Appendix K Traffic and Transport Assessment Report

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Final Final Traffic and Transport Assessment

Daroobalgie Solar Farm

Reference No. PO 4500007100
Prepared for Pacific Hydro Australia Developments Pty Ltd
28 January 2022

SMEC INTERNAL REF. 30012765

Document Control

Document:	Final Final Traffic and Transport Assessment
File Location:	\\filer.nasuni.local\smecanz\Projects\300127\30012765 - Daroobalgie Solar Farm\120 EIS\004 Traffic & Transport
Project Name:	Daroobalgie Solar Farm
Project Number:	30012765
Revision Number:	Final

Revision History

Revision No.	Date	Prepared by	Reviewed by	Approved for Issue by
0	26 March 2021	B Khan	A Brown	M Davey
1	18 May 2021	B Khan	A Brown	G Tallentire
2	21 July 2021	B Khan	A Brown	G Tallentire
Final	27 July 2021	B Khan	A Brown	G Tallentire
Final Final	28 January 2022	B Khan	A Brown	J Miller

Issue Register

Distribution List	Date Issued	Number of Copies
Pacific Hydro Australia Developments Pty Ltd	28 January 2022	1
Pacific Hydro Australia Developments Pty Ltd	28 January 2022	1

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Terms and Definitions

Term	Meaning
Daroobalgie Solar Farm	Daroobalgie Solar Farm comprises the solar farm site, the Electricity transmission line and switchyard site
ETL	Electricity transmission line
kW	Kilowatts
NB	North Bound
SB	South Bound
LoS	Level of Service
MW	Megawatts
OD	Over-dimensional vehicles
OSOM	Oversize and overmass
TfNSW	Transport for New South Wales
PV	Photovoltaic
SISD	Safe intersection site distance
Solar farm site	The solar farm site is approximately 300 hectares on land legally described as Lot 77 in Deposited Plan 750183
Substation	This refers to the substation within the solar farm site
Switchyard site	This refers to the switchyard site at the point where the transmission line will connect into the Parkes-Forbes 132KV line

Executive Summary

The Daroobalgie Solar Farm is proposed to comprise a solar farm site which will include the installation of approximately 420,000 solar photovoltaic (PV) panels, associated infrastructure (i.e., substation, Battery Energy Storage System, inverters, power cabling, site offices, car parking, and new access tracks), an Electricity Transmission Line (ETL) and switchyard site (the project) to connect the solar farm to an existing 132kV powerline west of Newell Highway. The project will have an estimated capacity of approximately 100 megawatts (MW) and will provide enough electricity to power up to the equivalent of 34,000 homes each year.

The proposed Daroobalgie Solar Farm is located in Daroobalgie approximately 11 kilometre (km) northeast of Forbes. The proposed solar farm site is approximately 300 hectares (Ha) on land legally described as Lot 77 in Deposited Plan 750183. The solar farm will be accessed by Troubalgie Road to the north of the proposed site.

The ETL connects the solar farm site to the switchyard site located near the existing Forbes-Parkes 132 kilovolts (kV) transmission line. The ETL easement is approximately 8.5 km long and approximately 45metre (m) wide. The easement traverses a number of private properties and road reserves.

The switchyard site is located approximately 5.5 km north of Forbes on Lot 14 in Deposited Plan 750158. The switchyard site is adjacent to the existing Forbes-Parkes 132 kV transmission line located approximately 500 m west of the Newell Highway. It will be accessed from Daroobalgie Road.

It is likely that Port of Botany, Port of Newcastle or Port Kembla would be utilised for equipment and construction related materials for the project. It is likely that all construction materials would be transported to the site via road, however rail is another option to transport construction materials.

There are two likely road options available to transport construction materials, namely from the north using Newell Highway (A39) and/or Henry Parkes Way via Parkes or from the south using The Escort Way and Newell Highway via Forbes. All of these roads are designated heavy vehicle routes and would be able to accommodate additional heavy vehicle movements associated with the project. Both of these routes would require heavy vehicles to access the site from Newell Highway via Back Yamma Road and Troubalgie Road. Forest Road is not considered to be suitable for heavy vehicle movements due to the tight turning radius at the Forest Road/Troubalgie Road intersection, as well as due to the general condition of the road which is unsealed making it unsuitable for heavy vehicles following rainfall.

A section of the proposed ETL is within the Forest Road reserve and some access by heavy vehicles will be necessary to construct the ETL, however otherwise it is not proposed that Forest Road is utilised by heavy vehicles during construction. A Traffic Management Plan for the project, once developed, will detail mitigations (e.g. such as signage and a project code of conduct) to ensure the use of Forest Road is limited during construction and operation.

This traffic assessment has been undertaken for the construction, operation and decommissioning stages of the project.

Construction Stage Impacts

The construction vehicle route via The Escort Way, Newell Highway and Back Yamma Road (between Newell Highway and Livestock Exchange Access Road) is a designated heavy vehicle route and additional construction vehicle movements associated with the project are anticipated to have minor/no impacts on the pavement condition and intersection capacities of these roads. However, Troubalgie Road is an unsealed road and it is anticipated that the additional construction related heavy vehicle movements would have major impacts on the pavement condition of this road. It is also anticipated that heavy vehicle movements would have major impacts on the existing culverts located on Back Yamma Road and Troubalgie Road.

Operational Stage Impacts

Additional vehicle movement numbers associated with the operation of the proposed solar farm would be very low and would have negligible impact on the performance of existing road network.

Decommissioning Stage Impacts

Solar farm decommissioning typically takes place after approximately 25 to 30 years of operation, generating traffic at a level less than or similar to the construction phase. Given the long duration between construction and decommissioning, it is difficult to determine an accurate baseline for this assessment. It is, however recommended to

prepare a specific Traffic Management Plan to address the impacts of decommissioning stage traffic movements on the surrounding road network.

Cumulative Impacts

Traffic count surveys were undertaken on Tuesday 2nd of March 2021, one of the sale days of the Livestock Exchange. As such, any traffic movements associated with the Livestock Exchange's peak hours have been captured in the traffic count survey data. This traffic is associated with an existing land use and is already accounted for in background traffic data.

Whilst there are other solar farms in the broader area, either committed, or under construction, vehicles associated with these developments are not anticipated to coincide with project related construction traffic. As such, there are no traffic related cumulative impacts expected to be associated with the project.

Mitigation Measures

The following mitigation measures are identified to minimise impacts and to ensure safe and efficient heavy vehicle movements:

- Engagement of a licensed haulage contractor with experience in operating over-dimensional vehicles and transporting similar loads to be responsible for obtaining all required approvals and permits from the relevant roads authorities and Councils and for complying with conditions specified in the approvals
- Identification of road improvement requirements, including upgradation of Back Yamma Road/Troubalgie Road intersection to accommodate OSOM vehicle movements during construction period
- Upgrade of Troubalgie Road between Back Yamma Road and the site access point to sealed road as well as widening of Troubalgie Road to accommodate two-way heavy vehicle movements including oversize and/or overmass (OSOM) vehicles during construction of the proposed solar farm
- Preparation and implementation of a Traffic Management Plan in conjunction with the haulage contractor and roads authorities
- Consideration of establishing a transport pool or utilising buses for employees to reduce staff vehicle movements on Back Yamma Road and Forest Road
- Preparation of pre, mid and post road dilapidation reports addressing pavement and drainage structures in consultation with Council for the local roads, namely Back Yamma Road and Troubalgie Road prior to the commencement of construction, during peak construction activities and after construction is complete
- Detailed design assessment and identification of intersection improvement measures at Back Yamma Road/Troubalgie Road intersection to accommodate two turning trucks side by side or alternatively implementation of traffic management measures by way of a Traffic Management Plan
- Preparation of a specific Traffic Management Plan for the decommissioning phase reflecting changes in traffic volumes and work procedures

Summary and Conclusions

The introduction of an additional three heavy vehicle movements per hour and 167 light vehicle movements during the am and pm peak, during the peak construction period, is anticipated to have major impacts on existing pavement conditions and loading capacity of culverts along Back Yamma Road and Troubalgie Road.

Formal discussion has already been undertaken with Forbes Shire Council and it has been agreed to upgrade the Troubalgie Road between Back Yamma Road and the proposed site access point to a sealed road, as well as the widening of Troubalgie Road to accommodate two-way heavy vehicle movements prior to commencing construction of the solar farm. It was also agreed to upgrade Back Yamma Road/Troubalgie Road intersection to accommodate appropriate heavy vehicle movements. The impacts during the operation phase are considered to be minimal.

Management strategies required to address traffic impacts relating to the project are outlined in this report. These strategies should be incorporated into a Traffic Management Plan and implemented in consultation with relevant roads authorities, including Forbes Shire Council and Transport for NSW. Adoption of strategies for minimising traffic impacts will reduce community disruption, maintain roads to an appropriate standard throughout the construction program and maintain safety requirements.

A pre, mid and post-dilapidation survey for the construction route, namely Back Yamma Road and Troubalgie Road and for existing culverts should be conducted and loading capacity of these roads and infrastructures determined prior to commencement of construction.

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1 Introduction

1.1 Overview

The Daroobalgie Solar Farm is proposed to comprise the installation of approximately 420,000 solar photovoltaic (PV) panels, associated infrastructure (i.e., substation, Battery Energy Storage System, inverters, power cabling, site offices, car parking, and new access tracks) and an Electricity Transmission Line (ETL) to connect the solar farm to an existing 132kV powerline west of Newell Highway. The project will have an estimated capacity of approximately 100 megawatts (MW) and will provide enough electricity to power up to the equivalent of 34,000 homes each year.

An Environmental Impact Statement (EIS) is a requirement of the approval process. This Traffic Impact Assessment (TIA) forms part of the EIS. It documents the traffic impact assessment methods and results, the initiatives built into the project design to avoid and minimise associated traffic impacts, and additional mitigation and management measures proposed to address any residual impacts not able to be avoided.

1.2 Assessment Guidelines and Requirements

This TIA has been prepared in accordance with the relevant government assessment requirements, guidelines and policies and in consultation with the relevant government agencies.

Current guidelines applied in this assessment include those specified in the project's Secretary's Environmental Assessment Requirements (SEARs):

- Guide to Traffic Management – Part 3 Traffic Studies and Analysis (Austroads, 2007)
- Guide to Traffic Generating Developments Version 2.2 (RTA, 2002)
- NSW Sustainable Design Guidelines Version 3.0 (TfNSW, 2013)
- EIS Guidelines – Road and Related Facilities (DoPI).

The project's SEARs were issued on 19 December 2019. The SEARs relating to traffic and transport are provided in Table 1-1.

Table 1-1 SEARs – Traffic and transport

Requirement	Where addressed in this report
An assessment of the peak and average traffic generation, including over dimensional vehicles, construction worker transportation and transport of materials by rail	Section 3
An assessment of the likely transport impacts to the site access route (including The Escort Way, Newell Highway, Back Yamma Road, Forest Road, Troubalgie Road and the Stockinbingal-Parkes railway line), site access point, any Crown land, particularly in relation to the capacity and condition of the roads	Section 3
A cumulative impact assessment of traffic from nearby developments	Section 6
A description of any proposed road upgrades developed in consultation with the relevant road and rail authorities (if required)	Prior to construction
A description of the measures that would be implemented to mitigate any transport impacts during construction	Section 8

1.3 Site Description

The proposed Daroobalgie Solar Farm is located in Daroobalgie approximately 11 km northeast of Forbes. The proposed site is approximately 300 hectares (ha) on land legally described as Lot 77 in Deposited Plan 750183. The solar farm will be accessed by Troubalgie Road to the north of the proposed site.

The topography of the proposed site is generally uniform with an average elevation of 240 metres (m) above the Australian Height Datum (AHD). The land is largely cleared, having been highly modified by past disturbances associated with land clearing, cropping, and livestock grazing. A number of dams are present within the solar farm site

and a natural watercourse runs to the east of the property boundary, intersecting the site in the southeast corner. Small ephemeral waterholes, known locally as *Gilgai*, are present in some paddocks, predominately in the south-eastern section of the site. These have been progressively ploughed and levelled by farming activities over time.

The surrounding land use is predominately agricultural, and the Forbes Central West Livestock Exchange is located on Back Yamma Road, 2.5 km to the west of the site. Back Yamma State Forest is situated 7 km to the east at an elevation of 340 m AHD, and the closest National Park is Goobang National Park, 30 km to the northeast. The Lachlan River runs approximately 3.5 km from the southern boundary of the project area.

There are no residential dwellings within the proposed site and the nearest dwelling is located approximately 600 m to the northwest of the western boundary. There are eight existing dwellings within 3 km of the solar farm site. The Newell Highway runs north-south, 5.5 km to the west of the proposed site.

The ETL connects the solar farm site to the switchyard site located near the existing Forbes-Parkes 132 kilovolts (kV) transmission line. The ETL easement is approximately 8.5 km long and approximately 45metre (m) wide. The easement traverses a number of private properties and road reserves.

The switchyard site is located approximately 5.5 km north of Forbes on Lot 14 in Deposited Plan 750158. The switchyard site is adjacent to the existing Forbes-Parkes 132 kV transmission line located approximately 500 m west of the Newell Highway. It will be accessed from Daroobalgie Road

The location of the project area is shown in Figure 1-1.

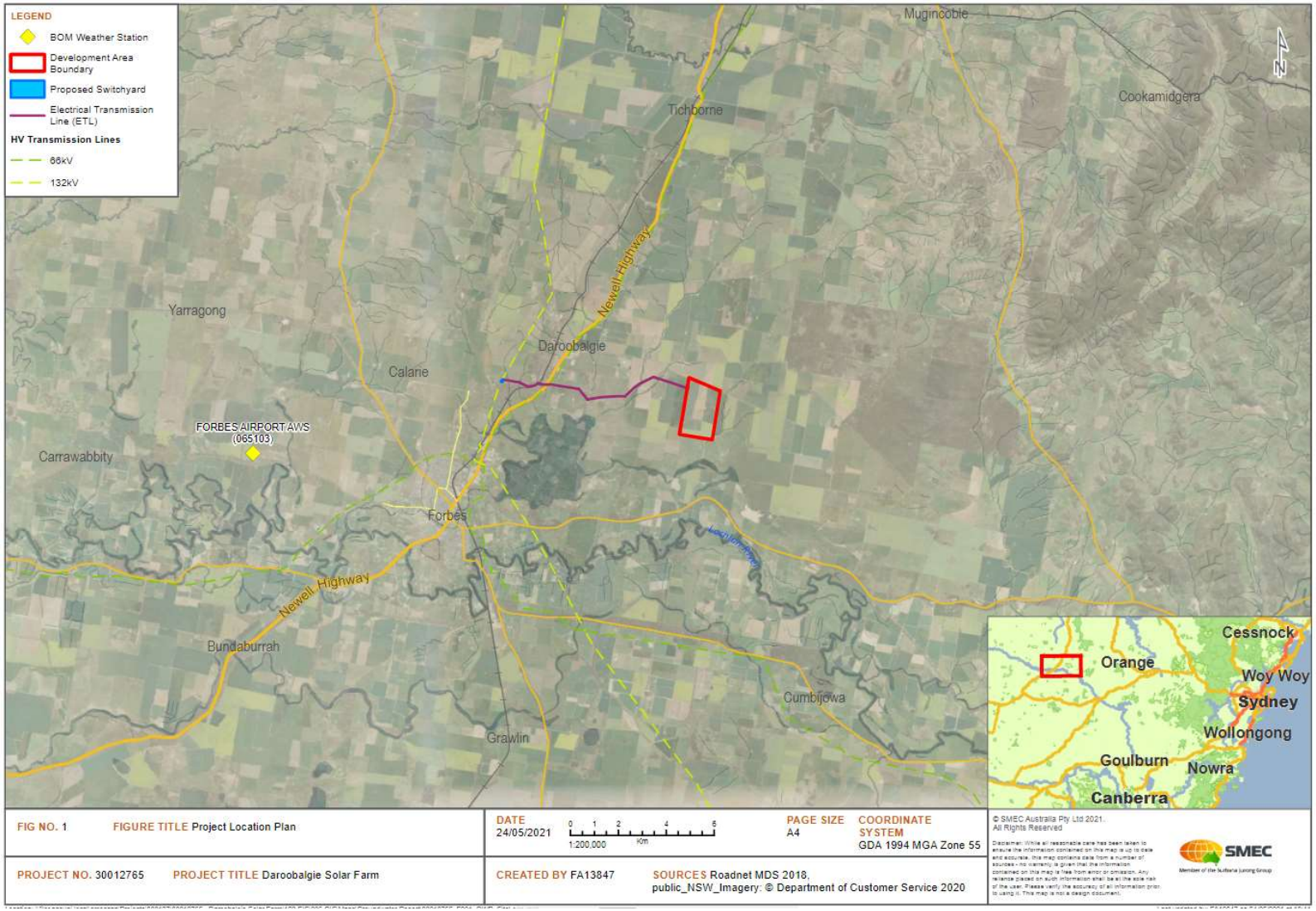


Figure 1-1 Location of Daroobalgie Solar Farm

1.4 The Project

1.4.1 Project Infrastructure

The proposed Daroobalgie Solar Farm project comprises:

- A network of PV solar panel arrays and Power Conversion Units (PCUs) (DC-AC inverters)
- Battery energy storage system (BESS) with embedded storage of approximately 40MW/160 MWh
- Electrical collection systems, substation and control room
- Temporary construction compound
- Operations and Maintenance (O&M) facility, including demountable offices, amenities, equipment sheds, storage and parking areas
- Internal access roads
- Electricity Transmission Line (ETL) infrastructure
- Switchyard to connect to TransGrid infrastructure
- Perimeter security fencing.

Figure 1-2 shows the general arrangement of the proposed site, including construction laydown areas and site access points.

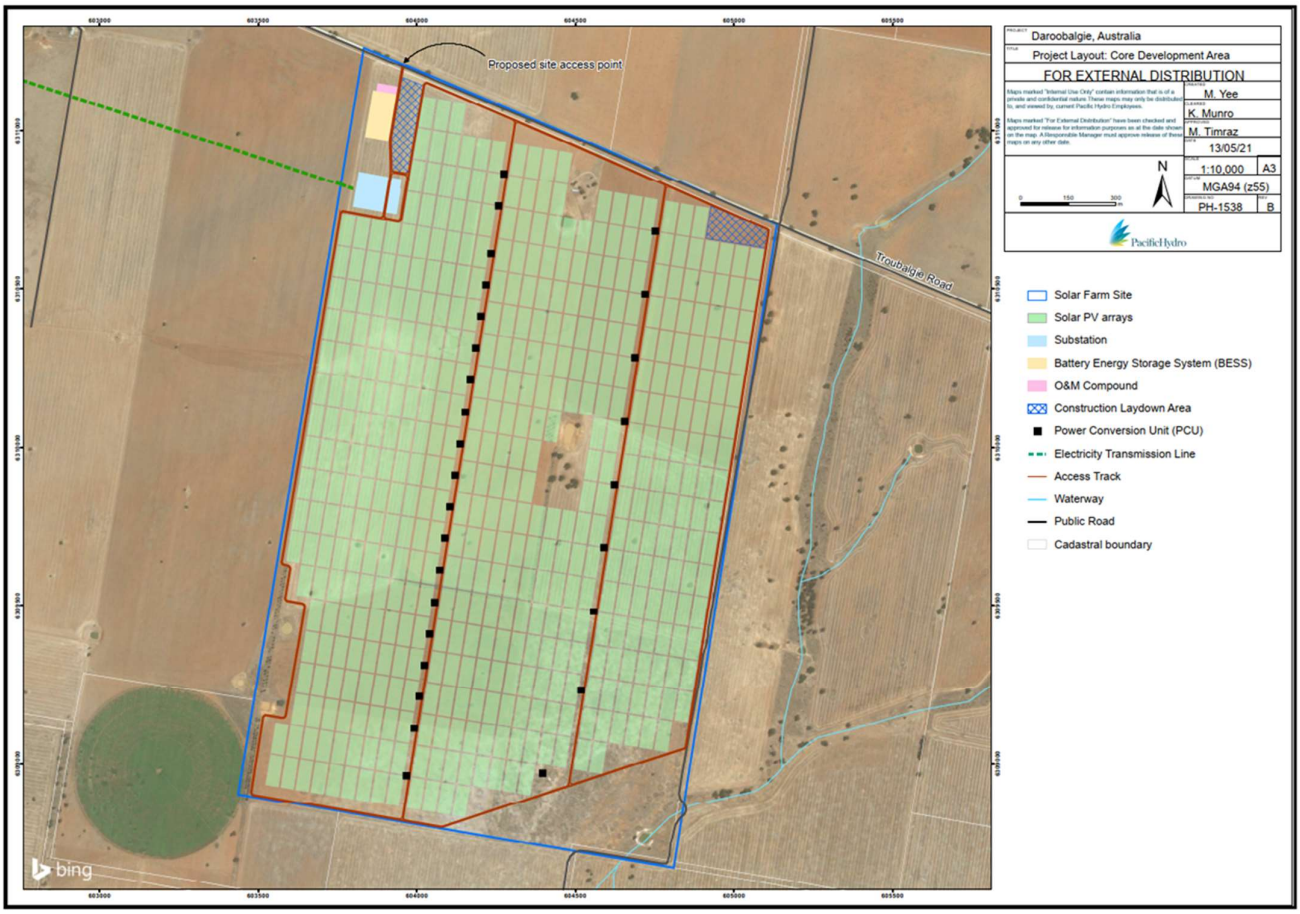


Figure 1-2 General Arrangement of Solar Farm Site

1.4.2 Solar Arrays and PV Modules

The project proposes the installation of PV panels mounted on either fixed-tilt or single-axis-tracking structures that will be configured in rows and columns oriented to the north to optimise power generation achieved at the site.

The PV panels must be elevated on the mounting system to ensure the minimum flood level freeboard requirements at the site and are expected to have a maximum height of up to 4.0 m when fully tilted at 60 degrees. Initial

investigations indicate approximately 420,000 PV panels could be installed for the project however the final design will depend on a range of factors including available technologies, available grid capacity, economies of scale, grid connection and environmental constraints.

1.4.3 Collector Network and Substation

PV panels are wired in a string array with each group feeding a DC-AC inverter, which converts DC current generated from the PV panels into AC current that can then be stepped up to 132 kV at the substation and subsequently exported to the national electricity grid.

Power Conditioning Units (PCUs) will contain the DC-AC inverters, medium-voltage transformers, switchgear, Supervisory Control and Data Acquisition (SCADA) and communications equipment. They are normally housed within 40-foot shipping container-like structures that measure approximately 12 m long x 2.5 m wide x 2.9 m high.

Underground electrical cabling is proposed to be installed between the PV panels, PCUs and the substation and the electricity generated by the project exported to the grid.

A new 33 kV / 132 kV electrical substation will be constructed to enable a connection of the solar farm to the national electricity grid. The proposed 132 kV substation will occupy a footprint of approximately 140 m long by 40 m wide. Its tallest component is the landing gantry that can reach approximately 12-14 m.

1.4.4 Operation and Maintenance Facility

The proposed Operation and Maintenance facility (O&M) is expected to be co-located with the proposed substation and battery storage facility. Structures will include demountable offices, staff amenities, equipment storage sheds, and at-grade car parking.

1.4.5 Battery Energy Storage System

The Battery Energy Storage System (BESS) storage capacity is proposed to be 40 MW and 160 MWh; however, the final sizing and design of the BESS will be determined during the detailed design process. The most likely technology for the BESS is lithium-ion.

The BESS compound will be approximately 150 m by 75 m, fully fenced and secured and proposed to be located immediately adjacent to the substation.

The compound components will include:

- Battery container (if in containerised solution) with approximate dimensions of 12 m long by 2.5 m wide by 3.0 m high
- Bidirectional inverters that converts power from DC to AC and allow charging of the batteries via AC to DC rectifiers
- Protection devices
- Cooling systems
- Control system.

1.4.6 Electricity Transmission Line (ETL)

A new 132 kV transmission line will be constructed from the substation to a switchyard near the existing Forbes-Parkes 132 kV transmission line located approximately 500 m west of the Newell Highway. The ETL is approximately 8.5 km long and traverses a number of private properties and road reserves. The ETL easement will be 45 m wide. Towers are likely to be monopole structures 25-30 m high.

Figure 1-3 shows the proposed route for electricity transmission line, access points and the switchyard.

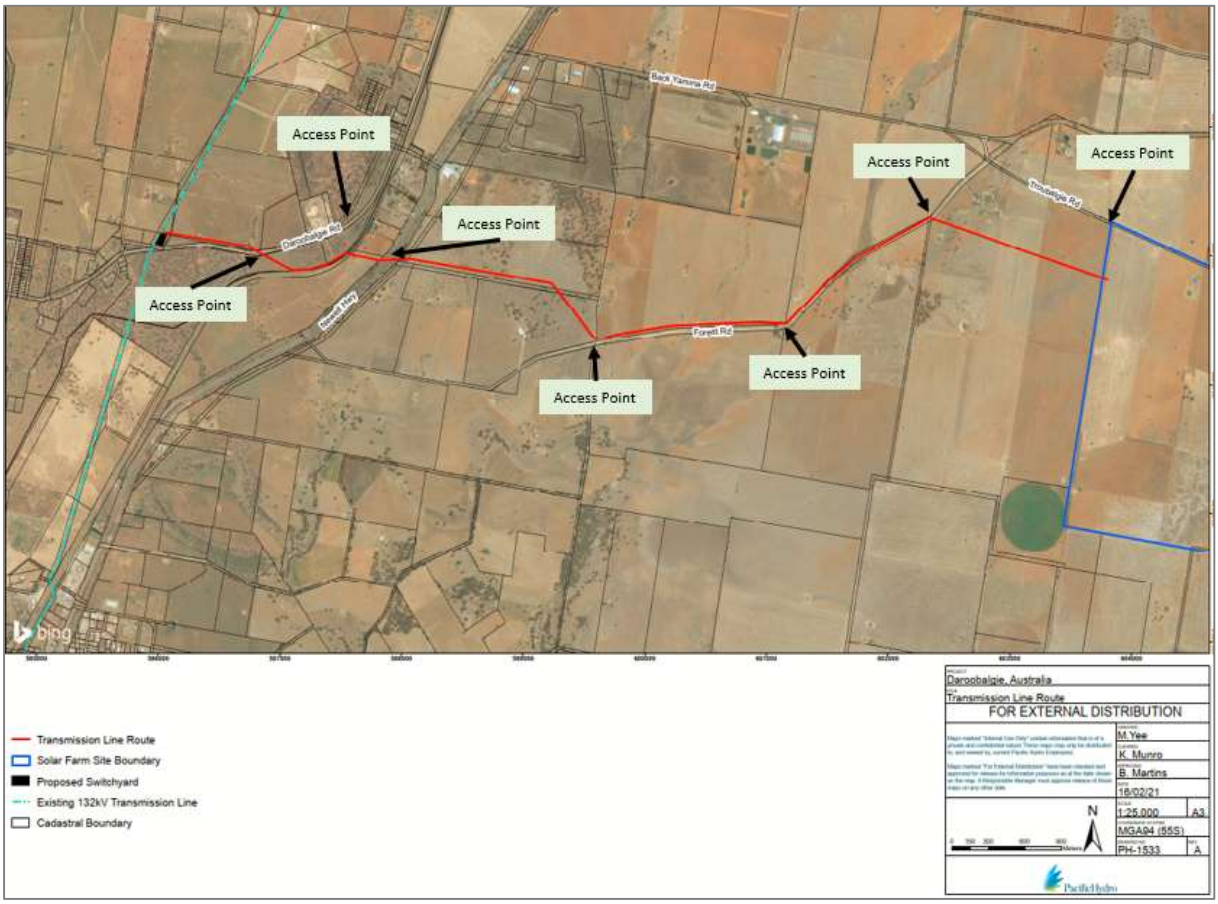


Figure 1-3 Proposed Electricity Transmission Line (ETL) Route and Access Points

1.4.7 Switchyard

The 132 kV Switchyard to connect the proposed ETL to the existing Forbes-Parkes 132 kV TransGrid Transmission Line, is expected to occupy a footprint of 90 m long x 55 m wide. Its tallest components are the landing gantries that can reach approximately 12-14 m.

