IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER Plan Change 63: Rezone 60 hectares of Rural Outer Plains to Living 1, Darfield.

EVIDENCE OF LISA MARIE WILLIAMS

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08 July 2021

INTRODUCTION

1. My full name is Lisa Marie Williams. I am a transport engineer and planner employed by Novo Group Limited, a Christchurch based resource management and traffic engineering consulting company. I hold the qualifications of a Master of Engineering (Transport) from the University of Canterbury. I have 15 years of experience as a Transport Engineer and Planner in New Zealand. I am a Transport Group member of Engineering New Zealand.

2. My specific experience relevant to this evidence includes processing and preparing traffic assessments under the Resource Management Act, for notified and non-notified applications on a range of land-use activities. This specifically includes a variety of Plan Change and Outline Plan applications in Selwyn District.

3. I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014. I have complied with it in preparing this evidence and I agree to comply with it in presenting evidence at this hearing. The evidence that I give is within my area of expertise except where I state that my evidence is given in reliance on another person's evidence. I have considered all material facts that are known to me that might alter or detract from the opinions that I express in this evidence.

SCOPE OF EVIDENCE

4. I have been requested to present transport evidence on the proposed Plan Change 63 to rezone 60ha of Rural Outer Plains to Living 1 zone.

5. I prepared the traffic assessment lodged with the application as well as the *Response to Waka Kotahi NZTA* dated 24/02/2021 and the *Additional Transport Assessment* dated 22/06/2021 (copies are included as Attachments 1 and 2 respectively). I am not aware of any changes to the proposal or road environment that would alter the conclusions of those assessments.

6. I have visited the site and have read:

    i. The Council planner's section 42A report, prepared by Rachael Carruthers;
    ii. The transport evidence prepared by David Smith, of Abley, on behalf of the Council;
    iii. The transport related submissions on the application;
    iv. Darfield Deferred Residential Rezoning Integrated Transport Assessment by Stantec New Zealand, dated 31 July 2019; and

v. Level Crossing Safety Impact Assessment (LCSIA) for Darfield Deferred Residential Rezoning by Stantec New Zealand, dated 13 February 2020.

7. There is broad agreement between myself and the Council officers on the transport effects. Accordingly, this evidence primarily focuses on responding to the matters raised in the submissions.

TRANSPORT SUMMARY

8. The site is located between Kimberley Road and Horndon Street on the northern side of Darfield. The proposed site layout is shown on the revised Outline Development Plan (ODP) provided to Council on the 28th of April 2020.

9. The ODP has two primary road connections, one from Hondon Street via Broadgate Street towards the north and one from Horndon Street via Broadmeadows Drive to Kimberley Road at the intersection with Landsborough Drive. Additional road connections are anticipated to Kimberley Road, and to Pearson Street via Reeds Road (opposite Dundee Close). The ODP also identifies indicative future connections to adjacent land.

10. A pedestrian and cycle connection is proposed to Kimberley Road in the south-western corner of the ODP area.

11. The ODP area provides for an estimated 441 future lots and a retirement village for up to 60 beds and 50 independent living units. The traffic generation[1] is estimated to be 420 vehicle movements in the peak hours.

SUBMISSIONS

12. 14 submissions were received and the key points related to traffic are summarised below. It is noted that amenity related effects[2] arising from traffic are assessed by others.

- Concerns regarding the rail level crossings (Waka Kotahi NZTA #10; KiwiRail Holdings Limited #9).

[1] Refer to the Transport Assessment and Attachment 1.

[2] It is specifically noted that the transport effects raised by Crystal Vercoe #5 related solely to amenity and are best assessed by others.

- Traffic generation rates and associated effects (Waka Kotahi NZTA #10; and Katherine Molloy #12).

- Questions regarding the operation of the State Highway 73 intersections (Waka Kotahi NZTA #10).

- Effects on the existing (Council-owned) road network (Phillipa Joan Anderson #1; Janice and Collan Perriton #3; Katherine Molloy #12; Westmar Senior Care #13; and Kirsty Lucey and Ben Hanburger #14) and whether there would be property access to Kimberley Road (Janice and Collan Perriton #3).

- Pedestrian and other (multi-modal) transport within the site and to the existing areas of Darfield (Waka Kotahi NZTA #10; KiwiRail holdings Limited #9 and Katherine Molloy #12) and the impacts on parking in Darfield (Katherine Molloy #12 and Westmar Senior Care Darfield #13).

- Impact on travel patterns in respect of the Greater Christchurch Urban Development Strategy (Waka Kotahi NZTA #10 and Katherine Molloy #12).

13. These matters have been addressed in turn below.

RAIL LEVEL CROSSINGS

14. As outlined in paragraphs 12-16 of David Smith's evidence, a Level Crossing Safety Impact Assessment was completed by Stantec, this has subsequently been provided to KiwiRail Holdings Limited and it is my understanding this has addressed the matters in their submission. In respect of the submission by Waka Kotahi NZTA, the proposed pedestrian level crossings upgrades have been scheduled by Council[3] and of particular note the Mathias Street and McMillan Street upgrades are planned for 2024/2025, (irrespective of PC63). I agree with David Smith's recommendation that, at the time of subdivision, a review should be undertaken of the respective timing of the relevant upgrades, and occupation of future lots.

TRAFFIC GENERATION RATES

15. Additional consideration of traffic generation rates was provided in the response to Waka Kotahi NZTA (refer to Attachment 1). I agree with David Smith's evidence that the

[3] Refer to Paragraph 15 of David Smiths evidence

adopted rate (0.9 trips per dwelling in the peak hour) is appropriate and is consistent with assessments, by others, for similar Plan Changes.

STATE HIGHWAY 73 INTERSECTIONS

16. The future operation of the State Highway 73 (SH73) intersections with Mathias Street and McMillan Street has been considered through the SIDRA intersection modelling provided to Waka Kotahi NZTA, and in the *Further Transport Assessment* (refer to Attachments 1 and 2) and this includes a "sensitivity test" of 20% growth in traffic volumes on SH73. I agree with David Smith's conclusion that the intersections will perform at acceptable levels, with both the proposed PC63 traffic and potential increased traffic on SH73.

17. David Smith has recommended a condition in respect of effects on the State Highway relative to the timing of PC63 land and development of other zoned land. This provides a sufficient mechanism to review of the impact on SH73, should significant development on other sites occur prior to development of the PC63 area.

IMPACTS ON EXISTING ROADS

18. The further transport assessment (Attachment 2) provided additional information in respect of increased traffic volumes on surrounding roads and analysis of the Kimberley Road – Landsborough Drive intersection. There is ample physical capacity to accommodate the anticipated traffic volumes within the surrounding road network. The design and layout of new intersections would be considered at subdivision stage, however I am satisfied that there are no existing constraints to achieving an appropriate design or layout. I also agree with the points highlighted in paragraphs 31-36 of David Smith's evidence, in respect of effects on the surrounding road network.

19. Property access arrangements are also considered at subdivision stage, however from a general perspective, I consider property access to Kimberley Road to be desirable. It can achieve better integration with existing communities, provide more direct routes for properties fronting existing roads, and supports the extension of the urban (50km/h) speed limit and an urban road environment suitable for all road users.

PEDESTRIAN AND MULTI-MODAL TRANSPORT

20. The proposed ODP includes a pedestrian and cycle connection in the south-west corner. All internal road layouts would cater for pedestrians and cyclists as required by the District Plan requirements and the design and layout is appropriately assessed at the

time of subdivision. The Transport Assessment recommended that the footpath be provided along the eastern side of Kimberley Road and that the existing facilities on the surrounding road network are otherwise appropriate. This is also illustrated in "Figure 1" of David Smith's evidence. As outlined above, upgrades to the pedestrian crossings of the Railway Line are also planned by Council (irrespective of this Plan Change). I agree with David Smith's evidence that the site is appropriately located to enable walking and cycling trips to key destinations within the Town Centre.

21. There is one public transport service (#86 Darfield to City[4]) on weekdays, departing Darfield at 7:10am and returning from Christchurch at 4:42pm. The bus stop is located on South Terrace (block near Russell Street) and is within reasonable distance for future residents to walk or cycle. This provides a very limited service, however the site is appropriately located and has primary road connections that could accommodate future extensions of services which may occur.

22. David Smith's evidence has addressed impacts on parking demand in paragraph 36 and I agree with that assessment.

IMPACTS ON TRAVEL DEMAND

23. Whilst outside of the Greater Christchurch, Urban Development Strategy (UDS), there have been various discussions regarding the impacts on travel demand to locations within the UDS area.

24. It is noted that Darfield already has a primary and high school, preschool, medical centre, supermarket, and various other day to day services (take-away, hairdressers, hardware etc) which suggests that residents would not be required to travel outside of Darfield for their day to day living needs. The Commuter Waka data suggested around 10.5% of commuter trips travelling from Darfield to Christchurch and around 3.8% to Rolleston[5]. David Smith's evidence[6] has considered work and education trips separately and suggests that 36% of Darfield residents travel to the UDS area for work and that around 10% travel from the UDS area to Darfield. It also showed that a significant number of people travel into Darfield from various locations for education.

25. Additional residential sections in Darfield may not necessarily proportionally increase the number of commuters to UDS areas. There may over time, be a shift towards local

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4 https://www.metroinfo.co.nz/timetables/86-darfield-city/

5 Refer to paragraph 15 of the response to Waka Kotahi in Attachment 1.

6 Paragraphs 38

employment replacing those currently commuting into Darfield from the UDS area as more residents with appropriate skills live locally. The additional population may also support business growth and create additional local job opportunities. There is also a growing trend towards remote working (working from home) which may also reduce commuter trips.

26. I concur with David Smith's comments that the site is well located in respect of walking and cycling.

27. I note there is currently also a commuter bus service (#86[7] Darfield to City) provided during weekdays from Darfield to Christchurch (via Kirwee, and West Melton) at 7:10am and return leaving Christchurch at 4.42pm. This provides an express service specifically for travel to and from work in Christchurch.

CONCLUSION

28. Having considered the matters raised in the submissions and the Council officers' reports, I consider that all transport related effects can be adequately managed such that the proposal can be supported from a transport perspective. I agree with the transport related conditions recommended in the Council officers report relating to assessment of the Rail Level Crossings and SH73 intersections at the time of subdivision.

