Private Plan Change 74: Hughes Developments Limited

Transportation Hearing Report

November 2022

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TRANSPORTATION SPECIALISTS

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Reviewed by:	**Ian Clark**

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SUMMARY OF MY PEER REVIEW

Selwyn District Council (Council) has requested Flow Transportation Specialists (Flow) to review the transportation matters associated with Private Plan Change 74 (PPC74), which has been lodged by Hughes Development Limited.

In terms of the immediate effects of PPC74, and the proposed ODP

- I consider that traffic modelling is required for the Halkett Road/SH73 intersection, to determine if mitigations for traffic efficiency effects are needed to support PPC74. Refer to my discussion in Section 5.1.
- I consider that further analysis of the Halkett Road/SH73 intersection is required, including a road safety audit. Should the primary access / SH73 intersection be formed as a left in/left out, PPC74 may create negative safety effects at the Halkett Road/SH73 intersection as this is likely to be the primary access point to the State Highway network for PPC74 vehicle trips travelling to the site from the east. Should improvements be required, I recommend that a District Plan rule is included to ensure these are delivered in conjunction with development within PPC74. Refer to my discussion in Section 5.2
- In my view, a roading connection to Rossington Drive that includes a shared footpath/cycleway is needed to address the otherwise limited transport network connectivity of the site. I recommend that the ODP narrative reflect this outcome and I suggest that a consent notice (or other such planning mechanism) is placed on 36 Rossington Drive identifying that it is required for a roading connection. Refer to my discussion in Section 5.3
- I recommend that the ODP narrative is amended to specify that cycle facilities are to be provided on Halkett Road, between Wylies Road and Rossington Drive. Refer to my discussion in Section 5.4
- I consider that at least an additional two road connections should be provided to the eastern PPC site boundary, to allow for extension should urbanisation occur. I recommend that the ODP narrative identify that Primary north-south road through the site shall include traffic calming to discourage through traffic between Halkett Road and SH73. Refer to my discussion in Section 5.5
- I recommend that the ODP should be amended to include a cycling and pedestrian route through the central reserve, and to allow future extensions of the cycling and pedestrian network to the east of the PPC site. Refer to my discussion in Section 5.6
- The Site has low accessibility to public transport, with one peak hour bus service on Halkett Road. I consider that additional bus stops along the Site frontage with Halkett Road are unlikely to be required, however I recommend that the applicant consult with Environment Canterbury on this matter. Refer to my discussion in Section 5.7
- I recommend that the ODP narrative identify that the applicant should consult with Council regarding relocation of the speed limit transition on Halkett Road. Refer to my discussion in Section 5.8

- I recommend that amendments are made to the ODP narrative. Refer to my discussion in Section 5.9.

PPC74 is outside the proposed infrastructure boundary identified in the CRPS Map A. Should PPC74 affect the quantum of residential growth within Selwyn District, without a corresponding increase in local employment and access to services, additional impact on the Greater Christchurch transport network can be expected as additional residents in Selwyn travel to access services and employment.

The transport effects of PPC74 at a subregional level, as an urban area outside the anticipated urban boundary, are likely to be minor and I note that West Melton/SH73 is less constrained that other key corridors in Selwyn (such as those around Rolleston, Lincoln and Prebbleton). However, the cumulative effect of large scale urban development outside the anticipated urban boundary (as proposed by multiple plan changes in the Selwyn District) could have a significant effect on the transport network, which may require additional and/or reprioritised funding from public agencies at the local, district or regional level to mitigate. Refer to my discussion in Section 6.

CONTENTS

APPENDICES

1 INTRODUCTION

This report has been completed by Mat Collins (Associate) with assistance from Vanessa Wong (Senior Transportation Planner) and reviewed by Ian Clark (Director). Ian, Vanessa, and I are experts in the field of transport planning and engineering. Ian and I frequently attend Council and Environment Court mediation and hearings as transport experts for local government, road controlling authorities and private concerns.

Hughes Developments Limited (requestor) has lodged a PPC to change the Selwyn District Plan to rezone approximately 20.687 hectares of Rural Inner Plains zoned land to Living West Melton (PPC74). This report details my review of PPC74.

The scope of this specialist transport report is to assist Council in determining the transport outcomes of PPC74 and includes the following

- A summary of PPC74 focusing on transport matters
- An overview of transport projects contained within the Long Term Plan (LTP), which are relevant to PPC74
- A review of the material provided to support the application for PPC74, and a discussion of the potential effects of PPC74
- Summary of submissions, relating to transport matters only
- My recommendations.

I have reviewed the following documents, as they relate to transport matters

- Application for Private Plan Change, prepared by Davie Lovell-Smith, dated March 2022, including
    - Appendix A: Outline Development Plan
    - Appendix I: Integrated Transport Assessment (NOVO Group, November 2020)
    - Appendix J: Plan Change 74 Response to Request for Further Information: Traffic Assessment (NOVO Group, March 2021)
    - Additional Information Following Submissions (Davie Lovell-Smith, October 2022)
- Submissions as outlined in Section 7.

