

TRAFFIC & TRANSPORT ASSESSMENT

Wilga Wilson Precinct, Ingleside

PREPARED FOR:

Mirvac Homes (NSW) Pty Ltd and Truslan Group Pty Ltd

REFERENCE:

0928r01v05

DATE:

2/05/2025



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1. Introduction

1.1. Overview

PDC Consultants has been commissioned by Mirvac Homes (NSW) Pty Ltd and Truslan Group Pty Ltd (Mircvac & Truslan) to undertake a Traffic & Transport Assessment (T&TA) of a Planning Proposal (PP) for proposed land rezoning at the Wilga Wilson Precinct, Ingleside. The PP relates to several lots of land within an approximate area of 28 hectares in the Northern Beaches local government area (LGA), of which around 16 hectares are owned by Mirvac and Truslan. The remainder is owned by private owners and other entities.

The PP seeks to implement a suite of planning controls to facilitate the delivery of medium density residential, areas for public recreation, and environmental conservation zones to preserve the site's important biodiversity. Residential development would be a mix of housing types as illustrated by the subdivision plan provided as **Appendix A**, and would generally consist of the following:

- 133 detached houses.
- 210 terrace and manor houses.
- 193 residential apartment units.
- Proposed new perimeter and internal roads, with two new connections to the existing road network at Powderworks Road, plus five further intersections with Wilga Street.
- A network of proposed new internal roads.

Having regard for the above, it is evident that the development is of a scale that would likely require referral of the PP to Transport for NSW (Transport) under the provisions of the State Environmental Planning Policy (Transport & Infrastructure) 2021.

The site is located within the Northern Beaches Council (Council) local government area (LGA); however, consolidated planning controls for the LGA are yet to come into effect. As such, the development has been assessed in accordance with the Pittwater Local Environmental Plan 2014 (PLEP) and Pittwater 21 Development Control Plan (PDCP).

1.2. Background

The site falls within the Ingleside Priority Growth Area and has a long history of planning for development. A Site Compatibility Certificate permitting seniors housing was granted in the early 2010s, however lapsed following encouragement by Council for its incorporation into the larger Ingleside rezoning program, for which Council and the Department of Planning, Housing and Infrastructure (DPHI), formerly known as the Department of Planning, Industry and Environment, were joint proponents at the time.

Several studies throughout the 2010s were conducted to derive the Ingleside Structure Plan and Precinct Plan, with the Draft Land Use and Infrastructure Strategy and a Draft Structure Plan released in 2016 for community

consultation. The plan envisaged 3,400 residential dwellings, biodiversity conservation and associated water-related and urban amenities.

Several issues were raised in submissions, including public transport, traffic, and bushfire safety. Responding to the bushfire safety concerns, a bushfire risk study was commissioned by DPHI in 2018 which identified a potential for the site to be exposed to extreme and catastrophic bushfire risk, as well as raising concerns about the ability to evacuate the precinct safely in the event of a bushfire.

A bushfire traffic evacuation study was therefore undertaken in 2020, following which the Draft Structure Plan was significantly revised, with the proposed area for rezoning focussing only on land south of Mona Vale Road, with the area north of Mona Vale Road excluded from the investigation area. The resultant dwelling yield reduced to around 980 residential dwellings, plus other uses and services as required.

In 2022, DPHI abandoned the rezoning process and instead deferred the future rezoning of the land to Council, which in turn has confirmed it has no agenda or timeframe for the further consideration of land within the release area, which remains zoned RU2 Rural Landscape under PLEP.

1.3. Structure of this Report

This report documents the findings of our investigations in relation to the anticipated traffic and parking impacts of the proposed development and should be read in the context of the accompanying planning documentation, prepared separately by others. The remainder of this report is structured as follows:

- Section 2: Describes the site and existing traffic and parking conditions in the locality.
- Section 3: Describes the proposed development.
- Section 4: Discusses the proposed future transport network conditions near the site.
- Section 5: Assesses the traffic impacts of the development under typical conditions.
- Section 6: Assesses the traffic impacts of the development under bushfire evacuation conditions.
- Section 7: Presents the overall study conclusions.
- Section 8: Presents study limitations.

1.4. References

In preparing this report, reference has been made to the following guidelines / standards and reports:

- State Environmental Planning Policy (Transport & Infrastructure) 2021 (SEPP T&I 2021).
- Pittwater 21 Development Control Plan (PDCP).
- Pittwater Local Environmental Plan 2014 (PLEP).

- Integrated Public Transport Service Planning Guideline, Sydney Metropolitan Area 2013 (Public Transport Planning Guidelines).
- RTA Guide to Traffic Generating Development 2002 (RTA Guide).
- RMS Technical Direction TDT 2013/04a - Guide to Traffic Generating Developments, Updated Traffic Surveys (TDT 2013/04a).
- Transport for NSW Trip Generation Surveys, Low Density Residential Analysis Report 2022 (Low Density Trip Generation Analysis Report).
- Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management (AGTM06-20).
- Austroads Guide to Road Design Part 3: Geometric Design (AGRD03-23).
- Austroads Guide to Road Design Part 4: Intersections and Crossings – General (AGRD04-23).
- Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (AGRD04A-23).
- Austroads Guide to Road Design Part 4B: Roundabouts (AGRD04B-23).
- Austroads Guide to Traffic Management Part 3: Transport Study and Analysis Methods (AGTM03-20).
- Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management (AGTM06-20).
- RMS Traffic Modelling Guidelines 2013 (RMS Modelling Guidelines).
- Towards 2040 Northern Beaches Local Strategic Planning Statement 2020 (LSPS).
- Northern Beaches Bike Plan, Northern Beaches Council, 2020 (Council Bike Plan).
- Northern Beaches Walking Plan, Northern Beaches Council, 2019 (Council Walking Plan).
- Trip Generation Surveys High Density Residential Car Based Data Report, Bitzios Consulting 2017 (High Density Residential Car Based Data Report)
- Mona Vale Road Upgrade East Traffic and Transport Assessment, AECOM 2015 (MVRE 2015).
- Mona Vale Road Upgrade West Traffic and Transport Assessment, AECOM 2015 (MVRW 2017).
- Community Preparedness and Response to the 2017 New South Wales Bushfires, Whittaker and Taylor February 2018 (Whittaker and Taylor).
- Planning for Bushfire Protection, NSW Rural Fire Service, November 2019 (PBP 2019).
- Ingleside Precinct Traffic and Transport Assessment, AECOM, 2016 (AECOM 2016).
- Bushfire Risk Assessment for the Ingleside Planned Precinct, Meridian Urban, 2018 (Meridian 2018).

- Ingleside Bushfire Evacuation Study: Traffic Assessment, AECOM, 2020 (AECOM 2020).
- Ingleside Precinct Rezoning Updated Traffic and Transport Assessment, SCT Consulting, 2021 (SCT 2021).
- Ingleside Precinct Bushfire Traffic Analysis, PDC Consultants, 2021 (PDC 2021).
- NSW Budget Paper No. 03 Infrastructure Statement 2024-25 (NSW Budget 2024-25).
- Infrastructure NSW State Infrastructure Plan 2023-24: A 5-Year Plan for Major Infrastructure for NSW (Infrastructure Plan 2023-24).
- Northern Beaches Section 7.12 Contributions Plan 2022 (Contributions Plan).
- NSW Government State Transit Authority Bus Infrastructure Guide 2011 (Bus Infrastructure Guide).
- Northern Beaches Council Engineering Design Code (Engineering Design Code).
- Wilga Wilson Precinct Ingleside – Flood and Bushfire Evacuation Capability Assessment, Water Technology 2024 (Water Technology 2024).
- Strategic Bushfire Study, Wilga-Wilson Precinct Ingleside NSW, Blackash 2024 (Blackash 2024).
- The Application of Timelines to Evacuation Planning, NSW State Emergency Service 2004 (NSW SES 2004).
- Minister for Infrastructure, Transport, Regional Development and Local Government, the Hon Catherine King MP, “Investing in roads and rail to build Australia’s future”, Media Release 25 March 2025.

2. Existing Conditions

2.1. Location and Site

The site covers an area of around 28 hectares and is located to the northeast of the Elanora Heights urban area, approximately 3.0 kilometres southwest of Mona Vale and 20 kilometres northeast of the Sydney CBD. More specifically, the site is bound by Powderworks Road and Wilson Avenue to the north, Powderworks Road and Wilga Street to the east, Wilga Street to the south, and the Monash Country Club golf course to the west.

The site includes several lots held across separate ownerships, with Mirvac and Truslan owning around 16 hectares and the remainder by private owners and other entities. The site is zoned RU2 Rural Landscape and is currently occupied by a variety of rural residential activities, a seniors housing development, a place of worship, and a plant nursery.

All existing developments on the site have vehicle accesses to either Wilson Avenue, Wilga Street, or Powderworks Road. Wilson Avenue and Wilga Street only connect to the broader road network via priority intersections with Powderworks Road, and thus all traffic generated by the site currently must use Powderworks Road. The location of the site in a local and broad context is illustrated by **Figure 1** and **Figure 2**, respectively.

2.2. Road Network

The road hierarchy near the site is shown by **Figure 2**, with the following roads considered noteworthy:

- **Mona Vale Road:** a classified state road (MR 162) which generally carries one lane of traffic in each direction between its intersections with the Pacific Highway in the south-west and Pittwater Road in the northeast along an undivided carriageway. There are however exceptions, with two-lane sections provided along with turn bays at certain intersections and locations. It is generally subject to 70 km/h speed zoning restrictions near the site, with No Stopping restrictions in place.

Upgrades were recently completed to widen to two lanes in each direction for a 3.2 kilometre stretch between Manor Road and Foley Street (MVRE 2015) with all lanes permanently opened to traffic in March 2024. Further upgrades are currently in the planning stage for widening of a further 3.4-kilometre section between McCarrs Creek Road and Powderworks Road (MVRE 2017). \$250 million was announced by the Federal Government on 25 March 2025 for upgrades to Mona Vale Road.

- **Powderworks Road:** an unclassified regional road (RR 7352) two-way road with one lane in each direction, which runs between signalised intersections with Mona Vale Road in the northwest and Garden Street in the southeast. It operates speed zoning restrictions of 60 km/h at its northern end, reducing to 50 km/h at the Elanora Heights town centre through to Garden Street. Powderworks Road forms the north and east boundary of the site and the only road by which all traffic generated by the site can access the broader network.

The road is characterised by steep topography in parts, several property accesses, and traffic calming devices. It is unsuitable for kerbside parking, with observations and review of aerial photography demonstrating little to no use of kerbside parking near the site.

- **Wilson Avenue:** a local road with one lane in each direction, which runs between a three-leg intersection with Powderworks Road in the east and its termination at 1 Wilson Avenue around 350 metres to the west. It is subject to 50 km/h speed zoning restrictions and serves an access function to local properties only.
- **Wilga Street:** a local road with one lane in each direction, which runs between a priority three-leg intersection with Powderworks Road in the east and Mirbelia Parade to the west. It is subject to 50 km/h speed zoning restrictions and serves an access function to local properties only.
- **Garden Street:** an unclassified regional road with two lanes in each direction near the site, which runs between Macpherson Street in the northwest Pittwater Road in the southeast. It is subject to a 50km/h speed zoning restriction. Near the site it is subject to a combination of No Stopping restrictions, Bus Zone restrictions, No Parking Restriction, 1P restricted parallel parking and unrestricted parallel parking.



Figure 1: Site Location

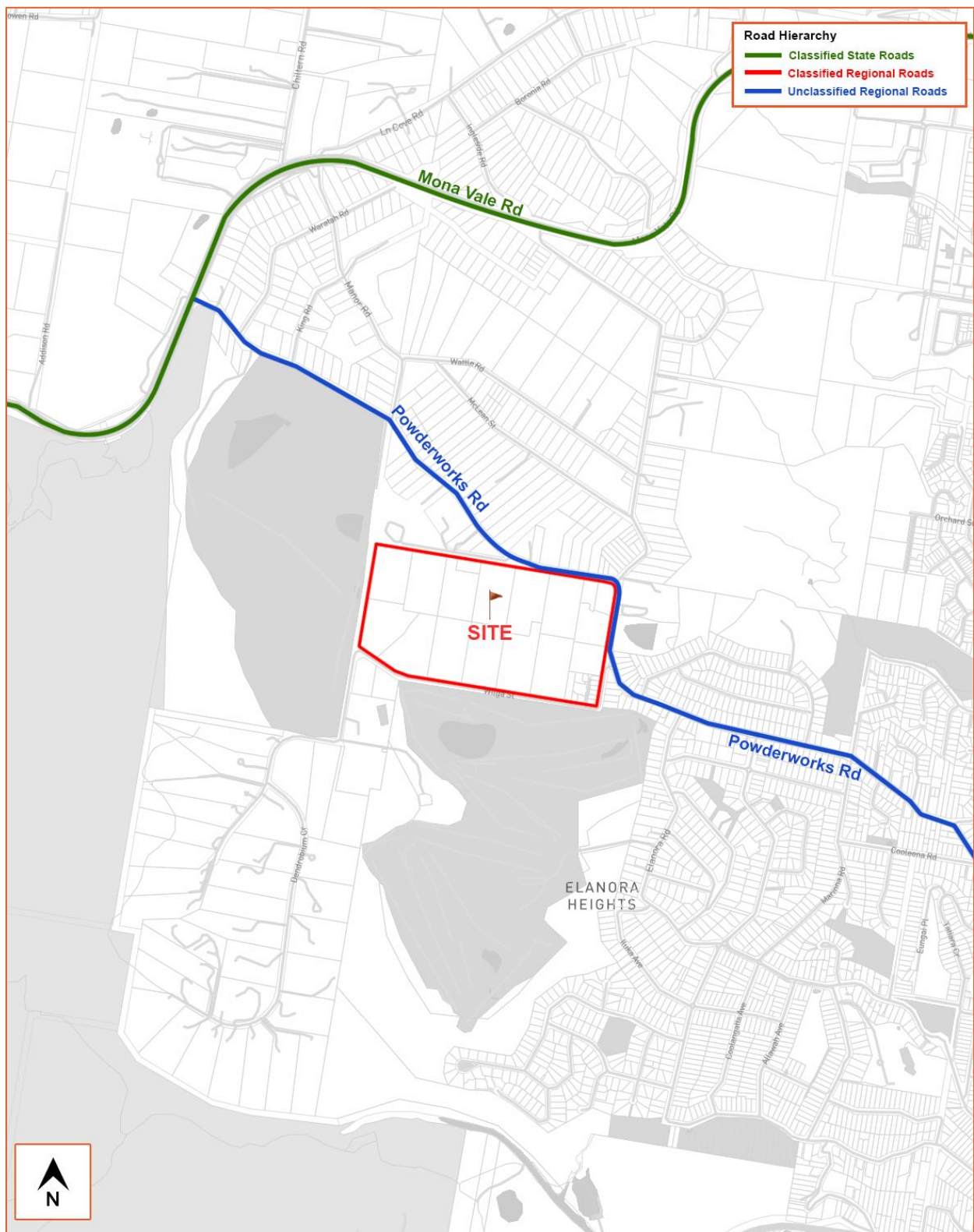


Figure 2: Location and Road Hierarchy Plan

2.3. Public and Active Transport

2.3.1. Bus Services

The Public Transport Planning Guidelines states that the walking catchment for metropolitan bus services includes all areas within a 400-metre radius of a bus stop. As illustrated by **Figure 3**, no public bus services are available within this catchment, with the nearest being on Mona Vale Road, south of Powderworks Road, or Powderworks Road, east of Kalang Road.

Nevertheless, it is expected that some residents of the proposed development may use these services as part of a multi-modal trip. These stops are services by several bus routes, the details of which are summarised by **Table 1**.

Table 1: Bus Services

ROUTE NO.	TO / FROM	ROUTE DESCRIPTION	AVERAGE HEADWAY
182	Mona Vale to Narrabeen	Via Warriewood, North Narrabeen	Weekdays: 1 hour Weekends: 1 hour
196	Mona Vale to Gordon	Via Ingleside, Terrey Hills, St Ives	Weekdays: 10 services per day Weekends: 14 services per day
197	Mona Vale to Macquarie University	Via Ingleside, Terrey Hills, St Ives, Gordon, Macquarie Park	Weekdays: 30 minutes Weekends: 1 hour

Development of release areas such as the subject site would however be expected to warrant further investigation into the provision of improved public transport facilities to serve occupants of the site and surrounding areas.

In addition to the above, an On Demand community bus service began in 2017 and is operated by Keolis Downer. The service is named Keoride and runs from Palm Beach, south to North Narrabeen and west to Chiltern Road, connecting residents to nearby transport hubs including Avalon bus stops, Warriewood, Mona Vale, and Narrabeen B-Line bus stops.

This service provides more tailored transportation services for those experiencing transport disadvantage, including but not limited to people who are financially disadvantaged, isolated, lack public transport, have mobility impairment, aged, or disabled. Bookings are made online, with a one-way trip fare is equivalent to Opal peak and off-peak bus fares. The service operates during the following times:

- Monday to Wednesday: 6am—10pm.
- Thursday and Friday: 6am—11:30pm.
- Saturday: 7am—11:30pm.
- Sunday: 7am—9pm.

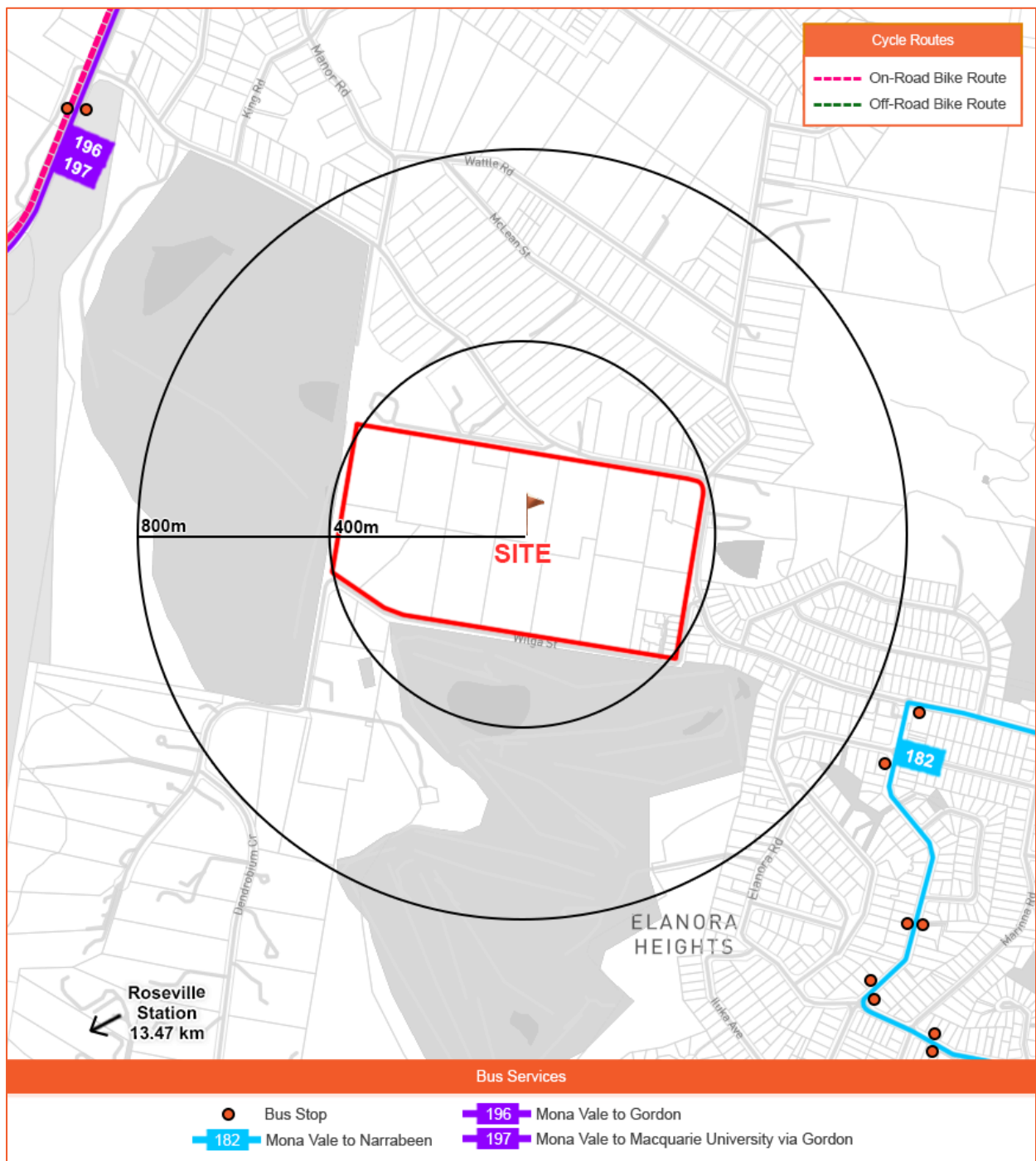


Figure 3: Public & Active Transport Services

2.3.2. Cycle Network

Given the relatively rural nature of the site, cycle infrastructure is scarce, with no dedicated cycle facilities provided along any of the frontage roads, nor along Powderworks Road. The topography of the area provides a constraint to cycling, with a general incline from the coast through to Mona Vale Road. Dedicated on-road cycle lanes are provided along Mona Vale Road to the west of Powderworks Road; however, these are not well connected to the broader cycle network and, given the posted speed and number of lanes, Mona Vale Road is not otherwise an attractive environment for inexperienced cyclists.

As part of the recent Mona Vale Road East upgrade works, shared off-road paths were provided along both sides of Mona Vale Road for certain sections, which provide a safer environment for cyclists, particularly in and around the suburb of Mona Vale.

Nevertheless, there is an opportunity to improve cycle infrastructure and connectivity, particularly between the site and suburbs to the southeast of Elanora Heights and North Narrabeen. Powderworks Road is a relatively friendly environment for cyclists given its residential nature, with the posted speed lowering to 50 km/h just west of the Elanora Heights town centre at Kalang Road, around 500 metres southeast of the site.

2.3.3. Walking Network

Given the relatively rural nature of the site at present, there are limited pedestrian facilities on the frontage roads or on the surrounding road network. Neither Wilson Avenue nor Wilga Street provide footpaths, with pedestrians currently required to walk on the roadway or Council verge.

Powderworks Road has a footpath on one side to the south of Wilga Street which provides connectivity to Elanora Heights; however, no footpath is provided north of this for connectivity to Mona Vale Road.

It would be expected that proposed internal roads and existing perimeter frontage roads would be upgraded in accordance with PDCP to provide suitable pedestrian facilities for future occupants of the site.

2.4. Existing Traffic Conditions

2.4.1. Data Collection

Traffic conditions of the surrounding road network have been assessed by several prior studies for works in the area; however, traffic data gathered for these studies is now considered outdated. As such, two data collection exercises were undertaken in February 2024 and March 2025 to provide baseline data upon which the impacts of the proposed development could be assessed.

Intersection turn counts, classified for lights, heavies, buses, pedestrians, and cyclists, were undertaken on weekday AM (06:30—09:30) and PM (15:30—18:30) peak periods during February 2024 at the following locations:

- Mona Vale Road / Powderworks Road.
- Powderworks Road / Wilson Avenue.

- Powderworks Road / Ingleside Road.
- Powderworks Road / Wilga Street.
- Powderworks Road / Kalang Road.

Intersection turn counts, classified for lights, heavies, buses, pedestrians, and cyclists, were undertaken on weekday AM (06:30—09:30) and PM (15:30—18:30) peak periods during March 2025 at the following locations:

- Garden Street / Powderworks Road.
- Garden Street / Pittwater Road.

These were used to develop base SIDRA Intersection traffic models of the intersections for the weekday AM and PM peaks, in conjunction with SCATS traffic signal data obtained from Transport for the signalised intersection of Mona Vale Road / Powderworks Road, Garden Street / Powderworks Road and Garden Street / Pittwater Road, plus queue length data obtained for the aforementioned intersections and Powderworks Road / Kalang Road.

In addition, automatic tube count (ATC) surveys were undertaken to provide further information on daily traffic volume profiles and vehicle speeds, at the following three locations:

- Mona Vale Road, south of Powderworks Road.
- Powderworks Road, north of Wilga Street.
- Powderworks Road, west of Warraba Road.

This data provides further background context and facilitates further assessments in delivering a safe and efficient transport network, such as sight distance assessment, intersection turn treatment assessment, and the need for other traffic calming and active transport infrastructure.

2.4.2. Weekend Volume Analysis

The ATC surveys allowed for assessment of weekend volumes and determined that Saturday and Sunday total daily traffic volumes are lower than the weekday average. For example, Saturday total daily traffic is only 85% that of the average weekday on Mona Vale Road south of Powderworks Road and Sunday daily traffic is only 82% of the weekday average. Similar findings were observed when comparing peak hour Saturday and Sunday volumes with those of weekdays.

Given this, and the fact that the proposed development would also generate fewer trips on weekends than during weekday commuter peak periods, assessment of weekend peak periods is not considered necessary.

2.4.3. Base Model Performance

The results of the surveys and site visits were used to develop existing (base case) SIDRA models of the intersections for the weekday AM and PM peak hours. SIDRA modelling outputs a range of performance measures, in particular:

- Degree of Saturation (DOS) – The DOS, or vehicle to capacity ratio (V/C), is used to measure the performance of intersections, where a value of 1.0 represents an intersection at theoretical capacity. As the performance of an intersection approaches DOS of 1.0, queue lengths and delays increase rapidly. The RTA Guide notes a DOS upper limit of 0.9 is appropriate, with satisfactory operation generally achieved with DOS of 0.7 – 0.8.
- Average Vehicle Delay (AVD) – The AVD (or average delay per vehicle, in seconds) for intersections provides a measure of the operational performance of an intersection and is used to determine an intersection's Level of Service. For traffic signals, the AVD is the weighted average experienced by all movement at the intersection. At priority intersections, the AVD is the highest recorded for any single movement at the intersection.
- Level of Service (LOS) – A comparative measure that provides an indication of the operating performance, based on AVD.

Table 2 provides a recommended baseline for assessment of intersection performance as per the RTA Guide.

Table 2: Intersection Performance Criteria

LOS	AVD (s)	TRAFFIC SIGNALS	PRIORITY
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, incidents will cause excessive delays	At capacity, requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity	Unsatisfactory and requires major treatment

The performance of the base models is shown by **Table 3**, with detailed SIDRA outputs provided as **Appendix B**.

