

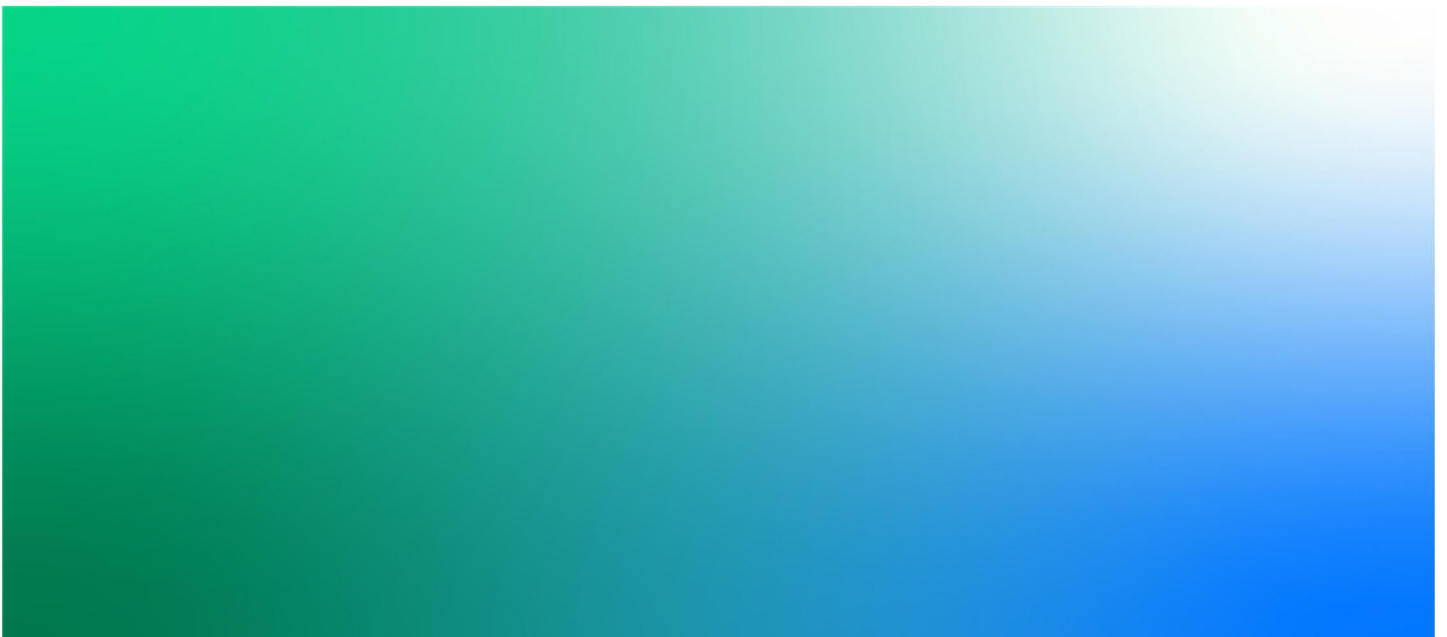


Templeton Cemetery Transport Assessment

Preliminary Transport Assessment

June 15, 2021

Christchurch City Council



Templeton Cemetery Transport Assessment

Project No: IA253600
Document Title: Preliminary Transport Assessment
Document No.:
Revision: A
Document Status: Final
Date: June 15, 2021
Client Name: Christchurch City Council
Client No: Client Reference
Project Manager: Amanda Klepper
Author: Amanda Klepper
File Name: Templeton Cemetery Preliminary Transport Assessment v2

Jacobs New Zealand Limited

Level 2, Wynn Williams Building
47 Hereford Street
Christchurch Central 8013
PO Box 1147
Christchurch 8140
New Zealand
T +64 3 940 4900
F +64 3 940 4901
www.jacobs.com

© Copyright 2019 Jacobs New Zealand Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright.

Limitation: This document has been prepared on behalf of, and for the exclusive use of Jacobs' client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this document by any third party.

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
A	15/6/21	Draft for client comment	AK	KJR	AP	MM

Contents

1.	Introduction	5
2.	Existing Land Use and Transport Environment	7
2.1	Land Use	7
2.2	Road Network	8
2.3	Kirk Road / Maddisons Road Intersection	10
2.4	Kirk Road / Main South Road / Trents Road	11
2.5	Pedestrians and Cyclists	14
2.6	Public Transportation	14
2.7	Road Safety	14
3.	Proposal	17
4.	Assessment of Transport Effects	18
4.1	Traffic Generation	18
4.1.1	Cemetery	18
4.1.2	Sports Hub	20
4.1.3	Quarry	21
4.1.4	Construction Traffic	22
4.2	Accessways	22
4.2.1	Maddisons Road Access	24
4.2.2	Kirk Road Access	25
4.2.3	Access Layout Options	27
4.3	External Intersections	31
4.3.1	Traffic Movement Assumptions	31
4.3.2	SIDRA Analysis	33
4.3.2.1	Kirk Road / Maddisons Road	33
4.3.2.2	Kirk Road / Main South Road / Trents Road	35
4.3.3	Recommendations	35
4.3.3.1	Kirk Road / Maddisons Road	35
4.3.3.2	Kirk Road / Main South Road / Trents Road	36
4.3.4	Summary of external intersections assessment	36
4.4	Parking	37
4.5	Pedestrians and Cyclists	37
5.	Compliance with District Plan	38
6.	Recommendations and Conclusion	39

Appendix A. SIDRA Modelling Full Results

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to assess the transport effects and requirements of the proposed cemetery in Templeton in accordance with the scope of services set out in the contract between Jacobs and Christchurch City Council ('the Client'). That scope of services, as described in this report, was developed with the Client.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change. Jacobs derived the data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law. This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

This report has been prepared on behalf of, and for the exclusive use of, the Client, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

1. Introduction

Jacobs New Zealand Limited (Jacobs) has been engaged by Christchurch City Council (CCC) to undertake a Preliminary Transport Assessment (TA) for their proposal to establish a new cemetery on a large greenfield site in Templeton bounded by Jones Road, Kirk Road, Maddisons Road, and Dawsons Road. The location of the proposed cemetery is shown in Figure 1.

Templeton is located about 15 km west of Christchurch city centre.



Figure 1: Templeton Cemetery Site Location

The purpose of this report is to inform CCC of the potential transport related effects of establishing a new cemetery at the above location. The report will detail the assessment undertaken in this regard and includes recommended changes or upgrades to the surrounding network that have been assessed to be required to mitigate the anticipated transport related impacts, including site access provisions. This report has been arranged to feed into a future potential Integrated Transport Assessment (ITA) (should one be considered necessary for consenting purposes). An ITA would also include a more in-depth assessment of the relevant transport provisions in the Christchurch District Plan.

Accordingly, this report is organised as follows:

- Section 2 gives a description of the current transport environment in the vicinity of the site;
- Section 3 describes the cemetery proposal;

- Section 4 will provide an assessment of the effects of the proposal;
- Section 5 provides a broad assessment of the proposal compliance relevant to central government and/or local Council policies, standards, rules and objectives relating to transport; and
- Section 6 will summarise the conclusions and recommendations of the transport assessment.

2. Existing Land Use and Transport Environment

2.1 Land Use

Figure 2 shows the location of the proposed cemetery site relative to the local road network. This property is not developed and is currently used for pastoral farming.

The site, which is about 115 hectares, is located on the block bounded by Jones Road, Dawsons Road, Kirk Road, and Maddisons Road, and borders the Templeton community on two sides.



Figure 2: Cemetery site location

The land to the west of the site, on the opposite side of Dawsons Road, is currently undergoing a resource consent application to become a quarry. Templeton is not planned to have a significant amount of growth in the future as it falls within the Airport Noise Contour. However, there is a development planned for the west side of Curraghs Road, on the other side of the quarry site from Templeton.

2.2 Road Network

The road hierarchy as defined by the Transport Agency's One Network Road Classification (ONRC) is shown in the below diagram:



Figure 3: Transport Agency Road Hierarchy¹

As noted in the previous section and illustrated above, the site is bounded by Jones Road, Dawsons Road, Kirk Road, and Maddisons Road. State Highway 1 (SH1) also runs near the southern boundary of the site and is expected to be the predominant route for vehicular access to and from the site from Christchurch and Selwyn District. The Main South Rail Line runs between Jones Road and SH1.

Jones Road is designated as a Primary Collector road with an estimated Annual Average Daily Traffic (AADT) of 6,000 vehicles per day in 2019². This volume is expected to now be lower since the opening of the Christchurch Southern Motorway Stage 2 (CSM2) in 2020. The alignment of Jones Road curves to the north just west of Kirk

¹ NZ Transport Agency, 2021. One Network Road Classification (ONRC). Retrieved from <https://nzta.maps.arcgis.com/apps/webappviewer/index.html?id=95fad5204ad243c39d84c37701f614b0>

² Christchurch City Council Traffic link counts database. <https://ccc.govt.nz/transport/legal-road/traffic-count-data/links-traffic-counts-dashboard/>

Road and is renamed Railway Terrace. It then meets Kirk Road in an offset intersection, with Waterloo Road on the east side.

A site visit has confirmed that Jones Road is a rural 2-lane road with unsealed shoulders and no cycle facilities. There is a footpath along the northern side. It has a posted speed limit of 50 kph through the Templeton community, and increases to 60 kph about 700m west of Kirk Road.

Kirk Road is also a Primary Collector road with an estimated weekday AADT of about 4,000 vehicles per day³. At the site, Kirk Road is a rural 2-lane road with unsealed shoulders and no cycle facilities. There is a footpath along the western side. It has a speed limit of 60 kph south of Maddisons Road, reducing to 50 kph through the Templeton community.

Maddisons Road is designated as a Secondary Collector road with an estimated weekday AADT of 2,700 vehicles per day in 2018⁴. It is a rural 2-lane road with unsealed shoulders and no footpath or cycle facilities. The speed limit is 80kph at Dawsons Road and reduces to 60 kph at the approach to Kirk Road.

Dawsons Road is also a Secondary Collector road with an estimated AADT of 600 vehicles per day⁵. It is a narrow rural 2-lane road with grassy shoulders and a water race along the eastern side (the site boundary). It has no cycle or pedestrian facilities. It has a posted speed limit of 80 kph. The intersection with Jones Road has been identified as having a high number of crashes, and would be upgraded to a roundabout if the quarry is constructed.

SH1 south of Templeton is approximately 14 m wide with two traffic lanes in each direction. It has a weekday AADT of about 14,000 vehicles per day on this section⁶. The posted speed limit is 70 kph at the Kirk Road intersection, and increases to 100 kph about 200m west of the intersection.

Road	Classification in ONRC	Speed limit (km/h)	AADT
State Highway 1	National State Highway	100 / 70	14,000
Jones Road	Primary Collector	60 / 50	6,000
Kirk Road	Primary Collector	60 / 50	4,000
Maddisons Road	Secondary Collector	80 / 60	2,300
Dawsons Road	Secondary Collector	80	600

³ Christchurch City Council Traffic link counts database. <https://ccc.govt.nz/transport/legal-road/traffic-count-data/links-traffic-counts-dashboard/>

⁴ Christchurch City Council Traffic link counts database. <https://ccc.govt.nz/transport/legal-road/traffic-count-data/links-traffic-counts-dashboard/>

⁵ Selwyn District Council traffic counts, 2017. Dawsons Road between Jones Road and Maddisons Road.

⁶ Waka Kotahi NZ Transport Agency, 2021. Traffic management system (TMS) count site 01S00350 (Templeton - Between Marshs Rd and Kirk Rd).

2.3 Kirk Road / Maddisons Road Intersection

The Kirk Road / Maddisons Road intersection is one of two external intersections that were identified in the initial transport stocktake as potentially needing mitigation from cemetery traffic impacts. It is located at the north-eastern corner of the site.



Figure 4: Kirk Road / Maddisons Road Intersection

This is currently a rural intersection with no turning pockets. There are currently no congestion issues at this intersection as volumes are low. Turning movement counts were collected at this location in May 2021. Peak hour counts are shown in Table 1.

Table 1: Kirk Road / Maddisons Road Turning Movement Counts

		AM Total	PM Total	Interpeak Total
Maddisons Road East	Left into Kirk Road South	17	30	13
	Thru to Maddisons Road West	95	131	95
	Right into Kirk Road North	7	12	15
Kirk Road South	Left into Maddisons Road West	18	19	22
	Thru to Kirk Road North	104	94	74
	Right into Maddisons Road East	18	17	15

Maddisons Road West	Left into Kirk Road North	13	9	22
	Thru to Maddisons Road East	84	151	94
	Right into Kirk Road South	20	9	22
Kirk Road North	Left into Maddisons Road East	26	10	31
	Thru to Kirk Road South	92	118	139
	Right into Maddisons Road West	12	12	15
Grand Total		506	612	557

Maddisons Road is offset across this intersection, with the east approach slightly further south than the west approach. This offset can be seen from above in Figure 4 and from the Maddisons Road west approach in Figure 5. One effect of the offset is that traffic moving through on Maddisons Road must use the same space as right turning traffic to align with the other side of the intersection. As the traffic counts show, through traffic on Maddisons Road (in both directions) is the largest movement at this intersection in the evening peak.



Figure 5: Maddisons Road west approach to Kirk Road

2.4 Kirk Road / Main South Road / Trents Road

The Kirk Road / Main South Road / Trents Road intersection is the second external intersection that was identified in the initial transport stocktake as potentially needing mitigation from cemetery traffic impacts. It is located south of the site and is assumed to be part of the main route that traffic would take to and from the site.

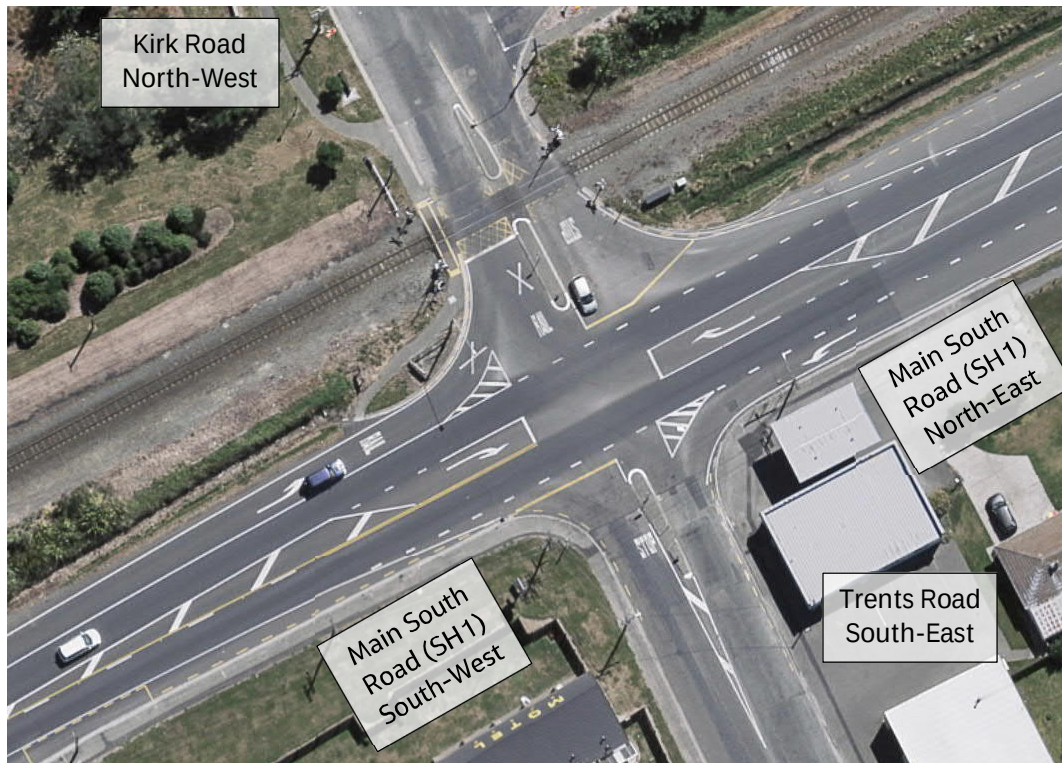


Figure 6: Kirk Road / Main South Road / Trents Road Intersection

The current intersection (Figure 6) is Stop controlled, and southbound vehicles waiting to go through or right have significant delays at times of high traffic. The rail line crosses this arm of the intersection only 15m from the stop line. In addition, the Waterloo Road intersection is only about 30m north of the stop line at Main South Road.

Turning movement counts were collected at this location in May 2021. Peak hour counts are shown in Table 2.

Table 2: Kirk Road / Main South Road / Trents Road Turning Movement Counts

		AM Total	PM Total	Interpeak Total
Main South Road North-East	Left into Trents Road South-East	17	58	27
	Thru to Main South Road South-West	650	1038	550
	Right into Kirk Road North-West	128	223	129
Trents Road South-East	Left into Main South Road South-West	15	32	18
	Thru to Kirk Road North-West	17	18	25
	Right into Main South Road North-East	3	8	8
Main South Road South-West	Left into Kirk Road North-West	94	17	49
	Thru to Main South Road North-East	990	699	425
	Right into Trents Road South-East	1	11	12

Kirk Road North-West	Left into Main South Road North-East	198	187	130
	Thru to Trents Road South-East	3	8	13
	Right into Main South Road South-West	3	4	5
Grand Total		2119	2303	1391

Figure 7 shows the Kirk Road north approach to Main South Road. This photo shows the short distance between the intersection and the rail line.



