

# Reeves Creek Development

## Traffic Impact Assessment

NA50613047

Prepared for  
Michael Brown Planning on behalf of  
Dartanyon Pty Ltd

July 2014



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# 1 Introduction

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## 1.1 Overview

Cardno has been commissioned by Michael Brown Planning on behalf of Dartanyon Pty Ltd to undertake a traffic and transport assessment to support a rezoning application for a residential land use development located in Picton, called Reeves Creek.

Once rezoned for residential land use it is anticipated that the proposed development will be undertaken in two separate stages. This assessment investigates the traffic and transport impacts pertaining to Stage 1 of the development which includes construction of 400 low to medium density residential dwellings.

The overall development Reeves Creek masterplan is presented in **Appendix A** of this report.

## 1.2 Report Content

This document considers the proposed Reeves Creek residential land use development and details the traffic and transport implications of the proposed residential land rezoning application on the surrounding road network.

The remainder of the report is structured as follows:

- > **Section 2** provides details of the existing traffic and transport environment surrounding the proposed development site.
- > **Section 3** provides details of the proposed development.
- > **Section 4** details the findings of the traffic assessment of the proposed development.
- > **Section 5** addresses the issues raised by RMS (letter reference: STH13/00050) and Wollondilly Shire Council.
- > **Section 6** provides a conclusion by summarising the findings and recommendations of the assessment.

## 1.3 Reference Documents / Data

The following documents have been referenced while undertaking the transport assessment discussed in this report:

- > Stone quarry Commercial Development – Traffic Impact Assessment (Cardno, 2014);
- > Service Planning Guidelines (Ministry of Transport, June 2006);
- > Wollondilly Shire Council *Development Control Plan* (2011); and
- > Wollondilly Shire Council Tracks Model.

## 1.4 Correspondence with Wollondilly Shire Council

The proposed rezoning application and proposed scope of works for the traffic and transport assessment was discussed with Wollondilly Shire Council (contact: Dick Webb – Manager Infrastructure Planning)

The following scope of works was discussed and verbally agreed with the Council (please refer to **Appendix B** for email correspondence):

- Utilise the Wollondilly Shire TRACKS model to undertake the traffic assessment for the Reeves Creek rezoning application located in Picton. It is understood that the Council is looking to update the TRACKS model. However the timeframe for this update has not been confirmed and would fall outside the delivery timeframe of our project. Therefore, the use of the current model would be appropriate for the purposes of this assessment.

- 
- The methodology of our traffic assessment shall be consistent with that was used for the Stone Quarry rezoning application and therefore the forecast flow, anticipated development trip generation and assignment shall be obtained by utilising the TRACKS model.
  - The intersections to be assessed are as follows (for the weekday AM and PM peak hour periods):
    - Site access / Menangle Street
    - Argyle Street / Menangle Street
    - Argyle Street / Margaret Street / Cliffe Street
  - The design years that will be assessed are 2016 and 2026 for the 'Base' and 'Base plus Development' scenarios.
  - The schemes / road upgrades that are committed and in the surrounding area are as follows:
    - Proposed signalisation of the Argyle Street / Margaret Street / Cliffe Steet intersection (open 2014).
    - Proposed roundabout at the Argyle Street / Regreme Road intersection (open 2016).
  - The traffic assessment for the Reeves Creek development would not need to consider the traffic generated by the Stone Quarry rezoning application as this has not been approved and is not a committed development.

## 2 Existing Conditions

### 2.1 Surrounding Roads

The existing road network surrounding the development site consists of:

- > Menangle Street;
- > Margaret Street; and
- > Argyle Street (also known as Remembrance Drive).

The location of the land, which is the subject of the rezoning application, in the context of the surrounding road network is shown in **Figure 2-1** below.



**Figure 2-1 Site Location**  
Background Source: [www.nearmap.com](http://www.nearmap.com)



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### 2.1.1 **Menangle Street**

Menangle Street is a State Road under the authority of the Roads and Maritime Services (RMS). The RTA (now RMS) NSW Road Management Arrangements (2008) defines State Roads as follows:

- *'State Roads are the major arterial links throughout NSW and within major urban areas. They are the principle traffic carrying and linking routes for the movement of people and goods within the Sydney, Newcastle, Wollongong and Central Coast urban areas and which connect between these urban centres, the major regions of the State and the major connections interstate.'*
- *'The RTA takes responsibility for managing the primary traffic function of State Roads including funding and determining priorities, and regulates the activities of third parties on the road and access to adjoining land to promote road safety, traffic efficient and protect the road asset.'*

Menangle Street intersects with Argyle Street to the north and becomes Picton Road at its intersection with Mineral Springs Road to the south. Menangle Street / Picton Road provide a link between Argyle Street and the Hume Motorway.

Menangle Street fronting the subject site comprises of a carriageway with one travel lane in each direction (separated by solid double barrier lines) and a posted speed limit of 60 km/hr.

### 2.1.2 **Argyle Street**

Argyle Street is classified as a Regional Road under the authority of the Council. The RTA (now RMS) NSW Road Management Arrangements (2008) defines Regional Roads as follows:

- *'Regional Road are routes of secondary importance between State Roads and Local Roads which together with the State Roads, provide the main connections to and between smaller towns and districts and perform a sub arterial functions in major urban areas.'*
- *'Regional Roads are the responsibility of councils to fund, determine priorities and carry out works.'*
- *'Regional Roads are eligible for annual assistance grants from the State Government in recognition of their relative importance.'*
- *'Councils also apply other sources of funding to works on Regional Roads including local rates, developer contributions and funding from the Federal Government.'*

Argyle Street provides access to local shops with kerbside parking provision on either side of the carriageway.

Argyle Street comprises of a carriageway with one travel lane in each direction and a posted speed limit of 50km/h.

### 2.1.3 **Margaret Street**

Margaret Street is classified as a Local Road under the authority of the Council. The RTA (now RMS) NSW Road Management Arrangements (2008) defines Local Roads as follows:

- *'Local Roads comprise the remaining council controlled roads which provide for local circulation and access.'*
- *'Local Roads are the responsibility of Councils to fund, determine priorities and carry out works.'*
- *'The State Government provides only limited assistance under special programs eg urban Bus Routes.'*
- *'The Federal Government has a long standing role in providing road funds to councils. It provides annual financial assistance grants to councils that include a significant identified roads component.'*

Margaret Street has a posted speed limit of 50km/h and one lane of travel in each direction with kerbside parking provision provided on either side of the carriageway.

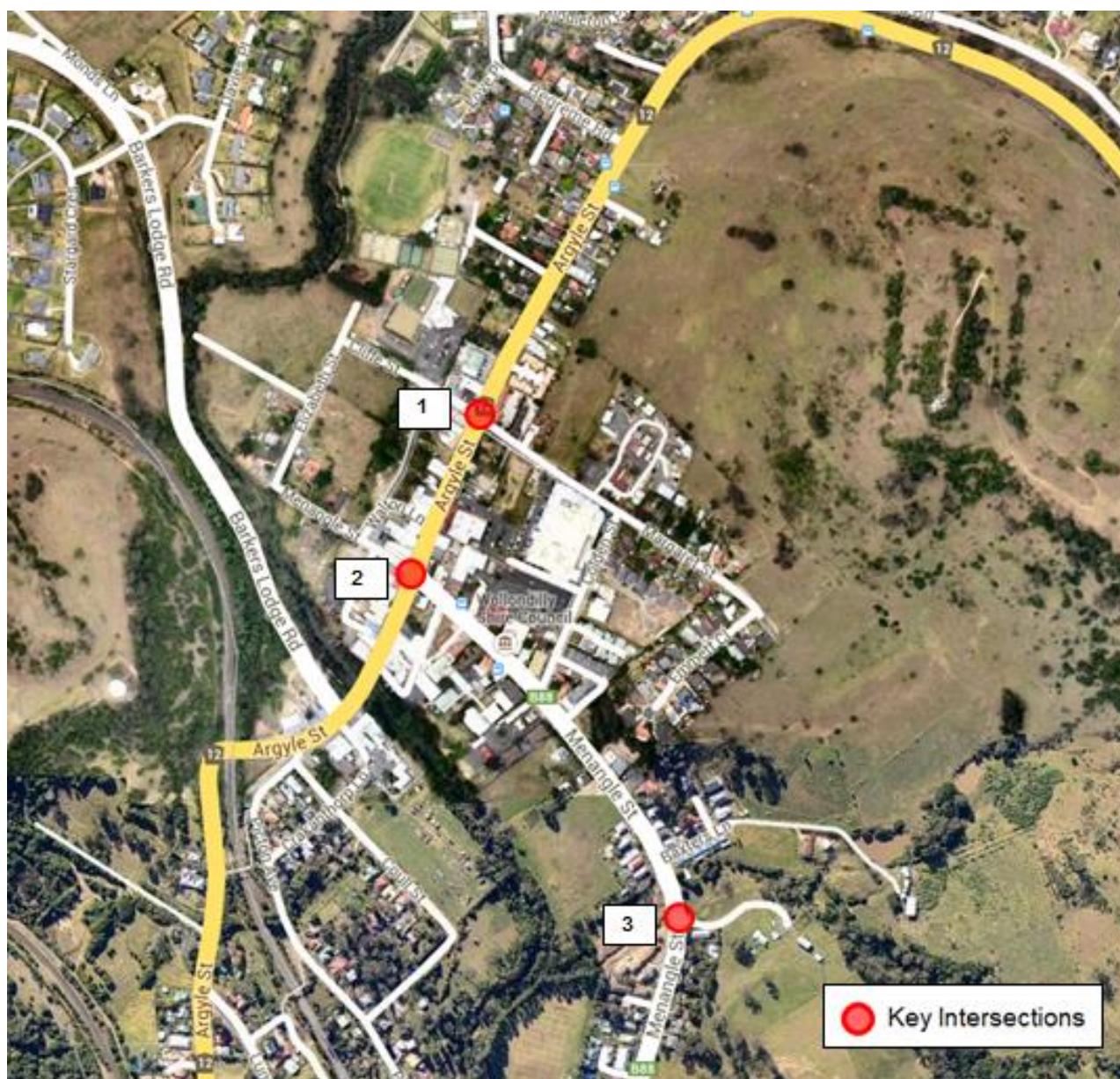
## 2.2 Key Intersections

The following are considered to be key intersections as highlighted in **Figure 2-2**:

1. Argyle Street / Margaret Street / Cliffe Street.
2. Argyle Street / Menangle Street.
3. Site Access / Menangle Street.

Traffic volumes for the surrounding road network were obtained from the Wollondilly Shire Council TRACKS model and were used in order to determine the future year baseline flows.

The key intersections were modelled, using software package SIDRA 6.0, in order to establish the anticipated traffic impacts of the proposed development on operation performance.



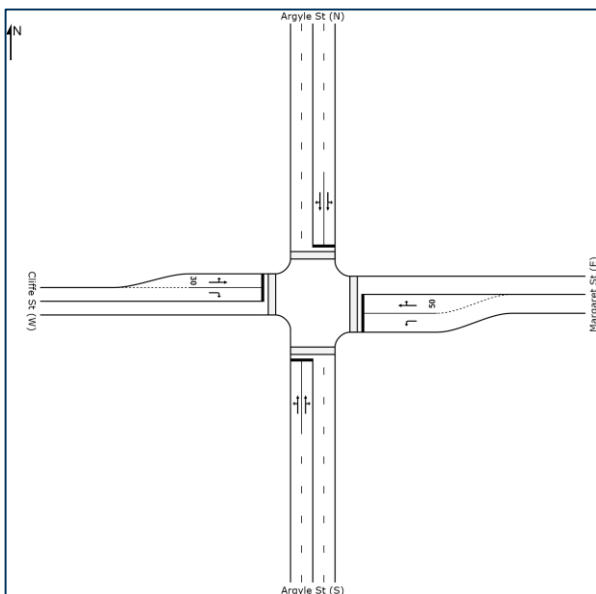
**Figure 2-2 Location of Key Intersections**

Background Source: [www.nearmap.com](http://www.nearmap.com)

The following sections provide details of the two Argyle Street intersections alongside their respective configurations that were modelled using SIDRA 6.0 software.

### 2.2.1 Argyle Street / Margaret Street / Cliffe Street Intersection

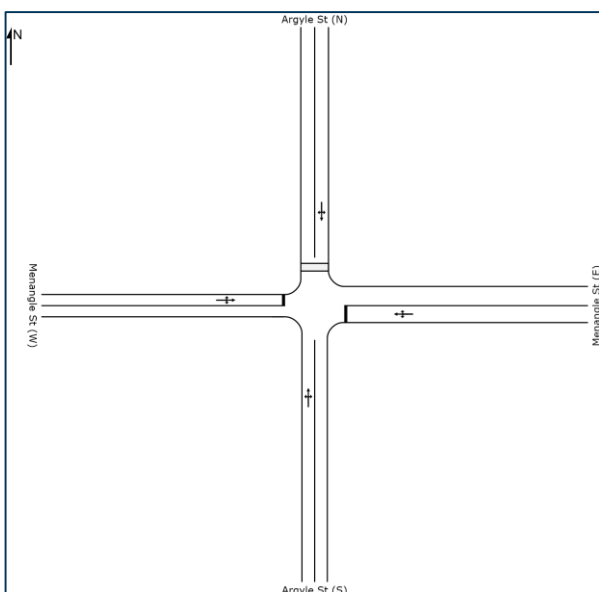
The intersection of Argyle Street / Margaret Street / Cliffe Street consists of four arm approaches which are currently controlled by Stop conditions on Margaret Street and Cliffe Street. Wollondilly Shire council has confirmed that this intersection will be upgraded to a signalised control by the end of 2014. As such, this intersection has been modelled as a signalised intersection in all of the future year scenarios analysed. It is noted that the Council confirmed that they would not be able to provide layout plans of the proposed signalised intersection due to protection restrictions. Through conversations with the Council assumptions have therefore been made in relation to the intersection layout. **Figure 2-3** below illustrates the assumed signalised configuration of this intersection used in the SIDRA analysis.



**Figure 2-3 Argyle Street / Margaret Street / Cliffe Street Intersection Layout**

### 2.2.2 Argyle Street / Menangle Street Intersection

This is a four-way intersection which is currently controlled by Stop conditions on the Menangle Street approaches. **Figure 2-4** illustrates the current configuration of this intersection used in the SIDRA analysis.



**Figure 2-4 Argyle Street / Menangle Street Intersection**



## 2.3 Public Transport

### 2.3.1 Bus Routes

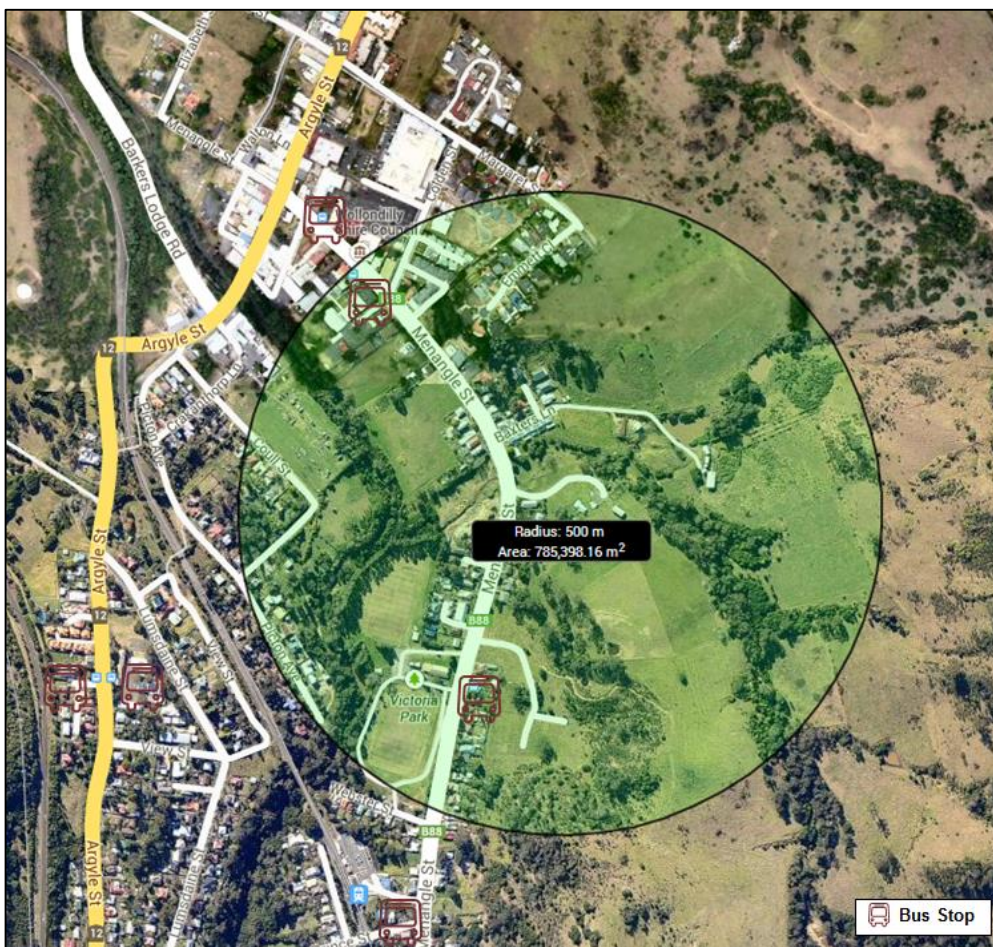
There are five bus routes which operate in vicinity of the proposed development along Argyle Street. These bus routes and their service frequencies are summarised in **Table 2-1** below. All of the bus services listed in the table below are operated by Picton Busline.

**Table 2-1 Bus Services**

Route #	Route Description	Weekday Services		Saturday Services
		AM Peak (7-10am)	PM Peak (4-7pm)	
900	Picton to Narellan & Campbelltown	1	0	2
911	Picton to Buxton & Bargo	2	0	0
912	Picton to Bargo & Yanderra	2	6	9
914	Picton to Buxton v Estonian Village	0	0	0

### 2.3.2 Bus Stops

There are two bus stops located within a 500 metre walking catchment of the proposed development. The locations of bus stops within the vicinity of the proposed development are presented in **Figure 2-5** below.



**Figure 2-5 Bus Stop Locations**

Background Source: [www.nearmap.com](http://www.nearmap.com)

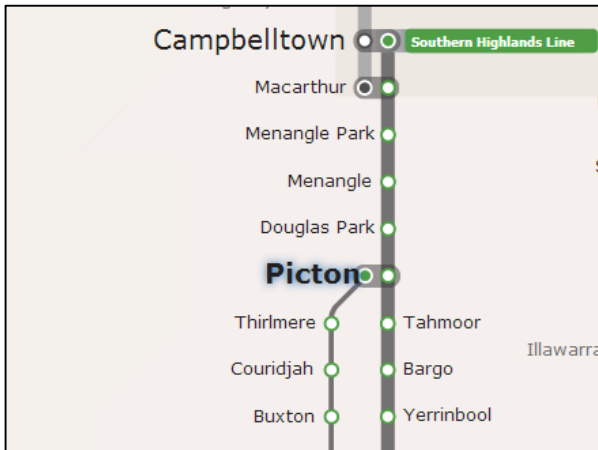


### 2.3.3 Rail

The proposed development site is approximately 1 km walking distance from Picton Railway Station. Picton Railway Station is located on the Southern Highlands Line of the Intercity TrainLink network, as indicated in **Figure 2-7** Train Network Map –Picton Station

Travel time from the station to the proposed development is an approximate 12 minute walk, 5 minute cycle or 2 minute drive. The travel path to the train station is presented in **Figure 2-8**.

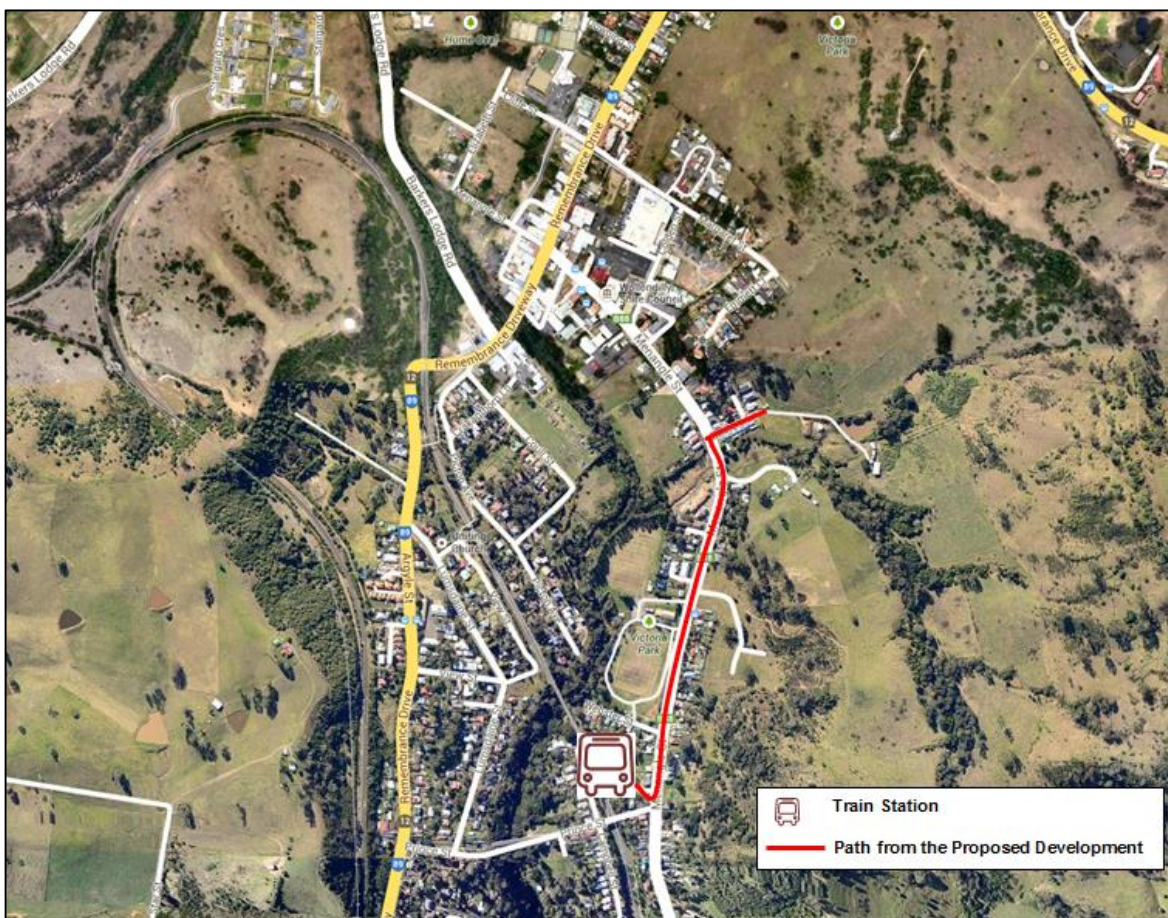
7.



Source: Sydney Trains

**Figure 2-7** Train Network Map –Picton Station

Travel time from the station to the proposed development is an approximate 12 minute walk, 5 minute cycle or 2 minute drive. The travel path to the train station is presented in **Figure 2-8**.



**Figure 2-8** Train Station Location

Background Source: [www.nearmap.com](http://www.nearmap.com)



## 3 Proposed Development

### 3.1 Reeves Creek Development Masterplan

The proposed residential lead rezoning application is related to the existing vacant land bound by private residential properties, vacant land and Argyle Street to the north and east; Menangle Street and private residential properties to the west and private residential properties and land to the south.

Once the rezoning application has been approved, the overall residential lead development is anticipated to be undertaken in two separate stages and will be subject to individual Development Application (DA) submissions. This assessment investigates the traffic and transport impacts pertaining to Stage 1 of the development.

The boundary of Stage 1 development and the proposed internal development zones are illustrated in **Figure 3-1** below. The respective areas of each of these zones and their proposed development yields are summarised in **Table 3-1** below.



**Figure 3-1 Reeves Creek Development – Stage 1**



### 3.2 Development Yield

Stage 1 of the proposed development is anticipated to consist of low to medium density residential, environmental conservation and public recreation land use areas. **Table 3-1** below outlines the proposed uses and their respective areas and development yields within Stage 1 of the Reeves Creek development.

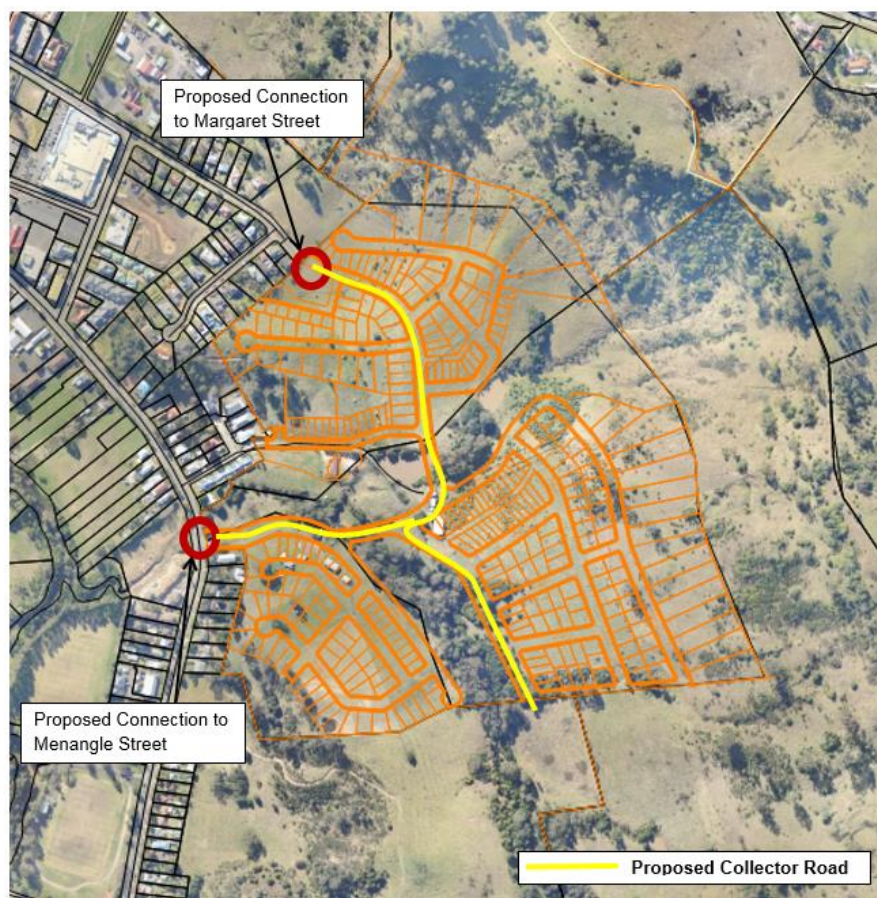
**Table 3-1 Proposed Reeves Creek Stage 1 Internal Development Zones**

Proposed Zones	Area (Gross Hectares)	Gross Density Range	Yield (Number of Dwellings)
Environmental Conservation- E2	4.3	-	0
Low Density Residential – R2	22	10-15 Dwellings/Hectare	220
Medium Density Residential – R3	9.9	18-22 Dwellings/Hectare	180
Public Recreation – RE1	2.6	-	0
<b>Totals</b>	<b>38.8</b>		<b>400</b>

### 3.3 Internal Road Hierarchy

The internal road hierarchy within the Reeves Creek masterplan area shall be based on the function and anticipated traffic volumes. The cross sections for the internal roads to the Reeves Creek development shall accord with Council requirements (reference shall be made to Wollondilly Shire Council Subdivision & Engineering Standards – Design Specifications). At this early stage, the anticipated internal road hierarchy is illustrated in **Figure 3-2** below.

Given that it is intended for the proposed collector roads to accommodate buses, these roads will be constructed to comprise a 13m minimum carriageway width with provision for bus stop spaces at the required intervals.



**Figure 3-2 Internal Road Hierarchy**

### 3.4 Site Access

Access to the site will be provided via both Margaret Street and Menangle Street as discussed below:

- Margaret Street Access – Margaret Street extends south east from its intersection with Emmett Close. This extension of Margaret Street will be used as a connection point to the proposed internal collector road within the subject development. It is noted that the Argyle Street / Margaret Street / Cliffe Steet intersection is to be upgraded to a signals by late 2014.
- Menangle Street Access – It is proposed to upgrade the existing access located to the east side of Menangle Street, in order to join the proposed internal collector road within the subject development. The proposed access configuration with Menangle Street is discussed in further detail below.