For transparency, I am identifying that Flow has provided advice to Waka Kotahi regarding the nearby PPC77. In November 2021 Stantec, acting for Marama Te Wai Ltd, sought feedback from Waka Kotahi regarding the Stantec Integrated Transport Assessment for PPC77, prior to lodgement with Council. Flow reviewed the ITA on behalf of Waka Kotahi and provided advice. Marama Te Wai Ltd subsequently lodged PPC77 with Council in December 2021. Flow has not acted for Waka Kotahi for PPC77 since November 2021.

I have reviewed Waka Kotahi's submission on PPC74 and, in my view, its submission did not rely on advice that Flow provided to it on PPC77.

2 A SUMMARY OF PPC74

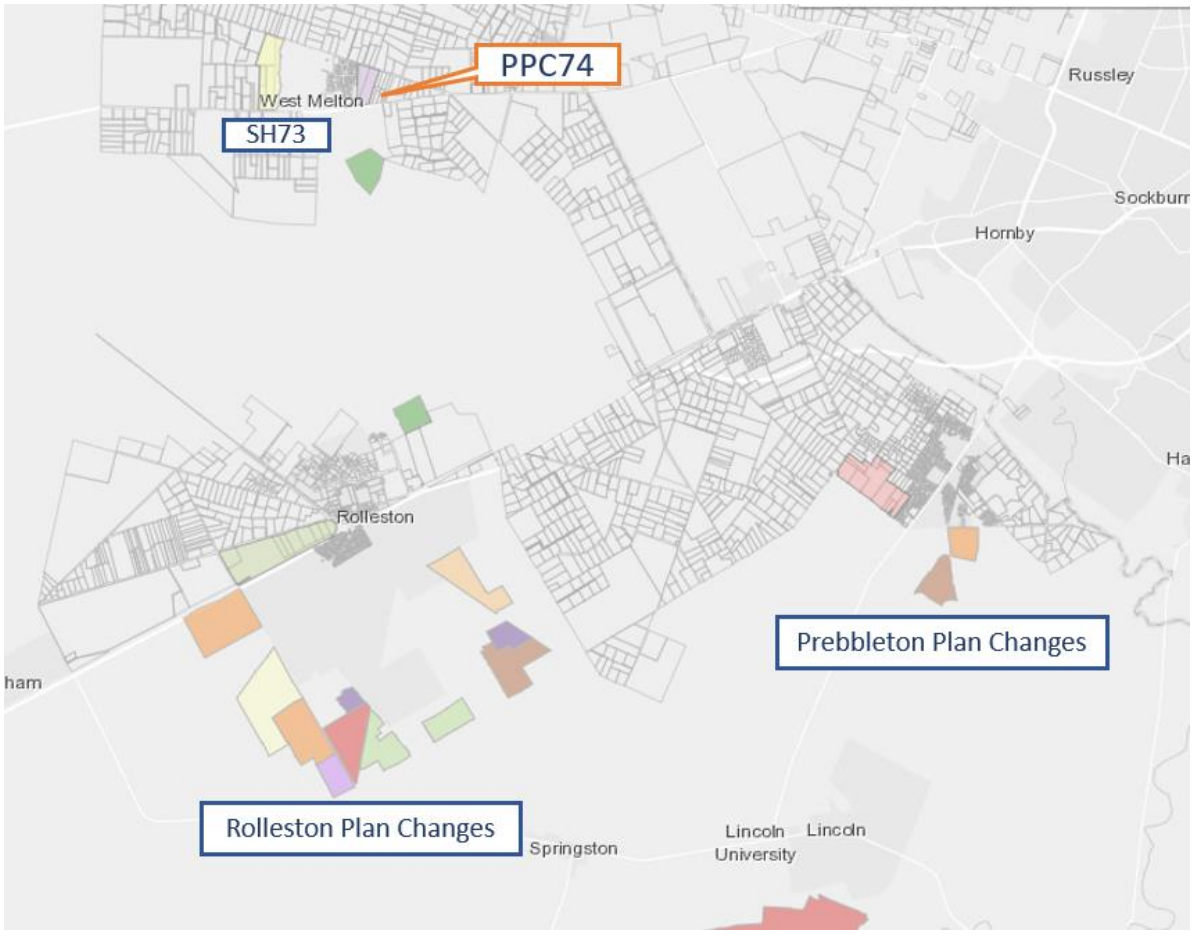
There are currently multiple private plan changes lodged within Rolleston, Lincoln and Prebbleton, as shown in Figure 1. PPC74 is east of the existing urban area of West Melton, and is generally bounded by Halkett Road to the north and State Highway 73 (SH73) to the south (the PPC site). The PPC site immediately adjoins the Gainsborough development in the west, and road access onto Halkett Road, SH73 and Rossington Drive is proposed.

PPC74 proposes to rezone approximately 20.687 hectares of Rural Inner Plains to Living West Melton. An Outline Development Plan (ODP) is proposed to guide the form and layout of future development.

