# **Traffic Impact Assessment**

22 St Quentin Avenue, Claremont -Mixed Use Development

CW1146300

Prepared for Synicast Pty Ltd

14 July 2021





### **Contact Information**

Cardno (WA) Pty Ltd ABN 77 009 119 000

11 Harvest Terrace West Perth WA 6005 Australia

www.cardno.com Phone +61 8 9273 3888 Fax +61 8 9486 8664

#### **Document Information**

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Author(s):

-0		
Sedrik Aralar	Effective Date	14/07/2021
Traffic Engineer		
Approved By:		
Ray Cook	Date Approved	14/07/2021
Business Leader, Traffic & Transport Planning		
Λ/Δ		

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## 1 Introduction

### 1.1 Background

Cardno has been commissioned by Synicast Pty Ltd (the Client) to prepare a Transport Impact Assessment (TIA) report in support of a Scheme Amendment for the proposed mixed-use development to be located at 22 St Quentin Avenue, Claremont (the Site). An aerial view of the Site is shown in **Figure 1-1**.

This TIA has been undertaken to outline transport aspects of the development, including access, parking, circulation, public transport, pedestrian and cycling.

This TIA has been prepared in accordance with the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines for Developments: Volume 4 – Individual Developments (2016)* and the checklist is included in **Appendix A**.

Figure 1-1 Aerial view of the Site

Source: Nearmap

## 2 Existing Site Situation

## 2.1 Site Location

The proposed Site is located on 22 St Quentin Avenue, Claremont which is located within the Town of Claremont. The Site is bordered by St Quentin Avenue to the North, Church Lane to the East, a commercial lot to the West and Stirling Highway to the South. The Site location is illustrated in **Figure 2-1**.

Figure 2-1 Site Location



Source: Nearmap

## 2.2 Surrounding Land Use

According to the *Town of Claremont Local Planning Scheme No.* 3 the Site is zoned as 'Town Centre'. A zoning map showing the surrounding land use in close proximity of the Site is illustrated in **Figure 2-2**.



Figure 2-2 Zoning Map of an area of the Town of Claremont

Source: Town of Claremont Local Planning Scheme No. 3

## 2.3 Existing Development

The northwest side of the lot is currently occupied by a two-storey commercial development with several tenancy spaces, with a parking area on the east side. The Claremont Community Hub and Library are located adjacent to and southwest of the proposed Site.

## 2.4 Existing Road Network

Based on information obtained from the *Main Roads WA: Road Information Mapping System* the layout and classification of road hierarchy are illustrated in **Figure 2-3** below.



Source: Main Roads WA: Road Information Mapping System

#### The characteristics of the surrounding road network are presented in Table 2-1.

 Table 2-1
 Road Network Description

			Road Network			
Road Name	Road Hierarchy	Jurisdiction	No. of Lanes	No. of Footpaths	Road Width (m)	Posted Speed Limit (km/h)
Stirling Highway	Primary Distributor	Main Roads WA	4	2	13.0	60
Avion Way	Access Road	Local Government	1	0	4.2	50
Church Lane	Access Road	Local Government	1	1	5.7	50
St Quentin Avenue	Access Road	Local Government	1	2	3.3	50
Stirling Road	Distributor A	Local Government	3	2	14.4	50
Queenslea Drive	Distributor B	Local Government	2	2	7	50
Bay View Terrace (south of Stirling Highway)	Distributor B	Local Government	2	2	12.6	50
Bay View Terrace (north of Stirling Highway)	Access Road	Local Government	1	(Pedestrianised Boulevard)	3	10

## 2.5 Existing Intersections

The following discusses the intersections in the proximity of the development:

#### 2.5.1 Church Lane / Stirling Highway

Stirling Highway/ Church Lane is a T-intersection located south-east of the Site (**Figure 2-4**) and is a give way-controlled intersection with priority given to Stirling Highway. The configuration of the intersection is as follows:

- > North leg: One approach lane;
- > West leg: Two approach lanes (for left turn and through movements); and
- > East leg: Two approach lanes (for right turn and through movements).

Figure 2-4 Church Lane/Stirling Highway intersection



#### 2.5.2 St Quentin Avenue/Church Lane

St Quentin Avenue/Church Lane is a T-intersection located north east of the Site (**Figure 2-5**) and is a give way-controlled intersection with priority given to St Quentin Avenue.

- > South leg: One approach lane (for left turn movements);
- > East leg: One approach lane (for both left and through movements); and
- > West leg: One way westbound.

Figure 2-5 St Quentin Avenue/Church Lane Intersection



Source: Nearmap (2020)

#### 2.5.3 Avion Way/St Quentin Avenue

Avion Way/St Quentin Avenue is a T-intersection located north west of the Site (**Figure 2-6**) and is a give way-controlled intersection with priority given to St Quentin Avenue. The configuration of the intersection is as follows:

- > South leg: One approach lane for left turn movements only;
- > West leg: One approach lane for right turning movements only; and
- > East leg: One approach lane for through and left movements (one-way westbound).

Figure 2-6 St Quentin Avenue/Avion Way intersection



#### 2.5.4 Bay View Terrace/St Quentin Avenue

Bay View Terrace/St Quentin Avenue is a give way-controlled intersection located north east of the Site. The configuration of the intersection is as follows:

- > North leg: One approach lane for right turning movements; and
- > South leg: One approach lane for left turning movements.

The intersection layout is as shown in Figure 2-7.

Figure 2-7 Bay View Terrace/St Quentin Avenue intersection



#### 2.5.5 Stirling Highway/Queenslea Drive/Stirling Road

Stirling Highway/Queenslea Drive/Stirling Road is a four-way signalised intersection located south west of the Site. The configuration of the intersection is as follows:

- > North leg: Two approach lanes for right and through movements with a left turn slip lane;
- > South leg: One approach lane for right and through movements with a dedicated left lane;
- > West leg: Two approach lanes for through movements with dedicated left and right turn lanes; and
- > East leg: Two approach lanes for left and through movements with a dedicated right turn lane.

The intersection layout is as shown in **Figure 2-8**.

Figure 2-8 Stirling Highway/Queenslea Drive/ Stirling Road intersection



#### 2.5.6 Stirling Highway/Bay View Terrace

Stirling Highway/Bay View Terrace is a four-way signalised intersection located south east of the Site. The configuration of the intersection is as follows:

- > South leg: One approach lane for left and through movements with a dedicated right turn lane;
- > East leg: Two approach lanes for left and through movements;
- > North leg: Exit lanes only;
- > West leg: Two approach lanes for left, right and through movements.

The intersection layout is as shown in Figure 2-9.

Figure 2-9 Stirling Highway/Bay View Terrace intersection



#### 2.5.7 Stirling Road/St Quentin Avenue

Stirling Road/St Quentin Avenue is a give way T-intersection located north-west of the Site. The configuration of the intersection is as follows:

- > South leg: One approach lane for through movements and a dedicated right turning lane;
- > North leg: Two approach lanes for left and through movements; and
- > East leg: one approach lane for left, through and right movements.

The intersection layout is as shown in Figure 2-10.

Figure 2-10 Stirling Road/St Quentin Avenue intersection



## 2.6 Existing Pedestrian / Cycle Networks

Based on information obtained from the *Department of Transport Perth, Fremantle and Stirling: Perth Bike Map*, there is a high-quality shared path running along St Quentin Avenue to the north of the Site connecting to Stirling Road as well as the Perth Bicycle Network (PBN) along Bay View Terrace to the east of the Site. Overall, the Site provides good connectivity and coverage to its surrounding areas. The bike map shown in **Figure 2-11** shows the detail of the existing cycling and pedestrian infrastructure surrounding the Site.



Figure 2-11 Perth Bike Map (Perth, Fremantle and Stirling)

Source: Department of Transport

## 2.7 Existing Public Transport Facilities

Train and bus services are located within close proximity of the Site as shown in the public transport map in **Figure 2-12**. The Site is serviced by numerous bus services running along major road corridors near the Site. The nearest bus stop is located along Stirling Highway to the east of the Site. The Site is served by bus service 23, 24, 25, 102, 103, 107, 998 and 999. Bus service 103, 998 and 999 travel along Stirling Highway, bus routes 102 and 107 traverses along Stirling Highway then deviates onto Leura Avenue to Gugeri Street and bus service 23, 24, 25 travel along Leura Avenue only.

The frequencies of buses and trains are summarised in Table 2-2 and Table 2-3 respectively.

Overall, the public transport amenity within the vicinity of the Site is excellent with a high frequency of bus and train services within walking distance.





Source: Transperth

#### Table 2-2 Bus Route Frequency

Bus Route	Route Description Frequency				
		Direction	Weekdays	Saturday	Sunday & Public Holidays
23	Perth – Claremont Station	From Perth	3 trips: 7:24 AM, 4:55 PM, 5:25 PM	-	-
		To Perth	3 trips: 7:05 AM, 7:33 AM, 3:45 PM	-	-
24	East Perth – Claremont Station		10-60 minutes	30-60 minutes	30-60 minutes
25	Perth – Claremont Station		30-60 minutes	60 minutes	-
102	Perth – Cottesloe Station		15-60 minutes	30-60 minutes	30-60 minutes
103	East Perth – Fremantle Station		30 minutes	60 minutes	60 minutes
107	Perth – Fremantle Station		15-60 minutes	60 minutes	120 minutes
998	Fremantle Station – South Street		15 minutes	30 minutes	30 minutes
999	South Street – Fremantle		15 minutes	30 minutes	30 minutes

Source: Transperth

 Table 2-3
 Train Service Frequency

Train Route	Weekday (Peak)	Weekday (Off-Peak)	Saturday	Sunday & Public Holiday
Fremantle Line	10 min	15-30 mins	15-30 mins	15-30 mins

Source: Transperth

## 2.8 Existing Traffic Volumes

Existing traffic volumes were obtained from the *Main Roads Western Australia's Traffic Map* and Town of Claremont for key road sections in the vicinity of the site as shown in **Table 2-4**.

Table 2-4 Existing Weekday Mid-Block Traffic Volumes

Location	Year	Average Weekday Traffic Volumes (two-way)		
		Daily	AM Peak	PM Peak
Stirling Road (north of Stirling Highway)	2019/20	15,456	1,116	1,291
Stirling Highway (West of Bay view Terrace)	2020/2021	32,313	2,414	2,585
Bay View Terrace (south of St Quentin Avenue)	2018	1,111	102	99
St Quentin Avenue (west of Bay View Terrace)	2018	3,329	267	275
Avion Way (south of St Quentin Avenue)	2018	1,804	146	161

### 2.9 Crash Assessment

The Main Roads Crash Map application was used to identify crash locations and severity near the Site. The search covered all recorded traffic accidents between 1 January 2016 and 31 December 2020 along the following roads:

- > Stirling Highway from Bay View Terrace to Avion Way;
- > Bay View Terrace from Stirling Highway to St Quentin Avenue;
- > St Quentin Avenue from Avion Way to Bay View Terrace;
- > Church Lane from Stirling Highway to St Quentin Avenue; and
- > Avion Way from Stirling Highway to St Quentin Avenue.

The resulting crash heatmap illustrating the severity of crashes is shown in Figure 2-13.

#### Figure 2-13 Crash Map



#### Details of the crashes are presented in Table 2-5, Table 2-6 and Table 2-7.

Table 2-5Total Crashes

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Right Turn Thru	1	1	2	8	2	14
Rear End	-	1	4	22	12	39
Right Angle	-	-	-	10	10	20
Sideswipe Same Direction	-	-	1	10	4	15
Hit Pedestrian	-	1	-	-	2	3
Hit Object	-	-	-	-	1	1
Unspecified	-	-	-	6	4	10
Total	1	3	7	56	35	102

#### Table 2-6 Total Intersection Crashes

Intersection Name	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Bay View Tce - Stirling Hwy	1	1	5	9	6	22
Bay View Tce - St Quentin Ave	-	-	-	2	-	2
St Quentin Av - Avion Wy	-	-	-	1	1	2
Church Lane - Stirling Hwy	-	-	-	9	2	11
Avion Way - Stirling Hwy	-	-	-	4	1	5
Stirling Hwy - Freshwater Pde	-	-	-	6	3	9
Total	1	1	5	31	13	51

#### Table 2-7Total Midblock Crashes

Road Name	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Bay View Tce	-	-	-	1	1	2
St Quentin Ave	-	-	-	3	4	7
Church Lane	-	-	-	5	5	10
Avion Way	-	-	-	-	1	1
Stirling Hwy	-	2	2	16	11	31
Total	-	2	2	25	22	51

A summary of the crash data is as follows:

- One fatal crash and one crash resulting in hospitalisation was recorded at the intersection of Stirling Highway and Bay View Terrace;
- > 7 crashes requiring medical attention were recorded- the majority of which occurred on Stirling Highway;
- > More than 50% of the crashes resulted in major property damage, which are mostly caused by a rear-end crash type;
- > Approximately 34% of the crashes (mostly of rear-end crash type) resulted in minor property damage;

- > Most of the intersection crashes occurred at Stirling Highway / Bay View Terrace intersection; and
- > Most of the midblock crashes occurred along Stirling Highway.

It is unlikely that the development will have any material impact on crash rates in the area, however, as the number of recorded crashes surrounding the Site is relatively high as well as the occurrence of a fatal crash, it is suggested that a road safety review is conducted by the Town of Claremont to evaluate road safety in the area.

## 3 Changes to Surrounding Area

### 3.1 Road Network

**Figure 3-1** shows the proposed Stirling Highway upgrade which comprises a bus priority lane to be located southwest of the Site in the eastbound direction of Stirling Highway and proposed laneways south of Stirling Highway. It is Cardno's understanding that the implementation of the proposed upgrades on the Stirling Highway Activity Corridor is not anticipated within the next 10-year horizon.