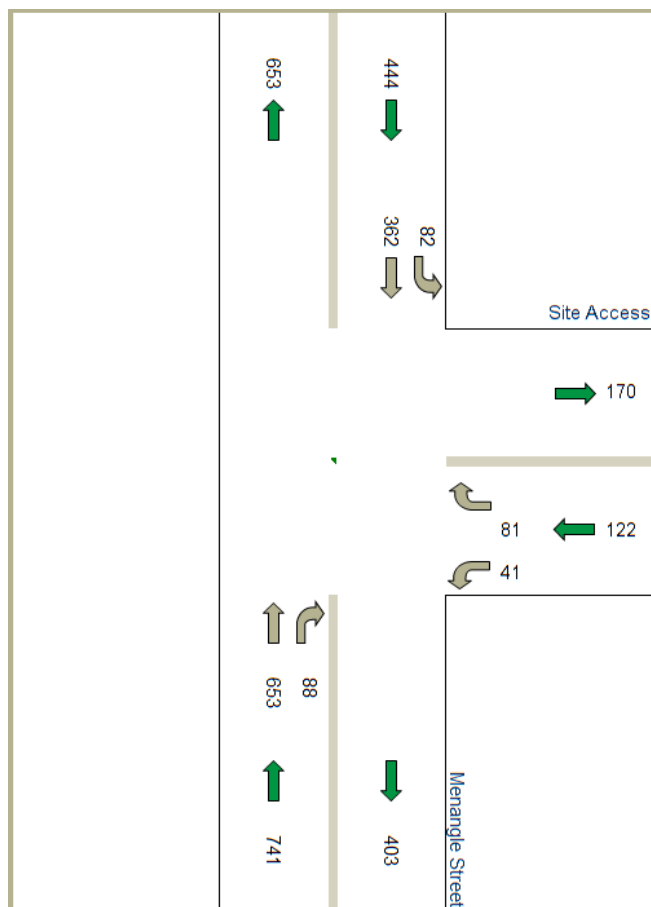
The locations of the above mentioned connections are shown in **Figure 3-2**.

#### 3.4.4 Menangle Street Access

Given the current arrangement and location of the Menangle Street access point, it is acknowledged that the existing access arrangement shall need to be upgraded in order to safely and operationally accommodate the forecast traffic flows generated by the proposed residential lead development. The following sub-sections will outline the constraints of the existing situation and further investigate a suitable access upgrade.

##### 3.4.4.1 *Priority controlled access with auxiliary / deceleration left turn lane and channelised right turn on Menangle Street*

The requirement for auxiliary lanes on Menangle Street, at the site access location, has been investigated as a part of this study. The figure below illustrates the forecast number of vehicle turning movements at the Menangle Street / Site Access intersection during the PM peak hour for 2026 baseline plus development scenario (worst case scenario).



**Figure 3-3 Forecast Traffic Volumes at Menangle Street/Site Access Intersection during the PM Peak for 2026 Base plus Development Scenario**



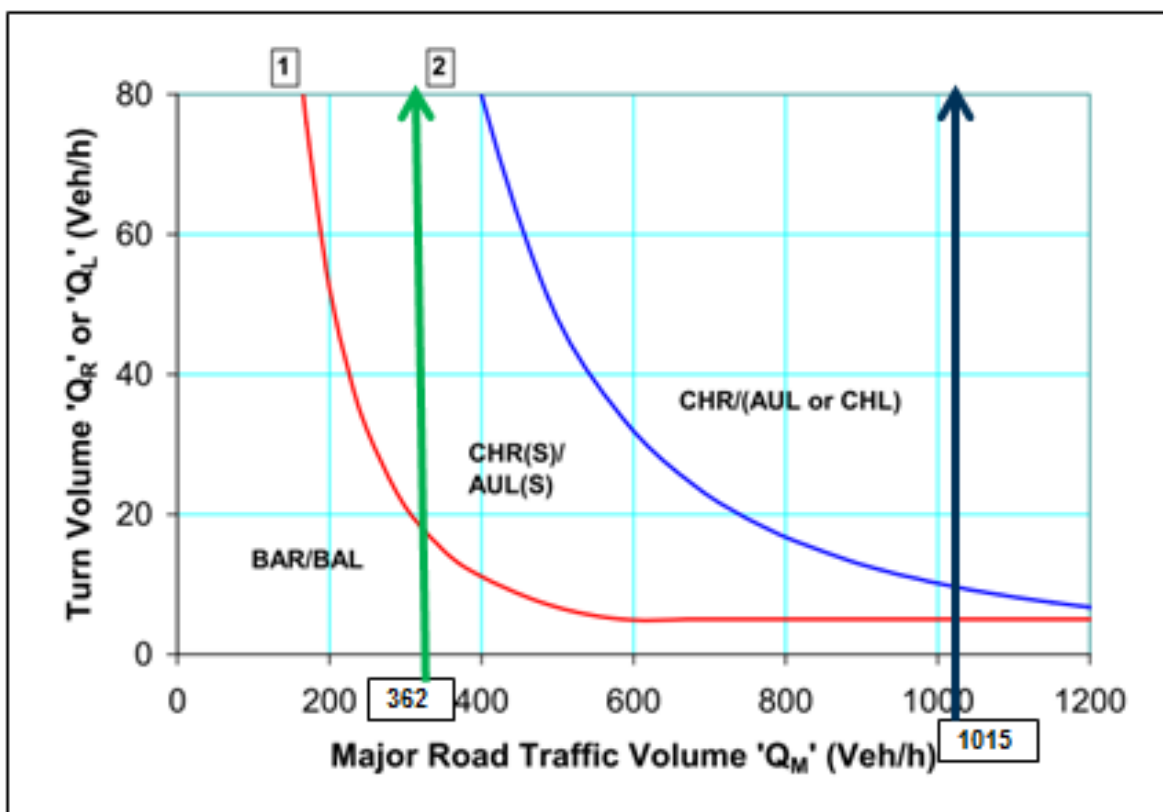
Based on the turning traffic volumes illustrated in the figure above, the requirements for turn treatments on Menangle Street can be established using the chart presented in **Figure 3-3** below (excerpt from Austroads Guide to Road Design Part 4A).

For the vehicles turning left from Menangle Street onto the Site;

- These vehicles will cause delays to the through southbound movements along Menangle Street (i.e. 362 vehicles/hour).
- Total of 82 vehicles will turn left into the site from Menangle Street during the PM peak hour.
- These traffic volumes, when plotted on the chart below (warrants for turn treatments), indicate a requirement for a short auxiliary lane (AUL(S)) to accommodate the left turning vehicles.

For the vehicles turning right from Menangle Street onto the Site;

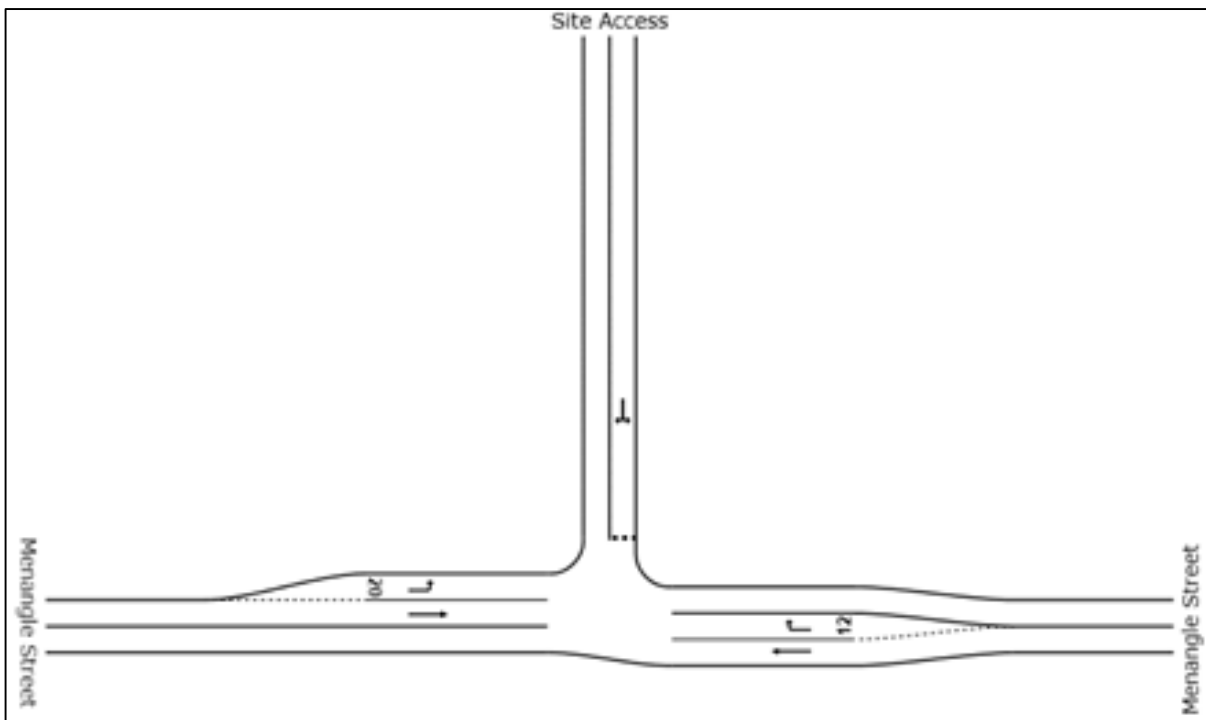
- These vehicles will cause delays to both northbound and southbound through vehicles along Menangle Street (i.e. 1,015 vehicles/hour).
- Total of 88 vehicles will turn right into the site from Menangle Street during the PM peak hour.
- These traffic volumes, when plotted on the chart below (warrants for turn treatments) indicate a requirement for a channelised right turn (CHR) lane.



**Figure 3-3 Warrants for Turn Treatments on the Major Road (Austroads Guide Part 4A)**

Therefore, it is proposed to upgrade the primary site access to a priority controlled access with auxiliary / deceleration left turn lane and channelised right turn on Menangle Street.

From the turn treatments established above, the subject intersection has been assessed in SIDRA software to model the performance with the development traffic. The following figure illustrates the configuration used to model the performance of this intersection.

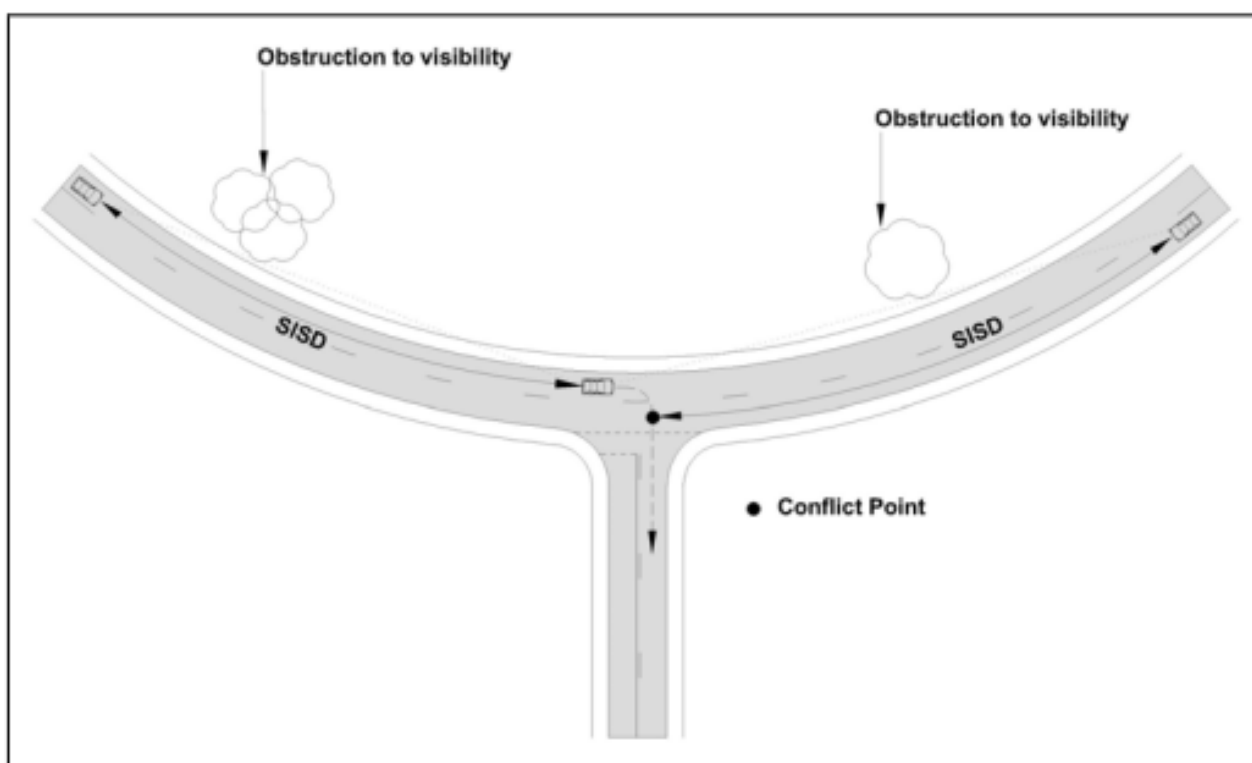


**Figure 3-4 Menangle Street Site Access Configuration**

#### **3.4.4.2 Menangle Street/Site Access – Safe Intersection Sight Distance**

It is acknowledged that the site access point intersects the outside of the horizontal curvature of Menangle Street. Therefore the Safe Intersection Sight Distance (SISD) has been assessed at this location to ensure that adequate visibility is provided between the motorists on conflicting movements.

SISD is the minimum distance which should be provided on the major road at any intersection and the SISD model presented in Austroads Guide Part 4A (Unsignalised and Signalised Intersections) is presented in **Figure 3-5** below.



**Figure 3-6 Figure 3-5 SISD model for minor roads intersection on the outside of the horizontal curves - Austroads Guide to Road Design Part 4A**

Referring to Table 3.2 in Austroads Guide Part 4A, the SISD applicable for the site access on Menangle Street is 123m (based on 60 km/h design speed along Menangle Street and a reaction time of 2.0 seconds). The following figure outlines the SISD model applied to this scenario.



**Figure 3-7 The SISD Envelops for Vehicles Approaching the Site Access Point**

From the SISD envelop illustrated in the figure above, it is evident that the vehicles approaching the site access point can foresee any potential conflicts with a clear sight envelop of 123m (with no permanent obstructions present within the sight triangles). Therefore, this sight distance, along Menangle Street, is deemed adequate to cater for the access point to the proposed development.

#### **3.4.4.3 Menangle Street/Site Access – Minimum Gap Sight Distance**

The Minimum Gap Sight Distance (MGSD) is based on distances corresponding to the critical acceptance gap that drivers are prepared to accept when undertaking a crossing or turning manoeuvre at intersections. The figure below illustrates the sight distance to a through vehicle from a vehicle turning left. Based on the

Austrroads Guide the minimum gap sight distance required is 83m. This requirement can be sufficiently met at the site access intersection with Menangle Street.

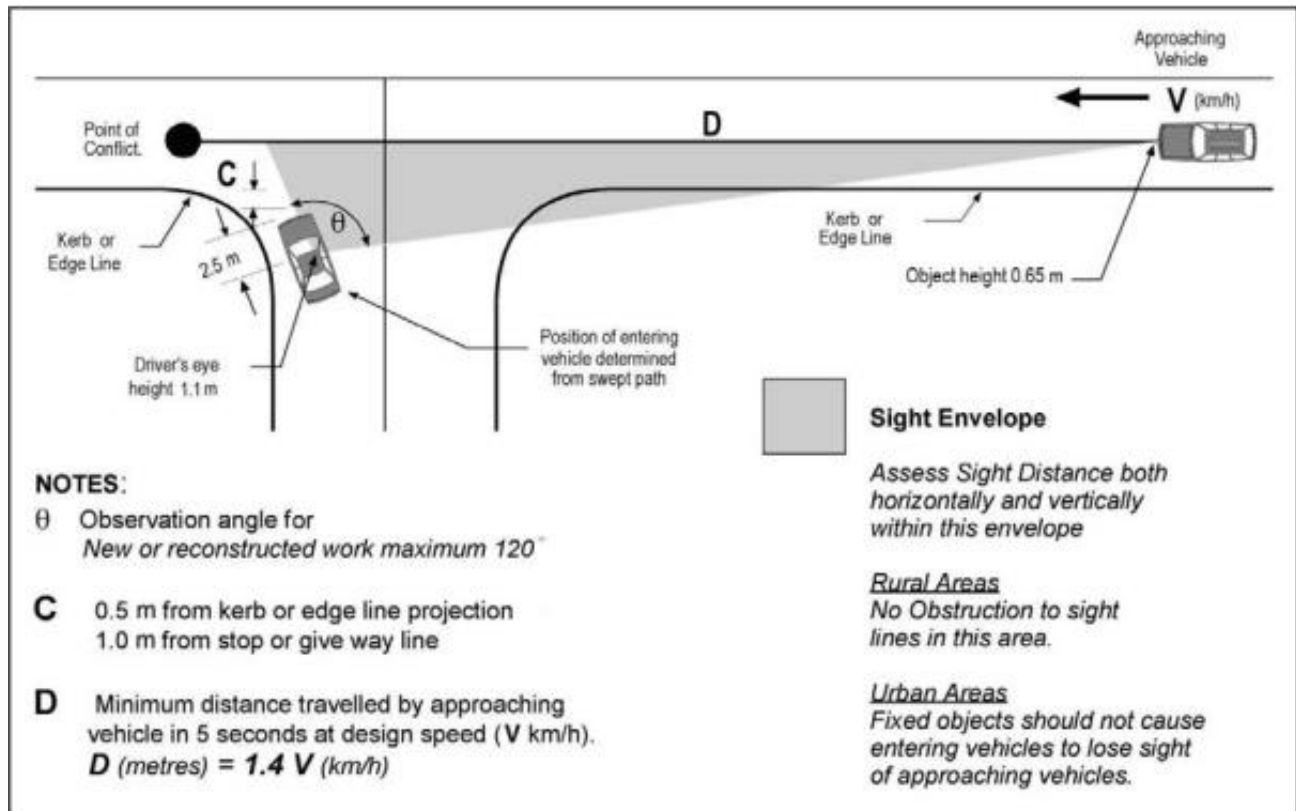


Figure 3-8 Sight distance to a through vehicle from a vehicle turning left (MGSD) – Austrroads Guide to Road Design Part 4A

### 3.5 Off-Street Parking Requirements

Part 2.3.7 of the Wollondilly Shire Council Development Control Plan (2011) sets out a parking requirement for the provision of at least 2 vehicle spaces behind the front building line for dwelling houses. As such, for the proposed 400 dwellings as part of Stage 1 development, provision shall be made for a total of 800 off-street car parking spaces. Sustainable Travel

Accessible, frequent and direct public transport options that encourage future Reeves Creek residents to reduce their trips taken by private vehicle will reduce the traffic generation from the site and reduce the greenhouse gas emissions associated with car travel. A public transport network will also ensure that all residents have equitable opportunity to access employment and recreational opportunities. Public transport should be viewed as convenient and attractive to the estate's new residents.

As the Reeves Creek masterplan area is undeveloped there exists opportunities to improve the existing transport networks. Analysis and recommendations to address any identified deficiencies shall be undertaken as part of the DA submission process. Key considerations shall be:

- > Provision of a permeable network for pedestrians and cyclists (footpath, cycle lanes, shared pathways).
- > Prominent and high quality walking and cycling facilities to connect residents to external network.
- > In line with TfNSW guidance, 80%-90% of dwellings should be within 400-500m of a bus route (a 5 minute walk).
- > The extension of existing or new bus routes into the development to serve residents of Reeves Creek being aware that route deviations to minimise walking times or access to low patronage generators will impact on travel time for most of the passengers which will reduce the attractiveness of the service. Any future bus routes within the site should be in line with the Collector Road network.
- > To facilitate the use of bus services it is important to provide accessible bus stops to ensure services are available to all users and do not restrict the potential demand for patronage.

- 
- > Recognising that some services may be less frequent, lower order bus stop and shelter facilities are required to be provided for rural bus routes. However as these services operate less frequently, shelter and seating should be provided where appropriate.
  - > Ensuring that gradients of roads and associated infrastructure (such as pathways) are within standards and do not present barriers to future use by pedestrians, cyclists, bus services and passengers.
  - > Provision of safe and efficient links to the external network and main trip attractors such as Picton Railway Station.



## 4 Traffic Impact Assessment

### 4.1 Baseline Intersection Performance

#### 4.1.4 Overview of Assessment

The operating performance of the Argyle Street / Margaret Street / Cliffe Street, Argyle Street / Menangle Street intersections as well as the site access onto Menangle Road was assessed using SIDRA 6.0 intersection modelling software package to determine the Degree of Saturation (DoS), Average Vehicle Delay (AVD) in seconds, Level of Service (LoS) and 95<sup>th</sup> percentile queues. The following scenarios were considered in this assessment for a typical weekday AM and PM peak hour:

- > 2016 Baseline Scenario;
- > 2016 Baseline with Development Scenario;
- > 2026 Baseline Scenario; and
- > 2026 Baseline with Development Scenario.

The RMS Guide to Traffic Generating Developments (Version 2.2, 2002) provides a guide in assessing level of service for various intersections. An extract of the guide is shown below in **Table 4-1** and highlights the key indicators in evaluating intersection performance.

**Table 4-1 Level of Service Summary**

LOS	Traffic Signal / Roundabout	Give Way / Stop Sign / T-Junction Control
A	Good operation	Good operation
B	Good operation, with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	Satisfactory	Satisfactory, but accident study required
D	Operating near capacity	Near capacity and accident study required
E	At capacity; at signals, incidents will cause excessive delays	At capacity, requires other control mode
F	Unsatisfactory and requires additional capacity. Roundabouts require other control mode	Unsatisfactory and requires additional capacity. Roundabouts require other control mode

For signalised intersections, the overall level of service should be considered. For roundabouts and priority controlled intersections (sign control) individual lanes should be analysed.

The Average Vehicle Delay (AVD) provides a measure of performance, relating average delay to the level of service, and should be taken as a guide only. The average delay measures level of service based on delay per second per vehicle.

The *RMS Guide to Traffic Generating Developments* identifies the key criteria in assessing the level of service based on average delays and can be seen in **Table 4-2** below.

**Table 4-2 Level of Service Average Vehicle Delay**

LOS	Average Delay per Vehicle (sec/veh)
A	< 14
B	15 to 28
C	29 to 42
D	43 to 56
E	57 to 70
F	> 70

Another form of operational measurement is to assess the Degree of Saturation (DoS) of individual intersections. An intersection at DoS of up to 0.8 is considered satisfactory. Intersections are reaching capacity as the DoS approaches 0.9, with queue lengths increasing and extended delays.

#### 4.1.5 Intersection Performance and Results

Traffic analysis of the baseline scenario was undertaken using the *SIDRA Intersection 6.0* software package, to assess the future base intersection operational performance prior to the construction of the proposed development.

The traffic volumes for this analysis are based upon the Wollondilly Shire Council TRACKS model obtained. These traffic volumes, obtained from TRACKS model outputs for years 2016 and 2026, are presented in **Appendix D**. The detailed SIDRA assessment outputs, for all scenarios assessed, are presented in **Appendix E**.

#### 4.1.6 2016 Baseline Scenario

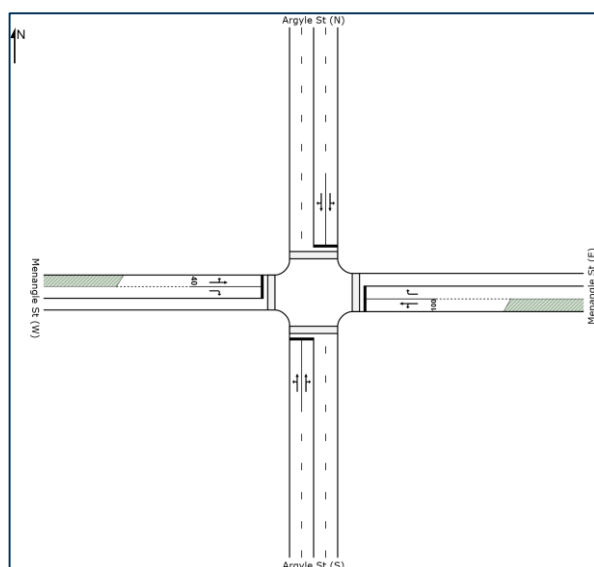
Based upon the intersection layouts indicated in **Section 2.2**, the results of the analysis for the year 2016 baseline scenario with *SIDRA Intersection 6.0* is presented in **Table 4-3** below.

**Table 4-3 2016 Baseline Scenario SIDRA Summary**

Intersection	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
Argyle Street / Cliffe Street / Margaret Street	Signalised	0.449	21.5	B	0.462	26.3	B
Argyle Street / Menangle Street	Give Way	1.197	448	F	1.306	584.4	F

The results outlined above reveal satisfactory performance of Argyle Street/Cliffe Street/Margaret Street intersection. However, the Argyle Street/Menangle Street intersection indicated unsatisfactory operations, with its capacity reached by 2016 (operating at a Level of Service F). As such, infrastructure upgrade is necessary by 2016 to the Argyle Street/Menangle Street intersection, in order for the intersection to perform at a satisfactory operational performance under the baseline scenario.

The recommended infrastructure upgrades to the Argyle Street/Menangle Street intersection and its operational performance is shown below in **Figure 4-11** and **Table 4-1** respectively. The modelling results of this intersection, with the proposed upgrades, indicate satisfactory intersection operational performance.



**Figure 4-11 2016 Baseline Scenario SIDRA Layout (with Upgrades) for Argyle Street / Menangle Street Intersection**

**Table 4-4 2016 Baseline Scenario SIDRA Summary with Upgrades**

Intersection	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
Argyle Street / Menangle Street	Signalised	0.496	24	B	0.558	28.4	B

The results of the intersection analysis indicate that with the proposed upgrades the intersections will operate with small delays at a Level of Service B during both AM and PM peak periods.

#### 4.1.7 2026 Baseline Scenario

The traffic volumes for 2026 baseline scenario were obtained from the Wollondilly Shire Council TRACKS model obtained. These traffic volumes, obtained from TRACKS model outputs, are presented in **Appendix D**.

The following table outlines the SIDRA modelling outputs for the key intersections for the 2026 baseline scenario.

**Table 2-6 2026 Baseline Scenario SIDRA Summary**

Intersection	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
Argyle Street / Cliffe Street / Margaret Street	Signalised	0.625	23.8	B	0.89	36	C
Argyle Street / Menangle Street	Signalised	0.771	28.5	C	0.669	27.2	B

It is to be noted that the Argyle Street / Menangle Street intersection has been assessed as a signalised intersection with the same layout adopted in the 2016 baseline scenario with the proposed upgrade (as this intersection fails at the existing layout in 2016 baseline scenario).

The baseline 2026 results indicate that the intersections generally perform at a satisfactory level, with the Argyle Street / Menangle Street intersection operating at Levels of Service C and B respectively for both AM and PM peak periods. The intersection has a degree of saturation below 0.9 and therefore the delays and queuing are generally satisfactory.

The Argyle Street / Cliffe Street / Margaret Street intersection indicates satisfactory operation during both AM and PM peak periods with a Level of Service A with acceptable delays and queues.

## 4.2 Development Traffic Generation

In order to assess the impact of the proposed development on the external road network, the proposed dwelling numbers (400 dwellings) associated with the development were added to the representative zone in the TRACKS model which calculated the trip generation and distributed and assigned trips accordingly.

## 4.3 Intersection Operational Performance

The proposed numbers of residential dwellings were introduced into the base TRACKS model in order to assess the impact of the proposed development. The resulting intersection traffic volumes (provided in **Appendix D**) were assessed using the *SIDRA Intersection 6.0* modelling software. The detailed SIDRA modelling outputs, for each scenario assessed, are presented in **Appendix E**.



#### 4.3.4 2016 Baseline plus Development Scenario Intersection Results

**Table 4-1** below outlines the intersection operational performance for the 2016 base plus development scenario.

**Table 4-1 2016 Baseline plus Development Scenario SIDRA Summary with Upgrades**

Intersection	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
Argyle Street / Cliffe Street / Margaret Street	Signalised	0.467	24	B	0.456	26.4	B
Argyle Street / Menangle Street	Signalised	0.525	24.8	D	0.629	31.3	C
Site Access / Menangle Street	Priority	0.034	11.8	B	0.140	11.2	B

As indicated in the table above, the Level of Service of the Argyle Street/Cliffe Street/Margaret Street intersection has dropped from LoS A in the baseline scenario to LoS B in the baseline with development scenario, for both AM and PM peak periods. This is due to the marginal increase in the average delay associated with the proposed development traffic. However, the degree of saturation of this intersection, during both peak periods, remains below 0.8 and is therefore the operations are considered satisfactory.