The ODP is shown in Figure 2 and is intended to provide

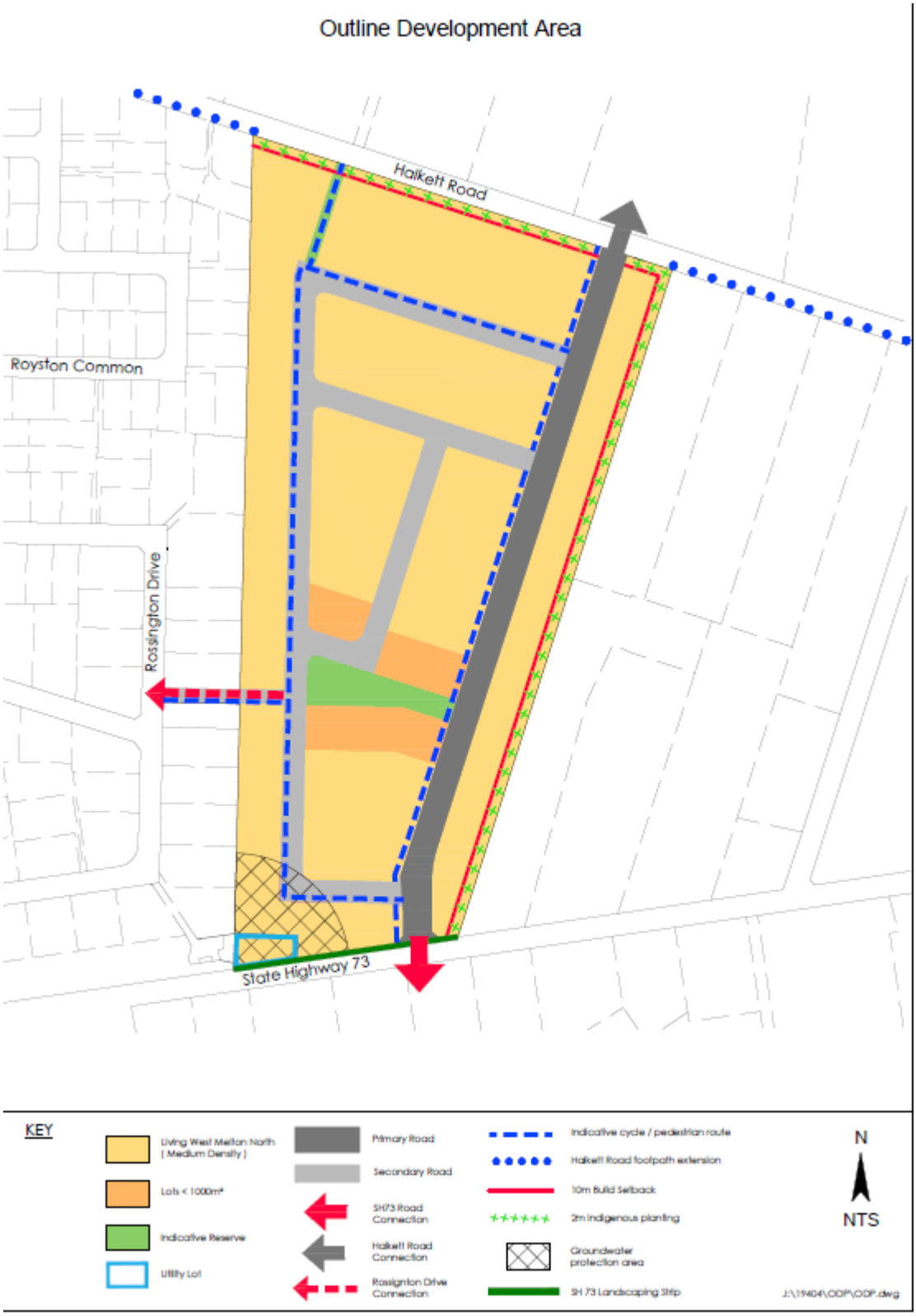
- Approximately 130 residential lots
- A primary road through site connection between SH73 and Halkett Road, with a left in/left out intersection on SH73
- A primary road connection to Rossington Drive
- Internal walking and cycling networks.

Figure 1: Overview of PPC74 and other nearby PPCs[1]



[1] Adapted from Council's "Current plan change requests" website, available at https://www.selwyn.govt.nz/property-And-building/planning/strategies-and-plans/selwyn-district-plan/plan-changes

Figure 2: PPC74 Outline Development Plan



3 WEST MELTON TRANSPORT PROJECTS RELEVANT TO PPC74

Council has provided a list of transport projects within the Long Term Plan (LTP) and National Land Transport Fund (NLTF) that I consider to be relevant to PPC74, shown in Table 1. In my view staging of development within PPC74 does not need to be aligned with these projects.

Table 1: LTP transport projects relevant to PPC74

Project	Scheduled year	Description
SH73/Weedon Ross Road intersection signalisation	2022/2023	Safety upgrade, being delivered by Waka Kotahi
West Melton to Rolleston cycleway	2031+	Unfunded project in the current LTP

4 WIDER AREA EFFECTS OF CURRENT PLAN CHANGES

Currently there are multiple PPCs are being sought within Selwyn District. Of note to PPC74 are the following

- PPC64: Rolleston, 969 residential lots
- PPC66: Rolleston, industrial
- PPC68: Prebbleton, 820 residential lots
- PPC69: Lincoln, 2000 residential lots plus commercial
- PPC70: Rolleston, 800 residential lots plus commercial
- PPC71: Rolleston, 660 residential lots
- PPC72: Prebbleton, 295 residential lots
- PPC74: West Melton, 130 residential lots (subject of this report)
- PPC73: Rolleston, 2100 residential lots plus commercial
- PPC75: Rolleston, 280 residential lots
- PPC77: West Melton, 525 residential lots
- PPC76: Rolleston, 150 residential lots
- PPC78: Rolleston, 750 residential lots
- PPC79: Prebbleton, 400 residential lots
- PPC80: Rolleston, industrial
- PPC81: Rolleston, 350 residential lots
- PPC82: Rolleston, 1320 residential lots.