[7] https://www.metroinfo.co.nz/timetables/86-darfield-city/

ATTACHMENT 1: RESPONSE TO WAKA KOTAHI NZTA

Novo Group Limited
Level 1, 279 Montreal Street
PO Box 365, Christchurch 8140
O - 03 365 5570
info@novogroup.co.nz

24 February 2021

Waka Kotahi NZ Transport Agency
PO Box 1479
Christchurch 8011
Attention: Gemma Kean

By email: Gemma.kean@nzta.govt.nz

RESPONSE TO SUBMISSION ON PLAN CHANGE 63, DARFIELD

1. The following letter provides further transport assessment on the matters raised in Waka Kotahi NZTA's submission on Proposed Plan Change 63, in Darfield. Each of the topic headings within the submission have been responded to in turn below.

Intersection Safety and Efficiency

2. The application adopted a peak hour trip rate of 0.85 trips per residential unit, for comparison, the NZ Transport Agency Research Report 453 (*Trips and Parking Related to Land Use*) suggests an 85th percentile traffic generation rate of 0.9 vehicle movements per dwelling per hour in the peak hours. If this rate was adopted it suggests a total of **420 trips** in the peak hours (including the retirement village generation per Table 1 of the ITA). This is a difference of 23 trips compared to the 397 estimated in the Integrated Transport Assessment provided with the Plan Change Application (herein referred to as the *ITA*). However, in order to be robust, the higher number has been adopted for the following assessment.

3. The ITE *Trip Generation* guidebook suggests a split of 63% arrivals and 37% departures in the weekday evening peak hour (equating to 265 trips arriving and 155 departing) and 26% arriving and 74% departing in the morning peak hour (109 arriving and 311 departing).

4. Trips have been disbursed over the road network[1] proportionate to the existing daily traffic volumes on each road (provided by Selwyn District Council[2]) as shown in **Table 1** below.

[1] No trips via the Creyke Rd intersection with SH73 are anticipated as this route would require a detour of more than 7km over the more direct routes shown in Table 1.
[2] From their RAMM database.

Table 1:Existing traffic volumes and proportional peak hour split of proposed traffic.

Intersection	Daily Traffic Volume[3]	Proportion	Distribution 5% Correction to Horndon St East[4]	**Peak Hour Volume Added to Intersection**
Horndon St East	351	7%	12%	**50**
Mathias Street	1317	26%	24%	**101**
McMillan Street	1988	40%	37%	**156**
North Terrace	1012	20%	20%	**84**
Horndon St West	323	6%	6%	**25**
Homebush Road	44	1%	1%	**4**

5. Noting that the Mathias Street and McMillan Street intersections are anticipated to carry the highest traffic volumes, turning counts were undertaken for the morning and evening peak hours[5] at each of these intersections.

6. The existing and proposed traffic volumes have been modelled using *SIDRA Intersection v9*. The proposed traffic volumes above were proportionately[6] added to the movements into and out of Matthias Street (north) and McMillan Street which would be increased by travel associated with the proposed plan change. The SIDRA intersection performance summaries are provided in **Attachment 1**. In summary these show:

   - McMillan St Intersection – AM peak: all movements will continue to operate at LOS A-C[7].
   - McMillan St Intersection - PM peak: all movements will operate at LOS A-C except the right turn from Ross Street which will operate at LOS D (but has a very low existing and no anticipated increased turning volume).
   - Mathias St Intersection - AM peak: all movements will operate at LOS A-C except the right turn from Mathias Street south side which remains at LOS D (i.e., no change from the existing LOS for this movement).
   - Mathias St Intersection - PM peak: all movements will operate at LOS A-C except right turn from Mathias Street north side which will operate at LOS D (this appears to be primarily due to the volume undertaking this movement rather than the ability to safely find gaps within the through traffic).

[3] Daily volumes provided by Selwyn District Council
[4] This assumes that 5% more traffic will use the Horndon Street East intersection due to greater proximity from the ODP Area relative to the existing residential. Traffic has therefore been redistributed from Mathias Street(2%) and McMillan Street (3%).
[5] Counts were undertaken from 7am-9am and 4pm-6pm. On the 9th and 10th of December 2020.
[6] Relative to the existing volume for each movement.
[7] Level of Service based on delay for turning movements, where LOS A is the best and F is the worst. It is generally considered that level of service E is acceptable within urban areas in peak hours.

7. Both intersections will overall continue to operate within acceptable levels of service for peak hour periods (i.e., Level of Service 'D' or better) with the proposed increase in traffic associated with the Plan Change application. Noting this, no further analysis of the lower volume intersections (i.e., the intersections with Horndon Street and North Terrace) has been undertaken. Furthermore, the North Terrace and both Horndon Street intersections are "T" intersections which would also be anticipated to operate a higher levels of service noting the reduced turning movements when compared to a crossroads intersection. For these reasons, it is reasonable to conclude that the other intersections identified in **Table 1** would also continue to operate within acceptable levels of service.

8. Based on the assessment provided in the ITA and the modelling results attached to this letter, we consider that there is ample capacity within the existing road intersections with the State Highway 73 to accommodate the proposed increase in traffic generation.

Level Crossings

9. The Mathias Street intersection performance suggested a 95th percentile back of queue distance of 11.2m in the PM peak (5.8m in the AM peak) for the northern arm which remains well clear of the rail level crossing (approximately 22m from the Mathias Street – SH73 limit line). As such queuing across the railway level crossing is not anticipated.

10. A Level Crossing Safety Impact Assessment had already been commissioned by Selwyn District Council at the time of writing the ITA and has since been provided to Kiwi Rail. We have previously provided[8] a summary, of the recommendations and associated timeframes, for Waka Kotahi's information. It is my understanding that Council and Kiwi Rail are liaising directly on the planned upgrades and that we do not need to consider these further at this stage.

Multi-modal Transport

11. An off-road connection is proposed to Kimberley Road (as shown on the notified Outline Development Plan) and footpaths will be provided within the roads in the ODP (in accordance with SDC District Plan[9] requirements for new roads). The ITA also indicates a proposed footpath upgrade along the eastern side of Kimberley Road is required. Horndon Street and the other key road connections to the shops and school already have footpaths and of course there are existing crossing points on SH73.

12. The crossing on SH73 immediately west of the McMillan Street intersection already operates with a Kea Crossing before and after school to assist children with crossing between the northern side of the State Highway and the existing schools. In addition, there are four other pedestrian crossing points (kerb build-outs and median islands) between McMillan Street and Mathias Street which are spaced between 100m and 200m apart and provide crossing opportunities for people moving between destinations within the town centre on either side of the State Highway. These are considered to be providing a good

[8] Email dated 17/09/2020.
[9] The proposed and operative District Plan contain similar requirements and either would be readily achieved as applicable at the time of subdivision consent.

level of service for pedestrians and an alternative crossing point for cyclists (to the use of intersections).

13. We consider that with the upgrades recommended in the ITA accompanying the Plan Change, this will support multi-modal travel.

Urban Development Strategy

14. It is noted that Darfield already has a primary and high school, preschool, medical centre, supermarket, and various other day to day services (take-away, hairdressers, hardware etc) which suggests that residents would not be required to travel outside of Darfield for their day to day living needs or educational purposes.

15. In respect of employment opportunities, a search of Statistics New Zealand 2018 Census map *Commuter Waka*[10] for Darfield identified 897 people living and working within Darfield. It identified 444 people departing Darfield for other locations around Selwyn, Waimakariri and Christchurch. Overall, only 10.5% were travelling from Darfield to Christchurch, and 3.8% to Rolleston. This does not suggest a significant commuter trend associated with living in Darfield. However, it does identify 1,023 people travelling from surrounding areas into Darfield. This suggests **there is significantly greater travel into Darfield than out of it**. Additional residential housing within Darfield may therefore enable people to live closer to their place of employment or education. These existing travel patterns do not suggest the proposal would contribute negatively in respect of private vehicle travel compared to growth in other centres within the UDS area.

Regional Policy Statement

16. As outlined above a range of pedestrian facilities are proposed which will connect to existing footpaths into the Darfield town centre. The proposed Plan Change area is generally within a 600m – 1,500m walk or cycle from the town centre (from the closest and furthest parts of the plan change area). This is considered appropriate to encourage non-motorised travel.

17. It is also located closer than much of the existing residential zoned land as illustrated in **Figure 1** below.

[10] https://commuter.waka.app/

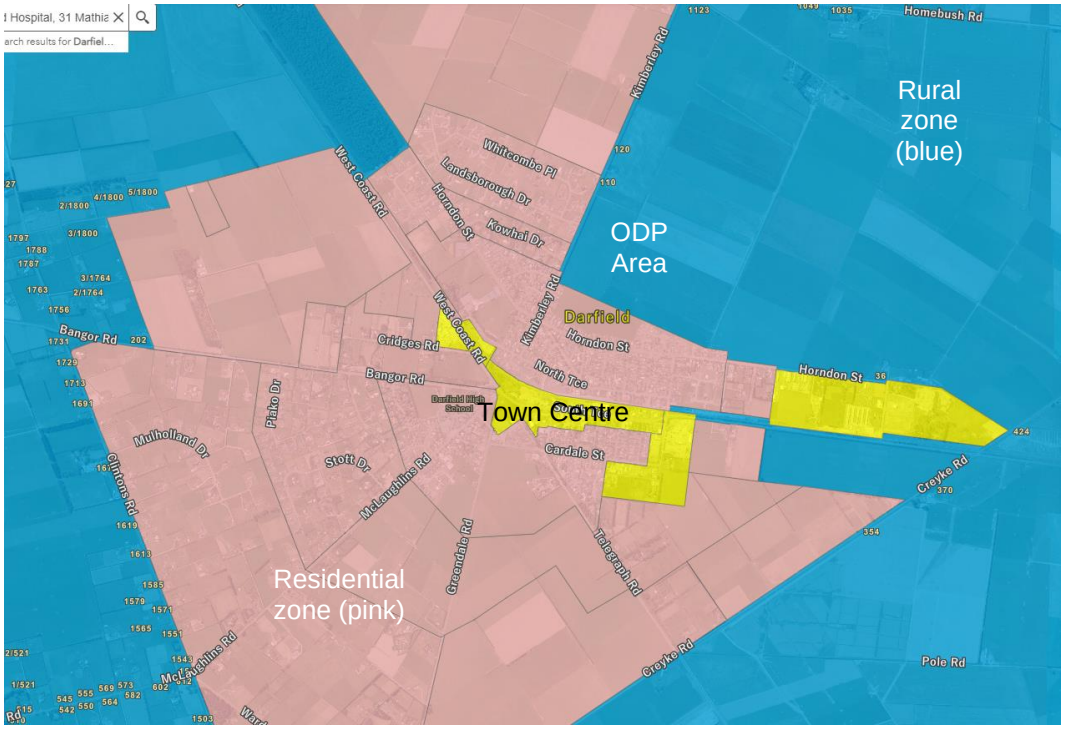


Figure 1: Location of ODP area relative to the Town Centre and existing residential areas

18. For the above reasons we consider the proposed Plan Change is appropriately located in respect of modal choice and reducing dependency on motorised travel.