The Argyle Street/Menangle Street intersection operates at LoS B during the AM peak period in both the baseline scenario and the baseline with development traffic scenario. However, the PM peak period operations indicate that the Level of Service has been reduced from LoS B in the baseline scenario to LoS C in the baseline with development traffic scenario. This reduction in the Level of Service is due to the marginal increase of the average delay associated with the development traffic. However, this intersection still operates with a degree of saturation well below 0.8, during both peak periods. Therefore, it is unlikely to cause excessive queues and delays.

The proposed upgraded Site Access onto Menangle Street is anticipated to operate well within capacity with a Los B for both AM and PM peak periods.

#### 4.3.1 2026 Baseline plus Development Scenario Intersection Results

**Table 4-2** below outlines the intersection operational performance for the 2026 base plus development scenario.

**Table 4-2 2026 Base plus Development Model SIDRA Summary with Upgrades**

Intersection	Intersection Control	AM Peak			PM Peak		
		Degree of Saturation	Delay (s)	Level of Service	Degree of Saturation	Delay (s)	Level of Service
Argyle Street / Cliffe Street / Margaret Street	Signalised	0.700	26.5	B	0.908	37.8	C
Argyle Street / Menangle Street	Signalised	0.815	29.2	C	0.708	28.5	C
Site Access / Menangle Street	Priority	0.052	14.7	B	0.182	13.3	B

From the intersection operational performance results outlined in the table above, it is evident that the Level of Service of the Argyle Street/Cliffe Street/Margaret Street intersection has dropped from LoS B in the 2026 baseline scenario to LoS C in the baseline with development scenario, for the AM peak period.

---

The Argyle Street/Menangle Street intersection operates with a Level of Service C, which is retained from the baseline scenario, for both AM and PM peak periods. The degree of saturation for this intersection remains below 0.9 for both peak periods assessed. As such, this intersection operates satisfactorily with acceptable delays and queuing in 2026 with development traffic.

The proposed upgraded Site Access onto Menangle Street is anticipated to continue to operate well within capacity with a Los B for both AM and PM peak periods.

## 5 Response to Comments by Council and RMS

The following sections summarises the responses to specific concerns raised by the Council and RMS.

### 5.1 Responses to Comments by Wollondilly Shire Council

As a part of the Menangle Street Planning Proposal - Specialist Studies Requirements, Wollondilly Shire Council has raised Traffic and Transport related concerns. The responses to each of these concerns are summarised in **Table 5-1** below.

**Table 5-1 Summary of Concerns Raised by Wollondilly Shire Council**

Concern raised by Wollondilly Shire Council	Response
The traffic and transport assessment should give consideration to the impacts on the local road network of the proposed and potential development over the whole property, utilising; <ol style="list-style-type: none"><li>1) Council's strategic network model (TRACKS) to determine traffic distributions to and from the site; and</li><li>2) Intersection modelling using SIDRA to assess the impact of the proposed new road on the local road network; and</li><li>3) Specific consideration being given to the treatment type for the proposed subdivision access road junction with the classified road network.</li></ol>	This traffic assessment has been carried out by adding the proposed development yields on to the existing Wollondilly Shire TRACKS model and subsequently modelling each intersection in SIDRA.
Review and address the RMS requirements outlined in their submission letter.	<b>Section 5.2</b> below.
Identify suitable infrastructure required to ameliorate traffic and safety impacts associated with the likely future development of the subject land.	See <b>Conclusions</b> section of this report
Identification of pedestrian, cyclist and public transport infrastructure needs required to service the proposed development.	Further details, including proposed cross sections of the internal road network, will be provided during DA stage.
Identify the timing of the infrastructure and appropriate planning mechanism to ensure the infrastructure is provided.	her details, including proposed cross sections of the internal road network, will be provided during DA stage.

### 5.2 Responses to Comments by RMS

It is acknowledged that RMS has raised traffic and parking concerns related to the subject development in their letter referenced: STH13/00050. The following table will outline and provide responses to each of these issues.

**Table 5-2 Summary of Concerns Raised by RMS**

Concern raised by RMS	Response
A Traffic Impact Study should be prepared in accordance with Table 2.1 of the RTA Guide to Traffic Generating Developments.	This traffic assessment has been undertaken to address specific issues pertaining to traffic and transport issues arising from the subject development.
Individual intersections should also be modelled in SIDRA where TRACKS has been used for the network model. This would be required for any proposed access road junctions with the classified roads concerned and potentially any other classified	Individual intersections have been modelled in SIDRA software and the results are presented in <b>Section 4</b> of this report.

---

road junctions in the vicinity that are likely to be adversely impacted by the traffic generated by the subject development.

The treatment type for the proposed subdivision access road junction with the classified road network would need to be determined based on the intersection modelling. The selection of treatment types should also consider other constraints on the classified road/s such as the speed environment and road safety, and the land available within the road reserve to create the junctions.

Refer to **Section 3.4.4** and **Figure 3.4**.

Electronic copies of all modelling undertaken to support the planning proposal should be provided to Council and RMS for review.

RMS' specific requirements for the treatment type of the proposed access road junction with Menangle Street (or Remembrance Driveway) will be provided following its assessment of the Traffic Impact Study and associated intersection modelling.

Noted.

The sight distance being significantly constrained due to the road curvature along the Remembrance Driveway at the boundary of the subject site.

No connection is proposed directly to Remembrance Driveway.

The existing road environment and nature of development on the northern side of Remembrance Driveway makes this stretch of Remembrance Drive conducive to a 100km/h environment and therefore RMS is unlikely to consider any proposed reduction of the sign posted speed limit as compliance and enforcement issues are likely to result.

No connection has been proposed on to Remembrance Driveway; as such no change in speed limit is required.

Consideration should be given to the size of the largest vehicle that will be required to access the site, including waste collection vehicles. Remembrance Driveway at this location is an approved B-Double route, therefore, any proposed intersection with Remembrance Drive will need to cater for vehicles of this size to undertake the through movements.

No new intersections have been proposed along Remembrance Driveway.

Consideration should be given to the impact of any loss of on-street parking and impacts on adjoining private access points on Menangle Street as a result of road or transport infrastructure improvements necessitated by future development of the site.

The minor loss of on-street public parking spaces along Menangle Street due to the proposed site access point can be relocated elsewhere along the same road. It is also noted that given the residential frontage on Menangle Street, the on-street parking demand is anticipated to be low.

The RMS preferred strategy is to deny access to the classified road where alternative local road access is available. Where this is not feasible, RMS is likely to restrict access to left in/left out as traffic volumes increase and right turning movements begin to compromise road safety and traffic efficiency.

No connection is proposed directly to Remembrance Driveway.

The internal road network within the site would need to allow for future subdivided lots to gain access to the internal subdivision roads to avoid any need for additional connections to Menangle Street or Remembrance Driveway.

Noted. This is incorporated within the road design.

RMS notes that the proposed zoning of R2 and R3 allows for the development of Child Care Centre and Educational Establishments. For safety reasons Council should ensure that any new Child Care Centres or Schools are prohibited where such properties have a direct frontage to a classified road by including a clause in the LEP. RMS would not support a development application within the subject site for this type of land use if the

The planning proposal for this site indicates only residential developments.

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site had frontage/a boundary to Menangle Street or Remembrance Driveway.

---

RMS strongly supports development with the potential to reduce car dependency and encourage the use of sustainable modes of travel including buses, bicycles and walking. RMS therefore recommends that the planning proposal ensure that it supports and considers, to the greatest extent possible, the aims and objectives of the State Government policies dealing with this matter.

---

Both public and active transport initiatives will be adopted during the detailed design stages of the development.

Consideration should be given to the identification of appropriate pedestrian and cycle links to/from the development. The applicant should identify suitable infrastructure to ameliorate any safety impacts as a result of the future development of the site.

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More details will be provided during the Development Application stage.

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## 6 Conclusion

---

This report was prepared to outline the traffic and transport impacts associated with Stage 1 of the proposed Reeves Creek residential development in Picton.

The transport assessment has considered the following:

- > Public transport provisions available within the vicinity of the subject development.
- > The optimal configuration and sight distance available for the proposed site access intersection on Menangle Street.
- > Performance of the key intersections in the vicinity of the proposed development for both with and without the proposed development traffic.
- > The concerns outlined by RMS in their letter referenced: STH13/00050

In summary, the findings of the transport assessment are as follows:

- > There are five bus routes which pass nearby the proposed development along Argyle Street with two buss tops located within a 500 metre radius of the proposed development. Also, the Picton Railway Station is located 1km from the subject development.
- > From the analysis presented in this report, with reference to AustRoads Guidelines, it is proposed to upgrade the primary site access to a priority controlled access with auxiliary / deceleration left turn lane and channelised right turn on Menangle Street.
- > The vehicles approaching the site access point can foresee any potential conflicts (with vehicles along Menangle Street) with a clear sight envelop of 123m (with no permanent obstructions present within the sight triangles). As such the Safe Intersection Sight Distance requirement of 123m can be achieved at this location.
- > Based on the Austroads Guide the minimum gap sight distance required is 83m for vehicle exiting the site on to Menangle Street via the site access approach. This requirement can be sufficiently met at the site access intersection with Menangle Street.
- > The 2016 and 2026 baseline traffic volumes were extracted from the Wollondilly Shire TRACKS model.
- > The analysis of the baseline scenarios indicated that the Argyle Street/Menangle Street intersection will need to be upgraded to signalised control by 2016 without the proposed development.
- > The Argyle Street / Cliffe Street / Margaret Street intersection and the Argyle Street/Menangle Street intersection (with proposed upgrades) will perform satisfactorily at the 2016 and 2026 baseline scenario.
- > In order to assess the impact of the proposed development on the external road network, the proposed dwelling numbers (400 dwellings) associated with the development were added to the representative zone in the TRACKS model which calculated the trip generation and distributed and assigned trips accordingly.
- > Modelling results for the post-development scenario for Argyle Street/Menangle Street, Argyle Street / Cliffe Street / Margaret Street and Site Access/Menangle Street intersections indicate satisfactory performance.

Traffic Impact  
Assessment

APPENDIX A  
PROPOSED  
DEVELOPMENT  
MASTERPLAN



DATE PLOTTED: 25 May 2015 5:29 PM BY: GIS ROEFFEN

CAD FILE: N:\Projects\506\506\FY13\NA50613047\_Reeves Creek\DRAWINGS\Bulldo\CVL11\_Sketches\NA50613047 - SK055 (01) REEVES CREEK EXTENT OF REZONING.dwg

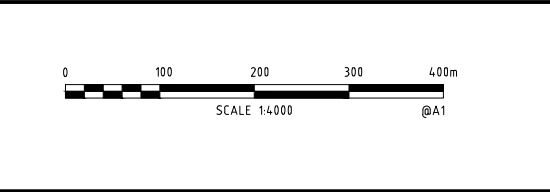


Rev.	Date	Description	Des.	Verif.	Appd.
02	18.03.15	ISSUE FOR INFORMATION	GR	GR	GR
01	04.02.14	ISSUE FOR INFORMATION	MZ	MZ	MZ

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Drawn	NVH	Date	FEB'14
Checked	MZ	Date	FEB'14
Designed	MZ	Date	FEB'14
Verified	MZ	Date	FEB'14
Approved		Date	

Client	MICHAEL BROWN PLANNING
	REEVES CREEK
	REEVES CREEK EXTENT OF REZONING

Status	FOR INFORMATION ONLY NOT TO BE USED FOR CONSTRUCTION PURPOSES			
Datum	A.H.D.	Register	Scale	Size
			1:4000	A1
Drawing Number	NA50613047 - SK055			Revision
				01



Traffic Impact  
Assessment

APPENDIX B  
WOLLONDILLY SHIRE  
COUNCIL  
CORRESPONDANCE

Hello Dick,

Further to our conversation on Monday 10 March and my email below, could you please provide us with an agreement to use the Wollondilly Shire TRACKS model to undertake the traffic assessment for the Reeves Creek rezoning application located in Picton?

We understand that the layout plans for the proposed signalisation of the Margaret Street / Argyle Street intersection (open 2014) are with your consultants and would appreciate if you are able to provide us with a copy of these plans so that we can use this in our assessment.

As discussed, the methodology of our traffic assessment shall be consistent with that was used for the Stone Quarry rezoning application and therefore the forecast flow, anticipated development trip generation and assignment shall be obtained by utilising the TRACKS model.

In our conversation you confirmed that our traffic assessment for the Reeves Creek development would not need to consider the traffic generated by the Stone Quarry rezoning application as this has not been approved and is not a committed development.

If you would like to discuss any of the above matters further, disagree with any of the above or require any more information, please don't hesitate to contact me. Otherwise we hope to receive the agreement for the TRACKS model shortly and the layout plans of the proposed signalised intersection, so that we can progress with our assessment.

Regards

**Devinda Kumarasinghe**

SENIOR ENGINEER  
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**From:** Devinda Kumarasinghe (Sydney)

**Sent:** Wednesday, 5 March 2014 12:10 PM

**To:** 'dick.webb@wollondilly.nsw.gov.au'

**Subject:** Reeves Creek, Picton Traffic Assessment

Hello Dick,

Further to our conversation yesterday, could you please provide us with an agreement to use the Wollondilly Shire TRACKS model to undertake the traffic assessment for the Reeves Creek rezoning application located in Picton?

We currently have access to the model from previous projects and anticipate that with the agreement we will use the model files currently on our system (more recently our Traffic Engineer, Neill Miller, was in contact with you and obtained the model for use in the traffic assessment for the Stone Quarry Creek rezoning application).

The methodology of our traffic assessment shall be consistent with that was used for the Stone Quarry rezoning application and therefore the forecast flow, anticipated development trip generation and assignment shall be obtained by utilising the TRACKS model.

We understand that the Council is looking to update the TRACKS model, however the timeframe for this update has not been confirmed and would fall outside the delivery timeframe of our project. Therefore, it was agreed to use the TRACKS model that we currently have on our system.

The intersections that we propose to assess are as follows (for the weekday AM and PM peak hour periods):

- Site access / Menangle Street
- Margaret Street / Argyle Street
- Argyle Street / Menangle Street

The design years that will be assessed are 2016 and 2026 for the 'Base' and 'Base plus Development' scenarios.

Please confirm if there are any committed schemes / road upgrades that we should take account of in our assessment. Could you provide us the available concept plans / details for the following proposed upgrades (committed) you noted yesterday:

- Proposed signalisation of the Margaret Street / Argyle Street intersection (open 2014)
- Proposed roundabout at the Argyle Street / Regreme Road intersection (open 2016).

If you would like to discuss any of the above matters further, disagree with anything, or require any more information, please contact me. Otherwise we hope to receive the agreement for the TRACKS model and the proposed intersection plans / details shortly, so that we can progress with our assessment.

Regards

**Devinda Kumarasinghe**

SENIOR ENGINEER  
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Traffic Impact  
Assessment

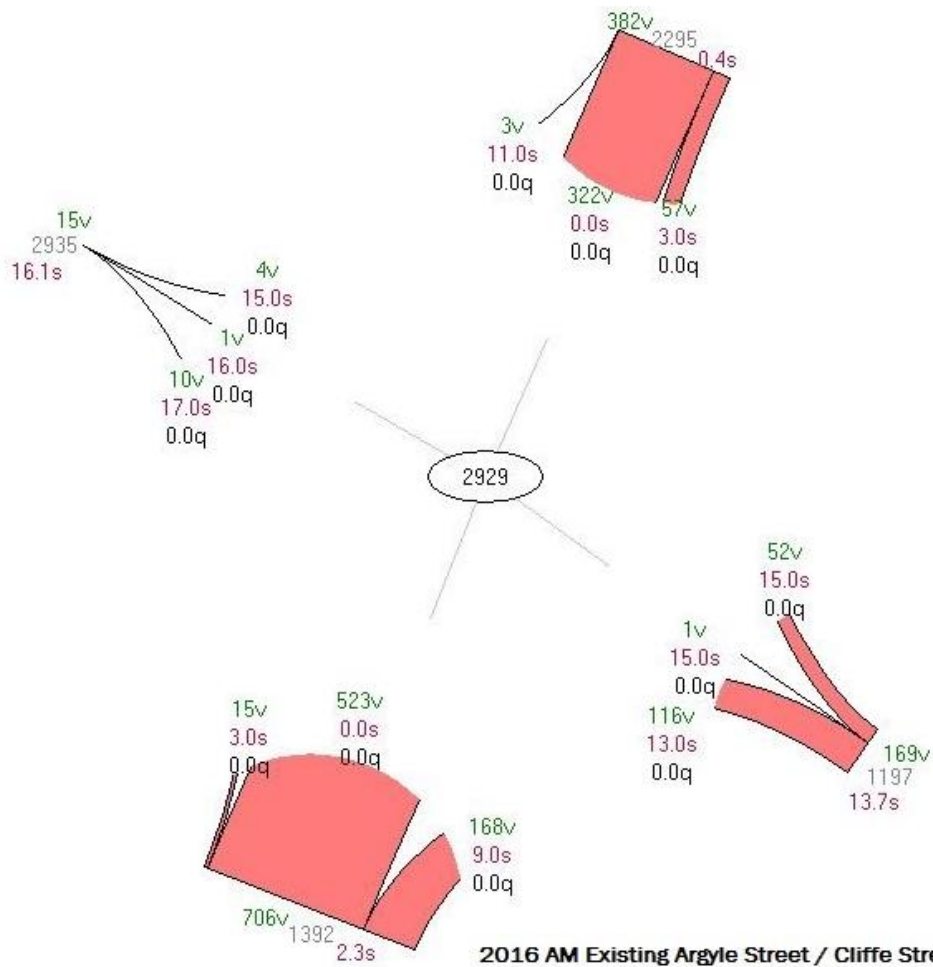
APPENDIX C  
TRACKS MODEL  
TRAFFIC VOLUMES

# 2016 Base

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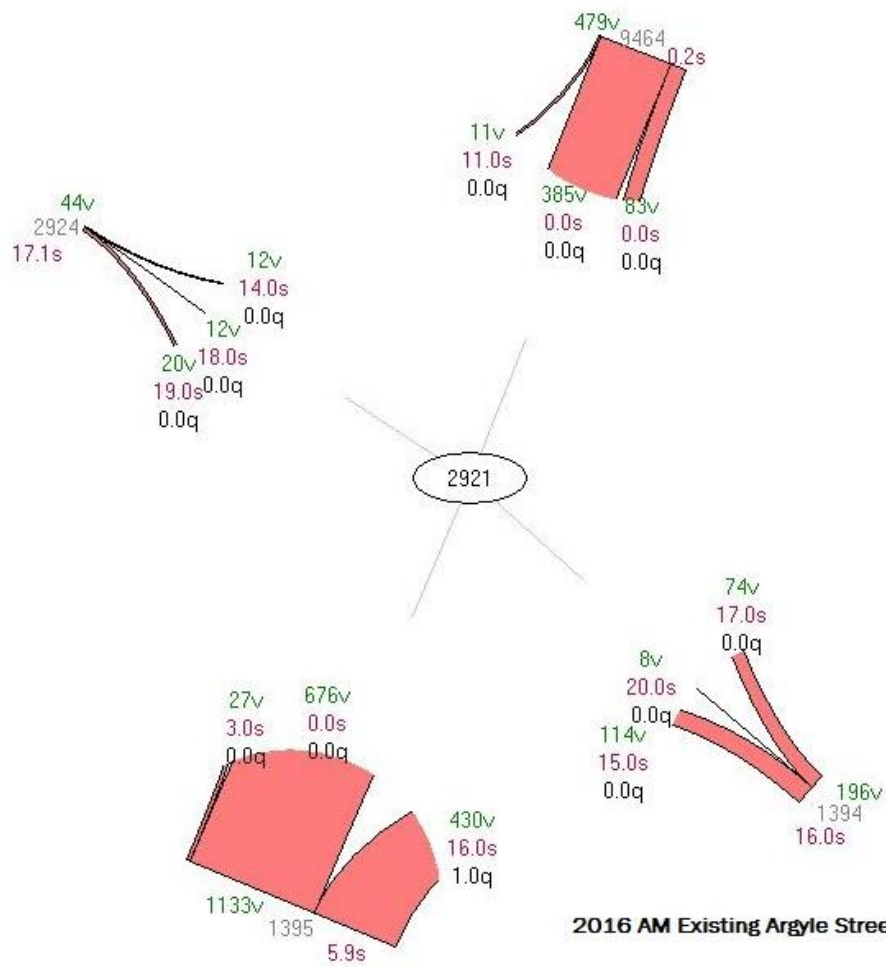
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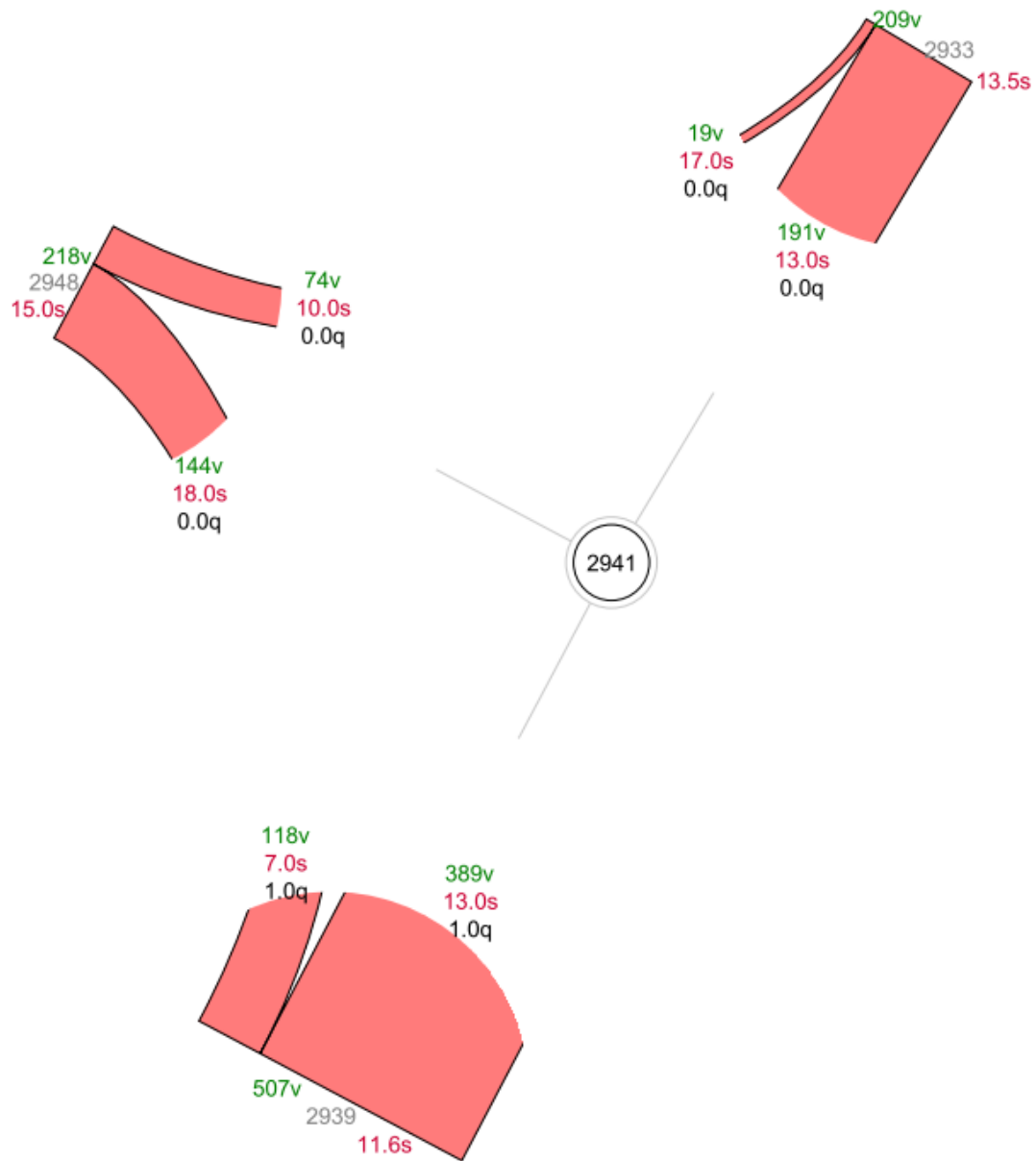
2016 AM Existing Argyle Street / Cliffe Street / Margaret Street

## Argyle Street/Menangle Street



2016 AM Existing Argyle Street / Menangle Street

## Argyle Street/Regreme Street



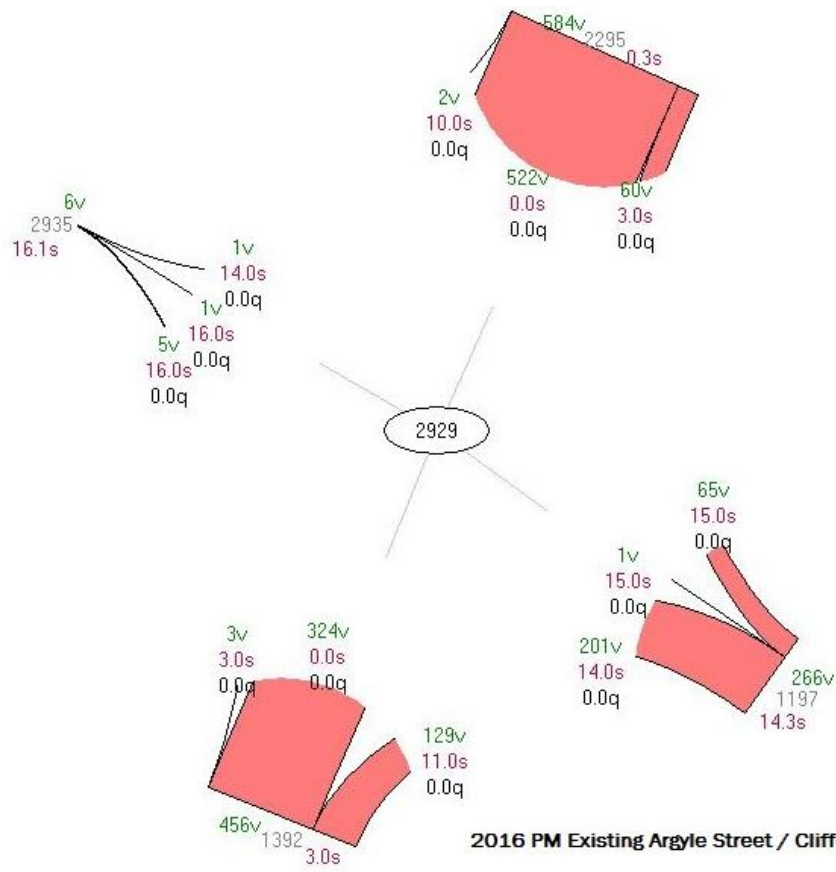
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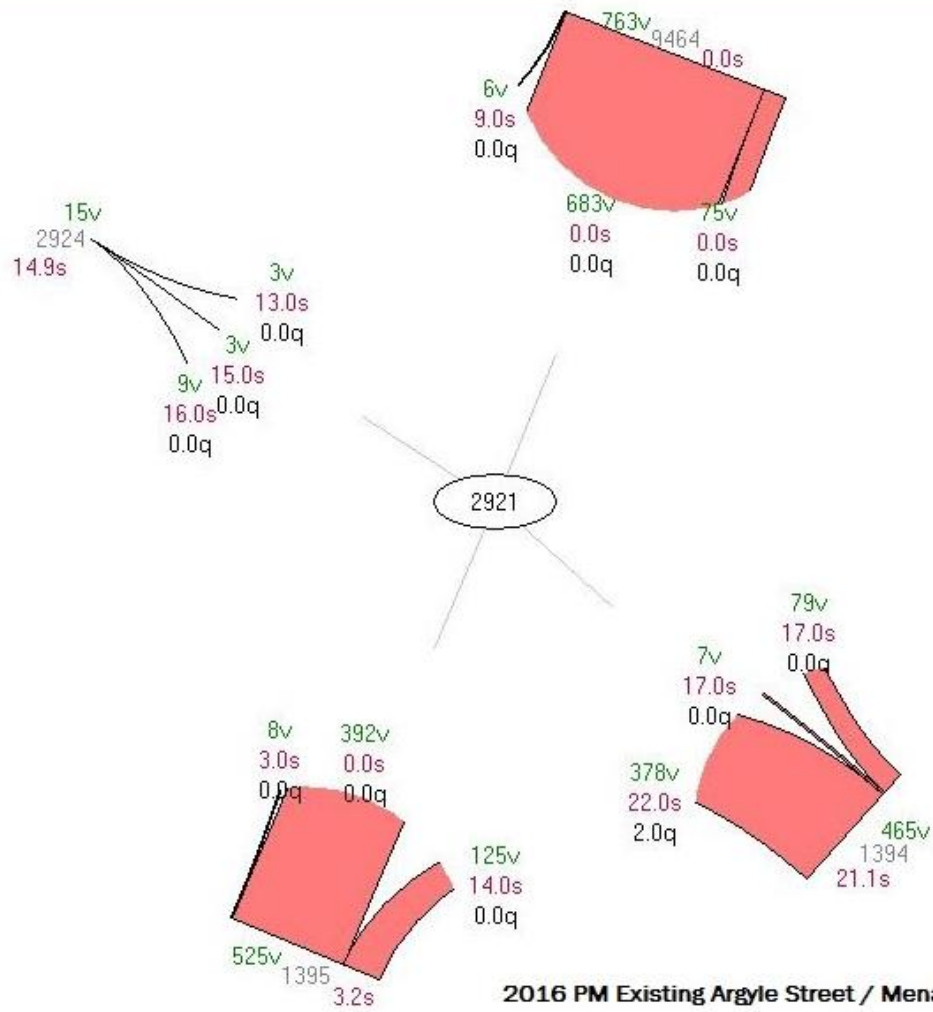