Figure 7: Kirk Road north approach to Main South Road

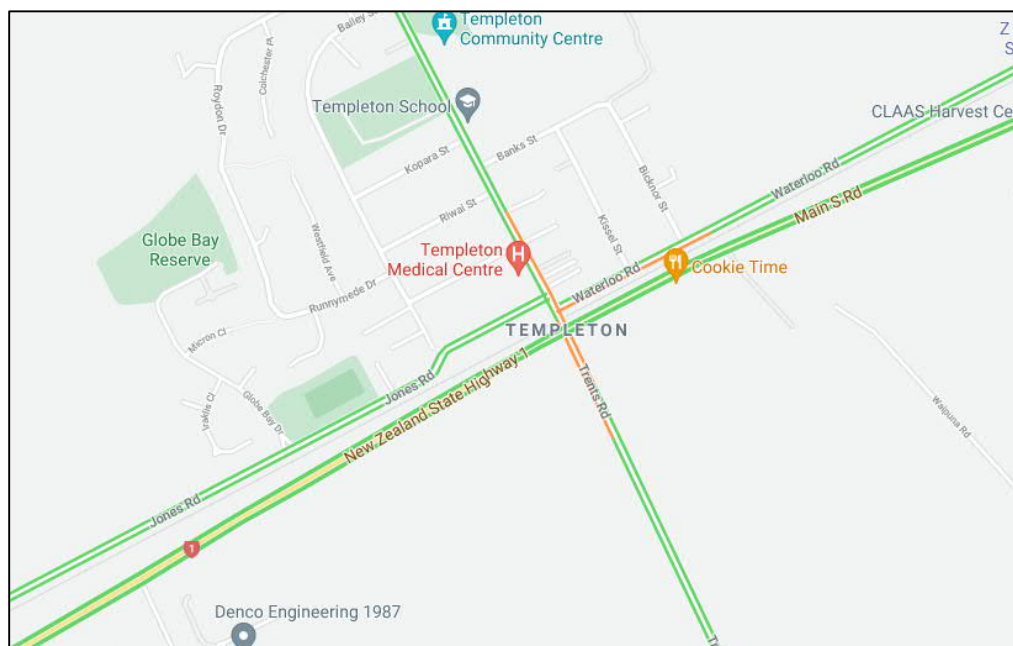


Figure 8: Google typical traffic at Kirk Road / Main South Road / Trents Road at 4:30 pm

Figure 8 shows the typical traffic at 4:30 pm at this intersection, indicating that there are some delays on the north and south approaches during the evening peak. Waterloo Road shows delays as well, indicating that the queue blocks back to that approach. It is understood that Waka Kotahi is not currently proposing any upgrades to this intersection in the future.

2.5 Pedestrians and Cyclists

The site is in a rural location, and pedestrian and cyclist activity is relatively low. There is a narrow footpath on Kirk Road that connects to the Templeton community. There is one zebra crossing on Kirk Road connecting Templeton Domain with Templeton School.

There is a new shared-use path on the south side of Jones Road along the rail corridor, part of the South Express Major Cycle Route, connecting Templeton with City Centre.

Pedestrian counts are not available in this area. Cycle counts were taken at the Kirk Road / Maddisons Road intersection and the Kirk Road / Main South Road intersection. Cycle counts at these intersections were very low, with only 1-3 cycles counted during the peak hours at each intersection.

2.6 Public Transportation

There are three bus stops in the Templeton community, served by Route 5, New Brighton to Rolleston. This is one of Christchurch's frequent routes, but it only stops in Templeton approximately every 30 minutes between 6:30 am and 10:45 pm.

2.7 Road Safety

Figure 9 shows the Waka Kotahi Crash Analysis System (CAS) recorded crashes in the vicinity of Templeton between 2016 and the end of 2020. The intersections of Dawsons Road with Jones Road and Main South Road

have had a particularly high number of crashes. This is one reason that a roundabout has been proposed for the Dawsons Road / Jones Road intersection.

There have been 5 crashes at the Kirk Road / Maddisons Road intersection in the past 5 years; however, these have all been non-injury or minor injury crashes, likely due to the lower speed environment. The Dawsons Road / Maddisons Road had 6 crashes in the past 5 years, all non-injury or minor except for one serious injury crash. Speeds are higher at this intersection than at Kirk Road / Maddisons Road.

Figure 10 shows a zoomed-in view of the crashes south of Templeton, which include one fatality on Main South Road (SH1). While there are many crashes on this section of SH1, only 8 occurred at the Kirk Road / SH1 intersection (the rest were midblock crashes). One of those was a serious injury crash. It involved a vehicle from the Kirk Road north approach striking a southbound vehicle on SH1.

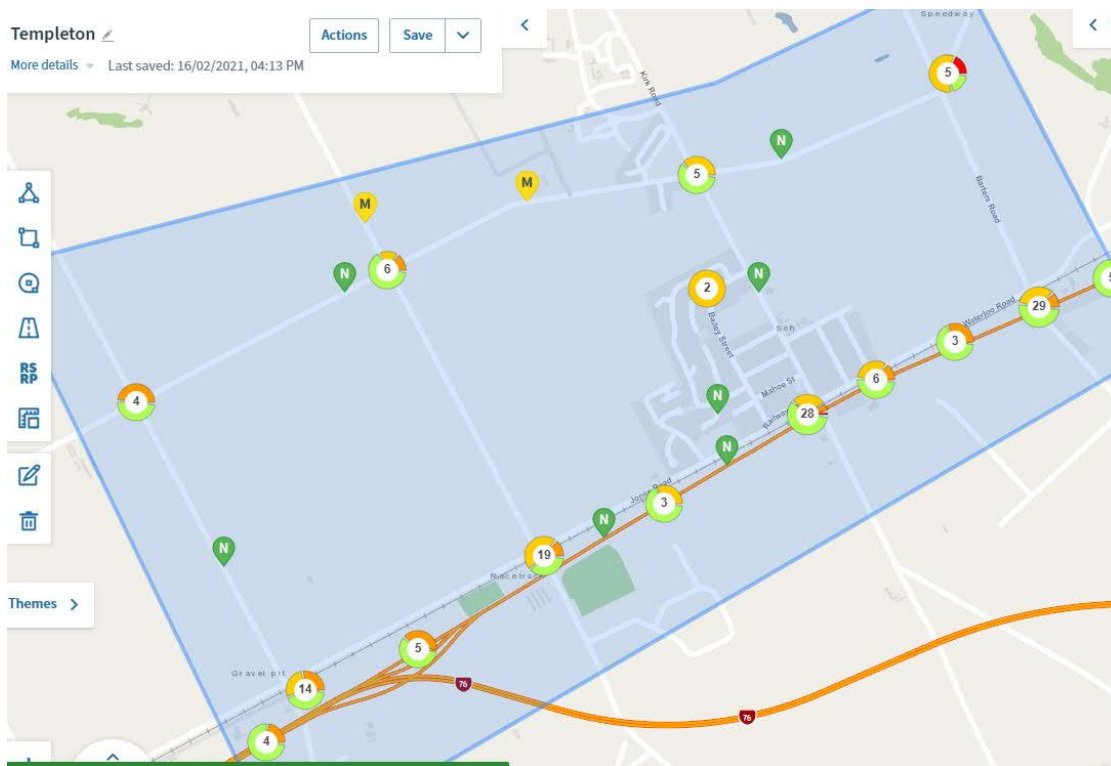


Figure 9: CAS recorded crashes, 2016 to 2020

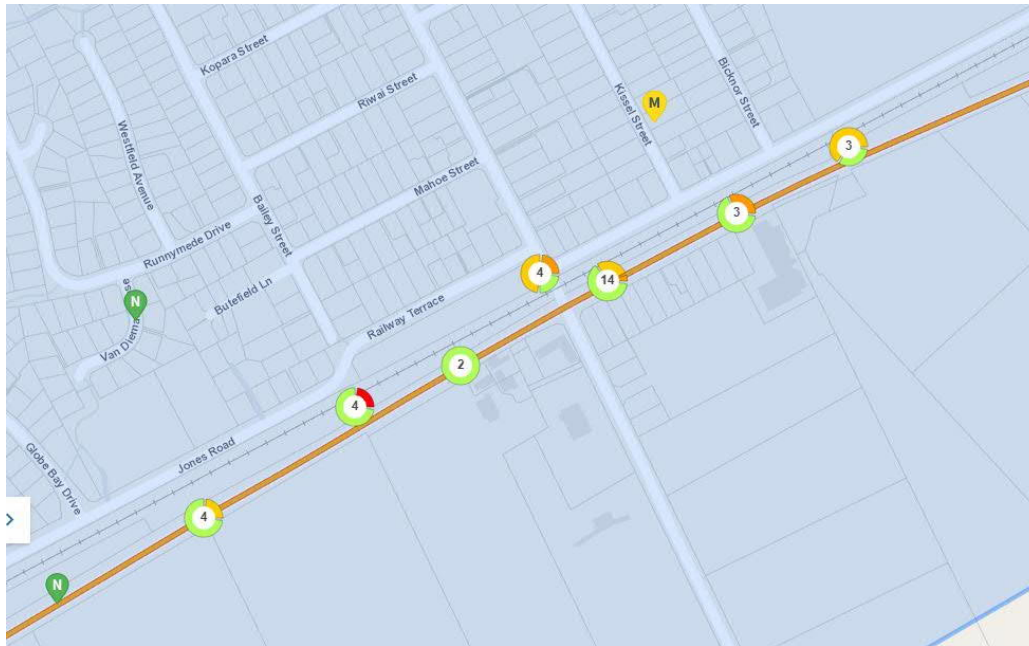


Figure 10: CAS recorded crashes (zoom), 2016 to 2020

Waka Kotahi are currently undertaking a speed review of SH1 from Dawsons Road to Templeton. According to the Waka Kotahi press release, “Due to motorway construction, this section of road has had temporary speed limits in place for a couple of years now.”⁷ However, even with temporary speed limits, there have still been a high number of crashes in the past 5 years.

⁷ Waka Kotahi NZ Transport Agency. 16 December 2020. SH1 Templeton to Dawsons Road permanent speed limits. <https://www.nzta.govt.nz/projects/sh1-templeton-to-dawsons-road-permanent-speed-limits/>

3. Proposal

At least 85 hectares of the land area is planned to be a cemetery, which will eventually be the main location of all burials in Christchurch City. The southernmost 30 hectares are being considered for a multi-sport hub, however planning for this complex has yet to commence.

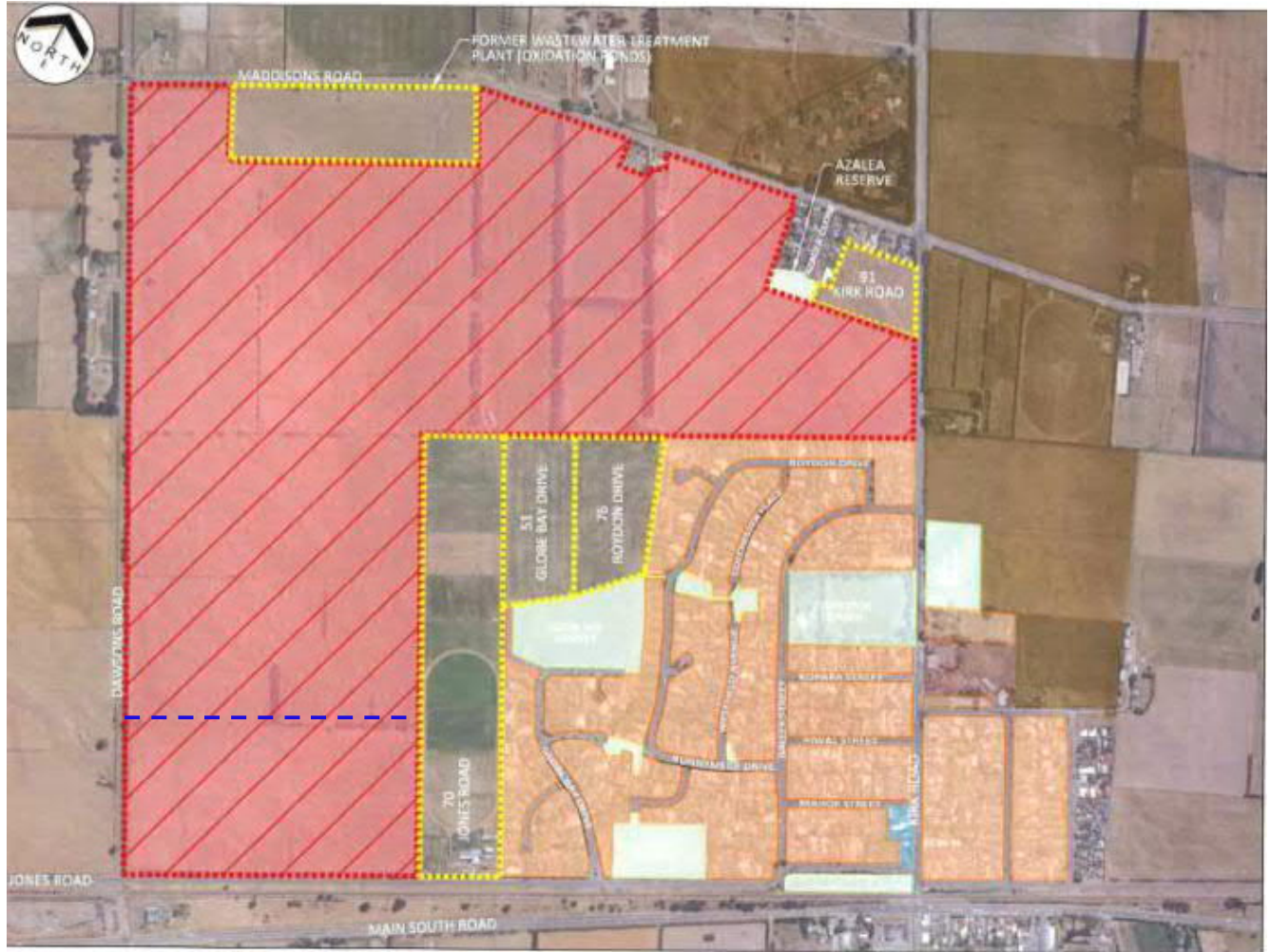


Figure 11: Proposed Templeton Cemetery site (red shaded), with approximate sports complex boundary in blue

The cemetery is planned to be developed in stages. The first stage will open in the northeastern end of the site within the next few years (approximately 2025), and it will then gradually spread to the east and south. It is expected that the site will be fully developed and in peak operation between 2035-2045.

The cemetery is planned to have at least two vehicular entrances in its opening stage, with a total of three to four entrances once the activity is in peak operation. In addition, the sports hub would likely have two entrances, one on Jones Road and one on Dawsons Road.

4. Assessment of Transport Effects

4.1 Traffic Generation

4.1.1 Cemetery

Estimating trip generation for the cemetery has begun with demand assumptions provided by CCC.

The hours for interment at the cemetery are assumed to be 9 am to 4 pm, with more interments occurring in the second half of the day as motorcades travel from funeral homes to the cemetery.

In the opening stage of the cemetery (currently proposed between 2025-2030), there are assumed to be at least 3 interments per day, generating approximately 20-30 vehicles per interment.

In addition to interments, there will be visitors throughout the day. Visitors include those visiting graves at the cemetery as well as recreational users, likely to be area locals using the cemetery for jogging, cycling, walking dogs, etc. There are assumed to be 100-150 visitors per day, with about 70-90 arriving by car.⁸

In the peak operation of the cemetery (around 2035-2045), there are assumed to be at least 5-6 interments per day, with the same estimate of 20-30 vehicles per interment. Up to 3 interments may occur simultaneously in different parts of the cemetery, though it would be more common to have only 2 at one time.

There are assumed to be about 300 visitors per day, with an estimated 200 arriving by car, when the cemetery is at peak operation.

Average vehicle occupancy for “personal business” trips in Christchurch is 1.41.⁹ For 200 visitors arriving in cars, that indicates about 142 cars. Evenly spread over 7 hours (9 am – 4 pm), there would be approximately 20 visitor vehicles per hour, or one every 3 minutes. These would be split between 3-4 entrances in different parts of the cemetery.

Traffic counts were taken on Kirk Road between Mahoe Street and Kopara Street. These counts were used to understand the traffic profile and when the peak hours occur. The traffic count per hour and direction is shown in Figure 12 and Figure 13. Based on these counts, the morning peak hour on Kirk Road is 8:00am to 9:00am, and the evening peak hour is 4:00pm to 5:00pm.