Council has commissioned Abley to prepare updates to the Rolleston and Lincoln Paramics models, which provide an indication of the potential future traffic demands within each settlement and the number of vehicles that are expected to enter and exit each settlement. However, no such traffic model exists for West Melton.

Council has recently engaged QTP[2] to test the effects of greater residential growth in Selwyn District on the Greater Christchurch transport network, as part of Council's "Selwyn 2051" plan, which I have attached as Appendix A. The transport model outputs provided in the QTP report do not attempt to precisely predict future conditions, but rather provide a broad indication of likely outcomes if a certain set of assumptions come to pass, and further model limitations are also noted in Section 2.3 of the QTP report. I note that the QTP report is in draft form.

In absence of a West Melton transport model, I have relied on the QTP report to understand the potential future performance of the West Melton transport network.

[2] Future Year Transport Model Outputs - Selwyn 2031 Update (Selwyn 2051) report, prepared by QTP, dated October 2021

The QTP report assesses the difference between two potential scenarios in 2038

- Scenario 1 (2038): growth in Selwyn based on forecasts agreed by the Greater Christchurch Partnership Committee for households, population, and employment
- Scenario 2 (2038): Scenario 1 plus an additional 10,000 dwellings (Selwyn District only), without any changes to employment, or any changes to households in Christchurch or Waimakariri. We note these are slightly lower than the sum of the current PPCs (11,024 dwellings) listed above.

The QTP assessment located the additional 10,000 dwellings to approximate the residential Private Plan Changes that had been lodged at the time of the writing of the report (PPC64, 67, 68, 69, 70, 21, 72, 73, 74, 75, 76, 77, 78 and 79).

Although the purpose of the QTP report is not to assess the cumulative transport effects of the multiple plan changes within Selwyn, it does provide insight into the potential quantum of effects, by comparing a standard population growth scenario (Scenario 1) with a high population growth scenario (Scenario 2). Of particular interest for my review are Halkett Road and SH73.

QTP found that

- Selwyn travel patterns in both Scenarios are indicated to remain similar to 2021, but with an increased magnitude proportional to population increase (increase of around 32% of peak hour trips)
- There is and will be high demand between Selwyn District and Christchurch City, with approximately 50% of Selwyn's peak hour trips starting or finishing in Christchurch, with trips distributing across available corridors between the two Districts
- For both Scenarios, more than 90% of trips are indicated to be by private vehicle

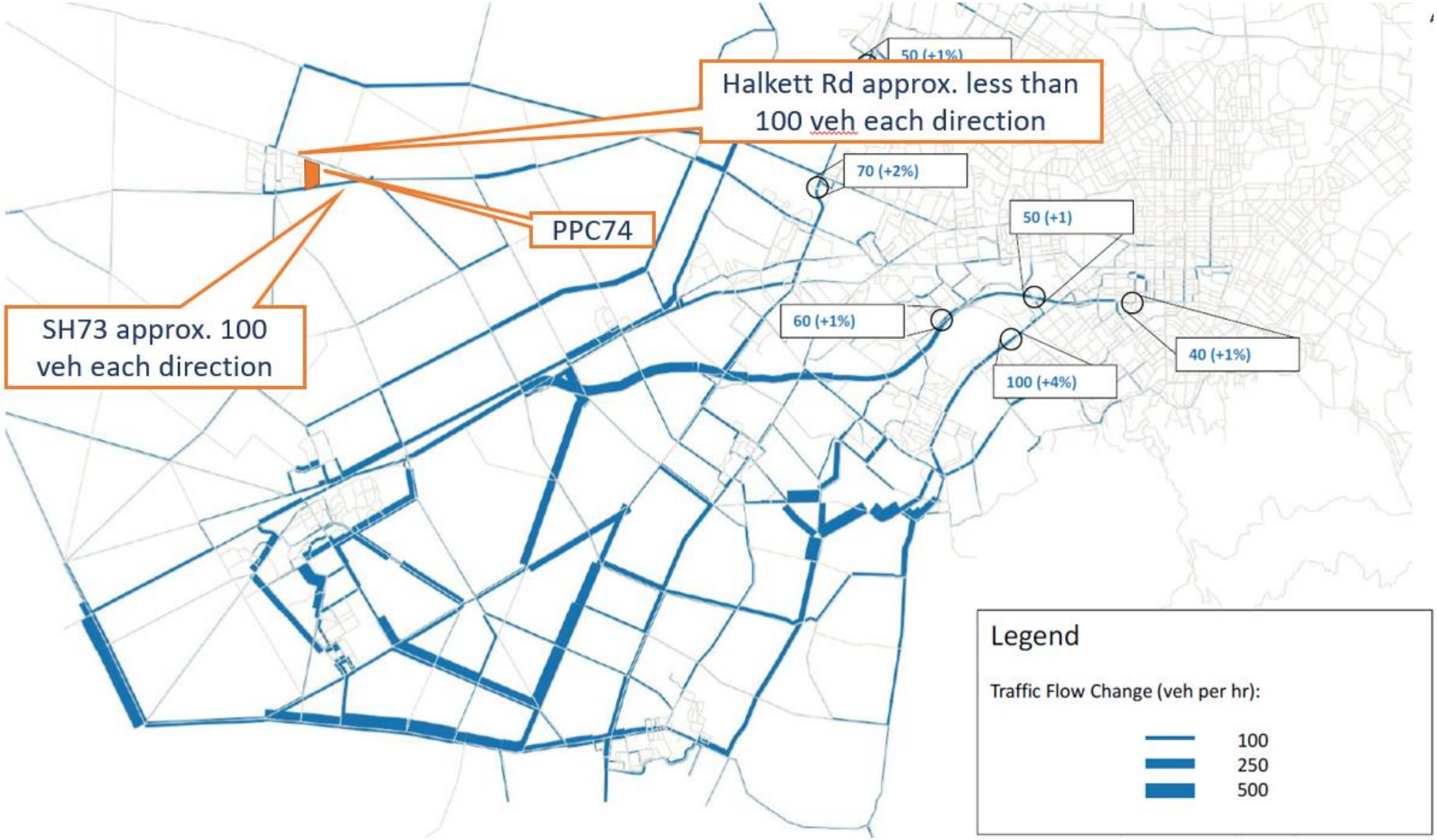
As can be seen in Figure 3, Scenario 2 is indicated to result in the following increase in morning peak hour flows, compared with Scenario 1, including