## PM Peak

### Argyle Street/Cliffe Street/Margaret Street

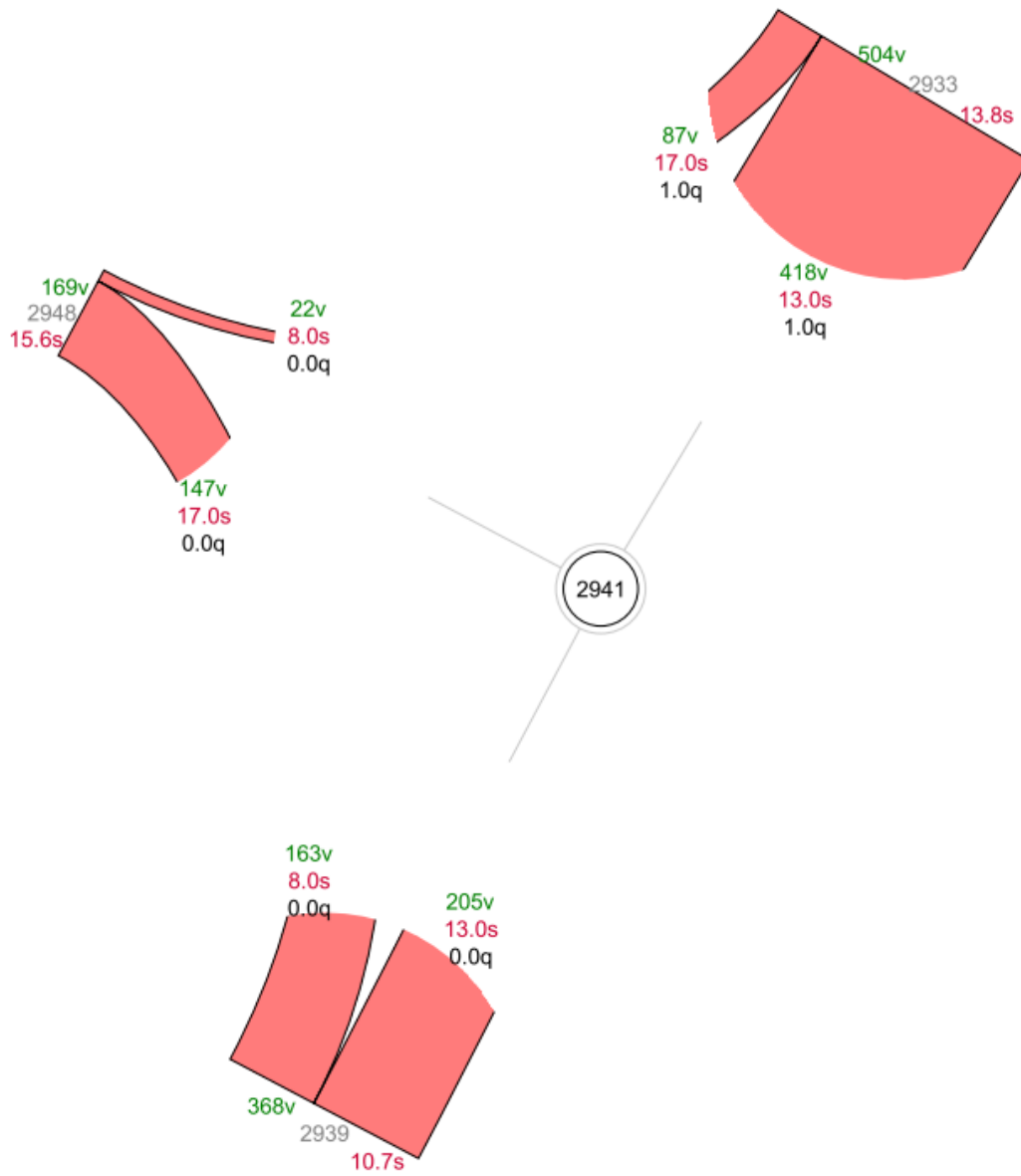


## Argyle Street/Menangle Street



2016 PM Existing Argyle Street / Menangle Street

## Argyle Street/Regreme Street



## **Menangle Street/Site Access**

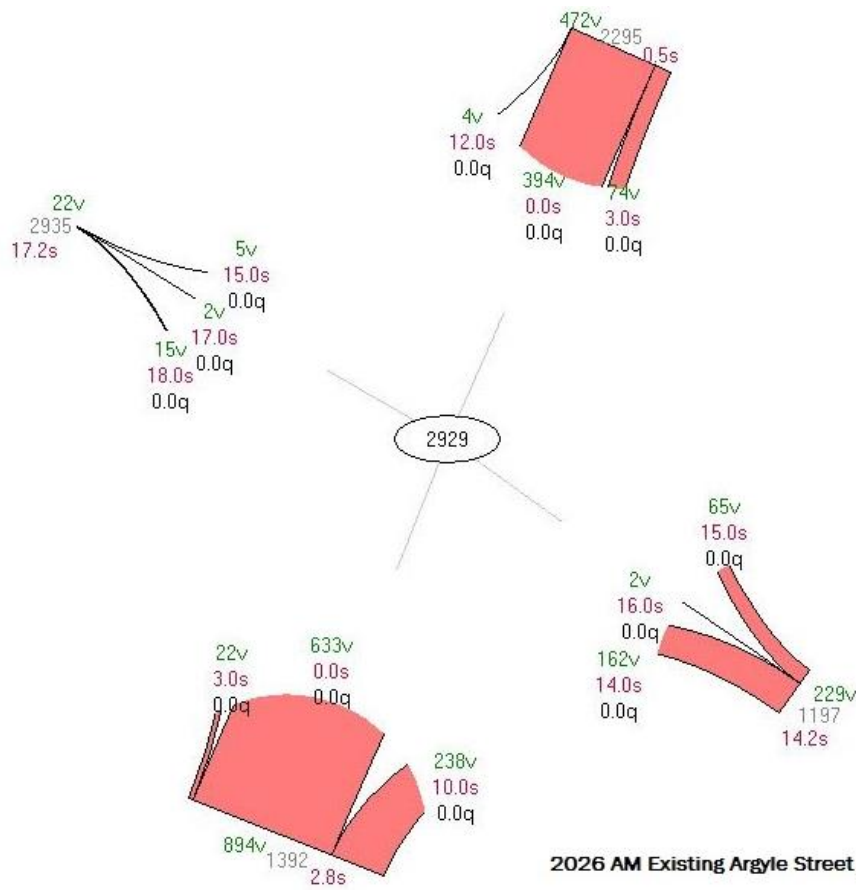
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# 2026 Base

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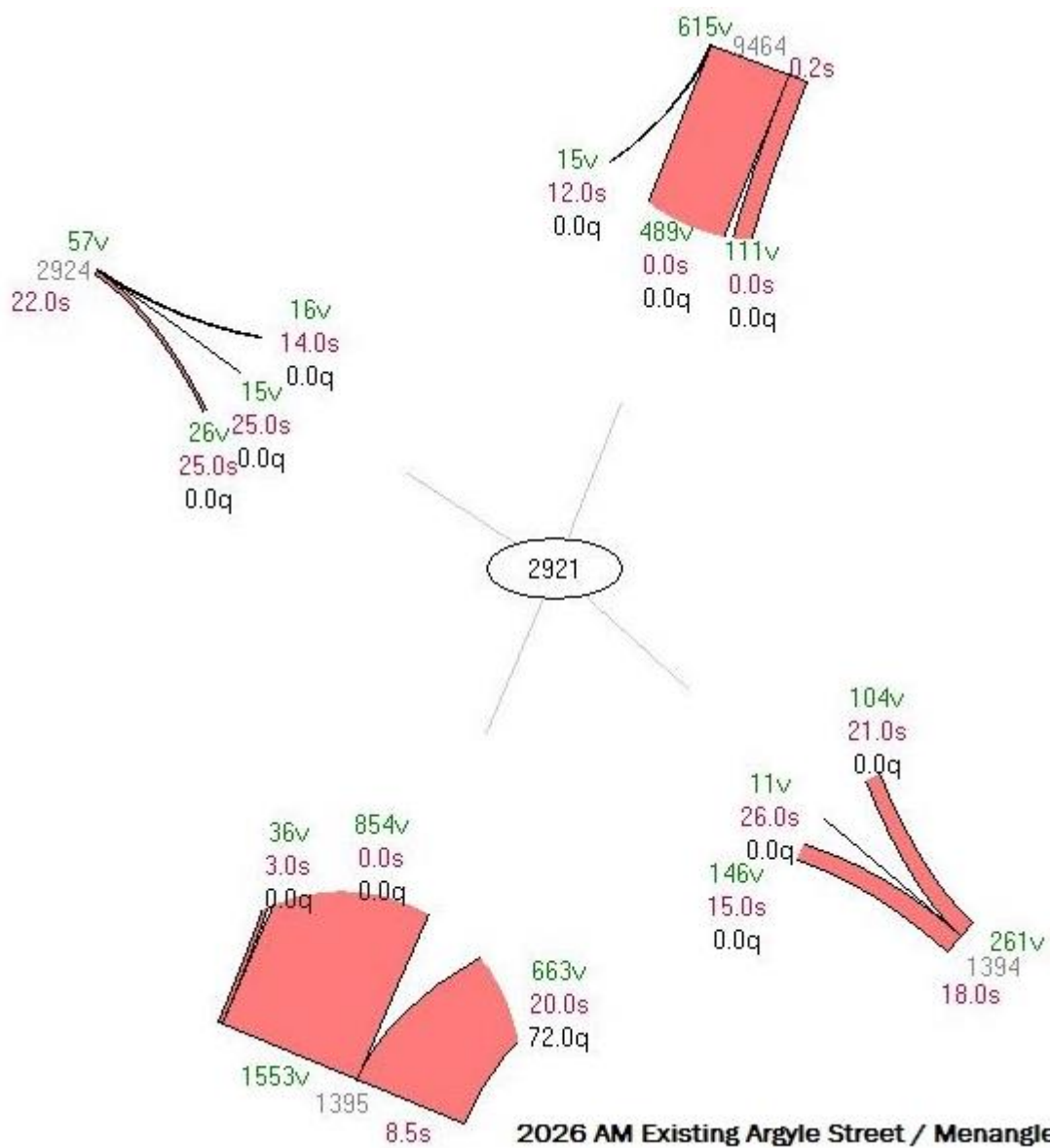
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### Argyle Street/Cliffe Street/Margaret Street

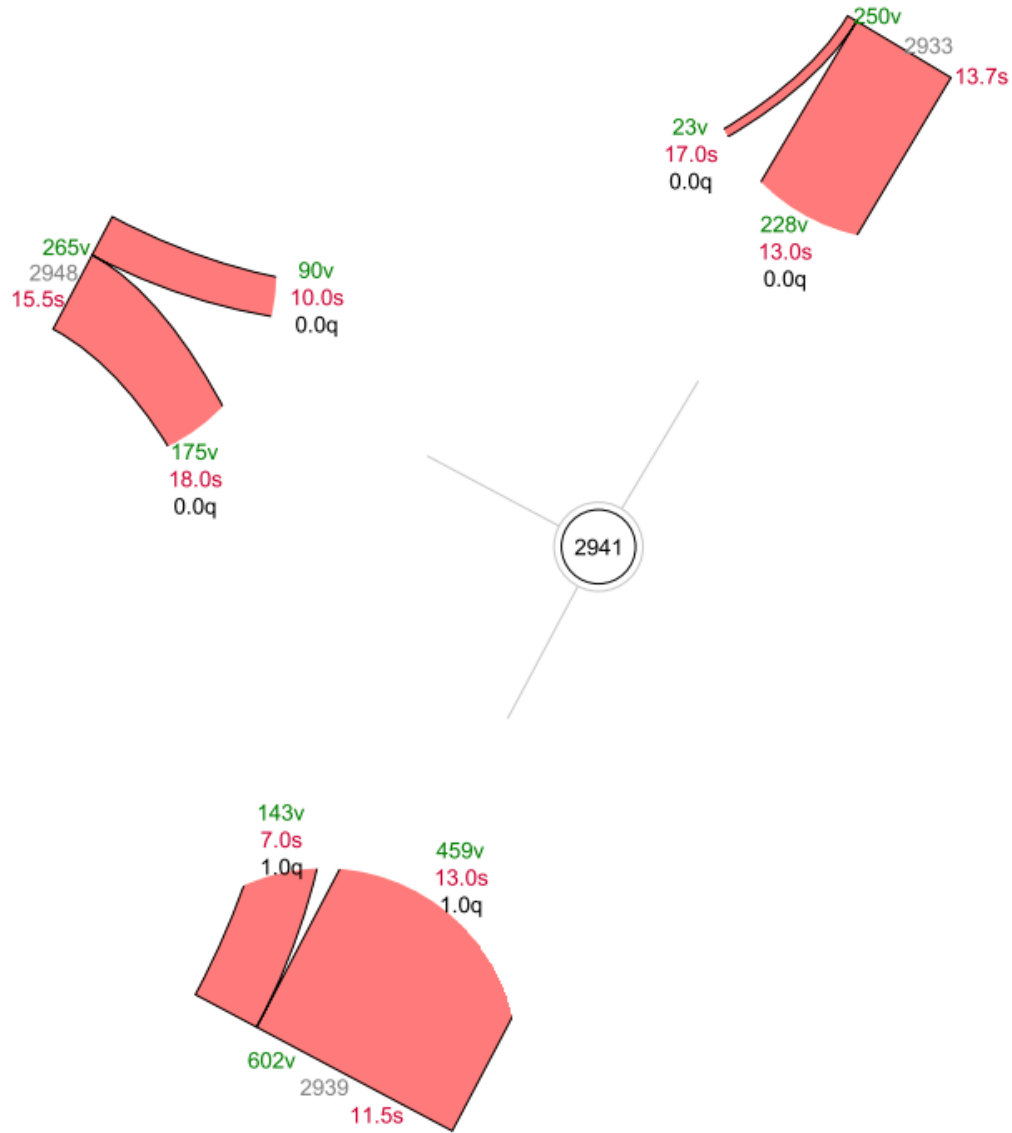


2026 AM Existing Argyle Street / Cliffe Street / Margaret Street

## Argyle Street/Menangle Street



## Argyle Street/Regreme Street



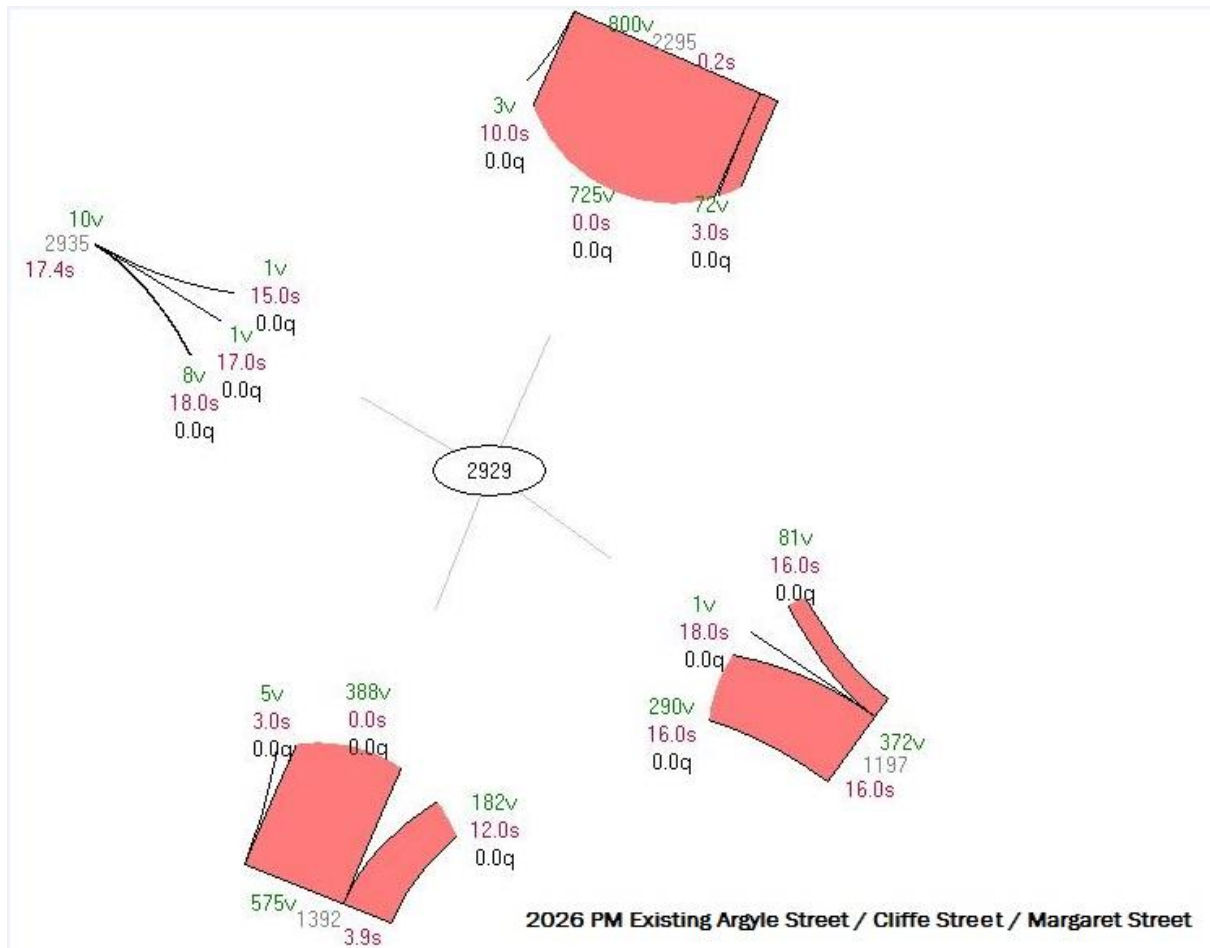
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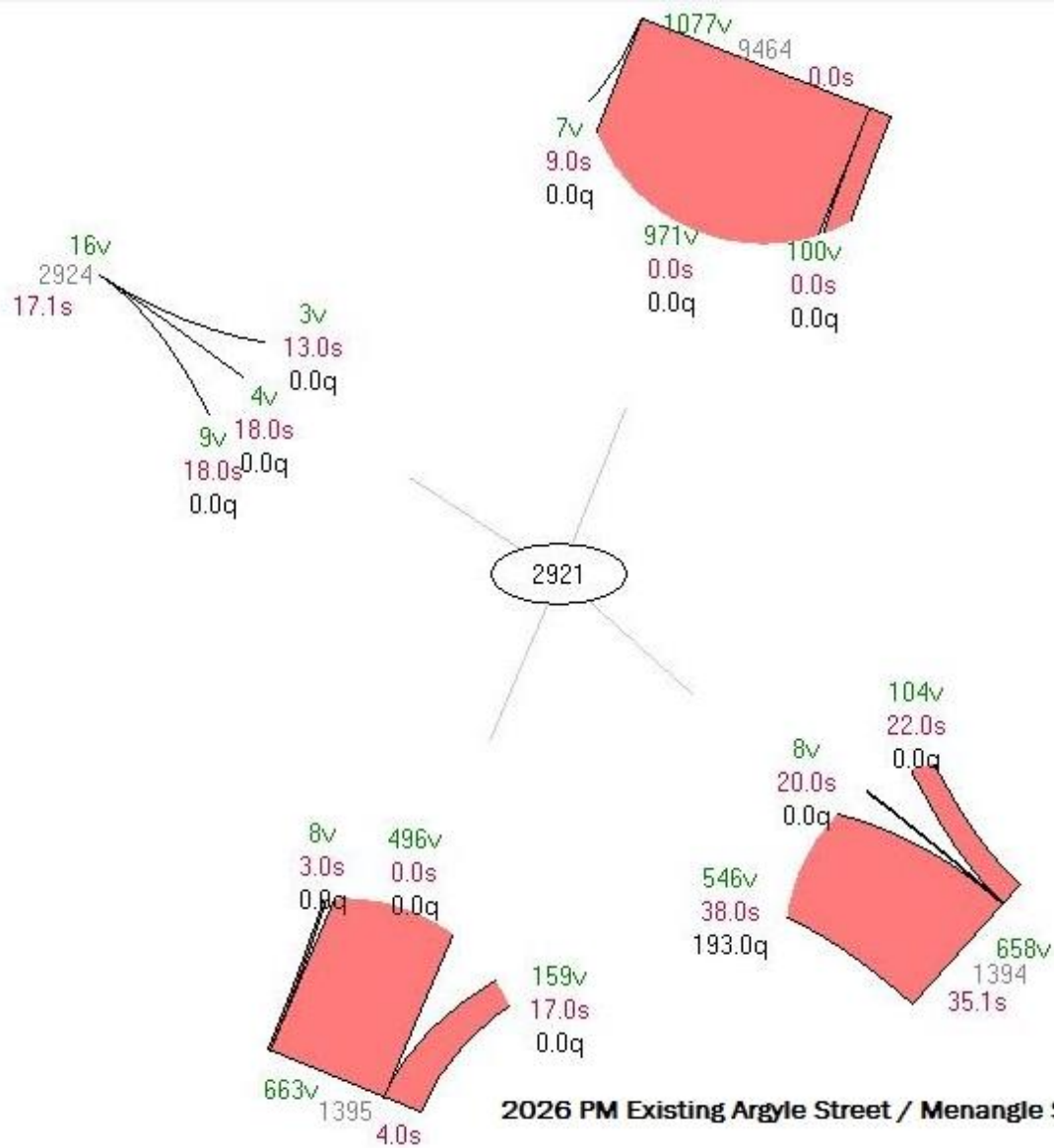


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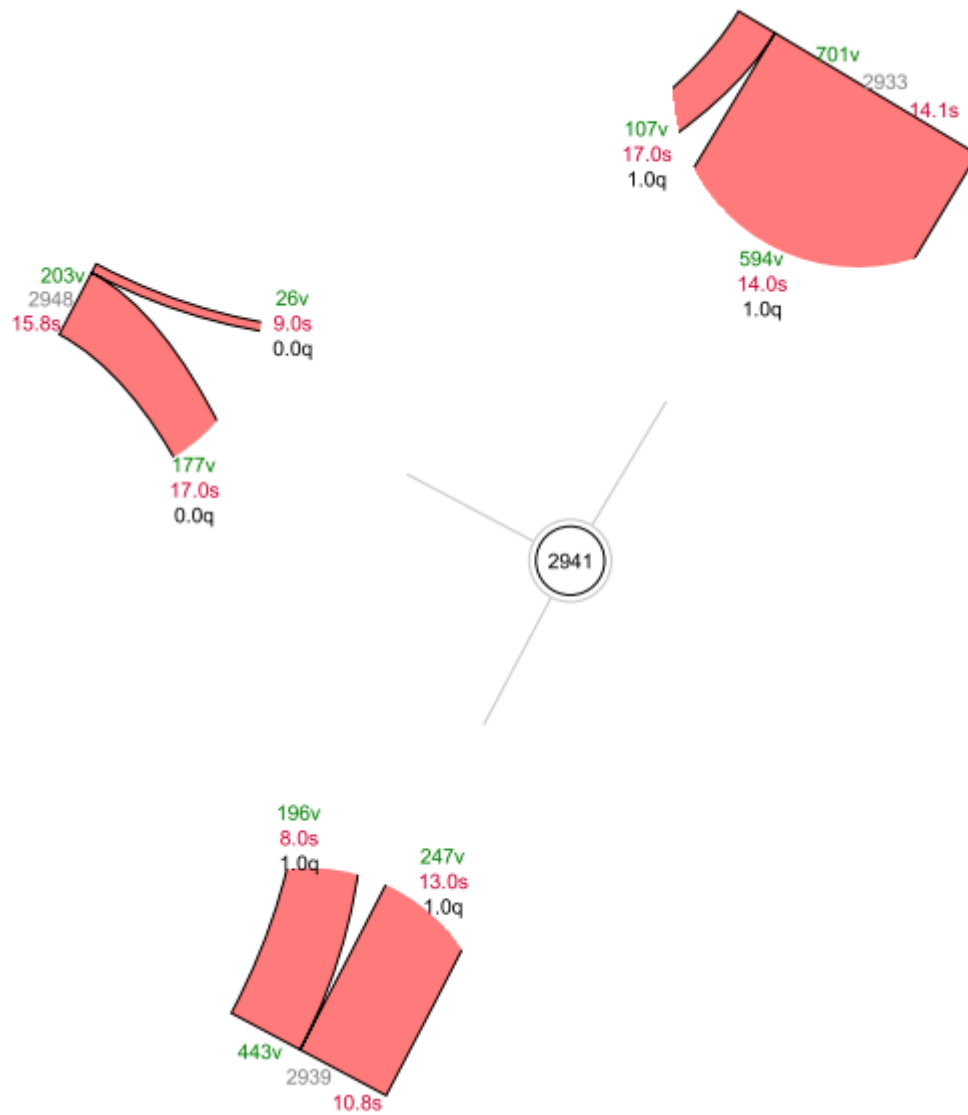
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## Argyle Street/Menangle Street



## Argyle Street/Regreme Street



## Menangle Street/Site Access

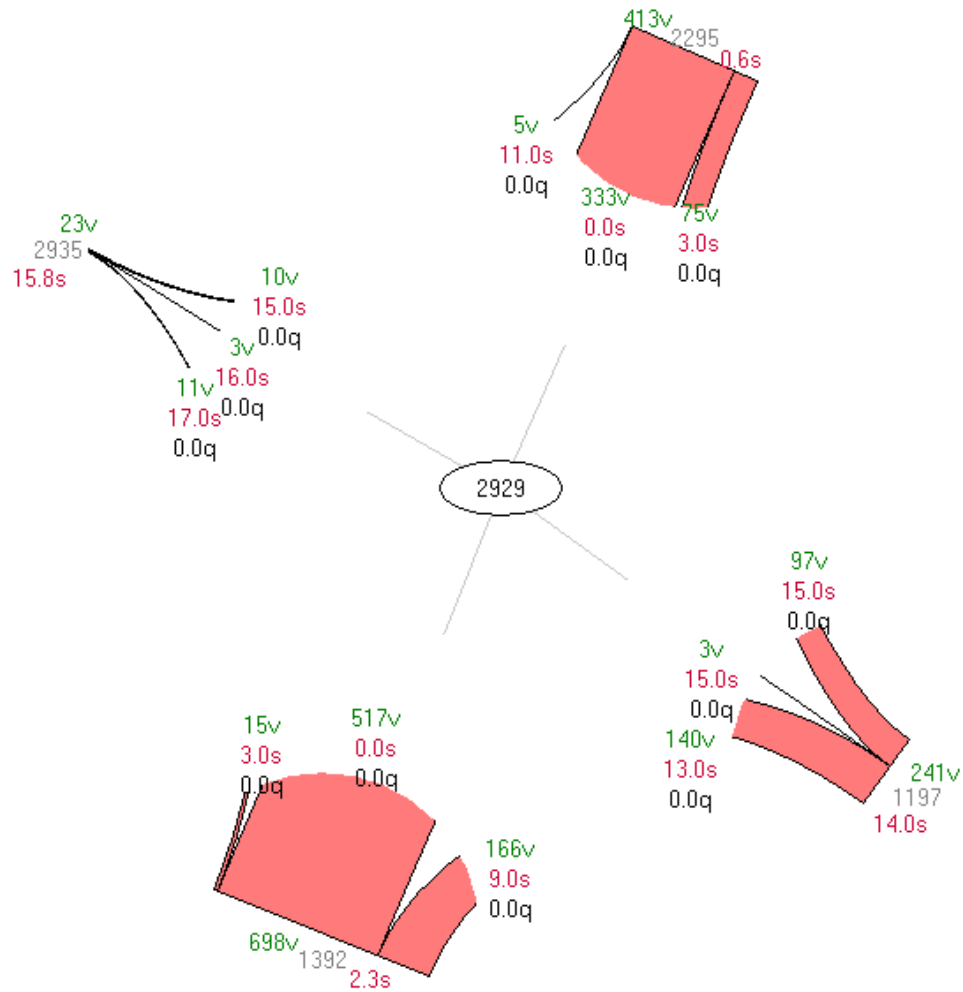
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# 2016 Base + Development