Table 3: Summary of SIDRA Modelling Results – 2024 Base Year Scenario

INTERSECTION	PEAK	DOS	AVERAGE DELAY (s)	LOS
Mona Vale Road / Powderworks Road ¹	AM	0.55	22.3	B
	PM	0.86	20.2	B
Powderworks Road / Wilson Avenue ²	AM	0.02	22.5	B
	PM	0.03	13.0	A
Powderworks Road / Ingleside Road ²	AM	0.07	15.4	B
	PM	0.06	15.9	B
Powderworks Road / Wilga Street ²	AM	0.35	11.7	A
	PM	0.07	12.4	A
Powderworks Road / Kalang Road ²	AM	0.32	12.6	A
	PM	0.35	11.7	A

INTERSECTION	PEAK	DOS	AVERAGE DELAY (s)	LOS
Powderworks Road / Garden Street ¹	AM	0.77	20.0	B
	PM	0.91	30.0	C
Garden Street / Pittwater Road ¹	AM	0.76	18.7	B
	PM	0.88	19.6	B

¹ Signalised Intersection.

² Results shown are for the movement with the highest delay in accordance with the RTA Guide.

Table 3 demonstrates that all seven intersections assessed perform well under current conditions, with a maximum LOS B observed across the intersections during weekday commuter AM and PM peak periods. The findings suggest that intersections have spare capacity to perform well within accepted performance criteria.

Once the proposed Mona Vale Road West upgrade works occur, estimated by the Infrastructure Plan 2023-24 for midway through 2029, its intersection with Powderworks Road may perform better still.

3. Proposed Development

A detailed description of the proposed development for which approval is now sought, is outlined in the Rezoning Proposal prepared separately. In summary, the PP proposes a residential subdivision comprising:

- 133 detached houses.
- 210 terrace and manor houses.
- 193 residential apartment units.
- Proposed new perimeter and internal roads, with two new connections to the existing road network at Powderworks Road, plus five further intersections with Wilga Street.
- A network of proposed new internal roads.

The traffic implications arising from the proposed development are discussed in Section 5. A copy of the subdivision plan is provided as **Appendix A**.

4. Proposed Transport Network

4.1. Public Transport Network

As discussed in Section 2.3 and illustrated by **Figure 3**, existing public transport infrastructure in the area is largely in the form of bus services along Mona Vale Road to the northwest of the precinct, or along Powderworks Road and Kalang Road to the southeast of the precinct. The nearest existing bus stops are those on Powderworks Road near Kalang Road, some 500—600 metres from the southeast corner of the precinct.

Transport has improved bus infrastructure along Mona Vale Road as part of the completed upgrades to the east, with more improvements to follow upon delivery of the Mona Vale Road West upgrades. These have the intent of improving service provision between Mona Vale and Macquarie Park that provide interchanges to the Metro and B-Line services respectively.

Further bus infrastructure and facilities would however be required to serve the new precinct upon its delivery, with Powderworks Road at the very least likely to be required for bus services connecting the precinct both to Mona Vale Road to the northwest, and local suburbs of Elanora Heights and North Narrabeen to the southeast. These services should either use new bus stops on Powderworks Road near the precinct or enter the precinct to more thoroughly service occupants of the proposed dwellings and units.

Roads serving bus routes should be designed in accordance with the Bus Infrastructure Guide, requiring minimum lane widths of 3.5 metres to allow buses to use the lane without passing over drainage structures. Council's Engineering Design Code also provides design criteria for bus routes, with some key requirements identified as follows:

- Location of bus routes and bus stops should be set such that no more than 5% of residents have to walk more than 400 metres to catch a bus.
- Collector roads should have 9.0 metre minimum carriageway widths with stops spaced at around 400 metres and bus stands provided at stops.
- Local sub-arterial roads should have 11.0 metre minimum carriageway widths with stops spaced at around 400 metres and bus shelters provided at stops.

Within the precinct, several proposed collector roads meet the minimum requirements of Council's Engineering Design Code and would be suitable for accommodating buses in future. These include the proposed north—south and east—west spine roads dissecting the precinct, further details of which are given in Section 4.4.

The precinct is within the service area of on-demand bus services operated by Keolis Downer and these would provide further ancillary services to residents in addition to any new public bus services discussed above.

4.2. Active Transport Network

As discussed in Section 2.3.2, upgraded cycle infrastructure in the form of shared paths was recently provided as part of the Mona Vale Road East upgrades, with an extension of these facilities expected to occur once the western portion of this upgrade occurs by 2029.

Whilst current cycle facilities in the local area are generally scarce, the Council Bike Plan does identify potential future cycle infrastructure networks near the site, with one action being the provision of “*new infrastructure in release areas – this would include... any future development in Ingleside*”, whilst Council’s Safe Cycling Network identifying Powderworks Road between Mona Vale Road and Bolwarra Road as a ‘Proposed Network’ (Figure 4). Council’s Road Cycling Network also acknowledges Powderworks Road as a popular cycling road.

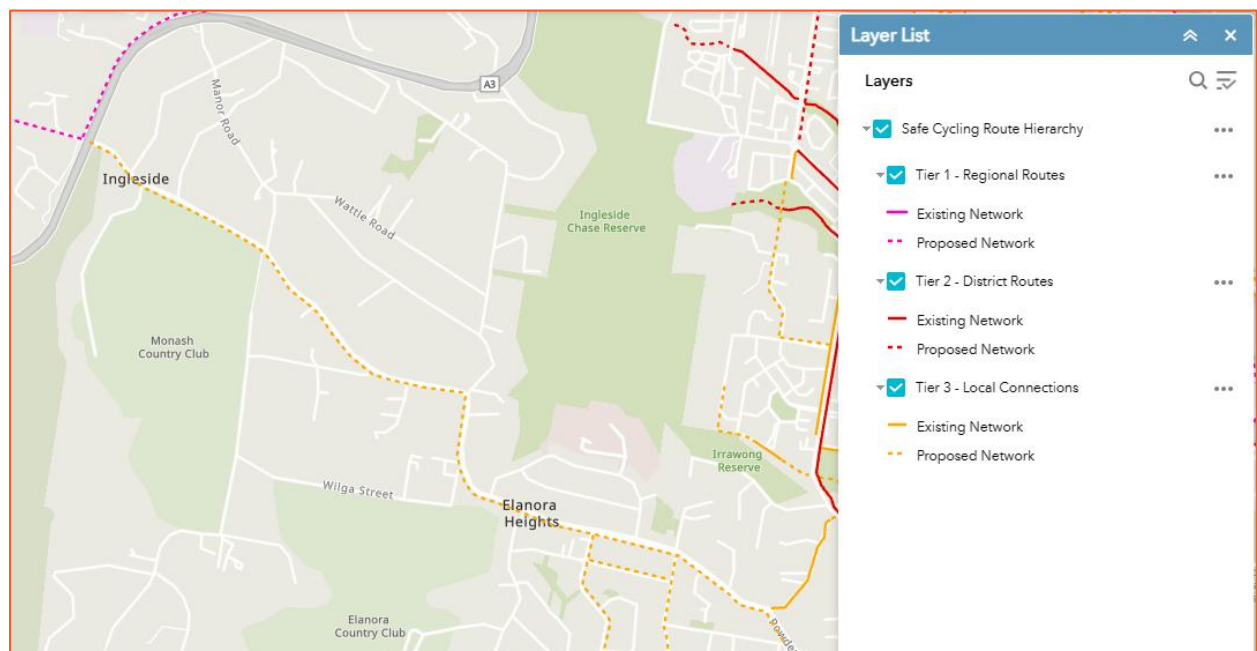


Figure 4: Council's Bike Plan - Safe Cycle Network

Council’s Engineering Design Code sets a stated objective to “*provide safe pedestrian and cycle routes to each allotment and through the street network*” in urban residential areas, with the precinct addressing this objective by proposing an internal road hierarchy and network which complies with the relevant requirements of the Engineering Design Code. Footpaths would be provided on one or both sides of all roads within the precinct, providing internal connections and connections to the broader active transport network.

The proposed network of pedestrian paths would also contribute towards achieving the objectives of Council’s Walking Plan, which sets as strategic direction intends to connect and deliver the network, make walking safe, create walking neighbourhoods, and encourage walking.

These footpaths will be supplemented by wide kerbside lanes and a generally low speed environment to encourage the uptake of cycling as a popular mode of travel in and around the precinct.

4.3. Broader Road Network

4.3.1. Mona Vale Road

Mona Vale Road forms the most accessible classified state road near the precinct which facilitates vehicular access to the arterial road network. It forms a key link in the LGA between the Pacific Highway at Pymble and Pittwater Road at Mona Vale, including passing to the north of the precinct and through the broader Ingleside suburb.

Mona Vale Road was recently widened to two lanes in each direction between Manor Road and Foley Street, with all lanes opened to traffic in March 2024. This widening is to the north and east of the precinct and provides additional capacity between the broader Ingleside suburb and those to the east, such as Mona Vale, but the widening stops short of the precinct and its intersection with Powderworks Road.

Further planning has been underway for some time to continue this widening westward to McCarrs Creek Road at Terrey Hills to the west of the precinct, with the NSW Budget 2024-25 allocating \$5.5 million for continued detail design progression. The Infrastructure Plan 2023-24 identified an estimated construction start date for these works of 2026 and estimated completion of 2029. Once complete, these works would provide additional road network capacity to residents of the precinct and local suburbs.

The Minister for Infrastructure, Transport, Regional Development and Local Government made a Media Release on 25 March 2025 announcing an investment of \$250 million to upgrade Mona Vale Road as part of the Federal Budget 2025-26.

No works are proposed to Mona Vale Road under the subject PP.

4.3.2. Powderworks Road

Powderworks Road is an unclassified regional road which forms the primary link between the proposed precinct and the existing broader road network. Near the precinct it operates posted speed zoning restrictions of 60 km/h and carries a single lane of traffic in each direction. Upon review of Council's Contributions Plan, there are no known planned or committed road upgrades to Powderworks Road near the precinct.

Under the subject PP, one new intersection is proposed to Powderworks Road between its intersections with Wilson Avenue and Ingleside Road, as illustrated by **Figure 5**.

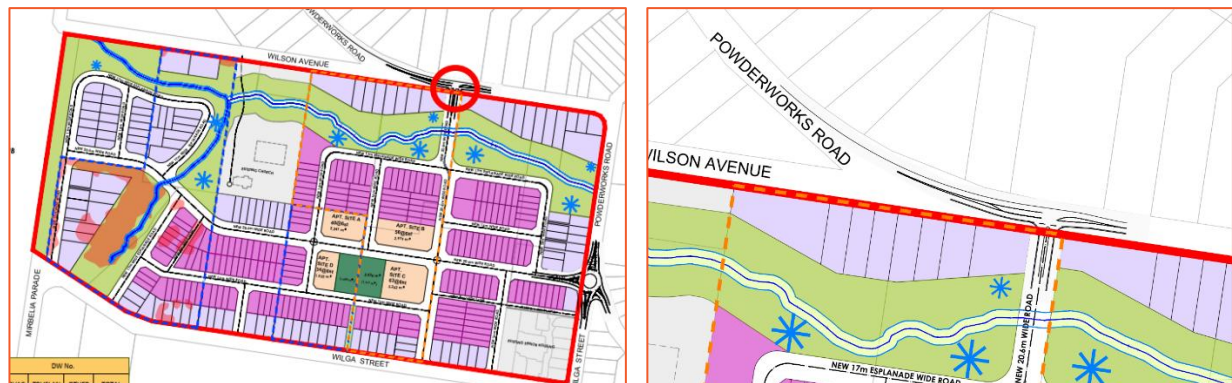


Figure 5: Proposed New Intersection 01

This new intersection will form one of three ultimate connections to Powderworks Road, with the other two being Wilson Avenue and Wilga Street, discussed below.

Given the watercourse which runs approximately east—west through the northern part of the precinct, residential lots along this northern part are relatively low in number, with most being delivered towards the south and east of the precinct as illustrated by the subdivision plan provided as **Appendix A**. Accordingly, Proposed New Intersection 01 is not considered the prominent connection to and from the precinct and will be ancillary in nature, serving a relatively low portion of the trips.

Proposed New Intersection 01 has been designed to provide a short channelised right turn (CHR(S)) bay on the Powderworks Road (west) approach in accordance with the intersection turn warrant assessment criteria of AGTM06-20 and design criteria of AGRD04A-23.

Aside from Proposed New Intersection 01, the other change proposed to Powderworks Road by the PP is the conversion of the Powderworks Road / Wilga Street intersection to a roundabout. This redesign would also involve the provision of a fourth leg, being the proposed new east—west spine collector road dissecting the precinct and is illustrated by **Figure 6**.



Figure 6: Powderworks Road / Wilga Street Proposed New Roundabout

The proposed redesign of the Powderworks Road / Wilga Street intersection to provide a roundabout gives a safe and efficient primary access to the precinct, which balances the traffic demands of each approach to ensure adequate opportunities for joining the road network without the need for traffic signals.

The roundabout serves as traffic calming and would be designed in accordance with the relevant requirements of AGRD04B-23 to ensure suitable vehicle deflection and negotiation of the roundabout is possible for the relevant design vehicles.

The proposed new western leg of this roundabout serves as a core collector road of the new precinct, as illustrated by subdivision plans in **Appendix A**, allowing this roundabout to form the primary location at which trips generated by the precinct would travel to and from the local road network.

Traffic performance of this new roundabout arrangement has been assessed and is discussed later in Section 5.

The intersection of Powderworks Road and Wilson Avenue will remain unchanged as part of this PP. Only three new low density lots are proposed within the precinct as having direct access onto Wilson Avenue and as using Wilson Avenue for broader access to and from Powderworks Road. The impact of trips generated by these three additional low-density lots would be immaterial and would not warrant any change to the Wilson Avenue intersection layout.

4.3.3. Wilga Street

The general alignment of Wilga Street will remain unchanged as part of the PP, though five new minor priority T-intersections are proposed to provide access to the precinct via Wilga Street, as illustrated by **Figure 7**.

Wilga Street currently carries very low traffic volumes of some 30—40 vehicles per hour and accordingly, once the PP is occupied, traffic volumes will remain low such that no intersection turn treatments in accordance with AGTM06-20 would be warranted. As such, all intersections would form standard basic left and right turn treatment intersections with single lane approaches on all legs and give-way sign control.



Figure 7: Proposed Wilga Street Priority Intersections

4.4. Internal Precinct Road Network

The proposed internal road hierarchy has been designed to provide a balanced response to the demands of future residents and in accordance with Council's Engineering Design Code and PBP 2019. Where the design requirements of PBP 2019 and Council's Engineering Design Code differ, the higher standard has been adopted. The proposed internal road hierarchy is illustrated by **Figure 8**.

Adherence to PBP 2019 is discussed separately but has ensured perimeter and non-perimeter roads are designed with adequate kerb to kerb widths to meet the relevant performance criteria and acceptable solutions, notably from a traffic perspective that perimeter roads have minimum 8.0 metre kerb to kerb carriageway widths and that non-perimeter roads have 5.5 metre widths. All internal roads have adopted either the Collector Road or Local Street categories of Council's Engineering Design Code, key details of which are summarised by **Table 4**.

Table 4: Characteristics of Roads in Residential Subdivisions

CATEGORY	MAX. VEHICLES PER DAY (VPD)	CARRIAGEWAY WIDTH	ROAD RESERVE WIDTH	FOOTPATH	DESIGN SPEED
Collector Road	6,000	11.0 m	20.0 m	Yes	50 km/h
Local Road	2,000	8.0 m	16.0 m	Optional	40 km/h

The majority of internal roads within the precinct meet or exceed the requirements of **Table 4**; in locations where they do not, this does not detract from the safety or efficiency of the proposed internal road network.

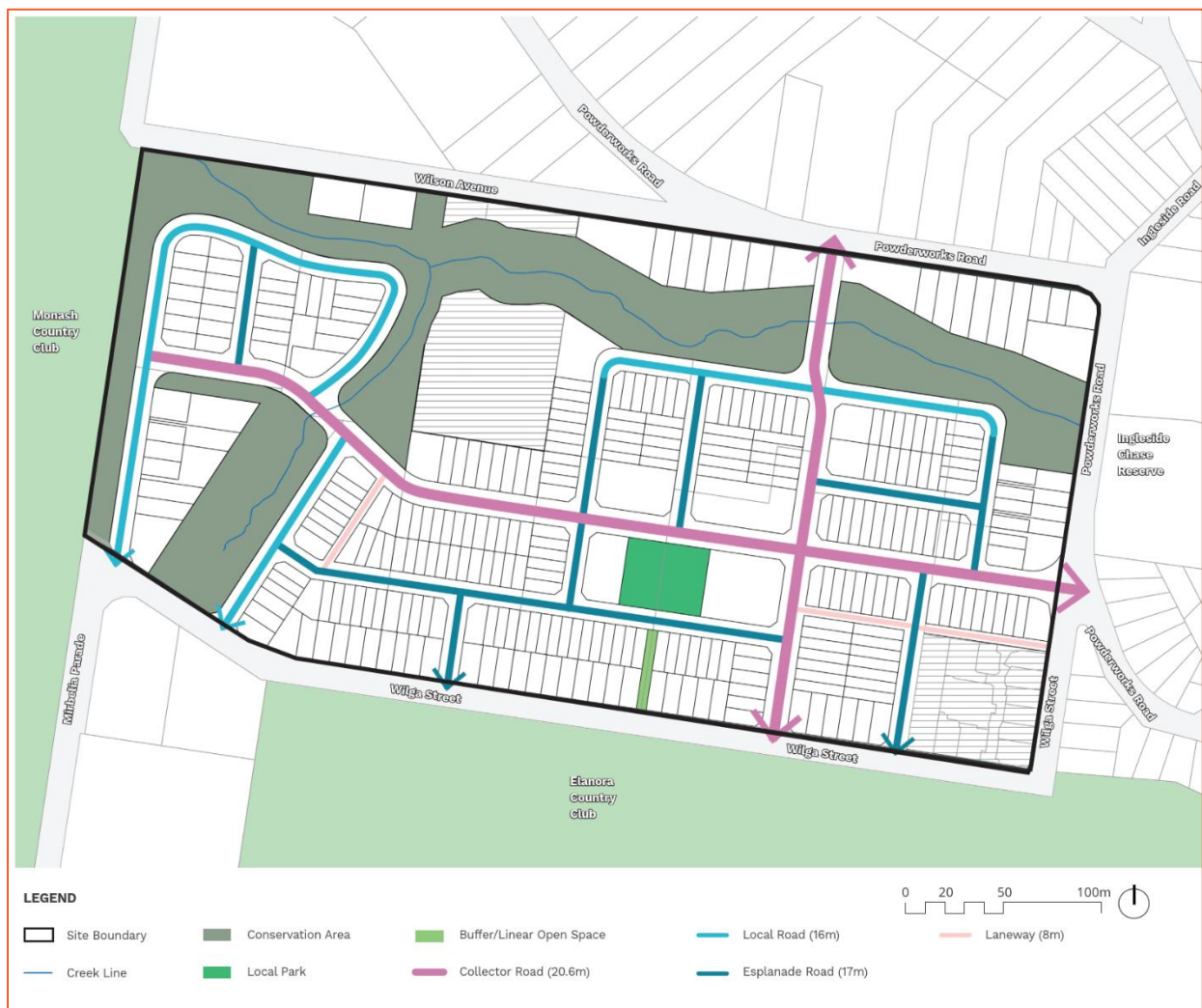


Figure 8: Proposed Internal Road Hierarchy

Further details on the proposed internal road hierarchy and cross sections are provided as **Appendix C**.

5. Traffic Impacts

5.1. Intersection Assessed

A total of seven intersections were assessed including six Powderworks Road intersections and the Garden Street and Pittwater Road intersection identified in Section 2.4 were assessed for performance during weekday AM and PM peak periods under ‘with development’ conditions, which assumes full occupancy of the 343 small lot and low-density residential lots and 193 residential apartment units proposed by the PP.

Traffic impacts assessed within this section are those under ‘typical’ conditions as would generally be required for any traffic impact assessment for a proposal of this nature under the requirements of the RTA Guide. This is opposed to an assessment of bushfire road network traffic conditions, which are discussed in Section 6.

5.2. Assessment Years & Future Year Traffic Growth

To ensure a robust assessment, traffic impacts have been assessed for Opening Year (2026) and Opening Year + 10 (2036) scenarios.

Future year traffic growth was determined based on Strategic Traffic Forecasting Model (STFM) link volume plots which were provided by Transport for 2021, 2026 and 2036 years for weekday AM and PM peak periods. The percentage per annum growths between 2021—2026 and 2026—2036 were determined and proportionally applied to 2024 observed intersection turn counts to derive 2026 and 2036 future year traffic volumes.

The adopted per annum growth rates are as presented in **Table 5**.

Table 5: Growth Rates

INTERSECTION	APPROACH	GROWTH (PER ANNUM)	
		AM	PM
Mona Vale Road / Powderworks Road	North	1.6%	1.0%
	East	1.5% ¹	1.6% ¹
	South	1.0%	1.7%
	West	1.7%	1.9%
Powderworks Road / Wilson Avenue	West	1.1%	1.7%
	East	2.0%	2.2%
	South	1.5% ¹	2.0% ¹
Powderworks Road / Ingleside Road	North	1.1%	1.6%
	East	1.5% ¹	1.9% ¹
	South	2.0%	2.2%
Powderworks Road / Wilga Street	North	1.1%	1.6%
	South	2.0%	2.2%

INTERSECTION	APPROACH	GROWTH (PER ANNUM)	
		AM	PM
Powderworks Road / Kalang Road	West	1.5% ¹	1.9% ¹
	East	2.0%	2.2%
	South	0.0%	0.0%
	West	1.1%	1.6%
Powderworks Road / Garden Street	North	-0.2%	0.1%
	South	0.6%	0.3%
	West	0.4%	0.8%
Garden Street / Pittwater Road	North	-0.1%	0.0%
	South	0.2%	-0.1%
	West	0.1%	0.6%

¹ Given the nature of the STFM, the local streets of Wilson Avenue, Ingleside Road, and Wilga Street are not coded. Growth on these approaches was taken as the average of the respective Powderworks Road approaches for each peak period. For the Powderworks Road approach to Mona Vale Road, significant population growth was forecast in the STFM which was considered double counting for population growth in the subject precinct. Accordingly, STFM growth was deemed excessive and was not adopted, with the average of the two Mona Vale Road approaches adopted instead.

The STFM plots did not make any attempt to zero any growth within the precinct, with standard population and employment forecasts given by the Strategic Transport Model used to inform vehicle trip generation. Accordingly, application of these growth rates is considered highly conservative at all intersections along Powderworks Road as it is thought to contain an element of double counting of potential growth within the subject precinct.

5.3. Without Development Traffic Assessment – 2026

The growth rates that were provided by Transport for the years 2021 and 2026 were applied to the Base (2024) model for two years to derive the 2026 Opening Year traffic volumes. Performance of the existing intersection arrangements under 2026 traffic flow conditions without the proposed development is summarised by **Table 6**.

Table 6: Summary of SIDRA Modelling Results – 2026 Opening Year Scenario

INTERSECTION	PEAK	DOS	AVERAGE DELAY (s)	LOS
Mona Vale Road / Powderworks Road ¹	AM	0.56	22.2	B
	PM	0.86	20.2	B
Powderworks Road / Wilson Avenue ²	AM	0.02	21.7	B
	PM	0.03	12.8	A
Powderworks Road / Ingleside Road ²	AM	0.06	14.9	B
	PM	0.06	15.6	B
Powderworks Road / Wilga Street ²	AM	0.35	11.5	A
	PM	0.07	12.1	A

INTERSECTION	PEAK	DOS	AVERAGE DELAY (s)	LOS
Powderworks Road / Kalang Road ²	AM	0.32	12.5	A
	PM	0.35	11.7	A
Powderworks Road / Garden Street ¹	AM	0.75	19.7	B
	PM	0.92	30.4	C
Garden Street / Pittwater Road ¹	AM	0.77	18.3	B
	PM	0.89	19.9	B

¹ Signalised Intersection. ² Results shown are for the movement with the highest delay in accordance with the RTA Guide.

Between 2021 and 2026, many approaches throughout the network were forecasted to have minor reductions in traffic by the STFM, with the sole exception being the Mona Vale Road (north) approach to Powderworks Road, which had low growth. Accordingly, the majority of the performances identified by **Table 6** are the same or better than the 2024 Base Case results presented in **Table 3**.

5.4. Without Development Traffic Assessment – 2036

The growth rates that were provided by Transport for the years 2021, 2026 and 2036 were applied to the Base (2024) model for 12 years to derive the 2036 Opening Year + 10 traffic volumes. Performance of the existing intersection arrangements under 2036 volumes without the proposed development is summarised by **Table 7**.

Table 7: Summary of SIDRA Modelling Results – 2036 Opening Year + 10 Scenario

INTERSECTION	PEAK	DOS	AVERAGE DELAY (s)	LOS
Mona Vale Road / Powderworks Road ¹	AM	0.66	29.2	C
	PM	0.92	29.5	C
Powderworks Road / Wilson Avenue ²	AM	0.04	38.3	C
	PM	0.05	19.4	B
Powderworks Road / Ingleside Road ²	AM	0.10	22.7	B
	PM	0.11	24.2	B
Powderworks Road / Wilga Street ²	AM	0.40	15.8	B
	PM	0.13	17.6	B
Powderworks Road / Kalang Road ²	AM	0.37	14.0	A
	PM	0.40	12.8	A
Powderworks Road / Garden Street ¹	AM	0.87	22.6	B
	PM	0.94	32.6	C
Garden Street / Pittwater Road ¹	AM	0.77	18.5	B
	PM	0.94	22.1	B

¹ Signalised Intersection. ² Results shown are for the movement with the highest delay in accordance with the RTA Guide.

It is noted that for many of the minor intersections presented in **Table 7**, outputs are presented for the movement with the highest delay, though often this movement has very few vehicles using it. An example is that of the Powderworks Road / Wilson Avenue intersection; in the AM peak, the movement experiencing 38.3 seconds delay is made by only two vehicles across the entire peak hour.

Detailed SIDRA outputs for 2026 and 2036 without development scenarios are provided as **Appendix D**.

5.5. Trip Generation

In determining anticipated traffic generation of the subdivision, the Low Density Trip Generation Analysis Report forms a contemporary update to the low density residential trip rates presented in TDT 2013/04a and are based on more recent surveys which acknowledge travel pattern shifts over the past few years. This recommends application of peak period trip generation rates for low density dwellings of 0.75 vehicle trips / hour / dwelling during weekday AM and PM peak periods.