1.4.8 Internal Access Tracks

The main access tracks will be approximately 6m wide with crushed rock (or similar) and internal access tracks approximately 4 m wide constructed with compacted soil (or similar), engineered to withstand light traffic all year round.

1.4.9 Perimeter Security Fencing

The security fencing is expected to be 2.1 m high total and made from 1.8m high chain-wire mesh and strainer wire and 0.3 m high barbed wire.

2 Existing Traffic Conditions

2.1 Road Network – Solar Farm Site

Figure 2-1 shows the existing road network in the vicinity of the proposed solar farm site. This includes The Escort Way, Newell Highway, Back Yamma Road, Troubalgie Road and Forest Road. The Escort Way and Newell Highway are designated heavy vehicle roads. Back Yamma Road, Forest Road and Troubalgie Road are local roads with sealed/unsealed pavement conditions.

It is recommended to assess the structural condition, as well as loading capacity of these local roads prior to commencement of construction works in consultation with the Forbes Shire Council in order to understand the capacity of infrastructure to carry over-size over-mass (OSOM) vehicle movements.

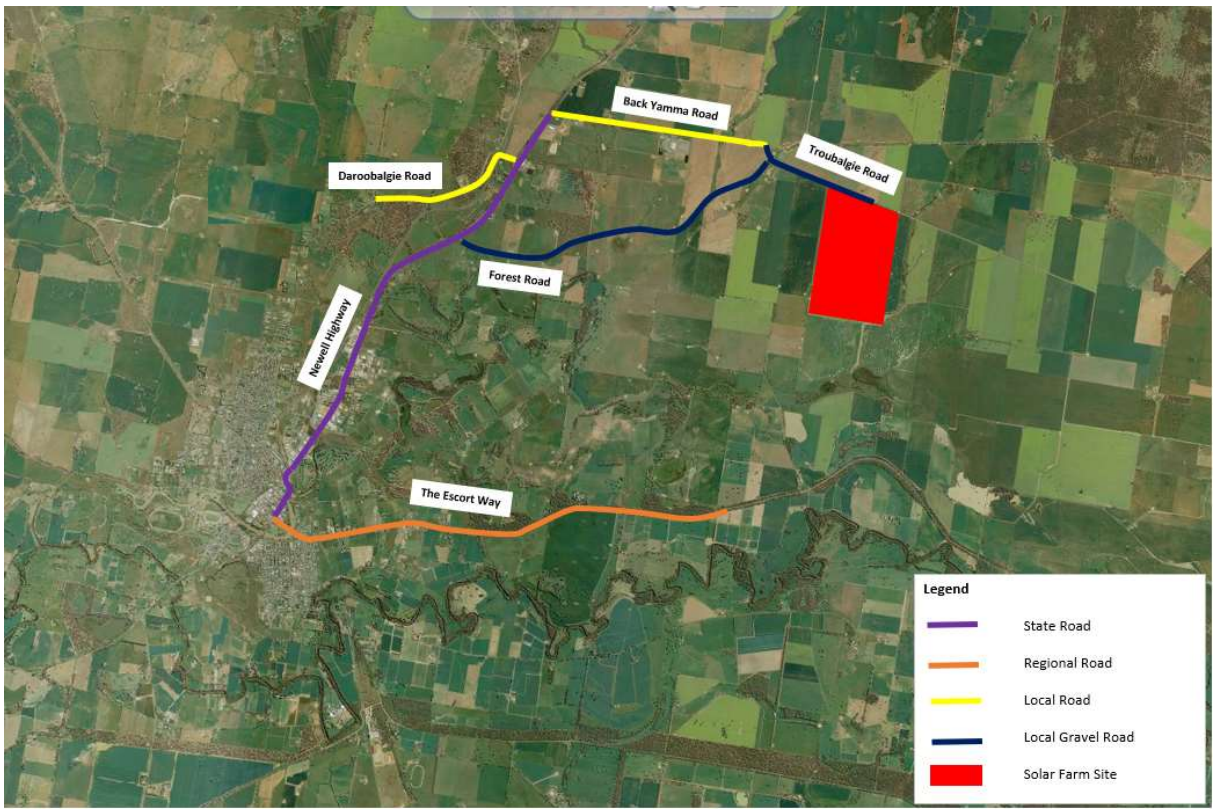


Figure 2-1 Surrounding Road Network (Image Source: SixMap)

2.1.1 Troubalgie Road

Troubalgie Road is a narrow two-way unsealed road with a causeway near its intersection with Back Yamma Road. The road provides direct access to the site and is shown in Figure 2-2.

Figure 2-2 Existing Troubalgie Road

2.1.2 Forest Road

Forest Road intersects with Troubalgie Road at its eastern end and the Newell Highway at its western end and is a narrow two-way unsealed road, which is shown in Figure 2-3. The posted speed limit ranges from 80 km/h to 100 km/h with several bends throughout the road segment.

Figure 2-3 Existing Forest Road

2.1.3 Back Yamma Road

Back Yamma Road is a two-way road with posted speed limit ranging from 80 km/h to 100 km/h with reduced speed zones throughout, as well as truck turning speed limit zones due to sharp bends. Large trucks are currently allowed to use Back Yamma Road to access the Forbes Central West Livestock Exchange. Figure 2-4 to Figure 2-8 show Back Yamma Road leading to the Forbes Central West Livestock Exchange.

Figure 2-4 Existing Back Yamma Road

Figure 2-5 Back Yamma Road/ Newell Highway Intersection

Figure 2-6 Back Yamma Road/Livestock Exchange Access Road Intersection

Figure 2-7 Sharp Bend on Back Yamma Road

Figure 2-8 Existing Culvert on Back Yamma Road

There is a sharp bend in the road immediately after the Back Yamma Road/Livestock Exchange Access Road intersection as shown in Figure 2-7. There are also a number of culverts located on Back Yamma Road between the Livestock Exchange Access Road and Troubalgie Road, such as shown in Figure 2-8.

2.1.4 Newell Highway (A39)

The Newell Highway is a major national highway connecting Queensland, Victoria and NSW. The highway is single carriageway in the vicinity of the project and within Forbes varying from two to four lanes with speed limits ranging from 50 km/h (inside Forbes township) to 110 km/h. An at-grade rail crossing facility is located on the Newell Highway on the northern side of the Union Street/Newell Highway intersection, as shown in Figure 2-9.

Figure 2-9 Existing At Grade Rail Crossing Facility on Newell Highway at Forbes

2.1.5 The Escort Way

The Escort Way is a single carriageway arterial road with two lanes running from the Mitchell Highway in Orange to the Lachlan Valley Way in Forbes. The posted speed limits on the road vary from 100 km/h outside of the Forbes Council area, 80 km/h on entry to the Forbes Council area and 50 km/h approaching the centre of the town.

2.2 Traffic Volumes

2.2.1 Traffic Count Survey Locations

For the purpose of this study, comprehensive traffic surveys were completed in March 2021 to understand and analyse existing traffic volumes and patterns within the study area. Traffic survey count locations are shown in Figure 2-10.

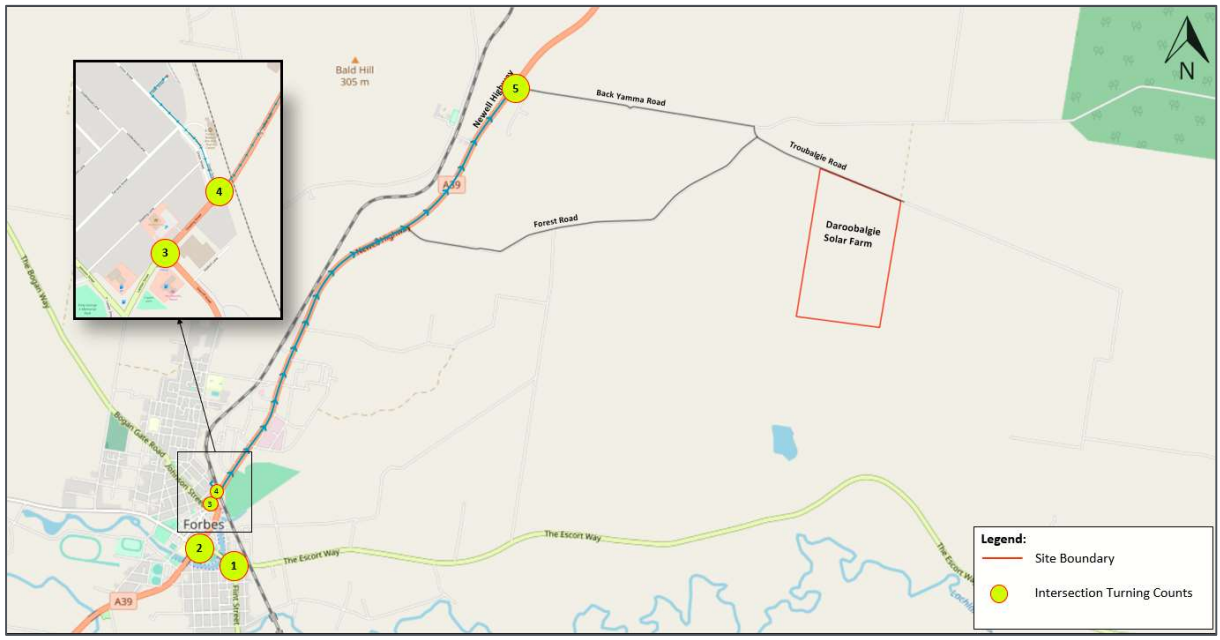


Figure 2-10 Intersection Turning Count Survey Locations

2.2.2 Intersection Turning Volumes and Patterns

Table 2-1 summarises details of intersection turning movement counts, which were undertaken for a three and half hour period during the morning peak (6 am to 9.30 am) and for three hours during the afternoon peak (4 pm to 7 pm) for an average weekday at five locations.

Table 2-1 Intersection Turning Count Locations – Summary

ID	Intersection	Control Type	Survey Period	Survey Date
1	Flint Street/The Escort Way Intersection	Roundabout	6:00 am to 9:30 am and 4:00 pm to 7:00 pm	Tuesday, 2nd March 2021
2	Newell Highway/Camp Street Intersection	Priority		
3	Newell Highway/Dowling Street Intersection	Signal		
4	Dowling Street/Union Street Intersection	Priority		
5	Newell Highway/Back Yamma Road Intersection	Priority		

Figure 2-11 to Figure 2-15 show traffic volumes by vehicle type for the AM and PM peak survey periods.

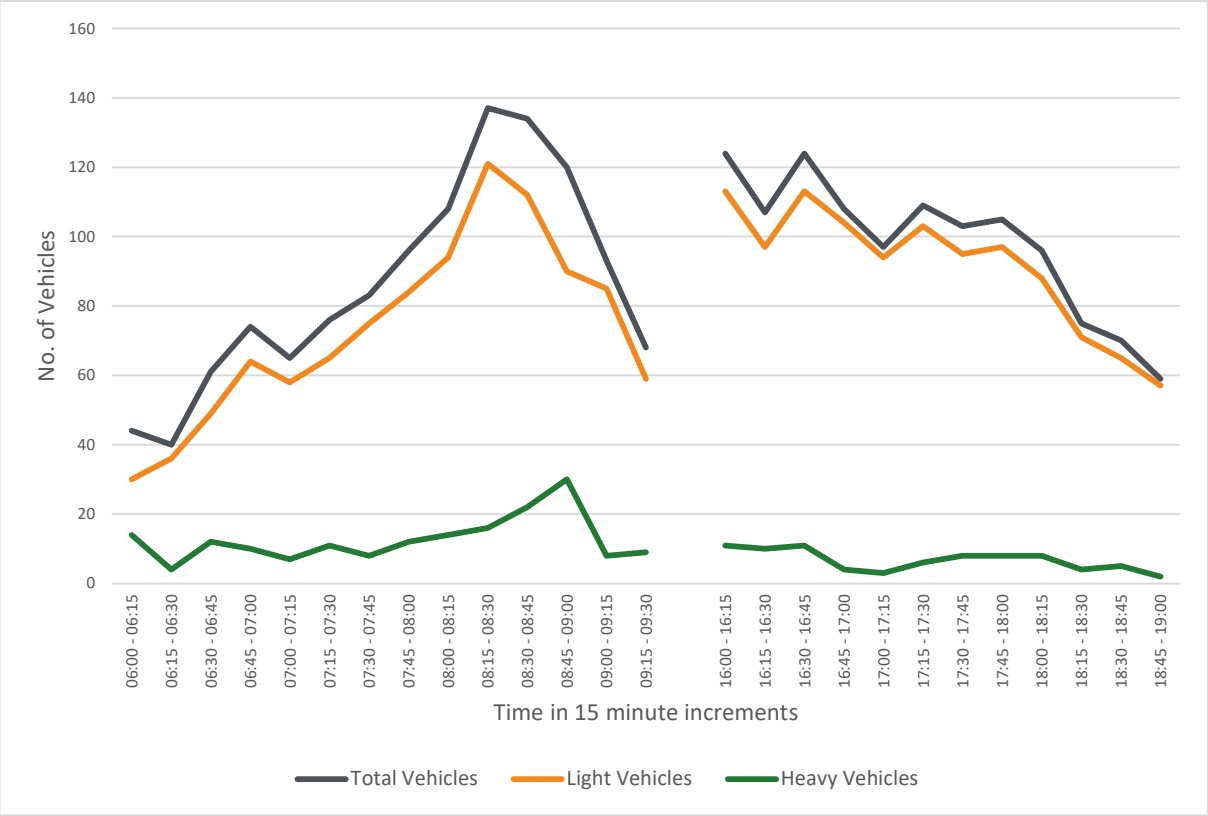


Figure 2-11 Intersection Turning Flows Profile by Vehicle Type at Flint Street/The Escort Way Intersection

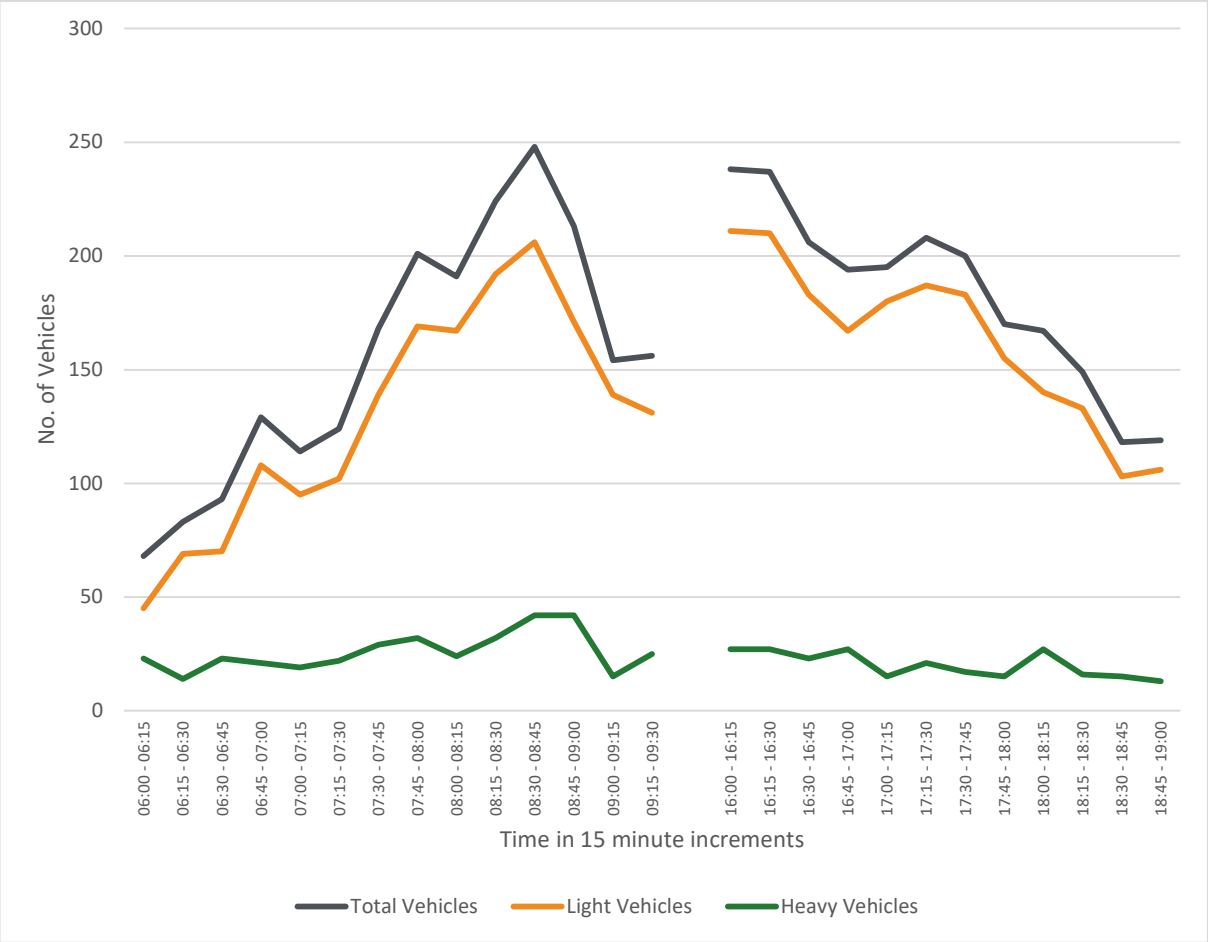


Figure 2-12 Intersection Turning Flows Profile by Vehicle Type at Newell Highway/Camp Street Intersection

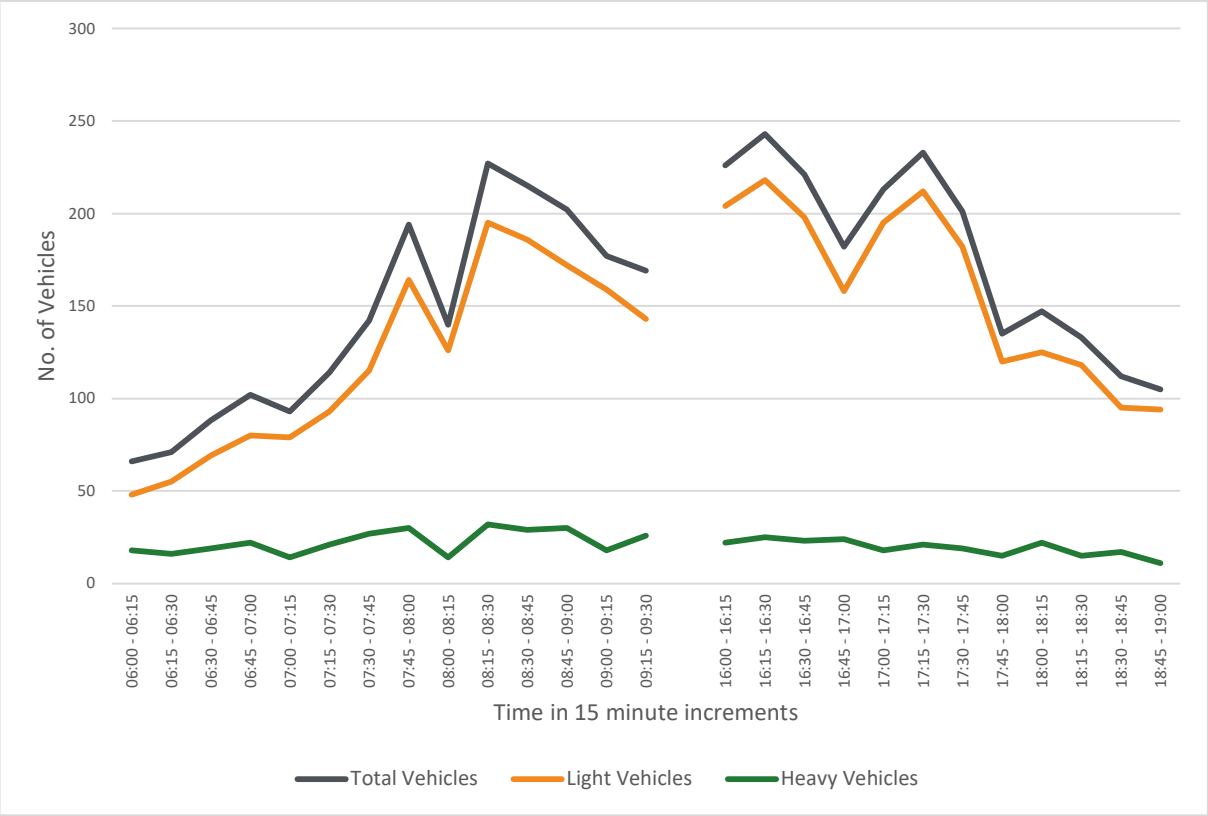


Figure 2-13 Intersection Turning Flows Profile by Vehicle Type at Newell Highway/Dowling Street Intersection

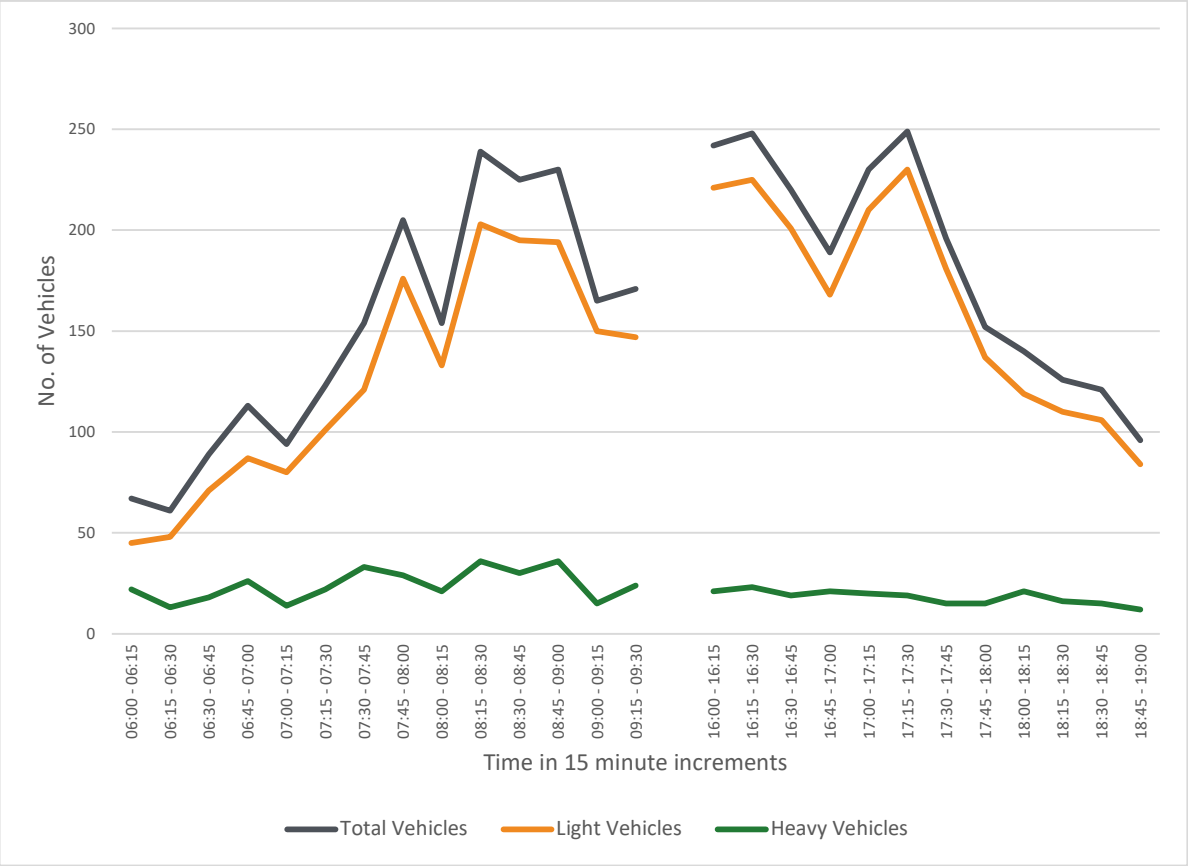


Figure 2-14 Intersection Turning Flows Profile by Vehicle Type at Union Street/Dowling Street Intersection

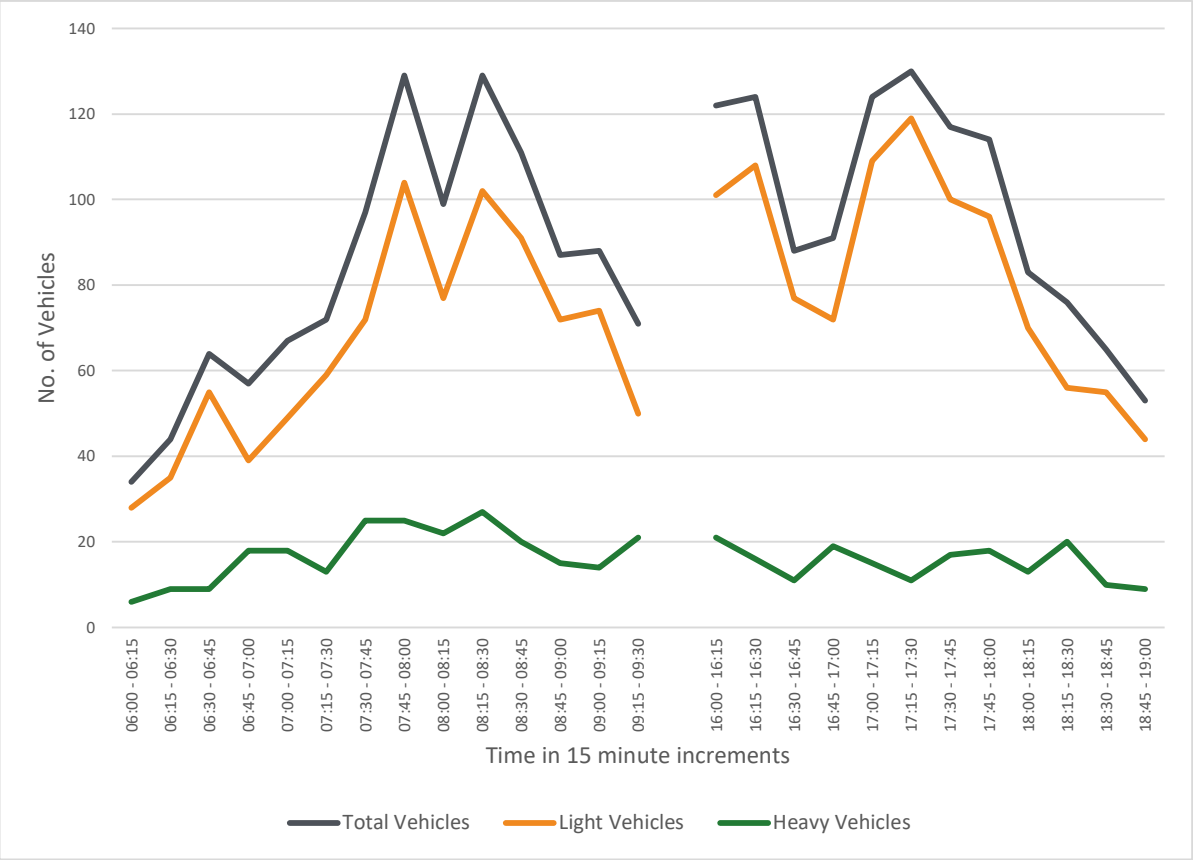


Figure 2-15 Intersection Turning Flows Profile by Vehicle Type at Newell Highway/Back Yamma Road Intersection

In general, intersection traffic volumes during the morning peak and afternoon peak periods are similar. High heavy vehicle movements was also observed at the studied intersections during both the AM and PM peak periods.

Table 2-2 summarises hourly traffic volumes and the heavy vehicle percentage along Newell Highway and The Escort Way.

