections and cut-ins.

The specific locations and duration of out-of-hours works will be determined during the construction planning phase once a contractor has been engaged. Communities will be notified in advance of any out-of-hours works in accordance with the Interim Construction Noise Guidelines and the project's Community and Stakeholder Engagement Plan.

5.1.3 *Construction method*

The methodology for constructing the brine pipeline will be dynamic, likely occurring in several locations at one time, moving progressively along the pipeline alignment, with each location likely to be in a different phase at any one time.

The delivery contractor(s) will install the brine pipeline using two construction methods. The method selected for certain sections of pipeline has been informed by a review of engineering and environmental constraints. About 5.1 km of the overall brine pipeline will be constructed using an open-cut trench method. About 2.6 km of pipeline between Marayong Park and Lynwood Park would be installed using a trenchless technique (expected to be HDD).

To reduce the construction program and for procurement reasons, several work fronts may be established along the length of the brine pipeline. It is likely that one work front would construct the open-cut trench sections of pipeline, while the other would construct the HDD sections of pipeline.

5.1.3.1 *Open trench method*

Open trenching involves digging a long linear trench in which the pipeline is placed. This requires excavation of the ground surface along the entire length of the pipeline. This method of construction is the most conventional for pipeline installation when depths are relatively shallow and there are minimal constraints such as structures, vegetation and large waterways. The project would use a range of open trenching methods for pipeline installation.

Depending on the depth of the pipeline, the area and size of the trench can range in size. If deep excavation is required, the trench needs to be benched, stepped or reinforced with shoring to prevent collapsing. The typical construction corridor width for open trench construction is 9–12 m wide, and wider in some areas to accommodate construction compounds. The open trench construction methodology can typically complete an average of 12 to 24 metres per standard working day. At some locations the construction corridor would be narrower due to site constraints.

It is anticipated that multiple work fronts will operate simultaneously, with each constructing a different section of the brine pipeline and progressing through various stages of construction. Restoration of impacted areas is expected to follow trench backfilling; however, the exact methodology will be determined by the delivery contractor during detailed design.

5.1.3.2 *Trenchless (HDD) method*

A launch and retrieval pit will be established at the start and end of the planned HDD route:

- launch pits will be located at construction compounds C9 and C13
- retrieval pits will be located at compound C11.

5.1.4 *Construction compounds*

Up to 20 locations for construction compounds have been identified at intervals along the brine pipeline alignment. Not all these locations are expected to be used for construction compounds. However, 20 options have been considered within this REF to provide flexibility for the pipeline delivery contractor(s).

Some construction compounds will be used as laydown areas for pipes (referred to as pipe-stringing) associated with trenchless pipe installation proposed at Marayong Park. Other compounds will serve as pipe-stringing areas for trenchless installation works proposed at Lynwood Park.

5.1.5 Equipment and vehicles

The construction plant and equipment required for each component of the proposal is presented in Table 5.2.

Table 5.2 Expected construction plant and equipment

Equipment	Proposal component	
	Secondary and advanced water treatment	Brine pipeline
7–10 tonne excavator	X	X
10–15 tonne roller	X	
12–15 tonne franna crane	X	X
30 tonne excavator	X	
50 tonne crane	X	
200 tonne crane	X	
Air compressor	X	X
Backhoe	X	X
Bob cat	X	X
CAT 140M grader	X	
Concrete agitator	X	
Concrete pump	X	
D10 dozer	X	
Dumper truck	X	X
Elevated working platform	X	
Excavator with hammer		X
Flatbed Hi-Ab truck	X	X
Generator	X	X
HDD rig		X
Piling rig	X	
Pneumatic jackhammer		X
Rigid tippers	X	
Semi trailer	X	X
Stringing winches		X
Transport truck	X	
Trencher		X
Water cart	X	

5.2 Construction vehicle movements

5.2.1 Construction vehicle

Most traffic and access impacts would occur during the construction phase of the project. Construction-related traffic would be generated by activities such as:

- worker crews carrying out tunnelling and open trenching along the pipeline alignment
- light vehicles accessing site compounds, including the secondary wastewater treatment upgrades and AWTP construction site at Quakers Hill WRRF
- heavy vehicles accessing site compounds, including the secondary wastewater treatment upgrades and AWTP construction site, to deliver construction materials and equipment to remove waste.

Table 5.3 outlines the estimated peak traffic movements for light and heavy vehicles during construction.

Table 5.3 Indicative construction traffic generated by the proposal

Location	Likely route	Estimated peak daily movements	
		Light vehicles	Heavy vehicles
AWTP works site at Quakers Hill WRRF	Quakers Road	100	78
Brine pipeline	Western section: M7 Motorway, Quakers Hill Parkway and Quakers Road Central section: M7 Motorway, Sunnyside Road and Vardys Road Eastern section: M7 Motorway and Sunnyside Road	50	8

5.2.2 Construction traffic generation

Light vehicle movements will primarily be associated with construction workforce commuting to and from the site. These trips are expected to occur outside the typical weekday morning and afternoon peak traffic periods, as construction hours are from 7:00 am to 6:00 pm. Therefore, construction-related light vehicle trips are unlikely to coincide with peak traffic volumes. However, to adopt a conservative approach in assessing potential traffic impacts, it has been assumed that all light vehicle trips will occur during peak periods, with inbound trips to the work area during the weekday AM peak and outbound trips during the weekday PM peak.

Heavy vehicle movements will be evenly distributed throughout the 11-hour construction workday. It is estimated that eight heavy vehicle trips to and from the AWTP works site at Quakers Hill WRRF, along with one heavy vehicle trip to and from the Brine pipeline work sites will occur during peak hours.

Table 5.4 summarised the directional distribution of light and heavy vehicle movements during the weekday AM and PM peak periods.

Table 5.4 Peak hour traffic generation – light and heavy construction vehicle

Project site	Period	Trips per hour			
		Light vehicle		Heavy vehicle	
		In	Out	In	Out
AWTP works site at Quakers Hill WRRF	Weekday AM peak	100	0	8	8
Brine pipeline		50	0	1	1
AWTP works site at Quakers Hill WRRF	Weekday PM peak	0	100	8	8
Brine pipeline		0	50	1	1

5.2.3 Construction vehicle parking

Car parking for construction workers will be provided within the existing Quakers Hill WRRF site during the construction period. Existing paved parking areas may be designated for worker use, and additional greenfield areas within the site could be made available for construction-related parking if necessary. However, during peak construction periods, the number of personal vehicles associated with the workforce may exceed the available onsite parking spaces. To address this potential shortage, an existing car park at Melrose Avenue (located approximately 100 m southeast of the Quakers Road and Melrose Avenue intersection, east of the Quakers Hill WRRF site) is proposed as temporary overflow parking. This car park will provide around 27 additional parking spaces.

Construction vehicles along the brine pipeline construction will be parked on local roads near the pipeline construction corridor and adjacent compound sites.

Details of the proposed parking locations and potential impacts are provided in Section 5.5.2 and Section 5.6.

5.3 Construction impact area

5.3.1 Secondary treatment and advanced treatment upgrade at the Quakers Hill WRRF site

Figure 5.1 shows the impact area for construction works within the WRRF. Activities including construction of new assets, use of laydown areas, construction amenities, and parking would be required within the WRRF impact area.

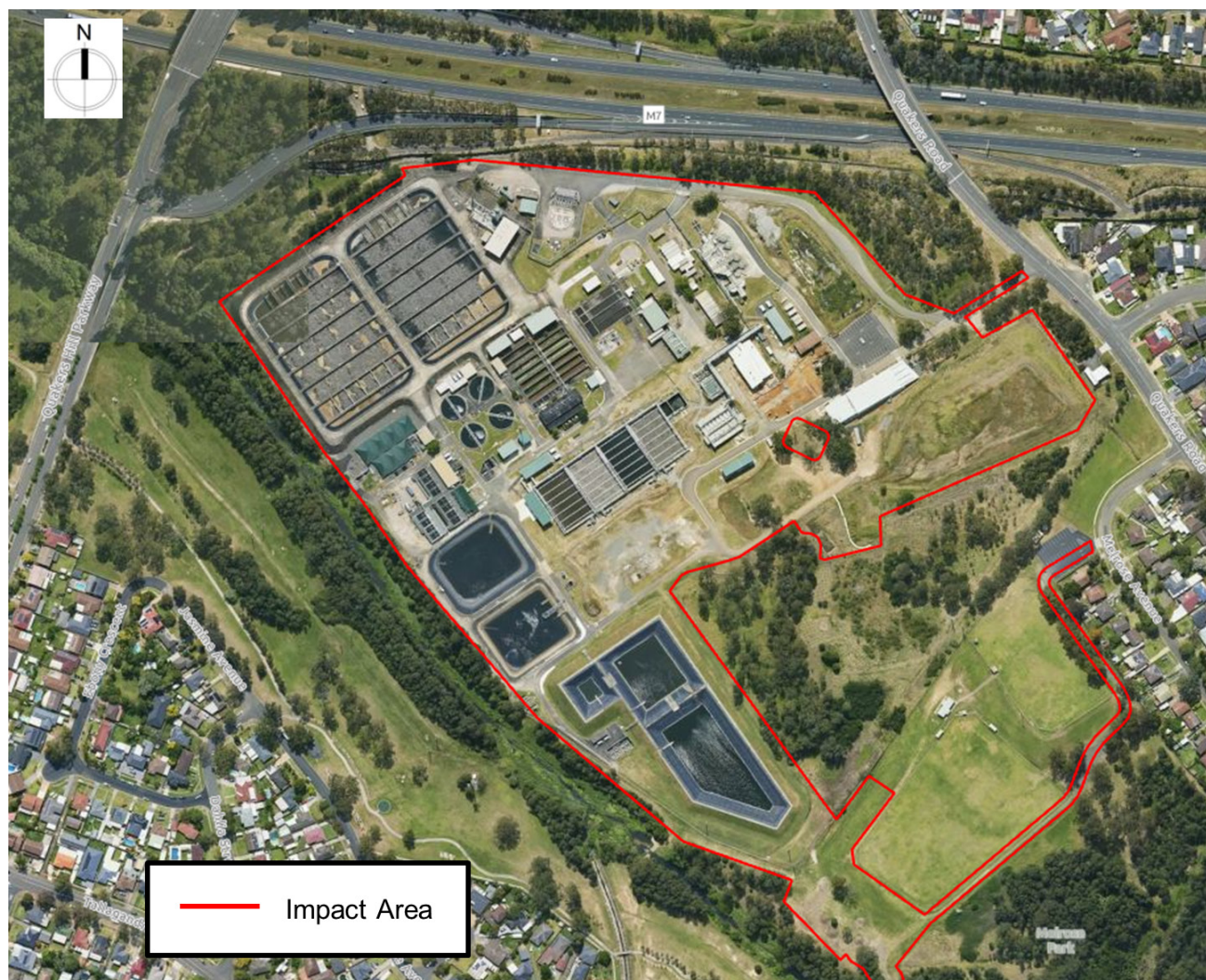


Figure 5.1 Impact area for construction works within Quakers Hill WRRF site

5.3.2 Brine pipeline

Figure 5.2 in Section 5.6 shows the construction route of the brine pipeline between the Quakers Hill WRRF site and the International Peace Park at Seven Hills.

5.4 Construction vehicle routes

The construction vehicle routes assessed in this study includes travel routes that workers and delivery vehicles will travel on during the construction phase to reach the work areas spread out along the project's alignment.

These have been divided into movements which are needed to carry out construction activities in the WRRF site and those required to construct the pipeline.

Higher traffic demand is estimated into/out of the Quakers Hill WRRF site considering the number of construction activities required at the site. These trips are generally concentrated to the WRRF access point on Quakers Road and onto the Quakers Hill Parkway. From Quakers Hill Parkway, vehicles can access the M7 Motorway with ramp connections travelling eastbound or continue travelling southbound to connect to other State Road network, such as Richmond Road and Doonside Road.

Lower traffic demand is estimated for pipeline installation works given the smaller workforce. These trips are also less concentrated given the smaller number of work areas scattered along the alignment of the proposed pipeline.

Construction vehicle routes for the PRW pipeline works should be planned to prioritise the use of state roads wherever possible, aiming to minimise travel distances to and from the motorway and arterial road network. These roads are designed to support the movement of people and goods between cities and urban centres and are therefore more suitable for accommodating construction-related traffic.

Use of regional and local roads should be restricted to those segments that are essential for accessing specific construction sites. This approach helps reduce the overall impact on the surrounding precinct, as regional and local roads serve more diverse functions, including pedestrian and cyclist movements, property access, kerbside parking, and local street activity and are more sensitive to disruption.

Any specific road segments that should be avoided by construction vehicles should be clearly identified in the Construction Traffic Management Plan (CTMP). These restrictions must be communicated to all construction personnel and delivery drivers before the commencement of works.

Along the brine pipeline between Quakers Hill Parkway and Sunnyholt Road, the construction route will generally be limited to Quakers Road and connecting streets to provide access to the proposed site compounds and pipeline work area.

In the section east of Sunnyholt Road, east-west roads such as Dunstable Road and Sackville Street will be used to connect the site compounds and work sites to Sunnyholt Road. Roads in the north-south direction will also be impacted as either they are on the pipeline alignment or used to access work areas.

5.5 Construction impact assessment

This section presents an assessment of the potential traffic and transport impacts associated with the proposed construction works. The assessment considers the likely impacts on various elements of the surrounding transport network, including road capacity, parking, active transport, public transport, and emergency access.

The assessment is based on the proposed construction methodology, anticipated traffic generation, and likely construction vehicle movements. It also considers relevant traffic survey data and existing conditions within the study area.

Detailed assessments for each construction impact area are provided in the following Section 5.6.

5.5.1 *Impacts on road capacity*

In general, the proposed open trench construction work across regional and local roads will require temporary lane closures, with traffic controllers in place to manage traffic movements. As the open trenching method typically progresses at a rate of approximately 12 to 24 metres per day under standard conditions, the associated lane closures are expected to be of a short-term nature and remain in place only for the duration necessary to complete the works at each location.

The impacts on road capacity are discussed for each section of the pipeline alignment in Section 5.6. The condition of temporary road or lane closure has been assessed based on existing traffic demand, available road width and construction methodology. This impacts the following locations:

- Section BP01: Falmouth Road (refer to Section 5.6.2.1)
- Section BP02: Breakfast Road (refer to Section 5.6.3.1)
- Section BP09: Sackville Street (refer to Section 5.6.10.1).

The proposed condition of the road closure aims to balance the impact of road network performance and providing the construction with adequate working shift to set up/set down traffic control devices and complete the works. Access to properties by all modes of transport (including for Emergency Vehicles) will be maintained at all times, however there will be situations where access routes will need to be detoured.

5.5.2 *Impacts on parking*

For the Quakers Hill WRRF site, the project will provide off-street car parking spaces within the site to accommodate for the larger number of workers required during construction and minimise the impact to on-street parking in surrounding streets. Parking spaces will be available for use by workers, construction trucks and visitors accessing the site.

Existing paved parking areas may be designated for worker use, and additional greenfield areas within the site could be made available for construction-related parking if necessary. An overflow parking area will likely be available within the site on grassed areas to minimise the impact on on-street parking. To further address potential shortages, an existing car park at Melrose Avenue, located approximately 100 m southeast of the Quakers Road and Melrose Avenue intersection east of the Quakers Hill WRRF site, is proposed as temporary overflow parking, providing around 27 additional spaces.

Along the pipeline, the impacts on parking are attributed to:

- increased parking demand from the construction related vehicles including staff parking and heavy vehicle parking
- the loss of on-street parking due to trenching and pipeline construction activities.

Overall, the construction of Brine pipeline would generate up to 50 light vehicles and 8 heavy vehicles per day during construction consisting of workers and delivery vehicles required to carry out the work.

Where it is possible, off-street parking spaces will likely be provided in larger site compounds along the pipeline alignment to minimise the impact to the surrounding streets. Where it is not possible, construction vehicles will be parked on-street surrounding the work area.

During the open trench construction across local or regional roads, kerbside parking on both sides of the road will be likely temporarily restricted, resulting in the loss of up to four parking spaces on each side. However, this restriction will only remain in place for the duration required to complete the trenching works. Similarly, for open trench construction along local roads, kerbside parking on both sides will likely be temporarily restricted to maintain two way traffic flow through the construction zone. The length of the restricted area and the number of temporarily unavailable parking spaces will vary each day, depending on the progress of pipeline works scheduled for completion.

The overall impact of the project on on-street parking is considered minor, as the works are temporary and, for the most part, the alignment runs along residential streets where there is ample unrestricted on street parking with observed low demand.

Temporary parking restrictions during the construction period should be discussed with Blacktown City Council, and residents should be notified of the construction schedule and any associated impacts.

The impacts on parking are discussed for each section of the pipeline alignment in Section 5.6.

5.5.3 *Impacts on property access*

This section summarises the list of properties which access will likely be affected due to open trenching construction along the pipeline alignment on the public road.

- 46A to 52 Dunstable Road, Blacktown
- 2 to 6 Mort Street, Blacktown
- 8 to 10A Mort Street, Blacktown
- 14 to 22 Mort Street, Blacktown
- 33 Cambridge Street, Blacktown
- 26 to 84 Mort Street, Blacktown
- 86 Mort Street, Blacktown
- 52 Sackville Street, Blacktown
- 16 to 52 Sarsfield Street, Blacktown
- 11 Sarsfield Street, Blacktown
- 36 Cardiff Street, Blacktown
- 15 to 17 Boyd Street, Blacktown
- 11 Boyd Street, Blacktown
- 12 to 18 Baker Street, Blacktown
- 20 to 30 Winifred Crescent, Blacktown.

Works along the pipeline will be undertaken in stages, and progressively along the pipeline alignment, to avoid impacting property access for long periods. Construction will also be planned during off-peak periods as much as practically possible to further minimise access impacts for residents.

Blacktown City Council, affected residents and businesses will be notified/consulted before construction works ensure the work area can be set up for construction and concerns from residents are addressed beforehand.

In addition to the above, reduced accessibility will be experienced by residents due to lane closure proposed where the pipeline needs to be trenched across or along a road corridor. These are discussed in Section 5.6 and detailed in subsequent sections.

5.5.4 *Impacts on public transport*

The impacts on road capacity, and subsequent impacts to public transport (predominantly bus routes), are discussed for each section of the pipeline alignment in Section 5.6. The condition of temporary full road or partial lane closure has been assessed based on existing bus route operating hours, traffic demand, available road width and construction methodology.

The proposed condition of the road closure aims to balance the impact of road network performance and providing the construction with adequate working shift to set up/set down traffic control devices and complete the works. Access to properties by all modes of transport (including for Emergency Vehicles) will be maintained at all times, however there will be situations where access routes will need to be detoured.

For bus routes, temporary detouring of a route will require consultation with TfNSW and affected bus operators. Bus customers of impacted bus routes and stops are to also be notified in advanced of the proposed temporary arrangements, date and time, and contact details provided for bus customers to seek assistance where required.

5.5.5 *Impacts on active transport*

The impacts on active transport are anticipated to be minor and temporary in nature. On footpaths, it will require isolated traffic control near construction sites to provide pedestrians safe access around the work area.

Existing on-road cycling facility including dedicated bicycle lane, bicycle lane shared with parking lane, and Quietway/mixed traffic treatment are to be maintained during construction under traffic control. This may entail introducing lower speed environment around construction impact area and ensuring existing road pavements are suitable for travels for cyclists.

For shared path facilities, the proposed works are likely to impact the following locations:

- Existing shared path refuge on Falmouth Road and Breakfast Creek will likely be temporarily closed during construction as the pipeline alignment will go through it. The works will be carried out at nighttime to minimise the impact of the temporary closure of the refuge.
- The shared path along the northern side of Breakfast Creek will likely be closed to ensure no interaction between the public and work area. Pedestrian and cyclist access between Falmouth Road and Breakfast Road will need to be maintained via alternative local streets that are equipped with existing footpaths, ensuring continued access for school students and residents.
- Shared paths in Marayong Park north of Breakfast Creek alignment will likely be closed during construction to ensure no interaction between the public and work area. Walking and cycling to connect Breakfast Road and Davis Road will need to be provided via alternative local routes to maintain access for residents.
- Temporary full closure of the shared path at the International Peace Park is likely required to separate people walking and cycling from the work area. Notifications of the path closure will be provided in advanced with detour through Dawn Drive, Anne Avenue and existing laneways possible to provide continuation of the paths during construction.

The impacts and mitigation as noted above will require prior notification in advanced to ensure path users, affected residents, businesses and specific users (e.g. school students) are well informed of the proposed works, temporary closure of the facility and alternative routes to take.

5.5.6 *Impacts on emergency access*

A minimum 3 m wide emergency access is generally required at all times by road authorities during any type of road closures. The appointed contractor is expected to comply with this access requirement by road authorities. With priority always given to emergency access, the impacts on emergency access are anticipated to be negligible.

5.6 Proposed traffic management and impact overview

This section aims to discuss the impacts of the proposed construction will have on the surrounding road network and transport services. For readability and ease of analysis, the pipeline sections have been divided into 13 sections which are summarised in Table 5.5 and shown in Figure 5.2.

The sections have been divided based on the differing characteristics of the section and associated impacts. These are described under each sub-headings in this section with relevant discussions on construction method, location, construction route, relevant lane closure requirement, impacts on parking, public transport, active transport and property accesses.