The road network changes proposed for the Stirling Highway will affect the distribution of traffic on the surrounding network and is enumerated below:

- > Conversion of Bay View Terrace north approach to two-way;
- > Additional right-turn pocket lane at the west approach of Stirling Highway-Bay View Terrace intersection;
- > Removal of channelization on north approach of Stirling Road-Stirling Highway intersection;
- Redesignation of approach lanes on the northern approach of the Stirling Road-Stirling Highway intersection;
- > Additional bus priority short lane on the east approach of Stirling Road-Stirling Highway intersection;
- Conversion of turn pocket lane on the west approach of Stirling Road-Stirling Highway intersection to a bus priority lane;
- > Conversion of the south approach of Freshwater Parade to left-turn out only;
- > Conversion of Church Lane to left-turn out only at its intersection with Stirling Highway; and
- > Provision of right-turn pocket lanes from Stirling Highway into Church Lane.

#### Figure 3-1 Proposed changes to road network



Source: Main Roads WA

## 3.2 Public Transport

Cardno has contacted the Public Transport Authority and was advised that no imminent changes in public transport are to occur in the area. However, there are changes in the long term, which includes the following:

- > Construction work on the Claremont Station upgrade will disrupt train services on the Fremantle Line for an extended period from February 2021 which will result in a reduction in train frequency south of the Showgrounds for a temporary period;
- > Construction of a new on-street bus interchange will commence shortly; and
- > Airport Line services (Claremont to High Wycombe) will commence in late 2021 and this will likely trigger some minor changes to the bus network around Claremont Station. It is anticipated that train frequencies will substantially increase between Claremont and Perth.

## 4 Development Proposal

## 4.1 Proposed Land Use

The proposed development comprises apartments with retail and commercial units. The development yields for the proposed development are detailed below:

- > 86 apartment units;
- > 507 m<sup>2</sup> retail/food and beverage; and
- > 1,216 m<sup>2</sup> commercial floor space.

Figure 4-1 shows the ground floor plan for the proposed development.



Source: Pennock Architects

#### 4.2 Site Access

The Site provides several access points located on the southern and eastern boundaries. **Figure 4-2** shows the location of the vehicle and pedestrian accesses to different areas of the development.



Source: Pennock Architects

A boom gate is proposed to be installed at the ramp leading from the Basement 1 level to the Basement 2 level as shown in **Figure 4-3**. This gate will restrict access between these two basement floor levels.



Figure 4-3 Basement 1 Boom Gate

Source: Pennock Architects

## 4.3 Car Parking Provision

The statutory requirements as defined by the *State Planning Policy 3.1 – Residential Design Codes (R-Codes), Town of Claremont Local Planning Scheme No.3,* and *City of Subiaco Local Planning Scheme No. 5* has been considered in the context of the proposed development and are summarised in **Table 4-1**.

It should be noted that the *Town of Claremont Local Planning Scheme No.3*, stipulates parking requirements for a 'Residential Building' land use which is not considered appropriate for the proposed development to be provided. Hence the R-Codes rates are considered to be more appropriate and applicable for the proposed multi-dwelling unit apartments being proposed.

From a planning perspective, Claremont and Subiaco are considered to be Secondary Centres based on accessibility to a train station. Claremont is anticipated to be the end of the line for the proposed airport line and is expected to have a peak frequency of about 5-minute headways. It also has better public transport connections to UWA/QEII and Fremantle and hence is considered to be comparable to Subiaco.

Based on this comparison, the minimum parking rates from the City of Subiaco Local Planning Scheme for the proposed office and retail development was applied and is summarised in **Table 4-1**.

Development Classification	Yield	Units	Minimum parking rates	Source	Required bays	Subtotal Required	Provided
1br Apartment	20	units	0.75 per dwelling		15		
2+ br apartment	66	units	1.00 per dwelling		66	81	125
Residential (visitor)	86	Dwelling	1 bay per four dwellings up to 12 dwellings	R- Codes	3		14 parking bays shared between residential and office/retail visitors (including 2 ACROD bays)
			1 bay per eight dwellings for the 13th dwelling and above		10	13	
Office	1216	sq.m	1 bay per 100 sqm NLA	City of Subiaco	12		22 parking bays
Retail (and Recreation)	507	sq.m	2 bays per 100 sqm NLA		10	22	for office & retail tenancies
TOTAL						116	161

Table 4-1 Car Parking Requirements

The table above shows that the total number of parking bays to be provided for the proposed development is 161 parking bays which would result in a surplus of 45 car parking bays for the overall development. 125 residential bays are proposed on Basement 2 to 4 which is intended to be separated from residential and commercial visitor bays with the implementation of a security gate. 14 residential visitor bays are proposed to be shared between retail/office and residential visitors since the peak demand for residential visitors typically occurs in the evening while office/retail parking demand typically occurs during normal business hours. 22 parking bays are proposed to be allocated exclusively for retail and office tenant use.

In addition, the R-Codes requires 0.10 motorcycle bays per car bay provided for residential use which equates to 14 motorcycle bays. The development is anticipated to provide a total of 54 motorcycle/scooter bays which adequately meets the requirements.

#### 4.3.2 Compliance with Australian Standards

The parking bay geometry requirements set forth by AS2890.1 and AS2890.6 for a User Class 1A and User Class 3 facility and the parking compliance assessment is detailed in **Table 4-2**.

The proposed development access falls under the Category 2 access facility (development fronting a local road and has between 101 to 300 parking spaces (Class 1A).

#### Table 4-2 Compliance with geometry requirements

Parameter	Required	Provided	Remarks
Circulation Ramp (straight, one-way), m	5.5	6	No non-compliance identified
Combined access width (Category 2), m	6.0 to 9.0	6	No non-compliance identified
Bay width, m Retail Commercial	2.6 2.4	2.4 - 2.6	No non-compliance identified. However, the 2.4m wide bays on Basement 1 (bay 19 and 20) should be designated for commercial staff use (User Class 1A)
Bay width (Commercial/Residential), m	2.4	2.6	No non-compliance identified
Bay length, m	5.4	5.4	No non-compliance identified
Aisle width (Retail), m	5.8	5.9 - 6.2	No non-compliance identified
Aisle width (Commercial/Residential), m	5.8	5.9 - 6.2	No non-compliance identified
Blind Aisle extension	1.0	1.0	No non-compliance identified
Ramp Grade (straight, <20m long)	1:5	1:5	No non-compliance identified
Change of Grade	1:6.7 (sag) 1:8 (summit)	1:8	No non-compliance identified
Vehicle body envelope	No obstructions within envelope	No obstructions within envelope	No non-compliance identified
ACROD bay width, m	2.4	2.6	No non-compliance identified
ACROD bay length, m	5.4	5.4	No non-compliance identified
ACROD shared area width, m	2.4	2.4	No non-compliance identified
Bollard distance from parking aisle, mm	800 ± 50	800	No non-compliance identified

## 4.4 Bicycle Parking Provision

According to the *Town of Claremont Local Planning Policy LV127 – Bicycle Parking and Facilities,* the requirements for bicycle parking are detailed in **Table 4-3**.

Land Use	Yield	Rate	Requirement	Source
Retail (employees)	507	1 space per 400m <sup>2</sup> gross floor area (GFA)	2	Town of Claremont LPP LV127
Retail (customers) 0 – 5,000sqm	507	1 space per 200m <sup>2</sup> of GFA	3	Town of Claremont LPP LV127
Commercial (employees)	1,216	1 space per 400m <sup>2</sup> of gross floor area (GFA)	4	Town of Claremont LPP LV127
Residential (resident)	86	0.5 space per dwelling	43	R-Codes
Residential (visitor)	86	0.1 space per dwelling	9	R-Codes
		Total	61	

Table 4-3Bicycle Parking Provision

40 bicycle bays are proposed at the mezzanine floor of the development. It is also anticipated that residents will utilise the 86 residential stores on the Mezzanine 2 level. Hence it is anticipated that the bicycle parking provision within the development is adequate.

### 4.5 8.4m Waste Truck Swept Path

The waste vehicle is proposed to enter and exit the site via Church Lane from/to Stirling Highway. A truck turntable is proposed internally in order for a waste vehicle to enter and exit the subject site in a forward direction. The swept path for an 8.4m Urbin waste truck as illustrated in **Figure 4-4** shows that the vehicle will be able to safely enter and exit the service area in the development in forward gear. It should be noted that the waste vehicle is proposed to only be allowed to turn right when exiting the site.



## 4.6 B99 Swept Path

Figure 4-5 shows that a B99 vehicle will be able to safely enter and exit the car park entrance from both directions on Church Lane.



#### Swept paths for Basement 1 are shown in Figure 4-6.

Figure 4-6 Basement 1 Swept Path



The swept paths show that the majority of the proposed parking bays could be easily accessed by a B99 design vehicle. B99 vehicles are also able to turn around using the turning bay at the end of the parking aisle.
#### Swept paths for Basement 2-4 are shown in Figure 4-7.

Figure 4-7 Basement 2 Swept Path



The swept paths show that vehicles are anticipated to occupy most of the parking aisle space when making the relevant manoeuvres. However, it is anticipated that vehicles would give way to turning vehicles and as such no safety concerns are anticipated to arise from these movements.

# 5 Integration with Surrounding Area

## 5.1 Surrounding Major Attractors/Generators

Being within the town centre, the Site is immediately surrounded by several commercial establishments and residential developments. In addition, major attractors/generators surrounding the development are shown in **Table 5-1**. Key attractors/generators include:

- > Claremont Station;
- > Showgrounds Station;
- > Claremont Pool;
- > Claremont Oval;
- > Claremont Showgrounds; and
- > Town of Claremont Golf Course





# 6 Analysis of Transport Network

### 6.1 Analysis Overview

#### 6.1.1 Key Intersections

A SIDRA network analysis has been undertaken for the following intersections to assess the potential impact of Site-generated traffic on the surrounding road network.

- > Stirling Hwy / Bay View Terrace;
- > Queenslea Dr / Stirling Hwy / Stirling Rd;
- > Church Ln / Stirling Hwy;
- > St Quentin Ave / Church Ln;
- > Stirling Road / St Quentin Ave;
- > Avion Way / St Quentin Ave; and
- > Bay View Terrace / St Quentin Ave.

### 6.2 Assessment Years and Time Period

A survey was conducted on Thursday 13<sup>th</sup> of February 2020 (7h00-9h00 & 15h00-17h00) and Saturday 15<sup>th</sup> February 2020 (11h00-13h00) at the key intersections. Assessed peak periods were based on the peak hours of the gathered data which is detailed below:

- > 7:45am to 8:45am on weekdays;
- > 3:30pm to 4:30pm on weekdays; and
- > 11:45am to 12:45pm on weekends.

The following scenarios have been analysed as part of this assessment for these peak activity periods:

- Scenario 1 2020 Existing Traffic without Development;
- Scenario 2 2022 Future Traffic (assumed opening year) without Development for future intersection layouts;
- Scenario 2.1 2022 Future Traffic (assumed opening year) without Development for existing intersection layouts;
- Scenario 3 2022 Future Traffic (assumed opening year) with Development for future intersection layouts;
- Scenario 3.1 2022 Future Traffic (assumed opening year) with Development for existing intersection layouts;
- Scenario 4 2032 Future Traffic (10-year horizon) without Development for future intersection layouts; and
- > Scenario 5 2032 Future Traffic (10-year horizon) with Development for future intersection layouts.

### 6.3 Key Assumptions

The following assumptions were made for the traffic analysis of the key intersections:

- The existing background traffic data was surveyed by an external service provider for the critical peak periods on Thursday 13<sup>th</sup> of February 2020 (7h00-9h00 & 15h00-17h00) and Saturday 15<sup>th</sup> February 2020 (11h00-13h00) for all the key intersections. This information was used as a basis for the traffic analysis of these intersections;
- > All relevant intersections have been analysed for the three assessment years by applying a conservative growth rate of 2% per annum to the traffic observations based on historical data obtained between 2017 and 2018 at the Stirling Hwy (west of Bay View Terrace) traffic counting station;

- > Changes to the intersection layouts discussed in Section 3 will be completed by 2022. Hence, all future scenarios are modelled based on the proposed layouts; and
- > Practical cycle time was used for signal timing of future scenarios.

### 6.4 Development Trip Generation

#### 6.4.1 Trip generation of existing developments

A trip generation survey of existing developments with similar purpose and transport environment to the proposed development has been conducted in order to estimate the potential trip generation for the said development. The survey involved undertaking an inventory of residential units and traffic counts at the development's access driveway during a typical weekday peak period. The following was assumed:

- > Residential units are fully occupied;
- > 100% of outgoing traffic during the AM peak and 100% of incoming traffic during the PM peak are residential traffic. Similarly, 100% of AM in and PM out traffic is associated with the commercial development;
- > The retail/food and beverage land use was assumed to be 100% food and beverage due to its higher trip generation rate compared to retail to obtain more conservative results;
- > Outgoing traffic during the AM peak represents 80% of total; and
- > Incoming traffic during the PM peak represents 80% of total.

#### Results of the survey are presented in Table 6-1.

Table 6-1 Trip Generation	Rates of Existing Developments
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Development	No. of Units	Traffic '	affic Volume Residential tr (vehicles per dwo				al trip rate dwelling u	nit)	
		AM out	PM in	AM in	AM out	AM total	PM in	PM out	PM total
Site 1	58	9	11	0.039	0.155	0.194	0.190	0.047	0.237
Site 2	63	7	6	0.028	0.111	0.139	0.095	0.024	0.119
Average						0.166			0.178

The results show that the average weekday AM and PM trip generation rates are 0.166 and 0.178 per dwelling unit respectively. In comparison, rates from *The Institute of Transportation Engineers (ITE): Trip Generation 10<sup>th</sup> Edition* are 0.31 for the AM peak and 0.20 for the PM peak. The lower values of the calculated trip rates may be attributed to their location since trip attractors are within walkable distance. It is expected that trip rates for the proposed development would be similar to these calculated values because of its proximity to public transport and trip attractors.