Table 2-2 Hourly Traffic Flows and Heavy Vehicle Percentage at Newell Highway and The Escort Way

Name	Direction	Weekday AM peak (1 hour)		Weekday PM peak (1 hour)	
		Total	Heavy	Total	Heavy
Newell Highway	Northbound	353	43 (12%)	347	31 (9%)
	Southbound	333	52 (16%)	411	49 (12%)
	Two-way	**686**	**95 (14%)**	**758**	**80 (11%)**
The Escort Way	Eastbound	77	15 (19%)	113	8 (7%)
	Westbound	145	18 (12%)	94	9 (10%)
	Two-way	**222**	**33 (15%)**	**207**	**17 (8%)**

It is evident from this information that peak hour traffic flows along these roads are low. It is anticipated that these roads would have sufficient capacity to accommodate additional construction related traffic volumes during the construction of the proposed project.

2.3 Existing Intersection Performance

SIDRA Intersection software (version 9.0) has been used to assess intersection performance at key intersections. Roads and Maritime's *Traffic Modelling Guideline, Version 1, February 2013* (modelling guideline) was used as the main guideline for base year model development.

2.3.1 Level of Service Criteria

The performance of an intersection is measured by the intersection average delay per vehicle which corresponds to a Level of Service (LoS) measure for the intersection.

Performance of an intersection is measured in accordance with the *Austroads Guide to Traffic Management-Part 3: Traffic Studies and Analysis (2013).* The guideline recommends that for priority intersections, such as roundabouts and sign controlled intersections, the LoS value is determined by the critical movement with the highest delay, whereas for a signalised intersection LoS criteria are related to the average overall intersection delay measured in seconds per vehicle.

Intersection LoS were assessed using the standard Roads and Maritime Level of Service criteria for intersections, which are reproduced in Table 2-3 below.

Table 2-3 Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	>70	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing

Source: RTA Guide to Traffic Generating Developments

2.3.2 Intersection Performance Analysis Results

Intersection performance was assessed for base year 2021 using the intersection turning counts data. Table 2-4 and Table 2-5 summarise base case intersection performance results for the AM and PM peak hours respectively.

Table 2-4 Existing Base Case Intersection Modelling Results, AM Peak

Intersection	Avg. Delay	LoS	DoS	95th Back of Queue Length [m]
Flint Street/The Escort Way Intersection	11.1*	A	0.17*	-
Newell Highway/Camp Street Intersection	11.4*	A	0.30*	-
Newell Highway/Dowling Street Intersection	31.2	C	0.73	67 (Westbound approach)
Dowling Street/Union Street Intersection	10.4*	A	0.22*	-
Newell Highway/Back Yamma Road Intersection	10.8*	A	0.11*	-
Newell Highway/Forest Road Intersection	8.7*	A	0.15*	-

** Worst movement*

Table 2-5 Existing Base Case Intersection Modelling Results, PM Peak

Intersection	Avg. Delay	LoS	DoS	95th Back of Queue Length [m]
Flint Street/The Escort Way Intersection	11.3	A	0.16	-
Newell Highway/Camp Street Intersection	11.1	A	0.27	-
Newell Highway/Dowling Street Intersection	31.7	C	0.77	67 (Westbound approach)
Dowling Street/Union Street Intersection	10.1*	A	0.26*	-
Newell Highway/Back Yamma Road Intersection	11.3*	A	0.14*	-
Newell Highway/Forest Road Intersection	8.6*	A	0.16	-

** Worst movement*

All intersections are performing with acceptable LoS during both AM and PM peak hours for the base case scenario. A 67-metre long queue is predicted along the westbound approach of Newell Highway/Dowling Street intersections during both AM and PM peak hours. This is due to high eastbound right turning movements from Newell Highway travelling to north. Details of the SIDRA modelling outputs are provided in Appendix A.

2.3.3 Safe Intersection Sight Distance Assessment – Newell Highway/Forest Road Intersection

During the coordination meeting with Forbes Shire Council and Transport for NSW (TfNSW) held on 14th of July 2021, TfNSW raised concern about the safe intersection sight distance (SISD) at Newell Highway/Forest Road. Consequently, a SISD assessment has been undertaken at this intersection.

Safe Intersection Sight Distance (SISD) has been assessed at the intersection of Newell Highway and Forest Road, Forbes, in accordance with *RMS Supplements to Austroads Guide to Road Design (AGRD) Part 4A Section 3.2.2*.

SISD is the minimum sight distance which should be provided on the major road at any intersection as shown in Figure 2-16.

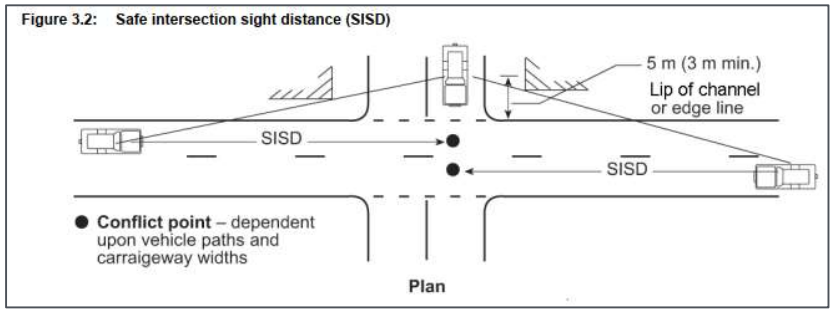


Figure 2-16 SISD check (typical) (AGRD Part 4A Figure 3.2)

SISD at this location has been assessed on the below criteria:

- Reaction Time R_T = 2.5 sec (rural roadway)
- Offset from conflict point (centre of lane) to position of waiting vehicle on side road = 7 m
- Driver eye height, h_1 = 1.1 m
- Object height (i.e. top of car), h_2 = 1.25 m
- Design speed = 110 km/h
- Grade correction factor = 0 (flat alignment)

Based on the above criteria, SISD required at this intersection = 300 m (AGRD Part 4A Table 3.2).

SISD was assessed using Google Maps and Street View. This method of assessment was deemed suitable for this intersection due to the very flat terrain and large horizontal radius on the Newell Highway in the vicinity of the intersection.

As shown in Figure 2-17 and Figure 2-18, SISD of 300 m is achieved in both directions to/from a vehicle on the Newell Highway to a vehicle stopped on Forest Road at the intersection. Figure 2-19 and Figure 2-20 demonstrate the line of sight to/from the waiting vehicle on Forest Road.

Figure 2-17 SISD of 300 m achieved Northbound (NB) vehicle on Newell Highway to vehicle on Forest Road

Figure 2-18 SISD of 300 m achieved from Southbound (SB) vehicle on Newell Highway to vehicle on Forest Road)

Figure 2-19: Street view of sight line to/from vehicle on Forest Road, to the north

Figure 2-20: Street view of sight line to/from vehicle on Forest Road, to the south

Additionally, SISD was also confirmed from a vehicle travelling on Newell Highway to another vehicle on Newell Highway turning into Forest Road. Refer Figure 2-21 and Figure 2-22 for plan view and Figure 2-23 and Figure 2-24 for street view.

Figure 2-21: SISD of 300 m achieved from Northbound (NB) vehicle on Newell Highway to NB vehicle turning right into Forest Road

Figure 2-22: SISD of 300 m achieved from Southbound (SB) vehicle on Newell Highway to SB vehicle turning left into Forest Road

Figure 2-23: Street view of sight line from NB vehicle on Newell Highway to vehicle turning into Forest Road

Figure 2-24: Street view of sight line from SB vehicle on Newell Highway to vehicle turning into Forest Road

In summary, as demonstrated in the above assessment, SISD is achieved at this intersection for all required directions/movements.

2.4 Rail Infrastructure and Services

Rail services run through both Parkes and Forbes. An at grade rail crossing facility is available on Newell Highway north of Union Street/Newell Highway intersection, as shown in Figure 2-9. Parkes, which is approximately 25km from the solar farm site, is the crossroads of the Australian railway system, with access to all of the state capitals and major ports via the Defined Interstate Rail Network (DIRN), which is standard gauge.

To support the NSW state government's target for increased rail modal share, the project will explore the use of rail for haulage of project components. Rail is a safe, efficient, and ideal choice for transporting the many intermodal shipping containers that will be used to deliver solar panels and other components.

2.5 Coach Services

The Western NSW coach service runs through Forbes using The Escort Way from the east or Newell Highway from the south. It then travels to Parkes using the Newell Highway as shown in Figure 2-25. The Western NSW coach service operates three time a day including two services in the morning and one service in the afternoon.

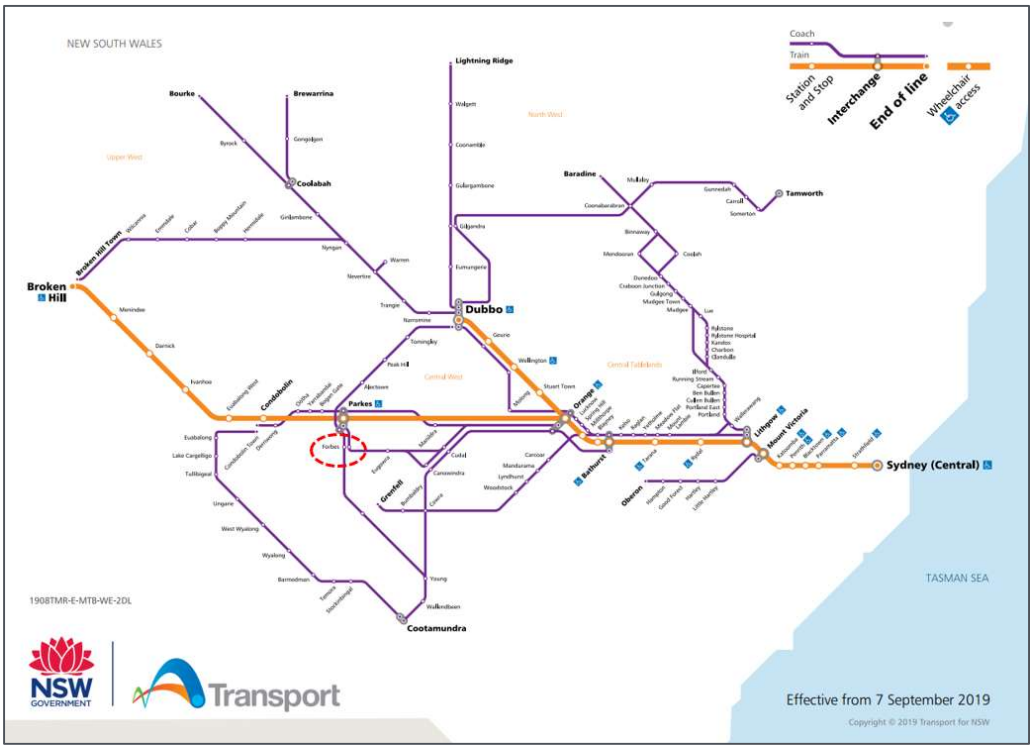


Figure 2-25 Existing Western NSW Coach Service Map (Source: TfNSW)

Currently coach services do not run through the local roads of Back Yamma, Forest Road and Troubalgie Road.

2.6 School Bus Services

Figure 2-26 shows existing school bus routes in the vicinity of the solar farm site. As shown, a designated school bus route uses Back Yamma Road, Daroobalgie Road and a small section of Newell Highway to provide school bus services to residents located along Back Yamma Road, Daroobalgie Road and in Forbes. There is also another school bus route runs through Newell Highway between Forbes and Parkes.

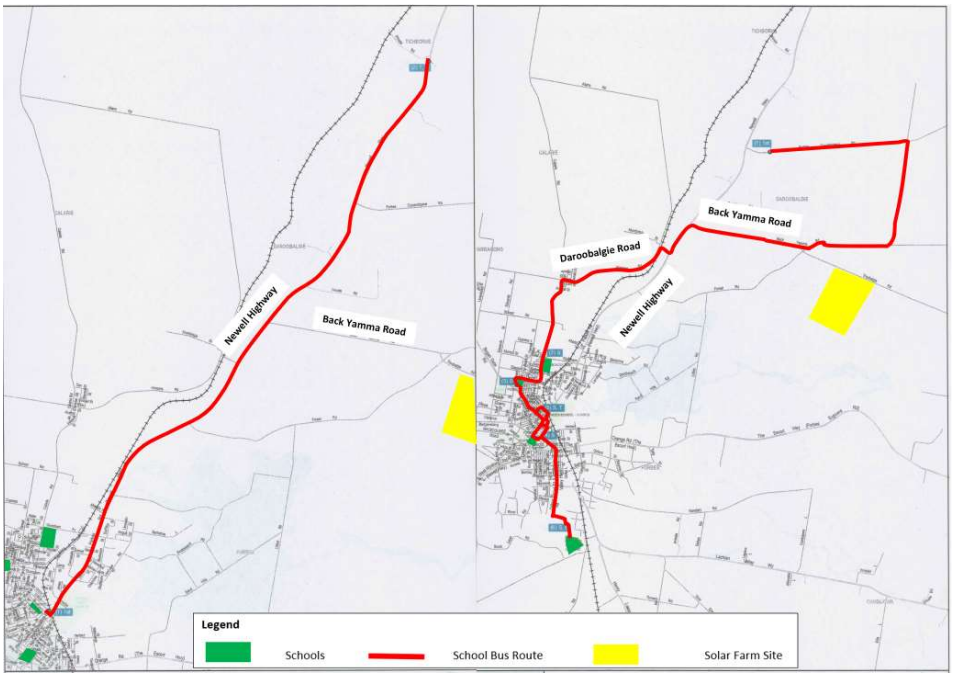


Figure 2-26 Existing Schools and School Bus Routes in the Vicinity of Solar Farm Site

2.7 Other Developments

2.7.1 Forbes Central West Livestock Exchange

The Forbes Central West Livestock Exchange, approximately 3 km west of the proposed solar farm site is owned by Forbes Shire Council. Key information about the Livestock Exchange (*Source: Pacific Hydro*), is summarised, as follows:

- Sale days - Mondays and Tuesdays (Mondays for cattle and Tuesdays for sheep)
- Capacity of the livestock exchange is up to 3,000 cattle, 50,000 sheep and 1,200 pigs
- 7 full time council staff. On sale days, there could be 300 people on site including agents, farmers and transport operators
- Typical work hours:
  - Monday 5 am to 9 pm
  - Tuesdays 3 am to 9 pm
  - Wednesday to Friday 7 am to 4 pm
  - Saturday 9 am to 3 pm
  - Sunday 3 pm to 11 pm
- Troubalgie Road, Back Yamma and Forest Road are used by transport operators to transport livestock to the livestock exchange for sale
- Occasionally cattle and sheep are brought to the livestock exchange by walk.

2.7.2 Other Solar Farms

There are several other solar farms in the area. The solar farms at Goonumbla, Jemalong and Parkes have already been constructed and are now operational. The assessment process of Quorn Park Solar Farm is on-going. These developments are sufficiently far apart from the proposed site, such that no traffic overlap is expected. A list of these solar farms is provided in Table 2-6 with locations presented in Figure 2-27.

Table 2-6 Nearby Solar Farms in the Vicinity of the Proposed Site

Solar Farm Development	Location	Status
Goonumbla Solar Farm	West of Parkes; access via Henry Parkes way	Operational
Jemalong Solar Farm	Southwest of Forbes; access via Lachlan Valley Way	Operational

Solar Farm Development	Location	Status
Parkes Solar Farm	West of Parkes; access via Henry Parkes way	Operational
Quorn Park Solar Farm	West of Parkes; access via Henry Parkes way	Under assessment

Figure 2-27 Locations of Other Solar Farms in Area

3 Construction Impacts

The construction phase of the project will generate the largest volume of project-related traffic and consequently have the greatest impact on the road network. Assessment of project impacts on the surrounding road network were undertaken against the following criteria:

- Road and intersection capacity
- Pavement condition
- Average travel speed
- Property access
- Pedestrians and cyclists
- School bus route(s)
- Public transport
- Culverts
- Traffic safety
- Car parking and laydown areas.

3.1 Construction Programme

Construction start and end dates are not known at this time, however total duration of construction works is anticipated to be 56 weeks from commencing date. Table 3-1 summarises the duration of various tasks (not necessarily in sequential order, many activities will overlap) required for construction of the proposed solar farm.

Table 3-1 Duration of Tasks during Construction Stage

Task Name	Duration
Construction activities	**56 weeks**
Site mobilisation	4 weeks
Site set-up/access roads	8 weeks
HV trenching	12 weeks
PV plant installation	30 weeks
Substation/BESS and O&M construction	52 weeks
Transmission line	12 weeks
Switchyard construction	30 weeks
Commissioning (Energisation and commercial operation)	12 weeks

Source: Pacific Hydro

3.2 Traffic Generation

3.2.1 Construction

The construction phase is expected to generate the largest number of traffic during the lifetime of the project.

Table 3-2 shows estimated construction related heavy vehicle movements during various stages of construction. Four over-dimensional truck movements are anticipated to occur during the substation construction stage to deliver transformers and electric rooms.

Table 3-2 Estimated Heavy Vehicle Movements (one-way) and Heavy Vehicle Types

Task Name	Purpose	Vehicle Type	No of one-way vehicle movements	Total No of one-way vehicle movements per task
Site mobilization and demobilisation	Portacabin delivery and removal	Low loader	20	24
	Water tank delivery and removal	Low loader	4	
Site set-up and access roads	Skip delivery and removal	Low loader	40	1358
	General deliveries	Semi-trailer	34	
	Crane mobilization and demob	Crane	4	
	Delivery of imported capping for road laydowns and crane hardstands	Truck and dog	400	
	Plant delivery and removal: excavators, compactors drill rig	Low loader	30	
	Fuel delivery	Fuel trucks	40	
	Water carts	Water cart	720	
	Concrete deliveries for maintenance container hardstands	Concrete agitators	90	
HV trenching	Cable delivery	Semi-trailer or B-double	180	1820
	Fuel deliveries	Fuel trucks	40	
	Backfill material delivery	Dump truck	1400	
	DC cabling trays and combiner boxes	Semi-trailer or B-double	200	
PV plant installation	Module deliveries	Semi-trailer	1300	2354
	Mounting structure and pile deliveries	Semi-trailer	1000	
	Inverter delivery	Low loader	26	
	Telescopic handler and excavator	Low loader	28	
Substation construction	Delivery of transformer units (4 OD vehicles) Crane (4 OD vehicles) Electrical building (1 OD vehicle)	OD vehicle	9	9
Electrical transmission line	Transmission towers	Semi-trailers	100	100
Switchyard	Concrete deliveries	Concrete agitators	90	110
	Infrastructure deliveries	Semi-trailers	20	
		Total one-way heavy vehicle movements		**5,775**

Source: Pacific Hydro, 2020

As shown in the above table, the majority of the one-way heavy vehicle movements would occur during the PV plant installation stage (2354 one-way truck movements over 30 weeks period). However, the maximum daily truck movements would occur during site set-up and access roads stage (1358 one-way truck movements over 8 weeks period).

Assuming 6 working days a week and on an average 10 working hours per day (assuming standard working hours - 6am to 7pm on weekday Monday to Friday and 8am to 1pm on Saturday), there would be 29 one-way heavy vehicle movements per day (around three one-way heavy vehicle movements per hour) during the site-up and access roads stage. This is considered to be the stage that generates the most significant heavy vehicle related movements and has been utilised to assess impacts during the construction stage.

In addition, the average number of staff during the peak construction stage would be around 200 comprising of trade assistants, sub-contractors and electricians (source: Pacific Hydro). Assuming a vehicle occupancy of 1.2 persons per vehicle, this would generate 167 one-way light vehicle movements. For the purposes of traffic assessment, it is assumed that all 167 vehicles would access the site during the AM peak hour and would leave the site during the PM peak hour.

3.2.2 Operation

Traffic generated during the operational phase is expected to be minimal in comparison to the construction phase. It is expected that operation will not generate significant traffic. The main activities that are involved in the operational phase are travel to and from the site for normal operational activities and routine maintenance.

3.2.3 Decommissioning

It is expected that decommissioning of the solar farm and its component components will be similar to that of the construction period.

3.3 Construction Vehicle Routes and Traffic Distribution

It is likely that either Port of Botany, Port of Newcastle or Port Kembla would be used to deliver construction related materials. It is likely that all construction materials would be transported to the site via road, however rail is another option to transport construction materials.

To support the NSW state government's target for increased rail modal share, the project will explore the use of rail for haulage of project components. Rail is a safe and efficient option for transporting the many intermodal shipping containers that will be used to deliver solar panels and other components. The Stockinbingal-Parkes railway line is located close to the project site, which is managed by the Australian Rail Track Corporation (ARTC).

Parkes, which is approximately 25km from the solar farm site, is the crossroads of the Australian railway system, with access to all of the state capitals and major ports via the Defined Interstate Rail Network (DIRN), which is standard gauge.

Locations where intermodal containers might be unloaded include sidings at Forbes (Mountain Industries intermodal terminal) and Parkes (several sidings) with extensive intermodal handling and transhipment capabilities. There are also several local trucking contractors who can handle the 'last miles' from the railhead to the project site.

There are two road options available to transport construction materials, namely from the north using Newell Highway (A39) and/or Henry Parkes Way via Parkes or from the south using The Escort Way and Newell Highway via Forbes. All of these roads are designated heavy vehicle routes and would be able to accommodate additional heavy vehicle movements associated with the project. Both of these routes would require heavy vehicles to access the site from Newell Highway via Back Yamma Road and Troubalgie Road.

Whilst both heavy vehicle routes, from the north via Parkes and from the south via Forbes as shown in Figure 3-1, would be able to accommodate additional construction related heavy vehicles, for purposes of traffic assessment, the route from the south via The Escort Way through Forbes is considered for detailed assessment, which aligns with the requirements of the SEARs. It is also to be noted that the intersection at Newell Highway and Back Yamma Road has spare capacity to accommodate vehicles coming from north via Parkes.

Figure 3-2 shows the proposed route for heavy and light construction related vehicles to the construction site from the south via Forbes using The Escort Way, Newell Highway, Back Yamma Road and Troubalgie Road. The Escort Way, Newell Highway and part of Back Yamma Road (between Newell Highway and Central West Livestock Exchange Access Road) are designated heavy vehicle roads.

Figure 3-1 Approved B-Double Route (26 metre)

Forest Road is not considered to be suitable for heavy vehicle movements due to the tight turning radius at the Forest Road/Troubalgie Road intersection, as well as due to the general condition of the road and the fact that the road is unsealed making it unsuitable for heavy vehicles following rainfall. The only heavy vehicle traffic that will be permitted access to Forest Road during construction, will be the small number of vehicles required for the construction of the ETL.

A small number of light vehicles may also utilise Forest Road to access the solar farm site, however light vehicle use will be also be largely restricted through mitigation measures outlined in a Traffic Management Plan.

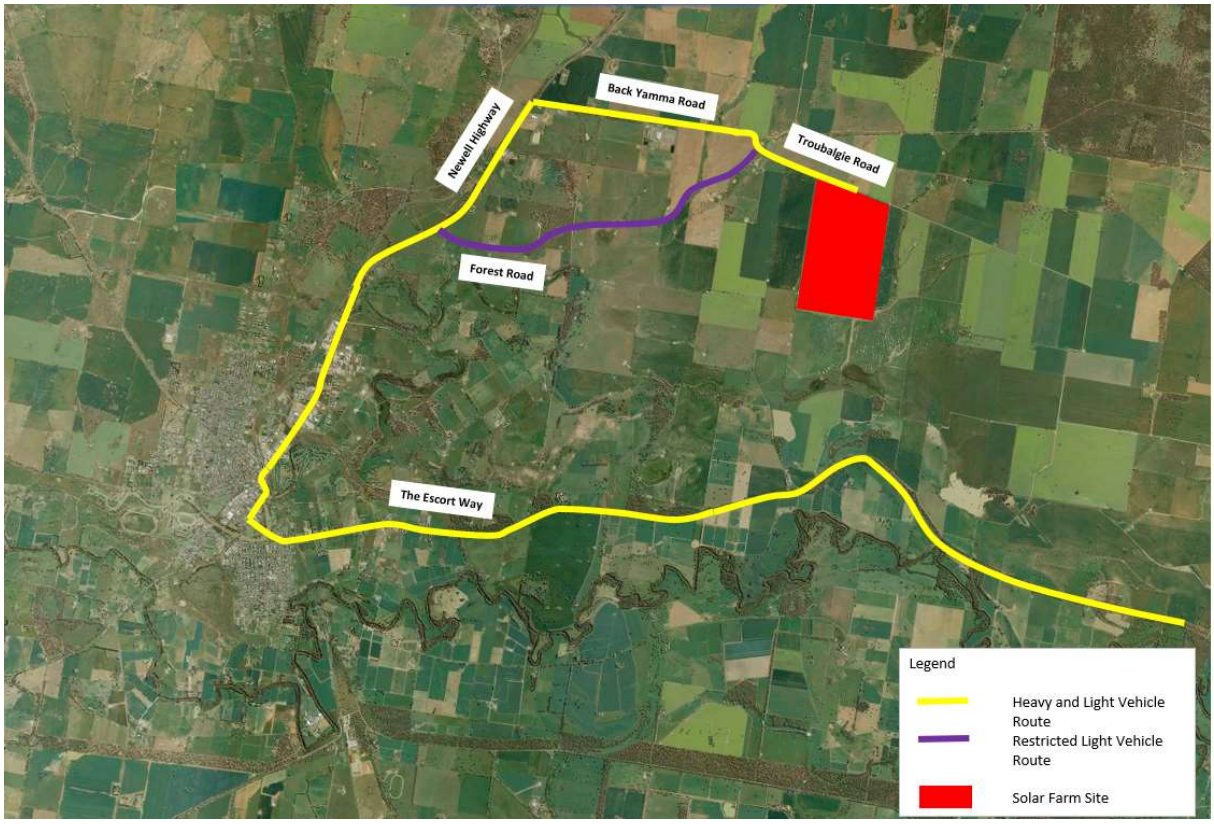


Figure 3-2 Proposed Route for Construction Related Vehicles (Heavy and Light)

For the purpose of this traffic assessment, it is anticipated that 100% of heavy vehicles would use the Escort Way, Newell Highway, Back Yamma Road and Troubalgie Road to access the site. In regard to the light vehicles, it is assumed that majority of the staff would stay at the nearby town of Forbes and Parkes and would travel to the site via Newell Highway. As such, 60% of light vehicles are assumed to travel from south (from Forbes) and the other 40% would travel from north (from Parkes) via Newell Highway into Back Yamma Road and Forest Road to access construction site. It is anticipated that 80% of the total light vehicles would use Back Yamma Road, while 20% would use Forest Road to access the site. This is a conservative estimate of light vehicle use on Forest Road for the purpose of predicting worst-case impacts on this route. The proposed traffic distribution is shown in Figure 3-3.