Table 5.5 Brine pipeline assessment section

Section ID	Start	End
QH WRRF	Quakers Hill WRRF	BP01
BP01	Quakers Hill WRRF	Falmouth Road
BP02	Falmouth Road	Breakfast Road
BP03	Breakfast Road	Marayong Park
BP04	Marayong Park	Gate Road
BP05	Gate Road	Lynwood Park Carpark
BP06	Lynwood Park Carpark	Venn Avenue
BP07	Venn Avenue	Cavanagh Reserve
BP08	Lynwood Park Carpark	Dunstable Road
BP09	Dunstable Road	Cardiff Street
BP10	Cardiff Street	Sydney Street
BP11	Sydney Street	Winifred Crescent
BP12	Blacktown Aquatic Centre carpark	International Peace Park

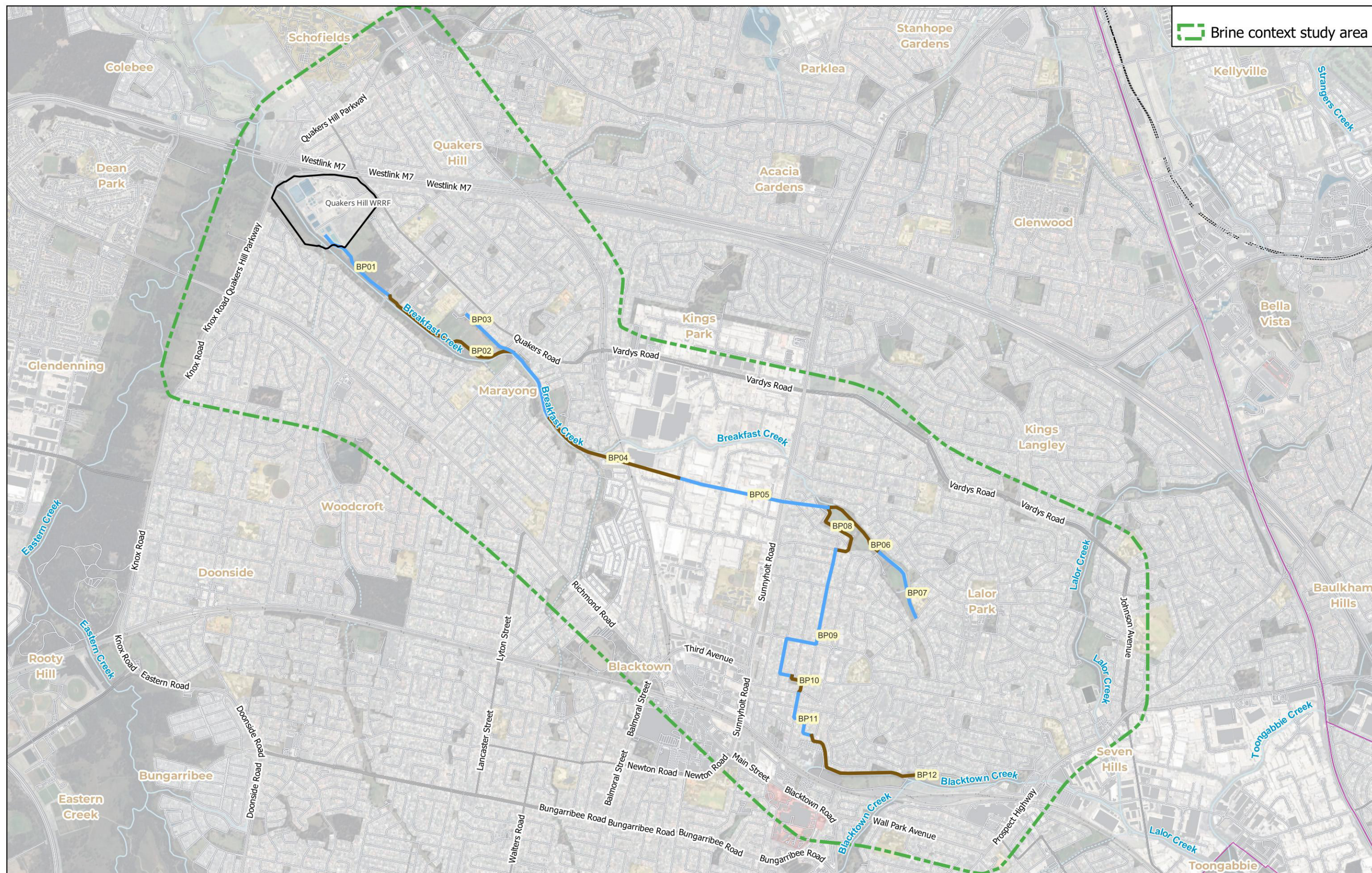


Figure 5.2
Brine assessment section

Coordinate system: GDA2020 / NSW Lambert (EPSG:8058)



0 1 2 km

1:26,000 @ A3



5.6.1 Quakers Hill WRRF

The Quakers Hill WRRF is located on Quakers Road, near the M7 Motorway eastbound on-ramp and off-ramp to Quakers Hill Parkway, refer to Figure 5.3.



Figure 5.3 Quakers Hill WRRF location site context

As discussed in Section 5.2, construction of the secondary wastewater treatment and the advanced water treatment plants will take place within the existing Quakers Hill WRRF site, which is expected to generate the largest number of traffic movements during the construction period. To minimise the impact of construction traffic movements to the surrounding road network and residential area, it is proposed for construction vehicles to enter and exit the site via Quakers Road towards Quakers Hill Parkway only. From Quakers Hill Parkway, vehicles can access the M7 Motorway with ramp connections travelling eastbound or continue travelling southbound to connect to other State Road network, such as Richmond Road and Doonside Road.

There is no road closure anticipated during the construction or use of WRRF site as a site office and compound, and as such, the project will maintain existing access, bus route and bicycle facility (shared path connecting to the M7 Motorway) on Quakers Road.

To assess the operational and safety impacts at the intersection of Quakers Road and Quakers Hill WRRF Access Road during construction, SIDRA intersection modelling was conducted to evaluate both the existing operational conditions and those expected during the peak construction year, 2028, considering the generated construction vehicles accessing the Quakers Hill WRRF site.

Light vehicle movements will primarily be associated with the construction workforce commuting to and from the site. These trips are expected to occur outside the typical weekday morning and afternoon peak traffic periods, as construction activities are scheduled between 7:00 am and 6:00 pm. Therefore, construction-related light vehicle movements are unlikely to coincide with peak traffic volumes. However, to adopt a conservative approach in assessing potential worst-case traffic impacts, it has been assumed that all light vehicle trips will arrive at the work area during the weekday AM peak and depart during the PM peak. It is assumed that light vehicles will be evenly distributed, with 50% accessing the site from the north via Quakers Road and the other 50% from the south via Quakers Road. Heavy vehicle movements are expected to maximise the use of State and Regional roads, so it is assumed that all heavy vehicles will access the site from the north via Quakers Road, Quakers Hill Parkway, and the M7 Motorway.

The performance of the existing layout of the Quakers Road and Quakers Hill WRRF Access Road intersection for the weekday AM and PM peak hours are summarised in Table 5.6. Detailed SIDRA results are provided in Appendix A.

SIDRA intersection modelling results indicate that the existing layout of the Quakers Road and Quakers Hill WRRF Access Road intersection will operate satisfactorily, achieving LoS C or better during weekday AM and PM peak hours until 2028. While the addition of construction vehicles accessing the Quakers Hill WRRF site may cause minor additional delays, the intersection is still expected to operate at LoS D or better during the construction year 2028.

Table 5.6 Intersection performance results at the Quakers Hill Road and WRRF Site Access Road intersection with and without construction vehicles

Assessment year	Condition	Peak period	Demand (veh/hr)	DoS ¹	Delay ²	LoS ³	Queue ⁴
2024	Existing year	AM	1,127	0.19	30	C	1
		PM	1,012	0.16	25	B	1
2028 – Peak construction year	Future base without construction vehicle	AM	1,219	0.20	36	C	1
		PM	1,093	0.17	28	B	1
	Peak construction year with construction vehicle	AM	1,335	0.25	43	D	7
		PM	1,211	0.37	36	C	10

- (1) DoS: Degree of Saturation
- (2) Delay: Average delay (seconds)
- (3) LoS: Level of Services
- (4) Queue: 95th percentile queue (metres) and approach

5.6.2 BP01 – Quakers Hill to Falmouth Road

Section BP01 is approximately a 650 metres long section between the Quakers Hill WRRF to Falmouth Road, located within Melrose Park to the north of Breakfast Creek alignment. The alignment is depicted in Figure 5.4.

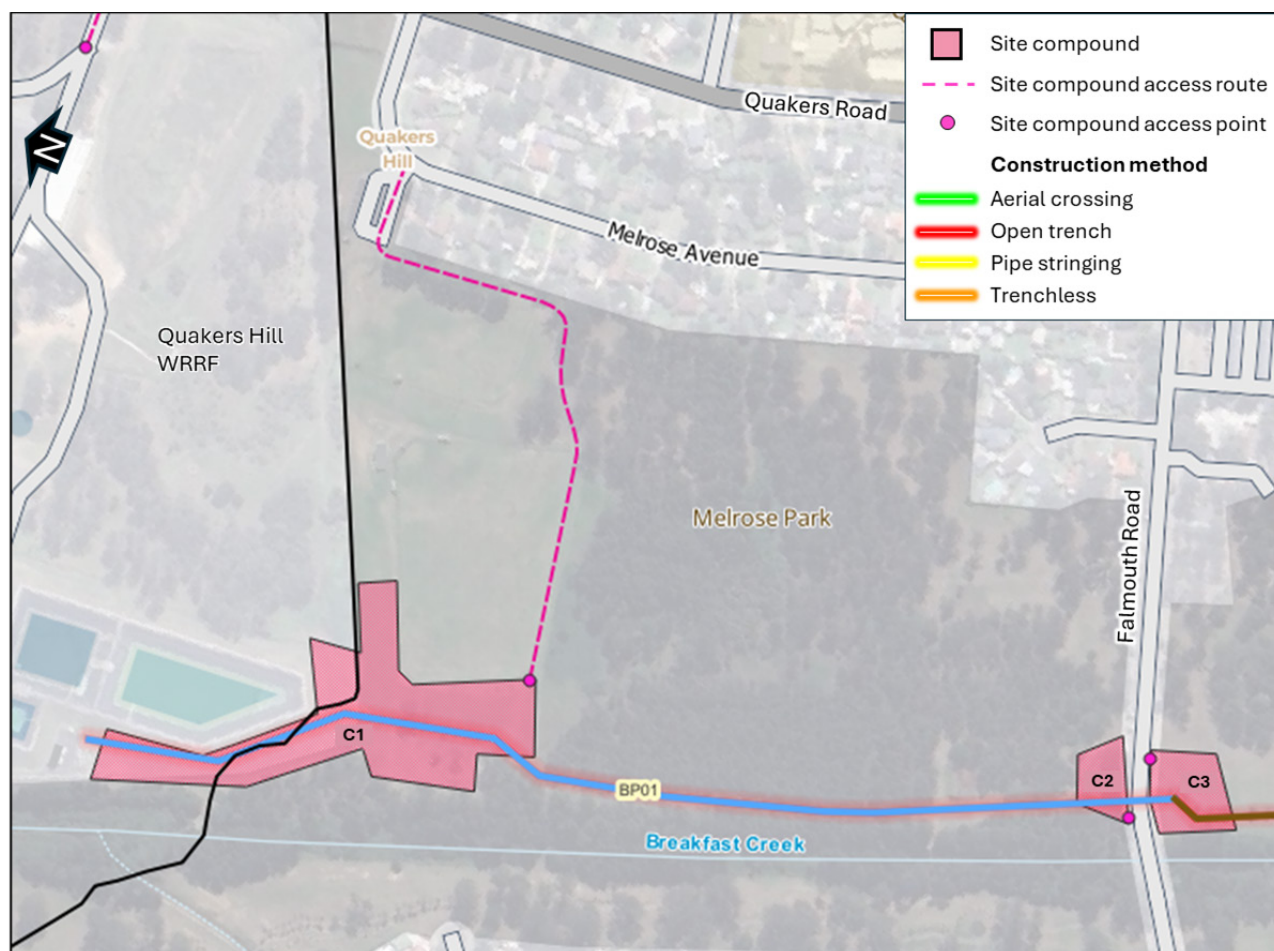


Figure 5.4 Section BP01 – Quakers Hill WRRF to Falmouth Road

The key elements of this section and impact overview are summarised in Table 5.7.

Table 5.7 Section BP01 description and impact overview

Elements	Description
Section length	650 metres
Construction method	Open trench
Compound location	C1 which is accessed via Melrose Avenue, Melrose Park car park and around the sporting fields in Melrose Park. C2 and C3 which is accessed from Falmouth Road.
Construction route and speed limit	Construction traffic will access the construction site via Quakers Road and Falmouth Road. Quakers Road has a 40 km/h School Zone which extends between Melrose Avenue and Benalla Crescent for Quakers Hill Public School and St Andrews College Junior Campus. While the pipeline construction will not impact the existing operation on Quakers Road, drivers of construction vehicles are to be made aware of risks around school zones and compliance to the road rules. Outside of the school zone hours, Quakers Road is sign posted at 60 km/h.

Elements	Description
	Falmouth Road is signposted at 60 km/h. Based on the crash data, Falmouth Road between Melrose Park and Quakers Road has recorded 9 crashes (5 injury and 4 tow-away) in the five-year period analysed. Most crashes involve right-through crashes and loss of control. To ensure the proposed construction would not make existing conditions worse, the set-up of construction work may consider lower work zone speed limit (40 km/h), avoid parking activities that would reduce sight distance at intersections, additional signage to inform road users of proposed works and educate drivers of construction vehicles of inherent safety issues at this location.
Road closure requirement	Lane closure of Melrose Park north of Breakfast Creek. Open trench across Falmouth Road will require lane closure. As the open trenching method typically progresses at a rate of approximately 12 to 24 metres per day under standard conditions, the associated lane closures on Falmouth Road are expected to be of a short-term nature and remain in place only for the duration necessary to complete the works at each location. The impact of this closure is further discussed in Section 5.6.2.1.
Parking impact	At C1 compound, construction vehicles are expected to park within the site compound and not impact on-street parking or parking within the Melrose Park car park. During the open trench construction across Falmouth Road, kerbside parking on both sides of the road would likely be temporarily restricted, resulting in the loss of approximately four parking spaces on each side. However, this restriction will only be in place for the duration necessary to complete the trenching works. Construction may utilise Compounds C2 and C3 for parking; however, it is likely that on-street parking will also be required along Falmouth Road and surrounding streets near the alignment. Falmouth Road provides unrestricted kerbside parking along its length, and daytime site inspections observed low occupancy levels. As such, the on-street parking of construction vehicles is not expected to result in any significant impacts.
Public transport impact	No public bus route is present on Falmouth Road near the construction site to result in any impact.
Active transport impact	Several existing active transport facilities which may be impacted by the construction include: — the pipeline alignment will cross Falmouth Road at the existing shared path refuge which connects to the shared path facility that runs along the northern side of Breakfast Creek, east of Falmouth Road — Falmouth Road consists of a bicycle lane, shared with parking lane, according to TfNSW's Cycleway Finder. During the construction across Falmouth Road, temporary closure of the shared path facility and crossing facility (refuge) is likely required. As the construction works are proposed at nighttime to manage works when transport demands are low, the impact that the lane closure will have on the active transport links will also be low. On-road cyclists' movements on Falmouth Road, are recommended to be managed through appropriate traffic management to accommodate their access and safety during construction.
Property access impact	None

5.6.2.1 Falmouth Road lane closure impact

Open trench construction across Falmouth Road will require a lane closure. To maintain traffic flow, a contra-flow arrangement will be implemented, allowing northbound and southbound traffic to move alternately under the control of traffic controllers.

As shown in Table 5.8, significant delays and queuing are expected if the partial lane closure is implemented during the weekday AM and PM peak hours. Extended queues from the pipeline crossing site would reach the signalised intersection of Quakers Road and Falmouth Road, as well as other nearby local intersections, potentially disrupting traffic operations in the area.

However, if the partial lane closure is scheduled during the midday or nighttime periods, the anticipated queues and delays would be significantly lower. In these off-peak times, traffic flow along Falmouth Road can be managed more effectively, minimising disruptions. Therefore, it is recommended to avoid open trench construction across Falmouth Road during the weekday AM and PM peak hours to reduce traffic impacts and maintain operational efficiency at adjacent intersections.

Table 5.8 Mid-block crossing modelling results for the pipeline crossing on Falmouth Road

Assessment year	Peak period	Demand (veh/hr)	DoS ¹	Delay ²	LoS ³	Queue ⁴
2028 – Peak construction year	AM: 8–9 am	1,450	1.13	169	F	549
	PM: 3–4 pm	1,278	1.09	104	F	492
	Mid-day: 12–1 pm	682	0.53	33	C	86
	Nighttime: 8–9 pm	549	0.44	32	C	69

- (1) DoS: Degree of Saturation
- (2) Delay: Average delay (seconds)
- (3) LoS: Level of Services
- (4) Queue: 95th percentile queue (metres) and approach

5.6.3 BP02 – Falmouth Road to Breakfast Road

Section BP02 is approximately a 1,120 metres long section between Falmouth Road to Breakfast Road, located to the south of Harvey Park and the north of Breakfast Creek alignment. The alignment is depicted in Figure 5.5

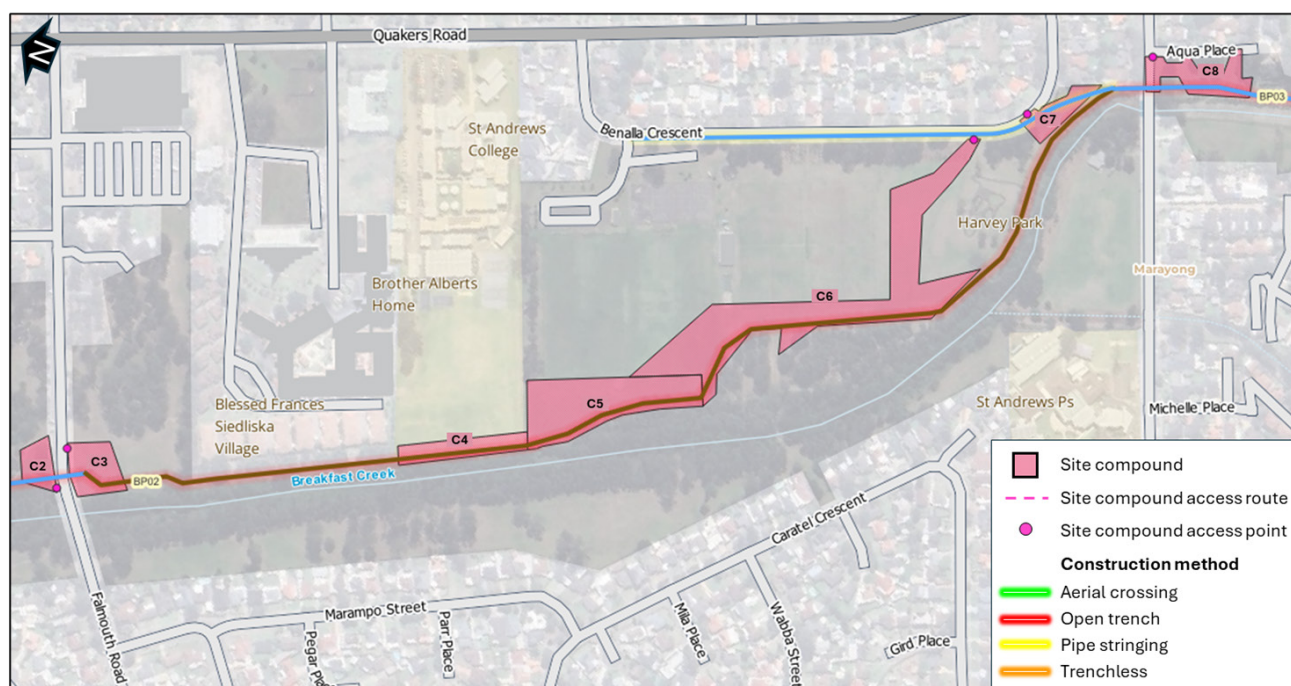


Figure 5.5 Section BP02 – Falmouth Road to Breakfast Road

The key elements of this section and impact overview are summarised in Table 5.9.

Table 5.9 Section BP02 description and impact overview

Criteria	Description
Section length	1,120 metres
Construction method	Open trench
Compound location	C3 which is accessed from Falmouth Road C4 to C7 which is accessed from Benalla Crescent C8 which is accessed from Breakfast Road
Construction route and speed limit	Construction traffic will access the construction site via Quakers Road, Benalla Crescent and Breakfast Road. Quakers Road has a 40 km/h School Zone to the west of Benalla Crescent for St Andrews College Junior Campus. Outside of the school zone hours, Quakers Road is sign posted at 60 km/h. Benalla Crescent and Breakfast Road have a sign posted speed limit of 50 km/h. Breakfast Road has a 40 km/h School Zone for St Andrews Primary School and Senior College south of Breakfast Creek. Based on the crash data, Quakers Road/ Narrabri Street intersection has recorded 3 crashes (2 injury and a tow-away) in the five-year period analysed. Most crashes involve intersection type crashes. Quakers Road/ Breakfast Road intersection has recorded 6 crashes (2 injury and 4 tow-away) in the five-year analysed, with most involving right-through crashes.