#### 6.4.2 Internal trip capture model

It is expected that a portion of visitors to the retail land uses will be coming from the residential land uses of the development. To consider this, Cardno's reciprocal parking model has been used to calculate the reduction factor for trip generation rates to be used in the analysis.

Land uses used in the model are as shown in Table 6-2.

Table 6-2	Land uses
-----------	-----------

Land Use	Yield	Unit
Residential (high-rise apartment)	86	dwelling
Retail	507	sqm
Commercial (commercial office)	1,216	sqm

Results of the analysis are presented in Table 6-3.

Table 6-3 Internal trip capture

Internal Trip Capture					
AM Peak	22%				
PM Peak	36%				
Weekend Peak	46%				

Trip generation for the retail land use was reduced by the above percentages to consider the effect of internal trips in the development's trip generation.

#### 6.4.3 Analysis trip generation rates

Trip generation rates for the development was also sourced from *The Institute of Transportation Engineers (ITE): Trip Generation 10<sup>th</sup> Edition.* To determine potential trip generation demand rates, the proposed development has been classified according to the land use classifications described in **Table 6-4**.

	Table 6-4	Trip Generation I	Rates
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Land Use	Source	Yield	Unit	Trip Generation Rate		
				AM	PM	Saturday
Residential	ITE 222 (for weekend) & traffic survey results discussed in Section 6.4.1 (for weekday)	86	dwelling	0.166 per dwelling	0.178 per dwelling	0.36 per 100 sqm
Retail (Quality Restaurant)	ITE 931	507	sqm	4.87 per 100 sqm	7.99 per 100 sqm	11.50 per 100 sqm
Commercial (General Office Building, dense multi-use urban)	ITE 710	1,216	sqm	0.98 per 100 sqm	0.94 per 100 sqm	0.29 per 100 sqm

Given the unique location of the development, the following assumptions related to the trip generation were adopted:

- > Retail trip generation was reduced as discussed in **Section 6.4.2**.
- > Directional trip distribution rates and estimated trips generated are detailed in **Table 6-5** and **Table 6-6**.

Table 6-5Directional Trip Distribution Rates

Vehicle Type	AM Peak		PM	Peak	Saturday Peak	
	In	Out	In	Out	In	Out
Residential	20%	80%	80%	20%	55%	45%
Retail (Quality Restaurant)	80%	20%	61%	39%	59%	41%
Commercial (General Office Building, dense multi-use urban)	87%	13%	19%	81%	48%	52%

#### Table 6-6 Development Trip Generation

Vehicle Type	AM Peak PM Peak		Saturday Peak			
	In	Out	In	Out	In	Out
Residential	3	12	13	4	18	14
Retail (Quality Restaurant)	16	4	16	11	19	13
Commercial (General Office Building, dense multi-use urban)	11	2	3	10	2	2
Subtotal	30	18	32	25	39	29
Total	48		57		6	8

As summarized above, the proposed development is expected to generate two-way trips of 48, 57 and 68 for the weekday AM, weekday PM and weekend peak hour periods respectively.

## 6.5 Development Trip Distribution

The distribution of the development traffic has been estimated based on the existing traffic flows at the approaches to key intersections as shown in **Figure 6-1**.



For Scenarios 2 to 5, a two-way geometric configuration for Bayview Terrace north of Stirling Highway has been assessed based on the proposed road upgrade discussed in **Section 3.1.** 20% of the existing right-turn traffic from Bayview Terrace into St Quentin Avenue is assumed to be diverted onto the proposed new southbound approach as a result of the proposed reconfiguration of the Bayview Terrace/Stirling Highway intersection. For this southbound traffic, the trip distribution shown in **Figure 6-2** has been adopted.





### 6.6 Traffic Volumes

6.6.1 Scenario 1 – 2020 Existing Traffic without Development

The existing background traffic data was surveyed by an external service provider for the critical peak periods on Thursday 13<sup>th</sup> of February 2020 (7h00-9h00 & 15h00-17h00) and Saturday 15<sup>th</sup> February 2020 (11h00-13h00) for all the key intersections. This information was used as a basis for the traffic analysis of these intersections.

Figure 6-3, Figure 6-4 and Figure 6-5 show the background traffic volumes for the weekday AM, PM and weekend peak hour periods for the key intersections in the study area.



Figure 6-3 Scenario 1 – 2020 Existing Traffic without Development AM



#### Figure 6-4 Scenario 1 – 2020 Existing Traffic without Development PM



#### Figure 6-5 Scenario 1 – 2020 Existing Traffic without Development Saturday

#### 6.6.2 Scenario 2 – 2022 Future Traffic without Development (future intersection layouts)

Existing traffic was projected to future year 2022 with growth rate of 2%. Figure 6-6, Figure 6-7 and Figure 6-8 show the calculated future traffic without the development and considering proposed changes to the intersection layouts.



Figure 6-6 Scenario 2 – 2022 Future Traffic without Development AM (future intersection layouts)



Figure 6-7 Scenario 2 – 2022 Future Traffic without Development PM (future intersection layouts)



Figure 6-8 Scenario 2 – 2022 Future Traffic without Development Saturday (future intersection layouts)

### 6.6.3 Scenario 2.1 - 2022 Future Traffic without Development (existing intersection layouts)

Existing traffic was projected to future year 2022 with growth rate of 2%. Figure 6-9, Figure 6-10 and Figure 6-11 show the calculated future traffic without the development without incorporating proposed intersection layout changes.



Figure 6-9 Scenario 2.1 – 2022 Future Traffic without Development AM (existing intersection layouts)







Figure 6-11 Scenario 2.1 – 2022 Future Traffic without Development Saturday (existing intersection layouts)

#### 6.6.4 Scenario 3 – 2022 Future Traffic with Development (future intersection layouts)

Traffic generated by the development was added to the 2022 traffic and are presented in **Figure 6-12**, **Figure 6-13** and **Figure 6-14**. These volumes also takes into consideration proposed changes to the intersection layouts











Figure 6-14 Scenario 3 – 2022 Future Traffic with Development Saturday (future intersection layouts)

#### 6.6.5 Scenario 3.1 – 2022 Future Traffic with Development (existing intersection layouts)

Traffic generated by the development was added to the 2022 traffic and are presented in **Figure 6-15**, **Figure 6-16** and **Figure 6-17**.







Figure 6-16 Scenario 3.1 – 2022 Future Traffic with Development PM (existing intersection layouts)



Figure 6-17 Scenario 3.1 – 2022 Future Traffic with Development Saturday (existing intersection layouts)

#### 6.6.6 Scenario 4 – 2032 Traffic without Development (future intersection layouts)

A 10-year future scenario was considered for the completeness of this assessment. Figure 6-18, Figure 6-19 and Figure 6-20 shows the estimated traffic volumes with 10 years' traffic growth for the weekday and weekend peak hour periods, based on a yearly traffic growth rate of 2% from 2022 to 2032.



Figure 6-18 Scenario 4– 2032 Future Traffic without Development AM (future intersection layouts)









### 6.6.7 Scenario 5 – 2032 Traffic with Development (future intersection layouts)

Traffic generated by the development was added to the 2032 traffic and are presented in Figure 6-21, Figure 6-22 and Figure 6-23.







Figure 6-22 Scenario 5– 2032 Future Traffic with Development PM (future intersection layouts)



Figure 6-23 Scenario 5– 2032 Future Traffic with Development Saturday (future intersection layouts)

### 6.7 Intersection Performance

The identified intersections have been analysed using the SIDRA analysis program. This program calculates the performance of intersections based on input parameters, including geometry and traffic volumes. As an output, SIDRA provides values for the Degree of Saturation (DOS), queue lengths, delays, level of service, and 95th Percentile Queue. These parameters are defined as follows:

- Degree of Saturation (DOS): is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The theoretical intersection capacity is exceeded for an un-signalized intersection where DOS > 0.80;
- Ave. Back of Queue: is the statistical estimate of the queue length up to or below which 50% of all observed queues would be expected;
- Average Delay: is the average of all travel time delays for vehicles through the intersection. An unsignalised intersection can be considered to be operating at capacity where the average delay exceeds 40 seconds for any movement; and
- Level of Service (LOS): is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. The different levels of service can generally be described as shown in Table 6-7.

LOS	Description	Signalised Intersection	Unsignalised Intersection
А	Free-flow operations (best condition)	≤10 sec	≤10 sec
В	Reasonable free-flow operations	10-20 sec	10-15 sec
С	At or near free-flow operations	20-35 sec	15-25 sec
D	Decreasing free-flow levels	35-55 sec	25-35 sec
E	Operations at capacity	55-80 sec	35-50 sec
F	A breakdown in vehicular flow (worst condition)	≥80 sec	≥50 sec

Table 6-7 Level of Service (LoS) Performance Criteria

The resulting parameters for all vehicles at the intersection are discussed in the succeeding sections. The software does not display 'all vehicle' LOS values for two-way sign-controlled intersections since delay is not a good measure of LOS. For these intersections, the LOS values presented are the LOS of the worst movement at the intersection.

Detailed SIDRA results are presented in Appendix B.

#### 6.7.2 Stirling Hwy/ Bay View Terrace

The intersection of Stirling Highway/ Bayview Terrace has been analysed under two different layouts shown in **Figure 6-24.** Scenarios 1, 2.1 and 3.1 were modelled based on the existing layout while Scenarios 2, 3, 4, and 5 were modelled based on the proposed future upgrade layout.



Figure 6-24 SIDRA Layouts – Stirling Hwy/ Bay View Terrace

Phasing for the *existing layout* scenarios (including base scenario) is based on existing SCATS phasing information for this intersection. *Future layout* scenarios are modelled with a split phasing for the northern and southern approaches and a leading right turn for the eastern and western approaches.

The overall SIDRA results for each scenario are summarised in **Table 6-8**. In the succeeding tables, green cells represent minor delays, orange cells represent medium delay, and red cells represent long delays.

	Base 2022 existing layouts		2022 proposed future layouts		2032 proposed future layouts			
		existing	without dev	with dev	without dev	with dev	without dev	with dev
	Parameter	Scenario 1	Scenario 2.1	Scenario 3.1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Σ	DOS	0.672	0.582	0.730	0.666	0.666	0.722	0.723
ay A ak	Delay (s)	23.2	26.7	23.6	37.5	37.4	40.4	40.2
Pe	LOS	С	С	С	D	D	D	D
We	Ave. Back of Queue (m)	105.1	107.1	161.8	126.2	127.5	177.4	179.1
Σ	DOS	0.619	0.641	0.942	0.669	0.677	0.810	0.804
<u>у</u> Р	Delay (s)	19.8	25.8	39.1	35.1	34.9	36.2	37.1
ekda Pea	LOS	В	С	D	D	С	D	D
Wee	Ave. Back of Queue (m)	146.1	153.1	322.9	159.5	161.7	218.8	225.3
äk	DOS	0.671	0.706	0.714	0.736	0.724	0.774	0.779
y Pe	Delay (s)	18.0	23.1	18.1	31.0	31.5	33.6	33.7
Irda	LOS	В	С	В	С	С	С	С
Satu	Ave. Back of Queue (m)	106.7	113.4	115.2	142.7	147.6	199.6	202.7

 Table 6-8
 SIDRA Analysis Results – Stirling Hwy/Bay View Terrace

#### 6.7.3 Queenslea Dr / Stirling Hwy / Stirling Rd

The intersection of Queenslea Dr / Stirling Hwy / Stirling Rd has been analysed under two different layouts shown in **Figure 6-25**. Scenarios 1, 2.1, and 3.1 were modelled based on the existing layout while Scenarios 2, 3, 4, and 5 were modelled based on the proposed future upgrade layout.



Figure 6-25 SIDRA Layouts – Queenslea Dr / Stirling Hwy / Stirling Rd

Phasing for the existing scenario is based on existing SCATS phasing information for this intersection. For the 2022 *existing layout* scenario, this intersection is modelled with a split phasing for the northern and southern approaches and a leading right turn for the eastern and western approaches. All scenarios for the future layouts are modelled with leading right turn phasing for all approaches.

The overall SIDRA	results for each	scenario are	summarised in	Table 6-9.
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Table 6-9 SIDRA Analysis Results – Queenslea Dr / Stirling Hwy / Stirling Rd								
		Base	2022 existing layouts		2022 proposed future layouts		2032 proposed future layouts	
		existing	without dev	with dev	without dev	with dev	without dev	with dev
	Parameter	Scenario 1	Scenario 2.1	Scenario 3.1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Σ	DOS	1.056	1.258	1.107	1.255	1.264	1.499	1.482
ay A ak	Delay (s)	101.6	189.1	135.2	183.9	190.0	311.3	287.5
Weekda Pea	LOS	F	F	F	F	F	F	F
	Ave. Back of Queue (m)	309.7	607.8	465.2	593.9	610.6	915.3	904.1
Weekday PM Peak	DOS	0.994	0.994	1.030	0.999	0.999	1.191	1.191
	Delay (s)	59.0	68.8	81.7	67.7	70.6	141.7	145.5
	LOS	E	E	F	Е	E	F	F
	Ave. Back of Queue (m)	217.0	254.9	232.7	266.7	277.7	540.9	548.4
Saturday Peak	DOS	0.907	1.001	1.002	1.000	1.020	1.183	1.166
	Delay (s)	48.8	70.9	62.8	69.9	72.5	140.0	135.7
	LOS	D	E	E	E	E	F	F
	Ave. Back of Queue (m)	192.1	321.0	279.2	276.9	281.0	530.6	536.2

 Table 6-9
 SIDRA Analysis Results – Queenslea Dr / Stirling Hwy / Stirling Rd

### 6.7.4 Church Ln / Stirling Hwy

The intersection of Church Ln / Stirling Hwy has been analysed under two different layouts shown in **Figure 6-26**. Scenarios 1, 2.1, and 3.1 were modelled using the existing layout while Scenarios 2, 3, 4, and 5 were modelled based on the proposed future upgrade layout.