19. The safety and efficiency effects on the surrounding transport network have been addressed above and in the ITA.

District Plan

20. These matters have all been addressed in the above sections and our conclusion remains that the proposal is consistent with the relevant Objectives and Policies of the operative District Plan.

21. A brief review of the Proposed Plan transport related objectives and policies did identify any aspects of the proposal that would be contrary to the proposed provisions. It is noted that these are subject to change following the review of submissions and should be given limited weight at the time of writing, for this reason a more detailed review has not been undertaken.

Additional Questions[11]

22. Following a review of the above information the below additional questions were raised by NZTA and have been consolidated into this revised response. Each question is addressed in turn.

[11] Responding to email from Gemma Kean dated 04/02/2021.

With reference to NZTA Research Report 453 (that you have referenced) Table 7.4, 0.9 vph per unit is for dwellings (outer suburban). The trip generation per unit (suburban) is 1.2 vph and the trip generation for a dwelling (rural) is 1.4 vph. We consider that the higher trip generation for a dwelling (suburban) of 1.2 vph is more appropriate in this context than the 0.9 vph figure that has been used and the modelling should reflect this.

23. RR453 has rates for Inner City, Suburban, Outer Suburban and Rural residential locations. The Rural rate is not considered applicable here as the Plan Change site will be zoned for residential. The plan change land will not include productive rural land uses, so the Rural residential rate is not considered to be applicable. Furthermore, the close proximity to a commercial area (Darfield Business zone – refer to Figure 1 above) will facilitate walking and cycling trips that are not generally anticipated in a rural location. For these reasons, the proposed plan change is not likely to have similar trip patterns to a rural dwelling.

24. Noting the smaller size of Darfield township, "outer suburban" is considered to be the most applicable category as opposed to "suburban", which would normally be applied in larger cities such as Christchurch. This recognises that as distance from larger metropolitan facilities increases some trip linking tends to occur (particularly noting that the RR453 rates were from 2010 and would be unlikely to reflect the increase working from home trends observed over recent years).

25. The proximity to larger Metropolitan Centres such as Christchurch and Rolleston means there may also be an element of trip spreading. For example, there is potential that drivers heading into work in these centres would need to leave earlier than traditional suburban trips because of the greater travel time required to reach the destination. However, there would remain a number of trips that (in comparison) could be delayed as they are within Darfield (i.e., to school or work in Darfield). The overall effect is a spreading of peak period traffic generation.

26. For comparison it is noted that this is also consistent with the rate (0.9 trips per proposed residential lot in the peak hour) adopted for the purpose of operative PC60 for rezoning to Living 1 zone in Kirwee[12].

27. It is also noted that as flexible working arrangements increase and reduced vehicular trip making is encouraged to meet climate goals that future trip generation rates per household would if anything be likely to reduce.

Table 1 – please provide a comparison of the existing daily traffic volumes on these roads against the daily additional traffic volume to be generated by this plan change to illustrate the difference in traffic volumes at the various intersections.

28. The second column is providing existing daily volumes and the right column shows the proposed peak hour increase (peak hour estimated traffic proportionately split across each road). It is noted that existing peak hour volumes for these roads were not available from Council. Noting the low daily volumes the peak hour volumes are also anticipated to be very low.

[12] Refer to transport assessment here: https://www.selwyn.govt.nz/property-And-building/planning/strategies-and-plans/selwyn-district-plan/plan-changes/operative-plan-changes/plan-change-60,-rezone-17.9-hectares-of-living-zone-2a-to-living-zone-1,-kirwee

Please clarify what future scenarios (year) and traffic growth assumptions were being made for State Highway 73 so we can better understand the timeframes on development of the area subject to the plan change.

29. The analysis considers full development of the proposed plan change area. No traffic growth assumptions have been made for traffic on SH73 as the yearly traffic volumes do not indicate a trend towards general growth on SH73 (refer to Figure 2 below[13]).

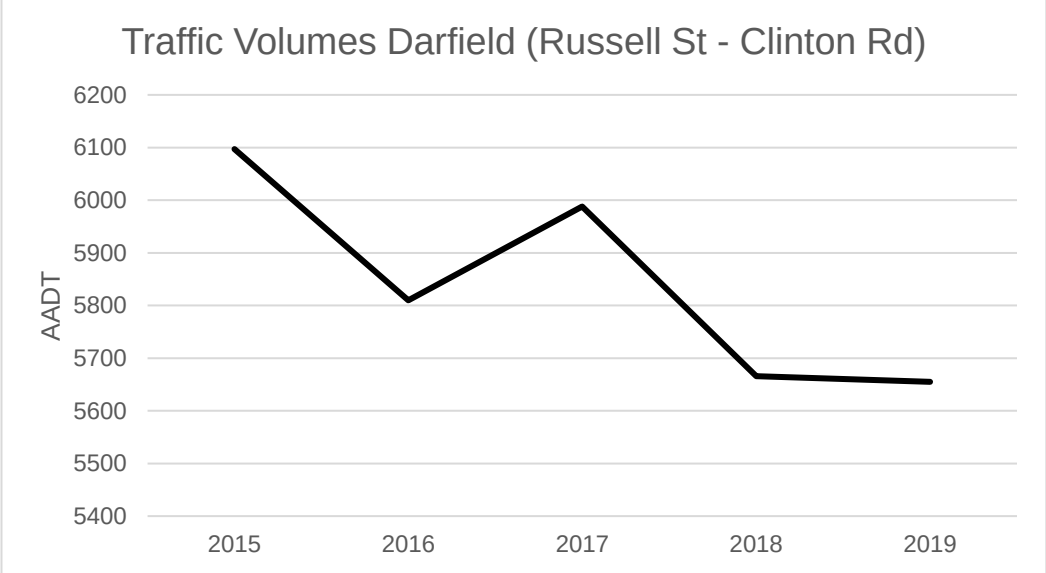


Figure 2: Change in Annual Average Daily Traffic Volumes in Darfield 2015-2019

30. The Council commissioned a report prepared by Stantec (2019) titled "*RE322 Residential Deferred, Darfield Deferred Residential Rezoning, Integrated Transport Assessment*. That report included upgrades to the road network which may be required to accommodate the anticipated residential growth in Darfield and includes a variety of road upgrades (refer to summary in paragraphs 26-32 of the Novo Group ITA submitted with the Plan Change application). The analysis therefore ensures that there is adequate capacity to accommodate the traffic generation anticipated from full development of the proposed plan change in the event that this occurs prior to any upgrades to the wider road network associated with general growth in the town centre.

Please clarify whether the* [LCSIA] *safety assessment study considered the potential increase in pedestrian crossing demands at these locations? If the pedestrian linkages are to be well used then consideration to the level crossings is important.

31. Yes, the assessment has provided for increased pedestrian volumes. Noting proximity to the site and destinations within the town centre pedestrians would primarily be using the Mathias Street and McMillan Street intersections and in that respect the assessment identifies the following recommendations:

McMillan St Pedestrian crossing:
- Install corridor fencing
- Pedestrian maze on western crossing

[13] https://www.nzta.govt.nz/resources/state-highway-traffic-volumes/ location ID:07300041 Darfield - Between Russell St and Clinton Rd

- Pedestrian focused flashing lights
- Re-lay warning tactile indicators for visually impaired
- Consider automatic gates in future

Mathias St Pedestrian crossing:

- Repair tactile paving for visually impaired users
- Install hoops on the footpath approaches
- Install corridor fencing on the western side
- Install flashing lights and bells on the northern approach

32. We would recommend any detailed questions regarding the LCSIA are taken up with the Selwyn District Council or Kiwi Rail directly as the relevant controlling authorities.

You have acknowledged there are existing crossing points across State Highway 73, however, there is a need to further consider a suitable walking route between the area subject to the plan change and the key activity centres. Justification on why the existing facilities are acceptable and further consideration of additional crossing facilities at North Terrace and Horndon Street are requested. If further crossings are required then the impacts on the operation of the state highway are required.

33. The plan change is unlikely to generate a noticeable increase in pedestrians crossing at either the eastern or western Horndon Street crossings noting their proximity from the site (more than 1.5km from the nearest corners of the plan change area) and noting that there are no landuse destinations on the opposite side of the State Highway from these intersections (the land is currently rural / paddocks).

34. The North Terrace intersection is also discrete from the key landuse destinations and is unlikely to have any noticeable increase in pedestrian volumes noting it would be a longer route than using McMillan Street to any destinations South-west of the Plan Change Area (for example the schools).

35. A pedestrian crossing point is provided within each block along SH73 between McMillan Street and Mathias Street which are providing the two key pedestrian connections between landuse destinations and the plan change area. These include a central island and kerb build outs which are appropriate for ensuring priority to traffic on the State Highway (as opposed to a traffic signal or zebra crossing which provide priority to pedestrians) whilst also simplifying the crossing task by reducing the distance and enabling each lane of traffic to be crossed separately.

36. There are already footpaths provided on McMillan Street and Mathias Street as well as the connecting sections of North Terrace, Horndon Street, and Kimberley Road and Jackson Street which provide for the most direct walking routes. Traffic volumes on North Terrace and Horndon Street remain well below the point at which crossing facilities would be needed to enable pedestrians to cross the two traffic lanes in one go.

37. It is noted that detailed design of pedestrian facilities is usually undertaken at the time of subdivision.

The data between workplace travel and education travel should be separated. There are 369 people who travel to Darfield for work vs 495 people who depart for work. A significant number of those travelling to Darfield are for schooling (660 people) as opposed to work. The comments in relation to this points should consider separating the data.

38. It is noted that these trips could be considered separately however both are key weekday travel destinations and as such the conclusions remain the same, that there is notable travel into Darfield and that providing additional dwellings within the Town Centre may enable people to live closer to their daily travel destinations (school or work) and this would support modal choice.

Summary

39. Noting the further information provided to date, and above, we trust the main questions posed in your submission have been addressed. We would like to work with you to resolve any matters which may remain. We would appreciate a response on any matters you consider still require further consideration.