Criteria	Description
	Both intersections are on the construction vehicle route, with no works proposed at the location. To ensure the proposed construction does not worsen existing conditions, construction workers and delivery drivers should be informed about areas with a history of crashes, especially along designated construction vehicle routes.
Road closure requirement	Closure of shared path in Harvey Park north of Breakfast Creek during construction of Section BP02 as the pipeline alignment follows the shared path alignment. Open trench across Breakfast Road will require a lane closure. As the open trenching method typically progresses at a rate of approximately 12 to 24 metres per day under standard conditions, the associated lane closures on Breakfast Road are expected to be of a short-term nature and remain in place only for the duration necessary to complete the works at each location. The impact of this closure is further discussed in Section 5.6.3.1.
Parking impact	During the open trench construction across Breakfast Road, kerbside parking on both sides of the road would likely be temporarily restricted, resulting in the loss of approximately three to four parking spaces on each side. However, this restriction will only be in place for the duration necessary to complete the trenching works. Parking for construction vehicles for C4 to C6 compound are expected to be provided within the construction compounds. Construction may utilise Compounds C7 and C8 for parking; however, it is likely that on-street parking will also be required along Breakfast Road and surrounding streets near the alignment. Breakfast Road provides unrestricted kerbside parking along its length, and daytime site inspections observed low occupancy levels. As such, the on-street parking of construction vehicles is not expected to result in any significant impacts.
Public transport impact	Bus route 753 (Blacktown to Doonside Loop Service) travels on Breakfast Road. On weekdays the services run between 5:30 am to 11 pm. On Saturday, the services run between 7:30 am and 10:30 pm, and on Sunday/public holidays, services run between 8 am to 8:30 pm. It is likely that bus access will still be maintained and not required to detour.
Active transport impact	Several existing active transport facilities which may be impacted by the construction include: — existing shared path facility that runs along the northern side of Breakfast Creek, which for most part will share alignment with the proposed pipeline — the pipeline alignment will cross Breakfast Road at the existing shared path refuge which connects to the shared path facility that runs along the northern side of Breakfast Creek, east of Falmouth Road. During the construction of Section BP02, the shared path along the northern side of Breakfast Creek will be closed to ensure no interaction between the public and work area. Pedestrian and cyclist access between Falmouth Road and Breakfast Road will need to be maintained via alternative local streets that are equipped with existing footpaths, ensuring continued access for school students and residents. During the construction across Breakfast Road, temporary closure of the shared path facility and crossing facility (refuge) is likely required. As the construction works are proposed at nighttime to manage works when transport demands are low, the impact that the lane closure will have on the active transport links will also be low.
Property access impact	None

5.6.3.1 Breakfast Road lane closure impact

Open trench construction across Breakfast Road will require a lane closure. To maintain traffic flow, a contra-flow arrangement will be implemented, allowing northbound and southbound traffic to move alternately under the control of traffic controllers.

As shown in Table 5.10, traffic operations across the construction site are expected to be satisfactorily managed, achieving Level of Service (LoS) C or better during the weekday AM and PM peak hours. However, the southbound vehicle queues generated from the pipeline crossing site are projected to extend approximately 124 metres, potentially reaching the signalised intersection of Quakers Road and Breakfast Road. This could impact traffic operations at the intersection. Additionally, St Andrew's the Apostle Catholic School is located approximately 350 metres south of the construction site. Given the potential for increased traffic congestion and delays during school drop-off and pick-up times, it is recommended to avoid construction activities across Breakfast Road during the weekday AM and PM peak hours.

To minimise traffic disruptions and maintain efficient operations at nearby intersections, it is preferable to undertake open trench construction across Breakfast Road during off-peak periods, such as midday or nighttime, when traffic volumes are lower.

Table 5.10 Mid-block crossing modelling results for the pipeline crossing on Breakfast Road

Assessment year	Peak period	Demand (veh/hr)	DoS ¹	Delay ²	LoS ³	Queue ⁴
2028 – Peak construction year	AM: 8–9 am	1024	0.75	30	C	124
	PM: 3–4 pm	786	0.69	26	B	85
	Mid-day: 12–1 pm	425	0.42	23	B	44
	Nighttime: 8–9 pm	377	0.38	23	B	40

- (1) DoS: Degree of Saturation
- (2) Delay: Average delay (seconds)
- (3) LoS: Level of Services
- (4) Queue: 95th percentile queue (metres) and approach

5.6.4 BP03 – Breakfast Road to Marayong Park

Section BP03 is approximately a 520 metres long section between Breakfast Road to Marayong Park, located to the south of Marayong Park and north of the Breakfast Creek alignment. The alignment is depicted in Figure 5.6.

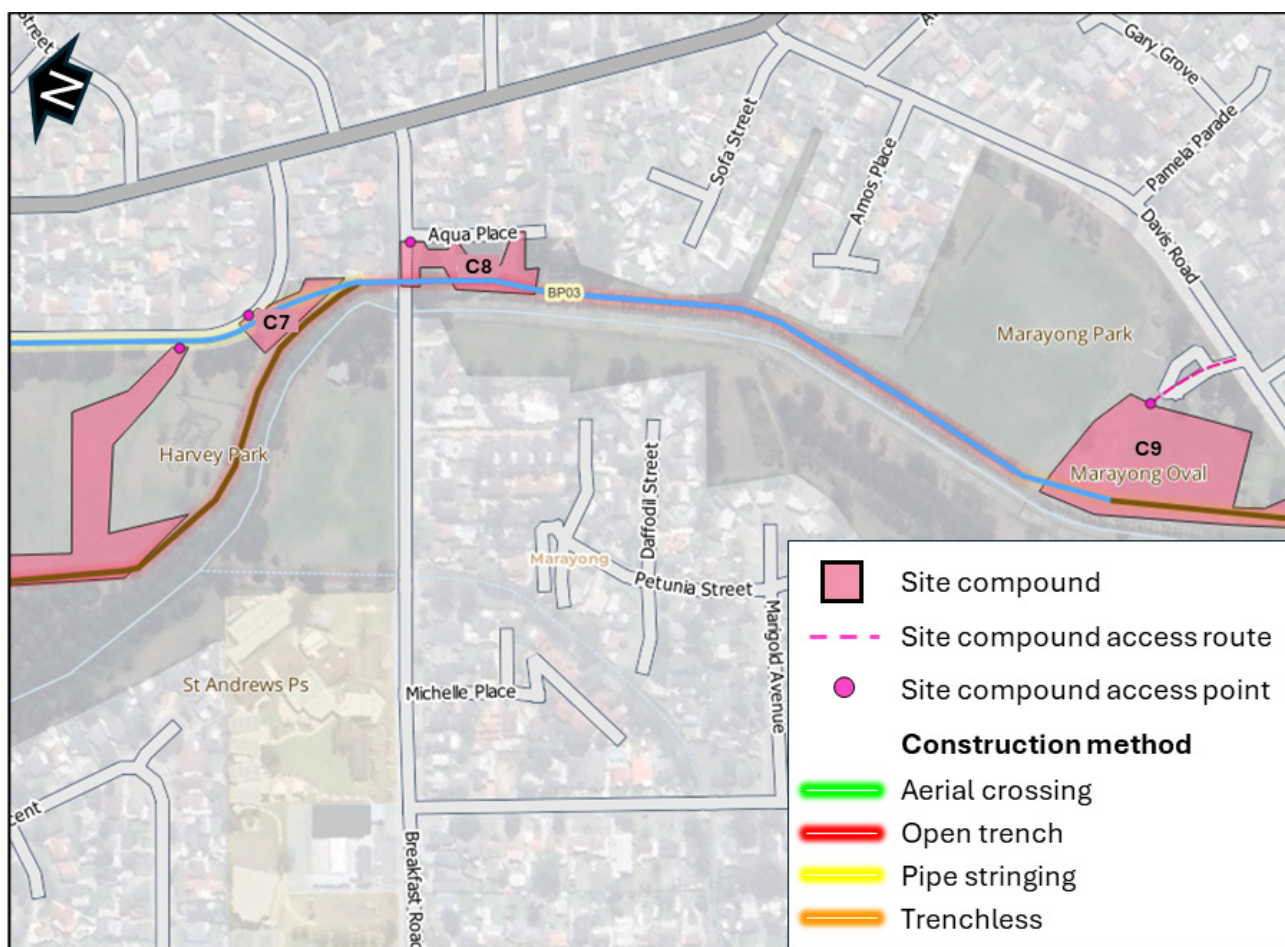


Figure 5.6 Section BP03 – Breakfast Road to Marayong Park

The key elements of this section and impact overview are summarised in Table 5.11.

Table 5.11 Section BP03 description and impact overview

Criteria	Description
Section length	520 metres
Construction method	Open trench
Compound location	C8 which is accessed from Breakfast Road C9 which is accessed from Davis Road.
Construction route and speed limit	Construction traffic will access the construction site via Quakers Road, Breakfast Road and Davis Road. Quakers Road is sign posted at 60 km/h. Breakfast Road and Davis Road have a sign posted speed limit of 50 km/h. Based on the crash data, Davis Road/Quakers Road intersection has recorded 4 crashes (1 injury and 3 tow-away) in the five-year period analysed. Most crashes involve intersection and rear-end crashes. The intersections are on the construction vehicle route, with no works proposed at the location. To ensure the proposed construction does not worsen existing conditions, construction workers and delivery drivers should be informed about areas with a history of crashes, especially along designated construction vehicle routes.
Road closure requirement	Closure of shared path in Marayong Park north of Breakfast Creek during construction of Section BP03 as the pipeline alignment follows the shared path alignment.
Parking impact	Construction may utilise Compounds C8 for parking; however, it is likely that on-street parking will also be required along Breakfast Road and surrounding streets near the alignment. Breakfast Road provides unrestricted kerbside parking along its length, and daytime site inspections observed low occupancy levels. As such, the on-street parking of construction vehicles is not expected to result in any significant impacts. Parking for construction vehicles at C9 compound are expected to be provided within the construction compounds.
Public transport impact	Davis Road is serviced by 752, 753 and N71. While no road closures are planned on Davis Road, any traffic management is to accommodate bus movements during construction.
Active transport impact	Shared paths in Marayong Park north of Breakfast Creek alignment will be impacted. During the construction of Section BP03, the shared path will be closed to ensure no interaction between the public and work area. Walking and cycling to connect Breakfast Road and Davis Road will need to be provided via alternative local routes to maintain access for residents (e.g. through Crudge Road).
Property access impact	None

5.6.5 BP04 – Marayong Park to Bessemer Street

Section BP04 is approximately a 520 metres long section between Breakfast Road to Marayong Park, located to the south of Marayong Park and north of the Breakfast Creek alignment. The alignment is depicted in Figure 5.7.

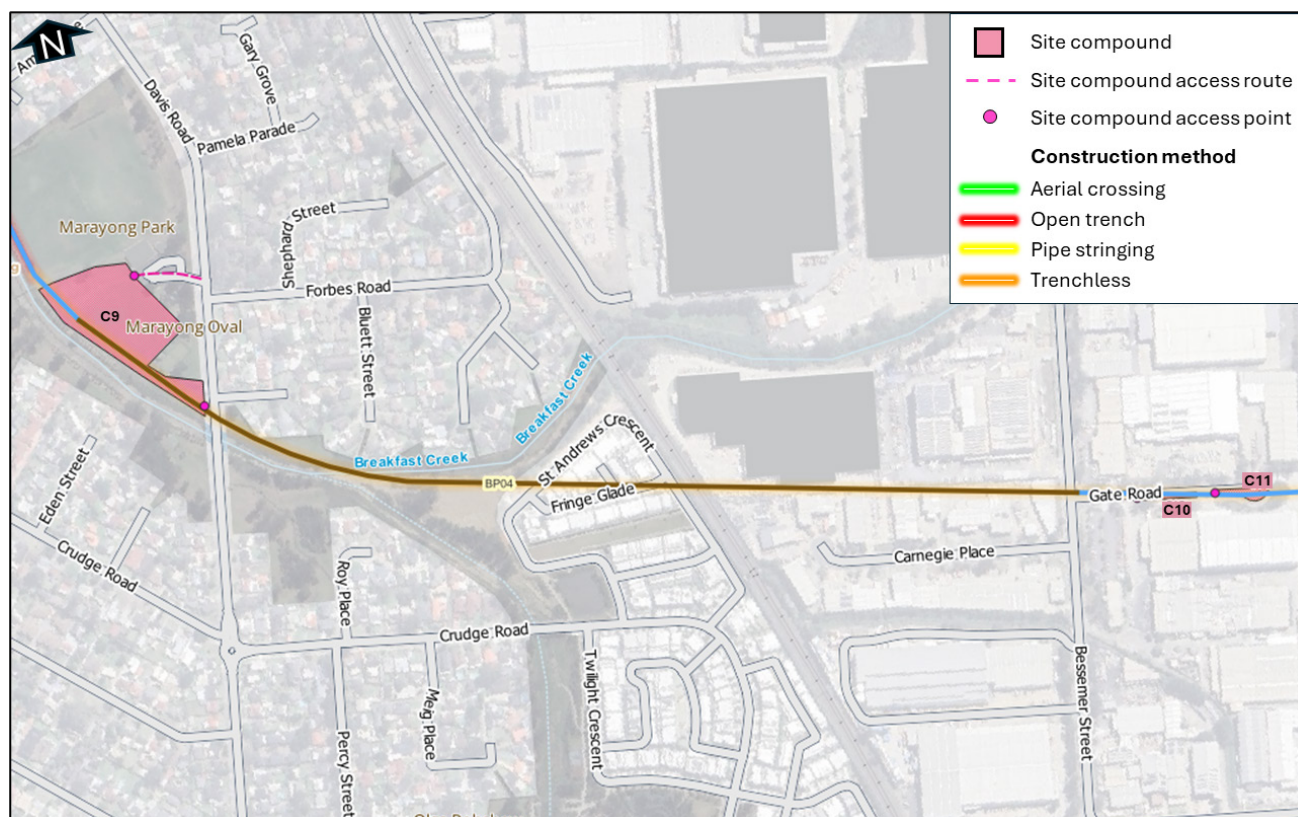


Figure 5.7 Section BP04 – Marayong Park to Bessemer Street

The key elements of this section and impact overview are summarised in Table 5.12.

Table 5.12 Section BP04 description and impact overview

Criteria	Description
Section length	1,100 metres
Construction method	Trenchless
Compound location	C9 which is accessed from Davis Road C10 and C11 accessed from Gate Road.
Construction route and speed limit	Construction traffic will access compound C9 site via Quakers Road and Davis Road. Quakers Road is sign posted at 60 km/h and Davis Road is sign posted speed at 50 km/h. Access to C10 and C11 will be provided via Gate Road and Bessemer Street which are sign posted at 50 km/h.
Road closure requirement	Two-way access to properties on Gate Road will be maintained; however, partial lane closures will be required along the southern kerbside of Gate Road and at the eastern end of the cul-de-sac, where Compounds C10 and C11 are proposed.

Criteria	Description
Parking impact	Construction vehicles are expected to park within the site compound at C9, and to utilise on-street parking at compound C10 and C11. High demand of on-street parking is observed on Gate Road and Bessemer Street, and as such Work Zone set up may be required to be established in consultation with Blacktown City Council.
Public transport impact	Davis Road is serviced by 752, 753 and N71. While no road closures are planned on Davis Road, any traffic management is to accommodate for bus movements during construction.
Active transport impact	None
Property access impact	None

5.6.6 BP05 – Bessemer Street to Allen Road

Section BP05 is approximately a 1,090 metres long section between Bessemer Street to Allen Road, located to the west of Lynwood Park. The alignment is depicted in Figure 5.8.

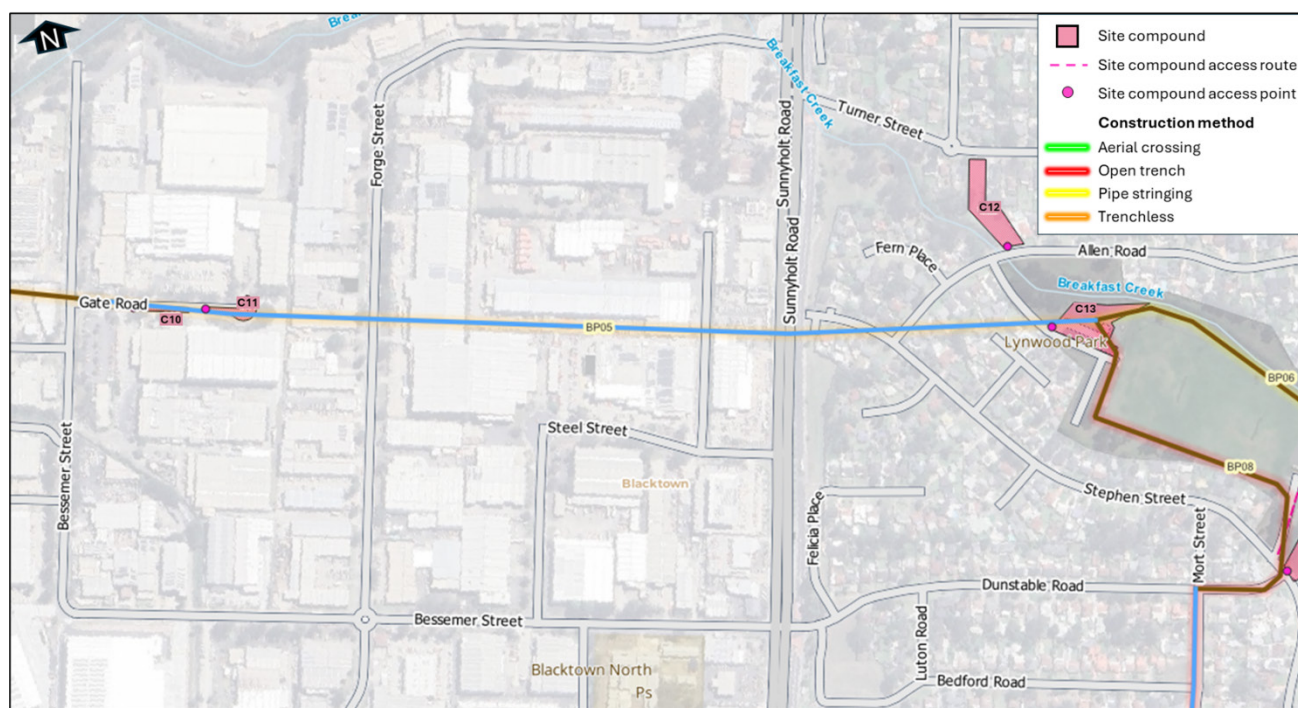


Figure 5.8 Section BP05 – Bessemer Street to Allen Road

The key elements of this section and impact overview are summarised in Table 5.13.

Table 5.13 Section BP05 description and impact overview

Criteria	Description
Section length	1,090 metres
Construction method	Trenchless
Compound location	C10 and C11 which is accessed from Gate Road C12 and C13 which is accessed from Allen Road.
Construction route and speed limit	Access to C10 and C11 will be provided via Gate Road and Bessemer Street which are sign posted at 50 km/h. Access to C12 and C13 are proposed via Dunstable Road, Mort Street, Stephen Street and Allen Road which are all signposted at 50 km/h.
Road closure requirement	Two-way access to properties on Gate Road will be maintained; however, partial lane closures will be required along the southern kerbside of Gate Road and at the eastern end of the cul-de-sac, where Compounds C10 and C11 are proposed. Compound C13 will require partial occupation of the off-street car park for Lynwood Park.
Parking impact	High demand of on-street parking is observed on Gate Road and Bessemer Street, and as such Work Zone set up may be required to be established in consultation with Blacktown City Council. The existing Lynwood Park car park provides approximately 135 parking spaces. The availability of parking within the site and the number of spaces potentially impacted by the pipeline construction and Compound C13 should be further assessed during later stages of design. Based on the proposed boundary of Compound C13, approximately 60 parking spaces may be removed during construction. However, the southern section of the car park is expected to remain open to the public. Consultation with Blacktown City Council and local sporting clubs are required to manage parking demand during construction. Use of off-street parking off Stephen Street and on-street parking in surrounding streets may be required as alternatives during sporting practice/game days.
Public transport impact	None
Active transport impact	None
Property access impact	None

5.6.7 BP06 – Allen Road to Venn Avenue

Section BP06 is approximately a 550 metres long section between Allen Road and Venn Avenue, located within Lynwood Park. The alignment is depicted in Figure 5.9.

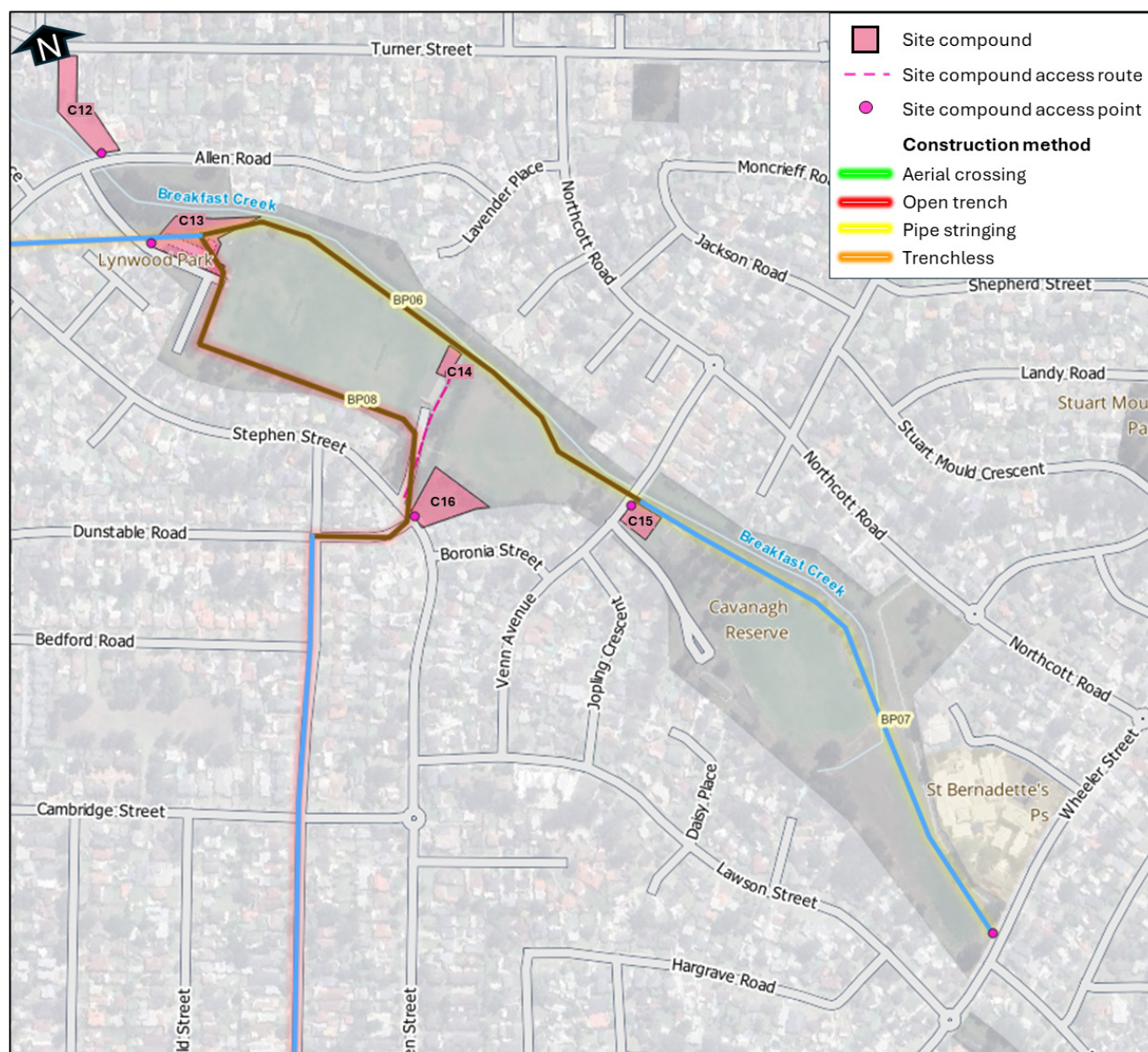


Figure 5.9 Section BP06 – Allen Road to Venn Avenue

The key elements of this section and impact overview are summarised in Table 5.14.