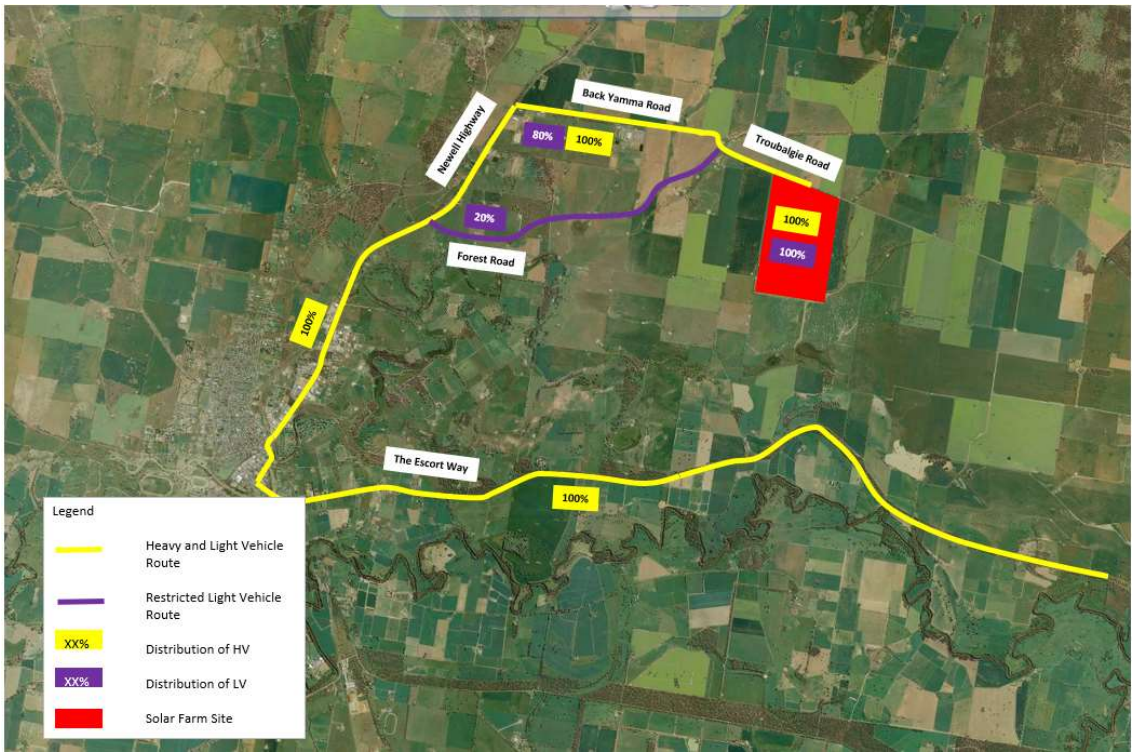


Figure 3-3 Distribution of Construction Related Vehicles

3.4 Construction Impacts Assessment

The construction phase of the project will generate the largest volume of project-related traffic and consequently have the greatest impact on road network. Assessment of project impacts on the surrounding road network are discussed in the following sections.

3.5 Road and Intersection Capacity

Performance of the six key intersections were assessed for the development case scenario considering the additional heavy and light vehicles that will be generated during the construction stage. Commencement and end dates for construction are not currently known, however it is anticipated that the construction will start between 2023 and 2026. For purposes of this traffic assessment and estimation of future year background traffic, it is assumed that construction would start in 2023 and run for a duration of 56 weeks.

3.5.1 Growth Rate Estimation

There is no historical traffic count data available in the vicinity of the proposed site. However, a permanent traffic counter (Station ID: 6144) is located on the southern side of Forbes on the Newell Highway. Traffic volume data from this counter was used to estimate the annual growth rate of traffic in the area. Table 3-3 shows the historical traffic volume data on Newell Highway and associated annual traffic growth.

Table 3-3 Historical Daily Traffic Counts Data and Growth Rates (Station ID: 6144)

Movement	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
Eastbound	1329	1370	1336	1148	1283
Westbound	1278	1311	1280	1098	1279
Total	**2607**	**2681**	**2616**	**2246**	**2562**
Growth Rate (%)		***3%***	***-2%***	***-14%***	***14%***

Source: RMS Traffic Volume Viewer (Station ID: 6144)

As shown in Table 3-3, there is a negative trend of traffic growth between 2018 and 2020. Although a positive growth is observed between 2020 and 2021, the daily total traffic volume in 2021 is still less than that of 2019. As such, no growth factor has been applied to existing traffic count survey data to estimate intersection turning volumes for 2022 when construction is expected to be ongoing.

3.5.2 Intersection Capacity

The performance of six key intersections were assessed with the additional construction related traffic volumes. Table 3-4 and Table 3-5 show performance of key intersections with additional construction related traffic for the AM and PM peak hours respectively.

Table 3-4 Intersection Modelling Results with Construction Traffic, AM Peak

Intersection	Avg. Delay	LoS	DoS	95th Back of Queue Length [m]
Flint Street/The Escort Way Intersection	11.1*	A	0.21*	-
Newell Highway/Camp Street Intersection	13.4*	A	0.47*	-
Newell Highway/Dowling Street Intersection	34	C	0.81	100 (Southeast approach)
Dowling Street/Union Street Intersection	12.3*	A	0.27*	-
Newell Highway/Back Yamma Road Intersection	12.5*	A	0.15*	-
Newell Highway/Forest Road Intersection	9.4*	A	0.21*	-

** Worst movement*

Table 3-5 Intersection Modelling Results with Construction Traffic, PM Peak

Intersection	Avg. Delay	LoS	DoS	95th Back of Queue Length [m]
Flint Street/The Escort Way Intersection	11.7*	A	0.22*	-
Newell Highway/Camp Street Intersection	12.7*	A	0.31*	-
Newell Highway/Dowling Street Intersection	31.4	C	0.78	72 (Northeast approach)
Dowling Street/Union Street Intersection	11.5*	A	0.31*	-
Newell Highway/Back Yamma Road Intersection	11.8*	A	0.25*	-
Newell Highway/Forest Road Intersection	9.4*	A	0.20*	-

** Worst movement*

All intersections are predicted to perform with acceptable LoS with the additional project construction related traffic. An 86-metre long queue is predicted in the AM peak on the westbound approach of the Newell Highway/Dowling Street intersection. This is due to high right turning vehicle movements from Newell Highway accessing the north approach to travel north.

The above assessment assumes that all three heavy vehicles (per hour) would approach from the south travelling via the Escort Way and Newell Highway into the Newell Highway/Back Yamma Road intersection with this intersection is performing LoS 'A'. However, should these vehicles approach from the north, this intersection would continue to perform satisfactorily due to low expected hourly vehicle volumes.

Details of the SIDRA outputs are provided in Appendix A.

3.6 Pavement Condition

The construction vehicle route via The Escort Way, Newell Highway and Back Yamma Road (between Newell Highway and Livestock Exchange Access Road) is a designated heavy vehicle route and anticipated to have minor/no impacts on pavement condition due to additional construction vehicle movements.

Troubalgie Road and Forest Road are unsealed roads as shown in Figure 3-4.

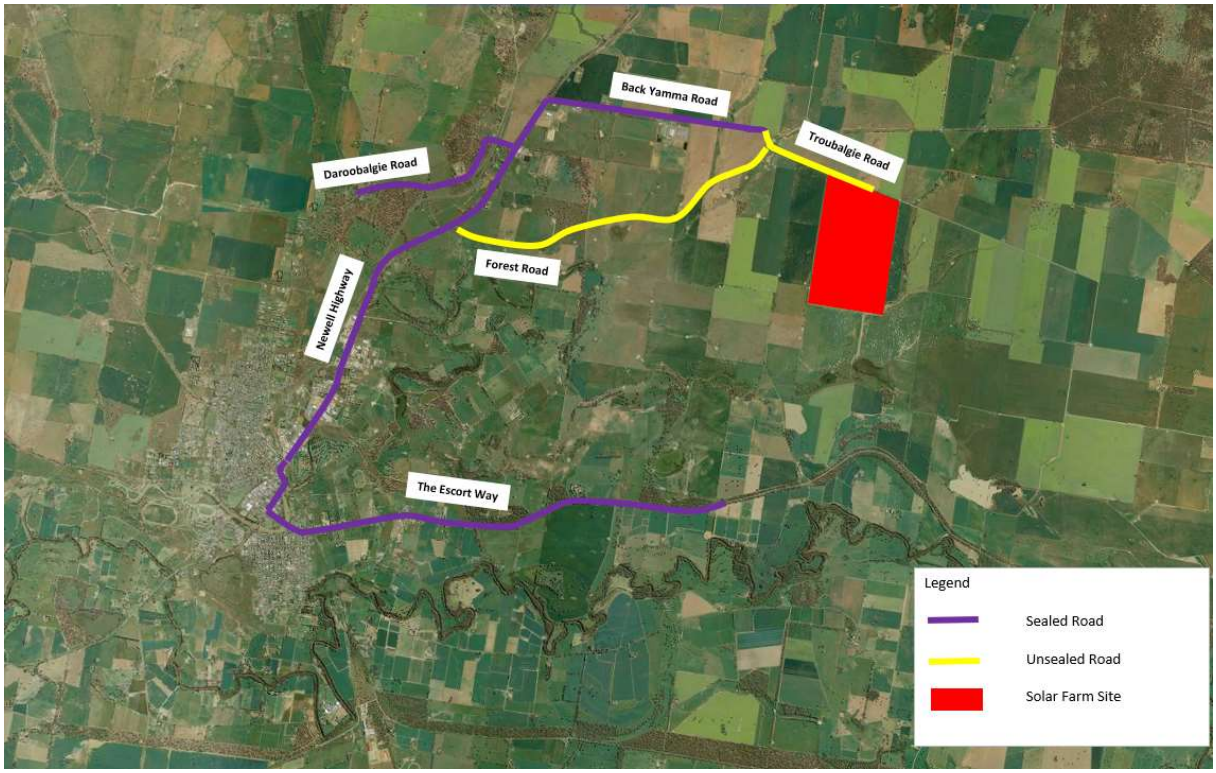


Figure 3-4 Location of Sealed and Unsealed Road

As mentioned earlier, heavy vehicles would not use Forest Road to access the site. It is recommended to restrict project related heavy vehicle movements on Forest Road and for this restriction to be reflected in the Traffic Management Plan, which will be prepared at later stage. The only heavy vehicle traffic that will be permitted access to Forest Road during construction, will be the small number of vehicles required for the construction of the ETL. Only minor impacts are therefore anticipated on the pavement condition of Forest Road, as only a small portion (20%) of light vehicles are anticipated to use this road to access the site.

All heavy vehicles including over-dimensional vehicles would travel via Troubalgie Road to access the project site. The unsealed road surfaces will likely deteriorate, and potholes are likely to form under increased traffic loads, particularly during wet weather conditions when water ponds, or floods across the road. Dust would be generated on the unsealed roads affecting visibility and resulting in the loss of pavement material.

The impact of construction traffic on Troubalgie Road will be addressed through road upgrades and sealing prior to use by construction vehicles in consultation and agreement with the Council.

3.7 Average Travel Speed

Over-dimensional vehicles, as well as heavy vehicles, are likely to travel at lower speeds than other vehicular traffic. The construction route via The Escort Way has one lane in each direction and likely to operate at lower speeds during the construction period. It is however noted that the Newell Highway from Forbes to Back Yamma Road has multiple lanes for travel in one direction and the impacts on average travel speed on this section of the route is anticipated to be minimal.

The Back Yamma Road from Newell Highway to Troubalgie Road is generally 6 to 8-metres wide. This may result in reduction of average travel speed and increase in travel time for other traffic accessing the Forbes Central West

Livestock Exchange, although this could be managed by implementation of a Traffic Management Plan through provision of passing opportunities, if required. It should also be noted that very little traffic currently uses these roads. Therefore, the impacts of construction related traffic on average travel speed on Back Yamma Road and Troubalgie Road is considered to be minor.

3.8 Property Access

There is one residential property access on the proposed construction route on Back Yamma Road. Existing property access will be maintained during the whole construction phase and no impacts are anticipated due to the movements of construction vehicles, including over-dimensional vehicles during the construction period. Notwithstanding the above, there are potential temporary safety implications for the due to the movement of heavy construction vehicles, which would need to be further considered and addressed in the Traffic Management Plan.

3.9 Pedestrian and Cyclists

Current onsite observation suggests that local roads proposed to be used by construction traffic currently experience little pedestrian and cyclist movements. As such, it is expected that the project would have minimal impact on pedestrians and cyclists along Back Yamma Road, Troubalgie Road and Forest Road.

The proposed construction route passes through the township of Forbes from Bridge Road to Union Street. Additional construction traffic is anticipated to have some impacts on pedestrian and cyclist movements along this section of Newell Highway. Site observation suggests that heavy trucks are frequently using this section of Newell Highway and that there are minimal active transport (pedestrians and cyclists) movements along this road. As such, the impacts on pedestrian and cyclist due to the additional construction related vehicles is anticipated to be minimal.

3.10 School Bus Route

There are a number of schools located on The Escort Way with designated school zones (being sections of roads which are signed to operate at 40 km/hr from 8:00-9:30 am and 2:30-4:00 pm weekdays).

Forbes Public High School and Forbes Red Bend Catholic College are located on Lachlan Street and College Road respectively in Forbes. Western Road Liners is the private school bus operator and collects students from Parkes, Forbes and Back Yamma. As shown in Figure 2-26, existing school buses currently run through Back Yamma Road, Daroobalgie Road, Newell Highway and other local roads within Forbes.

It is anticipated that construction vehicle movements during school bus operating hours would impact school bus movements along the above-mentioned roads. As such, the project would have some impact on existing school bus routes, however this impact can be mitigated as discussed in Sections 7 and 8.

3.11 Public Transport

As shown in Figure 2-25, the existing Western NSW coach service runs through The Escort Way and Newell Highway. However, this coach service operates three time a day. As such, it is anticipated that the impact of additional construction related traffic movement on the existing public bus services would be very low/minimal.

There are no existing public transport services available on the construction route from Newell Highway/Back Yamma Road to the project site. As such, there would be no impacts on public transport services on this section of the route due to the additional construction vehicle movements.

3.12 Culverts

There are a number of culverts located on Back Yamma Road and Troubalgie Road. The over-dimensional vehicles will exceed the parameters that roads were originally designed to accommodate. As such, these vehicles represent greater risk in terms of both road safety and damage to road infrastructure compared to normal heavy vehicle movements, particularly on local roads leading to the project site. Use of roads by OSOM vehicles will need to be managed in consultation with roads authorities to ensure impacts are satisfactorily mitigated. This will include obtaining permits for use of relevant roads by OSOM vehicles, as required by roads authorities.

3.13 Traffic Safety

As construction traffic is expected to be relatively minor in comparison to local traffic within the town centre of Forbes, the impact on the overall roads within the town centre of Forbes is expected to be minimal.

Particular consideration must be given to existing and/or proposed land uses that may be impacted along the local roads, namely Back Yamma Road, Forest Road and Troubalgie Road used to access the site off of Newell Highway. There are no major developments on Forest Road and Troubalgie Road. The Forbes Central West Livestock Exchange on Back Yamma Road may be impacted by construction vehicle use. The road used to enter this site will be via an access road off a roundabout on Back Yamma Road. The Forbes Central West Livestock Exchange operates between Sunday afternoon to Wednesday lunchtime. As such, a delivery management plan, as well as a Transport Management Plan, should to be prepared prior to construction works to minimise/avoid coinciding with the Livestock Exchange truck movements.

Appendix B contains a swept path analysis of the existing road geometry at the Back Yamma Road/ Troubalgie Road priority intersection to assess how B-Double (26m) trucks might be able to pass simultaneously turning to/ from Back Yamma Road and Troubalgie Road. This assessment demonstrated how a B-double can make the turn in both directions (Right turn from Back Yamma Road and Left turn from Troubalgie Road). However, there remains insufficient room for the turns to happen simultaneously (refer to Appendix B). Intersection upgrade measures would be required to accommodate such turning movements safely at this intersection. An alternative approach for potential consideration would be for B-Double movements at this intersection to be controlled by a traffic controller as part of other measures included in the Traffic Management Plan, which would be subject to discussion an agreement with Forbes Shire Council (refer to Appendix B).

3.14 Car Parking and Laydown Areas

It is anticipated that all car parking and a laydown area would be provided within the proposed site. As such, no impact is anticipated on car parking in the area.

3.15 Electricity Transmission Line (ETL) Route and Switchyard Site

As presented in Figure 1-3, the proposed ETL access points would be along Troubalgie Road, Forest Road, Newell Highway and Daroobalgie Road. Figure 3-5 shows proposed heavy vehicle routes for construction of the ETL and switchyard. The heavy vehicles would access the proposed construction route via Back Yamma Road to Troubalgie Road and then turn right to access Forest Road for construction of the ETL. Heavy vehicles would also turn left from Newell Highway into Daroobalgie Road to access the switchyard site and ETL.

Newell Highway and Daroobalgie Road are sealed roads and may be accessed by construction related vehicles. The average number of heavy vehicle movements during construction of the ETL and switchyard as shown in Table 3-1 and Table 3-2 would be 5-6 vehicle per day (total of 210 heavy vehicle movements over 42 weeks). This number of heavy vehicle movements is expected to be very low and anticipated to have minimal impacts on the operation of Newell Highway, Troubalgie Road, Forest Road and Daroobalgie Road.

To ensure safe access of construction vehicles, it is recommended that a safety review of proposed access points be undertaken at the detailed design stage. It is also recommended that this route and proposed access points be further considered in the development of a Traffic Management Plan to be prepared and implemented in agreement with the Council and TfNSW.

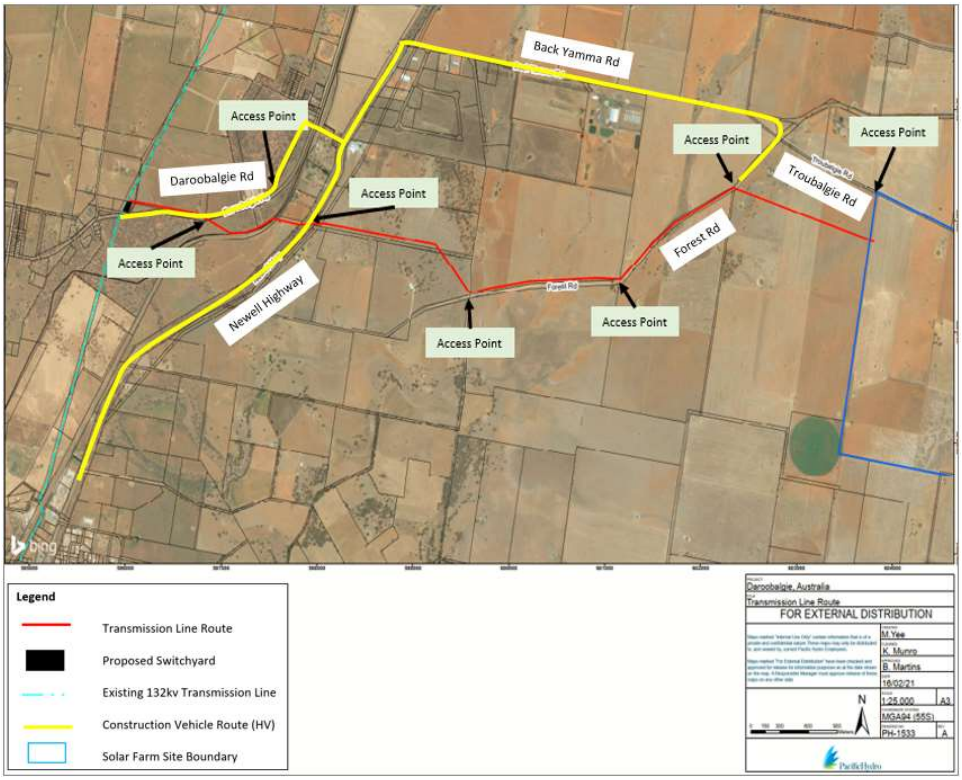


Figure 3-5 Proposed Construction Related Heavy Vehicle Routes for Construction of ETL and Switchyard

4 Operational Impacts

Following commissioning, the solar farm is expected to generate a minimal number of traffic movements per day. This traffic will be generated for operation and maintenance. Additional vehicle movement numbers associated with these activities are expected to be very low and will have negligible impacts on the existing road network.

5 Decommissioning Stage Impacts

Solar farm decommissioning is expected to take place after approximately 30 years of operation, generating traffic at a level less than or similar to the construction phase. Given the long duration between the present day and decommissioning, it is difficult to determine an accurate baseline for this assessment.

For purposes of a meaningful assessment, it is therefore proposed that the study relating to the decommissioning phase impacts is undertaken closer to the time of decommissioning. It is also recommended to prepare a specific Traffic Management Plan to address the impacts decommissioning stage traffic movements on the performance of surrounding road network.

6 Cumulative Impact Assessment

The traffic count surveys were undertaken on Tuesday 2nd of March 2021, one of the sale days of the nearby Livestock Exchange. As such, any traffic movements associated with the Livestock Exchange during the peak hours have already been captured in the traffic count survey data. This traffic is associated with an existing land use and is already accounted for in background traffic.

Whilst there are other solar farms in the area, vehicles associated with these developments are not anticipated to coincide with project related construction traffic. As such, there are no traffic related cumulative impacts expected to be associated with the project.

7 Summary of Impacts

A summary of the impacts associated with the construction and operation of the project is presented below.

7.1 Construction

Key findings relating to the impacts of construction traffic are summarised in Table 7-1 below.

Table 7-1 Impact assessment summary for the project

Impacts	Level	Assessment	Mitigation measures
Road operation and intersection capacity (The Escort Way, Newell Hwy, Back Yamma Road)	**Minor**	Project related traffic movements on six assessed intersections are low and anticipated to have minor overall impacts on intersection performance.	No further mitigation required
Intersection capacity (Back Yamma Road/Troubalgie Road)	**Major**	The geometry of Back Yamma Road/Troubalgie Road intersection is constrained and will not be able to accommodate two truck turning movements simultaneously (i.e., right in movement from Back Yamma Road to Troubalgie Road and left out movement from Troubalgie Road to Back Yamma Road).	Upgrade Back Yamma Road/Troubalgie Road intersection to accommodate OSOM vehicle movements during the construction period
Sight intersection safety distance (Forest Road/Newell Hwy)	**Minor**	SISD is achieved at Forest Road/Newell Hwy for all required directions/movements	No further mitigation required
Pavement condition	**Major**	Use of the unsealed section of Troubalgie Road is anticipated to have major impacts on pavement condition due to heavy vehicle movements, including over-dimensional vehicles. Use of Forest Road (unsealed) by heavy vehicle traffic is anticipated to have major impacts on pavement condition	Upgrade Troubalgie Road between Back Yamma Road and the site access point to sealed road. Widen Troubalgie Road between Back Yamma Road and the site access point, including Back Yamma Road/Troubalgie Road intersection to accommodate two-way heavy vehicle movements, including OSOM vehicles in consultation with road authorities Prohibit heavy vehicle use of Forest Road (unless required for ETL construction) Restrict light vehicle use of Forest Road through signage, code of conduct or other measures Consider establishing a transport pool for construction staff with common schedules to reduce staff vehicle movements on local roads, including Back Yamma Road and Forest Road during peak hours
Average travel speed	**Moderate**	Average travel speed on The Escort Way is anticipated to decrease due to slow moving heavy vehicles, including over-dimensional vehicle movements. This is considered to be a moderate impact on The Escort Way average travel speed.	Minimise/avoid construction vehicle movements during peak hours (i.e., 8.00am-9.00am and 4:00pm to 5:00pm)

Impacts	Level	Assessment	Mitigation measures
		Potential reduction in average travel speed and increase in travel time for other traffic accessing the Forbes Central West Livestock Exchange	Avoid deliveries and minimise construction related traffic during peak operating times of the Forbes Central West Livestock Exchange
Property access	**Minor**	Existing property access will be maintained during the whole construction phase and no impacts on property access is anticipated due to the movements of construction vehicles, including over-dimensional vehicles during the construction period. Notwithstanding the above, there are potential temporary safety implications for existing properties/businesses located on Back Yamma Road due to the movement of heavy construction vehicles on this road, which would need to be further considered and addressed in the Traffic Management Plan	Temporary safety measures for existing properties/businesses located on Back Yamma Road due to the movement of heavy construction vehicles on this road be outlined in a Traffic Management Plan
Pedestrian and cyclist	**Minor**	Due to the project being constructed in a rural area with minimal pedestrians and cyclists, the project would have minor impact on pedestrians and cyclists	No additional measures required
School bus	**Moderate**	Construction traffic is anticipated to have moderate impacts on existing school bus routes along Newell Highway, Back Yamma Road and The Escort Way	Schedule construction material delivery and associated heavy vehicle movements including over-dimensional vehicle movements outside school bus operating hours
Public transport	**Minor**	It is anticipated that there will be minimal impact on the existing Western NSW coach service along The Escort Way and Newell Highway during construction of the solar farm. There are no existing public transport services available on the construction route from Back Yamma Road/Newell Highway intersection to the project site. As such, there would be no impacts on the public transport services on this section of the route due to additional construction vehicle movements.	No additional measures required
Culverts	**Major**	Over-dimensional vehicles exceed the parameters that local roads, namely Back Yamma Road and Troubalgie Road were originally designed to accommodate, which could cause significant damage to existing culverts, particularly on local roads leading to the solar farm site.	Assessment of existing conditions and loading capacity of culverts and implementation of improvement measures as required to accommodate heavy construction vehicle movements, including over-dimensional vehicles
Traffic Safety	**Minor**	As construction related traffic is expected to be relatively minor in comparison to local traffic, the impact on the overall road safety within the	Minimise/avoid construction vehicle movements during peak hours (i.e., 8:00am to 9:00am and 4:00pm to 5:00pm) Upgrade Back Yamma Road/Troubalgie Road intersection to accommodate two-way heavy

Impacts	Level	Assessment	Mitigation measures
		town centres of Forbes is expected to be minimal. The geometry of Back Yamma Road/Troubalgie Road intersection is not sufficient to safely accommodate two turning truck movements simultaneously.	vehicle movements, including OSOM vehicles in consultation with road authorities
Car Parking and Laydown Areas	**Minor**	All car parking and laydown areas will be provided within the proposed site. No impact is envisaged for car parking in the area.	No additional measures required

7.2 Operation

Additional vehicle movement numbers associated with the operation of the proposed solar farm would be very low and would have negligible impacts on the performance of existing road network.

7.3 Decommissioning

Solar farm decommissioning typically takes place after approximately 25 to 30 years of operation, generating traffic at a level less than or similar to the construction phase. Given the long duration between the present day and decommissioning, it is difficult to determine an accurate baseline for this assessment. It is, however recommended to prepare a specific Traffic Management Plan to address the impacts decommissioning stage traffic movements on the surrounding road network.

8 Mitigation Measures

A number of measures have been identified to minimise the impacts of additional construction traffic movements on the existing road network, as follows:

- Engagement of a licensed haulage contractor with experience in operating over-dimensional vehicles and transporting similar loads to be responsible for obtaining all required approvals and permits from the relevant roads authorities and Councils and for complying with conditions specified in the approvals.
- Preparation and implementation of a Traffic Management Plan in conjunction with the haulage contractor and roads authorities. The Traffic Management Plan will include, but not limited to the following:
  - Scheduling of deliveries. Minimise deliveries and heavy vehicle traffic to the solar fam site during peak operating hours of the Forbes Central West Livestock Exchange i.e., Sunday 3-7pm; Monday 5am – 9 pm and Tuesday 3am – 9pm
  - Managing timing of transport to avoid coinciding with the school bus operating hours along The Escort Way, Newell Highway and Back Yamma Road
  - Prohibiting heavy vehicle traffic on Forest Road (unless required for ETL construction)
  - Restricting light vehicle access to Forest Road during construction
  - Providing updated information related to the haulage activities to the local community
  - Implementing temporary modifications to intersections and roadside furniture, including kerbside management, as required to accommodate over-dimensional vehicles
  - Ensuring ETL access points, including traffic control measures, allow for safe access of construction vehicles to the site
  - Managing the haulage process, including the erection of warning signs and/or advisory speed limits prior to isolated curves, crests, culverts and changes of road conditions along Back Yamma Road and Troubalgie Road
  - Placing of advisory speed limits on Back Yamma Road and Troubalgie Road used by construction traffic to enhance safety and manage maintenance costs
  - Producing a Transport Code of Conduct to be made available to all contractors and staff detailing traffic routes, behavioural requirements and speed limits
  - Establishing procedures to monitor traffic impacts during construction and work methods required to be implemented to reduce impacts
  - Establishing a dedicated telephone contact(s) to enable any issues or concerns to be rapidly identified and addressed
  - Reinstating pre-existing conditions after temporary modifications to the roads and pavement along the route
- Consideration of establishing a transport pool for construction staff with common schedules to reduce staff vehicle movements on Back Yamma Road and Forest Road during peak hours
- Undertaking safety review of proposed ETL access points at the detailed design stage to ensure safe access of construction vehicles.
- Preparation of pre, mid and post construction road dilapidation reports addressing pavement and drainage structures in consultation with Council for the local roads, namely Back Yamma Road and Troubalgie Road prior to the commencement of construction and after construction is complete. Any damage resulting from construction traffic, except that resulting from normal wear and tear, would be repaired at the Proponent's cost. Alternatively, the Proponent may negotiate an alternative for local road damage with the relevant road authorities
- Identification of road improvement requirements, including upgradation of Back Yamma Road/Troubalgie Road intersection to accommodate OSOM vehicle movements during construction period.
- Upgrade of Troubalgie Road between Back Yamma Road and the site access point to sealed road as well as widening of Troubalgie Road to accommodate two-way heavy vehicle movements including OSOM vehicles during construction of the proposed solar farm.
- Preparation of a specific Traffic Management Plan for the decommissioning phase reflecting changes in traffic volumes and work procedures

9 Conclusion

The introduction of three heavy vehicle movements per hour and 167 light vehicle movements during the am and pm peak, during the peak construction period, is anticipated to have major impacts on existing pavement conditions and loading capacity of culverts along Back Yamma Road and Troubalgie Road.