⁸ The percent of visitors who arrive in cars was given by CCC for the peak operation and a similar percentage was applied to the opening stage. This is about 67%, which is low for the area because it includes recreational users. The car mode share of people who work in Templeton is 90% (Census 2018 Journey to Work).

⁹ Source: https://www.pinnaclesearch.co.nz/research/survey/vehicle_occupancy.pdf. Social/recreational trip type could also be used (occupancy 1.68), but personal business is more conservative.

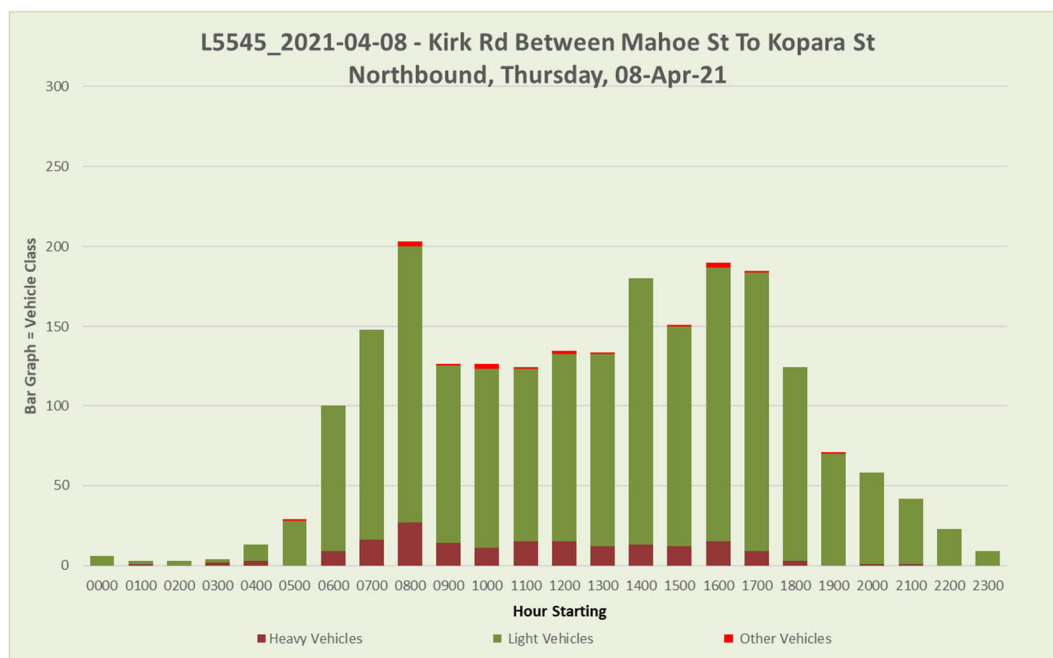


Figure 12 Traffic flow on Kirk Road, northbound (2021 counts)

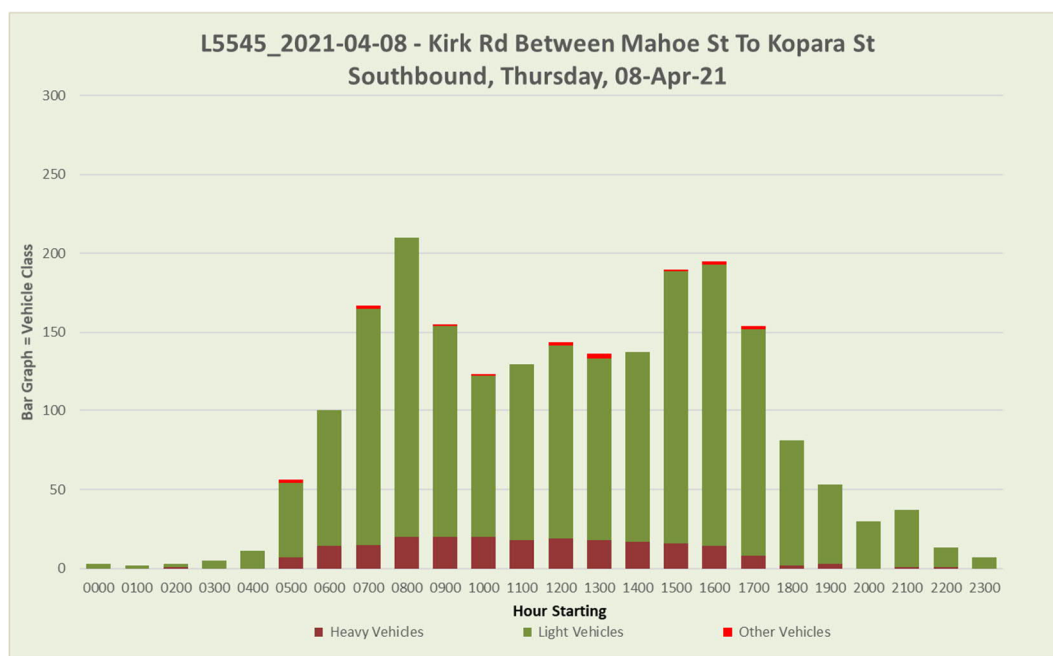


Figure 13: Traffic flow on Kirk Road, southbound (2021 counts)

Interment hours will be between 9am and 4pm. It is however expected that interments would generally begin later in the morning, as funeral services would typically commence after 10am and mourners will then be required to make their way from funeral homes located throughout the city. Therefore, the time with the greatest potential for issues to arise is at 4pm, when interments may finish and mourners would leave the cemetery during the evening peak period.

Accordingly, and as an extreme case, this analysis will focus on the evening peak hour. Assuming that three interments occur at once and finish at around 4pm, the following demands have been assessed:

- 30 vehicles per interment, and
- 20 other visitor vehicles in an hour.

This results in a total of 110 vehicles potentially departing the cemetery during the evening peak hour.

4.1.2 Sports Hub

To assess the potential traffic generation of the sports hub, assumptions were made regarding what sports and facilities would be provided at the sports hub, with the aim of developing the most likely scenario to generate the highest level of traffic.

The 'Spaces and Places' plan updated in July 2020 mentioned that Denton Park's velodrome was required further investigation, indicating that it may not be sufficient for velodrome demand in Christchurch, so a velodrome facility may be possible at Templeton. The Sport and Recreation team has indicated it is possible there will be indoor and outdoor facilities.

The 'Spaces and Places' plan did not mention indoor courts in Canterbury or within the Templeton area. City Council and Selwyn District Council have recently approved or recently built several indoor courts (see Table 3). If indoor sports are involved, it may be that one court is provided in the centre of the velodrome. This would not be used during large national events.

Table 3: Indoor Courts currently built or underway

Indoor Court Facility Name (Location)	Number of Indoor Courts
Metro Sport Facility (Central Christchurch)	9
'Netsal' Facility (Ngā Puna Wai Site)	10
Foster Park (Rolleston)	8
Total Number of New Courts	27

Given the area size dedicated to the multi-sport hub (30 ha), there is a limit on how many sports can be provided for on site.

Therefore, it has been assumed:

- One national event level velodrome will be built on site (the Avantidrome in Cambridge will continue to be the international venue for cycling);
- 2-3 sports fields will be developed;
- A changing room facility with lounge/hall will be included; and
- No indoor courts would be constructed.

Analysing the current New Zealand Cycling Calendar (Appendix A), Christchurch does not currently hold national competitions on a track, only road. There are 8 national events spread across Cambridge and Invercargill. For the purposes of this assessment, it can be assumed that the Templeton Multi-sport Hub will host 3 national cycling events per year.

Based on the assumptions above, and assuming the facility is at its maximum capacity, the assessed count of users and vehicles is in Table 4. This table shows estimates for a national velodrome event, weekend sports events, and regular weekday practice. The vehicles estimates are based on a conservative estimate of car mode share (90%, based on 2018 Census Journey to Work data – while this type of travel differs from commuting to work, no other data is available) and a car occupancy rate of 1.68 people per vehicle.¹⁰

Table 4: Sports hub users and vehicles estimates

	National Event		Weekend Event		Weekday Practice	
	People	Vehicles	People	Vehicles	People	Vehicles
Velodrome	1,500	803	500	268	50	27
Sports Fields	N/A	N/A	150	80	120	64
Lounge / Hall	N/A	N/A	100	54	50	27

The evening peak is the most likely time when traffic on the network may be impacted by traffic to the sports hub, as weekday practice would be occurring at this time. Practice would likely consist of two groups: school-age children practicing between 3 and 5 pm, and adults practicing between 6 and 9 pm. There will therefore be some traffic between 5 and 6 pm; however, this would occur after the evening peak of 4 to 5 pm.

4.1.3 Quarry

Fulton Hogan have lodged consent for a quarry to be developed to the west of the cemetery site, across Dawsons Road. The resource consent is currently under review. The quarry entrance is proposed to be on Jones Road, and as part of the conditions, the intersection of Jones Road and Dawsons Road would be made into a roundabout. The life of the quarry would be about 40 years; therefore, it would still be in operation when the cemetery is also at peak operation.

The quarry has proposed a condition allowing a maximum of 1,200 heavy vehicle movements per day and an average of 800 heavy vehicle movements per day. However, as the consent is still under review, further restrictions could be placed on the number of movements allowed.

As part of the consenting process, Fulton Hogan submitted a draft Transport Management and Routing Plan to address concerns that trucks would use Jones Road through Templeton rather than SH1. The quarry proposed banning the use of this route by its vehicles at all times (except if needing to deliver to Templeton). This is expected to be about 6 vehicles per day for local aggregate deliveries.

The layout of the roundabout has not been determined, as it is tied to the quarry decision and a detailed design has not yet been undertaken. However, if constructed, it is likely to be a 3-arm roundabout north of the existing intersection, in quarry land. The indicative design is shown in Figure 14.

¹⁰ Source: https://www.pinnacresearch.co.nz/research/survey/vehicle_occupancy.pdf. Social/recreational trip purpose.

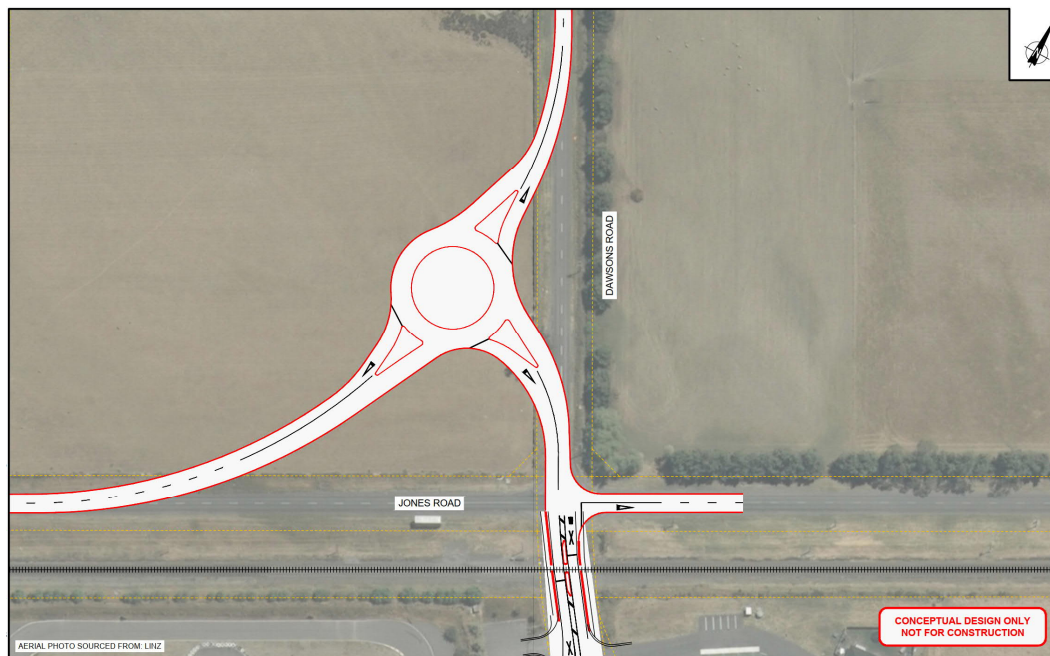


Figure 14: Indicative layout of proposed Jones Road / Dawsons Road roundabout

4.1.4 Construction Traffic

The potential effects of the likely construction related traffic demands has also been broadly considered as part of this TA. From the findings, it is assessed that there will be no obvious adverse effects arising during the construction and/or establishment of the new cemetery. This assessment is made on the basis that the likely volume of construction related movements (including building staff and subcontractors, building supplies, plant and machinery) will be no greater than a typical cemetery day of operation. Based on the predicted traffic conditions and the quality of the local roading network, it is concluded that there will be no anticipated construction related effects from this proposal. A more detailed assessment of construction traffic can be completed when more details are available about the site construction.

4.2 Accessways

Figure 15 shows the recommended approximate entrance locations from the previous work that was done for the transport stocktake.

It is recommended that at least two entrances be provided in the opening stage of the cemetery, with a main access on Maddisons Road and a secondary access on Kirk Road. This will divide traffic entering and exiting the site and help mitigate congestion when multiple interments are held at one time. Providing wayfinding signs to guide traffic to the State Highway could also help. As the cemetery grows, up to two more entrances should be provided, well-spaced to give visitors access to all parts of the cemetery and facilitate its use for recreation.

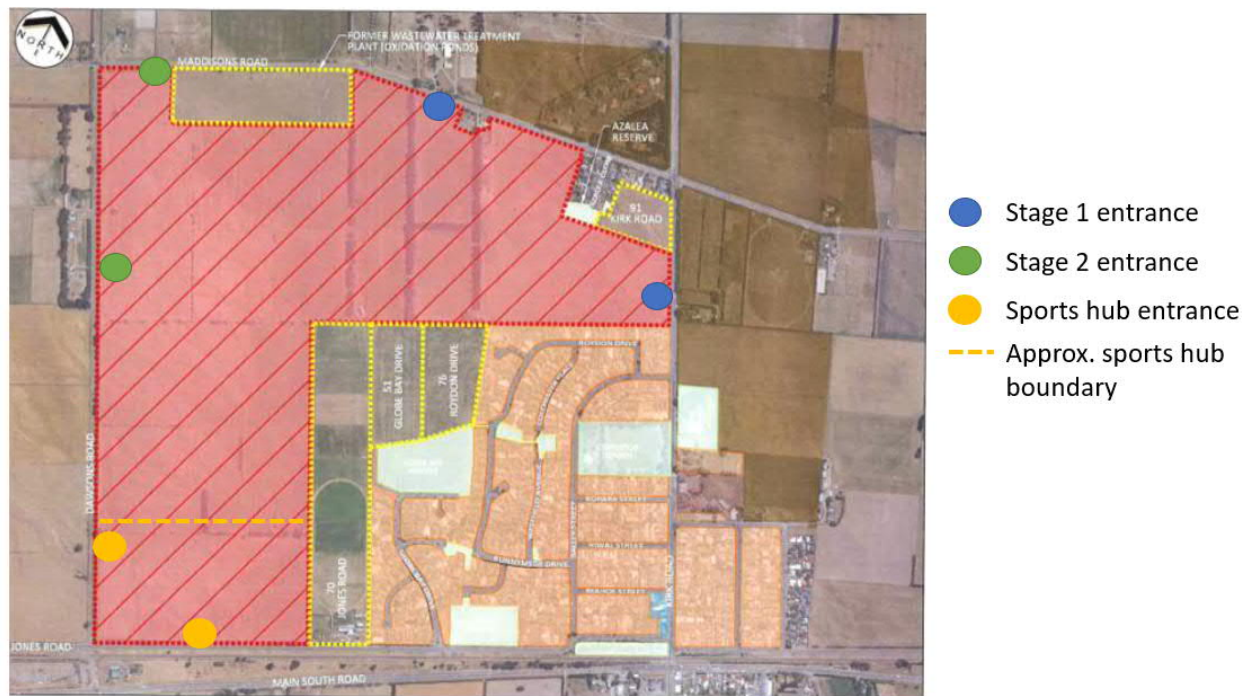


Figure 15: Potential entrance locations for the cemetery and sports hub - for illustration only

While the western side of the property, along Dawson's Road, is the largest side, there are a number of potential risks and limitations of locating entrances on this side.

- There is a water race along that side of the property, meaning that any accesses will require culverts. The water race limits the ability to create any pull-off space along the cemetery side of Dawson's Road.
- The road is along the boundary between Christchurch City and Selwyn District, and Selwyn District Council (SDC) is the controlling authority of Dawson's Road, so any future entrances must be agreed with SDC.
- Dawson's Road is extremely narrow, only about 8m wide, and is likely to have increased heavy vehicle traffic from the nearby quarry.
- CCC will be providing extensive planting along the Dawson's Road boundary as mitigation for the quarry, to block dust and other amenity effects created by the quarry. Accesses on that side will create breaks in the planting, increasing negative effects from the quarry.

There is potential for an entrance along Dawson's Road in a later stage of the cemetery's operation, possibly once the quarry is no longer in use. At that stage, the cemetery's needs can be evaluated to determine whether an entrance on that side is necessary.