Figure 6-26 SIDRA Layouts – Church Ln / Stirling Hwy

Table 0-10 SIDIXA Results - Church Ell' Stilling Hwy								
		Base	2022 existing layouts		2022 proposed future layouts		2032 proposed future layouts	
		existing	without dev	with dev	without dev	with dev	without dev	with dev
	Parameter	Scenario 1	Scenario 2.1	Scenario 3.1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Σ	DOS	0.420	0.352	0.419	0.362	0.365	0.512	0.493
ya A ya	Delay (s)	0.9	0.6	1.3	0.2	0.3	0.2	0.3
Weekday PM Weekda Peak Peak	LOS	F	F	F	В	В	В	В
	Ave. Back of Queue (m)	71.0	73.6	93.0	115.6	115.2	116.2	115.7
	DOS	0.831	0.949	0.864	0.664	0.652	0.501	0.485
	Delay (s)	3.4	4.8	4.3	0.5	0.7	0.5	0.6
	LOS	F	F	F	С	С	С	С
	Ave. Back of Queue (m)	17.9	105.2	92.7	129.3	129.1	134.3	133.0
Saturday Peak	DOS	0.620	0.651	0.783	0.399	0.407	0.658	0.646
	Delay (s)	3.2	3.7	4.8	0.9	1.1	1.0	1.2
	LOS	F	F	F	С	С	С	С
	Ave. Back of Queue (m)	35.1	112.1	40.9	108.7	109.0	129.0	99.5

#### The overall SIDRA results for each scenario are summarised in Table 6-10.

 Table 6-10
 SIDRA Results – Church Ln / Stirling Hwy

\*LOS shown is for the critical movement at this intersection

#### 6.7.5 St Quentin Ave / Church Ln

The intersection of St Quentin Ave / Church Ln has been analysed with the layout shown in **Figure 6-27**. All scenarios have been analysed using this intersection configuration.



Figure 6-27 SIDRA Layout – St Quentin Ave / Church Ln - Scenario 1 – 2020 Existing Traffic without Development

#### The overall SIDRA results for each scenario are presented in Table 6-11.

	Base		2022 existing layouts		2022 proposed future layouts		2032 proposed future layouts	
	Deverseter	existing	without dev	with dev	without dev	with dev	without dev	with dev
	Parameter	Scenano I	Scenano 2.1	Scenano 3.1	Scenano z	Scenario 3	Scenario 4	Scenano S
Σ	DOS	0.100	0.087	0.104	0.087	0.087	0.102	0.103
ay A ak	Delay (s)	1.4	1.3	1.6	1.3	1.4	1.2	1.4
Pe	LOS	А	A	А	А	А	А	А
We	Ave. Back of Queue (m)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Σ	DOS	0.156	0.140	0.162	0.140	0.141	0.159	0.159
통북 미	Delay (s)	2.0	2.0	2.2	2.0	2.2	2.0	2.1
Weekda	LOS	А	A	А	А	А	А	А
	Ave. Back of Queue (m)	0.4	0.5	0.6	0.5	0.6	0.5	0.6
ak	DOS	0.162	0.144	0.170	0.144	0.145	0.168	0.169
Saturday Pe	Delay (s)	2.6	2.6	2.7	2.6	2.8	2.6	2.7
	LOS	А	А	А	А	А	А	А
	Ave. Back of Queue (m)	1.0	1.0	1.2	1.0	1.2	1.2	1.3

Table 6-11 SIDRA Analysis Results – St Quentin Ave / Church Ln

\*LOS shown are from the worst movement at the intersection

#### 6.7.6 Stirling Road / St Quentin Ave

The intersection of Stirling Road / St Quentin Ave has been analysed with the layout shown in Figure 6-28. All scenarios have been analysed using this intersection configuration.



Figure 6-28 SIDRA Layout - Stirling Road / St Quentin Ave

The overall SIDRA results for each scenario are presented in Table 6-12.

SIDRA Analysis Results - Stirling Road / St Quentin Ave Table 6-12

	Base		2022 existing layouts		2022 proposed future layouts		2032 proposed future layouts	
		existing	without dev	with dev	without dev	with dev	without dev	with dev
	Parameter	Scenario 1	Scenario 2.1	Scenario 3.1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Σ	DOS	0.317	0.324	0.324	0.322	0.321	0.418	0.471
ay A ak	Delay (s)	1.2	1.3	1.4	1.2	1.3	1.7	1.9
Pe	LOS	С	D	D	D	D	E	E
Wee	Ave. Back of Queue (m)	35.3	52.1	46.1	27.5	34.0	91.3	3.9
Weekday PM Peak	DOS	0.499	0.560	0.639	0.477	0.581	0.878	0.986
	Delay (s)	1.9	2.2	2.7	1.9	2.4	5.6	9.0
	LOS	E	E	E	Е	Е	F	F
	Ave. Back of Queue (m)	33.3	46.6	49.8	4.3	8.1	81.5	80.9
ak	DOS	1.108	1.244	1.370	1.206	1.337	2.064	2.217
Saturday Pe	Delay (s)	25.6	41.6	61.6	34.5	53.6	138.8	166.9
	LOS	F	F	F	F	F	F	F
	Ave. Back of Queue (m)	74.1	113.8	119.9	94.2	119.9	119.9	119.9

\*LOS shown are from the worst movement at the intersection
## 6.7.7 Avion Way / St Quentin Ave

The intersection of Avion Way / St Quentin Ave has been analysed with the layout shown in **Figure 6-29.** All scenarios have been analysed using this intersection configuration.



Figure 6-29 SIDRA Layout – Avion Way / St Quentin Ave

The overall SIDRA results for each scenario are presented in Table 6-13.

Table 6-13 SIDRA Analysis Results – Avion Way / St Quentin Ave

		Base	2022 existi	ng layouts	2022 propo	osed layouts	2032 propos	ed layouts
		existing	without dev	with dev	without dev	with dev	without dev	with dev
	Parameter	Scenario 1	Scenario 2.1	Scenario 3.1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Σ	DOS	0.117	0.121	0.128	0.110	0.117	0.130	0.136
ay A ak	Delay (s)	4.0	4.0	4.0	4.1	4.0	4.1	4.1
Pes	LOS	А	А	А	А	А	А	А
Me	Ave. Back of Queue (m)	1.4	1.4	1.5	1.3	1.3	1.5	1.6
Σ	DOS	0.224	0.232	0.248	0.221	0.235	0.254	0.266
Б Ч	Delay (s)	4.2	4.2	4.2	4.2	4.2	4.3	4.3
ekda	LOS	А	А	А	А	А	А	А
Me	Ave. Back of Queue (m)	2.9	3.0	3.2	2.8	3.0	3.3	3.5
äk	DOS	0.342	0.442	0.625	0.378	0.556	0.663	0.692
v Pe	Delay (s)	4.2	4.2	4.8	4.2	4.4	5.3	5.5
Irda	LOS	А	А	А	А	А	А	А
Satu	Ave. Back of Queue (m)	4.4	4.6	7.2	4.4	5.4	9.4	10.8

\*LOS shown are from the worst movement at the intersection

### 6.7.8 Bay View Terrace / St Quentin Ave

The intersection of Bay View Terrace / St Quentin Ave has been analysed under two different layouts shown in **Figure 6-30.** Scenarios 1, 2.1, and 3.1 were modelled using the existing layout while Scenarios 2, 3, 4, and 5 were modelled based on the proposed future upgrade layout.



Figure 6-30 SIDRA Layouts – Bay View Terrace / St Quentin Ave

The overall SIDRA results for each scenario are presented in Table 6-14.

Table 6-14 SIDRA Analysis Results – Bay View Terrace / St Quentin Ave

		Base	2022 existi	ng layouts	2022 propo	osed layouts	2032 propos	ed layouts
		existing	without dev	with dev	without dev	with dev	without dev	with dev
	Parameter	Scenario 1	Scenario 2.1	Scenario 3.1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Σ	DOS	0.066	0.069	0.098	0.068	0.068	0.081	0.081
₹ A	Delay (s)	0.1	0.1	0.2	0.6	0.6	0.6	0.6
Pes	LOS	А	А	А	А	А	А	А
Me	Ave. Back of Queue (m)	0.4	0.4	0.4	0.3	0.3	0.4	0.4
Σ	DOS	0.084	0.088	0.088	0.087	0.088	0.104	0.104
Ъ Р Р	Delay (s)	0.2	0.2	0.2	0.6	0.6	0.6	0.6
Pes	LOS	А	А	А	А	А	А	А
Me	Ave. Back of Queue (m)	0.7	0.8	0.8	0.7	0.7	0.7	0.7
äk	DOS	0.087	0.090	0.091	0.089	0.090	0.107	0.108
v Pe	Delay (s)	0.2	0.2	0.2	0.6	0.6	0.6	0.6
Irda	LOS	А	А	А	А	А	А	А
Satu	Ave. Back of Queue (m)	0.9	0.9	0.9	0.8	0.8	0.9	0.9

\*LOS shown are from the worst movement at the intersection

# 6.8 SIDRA Results Summary

Results of the SIDRA analysis are summarised as follows:

- > Overall, the traffic impacts of the proposed development are expected to be minimal when compared to the impacts of future traffic growth on the surrounding network.
- For the existing scenario, the Stirling Highway/Bay View Terrace intersection operates at an acceptable LOS;
- The north approach of Stirling Highway/Bay View Terrace intersection (including upgrading this approach to two-way operations as per the proposed Stirling Highway upgrade) is expected to operate at LOS F for Scenario 2 (2022 without development) during the weekday AM, PM and weekend peak hour periods;
- For the existing scenario, Queenslea Dr/Stirling Highway/Stirling Road intersection currently operates at LOS F, LOS E and LOS D during the weekday AM, PM and weekend peak hour periods respectively. The traffic operations of this intersection are expected to worsen during the weekday AM, PM and weekend peak hour periods for the 2022 and 2032 horizon;
- > The right-turn movement exiting from Church Lane to Stirling Highway is currently operating at LOS F for all peak hours during the weekday and weekend periods;
- The eastern approach of the Stirling Road/St Quentin Avenue intersection currently operates at LOS F during the weekend peak and is anticipated to experience higher delays for future scenarios;
- The eastern approach of the Stirling Road/St Quentin Avenue intersection is anticipated to operate at LOS F during the weekday PM and weekend peak hour periods for Scenarios 4 and 5;
- > The intersections of St Quentin Ave / Church Ln, Avion Way / St Quentin Ave and Bay View Terrace / St Quentin Ave are expected to operate at satisfactory LOS (all movements at LOS A) for the weekday AM, PM and weekend peak hour periods for the 2032 horizon;
- > Comparison of the 2022 opening year "with" and "without" development scenario for the current intersection configurations would indicate similar operational results and hence indicate the proposed development traffic has minimal impact on the adjacent intersections and road network;
- > Scenario 4 assessment results showed that further traffic growth within the network will have a significant impact on the surrounding road network; and
- Scenario 5 assessment results indicate that the performance at the intersections within the surrounding area would deteriorate further with the additional development traffic. However, comparing the Scenario 4 and Scenario 5 modelling results, the performance of the intersections within the area are comparable and hence it is concluded that the impact of the proposed development traffic is minimal and insignificant in comparison with the impact due to the overall background traffic growth.

# 7 Conclusions

The following conclusions have been made in regards to the proposed development:

- > The proposed development consists of retail, commercial and residential land uses;
- > The Site is located within the Town of Claremont providing excellent access to pedestrian/cycle facilities, as well as public transport facilities. In addition, non-car trips such as walking and cycling is expected to be higher due to the proximity of trip attractors such as shopping centres;
- Internal trips within the Site is expected to reduce overall trips generated by the proposed development by about 22%, 36%, and 46% for AM, PM and weekend peaks respectively;
- Comparison of the 2022 opening year "with" and "without" development scenario for the current intersection configurations would indicate similar operational results and hence indicate the proposed development traffic has minimal impact on the adjacent intersections and road network; and
- > Overall, the traffic impacts of the proposed development are expected to be minimal when compared to the impacts of future background traffic growth on the surrounding network.