- Less than 100 veh/hr on Halkett Road in each direction
- Approximately 100 veh/hr on SH73 in each direction.

SH73 will experience some congestion during peak periods, particularly the section between Chattertons Road and Miners Road. However, if the proposed left in and left out for the access on SH73 is to proceed, this will drive more traffic to use Halkett Road as a direct result of PPC74.

Outcome: Regional modelling indicates that Halkett Road and SH73 are expected to experience little change in forecast traffic growth, when comparing a 2038 scenario with 10,000 additional dwellings more than forecast.

Figure 3: Indicative changes in AM traffic flows, Scenario 2 vs Scenario 1



5 MY REVIEW OF THE TRANSPORT MATTERS

During my review, I considered the following aspects of PPC74

- Traffic modelling
- Frontage upgrades
- Internal roading layout
- Provision for walking and cycling
- Safety effects on the Halkett Road / SH73 intersection.

I discuss these matters in the following subsections.

5.1 Traffic modelling

The ITA provides traffic modelling for the proposed access and SH73 intersection. However, this is modelled with all movements available at this intersection. The modelling has not been updated to the new proposed intersection configuration – left in and left out, which was proposed by the applicant in amendments to the ODP narrative following submissions.

In my view, the proposed access and SH73 intersection does not need to be remodelled, however the change to a left in and left out arrangement will result in more traffic from PPC74 using Halkett Road to access SH74 when travelling to and from the east. I consider that traffic modelling of the Halkett Road / SH73 intersection is required, to determine the traffic efficiency effects of PPC74 at this intersection.

Outcome: I consider that traffic modelling is required for the Halkett Road/SH73 intersection, to determine if mitigations for traffic efficiency effects are needed to support PPC74.

5.2 Safety effects at the Halkett Road / SH73 intersection

The ODP narrative states that the access to SH73 will be left in and left out only, unless otherwise approved by Waka Kotahi. Should the intersection be formed as a left in and left out only, all vehicles movements travelling to the site from the east will need to go through the Halkett Road / SH73 intersection.

Paragraphs 29 – 33 of the ITA discuss vehicle trip generation and it estimates that PPC74 will generate around 71 vehicle movements to and from the east during the AM peak, and 85 vehicle movements during the PM peak.

The ITA states that the Average Daily Traffic volume on Halkett Road was 1,097 in 2022, and I note that peak hour traffic volumes are typically around 10% of Average Daily Traffic volumes, which means around 110 vehicles per hour during peak periods.

PPC74 is therefore expected to generate an increase in traffic movements on Halkett Road, between the PPC site access and SH73, of around 77%, leading to totals of some 200 vehicles per hour. This will result in a significant increase in turning movements at the Halkett Road / SH73 intersection.

I have reviewed the crash records contained in Waka Kotahi's Crash Analysis System (CAS) for the 2017 – 2021 period. The extent of the search area was from 100m to the west of Halkett Road / SH73 intersection to 100m east of the Curraghs Road /SH73 intersection, including a 100m radius around each intersection.

- 2 non-injury crashes were recorded
- Both crashes occurred at the Halkett Road / SH73 intersection
- Both crashes involved drivers turning right from SH73 into Halketts Road, being involved in rear-end crashes as drivers behind failed to notice them turning.