Table 5.14 Section BP06 description and impact overview

Criteria	Description
Section length	570 metres
Construction method	Open trench
Compound location	C12 and C13 which is accessed from Allen Road. C14 accessed from Lynwood Park eastern car park off Stephen Street. C15 accessed from Venn Avenue.
Construction route and speed limit	Access to all site compounds will be via local roads (signposted at 50 km/h) which are connected to Dunstable Road. Dunstable Road connects with Sunnyholt Road which provides access to the remainder of the State Road network. Based on the crash data, Mort Street and Dunstable Road has recorded 4 crashes (1 injury and 3 tow-away) in the five-year period analysed. Most crashes involve cross traffic crashes. The intersection is on the construction vehicle route with no works proposed. To ensure the proposed construction does not worsen existing conditions, construction workers and delivery drivers should be informed about areas with a history of crashes, especially along designated construction vehicle routes.
Road closure requirement	Open trench across Venn Avenue will require a lane closure during construction with traffic management. Based on site observations, this location is not expected to carry high traffic volumes, minimising the potential impact on road users.
Parking	As mentioned in Table 5.13, consultation with Blacktown City Council and local sporting clubs are required to manage parking demand during construction. Use of off-street parking off Stephen Street and on-street parking in surrounding streets may be required as alternatives during sporting practice/game days. At compound C15, parking is expected to be provide within the site or at the adjacent off-street car park for Cavanagh Reserve to minimise impact to on-street parking spaces.
Public transport impact	Bus route 743 travels on Venn Avenue used to access compound C15. The bus route runs from 6 am–9 pm on weekdays, 7 am–9 pm on Saturdays and 9:30 am–6 pm on Sundays/ public holidays. It is likely that bus access will still be maintained and not required to detour.
Active transport impact	There is no existing cycleway or footpath that will be affected by the proposed construction of BP06.
Property access impact	None

5.6.8 BP07 – Venn Avenue to Wheeler Street

Section BP07 is approximately a 580 metres long section between Venn Avenue and Wheeler Street, located within Cavanagh Reserve. The alignment is depicted in Figure 5.9 with the key elements and impact overview summarised in Table 5.15.

Table 5.15 Section BP07 description and impact overview

Criteria	Description
Section length	580 metres
Construction method	Open trench
Compound location	C15, which is accessed from Venn Avenue
Construction route and speed limit	Venn Avenue and Wheeler Street are 50 km/h roads connected to Stephen Street and Dunstable Road, which connects with Sunnyholt Road which provides access to the remainder of the State Road network.
Road closure requirement	None
Parking impact	At both compounds, parking is expected to be provide within the site to minimise impact to on-street parking spaces.
Public transport impact	None
Active transport impact	Wheeler Street consists of a bicycle lane, shared with parking lane, according to TfNSW's Cycleway Finder. On-road cyclists' movements on Wheeler Street, are recommended to be managed using traffic management to accommodate their access and safety during construction.
Property access impact	None

5.6.9 BP08 – Allen Road to Dunstable Road

Section BP08 is approximately a 580 metres long section between Allen Road and Dunstable Road, located within Lynwood Park. The alignment is depicted in Figure 5.9 with the key elements and impact overview summarised in Table 5.16.

Table 5.16 Section BP08 description and impact overview

Criteria	Description
Section length	580 metres
Construction method	Open trench
Compound location	C13 which is accessed from Allen Road C16, which is accessed from Stephen Street.
Construction route and speed limit	Access to all site compounds will be via local roads (signposted at 50 km/h) which are connected to Dunstable Road. Dunstable Road connects with Sunnyholt Road which provides access to the remainder of the State Road network.
Road closure requirement	Temporary lane closures will be proposed at Stephen Street and Dunstable Road as the pipeline alignment are proposed to be constructed within the road corridor. The works are recommended to be staged to allow detour using Stephen Street/Mort Street/Dunstable Street triangular layout to maintain access for properties. As the open trenching method typically progresses at a rate of approximately 12 to 24 metres per day under standard conditions, the associated lane closures are expected to be of a short-term nature and remain in place only for the duration necessary to complete the works at each location.
Parking impact	Compound C13 will require partial occupation of off-street car park for Lynwood Park affecting approximately 60 spaces. Consultation with Blacktown City Council and local sporting clubs are required to manage parking demand during construction. At compound C16, parking activities by workers are expected to be provided on-site to minimise impact to on-street parking spaces.
Public transport impact	None
Active transport impact	There is no existing cycleway that will be affected by the proposed construction of BP08. Footpath on Stephen Street may experience disruptions during the construction and will require implementation of traffic management to ensure the accessibility and safety of road users.
Property access impact	Certain residential access driveways on the southern side Dunstable Road will be impacted as a cause of these works. The addresses for the impacted properties include: — 46A to 52 Dunstable Road, Blacktown NSW 2148. Blacktown City Council and residents will be notified/consulted before construction works ensure the work area can be set up for construction and concerns from residents are addressed beforehand. Construction will occur during off-peak periods as much as practically possible to ensure residents are minimally impacted.

5.6.10 BP09 – Dunstable Road to Cardiff Street

Section BP09 is approximately a 1,270 metres long section between Dunstable Road and Cardiff Street. The pipeline alignment is proposed within the road corridor on Mort Street (between Dunstable Road and Sackville Street), Sackville Street (between Mort Street and Sarsfield Street), Sarsfield Street (between Sackville Street and Cardiff Street) and on Cardiff Street (between Sarsfield Street and the Billy Goat Hill Reserve). The alignment is depicted in Figure 5.10.



Figure 5.10 Section BP09 – Dunstable Road to Cardiff Street

The key elements of this section and impact overview are summarised in Table 5.17.

Table 5.17 Section BP09 description and impact overview

Criteria	Description
Section length	1,270 metres
Construction method	Open trench
Compound location	C16 accessed from Stephen Street C17 accessed via Cardiff Street and Sydney Street.
Construction route and speed limit	Access to all site compounds will be via local roads (signposted at 50 km/h) which are connected to either Sackville Street or Dunstable Road which connects with Sunnyholt Road and provides access to the remainder of the State Road network.

Criteria	Description
Road closure requirement	Lane closures will be proposed at Dunstable Road, Mort Street (between Dunstable Road and Sackville Street), Sackville Street (between Mort Street and Sarsfield Street), Sarsfield Street (between Sackville Street and Cardiff Street) and Cardiff Street (between Sarsfield Street and Billy Goat Hill Reserve). Open trench across Sackville Street will require a lane closure. The impact of this closure is further discussed in Section 5.6.10.1. Construction will be undertaken in stages along Section BP09 to avoid impacting all road section simultaneously. To manage traffic demand passing adjacent to the construction impact area, the lane closure will likely be implemented with access restrictions for general traffic, only allowing access for residents of affected street during construction. This can be done by leveraging the grid layout of the local road network at this location, directing non-residents to travel on alternative routes. Bus access will likely be maintained and not required to detour. Based on the crash data, Sackville Street and Sarsfield Street has recorded 3 injury crashes in the five-year period analysed. The crashes involved pedestrian and loss of control. Trenching works are proposed at the intersection. To ensure the proposed construction would not make existing conditions worse, the set-up of construction work may consider lower work zone speed limit (40 km/h), avoid parking activities that would reduce sight distance at intersections, additional signage to inform road users of proposed works and educate drivers of construction vehicles of inherent safety issues at this location.
Parking impact	During construction, given the lack of available off-street parking at the compounds and the extended length of Section BP09 alignment, it is likely that construction vehicles will be parked on-street nearby the construction impact area. To maintain two-way traffic movement along Mort Street and Sackville Street, on-street parking on both sides of the road would likely be temporarily removed during construction. The length of the restricted area and the number of temporarily unavailable parking spaces will vary daily, depending on the progress of pipeline works scheduled for completion each day. The impact of losing car parking spaces during construction will be short term only. Alternative on-street parking spaces are available in surrounding streets, which were low occupancy rate observed during the daytime site inspection. Temporary parking restrictions during the construction period should be discussed with Blacktown City Council, and residents should be notified of the construction schedule and associated impacts.
Public transport impact	Bus routes 705 (Parramatta to Blacktown via Pendle Hill), 711 (Parramatta to Blacktown via Constitution Hill) and 743 (Blacktown to Kings Langley) currently travel on Sackville Street. Access to buses will be maintained during construction under traffic control. It is likely that bus access will still be maintained and not required to detour. Existing bus stop on the northern side of Sackville Street (servicing eastbound routes) between Harold Street and Mort Street will likely be maintained. Existing bus stop on the southern side of Sackville Street (servicing westbound routes) may need to shift to a temporary location when works are undertaken between Harold Street and Sarsfield Street.

Criteria	Description
Active transport impact	TfNSW Cycleway Finder dataset identifies Sackville Street to consist of an on-road bicycle lane shared with parking lane. During construction, this facility will likely be maintained with traffic management to accommodate for bicycle movements on the corridor.
Property access impact	Certain residential access driveways will be impacted as a cause of these works. The addresses for the impacted properties include: — 2 to 6 Mort Street, Blacktown NSW 2148 — 8 to 10A Mort Street, Blacktown NSW 2148 — 14 to 22 Mort Street, Blacktown NSW 2148 — 33 Cambridge Street, Blacktown NSW 2148 — 26 to 84 Mort Street, Blacktown NSW 2148 — 86 Mort Street, Blacktown NSW 2148 — 52 Sackville Street, Blacktown NSW 2148 — 16 to 52 Sarsfield Street, Blacktown NSW 2148 — 11 Sarsfield Street, Blacktown NSW 2148 — 36 Cardiff Street, Blacktown NSW 2148 — 46A to 52 Dunstable Road, Blacktown NSW 2148. Blacktown City Council and residents will be notified/consulted before construction works ensure the work area can be set up for construction and concerns from residents are addressed beforehand. Construction will occur during off-peak periods as much as practically possible to ensure residents are minimally impacted.

5.6.10.1 Sackville Street lane closure impact

Open trench construction across Sackville Street will require a lane closure. To maintain traffic flow, a contra-flow arrangement will be implemented, allowing eastbound and westbound traffic to move alternately under the control of traffic controllers.

As shown in Table 5.18, traffic operations at the construction site are expected to be managed satisfactorily, achieving Level of Service (LoS) C during the weekday AM and PM peak periods. However, both eastbound and westbound queues on Sackville Street are projected to extend beyond the nearby roundabout intersections at Sackville Street/Stephen Street and Sackville Street/Harold Street, which are located approximately 85 metres from Mort Street. This may interfere with traffic operations at these intersections as well as the surrounding road network.

As the traffic survey was only conducted during the weekday AM and PM peak periods, traffic volumes along Sackville Street during the midday and nighttime periods were not captured. However, it is expected that volumes would be significantly lower during these times. Based on modelling results for the early morning period between 7:00 and 8:00 am, the expected queues and delays would be manageable, allowing traffic to operate efficiently along Sackville Street without extended queues affecting nearby intersections. Therefore, to minimise disruptions, it is recommended that open trench construction across Sackville Street be undertaken during off-peak periods, such as midday or nighttime, when traffic volumes are lower.

Table 5.18 Mid-block crossing modelling results for the pipeline crossing on Breakfast Road

Assessment year	Peak period	Demand (veh/hr)	DoS ¹	Delay ²	LoS ³	Queue ⁴
2028 – Peak construction year	AM: 8–9 am	1021	0.77	39	C	173
	PM: 5–6 pm	1088	0.82	42	C	196
	Early morning: 7–8 am	709	0.65	31	C	83

- (1) DoS: Degree of Saturation
(2) Delay: Average delay (seconds)
(3) LoS: Level of Services
(4) Queue: 95th percentile queue (metres) and approach

5.6.11 BP10 – Cardiff Street to Sydney Street

Section BP10 is approximately a 215 metres long section between Cardiff Street and Sydney Street, that is also constructed within the Billy Goat Hill Reserve. The alignment is depicted in Figure 5.11.

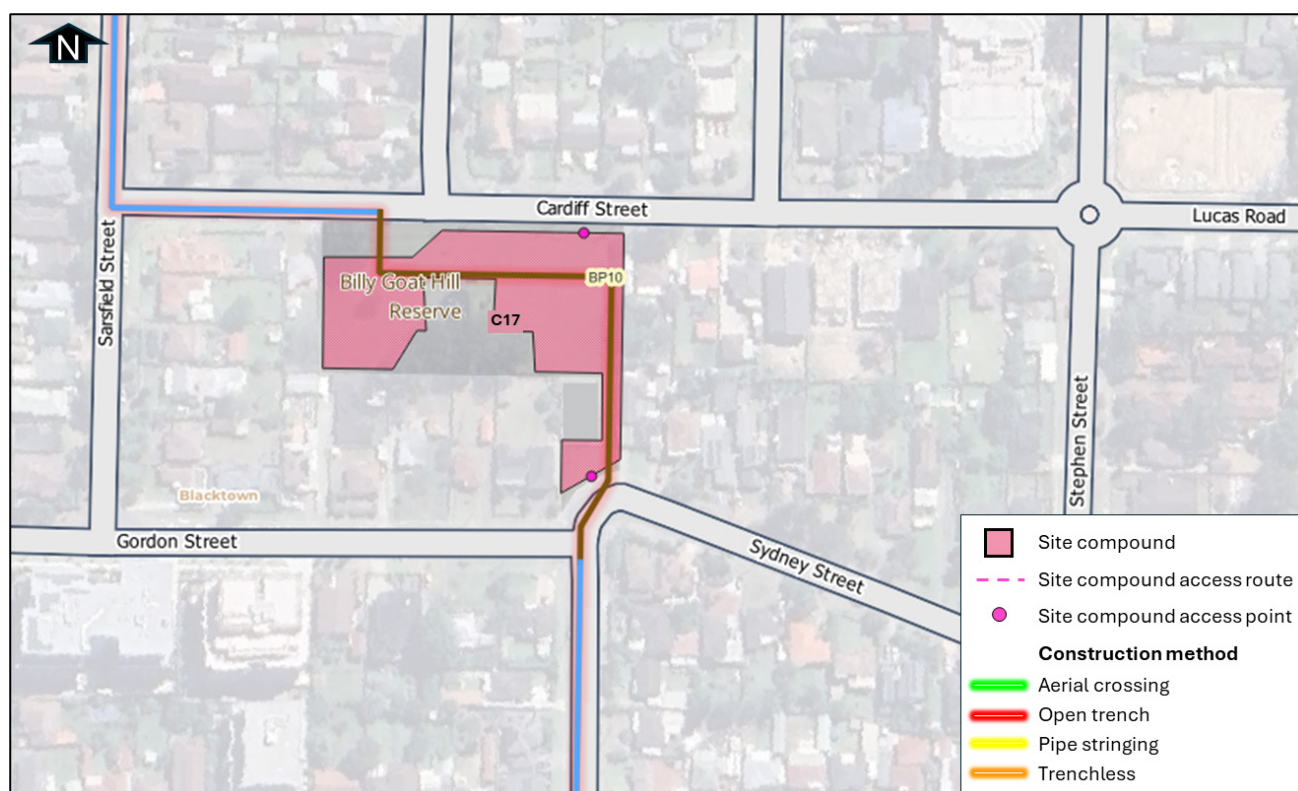


Figure 5.11 Section BP10 – Cardiff Street to Sydney Street

The key elements of this section and impact overview are summarised in Table 5.19.

Table 5.19 Section BP10 description and impact overview

Criteria	Description
Section length	215 metres
Construction method	Open trench
Compound location	C17, which is accessed from Cardiff Street and Sydney Street
Construction route and speed limit	Site compound C17 will be accessed through either Gordon Street or Cardiff Street which connects with Sackville Street which links to Sunnyholt Road to provide access to the remainder of the State Road network. All local roads are signposted at 50 km/h.
Road closure requirement	Considering the geometrical constraint in the road layout, pipeline construction at the intersection of Gordon Street and Sydney Street will require full occupation of the intersection. Based on the intersection count survey conducted during the weekday AM and PM peak periods, the highest total hourly traffic volumes range between 330 and 355 vehicles, which is considered low. Given the availability of potential detour routes via the surrounding local road network, the full occupation of the intersection is not expected to cause significant traffic issues. The lane closure will maintain access for residents only. Buses may need to be temporarily detoured during construction due to geometrical constraint at the intersection to accommodate a safe work area. Refer to Figure 5.12 for local detour routes that can be implemented during the construction at Gordon Street/Sydney Street intersection.
Parking impact	On-street parking by construction workers will likely be required during construction. On-street parking in areas outside of the work area will generally be maintainable and as such, the impact of parking loss during construction is considered minor.
Public transport impact	Bus route 743 will be impacted on Sydney Street and Gordon Street (heading eastbound and westbound). Services run from 5:30 am–9:30 pm on weekdays, 7 am–9 pm on Saturday and 9:30 am–6 pm on Sunday and public holidays. Detour of bus route can be accommodated through Sarsfield Street and Cardiff Street, during the construction at Gordon Street/ Sydney Street intersection. Bus stops on Gordon Street, Sydney Street and Stephen Street will be temporarily affected during the lane closure. Bus customers are to use existing bus stops on Gordon Street (west of Sarsfield Street) and Stephen Street (north of Cardiff Street). Temporary bus stop may be required for the eastbound/northbound direction at Stephen Street/Cardiff Street intersection to maintain good public transport access for affected residents.
Active transport impact	There is no bicycle infrastructure on Gordon Street, Sydney Street or Boyd Street where works are proposed. Pedestrian movements in the work area to be managed around the work area using traffic control.
Property access impact	Resident access will be maintained in the closed road sections required during construction. These will be managed using traffic control.

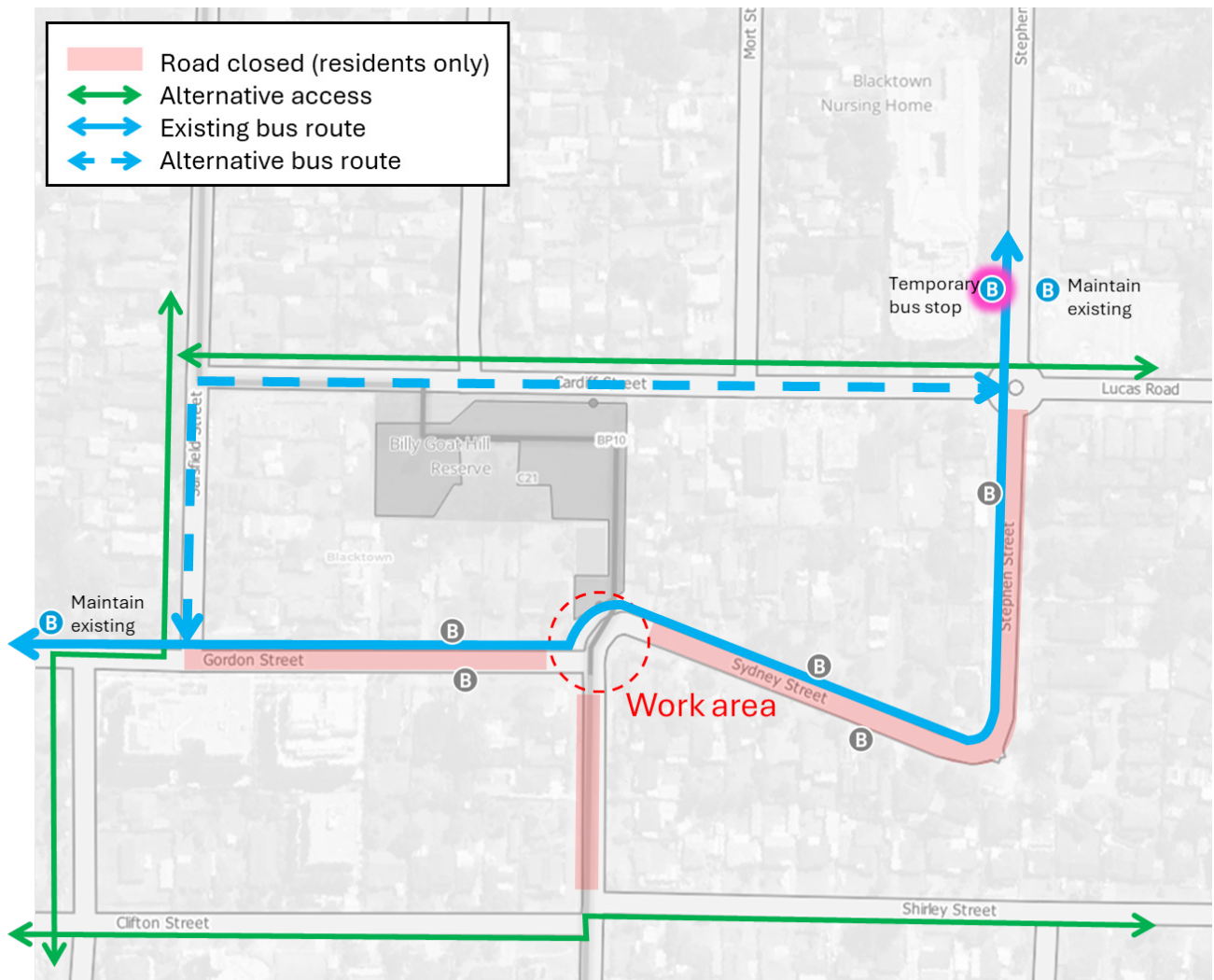


Figure 5.12 Traffic detour option during construction at Gordon Street/Sydney Street intersection

5.6.12 BP11 – Sydney Street to Winifred Crescent

Section BP11 is approximately a 440 metres long section between Sydney Street to Winifred Crescent, that is also being constructed at Boyd Street and Baker Street. The alignment is depicted in Figure 5.13.