This rate has been applied to the 343 proposed low-density dwellings to determine peak hour trip generation of 257 vehicle trips per hour during weekday AM and PM peak periods.

The High Density Residential Car Based Data Report has been used to determine trip generation for the proposed residential apartment units. Several sites were surveyed by this Report, one of which was in Manly and was thus considered most applicable to the subject site, being within the same LGA. This site was observed as having peak period trip generation rates of 0.27 trips / unit / hour during the AM peak and 0.30 trips / unit / hour during the PM peak.

This rate has been applied to the 193 residential units to determine peak hour trip generation of 51 and 57 vehicle trips per hour during weekday AM and PM peak periods, respectively.

Adopting the inbound and outbound splits for residential premises to each of these two residential land uses results in the following combined trip generation for the precinct:

- 309 vehicle trips / hour (127 in, 182 out), during the AM peak period.
- 322 vehicle trips / hour (176 in, 138 out), during the PM peak period.

5.6. Trip Distribution

The distribution of trips generated by the precinct during weekday AM and PM peak periods has been determined via development of a spreadsheet model. Having determined the total number of inbound and outbound trips generated during each peak period, the general process adopted to assign these trips to the broader road network was as follows:

1. Segment the precinct into smaller parcels, to allow for trips generated by these parcels within the precinct to be assigned different characteristics. Six such parcels were identified, with lots within each assumed as likely to have similar trip distribution characteristics.

2. Determine the percentage of trips generated by each parcel which would use each of the three possible connections to Powderworks Road, being the proposed new north—south spine road, the proposed new east—west spine road, and Wilga Street.
 - One exception to this rule is three low density residential lots which have direct access onto Wilson Street to the northwest of the precinct. Another is 11 low density residential lots which have direct access onto Powderworks Road to the northeast of the precinct.
3. For the new east—west spine road and Wilga Street, adopt existing Wilga Street north/south turn proportions for movements to and from Powderworks Road. For the new north—south spine road, adopt the existing Wilson Avenue east/west turn proportions for movements to and from Powderworks Road.

Modelling vehicle trip distribution onto the existing road network in this manner allows for assessment of the six Powderworks Road intersections and the Garden Street and Pittwater Road intersection under ‘with development’ conditions, the findings of which are presented in the following section.

5.7. With Development Traffic Assessment – 2026

Adopting the trip generation and distribution presented in the previous sections allows for assessment of the subject intersections with development traffic for the Opening Year. It is unlikely that the development would be fully occupied by 2026; however, full occupation has been assumed to ensure a robust and conservative assessment of traffic impacts.

To allow for ease of comparison, the findings of assessment are provided alongside the existing performance (**Table 6**) in **Table 8**. Detailed outputs are provided as **Appendix D**.

Table 8: Summary of SIDRA Modelling Results – 2026 Opening Year + Development Scenario

INTERSECTION	PEAK	SCENARIO	DOS	AVERAGE DELAY (s)	LOS
Mona Vale Road / Powderworks Road ¹	AM	Reference	0.56	22.2	B
		Development	0.61	24.0	B
	PM	Reference	0.86	20.2	B
		Development	0.94	25.8	B
Powderworks Road / Wilson Avenue ²	AM	Reference	0.02	21.7	B
		Development	0.05	19.7	B
	PM	Reference	0.03	12.8	A
		Development	0.06	15.9	B
Powderworks Road / Ingleside Road ²	AM	Reference	0.06	14.9	B
		Development	0.07	18.5	B
	PM	Reference	0.06	15.6	B
		Development	0.08	20.2	B

INTERSECTION	PEAK	SCENARIO	DOS	AVERAGE DELAY (s)	LOS
Powderworks Road / Wilga Street ²	AM	Reference	0.35	11.5	A
		Development	0.19	14.4	A
	PM	Reference	0.07	12.1	A
		Development	0.11	13.4	A
Powderworks Road / Kalang Road ²	AM	Reference	0.32	12.5	A
		Development	0.36	13.2	A
	PM	Reference	0.35	11.7	A
		Development	0.43	13.1	A
Powderworks Road / Garden Street ¹	AM	Reference	0.75	19.7	B
		Development	0.89	22.8	B
	PM	Reference	0.92	30.4	C
		Development	0.93	32.1	C
Garden Street / Pittwater Road ¹	AM	Reference	0.77	18.3	B
		Development	0.82	18.1	B
	PM	Reference	0.89	19.9	B
		Development	0.93	20.6	B

¹ Signalised Intersection.

² Results shown are for the movement with the highest delay in accordance with the RTA Guide.

The Powderworks Road / Wilga Street intersection is modelled as a roundabout under the 'with development' scenario, whereas the 'without development' results are for the existing three-leg priority intersection. Otherwise, all intersection layouts are the same with the only difference being the added development traffic.

Assessment of the 2026 Opening Year 'with development' scenario against the 2026 'without development' case demonstrates that the trips generated by the proposed development would have little material impact on intersection performance during weekday AM and PM peak periods, with every intersection performing at LOS A or B in 'with development' scenarios.

5.8. With Development Traffic Assessment – 2036

The findings of the 2036 'with development' scenario assessment are presented in **Table 9**, with respective 'no development' outputs from **Table 7** included, for comparison.

Table 9: Summary of SIDRA Modelling Results – 2036 Opening Year + Development Scenario

INTERSECTION	PEAK	SCENARIO	DOS	AVERAGE DELAY (s)	LOS
Mona Vale Road / Powderworks Road ¹	AM	Reference	0.66	29.2	C
		Development	0.70	56.2	D
	PM	Reference	0.92	29.5	C
		Development	0.98	34.9	C
Powderworks Road / Wilson Avenue ²	AM	Reference	0.04	38.3	C
		Development	0.09	35.0	C
	PM	Reference	0.05	19.4	B
		Development	0.10	24.8	B
Powderworks Road / Ingleside Road ²	AM	Reference	0.10	22.7	B
		Development	0.13	29.2	C
	PM	Reference	0.11	24.2	B
		Development	0.14	31.1	C
Powderworks Road / Wilga Street ²	AM	Reference	0.40	15.8	B
		Development	0.23	17.2	B
	PM	Reference	0.13	17.6	B
		Development	0.14	14.9	B
Powderworks Road / Kalang Road ²	AM	Reference	0.37	14.0	A
		Development	0.42	15.5	B
	PM	Reference	0.40	12.8	A
		Development	0.50	15.8	B
Powderworks Road / Garden Street ¹	AM	Reference	0.87	22.6	B
		Development	0.97	27.7	B
	PM	Reference	0.94	32.6	C
		Development	0.98	37.9	C
Garden Street / Pittwater Road ¹	AM	Reference	0.77	18.5	B
		Development	0.83	17.9	B
	PM	Reference	0.94	22.1	B
		Development	0.99	24.3	B

¹ Signalised Intersection.

² Results shown are for the movement with the highest delay in accordance with the RTA Guide.

Assessment of the 2036 'with development' scenario against the 2036 reference case demonstrates, as with 2026 assessment year findings, that the trips generated by the proposed development would have little material impact on intersection performance during weekday AM and PM peak periods.

The intersection of Mona Vale Road and Powderworks Road is found to shift from LOS C to LOS D once development traffic is added, though it is noted that this future year 2036 assessment does not include any potential upgrade to the intersection which would occur under the Mona Vale Road West upgrade works, estimated for completion in 2029.

As documented in MVRW 2017, these upgrade works would provide additional capacity at the intersection through the widening of Mona Vale Road to two lanes in each direction to the southwest of the intersection and providing additional lanes on the Powderworks Road and Bahai Temple Way side arms. These upgrades would improve performance from the LOS D identified for the 2036 future year.

The assessment of traffic impacts undertaken by MVRW 2017 assumed full development of the Ingleside Release Area as it was planned at the time, being a development for 3,400 low density residential dwellings and a small shopping village with a mix of commercial and community uses. It is evident therefore that MVRW 2017 determined an adequate intersection layout for Mona Vale Road / Powderworks Road which would have been capable of accommodating far greater local residential uplift than is now forecast.

Elsewhere, performance remains good and in keeping with respective reference case scenarios, with LOS A—C across all peak periods at all intersections.

Importantly, the proposed roundabout at Powderworks Road / Wilga Street performs very well, with LOS B during weekday AM and PM peak periods under 2036 'with development' conditions. This LOS B reflects the worst-performing movement, with the roundabout intersection average delay much lower at LOS A during both peak periods, representing excellent performance with very little delay.

6. Bushfire Traffic Impacts

6.1. Background

The area has undergone extensive assessment of potential traffic impacts in the event of a bushfire evacuation, with the two most relevant recent studies documenting findings being AECOM 2020 and PDC 2021. The methodology and findings of these studies are discussed at length therein; in summary, they identified that under the evacuation conditions agreed through significant government stakeholder engagement, a residential development yield of around 800 – 1,000 low-density dwellings located to the south of Mona Vale Road would be supportable.

The reader is referred to PDC 2021 for further context and information on PBP 2019, emergency warning and public information systems, and withdrawal and physical assistance processes, as well as for a summary of AECOM 2020. PDC 2021 then presented a succinct methodology for determining the evacuation traffic demand of a given catchment, in that case being a proposed residential subdivision of 980 dwellings, concluding that this would conservatively generate a total of 1,222 vehicle trips.

This T&TA draws upon the methodology adopted through significant engagement over years with government representatives to repeat an analysis into the likely traffic impacts of a bushfire evacuation should the proposed residential subdivision be approved. Some parts of the methodology have been updated where more contemporary information is available. Our findings are contained herein, with limitations to the bushfire assessment provided as **Appendix E**.

6.2. Methodology

6.2.1. Evacuation Route

Through the various prior assessments undertaken for proposed development in the area, documented further in AECOM 2020 and PDC 2021, Powderworks Road was repeatedly identified as the most appropriate evacuation route for Ingleside residents.

Multiple factors informed this, primarily the facts that Powderworks Road offers a direct route away from Ingleside to the more urban (and therefore less at-risk) suburbs of Elanora Heights and North Narrabeen to the southeast, whilst Mona Vale Road, the main classified state road in the vicinity, passes through areas of significantly exposed and bushfire prone vegetated land to the east and west.

It was therefore considered appropriate by government and private sector experts, and is maintained within this T&TA, that any assessment of bushfire evacuation of proposed development within Ingleside should be able to demonstrate satisfactory evacuation occurring wholly in the south-eastbound direction along Powderworks Road.

The ultimate destination of those evacuating via Powderworks Road is not critical to this analysis. This position is informed by liaison with stakeholders in prior planning for the site, in which emergency services noted a primary objective of relocating at-risk persons to areas of low to no risk.

Applying that objective to the context of the subject precinct, bushfire prone land mapping illustrates that dense, urban areas to the southeast, such as Elanora Heights and Narrabeen, are not considered at high risk from bushfire impact. This in turn implies that should vehicles be able to access either of these suburbs, they would be considered safe.

6.2.2. Background Traffic

AECOM 2020 and PDC 2021 explain emergency warning and public information systems, and withdrawal and physical evacuation assistance processes, in depth. These, along with stakeholder engagement during prior assessments, give context to the likely prevailing background traffic conditions on the local road network in the event of a bushfire evacuation.

Given the large expanse of bushfire prone, vegetated land to the south of Mona Vale Road west of Powderworks Road, it is considered undesirable for this stretch of Mona Vale Road to be used, or encouraged for use, by those evacuating in the event of a bushfire. There are also very few residential catchments directly fronting Mona Vale Road between Powderworks Road and Terrey Hills. As such, there would be little to no traffic demand from Mona Vale Road (southwest) right turning into Powderworks Road to travel southbound towards Elanora Heights to evacuate a bushfire. Emergency services intervention and traffic control would likely reinforce this behaviour.

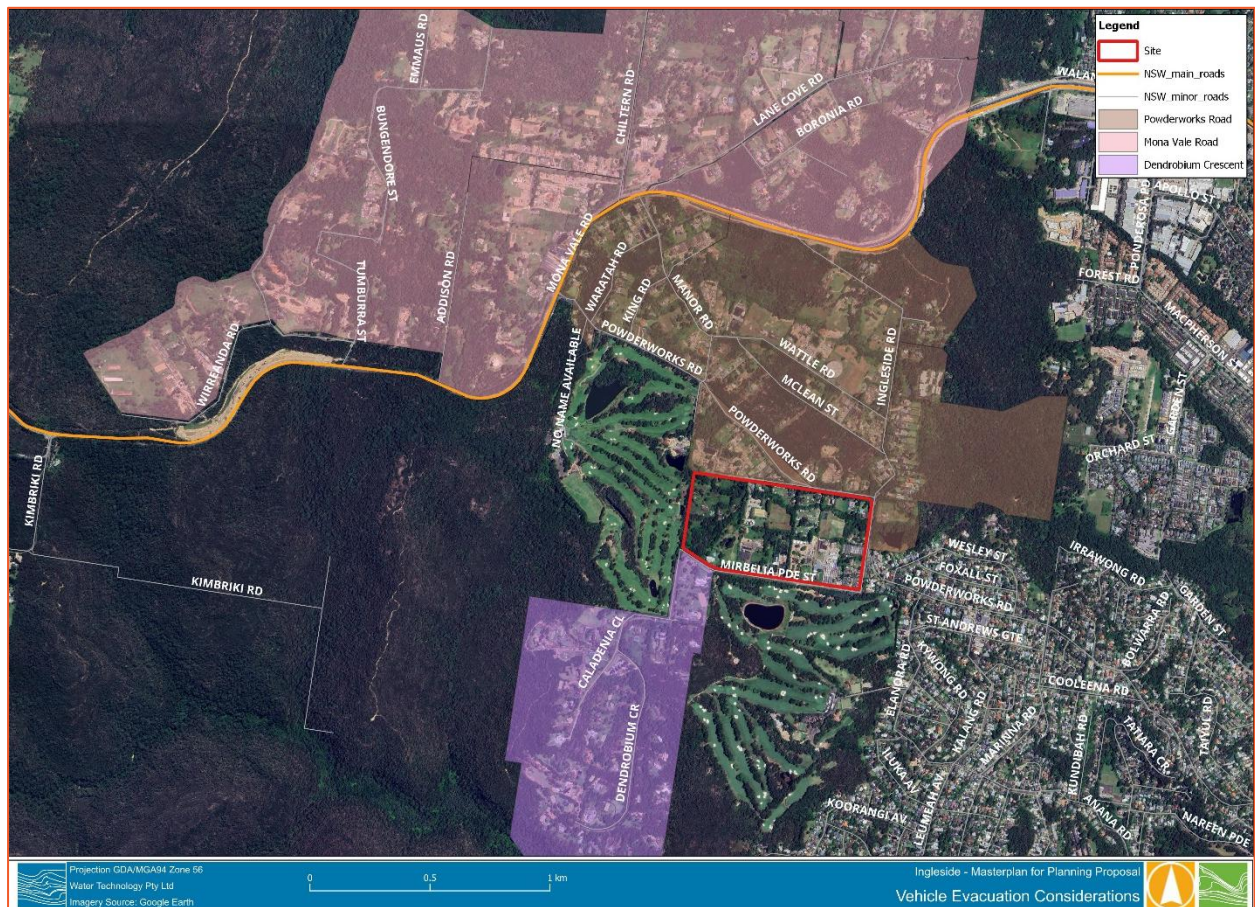
Existing residents of Ingleside to the north of Mona Vale Road, between Tumburra Street and Lane Cove Road, would be expected to evacuate south and eastwards, either using Mona Vale Road to continue southwards via Powderworks Road or Manor Road, travelling eastbound along Mona Vale Road towards Mona Vale, or using Cabbage Tree Road to travel eastbound towards Mona Vale and Bayview. As such, there may be some demand from Mona Vale Road (northeast) to left turn and travel southbound along Powderworks Road from the existing Ingleside catchment north of Mona Vale Road.

East of Lane Cove Road, the population is generally in an urban area which would be at lower risk than more exposed areas to the west. It would therefore be extremely unlikely for people in this area to travel westbound along Mona Vale Road, and even more unlikely for them to do so to turn left onto Powderworks Road, when other safer routes southwards, such as Pittwater Road, could be used.

Further, there is an existing small residential catchment around Dendrobium Crescent to the southwest of the precinct, which is at much greater risk of bushfire impact given its location in proximity to surrounding bushfire prone vegetation. This catchment would be required to use Wilga Street to access Powderworks Road to travel southwards towards urban areas.

These three existing catchments are illustrated by **Figure 9**.

The above demonstrates that once the initial emergency warning and public information protocols have been enacted, and / or motorists see signs of a bushfire (such as smoke), southbound traffic along Powderworks Road in the vicinity of the Wilga Wilson Precinct would quickly reduce to minimal levels. This would likely be further enforced by physical prevention and closure of routes by emergency services, though this cannot be guaranteed for planning purposes.



Source: Water Technology 2024

Figure 9: Bushfire Evacuation Catchment Areas

It is evident therefore that whilst some residual background traffic would likely be travelling southbound along Powderworks Road in the event of an evacuation, it would not be anywhere near as high as it is under 'typical' conditions during the time of day a bushfire might occur.

It is therefore appropriate for any assessment of the capacity of Powderworks Road, or any intersections along it, in the event of a bushfire to include only traffic which would be using it as a fast and convenient way to depart at-risk areas, to in turn ensure a realistic and representative response to bushfire in the area is considered.

The method to identify traffic demand along Powderworks Road is presented in the following sections.

6.2.3. Evacuation Traffic Demand

Key to determining the ability of residents of the precinct and surrounding areas to evacuate in the event of a bushfire is determining the number of vehicles, or traffic demand, that would access the road network in such an event. Conventional means of traffic generation, such as the use of trip rates presented in the RTA Guide and TDT

2013/04a, are not valid in the event of a bushfire evacuation, as the number of vehicles accessing the road network is inherently atypical and not reflective of usual peak period traffic demands.

Determining the evacuation traffic demand therefore requires a bespoke approach based on the number of dwellings in the study area and several geographic and behavioural influences. The proposed methodology for determining this demand is explained in detail in Water Technology 2024 which accompanies this PP application, with key details summarised below:

Number of Existing Residential Dwellings Required to Evacuate

- Residents from three existing residential precincts were considered as potentially needing to evacuate south-eastwards along Powderworks Road, namely:
 - Residential catchment at Dendrobium Crescent (estimate 42 dwellings).
 - Residential catchment north of Mona Vale Road (estimate 188 dwellings).
 - Residential catchment northeast of Powderworks Road (estimate 128 dwellings).
 - Total: 358 low density residential dwellings.

Number of Proposed Dwellings Within Wilga Wilson Precinct Required to Evacuate

- Given the proposed design standards adopted for development within the precinct (discussed in detail by other submissions forming part of this PP), no residents would necessarily need to evacuate during a bushfire. However, it is considered important to acknowledge that some residents may do so regardless.
- Bushfire attack level (BAL) mapping developed by Blackash 2024 was used to determine which dwellings and apartments within the precinct face bushland with a BAL of over 12.5 and thus contain residents who may decide to evacuate, as follows:
 - 100 low density residential dwellings (29% of total proposed within the precinct).
 - 0 high density residential units (0% of the total proposed within the precinct).

Vehicle Ownership Rates

- Raw census data from 2021 was downloaded from the Australian Bureau of Statistics (ABS) website to determine vehicle ownership rates for dwellings and apartments.
- The ownership rate for Ingleside for dwellings was determined as 2.6 vehicles per dwelling and this rate was applied to the existing 358 low density residential dwellings.
- The ownership rate for Elanora Heights was adopted for the subject precinct. The rate for dwellings was determined at 2.2 vehicles per dwelling and this was applied to the 100 dwellings within the precinct which may evacuate. The rate for apartments was determined at 1.8 vehicles per dwelling and this was applied to the zero apartments within the precinct which may evacuate.

Vehicles Used in the Event of an Evacuation

- It is highly unlikely that every resident would use every car they own to evacuate in the event of a bushfire.
- Nevertheless, to form a conservative assessment, private vehicle usage during a bushfire evacuation has been assumed to be 100%, meaning every resident takes every vehicle they own and tries to evacuate southwards along Powderworks Road.

Home Occupancy

- ABS census data found that the proportion of private unoccupied dwellings in Ingleside is 6.9%.
- Nevertheless, to form a conservative assessment, home occupancy in the event of the subject bushfire was assumed to be 100%, both for the existing 368 dwellings and the proposed dwellings and apartments within the precinct.

Vehicles Evacuating in the Final Hour

- Not all residents would choose to evacuate, and not all those that do would evacuate at the same time.
- Various behavioural studies discussed in Water Technology 2024 suggest appropriate assumptions as being:
 - 25% of all residents would respond to early warnings and messaging and evacuate well in advance of the fire arriving (that is, more than one hour before the fire arrives).
 - 50% of all residents would not evacuate and would choose to stay and defend.
 - 25% of residents would therefore evacuate within the final hour before the fire arrives.

The key assumptions for determining evacuation traffic demand are summarised by **Table 10**.

Table 10: Evacuation Traffic Demand Assumptions Summary

ASSUMPTION DESCRIPTION	ADOPTED VALUE
Total homes evacuating	0 apartments in the precinct 100 dwellings in the precinct 358 dwellings outside the precinct
Vehicle ownership rate	1.8 vehicles per apartment in the precinct 2.2 vehicles per dwelling in the precinct 2.6 vehicles per dwelling outside the precinct
Vehicle usage	100%
Home occupancy	100%
Decide to evacuate in final hour before fire arrival	25%
TOTAL VEHICLES	288

For reasons documented in AECOM 2020 and PDC 2021, the values presented in **Table 10** are each considered conservative and ensure a robust assessment of bushfire evacuation by layering conservative assumption upon conservative assumption.

Further, no on-site evacuation to Evacuation Centres or Neighbourhood Safer Places (NSP) is assumed in determination of traffic demand for the southbound evacuation along Powderworks Road.

6.2.4. Evacuation Traffic Distribution

All traffic is assumed as seeking to evacuate south-eastwards along Powderworks Road towards denser urban areas of Elanora Heights and North Narrabeen. Distribution of those from the residential catchments expected to travel southwards along Powderworks Road were distributed as follows:

- All trips from the Dedrobium Crescent catchment (42 dwellings) use Wilga Street to right turn onto Powderworks Road via the proposed new roundabout. They then continue south-eastwards along Powderworks Road until in an urban area.
- All trips from catchments north of Mona Vale Road (188 dwellings) travel southwards along Mona Vale Road and left turn from Mona Vale Road (northeast) to Powderworks Road. They then continue south-eastwards along Powderworks Road until in an urban area.
- 50% of trips from catchments northeast of Powderworks Road and south of Mona Vale Road (128 dwellings) turn left onto Powderworks Road from Wattle Road. The remaining 50% of these trips instead turn left onto Powderworks Road from Ingleside Road.
- All trips from the subject precinct (58 dwellings + 63 apartments) access the east—west spine road within the precinct and use that to make a right turn onto Powderworks Road at the proposed new Wilga Street roundabout. They then continue south-eastwards along Powderworks Road until in an urban area.

Adoption of these vehicle trip distributions assumptions allows for traffic impact assessment of the road network.

6.3. Traffic Impacts

6.3.1. Mid-Block Assessment

The NSW State Emergency Service adopts a vehicle flow rate for a traffic lane of 600 vehicles per hour per lane in its flood evacuation calculations (NSW SES 2004). This value is derived from a starting capacity of 1,200 vehicles per lane per hour, which is considered a typical mid-block lane capacity by AGTM03-20 for urban roads with interrupted flow, which a relatively wide carriageway and an absence of kerbside parking (as Powderworks Road near the precinct does). This typical lane capacity of 1,200 vehicles per lane per hour is then halved to 600 by NSW SES 2004 to account for adverse driving conditions, which in the context of a flood might be heavy rain, darkness or driver unfamiliarity. In the context of a bushfire, 'heavy rain' could be replaced with 'smoke reducing visibility'.

Adoption of this lane capacity in the event of an emergency to the subject assessment would suggest midblock capacity on Powderworks Road in the event of an evacuation would meet the NSW SES 2004 criteria, given a total of 301 vehicles are estimated as evacuating from the precinct and surrounding suburbs.

6.3.2. Intersection Assessment

For vehicles evacuating southwards along Mona Vale Road, the first intersection they would encounter which forms a control point for all movements would be the proposed new roundabout at Wilga Street. Accordingly, this is considered the key Powderworks Road intersection to test for capacity in the event of a bushfire. Once beyond (southeast of) this intersection, evacuating traffic has uninterrupted priority through to Kalang Road in the urbanised Elanora Heights town centre.

Assessment of the 301 vehicles determined as evacuating, distributed via the means detailed in Section 6.2.4, has been undertaken using SIDRA Intersection for the proposed roundabout layout illustrated by **Figure 6**. For conservatism, an assumed 20 heavy vehicles were modelled as travelling northbound along Powderworks Road, representing emergency service vehicles travelling towards the bushfire. Performance is summarised by **Table 11**.

Table 11: Powderworks Road / Wilga Street Performance

INTERSECTION	DOS	AVERAGE DELAY (s)	QUEUE (m)
Powderworks Road / Wilga Street / East—West Spine Road	0.04	11.0	2.1

Results shown are for the movement with the highest delay.

The highest delay experienced on any movement at the roundabout under the traffic volume conditions tested was 11 seconds. Conventional level of service performance criteria would not apply for this bespoke bushfire assessment and so has been omitted from **Table 11**, but 11 seconds would represent LOS A. The longest queue recorded on any approach under this scenario was 7.6 metres.

Detailed SIDRA outputs of this assessment are provided as **Appendix F**.

7. Conclusions

In summary:

- PDC Consultants has been commissioned by Mirvac Homes (NSW) Pty Ltd and Truslan Group Pty Ltd to undertake a traffic impact assessment for a proposed residential subdivision of 343 low density residential lots and 193 high density apartments at the Wilga Wilson Precinct, Ingleside.
- The proposed residential lots gain access to the existing local road network via connections to Powderworks Road and Wilga Street, with the two key intersections to Powderworks Road assessed for capacity and found to perform satisfactorily during typical weekday AM and PM peak periods.
- Wider traffic impact assessment also finds that the broader road network would operate satisfactorily to a 2034 future year at least, with most intersection levels of service at A—C and one intersection during one peak experiencing LOS D, though this intersection is planned for upgrade works by 2029.
- The proposed internal road network has been designed in accordance with the relevant requirements of Council's Engineering Design Code and are considered satisfactory.
- Assessment of bushfire traffic impacts has estimated the number of vehicles which might be required to evacuate from the proposed precinct and surrounding areas and travel southeast bound along Powderworks Road in the event of a bushfire. Assessment of this number of vehicles against NSW SES mid-block criteria and intersection analysis finds the number of vehicles fall within typically accepted performance criteria.