The main entrance for the sports hub is intended to be on Jones Road, due to the concerns above regarding Dawson's Road. An entrance on Jones Road may require a provision such as a passing bay so that cars turning right into the site will not impede traffic on Jones Road, though traffic counts will be required to confirm whether that is necessary. The location of the second entrance could be on Jones Road or on Dawson's Road. The exact location will be dependent on whether the Dawson's Road / Jones Road intersection is converted to a roundabout. The roundabout will move the intersection further north and realign Dawson's Road along the sports hub boundary. Based on the indicative design, there appears to be space north of the roundabout to place an entrance on Dawson's Road.

Using traffic counts and observations taken on site, recommendations have been made regarding the location and design of the Stage 1 entrances.

4.2.1 Maddisons Road Access

The main access for the site is planned to be on Maddisons Road. In later stages, there is likely to be at least one additional entrance on Maddisons Road. Figure 16 shows the southern side of Maddisons Road along the property boundary. The ground is flat and would easily allow entrances to be added at nearly any point along this side. The main constraint is the location of power poles. However, there is sufficient space between power poles to provide a left turning lane into the site. There may be a need for a section of kerb and channel for the access to support drainage.



Figure 16: Maddisons Road south shoulder, site boundary

Figure 17 shows the north side of Maddisons Road across from the site. It is expected that there will be sufficient space on this side to provide a shoulder widening to allow cars to manoeuvre around a vehicle turning right into the site.



Figure 17: Maddisons Road north shoulder

It is recommended to extend the 60 kph speed zone on Maddisons Road to begin west of the Stage 1 boundary of the cemetery. Reducing the speed past the cemetery accesses on Maddisons Road will improve safety for vehicles using them. Placing the speed limit change to the west of the boundary will reduce the noise impact of vehicles accelerating past the site.

4.2.2 Kirk Road Access

There will be an access to the site on Kirk Road. Figure 18 shows the western side of Kirk Road along the property boundary. As on Maddisons Road, the ground is flat and would easily allow entrances to be added at nearly any point along this side. The one constraint is the location of power poles. However, there is sufficient space between power poles to provide a left turning lane into the site. There may be a need for a section of kerb and channel for the access to support drainage.



Figure 18: Kirk Road west shoulder, site boundary

There is an opportunity to widen the existing narrow footpath along the site boundary into cemetery land to create a shared use path. This path can be connected to future cycle infrastructure and create a link between the cemetery and the Templeton community for recreation.



Figure 19: Kirk Road east shoulder

Figure 19 shows the east side of Kirk Road across from the site. It is expected that there will be sufficient space on this side to provide a shoulder widening to allow cars to manoeuvre around a vehicle turning right into the site without impacting the drainage channel. However, as a safe systems measure it is recommended to culvert the channel immediately across from the access to improve the safety of vehicles using the widened shoulder.

4.2.3 Access Layout Options

There are two options recommended for the design of both accessways. The layouts are related to traffic volumes and speed. Based on the graphs below (Figure 20) it is recommended to use Option 2 for the main entrance on Maddisons Road and Option 1 for the secondary access on Kirk Road. This recommendation assumes that the speed limit would be reduced to 60 kph on Maddisons Road.

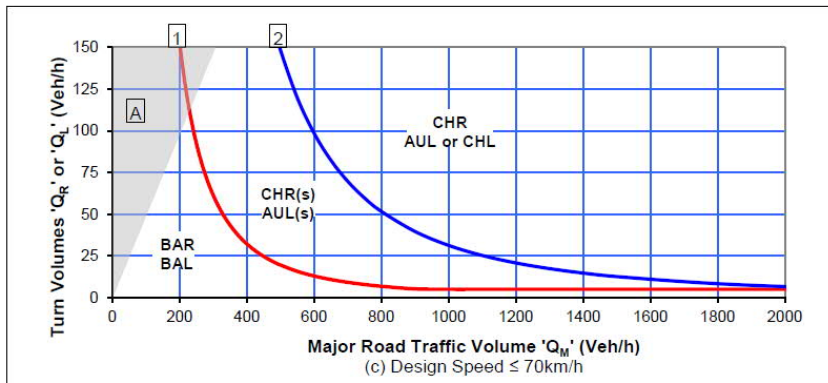


Figure 20: Access design by volume, design speed < 70 kph¹¹

Option 1 is a simple left turn treatment with sealed shoulder widening rather than a full left turn pocket. Figure 21 is a diagram from Austroads showing the design of this option. The minimum length of the widened shoulder (labelled P in Figure 21) is 5 m in a 60 kph environment and 15 m in an 80 kph environment.

¹¹ Austroads (2016a) Guide to Road Design Part 3 – Geometric Design, Austroads, Sydney Australia <https://austroads.com.au/publications>

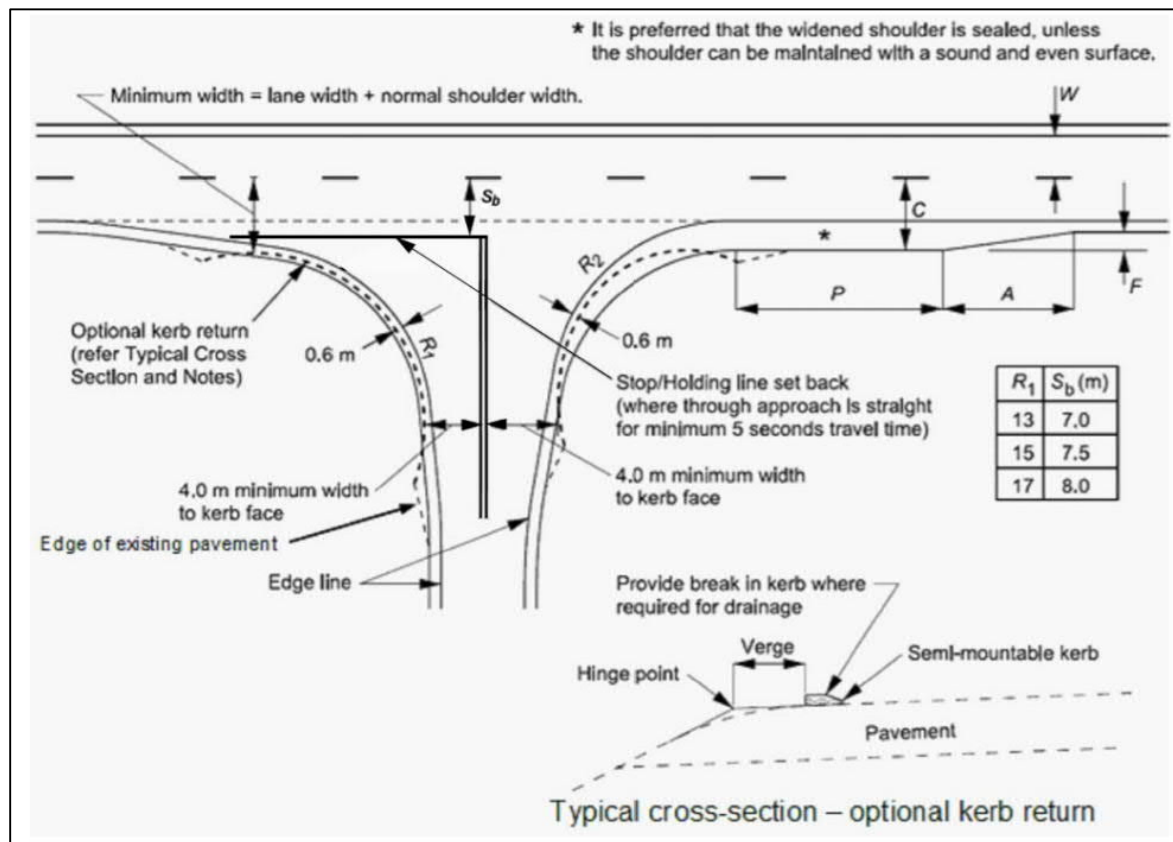


Figure 21: Rural basic left-turn treatment.¹²

Option 2 is a rural treatment with a short left-turn lane, as shown in Figure 22. The length of the lane (labelled D in Figure 22) is recommended to be at least 25 m in a 60 kph environment and 45 m in an 80 kph environment. The spacing between power poles is 50 m on Kirk Road (60 kph) and 60 m on Maddisons Road (currently 80 kph), meaning that there is expected to be sufficient space between the poles to allow this treatment, particularly if the speed on Maddisons Road is reduced to 60 kph (see section 4.3.3), but this will need to be checked during the design process.

¹² Department of Main Roads, October 2006. Road Planning and Design Manual, Chapter 13. Figure 13-80 Basic Left Turn Treatment on a Rural Road where the Side Road AADT is greater than or equal to 50 and/or Specifically for Articulated Vehicles. https://www.tmr.qld.gov.au/-/media/busind/techstdpubs/Road-planning-and-design/Road-planning-and-design-manual/Current-document/CPDM_Chapter13.pdf?la=en

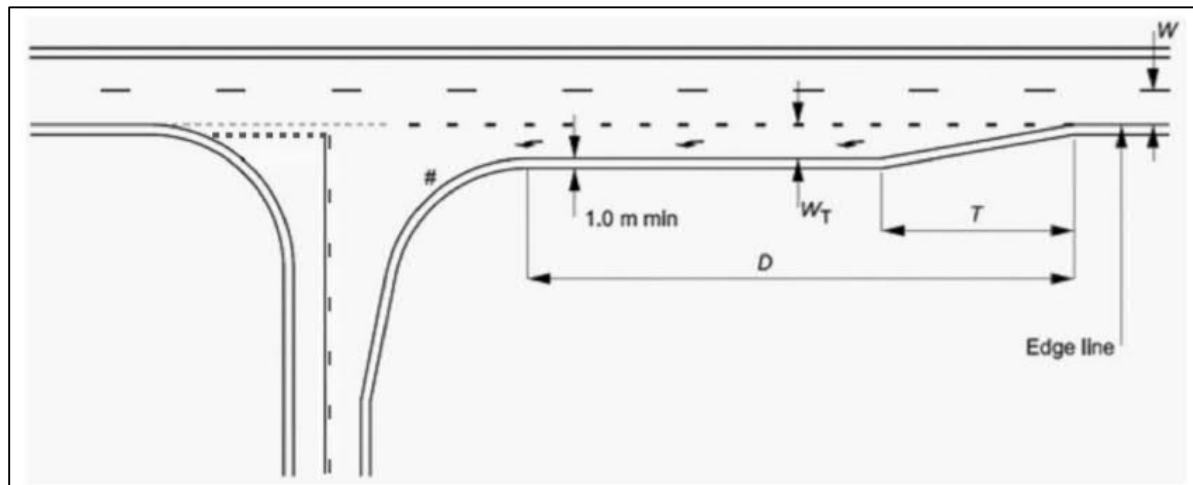


Figure 22: Short left turn lane into access¹³

As noted in Austroads, left turn slip lanes can create hazardous conflicts between cyclists and left-turning motor vehicles. If this layout is implemented on Kirk Road, the design must ensure that vehicles using the lane are aware of pedestrians and cyclists on the shared use path. This could be done, for example, by moving the shared path crossing further away from the intersection, so that vehicles will have completed the turn before reaching the crossing.

Figure 23 shows the recommended design for widening the seal on the side of the road opposite the accesses to allow through traffic to manoeuvre around vehicles turning into the site. According to Waka Kotahi's road traffic standards¹⁴, this is not necessary for collector roads with speed limits below 70 kph. However, it may be desirable, considering the estimated cemetery traffic. The length of the shoulder widening is dependent upon a number of variables and would be determined in detailed design. The width of the original lane plus widening (labelled as C in Figure 23) would be a minimum of 6.5 m.

¹³ Department of Main Roads, October 2006. Road Planning and Design Manual, Chapter 13. Figure 13-81 Auxiliary Left Turn Treatment with a Short Left Turn Slot AUL(S) on a Rural Road. https://www.tmr.qld.gov.au/-/media/busind/techstdpubs/Road-planning-and-design/Road-planning-and-design-manual/Current-document/RPDM_Chapter13.pdf?la=en

¹⁴ Waka Kotahi NZ Transport Agency. Road Traffic Standards 06. Guidelines for visibility at driveways. Section 4.1.

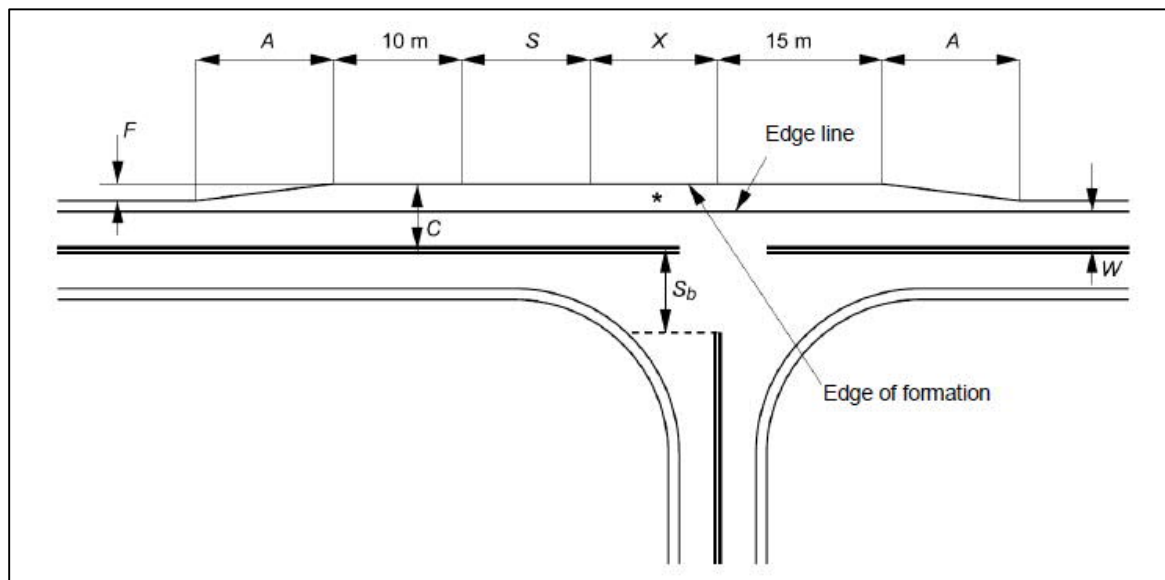


Figure 23: Basic right turn treatment on a two-lane rural road¹⁵

4.3 External Intersections

4.3.1 Traffic Movement Assumptions

It has been assumed that the majority of traffic to the cemetery site arrives from the east (from Christchurch) on SH1 and travels north to the site on Kirk Road, and departs the site using the same path (reversed). Approximately half of visitors are assumed to use the entrance on Kirk Road and half continue to Maddisons Road and use an access there. While there is potential for an access on Dawsons Road, it would not be added until a later stage of the cemetery's operation, possibly once the quarry is no longer in use. At that stage, the traffic environment would need to be re-evaluated, as much may have changed. It is assumed that few vehicles would use Dawsons Road, as this road is narrow, likely to have heavy vehicle traffic from the quarry, and would be mainly used by visitors travelling to/from the west (e.g. Rolleston), which is expected to be a small proportion of cemetery visitors.

Figure 24 shows the assumed split of traffic between the Kirk Road and Maddisons Road entrances. 50% / 50% has been assumed as a base case, and a sensitivity test has been done with 75% of the traffic using Maddisons Road and 25% using Kirk Road.