Yours sincerely,

Novo Group Limited

Lisa Williams

Transport Engineer and Planner

D: 03 365 5596 | **M:** 027 2929 825 | **O:** 03 365 5570

E: lisa@novogroup.co.nz | **W:** www.novogroup.co.nz

035033

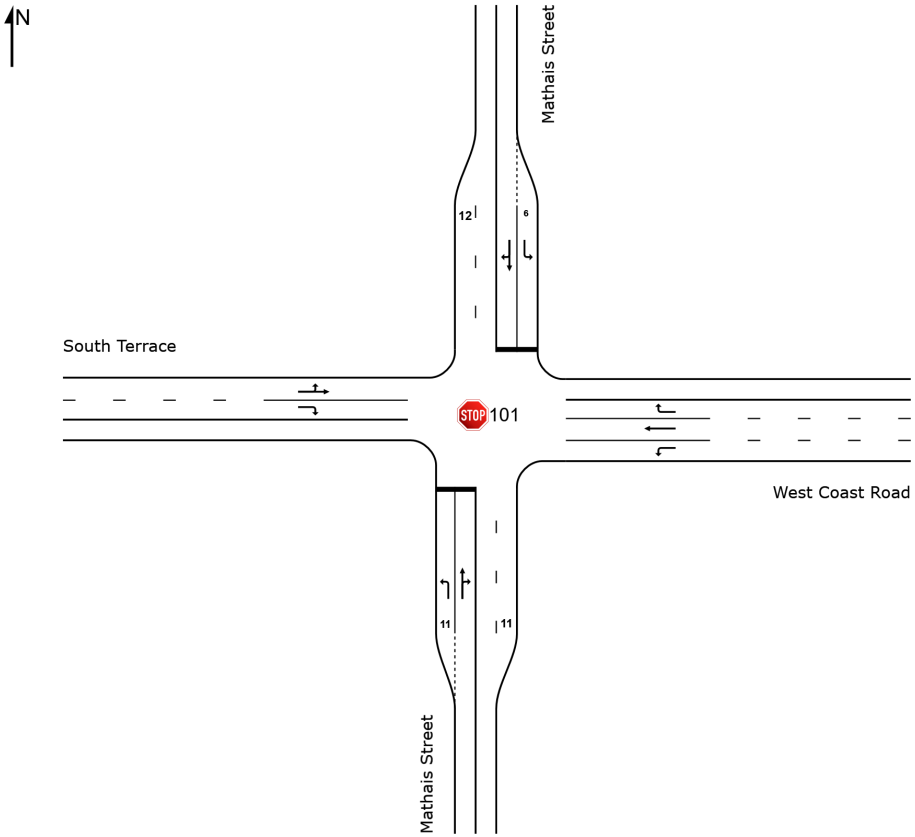
Attachment 1: SIDRA Intersection Movement Summary Reports and Layouts

SITE LAYOUT

Site: 101 [Mathias AM Existing (lanes) (Site Folder: General)]

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

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



MOVEMENT SUMMARY

Site: 101 [Mathias AM Existing (lanes) (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mathais Street														
1	L2	9	80.0	9	80.0	0.014	11.7	LOS B	0.0	0.6	0.29	0.94	0.29	43.6
2	T1	9	80.0	9	80.0	0.147	21.8	LOS C	0.5	6.0	0.68	1.03	0.68	37.8
3	R2	20	80.0	21	80.0	0.147	27.0	LOS D	0.5	6.0	0.68	1.03	0.68	38.0
Approach		38	80.0	40	80.0	0.147	22.1	LOS C	0.5	6.0	0.59	1.01	0.59	39.1
East: West Coast Road														
4	L2	13	5.0	14	5.0	0.008	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
5	T1	128	10.0	135	10.0	0.073	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
6	R2	11	5.0	12	5.0	0.008	5.3	LOS A	0.0	0.3	0.32	0.51	0.32	45.6
Approach		152	9.2	160	9.2	0.073	0.8	NA	0.0	0.3	0.02	0.08	0.02	49.3
North: Mathais Street														
7	L2	48	5.0	51	5.0	0.054	8.7	LOS A	0.2	1.4	0.32	0.88	0.32	44.7
8	T1	17	5.0	18	5.0	0.111	13.0	LOS B	0.4	2.9	0.55	0.97	0.55	42.4
9	R2	26	5.0	27	5.0	0.111	14.2	LOS B	0.4	2.9	0.55	0.97	0.55	42.3
Approach		91	5.0	96	5.0	0.111	11.1	LOS B	0.4	2.9	0.43	0.93	0.43	43.5
West: South Terrace														
10	L2	18	5.0	19	5.0	0.117	4.6	LOS A	0.0	0.0	0.00	0.05	0.00	49.1
11	T1	189	10.0	199	10.0	0.117	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	49.7
12	R2	21	5.0	22	5.0	0.018	5.2	LOS A	0.1	0.5	0.26	0.52	0.26	45.7
Approach		228	9.1	240	9.1	0.117	0.9	NA	0.1	0.5	0.02	0.09	0.02	49.2
All Vehicles		509	13.7	536	13.7	0.147	4.3	NA	0.5	6.0	0.14	0.31	0.14	47.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 101 [Mathias AM Proposed (lanes) (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mathais Street														
1	L2	9	80.0	9	80.0	0.014	11.7	LOS B	0.0	0.6	0.29	0.94	0.29	43.6
2	T1	15	75.0	16	75.0	0.193	22.4	LOS C	0.7	7.9	0.72	1.03	0.73	37.0
3	R2	20	80.0	21	80.0	0.193	31.6	LOS D	0.7	7.9	0.72	1.03	0.73	37.1
Approach		44	78.3	46	78.3	0.193	24.4	LOS C	0.7	7.9	0.63	1.01	0.64	38.2
East: West Coast Road														
4	L2	13	5.0	14	5.0	0.008	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
5	T1	128	10.0	135	10.0	0.073	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
6	R2	19	5.0	20	5.0	0.014	5.4	LOS A	0.1	0.4	0.33	0.52	0.33	45.6
Approach		160	9.0	168	9.0	0.073	1.0	NA	0.1	0.4	0.04	0.11	0.04	49.1
North: Mathais Street														
7	L2	87	5.0	92	5.0	0.098	8.8	LOS A	0.4	2.6	0.33	0.89	0.33	44.7
8	T1	31	5.0	33	5.0	0.209	13.7	LOS B	0.8	5.8	0.59	1.00	0.59	42.0
9	R2	47	5.0	49	5.0	0.209	15.2	LOS C	0.8	5.8	0.59	1.00	0.59	41.9
Approach		165	5.0	174	5.0	0.209	11.5	LOS B	0.8	5.8	0.45	0.94	0.45	43.3
West: South Terrace														
10	L2	30	5.0	32	5.0	0.124	4.6	LOS A	0.0	0.0	0.00	0.07	0.00	49.0
11	T1	189	10.0	199	10.0	0.124	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	49.5
12	R2	21	5.0	22	5.0	0.018	5.2	LOS A	0.1	0.5	0.26	0.52	0.26	45.7
Approach		240	8.9	253	8.9	0.124	1.1	NA	0.1	0.5	0.02	0.11	0.02	49.1
All Vehicles		609	12.9	641	12.9	0.209	5.6	NA	0.8	7.9	0.19	0.40	0.19	46.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 101 [Mathias PM Existing (lanes) (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mathais Street														
1	L2	17	20.0	18	20.0	0.024	10.3	LOS B	0.1	0.7	0.41	0.89	0.41	44.1
2	T1	16	20.0	17	20.0	0.109	19.8	LOS C	0.4	3.1	0.70	1.01	0.70	39.4
3	R2	10	20.0	11	20.0	0.109	22.2	LOS C	0.4	3.1	0.70	1.01	0.70	39.5
Approach		43	20.0	45	20.0	0.109	16.6	LOS C	0.4	3.1	0.59	0.96	0.59	41.2
East: West Coast Road														
4	L2	10	5.0	11	5.0	0.006	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
5	T1	290	10.0	305	10.0	0.165	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
6	R2	61	5.0	64	5.0	0.044	5.3	LOS A	0.2	1.4	0.31	0.53	0.31	45.6
Approach		361	9.0	380	9.0	0.165	1.1	NA	0.2	1.4	0.05	0.10	0.05	49.1
North: Mathais Street														
7	L2	15	5.0	16	5.0	0.016	8.4	LOS A	0.1	0.4	0.28	0.87	0.28	44.8
8	T1	15	5.0	16	5.0	0.215	17.9	LOS C	0.8	5.7	0.72	1.02	0.76	39.6
9	R2	40	5.0	42	5.0	0.215	20.8	LOS C	0.8	5.7	0.72	1.02	0.76	39.6
Approach		70	5.0	74	5.0	0.215	17.5	LOS C	0.8	5.7	0.62	0.98	0.65	40.6
West: South Terrace														
10	L2	34	5.0	36	5.0	0.107	4.6	LOS A	0.0	0.0	0.00	0.10	0.00	48.8
11	T1	155	10.0	163	10.0	0.107	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	49.4
12	R2	10	5.0	11	5.0	0.011	6.0	LOS A	0.0	0.3	0.40	0.56	0.40	45.4
Approach		199	8.9	209	8.9	0.107	1.1	NA	0.0	0.3	0.02	0.12	0.02	49.1
All Vehicles		673	9.3	708	9.3	0.215	3.8	NA	0.8	5.7	0.14	0.26	0.14	47.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 101 [Mathias PM Proposed (lanes) (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mathais Street														
1	L2	17	20.0	18	20.0	0.024	10.3	LOS B	0.1	0.7	0.41	0.89	0.41	44.1
2	T1	25	15.0	26	15.0	0.156	21.0	LOS C	0.5	4.3	0.74	1.01	0.74	38.9
3	R2	10	20.0	11	20.0	0.156	24.7	LOS C	0.5	4.3	0.74	1.01	0.74	39.0
Approach		52	17.6	55	17.6	0.156	18.2	LOS C	0.5	4.3	0.63	0.97	0.63	40.4
East: West Coast Road														
4	L2	10	5.0	11	5.0	0.006	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
5	T1	290	10.0	305	10.0	0.165	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
6	R2	96	5.0	101	5.0	0.071	5.4	LOS A	0.3	2.3	0.34	0.55	0.34	45.6
Approach		396	8.7	417	8.7	0.165	1.5	NA	0.3	2.3	0.08	0.15	0.08	48.7
North: Mathais Street														
7	L2	23	5.0	24	5.0	0.025	8.5	LOS A	0.1	0.6	0.28	0.88	0.28	44.8
8	T1	23	5.0	24	5.0	0.365	21.9	LOS C	1.5	11.2	0.78	1.07	1.01	37.8
9	R2	61	5.0	64	5.0	0.365	25.7	LOS D	1.5	11.2	0.78	1.07	1.01	37.8
Approach		107	5.0	113	5.0	0.365	21.2	LOS C	1.5	11.2	0.68	1.03	0.85	39.1
West: South Terrace														
10	L2	53	5.0	56	5.0	0.118	4.7	LOS A	0.0	0.0	0.00	0.14	0.00	48.6
11	T1	155	10.0	163	10.0	0.118	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	49.1
12	R2	10	5.0	11	5.0	0.011	6.0	LOS A	0.0	0.3	0.40	0.56	0.40	45.4
Approach		218	8.6	229	8.6	0.118	1.4	NA	0.0	0.3	0.02	0.16	0.02	48.8
All Vehicles		773	8.7	814	8.7	0.365	5.3	NA	1.5	11.2	0.18	0.33	0.21	46.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

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

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

Queue Model: SIDRA Standard.