It is therefore concluded that the PP is supportable on traffic planning grounds.



Appendix A

MONASH
COUNTRY CLUB

- LEGEND**
- Site Boundary
 - Mirvac's Land
 - Truslan's Land
 - Existing Building Footprint
 - Residential Lot - Detached Housing
 - Residential Lot - Front Loaded Terrace
 - Residential Lot - Apartment
 - Creek Line
 - Local Park
 - Buffer / Linear Open Space
 - Conservation Areas - Creek Corridor
 - Conservation Areas
 - Sensitive Vegetation
 - ✱ Indicative Basin Location

MIRBELIA PARADE

WILSON AVENUE

POWDERWORKS ROAD

WILGA STREET

ELANORA
COUNTRY CLUB

POWDERWORKS ROAD

WILGA STREET

AREA/OWNERSHIP	DW No.			
	MIRVAC	TRUSLAN	OTHER	TOTAL
 Detached Housing	39	16	78	133
 Terrace Housing	46	57 *	107 *	210 *
 Apartment	74	119	0	193
TOTAL	159	192	185	536

NOTE(1)*: This number includes both Terrace Housing and Manor Housing with each site allocated for Manor Housing accommodating 4 dwellings.
 NOTE (2) There is 1000 sqm of GBA Retail on Truslan's land (Apt Site C) equivalent to approx 5 Apt Units
 NOTE (3) The Dwelling Number in Other's land includes the Existing Senior Housing

ver.	date	comment	drawn	pm	co-ordinate information	level information	scale (A1 original size)	notes
A	09.04.2025	DRAFT	JDU	PJA	CO-ORDINATE SYSTEM: MGA56 GDA2020	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:1500 G 0 30 60 90 120 A3 1:3000	
project management civil engineering infrastructure superintendency social impact town planning surveying development feasibility visualisation urban design								



drawing title:

CONCEPT MASTERPLAN

location: INGLESIDE AND
ELANORA HEIGHTS, NSW

council: NORTHERN BEACHES COUNCIL

dwg ref: 300360-MP-012-V01

client:



central coast office ph: (02) 4305 4300
 hunter office ph: (02) 4978 5100
 sydney office ph: (02) 8046 7411

www.adwjohanson.com.au



Appendix B

Site: 101 [AM Mona Vale Rd & Powderworks Rd base (Site Folder: Base (2024))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 124 seconds (Site User-Given Phase Times)

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.

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
East: Powderworks Rd												
P1	Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95
North: Mona Vale Rd												

P3 Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95
West: Baha'l Temple Access Rd											
P2 Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95
All Pedestrians	3	3	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95

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

Site: 101 [PM Mona Vale Rd & Powderworks Rd base (Site Folder: Base (2024))]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 111 seconds (Site User-Given Phase Times)

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.

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
East: Powderworks Rd												
P1	Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98
North: Mona Vale Rd												

P3 Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98
West: Baha'l Temple Access Rd											
P2 Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98
All Pedestrians	3	3	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98

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

MOVEMENT SUMMARY

Site: 101 [AM Powderworks Rd & Ingleside Rd base (Site Folder: Base (2024))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (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
South: Powderworks Rd															
1	L2	All MCs	659	1.8	659	1.8	0.370	2.9	LOS A	0.0	0.0	0.00	0.40	0.00	33.8
3a	R1	All MCs	21	0.0	21	0.0	0.017	3.7	LOS A	0.1	0.5	0.42	0.48	0.42	38.5
Approach			680	1.7	680	1.7	0.370	2.9	NA	0.1	0.5	0.01	0.40	0.01	33.9
NorthEast: Ingleside Rd															
24a	L1	All MCs	28	7.4	28	7.4	0.065	5.2	LOS A	0.2	1.6	0.55	0.67	0.55	37.5
26a	R1	All MCs	12	0.0	12	0.0	0.065	15.4	LOS B	0.2	1.6	0.55	0.67	0.55	37.5
Approach			40	5.3	40	5.3	0.065	8.1	LOS A	0.2	1.6	0.55	0.67	0.55	37.5
West: Powderworks Rd															
10a	L1	All MCs	4	25.0	4	25.0	0.201	3.1	LOS A	0.0	0.0	0.00	0.41	0.00	33.7
12	R2	All MCs	363	4.9	363	4.9	0.201	2.9	LOS A	0.0	0.0	0.00	0.41	0.00	33.8
Approach			367	5.2	367	5.2	0.201	2.9	NA	0.0	0.0	0.00	0.41	0.00	33.8
All Vehicles			1087	3.0	1087	3.0	0.370	3.1	NA	0.2	1.6	0.03	0.41	0.03	34.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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.

MOVEMENT SUMMARY

Site: 101 [PM Powderworks Rd & Ingleside Rd base (Site Folder: Base (2024))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (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
South: Powderworks Rd															
1	L2	All MCs	432	3.4	432	3.4	0.246	2.8	LOS A	0.0	0.0	0.00	0.40	0.00	33.8
3a	R1	All MCs	15	0.0	15	0.0	0.017	5.2	LOS A	0.1	0.5	0.56	0.59	0.56	38.1
Approach			446	3.3	446	3.3	0.246	2.9	NA	0.1	0.5	0.02	0.41	0.02	33.9
NorthEast: Ingleside Rd															
24a	L1	All MCs	24	13.0	24	13.0	0.062	7.0	LOS A	0.2	1.5	0.61	0.78	0.61	37.1
26a	R1	All MCs	8	0.0	8	0.0	0.062	15.9	LOS B	0.2	1.5	0.61	0.78	0.61	37.1
Approach			33	9.7	33	9.7	0.062	9.3	LOS A	0.2	1.5	0.61	0.78	0.61	37.1
West: Powderworks Rd															
10a	L1	All MCs	6	16.7	6	16.7	0.343	3.1	LOS A	0.0	0.0	0.00	0.41	0.00	33.7
12	R2	All MCs	627	4.4	627	4.4	0.343	3.0	LOS A	0.0	0.0	0.00	0.41	0.00	33.8
Approach			634	4.5	634	4.5	0.343	3.0	NA	0.0	0.0	0.00	0.41	0.00	33.7
All Vehicles			1113	4.2	1113	4.2	0.343	3.1	NA	0.2	1.5	0.03	0.42	0.03	33.9

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.

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.

MOVEMENT SUMMARY

▼ Site: 101 [AM Powderworks Rd and Wilga St base (Site Folder: Base (2024))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (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
South: Powderworks Rd															
1	L2	All MCs	11	0.0	11	0.0	0.331	5.5	LOS A	0.1	0.7	0.00	0.01	0.00	53.0
2	T1	All MCs	647	3.7	647	3.7	0.331	0.0	LOS A	0.1	0.7	0.00	0.01	0.00	59.9
Approach			658	3.7	658	3.7	0.331	0.1	NA	0.1	0.7	0.00	0.01	0.00	59.8
North: Powderworks Rd															
8	T1	All MCs	385	4.4	385	4.4	0.349	0.2	LOS A	2.2	16.4	0.15	0.05	0.15	59.2
9	R2	All MCs	8	12.5	8	12.5	0.349	11.7	LOS A	2.2	16.4	0.15	0.05	0.15	51.8
Approach			394	4.5	394	4.5	0.349	0.5	NA	2.2	16.4	0.15	0.05	0.15	59.1
West: Wilga St															
10	L2	All MCs	18	0.0	18	0.0	0.062	6.5	LOS A	0.2	1.2	0.55	0.79	0.55	46.9
12	R2	All MCs	21	0.0	21	0.0	0.062	9.6	LOS A	0.2	1.2	0.55	0.79	0.55	46.8
Approach			39	0.0	39	0.0	0.062	8.2	LOS A	0.2	1.2	0.55	0.79	0.55	46.8
All Vehicles			1091	3.9	1091	3.9	0.349	0.5	NA	2.2	16.4	0.07	0.05	0.07	58.9

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.

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.

MOVEMENT SUMMARY

▼ Site: 101 [PM Powderworks Rd and Wilga St base (Site Folder: Base (2024))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (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
South: Powderworks Rd															
1	L2	All MCs	16	0.0	16	0.0	0.234	5.5	LOS A	0.1	0.9	0.01	0.02	0.01	52.9
2	T1	All MCs	431	7.8	431	7.8	0.234	0.0	LOS A	0.1	0.9	0.01	0.02	0.01	59.8
Approach			446	7.5	446	7.5	0.234	0.2	NA	0.1	0.9	0.01	0.02	0.01	59.5
North: Powderworks Rd															
8	T1	All MCs	644	4.4	644	4.4	0.576	0.4	LOS A	5.4	39.2	0.22	0.07	0.22	59.0
9	R2	All MCs	12	9.1	12	9.1	0.576	10.6	LOS A	5.4	39.2	0.22	0.07	0.22	51.8
Approach			656	4.5	656	4.5	0.576	0.5	NA	5.4	39.2	0.22	0.07	0.22	58.8
West: Wilga St															
10	L2	All MCs	15	7.1	15	7.1	0.072	6.0	LOS A	0.2	1.4	0.55	0.77	0.55	46.0
12	R2	All MCs	21	15.0	21	15.0	0.072	12.4	LOS A	0.2	1.4	0.55	0.77	0.55	45.3
Approach			36	11.8	36	11.8	0.072	9.7	LOS A	0.2	1.4	0.55	0.77	0.55	45.6
All Vehicles			1138	5.9	1138	5.9	0.576	0.7	NA	5.4	39.2	0.15	0.08	0.15	58.5

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.

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.

MOVEMENT SUMMARY

 **Site: 101 [AM Powderworks Rd and Kalang Rd base (Site Folder: Base (2024))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. Dist] veh m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Kalang Rd															
1	L2	All MCs	89	4.7	89	4.7	0.320	9.2	LOS A	2.0	14.5	0.71	0.72	0.71	45.5
3	R2	All MCs	101	7.3	101	7.3	0.320	11.6	LOS A	2.0	14.5	0.71	0.72	0.71	45.2
3u	U	All MCs	4	0.0	4	0.0	0.320	12.6	LOS A	2.0	14.5	0.71	0.72	0.71	42.6
Approach			195	5.9	195	5.9	0.320	10.5	LOS A	2.0	14.5	0.71	0.72	0.71	45.3
East: Powderworks Rd															
4	L2	All MCs	82	10.3	82	10.3	0.447	6.3	LOS A	3.9	28.2	0.45	0.50	0.45	48.2
5	T1	All MCs	428	1.0	428	1.0	0.447	5.8	LOS A	3.9	28.2	0.45	0.50	0.45	52.3
6u	U	All MCs	1	0.0	1	0.0	0.447	9.9	LOS A	3.9	28.2	0.45	0.50	0.45	51.6
Approach			512	2.5	512	2.5	0.447	5.9	LOS A	3.9	28.2	0.45	0.50	0.45	51.6
West: Powderworks Rd															
11	T1	All MCs	274	2.7	274	2.7	0.347	6.0	LOS A	2.9	20.6	0.47	0.53	0.47	51.8
12	R2	All MCs	89	1.2	89	1.2	0.347	8.7	LOS A	2.9	20.6	0.47	0.53	0.47	47.7
12u	U	All MCs	1	100.0	1	100.0	0.347	11.4	LOS A	2.9	20.6	0.47	0.53	0.47	49.3
Approach			364	2.6	364	2.6	0.347	6.7	LOS A	2.9	20.6	0.47	0.53	0.47	50.8
All Vehicles			1071	3.1	1071	3.1	0.447	7.0	LOS A	3.9	28.2	0.50	0.55	0.50	50.0

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.

Roundabout 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.

MOVEMENT SUMMARY

 **Site: 101 [PM Powderworks Rd and Kalang Rd base (Site Folder: Base (2024))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. Dist] veh m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Kalang Rd															
1	L2	All MCs	106	5.0	106	5.0	0.353	8.3	LOS A	2.3	16.8	0.69	0.69	0.69	46.0
3	R2	All MCs	129	4.1	129	4.1	0.353	10.5	LOS A	2.3	16.8	0.69	0.69	0.69	45.8
3u	U	All MCs	2	0.0	2	0.0	0.353	11.7	LOS A	2.3	16.8	0.69	0.69	0.69	43.0
Approach			238	4.4	238	4.4	0.353	9.5	LOS A	2.3	16.8	0.69	0.69	0.69	45.9
East: Powderworks Rd															
4	L2	All MCs	124	3.4	124	3.4	0.453	6.9	LOS A	3.9	28.2	0.57	0.54	0.57	47.9
5	T1	All MCs	333	2.8	333	2.8	0.453	6.5	LOS A	3.9	28.2	0.57	0.54	0.57	51.8
6u	U	All MCs	1	0.0	1	0.0	0.453	10.6	LOS A	3.9	28.2	0.57	0.54	0.57	51.2
Approach			458	3.0	458	3.0	0.453	6.6	LOS A	3.9	28.2	0.57	0.54	0.57	50.7
West: Powderworks Rd															
11	T1	All MCs	455	5.6	455	5.6	0.587	6.8	LOS A	6.3	46.1	0.67	0.55	0.67	51.2
12	R2	All MCs	146	2.9	146	2.9	0.587	9.5	LOS A	6.3	46.1	0.67	0.55	0.67	47.2
12u	U	All MCs	2	0.0	2	0.0	0.587	10.8	LOS A	6.3	46.1	0.67	0.55	0.67	50.6
Approach			603	4.9	603	4.9	0.587	7.5	LOS A	6.3	46.1	0.67	0.55	0.67	50.1
All Vehicles			1299	4.1	1299	4.1	0.587	7.5	LOS A	6.3	46.1	0.64	0.57	0.64	49.5

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.

Roundabout 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.

MOVEMENT SUMMARY

Site: 101 [AM Powderworks Rd & Wilson Av base (Site Folder: Base (2024))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (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
East: Powderworks Rd															
4a	L1	All MCs	4	0.0	4	0.0	0.342	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.9
6a	R1	All MCs	660	1.3	660	1.3	0.342	5.0	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
Approach			664	1.3	664	1.3	0.342	5.0	NA	0.0	0.0	0.00	0.57	0.00	53.2
NorthWest: Powderworks Rd															
27a	L1	All MCs	357	4.7	357	4.7	0.198	5.4	LOS A	0.1	0.4	0.02	0.59	0.02	52.7
29	R2	All MCs	4	0.0	4	0.0	0.198	8.5	LOS A	0.1	0.4	0.02	0.59	0.02	49.1
Approach			361	4.7	361	4.7	0.198	5.4	NA	0.1	0.4	0.02	0.59	0.02	52.7
SouthWest: Wilson Av															
30	L2	All MCs	5	0.0	5	0.0	0.019	7.9	LOS A	0.1	0.5	0.67	0.75	0.67	44.7
32a	R1	All MCs	2	50.0	2	50.0	0.019	22.5	LOS B	0.1	0.5	0.67	0.75	0.67	43.6
Approach			7	14.3	7	14.3	0.019	12.1	LOS A	0.1	0.5	0.67	0.75	0.67	44.4
All Vehicles			1033	2.5	1033	2.5	0.342	5.2	NA	0.1	0.5	0.01	0.58	0.01	52.9

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.

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.

MOVEMENT SUMMARY

Site: 101 [PM Powderworks Rd & Wilson Av base (Site Folder: Base (2024))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (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
East: Powderworks Rd															
4a	L1	All MCs	13	8.3	13	8.3	0.232	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
6a	R1	All MCs	431	2.9	431	2.9	0.232	4.9	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
Approach			443	3.1	443	3.1	0.232	5.0	NA	0.0	0.0	0.00	0.57	0.00	53.1
NorthWest: Powderworks Rd															
27a	L1	All MCs	622	3.4	622	3.4	0.337	5.3	LOS A	0.1	0.4	0.01	0.58	0.01	52.8
29	R2	All MCs	5	0.0	5	0.0	0.337	6.3	LOS A	0.1	0.4	0.01	0.58	0.01	49.1
Approach			627	3.4	627	3.4	0.337	5.3	NA	0.1	0.4	0.01	0.58	0.01	52.8
SouthWest: Wilson Av															
30	L2	All MCs	9	22.2	9	22.2	0.030	7.1	LOS A	0.1	0.8	0.59	0.69	0.59	45.2
32a	R1	All MCs	6	0.0	6	0.0	0.030	13.0	LOS A	0.1	0.8	0.59	0.69	0.59	46.2
Approach			16	13.3	16	13.3	0.030	9.4	LOS A	0.1	0.8	0.59	0.69	0.59	45.6
All Vehicles			1086	3.4	1086	3.4	0.337	5.2	NA	0.1	0.8	0.02	0.58	0.02	52.8

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.

MOVEMENT SUMMARY

 Site: 101 [AM Garden St & Powderworks Rd base (Site Folder: Base (2024))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 64 seconds (Site User-Given Phase Times)

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: Garden St															
1	L2	All MCs	362	2.3	362	2.3	0.327	9.0	LOS A	4.1	29.3	0.52	0.70	0.52	43.7
2	T1	All MCs	458	2.1	458	2.1	* 0.701	20.7	LOS B	13.0	92.4	0.92	0.83	0.96	39.0
Approach			820	2.2	820	2.2	0.701	15.6	LOS B	13.0	92.4	0.74	0.77	0.77	40.9
North: Garden St															
8	T1	All MCs	288	3.3	288	3.3	0.271	7.8	LOS A	4.6	33.5	0.55	0.47	0.55	45.2
9	R2	All MCs	175	3.6	175	3.6	* 0.481	23.4	LOS B	4.5	32.7	0.92	0.79	0.92	37.1
Approach			463	3.4	463	3.4	0.481	13.7	LOS A	4.6	33.5	0.69	0.59	0.69	41.8
West: Powderworks Rd															
10	L2	All MCs	177	2.4	177	2.4	0.271	24.2	LOS B	3.6	25.9	0.75	0.73	0.75	39.6
12	R2	All MCs	326	3.9	326	3.9	* 0.767	38.1	LOS C	10.5	75.8	0.97	0.92	1.14	34.4
Approach			503	3.3	503	3.3	0.767	33.2	LOS C	10.5	75.8	0.89	0.85	1.00	33.8
All Vehicles			1786	2.8	1786	2.8	0.767	20.0	LOS B	13.0	92.4	0.77	0.75	0.81	38.8

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
North: Garden St												
P2	Full	52	55	26.3	LOS C	0.1	0.1	0.91	0.91	180.2	200.0	1.11
West: Powderworks Rd												
P1	Full	18	19	26.3	LOS C	0.0	0.0	0.91	0.91	180.1	200.0	1.11
All Pedestrians		70	74	26.3	LOS C	0.1	0.1	0.91	0.91	180.2	200.0	1.11

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 101 [PM Garden St & Powderworks Rd base (Site Folder: Base (2024))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 79 seconds (Site User-Given Phase Times)

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: Garden St															
1	L2	All MCs	404	3.1	404	3.1	0.386	11.7	LOS A	6.7	48.4	0.57	0.72	0.57	42.4
2	T1	All MCs	366	2.3	366	2.3	* 0.729	30.5	LOS C	13.6	97.2	0.97	0.88	1.03	35.3
Approach			771	2.7	771	2.7	0.729	20.6	LOS B	13.6	97.2	0.76	0.80	0.79	38.7
North: Garden St															
8	T1	All MCs	406	1.3	406	1.3	0.406	12.4	LOS A	9.5	67.4	0.65	0.57	0.65	42.7
9	R2	All MCs	256	0.8	256	0.8	* 0.595	31.6	LOS C	8.2	58.0	0.94	0.91	0.94	34.3
Approach			662	1.1	662	1.1	0.595	19.8	LOS B	9.5	67.4	0.76	0.70	0.76	39.0
West: Powderworks Rd															
10	L2	All MCs	180	3.5	180	3.5	0.208	28.8	LOS C	3.5	25.0	0.61	0.70	0.61	41.0
12	R2	All MCs	416	6.1	416	6.1	* 0.908	64.0	LOS E	20.2	149.1	1.00	1.08	1.40	29.4
Approach			596	5.3	596	5.3	0.908	53.4	LOS D	20.2	149.1	0.88	0.96	1.16	28.5
All Vehicles			2028	3.0	2028	3.0	0.908	30.0	LOS C	20.2	149.1	0.80	0.81	0.89	35.1

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
North: Garden St												
P2	Full	16	17	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07
West: Powderworks Rd												
P1	Full	15	16	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07
All Pedestrians		31	33	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 101 [AM Garden St & Pittwater Rd Base (Site Folder: Base (2024))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 125 seconds (Site User-Given Phase Times)

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: Pittwater Rd															
1a	L1	All MCs	744	2.8	744	2.8	* 0.526	11.3	LOS A	14.3	102.3	0.47	1.32	0.47	49.7
2	T1	All MCs	1536	3.8	1536	3.8	0.503	11.2	LOS A	15.8	114.4	0.50	0.59	0.50	58.1
Approach			2280	3.5	2280	3.5	0.526	11.2	LOS A	15.8	114.4	0.49	0.83	0.49	54.2
North: Pittwater Rd															
8	T1	All MCs	1682	3.9	1682	3.9	* 0.689	11.6	LOS A	31.5	223.9	0.62	0.57	0.62	57.4
9b	R3	All MCs	84	5.0	84	5.0	0.638	19.2	LOS B	2.8	20.5	0.52	0.78	0.57	44.1
Approach			1766	4.0	1766	4.0	0.689	11.9	LOS A	31.5	223.9	0.62	0.58	0.62	56.4
NorthWest: Garden St															
27b	L3	All MCs	45	9.3	45	9.3	0.763	71.5	LOS F	22.3	160.6	1.00	0.97	1.07	24.8
29a	R1	All MCs	541	2.1	541	2.1	0.763	68.1	LOS E	22.3	160.6	1.00	0.93	1.07	27.5
Approach			586	2.7	586	2.7	0.763	68.3	LOS E	22.3	160.6	1.00	0.93	1.07	27.3
All Vehicles			4633	3.6	4633	3.6	0.763	18.7	LOS B	31.5	223.9	0.60	0.75	0.61	48.8

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
North: Pittwater Rd												
P2	Full	12	13	56.7	LOS E	0.0	0.0	0.95	0.95	210.5	200.0	0.95
NorthWest: Garden St												
P7	Full	16	17	56.7	LOS E	0.1	0.1	0.95	0.95	210.5	200.0	0.95
All Pedestrians		28	29	56.7	LOS E	0.1	0.1	0.95	0.95	210.5	200.0	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 101 [PM Garden St & Pittwater Rd Base (Site Folder: Base (2024))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 128 seconds (Site User-Given Phase Times)

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: Pittwater Rd															
1a	L1	All MCs	644	1.3	644	1.3	* 0.432	7.6	LOS A	7.2	50.8	0.26	0.68	0.26	50.7
2	T1	All MCs	1851	4.0	1851	4.0	* 0.832	6.9	LOS A	28.5	202.2	0.55	0.51	0.55	61.8
Approach			2495	3.3	2495	3.3	0.832	7.1	LOS A	28.5	202.2	0.47	0.55	0.47	58.5
North: Pittwater Rd															
8	T1	All MCs	1699	4.2	1699	4.2	0.447	12.4	LOS A	18.9	137.2	0.59	0.46	0.59	56.5
9b	R3	All MCs	95	5.6	95	5.6	* 0.618	80.8	LOS F	7.5	55.0	1.00	0.83	1.03	25.3
Approach			1794	4.3	1794	4.3	0.618	16.0	LOS B	18.9	137.2	0.61	0.48	0.61	53.0
NorthWest: Garden St															
27b	L3	All MCs	93	3.4	93	3.4	0.878	70.0	LOS E	24.7	178.0	1.00	1.08	1.20	24.8
29a	R1	All MCs	614	3.3	614	3.3	0.878	73.8	LOS F	24.7	178.0	1.00	1.03	1.20	26.5
Approach			706	3.3	706	3.3	0.878	73.3	LOS F	24.7	178.0	1.00	1.04	1.20	26.3
All Vehicles			4995	3.6	4995	3.6	0.878	19.6	LOS B	28.5	202.2	0.60	0.59	0.63	48.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
North: Pittwater Rd												
P2	Full	5	5	58.2	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94
NorthWest: Garden St												
P7	Full	1	1	58.1	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94
All Pedestrians		6	6	58.2	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.