Formal discussion has already been undertaken with Forbes Shire Council and it has been agreed to upgrade the Troubalgie Road between Back Yamma Road and the proposed site access point to a sealed road, as well as the widening of Troubalgie Road to accommodate two-way heavy vehicle movements prior to commencing construction of the solar farm. It was also agreed to upgrade Back Yamma Road/Troubalgie Road intersection to accommodate appropriate heavy vehicle movements. The impacts during the operation phase are considered to be minimal.

Management strategies required to address traffic impacts relating to the project are outlined in this report. These strategies should be incorporated into a Traffic Management Plan and implemented in consultation with relevant roads authorities, including Forbes Shire Council. Adoption of strategies for minimising traffic impacts will reduce community disruption, maintain roads to an appropriate standard throughout the construction program and maintain safety requirements.

A pre-and post-dilapidation survey for the construction route, namely Back Yamma Road and Troubalgie Road and for existing culverts should be conducted and loading capacity of these roads and infrastructures determined prior to commencement of construction. Road and infrastructure improvement works should also be identified based on dilapidation survey report findings.

Appendix A SIDRA Outputs

Appendix B Road Geometry Technical Memo

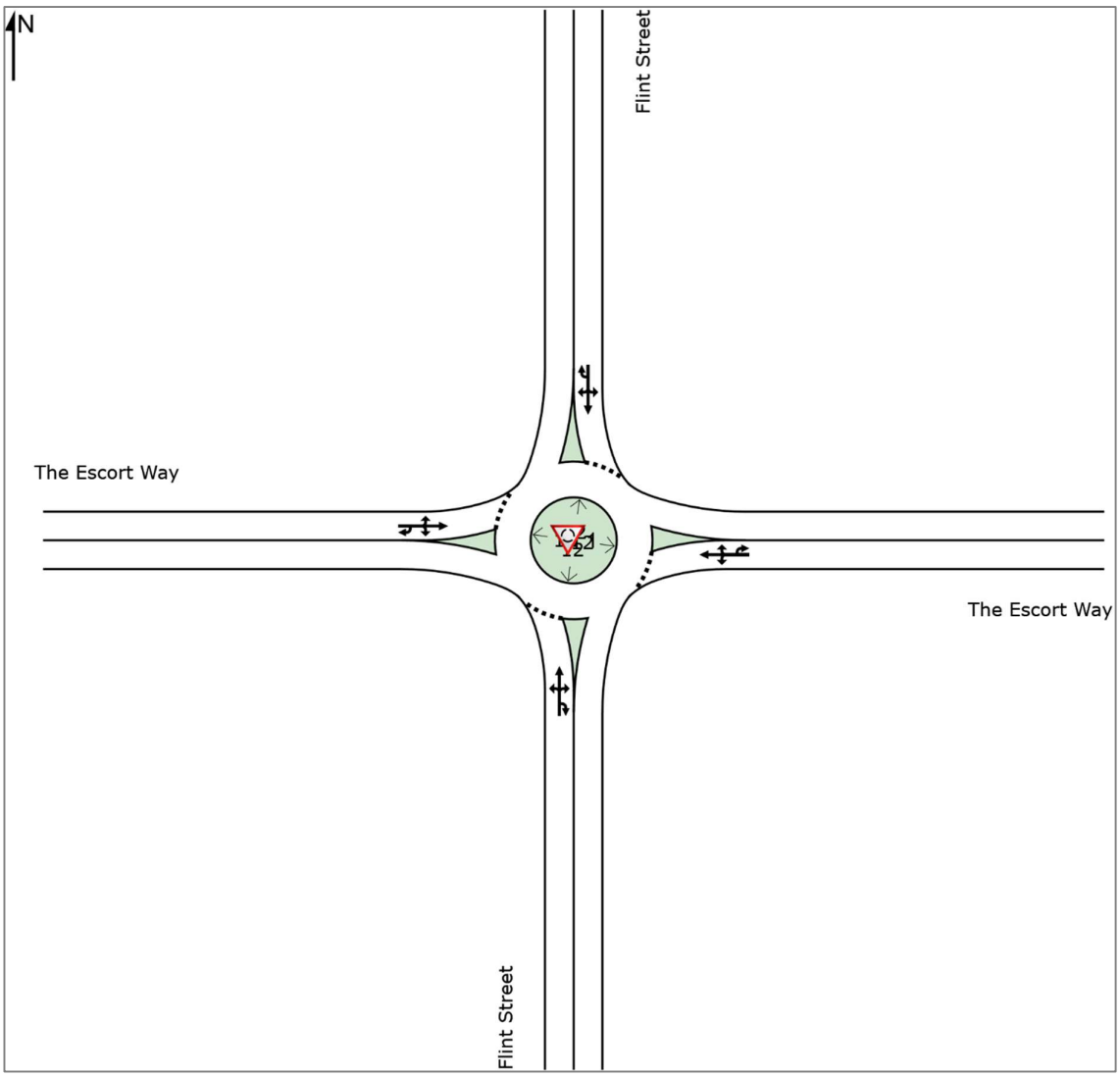
Existing Base Case 2021

SITE LAYOUT

Site: 1 [The Escort Way & Flint Street- Base Case - AM Peak (Site Folder: Base Case)]

The Escort Way & Flint Street
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 1 [The Escort Way & Flint Street- Base Case - AM Peak (Site Folder: Base Case)]

The Escort Way & Flint Street
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Flint Street														
1	L2	158	26	166	16.5	0.167	4.2	LOS A	0.9	7.2	0.35	0.51	0.35	34.9
2	T1	1	0	1	0.0	0.167	4.1	LOS A	0.9	7.2	0.35	0.51	0.35	39.8
3	R2	17	1	18	5.9	0.167	7.8	LOS A	0.9	7.2	0.35	0.51	0.35	38.0
3u	U	1	0	1	0.0	0.167	9.9	LOS A	0.9	7.2	0.35	0.51	0.35	30.3
Approach		177	27	186	15.3	0.167	4.5	LOS A	0.9	7.2	0.35	0.51	0.35	35.1
East: The Escort Way														
4	L2	23	4	24	17.4	0.135	4.3	LOS A	0.7	5.3	0.31	0.45	0.31	34.5
5	T1	120	14	126	11.7	0.135	4.3	LOS A	0.7	5.3	0.31	0.45	0.31	40.2
6	R2	2	0	2	0.0	0.135	7.8	LOS A	0.7	5.3	0.31	0.45	0.31	41.2
6u	U	1	0	1	0.0	0.135	10.9	LOS A	0.7	5.3	0.31	0.45	0.31	37.3
Approach		146	18	154	12.3	0.135	4.4	LOS A	0.7	5.3	0.31	0.45	0.31	39.4
North: Flint Street														
7	L2	2	0	2	0.0	0.012	4.3	LOS A	0.1	0.4	0.35	0.56	0.35	35.8
8	T1	1	0	1	0.0	0.012	4.3	LOS A	0.1	0.4	0.35	0.56	0.35	33.2
9	R2	8	1	8	12.5	0.012	8.2	LOS A	0.1	0.4	0.35	0.56	0.35	37.0
9u	U	1	0	1	0.0	0.012	11.1	LOS A	0.1	0.4	0.35	0.56	0.35	32.2
Approach		12	1	13	8.3	0.012	7.5	LOS A	0.1	0.4	0.35	0.56	0.35	36.1
West: The Escort Way														
10	L2	1	0	1	0.0	0.131	3.5	LOS A	0.7	5.9	0.12	0.52	0.12	38.1
11	T1	58	14	61	24.1	0.131	3.7	LOS A	0.7	5.9	0.12	0.52	0.12	37.8
12	R2	107	22	113	20.6	0.131	7.4	LOS A	0.7	5.9	0.12	0.52	0.12	33.3
12u	U	1	0	1	0.0	0.131	10.3	LOS A	0.7	5.9	0.12	0.52	0.12	32.8
Approach		167	36	176	21.6	0.131	6.1	LOS A	0.7	5.9	0.12	0.52	0.12	35.0
All Vehicles		502	82	528	16.3	0.167	5.1	LOS A	0.9	7.2	0.26	0.50	0.26	36.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [The Escort Way & Flint Street- Base Case - PM Peak (Site Folder: Base Case)]

The Escort Way & Flint Street
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Flint Street														
1	L2	135	7	142	5.2	0.133	3.8	LOS A	0.7	5.2	0.26	0.48	0.26	36.8
2	T1	4	1	4	25.0	0.133	3.9	LOS A	0.7	5.2	0.26	0.48	0.26	37.0
3	R2	18	1	19	5.6	0.133	7.5	LOS A	0.7	5.2	0.26	0.48	0.26	38.7
3u	U	1	0	1	0.0	0.133	9.6	LOS A	0.7	5.2	0.26	0.48	0.26	30.9
Approach		158	9	166	5.7	0.133	4.2	LOS A	0.7	5.2	0.26	0.48	0.26	37.0
East: The Escort Way														
4	L2	12	3	13	25.0	0.087	4.3	LOS A	0.4	3.2	0.29	0.43	0.29	34.5
5	T1	82	6	86	7.3	0.087	4.1	LOS A	0.4	3.2	0.29	0.43	0.29	40.9
6	R2	1	0	1	0.0	0.087	7.7	LOS A	0.4	3.2	0.29	0.43	0.29	41.4
6u	U	1	0	1	0.0	0.087	10.8	LOS A	0.4	3.2	0.29	0.43	0.29	37.4
Approach		96	9	101	9.4	0.087	4.3	LOS A	0.4	3.2	0.29	0.43	0.29	40.2
North: Flint Street														
7	L2	2	0	2	0.0	0.006	4.4	LOS A	0.0	0.2	0.38	0.53	0.38	36.6
8	T1	1	0	1	0.0	0.006	4.5	LOS A	0.0	0.2	0.38	0.53	0.38	33.9
9	R2	2	0	2	0.0	0.006	8.1	LOS A	0.0	0.2	0.38	0.53	0.38	39.2
9u	U	1	0	1	0.0	0.006	11.3	LOS A	0.0	0.2	0.38	0.53	0.38	32.7
Approach		6	0	6	0.0	0.006	6.8	LOS A	0.0	0.2	0.38	0.53	0.38	36.3
West: The Escort Way														
10	L2	2	0	2	0.0	0.155	3.5	LOS A	0.8	6.4	0.13	0.51	0.13	38.6
11	T1	95	7	100	7.4	0.155	3.6	LOS A	0.8	6.4	0.13	0.51	0.13	39.9
12	R2	112	11	118	9.8	0.155	7.3	LOS A	0.8	6.4	0.13	0.51	0.13	34.0
12u	U	1	0	1	0.0	0.155	10.3	LOS A	0.8	6.4	0.13	0.51	0.13	33.2
Approach		210	18	221	8.6	0.155	5.6	LOS A	0.8	6.4	0.13	0.51	0.13	36.7
All Vehicles		470	36	495	7.7	0.155	4.9	LOS A	0.8	6.4	0.21	0.48	0.21	37.5

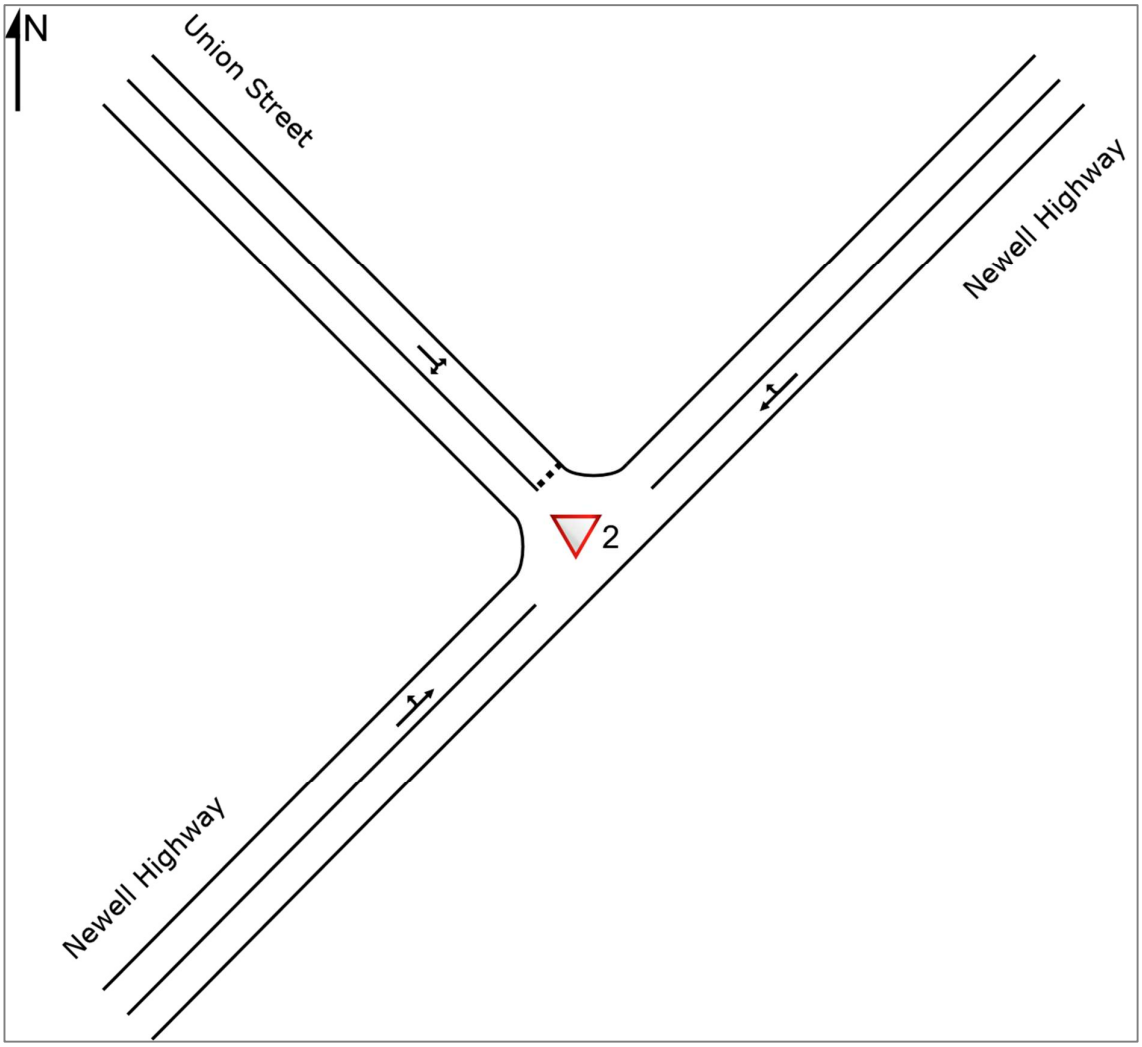
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 2 [Union Street & Dowling Street- Base Case - AM Peak (Site Folder: Base Case)]

Union Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 2 [Union Street & Dowling Street- Base Case - AM Peak (Site Folder: Base Case)]

Union Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Newell Highway														
5	T1	292	52	307	17.8	0.211	0.4	LOS A	0.4	3.4	0.16	0.08	0.16	48.0
6	R2	41	0	43	0.0	0.211	6.5	LOS A	0.4	3.4	0.16	0.08	0.16	45.9
Approach		333	52	351	15.6	0.211	1.1	NA	0.4	3.4	0.16	0.08	0.16	47.7
NorthWest: Union Street														
7	L2	69	7	73	10.1	0.221	6.0	LOS A	0.8	6.4	0.50	0.71	0.50	38.8
9	R2	75	17	79	22.7	0.221	10.4	LOS A	0.8	6.4	0.50	0.71	0.50	30.6
Approach		144	24	152	16.7	0.221	8.3	LOS A	0.8	6.4	0.50	0.71	0.50	35.2
SouthWest: Newell Highway														
10	L2	98	5	103	5.1	0.224	4.6	LOS A	0.0	0.0	0.00	0.14	0.00	44.1
11	T1	284	36	299	12.7	0.224	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	48.0
Approach		382	41	402	10.7	0.224	1.2	NA	0.0	0.0	0.00	0.14	0.00	47.3
All Vehicles		859	117	904	13.6	0.224	2.4	NA	0.8	6.4	0.14	0.21	0.14	45.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

MOVEMENT SUMMARY

Site: 2 [Union Street & Dowling Street- Base Case - PM Peak (Site Folder: Base Case)]

Union Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Newell Highway														
5	T1	355	48	374	13.5	0.259	0.5	LOS A	0.6	4.9	0.19	0.09	0.19	47.8
6	R2	56	1	59	1.8	0.259	6.8	LOS A	0.6	4.9	0.19	0.09	0.19	45.6
Approach		411	49	433	11.9	0.259	1.3	NA	0.6	4.9	0.19	0.09	0.19	47.4
NorthWest: Union Street														
7	L2	37	0	39	0.0	0.147	5.8	LOS A	0.5	3.6	0.50	0.72	0.50	38.9
9	R2	55	3	58	5.5	0.147	10.1	LOS A	0.5	3.6	0.50	0.72	0.50	31.7
Approach		92	3	97	3.3	0.147	8.3	LOS A	0.5	3.6	0.50	0.72	0.50	35.2
SouthWest: Newell Highway														
10	L2	89	1	94	1.1	0.229	4.6	LOS A	0.0	0.0	0.00	0.12	0.00	45.1
11	T1	310	31	326	10.0	0.229	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	48.2
Approach		399	32	420	8.0	0.229	1.0	NA	0.0	0.0	0.00	0.12	0.00	47.8
All Vehicles		902	84	949	9.3	0.259	1.9	NA	0.6	4.9	0.14	0.17	0.14	46.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

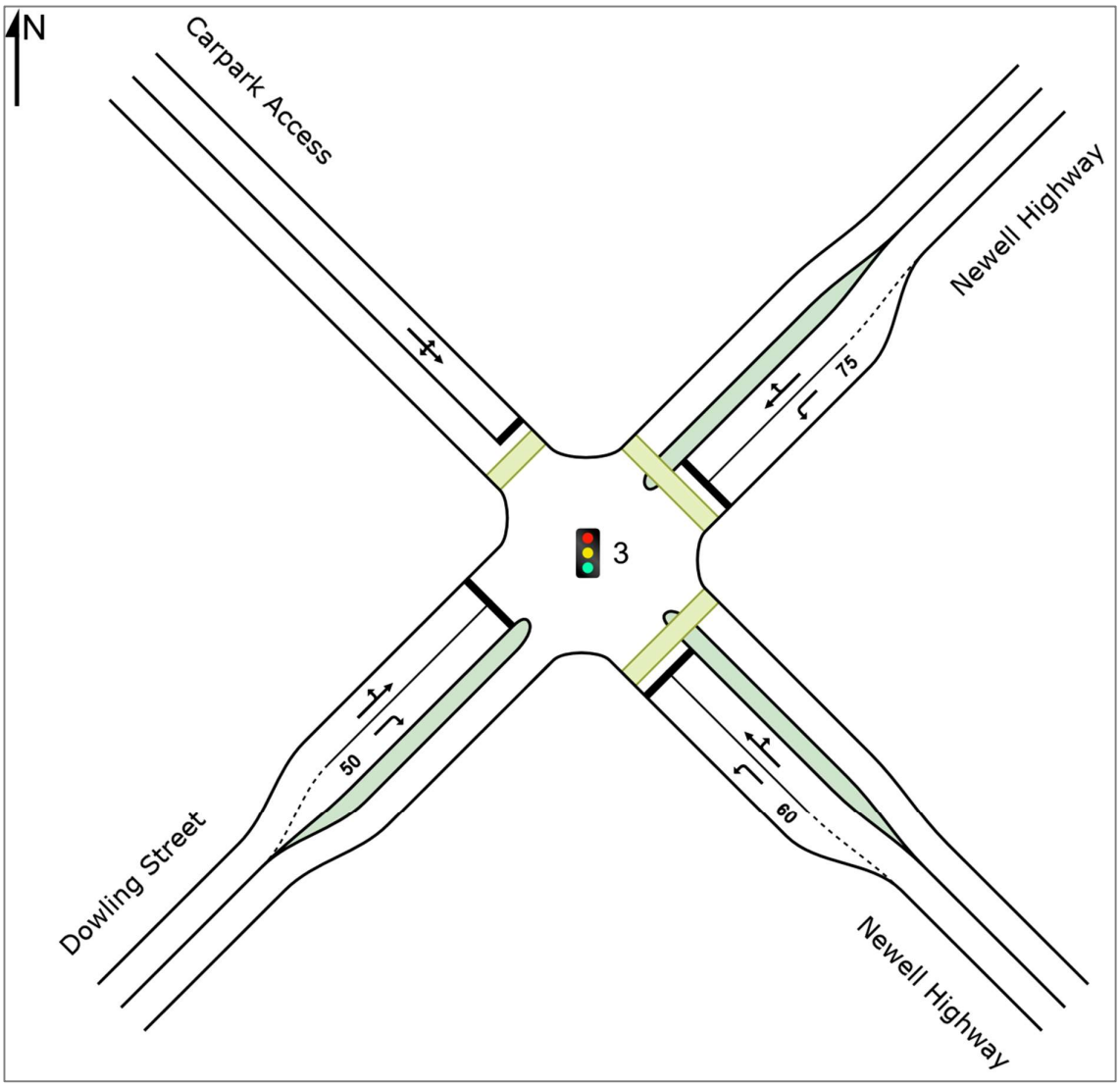
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3 [Dowling Street & Newell Highway- Base Case- AM Peak (Site Folder: Base Case)]

Dowling Street & Newell Highway
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3 [Dowling Street & Newell Highway- Base Case- AM Peak (Site Folder: Base Case)]

Dowling Street & Newell Highway
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 71 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Newell Highway														
1	L2	12	2	13	16.7	0.023	13.8	LOS A	0.2	1.2	0.70	0.64	0.70	34.9
22	T1	11	0	12	0.0	* 0.723	39.3	LOS C	8.6	67.0	0.99	0.89	1.12	19.0
3	R2	219	31	231	14.2	0.723	36.5	LOS C	8.6	67.0	0.99	0.89	1.12	24.1
Approach		242	33	255	13.6	0.723	35.5	LOS C	8.6	67.0	0.98	0.87	1.10	24.2
NorthEast: Newell Highway														
4	L2	220	64	232	29.1	0.396	22.4	LOS B	6.0	52.2	0.77	0.77	0.77	30.2
5	T1	125	5	132	4.0	0.460	29.9	LOS C	4.8	34.6	0.95	0.76	0.95	17.7
26	R2	15	0	16	0.0	0.460	36.5	LOS C	4.8	34.6	0.95	0.76	0.95	11.1
Approach		360	69	379	19.2	0.460	25.6	LOS B	6.0	52.2	0.84	0.77	0.84	25.7
NorthWest: Carpark Access														
27	L2	1	0	1	0.0	* 0.098	28.8	LOS C	0.9	6.0	0.88	0.71	0.88	10.4
28	T1	10	0	11	0.0	0.098	28.8	LOS C	0.9	6.0	0.88	0.71	0.88	19.4
29	R2	18	0	19	0.0	0.098	28.8	LOS C	0.9	6.0	0.88	0.71	0.88	9.9
Approach		29	0	31	0.0	0.098	28.8	LOS C	0.9	6.0	0.88	0.71	0.88	13.8
SouthWest: Dowling Street														
30	L2	32	0	34	0.0	0.730	43.3	LOS D	6.7	48.3	1.00	0.90	1.18	9.6
11	T1	142	6	149	4.2	* 0.730	35.2	LOS C	6.7	48.3	1.00	0.90	1.18	15.7
12	R2	17	1	18	5.9	0.079	35.2	LOS C	0.6	4.2	0.91	0.69	0.91	24.6
Approach		191	7	201	3.7	0.730	36.5	LOS C	6.7	48.3	0.99	0.88	1.15	15.6
All Vehicles		822	109	865	13.3	0.730	31.2	LOS C	8.6	67.0	0.92	0.82	0.99	22.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Newell Highway												
P1	Full	50	53	29.8	LOS C	0.1	0.1	0.92	0.92	194.4	213.9	1.10

NorthEast: Newell Highway												
P2	Full	50	53	29.8	LOS C	0.1	0.1	0.92	0.92	194.4	213.9	1.10
NorthWest: Carpark Access												
P7	Full	50	53	29.8	LOS C	0.1	0.1	0.92	0.92	190.3	208.6	1.10
All Pedestrians		150	158	29.8	LOS C	0.1	0.1	0.92	0.92	193.0	212.1	1.10

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.