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

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

USER REPORT FOR SITE

All Movement Classes

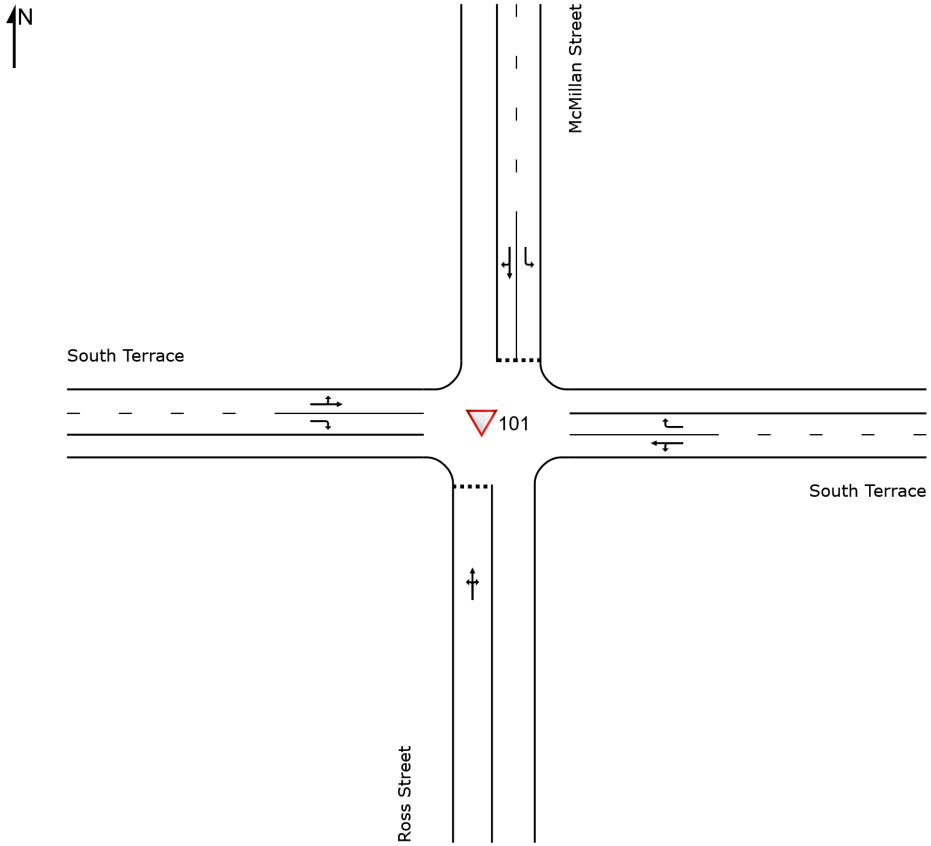
Project: Existing **Template: Default Site User Report**

Site: 101 [McMillan AM Existing (Site Folder: General)]

South Terrace
Site Category: (None)
Give-Way (Two-Way)

Site Layout

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



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Project: S:\Novo Projects\020-100 Favourites\035 Aston Consulting (Fiona Aston)\035033 Private Plan Change 63 Darfield\SIDRA\Existing.sip9

MOVEMENT SUMMARY

Site: 101 [McMillan AM Existing (Site Folder: General)]

South Terrace
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Ross Street														
1	L2	22	5.0	23	5.0	0.133	5.6	LOS A	0.5	3.6	0.53	0.70	0.53	43.7
2	T1	19	5.0	20	5.0	0.133	9.8	LOS A	0.5	3.6	0.53	0.70	0.53	43.9
3	R2	22	5.0	23	5.0	0.133	13.9	LOS B	0.5	3.6	0.53	0.70	0.53	43.9
Approach		63	5.0	66	5.0	0.133	9.8	LOS A	0.5	3.6	0.53	0.70	0.53	43.8
East: South Terrace														
4	L2	28	5.0	29	5.0	0.135	4.6	LOS A	0.0	0.0	0.00	0.06	0.00	49.0
5	T1	209	10.0	220	10.0	0.135	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	49.6
6	R2	33	5.0	35	5.0	0.026	5.6	LOS A	0.1	0.8	0.38	0.54	0.38	45.7
Approach		270	8.9	284	8.9	0.135	1.2	NA	0.1	0.8	0.05	0.12	0.05	49.0
North: McMillan Street														
7	L2	57	5.0	60	5.0	0.061	5.9	LOS A	0.2	1.6	0.35	0.58	0.35	45.7
8	T1	25	5.0	26	5.0	0.105	9.7	LOS A	0.4	2.9	0.62	0.79	0.62	43.3
9	R2	17	5.0	18	5.0	0.105	12.5	LOS B	0.4	2.9	0.62	0.79	0.62	43.2
Approach		99	5.0	104	5.0	0.105	8.0	LOS A	0.4	2.9	0.47	0.67	0.47	44.6
West: South Terrace														
10	L2	12	5.0	13	5.0	0.149	4.6	LOS A	0.0	0.0	0.00	0.02	0.00	49.2
11	T1	253	10.0	266	10.0	0.149	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
12	R2	9	5.0	9	5.0	0.007	5.4	LOS A	0.0	0.2	0.35	0.51	0.35	45.8
Approach		274	9.6	288	9.6	0.149	0.4	NA	0.0	0.2	0.01	0.04	0.01	49.6
All Vehicles		706	8.3	743	8.3	0.149	2.6	NA	0.5	3.6	0.13	0.22	0.13	48.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 101 [McMillan AM Proposed (Site Folder: General)]

South Terrace
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Ross Street														
1	L2	22	5.0	23	5.0	0.180	5.6	LOS A	0.7	4.9	0.57	0.73	0.57	43.0
2	T1	31	5.0	33	5.0	0.180	10.4	LOS B	0.7	4.9	0.57	0.73	0.57	43.2
3	R2	22	5.0	23	5.0	0.180	17.4	LOS C	0.7	4.9	0.57	0.73	0.57	43.2
Approach		75	5.0	79	5.0	0.180	11.1	LOS B	0.7	4.9	0.57	0.73	0.57	43.2
East: South Terrace														
4	L2	28	5.0	29	5.0	0.135	4.6	LOS A	0.0	0.0	0.00	0.06	0.00	49.0
5	T1	209	10.0	220	10.0	0.135	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	49.6
6	R2	54	5.0	57	5.0	0.043	5.6	LOS A	0.2	1.4	0.39	0.56	0.39	45.7
Approach		291	8.6	306	8.6	0.135	1.5	NA	0.2	1.4	0.07	0.16	0.07	48.7
North: McMillan Street														
7	L2	123	5.0	129	5.0	0.132	6.0	LOS A	0.5	3.6	0.37	0.60	0.37	45.7
8	T1	54	5.0	57	5.0	0.240	11.0	LOS B	1.0	7.2	0.67	0.85	0.72	42.5
9	R2	37	5.0	39	5.0	0.240	14.5	LOS B	1.0	7.2	0.67	0.85	0.72	42.4
Approach		214	5.0	225	5.0	0.240	8.7	LOS A	1.0	7.2	0.50	0.71	0.52	44.3
West: South Terrace														
10	L2	20	5.0	21	5.0	0.154	4.6	LOS A	0.0	0.0	0.00	0.04	0.00	49.1
11	T1	253	10.0	266	10.0	0.154	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	49.7
12	R2	9	5.0	9	5.0	0.007	5.4	LOS A	0.0	0.2	0.35	0.51	0.35	45.8
Approach		282	9.5	297	9.5	0.154	0.5	NA	0.0	0.2	0.01	0.05	0.01	49.5
All Vehicles		862	7.7	907	7.7	0.240	3.8	NA	1.0	7.2	0.20	0.31	0.21	47.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 101 [McMillan PM Existing (Site Folder: General)]

South Terrace
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Ross Street														
1	L2	18	5.0	19	5.0	0.074	6.5	LOS A	0.3	1.9	0.58	0.72	0.58	43.1
2	T1	7	5.0	7	5.0	0.074	14.2	LOS B	0.3	1.9	0.58	0.72	0.58	43.3
3	R2	6	5.0	6	5.0	0.074	20.1	LOS C	0.3	1.9	0.58	0.72	0.58	43.3
Approach		31	5.0	33	5.0	0.074	10.9	LOS B	0.3	1.9	0.58	0.72	0.58	43.2
East: South Terrace														
4	L2	15	5.0	16	5.0	0.210	4.7	LOS A	0.0	0.0	0.00	0.02	0.00	49.2
5	T1	353	10.0	372	10.0	0.210	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
6	R2	95	5.0	100	5.0	0.077	5.7	LOS A	0.3	2.5	0.40	0.57	0.40	45.6
Approach		463	8.8	487	8.8	0.210	1.4	NA	0.3	2.5	0.08	0.14	0.08	48.8
North: McMillan Street														
7	L2	62	5.0	65	5.0	0.068	5.9	LOS A	0.2	1.8	0.37	0.59	0.37	45.7
8	T1	10	5.0	11	5.0	0.129	14.3	LOS B	0.4	3.3	0.76	0.88	0.76	40.3
9	R2	22	5.0	23	5.0	0.129	18.4	LOS C	0.4	3.3	0.76	0.88	0.76	40.2
Approach		94	5.0	99	5.0	0.129	9.8	LOS A	0.4	3.3	0.50	0.69	0.50	43.7
West: South Terrace														
10	L2	16	5.0	17	5.0	0.158	4.6	LOS A	0.0	0.0	0.00	0.03	0.00	49.2
11	T1	265	10.0	279	10.0	0.158	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	49.8
12	R2	9	5.0	9	5.0	0.008	6.0	LOS A	0.0	0.2	0.44	0.55	0.44	45.5
Approach		290	9.6	305	9.6	0.158	0.5	NA	0.0	0.2	0.01	0.05	0.01	49.6
All Vehicles		878	8.5	924	8.5	0.210	2.3	NA	0.4	3.3	0.12	0.19	0.12	48.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 101 [McMillan PM Proposed (Site Folder: General)]