Appendix C

7.1 Street Typology

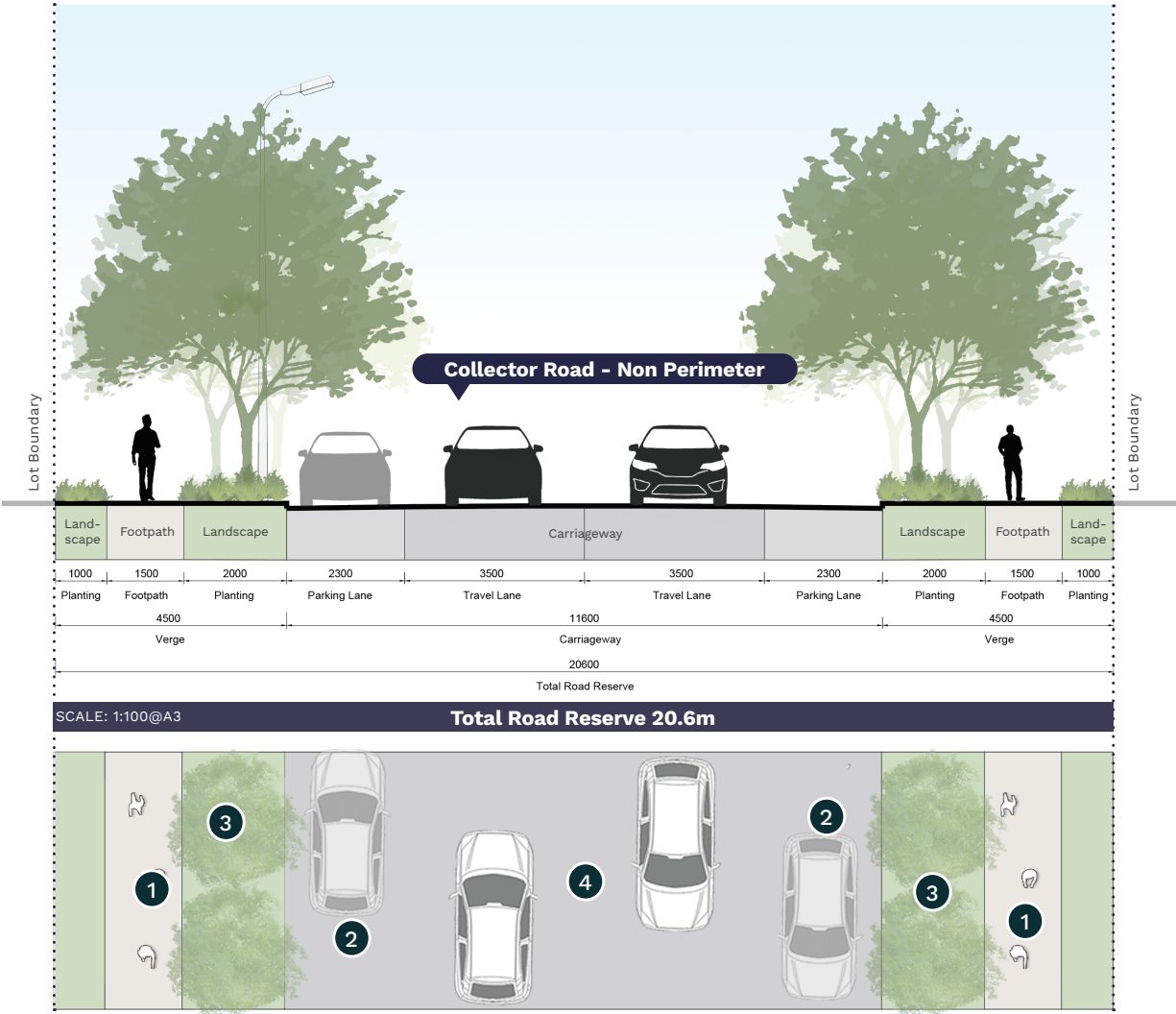
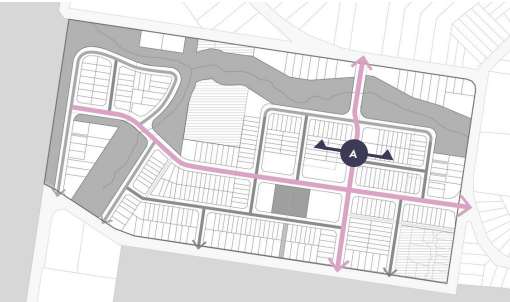
Collector Road

Role & Character

The streetscape character along this road is designed to create a distinctive sense of place and serve as an inviting gateway into the development. This approach not only establishes a welcoming entrance but also integrates seamlessly with the surrounding environment. The design carefully preserves and enhances the views toward the conservation corridor from Powderworks Road and Wilga Street, ensuring that the natural landscape remains a prominent and attractive feature in the overall visual experience of the area. The road reserve is also designed to address bushfire risks and meet evacuation requirements, ensuring safety in the face of potential emergencies.

Functional Requirements

- Gateway entrance from Powderworks Road
- Evacuation Route in case of an Emergency
- Avenue of trees which allow for view lines into the site
- Distinctive planting palette which contributes to a sense of place
- Variety of understorey plant species which improve flora and fauna biodiversity
- Clear wayfinding
- Connection to the creek and activated spaces
- Low maintenance and sustainable planting
- On-street parking provisions



Legend	Collector Road - Non-Perimeter
Total road reserve width	20.6m
Verge width	4.5m
Car parking	Both Sides of the street
Footpath	1.5m (both sides) pedestrian walkway
Lighting	Yes
RFS truck movement	OK

- LEGEND**
- Boundary
 - 1 Footpath
 - 2 On-street Car Parking
 - 3 Green Zone Planting
 - 4 Vehicle Carriageway

7.1 Street Typology

Local Road - Perimeter

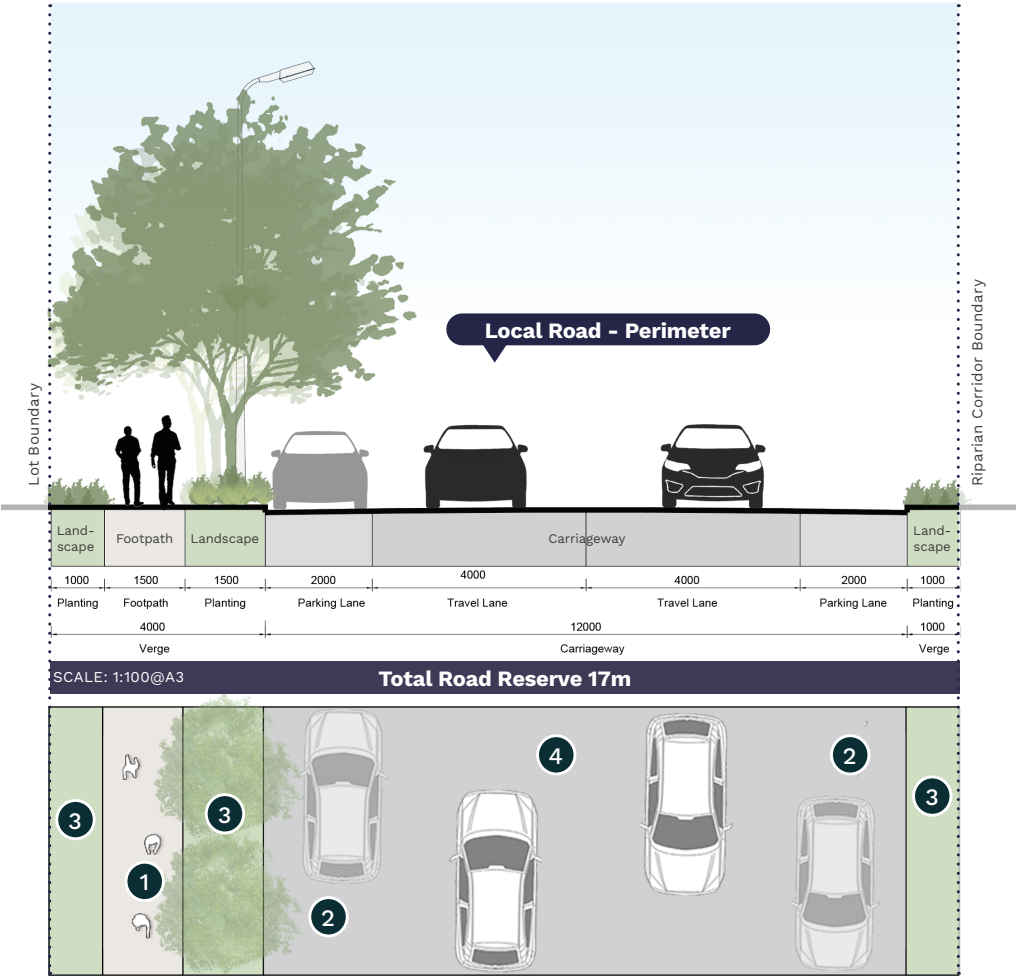
Role & character

Design of this road is a more intimate approach to the streetscape. The housing typologies and design responses to front fences and landscape treatments will create the sense of a quieter and safer residential zone. The street carriageway will be 12m, with provision of on-street parking.

On a human scale the use of staggered medium sized trees provides an informal approach to this streetscape character and contributes to a sense of movement in the landscape. Green placemaking will be guided through the use of a variety of plant species which create seasonal and visual interest.

Functional requirements

- Medium size street trees and understorey planting
- Seasonal and flowering species along kerb edge
- Consistent surface treatment and materiality selection
- No on street parking provided



Legend	Local Road - Perimeter
Total road reserve width	17m
Verge width	4m
Car parking	Both Sides of the street
Footpath	1.5m (one side) pedestrian walkway
Lighting	Yes
RFS truck movement	OK

- LEGEND**
- Boundary
 - 1 Footpath
 - 2 On-street Car Parking
 - 3 Green Zone Planting
 - 4 Vehicle Carriageway

7.1 Street Typology

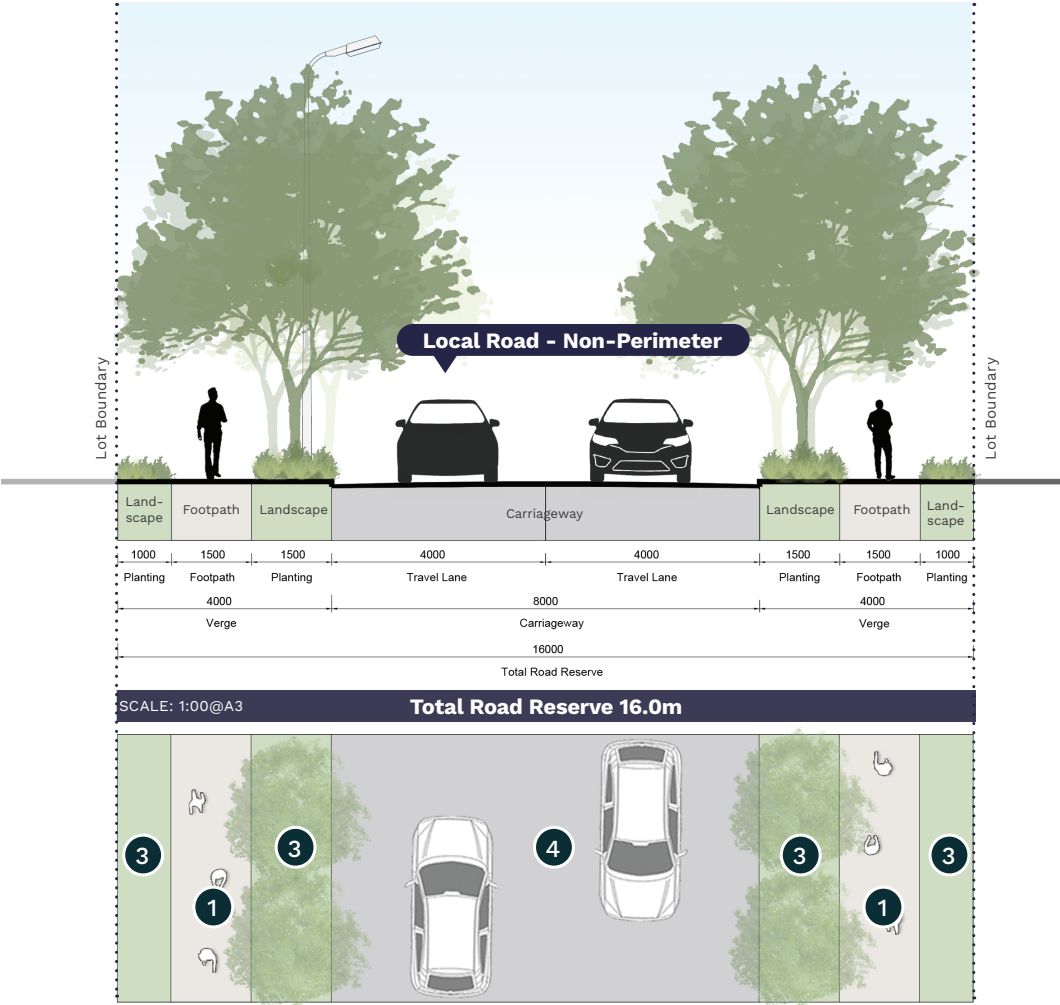
Local Road - Non-Perimeter

Role & character

Design of this road is a more intimate approach to the streetscape. The housing typologies and design responses to front fences and landscape treatments will create the sense of a quieter and safer residential zone. Vehicular access will be limited to an 8m carriageway, with the removal of on-street parking. A change in carriageway width will signal the need for vehicles to reduce their speed. On a human scale the use of staggered medium sized trees provides an informal approach to this streetscape character and contributes to a sense of movement in the landscape. Green placemaking will be guided through the use of a variety of plant species which create seasonal and visual interest.

Functional requirements

- Medium size street trees and understorey planting
- Seasonal and flowering species along kerb edge
- Consistent surface treatment and materiality selection
- No on street parking provided



Legend	Local Road - Non-Perimeter
Total road reserve width	16m
Verge width	4.0m on both sides
Car parking	None
Footpath	1.5m (both sides) pedestrian walkway
Lighting	Yes

- LEGEND**
- Boundary
 - 1 Footpath
 - 2 On-street Car Parking
 - 3 Green Zone Planting
 - 4 Vehicle Carriageway





Appendix D

MOVEMENT SUMMARY

 **Site: 101 [AM Mona Vale Rd & Powderworks Rd Base + 12 Years (Site Folder: Base + 12 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 124 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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]				km/h
			veh/h	%	veh/h	%	v/c	sec			m				
South: Mona Vale Rd															
1	L2	All MCs	5	0.0	5	0.0	* 0.440	10.5	LOS A	7.0	52.8	0.26	0.23	0.26	53.4
2	T1	All MCs	1002	9.2	1002	9.2	0.440	4.0	LOS A	7.0	52.8	0.25	0.22	0.25	65.0
3	R2	All MCs	325	6.2	325	6.2	* 0.662	17.3	LOS B	10.4	76.9	0.67	0.83	0.67	48.0
Approach			1332	8.4	1332	8.4	0.662	7.2	LOS A	10.4	76.9	0.35	0.37	0.35	59.8
East: Powderworks Rd															
4	L2	All MCs	677	1.5	677	1.5	0.642	63.3	LOS E	17.9	126.8	0.92	0.84	0.92	34.8
5	T1	All MCs	2	0.0	2	0.0	0.501	84.9	LOS F	2.3	16.8	1.00	0.74	1.02	26.1
6	R2	All MCs	34	3.7	34	3.7	* 0.501	94.9	LOS F	2.3	16.8	1.00	0.74	1.02	27.5
Approach			713	1.6	713	1.6	0.642	64.9	LOS E	17.9	126.8	0.92	0.84	0.92	31.1
North: Mona Vale Rd															
7	L2	All MCs	23	0.0	23	0.0	0.657	26.2	LOS B	27.3	202.0	0.74	0.68	0.74	46.6
8	T1	All MCs	1311	6.9	1311	6.9	* 0.657	32.0	LOS C	27.3	202.0	0.74	0.68	0.74	51.1
9	R2	All MCs	1	0.0	1	0.0	0.002	19.6	LOS B	0.0	0.1	0.33	0.61	0.33	49.2
Approach			1335	6.8	1335	6.8	0.657	31.9	LOS C	27.3	202.0	0.74	0.68	0.74	47.9
West: Baha'l Temple Access Rd															
10	L2	All MCs	3	0.0	3	0.0	0.011	47.8	LOS D	0.2	1.1	0.87	0.62	0.87	31.1
11	T1	All MCs	1	0.0	1	0.0	0.054	65.6	LOS E	0.2	1.5	0.95	0.62	0.95	28.0
12	R2	All MCs	3	0.0	3	0.0	0.054	80.7	LOS F	0.2	1.5	0.99	0.62	0.99	26.9
Approach			6	0.0	6	0.0	0.054	64.5	LOS E	0.2	1.5	0.93	0.62	0.93	28.7
All Vehicles			3387	6.3	3387	6.3	0.662	29.2	LOS C	27.3	202.0	0.63	0.59	0.63	46.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [Ped Dist]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
East: Powderworks Rd												
P1	Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95

North: Mona Vale Rd												
P3	Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95
West: Baha'I Temple Access Rd												
P2	Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95
All	Pedestrians	3	4	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95

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

MOVEMENT SUMMARY

 **Site: 101 [PM Mona Vale Rd & Powderworks Rd Base + 12 Years (Site Folder: Base + 12 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 111 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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: Mona Vale Rd															
1	L2	All MCs	11	11.1	11	11.1	* 0.651	16.4	LOS B	17.5	130.4	0.55	0.49	0.55	49.3
2	T1	All MCs	1302	7.2	1302	7.2	0.651	13.4	LOS A	17.6	131.0	0.54	0.49	0.54	59.2
3	R2	All MCs	662	4.2	662	4.2	* 0.921	46.7	LOS D	29.2	212.1	0.92	1.06	1.11	37.4
Approach			1975	6.2	1975	6.2	0.921	24.6	LOS B	29.2	212.1	0.67	0.68	0.73	46.3
East: Powderworks Rd															
4	L2	All MCs	409	3.4	409	3.4	0.281	29.4	LOS C	7.2	51.8	0.70	0.76	0.70	41.1
5	T1	All MCs	3	0.0	3	0.0	* 0.671	64.8	LOS E	2.8	21.6	1.00	0.81	1.17	27.0
6	R2	All MCs	44	14.3	44	14.3	0.671	69.2	LOS E	2.8	21.6	1.00	0.81	1.17	27.7
Approach			455	4.4	455	4.4	0.671	33.4	LOS C	7.2	51.8	0.73	0.77	0.74	39.1
North: Mona Vale Rd															
7	L2	All MCs	25	0.0	25	0.0	0.756	35.1	LOS C	27.3	201.8	0.90	0.81	0.90	42.3
8	T1	All MCs	1184	6.7	1184	6.7	* 0.756	35.4	LOS C	27.3	201.8	0.90	0.81	0.90	46.0
9	R2	All MCs	4	0.0	4	0.0	0.006	26.0	LOS B	0.0	0.3	0.47	0.64	0.47	47.4
Approach			1212	6.5	1212	6.5	0.756	35.4	LOS C	27.3	201.8	0.90	0.81	0.90	42.5
West: Baha'l Temple Access Rd															
10	L2	All MCs	8	16.7	8	16.7	0.042	41.3	LOS C	0.4	3.4	0.88	0.66	0.88	32.0
11	T1	All MCs	3	0.0	3	0.0	0.210	73.3	LOS F	0.7	5.2	0.93	0.67	0.93	29.7
12	R2	All MCs	12	0.0	12	0.0	0.210	67.4	LOS E	0.7	5.2	1.00	0.68	1.00	27.8
Approach			22	5.9	22	5.9	0.210	58.9	LOS E	0.7	5.2	0.95	0.67	0.95	29.4
All Vehicles			3664	6.1	3664	6.1	0.921	29.5	LOS C	29.2	212.1	0.75	0.73	0.79	43.8

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
East: Powderworks Rd												
P1	Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98

North: Mona Vale Rd												
P3	Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98
West: Baha'l Temple Access Rd												
P2	Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98
All	Pedestrians	3	4	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98

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

MOVEMENT SUMMARY

Site: 101 [AM Powderworks Rd & Ingleside Rd Base + 12 Years (Site Folder: Base + 12 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 12 years

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: Powderworks Rd															
1	L2	All MCs	817	1.8	817	1.8	0.459	3.0	LOS A	0.0	0.0	0.00	0.40	0.00	33.7
3a	R1	All MCs	26	0.0	26	0.0	0.022	3.9	LOS A	0.1	0.6	0.45	0.51	0.45	38.5
Approach			843	1.7	843	1.7	0.459	3.0	NA	0.1	0.6	0.01	0.40	0.01	33.9
NorthEast: Ingleside Rd															
24a	L1	All MCs	34	7.4	34	7.4	0.103	5.5	LOS A	0.3	2.5	0.64	0.74	0.64	36.6
26a	R1	All MCs	14	0.0	14	0.0	0.103	22.7	LOS B	0.3	2.5	0.64	0.74	0.64	36.6
Approach			47	5.3	47	5.3	0.103	10.5	LOS A	0.3	2.5	0.64	0.74	0.64	36.6
West: Powderworks Rd															
10a	L1	All MCs	5	25.0	5	25.0	0.227	3.1	LOS A	0.0	0.0	0.00	0.41	0.00	33.7
12	R2	All MCs	411	4.9	411	4.9	0.227	2.9	LOS A	0.0	0.0	0.00	0.41	0.00	33.8
Approach			416	5.2	416	5.2	0.227	2.9	NA	0.0	0.0	0.00	0.41	0.00	33.8
All Vehicles			1306	2.9	1306	2.9	0.459	3.2	NA	0.3	2.5	0.03	0.42	0.03	33.9

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.

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.

MOVEMENT SUMMARY

Site: 101 [PM Powderworks Rd & Ingleside Rd Base + 12 Years (Site Folder: Base + 12 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 12 years

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: Powderworks Rd															
1	L2	All MCs	546	3.4	546	3.4	0.311	2.9	LOS A	0.0	0.0	0.00	0.40	0.00	33.8
3a	R1	All MCs	19	0.0	19	0.0	0.025	6.2	LOS A	0.1	0.7	0.61	0.67	0.61	37.6
Approach			564	3.3	564	3.3	0.311	3.0	NA	0.1	0.7	0.02	0.41	0.02	33.9
NorthEast: Ingleside Rd															
24a	L1	All MCs	30	13.0	30	13.0	0.106	8.2	LOS A	0.3	2.5	0.72	0.86	0.72	36.0
26a	R1	All MCs	10	0.0	10	0.0	0.106	24.2	LOS B	0.3	2.5	0.72	0.86	0.72	36.0
Approach			40	9.7	40	9.7	0.106	12.3	LOS A	0.3	2.5	0.72	0.86	0.72	36.0
West: Powderworks Rd															
10a	L1	All MCs	8	16.7	8	16.7	0.409	3.1	LOS A	0.0	0.0	0.00	0.41	0.00	33.6
12	R2	All MCs	748	4.4	748	4.4	0.409	3.0	LOS A	0.0	0.0	0.00	0.41	0.00	33.7
Approach			755	4.5	755	4.5	0.409	3.0	NA	0.0	0.0	0.00	0.41	0.00	33.7
All Vehicles			1360	4.1	1360	4.1	0.409	3.3	NA	0.3	2.5	0.03	0.42	0.03	33.9

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.

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.

MOVEMENT SUMMARY

▼ Site: 101 [AM Powderworks Rd and Wilga St Base + 12 Years
(Site Folder: Base + 12 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 12 years

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
South: Powderworks Rd															
1	L2	All MCs	13	0.0	13	0.0	0.411	5.5	LOS A	0.1	0.9	0.00	0.01	0.00	53.0
2	T1	All MCs	803	3.7	803	3.7	0.411	0.0	LOS A	0.1	0.9	0.00	0.01	0.00	59.9
Approach			816	3.7	816	3.7	0.411	0.1	NA	0.1	0.9	0.00	0.01	0.00	59.8
North: Powderworks Rd															
8	T1	All MCs	436	4.4	436	4.4	0.401	0.3	LOS A	2.8	20.1	0.18	0.06	0.18	59.1
9	R2	All MCs	10	12.5	10	12.5	0.401	15.8	LOS B	2.8	20.1	0.18	0.06	0.18	51.7
Approach			446	4.5	446	4.5	0.401	0.6	NA	2.8	20.1	0.18	0.06	0.18	58.9
West: Wilga St															
10	L2	All MCs	21	0.0	21	0.0	0.096	7.4	LOS A	0.3	1.8	0.67	0.85	0.67	45.8
12	R2	All MCs	25	0.0	25	0.0	0.096	12.3	LOS A	0.3	1.8	0.67	0.85	0.67	45.7
Approach			46	0.0	46	0.0	0.096	10.1	LOS A	0.3	1.8	0.67	0.85	0.67	45.7
All Vehicles			1307	3.8	1307	3.8	0.411	0.6	NA	2.8	20.1	0.09	0.06	0.09	58.9

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.

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.

MOVEMENT SUMMARY

▼ Site: 101 [PM Powderworks Rd and Wilga St Base + 12 Years
(Site Folder: Base + 12 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 12 years

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				
South: Powderworks Rd															
1	L2	All MCs	20	0.0	20	0.0	0.296	5.5	LOS A	0.2	1.3	0.01	0.02	0.01	52.9
2	T1	All MCs	544	7.8	544	7.8	0.296	0.0	LOS A	0.2	1.3	0.01	0.02	0.01	59.8
Approach			564	7.5	564	7.5	0.296	0.2	NA	0.2	1.3	0.01	0.02	0.01	59.5
North: Powderworks Rd															
8	T1	All MCs	768	4.4	768	4.4	0.694	0.6	LOS A	8.4	61.4	0.32	0.12	0.32	58.5
9	R2	All MCs	14	9.1	14	9.1	0.694	15.2	LOS B	8.4	61.4	0.32	0.12	0.32	51.4
Approach			782	4.5	782	4.5	0.694	0.8	NA	8.4	61.4	0.32	0.12	0.32	58.4
West: Wilga St															
10	L2	All MCs	18	7.1	18	7.1	0.128	6.5	LOS A	0.3	2.4	0.68	0.85	0.68	44.2
12	R2	All MCs	26	15.0	26	15.0	0.128	17.6	LOS B	0.3	2.4	0.68	0.85	0.68	43.6
Approach			44	11.8	44	11.8	0.128	13.0	LOS A	0.3	2.4	0.68	0.85	0.68	43.8
All Vehicles			1390	6.0	1390	6.0	0.694	1.0	NA	8.4	61.4	0.21	0.10	0.21	58.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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.

MOVEMENT SUMMARY

 **Site: 101 [AM Powderworks Rd and Kalang Rd Base + 12 Years (Site Folder: Base + 12 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 12 years

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: Kalang Rd															
1	L2	All MCs	89	4.7	89	4.7	0.368	10.6	LOS A	2.3	17.0	0.79	0.77	0.79	44.6
3	R2	All MCs	101	7.3	101	7.3	0.368	13.0	LOS A	2.3	17.0	0.79	0.77	0.79	44.4
3u	U	All MCs	4	0.0	4	0.0	0.368	14.0	LOS A	2.3	17.0	0.79	0.77	0.79	41.9
Approach			195	5.9	195	5.9	0.368	12.0	LOS A	2.3	17.0	0.79	0.77	0.79	44.4
East: Powderworks Rd															
4	L2	All MCs	102	10.3	102	10.3	0.559	6.6	LOS A	5.7	40.8	0.55	0.51	0.55	47.9
5	T1	All MCs	531	1.0	531	1.0	0.559	6.1	LOS A	5.7	40.8	0.55	0.51	0.55	52.0
6u	U	All MCs	1	0.0	1	0.0	0.559	10.2	LOS A	5.7	40.8	0.55	0.51	0.55	51.3
Approach			634	2.5	634	2.5	0.559	6.2	LOS A	5.7	40.8	0.55	0.51	0.55	51.3
West: Powderworks Rd															
11	T1	All MCs	310	2.7	310	2.7	0.391	6.0	LOS A	3.4	24.6	0.49	0.53	0.49	51.8
12	R2	All MCs	101	1.2	101	1.2	0.391	8.7	LOS A	3.4	24.6	0.49	0.53	0.49	47.7
12u	U	All MCs	1	100.0	1	100.0	0.391	11.5	LOS A	3.4	24.6	0.49	0.53	0.49	49.2
Approach			412	2.6	412	2.6	0.391	6.7	LOS A	3.4	24.6	0.49	0.53	0.49	50.7
All Vehicles			1241	3.1	1241	3.1	0.559	7.3	LOS A	5.7	40.8	0.57	0.56	0.57	49.9

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.