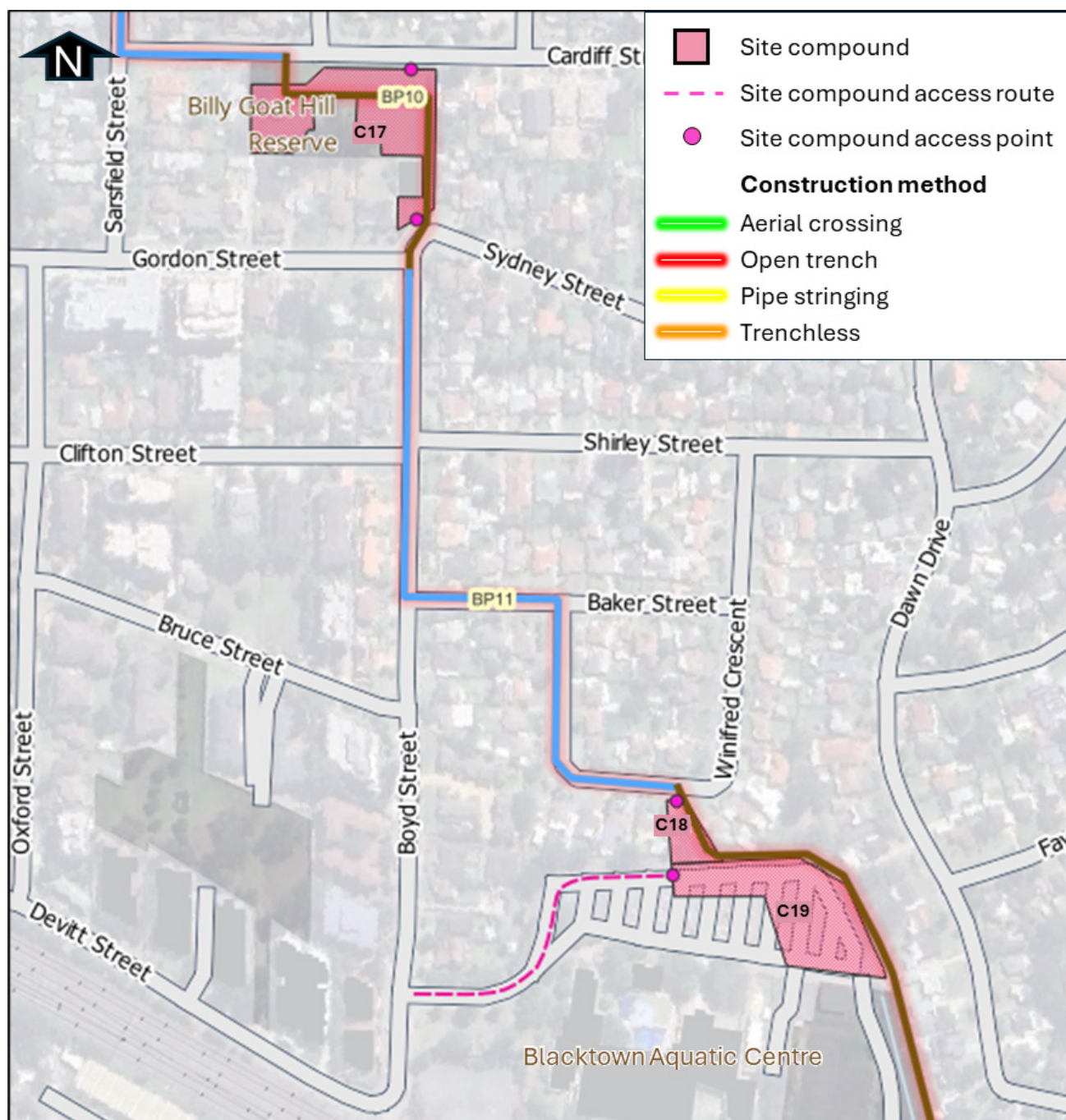


Figure 5.13 Section BP11 – Sydney Street to Winifred Crescent

The key elements of this section and impact overview are summarised in Table 5.20.

Table 5.20 Section BP11 description and impact overview

Criteria	Description
Section length	440 metres
Construction method	Open trench
Compound location	None
Construction route	Winifred Crescent, Baker Street and Boyd Street will be accessed through Gordon Street which connects to Sunnyside Road. This will provide access to the remainder of the State Road network.
Road closure requirement	Temporary lane closure will be proposed at Boyd Street, Baker Street and Winifred Crescent.
Parking	During open trench construction along Boyd Street and Barker Street, kerbside parking on both sides of the road will likely be temporarily restricted to maintain two-way traffic flow through the construction zone. The length of the restricted area and the number of temporarily unavailable parking spaces will vary daily, depending on the progress of pipeline works scheduled for completion each day. Temporary parking restrictions during the construction period should be discussed with Blacktown City Council, and residents should be notified of the construction schedule and associated impacts.
Public transport impact	None
Active transport impact	None
Property access impact	Certain residential access driveways will be impacted as a cause of these works. The addresses for the impacted properties include: — 15 to 17 Boyd Street, Blacktown NSW 2148 — 11 Boyd Street, Blacktown NSW 2148 — 12 to 18 Baker Street, Blacktown NSW 2148 — 20 to 30 Winifred Crescent, Blacktown NSW 2148. Blacktown City Council and residents will be notified/consulted before construction works ensure the work area can be set up for construction and concerns from residents are addressed beforehand. Construction will occur during off-peak periods as much as practically possible to ensure residents are minimally impacted.

5.6.13 BP12 – Winifred Crescent to Jean Crescent

Section BP12 is approximately a 1,080 metres long section between Winifred Crescent to Jean Crescent, near the Netball City Blacktown Association and International Peace Park. The alignment is depicted in Figure 5.14.



Figure 5.14 Section BP12 – Winifred Crescent to Jean Crescent

The key elements of this section and impact overview are summarised in Table 5.21.

Table 5.21 Section BP12 description and impact overview

Criteria	Description
Section length	1,080 metres
Construction method	Open trench
Compound location	C18 is proposed on the vacant lot on Winifred Crescent which will be accessed via Winifred Crescent. C19 will partially occupy the Blacktown Aquatic Centre car park. C20 will be located on the eastern end of the pipeline, accessed from Barbara Boulevard and Jean Street and the existing car park for the International Peace Park.
Construction route and speed limit	Site compound C18 and C19 will be accessed by either Boyd Street or Baker Street (which are signposted 50 km/h roads). These roads are connected to Sarsfield Street which provides access to Sunnyholt Road and the remainder of the State Road network. Jean Street provides access to site compounds C20. Jean Street connects to local roads such as Barabara Boulevard, Locas Road and Sackville Street with signposted speed limits of 50 km/h. Sackville Street then connects to Sunnyholt Road and the remainder of the State Road network.
Road closure requirement	No road closure is expected to construct this section of the pipeline as the alignment is proposed off-street along the northern side of Blacktown Creek and International Peace Park.

Criteria	Description
Parking impact	During construction, partial occupation of the Blacktown Aquatic Centre car park is proposed to allow for a site compound (C19). Up to 50% of the car parking area will be temporarily occupied during construction, with the exact number of car parking spaces lost during construction to be confirmed by the construction team at a later stage. The timing of the car park construction will need to minimise extensive closure during the peak periods (summer) of the Aquatic Centre to minimise the impact to the centre. The use of this car park will be consulted with Blacktown City Council as operators of the aquatic centre. Existing car parking spaces on International Peace Park will be maintained, however its access may experience minor interruptions during work with C20 compound proposed to be set up nearby.
Public transport impact	None
Active transport impact	The alignment of the pipeline is proposed along the current shared path facility located north of the International Peace Park. Temporary full closure of the shared path is likely required to separate people walking and cycling from the work area. Notifications of the path closure will be provided in advance with detour through Dawn Drive, Anne Avenue and existing laneways possible to provide continuation of the paths during construction.
Property access impact	None

5.7 Project wide cumulative impacts

Sydney Water has provided a list of State Significant Infrastructure (SSI) developments proposed adjacent to the impact area. Where publicly available information on the expected transport impact of these projects was available, it has been considered in this assessment.

Table 5.22 summarises the proposed developments, their locations, estimated traffic generation, and assessed key intersections based on the accompanying traffic impact assessment reports.

While most of the traffic generation for this project will occur during the construction period at the Quakers Hill WRRF site, all developments listed in Table 5.22 are located at a considerable distance from this site. Furthermore, these developments are not expected to generate a significant amount of traffic. The reported intersection performance results indicate that key intersections will continue to operate satisfactorily. Given the locations and expected traffic generation of these developments, the cumulative traffic impacts are considered negligible.

Table 5.22 Summary of other developments located adjacent to the project site – for cumulative traffic consideration

Project name/ DA reference	Address	Project description	Status	Reason for consideration/identified traffic impact by the proposed development
Securing our water supply Quakers Hill to Prospect/ SSI-73302712	Quakers Hill WRRF site and PRW pipeline	A Purified Recycled Water Treatment Plant at Quakers Hill to provide a potential new water supply for Greater Sydney, and associated pipeline to Prospect Reservoir.	Preparing EIS	This project is considered a related development, as construction activities for the PRW treatment plant will take place within the existing Quakers Hill WRRF site. At peak construction, it is expected to generate approximately 54 light vehicle movements and 30 heavy vehicle movements per day. However, construction is scheduled to commence in 2029, following the completion of the advanced and secondary treatment works at the Quakers Hill WRRF site. The additional traffic generated by operational staff is expected to be minimal. As such, no cumulative traffic impacts are anticipated.
Honeman Close Data Centre/ SSD-58601963	6 Honeman Close, Huntingwood	Construction and operation of a new 96 MW data centre with associated civil works.	Project under assessment	The site is located southwest of the Great Western Highway and Reservoir Road intersection. The proposal involves the development of a five-storey, 96 MW data centre facility operating 24/7. At peak occupancy, up to 79 staff, contractors, and visitors may be on-site at any given time. Based on the car mode split in the Huntingwood area and its surroundings, the proposed development is expected to generate approximately 72 car trips during each peak period.
Augusta Street Warehouse and Distribution Centre/ SSD-36138263	Augusta Street, Blacktown (multiple lot/DPs)	The construction and operation of a warehouse and distribution centre	Determined 17 Dec 2024 Approved project	The site is situated on the southern side of the Great Western Highway, between Flushcombe Road and Prospect Highway. The proposed development consists of a warehouse and distribution centre with a gross floor area of approximately 134,565 m ² , including four warehouse buildings, ancillary office space, and office facilities. A traffic impact assessment was conducted for the Flushcombe Road/Great Western Highway intersection, which operated at Level of Service (LoS) C and D in 2023. With the addition of development traffic to projected 2033 traffic flows and the implementation of proposed intersection upgrades, the intersection is expected to continue operating at LoS C/D in 2033.
Davis Road Data Centre (Cundall)/ SSD-59416728	3 Davis Road, Wetherill Park	Construction and operation of two data centre buildings and associated infrastructure, with an overall power consumption of 180 megawatts (MW)	Determined 20 Dec 2024 Approved project	Based on the traffic assessment report for this project, no significant traffic impacts are expected at the Flushcombe Road and Great Western Highway intersection. Additionally, as the site is located away from both the proposed impact area and the Quakers Hill WRRF site, no cumulative impact is anticipated.

6 Operation impact assessment

6.1 Impacts on road capacity

The increase of approximately four additional workers at Quakers Hill WRRF will generate minor additional trips, which are considered negligible in terms of road network operation. The intersection of Quakers Road with the WRRF access point is expected to continue operating satisfactorily at LoS D or better during the weekday AM and PM peak hours, even with the higher demand experienced during construction.

Following the completion of construction works for the pipeline, existing operations of the road network and associated capacity will be reinstated to the conditions prior to construction. As such there will be no impact to the road network capacity caused by the operation of the pipeline.

6.2 Impacts on parking

Additional facilities within the Quakers Hill WRRF will result in a small increase by approximately four workers required to operate the site. There is currently a surplus of operational facilities and parking capacity on site, which is expected to accommodate the small increase in workforce without the need for additional on-street parking provisions..

Following the completion of construction works for the pipeline, existing on-street car parks will be reinstated and available for use by the public. As such there will be no impact to on-street parking caused by the operation of the project.

6.3 Impacts on property access

Following the completion of construction works for both the Quakers Hill WRRF and pipeline, existing operations of the road network will be reinstated. As such there will be no impact to property access caused by the operation of the project.

6.4 Impacts on public transport

Following the completion of construction works for both the Quakers Hill WRRF and pipeline, existing operations of the road network, bus routes and bus stops will be reinstated. As such there will be no impact to public transport operations caused by the project.

6.5 Impacts on active transport

Trenching along and across existing shared paths and footpaths resulting from the construction for the project will be reinstated during to the condition previously found prior to construction. These paths will be reopened as soon as works are progressively completed along the pipeline to minimise impacts to active transport accesses. As such, there will be no impact to active transport facilities caused by the project following its completion.

6.6 Impacts on emergency access

Following the completion of construction works for both the Quakers Hill WRRF and pipeline, existing operations of the road network will be reinstated. As such there will be no impact to emergency vehicle accesses caused by the operation of the project.

7 Mitigation measures

This section outlines the mitigation measures identified as necessary to minimise the traffic and transport impacts as summarised in Section 5 and Section 6 for construction and operational impacts respectively.

The proposed mitigation measures for this project are summarised in Table 7.1.

As the majority of impacts will be experienced during the construction stage, with considerable interaction on the road network, it is important for the appointed construction contractor to prepare a Construction Traffic Management Plan (CTMP) as part of the Construction Environmental Management Plan (CEMP) of the works.

The CTMP will detail the implementation plan proposed for the construction works and enables a consultation process with stakeholders and road authorities to mitigate and plan response strategies for any residual risks. The CTMP would include:

- confirmation of construction routes associated with construction compounds through the preparation of Vehicle Movement Plan (VMP)
- measures to maintain access to local roads and properties
- site specific traffic control measures (including signage) to manage and regulate traffic movement
- measures to maintain pedestrian and cyclist access
- requirements and methods to consult and inform the local community of impacts on the local road network
- obtain relevant approvals for any potential works in the road corridor and access by restricted access vehicles required for the project
- access to construction sites including entry and exit locations and measures to prevent construction vehicles from queuing on public roads
- a response plan for any construction traffic incident
- consideration of other developments that may be under construction to minimise cumulative impacts.

Table 7.1 Mitigation measures

Measure No	Impact type	Identified mitigation measure	Timing
1	Road and traffic management	CTMP and associated Traffic Guidance Scheme (TGS) will be developed in consultation with the relevant road authorities and implemented by licensed traffic management contractors. Necessary road occupancy licences and road related work approvals will be obtained before the commencement of relevant works (including site access and access tracks).	Construction
2	Road and traffic management	Consult with the relevant traffic authority to manage potential impacts on pedestrian traffic, signposting, parking meters, line-marking, and parking. Additionally, confirm whether traffic control measures or pavement restoration will be required.	Pre-construction Construction

Measure No	Impact type	Identified mitigation measure	Timing
3	Temporary lane closures or temporary road closures	TGS plans to be prepared and Road Occupancy Licence(s) will be sought for all temporary lane closures (as required). Where road closures are likely to result in a significant traffic impact (e.g. short-term full road closure and long-term temporary lane/road closures), prior consultation will be undertaken with potentially affected stakeholders (e.g. landowners, emergency services, transport services) and relevant approval(s) obtained from the relevant roads authority. Where feasible, temporary road closures will be planned to occur outside of the traffic peak periods to minimise impacts to the road network.	Construction
4	Construction vehicle routes	Any specific road segments that should be avoided by construction vehicles should be clearly identified in the Construction Traffic Management Plan (CTMP). These restrictions must be communicated to all construction personnel and delivery drivers before the commencement of works. Construction workers and delivery drivers should be informed about areas with a history of crashes, especially along designated construction vehicle routes.	Construction
5	Heavy vehicles using the road network	A Vehicle Movement Plan will be prepared as part of the CTMP which identifies the construction vehicle route(s) to be used during construction. The Vehicle Movement Plan will also include details of activities of adjoining land uses and awareness of public safety measures (e.g. school zones and high pedestrian activity areas) to provide guidance to drivers of construction vehicles travelling to and from project locations.	Construction

Measure No	Impact type	Identified mitigation measure	Timing
6	Road safety – driver related	The following road safety measures will be implemented with regard to driver management during construction: — A Driver Code of Conduct will be developed and implemented. The code will define acceptable driver behaviour for proposal personnel to promote road safety and ensure that the impacts of construction-related vehicle movements on local roads and the local community are minimised. — In-vehicle monitoring systems (IVMS) will be installed in relevant vehicles to monitor load limits and fatigue management. — A Driver Fatigue Management Plan will be developed and implemented as part of the Construction Environmental Management Plan, and will incorporate appropriate measures to manage driver fatigue risks, including, but not limited to: — planning of regular breaks — mapping locations of driver rest areas along the proposed construction routes.	Construction
7	Property access	Accesses to some residential properties will be affected as open trenching construction will be conducted along the pipeline alignment on the public road at these properties. Works along the pipeline will be undertaken in stages, and progressively along the pipeline alignment, to avoid impacting property access for long periods. Construction will also be planned during off-peak periods as much as practically possible to further minimise access impacts for residents. Blacktown City Council, affected residents and businesses will be notified/consulted before construction works ensure the work area can be set up for construction and concerns from residents are addressed beforehand.	Construction
8	Parking	To minimise impact to on-street parking availability, off-street parking will be provided in Quakers Hill WRRF where larger workforce, generated by the project's site office and construction activities are expected. Where it is possible, off-street parking spaces will be provided in larger site compounds along the pipeline alignment to minimise the impact to the surrounding streets. Where it is not possible, construction vehicles will be parked on-street surrounding the work area.	Construction

Measure No	Impact type	Identified mitigation measure	Timing
9	Pedestrian and cyclist access	The project will temporarily impact footpath network adjacent to work areas, which will need to be managed through traffic control. Several dedicated cycleways affected by the project include: - Existing shared path refuge on Falmouth Road and Breakfast Creek will be temporarily closed during construction as the pipeline alignment will go through it. The works will be carried out at nighttime to minimise the impact of the temporary closure of the refuge. - The shared path along the northern side of Breakfast Creek will be closed to ensure no interaction between the public and work area. Walking and cycling to connect Falmouth Road and Breakfast Road will need to be provided via alternative local routes to maintain access for school students and residents - Shared paths in Marayong Park north of Breakfast Creek alignment will be closed during construction to ensure no interaction between the public and work area. Walking and cycling to connect Breakfast Road and Davis Road will need to be provided via alternative local routes to maintain access for residents. - Temporary full closure of the shared path at the International Peace Park is likely required to separate people walking and cycling from the work area. The project will actively consult with local bicycle groups where available. Safe pedestrian and bicycle movements around work areas will be considered in the preparation of CTMP and TGS and minimise interaction with construction traffic.	Construction
10	Emergency access	A minimum 3 m emergency access is to be maintained at all times. Local emergency services are to be notified of traffic changes as required by road authorities.	Construction

Appendix A

Detailed SIDRA results



MOVEMENT SUMMARY

 **Site: I-01 [I-01 2024 AM (Site Folder: I-01 Quakers Road / Access Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

I-01 Quakers Road / Quakers Hill WRRF Access Road
2024 Existing AM Peak
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
SouthEast: Quakers Road (SE)															
1	L2	All MCs	5	0.0	5	0.0	0.121	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	47.8
2	T1	All MCs	457	3.0	457	3.0	0.121	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
Approach			462	3.0	462	3.0	0.121	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.9
NorthWest: Quakers Road (NW)															
8	T1	All MCs	715	2.2	715	2.2	0.189	0.1	LOS A	0.1	0.5	0.01	0.01	0.01	49.9
9	R2	All MCs	4	25.0	4	25.0	0.189	7.4	LOS A	0.1	0.5	0.02	0.02	0.02	46.5
Approach			719	2.3	719	2.3	0.189	0.1	NA	0.1	0.5	0.01	0.01	0.01	49.9
SouthWest: Access Road (SW)															
10	L2	All MCs	3	33.3	3	33.3	0.004	10.2	LOS A	0.0	0.1	0.35	0.87	0.35	40.1
12	R2	All MCs	2	0.0	2	0.0	0.015	30.3	LOS C	0.0	0.3	0.86	1.00	0.86	29.5
Approach			5	20.0	5	20.0	0.015	18.3	LOS B	0.0	0.3	0.55	0.92	0.55	35.1
All Vehicles			1186	2.7	1186	2.7	0.189	0.2	NA	0.1	0.5	0.01	0.01	0.01	49.8