¹⁵ Department of Main Roads, October 2006. Road Planning and Design Manual, Chapter 13. Figure 13-58 Basic Right Turn Treatment (BAR) on a Two Lane Rural Road. https://www.tmr.qld.gov.au/-/media/busind/techstdpubs/Road-planning-and-design/Road-planning-and-design-manual/Current-document/RPDM_Chapter13.pdf?la=en

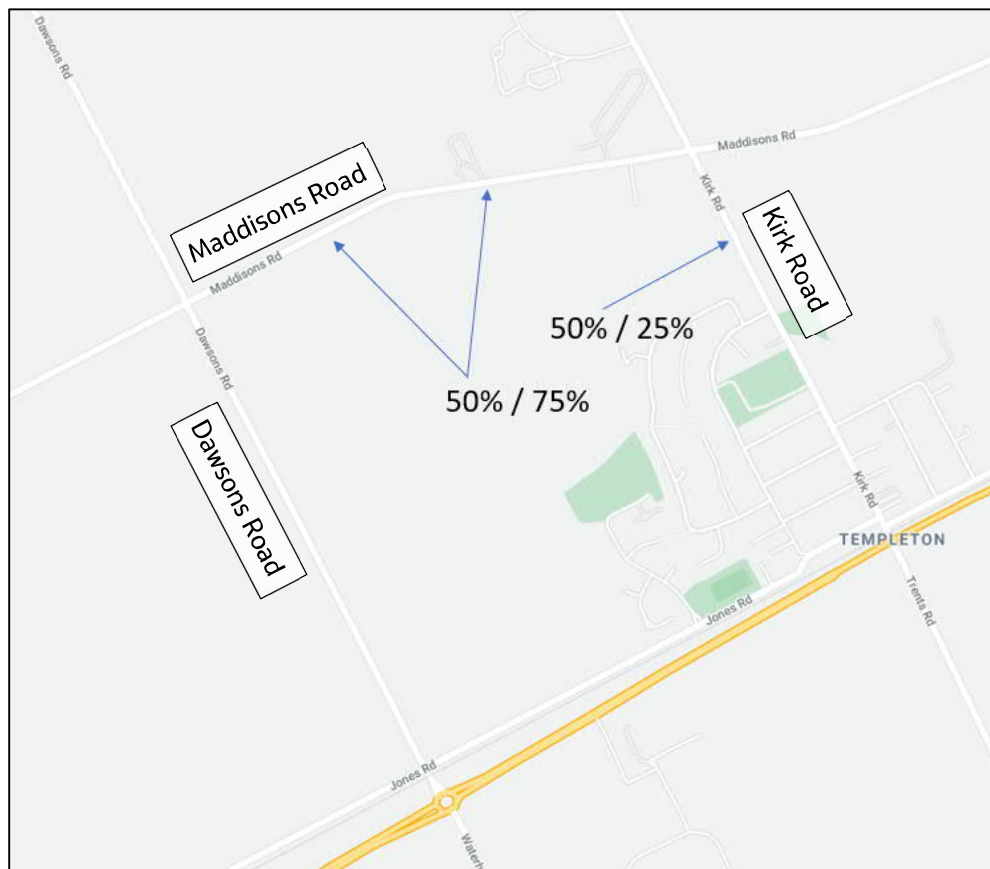


Figure 24: Assumed entrance traffic split

Analysis has focused mainly on traffic departing the site, as that may occur during the evening peak hour and involves a right turn at Kirk Road / Maddisons Road. It has been assumed that upon leaving the site, 100% of the traffic from the Maddisons Road entrance turns right onto Kirk Road to travel south to SH1. Of the 110 estimated peak demand, this would be either 55 vehicles (50%) or 83 vehicles (75%).

At the Kirk Road / SH1 intersection, it has been assumed that 90% of vehicles turn left toward Christchurch, 5% go through onto Trents Road, and 5% turn right toward Rolleston. A sensitivity test has been done using the current split of movements at the intersection, with 80% turning left, 15% going through, and 4% turning right.

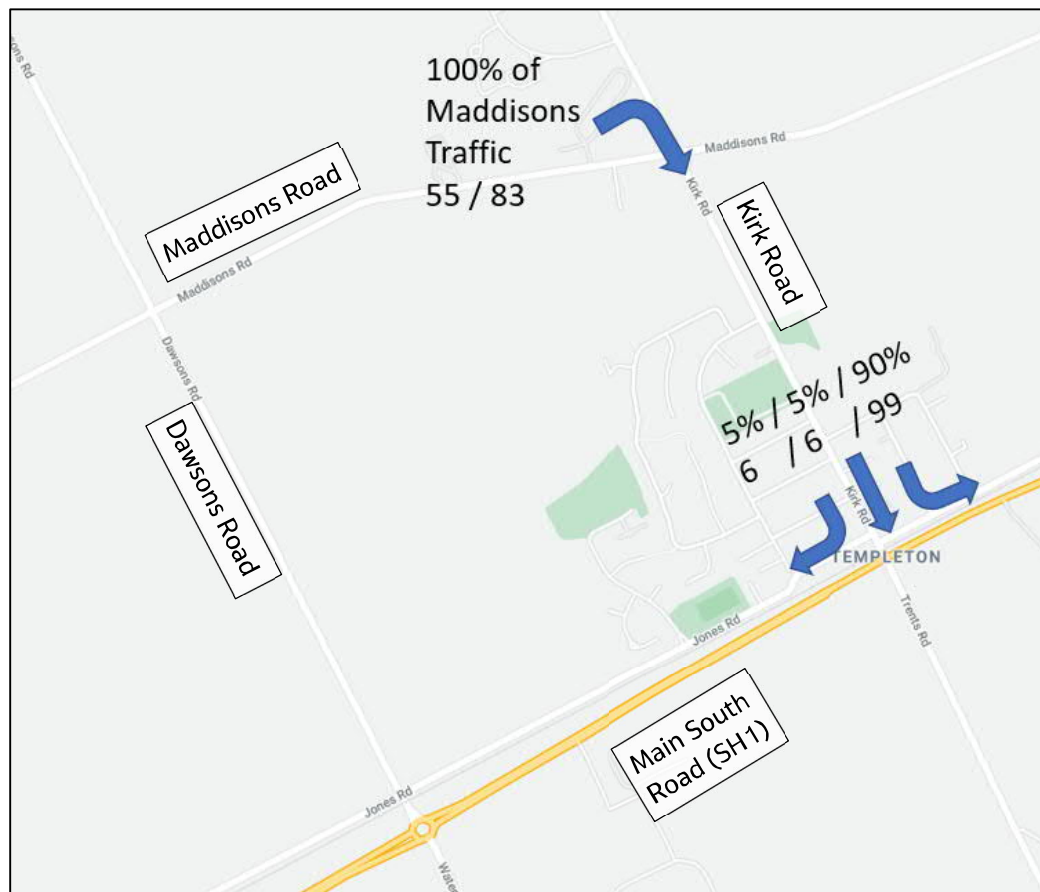


Figure 25: Movement assumptions at external intersections

4.3.2 SIDRA Analysis

The Kirk Road / Maddisons Road and Kirk Road / SH1 intersections have been modelled in SIDRA in the base year, 2021, and the assumed peak operation year of 2038. The following assumptions apply to both intersection models:

- 2038 volumes have been estimated by applying a growth rate from the CAST model to the 2021 counts.
- Cruise speeds were set to the posted speed limits for each approach.
- Peak hours modelled were based on the 2021 count data for each intersection.
- Default values were used for all other parameters unless better information was available (e.g. lane widths).

Full details of the SIDRA analysis including layout diagrams, level of service definitions, and results by movement are in Appendix A.

4.3.2.1 Kirk Road / Maddisons Road

The Kirk Road / Maddisons Road intersection has been modelled with a 10 m short lane on the west approach, allowing traffic turning left onto Kirk Road to bypass through and right turning traffic. Tests have been done with no left turn lane and with a 25 m left turn lane to test the impact of widening this approach. However, the length of this lane makes little difference to the operation of the intersection, as the modelling results below indicate.

Table 5 shows the model results for the Maddisons Road west approach in the PM peak, where it is assumed that a significant portion of the cemetery demand will make a right turn onto Kirk Road. The table shows the number of vehicles making each movement, the level of service (as defined in Appendix A), the delay in seconds, and the length of the queue in metres. The other approaches operate at level of service A in all tests and are not significantly impacted by the addition of cemetery traffic. The following tests are shown:

- Base 2038 – forecast traffic without cemetery demand
- 50% of cemetery traffic uses an access on Maddisons Road and turns right onto Kirk Road (includes 10 m turn pocket for left turn)
- 75% of cemetery traffic uses an access on Maddisons Road and turns right onto Kirk Road (includes 10 m turn pocket for left turn)
- 75% of cemetery traffic uses an access on Maddisons Road and turns right onto Kirk Road, and there is a 25m left turn lane
- 75% of cemetery traffic uses an access on Maddisons Road and turns right onto Kirk Road, and there is no left turn lane
- 50% of cemetery traffic uses an access on Maddisons Road, and movements at this intersection follow the existing movement split, with most traffic going through on Maddisons Road.

Table 5: Model results for Kirk Road / Maddisons Road

Kirk Road / Maddisons Road – West Approach, PM 2038												
	Left				Through				Right			
Test	Vehicles	LOS	Delay (s)	Queue (m)	Vehicles	LOS	Delay (s)	Queue (m)	Vehicles	LOS	Delay (s)	Queue (m)
Base 2038	19	A	8	0	379	A	9	16	12	B	13	16
50% use Maddisons, turn R	19	A	8	0	379	B	10	25	69	B	14	25
75% use Maddisons, turn R	19	A	8	0	379	B	11	33	99	B	15	33
75% use Maddisons, turn R, 25m LT lane	19	A	8	0	379	B	11	33	99	B	15	33
75% use Maddisons, turn R, no LT lane	19	A	10	35	379	B	11	35	99	B	15	35
50% use Maddisons, existing split	20	A	8	0	433	A	10	22	15	B	14	22

These tests show that this intersection operates well, at level of service B or better and with 15 seconds or less of delay for all movements at this approach. (During a peak hour, it is considered that level of service C and above is operating well.) Increasing the length of the left turning pocket does not change the level of delay for the through or right turn movements.

4.3.2.2 Kirk Road / Main South Road / Trents Road

The Kirk Road / Main South Road / Trents Road intersection has been modelled with a 5 m turning pocket for left turns on the north approach to reflect the wide approach which allows left turners to pass a single queued vehicle. As noted in section 4.3.1, it has been assumed as an extreme case that all cemetery demand uses the Kirk Road north approach to access State Highway 1 (Main South Road).

Table 6 shows the model results for the north approach for the base 2038 demand (without cemetery traffic), as well as two tests with different movement splits for cemetery traffic on the north approach. These splits are the “likely” split with 90% of cemetery traffic turning left toward Christchurch, and the “existing” split, with 80% of traffic turning left. The other approaches operate at level of service A in all tests and are not significantly impacted by the addition of cemetery traffic.

Table 6: Model results for Kirk Road / Main South Road / Trents Road

Kirk Road / Main South Road / Trents Road – North Approach, PM 2038												
	Left				Through				Right			
Test	Vehicles	LOS	Delay (s)	Queue (m)	Vehicles	LOS	Delay (s)	Queue (m)	Vehicles	LOS	Delay (s)	Queue (m)
Base 2038	124	B	12	5	13	F	1600	70	1	F	1800	70
Existing Movement Split	217	B	13	12	31	F	>1h	220	6	F	>1h	220
Likely Movement Split	228	B	13	13	19	F	3200	150	7	F	3200	150

These results show that the north approach through and right turn movements are operating at level of service F even without cemetery traffic, with extreme delays and queuing. However, the current demand is very low for these movements, and therefore the queue is rarely long enough to block the left turn movement. The addition of cemetery traffic increases the likelihood of that the left turn movement would be blocked.

The model also considered traffic to the cemetery turning right from SH1 onto Kirk Road. The model indicated that there are no issues anticipated with this movement.

4.3.3 Recommendations

4.3.3.1 Kirk Road / Maddisons Road

The Kirk Road / Maddisons Road intersection is expected to perform well even in the most extreme test case of cemetery traffic. While there may be occasional queues for the right turn resulting when interments occur during peak hours, in general the traffic on Kirk Road is light enough that queues will clear relatively quickly.

There is space on the west approach of Maddisons Road to create a left turn pocket, though this would require relocating one power pole. However, because of the offset of the intersection, this would only benefit the left turn, as through traffic must use the right side of the lane to align with the other side of Maddisons Road. As the demand for the left turn is relatively small, this would have little benefit for cemetery traffic.

It is therefore recommended that no changes be made to this intersection.

4.3.3.2 Kirk Road / Main South Road / Trents Road

As shown in section 2.4, this intersection has some light congestion on the north approach due to the difficulty of making the through and right turn movements. However, the demand for these movements is very small – only 18 vehicles counted in the evening peak hour. The cemetery traffic will add to the vehicles queuing here, but it is not expected to be a significant increase, as most cemetery visitors would likely turn left to go to Christchurch.

The potential for increasing capacity at this intersection is minimal. There are a number of constraints that would make widening the north approach very difficult – proximity to Waterloo Road, and proximity to the rail line. The recommended strategy is to encourage visitors to avoid this intersection by rerouting away from Kirk Road. Traffic from the Maddisons Road access can instead take Maddisons Road to the east and then use the signalised intersection at Pound Road to access SH1 (see Figure 26). This can be done through signage at the site and educating visitors by providing information to funeral homes. This approach will also reduce the impact of cemetery traffic on the Templeton community. Visitors departing through the Kirk Road access may still pass through Templeton; however, as Maddisons Road will be the main access and possibly have multiple accesses in the future, this will be a smaller proportion of cemetery traffic (expected to be about 150 vehicles or less per direction per day).

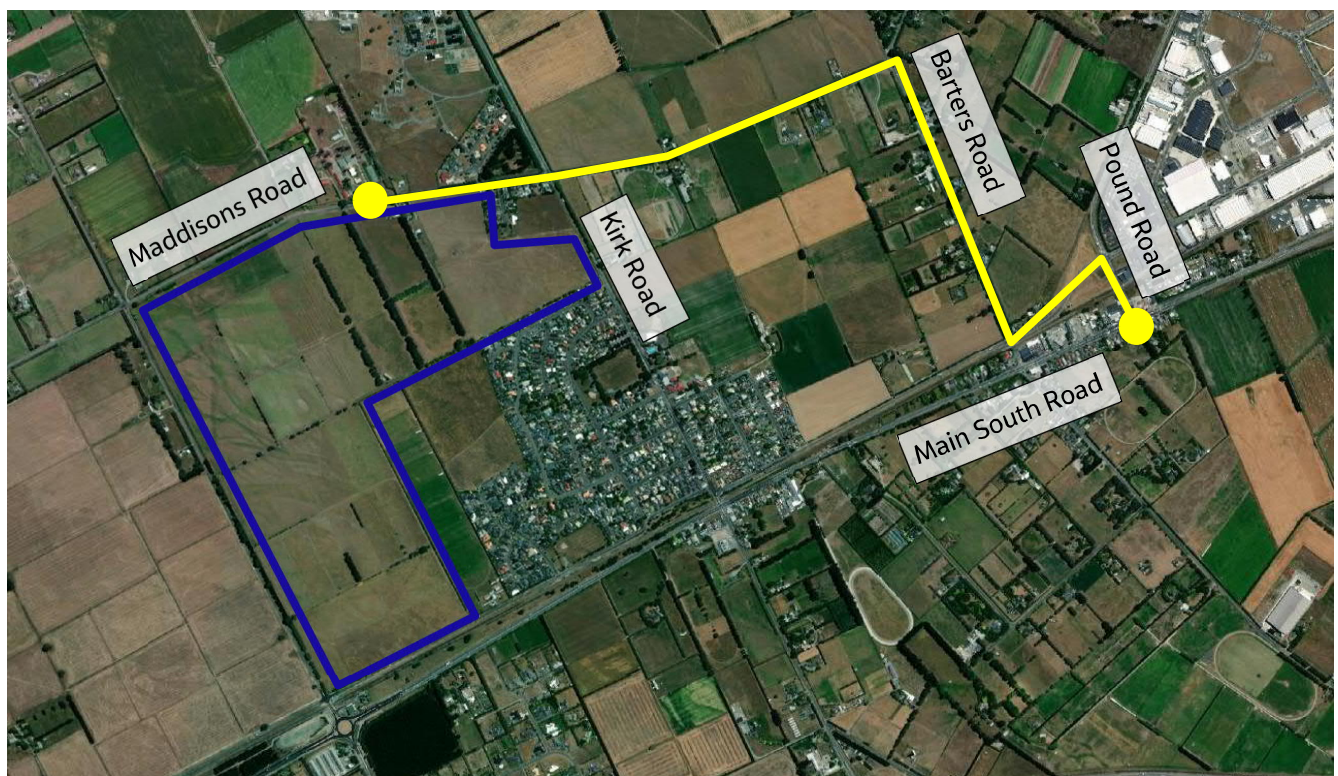


Figure 26: Alternate route from Maddisons Road access to Pound Road / SH1

4.3.4 Summary of external intersections assessment

The planned cemetery in Templeton is being introduced into an environment without significant traffic or congestion issues in general, with only localised delays at peak times around the Kirk Road / SH1 intersection. The Kirk Road / Maddisons Road is expected to have sufficient capacity to accommodate cemetery traffic in most instances. The Kirk Road / SH1 intersection already has a poor level of service for traffic turning right onto SH1, and there is little opportunity to increase capacity.

Overall, it is expected that traffic impacts from the cemetery can be managed through travel demand management measures. This could include signage to divert vehicles away from potential traffic issues (e.g. away from Kirk Road and onto Pound Road), scheduling interments to avoid large numbers of people departing during peak traffic times, and distributing traffic among the site accesses.

4.4 Parking

Some consideration has been given to the quantity of parking to be provided within the cemetery site. The high-demand scenario that was used for the traffic assessment in section 4.3 assumed three interments occurring at once. However, a more common occurrence in day-to-day operation would be two interments occurring at once. It is recommended to provide parking for this everyday demand, plus visitors, rather than the occasional high-demand case. Based on the demand assumptions in section 4.1, two interments would generate a demand of about 40-60 vehicles. It is estimated that there would be about 20 visitor vehicles per hour. Therefore, it is recommended to provide parking for about 80 vehicles in Stage 2 of the cemetery.

For Stage 1, there would be approximately 10 visitor vehicles per hour. It is expected that in Stage 1 there are only expected to be 3 interments per day, as other cemeteries may still be in operation, and these could be scheduled throughout the day. Therefore, about 40 parking spaces are recommended for Stage 1.