In my view, the above crashes lack sufficient frequency to be called a "trend", due to the limited number of recorded crashes. However, it is reasonable to assume that PPC74 will increase the rate of crashes at this intersection, if Halkett Road is used as the primary route for PPC74 traffic from the east.

To mitigate potential safety issues at the Halkett Road/SH73 intersection, mitigation measures, such as widening of the sealed shoulder or formation of a right turn bay, may be required. However, the proximity of the Lawford Road/Curraghs Road/SH73 intersection to the east may have an influence on any safety improvements that might be needed. I consider that the applicant should undertake further analysis of safety effects at this intersection, including a road safety audit.

Outcome: I consider that further analysis of the Halkett Road/SH73 intersection is required, including a road safety audit. Should the primary access / SH73 intersection be formed as a left in/left out, PPC74 may create negative safety effects at the Halkett Road/SH73 intersection as this is likely to be the primary access point for PPC74 vehicle trips travelling to the site from the east. Should improvements be required, I recommend that a District Plan rule is included to ensure these are delivered in conjunction with development within PPC74.

5.3 Roading connection to Rossington Drive

Paragraph 26 of the ITA identifies that a shared footpath/cycleway will be provided through Lot 105 within the Halkett Grove subdivision (36 Rossington Drive). However, the ODP indicates that this will be a road, and Section 3.1 of the AEE identifies that the applicant owns this site to ensure that a road connection is achieved.

In my view, a roading connection to Rossington Drive that includes a shared footpath/cycleway is needed to address the otherwise limited transport network connectivity of the site. I recommend that the ODP narrative reflect this outcome and I suggest that a consent notice (or other such planning mechanism) is placed on 36 Rossington Drive identifying that it is required for a roading connection.

Outcome: In my view, a roading connection to Rossington Drive that includes a shared footpath/cycleway is needed to address the otherwise limited transport network connectivity of the site. I recommend that the ODP narrative reflect this outcome and I suggest that a consent notice (or other such planning mechanism) is placed on 36 Rossington Drive identifying that it is required for a roading connection.

5.4 Frontage upgrades

The ODP narrative includes a discussion of the requirement to upgrade the Halkett Road frontage along the PPC site boundary, including the extension of a footpath on Halkett Road to Wylies Road and Rossington Drive. I support this outcome.

However, I consider that this should include cycle facilities, which may be in the form of a shared use path, as on road cycling on Halkett Road would not be suitable for most users. I recommend that these facilities connect to the existing footpath on Rossington Drive, which currently terminates around 30m to the south of the intersection with Halkett Road.

Outcome: I recommend that the ODP narrative is amended to specify that cycle facilities are to be provided on Halkett Road, between Wylies Road and Rossington Drive.

5.5 Internal roading layout

I consider that the OPD provides a logical roading layout within the site. However

- I consider that at least an additional two road connections should be provided to the eastern PPC site boundary, to allow for extension, should urbanisation occur. I have marked the suggested locations in Figure 4
- I recommend that the ODP narrative identify that Primary north-south road through the site shall include traffic calming to discourage through traffic between Halkett Road and SH73.

Outcome: I consider that at least an additional two road connections should be provided to the eastern PPC site boundary, to allow for extension should urbanisation occur. I recommend that the ODP narrative identify that Primary north-south road through the site shall include traffic calming to discourage through traffic between Halkett Road and SH73.

5.6 Provision for walking and cycling

I consider that the OPD provides good pedestrian and cycling facilities within the site. However, I recommend that, as shown in Figure 4:

- the cycling and pedestrian route is connected through the central reserve, as I consider that this provides for better connectivity for active modes
- the pedestrian and cycling network is future proofed for future extension to the east, should urbanisation beyond the PPC site occur.

Outcome: I recommend that the ODP should be amended to include a cycling and pedestrian route through the central reserve, and to allow for future extensions of the cycling and pedestrian network to the east of the PPC site.

5.7 Provision for public transport

The Site has low accessibility to public transport, with Metro Bus Service 86 running one Christchurch bound service at 7.33AM and one Darfield bound service at 5.26PM on Halkett Road. The nearest bus

stops are about 300m to the west of the site, I therefore consider that additional bus stops along the Site frontage are unlikely to be required, however I recommend that the applicant consult with Environment Canterbury on this matter.

Outcome: The Site has low accessibility to public transport, with one peak hour bus service on Halkett Road. I consider that additional bus stops along the Site frontage with Halkett Road are unlikely to be required, however I recommend that the applicant consult with Environment Canterbury on this matter.

5.8 Speed limit changes on Halkett Road

As noted in the ITA, the speed limit on Halkett Road changes from 60 km/hr to 80 km/hr along the site frontage. As part of the frontage upgrade to Halkett Road the change in speed limit should be relocated to the east of the site. However, speed limit changes can only be enacted by the Road Controlling Authority. I therefore recommend that the ODP narrative identify that the applicant should consult with Council regarding a speed limit change on Halkett Road.

Outcome: I recommend that the ODP narrative identify that the applicant should consult with Council regarding relocation of the speed limit transition on Halkett Road.