PHASING SUMMARY

Site: 3 [Dowling Street & Newell Highway- Base Case- AM Peak (Site Folder: Base Case)]

Dowling Street & Newell Highway
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 71 seconds (Site Optimum Cycle Time - Minimum Delay)

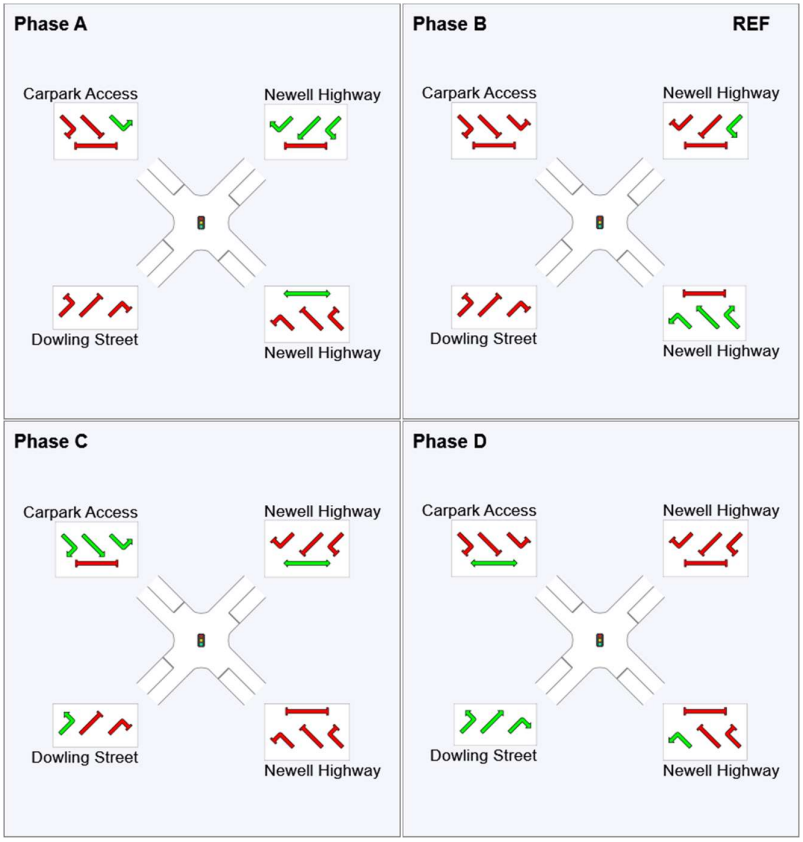
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	53	0	20	38
Green Time (sec)	12	14	12	9
Phase Time (sec)	18	20	18	15
Phase Split	25%	28%	25%	21%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 3 [Dowling Street & Newell Highway- Base Case- PM Peak (Site Folder: Base Case)]

Dowling Street & Newell Highway
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Newell Highway														
1	L2	11	0	12	0.0	0.034	30.1	LOS C	0.3	2.3	0.84	0.66	0.84	26.7
22	T1	10	0	11	0.0	* 0.755	40.6	LOS C	8.5	67.2	1.00	0.91	1.19	18.7
3	R2	213	35	224	16.4	0.755	37.9	LOS C	8.5	67.2	1.00	0.91	1.19	23.7
Approach		234	35	246	15.0	0.755	37.6	LOS C	8.5	67.2	0.99	0.90	1.17	23.5
NorthEast: Newell Highway														
4	L2	225	49	237	21.8	0.397	22.5	LOS B	6.1	50.5	0.78	0.77	0.78	30.2
5	T1	182	2	192	1.1	0.604	30.3	LOS C	6.6	46.8	0.97	0.81	0.99	17.7
26	R2	8	0	8	0.0	0.604	36.9	LOS C	6.6	46.8	0.97	0.81	0.99	11.1
Approach		415	51	437	12.3	0.604	26.2	LOS B	6.6	50.5	0.87	0.79	0.88	25.0
NorthWest: Carpark Access														
27	L2	1	0	1	0.0	* 0.080	27.1	LOS B	0.7	4.7	0.87	0.70	0.87	10.7
28	T1	10	0	11	0.0	0.080	27.1	LOS B	0.7	4.7	0.87	0.70	0.87	19.8
29	R2	13	0	14	0.0	0.080	27.1	LOS B	0.7	4.7	0.87	0.70	0.87	10.2
Approach		24	0	25	0.0	0.080	27.1	LOS B	0.7	4.7	0.87	0.70	0.87	14.9
SouthWest: Dowling Street														
30	L2	32	0	34	0.0	0.766	43.8	LOS D	7.2	51.7	1.00	0.94	1.23	9.5
11	T1	153	6	161	3.9	* 0.766	35.6	LOS C	7.2	51.7	1.00	0.94	1.23	15.6
12	R2	15	2	16	13.3	0.072	34.8	LOS C	0.5	3.9	0.91	0.68	0.91	24.7
Approach		200	8	211	4.0	0.766	36.9	LOS C	7.2	51.7	0.99	0.92	1.21	15.4
All Vehicles		873	94	919	10.8	0.766	31.7	LOS C	8.5	67.2	0.93	0.84	1.03	22.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Newell Highway												
P1	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	193.9	213.9	1.10

NorthEast: Newell Highway											
P2	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	193.9	213.9	1.10
NorthWest: Carpark Access											
P7	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	189.8	208.6	1.10
All Pedestrians		150	158	29.3	LOS C	0.1	0.1	0.92	0.92	192.5	212.1	1.10

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.

PHASING SUMMARY

Site: 3 [Dowling Street & Newell Highway- Base Case- PM Peak (Site Folder: Base Case)]

Dowling Street & Newell Highway
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

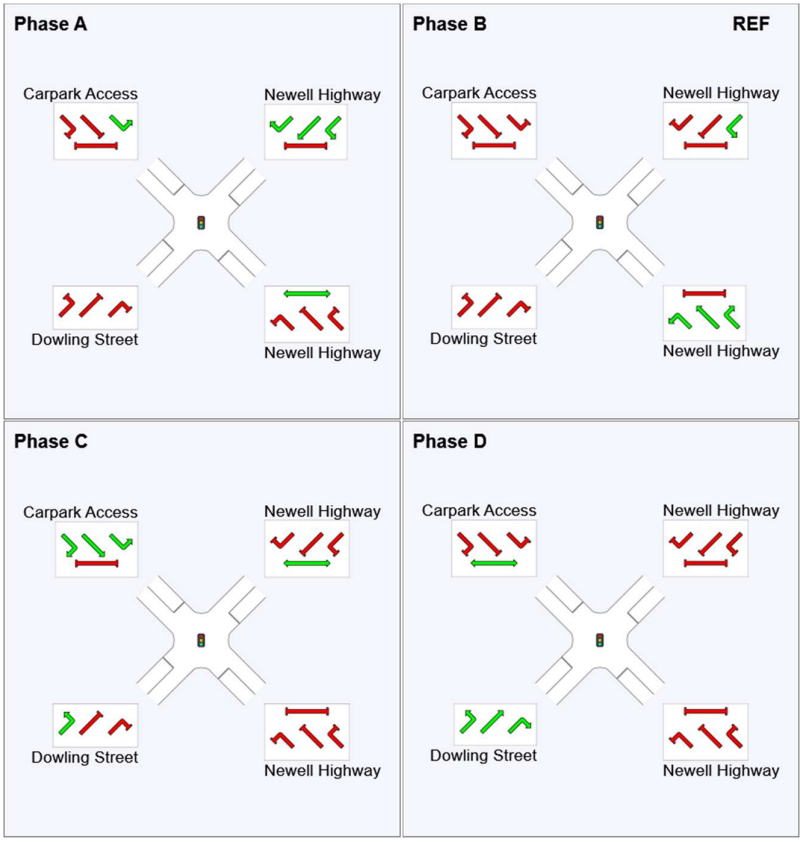
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	52	0	19	37
Green Time (sec)	12	13	12	9
Phase Time (sec)	18	19	18	15
Phase Split	26%	27%	26%	21%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



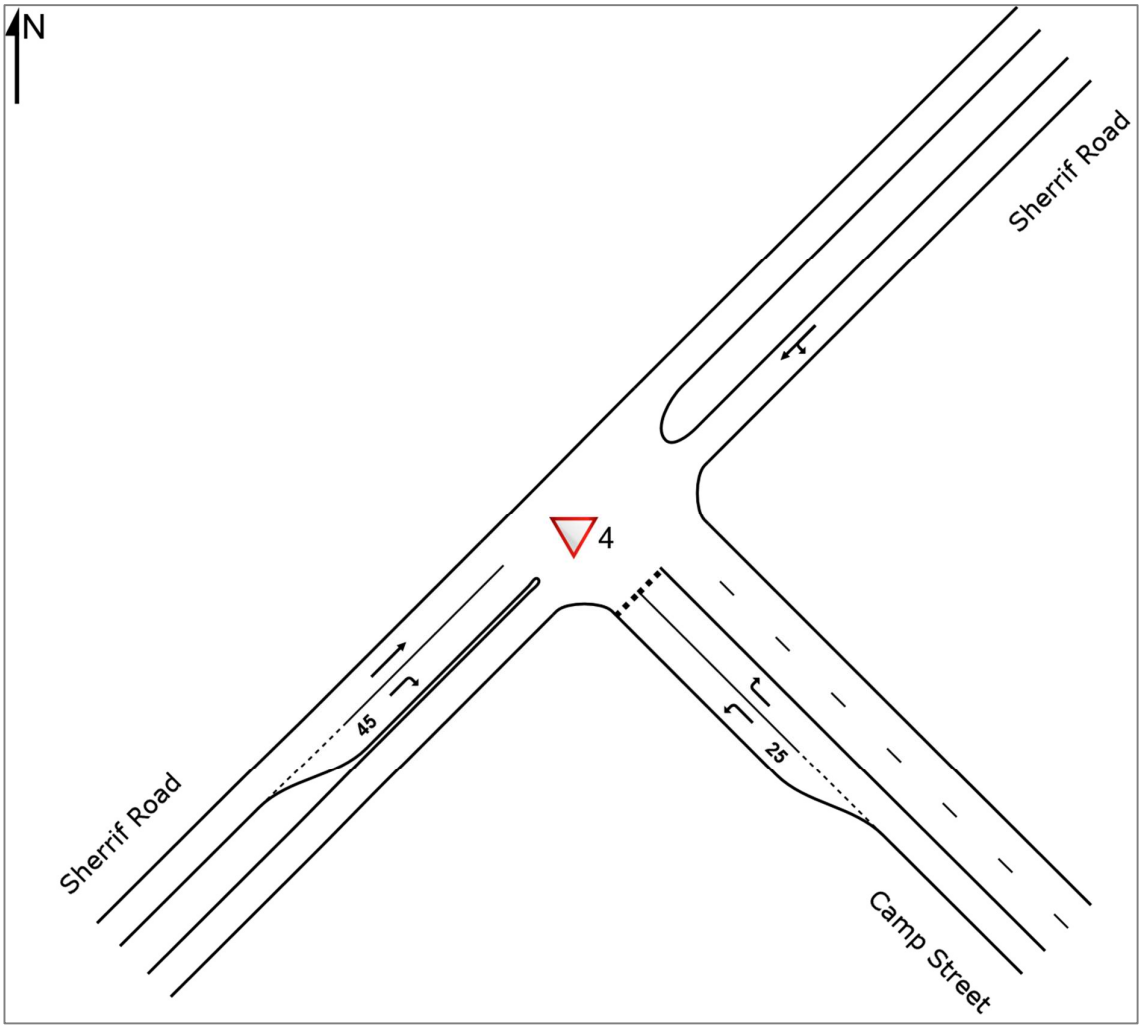
REF: Reference Phase
VAR: Variable Phase

SITE LAYOUT

Site: 4 [Camp Street & Sherrif Street- Base Case- AM Peak (Site Folder: Base Case)]

Camp Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 4 [Camp Street & Sherrif Street- Base Case- AM Peak (Site Folder: Base Case)]

Camp Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Camp Street														
1	L2	114	19	120	16.7	0.097	5.5	LOS A	0.4	3.2	0.32	0.55	0.32	37.8
3	R2	138	14	145	10.1	0.289	11.4	LOS A	1.3	9.7	0.64	0.87	0.74	29.1
Approach		252	33	265	13.1	0.289	8.7	LOS A	1.3	9.7	0.49	0.72	0.55	33.0
NorthEast: Sherrif Road														
4	L2	132	23	139	17.4	0.194	3.9	LOS A	0.0	0.0	0.00	0.23	0.00	43.3
5	T1	175	44	184	25.1	0.194	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	44.1
Approach		307	67	323	21.8	0.194	1.7	NA	0.0	0.0	0.00	0.23	0.00	43.7
SouthWest: Sherrif Road														
11	T1	258	25	272	9.7	0.149	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	59	15	62	25.4	0.057	6.4	LOS A	0.2	2.1	0.45	0.61	0.45	37.3
Approach		317	40	334	12.6	0.149	1.2	NA	0.2	2.1	0.08	0.11	0.08	45.5
All Vehicles		876	140	922	16.0	0.289	3.5	NA	1.3	9.7	0.17	0.33	0.19	39.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

MOVEMENT SUMMARY

Site: 4 [Camp Street & Sherrif Street- Base Case- PM Peak (Site Folder: Base Case)]

Camp Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Camp Street														
1	L2	108	3	114	2.8	0.088	5.4	LOS A	0.4	2.5	0.33	0.56	0.33	38.9
3	R2	128	9	135	7.0	0.265	11.1	LOS A	1.1	8.3	0.64	0.86	0.71	29.4
Approach		236	12	248	5.1	0.265	8.5	LOS A	1.1	8.3	0.50	0.72	0.53	33.6
NorthEast: Sherrif Road														
4	L2	133	10	140	7.5	0.208	3.9	LOS A	0.0	0.0	0.00	0.21	0.00	43.9
5	T1	207	47	218	22.7	0.208	0.0	LOS A	0.0	0.0	0.00	0.21	0.00	44.4
Approach		340	57	358	16.8	0.208	1.5	NA	0.0	0.0	0.00	0.21	0.00	44.2
SouthWest: Sherrif Road														
11	T1	206	28	217	13.6	0.122	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
12	R2	93	7	98	7.5	0.083	6.2	LOS A	0.4	2.7	0.46	0.62	0.46	37.9
Approach		299	35	315	11.7	0.122	1.9	NA	0.4	2.7	0.14	0.19	0.14	43.8
All Vehicles		875	104	921	11.9	0.265	3.5	NA	1.1	8.3	0.18	0.34	0.19	40.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

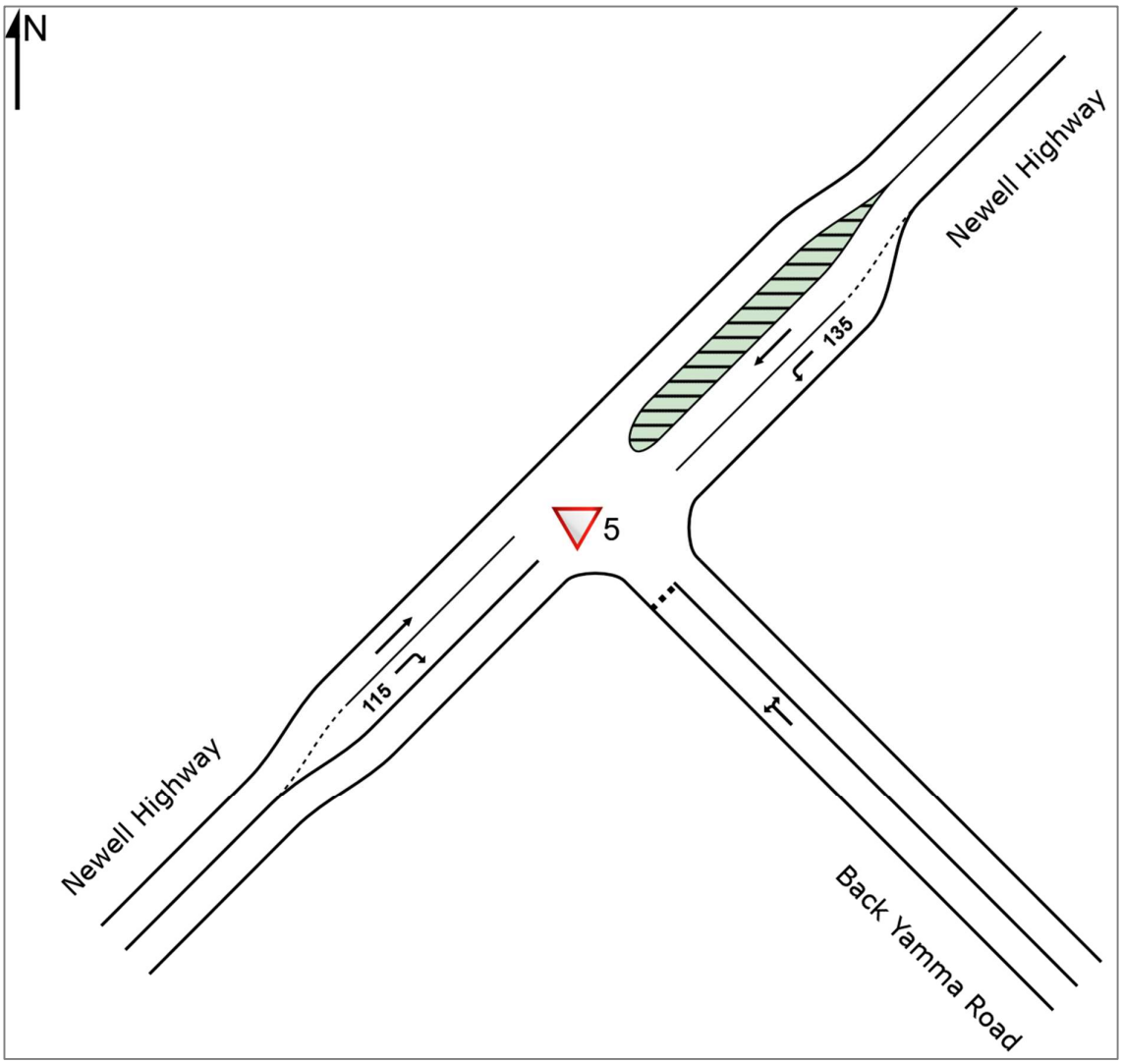
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 5 [Newell Highway & Back Yamma Road- Base Case- AM Peak (Site Folder: Base Case)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 5 [Newell Highway & Back Yamma Road- Base Case- AM Peak (Site Folder: Base Case)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Back Yamma Road														
1	L2	27	11	28	40.7	0.040	8.7	LOS A	0.1	1.3	0.34	0.64	0.34	45.8
3	R2	4	0	4	0.0	0.040	10.8	LOS A	0.1	1.3	0.34	0.64	0.34	58.2
Approach		31	11	33	35.5	0.040	8.9	LOS A	0.1	1.3	0.34	0.64	0.34	47.1
NorthEast: Newell Highway														
4	L2	7	3	7	42.9	0.005	7.7	LOS A	0.0	0.0	0.00	0.63	0.00	55.0
5	T1	180	29	189	16.1	0.107	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		187	32	197	17.1	0.107	0.3	NA	0.0	0.0	0.00	0.02	0.00	79.0
SouthWest: Newell Highway														
11	T1	186	35	196	18.8	0.114	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
12	R2	63	15	66	23.8	0.065	8.2	LOS A	0.3	2.2	0.34	0.64	0.34	55.3
Approach		249	50	262	20.1	0.114	2.1	NA	0.3	2.2	0.09	0.16	0.09	73.7
All Vehicles		467	93	492	19.9	0.114	1.8	NA	0.3	2.2	0.07	0.14	0.07	73.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

MOVEMENT SUMMARY

Site: 5 [Newell Highway & Back Yamma Road- Base Case- PM Peak (Site Folder: Base Case)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Back Yamma Road														
1	L2	38	4	40	10.5	0.061	8.3	LOS A	0.2	1.7	0.39	0.66	0.39	54.1
3	R2	10	1	11	10.0	0.061	11.3	LOS A	0.2	1.7	0.39	0.66	0.39	54.0
Approach		48	5	51	10.4	0.061	8.9	LOS A	0.2	1.7	0.39	0.66	0.39	54.1
NorthEast: Newell Highway														
4	L2	17	1	18	5.9	0.010	7.1	LOS A	0.0	0.0	0.00	0.63	0.00	59.7
5	T1	232	31	244	13.4	0.136	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		249	32	262	12.9	0.136	0.5	NA	0.0	0.0	0.00	0.04	0.00	78.6
SouthWest: Newell Highway														
11	T1	179	22	188	12.3	0.104	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
12	R2	4	2	4	50.0	0.005	9.3	LOS A	0.0	0.2	0.40	0.61	0.40	51.6
Approach		183	24	193	13.1	0.104	0.2	NA	0.0	0.2	0.01	0.01	0.01	79.3
All Vehicles		480	61	505	12.7	0.136	1.2	NA	0.2	1.7	0.04	0.09	0.04	76.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

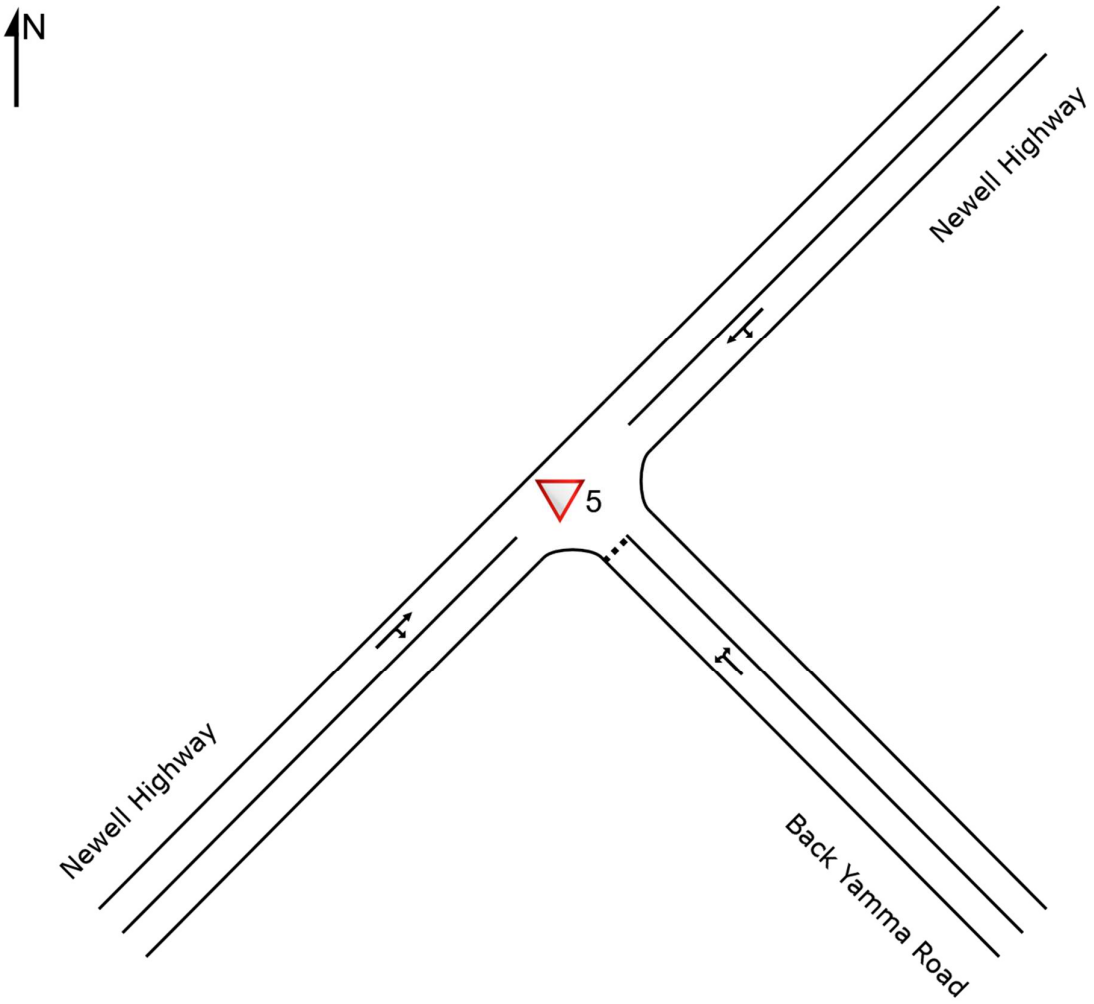
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 5 [Newell Highway & Forest Road - Base Case - AM Peak (Site Folder: Base Case)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 5 [Newell Highway & Forest Road - Base Case - AM Peak (Site Folder: Base Case)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Back Yamma Road														
1	L2	1	0	1	0.0	0.002	7.6	LOS A	0.0	0.1	0.35	0.59	0.35	58.7
3	R2	1	0	1	0.0	0.002	8.7	LOS A	0.0	0.1	0.35	0.59	0.35	58.2
Approach		2	0	2	0.0	0.002	8.2	LOS A	0.0	0.1	0.35	0.59	0.35	58.5
NorthEast: Newell Highway														
4	L2	1	0	1	0.0	0.126	7.0	LOS A	0.0	0.0	0.00	0.00	0.00	72.4
5	T1	207	40	218	19.3	0.126	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		208	40	219	19.2	0.126	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.8
SouthWest: Newell Highway														
11	T1	249	50	262	20.1	0.153	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	79.9
12	R2	1	0	1	0.0	0.153	7.5	LOS A	0.0	0.1	0.00	0.00	0.00	71.5
Approach		250	50	263	20.0	0.153	0.0	NA	0.0	0.1	0.00	0.00	0.00	79.9
All Vehicles		460	90	484	19.6	0.153	0.1	NA	0.0	0.1	0.00	0.01	0.00	79.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

MOVEMENT SUMMARY

Site: 5 [Newell Highway & Forest Road - Base Case - PM Peak (Site Folder: Base Case)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Back Yamma Road														
1	L2	1	0	1	0.0	0.002	7.8	LOS A	0.0	0.1	0.38	0.60	0.38	58.6
3	R2	1	0	1	0.0	0.002	8.6	LOS A	0.0	0.1	0.38	0.60	0.38	58.0
Approach		2	0	2	0.0	0.002	8.2	LOS A	0.0	0.1	0.38	0.60	0.38	58.3
NorthEast: Newell Highway														
4	L2	1	0	1	0.0	0.159	7.0	LOS A	0.0	0.0	0.00	0.00	0.00	72.4
5	T1	270	35	284	13.0	0.159	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		271	35	285	12.9	0.159	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.8
SouthWest: Newell Highway														
11	T1	183	24	193	13.1	0.108	0.0	LOS A	0.0	0.1	0.01	0.00	0.01	79.9
12	R2	1	0	1	0.0	0.108	7.7	LOS A	0.0	0.1	0.01	0.00	0.01	71.5
Approach		184	24	194	13.0	0.108	0.1	NA	0.0	0.1	0.01	0.00	0.01	79.8
All Vehicles		457	59	481	12.9	0.159	0.1	NA	0.0	0.1	0.00	0.01	0.00	79.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

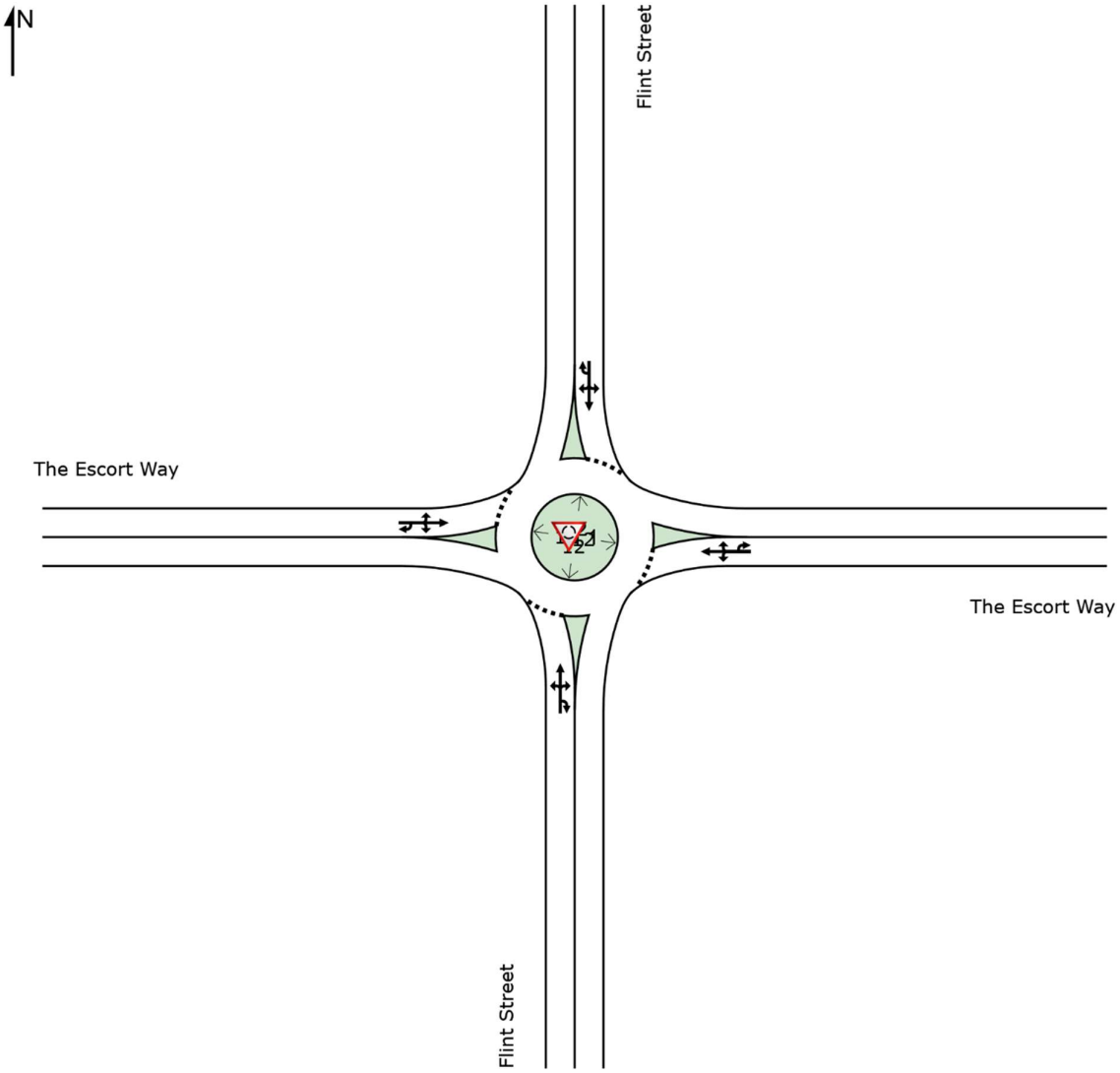
Opening Year with Project Traffic

SITE LAYOUT

Site: 1 [The Escort Way & Flint Street - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