As noted, there are expected to be times when three interments could occur at once in Stage 2, generating a total demand (with visitors) of 110 vehicles. In addition, there are occasional very large services with up to 250 visitors, which would generate approximately 125 vehicles (assuming 2 people per vehicle for an interment). It is not recommended to provide such a large amount of parking to accommodate infrequent events. As the site is within the urban-rural fringe, a large amount of parking may create consenting challenges and detract from the visual appeal of the site.

There is potential for occasional large events to use the grass berms (or carriageway, retaining one-way traffic) around the site for parking, with some temporary traffic management measures to improve safety. Reducing the speed along Maddisons Road to 60 kph will improve the safety of this option as well. There may be other opportunities within the site to create temporary parking areas as well, as the staged nature of the cemetery may benefit from flexible parking locations.

It is recommended that prior to an interment, funeral homes provide information to attendees about which entrance and parking location is best suited to the interment site. This will reduce traffic from vehicles cruising through and around the site. It is also recommended to develop a temporary parking management plan for anticipated large events that will direct mourners to temporary parking sites.

4.5 Pedestrians and Cyclists

The proposal will have a positive impact on pedestrians and cyclists, as the cemetery will provide recreational space and may create additional connections while the cemetery is open. If a shared use path is developed along Kirk Road, it will improve the attractiveness of walking and cycling through Templeton.

5. Compliance with District Plan

At this stage, we cannot confirm compliance because the site development plan has not been established. This will be done at a later stage.

6. Recommendations and Conclusion

Templeton is on the urban-rural fringe without a significant amount of development planned for future years. The introduction of CSM2 to the south has created an alternative to Main South Road and reduced the demand for traffic on Jones Road. The planned cemetery in Templeton is therefore being introduced into an environment without significant traffic or congestion issues in general, with only localised delays at peak times around the Kirk Road / SH1 intersection.

6.1 External Intersections

The road network around the site has been assessed to anticipate any potential effects that cemetery traffic may have. In particular, two Intersections in the vicinity of the site, Kirk Road / Maddisons Road and Kirk Road / Main South Road (SH1), have been identified as potential issues and assessed in greater detail. Through transport modelling and on-site assessment, the following conclusions have been made:

- Cemetery traffic is not expected to significantly impact the Kirk Road / Maddisons Road intersection, even if most demand is for the right turn onto Kirk Road. Traffic on Kirk Road is forecast to be sufficiently low to allow the right turn to function at a level of service B.
- Modelling indicates that widening the Maddisons Road west approach to provide a left turning pocket would not significantly change the intersection's operation.
- At the Kirk Road / SH1 intersection, the through and right turn movements from the Kirk Road north approach are already significantly delayed (level of service F); however, demand for these movements is currently low enough that the left turning movement is unlikely to be blocked. Cemetery traffic is likely to create more queuing at this location, even assuming that most cemetery visitors would turn left toward Christchurch. There is little space to widen this approach, given the proximity of the Waterloo Road intersection. The rail line and rail signals would create additional complexity.
- It is recommended to encourage cemetery traffic to avoid the Kirk Road / SH1 intersection by taking Maddisons Road to the east and using Barbers Road and Pound Road to access SH1 at the signalised Pound Road / SH1 intersection. This can be done through signage at the site and educating visitors by providing information to funeral homes. This approach would reduce the impact of cemetery traffic on the Templeton community.

6.2 Accessways

Using traffic counts and observations taken on site, the location and design of the Stage 1 entrances to the site on Maddisons Road and Kirk Road have been assessed and the following conclusions made:

- The site boundaries on both Maddisons Road and Kirk Road have flat ground with no constraints anticipated other than the locations of power poles.
- It is recommended to extend the 60 kph zone on Maddisons Road to cover at least the Stage 1 boundary of the cemetery. This will improve the safety of the accessways on this road. Placing the speed limit change to the west of the boundary will reduce the noise impact of vehicles accelerating past the site.
- There is expected to be sufficient space between power poles to provide a left turning lane into the site, though it may be a constraint if the speed on Maddisons Road remains at 80 kph.
- It is expected that there will be sufficient space on the opposite side of both roads to provide shoulder widening to allow cars to manoeuvre around a vehicle turning right into the site. This is not expected to impact the drainage channel on Kirk Road.

- It is recommended to widen the existing narrow footpath along the site boundary into cemetery land to create a shared use path. This path can be connected to future cycle infrastructure and create a link between the cemetery and the Templeton community for recreation.
- The detailed design for the Kirk Road access must maintain safety for users of the footpath or shared use path when considering the left turn treatment to be used.

6.3 Other conclusions

Some consideration was given to the quantity of parking to be provided within the cemetery site. It is recommended to provide parking for at least 40 vehicles in Stage 1 and about 80 vehicles in Stage 2.

Overall, it is expected that traffic impacts from the cemetery can be managed through travel demand management measures. This could include signage to divert vehicles away from potential traffic issues (e.g. away from Kirk Road and onto Pound Road), scheduling interments to avoid large numbers of people departing during peak traffic times, and distributing traffic among the site accesses.

Appendix A. SIDRA Modelling Full Results

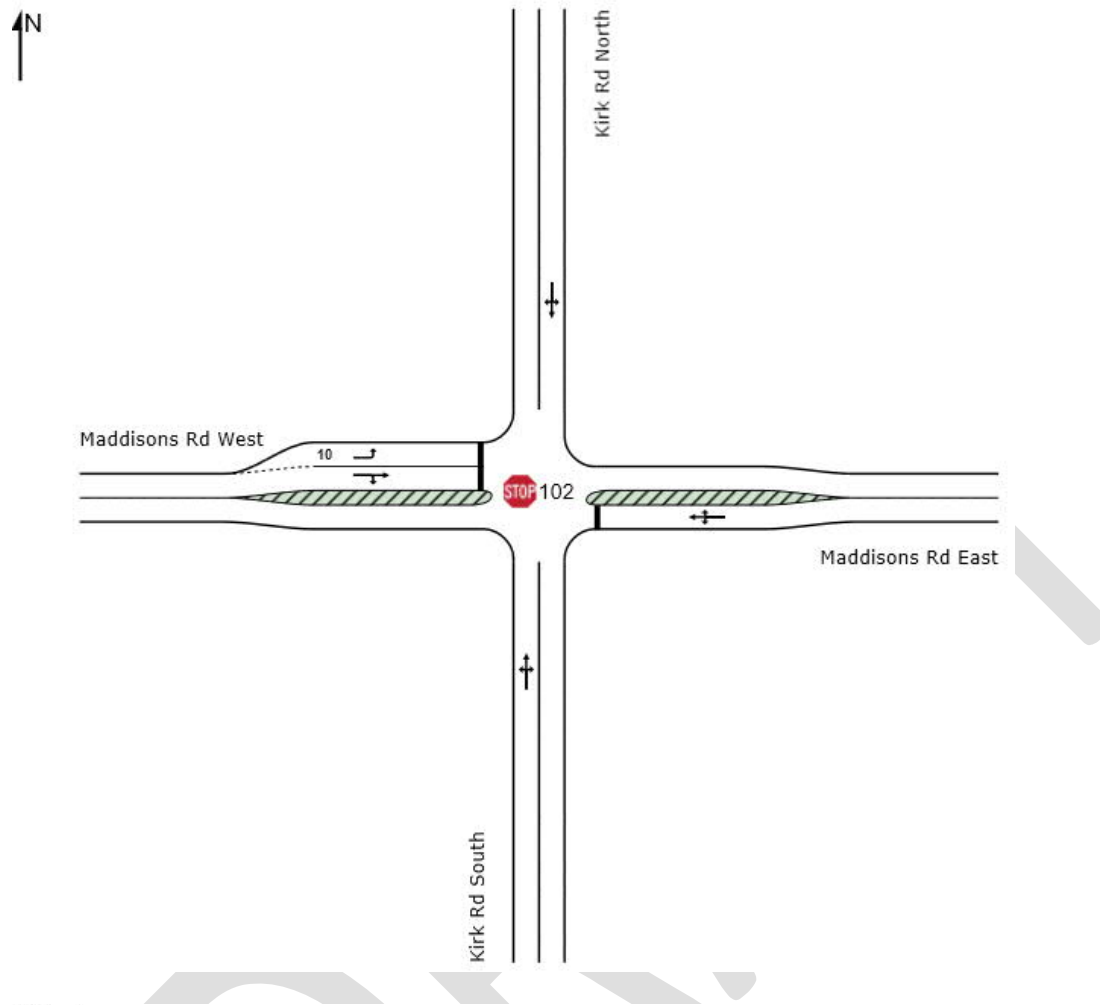
Table 7: SIDRA level of service definitions

Level of Service	Control delay per vehicle in seconds (d)		
	Signals	"SIDRA Roundabout LOS" method ⁽¹⁾	Sign Control
A	$d \leq 10$	$d \leq 10$	$d \leq 10$
B	$10 < d \leq 20$	$10 < d \leq 20$	$10 < d \leq 15$
C	$20 < d \leq 35$	$20 < d \leq 35$	$15 < d \leq 25$
D	$35 < d \leq 55$	$35 < d \leq 50$	$25 < d \leq 35$
E	$55 < d \leq 80$	$50 < d \leq 70$	$35 < d \leq 50$
F	$80 < d$	$70 < d$	$50 < d$

For Standard Left, Standard Right and New Zealand setups in SIDRA INTERSECTION, this is the default LOS Method for vehicles. Level of Service Target = LOS D is indicated by the table.

⁽¹⁾ The default *Roundabout LOS Method* is the **SIDRA Roundabout LOS** method for roundabouts which is unique to SIDRA INTERSECTION. It has been recommended by AUSTROADS - AGTM 03-13 (2013). Guide to Traffic Management Part 3: Traffic Studies and Analysis.

Kirk Road / Maddisons Road



AM_Current
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	18	11.8	0.084	5.9	LOS A	0.1	1.2	0.09	0.14	0.09	56.1
2	T1	109	18.3	0.084	0.1	LOS A	0.1	1.2	0.09	0.14	0.09	58.2
3	R2	19	0.0	0.084	5.9	LOS A	0.1	1.2	0.09	0.14	0.09	56.1
Approach		146	15.1	0.084	1.5	NA	0.1	1.2	0.09	0.14	0.09	57.6
East: Maddisons Rd East												
4	L2	18	0.0	0.148	8.4	LOS A	0.6	4.3	0.35	0.96	0.35	51.3
5	T1	100	9.5	0.148	9.9	LOS A	0.6	4.3	0.35	0.96	0.35	50.7
6	R2	7	28.6	0.148	12.4	LOS B	0.6	4.3	0.35	0.96	0.35	49.7
Approach		125	9.2	0.148	9.9	LOS A	0.6	4.3	0.35	0.96	0.35	50.7
North: Kirk Rd North												
7	L2	27	23.1	0.081	6.0	LOS A	0.1	1.0	0.07	0.16	0.07	55.6
8	T1	97	15.2	0.081	0.1	LOS A	0.1	1.0	0.07	0.16	0.07	58.2
9	R2	13	25.0	0.081	6.4	LOS A	0.1	1.0	0.07	0.16	0.07	55.3
Approach		137	17.7	0.081	1.8	NA	0.1	1.0	0.07	0.16	0.07	57.4
West: Maddisons Rd West												
10	L2	14	7.7	0.011	8.8	LOS A	0.0	0.3	0.22	0.88	0.22	51.4
11	T1	88	8.3	0.141	9.9	LOS A	0.5	3.9	0.42	0.96	0.42	50.6
12	R2	21	10.0	0.141	11.0	LOS B	0.5	3.9	0.42	0.96	0.42	50.3
Approach		123	8.5	0.141	10.0	LOS A	0.5	3.9	0.39	0.95	0.39	50.6
All Vehicles		532	12.9	0.148	5.5	NA	0.6	4.3	0.22	0.53	0.22	54.1

Preliminary Transport Assessment



AM_2038
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	19	11.1	0.062	5.8	LOS A	0.1	1.0	0.09	0.19	0.09	55.7
2	T1	74	15.7	0.062	0.1	LOS A	0.1	1.0	0.09	0.19	0.09	57.8
3	R2	18	0.0	0.062	5.7	LOS A	0.1	1.0	0.09	0.19	0.09	55.7
Approach		111	12.4	0.062	2.0	NA	0.1	1.0	0.09	0.19	0.09	57.1
East: Maddisons Rd East												
4	L2	20	0.0	0.207	8.3	LOS A	0.8	6.3	0.31	0.96	0.31	51.5
5	T1	161	7.6	0.207	9.4	LOS A	0.8	6.3	0.31	0.96	0.31	50.9
6	R2	9	33.3	0.207	12.4	LOS B	0.8	6.3	0.31	0.96	0.31	49.7
Approach		191	8.3	0.207	9.4	LOS A	0.8	6.3	0.31	0.96	0.31	50.9
North: Kirk Rd North												
7	L2	35	15.2	0.063	5.8	LOS A	0.1	1.0	0.09	0.25	0.09	55.2
8	T1	59	8.9	0.063	0.1	LOS A	0.1	1.0	0.09	0.25	0.09	57.4
9	R2	15	21.4	0.063	6.1	LOS A	0.1	1.0	0.09	0.25	0.09	54.7
Approach		108	12.6	0.063	2.8	NA	0.1	1.0	0.09	0.25	0.09	56.3
West: Maddisons Rd West												
10	L2	16	13.3	0.013	8.9	LOS A	0.0	0.4	0.18	0.90	0.18	51.2
11	T1	115	13.8	0.164	9.7	LOS A	0.6	4.8	0.37	0.97	0.37	50.6
12	R2	22	0.0	0.164	10.3	LOS B	0.6	4.8	0.37	0.97	0.37	51.0
Approach		153	11.7	0.164	9.7	LOS A	0.6	4.8	0.35	0.96	0.35	50.7
All Vehicles		562	10.9	0.207	6.8	NA	0.8	6.3	0.23	0.67	0.23	53.0

IP_Current
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	17	6.3	0.070	6.0	LOS A	0.2	1.3	0.13	0.17	0.13	55.8
2	T1	81	26.0	0.070	0.2	LOS A	0.2	1.3	0.13	0.17	0.13	57.6
3	R2	19	5.6	0.070	6.1	LOS A	0.2	1.3	0.13	0.17	0.13	55.3
Approach		117	19.8	0.070	2.0	NA	0.2	1.3	0.13	0.17	0.13	57.0
East: Maddisons Rd East												
4	L2	18	5.9	0.172	8.9	LOS A	0.7	5.1	0.41	0.97	0.41	50.8
5	T1	98	12.9	0.172	10.4	LOS B	0.7	5.1	0.41	0.97	0.41	50.3
6	R2	18	17.6	0.172	12.2	LOS B	0.7	5.1	0.41	0.97	0.41	49.9
Approach		134	12.6	0.172	10.4	LOS B	0.7	5.1	0.41	0.97	0.41	50.3
North: Kirk Rd North												
7	L2	31	10.3	0.110	5.9	LOS A	0.2	1.7	0.08	0.15	0.08	56.3
8	T1	140	10.5	0.110	0.1	LOS A	0.2	1.7	0.08	0.15	0.08	58.4
9	R2	20	36.8	0.110	6.4	LOS A	0.2	1.7	0.08	0.15	0.08	54.8
Approach		191	13.3	0.110	1.7	NA	0.2	1.7	0.08	0.15	0.08	57.7
West: Maddisons Rd West												
10	L2	25	8.3	0.020	8.7	LOS A	0.1	0.6	0.19	0.89	0.19	51.4
11	T1	95	8.9	0.158	10.2	LOS B	0.6	4.4	0.44	0.97	0.44	50.4
12	R2	24	4.3	0.158	10.9	LOS B	0.6	4.4	0.44	0.97	0.44	50.4
Approach		144	8.0	0.158	10.0	LOS B	0.6	4.4	0.40	0.96	0.40	50.6
All Vehicles		585	13.1	0.172	5.8	NA	0.7	5.1	0.24	0.54	0.24	53.9

IP_2038
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	18	5.9	0.066	6.0	LOS A	0.2	1.3	0.13	0.19	0.13	55.7
2	T1	75	19.7	0.066	0.2	LOS A	0.2	1.3	0.13	0.19	0.13	57.5
3	R2	21	5.0	0.066	6.0	LOS A	0.2	1.3	0.13	0.19	0.13	55.2
Approach		114	14.8	0.066	2.2	NA	0.2	1.3	0.13	0.19	0.13	56.8
East: Maddisons Rd East												
4	L2	19	5.6	0.244	8.8	LOS A	1.0	7.5	0.45	0.99	0.45	50.3
5	T1	132	12.8	0.244	11.1	LOS B	1.0	7.5	0.45	0.99	0.45	49.8
6	R2	21	20.0	0.244	15.1	LOS C	1.0	7.5	0.45	0.99	0.45	49.3
Approach		172	12.9	0.244	11.3	LOS B	1.0	7.5	0.45	0.99	0.45	49.8
North: Kirk Rd North												
7	L2	38	33.3	0.155	6.3	LOS A	0.7	5.5	0.20	0.29	0.20	53.7
8	T1	116	4.5	0.155	0.3	LOS A	0.7	5.5	0.20	0.29	0.20	56.7
9	R2	101	16.7	0.155	6.1	LOS A	0.7	5.5	0.20	0.29	0.20	54.2
Approach		255	13.6	0.155	3.5	NA	0.7	5.5	0.20	0.29	0.20	55.2
West: Maddisons Rd West												
10	L2	58	5.5	0.045	8.6	LOS A	0.2	1.3	0.18	0.90	0.18	51.5
11	T1	160	9.9	0.275	11.1	LOS B	1.1	8.6	0.52	1.02	0.54	49.8
12	R2	31	6.9	0.275	12.6	LOS B	1.1	8.6	0.52	1.02	0.54	49.7
Approach		248	8.5	0.275	10.7	LOS B	1.1	8.6	0.44	0.99	0.45	50.2
All Vehicles		788	12.0	0.275	7.3	NA	1.1	8.6	0.32	0.65	0.32	52.5