5.9 ODP narrative

I recommend amendments to the ODP narrative:

- Council requirements for road cross sections are detailed in Council's Engineering Code of Practice (CoP). I recommend that road cross sections are not detailed within the ODP, as the requirements of the CoP are a "live" document and can be changed in the future, whereas the ODP narrative is "fixed"
- As discussed in Section 5.3, I consider that the Halkett Road upgrade should include pedestrian and cycling facilities
- Identification of any upgrade to the SH73/Halkett Road intersection, with details to be confirmed as discussed in Section 5.2.

My recommended amendments are shown below in strikethrough and underline

> "***Movement Network***
>
> *Access to the site is provided from Halkett Road, State Highway 73 and Rossington Drive. There shall be no direct access from individual lots to State Highway 73. <u>The roading connection to Rossington Drive (via 36 Rossington Drive) shall be vested to Council as part of any subdivision of the site</u>.*
>
> *Unless otherwise agreed, access to State Highway 73 will be left in and left out. This intersection will require a 'physical barrier' (installed by either the developer or Waka Kotahi, or a combination of both) to prevent right turning movements. The intersection onto State Highway 73 is not to open until this barrier has been installed and the internal road connection to Rossington Drive has been made.*

Prior to any development within the ODP, the State Highway 73 / Halkett Road intersection shall be upgraded to include [details to be confirmed]

The primary ODP road between State Highway 73 and Halkett Road shall include traffic calming measures to reduce traffic speed and discourage through traffic. The secondary roads identified on the ODP shall facilitate internal connectivity, providing a basis for cohesive residential design.

~~*Cross Sections of the internal road network are attached. Development is to occur in accordance with these cross sections.*~~

Halkett Road will be upgraded to urban standards along the frontage of the ODP, along with reducing the speed limit to 60 km/hr or lower (note that speed limit changes can only be implemented by the relevant Road Controlling Authority). In addition, ~~footpath extensions~~ walking and cycling facilities along Halkett Road are to be constructed to the east to the intersection with Wylies Road and to the west to the ~~intersection with~~ existing footpath on Rossington Drive.

Internal pedestrian and cycling routes will generally be provided as part of the roading infrastructure. An internal access reserve will provide off-road pedestrian and cycle connection with Halkett Road.

A detailed assessment of the intersection of State Highway 73 and Halkett Road shall be undertaken as part of the subdivision consent process to identify any improvements or upgrades necessary. The assessment of this intersection shall be done in consultation with Waka Kotahi and Selwyn District Council."

Outcome: I recommend that amendments are made to the ODP narrative.

Figure 4: Recommended ODP amendments

6 CANTERBURY REGIONAL POLICY STATEMENT INFRASTRUCTURE BOUNDARY

PPC74 sits outside the proposed infrastructure boundary specified in the Canterbury Regional Policy Statement (CRPS) Map A[3].

In regard to the potential effects of PPC74 on the wider transport network

- The transport effects of PPC74 on the wider transport network, beyond West Melton, have not been assessed in the ITA
- If PPC74 does not affect the quantum of residential growth within Selwyn District over the life of the District Plan (i.e. residential growth in Selwyn District is a "zero sum game", with PPC74 drawing growth demand away from other parts of Selwyn), PPC74 is unlikely to result in significant wider transport network effects beyond what are already anticipated by strategic growth plans and policies (such as Our Space and the CRPS)
- If PPC74 (as a Plan Change outside the anticipated urban area) leads to greater residential growth in Selwyn District beyond what has been anticipated strategic growth plans and policies, without a corresponding increase in local employment and access to services, additional impact on the Greater Christchurch transport network can be expected as additional residents in Selwyn travel to access services and employment. However West Melton/SH73 is less constrained that other key corridors in Selwyn (such as those around Rolleston, Lincoln and Prebbleton)
- The wider area effects of PPC74 may not be overly apparent in a macro scale regional traffic model. Assessing the effects of PPC74, as a development outside of the identified infrastructure boundary, on the long term planning and funding commitments associated with bulk transport infrastructure is complex and requires assessment of multiple land use scenarios (e.g. expansion vs intensification scenarios). My discussion of the transport effects of two potential future growth scenarios is included in Section 4
- The transport effects of PPC74 at a subregional level, as an urban area outside the anticipated urban boundary, are likely to be minor. However, the cumulative effect of large scale urban development outside the anticipated urban boundary (as proposed by multiple plan changes in the Selwyn District) could have significant unanticipated effects on the transport network, which may require additional and/or reprioritised funding from public agencies at the local, district or regional level to mitigate.

Outcome: PPC74 is outside the proposed infrastructure boundary identified in the CRPS Map A. Should PPC74 affect the quantum of residential growth within Selwyn District, without a corresponding increase in local employment and access to services, additional impact on the Greater Christchurch transport network can be expected as additional residents in Selwyn travel to access services and employment.

[3] Canterbury Regional Policy Statement Map A, available online https://www.ecan.govt.nz/your-region/plans-strategies-and-bylaws/canterbury-regional-policy-statement/

The transport effects of PPC74 at a subregional level, as an urban area outside the anticipated urban boundary, are likely to be minor and I note that West Melton/SH73 is less constrained that other key corridors in Selwyn (such as those around Rolleston, Lincoln and Prebbleton). However, the cumulative effect of large scale urban development outside the anticipated urban boundary (as proposed by multiple plan changes in the Selwyn District) could have a significant effect on the transport network, which may require additional and/or reprioritised funding from public agencies at the local, district or regional level to mitigate.