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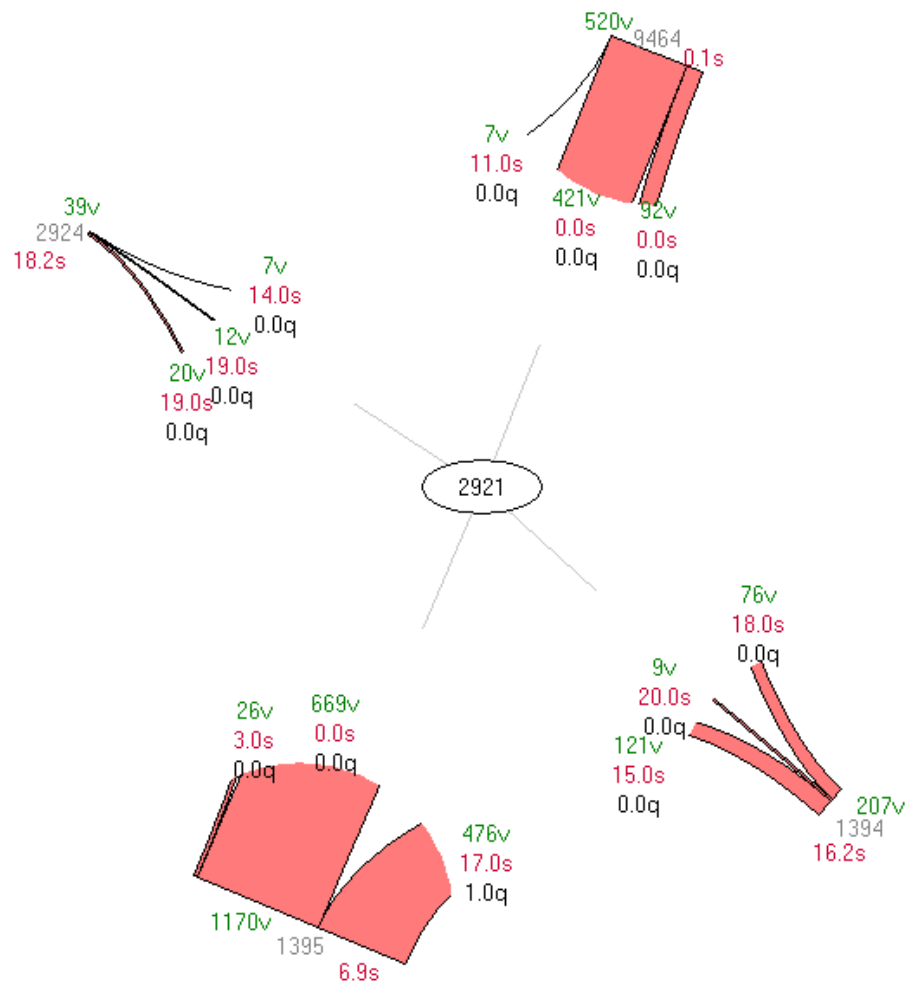
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### Argyle Street/Cliffe Street/Margaret Street

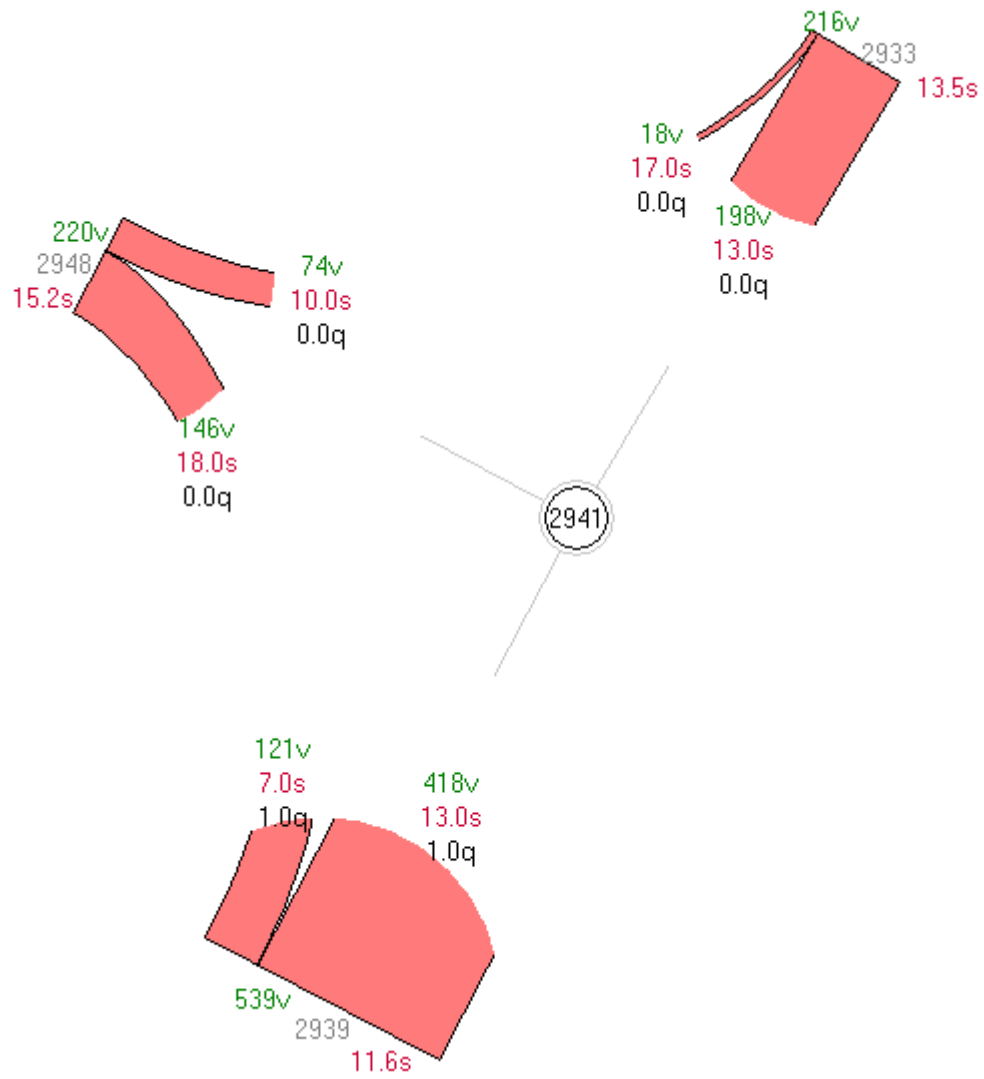




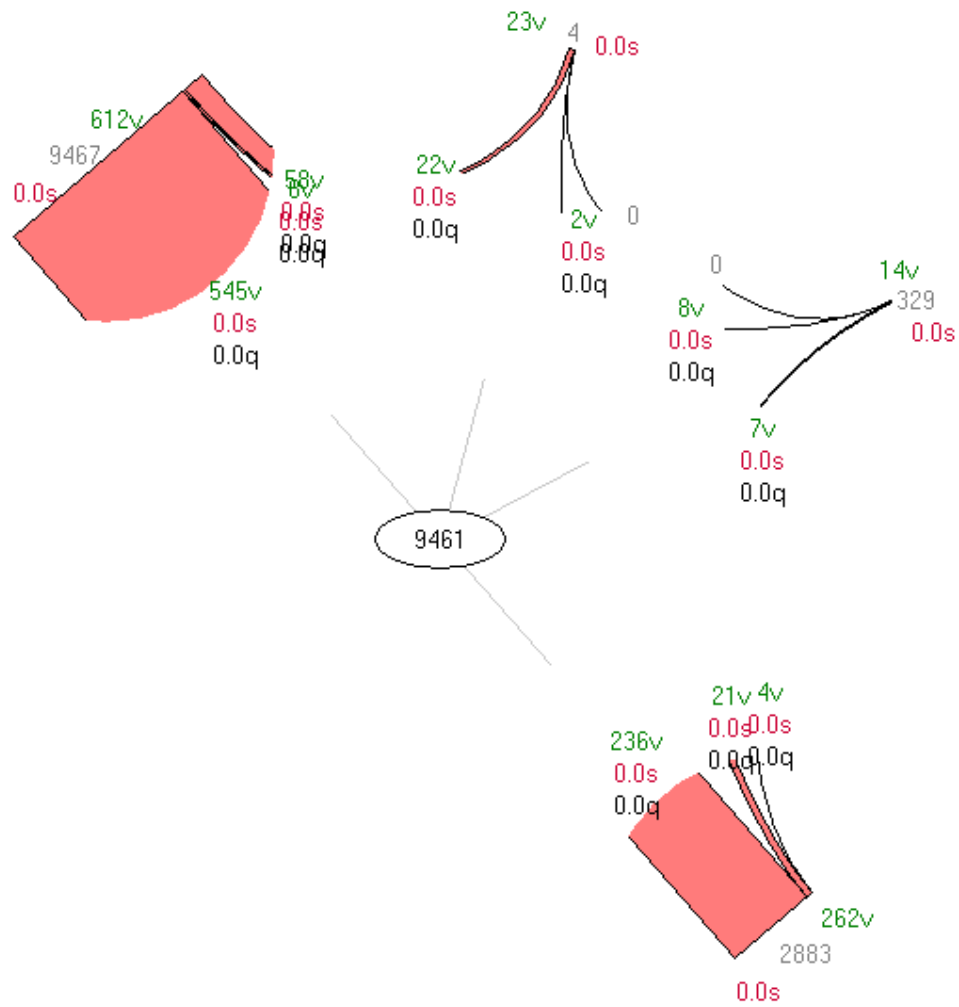
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## Argyle Street/Regreme Street

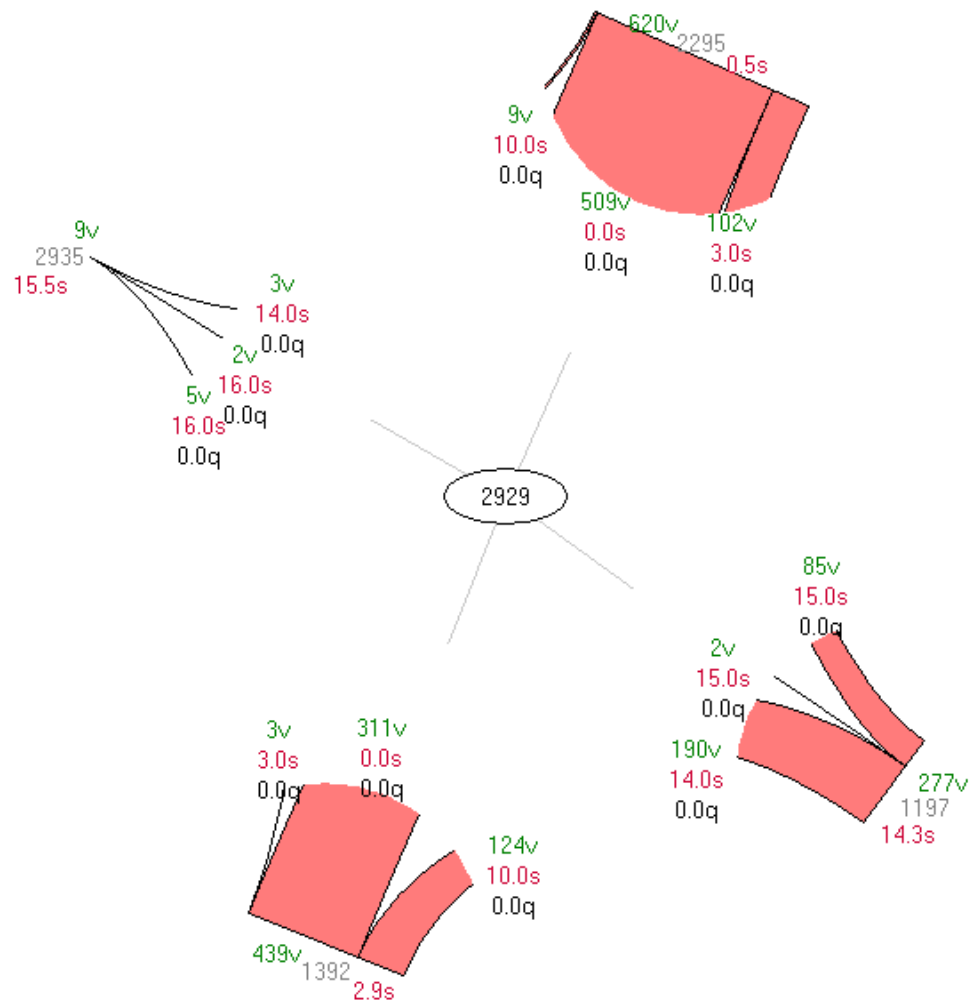


## Menangle Street/Site Access



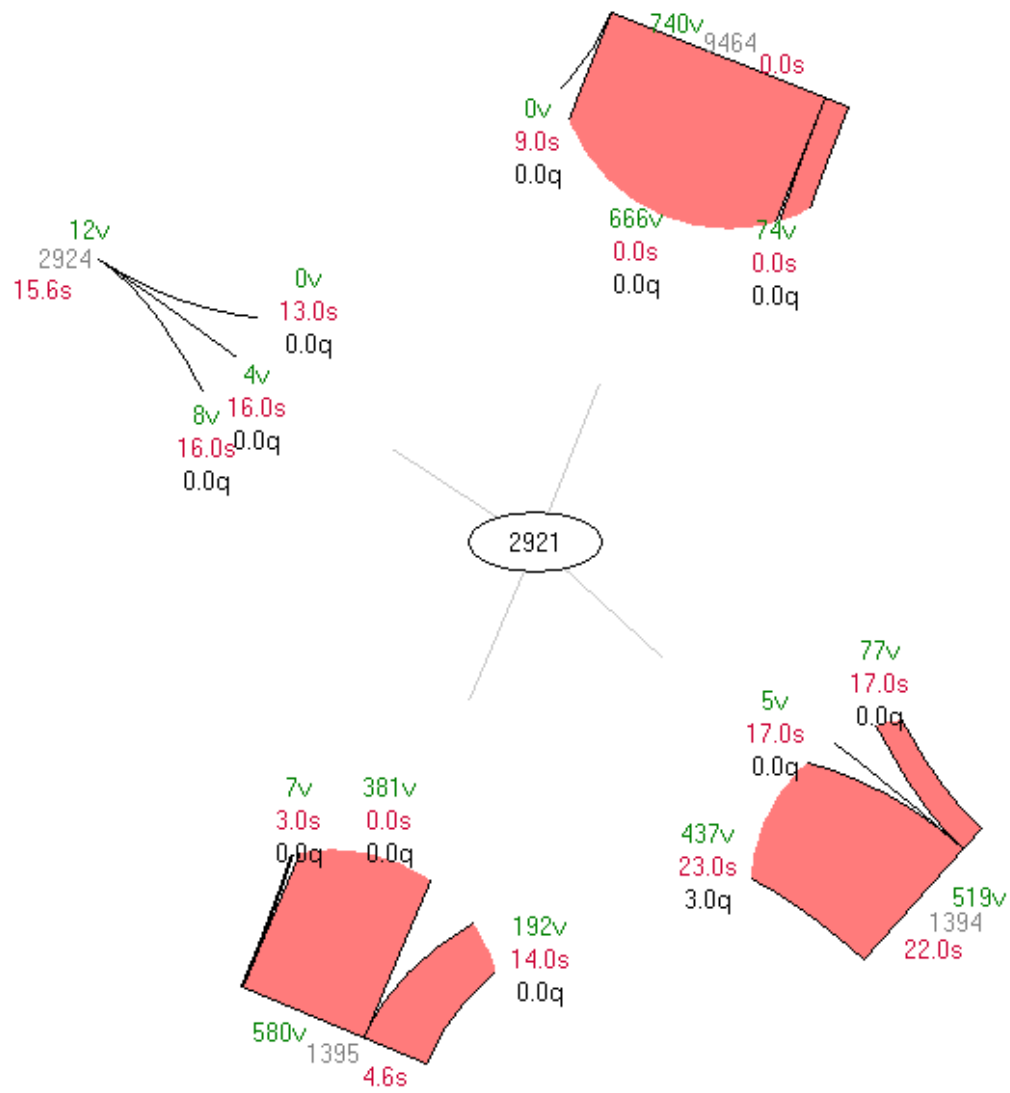
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### Argyle Street/Cliffe Street/Margaret Street

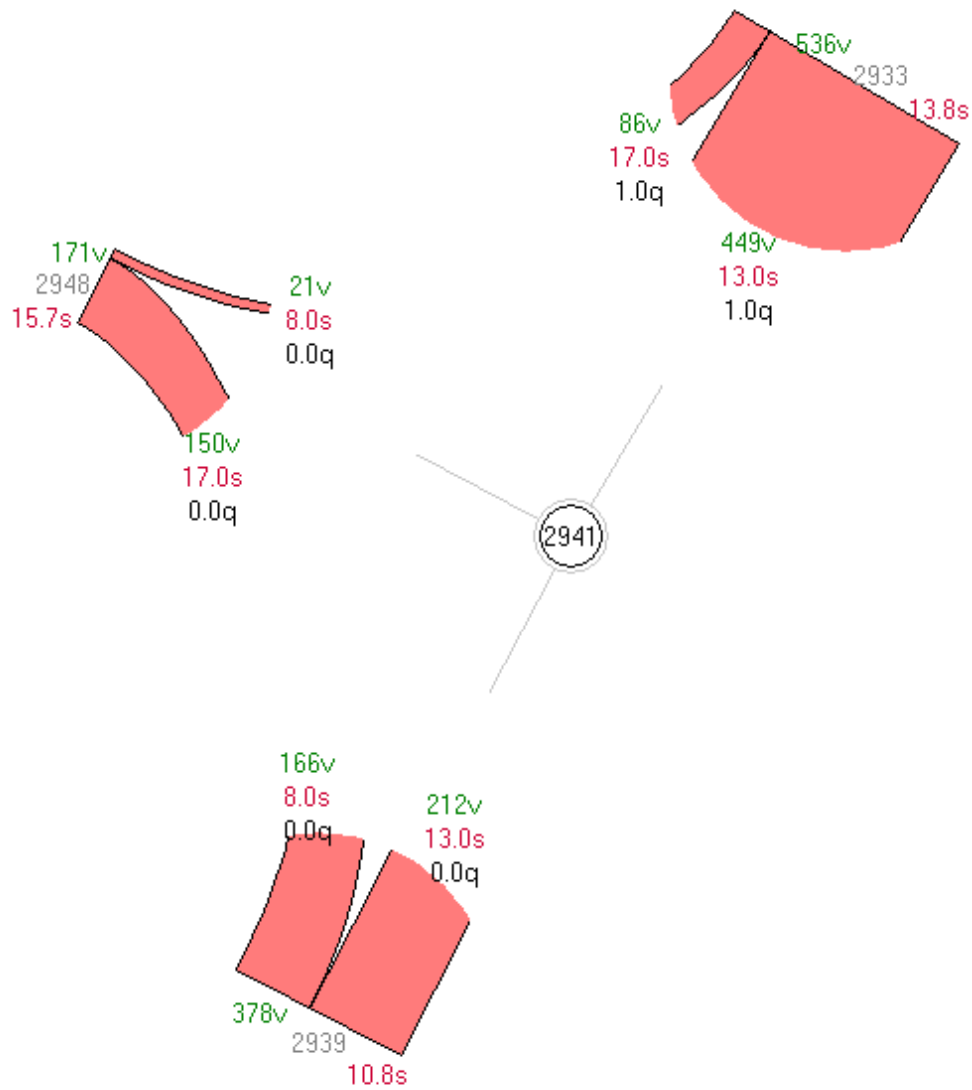




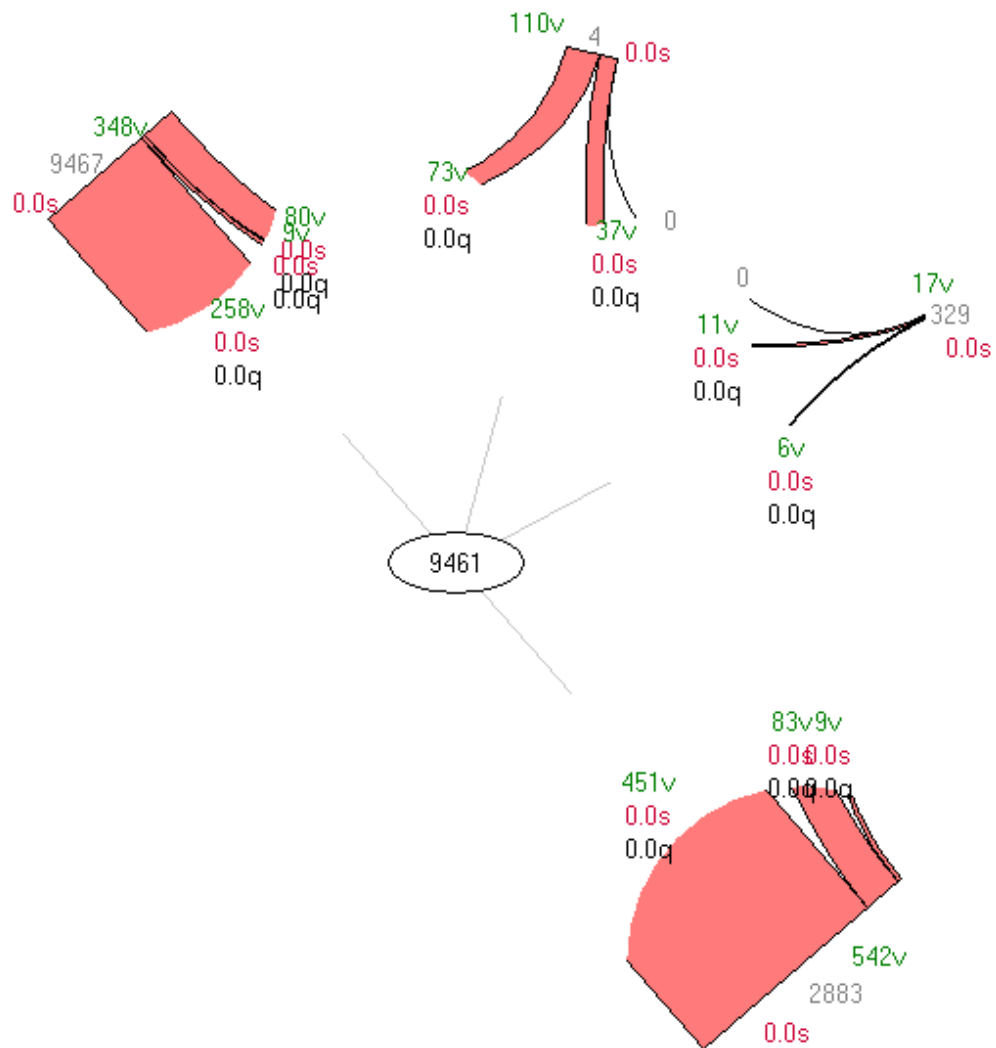
## Argyle Street/Menangle Street



## Argyle Street/Regreme Street



## Menangle Street/Site Access

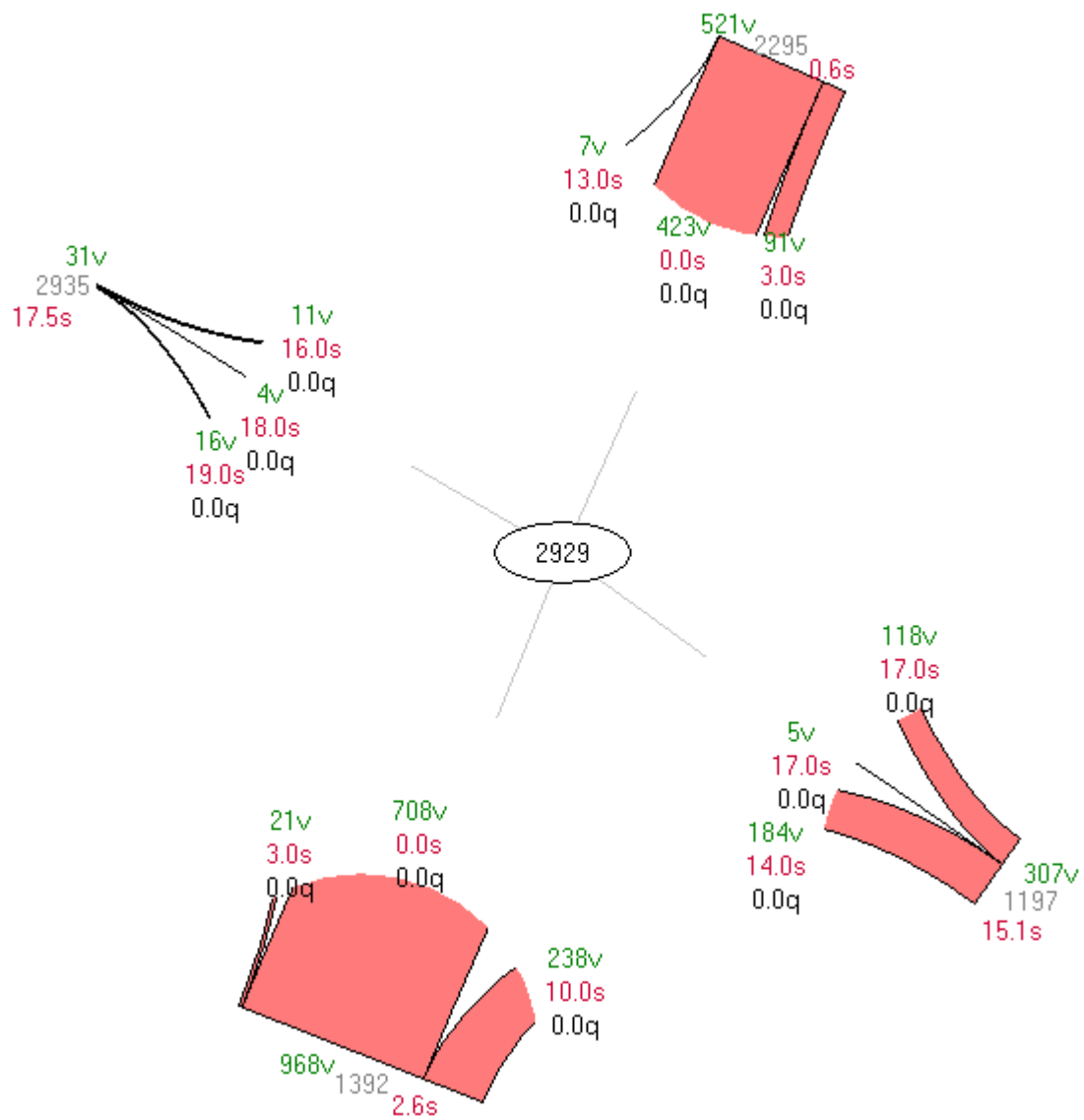


# 2026 Base + Development

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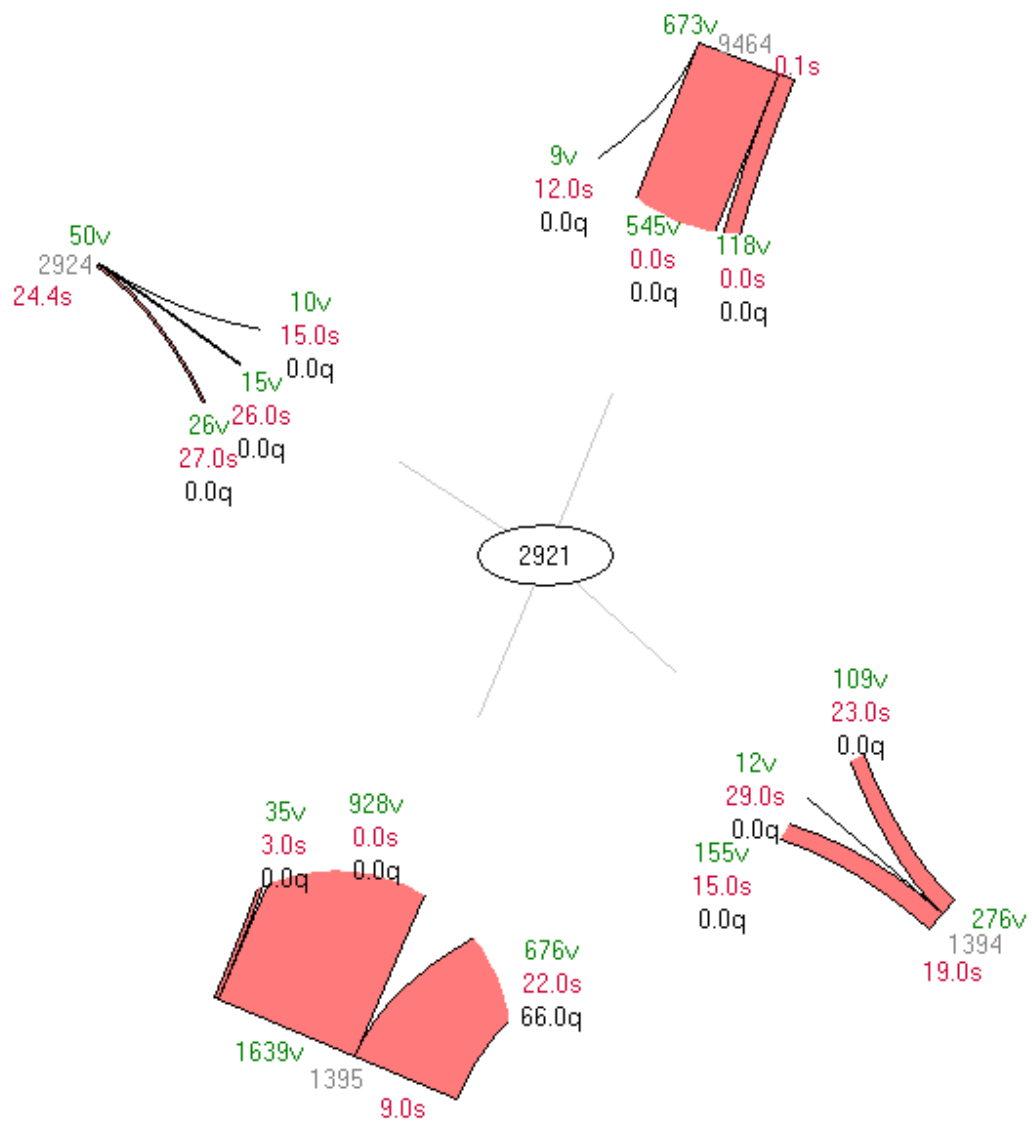
## AM Peak