Roundabout 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.

MOVEMENT SUMMARY

 **Site: 101 [PM Powderworks Rd and Kalang Rd Base + 12 Years (Site Folder: Base + 12 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 12 years

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: Kalang Rd															
1	L2	All MCs	106	5.0	106	5.0	0.401	9.5	LOS A	2.7	19.4	0.77	0.73	0.77	45.3
3	R2	All MCs	129	4.1	129	4.1	0.401	11.7	LOS A	2.7	19.4	0.77	0.73	0.77	45.1
3u	U	All MCs	2	0.0	2	0.0	0.401	12.8	LOS A	2.7	19.4	0.77	0.73	0.77	42.4
Approach			238	4.4	238	4.4	0.401	10.7	LOS A	2.7	19.4	0.77	0.73	0.77	45.2
East: Powderworks Rd															
4	L2	All MCs	157	3.4	157	3.4	0.595	7.6	LOS A	6.0	43.3	0.73	0.58	0.73	47.5
5	T1	All MCs	420	2.8	420	2.8	0.595	7.2	LOS A	6.0	43.3	0.73	0.58	0.73	51.4
6u	U	All MCs	1	0.0	1	0.0	0.595	11.3	LOS A	6.0	43.3	0.73	0.58	0.73	50.8
Approach			579	3.0	579	3.0	0.595	7.3	LOS A	6.0	43.3	0.73	0.58	0.73	50.3
West: Powderworks Rd															
11	T1	All MCs	542	5.6	542	5.6	0.693	7.2	LOS A	8.9	64.7	0.79	0.56	0.79	50.8
12	R2	All MCs	174	2.9	174	2.9	0.693	9.8	LOS A	8.9	64.7	0.79	0.56	0.79	46.9
12u	U	All MCs	3	0.0	3	0.0	0.693	11.2	LOS A	8.9	64.7	0.79	0.56	0.79	50.3
Approach			719	4.9	719	4.9	0.693	7.8	LOS A	8.9	64.7	0.79	0.56	0.79	49.8
All Vehicles			1536	4.1	1536	4.1	0.693	8.1	LOS A	8.9	64.7	0.76	0.59	0.76	49.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout 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.

MOVEMENT SUMMARY

Site: 101 [AM Powderworks Rd & Wilson Av Base + 12 Years
(Site Folder: Base + 12 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 12 years

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]				km/h
East: Powderworks Rd															
4a	L1	All MCs	5	0.0	5	0.0	0.424	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
6a	R1	All MCs	818	1.3	818	1.3	0.424	5.0	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
Approach			824	1.3	824	1.3	0.424	5.0	NA	0.0	0.0	0.00	0.57	0.00	53.1
NorthWest: Powderworks Rd															
27a	L1	All MCs	404	4.7	404	4.7	0.226	5.4	LOS A	0.1	0.6	0.03	0.59	0.03	52.7
29	R2	All MCs	5	0.0	5	0.0	0.226	10.6	LOS A	0.1	0.6	0.03	0.59	0.03	49.0
Approach			409	4.7	409	4.7	0.226	5.5	NA	0.1	0.6	0.03	0.59	0.03	52.6
SouthWest: Wilson Av															
30	L2	All MCs	6	0.0	6	0.0	0.037	9.7	LOS A	0.1	0.8	0.78	0.90	0.78	41.7
32a	R1	All MCs	2	50.0	2	50.0	0.037	38.3	LOS C	0.1	0.8	0.78	0.90	0.78	40.8
Approach			9	14.3	9	14.3	0.037	17.9	LOS B	0.1	0.8	0.78	0.90	0.78	41.4
All Vehicles			1241	2.5	1241	2.5	0.424	5.3	NA	0.1	0.8	0.01	0.58	0.01	52.9

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.

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.

MOVEMENT SUMMARY

Site: 101 [PM Powderworks Rd & Wilson Av Base + 12 Years
(Site Folder: Base + 12 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 12 years

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
East: Powderworks Rd															
4a	L1	All MCs	16	8.3	16	8.3	0.293	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.7
6a	R1	All MCs	544	2.9	544	2.9	0.293	5.0	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
Approach			560	3.1	560	3.1	0.293	5.0	NA	0.0	0.0	0.00	0.57	0.00	53.1
NorthWest: Powderworks Rd															
27a	L1	All MCs	749	3.4	749	3.4	0.406	5.3	LOS A	0.1	0.7	0.01	0.59	0.02	52.8
29	R2	All MCs	6	0.0	6	0.0	0.406	7.1	LOS A	0.1	0.7	0.01	0.59	0.02	49.1
Approach			755	3.4	755	3.4	0.406	5.3	NA	0.1	0.7	0.01	0.59	0.02	52.8
SouthWest: Wilson Av															
30	L2	All MCs	12	22.2	12	22.2	0.053	8.2	LOS A	0.2	1.3	0.68	0.80	0.68	43.4
32a	R1	All MCs	8	0.0	8	0.0	0.053	19.4	LOS B	0.2	1.3	0.68	0.80	0.68	44.4
Approach			20	13.3	20	13.3	0.053	12.7	LOS A	0.2	1.3	0.68	0.80	0.68	43.8
All Vehicles			1335	3.4	1335	3.4	0.406	5.3	NA	0.2	1.3	0.02	0.58	0.02	52.8

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.

MOVEMENT SUMMARY

 Site: 101 [AM Garden St & Powderworks Rd Base + 12 Years
(Site Folder: Base + 12 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 64 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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: Garden St															
1	L2	All MCs	375	2.3	375	2.3	0.338	9.1	LOS A	4.3	30.6	0.52	0.70	0.52	43.7
2	T1	All MCs	474	2.1	474	2.1	* 0.726	21.5	LOS B	13.8	98.3	0.93	0.86	0.99	38.6
Approach			850	2.2	850	2.2	0.726	16.0	LOS B	13.8	98.3	0.75	0.79	0.79	40.7
North: Garden St															
8	T1	All MCs	292	3.3	292	3.3	0.275	7.8	LOS A	4.7	33.9	0.55	0.47	0.55	45.2
9	R2	All MCs	177	3.6	177	3.6	* 0.497	23.7	LOS B	4.6	33.5	0.93	0.80	0.93	37.0
Approach			469	3.4	469	3.4	0.497	13.8	LOS A	4.7	33.9	0.69	0.59	0.69	41.7
West: Powderworks Rd															
10	L2	All MCs	194	2.4	194	2.4	0.297	26.2	LOS B	4.0	28.8	0.75	0.74	0.75	39.5
12	R2	All MCs	358	3.9	358	3.9	* 0.871	47.7	LOS D	13.4	97.0	1.00	1.05	1.39	32.1
Approach			551	3.3	551	3.3	0.871	40.1	LOS C	13.4	97.0	0.91	0.94	1.16	31.7
All Vehicles			1870	2.8	1870	2.8	0.871	22.6	LOS B	13.8	98.3	0.78	0.78	0.87	37.8

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Garden St												
P2	Full	52	68	26.4	LOS C	0.1	0.1	0.91	0.91	180.2	200.0	1.11
West: Powderworks Rd												
P1	Full	18	23	26.3	LOS C	0.0	0.0	0.91	0.91	180.2	200.0	1.11
All Pedestrians		70	91	26.3	LOS C	0.1	0.1	0.91	0.91	180.2	200.0	1.11

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: Z:\PDC Consultants\3. Jobs\8. 801-1,000\0928\Modelling\0928-mv05.sip9

MOVEMENT SUMMARY

 Site: 101 [PM Garden St & Powderworks Rd Base + 12 Years
(Site Folder: Base + 12 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 79 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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: Garden St															
1	L2	All MCs	419	3.1	419	3.1	0.383	10.9	LOS A	6.5	46.6	0.55	0.71	0.55	42.9
2	T1	All MCs	380	2.3	380	2.3	* 0.755	31.4	LOS C	14.4	103.0	0.98	0.91	1.07	35.0
Approach			798	2.7	798	2.7	0.755	20.6	LOS B	14.4	103.0	0.75	0.80	0.79	38.7
North: Garden St															
8	T1	All MCs	411	1.3	411	1.3	0.432	13.8	LOS A	10.2	72.1	0.69	0.60	0.69	42.0
9	R2	All MCs	259	0.8	259	0.8	* 0.684	35.6	LOS C	8.8	62.3	0.98	0.97	1.03	33.1
Approach			670	1.1	670	1.1	0.684	22.2	LOS B	10.2	72.1	0.80	0.74	0.82	38.0
West: Powderworks Rd															
10	L2	All MCs	197	3.5	197	3.5	0.228	29.4	LOS C	3.9	28.0	0.61	0.71	0.61	40.9
12	R2	All MCs	456	6.1	456	6.1	* 0.935	70.1	LOS E	23.9	176.0	1.00	1.13	1.48	28.1
Approach			653	5.3	653	5.3	0.935	57.8	LOS E	23.9	176.0	0.88	1.00	1.22	27.5
All Vehicles			2121	3.0	2121	3.0	0.935	32.6	LOS C	23.9	176.0	0.81	0.85	0.93	34.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Garden St												
P2	Full	16	21	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07
West: Powderworks Rd												
P1	Full	15	20	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07
All Pedestrians		31	40	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 **Site: 101 [AM Garden St & Pittwater Rd Base + 12 Years (Site Folder: Base + 12 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 125 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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: Pittwater Rd																
1a	L1	All MCs	762	2.8	762	2.8	* 0.538	11.5	LOS A	14.9	107.0	0.47	1.32	0.47	49.7	
2	T1	All MCs	1573	3.8	1573	3.8	0.518	11.3	LOS A	16.6	119.8	0.50	0.60	0.50	58.0	
Approach			2335	3.5	2335	3.5	0.538	11.4	LOS A	16.6	119.8	0.49	0.83	0.49	54.0	
North: Pittwater Rd																
8	T1	All MCs	1662	3.9	1662	3.9	* 0.633	10.4	LOS A	26.9	190.9	0.57	0.52	0.57	58.3	
9b	R3	All MCs	83	5.0	83	5.0	0.643	19.2	LOS B	2.8	20.7	0.53	0.78	0.59	43.9	
Approach			1745	4.0	1745	4.0	0.643	10.8	LOS A	26.9	190.9	0.57	0.54	0.57	57.4	
NorthWest: Garden St																
27b	L3	All MCs	46	9.3	46	9.3	0.773	72.0	LOS F	22.7	163.2	1.00	0.98	1.08	24.7	
29a	R1	All MCs	548	2.1	548	2.1	0.773	68.6	LOS E	22.7	163.2	1.00	0.93	1.08	27.4	
Approach			593	2.7	593	2.7	0.773	68.8	LOS E	22.7	163.2	1.00	0.94	1.08	27.2	
All Vehicles			4673	3.6	4673	3.6	0.773	18.5	LOS B	26.9	190.9	0.59	0.73	0.60	48.9	

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Pittwater Rd												
P2	Full	12	16	56.7	LOS E	0.1	0.1	0.95	0.95	210.5	200.0	0.95
NorthWest: Garden St												
P7	Full	16	21	56.7	LOS E	0.1	0.1	0.95	0.95	210.5	200.0	0.95
All Pedestrians		28	37	56.7	LOS E	0.1	0.1	0.95	0.95	210.5	200.0	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 101 [PM Garden St & Pittwater Rd Base + 12 Years (Site Folder: Base + 12 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 128 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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: Pittwater Rd																
1a	L1	All MCs	636	1.3	636	1.3	* 0.427	7.6	LOS A	7.0	49.9	0.25	0.68	0.25	50.7	
2	T1	All MCs	1828	4.0	1828	4.0	* 0.822	6.7	LOS A	27.3	193.6	0.53	0.49	0.53	62.0	
Approach			2465	3.3	2465	3.3	0.822	6.9	LOS A	27.3	193.6	0.46	0.54	0.46	58.6	
North: Pittwater Rd																
8	T1	All MCs	1699	4.2	1699	4.2	0.447	12.4	LOS A	18.9	137.2	0.59	0.46	0.59	56.5	
9b	R3	All MCs	95	5.6	95	5.6	* 0.614	80.5	LOS F	7.6	55.7	1.00	0.81	1.02	25.4	
Approach			1794	4.3	1794	4.3	0.614	16.0	LOS B	18.9	137.2	0.61	0.48	0.61	53.0	
NorthWest: Garden St																
27b	L3	All MCs	99	3.4	99	3.4	0.941	82.8	LOS F	29.1	209.2	1.00	1.18	1.34	22.8	
29a	R1	All MCs	658	3.3	658	3.3	0.941	86.6	LOS F	29.1	209.2	1.00	1.13	1.33	24.3	
Approach			757	3.3	757	3.3	0.941	86.1	LOS F	29.1	209.2	1.00	1.14	1.34	24.1	
All Vehicles			5016	3.6	5016	3.6	0.941	22.1	LOS B	29.1	209.2	0.60	0.61	0.65	46.7	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Pittwater Rd												
P2	Full	5	7	58.2	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94
NorthWest: Garden St												
P7	Full	1	1	58.1	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94
All Pedestrians		6	8	58.2	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 101 [AM Mona Vale Rd & Powderworks Rd base - DEV
(Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 124 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 2 years

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: Mona Vale Rd															
1	L2	All MCs	4	0.0	4	0.0	* 0.391	10.4	LOS A	5.8	44.0	0.24	0.22	0.24	53.5
2	T1	All MCs	891	9.2	891	9.2	0.391	3.8	LOS A	5.8	44.0	0.23	0.21	0.23	65.2
3	R2	All MCs	327	5.4	327	5.4	* 0.612	11.5	LOS A	7.7	56.2	0.49	0.75	0.49	52.0
Approach			1223	8.1	1223	8.1	0.612	5.9	LOS A	7.7	56.2	0.30	0.35	0.30	61.0
East: Powderworks Rd															
4	L2	All MCs	647	1.3	647	1.3	0.603	55.8	LOS D	17.0	120.6	0.90	0.83	0.90	35.0
5	T1	All MCs	2	0.0	2	0.0	0.470	83.2	LOS F	2.2	15.7	1.00	0.73	1.00	26.1
6	R2	All MCs	32	3.2	32	3.2	* 0.470	93.2	LOS F	2.2	15.7	1.00	0.73	1.00	27.5
Approach			681	1.4	681	1.4	0.603	57.6	LOS E	17.0	120.6	0.91	0.83	0.91	31.6
North: Mona Vale Rd															
7	L2	All MCs	21	0.0	21	0.0	0.558	24.6	LOS B	21.3	157.3	0.68	0.62	0.68	47.5
8	T1	All MCs	1113	6.9	1113	6.9	* 0.558	23.2	LOS B	21.3	157.3	0.68	0.62	0.68	52.3
9	R2	All MCs	1	0.0	1	0.0	0.002	16.4	LOS B	0.0	0.1	0.31	0.61	0.31	49.4
Approach			1136	6.8	1136	6.8	0.558	23.2	LOS B	21.3	157.3	0.68	0.62	0.68	49.9
West: Baha'l Temple Access Rd															
10	L2	All MCs	2	0.0	2	0.0	0.009	47.7	LOS D	0.1	0.9	0.87	0.61	0.87	31.1
11	T1	All MCs	1	0.0	1	0.0	0.045	65.4	LOS E	0.2	1.2	0.95	0.61	0.95	28.0
12	R2	All MCs	2	0.0	2	0.0	0.045	74.8	LOS F	0.2	1.2	0.99	0.61	0.99	26.9
Approach			5	0.0	5	0.0	0.045	62.1	LOS E	0.2	1.2	0.93	0.61	0.93	28.7
All Vehicles			3045	6.1	3045	6.1	0.612	24.0	LOS B	21.3	157.3	0.58	0.56	0.58	47.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
East: Powderworks Rd												
P1	Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95

North: Mona Vale Rd												
P3	Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95
West: Baha'I Temple Access Rd												
P2	Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95
All	Pedestrians	3	3	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95

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

MOVEMENT SUMMARY

 Site: 101 [PM Mona Vale Rd & Powderworks Rd base - DEV
(Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 111 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 2 years

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]				km/h
			veh/h	%	veh/h	%	v/c	sec			m				
South: Mona Vale Rd															
1	L2	All MCs	9	11.1	9	11.1	* 0.477	11.2	LOS A	8.0	59.2	0.30	0.27	0.30	53.0
2	T1	All MCs	1077	7.2	1077	7.2	0.477	9.0	LOS A	8.0	59.2	0.30	0.27	0.30	64.6
3	R2	All MCs	600	3.8	600	3.8	* 0.936	50.0	LOS D	29.4	212.8	0.86	1.05	1.11	36.7
Approach			1686	6.0	1686	6.0	0.936	23.6	LOS B	29.4	212.8	0.50	0.54	0.59	46.8
East: Powderworks Rd															
4	L2	All MCs	414	2.8	414	2.8	0.363	38.6	LOS C	8.6	61.6	0.80	0.79	0.80	37.8
5	T1	All MCs	2	0.0	2	0.0	* 0.652	67.9	LOS E	2.8	21.3	1.00	0.80	1.15	27.1
6	R2	All MCs	45	11.6	45	11.6	0.652	72.3	LOS F	2.8	21.3	1.00	0.80	1.15	27.8
Approach			461	3.6	461	3.6	0.652	42.0	LOS C	8.6	61.6	0.82	0.79	0.84	35.8
North: Mona Vale Rd															
7	L2	All MCs	24	0.0	24	0.0	0.567	25.6	LOS B	19.4	143.3	0.71	0.65	0.71	47.3
8	T1	All MCs	1065	6.7	1065	6.7	* 0.567	21.9	LOS B	19.4	143.3	0.71	0.64	0.71	52.0
9	R2	All MCs	3	0.0	3	0.0	0.006	15.5	LOS B	0.0	0.2	0.35	0.63	0.35	49.2
Approach			1093	6.5	1093	6.5	0.567	22.0	LOS B	19.4	143.3	0.71	0.64	0.71	50.0
West: Baha'l Temple Access Rd															
10	L2	All MCs	6	16.7	6	16.7	0.031	43.2	LOS D	0.3	2.6	0.87	0.65	0.87	32.3
11	T1	All MCs	2	0.0	2	0.0	0.157	64.8	LOS E	0.6	4.2	0.94	0.66	0.94	29.5
12	R2	All MCs	9	0.0	9	0.0	0.157	66.1	LOS E	0.6	4.2	1.00	0.67	1.00	26.3
Approach			18	5.9	18	5.9	0.157	57.9	LOS E	0.6	4.2	0.94	0.66	0.94	28.5
All Vehicles			3258	5.8	3258	5.8	0.936	25.8	LOS B	29.4	212.8	0.62	0.61	0.67	45.6

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [Ped Dist]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
East: Powderworks Rd												
P1	Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98

North: Mona Vale Rd												
P3	Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98
West: Baha'l Temple Access Rd												
P2	Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98
All	Pedestrians	3	3	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98

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

MOVEMENT SUMMARY

Site: 101 [AM Powderworks Rd & Ingleside Rd base - DEV
(Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 2 years

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: Powderworks Rd															
1	L2	All MCs	727	1.6	727	1.6	0.407	2.9	LOS A	0.0	0.0	0.00	0.40	0.00	33.8
3a	R1	All MCs	23	0.0	23	0.0	0.019	3.9	LOS A	0.1	0.6	0.45	0.50	0.45	38.5
Approach			750	1.5	750	1.5	0.407	3.0	NA	0.1	0.6	0.01	0.40	0.01	33.9
NorthEast: Ingleside Rd															
24a	L1	All MCs	28	7.4	28	7.4	0.074	5.4	LOS A	0.2	1.8	0.59	0.71	0.59	37.1
26a	R1	All MCs	11	0.0	11	0.0	0.074	18.5	LOS B	0.2	1.8	0.59	0.71	0.59	37.1
Approach			39	5.3	39	5.3	0.074	9.2	LOS A	0.2	1.8	0.59	0.71	0.59	37.1
West: Powderworks Rd															
10a	L1	All MCs	4	25.0	4	25.0	0.222	3.1	LOS A	0.0	0.0	0.00	0.41	0.00	33.7
12	R2	All MCs	405	4.4	405	4.4	0.222	2.9	LOS A	0.0	0.0	0.00	0.41	0.00	33.8
Approach			409	4.6	409	4.6	0.222	2.9	NA	0.0	0.0	0.00	0.41	0.00	33.8
All Vehicles			1198	2.7	1198	2.7	0.407	3.1	NA	0.2	1.8	0.03	0.41	0.03	33.9

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.

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.

MOVEMENT SUMMARY

Site: 101 [PM Powderworks Rd & Ingleside Rd base - DEV
(Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 2 years

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
South: Powderworks Rd															
1	L2	All MCs	544	2.8	544	2.8	0.309	2.9	LOS A	0.0	0.0	0.00	0.40	0.00	33.8
3a	R1	All MCs	19	0.0	19	0.0	0.022	5.5	LOS A	0.1	0.6	0.57	0.62	0.57	37.9
Approach			563	2.7	563	2.7	0.309	2.9	NA	0.1	0.6	0.02	0.41	0.02	33.9
NorthEast: Ingleside Rd															
24a	L1	All MCs	24	13.0	24	13.0	0.077	7.3	LOS A	0.2	1.9	0.67	0.84	0.67	36.5
26a	R1	All MCs	9	0.0	9	0.0	0.077	20.2	LOS B	0.2	1.9	0.67	0.84	0.67	36.5
Approach			33	9.4	33	9.4	0.077	11.0	LOS A	0.2	1.9	0.67	0.84	0.67	36.5
West: Powderworks Rd															
10a	L1	All MCs	6	16.7	6	16.7	0.364	3.1	LOS A	0.0	0.0	0.00	0.41	0.00	33.7
12	R2	All MCs	667	4.0	667	4.0	0.364	3.0	LOS A	0.0	0.0	0.00	0.41	0.00	33.7
Approach			673	4.2	673	4.2	0.364	3.0	NA	0.0	0.0	0.00	0.41	0.00	33.7
All Vehicles			1269	3.7	1269	3.7	0.364	3.2	NA	0.2	1.9	0.03	0.42	0.03	33.9

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.

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.

MOVEMENT SUMMARY

 **Site: 101 [AM Powderworks Rd and Kalang Rd base - DEV (Site Folder: Development (2026))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 2 years

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: Kalang Rd															
1	L2	All MCs	100	4.2	100	4.2	0.356	9.8	LOS A	2.2	16.5	0.75	0.74	0.75	45.1
3	R2	All MCs	101	7.3	101	7.3	0.356	12.2	LOS A	2.2	16.5	0.75	0.74	0.75	44.9
3u	U	All MCs	4	0.0	4	0.0	0.356	13.2	LOS A	2.2	16.5	0.75	0.74	0.75	42.3
Approach			205	5.6	205	5.6	0.356	11.0	LOS A	2.2	16.5	0.75	0.74	0.75	45.0
East: Powderworks Rd															
4	L2	All MCs	80	10.3	80	10.3	0.498	6.6	LOS A	4.6	33.0	0.52	0.52	0.52	48.0
5	T1	All MCs	468	0.9	468	0.9	0.498	6.1	LOS A	4.6	33.0	0.52	0.52	0.52	52.0
6u	U	All MCs	1	0.0	1	0.0	0.498	10.2	LOS A	4.6	33.0	0.52	0.52	0.52	51.4
Approach			550	2.3	550	2.3	0.498	6.2	LOS A	4.6	33.0	0.52	0.52	0.52	51.4
West: Powderworks Rd															
11	T1	All MCs	338	2.2	338	2.2	0.421	6.1	LOS A	3.8	27.3	0.51	0.53	0.51	51.7
12	R2	All MCs	111	0.9	111	0.9	0.421	8.8	LOS A	3.8	27.3	0.51	0.53	0.51	47.6
12u	U	All MCs	1	100.0	1	100.0	0.421	11.6	LOS A	3.8	27.3	0.51	0.53	0.51	49.2
Approach			450	2.1	450	2.1	0.421	6.7	LOS A	3.8	27.3	0.51	0.53	0.51	50.7
All Vehicles			1205	2.8	1205	2.8	0.498	7.2	LOS A	4.6	33.0	0.56	0.56	0.56	49.9

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.

Roundabout 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.

MOVEMENT SUMMARY

 **Site: 101 [PM Powderworks Rd and Kalang Rd base - DEV (Site Folder: Development (2026))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 2 years

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: Kalang Rd															
1	L2	All MCs	133	4.0	133	4.0	0.434	9.7	LOS A	3.0	22.0	0.78	0.74	0.80	45.2
3	R2	All MCs	129	4.1	129	4.1	0.434	12.0	LOS A	3.0	22.0	0.78	0.74	0.80	45.0
3u	U	All MCs	2	0.0	2	0.0	0.434	13.1	LOS A	3.0	22.0	0.78	0.74	0.80	42.4
Approach			264	4.0	264	4.0	0.434	10.9	LOS A	3.0	22.0	0.78	0.74	0.80	45.1
East: Powderworks Rd															
4	L2	All MCs	123	3.4	123	3.4	0.538	7.2	LOS A	5.1	36.6	0.66	0.56	0.66	47.7
5	T1	All MCs	411	2.3	411	2.3	0.538	6.9	LOS A	5.1	36.6	0.66	0.56	0.66	51.6
6u	U	All MCs	1	0.0	1	0.0	0.538	10.9	LOS A	5.1	36.6	0.66	0.56	0.66	51.0
Approach			535	2.5	535	2.5	0.538	7.0	LOS A	5.1	36.6	0.66	0.56	0.66	50.6
West: Powderworks Rd															
11	T1	All MCs	501	5.0	501	5.0	0.643	7.0	LOS A	7.6	55.2	0.73	0.55	0.73	51.0
12	R2	All MCs	161	2.6	161	2.6	0.643	9.6	LOS A	7.6	55.2	0.73	0.55	0.73	47.0
12u	U	All MCs	2	0.0	2	0.0	0.643	11.0	LOS A	7.6	55.2	0.73	0.55	0.73	50.5
Approach			664	4.4	664	4.4	0.643	7.6	LOS A	7.6	55.2	0.73	0.55	0.73	50.0
All Vehicles			1464	3.6	1464	3.6	0.643	8.0	LOS A	7.6	55.2	0.71	0.59	0.72	49.3

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.