South Terrace
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Ross Street														
1	L2	18	5.0	19	5.0	0.110	6.5	LOS A	0.4	2.8	0.64	0.76	0.64	42.0
2	T1	13	5.0	14	5.0	0.110	16.8	LOS C	0.4	2.8	0.64	0.76	0.64	42.2
3	R2	6	5.0	6	5.0	0.110	25.5	LOS D	0.4	2.8	0.64	0.76	0.64	42.2
Approach		37	5.0	39	5.0	0.110	13.2	LOS B	0.4	2.8	0.64	0.76	0.64	42.1
East: South Terrace														
4	L2	15	5.0	16	5.0	0.210	4.7	LOS A	0.0	0.0	0.00	0.02	0.00	49.2
5	T1	353	10.0	372	10.0	0.210	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
6	R2	174	5.0	183	5.0	0.143	5.9	LOS A	0.7	4.8	0.43	0.60	0.43	45.6
Approach		542	8.3	571	8.3	0.210	2.1	NA	0.7	4.8	0.14	0.21	0.14	48.3
North: McMillan Street														
7	L2	100	5.0	105	5.0	0.109	6.0	LOS A	0.4	2.9	0.38	0.60	0.38	45.7
8	T1	16	5.0	17	5.0	0.247	18.3	LOS C	0.9	6.7	0.82	0.94	0.91	38.3
9	R2	36	5.0	38	5.0	0.247	23.5	LOS C	0.9	6.7	0.82	0.94	0.91	38.2
Approach		152	5.0	160	5.0	0.247	11.4	LOS B	0.9	6.7	0.53	0.72	0.56	42.8
West: South Terrace														
10	L2	29	5.0	31	5.0	0.166	4.7	LOS A	0.0	0.0	0.00	0.05	0.00	49.1
11	T1	265	10.0	279	10.0	0.166	0.1	LOS A	0.0	0.0	0.00	0.05	0.00	49.6
12	R2	9	5.0	9	5.0	0.008	6.0	LOS A	0.0	0.2	0.44	0.55	0.44	45.5
Approach		303	9.4	319	9.4	0.166	0.7	NA	0.0	0.2	0.01	0.07	0.01	49.4
All Vehicles		1034	8.0	1088	8.0	0.247	3.4	NA	0.9	6.7	0.18	0.26	0.18	47.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

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

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

Queue Model: SIDRA Standard.

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

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

ATTACHMENT 2: FURTHER TRANSPORT ASSESSMENT

22 June 2021

Novo Group Limited
Level 1, 279 Montreal Street
PO Box 365, Christchurch 8140
O - 03 365 5570
info@novogroup.co.nz

Selwyn District Council
c/- Dave Smith, Abley

By email: dave.smith@abley.com

ADDITIONAL TRANSPORTATION ASSESSMENT: PLAN CHANGE 63, DARFIELD

1. As discussed, the following letter provides further transport assessment on the following matters:

   - An estimate of the approximate distribution of traffic via each future road connection.
   - Feasibility of a right turn bay into the development from the Kimberley/Landsborough intersection, including consideration of the likely traffic demands through a future four leg intersection.
   - Sidra intersection assessment of SH73/McMillan St and SH73/Mathias St intersections with development traffic and 20% background growth in through traffic along SH73.

Trip Distribution

2. The following image summarises the indicative distribution of traffic via each future road connection (excluding 10 vehicles per hour (vph) indicatively allocated for those lots that may have direct property access to Kimberley Road).

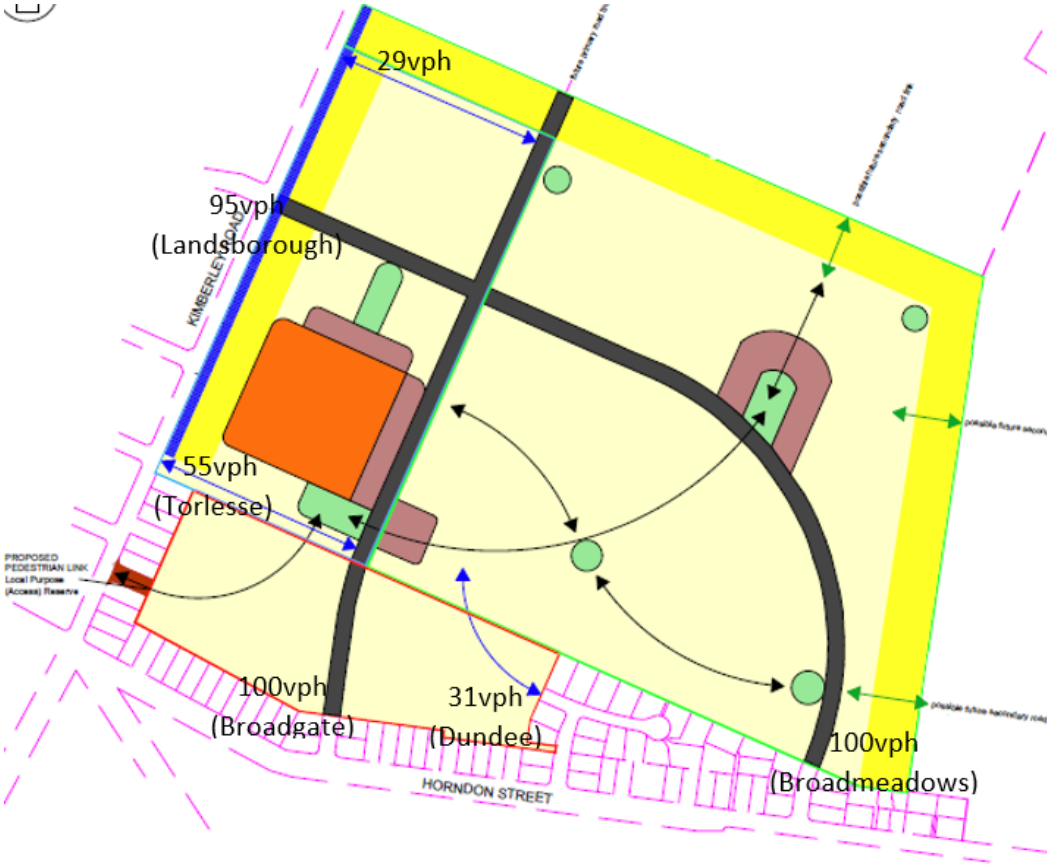


Figure 1: Estimates of trip distribution.

3. The key assumptions for the above distributions are set out below:

- Both Kimberley Road and Horndon Street provide access to key destinations (SH73 and the town centre) therefore traffic is likely to be split by origin within the future subdivision and destination which is anticipated to be reasonably even between these two routes. However, noting that both key destinations are to the south and that two primary road connections are to Hordon Street, the distribution is anticipated to be slightly skewed towards Hordon Street over Kimberley Road. That is, it has been assumed that there will be approximately 55% of trips (231 vph) towards Horndon Street and 45% towards Kimberley (189vph).

- The Pearson Street / Dundee Close connection is anticipated to cater for access to lots on the extension of this road / in close proximity. It is intended that this will not be a direct connection to the bulk of the Plan Change site. This can be achieved through subdivision design, including the use of narrower local roads and off-set intersections to avoid creating a desirable through route.

- The remaining trips towards Horndon Street are anticipated to be split reasonably evenly between the connections at Broadmeadows Drive and Broadgate Street.

- The connection to Kimberley Road at Landsborough Drive would be the main connection to Kimberley Road catering for approximately half of the trips towards Kimberley Road.

- The southern-most connection to Kimberley Road (opposite Torlesse Crescent) is on the southern travel desire line but will have only secondary connections within the subdivision. It is therefore assumed it may cater for approximately 30% of trips towards Kimberley Road.

- The northern-most connection to Kimberley Road will largely service lots in close proximity (i.e., at the north-western corner of the future subdivision). Some lots will also have direct property access to Kimberley Road (indicatively 10vph).

4. It is noted that these estimates are considered to be indicatively only and for the purposes of informing the assessment of effects and guiding future subdivision layout and design.

Kimberley Road / Landsborough Drive Right Turn Lane

5. The Mobile road website[1] indicates traffic volumes on Kimberley Road of around 601vehicles per day (vpd) and of 519 vpd on Landsborough Drive. Assuming peak hour traffic volumes are 15% of daily trips this would suggest 90 vph on Kimberley Road[2] and 78vph on Landsborough Drive. The ITE Trip Generation guidebook suggests a split of 26% arriving and 74% departing in the morning peak hour and 63% arrivals and 37% departures in the weekday evening peak hour. It is assumed that the majority (80%) of trips will be to and from the south. Based on these assumptions the following turning movements are anticipated:

Figure 2: Estimate of Turning Movements Landsborough Drive and Proposed Road Intersection

	Peak Hour	Direction	Left	Through[3]	Right
Proposed Road 95vph	AM	In (26%) 25vph	5	N/A	20
		Out (74%) 70vph	56	4	10
	PM	In (63%) 60vph	12	N/A	48
		Out (37%) 35vph	28	2	5
Landsborough Road 78vph	AM	In (26%) 20vph	16	N/A	4
		Out (74%) 58vph	9	3	46
	PM	In (63%) 47vph	30	N/A	17
		Out (37%) 31vph	4	2	25

6. A basic SIDRA analysis suggests that a basic intersection layout would accommodate these turning movements with a LOS A. The SIDRA outputs are shown in **Attachment 1**. This suggests that turning lanes may not be required. This analysis is however preliminary and relies on a number of assumptions (as set out above) and a more detailed analysis

[1] https://mobileroad.org/desktop.html
[2] Assuming 60% southbound in the AM peak and 60% northbound in the PM peak.
[3] Indicatively allowing for 5% for visiting other residential destinations or Landsborough Drive residents using the future subdivision as a through route to SH73.

including surveys of existing peak hour volumes, could be undertaken at the time of subdivision to determine the most appropriate intersection layout.

7. Regardless It is noted that Kimberley Road at the intersection with Landsborough Drive has an existing formed width of around 9m and there is an approximately 6m wide grass berm to the east of the sealed carriageway. Should further analysis suggest a right turn lane is necessary, this will provide ample space for a right turn lane to be provided at the time the fourth arm of this intersection is created.

8. It is noted that this intersection may cater for increased traffic volumes in the future should OPD Area 5 (refer to Figure 8 of the ITA) be developed (we are not aware of any current plans to do so). This could include consideration of a roundabout at the Landsborough Drive / Kimberley Road intersection. In respect of future proofing this intersection, this can be considered further at the time of subdivision such as ensuring sufficient road reserve is provided to cater for a future roundabout (by others).

SH73 Traffic Growth

9. The now available 2020 AADT has been added to the SH73 volumes in Figure 2 of the NZTA Response and is shown below. It is noted that whilst 2020 suggests an increase in traffic since 2019 the recent AADT's (since 2015) do not suggest a clear increase / background growth in traffic on SH73 near the site.