### Argyle Street/Cliffe Street/Margaret Street

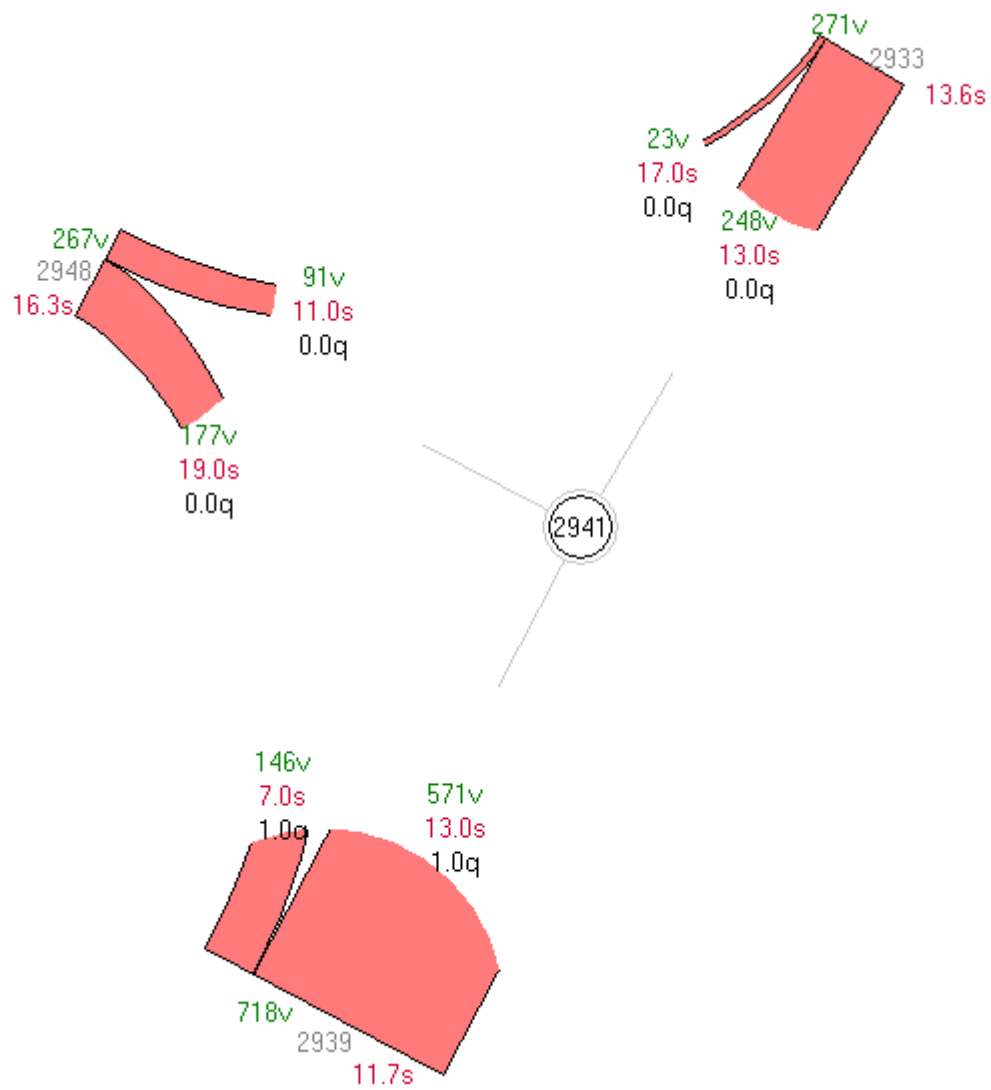




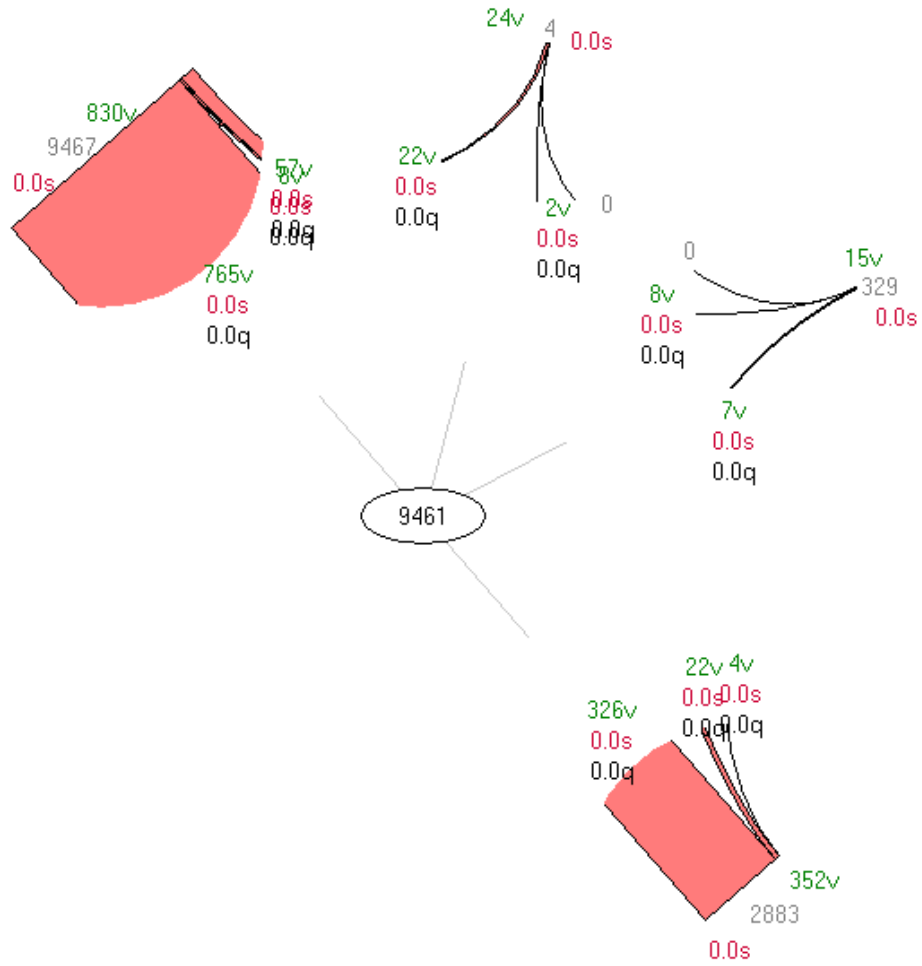
## Argyle Street/Menangle Street



## Argyle Street/Regreme Street

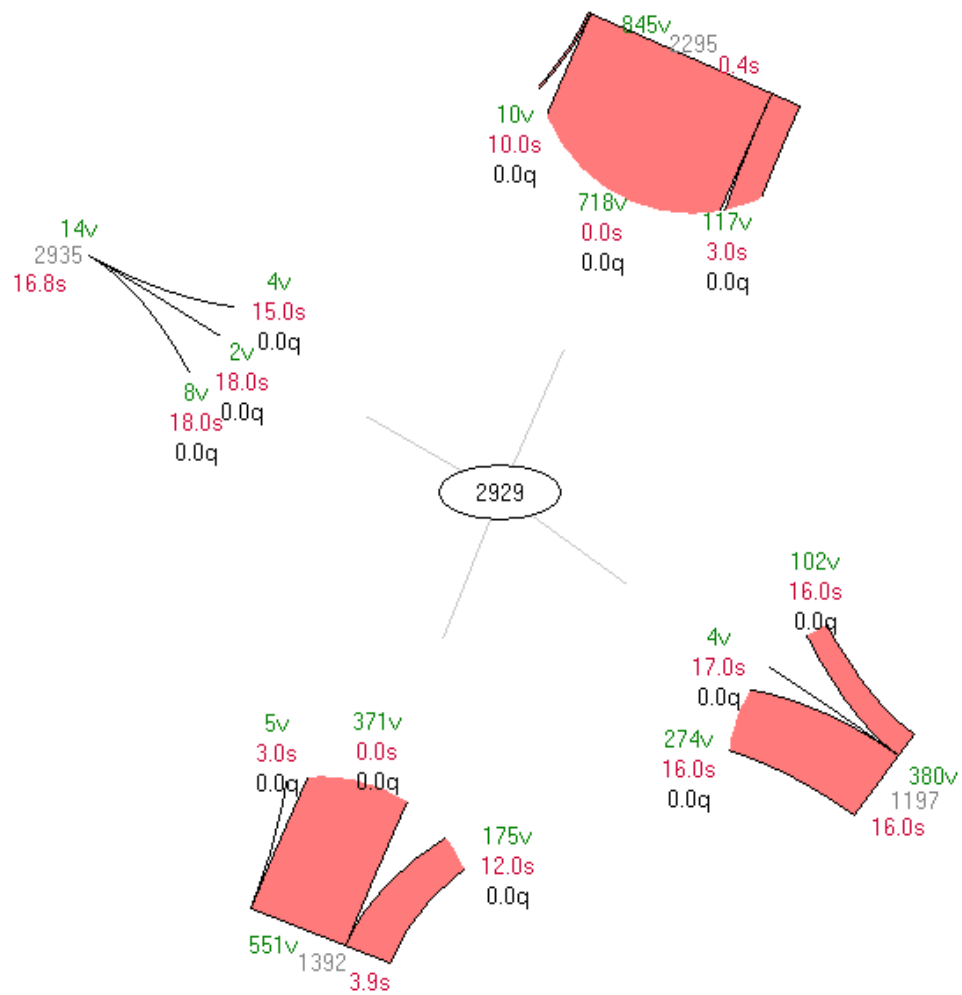


## Menangle Street/Site Access

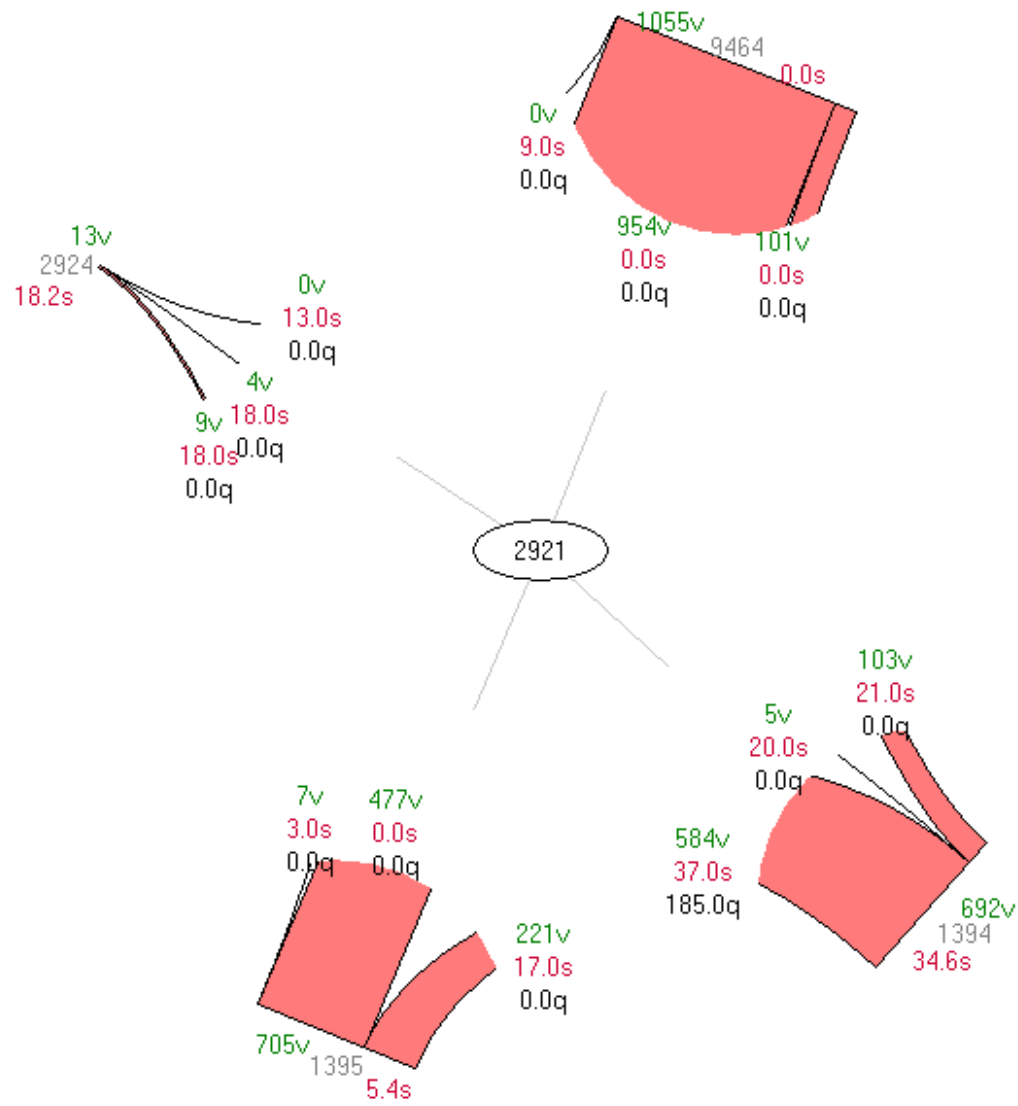


## PM Peak

Argyle Street/Cliffe Street/Margaret Street

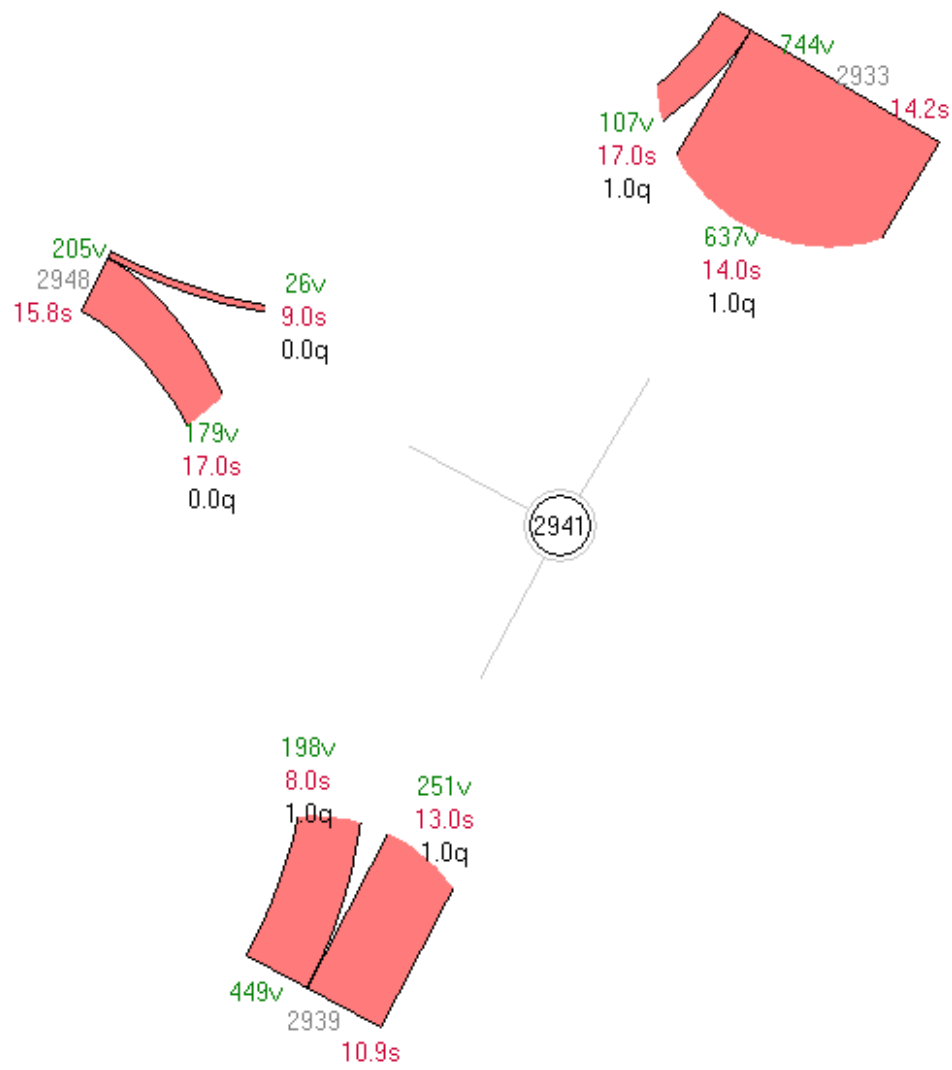


## Argyle Street/Menangle Street

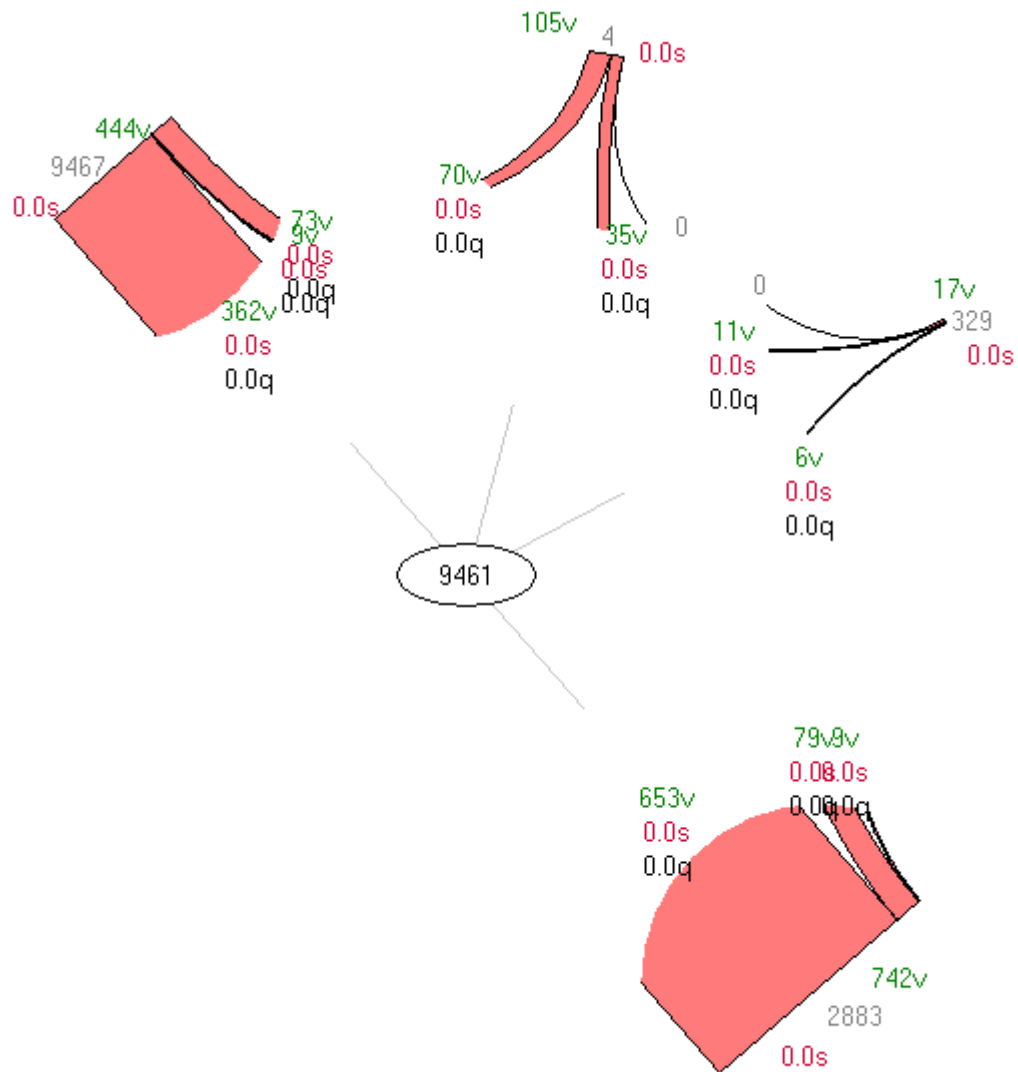




## Argyle Street/Regreme Street



## Menangle Street/Site Access



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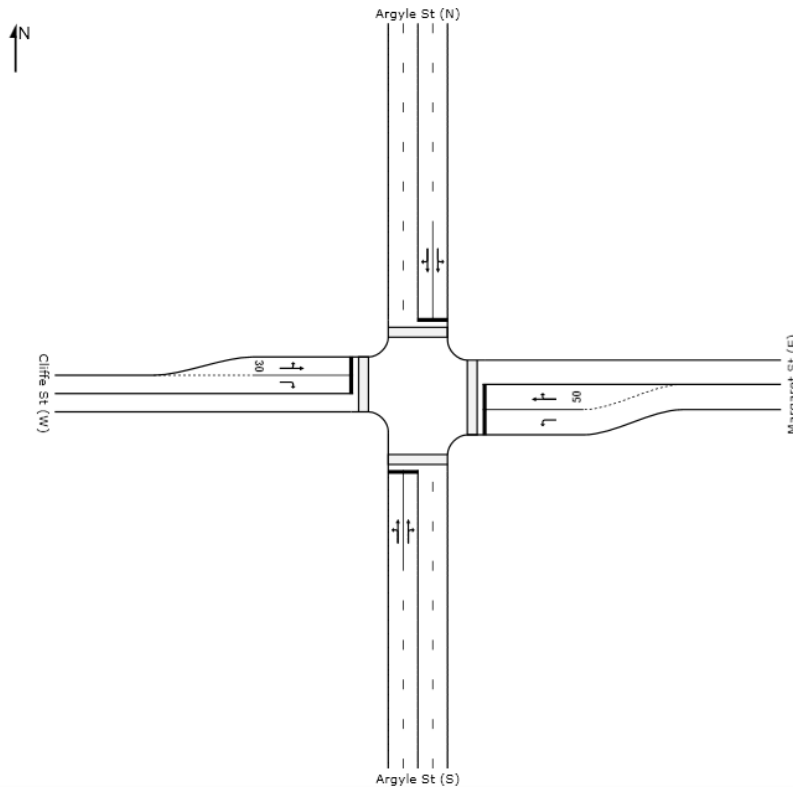
Traffic Impact  
Assessment

APPENDIX D  
SIDRA MODEL  
OUTPUTS

# BASELINE SCENARIO – 2016

## AM PEAK

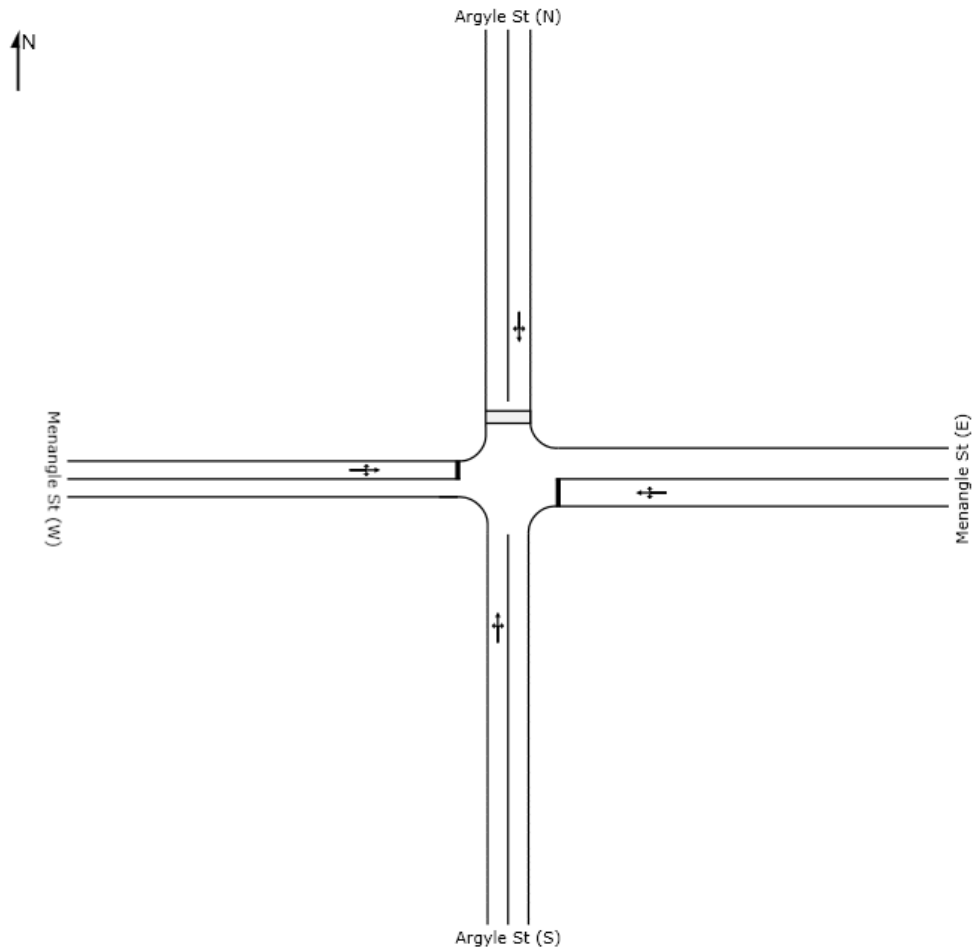
### Argyle St/Margaret St/Cliffe St



#### Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Argyle St (S)											
1	L2	15	2.0	0.449	20.8	LOS B	14.3	104.4	0.62	0.56	35.8
2	T1	523	5.0	0.449	14.8	LOS B	14.3	104.4	0.63	0.58	35.3
3	R2	168	2.0	0.449	24.3	LOS B	8.0	57.5	0.67	0.73	32.1
Approach		706	4.2	0.449	17.2	LOS B	14.3	104.4	0.64	0.62	34.5
East: Margaret St (E)											
4	L2	116	2.0	0.427	54.5	LOS D	5.9	41.7	0.96	0.78	21.6
5	T1	5	2.0	0.209	46.3	LOS D	2.8	19.7	0.93	0.74	22.1
6	R2	52	2.0	0.209	52.8	LOS D	2.8	19.7	0.93	0.74	22.1
Approach		173	2.0	0.427	53.8	LOS D	5.9	41.7	0.95	0.77	21.8
North: Argyle St (N)											
7	L2	57	2.0	0.189	18.3	LOS B	5.0	36.4	0.51	0.54	36.8
8	T1	322	5.0	0.189	12.5	LOS A	5.0	36.4	0.52	0.49	36.9
9	R2	5	2.0	0.189	19.3	LOS B	4.9	35.5	0.53	0.46	36.9
Approach		384	4.5	0.189	13.4	LOS A	5.0	36.4	0.52	0.50	36.9
West: Cliffe St (W)											
10	L2	5	2.0	0.038	51.1	LOS D	0.5	3.3	0.89	0.65	9.7
11	T1	5	2.0	0.038	44.7	LOS D	0.5	3.3	0.89	0.65	9.7
12	R2	10	2.0	0.039	51.3	LOS D	0.5	3.3	0.89	0.68	9.4
Approach		20	2.0	0.039	49.6	LOS D	0.5	3.3	0.89	0.66	9.5
All Vehicles		1283	4.0	0.449	21.5	LOS B	14.3	104.4	0.65	0.60	32.2