# APPENDIX



# WAPC CHECKLIST



Item	Provided	Comments/Proposals
Introduction/Background		
name of applicant and consultant	Section 1	
development location and context	Section 2	
brief description of development proposal	Section 2	
key issues	N/A	
background information	Section 1	
Existing situation		
existing site uses (if any)	Section 2	
existing parking and demand (if appropriate)	Section 2	
existing access arrangements	Section 2	
existing site traffic	Section 6	
surrounding land uses	Section 2	
surrounding road network	Section 2	
traffic management on frontage roads	Section 2	
traffic flows on surrounding roads (usually am and pm peak hours)	Section 6	
traffic flows at major intersections (usually am and pm peak hours)	Section 6	
operation of surrounding intersections	Section 6	
existing pedestrian/cycle networks	Section 2	
existing public transport services surrounding the development	Section 2	
Crash data	Section 2	
Development proposal		
regional context	Section 2	
proposed land uses	Section 4	
table of land uses and quantities	Section 6	
access arrangements	Section 4	
parking provision	Section 4	
end of trip facilities	N/A	
any specific issues	N/A	
road network	N/A	
intersection layouts and controls	Section 2	
pedestrian/cycle networks and crossing facilities	Section 4	
public transport services	Section 4	

Item	Provided	Comments/Proposals
Integration with surrounding area	Section 5	
surrounding major attractors/generators	Section 5	
committed developments and transport proposals	N/A	
proposed changes to land uses within 1200 metres	Section 4	
travel desire lines from development to these attractors/generators	N/A	
adequacy of existing transport networks	Section 2	
deficiencies in existing transport networks	N/A	
remedial measures to address deficiencies	N/A	
Analysis of transport networks		
assessment years	Section 6	
time periods	Section 6	
development generated traffic	Section 6	
distribution of generated traffic	Section 6	
parking supply & demand	Section 4	
base and "with development" traffic flows	Section 6	
analysis of development accesses	Section 6	
impact on surrounding roads	Section 6	
impact on intersections	Section 6	
impact on neighbouring areas	N/A	
traffic noise and vibration	N/A	
road safety	N/A	
public transport access	N/A	
pedestrian access / amenity	Section 2	
cycle access / amenity	Section 2	
analysis of pedestrian / cycle networks	N/A	
safe walk/cycle to school (for residential and school site developments only)	N/A	
Traffic management plan (where appropriate)	N/A	
Conclusions	Section 7	

# APPENDIX

# SIDRA RESULTS



# **SIDRA Analysis Results**

# 1 Stirling Highway/Bay View Terrace

SIDRA Results – Stirling Hwy/ Bay View Terrace - Scenario 1 – 2020 Existing Traffic without Development

Intersection Approach		V	leekday	AM Pe	ak	V	leekday	PM Pe	ak	Saturday Peak			
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Bay	L	0.650	71.0	Е	52.5	0.591	70.2	Е	47.3	0.660	77.0	Е	42.9
View	Т	0.650	74.5	Е	52.5	0.591	73.6	Е	47.3	0.660	80.5	F	42.9
Terrace	R	0.626	70.5	Е	52.9	0.405	68.0	Е	32.9	0.485	75.4	Е	28.5
East: Stirling	L	0.556	21.6	С	105.1	0.619	22.7	С	123.2	0.518	17.6	В	106.0
Highway	Т	0.556	15.9	В	105.1	0.619	17.0	В	146.1	0.518	12.0	В	106.7
West.	L	0.672	26.8	С	93.0	0.594	21.8	С	93.0	0.671	20.8	С	93.0
West: Stirling	Т	0.672	17.9	В	93.0	0.594	13.0	В	93.0	0.671	14.0	В	93.0
Highway	R	0.672	23.5	С	93.0	0.594	18.7	В	93.0	0.671	22.6	С	93.0
All vehicles		0.672	23.2	С	105.1	0.619	19.8	В	146.1	0.671	18.0	В	106.7

SIDRA Results - Stirling Hwy/ Bay View Terrace - Scenario 2 – 2022 Future Traffic without Development (future intersection layouts)

Intersection Approach		١	Neekday	AM Pe	eak	١	Neekday	y PM Pe	eak	Saturday Peak			
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Bay	L	0.598	69.9	E	53.7	0.663	74.4	Е	50.5	0.736	79.8	Е	45.8
Terrace	Т	0.598	74.2	Е	53.7	0.663	78.7	Е	50.5	0.736	84.1	F	45.8
	R	0.653	70.9	Е	55.2	0.515	72.8	Е	35.7	0.538	76.9	Е	29.8
East: Stirling Highway	L	0.566	28.6	С	124.7	0.655	28.2	С	158.7	0.609	25.0	С	141.9
nignway	Т	0.566	23.0	С	126.2	0.655	22.5	С	159.5	0.609	19.4	В	142.7
North: Bay	L	0.439	86.3	F	11.2	0.609	87.6	F	15.9	0.637	87.9	F	16.6
Terrace	Т	0.439	81.0	F	11.2	0.609	82.4	F	15.9	0.637	82.7	F	16.6
	R	0.439	86.2	F	11.2	0.609	87.6	F	15.9	0.637	87.9	F	16.6
West:	L	0.666	44.4	D	11.2	0.669	41.0	D	15.9	0.711	36.5	D	16.6
Stirling Highway	Т	0.666	39.6	D	93.0	0.669	38.3	D	93.0	0.711	31.6	С	93.0
	R	0.005	57.1	Е	93.0	0.009	54.1	D	93.0	0.325	58.0	Е	93.0
All vehicles		0.666	37.5	D	126.2	0.669	35.1	D	159.5	0.736	31.0	С	142.7

SIDRA Results - Stirling Hwy/ Bay View Terrace - Scenario 2.1 – 2022 Future Traffic without Development (existing intersection layouts)

Intersection Approach		١	Veekday	AM Pe	eak	١	Neekday	∕ PM Pe	eak	Saturday Peak			
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Bay	L	0.526	66.6	E	52.1	0.641	71.7	E	49.6	0.687	77.6	E	44.9
Terrace	Т	0.526	70.0	E	52.1	0.641	75.1	E	49.6	0.687	81.1	F	44.9
	R	0.572	67.4	E	53.5	0.441	69.3	Е	34.6	0.502	75.6	Е	29.5
East: Stirling	L	0.505	22.3	С	105.8	0.637	22.5	С	129.1	0.538	17.9	В	112.7
підпімаў	Т	0.505	16.6	В	107.1	0.637	16.8	В	153.1	0.538	12.3	В	113.4
West:	L	0.582	33.4	С	93.0	0.611	33.0	С	93.0	0.706	29.4	С	93.0
Highway	Т	0.582	24.4	С	93.0	0.611	25.8	С	93.0	0.706	24.2	С	93.0
	R	0.582	29.8	С	93.0	0.611	32.9	С	93.0	0.706	35.2	D	93.0
All vehicles		0.582	26.7	С	107.1	0.641	25.8	С	153.1	0.706	23.1	С	113.4

SIDRA Results - Stirling Hwy/ Bay View Terrace - Scenario 3 – 2022 Future Traffic with Development (future intersection layouts)

Intersection Approach		V	Veekday	AM Pe	eak	\	Veekday	PM Pe	ak		Saturday Peak			
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	
South: Bay	L	0.605	70.0	E	54.4	0.677	74.7	E	51.7	0.703	78.0	E	46.2	
Terrace	Т	0.605	74.3	Е	54.4	0.677	79.0	Е	51.7	0.703	82.3	F	46.2	
	R	0.653	70.9	Е	55.2	0.515	72.8	Е	35.7	0.502	75.6	Е	29.5	
East: Stirling	L	0.570	28.7	С	126.0	0.661	28.3	С	160.9	0.623	25.8	С	146.7	
Highway	Т	0.570	23.0	С	127.5	0.661	22.6	С	161.7	0.623	20.2	С	147.6	
North: Bay	L	0.439	86.3	F	11.2	0.609	87.6	F	15.9	0.637	87.9	F	16.6	
Terrace	Т	0.439	81.0	F	11.2	0.609	82.4	F	15.9	0.637	82.7	F	16.6	
	R	0.439	86.2	F	11.2	0.609	87.6	F	15.9	0.637	87.9	F	16.6	
West:	L	0.666	44.0	D	11.2	0.675	40.5	D	15.9	0.724	37.0	D	16.6	
Highway	Т	0.666	39.4	D	93.0	0.675	37.8	D	93.0	0.724	31.9	С	93.0	
	R	0.005	57.1	Е	93.0	0.019	55.2	Е	93.0	0.338	59.6	E	93.0	
All vehicles		0.666	37.4	D	127.5	0.677	34.9	С	161.7	0.724	31.5	С	147.6	

Intersection Approach		Weel	kday Al	/I Peak		Weel	kday PN	/I peak		Satu	rday Pe	ak	
		DOS	Delay (s)	LOS	Ave. Back of Queue	DOS	Delay (s)	LOS	Ave. Back of Queue	DOS	Delay (s)	LOS	Ave. Back of Queue
South: Bay	L	0.730	74.2	Е	57.2	0.942	103.4	F	65.7	0.703	78.0	Е	46.2
view refrace	Т	0.730	77.6	Е	57.2	0.942	106.9	F	65.7	0.703	81.5	F	46.2
	R	0.691	72.8	Е	56.2	0.441	69.3	Е	34.6	0.502	75.6	Е	29.5
East: Stirling	L	0.719	24.2	С	161.8	0.941	68.5	Е	253.0	0.544	17.9	В	114.6
Highway	Т	0.719	18.6	В	161.8	0.941	56.3	Е	322.9	0.544	12.3	В	115.2
West: Stirling	L	0.659	23.6	С	93.0	0.629	19.9	В	93.0	0.714	20.1	С	93.0
Highway	Т	0.659	15.9	В	93.0	0.629	12.4	В	93.0	0.714	13.8	В	93.0
	R	0.659	22.7	С	93.0	0.629	19.3	В	93.0	0.714	23.3	С	93.0
All vehicles		0.730	23.6	С	161.8	0.942	39.1	D	322.9	0.714	18.1	В	115.2

SIDRA Results - Stirling Hwy/ Bay View Terrace - Scenario 3.1 – 2022 Future Traffic with Development (existing intersection layouts)

SIDRA Results - Stirling Hwy/ Bay View Terrace - Scenario 4 – 2032 Future Traffic without Development

Intersection Approach		۷	Veekday	AM Pe	eak	١	Neekday	PM Pe	ak	Saturday Peak			
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Bay	L	0.669	65.7	Е	62.2	0.810	78.6	E	63.5	0.764	79.0	E	54.4
Terrace	Т	0.669	70.0	Е	62.2	0.810	82.9	F	63.5	0.764	83.3	F	54.4
	R	0.722	68.0	Е	64.9	0.583	72.6	E	42.9	0.568	75.2	E	35.7
East: Stirling Highway	L	0.717	34.8	С	175.4	0.789	32.0	С	217.7	0.745	29.0	С	198.4
пупway	Т	0.717	29.1	С	177.4	0.789	26.3	С	218.8	0.745	23.4	С	199.6
North: Bay	L	0.495	86.6	F	12.7	0.694	88.7	F	18.3	0.750	89.7	F	19.9
Terrace	Т	0.495	81.3	F	12.7	0.694	83.5	F	18.3	0.750	84.5	F	19.9
	R	0.495	86.6	F	12.7	0.694	88.7	F	18.3	0.750	89.7	F	19.9
West:	L	0.706	46.3	D	12.7	0.711	39.2	D	18.3	0.774	39.1	D	19.9
Highway	Т	0.706	41.9	D	93.0	0.711	36.6	D	93.0	0.774	33.1	С	93.0
	R	0.007	67.3	Е	93.0	0.012	59.3	Е	93.0	0.520	73.1	E	93.0
All vehicles		0.722	40.4	D	177.4	0.810	36.2	D	218.8	0.774	33.6	С	199.6

Intersection Approach		۷	Veekday	AM Pe	eak	١	Veekday	PM Pe	ak	Saturday Peak			
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Bay	L	0.682	66.0	Е	63.1	0.780	76.1	Е	62.9	0.779	79.6	Е	55.9
Terrace	Т	0.682	70.3	Е	63.1	0.780	80.4	F	62.9	0.779	83.9	F	55.9
	R	0.723	68.0	E	65.0	0.554	71.4	Е	42.5	0.568	75.2	Е	35.7
East: Stirling	L	0.721	34.9	С	177.1	0.804	33.0	С	224.2	0.751	29.2	С	201.6
nignway	Т	0.721	29.2	С	179.1	0.804	27.3	С	225.3	0.751	23.6	С	202.7
North: Bay	L	0.495	86.6	F	12.7	0.694	88.7	F	18.3	0.750	89.7	F	19.9
Terrace	Т	0.495	81.3	F	12.7	0.694	83.5	F	18.3	0.750	84.5	F	19.9
	R	0.495	86.6	F	12.7	0.694	88.7	F	18.3	0.750	89.7	F	19.9
West:	L	0.707	45.3	D	12.7	0.713	40.3	D	18.3	0.772	38.9	D	19.9
Highway	Т	0.707	41.1	D	93.0	0.713	38.0	D	93.0	0.772	33.0	С	93.0
	R	0.007	67.9	Е	93.0	0.025	62.1	Е	93.0	0.525	72.8	Е	93.0
All vehicles		0.723	40.2	D	179.1	0.804	37.1	D	225.3	0.779	33.7	С	202.7

SIDRA Results - Stirling Hwy/ Bay View Terrace - Scenario 5 – 2032 Future Traffic with Development

# 2 Queenslea Dr / Stirling Hwy / Stirling Rd

SIDRA Results – Queenslea Dr / Stirling Hwy / Stirling Rd - Scenario 1 – 2020 Existing Traffic without Development

Intersection Approach	Weekday AM Peak DOS Delay LOS Ave (s) Ba					۷	Veekday	PM Pe	ak		Saturda	ay Peak	ζ.
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South:	L	0.377	52.6	D	49.6	0.980	111.8	F	82.7	0.765	76.9	Е	60.1
Drive	Т	1.022	129.6	F	106.2	0.985	108.8	F	92.0	0.902	87.0	F	56.4
	R	1.022	134.2	F	106.2	0.985	113.4	F	92.0	0.902	91.6	F	56.4
East: Stirling	L	1.033	134.7	F	217.0	0.930	53.1	D	217.0	0.757	36.5	D	138.0
підпімаў	Т	1.033	128.5	F	217.0	0.930	52.9	D	217.0	0.757	32.8	С	138.0
	R	1.048	150.1	F	56.3	0.994	115.0	F	61.0	0.907	92.3	F	66.4
North:	L	1.023	100.1	F	84.0	0.933	91.3	F	84.0	0.823	65.3	E	84.0
Suning Road	Т	1.023	95.6	F	84.0	0.933	86.8	F	84.0	0.823	60.8	Е	84.0
	R	1.023	127.3	F	84.0	0.933	91.6	F	84.0	0.823	71.4	Е	84.0
West:	L	0.259	8.6	А	25.9	0.369	9.8	А	44.7	0.313	9.5	А	35.7
Highway	Т	0.999	88.2	F	309.7	0.856	41.6	D	177.5	0.886	47.5	D	192.1
	R	1.056	158.7	F	160.9	0.749	78.1	Е	55.0	0.759	77.7	Е	58.9
All vehicles		1.056	101.6	F	309.7	0.994	59.0	Е	217.0	0.907	48.8	D	192.1

SIDRA Results – Queenslea Dr / Stirling Hwy / Stirling Rd - Scenario 2 – 2022 Future Traffic without Development (future intersection layouts)