Preliminary Transport Assessment

PM_Current
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	20	0.0	0.074	5.8	LOS A	0.1	1.0	0.09	0.16	0.09	56.6
2	T1	99	5.3	0.074	0.1	LOS A	0.1	1.0	0.09	0.16	0.09	58.1
3	R2	18	0.0	0.074	5.9	LOS A	0.1	1.0	0.09	0.16	0.09	56.0
Approach		137	3.8	0.074	1.7	NA	0.1	1.0	0.09	0.16	0.09	57.6
East: Maddisons Rd East												
4	L2	32	0.0	0.202	8.6	LOS A	0.8	5.7	0.37	0.94	0.37	51.3
5	T1	138	0.8	0.202	9.4	LOS A	0.8	5.7	0.37	0.94	0.37	51.1
6	R2	13	8.3	0.202	11.6	LOS B	0.8	5.7	0.37	0.94	0.37	50.5
Approach		182	1.2	0.202	9.4	LOS A	0.8	5.7	0.37	0.94	0.37	51.1
North: Kirk Rd North												
7	L2	11	10.0	0.078	5.9	LOS A	0.1	0.7	0.06	0.09	0.06	56.9
8	T1	124	1.7	0.078	0.0	LOS A	0.1	0.7	0.06	0.09	0.06	58.9
9	R2	13	0.0	0.078	5.9	LOS A	0.1	0.7	0.06	0.09	0.06	57.1
Approach		147	2.1	0.078	1.0	NA	0.1	0.7	0.06	0.09	0.06	58.6
West: Maddisons Rd West												
10	L2	9	0.0	0.007	8.4	LOS A	0.0	0.2	0.20	0.87	0.20	51.8
11	T1	159	1.3	0.194	9.4	LOS A	0.8	5.4	0.41	0.95	0.41	51.1
12	R2	9	0.0	0.194	11.0	LOS B	0.8	5.4	0.41	0.95	0.41	50.9
Approach		178	1.2	0.194	9.4	LOS A	0.8	5.4	0.39	0.95	0.39	51.1
All Vehicles		644	2.0	0.202	5.8	NA	0.8	5.7	0.24	0.58	0.24	54.0

PM 2038 Base case

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	20	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.17	0.07	56.6
2	T1	89	1.2	0.068	0.0	LOS A	0.1	1.0	0.07	0.17	0.07	58.1
3	R2	19	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.17	0.07	56.0
Approach		128	0.8	0.068	1.7	NA	0.1	1.0	0.07	0.17	0.07	57.6
East: Maddisons Rd East												
4	L2	43	0.0	0.312	8.3	LOS A	1.4	9.8	0.30	0.95	0.30	51.2
5	T1	221	0.5	0.312	9.0	LOS A	1.4	9.8	0.30	0.95	0.30	50.9
6	R2	20	26.3	0.312	17.3	LOS C	1.4	9.8	0.30	0.95	0.30	49.7
Approach		284	2.2	0.312	9.5	LOS A	1.4	9.8	0.30	0.95	0.30	50.9
North: Kirk Rd North												
7	L2	13	8.3	0.047	5.9	LOS A	0.1	0.9	0.11	0.20	0.11	55.8
8	T1	56	1.9	0.047	0.1	LOS A	0.1	0.9	0.11	0.20	0.11	57.7
9	R2	18	0.0	0.047	5.8	LOS A	0.1	0.9	0.11	0.20	0.11	56.0
Approach		86	2.4	0.047	2.1	NA	0.1	0.9	0.11	0.20	0.11	57.0
West: Maddisons Rd West												
10	L2	19	0.0	0.014	8.3	LOS A	0.1	0.4	0.19	0.88	0.19	51.8
11	T1	379	1.1	0.413	9.4	LOS A	2.3	16.1	0.42	0.95	0.46	51.1
12	R2	12	0.0	0.413	12.7	LOS B	2.3	16.1	0.42	0.95	0.46	50.9
Approach		409	1.0	0.413	9.5	LOS A	2.3	16.1	0.41	0.95	0.44	51.1
All Vehicles		908	1.5	0.413	7.7	NA	2.3	16.1	0.30	0.77	0.32	52.4

PM 2038 with 50% of cemetery demand turning right

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	20	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.30	0.07	51.9
2	T1	89	1.2	0.068	1.2	LOS A	0.1	1.0	0.07	0.30	0.07	52.5
3	R2	19	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.30	0.07	51.4
Approach		128	0.8	0.068	2.5	NA	0.1	1.0	0.07	0.30	0.07	52.2
East: Maddisons Rd East												
4	L2	43	0.0	0.312	8.3	LOS A	1.4	9.8	0.30	0.95	0.30	55.9
5	T1	221	0.5	0.312	9.0	LOS A	1.4	9.8	0.30	0.95	0.30	55.5
6	R2	20	26.3	0.312	17.3	LOS C	1.4	9.8	0.30	0.95	0.30	49.5
Approach		284	2.2	0.312	9.5	LOS A	1.4	9.8	0.30	0.95	0.30	55.1
North: Kirk Rd North												
7	L2	13	8.3	0.047	5.9	LOS A	0.1	0.9	0.11	0.20	0.11	59.4
8	T1	56	1.9	0.047	0.1	LOS A	0.1	0.9	0.11	0.20	0.11	65.4
9	R2	18	0.0	0.047	5.8	LOS A	0.1	0.9	0.11	0.20	0.11	61.7
Approach		86	2.4	0.047	2.1	NA	0.1	0.9	0.11	0.20	0.11	63.7
West: Maddisons Rd West												
10	L2	19	0.0	0.014	8.3	LOS A	0.1	0.4	0.19	0.88	0.19	56.5
11	T1	379	1.1	0.510	10.3	LOS B	3.8	26.5	0.48	0.99	0.61	54.6
12	R2	69	0.0	0.510	13.9	LOS B	3.8	26.5	0.48	0.99	0.61	54.7
Approach		467	0.9	0.510	10.7	LOS B	3.8	26.5	0.47	0.98	0.60	54.7
All Vehicles		966	1.4	0.510	8.5	NA	3.8	26.5	0.33	0.81	0.40	55.2

PM 2038 with 50% of cemetery demand using Kirk / Maddisons, following existing traffic split

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	20	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.17	0.07	56.6
2	T1	89	1.2	0.068	0.0	LOS A	0.1	1.0	0.07	0.17	0.07	58.1
3	R2	19	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.17	0.07	56.0
Approach		128	0.8	0.068	1.7	NA	0.1	1.0	0.07	0.17	0.07	57.6
East: Maddisons Rd East												
4	L2	43	0.0	0.317	8.3	LOS A	1.4	9.9	0.31	0.95	0.31	51.1
5	T1	221	0.5	0.317	9.0	LOS A	1.4	9.9	0.31	0.95	0.31	50.9
6	R2	20	26.3	0.317	18.7	LOS C	1.4	9.9	0.31	0.95	0.31	49.6
Approach		284	2.2	0.317	9.6	LOS A	1.4	9.9	0.31	0.95	0.31	50.8
North: Kirk Rd North												
7	L2	13	8.3	0.047	5.9	LOS A	0.1	0.9	0.11	0.20	0.11	55.8
8	T1	56	1.9	0.047	0.1	LOS A	0.1	0.9	0.11	0.20	0.11	57.7
9	R2	18	0.0	0.047	5.8	LOS A	0.1	0.9	0.11	0.20	0.11	56.0
Approach		86	2.4	0.047	2.1	NA	0.1	0.9	0.11	0.20	0.11	57.0
West: Maddisons Rd West												
10	L2	20	0.0	0.015	8.3	LOS A	0.1	0.4	0.19	0.88	0.19	51.8
11	T1	433	1.0	0.473	9.9	LOS A	3.2	22.4	0.45	0.96	0.53	50.8
12	R2	15	0.0	0.473	13.4	LOS B	3.2	22.4	0.45	0.96	0.53	50.6
Approach		467	0.9	0.473	9.9	LOS A	3.2	22.4	0.44	0.96	0.51	50.8
All Vehicles		966	1.4	0.473	8.0	NA	3.2	22.4	0.32	0.78	0.36	52.2

PM 2038 with 75% of cemetery demand turning right

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	20	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.17	0.07	56.6
2	T1	89	1.2	0.068	0.0	LOS A	0.1	1.0	0.07	0.17	0.07	58.1
3	R2	19	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.17	0.07	56.0
Approach		128	0.8	0.068	1.7	NA	0.1	1.0	0.07	0.17	0.07	57.6
East: Maddisons Rd East												
4	L2	43	0.0	0.312	8.3	LOS A	1.4	9.8	0.30	0.95	0.30	51.2
5	T1	221	0.5	0.312	9.0	LOS A	1.4	9.8	0.30	0.95	0.30	50.9
6	R2	20	26.3	0.312	17.3	LOS C	1.4	9.8	0.30	0.95	0.30	49.7
Approach		284	2.2	0.312	9.5	LOS A	1.4	9.8	0.30	0.95	0.30	50.9
North: Kirk Rd North												
7	L2	13	8.3	0.047	5.9	LOS A	0.1	0.9	0.11	0.20	0.11	55.8
8	T1	56	1.9	0.047	0.1	LOS A	0.1	0.9	0.11	0.20	0.11	57.7
9	R2	18	0.0	0.047	5.8	LOS A	0.1	0.9	0.11	0.20	0.11	56.0
Approach		86	2.4	0.047	2.1	NA	0.1	0.9	0.11	0.20	0.11	57.0
West: Maddisons Rd West												
10	L2	19	0.0	0.014	8.3	LOS A	0.1	0.4	0.19	0.88	0.19	51.8
11	T1	379	1.1	0.559	10.8	LOS B	4.6	32.6	0.51	1.01	0.71	49.8
12	R2	99	0.0	0.559	14.6	LOS B	4.6	32.6	0.51	1.01	0.71	49.6
Approach		497	0.8	0.559	11.4	LOS B	4.6	32.6	0.50	1.01	0.69	49.8
All Vehicles		996	1.4	0.559	8.8	NA	4.6	32.6	0.35	0.81	0.45	51.6

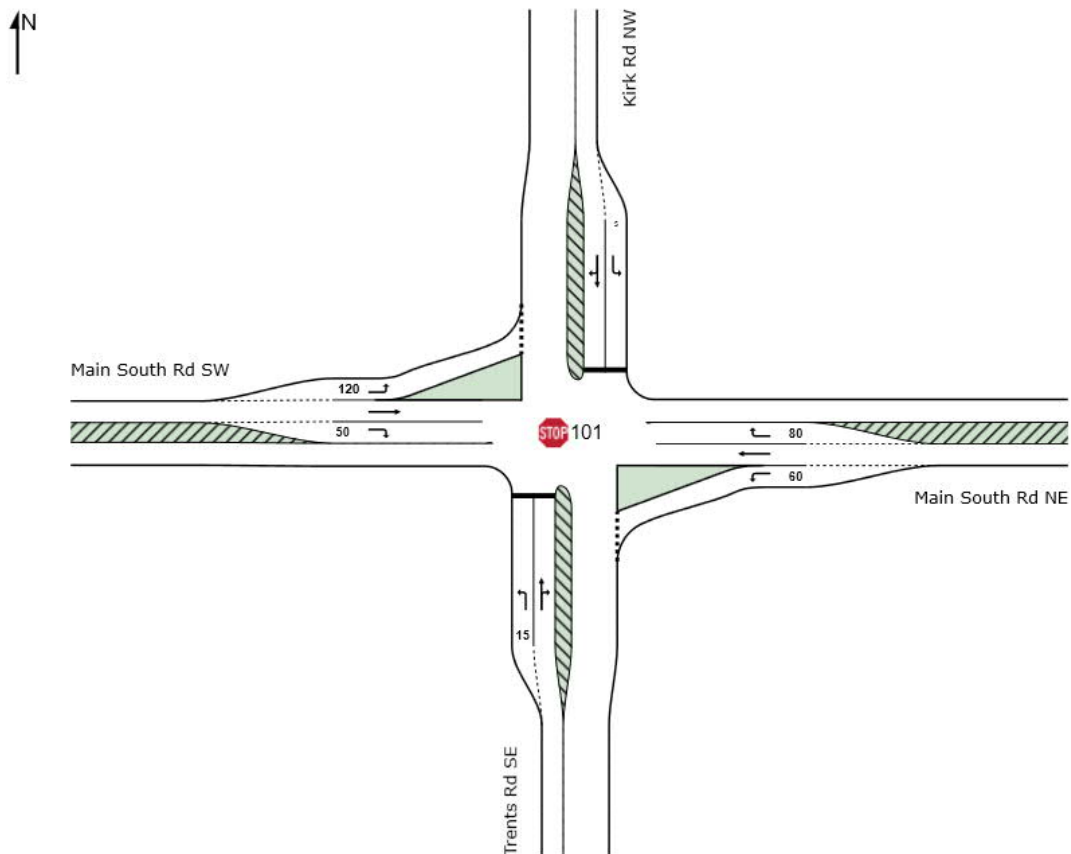
PM 2038 with 25m left turn lane

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	20	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.17	0.07	56.6
2	T1	89	1.2	0.068	0.0	LOS A	0.1	1.0	0.07	0.17	0.07	58.1
3	R2	19	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.17	0.07	56.0
Approach		128	0.8	0.068	1.7	NA	0.1	1.0	0.07	0.17	0.07	57.6
East: Maddisons Rd East												
4	L2	43	0.0	0.312	8.3	LOS A	1.4	9.8	0.30	0.95	0.30	51.2
5	T1	221	0.5	0.312	9.0	LOS A	1.4	9.8	0.30	0.95	0.30	50.9
6	R2	20	26.3	0.312	17.3	LOS C	1.4	9.8	0.30	0.95	0.30	49.7
Approach		284	2.2	0.312	9.5	LOS A	1.4	9.8	0.30	0.95	0.30	50.9
North: Kirk Rd North												
7	L2	13	8.3	0.047	5.9	LOS A	0.1	0.9	0.11	0.20	0.11	55.8
8	T1	56	1.9	0.047	0.1	LOS A	0.1	0.9	0.11	0.20	0.11	57.7
9	R2	18	0.0	0.047	5.8	LOS A	0.1	0.9	0.11	0.20	0.11	56.0
Approach		86	2.4	0.047	2.1	NA	0.1	0.9	0.11	0.20	0.11	57.0
West: Maddisons Rd West												
10	L2	19	0.0	0.014	8.3	LOS A	0.1	0.4	0.19	0.88	0.19	51.8
11	T1	379	1.1	0.559	10.8	LOS B	4.6	32.6	0.51	1.01	0.71	49.8
12	R2	99	0.0	0.559	14.6	LOS B	4.6	32.6	0.51	1.01	0.71	49.6
Approach		497	0.8	0.559	11.4	LOS B	4.6	32.6	0.50	1.01	0.69	49.8
All Vehicles		996	1.4	0.559	8.8	NA	4.6	32.6	0.35	0.81	0.45	51.6

PM 2038 with no left turn lane on Maddisons Road

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Des. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Kirk Rd South												
1	L2	20	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.17	0.07	56.6
2	T1	89	1.2	0.068	0.0	LOS A	0.1	1.0	0.07	0.17	0.07	58.1
3	R2	19	0.0	0.068	5.7	LOS A	0.1	1.0	0.07	0.17	0.07	56.0
Approach		128	0.8	0.068	1.7	NA	0.1	1.0	0.07	0.17	0.07	57.6
East: Maddisons Rd East												
4	L2	43	0.0	0.312	8.3	LOS A	1.4	9.8	0.30	0.95	0.30	51.2
5	T1	221	0.5	0.312	9.0	LOS A	1.4	9.8	0.30	0.95	0.30	50.9
6	R2	20	26.3	0.312	17.3	LOS C	1.4	9.8	0.30	0.95	0.30	49.7
Approach		284	2.2	0.312	9.5	LOS A	1.4	9.8	0.30	0.95	0.30	50.9
North: Kirk Rd North												
7	L2	13	8.3	0.047	5.9	LOS A	0.1	0.9	0.11	0.20	0.11	55.8
8	T1	56	1.9	0.047	0.1	LOS A	0.1	0.9	0.11	0.20	0.11	57.7
9	R2	18	0.0	0.047	5.8	LOS A	0.1	0.9	0.11	0.20	0.11	55.7
Approach		86	2.4	0.047	2.1	NA	0.1	0.9	0.11	0.20	0.11	57.0
West: Maddisons Rd West												
10	L2	19	0.0	0.573	10.0	LOS A	5.0	35.0	0.50	1.01	0.70	50.0
11	T1	379	1.1	0.573	10.9	LOS B	5.0	35.0	0.50	1.01	0.70	49.7
12	R2	99	0.0	0.573	14.8	LOS B	5.0	35.0	0.50	1.01	0.70	49.5
Approach		497	0.8	0.573	11.6	LOS B	5.0	35.0	0.50	1.01	0.70	49.7
All Vehicles		996	1.4	0.573	8.9	NA	5.0	35.0	0.35	0.81	0.45	51.5