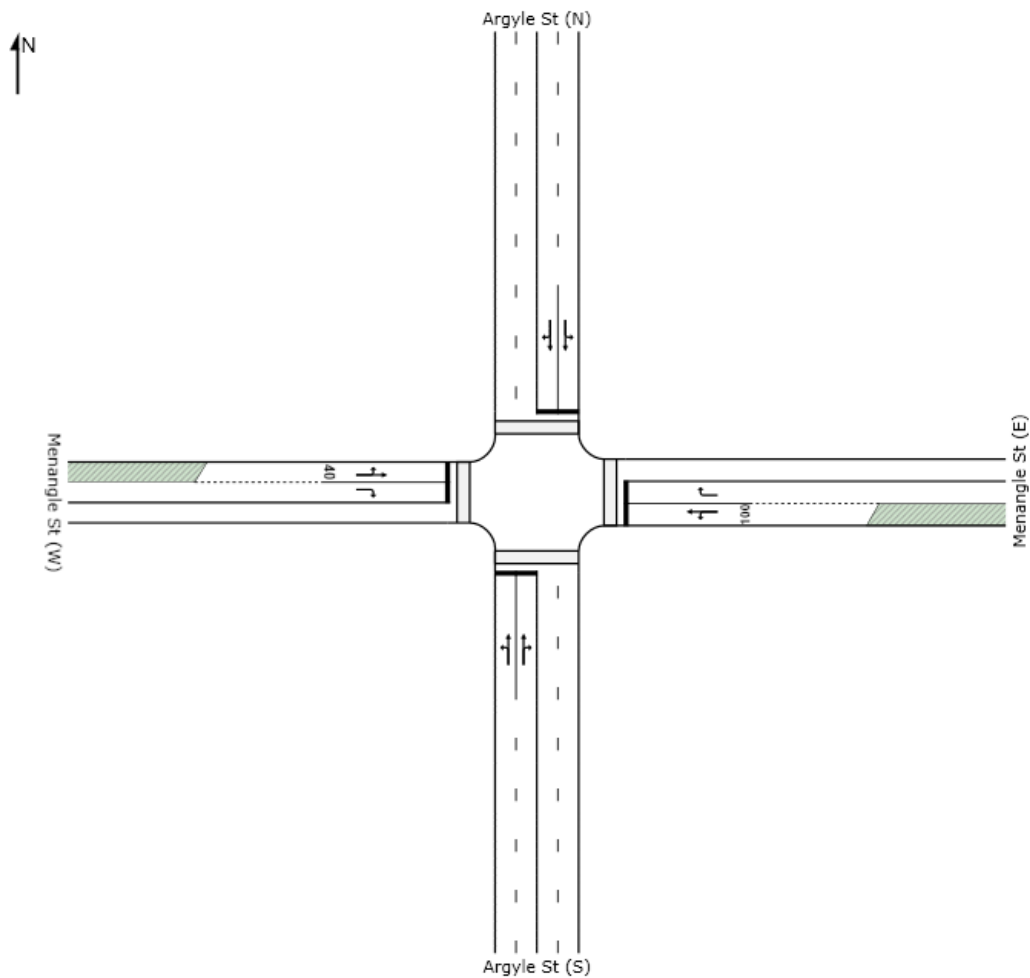
## Argyle St/Menangle St



Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows Total veh/h	Deg. Satn HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Argyle St (S)											
1	L2	27	2.0	0.770	16.5	LOS B	17.8	128.7	1.00	0.57	36.9
2	T1	676	5.0	0.770	10.1	LOS A	17.8	128.7	1.00	0.57	36.9
3	R2	430	2.0	0.770	15.9	LOS B	17.8	128.7	1.00	0.57	36.9
Approach		1133	3.8	0.770	12.5	NA	17.8	128.7	1.00	0.57	36.9
East: Menangle St (E)											
4	L2	114	2.0	1.197	448.0	LOS F	48.6	345.9	1.00	6.37	4.2
5	T1	8	2.0	1.197	447.6	LOS F	48.6	345.9	1.00	6.37	4.2
6	R2	74	2.0	1.197	447.9	LOS F	48.6	345.9	1.00	6.37	4.2
Approach		196	2.0	1.197	448.0	LOS F	48.6	345.9	1.00	6.37	4.2
North: Argyle St (N)											
7	L2	83	2.0	0.260	10.8	LOS A	3.2	23.3	0.76	0.06	41.2
8	T1	385	5.0	0.260	5.2	LOS A	3.2	23.3	0.76	0.06	41.2
9	R2	11	2.0	0.260	11.9	LOS A	3.2	23.3	0.76	0.06	41.2
Approach		479	4.4	0.260	6.3	NA	3.2	23.3	0.76	0.06	41.2
West: Menangle St (W)											
10	L2	12	2.0	0.504	66.8	LOS E	1.6	11.4	0.95	1.08	12.1
11	T1	12	2.0	0.504	65.7	LOS E	1.6	11.4	0.95	1.08	12.1
12	R2	20	2.0	0.504	66.6	LOS E	1.6	11.4	0.95	1.08	12.1
Approach		44	2.0	0.504	66.4	LOS E	1.6	11.4	0.95	1.08	12.1
All Vehicles		1852	3.7	1.197	58.2	NA	48.6	345.9	0.94	1.06	19.9

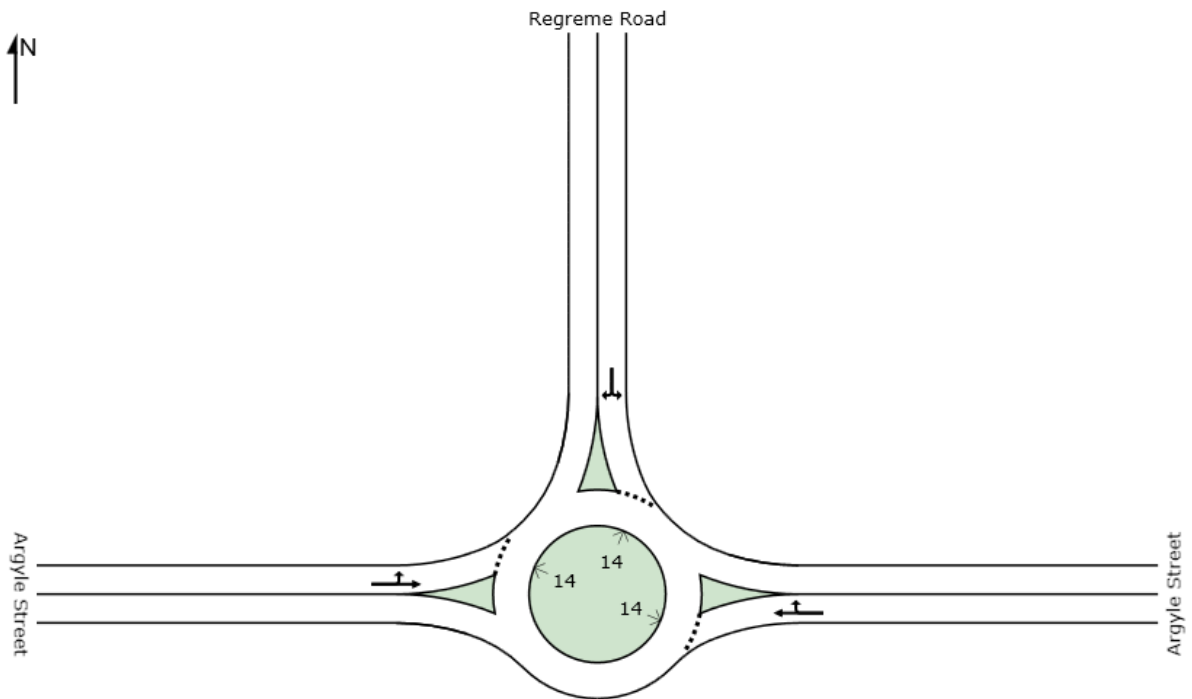


## Argyle St/Menangle St (Proposed Signalised Layout)



Movement Performance - Vehicles										
Mov ID	ODMo v	Demand Flows Total veh/h	Deg. Satn HV %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Argyle St (S)										
1	L2	27	2.0	0.496	LOS A	15.1	109.8	0.45	0.43	42.0
2	T1	676	5.0	0.496	LOS A	15.1	109.8	0.46	0.44	41.7
3	R2	430	2.0	0.496	LOS B	14.2	101.5	0.71	0.87	31.9
Approach		1133	3.8	0.496	LOS A	15.1	109.8	0.55	0.60	37.4
East: Menangle St (E)										
4	L2	114	2.0	0.425	LOS D	6.1	43.2	0.95	0.79	20.3
5	T1	8	2.0	0.425	LOS D	6.1	43.2	0.95	0.79	20.3
6	R2	74	2.0	0.359	LOS D	3.7	26.5	0.94	0.77	20.0
Approach		196	2.0	0.425	LOS D	6.1	43.2	0.95	0.78	20.2
North: Argyle St (N)										
7	L2	83	2.0	0.475	LOS C	11.4	82.9	0.87	0.77	25.7
8	T1	385	5.0	0.475	LOS C	11.4	82.9	0.88	0.76	25.6
9	R2	11	2.0	0.475	LOS D	10.1	73.4	0.89	0.75	25.4
Approach		479	4.4	0.475	LOS C	11.4	82.9	0.88	0.76	25.6
West: Menangle St (W)										
10	L2	12	2.0	0.083	LOS D	1.1	7.9	0.89	0.69	14.9
11	T1	12	2.0	0.083	LOS D	1.1	7.9	0.89	0.69	14.9
12	R2	20	2.0	0.140	LOS E	1.0	7.3	0.94	0.71	13.5
Approach		44	2.0	0.140	LOS D	1.1	7.9	0.91	0.70	14.2
All Vehicles		1852	3.7	0.496	LOS B	15.1	109.8	0.69	0.66	30.3

## Argyle St/Regreme Rd



Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
East: Argyle Street											
5	T1	191	5.0	0.187	7.0	LOS A	1.1	8.0	0.37	1.10	48.7
6	R2	19	2.0	0.187	11.8	LOS B	1.1	8.0	0.37	1.10	48.7
Approach		210	4.7	0.187	7.4	LOS A	1.1	8.0	0.37	0.55	48.7
North: Regreme Road											
7	L2	74	2.0	0.233	9.5	LOS A	1.3	9.2	0.56	1.49	45.2
9	R2	144	2.0	0.233	13.4	LOS B	1.3	9.2	0.56	1.49	45.2
Approach		218	2.0	0.233	12.1	LOS B	1.3	9.2	0.56	0.74	45.2
West: Argyle Street											
10	L2	118	2.0	0.332	7.1	LOS A	2.3	16.9	0.13	0.99	50.3
11	T1	389	5.0	0.332	6.2	LOS A	2.3	16.9	0.13	0.99	50.3
Approach		507	4.3	0.332	6.4	LOS A	2.3	16.9	0.13	0.49	50.3
All Vehicles		935	3.9	0.332	8.0	LOS A	2.3	16.9	0.28	0.56	48.6

## PM PEAK

### Argyle St/Margaret St/Cliffe St

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
South: Argyle St (S)											
1	L2	5	2.0	0.367	24.9	LOS B	10.8	79.1	0.66	0.58	33.4
2	T1	324	5.0	0.367	18.5	LOS B	10.8	79.1	0.66	0.58	33.4
3	R2	129	2.0	0.452	33.8	LOS C	5.3	37.7	0.79	0.79	27.6
Approach		458	4.1	0.452	22.9	LOS B	10.8	79.1	0.70	0.64	31.5
East: Margaret St (E)											
4	L2	201	2.0	0.462	47.1	LOS D	9.5	67.5	0.92	0.81	23.4
5	T1	5	2.0	0.160	37.6	LOS C	3.0	21.7	0.85	0.75	24.3
6	R2	65	2.0	0.160	44.0	LOS D	3.0	21.7	0.85	0.75	24.3
Approach		271	2.0	0.462	46.2	LOS D	9.5	67.5	0.90	0.79	23.6
North: Argyle St (N)											
7	L2	60	2.0	0.332	24.5	LOS B	9.6	69.9	0.65	0.62	33.2
8	T1	522	5.0	0.332	18.4	LOS B	9.6	69.9	0.65	0.59	33.2
9	R2	5	2.0	0.332	25.1	LOS B	9.5	69.0	0.66	0.57	33.3
Approach		587	4.7	0.332	19.1	LOS B	9.6	69.9	0.65	0.60	33.2
West: Cliffe St (W)											
10	L2	5	2.0	0.038	51.1	LOS D	0.5	3.3	0.89	0.65	9.7
11	T1	5	2.0	0.038	44.7	LOS D	0.5	3.3	0.89	0.65	9.7
12	R2	5	2.0	0.020	51.0	LOS D	0.2	1.7	0.89	0.65	9.4
Approach		15	2.0	0.038	48.9	LOS D	0.5	3.3	0.89	0.65	9.6
All Vehicles		1331	3.9	0.462	26.3	LOS B	10.8	79.1	0.72	0.65	29.9

### Argyle St/Menangle St

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Argyle St (S)											
1	L2	8	2.0	0.389	14.0	LOS A	5.0	36.6	0.95	0.27	39.2
2	T1	392	5.0	0.389	7.6	LOS A	5.0	36.6	0.95	0.27	39.2
3	R2	125	2.0	0.389	14.1	LOS A	5.0	36.6	0.95	0.27	39.2
Approach		525	4.2	0.389	9.2	NA	5.0	36.6	0.95	0.27	39.2
East: Menangle St (E)											
4	L2	378	2.0	1.306	584.4	LOS F	144.8	1030.7	1.00	10.28	3.3
5	T1	7	2.0	1.306	584.0	LOS F	144.8	1030.7	1.00	10.28	3.3
6	R2	79	2.0	1.306	584.3	LOS F	144.8	1030.7	1.00	10.28	3.3
Approach		464	2.0	1.306	584.4	LOS F	144.8	1030.7	1.00	10.28	3.3
North: Argyle St (N)											
7	L2	75	2.0	0.402	9.4	LOS A	4.8	35.3	0.66	0.04	42.5
8	T1	683	5.0	0.402	2.9	LOS A	4.8	35.3	0.66	0.04	42.5
9	R2	6	2.0	0.402	9.7	LOS A	4.8	35.3	0.66	0.04	42.5
Approach		764	4.7	0.402	3.6	NA	4.8	35.3	0.66	0.04	42.5
West: Menangle St (W)											
10	L2	5	2.0	0.114	29.3	LOS C	0.3	2.4	0.83	0.97	21.7
11	T1	5	2.0	0.114	28.9	LOS C	0.3	2.4	0.83	0.97	21.7
12	R2	9	2.0	0.114	29.2	LOS C	0.3	2.4	0.83	0.97	21.7
Approach		19	2.0	0.114	29.2	LOS C	0.3	2.4	0.83	0.97	21.7
All Vehicles		1772	3.8	1.306	157.6	NA	144.8	1030.7	0.83	2.80	10.3

## Argyle St/Menangle St (Proposed Signalised Layout)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows Total veh/h	Deg. Satn HV %	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed	
			v/c			Vehicles veh	Distance m			km/h	
South: Argyle St (S)											
1	L2	8	2.0	0.407	23.6	LOS B	12.9	94.0	0.65	0.58	34.1
2	T1	392	5.0	0.407	17.3	LOS B	12.9	94.0	0.66	0.58	34.1
3	R2	125	2.0	0.407	36.4	LOS C	5.6	40.0	0.87	0.80	25.9
Approach		525	4.2	0.407	21.9	LOS B	12.9	94.0	0.71	0.63	31.7
East: Menangle St (E)											
4	L2	378	2.0	0.558	34.7	LOS C	16.3	116.3	0.85	0.82	24.3
5	T1	7	2.0	0.558	29.4	LOS C	16.3	116.3	0.85	0.82	24.3
6	R2	79	2.0	0.167	30.4	LOS C	2.8	20.3	0.70	0.74	25.6
Approach		464	2.0	0.558	33.8	LOS C	16.3	116.3	0.82	0.81	24.5
North: Argyle St (N)											
7	L2	75	2.0	0.543	34.1	LOS C	16.2	117.9	0.83	0.75	28.2
8	T1	683	5.0	0.543	28.8	LOS C	16.2	117.9	0.84	0.74	28.3
9	R2	6	2.0	0.543	35.6	LOS C	15.8	115.3	0.84	0.73	28.3
Approach		764	4.7	0.543	29.4	LOS C	16.2	117.9	0.84	0.74	28.2
West: Menangle St (W)											
10	L2	5	2.0	0.014	29.3	LOS C	0.3	2.4	0.65	0.60	21.3
11	T1	5	2.0	0.014	24.1	LOS B	0.3	2.4	0.65	0.60	21.3
12	R2	9	2.0	0.043	44.7	LOS D	0.4	2.8	0.82	0.69	16.1
Approach		19	2.0	0.043	35.3	LOS C	0.4	2.8	0.73	0.64	18.4
All Vehicles		1772	3.8	0.558	28.4	LOS B	16.3	117.9	0.79	0.73	27.9

## Argyle St/Regreme Rd

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows Total veh/h	Deg. Satn HV %	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed	
			v/c			Vehicles veh	Distance m			km/h	
East: Argyle Street											
5	T1	418	5.0	0.424	7.2	LOS A	3.1	22.5	0.45	1.17	47.9
6	R2	87	2.0	0.424	12.0	LOS B	3.1	22.5	0.45	1.17	47.9
Approach		505	4.5	0.424	8.0	LOS A	3.1	22.5	0.45	0.58	47.9
North: Regreme Road											
7	L2	22	2.0	0.157	8.2	LOS A	0.8	6.0	0.41	1.36	45.4
9	R2	147	2.0	0.157	12.1	LOS B	0.8	6.0	0.41	1.36	45.4
Approach		169	2.0	0.157	11.6	LOS B	0.8	6.0	0.41	0.68	45.4
West: Argyle Street											
10	L2	163	2.0	0.287	7.5	LOS A	1.9	13.5	0.30	1.05	49.1
11	T1	205	5.0	0.287	6.6	LOS A	1.9	13.5	0.30	1.05	49.1
Approach		368	3.7	0.287	7.0	LOS A	1.9	13.5	0.30	0.53	49.1
All Vehicles		1042	3.8	0.424	8.2	LOS A	3.1	22.5	0.39	0.58	47.9

# BASELINE SCENARIO – 2026

## AM PEAK

### Argyle St/Margaret St/Cliffe St

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows Total	Deg. Satn HV	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed	
		veh/h	%	v/c	sec	veh	m		per veh	km/h	
South: Argyle St (S)											
1	L2	22	2.0	0.625	23.0	LOS B	23.1	168.5	0.72	0.66	34.3
2	T1	633	5.0	0.625	16.6	LOS B	23.1	168.5	0.72	0.66	34.3
3	R2	238	2.0	0.625	28.9	LOS C	9.6	68.6	0.79	0.82	29.5
Approach		893	4.1	0.625	20.1	LOS B	23.1	168.5	0.74	0.70	32.9
East: Margaret St (E)											
4	L2	162	2.0	0.596	55.9	LOS D	8.4	59.9	0.99	0.81	21.3
5	T1	5	2.0	0.257	46.7	LOS D	3.4	24.4	0.93	0.76	21.9
6	R2	65	2.0	0.257	53.2	LOS D	3.4	24.4	0.93	0.76	21.9
Approach		232	2.0	0.596	54.9	LOS D	8.4	59.9	0.97	0.79	21.5
North: Argyle St (N)											
7	L2	74	2.0	0.236	18.7	LOS B	6.5	46.9	0.53	0.56	36.5
8	T1	394	5.0	0.236	13.4	LOS A	6.5	46.9	0.55	0.52	36.2
9	R2	5	2.0	0.236	20.8	LOS B	6.3	46.0	0.57	0.49	35.9
Approach		473	4.5	0.236	14.3	LOS A	6.5	46.9	0.55	0.53	36.2
West: Cliffe St (W)											
10	L2	5	2.0	0.038	51.1	LOS D	0.5	3.3	0.89	0.65	9.7
11	T1	5	2.0	0.038	44.7	LOS D	0.5	3.3	0.89	0.65	9.7
12	R2	15	2.0	0.059	51.6	LOS D	0.7	5.0	0.90	0.69	9.3
Approach		25	2.0	0.059	50.1	LOS D	0.7	5.0	0.90	0.68	9.5
All Vehicles		1623	3.9	0.625	23.8	LOS B	23.1	168.5	0.72	0.66	31.0

### Argyle St/Menangle St (Proposed Signalised Layout)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows	Deg. Satn	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
		Total veh/h	HV %			v/c	Vehicles veh				Distance m
South: Argyle St (S)											
1	L2	36	2.0	0.633	13.5	LOS A	22.6	164.8	0.52	0.50	41.1
2	T1	854	5.0	0.633	7.1	LOS A	22.6	164.8	0.52	0.50	41.1
3	R2	663	2.0	0.771	32.3	LOS C	23.7	168.5	0.90	1.03	27.4
Approach		1553	3.6	0.771	18.0	LOS B	23.7	168.5	0.68	0.73	34.0
East: Menangle St (E)											
4	L2	146	2.0	0.581	53.9	LOS D	8.1	57.7	0.98	0.80	19.8
5	T1	11	2.0	0.581	48.6	LOS D	8.1	57.7	0.98	0.80	19.8
6	R2	104	2.0	0.545	55.4	LOS D	5.5	38.8	0.98	0.79	19.5
Approach		261	2.0	0.581	54.3	LOS D	8.1	57.7	0.98	0.80	19.7
North: Argyle St (N)											
7	L2	111	2.0	0.675	43.6	LOS D	17.1	123.6	0.95	0.83	24.7
8	T1	489	5.0	0.675	41.1	LOS C	17.1	123.6	0.96	0.83	24.0
9	R2	15	2.0	0.675	50.6	LOS D	13.1	95.7	0.98	0.83	23.3
Approach		615	4.4	0.675	41.8	LOS C	17.1	123.6	0.96	0.83	24.1
West: Menangle St (W)											
10	L2	16	2.0	0.114	51.0	LOS D	1.5	10.4	0.90	0.70	14.6
11	T1	15	2.0	0.114	45.9	LOS D	1.5	10.4	0.90	0.70	14.6



12	R2	26	2.0	0.234	61.6	LOS E	1.4	10.0	0.98	0.72	12.8
Approach		57	2.0	0.234	54.5	LOS D	1.5	10.4	0.94	0.71	13.7
All Vehicles		2486	3.6	0.771	28.5	LOS C	23.7	168.5	0.79	0.76	28.3

## Argyle St/Regreme Rd

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
East: Argyle Street											
5	T1	228	5.0	0.231	7.2	LOS A	1.4	10.4	0.43	1.15	48.3
6	R2	23	2.0	0.231	12.0	LOS B	1.4	10.4	0.43	1.15	48.3
Approach		251	4.7	0.231	7.6	LOS A	1.4	10.4	0.43	0.57	48.3
North: Regreme Road											
7	L2	90	2.0	0.300	10.1	LOS B	1.8	12.6	0.63	1.57	44.6
9	R2	175	2.0	0.300	14.1	LOS B	1.8	12.6	0.63	1.57	44.6
Approach		265	2.0	0.300	12.8	LOS B	1.8	12.6	0.63	0.79	44.6
West: Argyle Street											
10	L2	143	2.0	0.396	7.1	LOS A	3.1	22.3	0.16	0.98	50.1
11	T1	459	5.0	0.396	6.3	LOS A	3.1	22.3	0.16	0.98	50.1
Approach		602	4.3	0.396	6.5	LOS A	3.1	22.3	0.16	0.49	50.1
All Vehicles		1118	3.8	0.396	8.2	LOS A	3.1	22.3	0.33	0.58	48.3

## PM PEAK

### Argyle St/Margaret St/Cliffe St

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Total	Flows HV	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%				veh	m		per veh	km/h
South: Argyle St (S)											
1	L2	5	2.0	0.437	27.4	LOS B	14.7	107.4	0.69	0.61	32.1
2	T1	388	5.0	0.437	21.0	LOS B	14.7	107.4	0.69	0.61	32.1
3	R2	182	2.0	0.890	78.5	LOS F	14.3	101.5	1.00	1.14	17.3
Approach		575	4.0	0.890	39.3	LOS C	14.7	107.4	0.79	0.78	25.2
East: Margaret St (E)											
4	L2	290	2.0	0.880	64.2	LOS E	18.1	128.9	0.94	0.98	19.6
5	T1	5	2.0	0.178	38.7	LOS C	4.0	28.3	0.83	0.75	24.0
6	R2	81	2.0	0.178	45.1	LOS D	4.0	28.3	0.83	0.75	24.0
Approach		376	2.0	0.880	59.8	LOS E	18.1	128.9	0.92	0.93	20.5
North: Argyle St (N)											
7	L2	72	2.0	0.452	27.6	LOS B	15.4	111.9	0.70	0.66	31.6
8	T1	725	5.0	0.452	21.5	LOS B	15.4	111.9	0.71	0.64	31.6
9	R2	5	2.0	0.452	28.2	LOS B	15.1	110.2	0.71	0.63	31.6
Approach		802	4.7	0.452	22.1	LOS B	15.4	111.9	0.71	0.64	31.6
West: Cliffe St (W)											
10	L2	5	2.0	0.042	56.5	LOS D	0.5	3.7	0.91	0.65	8.9
11	T1	5	2.0	0.042	50.0	LOS D	0.5	3.7	0.91	0.65	8.9
12	R2	8	2.0	0.034	56.5	LOS E	0.4	2.9	0.90	0.67	8.7
Approach		18	2.0	0.042	54.7	LOS D	0.5	3.7	0.91	0.66	8.8
All Vehicles		1771	3.9	0.890	36.0	LOS C	18.1	128.9	0.78	0.75	26.2

### Argyle St/Menangle St (Proposed Signalised Layout)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Total	Flows HV	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%				veh	m		per veh	km/h
South: Argyle St (S)											
1	L2	8	2.0	0.474	21.6	LOS B	15.9	115.9	0.64	0.58	35.3
2	T1	496	5.0	0.474	15.2	LOS B	15.9	115.9	0.64	0.58	35.3
3	R2	159	2.0	0.630	46.7	LOS D	8.3	58.9	1.00	0.91	22.8
Approach		663	4.2	0.630	22.8	LOS B	15.9	115.9	0.73	0.66	31.3
East: Menangle St (E)											
4	L2	546	2.0	0.669	30.5	LOS C	23.2	165.1	0.84	0.84	25.6
5	T1	8	2.0	0.669	25.2	LOS B	23.2	165.1	0.84	0.84	25.6
6	R2	104	2.0	0.248	34.9	LOS C	4.1	29.4	0.77	0.76	24.2
Approach		658	2.0	0.669	31.1	LOS C	23.2	165.1	0.83	0.83	25.3
North: Argyle St (N)											
7	L2	100	2.0	0.668	32.1	LOS C	23.3	169.1	0.86	0.79	29.0
8	T1	971	5.0	0.668	26.8	LOS B	23.3	169.1	0.86	0.78	29.1
9	R2	7	2.0	0.668	33.5	LOS C	22.7	165.8	0.86	0.77	29.1
Approach		1078	4.7	0.668	27.3	LOS B	23.3	169.1	0.86	0.78	29.1
West: Menangle St (W)											
10	L2	5	2.0	0.016	32.8	LOS C	0.4	2.5	0.70	0.61	19.8
11	T1	5	2.0	0.016	27.7	LOS B	0.4	2.5	0.70	0.61	19.8
12	R2	9	2.0	0.050	44.2	LOS D	0.4	2.8	0.82	0.69	16.2
Approach		19	2.0	0.050	36.9	LOS C	0.4	2.8	0.75	0.65	17.9
All Vehicles		2418	3.8	0.669	27.2	LOS B	23.3	169.1	0.81	0.76	28.4

## Argyle St/Regreme Rd

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
East: Argyle Street											
5	T1	594	5.0	0.602	7.8	LOS A	5.5	39.9	0.61	1.25	47.2
6	R2	107	2.0	0.602	12.6	LOS B	5.5	39.9	0.61	1.25	47.2
Approach		701	4.5	0.602	8.5	LOS A	5.5	39.9	0.61	0.62	47.2
North: Regreme Road											
7	L2	26	2.0	0.197	8.5	LOS A	1.1	7.9	0.47	1.39	45.1
9	R2	177	2.0	0.197	12.4	LOS B	1.1	7.9	0.47	1.39	45.1
Approach		203	2.0	0.197	11.9	LOS B	1.1	7.9	0.47	0.70	45.1
West: Argyle Street											
10	L2	196	2.0	0.355	7.7	LOS A	2.6	18.5	0.37	1.08	48.7
11	T1	247	5.0	0.355	6.8	LOS A	2.6	18.5	0.37	1.08	48.7
Approach		443	3.7	0.355	7.2	LOS A	2.6	18.5	0.37	0.54	48.7
All Vehicles		1347	3.9	0.602	8.6	LOS A	5.5	39.9	0.51	0.61	47.3