Roundabout 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.

MOVEMENT SUMMARY

Site: 101 [AM Powderworks Rd & Wilson Av base - DEV (Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 2 years

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
East: Powderworks Rd															
4a	L1	All MCs	8	0.0	8	0.0	0.380	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
6a	R1	All MCs	730	1.1	730	1.1	0.380	5.0	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
Approach			738	1.1	738	1.1	0.380	5.0	NA	0.0	0.0	0.00	0.57	0.00	53.2
NorthWest: Powderworks Rd															
27a	L1	All MCs	390	4.3	390	4.3	0.221	5.5	LOS A	0.1	0.9	0.04	0.60	0.04	52.6
29	R2	All MCs	8	0.0	8	0.0	0.221	9.7	LOS A	0.1	0.9	0.04	0.60	0.04	49.0
Approach			398	4.2	398	4.2	0.221	5.5	NA	0.1	0.9	0.04	0.60	0.04	52.5
SouthWest: Wilson Av															
30	L2	All MCs	15	0.0	15	0.0	0.052	8.8	LOS A	0.2	1.2	0.69	0.84	0.69	44.7
32a	R1	All MCs	6	16.5	6	16.5	0.052	19.7	LOS B	0.2	1.2	0.69	0.84	0.69	44.3
Approach			21	5.0	21	5.0	0.052	12.0	LOS A	0.2	1.2	0.69	0.84	0.69	44.6
All Vehicles			1157	2.2	1157	2.2	0.380	5.3	NA	0.2	1.2	0.03	0.58	0.03	52.8

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.

MOVEMENT SUMMARY

Site: 101 [PM Powderworks Rd & Wilson Av base - DEV (Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 2 years

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
East: Powderworks Rd															
4a	L1	All MCs	22	4.8	22	4.8	0.279	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
6a	R1	All MCs	512	2.5	512	2.5	0.279	5.0	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
Approach			534	2.6	534	2.6	0.279	5.0	NA	0.0	0.0	0.00	0.57	0.00	53.1
NorthWest: Powderworks Rd															
27a	L1	All MCs	663	3.1	663	3.1	0.362	5.3	LOS A	0.1	0.8	0.02	0.59	0.02	52.8
29	R2	All MCs	9	0.0	9	0.0	0.362	7.8	LOS A	0.1	0.8	0.02	0.59	0.02	49.1
Approach			672	3.1	672	3.1	0.362	5.4	NA	0.1	0.8	0.02	0.59	0.02	52.7
SouthWest: Wilson Av															
30	L2	All MCs	16	13.3	16	13.3	0.058	7.5	LOS A	0.2	1.4	0.64	0.77	0.64	44.8
32a	R1	All MCs	10	0.0	10	0.0	0.058	15.9	LOS B	0.2	1.4	0.64	0.77	0.64	45.4
Approach			26	8.0	26	8.0	0.058	10.9	LOS A	0.2	1.4	0.64	0.77	0.64	45.0
All Vehicles			1233	3.0	1233	3.0	0.362	5.3	NA	0.2	1.4	0.03	0.58	0.03	52.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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.

MOVEMENT SUMMARY

 **Site: 101v [AM Powderworks Rd & Wilga St base - Roundabout - DEV (Site Folder: Development (2026))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 2 years

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: Wilga St															
1	L2	All MCs	1	0.0	1	0.0	0.136	10.4	LOS A	0.7	5.2	0.71	0.77	0.71	48.2
2	T1	All MCs	36	0.0	36	0.0	0.136	10.6	LOS A	0.7	5.2	0.71	0.77	0.71	48.5
3b	R3	All MCs	42	0.0	42	0.0	0.136	14.7	LOS B	0.7	5.2	0.71	0.77	0.71	47.9
Approach			78	0.0	78	0.0	0.136	12.7	LOS A	0.7	5.2	0.71	0.77	0.71	48.2
SouthEast: Powderworks Rd															
21b	L3	All MCs	21	0.0	21	0.0	0.511	5.3	LOS A	4.5	32.1	0.26	0.57	0.26	51.1
21a	L1	All MCs	29	0.0	29	0.0	0.511	4.6	LOS A	4.5	32.1	0.26	0.57	0.26	51.7
23a	R1	All MCs	656	3.6	656	3.6	0.511	7.5	LOS A	4.5	32.1	0.26	0.57	0.26	50.9
Approach			707	3.4	707	3.4	0.511	7.4	LOS A	4.5	32.1	0.26	0.57	0.26	50.9
North: Powderworks Rd															
7a	L1	All MCs	394	4.2	394	4.2	0.337	5.0	LOS A	2.3	16.7	0.33	0.49	0.33	53.0
8	T1	All MCs	17	6.2	17	6.2	0.337	5.4	LOS A	2.3	16.7	0.33	0.49	0.33	52.9
9	R2	All MCs	23	0.0	23	0.0	0.337	8.6	LOS A	2.3	16.7	0.33	0.49	0.33	52.4
Approach			434	4.1	434	4.1	0.337	5.2	LOS A	2.3	16.7	0.33	0.49	0.33	53.0
West: Proposed Rd															
10	L2	All MCs	47	0.0	47	0.0	0.187	11.0	LOS A	1.0	7.2	0.73	0.77	0.73	48.3
12a	R1	All MCs	56	0.0	56	0.0	0.187	13.6	LOS A	1.0	7.2	0.73	0.77	0.73	48.0
12	R2	All MCs	1	0.0	1	0.0	0.187	14.4	LOS A	1.0	7.2	0.73	0.77	0.73	48.0
Approach			104	0.0	104	0.0	0.187	12.4	LOS A	1.0	7.2	0.73	0.77	0.73	48.1
All Vehicles			1323	3.1	1323	3.1	0.511	7.4	LOS A	4.5	32.1	0.35	0.57	0.35	51.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout 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.

MOVEMENT SUMMARY

 **Site: 101v [PM Powderworks Rd & Wilga St base - Roundabout - DEV (Site Folder: Development (2026))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 2 years

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: Wilga St															
1	L2	All MCs	1	0.0	1	0.0	0.106	8.7	LOS A	0.5	4.0	0.64	0.73	0.64	49.0
2	T1	All MCs	27	3.8	27	3.8	0.106	9.1	LOS A	0.5	4.0	0.64	0.73	0.64	49.2
3b	R3	All MCs	39	8.1	39	8.1	0.106	13.4	LOS A	0.5	4.0	0.64	0.73	0.64	48.4
Approach			67	6.2	67	6.2	0.106	11.6	LOS A	0.5	4.0	0.64	0.73	0.64	48.8
SouthEast: Powderworks Rd															
21b	L3	All MCs	31	0.0	31	0.0	0.425	5.3	LOS A	3.3	24.0	0.28	0.56	0.28	51.2
21a	L1	All MCs	42	0.0	42	0.0	0.425	4.7	LOS A	3.3	24.0	0.28	0.56	0.28	51.8
23a	R1	All MCs	477	7.0	477	7.0	0.425	7.7	LOS A	3.3	24.0	0.28	0.56	0.28	50.8
Approach			550	6.1	550	6.1	0.425	7.3	LOS A	3.3	24.0	0.28	0.56	0.28	50.9
North: Powderworks Rd															
7a	L1	All MCs	640	4.4	640	4.4	0.515	5.0	LOS A	4.4	31.7	0.38	0.48	0.38	52.9
8	T1	All MCs	23	4.5	23	4.5	0.515	5.4	LOS A	4.4	31.7	0.38	0.48	0.38	52.9
9	R2	All MCs	31	0.0	31	0.0	0.515	8.6	LOS A	4.4	31.7	0.38	0.48	0.38	52.3
Approach			694	4.2	694	4.2	0.515	5.2	LOS A	4.4	31.7	0.38	0.48	0.38	52.9
West: Proposed Rd															
10	L2	All MCs	33	0.0	33	0.0	0.121	8.7	LOS A	0.6	4.4	0.63	0.72	0.63	49.7
12a	R1	All MCs	46	0.0	46	0.0	0.121	11.4	LOS A	0.6	4.4	0.63	0.72	0.63	49.4
12	R2	All MCs	1	0.0	1	0.0	0.121	12.2	LOS A	0.6	4.4	0.63	0.72	0.63	49.4
Approach			80	0.0	80	0.0	0.121	10.3	LOS A	0.6	4.4	0.63	0.72	0.63	49.5
All Vehicles			1391	4.8	1391	4.8	0.515	6.6	LOS A	4.4	31.7	0.37	0.54	0.37	51.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout 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.

MOVEMENT SUMMARY

Site: 101 [AM Powderworks Rd & New Proposed Internal Rd - DEV (Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 2 years

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: New Proposed Internal Rd															
1	L2	All MCs	18	0.0	18	0.0	0.079	9.1	LOS A	0.2	1.7	0.68	0.87	0.68	48.4
3	R2	All MCs	18	0.0	18	0.0	0.079	14.6	LOS B	0.2	1.7	0.68	0.87	0.68	48.2
Approach			36	0.0	36	0.0	0.079	11.9	LOS A	0.2	1.7	0.68	0.87	0.68	48.3
East: Powderworks Rd															
4	L2	All MCs	13	0.0	13	0.0	0.383	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	57.2
5	T1	All MCs	727	1.6	727	1.6	0.383	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
Approach			739	1.5	739	1.5	0.383	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.6
West: Powderworks Rd															
11	T1	All MCs	383	4.6	383	4.6	0.219	0.3	LOS A	0.2	1.4	0.06	0.08	0.06	59.4
12	R2	All MCs	13	0.0	13	0.0	0.219	9.7	LOS A	0.2	1.4	0.06	0.08	0.06	56.6
Approach			396	4.5	396	4.5	0.219	0.6	NA	0.2	1.4	0.06	0.08	0.06	59.3
All Vehicles			1171	2.5	1171	2.5	0.383	0.7	NA	0.2	1.7	0.04	0.06	0.04	59.1

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.

MOVEMENT SUMMARY

Site: 101 [PM Powderworks Rd & New Proposed Internal Rd - DEV (Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 2 years

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: New Proposed Internal Rd															
1	L2	All MCs	14	0.0	14	0.0	0.059	7.6	LOS A	0.2	1.3	0.63	0.81	0.63	48.7
3	R2	All MCs	14	0.0	14	0.0	0.059	15.5	LOS B	0.2	1.3	0.63	0.81	0.63	48.4
Approach			27	0.0	27	0.0	0.059	11.5	LOS A	0.2	1.3	0.63	0.81	0.63	48.5
East: Powderworks Rd															
4	L2	All MCs	18	0.0	18	0.0	0.280	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	57.2
5	T1	All MCs	517	2.9	517	2.9	0.280	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach			535	2.8	535	2.8	0.280	0.3	NA	0.0	0.0	0.00	0.02	0.00	59.6
West: Powderworks Rd															
11	T1	All MCs	656	3.2	656	3.2	0.361	0.1	LOS A	0.2	1.6	0.04	0.05	0.04	59.6
12	R2	All MCs	18	0.0	18	0.0	0.361	8.3	LOS A	0.2	1.6	0.04	0.05	0.04	56.9
Approach			674	3.1	674	3.1	0.361	0.4	NA	0.2	1.6	0.04	0.05	0.04	59.6
All Vehicles			1236	2.9	1236	2.9	0.361	0.6	NA	0.2	1.6	0.04	0.06	0.04	59.3

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.

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.

MOVEMENT SUMMARY

 Site: 101 [AM Garden St & Powderworks Rd base - DEV (Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 64 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 2 years

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: Garden St															
1	L2	All MCs	391	2.1	391	2.1	0.351	9.0	LOS A	4.6	32.7	0.51	0.70	0.51	43.7
2	T1	All MCs	453	2.1	453	2.1	* 0.694	20.5	LOS B	12.7	90.8	0.92	0.82	0.95	39.0
Approach			844	2.1	844	2.1	0.694	15.2	LOS B	12.7	90.8	0.73	0.76	0.75	41.1
North: Garden St															
8	T1	All MCs	287	3.3	287	3.3	0.270	7.8	LOS A	4.6	33.3	0.55	0.47	0.55	45.2
9	R2	All MCs	190	3.3	190	3.3	* 0.522	23.7	LOS B	5.0	36.0	0.93	0.80	0.93	37.0
Approach			477	3.3	477	3.3	0.522	14.1	LOS A	5.0	36.0	0.70	0.60	0.70	41.6
West: Powderworks Rd															
10	L2	All MCs	196	2.1	196	2.1	0.297	26.4	LOS B	4.1	29.1	0.74	0.74	0.74	39.5
12	R2	All MCs	364	3.4	364	3.4	* 0.887	49.9	LOS D	14.1	101.5	1.00	1.07	1.43	31.5
Approach			560	2.9	560	2.9	0.887	41.7	LOS C	14.1	101.5	0.91	0.96	1.19	31.3
All Vehicles			1882	2.7	1882	2.7	0.887	22.8	LOS B	14.1	101.5	0.78	0.78	0.87	37.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Garden St												
P2	Full	52	57	26.3	LOS C	0.1	0.1	0.91	0.91	180.2	200.0	1.11
West: Powderworks Rd												
P1	Full	18	20	26.3	LOS C	0.0	0.0	0.91	0.91	180.1	200.0	1.11
All Pedestrians		70	77	26.3	LOS C	0.1	0.1	0.91	0.91	180.2	200.0	1.11

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 101 [PM Garden St & Powderworks Rd base - DEV (Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 79 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 2 years

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: Garden St															
1	L2	All MCs	452	2.8	452	2.8	0.410	11.0	LOS A	7.2	51.8	0.55	0.72	0.55	42.8
2	T1	All MCs	365	2.3	365	2.3	* 0.726	30.4	LOS C	13.5	96.5	0.97	0.87	1.03	35.3
Approach			817	2.6	817	2.6	0.726	19.7	LOS B	13.5	96.5	0.73	0.79	0.76	39.1
North: Garden St															
8	T1	All MCs	401	1.3	401	1.3	0.422	13.7	LOS A	9.9	70.0	0.68	0.60	0.68	42.1
9	R2	All MCs	284	0.7	284	0.7	* 0.743	37.4	LOS C	10.0	70.5	0.99	1.02	1.10	32.5
Approach			686	1.1	686	1.1	0.743	23.5	LOS B	10.0	70.5	0.81	0.77	0.86	37.5
West: Powderworks Rd															
10	L2	All MCs	197	3.2	197	3.2	0.226	29.3	LOS C	3.9	27.9	0.60	0.70	0.60	40.9
12	R2	All MCs	455	5.6	455	5.6	* 0.929	68.4	LOS E	23.4	171.9	1.00	1.12	1.46	28.5
Approach			652	4.9	652	4.9	0.929	56.6	LOS E	23.4	171.9	0.88	0.99	1.20	27.8
All Vehicles			2155	2.8	2155	2.8	0.929	32.1	LOS C	23.4	171.9	0.80	0.84	0.93	34.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Garden St												
P2	Full	16	18	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07
West: Powderworks Rd												
P1	Full	15	16	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07
All Pedestrians		31	34	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 **Site: 101 [AM Garden St & Pittwater Rd Base - DEV (Site Folder: Development (2026))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 125 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 2 years

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: Pittwater Rd																
1a	L1	All MCs	777	2.7	777	2.7	* 0.546	11.6	LOS A	16.5	118.4	0.49	1.31	0.49	49.5	
2	T1	All MCs	1542	3.8	1542	3.8	0.506	11.2	LOS A	16.0	115.6	0.50	0.59	0.50	58.1	
Approach			2319	3.4	2319	3.4	0.546	11.3	LOS A	16.5	118.4	0.50	0.83	0.50	54.0	
North: Pittwater Rd																
8	T1	All MCs	1679	3.9	1679	3.9	* 0.691	11.6	LOS A	31.7	225.3	0.63	0.58	0.63	57.4	
9b	R3	All MCs	87	4.8	87	4.8	0.670	20.8	LOS B	3.2	23.7	0.57	0.80	0.64	43.3	
Approach			1766	4.0	1766	4.0	0.691	12.0	LOS A	31.7	225.3	0.62	0.59	0.63	56.3	
NorthWest: Garden St																
27b	L3	All MCs	51	8.3	51	8.3	0.822	54.1	LOS D	19.7	141.4	1.00	0.94	1.13	28.9	
29a	R1	All MCs	582	2.0	582	2.0	0.822	60.3	LOS E	20.1	143.4	1.00	0.94	1.13	29.1	
Approach			633	2.5	633	2.5	0.822	59.8	LOS E	20.1	143.4	1.00	0.94	1.13	29.1	
All Vehicles			4717	3.5	4717	3.5	0.822	18.1	LOS B	31.7	225.3	0.61	0.75	0.63	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.

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Pittwater Rd												
P2	Full	12	13	56.7	LOS E	0.0	0.0	0.95	0.95	210.5	200.0	0.95
NorthWest: Garden St												
P7	Full	16	18	56.7	LOS E	0.1	0.1	0.95	0.95	210.5	200.0	0.95
All Pedestrians		28	31	56.7	LOS E	0.1	0.1	0.95	0.95	210.5	200.0	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 101 [PM Garden St & Pittwater Rd Base - DEV (Site Folder: Development (2026))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 128 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 2 years

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: Pittwater Rd																
1a	L1	All MCs	686	1.2	686	1.2	* 0.460	7.7	LOS A	8.4	59.1	0.27	0.68	0.27	50.6	
2	T1	All MCs	1847	4.0	1847	4.0	* 0.830	6.8	LOS A	28.2	200.3	0.54	0.50	0.54	61.9	
Approach			2533	3.2	2533	3.2	0.830	7.0	LOS A	28.2	200.3	0.47	0.55	0.47	58.4	
North: Pittwater Rd																
8	T1	All MCs	1699	4.2	1699	4.2	0.447	12.4	LOS A	18.9	137.2	0.59	0.46	0.59	56.5	
9b	R3	All MCs	101	5.2	101	5.2	* 0.659	84.9	LOS F	8.0	58.3	1.00	0.86	1.05	24.6	
Approach			1800	4.3	1800	4.3	0.659	16.5	LOS B	18.9	137.2	0.61	0.48	0.62	52.6	
NorthWest: Garden St																
27b	L3	All MCs	99	3.2	99	3.2	0.933	68.4	LOS E	27.9	200.9	1.00	1.08	1.32	25.5	
29a	R1	All MCs	653	3.1	653	3.1	0.933	77.7	LOS F	28.3	203.3	1.00	1.08	1.31	25.7	
Approach			752	3.1	752	3.1	0.933	76.5	LOS F	28.3	203.3	1.00	1.08	1.31	25.7	
All Vehicles			5085	3.6	5085	3.6	0.933	20.6	LOS B	28.3	203.3	0.60	0.61	0.65	47.6	

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Pittwater Rd												
P2	Full	5	5	58.2	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94
NorthWest: Garden St												
P7	Full	1	1	58.1	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94
All Pedestrians		6	7	58.2	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 **Site: 101 [AM Mona Vale Rd & Powderworks Rd base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 124 seconds (Site User-Given Cycle Time)

Design Life Analysis (Final Year): Results for 12 years

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]					km/h
			veh/h	%	veh/h	%	v/c	sec			m					
South: Mona Vale Rd																
1	L2	All MCs	5	0.0	5	0.0	* 0.457	11.9	LOS A	8.5	64.3	0.31	0.28	0.31	52.4	
2	T1	All MCs	1002	9.2	1002	9.2	0.457	5.3	LOS A	8.5	64.3	0.31	0.27	0.31	63.5	
3	R2	All MCs	363	5.5	363	5.5	* 0.627	17.9	LOS B	11.0	80.7	0.63	0.83	0.63	47.7	
Approach			1370	8.2	1370	8.2	0.627	8.7	LOS A	11.0	80.7	0.39	0.42	0.39	58.4	
East: Powderworks Rd																
4	L2	All MCs	764	1.3	764	1.3	0.682	104.6	LOS F	20.2	142.7	0.92	0.85	0.92	35.5	
5	T1	All MCs	2	0.0	2	0.0	* 0.559	89.5	LOS F	2.6	18.8	1.00	0.76	1.06	26.0	
6	R2	All MCs	38	3.3	38	3.3	0.559	96.2	LOS F	2.6	18.8	1.00	0.76	1.06	27.4	
Approach			805	1.4	805	1.4	0.682	104.2	LOS F	20.2	142.7	0.92	0.84	0.92	30.9	
North: Mona Vale Rd																
7	L2	All MCs	25	0.0	25	0.0	0.697	29.4	LOS C	29.5	218.2	0.80	0.73	0.80	44.8	
8	T1	All MCs	1311	6.9	1311	6.9	* 0.697	77.0	LOS F	29.5	218.2	0.80	0.73	0.80	49.0	
9	R2	All MCs	1	0.0	1	0.0	0.002	21.6	LOS B	0.0	0.1	0.32	0.61	0.32	49.4	
Approach			1337	6.8	1337	6.8	0.697	76.0	LOS F	29.5	218.2	0.80	0.73	0.80	45.4	
West: Baha'l Temple Access Rd																
10	L2	All MCs	3	0.0	3	0.0	0.011	48.1	LOS D	0.2	1.1	0.88	0.62	0.88	30.8	
11	T1	All MCs	1	0.0	1	0.0	0.056	69.9	LOS E	0.2	1.5	0.96	0.62	0.96	27.7	
12	R2	All MCs	3	0.0	3	0.0	0.056	120.2	LOS F	0.2	1.5	0.99	0.62	0.99	26.9	
Approach			6	0.0	6	0.0	0.056	81.3	LOS F	0.2	1.5	0.94	0.62	0.94	28.5	
All Vehicles			3518	6.1	3518	6.1	0.697	56.2	LOS D	29.5	218.2	0.67	0.63	0.67	44.5	

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
East: Powderworks Rd												
P1	Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95

North: Mona Vale Rd												
P3	Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95
West: Baha'l Temple Access Rd												
P2	Full	1	1	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95
All	Pedestrians	3	4	56.1	LOS E	0.0	0.0	0.95	0.95	210.0	200.0	0.95

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

MOVEMENT SUMMARY

 **Site: 101 [PM Mona Vale Rd & Powderworks Rd base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 111 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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]				km/h
			veh/h	%	veh/h	%	v/c	sec			m				
South: Mona Vale Rd															
1	L2	All MCs	11	11.1	11	11.1	* 0.651	16.4	LOS B	17.5	130.4	0.55	0.49	0.55	49.3
2	T1	All MCs	1302	7.2	1302	7.2	0.651	14.6	LOS B	17.6	131.0	0.54	0.49	0.54	59.2
3	R2	All MCs	705	4.0	705	4.0	* 0.980	70.0	LOS E	39.7	287.0	1.00	1.16	1.36	30.8
Approach			2018	6.1	2018	6.1	0.980	34.0	LOS C	39.7	287.0	0.70	0.72	0.83	41.4
East: Powderworks Rd															
4	L2	All MCs	485	2.8	485	2.8	0.336	32.0	LOS C	8.9	63.7	0.72	0.77	0.72	40.9
5	T1	All MCs	3	0.0	3	0.0	* 0.724	68.7	LOS E	3.0	23.6	1.00	0.83	1.23	26.9
6	R2	All MCs	48	13.0	48	13.0	0.724	73.1	LOS F	3.0	23.6	1.00	0.83	1.23	27.5
Approach			535	3.7	535	3.7	0.724	35.9	LOS C	8.9	63.7	0.74	0.78	0.76	38.3
North: Mona Vale Rd															
7	L2	All MCs	27	0.0	27	0.0	0.757	35.3	LOS C	27.4	202.3	0.90	0.81	0.90	42.2
8	T1	All MCs	1184	6.7	1184	6.7	* 0.757	35.8	LOS C	27.4	202.3	0.90	0.81	0.90	46.0
9	R2	All MCs	4	0.0	4	0.0	0.006	26.0	LOS B	0.0	0.3	0.47	0.64	0.47	47.4
Approach			1214	6.5	1214	6.5	0.757	35.7	LOS C	27.4	202.3	0.90	0.81	0.90	42.4
West: Baha'l Temple Access Rd															
10	L2	All MCs	8	16.7	8	16.7	0.038	41.1	LOS C	0.4	3.3	0.87	0.66	0.87	32.3
11	T1	All MCs	3	0.0	3	0.0	0.192	71.2	LOS F	0.7	5.2	0.94	0.67	0.94	29.6
12	R2	All MCs	12	0.0	12	0.0	0.192	67.1	LOS E	0.7	5.2	1.00	0.68	1.00	26.2
Approach			22	5.9	22	5.9	0.192	58.4	LOS E	0.7	5.2	0.95	0.67	0.95	28.5
All Vehicles			3789	5.9	3789	5.9	0.980	34.9	LOS C	39.7	287.0	0.77	0.76	0.84	41.1

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
East: Powderworks Rd												
P1	Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98

North: Mona Vale Rd												
P3	Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98
West: Baha'l Temple Access Rd												
P2	Full	1	1	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98
All	Pedestrians	3	4	49.7	LOS E	0.0	0.0	0.95	0.95	203.5	200.0	0.98

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

MOVEMENT SUMMARY

▼ Site: 101 [AM Powderworks Rd & Ingleside Rd base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 12 years

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: Powderworks Rd															
1	L2	All MCs	898	1.6	898	1.6	0.503	3.0	LOS A	0.0	0.0	0.00	0.40	0.00	33.7
3a	R1	All MCs	28	0.0	28	0.0	0.025	4.1	LOS A	0.1	0.7	0.48	0.53	0.48	38.4
Approach			926	1.5	926	1.5	0.503	3.1	NA	0.1	0.7	0.01	0.40	0.01	33.8
NorthEast: Ingleside Rd															
24a	L1	All MCs	34	7.4	34	7.4	0.128	5.7	LOS A	0.4	3.0	0.69	0.80	0.69	35.9
26a	R1	All MCs	14	0.0	14	0.0	0.128	29.2	LOS C	0.4	3.0	0.69	0.80	0.69	35.9
Approach			47	5.3	47	5.3	0.128	12.5	LOS A	0.4	3.0	0.69	0.80	0.69	35.9
West: Powderworks Rd															
10a	L1	All MCs	5	25.0	5	25.0	0.251	3.1	LOS A	0.0	0.0	0.00	0.41	0.00	33.7
12	R2	All MCs	456	4.4	456	4.4	0.251	2.9	LOS A	0.0	0.0	0.00	0.41	0.00	33.8
Approach			461	4.7	461	4.7	0.251	2.9	NA	0.0	0.0	0.00	0.41	0.00	33.8
All Vehicles			1435	2.7	1435	2.7	0.503	3.3	NA	0.4	3.0	0.03	0.42	0.03	33.9

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.