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

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MOVEMENT SUMMARY

 **Site: I-01 [I-01 2024 PM (Site Folder: I-01 Quakers Road / Access Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

I-01 Quakers Road / Quakers Hill WRRF Access Road
2024 Existing PM Peak
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	Dist]				
			veh/h		veh/h		v/c	sec		veh	m				km/h
SouthEast: Quakers Road (SE)															
1	L2	All MCs	1	0.0	1	0.0	0.158	4.6	LOS A	0.0	0.0	0.00	0.00	0.00	47.9
2	T1	All MCs	605	2.3	605	2.3	0.158	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach			606	2.3	606	2.3	0.158	0.1	NA	0.0	0.0	0.00	0.00	0.00	49.9
NorthWest: Quakers Road (NW)															
8	T1	All MCs	439	4.8	439	4.8	0.117	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	50.0
9	R2	All MCs	1	0.0	1	0.0	0.117	5.7	LOS A	0.0	0.1	0.01	0.01	0.01	47.9
Approach			440	4.8	440	4.8	0.117	0.0	NA	0.0	0.1	0.00	0.00	0.00	50.0
SouthWest: Access Road (SW)															
10	L2	All MCs	14	0.0	14	0.0	0.016	9.0	LOS A	0.1	0.4	0.38	0.86	0.38	40.8
12	R2	All MCs	5	0.0	5	0.0	0.028	24.8	LOS B	0.1	0.6	0.82	1.00	0.82	31.9
Approach			19	0.0	19	0.0	0.028	13.4	LOS A	0.1	0.6	0.50	0.90	0.50	37.8
All Vehicles			1065	3.3	1065	3.3	0.158	0.3	NA	0.1	0.6	0.01	0.02	0.01	49.8

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

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MOVEMENT SUMMARY

 **Site: I-01 [I-01 2028 BASE AM (Site Folder: I-01 Quakers Road / Access Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

I-01 Quakers Road / Quakers Hill WRRF Access Road
2028 Future Base AM Peak
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	[Dist]				km/h
SouthEast: Quakers Road (SE)															
1	L2	All MCs	5	0.0	5	0.0	0.131	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	47.8
2	T1	All MCs	495	3.0	495	3.0	0.131	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
Approach			500	2.9	500	2.9	0.131	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.9
NorthWest: Quakers Road (NW)															
8	T1	All MCs	774	2.2	774	2.2	0.204	0.1	LOS A	0.1	0.5	0.01	0.01	0.01	49.9
9	R2	All MCs	4	25.0	4	25.0	0.204	7.7	LOS A	0.1	0.5	0.02	0.02	0.02	46.5
Approach			778	2.3	778	2.3	0.204	0.1	NA	0.1	0.5	0.01	0.01	0.01	49.9
SouthWest: Access Road (SW)															
10	L2	All MCs	3	33.3	3	33.3	0.004	10.4	LOS A	0.0	0.1	0.36	0.87	0.36	40.0
12	R2	All MCs	2	0.0	2	0.0	0.018	35.8	LOS C	0.1	0.4	0.88	1.00	0.88	27.5
Approach			5	20.0	5	20.0	0.018	20.6	LOS B	0.1	0.4	0.57	0.92	0.57	33.9
All Vehicles			1283	2.6	1283	2.6	0.204	0.2	NA	0.1	0.5	0.01	0.01	0.01	49.8

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

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MOVEMENT SUMMARY

 **Site: I-01 [I-01 2028 BASE PM (Site Folder: I-01 Quakers Road / Access Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

I-01 Quakers Road / Quakers Hill WRRF Access Road
2028 Future Base PM Peak
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	Dist]				
			veh/h		veh/h		v/c	sec		veh	m				km/h
SouthEast: Quakers Road (SE)															
1	L2	All MCs	1	0.0	1	0.0	0.171	4.6	LOS A	0.0	0.0	0.00	0.00	0.00	47.9
2	T1	All MCs	655	2.3	655	2.3	0.171	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach			656	2.2	656	2.2	0.171	0.1	NA	0.0	0.0	0.00	0.00	0.00	49.9
NorthWest: Quakers Road (NW)															
8	T1	All MCs	476	4.9	476	4.9	0.127	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	50.0
9	R2	All MCs	1	0.0	1	0.0	0.127	5.9	LOS A	0.0	0.1	0.01	0.01	0.01	47.9
Approach			477	4.9	477	4.9	0.127	0.0	NA	0.0	0.1	0.00	0.00	0.00	50.0
SouthWest: Access Road (SW)															
10	L2	All MCs	15	0.0	15	0.0	0.018	9.2	LOS A	0.1	0.4	0.39	0.86	0.39	40.7
12	R2	All MCs	5	0.0	5	0.0	0.033	28.4	LOS B	0.1	0.7	0.84	1.00	0.84	30.3
Approach			20	0.0	20	0.0	0.033	14.2	LOS A	0.1	0.7	0.51	0.90	0.51	37.3
All Vehicles			1153	3.3	1153	3.3	0.171	0.3	NA	0.1	0.7	0.01	0.02	0.01	49.8

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

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MOVEMENT SUMMARY

 **Site: I-01 [I-01 2028 Construction AM (Site Folder: I-01 Quakers Road / Access Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

I-01 Quakers Road / Quakers Hill WRRF Access Road
2028 Future year with Construction AM Peak
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
SouthEast: Quakers Road (SE)															
1	L2	All MCs	58	0.0	58	0.0	0.145	4.6	LOS A	0.0	0.0	0.00	0.11	0.00	46.9
2	T1	All MCs	495	3.0	495	3.0	0.145	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	49.7
Approach			553	2.7	553	2.7	0.145	0.5	NA	0.0	0.0	0.00	0.06	0.00	49.5
NorthWest: Quakers Road (NW)															
8	T1	All MCs	774	2.2	774	2.2	0.249	0.6	LOS A	1.0	7.3	0.12	0.13	0.12	49.2
9	R2	All MCs	65	14.5	65	14.5	0.249	8.7	LOS A	1.0	7.3	0.31	0.33	0.31	44.6
Approach			839	3.1	839	3.1	0.249	1.3	NA	1.0	7.3	0.13	0.14	0.13	49.0
SouthWest: Access Road (SW)															
10	L2	All MCs	12	81.8	12	81.8	0.019	12.8	LOS A	0.1	0.8	0.38	0.94	0.38	38.8
12	R2	All MCs	2	0.0	2	0.0	0.022	43.3	LOS D	0.1	0.5	0.91	1.00	0.91	25.2
Approach			14	69.2	14	69.2	0.022	17.5	LOS B	0.1	0.8	0.46	0.95	0.46	35.8
All Vehicles			1405	3.6	1405	3.6	0.249	1.1	NA	1.0	7.3	0.08	0.12	0.08	49.1

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

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MOVEMENT SUMMARY

 **Site: I-01 [I-01 2028 Construction PM (Site Folder: I-01 Quakers Road / Access Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

I-01 Quakers Road / Quakers Hill WRRF Access Road
2028 Future year with Construction PM Peak
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV] veh/h	%	[Total HV] veh/h	%				[Veh. veh	Dist] m				
SouthEast: Quakers Road (SE)															
1	L2	All MCs	1	0.0	1	0.0	0.171	4.6	LOS A	0.0	0.0	0.00	0.00	0.00	47.9
2	T1	All MCs	655	2.3	655	2.3	0.171	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach			656	2.2	656	2.2	0.171	0.1	NA	0.0	0.0	0.00	0.00	0.00	49.9
NorthWest: Quakers Road (NW)															
8	T1	All MCs	476	4.9	476	4.9	0.141	0.7	LOS A	0.4	3.2	0.07	0.06	0.07	49.4
9	R2	All MCs	9	88.9	9	88.9	0.141	14.9	LOS B	0.4	3.2	0.15	0.15	0.15	42.2
Approach			485	6.5	485	6.5	0.141	0.9	NA	0.4	3.2	0.07	0.07	0.07	49.3
SouthWest: Access Road (SW)															
10	L2	All MCs	76	11.1	76	11.1	0.100	10.1	LOS A	0.4	2.7	0.43	0.92	0.43	40.1
12	R2	All MCs	58	0.0	58	0.0	0.370	35.8	LOS C	1.4	9.5	0.90	1.06	1.10	27.5
Approach			134	6.3	134	6.3	0.370	21.2	LOS B	1.4	9.5	0.63	0.98	0.72	33.5
All Vehicles			1275	4.3	1275	4.3	0.370	2.6	NA	1.4	9.5	0.09	0.13	0.10	48.1

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.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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 Gap.

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.

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MOVEMENT SUMMARY

 **Site: M-01 [M-01 Falmouth Road 2028 AM (Site Folder: M-01 Falmouth Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
South: Falmouth Road (S)															
1	T1	All MCs	793	3.0	793	3.0	* 1.130	175.1	LOS F	76.4	548.9	1.00	1.76	2.39	14.6
Approach			793	3.0	793	3.0	1.130	175.1	LOS F	76.4	548.9	1.00	1.76	2.39	14.6
North: Falmouth Road (N)															
2	T1	All MCs	734	3.0	734	3.0	* 1.114	162.7	LOS F	67.9	487.2	1.00	1.70	2.29	15.5
Approach			734	3.0	734	3.0	1.114	162.7	LOS F	67.9	487.2	1.00	1.70	2.29	15.5
All Vehicles			1526	3.0	1526	3.0	1.130	169.1	LOS F	76.4	548.9	1.00	1.73	2.34	15.0

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)

MOVEMENT SUMMARY

 **Site: M-01 [M-01 Falmouth Road 2028 PM (Site Folder: M-01 Falmouth Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
			veh/h		veh/h		v/c	sec							km/h
South: Falmouth Road (S)															
1	T1	All MCs	558	3.0	558	3.0	* 0.875	48.7	LOS D	27.1	194.3	1.00	1.01	1.20	31.7
Approach			558	3.0	558	3.0	0.875	48.7	LOS D	27.1	194.3	1.00	1.01	1.20	31.7
North: Falmouth Road (N)															
2	T1	All MCs	787	3.0	787	3.0	* 1.090	142.5	LOS F	68.6	492.4	1.00	1.61	2.12	17.0
Approach			787	3.0	787	3.0	1.090	142.5	LOS F	68.6	492.4	1.00	1.61	2.12	17.0
All Vehicles			1345	3.0	1345	3.0	1.090	103.6	LOS F	68.6	492.4	1.00	1.36	1.74	21.1

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: M-01 [M-01 Falmouth Road 2028 Mid-day (Site Folder: M-01 Falmouth Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 86 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	[Dist]				
			veh/h		veh/h		v/c	sec		veh	m				km/h
South: Falmouth Road (S)															
1	T1	All MCs	356	3.0	356	3.0	* 0.533	33.2	LOS C	12.0	86.4	0.85	0.82	0.85	37.0
Approach			356	3.0	356	3.0	0.533	33.2	LOS C	12.0	86.4	0.85	0.82	0.85	37.0
North: Falmouth Road (N)															
2	T1	All MCs	294	3.0	294	3.0	* 0.440	32.2	LOS C	9.5	68.5	0.82	0.81	0.82	37.6
Approach			294	3.0	294	3.0	0.440	32.2	LOS C	9.5	68.5	0.82	0.81	0.82	37.6
All Vehicles			649	3.0	649	3.0	0.533	32.7	LOS C	12.0	86.4	0.84	0.82	0.84	37.3

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: M-01 [M-01 Falmouth Road 2028 Night time (Site Folder: M-01 Falmouth Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 86 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	[Dist]				
			veh/h		veh/h		v/c	sec		veh	m				km/h
South: Falmouth Road (S)															
1	T1	All MCs	284	3.0	284	3.0	* 0.426	32.1	LOS C	9.2	65.9	0.81	0.80	0.81	37.5
Approach			284	3.0	284	3.0	0.426	32.1	LOS C	9.2	65.9	0.81	0.80	0.81	37.5
North: Falmouth Road (N)															
2	T1	All MCs	294	3.0	294	3.0	* 0.440	32.2	LOS C	9.5	68.5	0.82	0.81	0.82	37.6
Approach			294	3.0	294	3.0	0.440	32.2	LOS C	9.5	68.5	0.82	0.81	0.82	37.6
All Vehicles			578	3.0	578	3.0	0.440	32.1	LOS C	9.5	68.5	0.82	0.81	0.82	37.6

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: M-02 [M-02 Breakfast Road 2028 AM (Site Folder: M-02 Breakfast Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
South: Breakfast Road (S)															
1	T1	All MCs	553	3.0	553	3.0	* 0.749	28.6	LOS C	17.3	124.2	0.93	0.89	0.98	31.4
Approach			553	3.0	553	3.0	0.749	28.6	LOS C	17.3	124.2	0.93	0.89	0.98	31.4
North: Breakfast Road (N)															
2	T1	All MCs	472	3.0	472	3.0	* 0.750	31.6	LOS C	15.4	110.5	0.95	0.90	1.03	30.1
Approach			472	3.0	472	3.0	0.750	31.6	LOS C	15.4	110.5	0.95	0.90	1.03	30.1
All Vehicles			1024	3.0	1024	3.0	0.750	30.0	LOS C	17.3	124.2	0.94	0.90	1.00	30.8

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: M-02 [M-02 Breakfast Road 2028 PM (Site Folder: M-02 Breakfast Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Breakfast Road (S)															
1	T1	All MCs	345	3.0	345	3.0	* 0.542	24.7	LOS B	8.4	60.5	0.86	0.81	0.86	33.0
Approach			345	3.0	345	3.0	0.542	24.7	LOS B	8.4	60.5	0.86	0.81	0.86	33.0
North: Breakfast Road (N)															
2	T1	All MCs	441	3.0	441	3.0	* 0.692	26.6	LOS B	11.8	84.5	0.92	0.87	0.96	32.1
Approach			441	3.0	441	3.0	0.692	26.6	LOS B	11.8	84.5	0.92	0.87	0.96	32.1
All Vehicles			786	3.0	786	3.0	0.692	25.8	LOS B	11.8	84.5	0.90	0.84	0.92	32.5

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: M-02 [M-02 Breakfast Road 2028 Mid-day (Site Folder: M-02 Breakfast Road)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh]	[Dist] m				
veh/h % veh/h % v/c sec km/h															
South: Breakfast Road (S)															
1	T1	All MCs	160	3.0	160	3.0	* 0.251	22.7	LOS B	3.5	24.9	0.77	0.75	0.77	33.9
Approach			160	3.0	160	3.0	0.251	22.7	LOS B	3.5	24.9	0.77	0.75	0.77	33.9
North: Breakfast Road (N)															
2	T1	All MCs	265	3.0	265	3.0	* 0.416	23.8	LOS B	6.1	44.1	0.82	0.79	0.82	33.3
Approach			265	3.0	265	3.0	0.416	23.8	LOS B	6.1	44.1	0.82	0.79	0.82	33.3
All Vehicles			425	3.0	425	3.0	0.416	23.4	LOS B	6.1	44.1	0.80	0.77	0.80	33.5

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: M-02 [M-02 Breakfast Road 2028 Night time (Site Folder: M-02 Breakfast Road)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance																
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%				[Veh. veh]	[Dist] m					km/h
South: Breakfast Road (S)																
1	T1	All MCs	134	3.0	134	3.0	* 0.210	22.5	LOS B	2.9	20.5	0.75	0.74	0.75	34.0	
Approach			134	3.0	134	3.0	0.210	22.5	LOS B	2.9	20.5	0.75	0.74	0.75	34.0	
North: Breakfast Road (N)																
2	T1	All MCs	243	3.0	243	3.0	* 0.381	23.6	LOS B	5.6	39.9	0.81	0.78	0.81	33.4	
Approach			243	3.0	243	3.0	0.381	23.6	LOS B	5.6	39.9	0.81	0.78	0.81	33.4	
All Vehicles			377	3.0	377	3.0	0.381	23.2	LOS B	5.6	39.9	0.79	0.77	0.79	33.6	

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: M-03 [I-02 Sackville Street 2028 AM (Site Folder: I-02, M-03 Sackville Street)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
veh/h															
%															
veh/h															
%															
v/c															
sec															
[Veh. veh															
Dist] m															
km/h															
East: Sackville Street (E)															
1	T1	All MCs	459	3.0	459	3.0	* 0.774	42.8	LOS D	21.3	153.1	0.97	0.90	1.03	15.4
Approach			459	3.0	459	3.0	0.774	42.8	LOS D	21.3	153.1	0.97	0.90	1.03	15.4
West: Sackville Street (W)															
2	T1	All MCs	562	3.0	562	3.0	* 0.754	35.8	LOS C	24.0	172.6	0.93	0.87	0.94	17.4
Approach			562	3.0	562	3.0	0.754	35.8	LOS C	24.0	172.6	0.93	0.87	0.94	17.4
All Vehicles			1021	3.0	1021	3.0	0.774	39.0	LOS C	24.0	172.6	0.95	0.89	0.98	16.5

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: M-03 [I-02 Sackville Street 2028 PM (Site Folder: I-02, M-03 Sackville Street)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
East: Sackville Street (E)															
1	T1	All MCs	500	3.0	500	3.0	* 0.817	44.8	LOS D	24.3	174.5	0.99	0.94	1.08	15.0
Approach			500	3.0	500	3.0	0.817	44.8	LOS D	24.3	174.5	0.99	0.94	1.08	15.0
West: Sackville Street (W)															
2	T1	All MCs	588	3.0	588	3.0	* 0.810	39.9	LOS C	27.4	196.4	0.96	0.92	1.03	16.2
Approach			588	3.0	588	3.0	0.810	39.9	LOS C	27.4	196.4	0.96	0.92	1.03	16.2
All Vehicles			1088	3.0	1088	3.0	0.817	42.2	LOS C	27.4	196.4	0.97	0.93	1.05	15.6

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: M-03 [I-02 Sackville Street 2028 AM Early (Site Folder: I-02, M-03 Sackville Street)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2-Way Road with shared 1-Lane Section controlled by Signals
Applicable to Work Zone Traffic Control
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
East: Sackville Street (E)															
1	T1	All MCs	369	3.0	369	3.0	* 0.676	31.7	LOS C	11.6	83.4	0.94	0.85	0.97	18.8
Approach			369	3.0	369	3.0	0.676	31.7	LOS C	11.6	83.4	0.94	0.85	0.97	18.8
West: Sackville Street (W)															
2	T1	All MCs	340	3.0	340	3.0	* 0.622	30.8	LOS C	10.3	74.2	0.92	0.83	0.92	19.1
Approach			340	3.0	340	3.0	0.622	30.8	LOS C	10.3	74.2	0.92	0.83	0.92	19.1
All Vehicles			709	3.0	709	3.0	0.676	31.2	LOS C	11.6	83.4	0.93	0.84	0.95	18.9

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)

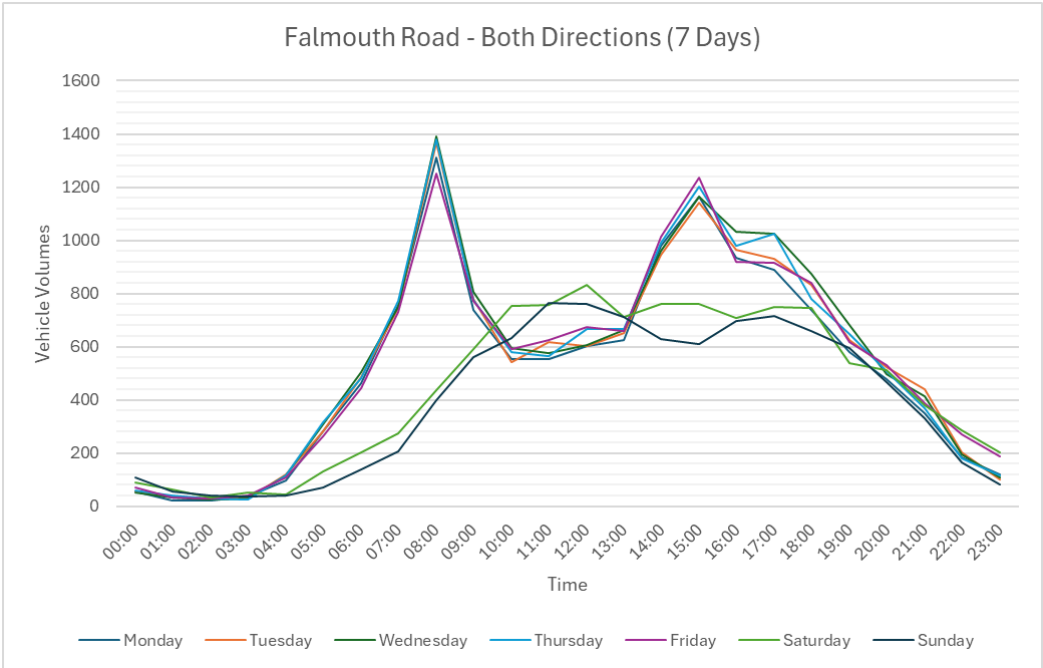
Appendix B

Intersection turn count diagram and traffic survey data



M-01 – Falmouth Road, Marayong

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
00:00	55	56	53	59	71	88	109
01:00	20	36	33	40	34	64	56
02:00	21	27	26	30	29	31	41
03:00	37	28	30	24	41	50	36
04:00	98	121	115	116	107	42	39
05:00	283	281	308	317	264	129	70
06:00	464	484	503	483	445	201	139
07:00	757	745	750	770	732	272	205
08:00	1311	1369	1391	1378	1251	437	399
09:00	738	781	806	776	771	591	562
10:00	553	542	595	581	592	753	634
11:00	552	617	576	563	625	755	763
12:00	601	601	607	667	673	832	761
13:00	623	651	661	665	660	711	713
14:00	978	947	960	991	1013	759	627
15:00	1164	1140	1164	1201	1235	759	608
16:00	933	965	1031	980	919	709	697
17:00	887	929	1024	1024	914	751	717
18:00	738	832	874	778	838	744	657
19:00	581	626	681	646	616	538	596
20:00	477	523	497	507	529	511	468
21:00	348	438	413	368	388	381	331
22:00	184	201	196	180	269	285	163
23:00	121	99	106	114	186	201	80
	12524	13039	13400	13258	13202	10594	9471