# BASE plus DEVELOPMENT SCENARIO – 2016

## AM PEAK

### Argyle St/Margaret St/Cliffe St

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows	Deg. Satn	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
		Total veh/h	HV %			Vehicles veh	Distance m				
South: Argyle St (S)											
1	L2	15	2.0	0.467	22.1	LOS B	15.1	110.0	0.65	0.58	35.0
2	T1	517	5.0	0.467	16.2	LOS B	15.1	110.0	0.65	0.60	34.5
3	R2	166	2.0	0.467	26.4	LOS B	8.1	57.8	0.71	0.75	31.1
Approach		698	4.2	0.467	18.7	LOS B	15.1	110.0	0.67	0.64	33.6
East: Margaret St (E)											
4	L2	140	2.0	0.455	52.9	LOS D	7.0	49.7	0.96	0.79	22.0
5	T1	5	2.0	0.330	45.4	LOS D	5.0	35.4	0.93	0.77	22.2
6	R2	97	2.0	0.330	51.9	LOS D	5.0	35.4	0.93	0.77	22.2
Approach		242	2.0	0.455	52.4	LOS D	7.0	49.7	0.95	0.79	22.1
North: Argyle St (N)											
7	L2	75	2.0	0.210	19.0	LOS B	5.6	40.4	0.53	0.57	36.1
8	T1	333	5.0	0.210	13.5	LOS A	5.6	40.4	0.54	0.52	36.1
9	R2	5	2.0	0.210	20.5	LOS B	5.5	40.1	0.56	0.48	36.1
Approach		413	4.4	0.210	14.6	LOS B	5.6	40.4	0.54	0.53	36.1
West: Cliffe St (W)											
10	L2	10	2.0	0.058	51.4	LOS D	0.7	5.0	0.90	0.68	9.6
11	T1	5	2.0	0.058	45.0	LOS D	0.7	5.0	0.90	0.68	9.6
12	R2	11	2.0	0.043	51.4	LOS D	0.5	3.7	0.90	0.68	9.4
Approach		26	2.0	0.058	50.2	LOS D	0.7	5.0	0.90	0.68	9.5
All Vehicles		1379	3.8	0.467	24.0	LOS B	15.1	110.0	0.68	0.63	31.0

### Argyle St/Menangle St (Proposed Signalised Layout)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows Total veh/h	Deg. Satn HV %	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Argyle St (S)											
1	L2	15	2.0	0.467	22.1	LOS B	15.1	110.0	0.65	0.58	35.0
2	T1	517	5.0	0.467	16.2	LOS B	15.1	110.0	0.65	0.60	34.5
3	R2	166	2.0	0.467	26.4	LOS B	8.1	57.8	0.71	0.75	31.1
Approach		698	4.2	0.467	18.7	LOS B	15.1	110.0	0.67	0.64	33.6
East: Margaret St (E)											
4	L2	140	2.0	0.455	52.9	LOS D	7.0	49.7	0.96	0.79	22.0
5	T1	5	2.0	0.330	45.4	LOS D	5.0	35.4	0.93	0.77	22.2
6	R2	97	2.0	0.330	51.9	LOS D	5.0	35.4	0.93	0.77	22.2
Approach		242	2.0	0.455	52.4	LOS D	7.0	49.7	0.95	0.79	22.1
North: Argyle St (N)											
7	L2	75	2.0	0.210	19.0	LOS B	5.6	40.4	0.53	0.57	36.1
8	T1	333	5.0	0.210	13.5	LOS A	5.6	40.4	0.54	0.52	36.1
9	R2	5	2.0	0.210	20.5	LOS B	5.5	40.1	0.56	0.48	36.1
Approach		413	4.4	0.210	14.6	LOS B	5.6	40.4	0.54	0.53	36.1
West: Cliffe St (W)											
10	L2	10	2.0	0.058	51.4	LOS D	0.7	5.0	0.90	0.68	9.6
11	T1	5	2.0	0.058	45.0	LOS D	0.7	5.0	0.90	0.68	9.6

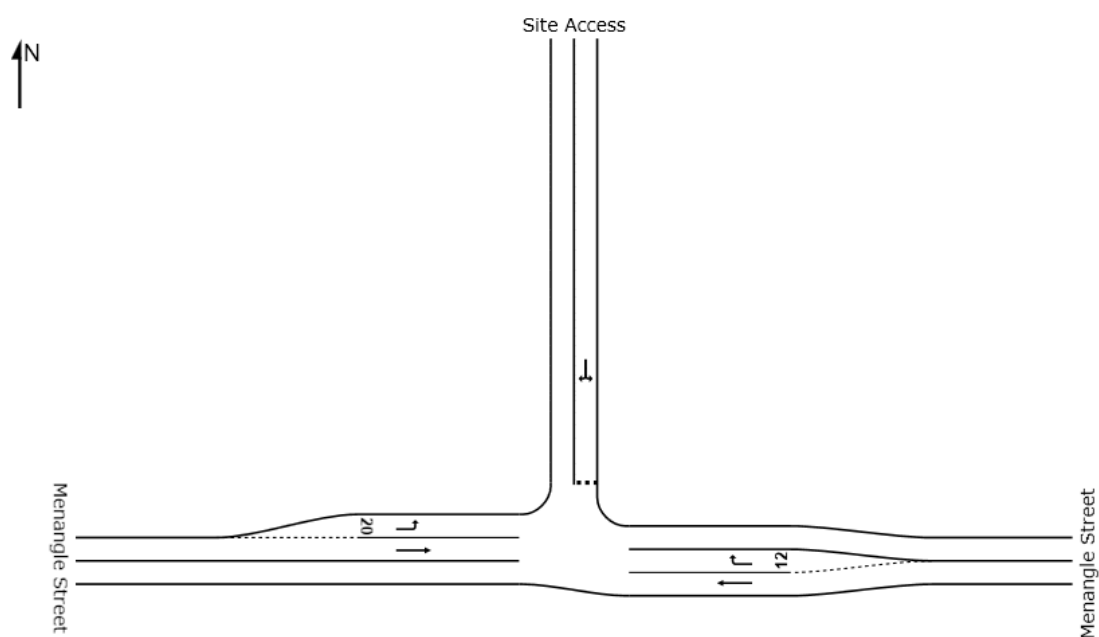
12	R2	11	2.0	0.043	51.4	LOS D	0.5	3.7	0.90	0.68	9.4
Approach		26	2.0	0.058	50.2	LOS D	0.7	5.0	0.90	0.68	9.5
All Vehicles		1379	3.8	0.467	24.0	LOS B	15.1	110.0	0.68	0.63	31.0

## Argyle St/Regreme Rd

### Movement Performance - Vehicles

Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
East: Argyle Street											
5	T1	198	5.0	0.193	7.0	LOS A	1.1	8.3	0.38	1.10	48.7
6	R2	18	2.0	0.193	11.8	LOS B	1.1	8.3	0.38	1.10	48.7
Approach		216	4.8	0.193	7.4	LOS A	1.1	8.3	0.38	0.55	48.7
North: Regreme Road											
7	L2	74	2.0	0.241	9.7	LOS A	1.3	9.6	0.58	1.51	45.0
9	R2	146	2.0	0.241	13.6	LOS B	1.3	9.6	0.58	1.51	45.0
Approach		220	2.0	0.241	12.3	LOS B	1.3	9.6	0.58	0.76	45.0
West: Argyle Street											
10	L2	121	2.0	0.350	7.1	LOS A	2.5	18.3	0.13	0.99	50.3
11	T1	418	5.0	0.350	6.2	LOS A	2.5	18.3	0.13	0.99	50.3
Approach		539	4.3	0.350	6.4	LOS A	2.5	18.3	0.13	0.49	50.3
All Vehicles		975	3.9	0.350	8.0	LOS A	2.5	18.3	0.28	0.57	48.6

## Menangle St/Site Access



Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Total	Flows HV	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Menangle Street											
5	T1	244	5.0	0.129	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	25	0.0	0.026	11.0	LOS B	0.1	0.7	0.55	0.73	46.0
Approach		269	4.5	0.129	1.0	NA	0.1	0.7	0.05	0.07	58.3
North: Site Access											
7	L2	2	0.0	0.034	11.7	LOS B	0.1	0.8	0.56	0.80	45.3
9	R2	22	0.0	0.034	11.8	LOS B	0.1	0.8	0.56	0.80	45.3
Approach		24	0.0	0.034	11.8	LOS B	0.1	0.8	0.56	0.80	45.3
West: Menangle Street											
10	L2	67	0.0	0.036	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
11	T1	545	5.0	0.289	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		612	4.5	0.289	0.9	NA	0.0	0.0	0.00	0.07	58.5
All Vehicles		905	4.4	0.289	1.3	NA	0.1	0.8	0.03	0.09	58.0

## PM PEAK

### Argyle St/Margaret St/Cliffe St

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Total	Flows HV	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Argyle St (S)											
1	L2	5	2.0	0.346	24.1	LOS B	10.1	73.9	0.65	0.56	33.9
2	T1	311	5.0	0.346	17.7	LOS B	10.1	73.9	0.65	0.56	33.9
3	R2	124	2.0	0.450	33.8	LOS C	5.1	36.3	0.78	0.79	27.6
Approach		440	4.1	0.450	22.3	LOS B	10.1	73.9	0.69	0.63	31.8
East: Margaret St (E)											
4	L2	190	2.0	0.456	47.8	LOS D	9.0	64.2	0.92	0.81	23.2
5	T1	5	2.0	0.215	39.0	LOS C	4.0	28.6	0.87	0.76	23.9
6	R2	85	2.0	0.215	45.5	LOS D	4.0	28.6	0.87	0.76	23.9
Approach		280	2.0	0.456	46.9	LOS D	9.0	64.2	0.91	0.79	23.4
North: Argyle St (N)											
7	L2	102	2.0	0.347	24.1	LOS B	10.2	74.0	0.65	0.65	33.1
8	T1	509	5.0	0.347	18.4	LOS B	10.2	74.0	0.66	0.61	33.1
9	R2	9	2.0	0.347	25.3	LOS B	10.0	72.6	0.66	0.58	33.1
Approach		620	4.5	0.347	19.4	LOS B	10.2	74.0	0.66	0.62	33.1
West: Cliffe St (W)											
10	L2	5	2.0	0.038	51.1	LOS D	0.5	3.3	0.89	0.65	9.7
11	T1	5	2.0	0.038	44.7	LOS D	0.5	3.3	0.89	0.65	9.7
12	R2	5	2.0	0.020	51.0	LOS D	0.2	1.7	0.89	0.65	9.4
Approach		15	2.0	0.038	48.9	LOS D	0.5	3.3	0.89	0.65	9.6
All Vehicles		1355	3.8	0.456	26.4	LOS B	10.2	74.0	0.72	0.66	29.9



## Argyle St/Menangle St (Proposed Signalised Layout)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
South: Argyle St (S)											
1	L2	7	2.0	0.427	26.2	LOS B	13.4	98.0	0.70	0.62	32.6
2	T1	381	5.0	0.427	19.8	LOS B	13.4	98.0	0.70	0.62	32.6
3	R2	192	2.0	0.629	46.0	LOS D	9.6	68.2	0.99	0.90	23.0
Approach		580	4.0	0.629	28.5	LOS C	13.4	98.0	0.79	0.71	28.8
East: Menangle St (E)											
4	L2	437	2.0	0.584	32.3	LOS C	18.3	130.6	0.83	0.82	25.0
5	T1	5	2.0	0.584	27.0	LOS B	18.3	130.6	0.83	0.82	25.0
6	R2	77	2.0	0.149	27.5	LOS B	2.6	18.5	0.66	0.73	26.5
Approach		519	2.0	0.584	31.6	LOS C	18.3	130.6	0.81	0.81	25.2
North: Argyle St (N)											
7	L2	74	2.0	0.598	38.3	LOS C	16.9	122.4	0.89	0.79	26.6
8	T1	666	5.0	0.598	32.7	LOS C	16.9	122.4	0.89	0.78	26.8
9	R2	5	2.0	0.598	39.1	LOS C	16.4	119.8	0.89	0.77	26.9
Approach		745	4.7	0.598	33.3	LOS C	16.9	122.4	0.89	0.78	26.8
West: Menangle St (W)											
10	L2	5	2.0	0.013	26.7	LOS B	0.3	2.2	0.61	0.59	22.5
11	T1	5	2.0	0.013	21.5	LOS B	0.3	2.2	0.61	0.59	22.5
12	R2	8	2.0	0.038	43.0	LOS D	0.3	2.4	0.80	0.69	16.5
Approach		18	2.0	0.038	32.5	LOS C	0.3	2.4	0.70	0.63	19.3
All Vehicles		1862	3.7	0.629	31.3	LOS C	18.3	130.6	0.83	0.77	26.8

## Argyle St/Regreme Rd

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
East: Argyle Street											
5	T1	449	5.0	0.450	7.2	LOS A	3.4	24.6	0.47	1.17	47.9
6	R2	86	2.0	0.450	12.1	LOS B	3.4	24.6	0.47	1.17	47.9
Approach		535	4.5	0.450	8.0	LOS A	3.4	24.6	0.47	0.59	47.9
North: Regreme Road											
7	L2	21	2.0	0.160	8.2	LOS A	0.9	6.2	0.42	1.36	45.3
9	R2	150	2.0	0.160	12.2	LOS B	0.9	6.2	0.42	1.36	45.3
Approach		171	2.0	0.160	11.7	LOS B	0.9	6.2	0.42	0.68	45.3
West: Argyle Street											
10	L2	166	2.0	0.294	7.5	LOS A	1.9	14.0	0.30	1.05	49.1
11	T1	212	5.0	0.294	6.6	LOS A	1.9	14.0	0.30	1.05	49.1
Approach		378	3.7	0.294	7.0	LOS A	1.9	14.0	0.30	0.53	49.1
All Vehicles		1084	3.8	0.450	8.2	LOS A	3.4	24.6	0.40	0.58	47.9

## Menangle St/Site Access

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
East: Menangle Street											
5	T1	462	5.0	0.245	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
6	R2	92	0.0	0.071	9.7	LOS A	0.3	2.2	0.42	0.68	47.0
Approach		554	4.2	0.245	1.6	NA	0.3	2.2	0.07	0.11	57.3
North: Site Access											
7	L2	37	0.0	0.140	11.1	LOS B	0.5	3.5	0.46	0.78	45.8
9	R2	73	0.0	0.140	11.2	LOS B	0.5	3.5	0.46	0.78	45.8
Approach		110	0.0	0.140	11.2	LOS B	0.5	3.5	0.46	0.78	45.8
West: Menangle Street											
10	L2	89	0.0	0.048	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
11	T1	258	5.0	0.137	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		347	3.7	0.137	2.1	NA	0.0	0.0	0.00	0.17	56.7
All Vehicles		1011	3.6	0.245	2.8	NA	0.5	3.5	0.09	0.21	55.6

# BASE plus DEVELOPMENT SCENARIO – 2026

## AM PEAK

### Argyle St/Margaret St/Cliffe St

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Argyle St (S)											
1	L2	21	2.0	0.696	24.2	LOS B	27.5	200.5	0.77	0.71	33.6
2	T1	708	5.0	0.696	17.8	LOS B	27.5	200.5	0.77	0.71	33.6
3	R2	238	2.0	0.700	35.6	LOS C	11.1	78.9	0.86	0.87	27.0
Approach		967	4.2	0.700	22.3	LOS B	27.5	200.5	0.79	0.75	31.7
East: Margaret St (E)											
4	L2	184	2.0	0.677	57.2	LOS E	9.8	69.8	1.00	0.84	21.0
5	T1	5	2.0	0.452	48.3	LOS D	6.2	44.4	0.97	0.79	21.6
6	R2	118	2.0	0.452	54.8	LOS D	6.2	44.4	0.97	0.79	21.6
Approach		307	2.0	0.677	56.1	LOS D	9.8	69.8	0.99	0.82	21.2
North: Argyle St (N)											
7	L2	91	2.0	0.267	19.0	LOS B	7.5	54.3	0.54	0.58	36.2
8	T1	423	5.0	0.267	14.6	LOS B	7.5	54.3	0.58	0.55	35.3
9	R2	7	2.0	0.267	22.7	LOS B	7.2	52.6	0.61	0.53	34.7
Approach		521	4.4	0.267	15.5	LOS B	7.5	54.3	0.57	0.56	35.5
West: Cliffe St (W)											
10	L2	11	2.0	0.062	51.4	LOS D	0.8	5.4	0.90	0.68	9.6
11	T1	5	2.0	0.062	45.0	LOS D	0.8	5.4	0.90	0.68	9.6
12	R2	16	2.0	0.063	51.6	LOS D	0.8	5.4	0.90	0.70	9.3
Approach		32	2.0	0.063	50.5	LOS D	0.8	5.4	0.90	0.69	9.4
All Vehicles		1827	3.9	0.700	26.5	LOS B	27.5	200.5	0.76	0.70	29.7

### Argyle St/Menangle St (Proposed Signalised Layout)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
South: Argyle St (S)											
1	L2	35	2.0	1.328	604.7	LOS F	523.9	3783.9	1.00	7.59	3.2
2	T1	928	5.0	1.328	598.3	LOS F	523.9	3783.9	1.00	7.59	3.2
3	R2	676	2.0	1.328	604.1	LOS F	523.9	3783.9	1.00	7.59	3.2
Approach		1639	3.7	1.328	600.8	NA	523.9	3783.9	1.00	7.59	3.2
East: Menangle St (E)											
4	L2	155	2.0	3.100	3847.8	LOS F	240.9	1715.2	1.00	13.97	0.5
5	T1	12	2.0	3.100	3846.4	LOS F	240.9	1715.2	1.00	13.97	0.5
6	R2	109	2.0	3.100	3847.9	LOS F	240.9	1715.2	1.00	13.97	0.5
Approach		276	2.0	3.100	3847.8	LOS F	240.9	1715.2	1.00	13.97	0.5
North: Argyle St (N)											
7	L2	118	2.0	0.367	18.3	LOS B	7.5	54.8	1.00	0.02	35.8
8	T1	545	5.0	0.367	12.7	LOS A	7.5	54.8	1.00	0.02	35.8
9	R2	9	2.0	0.367	19.4	LOS B	7.5	54.8	1.00	0.02	35.8
Approach		672	4.4	0.367	13.7	NA	7.5	54.8	1.00	0.02	35.8
West: Menangle St (W)											
10	L2	10	2.0	1.000	388.3	LOS F	8.5	60.8	1.00	1.38	2.5

11	T1	15	2.0	1.000	386.3	LOS F	8.5	60.8	1.00	1.38	2.5
12	R2	26	2.0	1.000	388.8	LOS F	8.5	60.8	1.00	1.38	2.5
Approach		51	2.0	1.000	388.0	LOS F	8.5	60.8	1.00	1.38	2.5
All Vehicles		2638	3.7	3.100	786.9	NA	523.9	3783.9	1.00	6.21	2.4

## Argyle St/Regreme Rd

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
South: Argyle St (S)											
1	L2	35	2.0	0.685	14.1	LOS A	26.4	192.5	0.57	0.54	40.6
2	T1	928	5.0	0.685	7.7	LOS A	26.4	192.5	0.57	0.54	40.6
3	R2	676	2.0	0.815	37.2	LOS C	27.2	193.4	0.93	1.08	25.6
Approach		1639	3.7	0.815	20.0	LOS B	27.2	193.4	0.72	0.76	32.9
East: Menangle St (E)											
4	L2	155	2.0	0.618	54.3	LOS D	8.7	61.9	0.99	0.81	19.8
5	T1	12	2.0	0.618	49.0	LOS D	8.7	61.9	0.99	0.81	19.8
6	R2	109	2.0	0.559	55.5	LOS D	5.7	40.8	0.98	0.80	19.5
Approach		276	2.0	0.618	54.6	LOS D	8.7	61.9	0.99	0.81	19.7
North: Argyle St (N)											
7	L2	118	2.0	0.658	42.0	LOS C	17.4	125.8	0.93	0.82	25.2
8	T1	545	5.0	0.658	38.7	LOS C	17.4	125.8	0.94	0.82	24.7
9	R2	9	2.0	0.658	47.1	LOS D	14.8	107.9	0.96	0.82	24.3
Approach		672	4.4	0.658	39.4	LOS C	17.4	125.8	0.94	0.82	24.8
West: Menangle St (W)											
10	L2	10	2.0	0.092	50.8	LOS D	1.2	8.4	0.90	0.69	14.6
11	T1	15	2.0	0.092	45.6	LOS D	1.2	8.4	0.90	0.69	14.6
12	R2	26	2.0	0.248	62.8	LOS E	1.4	10.1	0.98	0.72	12.6
Approach		51	2.0	0.248	55.4	LOS D	1.4	10.1	0.94	0.70	13.5
All Vehicles		2638	3.7	0.815	29.2	LOS C	27.2	193.4	0.81	0.78	28.1

## Menangle St/Site Access

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
East: Menangle Street											
5	T1	334	5.0	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	26	0.0	0.038	12.8	LOS B	0.1	1.0	0.63	0.82	44.3
Approach		360	4.6	0.177	0.9	NA	0.1	1.0	0.05	0.06	58.5
North: Site Access											
7	L2	2	0.0	0.052	14.6	LOS B	0.2	1.2	0.71	0.91	42.6
9	R2	22	0.0	0.052	14.7	LOS B	0.2	1.2	0.71	0.91	42.6
Approach		24	0.0	0.052	14.7	LOS B	0.2	1.2	0.71	0.91	42.6
West: Menangle Street											
10	L2	65	0.0	0.035	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
11	T1	765	5.0	0.405	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		830	4.6	0.405	0.7	NA	0.0	0.0	0.00	0.05	58.9
All Vehicles		1214	4.5	0.405	1.1	NA	0.2	1.2	0.03	0.07	58.3

## PM PEAK

### Argyle St/Margaret St/Cliffe St

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
South: Argyle St (S)											
1	L2	5	2.0	0.408	26.9	LOS B	14.1	102.9	0.67	0.59	32.3
2	T1	371	5.0	0.408	20.5	LOS B	14.1	102.9	0.67	0.59	32.3
3	R2	175	2.0	0.896	83.4	LOS F	14.5	103.1	1.00	1.15	16.6
Approach		551	4.0	0.896	40.6	LOS C	14.5	103.1	0.77	0.77	24.9
East: Margaret St (E)											
4	L2	274	2.0	0.908	73.2	LOS F	18.8	133.9	0.94	1.03	18.1
5	T1	5	2.0	0.223	40.9	LOS C	5.2	37.2	0.84	0.77	23.4
6	R2	102	2.0	0.223	47.4	LOS D	5.2	37.2	0.84	0.77	23.4
Approach		381	2.0	0.908	65.9	LOS E	18.8	133.9	0.91	0.95	19.3
North: Argyle St (N)											
7	L2	117	2.0	0.469	27.8	LOS B	17.0	123.0	0.70	0.68	31.3
8	T1	718	5.0	0.469	22.0	LOS B	17.0	123.0	0.71	0.66	31.3
9	R2	10	2.0	0.469	29.0	LOS C	16.4	119.8	0.71	0.64	31.2
Approach		845	4.5	0.469	22.9	LOS B	17.0	123.0	0.71	0.66	31.3
West: Cliffe St (W)											
10	L2	5	2.0	0.043	59.1	LOS E	0.5	3.9	0.91	0.66	8.6
11	T1	5	2.0	0.043	52.7	LOS D	0.5	3.9	0.91	0.66	8.6
12	R2	8	2.0	0.036	59.2	LOS E	0.4	3.1	0.91	0.67	8.3
Approach		18	2.0	0.043	57.4	LOS E	0.5	3.9	0.91	0.66	8.5
All Vehicles		1795	3.8	0.908	37.8	LOS C	18.8	133.9	0.77	0.76	25.6

### Argyle St/Menangle St (Proposed Signalised Layout)

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows Total veh/h	Deg. Satn HV %	Average Delay v/c sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Argyle St (S)											
1	L2	7	2.0	0.448	20.7	LOS B	14.7	107.3	0.62	0.55	35.9
2	T1	477	5.0	0.448	14.3	LOS A	14.7	107.3	0.62	0.55	35.9
3	R2	221	2.0	0.708	51.1	LOS D	11.4	81.2	1.00	1.03	21.7
Approach		705	4.0	0.708	25.9	LOS B	14.7	107.3	0.74	0.70	29.9
East: Menangle St (E)											
4	L2	584	2.0	0.670	28.6	LOS C	24.0	171.1	0.82	0.84	26.1
5	T1	5	2.0	0.670	23.3	LOS B	24.0	171.1	0.82	0.84	26.1
6	R2	103	2.0	0.252	35.7	LOS C	4.1	29.5	0.78	0.76	24.0
Approach		692	2.0	0.670	29.6	LOS C	24.0	171.1	0.82	0.83	25.8
North: Argyle St (N)											
7	L2	101	2.0	0.697	34.5	LOS C	23.7	172.0	0.89	0.81	28.0
8	T1	954	5.0	0.697	28.8	LOS C	23.7	172.0	0.89	0.80	28.2
9	R2	5	2.0	0.697	35.3	LOS C	23.2	169.4	0.89	0.79	28.4
Approach		1060	4.7	0.697	29.4	LOS C	23.7	172.0	0.89	0.80	28.2
West: Menangle St (W)											
10	L2	5	2.0	0.017	33.5	LOS C	0.4	2.6	0.71	0.62	19.5
11	T1	5	2.0	0.017	28.4	LOS B	0.4	2.6	0.71	0.62	19.5
12	R2	9	2.0	0.049	42.5	LOS D	0.4	2.7	0.80	0.69	16.6
Approach		19	2.0	0.049	36.4	LOS C	0.4	2.7	0.75	0.65	18.0
All Vehicles		2476	3.7	0.708	28.5	LOS C	24.0	172.0	0.82	0.78	27.9

## Argyle St/Regreme Rd

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
East: Argyle Street											
5	T1	637	5.0	0.638	7.9	LOS A	6.1	44.6	0.64	1.26	47.0
6	R2	107	2.0	0.638	12.7	LOS B	6.1	44.6	0.64	1.26	47.0
Approach		744	4.6	0.638	8.6	LOS A	6.1	44.6	0.64	0.63	47.0
North: Regreme Road											
7	L2	26	2.0	0.200	8.5	LOS A	1.1	8.0	0.47	1.40	45.1
9	R2	179	2.0	0.200	12.5	LOS B	1.1	8.0	0.47	1.40	45.1
Approach		205	2.0	0.200	12.0	LOS B	1.1	8.0	0.47	0.70	45.1
West: Argyle Street											
10	L2	198	2.0	0.360	7.7	LOS A	2.6	19.0	0.38	1.08	48.7
11	T1	251	5.0	0.360	6.8	LOS A	2.6	19.0	0.38	1.08	48.7
Approach		449	3.7	0.360	7.2	LOS A	2.6	19.0	0.38	0.54	48.7
All Vehicles		1398	3.9	0.638	8.6	LOS A	6.1	44.6	0.53	0.61	47.2

## Menangle St/Site Access

Movement Performance - Vehicles											
Mov ID	ODMo v	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total	HV				Vehicles	Distance			
		veh/h	%				veh	m			
East: Menangle Street											
5	T1	653	5.0	0.346	0.1	LOS A	0.0	0.0	0.00	0.00	59.9
6	R2	88	0.0	0.076	10.1	LOS B	0.3	2.3	0.48	0.72	46.8
Approach		741	4.4	0.346	1.2	NA	0.3	2.3	0.06	0.09	58.0
North: Site Access											
7	L2	35	0.0	0.182	13.2	LOS B	0.6	4.4	0.59	0.84	43.9
9	R2	70	0.0	0.182	13.3	LOS B	0.6	4.4	0.59	0.84	43.9
Approach		105	0.0	0.182	13.3	LOS B	0.6	4.4	0.59	0.84	43.9
West: Menangle Street											
10	L2	82	0.0	0.044	8.2	LOS A	0.0	0.0	0.00	0.67	48.9
11	T1	362	5.0	0.192	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		444	4.1	0.192	1.5	NA	0.0	0.0	0.00	0.12	57.6
All Vehicles		1290	3.9	0.346	2.3	NA	0.6	4.4	0.08	0.16	56.4