The Escort Way & Flint Street
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 1 [The Escort Way & Flint Street - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

The Escort Way & Flint Street
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Flint Street														
1	L2	158	26	166	16.5	0.185	4.8	LOS A	1.0	8.0	0.45	0.57	0.45	34.3
2	T1	1	0	1	0.0	0.185	4.6	LOS A	1.0	8.0	0.45	0.57	0.45	39.0
3	R2	17	1	18	5.9	0.185	8.4	LOS A	1.0	8.0	0.45	0.57	0.45	37.2
3u	U	1	0	1	0.0	0.185	10.5	LOS A	1.0	8.0	0.45	0.57	0.45	29.6
Approach		177	27	186	15.3	0.185	5.2	LOS A	1.0	8.0	0.45	0.57	0.45	34.5
East: The Escort Way														
4	L2	23	4	24	17.4	0.209	4.4	LOS A	1.1	8.7	0.33	0.45	0.33	34.4
5	T1	209	19	220	9.1	0.209	4.3	LOS A	1.1	8.7	0.33	0.45	0.33	40.4
6	R2	2	0	2	0.0	0.209	7.8	LOS A	1.1	8.7	0.33	0.45	0.33	41.1
6u	U	1	0	1	0.0	0.209	10.9	LOS A	1.1	8.7	0.33	0.45	0.33	37.2
Approach		235	23	247	9.8	0.209	4.3	LOS A	1.1	8.7	0.33	0.45	0.33	39.9
North: Flint Street														
7	L2	2	0	2	0.0	0.012	4.3	LOS A	0.1	0.4	0.36	0.56	0.36	35.8
8	T1	1	0	1	0.0	0.012	4.4	LOS A	0.1	0.4	0.36	0.56	0.36	33.1
9	R2	8	1	8	12.5	0.012	8.2	LOS A	0.1	0.4	0.36	0.56	0.36	37.0
9u	U	1	0	1	0.0	0.012	11.1	LOS A	0.1	0.4	0.36	0.56	0.36	32.1
Approach		12	1	13	8.3	0.012	7.5	LOS A	0.1	0.4	0.36	0.56	0.36	36.1
West: The Escort Way														
10	L2	1	0	1	0.0	0.137	3.5	LOS A	0.8	6.4	0.13	0.52	0.13	38.0
11	T1	63	19	66	30.2	0.137	3.8	LOS A	0.8	6.4	0.13	0.52	0.13	37.3
12	R2	107	22	113	20.6	0.137	7.4	LOS A	0.8	6.4	0.13	0.52	0.13	33.3
12u	U	1	0	1	0.0	0.137	10.3	LOS A	0.8	6.4	0.13	0.52	0.13	32.8
Approach		172	41	181	23.8	0.137	6.0	LOS A	0.8	6.4	0.13	0.52	0.13	34.8
All Vehicles		596	92	627	15.4	0.209	5.1	LOS A	1.1	8.7	0.31	0.51	0.31	36.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 1 [The Escort Way & Flint Street - PM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

The Escort Way & Flint Street
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Flint Street														
1	L2	135	7	142	5.2	0.135	3.8	LOS A	0.7	5.3	0.28	0.48	0.28	36.7
2	T1	4	1	4	25.0	0.135	3.9	LOS A	0.7	5.3	0.28	0.48	0.28	36.9
3	R2	18	1	19	5.6	0.135	7.6	LOS A	0.7	5.3	0.28	0.48	0.28	38.6
3u	U	1	0	1	0.0	0.135	9.7	LOS A	0.7	5.3	0.28	0.48	0.28	30.8
Approach		158	9	166	5.7	0.135	4.3	LOS A	0.7	5.3	0.28	0.48	0.28	36.9
East: The Escort Way														
4	L2	12	3	13	25.0	0.094	4.4	LOS A	0.5	3.6	0.30	0.43	0.30	34.5
5	T1	87	11	92	12.6	0.094	4.2	LOS A	0.5	3.6	0.30	0.43	0.30	40.2
6	R2	1	0	1	0.0	0.094	7.7	LOS A	0.5	3.6	0.30	0.43	0.30	41.3
6u	U	1	0	1	0.0	0.094	10.8	LOS A	0.5	3.6	0.30	0.43	0.30	37.4
Approach		101	14	106	13.9	0.094	4.3	LOS A	0.5	3.6	0.30	0.43	0.30	39.6
North: Flint Street														
7	L2	2	0	2	0.0	0.006	4.9	LOS A	0.0	0.2	0.44	0.55	0.44	36.2
8	T1	1	0	1	0.0	0.006	4.9	LOS A	0.0	0.2	0.44	0.55	0.44	33.5
9	R2	2	0	2	0.0	0.006	8.6	LOS A	0.0	0.2	0.44	0.55	0.44	38.8
9u	U	1	0	1	0.0	0.006	11.7	LOS A	0.0	0.2	0.44	0.55	0.44	32.4
Approach		6	0	6	0.0	0.006	7.3	LOS A	0.0	0.2	0.44	0.55	0.44	35.9
West: The Escort Way														
10	L2	2	0	2	0.0	0.216	3.5	LOS A	1.3	9.4	0.14	0.47	0.14	39.3
11	T1	184	12	194	6.5	0.216	3.6	LOS A	1.3	9.4	0.14	0.47	0.14	40.7
12	R2	112	11	118	9.8	0.216	7.3	LOS A	1.3	9.4	0.14	0.47	0.14	34.7
12u	U	1	0	1	0.0	0.216	10.3	LOS A	1.3	9.4	0.14	0.47	0.14	33.6
Approach		299	23	315	7.7	0.216	5.0	LOS A	1.3	9.4	0.14	0.47	0.14	38.5
All Vehicles		564	46	594	8.2	0.216	4.7	LOS A	1.3	9.4	0.21	0.47	0.21	38.3

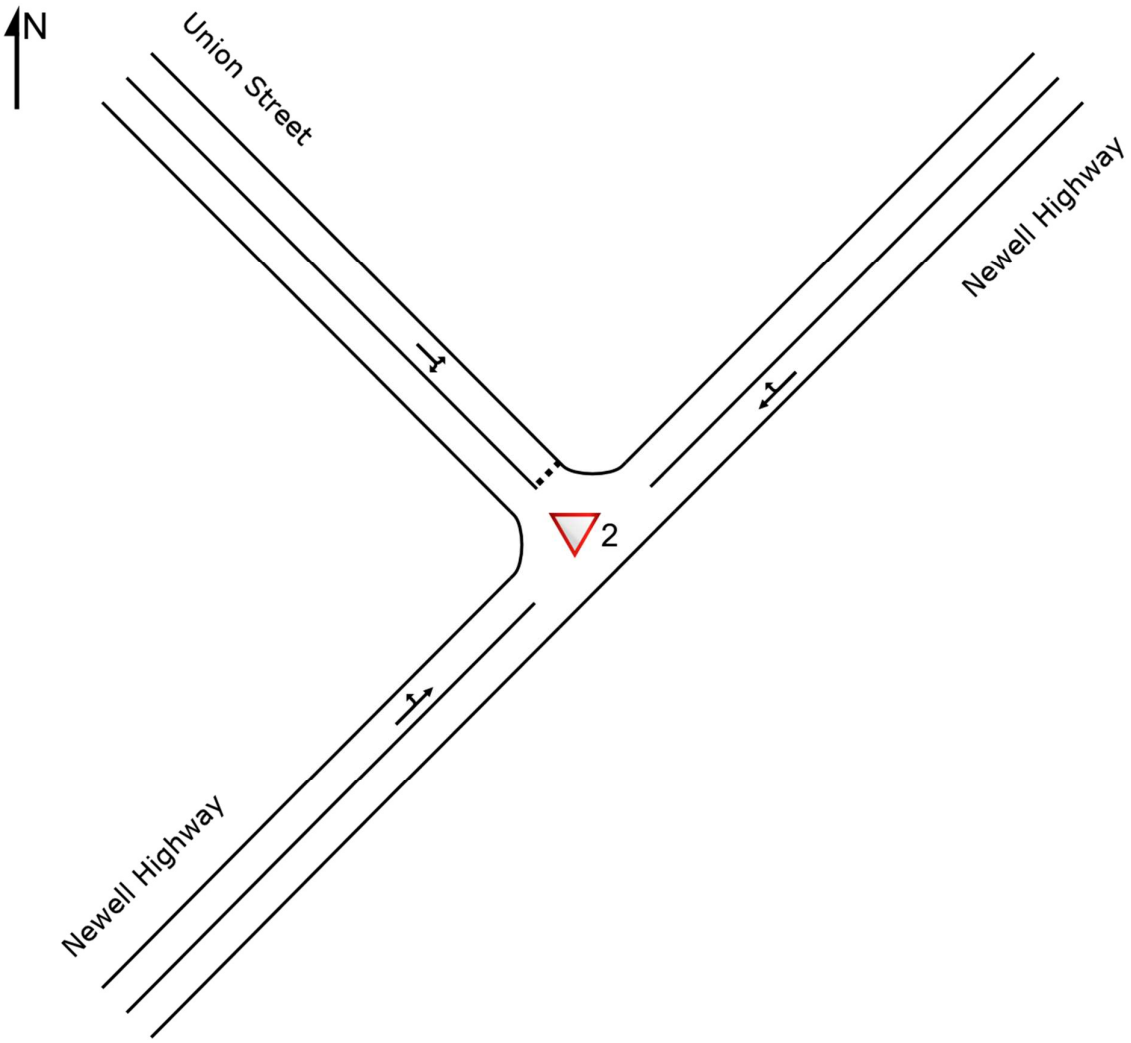
Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 2 [Union Street & Dowling Street - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Union Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 2 [Union Street & Dowling Street - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Union Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Newell Highway														
5	T1	297	57	313	19.2	0.220	0.5	LOS A	0.5	3.9	0.18	0.08	0.18	47.8
6	R2	41	0	43	0.0	0.220	7.2	LOS A	0.5	3.9	0.18	0.08	0.18	45.8
Approach		338	57	356	16.9	0.220	1.3	NA	0.5	3.9	0.18	0.08	0.18	47.5
NorthWest: Union Street														
7	L2	69	7	73	10.1	0.256	6.8	LOS A	1.0	7.7	0.57	0.78	0.61	37.6
9	R2	75	17	79	22.7	0.256	12.3	LOS A	1.0	7.7	0.57	0.78	0.61	29.3
Approach		144	24	152	16.7	0.256	9.6	LOS A	1.0	7.7	0.57	0.78	0.61	33.9
SouthWest: Newell Highway														
10	L2	98	5	103	5.1	0.273	4.6	LOS A	0.0	0.0	0.00	0.11	0.00	44.7
11	T1	373	41	393	11.0	0.273	0.0	LOS A	0.0	0.0	0.00	0.11	0.00	48.3
Approach		471	46	496	9.8	0.273	1.0	NA	0.0	0.0	0.00	0.11	0.00	47.8
All Vehicles		953	127	1003	13.3	0.273	2.4	NA	1.0	7.7	0.15	0.20	0.16	45.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

MOVEMENT SUMMARY

Site: 2 [Union Street & Dowling Street - PM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Union Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Newell Highway														
5	T1	444	53	467	11.9	0.310	0.5	LOS A	0.7	5.5	0.17	0.07	0.17	48.1
6	R2	56	1	59	1.8	0.310	7.0	LOS A	0.7	5.5	0.17	0.07	0.17	45.9
Approach		500	54	526	10.8	0.310	1.2	NA	0.7	5.5	0.17	0.07	0.17	47.8
NorthWest: Union Street														
7	L2	37	0	39	0.0	0.167	5.8	LOS A	0.6	4.0	0.53	0.73	0.53	38.0
9	R2	55	3	58	5.5	0.167	11.5	LOS A	0.6	4.0	0.53	0.73	0.53	30.7
Approach		92	3	97	3.3	0.167	9.2	LOS A	0.6	4.0	0.53	0.73	0.53	34.3
SouthWest: Newell Highway														
10	L2	89	1	94	1.1	0.234	4.6	LOS A	0.0	0.0	0.00	0.12	0.00	45.1
11	T1	315	36	332	11.4	0.234	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	48.2
Approach		404	37	425	9.2	0.234	1.0	NA	0.0	0.0	0.00	0.12	0.00	47.8
All Vehicles		996	94	1048	9.4	0.310	1.9	NA	0.7	5.5	0.13	0.15	0.14	46.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

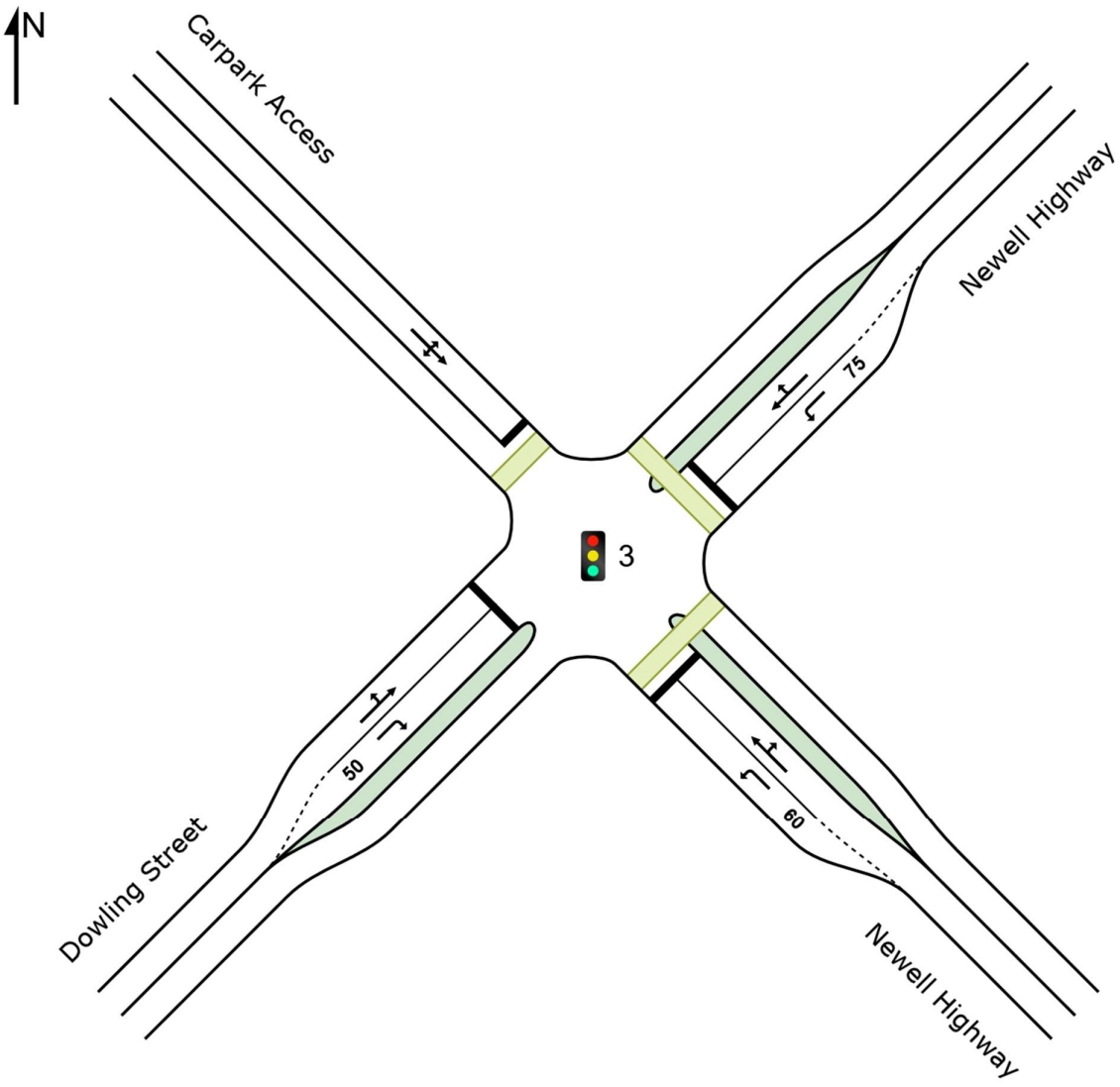
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3 [Dowling Street & Newell Highway - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Dowling Street & Newell Highway
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3 [Dowling Street & Newell Highway - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Dowling Street & Newell Highway
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 79 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Newell Highway														
1	L2	12	2	13	16.7	0.021	13.5	LOS A	0.2	1.3	0.66	0.64	0.66	35.1
22	T1	11	0	12	0.0	* 0.770	40.8	LOS C	13.2	101.3	0.99	0.91	1.12	18.7
3	R2	308	36	324	11.7	0.770	38.0	LOS C	13.2	101.3	0.99	0.91	1.12	23.7
Approach		331	38	348	11.5	0.770	37.2	LOS C	13.2	101.3	0.97	0.90	1.11	23.8
NorthEast: Newell Highway														
4	L2	227	71	239	31.3	0.366	21.4	LOS B	6.3	55.9	0.72	0.76	0.72	30.7
5	T1	125	5	132	4.0	0.472	33.4	LOS C	5.3	38.6	0.95	0.77	0.95	16.5
26	R2	15	0	16	0.0	0.472	40.1	LOS C	5.3	38.6	0.95	0.77	0.95	10.4
Approach		367	76	386	20.7	0.472	26.3	LOS B	6.3	55.9	0.81	0.76	0.81	25.4
NorthWest: Carpark Access														
27	L2	1	0	1	0.0	* 0.100	31.6	LOS C	1.0	6.7	0.88	0.71	0.88	9.9
28	T1	10	0	11	0.0	0.100	31.6	LOS C	1.0	6.7	0.88	0.71	0.88	18.8
29	R2	18	0	19	0.0	0.100	31.6	LOS C	1.0	6.7	0.88	0.71	0.88	9.5
Approach		29	0	31	0.0	0.100	31.6	LOS C	1.0	6.7	0.88	0.71	0.88	13.2
SouthWest: Dowling Street														
30	L2	32	0	34	0.0	0.812	50.6	LOS D	7.8	56.4	1.00	0.97	1.31	8.6
11	T1	142	6	149	4.2	* 0.812	42.4	LOS C	7.8	56.4	1.00	0.97	1.31	13.8
12	R2	17	1	18	5.9	0.088	39.7	LOS C	0.6	4.7	0.92	0.69	0.92	23.1
Approach		191	7	201	3.7	0.812	43.6	LOS D	7.8	56.4	0.99	0.95	1.27	13.8
All Vehicles		918	121	966	13.2	0.812	34.0	LOS C	13.2	101.3	0.91	0.85	1.01	22.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Newell Highway												
P1	Full	50	53	33.8	LOS D	0.1	0.1	0.93	0.93	198.3	213.9	1.08
NorthEast: Newell Highway												
P2	Full	50	53	33.8	LOS D	0.1	0.1	0.93	0.93	198.3	213.9	1.08

NorthWest: Carpark Access												
P7	Full	50	53	33.8	LOS D	0.1	0.1	0.93	0.93	194.3	208.6	1.07
All Pedestrians		150	158	33.8	LOS D	0.1	0.1	0.93	0.93	197.0	212.1	1.08

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.

PHASING SUMMARY

Site: 3 [Dowling Street & Newell Highway - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Dowling Street & Newell Highway
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 79 seconds (Site Optimum Cycle Time - Minimum Delay)

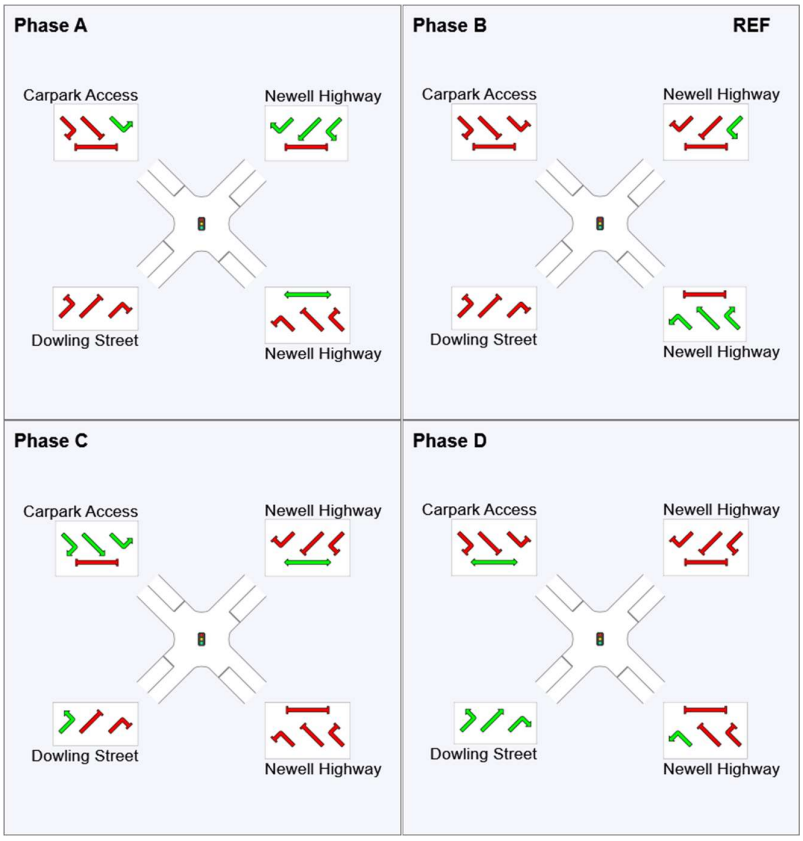
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	60	0	26	45
Green Time (sec)	13	20	13	9
Phase Time (sec)	19	26	19	15
Phase Split	24%	33%	24%	19%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 3 [Dowling Street & Newell Highway - PM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Dowling Street & Newell Highway
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 71 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Newell Highway														
1	L2	11	0	12	0.0	0.032	29.6	LOS C	0.3	2.3	0.83	0.66	0.83	26.9
22	T1	10	0	11	0.0	* 0.741	39.9	LOS C	8.7	70.0	0.99	0.90	1.15	18.8
3	R2	219	41	231	18.7	0.741	37.2	LOS C	8.7	70.0	0.99	0.90	1.15	23.8
Approach		240	41	253	17.1	0.741	37.0	LOS C	8.7	70.0	0.99	0.89	1.14	23.7
NorthEast: Newell Highway														
4	L2	314	54	331	17.2	0.525	23.4	LOS B	9.0	72.6	0.82	0.80	0.82	29.8
5	T1	182	2	192	1.1	0.612	31.0	LOS C	6.8	47.7	0.98	0.81	1.00	17.5
26	R2	8	0	8	0.0	0.612	37.6	LOS C	6.8	47.7	0.98	0.81	1.00	11.0
Approach		504	56	531	11.1	0.612	26.4	LOS B	9.0	72.6	0.88	0.80	0.89	25.7
NorthWest: Carpark Access														
27	L2	1	0	1	0.0	* 0.081	27.5	LOS B	0.7	4.7	0.87	0.70	0.87	10.6
28	T1	10	0	11	0.0	0.081	27.5	LOS B	0.7	4.7	0.87	0.70	0.87	19.7
29	R2	13	0	14	0.0	0.081	27.5	LOS B	0.7	4.7	0.87	0.70	0.87	10.1
Approach		24	0	25	0.0	0.081	27.5	LOS B	0.7	4.7	0.87	0.70	0.87	14.8
SouthWest: Dowling Street														
30	L2	32	0	34	0.0	0.777	44.7	LOS D	7.3	52.7	1.00	0.95	1.25	9.4
11	T1	153	6	161	3.9	* 0.777	36.5	LOS C	7.3	52.7	1.00	0.95	1.25	15.3
12	R2	15	2	16	13.3	0.073	35.3	LOS C	0.5	3.9	0.91	0.69	0.91	24.5
Approach		200	8	211	4.0	0.777	37.7	LOS C	7.3	52.7	0.99	0.93	1.22	15.1
All Vehicles		968	105	1019	10.8	0.777	31.4	LOS C	9.0	72.6	0.93	0.85	1.02	22.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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 (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
SouthEast: Newell Highway												
P1	Full	50	53	29.8	LOS C	0.1	0.1	0.92	0.92	194.4	213.9	1.10
NorthEast: Newell Highway												

P2	Full	50	53	29.8	LOS C	0.1	0.1	0.92	0.92	194.4	213.9	1.10
NorthWest: Carpark Access												
P7	Full	50	53	29.8	LOS C	0.1	0.1	0.92	0.92	190.3	208.6	1.10
All Pedestrians		150	158	29.8	LOS C	0.1	0.1	0.92	0.92	193.0	212.1	1.10

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.