M-01 Hourly traffic volumes on Falmouth Road, north of Breakfast Creek, recorded over a 7-day period

Weekday Average - Combined

AM Peak
PM Peak
Mid-Day
Night Time

	Northbound	Southbound	Combined
08:00	696	644	1340
15:00	490	691	1181
12:00	312	318	630
20:00	249	258	#N/A
HV%	3.02%	2.91%	2.97%

Northbound

00:00	23	27	19	29	34	33	53	218	31	132	26	86	43
01:00	9	19	19	18	16	25	26	132	19	81	16	51	26
02:00	10	11	13	14	17	22	21	108	15	65	13	43	22
03:00	26	15	18	13	24	21	14	131	19	96	19	35	18
04:00	62	76	71	75	69	23	20	396	57	353	71	43	22
05:00	208	194	209	222	183	91	43	1150	164	1016	203	134	67
06:00	331	338	357	339	318	122	90	1895	271	1683	337	212	106
07:00	492	475	508	523	481	176	117	2772	396	2479	496	293	147
08:00	681	721	732	703	644	244	245	3970	567	3481	696	489	245
09:00	379	442	447	428	416	330	290	2732	390	2112	422	620	310
10:00	280	265	321	295	301	395	341	2198	314	1462	292	736	368
11:00	299	330	296	301	290	391	382	2289	327	1516	303	773	387
12:00	305	307	280	340	328	425	382	2367	338	1560	312	807	404
13:00	328	339	332	347	332	361	371	2410	344	1678	336	732	366
14:00	524	485	501	516	554	408	343	3331	476	2580	516	751	376
15:00	456	471	480	504	537	385	311	3144	449	2448	490	696	348
16:00	432	483	493	480	439	384	397	3108	444	2327	465	751	391
17:00	423	455	548	534	451	402	350	3163	452	2411	482	752	376
18:00	379	413	425	418	467	381	352	2835	405	2102	420	733	367
19:00	297	312	332	333	310	282	297	2163	309	1584	317	579	290
20:00	238	241	246	248	270	265	228	1736	248	1243	249	493	247
21:00	188	223	188	164	199	190	164	1316	188	962	192	354	177
22:00	94	102	97	89	132	138	77	729	104	514	103	215	108
23:00	57	46	43	51	86	93	29	405	58	283		122	61

Southbound

00:00	32	29	34	30	37	55	56	273	39	162	32	111	56
01:00	11	17	14	22	18	39	30	151	22	82	16	69	35
02:00	11	16	13	16	12	9	20	97	14	68	14	29	15
03:00	11	13	12	11	17	29	22	115	16	64	13	51	26
04:00	36	45	44	41	38	19	19	242	35	204	41	38	19
05:00	75	87	99	95	81	38	27	502	72	437	87	65	33
06:00	133	146	146	144	127	79	49	824	118	696	139	128	64
07:00	265	270	242	247	251	96	88	1459	208	1275	255	184	92
08:00	630	648	659	675	607	193	154	3566	509	3219	644	347	174
09:00	359	339	359	348	355	261	272	2293	328	1760	352	533	267
10:00	273	277	274	286	291	358	293	2052	293	1401	280	651	326
11:00	253	287	280	262	335	364	381	2162	309	1417	283	745	373
12:00	296	294	327	327	345	407	379	2375	339	1589	318	786	393
13:00	295	312	329	318	328	350	342	2274	325	1582	316	692	346
14:00	454	462	459	475	459	351	284	2944	421	2309	462	635	318
15:00	708	669	684	697	698	374	297	4127	590	3456	691	671	336
16:00	501	482	538	500	480	325	300	3126	447	2501	500	625	313
17:00	464	474	476	490	463	349	367	3083	440	2367	473	716	358
18:00	359	419	449	360	371	363	305	2626	375	1958	392	668	334
19:00	284	314	349	313	306	256	299	2121	303	1566	313	555	275
20:00	239	282	251	269	269	246	240	1776	254	1280	258	486	243
21:00	160	215	225	204	189	191	167	1351	193	993	199	368	179
22:00	90	99	99	91	137	147	86	749	107	516	103	233	117
23:00	64	53	63	63	100	108	51	502	72	343		159	80

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AUTOMATIC COUNT SUMMARY

Street Name :	Falmouth Rd	Location :	Outside Property 52
Suburb :	Marayong	Start Date :	00:00 Thu 13/February/2025
Machine ID:	YE17CVWV	Finish Date :	00:00 Thu 20/February/2025
Site ID:	3692	Speed Zone :	60 km/h
Prepared By :			

GPS information		Lat	33° 44' 31.67 South	Direction of Travel		
		Long		150° 52' 58.99 East		
		Both directions	Northbound	Southbound		
Traffic Volume :	Weekdays Average	13,083	6,833	6,250		
(Vehicles/Day)	7 Day Average	12,214	6,385	5,829		
Weekday	AM	08:00	1340	696	644	
Peak hour starts	PM	15:00	1181	490	691	
Speeds :	85th Percentile		56.6	56.5	56.7	
(Km/Hr)	Average		51.5	51.3	51.7	
Classification % :	Light Vehicles up to 5.5m		97.4%	97.4%	97.4%	

Location

GPS information [Load Google Map \(internet required\)](#)
(Latitude, Longitude) -33.742130, 150.863053



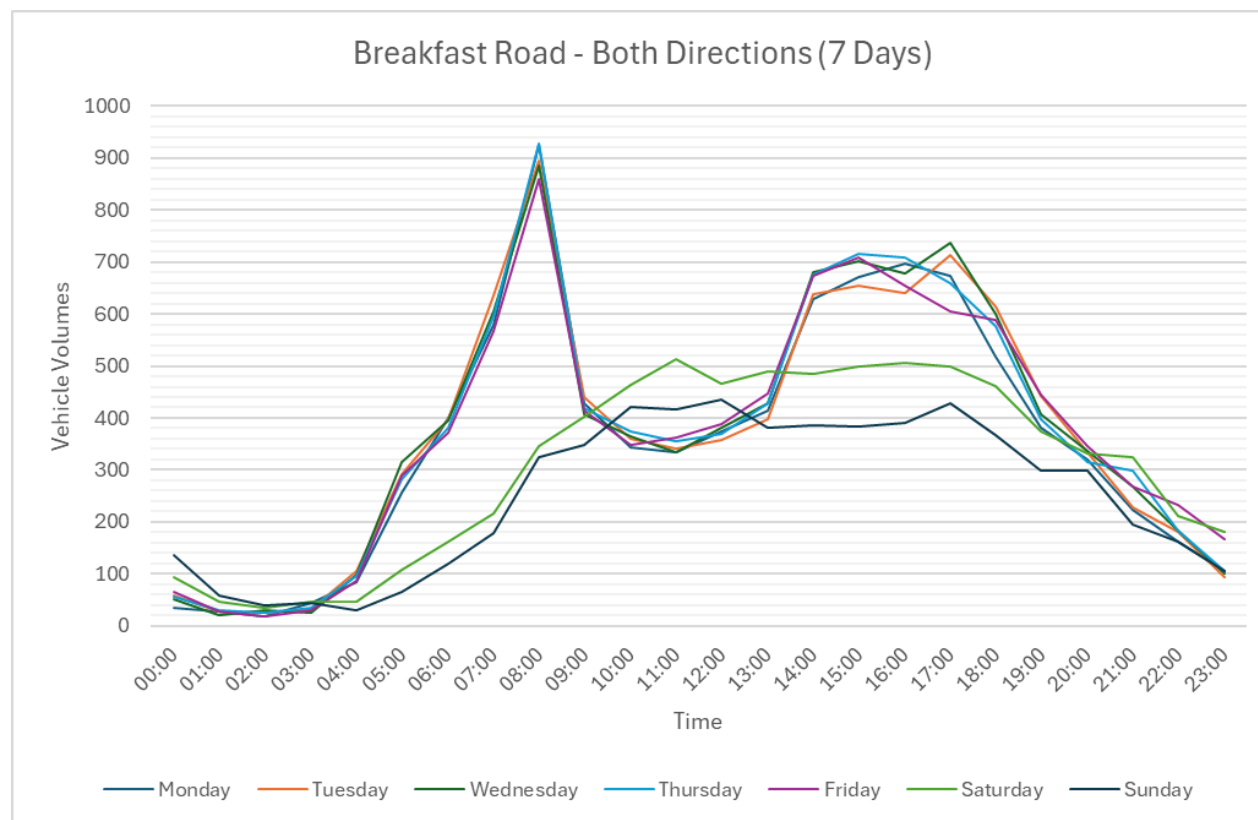
Speed Data Speed Graph Speed Bin
Volume Data Volume Graph Classification

COMBINED

00:00	55	56	53	59	71	88	109	491	70	294	59	197	99
01:00	20	36	33	40	34	64	56	283	40	163	33	120	60
02:00	21	27	26	30	29	31	41	205	29	133	27	72	36
03:00	37	28	30	24	41	50	36	246	35	160	32	86	43
04:00	98	121	115	116	107	42	39	638	91	557	111	81	41
05:00	283	281	308	317	264	129	70	1652	236	1453	291	199	100
06:00	464	484	503	483	445	201	139	2719	388	2379	476	340	170
07:00	757	745	750	770	732	272	205	4231	604	3754	751	477	239
08:00	1311	1369	1391	1378	1251	437	399	7536	1077	6700	1340	836	418
09:00	738	781	806	776	771	591	562	5025	718	3872	774	1153	577
10:00	553	542	595	581	592	753	634	4250	607	2863	573	1387	694
11:00	552	617	576	563	625	755	763	4451	636	2933	587	1518	759
12:00	601	601	607	667	673	832	761	4742	677	3149	630	1593	797
13:00	623	651	661	665	660	711	713	4684	669	3260	652	1424	712
14:00	978	947	960	991	1013	759	627	6275	896	4889	978	1386	693
15:00	1164	1140	1164	1201	1235	759	608	7271	1039	5904	1181	1367	684
16:00	933	965	1031	980	919	709	697	6234	891	4828	966	1406	703
17:00	887	929	1024	1024	914	751	717	6246	892	4778	956	1468	734
18:00	738	832	874	778	838	744	657	5461	780	4060	812	1401	701
19:00	581	626	681	646	616	598	598	4284	612	3150	630	1134	567
20:00	477	523	497	507	511	468	3612	502	2533	507	979	490	
21:00	348	438	413	368	368	381	331	2667	381	1955	391	712	324
22:00	184	201	196	180	269	285	163	1478	211	1030	206	448	256
23:00	121	99	106	114	186	201	80	907	130	626	125	281	141

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
00:00	35	58	51	56	64	94	136
01:00	27	28	21	30	28	47	57
02:00	17	25	29	25	17	34	38
03:00	43	32	24	35	30	47	44
04:00	84	106	97	96	87	47	29
05:00	256	292	315	282	290	107	65
06:00	399	398	395	380	372	162	119
07:00	578	636	606	595	567	216	178
08:00	925	894	886	928	860	345	324
09:00	429	440	406	418	414	403	349
10:00	343	360	365	373	349	463	422
11:00	333	342	333	356	362	512	417
12:00	373	357	381	370	388	466	436
13:00	413	398	428	428	446	490	380
14:00	628	639	681	676	673	485	385
15:00	672	654	702	715	708	498	383
16:00	698	640	678	708	655	507	390
17:00	673	713	737	660	604	498	427
18:00	518	614	600	577	589	462	366
19:00	380	443	408	398	445	375	299
20:00	319	333	337	316	346	332	298
21:00	223	228	269	299	269	325	195
22:00	161	180	182	184	232	212	161
23:00	105	93	101	106	167	180	105
	8632	8903	9032	9011	8962	7307	6003

M-02 Hourly traffic volumes on Breakfast Road, north of Breakfast Creek, recorded over a 7-day period



Weekday Average - Combined

AM Peak
PM Peak
Mid-Day
Night Time

	Northbound	Southbound	Combined
08:00	485	414	899
15:00	303	387	690
12:00	140	233	374
20:00	117	213	#N/A
HV%	2.97%	3.40%	3.22%

Northbound

00:00	12	10	9	17	13	24	46	131	19	61	12	70	35
01:00	10	12	5	5	7	18	17	74	11	39	8	35	18
02:00	8	12	14	13	6	11	17	81	12	53	11	28	14
03:00	20	12	18	17	18	21	18	124	18	85	17	39	20
04:00	49	61	58	60	49	21	14	312	45	277	55	35	18
05:00	158	182	198	181	177	63	25	984	141	896	179	88	44
06:00	210	223	218	212	226	85	61	1235	176	1089	218	146	73
07:00	298	329	306	276	269	110	60	1648	235	1478	296	170	85
08:00	497	505	466	495	460	149	144	2716	388	2423	485	293	147
09:00	192	200	188	167	184	143	160	1234	176	931	186	303	152
10:00	150	138	157	157	138	145	147	1032	147	740	148	292	146
11:00	110	131	122	147	133	166	177	986	141	643	129	343	172
12:00	134	121	158	151	138	171	186	1059	151	702	140	357	179
13:00	156	155	163	147	150	189	139	1099	157	771	154	328	164
14:00	238	224	248	249	241	185	151	1536	219	1200	240	336	168
15:00	292	293	303	312	315	185	155	1855	265	1515	303	340	170
16:00	210	192	233	221	234	171	147	1417	202	1099	220	318	159
17:00	256	268	279	241	212	200	162	1618	231	1256	251	362	181
18:00	190	230	234	213	215	209	155	1446	207	1082	216	364	182
19:00	142	154	152	151	152	136	117	1004	143	751	150	253	127
20:00	112	124	113	110	125	134	100	818	117	584	117	234	117
21:00	80	78	91	105	93	104	75	626	89	447	89	179	90
22:00	56	56	63	64	74	61	61	435	62	313	63	122	61
23:00	34	31	23	33	47	55	27	250	36	168		82	41

Southbound

00:00	23	48	42	39	51	70	90	363	52	203	41	160	80
01:00	17	16	16	25	21	29	40	164	23	95	19	69	35
02:00	9	13	15	12	11	23	21	104	15	60	12	44	22
03:00	23	20	6	18	12	26	26	131	19	79	16	52	26
04:00	35	45	39	36	38	26	15	234	33	193	39	41	21
05:00	98	110	117	101	113	44	40	623	89	539	108	84	42
06:00	189	175	177	168	146	77	58	990	141	855	171	135	68
07:00	280	307	300	319	298	106	118	1728	247	1504	301	224	112
08:00	428	389	420	433	400	196	180	2446	349	2070	414	376	188
09:00	237	240	218	251	230	260	189	1625	232	1176	235	449	225
10:00	193	222	208	216	211	318	275	1643	235	1050	210	593	297
11:00	223	211	211	209	229	346	240	1669	238	1083	217	586	293
12:00	239	236	223	219	250	295	250	1712	245	1167	233	545	273
13:00	257	243	265	281	296	301	241	1884	269	1342	268	542	271
14:00	390	415	433	427	432	300	234	2631	376	2097	419	534	267
15:00	380	361	399	403	393	313	228	2477	354	1936	387	541	271
16:00	479	448	445	487	421	336	243	2859	408	2280	456	579	290
17:00	417	445	458	419	392	298	265	2694	385	2131	426	563	282
18:00	328	384	366	364	374	253	211	2280	326	1816	363	464	232
19:00	238	289	256	247	293	239	182	1744	249	1323	265	421	211
20:00	207	209	224	206	221	198	198	1463	299	1067	213	396	198
21:00	143	150	178	194	176	221	120	1182	169	841	168	341	171
22:00	105	124	119	120	158	151	100	877	125	626	125	251	126
23:00	71	62	78	73	120	125	78	607	87	404		203	102

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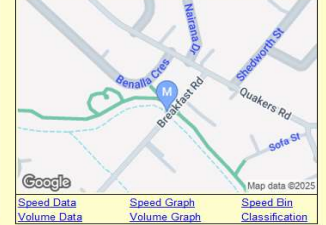
AUTOMATIC COUNT SUMMARY

Street Name :	Breakfast Rd	Location :	Outside Property 12
Suburb :	Marayong	Start Date :	00:00 Thu 13/February/2025
Machine ID:	YB18G5TW	Finish Date :	00:00 Thu 20/February/2025
Site ID:	3693	Speed Zone :	50 km/h
Prepared By :			

GPS information		Lat	33° 44' 45.64 South	Direction of Travel		
		Long	150° 53' 35.30 East	Both directions	Northbound	Southbound
Traffic Volume : (Vehicles/Day)		Weekdays Average		8,908	3,721	5,187
		7 Day Average		8,263	3,388	4,875
Weekday		AM	08:00	899	485	414
Peak hour starts		PM	15:00	690	303	387
Speeds : (Km/Hr)		85th Percentile		54.0	54.2	53.8
		Average		48.0	48.2	47.9
Classification % :		Light Vehicles up to 5.5m		97.2%	97.4%	97.1%

Location

GPS Information [Load Google Map \(internet required\)](#)
(Latitude, Longitude) -33.746012, 150.893138



COMBINED

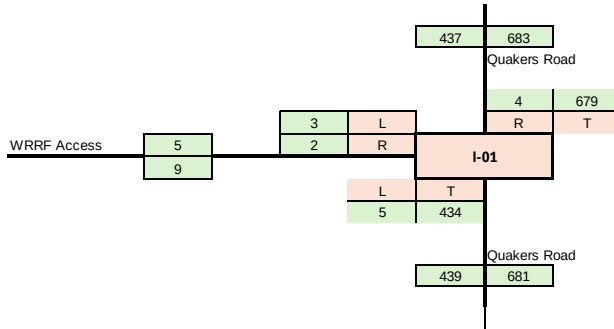
00:00	35	58	51	56	64	94	136	494	71	264	53	230	115
01:00	27	28	21	30	28	47	57	238	34	134	27	104	52
02:00	17	25	29	25	17	34	38	185	26	113	23	72	36
03:00	43	32	24	35	30	47	44	255	36	164	33	91	46
04:00	84	106	97	96	87	47	29	546	78	470	94	76	38
05:00	256	292	315	282	290	107	65	1607	230	1435	287	172	86
06:00	399	398	395	380	372	162	119	2225	318	1944	389	281	141
07:00	578	636	606	595	567	216	178	3376	482	2982	596	394	197
08:00	925	894	886	928	860	345	324	5162	737	4493	899	669	335
09:00	429	440	406	418	414	403	349	2859	408	2107	421	752	376
10:00	343	360	365	373	349	463	422	2675	382	1790	358	885	443
11:00	333	342	333	356	362	512	417	2655	379	1726	345	929	465
12:00	373	357	381	370	388	466	436	2771	396	1869	374	902	451
13:00	413	398	428	428	446	490	380	2983	426	2113	423	870	435
14:00	628	639	681	676	673	485	385	4167	595	3297	659	870	435
15:00	672	654	702	715	708	498	383	4332	619	3451	690	881	441
16:00	698	640	678	708	655	507	390	4276	611	3379	676	897	449
17:00	673	713	737	660	604	498	427	4312	616	3387	677	925	463
18:00	518	614	600	577	589	462	366	3726	532	2898	580	828	414
19:00	380	443	408	398	445	375	299	2746	393	2074	415	674	337
20:00	319	333	337	316	346	332	298	2281	326	1651	330	630	315
21:00	223	228	269	299	269	325	195	1808	258	1288	258	520	260
22:00	161	180	182	184	232	212	161	1312	187	939	188	373	187
23:00	105	93	101	106	167	180	105	857	122	572	114	265	143



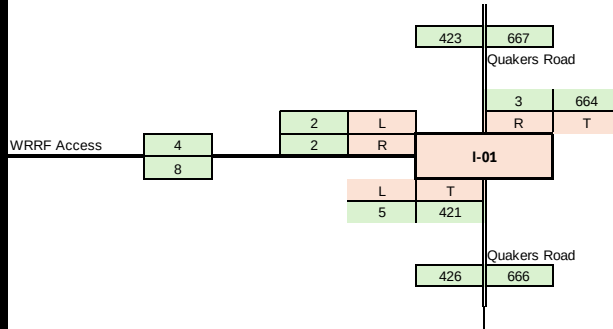
I-01 – Quakers Road / Quakers Hill WRRF Site Access, Quakers Hill