Intersection Approach		١	Neekday	/ AM Pe	eak	١	Neekday	y PM Pe	eak		Saturd	ay Peal	k
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South:	L	1.225	284.5	F	229.9	0.975	104.2	F	148.9	0.729	61.5	Е	88.5
Drive	Т	1.225	280.0	F	229.9	0.975	99.7	F	148.9	0.729	56.9	Е	88.5
	R	0.852	89.1	F	38.5	0.361	72.2	Е	23.3	0.317	75.8	Е	16.4
East: Stirling Highway	L	0.140	40.6	D	27.7	0.175	35.1	D	30.8	0.150	37.2	D	27.5
	Т	0.666	43.2	D	147.9	0.876	47.8	D	207.8	0.750	39.6	D	158.6
	R	0.326	38.3	D	22.4	0.883	72.8	Е	51.1	1.000	89.2	F	71.5
North:	L	0.957	101.7	F	84.0	0.799	67.7	Е	78.6	0.984	109.6	F	84.0
Surling Road	Т	0.957	97.1	F	84.0	0.799	63.1	Е	78.6	0.984	105.0	F	84.0
	R	1.239	296.5	F	84.0	0.967	106.7	F	84.0	0.997	120.7	F	70.1
West:	L	0.272	7.7	А	84.0	0.390	10.3	В	84.0	0.338	10.0	А	84.0
Stirling Highway	Т	1.240	286.4	F	22.8	0.980	86.2	F	50.9	0.992	92.7	F	41.1
	R	1.255	312.4	F	593.9	0.999	122.9	F	266.7	0.939	99.1	F	276.9
All vehicles		1.255	183.9	F	593.9	0.999	67.7	Е	266.7	1.000	69.9	Е	276.9

Intersection Approach		١	Veekday	V AM Pe	eak	١	Neekday	∕ PM P€	eak		Saturd	ay Peal	k
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South:	L	1.037	142.7	F	93.6	0.882	84.3	F	73.3	0.985	114.4	F	79.5
Drive	Т	1.213	270.0	F	163.1	0.994	113.1	F	97.6	0.764	74.5	Е	53.4
	R	1.213	274.6	F	163.1	0.994	117.7	F	97.6	0.764	79.1	Е	53.4
East: Stirling Highway	L	0.722	44.7	D	157.6	0.913	63.0	Е	217.0	0.763	44.4	D	176.2
	Т	0.722	37.9	D	157.6	0.913	57.3	E	217.0	0.763	37.1	D	176.2
	R	0.326	61.0	Е	33.7	0.824	83.1	F	52.5	0.983	108.7	F	75.8
North: Stirling	L	1.176	212.6	F	84.0	0.940	93.2	F	84.0	0.899	80.6	F	84.0
Nuau	Т	1.176	208.1	F	84.0	0.940	88.7	F	84.0	0.899	76.1	Е	84.0
	R	1.176	238.3	F	84.0	0.940	93.1	F	84.0	0.899	82.2	F	84.0
West: Stirling	L	0.289	8.1	А	25.4	0.409	10.4	В	51.9	0.348	9.8	А	40.1
Highway 7	Т	1.258	301.5	F	607.8	0.965	78.1	E	254.9	1.001	104.1	F	321.0
	R	1.255	312.3	F	235.1	0.933	97.9	F	66.2	0.884	88.3	F	67.0
All vehicles		1.258	189.1	F	607.8	0.994	68.8	E	254.9	1.001	70.9	E	321.0

SIDRA Results – Queenslea Dr / Stirling Hwy / Stirling Rd - Scenario 2.1 – 2022 Future Traffic without Development (existing intersection layouts)

SIDRA Results – Queenslea Dr / Stirling Hwy / Stirling Rd - Scenario 3 – 2022 Future Traffic with	
Development (future intersection layouts)	

Intersection Approach		۷	Veekday	AM Pe	ak	۷	Veekday	PM Pe	ak		Saturda	ay Peal	ζ.
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South:	L	1.227	286.2	F	230.6	0.979	106.0	F	150.2	0.733	61.6	E	88.7
Drive	Т	1.227	281.6	F	230.6	0.979	101.4	F	150.2	0.733	57.1	Е	88.7
	R	0.869	90.4	F	39.7	0.376	72.3	E	24.3	0.337	75.9	E	17.5
East: Stirling L Highway	L	0.140	40.6	D	27.7	0.175	34.5	С	30.2	0.148	36.9	D	27.5
	Т	0.666	43.2	D	147.9	0.876	47.4	D	206.8	0.738	39.2	D	158.1
	R	0.326	38.3	D	22.4	0.883	73.3	Е	51.1	1.020	100.6	F	76.1
North: Stirling	L	0.981	111.6	F	84.0	0.835	70.9	E	83.7	0.993	113.9	F	84.0
Nudu	Т	0.981	107.0	F	84.0	0.835	66.3	Е	83.7	0.993	109.3	F	84.0
	R	1.264	316.8	F	84.0	0.996	119.9	F	84.0	1.018	130.8	F	75.0
West: Stirling	L	0.272	7.7	А	84.0	0.390	10.3	В	84.0	0.335	9.7	А	84.0
підпімаў	Т	1.252	296.1	F	22.8	0.989	91.3	F	50.9	0.992	91.9	F	39.7
F	R	1.257	314.2	F	610.6	0.999	122.9	F	277.7	1.002	123.9	F	281.0
All vehicles		1.264	190.0	F	610.6	0.999	70.6	E	277.7	1.020	72.5	Е	281.0

Intersection Approach		۷	Veekday	AM Pe	ak	۷	Veekday	PM Pe	ak		Saturda	ay Peal	¢
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South:	L	0.392	52.8	D	51.8	1.025	135.9	F	96.4	0.773	76.3	E	62.5
Drive	Т	1.105	184.3	F	134.2	1.010	122.8	F	104.7	0.959	99.6	F	64.8
East: Stirling	R	1.105	188.9	F	134.2	1.010	127.3	F	104.7	0.959	104.2	F	64.8
East: Stirling Highway	L	1.074	155.4	F	217.0	1.000	97.0	F	217.0	0.800	38.6	D	152.8
	Т	1.074	153.3	F	217.0	1.000	93.4	F	217.0	0.800	35.3	D	152.8
	R	1.087	172.4	F	63.1	1.030	133.3	F	69.0	1.002	118.6	F	79.5
North: Stirling	L	1.046	101.1	F	84.0	0.971	106.5	F	84.0	0.887	75.7	E	84.0
Road	Т	1.046	96.6	F	84.0	0.971	102.0	F	84.0	0.887	71.2	Е	84.0
	R	1.046	139.4	F	84.0	0.971	105.1	F	84.0	0.887	79.3	Е	84.0
West: Stirling	L	0.267	8.4	А	84.0	0.384	10.7	В	84.0	0.329	10.0	В	84.0
Highway	Т	1.073	147.1	F	26.1	0.933	62.8	E	51.2	0.976	82.3	F	40.1
	R	1.107	195.1	F	465.2	0.777	79.3	Е	232.7	0.751	76.5	Е	279.2
All vehicles		1.107	135.2	F	465.2	1.030	81.7	F	232.7	1.002	62.8	Е	279.2

SIDRA Results – Queenslea Dr / Stirling Hwy / Stirling Rd - Scenario 3.1 – 2022 Future Traffic with Development (existing intersection layouts)

SIDRA Results – Queenslea Dr / Stirling Hwy / Stirling Rd - Scenario 4 – 2032 Future Traffic without Development

Intersection Approach		۷	Veekday	AM Pe	ak	۷	Veekday	PM Pe	ak		Saturda	ay Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South:	L	1.464	487.6	F	363.3	1.163	232.5	F	274.8	0.921	84.2	F	131.0
Drive	Т	1.464	483.0	F	363.3	1.163	227.9	F	274.8	0.921	79.7	E	131.0
F East: Stirling I	R	1.021	132.6	F	58.4	0.438	73.0	Е	27.9	0.407	77.6	Е	19.8
East: Stirling I Highway	L	0.166	40.3	D	32.5	0.174	31.9	С	22.9	0.178	34.3	С	30.5
	Т	0.814	47.1	D	183.5	0.872	39.7	D	184.5	0.892	49.6	D	216.0
	R	0.386	42.0	D	29.7	0.885	81.9	F	53.1	1.145	196.6	F	126.5
North: Stirling	L	1.204	268.7	F	84.0	1.032	141.4	F	84.0	1.167	237.9	F	84.0
Rudu	Т	1.204	264.1	F	84.0	1.032	136.8	F	84.0	1.167	233.3	F	84.0
	R	1.479	499.9	F	84.0	1.153	226.4	F	84.0	1.183	250.0	F	84.0
West: Stirling	L	0.329	8.3	А	84.0	0.473	11.5	В	84.0	0.414	11.7	В	84.0
Highway 7 F	Т	1.478	493.2	F	32.1	1.187	242.9	F	71.4	1.169	226.7	F	59.8
	R	1.499	520.7	F	915.3	1.191	257.1	F	540.9	1.083	173.9	F	530.6
All vehicles		1.499	311.3	F	915.3	1.191	141.7	F	540.9	1.183	140.0	F	530.6

Intersection Approach		۷	Veekday	AM Pe	ak	۷	Veekday	PM Pe	ak		Saturda	ay Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South:	L	1.466	489.3	F	364.0	1.166	234.6	F	276.1	1.012	124.9	F	163.0
Drive	Т	1.466	484.7	F	364.0	1.166	230.1	F	276.1	1.012	120.3	F	163.0
East: Stirling I	R	1.482	502.6	F	125.2	0.448	73.0	Е	28.9	0.401	76.5	E	21.0
East: Stirling Highway -	L	0.161	38.7	D	31.7	0.173	31.9	С	22.7	0.176	33.6	С	28.5
	Т	0.788	44.3	D	177.8	0.865	38.9	D	180.8	0.878	46.1	D	205.3
	R	0.374	41.0	D	29.1	0.879	81.4	F	52.5	1.124	178.5	F	119.7
North: Stirling	L	1.146	221.3	F	84.0	1.054	154.7	F	84.0	1.156	227.8	F	84.0
Ruau	Т	1.146	216.7	F	84.0	1.054	150.1	F	84.0	1.156	223.2	F	84.0
	R	0.931	100.7	F	31.3	1.181	248.8	F	84.0	1.112	193.9	F	84.0
West: Stirling	L	0.329	8.3	А	84.0	0.473	11.4	В	84.0	0.419	12.4	В	84.0
Highway -	Т	1.449	467.5	F	32.0	1.189	244.0	F	71.3	1.166	224.1	F	63.5
	R	1.480	504.3	F	904.1	1.191	257.1	F	548.4	1.069	164.3	F	536.2
All vehicles		1.482	287.5	F	904.1	1.191	145.5	F	548.4	1.166	135.7	F	536.2

SIDRA Results – Queenslea Dr / Stirling Hwy / Stirling Rd - Scenario 5 – 2032 Future Traffic with Development

# 3 Church Ln / Stirling Hwy

Intersection Approach		V	Veekday	AM Pe	ak	V	Veekday	PM Pe	ak		Saturda	ay Peał	<b>&lt;</b>
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East: Stirling	Т	0.313	1.2	А	49.2	0.529	1.2	А	17.9	0.457	3.2	А	13.1
підпічау	R	0.313	26.1	D	49.2	0.529	20.2	С	5.4	0.457	23.9	С	13.1
North:	L	0.290	12.8	В	1.4	0.831	75	F	9.3	0.62	23	С	5.2
Church Lane	R	0.290	175.2	F	1.4	0.831	347.8	F	9.3	0.62	241	F	5.2
West:	L	0.420	5.6	А	69.4	0.362	5.6	А	7.3	0.385	5.6	А	35.1
Stirling Highway	Т	0.420	0	А	71.0	0.362	0	А	10.8	0.385	0	А	35.1
All vehicles		0.420	0.9	NA	71.0	0.831	3.4	NA	17.9	0.62	3.2	NA	35.1

SIDRA Results - Church Ln / Stirling Hwy - Scenario 1 - 2020 Existing Traffic without Development

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Results – Church Ln / Stirling Hwy - Scenario 2 – 2022 Future Traffic without Development (future intersection layouts)

Intersection Approach		W	/eekday	AM Pe	ak	W	/eekday	PM Pe	ak		Saturda	ay Peak	C
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East: Stirling	Т	0.331	0.0	А	0.0	0.664	0.1	А	0.0	0.391	0.0	А	0.0
Tiigiiway	R	0.038	14.3	В	0.3	0.096	16.3	С	0.8	0.247	19.4	С	2.3
North: Church Lane	L	0.033	8.1	А	1.7	0.156	8.2	A	8.3	0.214	8.4	A	12.3
West:	L	0.362	5.6	А	103.2	0.376	5.6	А	99.9	0.399	5.6	А	108.7
Stirling Highway	Т	0.362	0.1	А	115.6	0.376	0.1	А	129.3	0.399	0.1	А	108.7
All vehicles		0.362	0.2	NA	115.6	0.664	0.5	NA	129.3	0.399	0.9	NA	108.7

SIDRA Results – Church Ln / Stirling Hwy - Scenario 2.1 – 2022 Future Traffic without Development (existing intersection layouts)

Intersection Approach		M	/eekday	AM Pe	ak	M	/eekday	PM Pe	ak		Saturda	ay Peał	¢
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East: Stirling Highway	Т	0.352	0.6	А	2.4	0.558	1.3	А	45.7	0.539	4	А	27.7
Tiigiiway	R	0.352	18.9	С	2.4	0.558	21.3	С	6.1	0.539	26.5	D	27.7
North:	L	0.170	8	А	0.9	0.949	124.8	F	15.3	0.651	25.8	D	5.8
Church Lane	R	0.170	93.6	F	0.9	0.949	442.4	F	15.3	0.651	250	F	5.8
West:	L	0.350	5.6	А	72.3	0.376	5.6	А	84.1	0.397	5.6	А	112.1
Stirling Highway	Т	0.350	0	А	73.6	0.376	0	А	105.2	0.397	0	А	112.1
All vehicles		0.352	0.6	NA	73.6	0.949	4.8	NA	105.2	0.651	3.7	NA	112.1