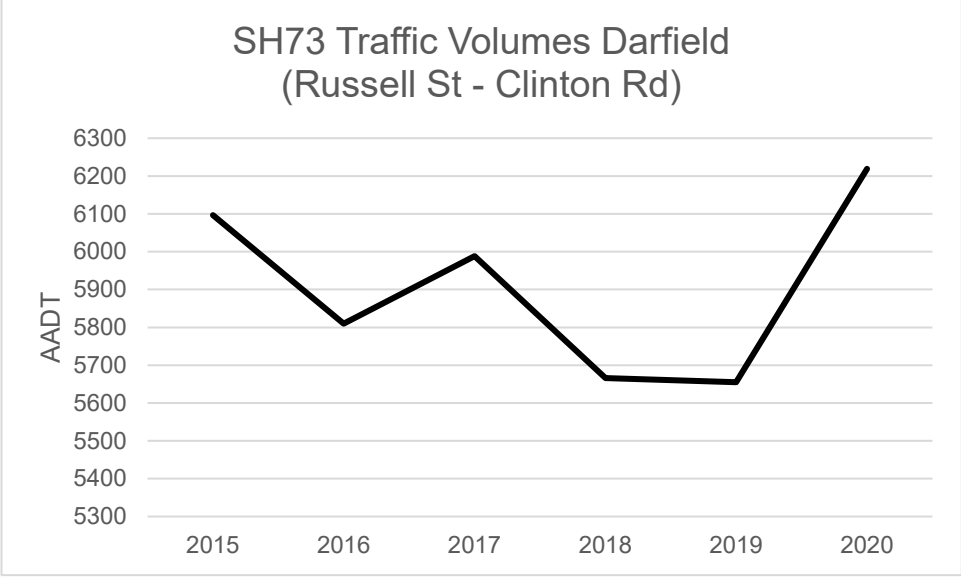


Figure 3: Updated AADT for SH73

10. Regardless, a sensitivity test of 20% growth has been added to the through traffic volumes on SH73. The Sidra outputs suggest that all movements would stay within LOS A-D with the exception of the right turn from the southern side of Mathias Street in the morning peak hour (LOS E). We consider LOS E is acceptable for this movement in the peak hour, particularly as a sensitivity test. Further analysis of this movement suggests that this delay is due to the high proportion of existing heavy vehicle movements in the morning peak hour.

11. The default SIDRA settings appear to be over-estimating the delay for heavy vehicles as the traffic surveys undertaken showed only two vehicles queuing for a very short period of time during the peak hour with no queuing occurring outside of this period. The SIDRA results for the existing model appear to be overstating the delay and queuing associated with the southern arm. This may because whilst there was a high proportion of heavy vehicles, casual observations during the surveys suggested this included a number of smaller heavy vehicles which would require a smaller gap in traffic to turn safely. It is also anticipated that during the peak hours, truck drivers turning onto a State Highway would be expected to be more alert and select all appropriate gaps rather than waiting for a larger gap, particularly in this location where there is excellent visibility. As a test, the existing model was calibrated to a 1.2 HV Gap Acceptance Factor (compared to a default value of 1.5) which still suggested that the model was over estimation of the queueing occurring on this arm of the intersection compared to that observed during the surveys.

12. In terms of the revised SIDRA Model for the 20% SH73 traffic growth, even a small adjustment to the HV Gap Acceptance Factor from 1.5 to 1.4 suggests that the right turn movement would operate within Level of Service D. As such we can reasonably conclude that this arm of the intersection would continue to operate satisfactorily. The SIDRA outputs for 20% increase through traffic on SH73 (including the 1.4 factor for the southern arm in the AM peak) are provided in **Attachment 2**.

Summary

13. We trust the above information will assist you with preparation of evidence and response to submissions. Should you have any further questions please do not hesitate to contact me directly.

Yours sincerely,

Novo Group Limited

Lisa Williams

Transport Engineer and Planner

D: 03 365 5596 | **M:** 027 2929 825 | **O:** 03 365 5570

E: lisa@novogroup.co.nz | **W:** www.novogroup.co.nz

035033

Attachment 1: Landsborough Drive, Kimberley Road SIDRA Intersection Movement Summary Reports and Layouts

MOVEMENT SUMMARY

Site: 101 [Proposed Road Kimberley Road Landsborough Drive AM Peak (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kimberley Road (southern arm)														
1	L2	16	5.0	17	5.0	0.033	4.7	LOS A	0.1	0.9	0.12	0.33	0.12	47.2
2	T1	20	5.0	21	5.0	0.033	0.1	LOS A	0.1	0.9	0.12	0.33	0.12	47.8
3	R2	20	5.0	21	5.0	0.033	4.8	LOS A	0.1	0.9	0.12	0.33	0.12	46.8
Approach		56	5.0	59	5.0	0.033	3.1	NA	0.1	0.9	0.12	0.33	0.12	47.3
East: Proposed Road														
4	L2	56	5.0	59	5.0	0.053	4.8	LOS A	0.2	1.5	0.14	0.50	0.14	46.3
5	T1	4	5.0	4	5.0	0.053	3.7	LOS A	0.2	1.5	0.14	0.50	0.14	46.4
6	R2	10	5.0	11	5.0	0.053	5.2	LOS A	0.2	1.5	0.14	0.50	0.14	45.8
Approach		70	5.0	74	5.0	0.053	4.8	LOS A	0.2	1.5	0.14	0.50	0.14	46.2
North: Kimberley Road (northern arm)														
7	L2	5	5.0	5	5.0	0.033	4.7	LOS A	0.0	0.2	0.02	0.08	0.02	48.9
8	T1	50	5.0	53	5.0	0.033	0.0	LOS A	0.0	0.2	0.02	0.08	0.02	49.5
9	R2	4	5.0	4	5.0	0.033	4.7	LOS A	0.0	0.2	0.02	0.08	0.02	48.4
Approach		59	5.0	62	5.0	0.033	0.7	NA	0.0	0.2	0.02	0.08	0.02	49.3
West: Landsborough Drive														
10	L2	9	5.0	9	5.0	0.061	4.7	LOS A	0.2	1.5	0.15	0.55	0.15	46.2
11	T1	3	5.0	3	5.0	0.061	3.7	LOS A	0.2	1.5	0.15	0.55	0.15	46.2
12	R2	46	5.0	48	5.0	0.061	5.5	LOS A	0.2	1.5	0.15	0.55	0.15	45.7
Approach		58	5.0	61	5.0	0.061	5.3	LOS A	0.2	1.5	0.15	0.55	0.15	45.8
All Vehicles		243	5.0	256	5.0	0.061	3.5	NA	0.2	1.5	0.11	0.37	0.11	47.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.

MOVEMENT SUMMARY

Site: 101 [Proposed Road Kimberley Road Landsborough Drive PM Peak (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Kimberley Road (southern arm)														
1	L2	30	5.0	32	5.0	0.061	4.7	LOS A	0.3	1.9	0.10	0.39	0.10	47.0
2	T1	24	5.0	25	5.0	0.061	0.1	LOS A	0.3	1.9	0.10	0.39	0.10	47.5
3	R2	48	5.0	51	5.0	0.061	4.7	LOS A	0.3	1.9	0.10	0.39	0.10	46.5
Approach		102	5.0	107	5.0	0.061	3.6	NA	0.3	1.9	0.10	0.39	0.10	46.9
East: Proposed Road														
4	L2	28	5.0	29	5.0	0.026	4.7	LOS A	0.1	0.7	0.06	0.51	0.06	46.5
5	T1	2	5.0	2	5.0	0.026	3.8	LOS A	0.1	0.7	0.06	0.51	0.06	46.5
6	R2	5	5.0	5	5.0	0.026	5.2	LOS A	0.1	0.7	0.06	0.51	0.06	46.0
Approach		35	5.0	37	5.0	0.026	4.7	LOS A	0.1	0.7	0.06	0.51	0.06	46.4
North: Kimberley Road (northern arm)														
7	L2	12	5.0	13	5.0	0.029	4.7	LOS A	0.1	0.8	0.12	0.31	0.12	47.4
8	T1	19	5.0	20	5.0	0.029	0.1	LOS A	0.1	0.8	0.12	0.31	0.12	47.9
9	R2	17	5.0	18	5.0	0.029	4.8	LOS A	0.1	0.8	0.12	0.31	0.12	46.9
Approach		48	5.0	51	5.0	0.029	2.9	NA	0.1	0.8	0.12	0.31	0.12	47.4
West: Landsborough Drive														
10	L2	4	5.0	4	5.0	0.033	4.7	LOS A	0.1	0.8	0.17	0.54	0.17	46.2
11	T1	2	5.0	2	5.0	0.033	3.8	LOS A	0.1	0.8	0.17	0.54	0.17	46.3
12	R2	25	5.0	26	5.0	0.033	5.4	LOS A	0.1	0.8	0.17	0.54	0.17	45.8
Approach		31	5.0	33	5.0	0.033	5.2	LOS A	0.1	0.8	0.17	0.54	0.17	45.8
All Vehicles		216	5.0	227	5.0	0.061	3.9	NA	0.3	1.9	0.11	0.41	0.11	46.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

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

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

Queue Model: SIDRA Standard.