Kirk Road / Main South Road (SH1) / Trents Road



Preliminary Transport Assessment



AM_Current
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Trents Rd SE												
1	L2	16	6.7	0.038	15.4	LOS C	0.1	0.9	0.65	0.99	0.65	51.7
2	T1	18	5.9	2.628	1870.5	LOS F	14.6	106.9	1.00	1.30	2.60	1.7
3	R2	3	0.0	2.628	2080.2	LOS F	14.6	106.9	1.00	1.30	2.60	1.7
Approach		37	5.7	2.628	1093.4	LOS F	14.6	106.9	0.85	1.17	1.77	2.8
East: Main South Rd NE												
4	L2	18	23.5	0.012	6.9	LOS A	0.0	0.4	0.03	0.56	0.03	54.1
5	T1	684	11.1	0.376	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
6	R2	135	11.7	0.388	20.2	LOS C	1.6	12.4	0.86	1.01	1.11	43.9
Approach		837	11.4	0.388	3.4	LOS A	1.6	12.4	0.14	0.17	0.18	63.4
North: Kirk Rd NW												
7	L2	207	1.5	1.125	176.0	LOS F	21.4	152.0	1.00	2.76	7.28	15.1
8	T1	3	0.0	0.856	742.2	LOS F	2.3	16.3	1.00	1.06	1.25	4.0
9	R2	3	0.0	0.856	981.6	LOS F	2.3	16.3	1.00	1.06	1.25	4.0
Approach		214	1.5	1.125	196.3	LOS F	21.4	152.0	1.00	2.71	7.11	13.9
West: Main South Rd SW												
10	L2	99	1.1	0.070	7.1	LOS A	0.3	2.0	0.26	0.57	0.26	52.3
11	T1	1041	5.4	0.552	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
12	R2	1	0.0	0.001	9.6	LOS A	0.0	0.0	0.58	0.61	0.58	56.9
Approach		1141	5.0	0.552	0.7	LOS A	0.3	2.0	0.02	0.05	0.02	67.7
All Vehicles		2228	7.1	2.628	38.6	NA	21.4	152.0	0.17	0.37	0.79	38.2

AM_2038
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Trents Rd SE												
1	L2	11	10.0	0.038	20.1	LOS C	0.1	0.9	0.77	1.00	0.77	48.1
2	T1	15	7.1	1.898	1291.4	LOS F	9.8	72.5	1.00	1.26	2.39	2.4
3	R2	2	0.0	1.898	1496.3	LOS F	9.8	72.5	1.00	1.26	2.39	2.4
Approach		27	7.7	1.898	818.2	LOS F	9.8	72.5	0.91	1.16	1.77	3.7
East: Main South Rd NE												
4	L2	18	17.6	0.012	6.8	LOS A	0.0	0.4	0.03	0.57	0.03	55.5
5	T1	848	8.7	0.463	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
6	R2	122	9.5	0.267	15.3	LOS C	1.1	8.1	0.79	0.94	0.90	46.6
Approach		988	8.9	0.463	2.1	LOS A	1.1	8.1	0.10	0.13	0.11	65.5
North: Kirk Rd NW												
7	L2	162	0.6	0.642	30.1	LOS D	2.9	20.6	0.91	1.19	1.56	39.0
8	T1	4	0.0	0.969	1116.8	LOS F	2.7	18.8	1.00	1.07	1.28	2.9
9	R2	1	0.0	0.969	1505.5	LOS F	2.7	18.8	1.00	1.07	1.28	2.9
Approach		167	0.6	0.969	66.7	LOS F	2.9	20.6	0.92	1.18	1.55	28.0
West: Main South Rd SW												
10	L2	476	0.2	0.329	7.2	LOS A	1.7	11.9	0.30	0.58	0.30	52.1
11	T1	938	5.6	0.499	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
12	R2	1	0.0	0.002	11.2	LOS B	0.0	0.0	0.67	0.66	0.67	55.5
Approach		1415	3.8	0.499	2.5	LOS A	1.7	11.9	0.10	0.20	0.10	62.6
All Vehicles		2598	5.6	1.898	15.1	NA	9.8	72.5	0.16	0.24	0.22	50.9

IP_Current
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Total veh/h	Demand Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Trents Rd SE												
1	L2	19	16.7	0.040	14.6	LOS B	0.1	1.1	0.58	0.97	0.58	50.4
2	T1	26	8.0	0.471	67.3	LOS F	1.6	12.1	0.96	1.05	1.20	26.2
3	R2	8	12.5	0.471	114.0	LOS F	1.6	12.1	0.96	1.05	1.20	27.3
Approach		54	11.8	0.471	56.0	LOS F	1.6	12.1	0.82	1.02	0.98	31.8
East: Main South Rd NE												
4	L2	28	14.8	0.019	6.8	LOS A	0.1	0.6	0.09	0.55	0.09	56.0
5	T1	579	8.7	0.316	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
6	R2	136	15.5	0.135	8.9	LOS A	0.6	4.7	0.52	0.72	0.52	50.7
Approach		743	10.2	0.316	1.9	LOS A	0.6	4.7	0.10	0.15	0.10	64.8
North: Kirk Rd NW												
7	L2	134	2.4	0.199	11.0	LOS B	0.7	5.3	0.53	0.98	0.53	48.1
8	T1	14	15.4	0.242	58.1	LOS F	0.8	5.8	0.94	1.02	1.01	28.7
9	R2	5	0.0	0.242	63.9	LOS F	0.8	5.8	0.94	1.02	1.01	30.0
Approach		153	3.4	0.242	17.0	LOS C	0.8	5.8	0.58	0.99	0.59	44.5
West: Main South Rd SW												
10	L2	52	8.2	0.038	7.2	LOS A	0.2	1.1	0.27	0.56	0.27	52.1
11	T1	447	8.5	0.242	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
12	R2	13	8.3	0.014	9.2	LOS A	0.1	0.4	0.55	0.67	0.55	55.1
Approach		512	8.4	0.242	1.0	LOS A	0.2	1.1	0.04	0.07	0.04	67.2
All Vehicles		1461	8.9	0.471	5.2	NA	1.6	12.1	0.16	0.24	0.16	60.4

Preliminary Transport Assessment



IP_2038
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Trents Rd SE												
1	L2	27	15.4	0.070	16.5	LOS C	0.2	1.8	0.67	1.01	0.67	49.4
2	T1	38	13.9	0.597	87.3	LOS F	2.2	17.0	0.97	1.08	1.35	24.2
3	R2	6	0.0	0.597	107.8	LOS F	2.2	17.0	0.97	1.08	1.35	25.8
Approach		72	13.2	0.597	62.0	LOS F	2.2	17.0	0.85	1.05	1.09	30.3
East: Main South Rd NE												
4	L2	29	14.3	0.020	6.9	LOS A	0.1	0.6	0.12	0.55	0.12	56.0
5	T1	678	8.2	0.368	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
6	R2	27	57.7	0.036	10.3	LOS B	0.1	1.5	0.54	0.69	0.54	49.5
Approach		735	10.3	0.368	0.7	LOS A	0.1	1.5	0.02	0.05	0.02	68.1
North: Kirk Rd NW												
7	L2	112	0.9	0.164	10.7	LOS B	0.6	4.2	0.51	0.97	0.51	48.5
8	T1	24	8.7	0.417	76.1	LOS F	1.4	10.2	0.96	1.05	1.14	25.3
9	R2	4	0.0	0.417	95.6	LOS F	1.4	10.2	0.96	1.05	1.14	25.8
Approach		140	2.3	0.417	24.6	LOS C	1.4	10.2	0.60	0.99	0.64	40.9
West: Main South Rd SW												
10	L2	181	15.7	0.128	7.1	LOS A	0.6	4.4	0.18	0.55	0.18	52.3
11	T1	456	4.4	0.242	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
12	R2	18	5.9	0.023	9.9	LOS A	0.1	0.7	0.59	0.73	0.59	55.0
Approach		655	7.6	0.242	2.2	LOS A	0.6	4.4	0.07	0.17	0.07	63.5
All Vehicles		1601	8.6	0.597	6.2	NA	2.2	17.0	0.13	0.23	0.14	59.6

PM_Current
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Trents Rd SE												
1	L2	34	3.1	0.218	32.1	LOS D	0.7	4.7	0.89	1.01	0.96	42.6
2	T1	19	0.0	4.462	3492.3	LOS F	23.6	170.9	1.00	1.29	2.58	0.9
3	R2	8	12.5	4.462	3483.7	LOS F	23.6	170.9	1.00	1.29	2.58	0.9
Approach		61	3.4	4.462	1582.1	LOS F	23.6	170.9	0.94	1.14	1.68	2.0
East: Main South Rd NE												
4	L2	61	3.4	0.039	6.7	LOS A	0.2	1.1	0.07	0.56	0.07	59.1
5	T1	1093	4.2	0.579	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
6	R2	235	2.2	0.321	11.7	LOS B	1.6	11.1	0.68	0.91	0.62	46.9
Approach		1388	3.9	0.579	2.4	LOS A	1.6	11.1	0.12	0.18	0.14	64.5
North: Kirk Rd NW												
7	L2	197	1.6	0.488	18.7	LOS C	2.3	16.2	0.79	1.12	1.17	44.1
8	T1	8	0.0	2.448	1920.4	LOS F	10.0	70.3	1.00	1.26	2.12	1.6
9	R2	4	0.0	2.448	2019.2	LOS F	10.0	70.3	1.00	1.26	2.12	1.6
Approach		209	1.5	2.448	135.3	LOS F	10.0	70.3	0.80	1.13	1.23	16.7
West: Main South Rd SW												
10	L2	18	11.8	0.015	7.6	LOS A	0.1	0.4	0.33	0.57	0.33	51.9
11	T1	736	6.4	0.393	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
12	R2	12	0.0	0.032	15.7	LOS C	0.1	0.7	0.80	0.92	0.80	51.9
Approach		765	6.5	0.393	0.5	LOS A	0.1	0.7	0.02	0.03	0.02	68.9
All Vehicles		2424	4.5	4.462	53.0	NA	23.6	170.9	0.17	0.24	0.24	32.2

PM 2038 Base case

PM_2038
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Trents Rd SE												
1	L2	16	6.7	0.158	42.9	LOS E	0.4	3.2	0.93	1.00	0.94	37.5
2	T1	22	0.0	3.950	3016.1	LOS F	22.2	160.2	1.00	1.31	2.69	1.1
3	R2	5	20.0	3.950	3046.6	LOS F	22.2	160.2	1.00	1.31	2.69	1.1
Approach		43	4.9	3.950	1932.1	LOS F	22.2	160.2	0.97	1.20	2.05	1.7
East: Main South Rd NE												
4	L2	81	2.6	0.051	6.7	LOS A	0.2	1.5	0.09	0.56	0.09	59.2
5	T1	1199	3.1	0.631	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.6
6	R2	202	1.0	0.200	9.0	LOS A	0.9	6.2	0.56	0.77	0.56	50.8
Approach		1482	2.8	0.631	1.7	LOS A	0.9	6.2	0.08	0.14	0.08	65.7
North: Kirk Rd NW												
7	L2	124	1.7	0.209	11.8	LOS B	0.8	5.4	0.57	1.00	0.57	47.7
8	T1	13	0.0	2.191	1647.1	LOS F	9.5	66.6	1.00	1.30	2.24	1.9
9	R2	1	0.0	2.191	1821.3	LOS F	9.5	66.6	1.00	1.30	2.24	1.9
Approach		138	1.5	2.191	175.4	LOS F	9.5	66.6	0.61	1.03	0.73	13.8
West: Main South Rd SW												
10	L2	83	3.8	0.063	7.4	LOS A	0.3	1.8	0.31	0.58	0.31	52.1
11	T1	528	7.0	0.285	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
12	R2	14	0.0	0.050	19.1	LOS C	0.2	1.1	0.85	0.94	0.85	49.5
Approach		625	6.4	0.285	1.4	LOS A	0.3	1.8	0.06	0.10	0.06	66.3
All Vehicles		2288	3.7	3.950	48.5	NA	22.2	160.2	0.12	0.20	0.15	33.7

PM 2038 with cemetery demand following existing split of traffic movements

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Trents Rd SE												
1	L2	16	6.7	0.158	42.9	LOS E	0.4	3.2	0.93	1.00	0.94	37.5
2	T1	22	0.0	3.950	3013.3	LOS F	22.1	159.8	1.00	1.31	2.70	1.1
3	R2	5	20.0	3.950	3040.4	LOS F	22.1	159.8	1.00	1.31	2.70	1.1
Approach		43	4.9	3.950	1929.9	LOS F	22.1	159.8	0.97	1.20	2.05	1.7
East: Main South Rd NE												
4	L2	81	2.6	0.052	6.7	LOS A	0.2	1.5	0.12	0.55	0.12	59.1
5	T1	1199	3.1	0.631	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.6
6	R2	202	1.0	0.200	9.0	LOS A	0.9	6.2	0.56	0.77	0.56	50.8
Approach		1482	2.8	0.631	1.7	LOS A	0.9	6.2	0.08	0.14	0.08	65.7
North: Kirk Rd NW												
7	L2	217	1.0	0.362	13.0	LOS B	1.7	11.9	0.61	1.06	0.78	47.2
8	T1	31	0.0	5.656	4482.5	LOS F	31.3	219.1	1.00	1.45	2.87	0.7
9	R2	6	0.0	5.656	4495.8	LOS F	31.3	219.1	1.00	1.45	2.87	0.7
Approach		254	0.8	5.656	662.4	LOS F	31.3	219.1	0.67	1.12	1.08	4.7
West: Main South Rd SW												
10	L2	83	3.8	0.063	7.4	LOS A	0.3	1.8	0.31	0.58	0.31	52.1
11	T1	528	7.0	0.285	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
12	R2	14	0.0	0.050	19.1	LOS C	0.2	1.1	0.85	0.94	0.85	49.5
Approach		625	6.4	0.285	1.4	LOS A	0.3	1.8	0.06	0.10	0.06	66.3
All Vehicles		2404	3.5	5.656	106.0	NA	31.3	219.1	0.15	0.25	0.22	21.5

PM 2038 with cemetery demand following likely split (90% turn left)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Trents Rd SE												
1	L2	16	6.7	0.158	42.9	LOS E	0.4	3.2	0.93	1.00	0.94	37.5
2	T1	22	0.0	3.950	3013.5	LOS F	22.1	159.8	1.00	1.31	2.69	1.1
3	R2	5	20.0	3.950	3040.8	LOS F	22.1	159.8	1.00	1.31	2.69	1.1
Approach		43	4.9	3.950	1930.0	LOS F	22.1	159.8	0.97	1.20	2.05	1.7
East: Main South Rd NE												
4	L2	81	2.6	0.052	6.7	LOS A	0.2	1.5	0.10	0.55	0.10	59.2
5	T1	1199	3.1	0.631	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.6
6	R2	202	1.0	0.200	9.0	LOS A	0.9	6.2	0.56	0.77	0.56	50.8
Approach		1482	2.8	0.631	1.7	LOS A	0.9	6.2	0.08	0.14	0.08	65.7
North: Kirk Rd NW												
7	L2	228	0.9	0.381	13.2	LOS B	1.8	12.8	0.62	1.07	0.81	47.1
8	T1	19	0.0	4.139	3185.1	LOS F	21.5	150.5	1.00	1.41	2.71	1.0
9	R2	7	0.0	4.139	3203.1	LOS F	21.5	150.5	1.00	1.41	2.71	1.0
Approach		255	0.8	4.139	341.4	LOS F	21.5	150.5	0.66	1.11	1.00	8.3
West: Main South Rd SW												
10	L2	83	3.8	0.063	7.4	LOS A	0.3	1.8	0.31	0.58	0.31	52.1
11	T1	528	7.0	0.285	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
12	R2	14	0.0	0.050	19.1	LOS C	0.2	1.1	0.85	0.94	0.85	49.5
Approach		625	6.4	0.285	1.4	LOS A	0.3	1.8	0.06	0.10	0.06	66.3
All Vehicles		2405	3.5	4.139	72.2	NA	22.1	159.8	0.15	0.25	0.21	27.1