AM Peak

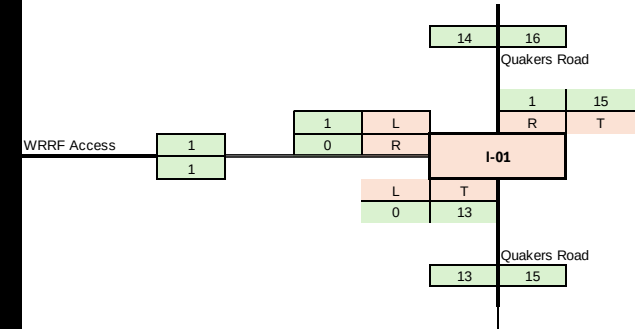
Total



Light vehicle

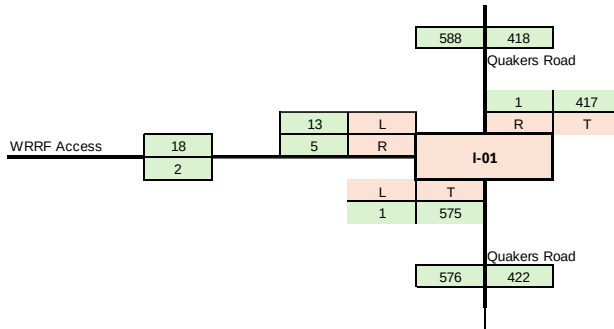


Heavy vehicle

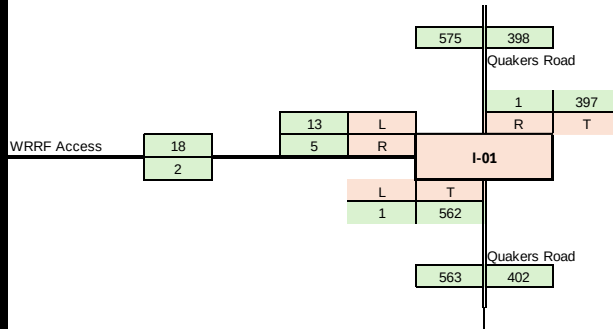


PM Peak

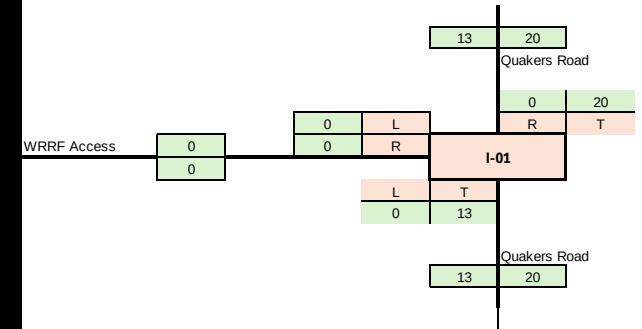
Total



Light vehicle



Heavy vehicle



Traffic Volume	(vehicle/hour)
Turning Movements	L - Left, T - Through, R - Right

Intersection of Waste Recycling Facility Access and Quake

GPS -33.73523, 150.88118

Date:	Thu 20/02/25
Weather:	Overcast
Suburban:	Quakers Hill
Customer:	WSP

North:	Quakers Rd
East:	N/A
South:	Quakers Rd
West:	Waste Recycling Facility Access

Survey	AM:	6:30 AM-9:30 AM
Period	PM:	3:30 PM-6:30 PM
Traffic	AM:	7:45 AM-8:45 AM
Peak	PM:	3:30 PM-4:30 PM

All Vehicles

Time		North Approach Quakers Rd			South Approach Quakers Rd			Approach Waste Recycling Facility			Hourly Total	
Period Start	Period End	U	R	SB	U	NB	L	U	R	L	Hour	Peak
6:30	6:45	0	7	62	0	52	0	0	1	0	565	
6:45	7:00	0	7	79	0	58	6	0	1	0	654	
7:00	7:15	0	7	72	0	39	1	0	0	1	723	
7:15	7:30	0	4	111	0	57	0	0	0	0	826	
7:30	7:45	0	1	132	0	76	1	0	1	0	883	
7:45	8:00	0	1	135	0	84	0	0	0	0	921	
8:00	8:15	0	2	157	0	61	3	0	0	0	1025	
8:15	8:30	0	2	147	0	77	2	0	0	1	1127	Peak
8:30	8:45	0	0	147	0	100	1	0	0	1	1088	
8:45	9:00	0	2	200	0	120	0	0	1	1		
9:00	9:15	0	0	185	0	137	2	0	1	0		
9:15	9:30	0	3	77	0	106	1	0	0	3		
15:30	15:45	0	0	110	0	182	1	0	1	10	1011	Peak
15:45	16:00	0	0	92	0	126	0	0	0	2	951	
16:00	16:15	0	0	105	0	144	0	0	3	1	984	
16:15	16:30	0	0	110	0	123	0	0	1	0	974	
16:30	16:45	0	0	103	0	138	1	0	0	2	1009	
16:45	17:00	0	0	114	0	138	0	0	0	1	981	
17:00	17:15	0	0	115	0	128	0	0	0	0	993	
17:15	17:30	0	0	98	0	170	0	0	0	1	971	
17:30	17:45	0	0	79	0	137	0	0	0	0	897	
17:45	18:00	0	0	124	0	141	0	0	0	0		
18:00	18:15	0	0	105	0	116	0	0	0	0		
18:15	18:30	0	0	94	0	101	0	0	0	0		

Peak Time		North Approach Quakers Rd			South Approach Quakers Rd			Approach Waste Recycling Facility			Peak total
Period Start	Period End	U	R	SB	U	NB	L	U	R	L	
8:15	9:15	0	4	679	0	434	5	0	2	3	1127
15:30	16:30	0	0	417	0	575	1	0	5	13	1011

Pedestrians Crossing

Time		North Approach Quakers Rd		South Approach Quakers Rd		Approach Waste Recycling Facility		Hourly Total	
Period Start	Period End	Westbound	Eastbound	Westbound	Eastbound	Southbound	Northbound		
6:30	6:45	0	0	0	0	0	0	2	
6:45	7:00	0	0	0	0	0	0	2	
7:00	7:15	0	0	0	0	1	1	2	
7:15	7:30	0	0	0	0	0	0	0	
7:30	7:45	0	0	0	0	0	0	0	
7:45	8:00	0	0	0	0	0	0	2	
8:00	8:15	0	0	0	0	0	0	2	
8:15	8:30	0	0	0	0	0	0	2	
8:30	8:45	0	0	0	0	2	0	3	
8:45	9:00	0	0	0	0	0	0		
9:00	9:15	0	0	0	0	0	0		
9:15	9:30	0	0	0	0	0	1		
15:30	15:45	0	0	0	0	0	0	2	
15:45	16:00	0	0	0	0	0	0	3	
16:00	16:15	0	0	0	2	0	0	3	
16:15	16:30	0	0	0	0	0	0	1	
16:30	16:45	0	0	0	0	0	1	1	
16:45	17:00	0	0	0	0	0	0	0	
17:00	17:15	0	0	0	0	0	0	0	
17:15	17:30	0	0	0	0	0	0	2	
17:30	17:45	0	0	0	0	0	0	3	
17:45	18:00	0	0	0	0	0	0		
18:00	18:15	0	0	0	0	2	0		
18:15	18:30	0	0	0	0	0	1		

Peak Time		North Approach Quakers Rd		South Approach Quakers Rd		Approach Waste Recycling Facility		Peak total
Period Start	Period End	Westbound	Eastbound	Westbound	Eastbound	Southbound	Northbound	
8:15	9:15	0	0	0	0	2	0	2
15:30	16:30	0	0	0	2	0	0	2



I-02 – Sackville Street / Mort Street, Blacktown

AM Peak

Total

			Mort Street		
Sackville Street	7	L	8	2	6
	479	T	R	T	L
	7	R	I-02		
			R	1	
	L	T	R	T	8
	7	3	1	L	394
			Mort Street		

Light vehicle

			Mort Street		
Sackville Street	6	L	8	2	6
	461	T	R	T	L
	7	R	I-02		
			R	1	
	L	T	R	T	8
	7	3	1	L	377
			Mort Street		

Heavy vehicle

			Mort Street		
Sackville Street	1	L	0	0	0
	18	T	R	T	L
	0	R	I-02		
			R	0	
	L	T	R	T	0
	0	0	0	L	17
			Mort Street		

PM Peak

Total

			Mort Street		
Sackville Street	26	L	17	1	5
	485	T	R	T	L
	5	R	I-02		
			R	10	
	L	T	R	T	424
	13	1	3	L	5
			Mort Street		

Light vehicle

			Mort Street		
Sackville Street	26	L	17	1	5
	471	T	R	T	L
	5	R	I-02		
			R	10	
	L	T	R	T	416
	13	1	3	L	5
			Mort Street		

Heavy vehicle

			Mort Street		
Sackville Street	0	L	0	0	0
	14	T	R	T	L
	0	R	I-02		
			R	0	
	L	T	R	T	8
	0	0	0	L	0
			Mort Street		

Traffic Volume	(vehicle/hour)
Turning Movements	L - Left, T - Through, R- Right



Intersection of Sackville St and Mort St, Blacktown

GPS -33.76439, 150.91806

Date:	Thu 20/02/25
Weather:	Overcast
Suburban:	Blacktown
Customer:	WSP

North:	Mort St
East:	Sackville St
South:	Mort St
West:	Sackville St

Survey	AM: 6:30 AM-9:30 AM
Period	PM: 3:30 PM-6:30 PM
Traffic	AM: 8:00 AM-9:00 AM
Peak	PM: 5:00 PM-6:00 PM

All Vehicles

Time		North Approach Mort St				East Approach Sackville St				South Approach Mort St				West Approach Sackville St				Hourly Total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	Hour	Peak
6:30	6:45	0	2	0	4	0	1	46	0	0	1	0	4	0	1	46	4	518	
6:45	7:00	0	3	0	4	0	0	54	0	0	0	0	2	0	0	60	3	576	
7:00	7:15	0	1	0	1	0	4	65	0	0	2	0	0	0	0	58	2	649	
7:15	7:30	0	1	0	3	0	0	61	0	0	0	0	1	0	1	81	2	748	
7:30	7:45	0	5	1	2	0	1	79	0	0	2	0	1	0	2	72	2	816	
7:45	8:00	0	3	0	2	0	1	113	0	0	0	0	2	0	0	76	2	898	
8:00	8:15	0	3	1	0	0	1	85	0	0	0	2	2	0	4	134	0	923	Peak
8:15	8:30	0	0	0	3	1	3	82	0	0	1	0	3	0	1	123	1	921	
8:30	8:45	0	2	0	1	0	3	120	0	0	0	1	2	0	0	117	3	880	
8:45	9:00	0	3	1	2	0	1	107	0	0	0	0	0	0	2	105	3		
9:00	9:15	0	3	2	1	0	0	110	0	0	2	1	0	1	1	106	3		
9:15	9:30	0	1	0	0	0	0	90	1	0	0	0	1	0	1	80	2		
15:30	15:45	0	4	0	0	0	3	84	1	0	0	0	0	0	1	109	1	837	
15:45	16:00	0	3	0	1	0	3	89	0	0	1	0	0	0	2	87	3	884	
16:00	16:15	0	1	0	1	0	2	97	2	0	0	0	1	0	3	132	2	929	
16:15	16:30	0	1	0	0	0	1	93	2	0	0	0	0	0	1	102	4	949	
16:30	16:45	0	5	0	3	0	4	90	0	0	0	0	0	0	2	138	8	968	
16:45	17:00	0	1	1	3	0	2	103	0	0	1	0	2	0	5	111	5	976	
17:00	17:15	0	3	0	1	0	3	101	1	0	0	0	2	0	3	135	12	994	Peak
17:15	17:30	0	8	0	1	0	3	102	3	0	3	1	5	0	2	91	4	955	
17:30	17:45	0	1	0	2	0	3	106	0	0	0	0	4	0	0	135	7	961	
17:45	18:00	0	5	0	1	0	1	115	1	0	0	0	2	0	0	124	3		
18:00	18:15	0	3	0	2	0	2	106	1	0	0	0	2	0	0	104	2		
18:15	18:30	0	2	0	0	1	0	103	1	0	0	0	0	0	6	113	3		

Peak Time		North Approach Mort St				East Approach Sackville St				South Approach Mort St				West Approach Sackville St				Peak total
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	
8:00	9:00	0	8	2	6	1	8	394	0	0	1	3	7	0	7	479	7	923
17:00	18:00	0	17	0	5	0	10	424	5	0	3	1	13	0	5	485	26	994

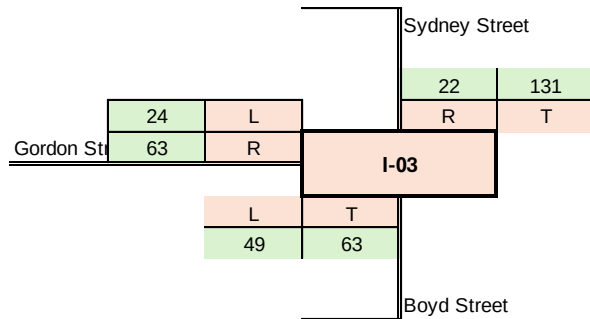
Pedestrians Crossing

Time		North Approach Mort St		East Approach Sackville St		South Approach Mort St		West Approach Sackville St		Hourly Total
Period Start	Period End	Westbound	Eastbound	Southbound	Northbound	Westbound	Eastbound	Southbound	Northbound	
6:30	6:45	1	1	0	0	0	0	0	0	13
6:45	7:00	0	0	0	0	1	1	0	0	22
7:00	7:15	0	0	0	0	2	0	0	0	26
7:15	7:30	3	0	1	0	3	0	0	0	33
7:30	7:45	3	3	0	0	4	0	1	0	30
7:45	8:00	0	2	0	0	2	1	0	1	23
8:00	8:15	3	0	2	0	3	1	0	0	22
8:15	8:30	0	1	0	0	3	0	0	0	21
8:30	8:45	0	1	1	0	0	2	0	0	27
8:45	9:00	0	3	0	0	1	1	0	0	
9:00	9:15	3	1	0	0	0	4	0	0	
9:15	9:30	2	4	0	0	3	1	0	0	
15:30	15:45	1	1	0	0	1	0	0	0	17
15:45	16:00	1	3	0	0	1	0	0	0	19
16:00	16:15	1	1	0	0	0	0	0	0	23
16:15	16:30	0	1	1	0	1	4	0	0	26
16:30	16:45	0	2	0	0	1	1	0	1	25
16:45	17:00	4	3	0	0	1	0	0	1	24
17:00	17:15	1	2	0	0	0	2	0	0	22
17:15	17:30	1	1	0	0	2	1	0	1	23
17:30	17:45	0	0	0	0	2	0	1	1	22
17:45	18:00	2	3	0	2	0	0	0	0	
18:00	18:15	4	1	0	0	0	1	0	0	
18:15	18:30	0	5	0	0	0	0	0	0	

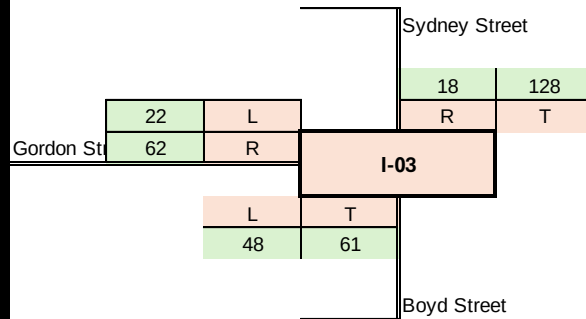
Peak Time		North Approach Mort St		East Approach Sackville St		South Approach Mort St		West Approach Sackville St		Peak hour
Period Start	Period End	Westbound	Eastbound	Southbound	Northbound	Westbound	Eastbound	Southbound	Northbound	
8:00	9:00	3	5	3	0	7	4	0	0	22
17:00	18:00	4	6	0	2	4	3	1	2	22

AM Peak

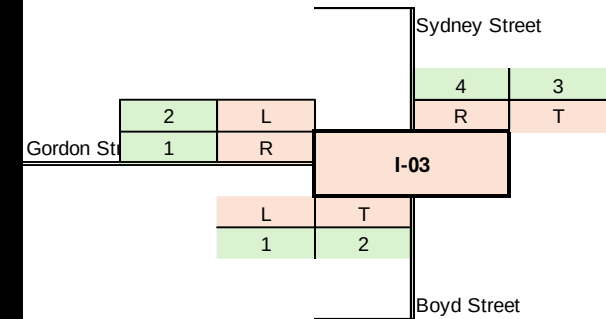
Total



Light vehicle

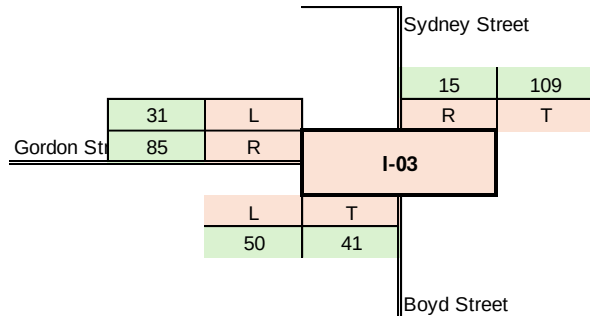


Heavy vehicle

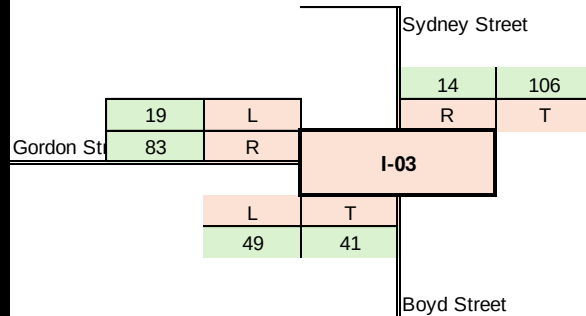


PM Peak

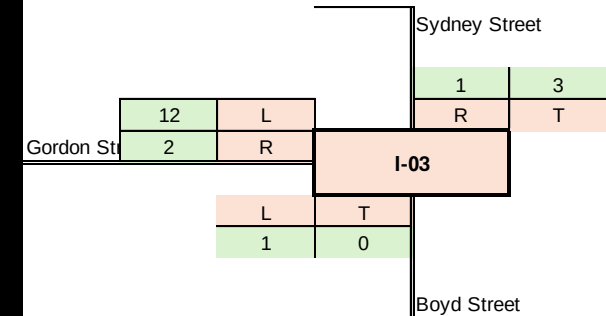
Total



Light vehicle



Heavy vehicle



Traffic Volume	(vehicle/hour)
Turning Movements	L - Left, T - Through, R - Right

Intersection of Gordon St and Sydney St, Blacktown

GPS: -33.76769, 150.91679

Date:	Thu 20/02/25
Weather:	Overcast
Suburban:	Blacktown
Customer:	WSP

North:	Sydney St
East:	N/A
South:	Boyd St
West:	Gordon St

Survey	AM:	6:30 AM-9:30 AM
Period	PM:	3:30 PM-6:30 PM
Traffic	AM:	7:30 AM-8:30 AM
Peak	PM:	5:15 PM-6:15 PM

All Vehicles

Time		North Approach Sydney St			South Approach Boyd St			West Approach Gordon St			Hourly Total	
Period Start	Period End	U	R	SB	U	NB	L	U	R	L	Hour	Peak
6:30	6:45	0	5	5	0	8	6	0	4	1	131	
6:45	7:00	0	4	11	0	12	3	0	2	2	149	
7:00	7:15	0	2	8	0	10	9	0	1	6	176	
7:15	7:30	0	1	13	0	5	3	0	6	4	229	
7:30	7:45	0	4	11	0	8	8	0	12	4	299	
7:45	8:00	0	0	19	0	13	14	0	12	3	339	
8:00	8:15	0	1	35	0	11	19	0	17	6	352	Peak
8:15	8:30	0	5	45	0	18	15	0	16	3	310	
8:30	8:45	0	6	24	0	17	11	0	20	9	246	
8:45	9:00	0	10	27	0	17	4	0	10	6		
9:00	9:15	0	2	20	0	9	5	0	6	5		
9:15	9:30	0	4	14	0	6	5	0	5	4		
15:30	15:45	0	6	27	0	5	5	0	11	2	244	
15:45	16:00	0	5	26	0	9	6	0	13	3	259	
16:00	16:15	0	5	19	0	11	9	0	11	3	260	
16:15	16:30	0	5	31	0	8	5	0	11	8	273	
16:30	16:45	0	5	32	0	11	5	0	15	3	295	
16:45	17:00	0	5	20	0	8	6	0	18	6	294	
17:00	17:15	0	7	30	0	9	9	0	10	6	317	
17:15	17:30	0	5	37	0	9	12	0	20	7	331	Peak
17:30	17:45	0	3	20	0	12	15	0	13	7	305	
17:45	18:00	0	4	29	0	14	11	0	20	8		
18:00	18:15	0	3	23	0	6	12	0	32	9		
18:15	18:30	0	6	27	0	16	7	0	5	3		

Peak Time		North Approach Sydney St			South Approach Boyd St			West Approach Gordon St			Peak total
Period Start	Period End	U	R	SB	U	NB	L	U	R	L	
8:00	9:00	0	22	131	0	63	49	0	63	24	352
17:15	18:15	0	15	109	0	41	50	0	85	31	331

Pedestrians Crossing

Time		North Approach Sydney St		South Approach Boyd St		West Approach Gordon St		Hourly Total
Period Start	Period End	Westbound	Eastbound	Westbound	Eastbound	Southbound	Northbound	
6:30	6:45	1	0	0	0	0	0	1
6:45	7:00	0	0	0	0	0	0	1
7:00	7:15	0	0	0	0	0	0	1
7:15	7:30	0	0	0	0	0	0	1
7:30	7:45	0	1	0	0	0	0	2
7:45	8:00	0	0	0	0	0	0	1
8:00	8:15	0	0	0	0	0	0	2
8:15	8:30	1	0	0	0	0	0	2
8:30	8:45	0	0	0	0	0	0	1
8:45	9:00	1	0	0	0	0	0	
9:00	9:15	0	0	0	0	0	0	
9:15	9:30	0	0	0	0	0	0	
15:30	15:45	0	0	0	0	0	0	3
15:45	16:00	0	0	0	0	0	0	3
16:00	16:15	0	0	0	0	0	0	3
16:15	16:30	2	0	0	0	0	1	4
16:30	16:45	0	0	0	0	0	0	1
16:45	17:00	0	0	0	0	0	0	2
17:00	17:15	1	0	0	0	0	0	3
17:15	17:30	0	0	0	0	0	0	2
17:30	17:45	0	1	0	0	0	0	3
17:45	18:00	0	1	0	0	0	0	
18:00	18:15	0	0	0	0	0	0	
18:15	18:30	0	1	0	0	0	0	

Peak Time		North Approach Sydney St		South Approach Boyd St		West Approach Gordon St		Peak total
Period Start	Period End	Westbound	Eastbound	Westbound	Eastbound	Southbound	Northbound	
8:00	9:00	2	0	0	0	0	0	2
17:15	18:15	0	2	0	0	0	0	2

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