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

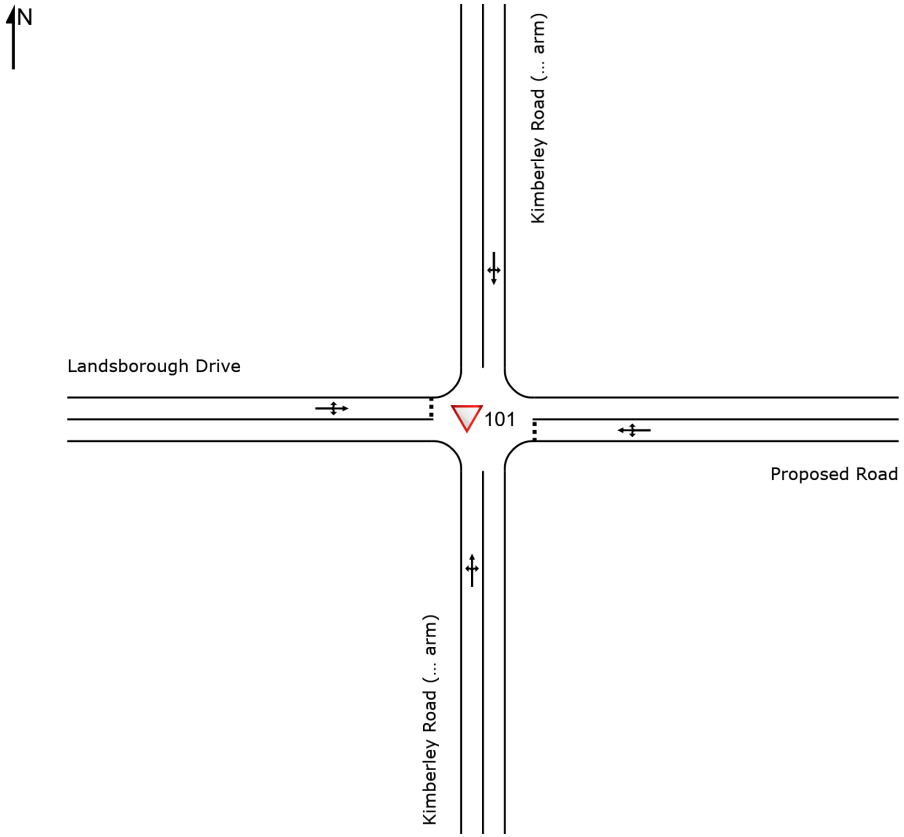
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [Proposed Road Kimberley Road Landsborough Drive AM Peak (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

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



Attachment 2: SH73 20% growth SIDRA Intersection Movement Summary Reports

MOVEMENT SUMMARY

Site: 101 [Mathias AM Proposed (lanes) +20% on SH (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mathais Street														
1	L2	9	80.0	9	80.0	0.013	11.9	LOS B	0.0	0.5	0.31	0.94	0.31	43.5
2	T1	15	75.0	16	75.0	0.204	24.1	LOS C	0.7	8.4	0.76	1.04	0.79	36.3
3	R2	20	80.0	21	80.0	0.204	33.6	LOS D	0.7	8.4	0.76	1.04	0.79	36.5
Approach		44	78.3	46	78.3	0.204	25.9	LOS D	0.7	8.4	0.67	1.02	0.69	37.7
East: West Coast Road														
4	L2	13	5.0	14	5.0	0.008	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
5	T1	128	10.0	162	10.0	0.087	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
6	R2	19	5.0	20	5.0	0.015	5.5	LOS A	0.1	0.5	0.37	0.54	0.37	45.5
Approach		160	9.0	195	9.1	0.087	0.9	NA	0.1	0.5	0.04	0.09	0.04	49.2
North: Mathais Street														
7	L2	87	5.0	92	5.0	0.103	9.1	LOS A	0.4	2.8	0.36	0.90	0.36	44.5
8	T1	31	5.0	33	5.0	0.240	15.6	LOS C	0.9	6.8	0.64	1.02	0.69	41.0
9	R2	47	5.0	49	5.0	0.240	17.6	LOS C	0.9	6.8	0.64	1.02	0.69	41.0
Approach		165	5.0	174	5.0	0.240	12.7	LOS B	0.9	6.8	0.50	0.96	0.52	42.8
West: South Terrace														
10	L2	30	5.0	32	5.0	0.146	4.6	LOS A	0.0	0.0	0.00	0.06	0.00	49.0
11	T1	189	10.0	239	10.0	0.146	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	49.6
12	R2	21	5.0	22	5.0	0.019	5.3	LOS A	0.1	0.5	0.29	0.53	0.29	45.7
Approach		240	8.9	292	9.1	0.146	0.9	NA	0.1	0.5	0.02	0.10	0.02	49.2
All Vehicles		609	12.9	708	12.6	0.240	5.5	NA	0.9	8.4	0.18	0.37	0.19	46.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 101 [Mathias PM Proposed (lanes) +20% SH (Site Folder: General)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mathais Street														
1	L2	17	20.0	18	20.0	0.027	10.9	LOS B	0.1	0.7	0.45	0.91	0.45	43.8
2	T1	25	15.0	26	15.0	0.195	25.5	LOS D	0.7	5.4	0.80	1.02	0.83	37.0
3	R2	10	20.0	11	20.0	0.195	30.8	LOS D	0.7	5.4	0.80	1.02	0.83	37.0
Approach		52	17.6	55	17.6	0.195	21.7	LOS C	0.7	5.4	0.69	0.98	0.71	39.0
East: West Coast Road														
4	L2	10	5.0	11	5.0	0.006	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
5	T1	290	10.0	366	10.0	0.198	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
6	R2	96	5.0	101	5.0	0.074	5.5	LOS A	0.3	2.4	0.37	0.56	0.37	45.5
Approach		396	8.7	478	8.8	0.198	1.3	NA	0.3	2.4	0.08	0.13	0.08	48.8
North: Mathais Street														
7	L2	23	5.0	24	5.0	0.026	8.7	LOS A	0.1	0.7	0.31	0.87	0.31	44.7
8	T1	23	5.0	24	5.0	0.455	28.1	LOS D	1.9	14.2	0.85	1.11	1.19	35.2
9	R2	61	5.0	64	5.0	0.455	33.3	LOS D	1.9	14.2	0.85	1.11	1.19	35.2
Approach		107	5.0	113	5.0	0.455	26.9	LOS D	1.9	14.2	0.73	1.06	1.00	36.9
West: South Terrace														
10	L2	53	5.0	56	5.0	0.136	4.7	LOS A	0.0	0.0	0.00	0.12	0.00	48.7
11	T1	155	10.0	196	10.0	0.136	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	49.2
12	R2	10	5.0	11	5.0	0.011	6.4	LOS A	0.0	0.3	0.44	0.58	0.44	45.3
Approach		218	8.6	262	8.7	0.136	1.3	NA	0.0	0.3	0.02	0.14	0.02	48.9
All Vehicles		773	8.7	907	8.9	0.455	5.7	NA	1.9	14.2	0.18	0.30	0.21	46.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

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

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

Queue Model: SIDRA Standard.

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

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

MOVEMENT SUMMARY

Site: 101 [McMillan AM Proposed +20% SH (Site Folder: General)]

South Terrace
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Ross Street														
1	L2	22	5.0	23	5.0	0.215	6.0	LOS A	0.8	5.8	0.63	0.77	0.64	42.0
2	T1	31	5.0	33	5.0	0.215	12.6	LOS B	0.8	5.8	0.63	0.77	0.64	42.2
3	R2	22	5.0	23	5.0	0.215	21.2	LOS C	0.8	5.8	0.63	0.77	0.64	42.2
Approach		75	5.0	79	5.0	0.215	13.2	LOS B	0.8	5.8	0.63	0.77	0.64	42.1
East: South Terrace														
4	L2	28	5.0	29	5.0	0.159	4.6	LOS A	0.0	0.0	0.00	0.05	0.00	49.1
5	T1	209	10.0	264	10.0	0.159	0.0	LOS A	0.0	0.0	0.00	0.05	0.00	49.6
6	R2	54	5.0	57	5.0	0.046	5.9	LOS A	0.2	1.4	0.42	0.58	0.42	45.6
Approach		291	8.6	350	8.8	0.159	1.4	NA	0.2	1.4	0.07	0.14	0.07	48.9
North: McMillan Street														
7	L2	123	5.0	129	5.0	0.141	6.3	LOS A	0.5	3.8	0.41	0.64	0.41	45.6
8	T1	54	5.0	57	5.0	0.289	13.9	LOS B	1.2	8.9	0.75	0.91	0.87	41.0
9	R2	37	5.0	39	5.0	0.289	18.1	LOS C	1.2	8.9	0.75	0.91	0.87	40.9
Approach		214	5.0	225	5.0	0.289	10.3	LOS B	1.2	8.9	0.56	0.75	0.61	43.5
West: South Terrace														
10	L2	20	5.0	21	5.0	0.182	4.7	LOS A	0.0	0.0	0.00	0.03	0.00	49.2
11	T1	253	10.0	320	10.0	0.182	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	49.7
12	R2	9	5.0	9	5.0	0.007	5.6	LOS A	0.0	0.2	0.38	0.52	0.38	45.7
Approach		282	9.5	350	9.6	0.182	0.5	NA	0.0	0.2	0.01	0.05	0.01	49.6
All Vehicles		862	7.7	1005	7.9	0.289	4.0	NA	1.2	8.9	0.20	0.29	0.21	47.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

MOVEMENT SUMMARY

Site: 101 [McMillan PM Proposed +20% SH (Site Folder: General)]

South Terrace
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Ross Street														
1	L2	18	5.0	19	5.0	0.142	7.1	LOS A	0.5	3.4	0.73	0.83	0.73	40.4
2	T1	13	5.0	14	5.0	0.142	21.7	LOS C	0.5	3.4	0.73	0.83	0.73	40.6
3	R2	6	5.0	6	5.0	0.142	33.8	LOS D	0.5	3.4	0.73	0.83	0.73	40.6
Approach		37	5.0	39	5.0	0.142	16.5	LOS C	0.5	3.4	0.73	0.83	0.73	40.5
East: South Terrace														
4	L2	15	5.0	16	5.0	0.250	4.7	LOS A	0.0	0.0	0.00	0.02	0.00	49.2
5	T1	353	10.0	446	10.0	0.250	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
6	R2	174	5.0	183	5.0	0.153	6.2	LOS A	0.7	5.1	0.47	0.63	0.47	45.5
Approach		542	8.3	645	8.5	0.250	1.9	NA	0.7	5.1	0.13	0.19	0.13	48.5
North: McMillan Street														
7	L2	100	5.0	105	5.0	0.117	6.4	LOS A	0.4	3.1	0.42	0.64	0.42	45.5
8	T1	16	5.0	17	5.0	0.330	25.7	LOS D	1.2	8.9	0.88	0.99	1.05	35.1
9	R2	36	5.0	38	5.0	0.330	32.8	LOS D	1.2	8.9	0.88	0.99	1.05	35.0
Approach		152	5.0	160	5.0	0.330	14.7	LOS B	1.2	8.9	0.58	0.76	0.63	41.3
West: South Terrace														
10	L2	29	5.0	31	5.0	0.196	4.7	LOS A	0.0	0.0	0.00	0.05	0.00	49.1
11	T1	265	10.0	335	10.0	0.196	0.1	LOS A	0.0	0.0	0.00	0.05	0.00	49.6
12	R2	9	5.0	9	5.0	0.009	6.4	LOS A	0.0	0.3	0.49	0.58	0.49	45.4
Approach		303	9.4	375	9.5	0.196	0.6	NA	0.0	0.3	0.01	0.06	0.01	49.5
All Vehicles		1034	8.0	1219	8.2	0.330	3.7	NA	1.2	8.9	0.17	0.25	0.18	47.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.

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

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

Queue Model: SIDRA Standard.

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

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