SIDRA Results – Church Ln / Stirling Hwy - Scenario 3 – 2022 Future Traffic with Development (future intersection layouts)

Intersection Approach		M	/eekday	AM Pe	ak	M	/eekday	PM Pe	ak		Saturda	ay Peał	C
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East: Stirling	Т	0.331	0.0	А	0.0	0.652	0.1	А	0.0	0.389	0.0	А	0.0
підпімаў	R	0.067	14.6	В	0.6	0.145	16.9	С	1.3	0.318	21.1	С	3.1
North: Church Lane	L	0.055	8.0	A	3.0	0.183	8.1	A	10.0	0.248	8.3	A	15.0
West:	L	0.365	5.6	А	100.7	0.383	5.6	А	98.9	0.407	5.6	А	109.0
Stirling	Т	0.365	0.1	А	115.2	0.383	0.1	А	129.1	0.407	0.1	А	109.0
All vehicles		0.365	0.3	NA	115.2	0.652	0.7	NA	129.1	0.407	1.1	NA	109.0

SIDRA Results – Church Ln / Stirling Hwy - Scenario 3.1 – 2022 Future Traffic with Development (existing intersection layouts)

Intersection Approach		V	/eekday	AM Pe	ak	V	/eekday	PM Pe	ak		Saturda	ay Peak	¢
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East: Stirling Highway	Т	0.342	1.7	А	93.0	0.459	2.2	А	92.7	0.538	4.5	А	24.3
	R	0.342	24.5	С	93.0	0.459	24.5	С	73.2	0.538	27.3	D	24.3
North: Church Lane	L	0.287	11.2	В	2.4	0.864	76.5	F	11.2	0.783	41.6	E	9.2
	R	0.287	154.4	F	2.4	0.864	349.8	F	11.2	0.783	330.7	F	9.2
West:	L	0.419	5.6	А	42.1	0.383	5.6	А	5.9	0.406	5.6	А	40.9
Stirling Highway	Т	0.419	0.1	А	71.0	0.383	0.1	А	5.9	0.406	0.1	А	40.9
All vehicles		0.419	1.3	NA	93.0	0.864	4.3	NA	92.7	0.783	4.8	NA	40.9

SIDRA Results – Church Ln / Stirling Hwy - Scenario 4 – 2032 Future Traffic without Development

Intersection Approach		W	/eekday	AM Pe	ak	W	/eekday	PM Pe	ak		Saturda	ay Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East: Stirling	Т	0.512	0.1	А	0.0	0.501	0.1	А	0.0	0.658	0.1	А	0.0
nignway	R	0.044	14.3	В	0.4	0.103	16.9	С	0.9	0.306	20.9	С	3.0
North: Church Lane	L	0.041	8.1	A	2.2	0.182	8.5	A	9.3	0.252	8.7	A	16.3
West:	L	0.361	5.6	А	103.9	0.392	5.6	А	101.2	0.413	5.6	А	129.0
Highway	Т	0.361	0.1	А	116.2	0.392	0.1	А	134.3	0.413	0.1	А	129.0
All vehicles		0.512	0.2	NA	116.2	0.501	0.5	NA	134.3	0.658	1.0	NA	129.0

Intersection Approach		V	/eekday	AM Pe	ak	V	/eekday	PM Pe	ak		Saturda	ay Peał	C
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East: Stirling	Т	0.493	0.1	А	0.0	0.485	0.1	А	0.0	0.646	0.1	А	0.0
Tiigiiway	R	0.075	14.6	В	0.7	0.136	17.0	С	1.2	0.372	22.1	С	3.8
North: Church Lane	L	0.063	8.0	A	3.4	0.205	8.3	A	10.7	0.286	8.8	A	1.9
West:	L	0.364	5.6	А	100.8	0.391	5.6	А	97.7	0.416	5.6	А	0.0
Highway	Т	0.364	0.1	А	115.7	0.391	0.1	А	133.0	0.416	0.1	А	99.5
All vehicles		0.493	0.3	NA	115.7	0.485	0.6	NA	133.0	0.646	1.2	NA	99.5

SIDRA Results – Church Ln / Stirling Hwy - Scenario 5 – 2032 Future Traffic with Development

# 4 St Quentin Ave / Church Ln

Intersection Approach		V	/eekday	AM Pe	ak	v	leekday	PM Pe	ak		Saturda	ay Peak	ζ.
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Church Ln	L	0.014	5	А	0.2	0.037	5.2	A	0.4	0.08	5.2	A	1
East: St	L	0.100	4.6	А	0	0.156	4.6	А	0	0.162	4.6	А	0
	Т	0.100	0	А	0	0.156	0	А	0	0.162	0	А	0
All vehicles		0.100	1.4	NA	0.2	0.156	2	NA	0.4	0.162	2.6	NA	1

SIDRA Results – St Quentin Ave / Church Ln - Scenario 1 – 2020 Existing Traffic without Development

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Results – St Quentin Ave / Church Ln - Scenario 2 – 2022 Future Traffic without Development (future intersection layouts)

Intersection Approach		W	/eekday	AM Pe	ak	N	/eekday	PM Pe	ak		Saturda	ay Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Church Ln	L	0.014	4.9	A	0.2	0.041	5.1	A	0.5	0.084	5.2	A	1.0
East: St	L	0.087	4.6	А	0.0	0.140	4.6	А	0.0	0.144	4.6	А	0.0
	Т	0.087	0.0	А	0.0	0.140	0.0	А	0.0	0.144	0.0	А	0.0
All vehicles		0.087	1.3	NA	0.2	0.140	2.0	NA	0.5	0.144	2.6	NA	1.0

SIDRA Results – St Quentin Ave / Church Ln - Scenario 2.1 – 2022 Future Traffic without Development (existing intersection layouts)

Intersection Approach		V	/eekday	AM Pe	ak	V	/eekday	PM Pe	ak		Saturda	ay Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Church Ln	L	0.014	4.9	A	0.2	0.041	5.1	A	0.5	0.084	5.2	A	1.0
East: St	L	0.087	4.6	А	0.0	0.140	4.6	А	0.0	0.144	4.6	А	0.0
Quentin Ave	Т	0.087	0.0	А	0.0	0.140	0.0	А	0.0	0.144	0.0	А	0.0
All vehicles		0.087	1.3	NA	0.2	0.140	2.0	NA	0.5	0.144	2.6	NA	1.0

SIDRA Results – St Quentin Ave / Church Ln - Scenario 3 – 2022 Future Traffic with Development (future intersection layouts)

Intersection Approach		W	/eekday	AM Pe	ak	W	/eekday	PM Pea	ak		Saturda	ıy Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Church Ln	L	0.021	5.0	A	0.2	0.054	5.1	A	0.6	0.101	5.2	A	1.2
East: St	L	0.087	4.6	А	0.0	0.141	4.6	А	0.0	0.145	4.6	А	0.0
Quentin Ave	Т	0.087	0.0	А	0.0	0.141	0.0	А	0.0	0.145	0.0	А	0.0
All vehicles		0.087	1.4	NA	0.2	0.141	2.2	NA	0.6	0.145	2.8	NA	1.2

SIDRA Results – St Quentin Ave / Church Ln - Scenario 3.1 – 2022 Future Traffic with Development (existing intersection layouts)

Intersection Approach		W	/eekday	AM Pe	ak	W	/eekday	PM Pea	ak		Saturda	y Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Church Ln	L	0.021	5.0	A	0.2	0.052	5.2	A	0.6	0.100	5.2	A	1.2
East: St	L	0.104	4.6	А	0.0	0.162	4.6	А	0.0	0.170	4.6	А	0.0
Quentin Ave	Т	0.104	0.0	А	0.0	0.162	0.0	А	0.0	0.170	0.0	А	0.0
All vehicles		0.104	1.6	NA	0.2	0.162	2.2	NA	0.6	0.170	2.7	NA	1.2

SIDRA Results – St Quentin Ave / Church Ln - Scenario 4 – 2032 Future Traffic without Development

Intersection Approach		W	leekday	AM Pea	ak	W	leekday	PM Pea	ak		Saturda	y Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Church Ln	L	0.016	5.0	A	0.2	0.043	5.2	A	0.5	0.095	5.3	A	1.2
East: St	L	0.102	4.6	А	0.0	0.159	4.6	А	0.0	0.168	4.6	А	0.0
	Т	0.102	0.0	А	0.0	0.159	0.0	А	0.0	0.168	0.0	А	0.0
All vehicles		0.102	1.2	NA	0.2	0.159	2.0	NA	0.5	0.168	2.6	NA	1.2

Intersection Approach		V	/eekday	AM Pe	ak	V	/eekday	PM Pea	ak		Saturda	ıy Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Church Ln	L	0.021	5.0	A	0.2	0.054	5.2	A	0.6	0.110	5.3	A	1.3
East: St	L	0.103	4.6	А	0.0	0.159	4.6	А	0.0	0.169	4.6	А	0.0
	Т	0.103	0.0	А	0.0	0.159	0.0	А	0.0	0.169	0.0	А	0.0
All vehicles		0.103	1.4	NA	0.2	0.159	2.1	NA	0.6	0.169	2.7	NA	1.3

SIDRA Results – St Quentin Ave /	<sup>/</sup> Church Ln - Scenario 5 – 20	032 Future Traffic with	Development

### 5 Stirling Road / St Quentin Ave

SIDRA Results – Stirling Road / St Quentin Ave - Scenario 1 – 2020 Existing Traffic without Development

Intersection Approach		W	/eekday	AM Pe	ak	W	/eekday	PM Pe	ak		Saturda	ıy Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Stirling T Road	Т	0.317	0	А	0.0	0.38	0	А	0.0	0.345	0	А	0.0
Rudu	R	0.087	7	А	0.9	0.084	7.5	А	0.8	0.125	7.5	А	1.2
East: St	L	0.265	5.8	А	1.7	0.499	12	В	4.4	1.108	149.7	F	74.1
Avenue	R	0.265	23.7	С	1.7	0.499	38	Е	4.4	1.108	189.6	F	74.1
Avenue North: Stirling L Road	L	0.126	4.7	А	4.7	0.15	4.6	А	28.1	0.146	4.6	А	11.6
	Т	0.126	0	А	35.3	0.15	0	А	33.3	0.146	0	А	18.9
All vehicles		0.317	1.2	NA	35.3	0.499	1.9	NA	33.3	1.108	25.6	NA	74.1

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Results – Stirling Road / St Quentin Ave - Scenario 2 – 2022 Future Traffic without Development (future intersection layouts)

Intersection Approach		W	/eekday	AM Pea	ak	W	/eekday	PM Pe	ak		Saturda	ıy Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Stirling T Road	Т	0.322	0.0	А	0.0	0.396	0.0	А	0.0	0.359	0.0	А	0.0
	R	0.091	7.1	А	1.0	0.093	7.8	А	0.9	0.135	7.7	А	1.3
East: St	L	0.260	6.2	А	1.8	0.477	12.8	В	4.3	1.206	226.8	F	94.2
Avenue	R	0.260	25.8	D	1.8	0.477	41.4	Е	4.3	1.206	260.4	F	94.2
Avenue North: Stirling L	L	0.131	4.7	А	0.0	0.207	4.6	А	0.0	0.181	4.6	А	0.0
Ruau	Т	0.131	0.0	А	27.5	0.207	0.1	А	0.0	0.181	0.1	А	0.0
All vehicles		0.322	1.2	NA	27.5	0.477	1.9	NA	4.3	1.206	34.5	NA	94.2

SIDRA Results – Stirling Road / St Quentin Ave - Scenario 2.1 – 2022 Future Traffic without Development (existing intersection layouts)

Intersection Approach		W	/eekday	AM Pe	ak	W	/eekday	PM Pe	ak		Saturda	y Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Stirling	Т	0.324	0	А	0.0	0.394	0	А	0.0	0.359	0	А	0.0
Rudu	R	0.091	7.1	А	0.9	0.091	7.7	А	0.9	0.134	7.7	А	1.3
East: St	L	0.291	6.4	А	2.0	0.56	14.9	В	5.2	1.244	257.9	F	113.8
Avenue	R	0.291	25.9	D	2.0	0.56	43.9	Е	5.2	1.244	295.2	F	113.8
North: Stirling	L	0.131	4.6	А	34.9	0.156	4.6	А	39.2	0.151	4.6	А	17.0
Ruau	Т	0.131	0	А	52.1	0.156	0	А	46.6	0.151	0	А	24.9
All vehicles		0.324	1.3	NA	52.1	0.56	2.2	NA	46.6	1.244	41.6	NA	113.8

SIDRA Results – Stirling Road / St Quentin Ave - Scenario 3 – 2022 Future Traffic with Development (future intersection layouts)

Intersection Approach		W	/eekday	AM Pea	ak	W	/eekday	PM Pe	ak		Saturda	y Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Stirling	Т	0.321	0.0	А	0.0	0.396	0.0	А	0.0	0.357	0.0	А	0.0
Nudu	R	0.091	7.1	А	1.0	0.091	7.7	А	0.9	0.136	7.8	А	1.3
East: St	L	0.295	6.7	А	2.1	0.581	16.3	С	5.8	1.337	334.5	F	119.9
Avenue	R	0.295	26.6	D	2.1	0.581	45.8	Е	5.8	1.337	364.6	F	119.9
North: Stirling	L	0.132	4.7	А	0.0	0.157	4.6	А	0.0	0.191	4.6	А	0.0
Rudu	Т	0.132	0.0	А	34.0	0.157	0.0	А	8.1	0.191	0.1	А	0.0
All vehicles		0.321	1.3	NA	34.0	0.581	2.4	NA	8.1	1.337	53.6	NA	119.9