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.

MOVEMENT SUMMARY

▼ Site: 101 [PM Powderworks Rd & Ingleside Rd base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 12 years

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: Powderworks Rd															
1	L2	All MCs	637	2.9	637	2.9	0.362	2.9	LOS A	0.0	0.0	0.00	0.40	0.00	33.8
3a	R1	All MCs	22	0.0	22	0.0	0.032	6.8	LOS A	0.1	0.8	0.63	0.71	0.63	37.4
Approach			659	2.8	659	2.8	0.362	3.0	NA	0.1	0.8	0.02	0.41	0.02	33.9
NorthEast: Ingleside Rd															
24a	L1	All MCs	30	13.0	30	13.0	0.137	8.8	LOS A	0.4	3.1	0.78	0.89	0.78	35.1
26a	R1	All MCs	11	0.0	11	0.0	0.137	31.1	LOS C	0.4	3.1	0.78	0.89	0.78	35.1
Approach			41	9.4	41	9.4	0.137	15.0	LOS B	0.4	3.1	0.78	0.89	0.78	35.1
West: Powderworks Rd															
10a	L1	All MCs	8	16.7	8	16.7	0.435	3.1	LOS A	0.0	0.0	0.00	0.41	0.00	33.6
12	R2	All MCs	796	4.1	796	4.1	0.435	3.0	LOS A	0.0	0.0	0.00	0.41	0.00	33.7
Approach			804	4.2	804	4.2	0.435	3.0	NA	0.0	0.0	0.00	0.41	0.00	33.7
All Vehicles			1504	3.7	1504	3.7	0.435	3.3	NA	0.4	3.1	0.03	0.42	0.03	33.8

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.

MOVEMENT SUMMARY

Site: 101 [AM Powderworks Rd & Wilson Av base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 12 years

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
East: Powderworks Rd															
4a	L1	All MCs	9	0.0	9	0.0	0.469	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
6a	R1	All MCs	902	1.2	902	1.2	0.469	5.0	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
Approach			911	1.1	911	1.1	0.469	5.0	NA	0.0	0.0	0.00	0.57	0.00	53.1
NorthWest: Powderworks Rd															
27a	L1	All MCs	440	4.3	440	4.3	0.253	5.6	LOS A	0.2	1.5	0.05	0.60	0.05	52.5
29	R2	All MCs	9	0.0	9	0.0	0.253	11.9	LOS A	0.2	1.5	0.05	0.60	0.05	48.8
Approach			449	4.2	449	4.2	0.253	5.7	NA	0.2	1.5	0.05	0.60	0.05	52.4
SouthWest: Wilson Av															
30	L2	All MCs	16	0.0	16	0.0	0.094	11.2	LOS A	0.3	1.9	0.81	0.91	0.81	41.5
32a	R1	All MCs	7	18.6	7	18.6	0.094	35.0	LOS C	0.3	1.9	0.81	0.91	0.81	41.2
Approach			22	5.6	22	5.6	0.094	18.3	LOS B	0.3	1.9	0.81	0.91	0.81	41.4
All Vehicles			1382	2.2	1382	2.2	0.469	5.5	NA	0.3	1.9	0.03	0.58	0.03	52.6

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.

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.

MOVEMENT SUMMARY

Site: 101 [PM Powderworks Rd & Wilson Av base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 12 years

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
East: Powderworks Rd															
4a	L1	All MCs	25	5.2	25	5.2	0.338	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.8
6a	R1	All MCs	622	2.6	622	2.6	0.338	5.0	LOS A	0.0	0.0	0.00	0.57	0.00	53.1
Approach			648	2.7	648	2.7	0.338	5.0	NA	0.0	0.0	0.00	0.57	0.00	53.1
NorthWest: Powderworks Rd															
27a	L1	All MCs	797	3.2	797	3.2	0.437	5.4	LOS A	0.2	1.6	0.02	0.59	0.03	52.7
29	R2	All MCs	11	0.0	11	0.0	0.437	9.3	LOS A	0.2	1.6	0.02	0.59	0.03	49.0
Approach			808	3.1	808	3.1	0.437	5.4	NA	0.2	1.6	0.02	0.59	0.03	52.7
SouthWest: Wilson Av															
30	L2	All MCs	18	14.5	18	14.5	0.100	8.7	LOS A	0.3	2.4	0.75	0.88	0.75	42.5
32a	R1	All MCs	12	0.0	12	0.0	0.100	24.8	LOS B	0.3	2.4	0.75	0.88	0.75	43.1
Approach			30	8.7	30	8.7	0.100	15.2	LOS B	0.3	2.4	0.75	0.88	0.75	42.7
All Vehicles			1486	3.0	1486	3.0	0.437	5.5	NA	0.3	2.4	0.03	0.59	0.03	52.6

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.

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.

MOVEMENT SUMMARY

 **Site: 101 [AM Powderworks Rd and Kalang Rd base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 12 years

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: Kalang Rd															
1	L2	All MCs	100	4.2	100	4.2	0.418	12.2	LOS A	2.9	21.0	0.84	0.82	0.91	43.8
3	R2	All MCs	101	7.3	101	7.3	0.418	14.7	LOS B	2.9	21.0	0.84	0.82	0.91	43.6
3u	U	All MCs	4	0.0	4	0.0	0.418	15.5	LOS B	2.9	21.0	0.84	0.82	0.91	41.1
Approach			205	5.6	205	5.6	0.418	13.5	LOS A	2.9	21.0	0.84	0.82	0.91	43.6
East: Powderworks Rd															
4	L2	All MCs	102	10.3	102	10.3	0.624	7.1	LOS A	6.9	49.0	0.65	0.53	0.65	47.7
5	T1	All MCs	580	0.9	580	0.9	0.624	6.6	LOS A	6.9	49.0	0.65	0.53	0.65	51.6
6u	U	All MCs	1	0.0	1	0.0	0.624	10.7	LOS A	6.9	49.0	0.65	0.53	0.65	51.0
Approach			683	2.3	683	2.3	0.624	6.7	LOS A	6.9	49.0	0.65	0.53	0.65	51.0
West: Powderworks Rd															
11	T1	All MCs	377	2.2	377	2.2	0.468	6.1	LOS A	4.5	32.4	0.54	0.53	0.54	51.6
12	R2	All MCs	123	1.0	123	1.0	0.468	8.8	LOS A	4.5	32.4	0.54	0.53	0.54	47.6
12u	U	All MCs	1	100.0	1	100.0	0.468	11.8	LOS A	4.5	32.4	0.54	0.53	0.54	49.1
Approach			502	2.1	502	2.1	0.468	6.8	LOS A	4.5	32.4	0.54	0.53	0.54	50.6
All Vehicles			1390	2.7	1390	2.7	0.624	7.7	LOS A	6.9	49.0	0.64	0.57	0.65	49.6

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.

Roundabout 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.

MOVEMENT SUMMARY

 **Site: 101 [PM Powderworks Rd and Kalang Rd base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 12 years

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: Kalang Rd															
1	L2	All MCs	133	4.0	133	4.0	0.502	12.5	LOS A	4.0	28.6	0.86	0.83	1.00	43.7
3	R2	All MCs	129	4.1	129	4.1	0.502	14.7	LOS B	4.0	28.6	0.86	0.83	1.00	43.6
3u	U	All MCs	2	0.0	2	0.0	0.502	15.8	LOS B	4.0	28.6	0.86	0.83	1.00	41.1
Approach			264	4.0	264	4.0	0.502	13.6	LOS A	4.0	28.6	0.86	0.83	1.00	43.6
East: Powderworks Rd															
4	L2	All MCs	157	3.4	157	3.4	0.693	9.1	LOS A	8.8	63.1	0.85	0.63	0.91	46.9
5	T1	All MCs	501	2.4	501	2.4	0.693	8.8	LOS A	8.8	63.1	0.85	0.63	0.91	50.7
6u	U	All MCs	1	0.0	1	0.0	0.693	12.8	LOS A	8.8	63.1	0.85	0.63	0.91	50.1
Approach			660	2.6	660	2.6	0.693	8.8	LOS A	8.8	63.1	0.85	0.63	0.91	49.8
West: Powderworks Rd															
11	T1	All MCs	595	5.1	595	5.1	0.756	7.5	LOS A	11.0	79.8	0.88	0.56	0.88	50.6
12	R2	All MCs	191	2.6	191	2.6	0.756	10.1	LOS A	11.0	79.8	0.88	0.56	0.88	46.7
12u	U	All MCs	3	0.0	3	0.0	0.756	11.5	LOS A	11.0	79.8	0.88	0.56	0.88	50.0
Approach			788	4.5	788	4.5	0.756	8.1	LOS A	11.0	79.8	0.88	0.56	0.88	49.6
All Vehicles			1712	3.7	1712	3.7	0.756	9.2	LOS A	11.0	79.8	0.87	0.63	0.91	48.6

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.

Roundabout 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.

MOVEMENT SUMMARY

 **Site: 101v [AM Powderworks Rd & Wilga St base - Roundabout - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 12 years

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. Dist] veh m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Wilga St															
1	L2	All MCs	1	0.0	1	0.0	0.183	12.9	LOS A	1.1	7.4	0.80	0.81	0.80	46.7
2	T1	All MCs	39	0.0	39	0.0	0.183	13.0	LOS A	1.1	7.4	0.80	0.81	0.80	47.0
3b	R3	All MCs	46	0.0	46	0.0	0.183	17.1	LOS B	1.1	7.4	0.80	0.81	0.80	46.4
Approach			86	0.0	86	0.0	0.183	15.2	LOS B	1.1	7.4	0.80	0.81	0.80	46.7
SouthEast: Powderworks Rd															
21b	L3	All MCs	24	0.0	24	0.0	0.625	5.4	LOS A	6.8	48.8	0.32	0.55	0.32	51.0
21a	L1	All MCs	29	0.0	29	0.0	0.625	4.7	LOS A	6.8	48.8	0.32	0.55	0.32	51.5
23a	R1	All MCs	821	3.7	821	3.7	0.625	7.6	LOS A	6.8	48.8	0.32	0.55	0.32	50.7
Approach			874	3.4	874	3.4	0.625	7.5	LOS A	6.8	48.8	0.32	0.55	0.32	50.7
North: Powderworks Rd															
7a	L1	All MCs	449	4.2	449	4.2	0.381	5.0	LOS A	2.8	19.9	0.36	0.49	0.36	52.9
8	T1	All MCs	18	6.6	18	6.6	0.381	5.5	LOS A	2.8	19.9	0.36	0.49	0.36	52.9
9	R2	All MCs	23	0.0	23	0.0	0.381	8.6	LOS A	2.8	19.9	0.36	0.49	0.36	52.3
Approach			490	4.1	490	4.1	0.381	5.2	LOS A	2.8	19.9	0.36	0.49	0.36	52.9
West: Proposed Rd															
10	L2	All MCs	47	0.0	47	0.0	0.231	13.7	LOS A	1.3	9.4	0.82	0.82	0.82	46.6
12a	R1	All MCs	56	0.0	56	0.0	0.231	16.3	LOS B	1.3	9.4	0.82	0.82	0.82	46.3
12	R2	All MCs	1	0.0	1	0.0	0.231	17.2	LOS B	1.3	9.4	0.82	0.82	0.82	46.3
Approach			104	0.0	104	0.0	0.231	15.2	LOS B	1.3	9.4	0.82	0.82	0.82	46.5
All Vehicles			1554	3.2	1554	3.2	0.625	7.7	LOS A	6.8	48.8	0.39	0.56	0.39	50.8

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.

Roundabout 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.

MOVEMENT SUMMARY

 **Site: 101v [PM Powderworks Rd & Wilga St base - Roundabout - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout
Design Life Analysis (Final Year): Results for 12 years

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: Wilga St															
1	L2	All MCs	1	0.0	1	0.0	0.138	10.0	LOS A	0.7	5.4	0.71	0.77	0.71	48.1
2	T1	All MCs	31	4.2	31	4.2	0.138	10.5	LOS A	0.7	5.4	0.71	0.77	0.71	48.3
3b	R3	All MCs	44	8.9	44	8.9	0.138	14.9	LOS B	0.7	5.4	0.71	0.77	0.71	47.5
Approach			76	6.8	76	6.8	0.138	13.0	LOS A	0.7	5.4	0.71	0.77	0.71	47.8
SouthEast: Powderworks Rd															
21b	L3	All MCs	36	0.0	36	0.0	0.516	5.4	LOS A	4.6	34.0	0.33	0.56	0.33	51.0
21a	L1	All MCs	42	0.0	42	0.0	0.516	4.8	LOS A	4.6	34.0	0.33	0.56	0.33	51.6
23a	R1	All MCs	594	7.2	594	7.2	0.516	7.8	LOS A	4.6	34.0	0.33	0.56	0.33	50.7
Approach			672	6.3	672	6.3	0.516	7.4	LOS A	4.6	34.0	0.33	0.56	0.33	50.8
North: Powderworks Rd															
7a	L1	All MCs	773	4.4	773	4.4	0.614	5.2	LOS A	6.1	44.4	0.46	0.48	0.46	52.7
8	T1	All MCs	25	4.9	25	4.9	0.614	5.6	LOS A	6.1	44.4	0.46	0.48	0.46	52.7
9	R2	All MCs	31	0.0	31	0.0	0.614	8.8	LOS A	6.1	44.4	0.46	0.48	0.46	52.0
Approach			829	4.2	829	4.2	0.614	5.4	LOS A	6.1	44.4	0.46	0.48	0.46	52.6
West: Proposed Rd															
10	L2	All MCs	33	0.0	33	0.0	0.138	10.1	LOS A	0.7	5.2	0.70	0.76	0.70	48.8
12a	R1	All MCs	46	0.0	46	0.0	0.138	12.7	LOS A	0.7	5.2	0.70	0.76	0.70	48.5
12	R2	All MCs	1	0.0	1	0.0	0.138	13.6	LOS A	0.7	5.2	0.70	0.76	0.70	48.5
Approach			80	0.0	80	0.0	0.138	11.7	LOS A	0.7	5.2	0.70	0.76	0.70	48.6
All Vehicles			1656	5.0	1656	5.0	0.614	6.9	LOS A	6.1	44.4	0.43	0.54	0.43	51.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout 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.

MOVEMENT SUMMARY

 **Site: 101 [PM Garden St & Powderworks Rd base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 79 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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: Garden St															
1	L2	All MCs	468	2.8	468	2.8	0.425	11.1	LOS A	7.6	54.3	0.55	0.72	0.55	42.8
2	T1	All MCs	380	2.3	380	2.3	* 0.793	33.9	LOS C	15.1	107.6	0.99	0.95	1.14	34.2
Approach			848	2.6	848	2.6	0.793	21.3	LOS B	15.1	107.6	0.75	0.82	0.81	38.4
North: Garden St															
8	T1	All MCs	411	1.3	411	1.3	0.444	14.6	LOS B	10.5	74.0	0.71	0.61	0.71	41.7
9	R2	All MCs	290	0.7	290	0.7	* 0.788	40.6	LOS C	10.6	74.4	1.00	1.06	1.17	31.6
Approach			702	1.1	702	1.1	0.788	25.3	LOS B	10.6	74.4	0.83	0.80	0.90	36.9
West: Powderworks Rd															
10	L2	All MCs	213	3.2	213	3.2	0.239	29.8	LOS C	4.1	29.6	0.59	0.70	0.59	41.1
12	R2	All MCs	493	5.6	493	5.6	* 0.983	88.1	LOS F	30.2	221.4	1.00	1.26	1.69	24.9
Approach			706	4.9	706	4.9	0.983	70.5	LOS E	30.2	221.4	0.88	1.09	1.36	25.1
All Vehicles			2255	2.8	2255	2.8	0.983	37.9	LOS C	30.2	221.4	0.81	0.90	1.01	32.6

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Garden St												
P2	Full	16	21	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07
West: Powderworks Rd												
P1	Full	15	20	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07
All Pedestrians		31	40	33.8	LOS D	0.0	0.0	0.92	0.92	187.6	200.0	1.07

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 **Site: 101 [AM Garden St & Pittwater Rd Base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 125 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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: Pittwater Rd																
1a	L1	All MCs	792	2.7	792	2.7	* 0.557	11.7	LOS A	17.2	123.2	0.50	1.30	0.50		49.5
2	T1	All MCs	1573	3.8	1573	3.8	0.519	11.3	LOS A	16.6	120.2	0.50	0.60	0.50		58.0
Approach			2365	3.4	2365	3.4	0.557	11.5	LOS A	17.2	123.2	0.50	0.83	0.50		53.9
North: Pittwater Rd																
8	T1	All MCs	1662	3.9	1662	3.9	* 0.635	10.4	LOS A	27.0	192.0	0.57	0.52	0.57		58.3
9b	R3	All MCs	86	4.8	86	4.8	0.674	20.8	LOS B	3.3	23.7	0.57	0.80	0.65		43.1
Approach			1748	4.0	1748	4.0	0.674	10.9	LOS A	27.0	192.0	0.57	0.54	0.57		57.3
NorthWest: Garden St																
27b	L3	All MCs	51	8.3	51	8.3	0.830	54.8	LOS D	20.0	144.0	1.00	0.95	1.14		28.7
29a	R1	All MCs	588	2.0	588	2.0	0.830	61.0	LOS E	20.5	146.0	1.00	0.95	1.14		29.0
Approach			639	2.5	639	2.5	0.830	60.5	LOS E	20.5	146.0	1.00	0.95	1.14		29.0
All Vehicles			4752	3.5	4752	3.5	0.830	17.9	LOS B	27.0	192.0	0.59	0.74	0.61		49.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Pittwater Rd												
P2	Full	12	16	56.7	LOS E	0.1	0.1	0.95	0.95	210.5	200.0	0.95
NorthWest: Garden St												
P7	Full	16	21	56.7	LOS E	0.1	0.1	0.95	0.95	210.5	200.0	0.95
All Pedestrians		28	37	56.7	LOS E	0.1	0.1	0.95	0.95	210.5	200.0	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 Site: 101 [PM Garden St & Pittwater Rd Base - DEV + 10 Years
(Site Folder: Development + 10 Years (2036))]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 128 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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: Pittwater Rd															
1a	L1	All MCs	679	1.2	679	1.2	* 0.455	7.7	LOS A	8.2	58.1	0.27	0.68	0.27	50.6
2	T1	All MCs	1828	4.0	1828	4.0	* 0.822	6.7	LOS A	27.3	193.6	0.53	0.49	0.53	62.0
Approach			2507	3.2	2507	3.2	0.822	7.0	LOS A	27.3	193.6	0.46	0.54	0.46	58.4
North: Pittwater Rd															
8	T1	All MCs	1699	4.2	1699	4.2	0.447	12.4	LOS A	18.9	137.2	0.59	0.46	0.59	56.5
9b	R3	All MCs	101	5.2	101	5.2	* 0.656	84.7	LOS F	8.0	58.7	1.00	0.85	1.05	24.7
Approach			1800	4.3	1800	4.3	0.656	16.5	LOS B	18.9	137.2	0.61	0.48	0.62	52.6
NorthWest: Garden St															
27b	L3	All MCs	105	3.2	105	3.2	0.989	88.4	LOS F	33.6	241.4	1.00	1.19	1.48	22.4
29a	R1	All MCs	692	3.1	692	3.1	0.989	97.7	LOS F	34.0	244.1	1.00	1.19	1.48	22.6
Approach			797	3.1	797	3.1	0.989	96.5	LOS F	34.0	244.1	1.00	1.19	1.48	22.5
All Vehicles			5104	3.6	5104	3.6	0.989	24.3	LOS B	34.0	244.1	0.60	0.62	0.67	45.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

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

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

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

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

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

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Pittwater Rd												
P2	Full	5	7	58.2	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94
NorthWest: Garden St												
P7	Full	1	1	58.1	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94
All Pedestrians		6	8	58.2	LOS E	0.0	0.0	0.95	0.95	212.0	200.0	0.94

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

 **Site: 101 [AM Garden St & Powderworks Rd base - DEV + 10 Years (Site Folder: Development + 10 Years (2036))]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 64 seconds (Site User-Given Phase Times)

Design Life Analysis (Final Year): Results for 12 years

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: Garden St															
1	L2	All MCs	421	2.1	421	2.1	0.377	9.1	LOS A	5.0	36.0	0.53	0.70	0.53	43.6
2	T1	All MCs	491	2.1	491	2.1	* 0.752	22.4	LOS B	14.7	104.7	0.95	0.89	1.03	38.3
Approach			912	2.1	912	2.1	0.752	16.3	LOS B	14.7	104.7	0.75	0.80	0.80	40.6
North: Garden St															
8	T1	All MCs	281	3.3	281	3.3	0.265	7.7	LOS A	4.5	32.5	0.55	0.47	0.55	45.2
9	R2	All MCs	186	3.3	186	3.3	* 0.534	24.6	LOS B	5.0	36.1	0.94	0.80	0.94	36.7
Approach			468	3.3	468	3.3	0.534	14.5	LOS A	5.0	36.1	0.70	0.60	0.70	41.4
West: Powderworks Rd															
10	L2	All MCs	210	2.1	210	2.1	0.316	27.9	LOS B	4.4	31.4	0.74	0.74	0.74	39.5
12	R2	All MCs	388	3.4	388	3.4	* 0.967	70.3	LOS E	18.9	136.5	1.00	1.27	1.79	27.1
Approach			598	3.0	598	3.0	0.967	55.4	LOS D	18.9	136.5	0.91	1.09	1.43	28.0
All Vehicles			1977	2.6	1977	2.6	0.967	27.7	LOS B	18.9	136.5	0.79	0.84	0.97	35.9

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)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped]	[Dist]			sec	m	m/sec
North: Garden St												
P2	Full	52	68	26.4	LOS C	0.1	0.1	0.91	0.91	180.2	200.0	1.11
West: Powderworks Rd												
P1	Full	18	23	26.3	LOS C	0.0	0.0	0.91	0.91	180.2	200.0	1.11
All Pedestrians		70	91	26.3	LOS C	0.1	0.1	0.91	0.91	180.2	200.0	1.11

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.



Appendix E

Limitations and Exclusions

Limitations of the Traffic Analysis are listed below, noting this may not be an exhaustive list.

- The study assesses the ability of Powderworks Road to accommodate residents evacuating from the Ingleside Precinct and broader population catchment traffic but does not assess broader regional traffic constraints.
- The study assumes a reasonable degree of emergency management and warning will be enacted in the event of a bushfire, resulting in assisted evacuation conditions. It is acknowledged that no guarantee can be made as to the availability or ability of emergency services to enact any one physical measure given the high degree of variability under such circumstances.
- It is assumed no visitors or vehicles belonging to non-residents are in the precinct or surrounding areas at the time of an evacuation. It is noted that the conservative assumptions informing resident populations (such as an assumed 100% home occupancy) offset any potential lack of visitor traffic demand.
- This T&TA assumes reasonable adherence to emergency warning messages; however, acknowledges research by Oppenheimer that human behaviour and decision-making becomes strained in an emergency, and processing of information may become illogical or irrational.
- No businesses or other traffic generators have been considered within the precinct or surrounding areas as generating evacuation traffic above and beyond that generated by residential dwellings and apartments.
- This T&TA has been undertaken as a desktop study only and relies upon data from others.
- The T&TA makes no comment or judgement on the risk to or safety of residents evacuating in the event of a bushfire.
- This T&TA does not comment on the ability of firefighting vehicles to access properties, fire fronts or water supply in the precinct.
- This T&TA is not sophisticated enough to reflect individual premises' evacuation protocols, with the broader population catchment assumed as using the average household behavioural characteristics.
- No consideration is given to unpredictable events which may impact upon the road network's ability to cater for evacuating traffic demand, such as car crashes, broken down vehicles, fallen trees or power lines, utility failures or the like. However, such events are somewhat captured by the conservatively low mid-block road network capacity of 600 vehicles per hour per lane identified by NSW SES 2004.
- This T&TA bases certain assumptions on research findings of what individuals say they will do in the event of a bushfire; however, their behaviour in reality may be different.
- There are no criteria documented by Federal or State agencies with regards to defining a 'successful' evacuation, and as such comment on the performance of any such evacuation is subjective, based on input from all available stakeholders and tailored to the subject study area.
- This T&TA has been driven by a land use planning exercise for the Wilga Wilson Precinct and is not intended to advise on emergency service planning or procedures in the event of a bushfire.

- Bushfire behaviour is highly variable and dependent upon multiple factors which are difficult to foresee. This assessment uses a wealth of observed input data, research, surveys, and industry expertise to test a unique set of conditions that are considered representative of how an event may unfold, though does not constitute a prediction, nor claim to be wholly encompassing of the potential outcomes of any bushfire event in the study area.
- NSW Government agencies remain ultimately responsible for determining whether the findings of this T&TA and associated studies satisfy the strategic planning principles and strategic planning assessment considerations of PBP 2019 in the manner intended by PBP 2019.



Appendix F

MOVEMENT SUMMARY

 **Site: 101v [Powderworks Rd & Wilga St roundabout - Bushfire (Site Folder: Bushfire)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Roundabout

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: Wilga St															
3b	R3	All MCs	28	0.0	28	0.0	0.026	9.0	LOS A	0.1	0.9	0.15	0.64	0.15	50.1
Approach			28	0.0	28	0.0	0.026	9.0	LOS A	0.1	0.9	0.15	0.64	0.15	50.1
SouthEast: Powderworks Rd															
23a	R1	All MCs	21	100.0	21	100.0	0.036	11.0	LOS A	0.2	2.1	0.45	0.63	0.45	45.5
Approach			21	100.0	21	100.0	0.036	11.0	LOS A	0.2	2.1	0.45	0.63	0.45	45.5
North: Powderworks Rd															
7a	L1	All MCs	214	0.0	214	0.0	0.197	5.7	LOS A	1.1	7.6	0.44	0.54	0.44	52.9
Approach			214	0.0	214	0.0	0.197	5.7	LOS A	1.1	7.6	0.44	0.54	0.44	52.9
West: Proposed Rd															
12	R2	All MCs	222	0.0	222	0.0	0.190	8.4	LOS A	1.1	7.4	0.22	0.61	0.22	50.5
Approach			222	0.0	222	0.0	0.190	8.4	LOS A	1.1	7.4	0.22	0.61	0.22	50.5
All Vehicles			485	4.3	485	4.3	0.197	7.4	LOS A	1.1	7.6	0.33	0.58	0.33	51.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

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

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

Roundabout 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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