PHASING SUMMARY

Site: 3 [Dowling Street & Newell Highway - PM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Dowling Street & Newell Highway
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 71 seconds (Site Optimum Cycle Time - Minimum Delay)

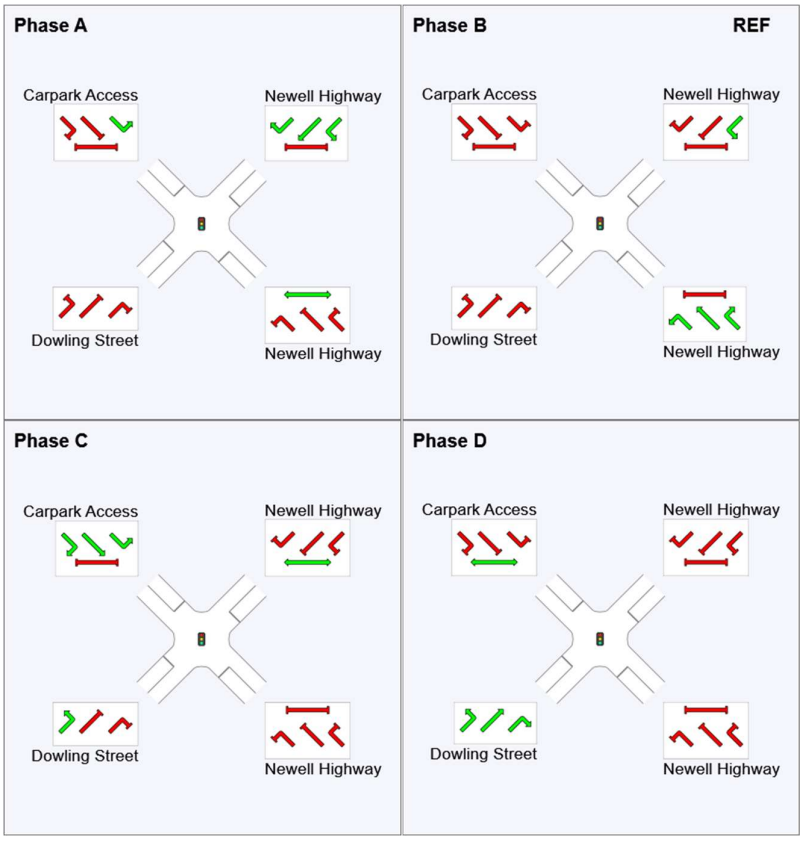
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	53	0	20	38
Green Time (sec)	12	14	12	9
Phase Time (sec)	18	20	18	15
Phase Split	25%	28%	25%	21%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



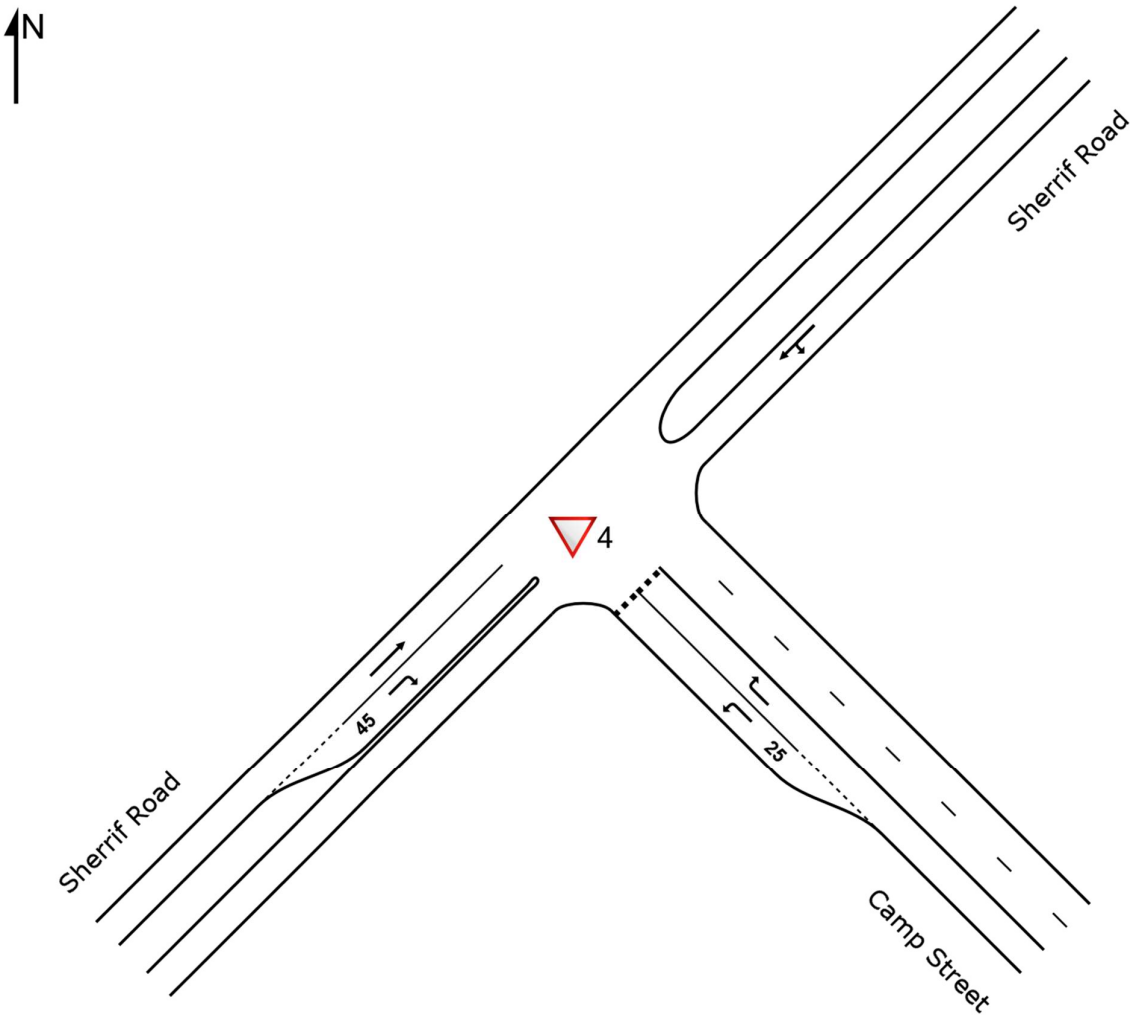
REF: Reference Phase
VAR: Variable Phase

SITE LAYOUT

Site: 4 [Camp Street & Sherrif Street - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Camp Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 4 [Camp Street & Sherrif Street - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Camp Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Camp Street														
1	L2	114	19	120	16.7	0.097	5.5	LOS A	0.4	3.2	0.32	0.55	0.32	37.8
3	R2	227	19	239	8.4	0.470	13.4	LOS A	2.7	20.1	0.70	0.99	1.05	27.4
Approach		341	38	359	11.1	0.470	10.8	LOS A	2.7	20.1	0.57	0.84	0.80	30.7
NorthEast: Sherrif Road														
4	L2	137	28	144	20.4	0.199	3.9	LOS A	0.0	0.0	0.00	0.23	0.00	43.1
5	T1	175	44	184	25.1	0.199	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	44.1
Approach		312	72	328	23.1	0.199	1.7	NA	0.0	0.0	0.00	0.23	0.00	43.6
SouthWest: Sherrif Road														
11	T1	258	25	272	9.7	0.149	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
12	R2	59	15	62	25.4	0.058	6.5	LOS A	0.2	2.1	0.45	0.61	0.45	37.3
Approach		317	40	334	12.6	0.149	1.2	NA	0.2	2.1	0.08	0.11	0.08	45.5
All Vehicles		970	150	1021	15.5	0.470	4.7	NA	2.7	20.1	0.23	0.41	0.31	37.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

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

MOVEMENT SUMMARY

Site: 4 [Camp Street & Sherrif Street - PM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Camp Street & Newell Highway
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Camp Street														
1	L2	108	3	114	2.8	0.088	5.4	LOS A	0.4	2.5	0.33	0.56	0.33	38.9
3	R2	133	14	140	10.5	0.308	12.7	LOS A	1.4	10.4	0.69	0.90	0.82	27.9
Approach		241	17	254	7.1	0.308	9.4	LOS A	1.4	10.4	0.53	0.75	0.60	32.6
NorthEast: Sherrif Road														
4	L2	222	15	234	6.8	0.260	3.9	LOS A	0.0	0.0	0.00	0.27	0.00	42.9
5	T1	207	47	218	22.7	0.260	0.0	LOS A	0.0	0.0	0.00	0.27	0.00	42.9
Approach		429	62	452	14.5	0.260	2.0	NA	0.0	0.0	0.00	0.27	0.00	42.9
SouthWest: Sherrif Road														
11	T1	206	28	217	13.6	0.122	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
12	R2	93	7	98	7.5	0.094	6.7	LOS A	0.4	3.0	0.51	0.67	0.51	37.5
Approach		299	35	315	11.7	0.122	2.1	NA	0.4	3.0	0.16	0.21	0.16	43.5
All Vehicles		969	114	1020	11.8	0.308	3.9	NA	1.4	10.4	0.18	0.37	0.20	39.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

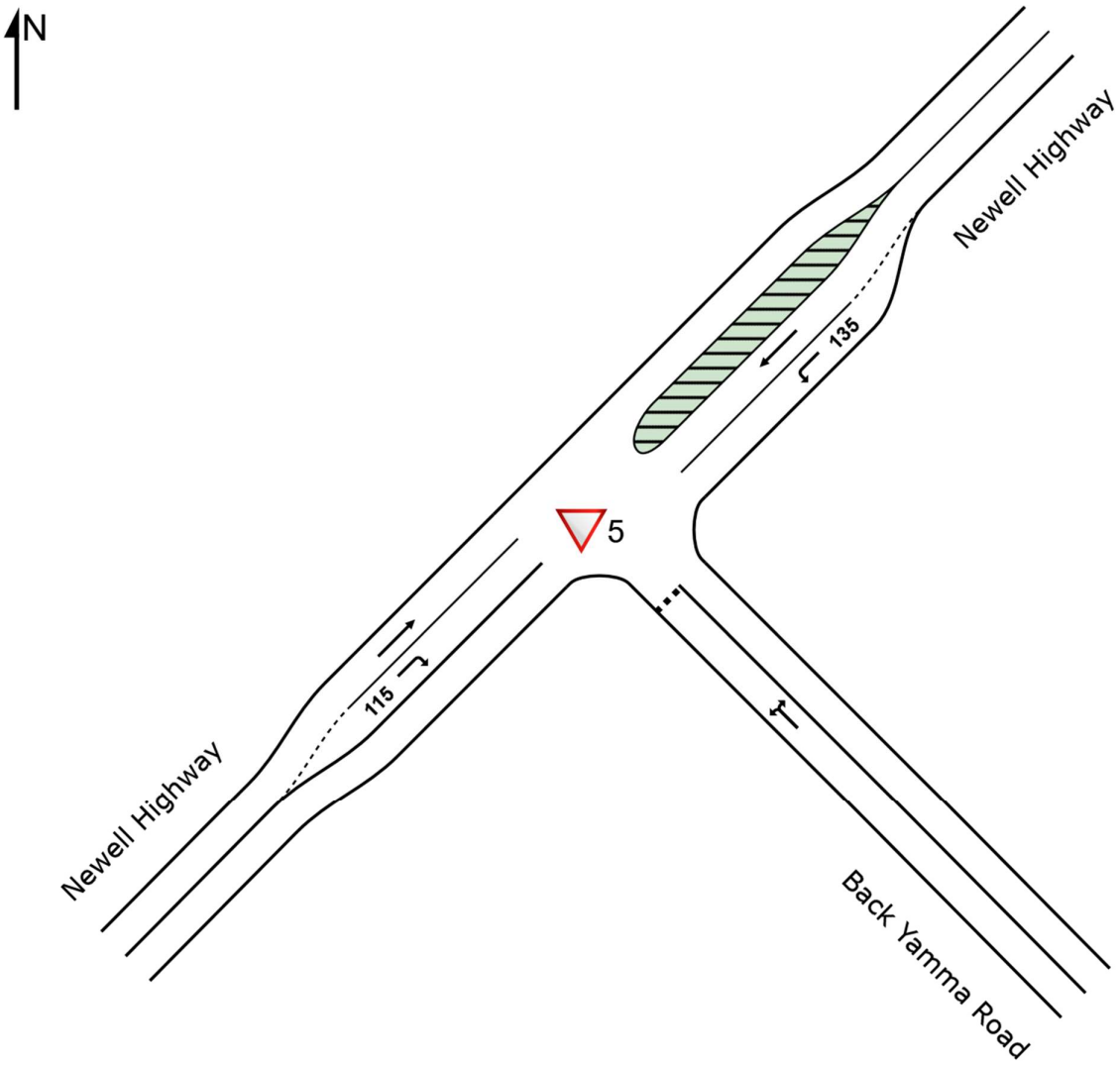
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 5 [Newell Highway & Back Yamma Road - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 5 [Newell Highway & Back Yamma Road - AM Peak - With Dev-Rev01 (Site Folder: With Dev - Rev 01)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Back Yamma Road														
1	L2	30	14	32	46.7	0.047	8.9	LOS A	0.2	1.6	0.36	0.65	0.36	44.1
3	R2	4	0	4	0.0	0.047	12.5	LOS A	0.2	1.6	0.36	0.65	0.36	57.8
Approach		34	14	36	41.2	0.047	9.3	LOS A	0.2	1.6	0.36	0.65	0.36	45.4
NorthEast: Newell Highway														
4	L2	61	3	64	4.9	0.036	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	59.8
5	T1	193	29	203	15.0	0.114	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		254	32	267	12.6	0.114	1.7	NA	0.0	0.0	0.00	0.15	0.00	75.4
SouthWest: Newell Highway														
11	T1	186	35	196	18.8	0.114	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
12	R2	146	18	154	12.3	0.153	8.3	LOS A	0.6	5.0	0.41	0.68	0.41	56.5
Approach		332	53	349	16.0	0.153	3.7	NA	0.6	5.0	0.18	0.30	0.18	69.7
All Vehicles		620	99	653	16.0	0.153	3.2	NA	0.6	5.0	0.12	0.26	0.12	70.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 5 [Newell Highway & Back Yamma Road - PM Peak - With Dev-Rev01 (Site Folder: With Dev - Rev 01)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Back Yamma Road														
1	L2	121	7	127	5.8	0.247	8.4	LOS A	1.0	7.3	0.46	0.73	0.46	54.9
3	R2	64	1	67	1.6	0.247	11.8	LOS A	1.0	7.3	0.46	0.73	0.46	56.2
Approach		185	8	195	4.3	0.247	9.6	LOS A	1.0	7.3	0.46	0.73	0.46	55.3
NorthEast: Newell Highway														
4	L2	17	1	18	5.9	0.010	7.1	LOS A	0.0	0.0	0.00	0.63	0.00	59.7
5	T1	232	31	244	13.4	0.136	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		249	32	262	12.9	0.136	0.5	NA	0.0	0.0	0.00	0.04	0.00	78.6
SouthWest: Newell Highway														
11	T1	192	22	202	11.5	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
12	R2	7	5	7	71.4	0.010	10.1	LOS A	0.0	0.4	0.41	0.64	0.41	48.9
Approach		199	27	209	13.6	0.111	0.4	NA	0.0	0.4	0.01	0.02	0.01	78.7
All Vehicles		633	67	666	10.6	0.247	3.1	NA	1.0	7.3	0.14	0.24	0.14	71.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

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

Queue Model: SIDRA Standard.

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

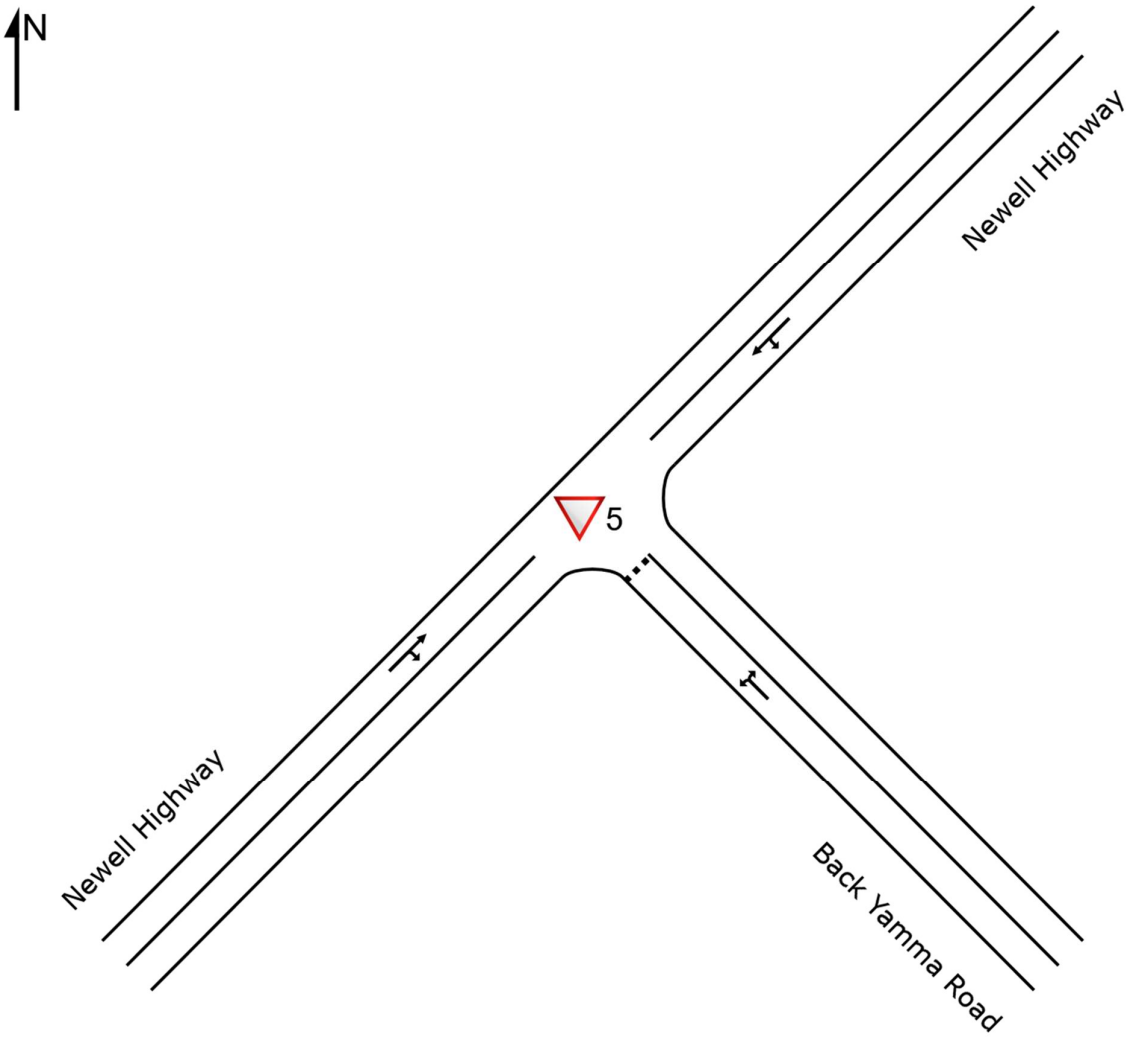
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 5 [Newell Highway & Forest Road - AM Peak - With Dev-Rev01 (Site Folder: Base Case - Rev 01)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 5 [Newell Highway & Forest Road - AM Peak - With Dev-Rev01 (Site Folder: With Dev - Rev 01)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Back Yamma Road														
1	L2	1	0	1	0.0	0.002	7.6	LOS A	0.0	0.1	0.36	0.60	0.36	58.3
3	R2	1	0	1	0.0	0.002	9.4	LOS A	0.0	0.1	0.36	0.60	0.36	57.7
Approach		2	0	2	0.0	0.002	8.5	LOS A	0.0	0.1	0.36	0.60	0.36	58.0
NorthEast: Newell Highway														
4	L2	13	0	14	0.0	0.133	7.0	LOS A	0.0	0.0	0.00	0.04	0.00	71.4
5	T1	207	40	218	19.3	0.133	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	79.0
Approach		220	40	232	18.2	0.133	0.4	NA	0.0	0.0	0.00	0.04	0.00	78.7
SouthWest: Newell Highway														
11	T1	332	53	349	16.0	0.212	0.1	LOS A	0.2	1.4	0.05	0.04	0.05	78.8
12	R2	20	0	21	0.0	0.212	7.6	LOS A	0.2	1.4	0.05	0.04	0.05	70.2
Approach		352	53	371	15.1	0.212	0.5	NA	0.2	1.4	0.05	0.04	0.05	78.4
All Vehicles		574	93	604	16.2	0.212	0.5	NA	0.2	1.4	0.03	0.04	0.03	78.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 5 [Newell Highway & Forest Road - PM Peak - With Dev-Rev01 (Site Folder: With Dev - Rev 01)]

Newell Highway & Back Yamma Road
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Back Yamma Road														
1	L2	20	0	21	0.0	0.038	8.3	LOS A	0.1	0.9	0.43	0.68	0.43	58.0
3	R2	13	0	14	0.0	0.038	9.4	LOS A	0.1	0.9	0.43	0.68	0.43	57.5
Approach		33	0	35	0.0	0.038	8.7	LOS A	0.1	0.9	0.43	0.68	0.43	57.8
NorthEast: Newell Highway														
4	L2	1	0	1	0.0	0.204	7.0	LOS A	0.0	0.0	0.00	0.00	0.00	72.4
5	T1	353	38	372	10.8	0.204	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		354	38	373	10.7	0.204	0.1	NA	0.0	0.0	0.00	0.00	0.00	79.8
SouthWest: Newell Highway														
11	T1	186	27	196	14.5	0.111	0.0	LOS A	0.0	0.1	0.01	0.00	0.01	79.9
12	R2	1	0	1	0.0	0.111	8.2	LOS A	0.0	0.1	0.01	0.00	0.01	71.5
Approach		187	27	197	14.4	0.111	0.1	NA	0.0	0.1	0.01	0.00	0.01	79.8
All Vehicles		574	65	604	11.3	0.204	0.6	NA	0.1	0.9	0.03	0.04	0.03	78.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Member of the Surbana Jurong Group

Technical Memorandum

Memo No.	1	**Date of Issue**	28 January 2022
Subject	Road Geometry Assessment	**Discipline**	Roads & Highways
Project Title	Daroobalgie	**Project No.**	30012765
Document No.	1	**Revision**	1
Author	Graeme Allen, Designer		
Reviewed by	Andrew Brown	**Approved by**	Jessica Miller
Prepared for	Pacific Hydro	**Attention to**	Kate Munro
Attachments	NA		

1. Introduction

Swept path analysis of the existing road geometry at the Back Yamma Road/ Troubalgie Road priority intersection has been undertaken to determine the ability of B-Double (26m) trucks to pass simultaneously turning to/ from Back Yamma Road and Troubalgie Road.

1.1 Existing conditions

As shown in Figure 1-1, the current road geometry allows for a B-double to make the turn in both directions (Right turn from Back Yamma Road and Left turn from Troubalgie Road), however there is insufficient room for the turns to happen simultaneously. The yellow circle in the figure shows the vehicle conflict point.

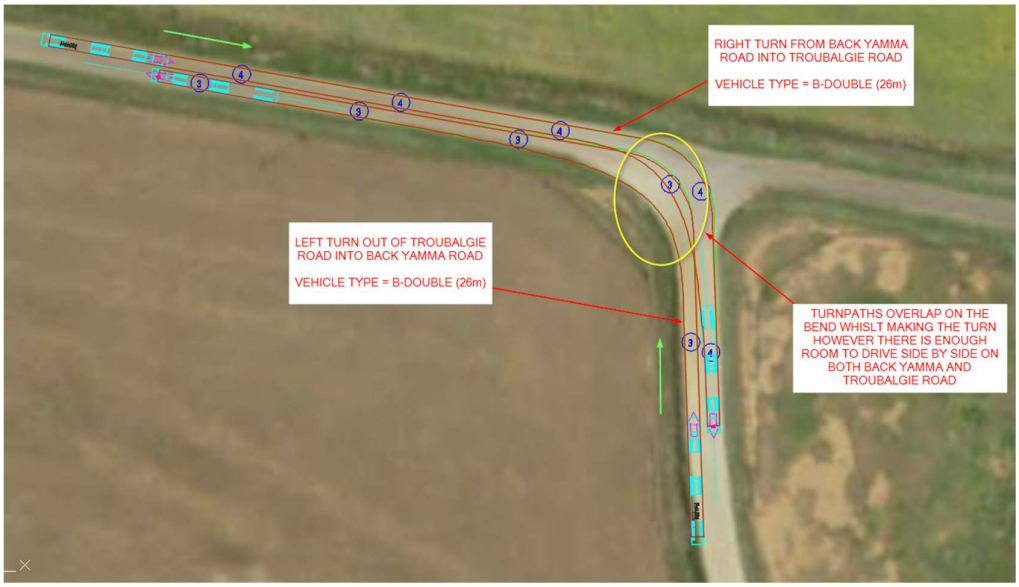


Figure 1-1 Swept path analysis - Back Yamma Road/ Troubalgie Road existing priority intersection

1.2 Potential options for mitigation

1.2.1 Option 1 – Intersection widening

Figure 1-2 highlights widening needed on the left turn of Troubalgie Road to allow B-Double vehicles to pass simultaneously. The current radius of this turn is 30m and would need to be increased to 50m to avoid vehicle collision. This would require an additional pavement area of around 207m², as shown in Figure 1-3.

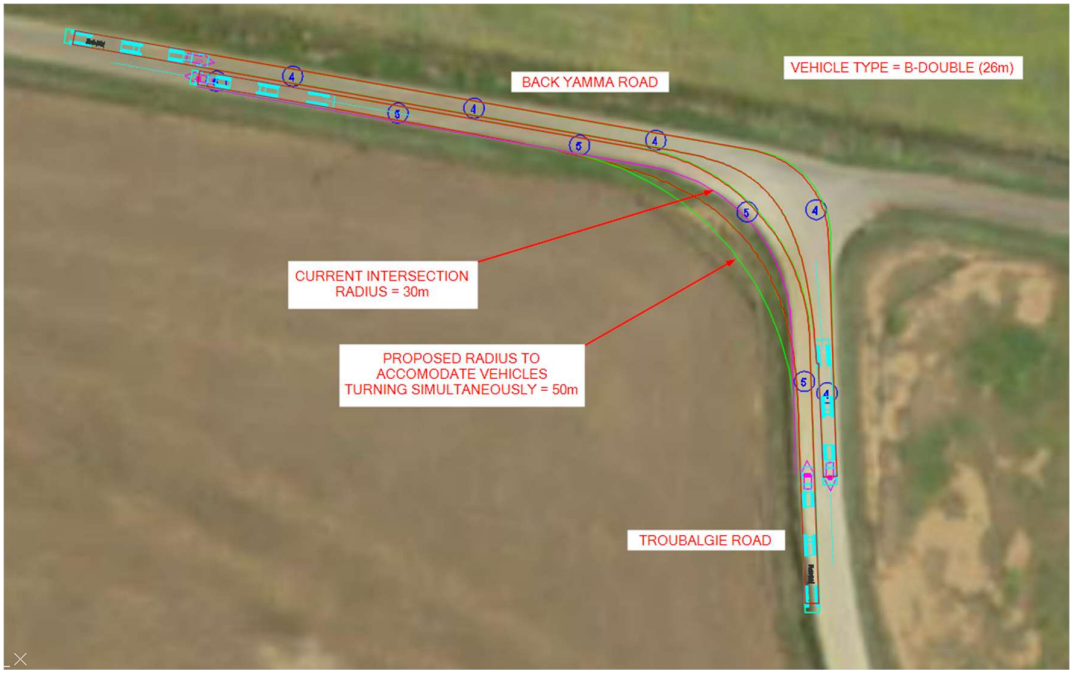


Figure 1-2 Swept path analysis - Back Yamma Road/ Troubalgie Road priority intersection widening

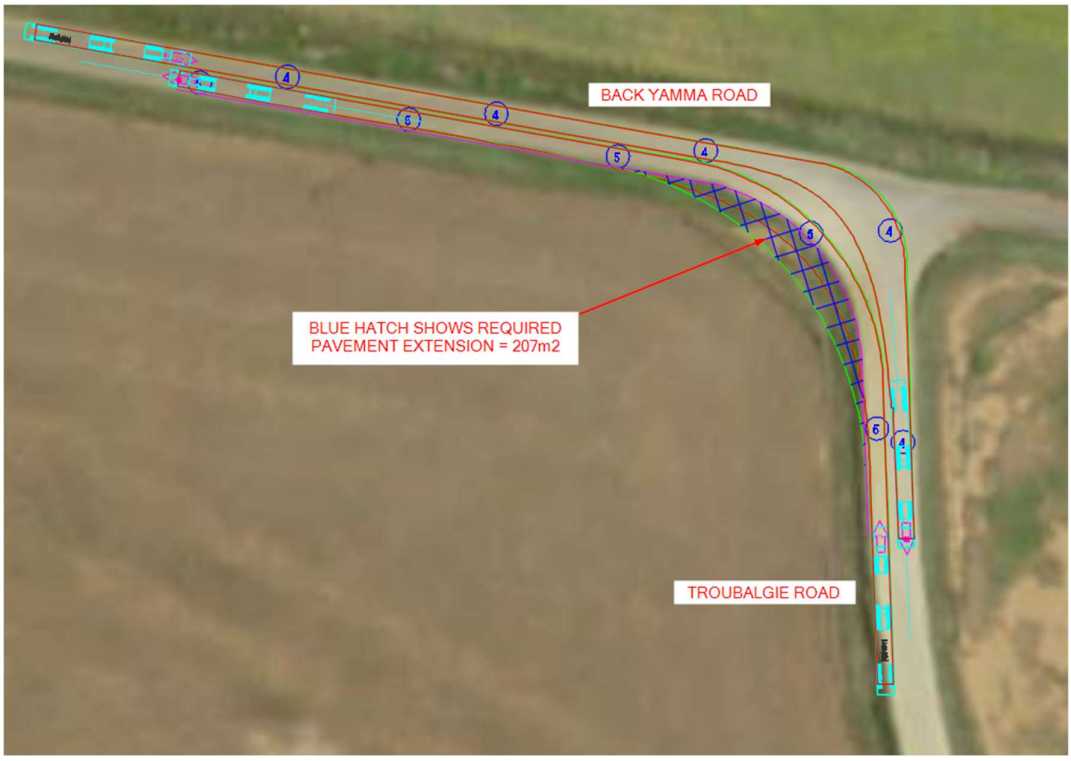


Figure 1-3 Swept path analysis - Back Yamma Road/ Troubalgie Road priority intersection pavement extension requirements

1.2.2 Construction Traffic Management Plan (CTMP)

An alternative approach for potential consideration would be for B-Double movements at this intersection to be controlled by a traffic controller as part of other measures included in the CTMP, which would be subject to discussion an agreement with Council.

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