SIDRA Results – Stirling Road / St Quentin Ave - Scenario 3.1 – 2022 Future Traffic with Development (existing intersection layouts)

Intersection Approach		۷	Veekday	AM Pe	ak	۷	Veekday	PM Pe	ak		Saturda	ay Peal	٢
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Stirling	Т	0.324	0.0	А	0.0	0.394	0.0	А	0.0	0.359	0.0	А	0.0
Nudu	R	0.092	7.1	А	1.0	0.091	7.7	А	0.9	0.135	7.7	А	1.3
East: St	L	0.324	6.9	А	2.3	0.639	18.4	С	6.8	1.370	363.1	F	119.9
Avenue	R	0.324	26.6	D	2.3	0.639	48.0	E	6.8	1.370	397.5	F	119.9
North: Stirling	L	0.132	4.7	А	0.0	0.157	4.6	А	0.0	0.153	4.6	A	0.0
Rudu	Т	0.132	0.0	А	46.1	0.157	0.0	А	49.8	0.153	0.0	А	33.2
All vehicles		0.324	1.4	NA	46.1	0.639	2.7	NA	49.8	1.370	61.6	NA	119.9

Intersection Approach		v	Veekday	AM Pe	ak	v	Veekday	PM Pe	ak		Saturda	ıy Peak	
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Stirling	Т	0.374	0.0	А	0.0	0.445	0.0	А	0.0	0.416	0.0	А	0.0
Nudu	R	0.117	7.8	А	1.2	0.118	8.7	А	1.1	0.178	8.7	А	1.7
East: St	L	0.418	11.6	В	3.2	0.878	66.1	F	13.4	2.064	982.7	F	119.9
Avenue	R	0.418	42.3	Е	3.2	0.878	112.2	F	13.4	2.064	1010.7	F	119.9
North: Stirling	L	0.156	4.7	А	0.0	0.186	4.6	А	0.0	0.181	4.6	А	0.0
Nudu	Т	0.156	0.0	А	91.3	0.186	0.1	А	81.5	0.181	0.1	А	32.4
All vehicles		0.418	1.7	NA	91.3	0.878	5.6	NA	81.5	2.064	138.8	NA	119.9

SIDRA Results – Stirling Road / St Quentin Ave - Scenario 4 – 2032 Future Traffic without Development

SIDRA Results – Stirling Road / St Quentin Ave - Scenario 5 – 2032 Future Traffic with Development

Intersection Approach		۷	Veekday	AM Pe	ak	۷	Veekday	PM Pe	ak		Saturda	ay Peak	(
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Stirling	Т	0.374	0.0	А	0.0	0.445	0.0	А	0.0	0.416	0.0	А	0.0
Noau	R	0.118	7.8	А	1.2	0.118	8.8	А	1.1	0.180	8.8	А	1.7
East: St	L	0.471	13.3	В	3.9	0.986	105.4	F	23.6	2.217	1118.9	F	119.9
Avenue	R	0.471	44.3	Е	3.9	0.986	152.7	F	23.6	2.217	1145.3	F	119.9
North: Stirling	L	0.157	4.7	А	0.0	0.187	4.6	А	0.0	0.183	4.6	А	0.0
Nudu	Т	0.157	0.0	А	0.0	0.187	0.1	А	80.9	0.183	0.1	А	18.7
All vehicles		0.471	1.9	NA	3.9	0.986	9.0	NA	80.9	2.217	166.9	NA	119.9

## 6 Avion Way / St Quentin Ave

Intersect Approa	ion ch		٧	Veekday	AM Pe	ak	۷	Veekday	PM Pe	ak		Saturda	ay Peal	ζ.
			DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East:	St	L	0.117	4.8	А	1.4	0.224	5	А	2.9	0.342	5.1	А	4.4
Avenue		Т	0.117	3.4	А	1.4	0.224	3.6	А	2.9	0.342	3.7	А	4.4
West: Quentin Avenue	St	R	0.043	4.8	A	0	0.062	4.8	A	0	0.072	4.8	A	0
All vehicle	es		0.117	4	NA	1.4	0.224	4.2	NA	2.9	0.342	4.2	NA	4.4

SIDRA Results – Avion Way / St Quentin Ave - Scenario 1 – 2020 Existing Traffic without Development

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Results – Avion Way / St Quentin Ave - Scenario 2 – 2022 Future Traffic without Development (future intersection layouts)

Intersecti Approac	on h		V	leekday	AM Pe	ak	۷	Veekday	PM Pe	ak		Saturda	ay Peal	¢
			DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East:	St	L	0.110	4.8	А	1.3	0.221	5.0	А	2.8	0.378	5.1	А	4.4
Avenue		Т	0.110	3.4	А	1.3	0.221	3.6	А	2.8	0.378	3.8	А	4.4
West: Quentin Avenue	St	R	0.044	4.8	A	0.0	0.064	4.8	A	0.0	0.075	4.8	A	0.0
All vehicle	S		0.110	4.1	NA	1.3	0.221	4.2	NA	2.8	0.378	4.2	NA	4.4

SIDRA Results – Avion Way / St Quentin Ave - Scenario 2.1 – 2022 Future Traffic without Development (existing intersection layouts)

Intersection Approact	on h		V	/eekday	AM Pe	ak	V	/eekday	PM Pe	ak		Saturda	ay Peak	
			DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East:	St	L	0.121	4.8	А	1.4	0.232	5	А	3	0.442	5.2	А	4.6
Avenue		Т	0.121	3.4	А	1.4	0.232	3.6	А	3	0.442	3.8	А	4.6
West: Quentin Avenue	St	R	0.044	4.8	A	0	0.064	4.8	A	0	0.075	4.8	A	0
All vehicles	5		0.121	4	NA	1.4	0.232	4.2	NA	3	0.442	4.2	NA	4.6

SIDRA Results – Avion Way / St Quentin Ave - Scenario 3 – 2022 Future Traffic with Development (future intersection layouts)

Intersect Approa	ion ch		v	Veekday	AM Pe	ak	v	Veekday	PM Pe	ak		Saturda	ay Peak	C
			DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East:	St	L	0.117	4.8	А	1.3	0.235	5.0	А	3.0	0.556	5.3	А	5.4
Avenue		Т	0.117	3.4	А	1.3	0.235	3.6	А	3.0	0.556	4.0	А	5.4
West: Quentin Avenue	St	R	0.044	4.8	A	0.0	0.064	4.8	A	0.0	0.075	4.8	A	0.0
All vehicle	es		0.117	4.0	NA	1.3	0.235	4.2	NA	3.0	0.556	4.4	NA	5.4

SIDRA Results – Avion Way / St Quentin Ave - Scenario 3.1 – 2022 Future Traffic with Development (existing intersection layouts)

Intersection Approach		V	leekday	AM Pe	ak	٧	Veekday	PM Pe	ak		Saturda	ay Peak	ζ.
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East: St	L	0.128	4.8	А	1.5	0.248	5.0	А	3.2	0.625	5.9	А	7.2
Avenue	Т	0.128	3.4	А	1.5	0.248	3.6	А	3.2	0.625	4.5	А	7.2
West: St Quentin Avenue	R	0.043	4.8	A	0.0	0.064	4.8	A	0.0	0.075	4.8	A	0.0
All vehicles		0.128	4.0	NA	1.5	0.248	4.2	NA	3.2	0.625	4.8	NA	7.2

SIDRA Results - Avion Way / St Quentin Ave - Scenario 4 - 2032 Future Traffic without Development

Intersect Approa	ion ch		V	/eekday	AM Pe	ak	V	/eekday	PM Pe	ak		Saturda	ay Peak	C
			DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East:	St	L	0.130	4.9	А	1.5	0.254	5.1	А	3.3	0.663	6.5	А	9.4
Avenue		Т	0.130	3.5	А	1.5	0.254	3.7	А	3.3	0.663	5.2	А	9.4
West: Quentin Avenue	St	R	0.051	4.8	A	0.0	0.075	4.8	A	0.0	0.087	4.8	A	0.0
All vehicle	es		0.130	4.1	NA	1.5	0.254	4.3	NA	3.3	0.663	5.3	NA	9.4

Intersection Approach		٧	Veekday	AM Pe	ak	v	/eekday	PM Pe	ak		Saturda	ay Peak	¢
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
East: St	L	0.136	4.9	А	1.6	0.266	5.1	А	3.5	0.692	6.9	А	10.8
Avenue	Т	0.136	3.5	А	1.6	0.266	3.7	А	3.5	0.692	5.5	А	10.8
West: St Quentin Avenue	R	0.051	4.8	A	0.0	0.074	4.8	A	0.0	0.087	4.8	A	0.0
All vehicles		0.136	4.1	NA	1.6	0.266	4.3	NA	3.5	0.692	5.5	NA	10.8

SIDRA Results – Avion Way / St Quentin Ave - Scenario 5 – 2032 Future Traffic with Development

### 7 Bay View Terrace / St Quentin Ave

SIDRA Results – Bay View Terrace / St Quentin Ave - Scenario 1 – 2020 Existing Traffic without Development

Intersection Approach	Weekday AM Peak					W	/eekday	PM Pe	ak	Saturday Peak			
	I	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Bay View Terrace	L	0.036	0.3	A	0.4	0.071	0.5	A	0.7	0.083	0.5	A	0.9
North: Bay View Terrace	R	0.066	0	A	0	0.084	0	A	0	0.087	0	A	0
All vehicles		0.066	0.1	NA	0.4	0.084	0.2	NA	0.7	0.087	0.2	NA	0.9

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Results – Bay View Terrace / St Quentin Ave - Scenario 2 – 2022 Future Traffic without Development (future intersection layouts)

Intersection Approach		V	/eekday	AM Pe	ak	W	/eekday	PM Pe	ak	Saturday Peak				
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	
South: Bay View Terrace	L	0.032	0.3	A	0.3	0.065	0.4	A	0.7	0.076	0.4	A	0.8	
North: Bay	Т	0.068	0.0	А	0.0	0.087	0.0	А	0.0	0.089	0.0	А	0.0	
Terrace	R	0.068	0.9	A	0.0	0.087	0.9	Α	0.0	0.089	0.9	A	0.0	
All vehicles		0.068	0.6	NA	0.3	0.087	0.6	NA	0.7	0.089	0.6	NA	0.8	

SIDRA Results – Bay View Terrace / St Quentin Ave - Scenario 2.1 – 2022 Future Traffic without Development (existing intersection layouts)

Intersection Approach		V	Veekday	AM Pe	eak	N	/eekday	PM Pe	ak	Saturday Peak			
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)
South: Bay View Terrace	L	0.037	0.4	A	0.4	0.075	0.5	A	0.8	0.088	0.5	A	0.9
North: Bay View Terrace	R	0.069	0	A	0	0.088	0	A	0	0.09	0	A	0
All vehicles		0.069	0.1	NA	0.4	0.088	0.2	NA	0.8	0.09	0.2	NA	0.9

SIDRA Results – Bay View Terrace / St Quentin Ave - Scenario 3 – 2022 Future Traffic with Development (future intersection layouts)

Intersection Approach		v	/eekday	AM Pe	eak	v	/eekday	PM Pe	eak	Saturday Peak				
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	
South: Bay View Terrace	L	0.032	0.3	A	0.3	0.065	0.4	A	0.7	0.076	0.4	A	0.8	
North: Bay	Т	0.068	0.0	А	0.0	0.088	0.0	А	0.0	0.090	0.0	А	0.0	
Terrace	R	0.068	0.9	А	0.0	0.088	0.9	А	0.0	0.090	0.9	А	0.0	
All vehicles		0.068	0.6	NA	0.3	0.088	0.6	NA	0.7	0.090	0.6	NA	0.8	

SIDRA Results – Bay View Terrace / St Quentin Ave - Scenario 3.1 – 2022 Future Traffic with Development (existing intersection layouts)

Intersection Approach		V	Veekday	AM Pe	eak	V	/eekday	PM Pe	ak	Saturday Peak				
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	
South: Bay View Terrace	L	0.039	0.5	A	0.4	0.075	0.5	A	0.8	0.088	0.5	A	0.9	
North: Bay View Terrace	R	0.098	0.0	A	0.0	0.088	0.0	A	0.0	0.091	0.0	A	0.0	
All vehicles		0.098	0.2	NA	0.4	0.088	0.2	NA	0.8	0.091	0.2	NA	0.9	

SIDRA Results - Bay View Terrace / St Quentin Ave - Scenario 4 - 2032 Future Traffic without Development

Intersection Approach		N	Veekday	AM Pe	eak	W	/eekday	PM Pe	ak	Saturday Peak				
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	
South: Bay View Terrace	L	0.037	0.3	A	0.4	0.069	0.5	A	0.7	0.088	0.5	A	0.9	
North: Bay	Т	0.081	0.0	А	0.0	0.104	0.0	А	0.0	0.107	0.0	А	0.0	
Terrace	R	0.081	0.9	А	0.0	0.104	0.9	А	0.0	0.107	0.9	А	0.0	
All vehicles		0.081	0.6	NA	0.4	0.104	0.6	NA	0.7	0.107	0.6	NA	0.9	

Intersection Approach		٧	Veekday	AM Pe	eak	N	/eekday	PM Pe	ak	Saturday Peak				
		DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	DOS	Delay (s)	LOS	Ave. Back of Queue (m)	
South: Bay View Terrace	L	0.037	0.4	A	0.4	0.067	0.5	A	0.7	0.087	0.5	A	0.9	
North: Bay	Т	0.081	0.0	А	0.0	0.104	0.0	А	0.0	0.108	0.0	А	0.0	
Terrace	R	0.081	0.9	А	0.0	0.104	0.9	А	0.0	0.108	0.9	А	0.0	
All vehicles		0.081	0.6	NA	0.4	0.104	0.6	NA	0.7	0.108	0.6	NA	0.9	

SIDRA Results – Bay View Terrace / St Quentin Ave - Scenario 5 – 2032 Future Traffic with Development