7 MY REVIEW OF SUBMISSIONS

Multiple submissions were received relating to transport matters, which include the following broad topics

- Provision of transport infrastructure
- Walking and cycling
- Public transport
- Speed limits for existing roads

I comment on these matters further in the following subsections.

Other matters related to traffic were identified in submissions, however I have not commented on these as I am not a subject matter expert for

- Traffic noise and pollution
- Greenhouse gas emissions from traffic.

7.1 Traffic congestion and safety effects

Aspects of submissions that discussed the adequacy of existing and/or planned transport infrastructure, and my responses, are provided in Table 2.

Table 2: Commentary on submissions related to traffic effects

Submission point	Flow comment
Congestion effects on Halkett Road, Brampton Drive, Brinsworth Ave, Weedons Ross Road.	Based on the QTP modelling results showing increase in traffic flows between Scenario 1 and 2, there is little increase expected for Bramton Drive and Brinsworth Avenue. Refer to my discussion of the SH73/Halkett Road intersection in Sections 5.1 and 5.2.
Need to assess combined traffic effects of all plan changes in West Melton.	Refer to my discussion in Section 4.
Concerns about the majority of new subdivision traffic using Halkett Road / SH73 (due to access / SH73 being left in and left out only) and those needing to turn right into Halkett Road, where currently drivers have to stop in the middle of the SH73 to do so (there is no right turn bay).	Refer to my discussion in Sections 5.1 and 5.2.
Concerns of the lack of assessment of effects for the Halkett Road / SH73 intersection – no agreement with Waka Kotahi over potential upgrade requirements.	Refer to my discussion in Sections 5.1 and 5.2.

Concern about the extra volume of traffic, noise and air pollution and capacity issues.	I have discussed traffic effects in my report.
Traffic surveys were conducted in 2013 to determine likely traffic distributions for the site – this is outdated.	I consider that this is unlikely to fundamentally affect the ITA's assessment of conclusions, or the recommendations of my report.
Traffic effects on Rossington Drive and the desire to make this proposed throughfare only for pedestrians / cyclists use.	In my view the traffic effects on Rossington Drive are able to be accommodated by the existing layout of Rossington Drive. I consider that a roading connection, with a walking and cycling connection, is preferrable to a walking and cycling connection only, as this provides for greater network connectivity and resilience.

7.2 Walking and cycling

Aspects of submissions that discussed matters related to walking and cycling, and my responses, are provided in Table 3.

Table 3: Commentary on submissions related to walking and cycling

Submission point	Flow comment
Effects on pedestrians and cyclists on Halkett Road and SH73, including the intersection of these roads.	Refer to my discussion in Section 5.6.
Lack of parking pick up / drop offs by school area will worsen.	I consider that parking effects around schools should be managed by the School and/or the Road Controlling Authority.

7.3 Public transport

Aspects of submissions that discussed public transport services, and my responses, are provided in Table 4.

Table 4: Commentary on submissions related to public transport

Submission point	Flow comment
The plan change does not include public transport and/or should provide public transport.	In my view, the funding and implementation of a public transport system is a matter for West Melton as a whole, rather than a site specific matter relating to this plan change. I consider it would be difficult to require the developer of these sites to fund and implement a public transport system to service the site, nor is it likely that such services would be provided by a third party prior to any development occurring. I consider that the transport network within and adjacent to PPC74 allows for future public transport services to run through the site.
Existing public transport services are poor.	

7.4 Speed limits for existing roads

One submitter suggested to extend the 60km/hr zone on Halkett Road up to the crossing with Adams Road due to concerns with the current speed limit (80km/hr) when more traffic is added.

Several submitters identified concerns with existing speed limits being too high on SH73 (near the entrance / exits of the proposed subdivision.

I note that only the Road Controlling Authority can alter speed limits, and I expect the Council and/or Waka Kotahi will reduce speed limits on surrounding roads where warranted. I have recommended amendments to the ODP narrative to address the speed limit on Halkett Road. Refer to my discussion in Section 5.8.

8 SUMMARY AND CONCLUSION

I have reviewed the PPC74 application documents, responses to Council information requests, and submissions.

In terms of the immediate effects of PPC74, and the proposed ODP

- I consider that traffic modelling is required for the Halkett Road/SH73 intersection, to determine if mitigations for traffic efficiency effects are needed to support PPC74. Refer to my discussion in Section 5.1.
- I consider that further analysis of the Halkett Road/SH73 intersection is required, including a road safety audit. Should the primary access / SH73 intersection be formed as a left in/left out, PPC74 may create negative safety effects at the Halkett Road/SH73 intersection as this is likely to be the primary access point to the State Highway network for PPC74 vehicle trips travelling to the site from the east. Should improvements be required, I recommend that a District Plan rule is included to ensure these are delivered in conjunction with development within PPC74. Refer to my discussion in Section 5.2
- In my view, a roading connection to Rossington Drive that includes a shared footpath/cycleway is needed to address the otherwise limited transport network connectivity of the site. I recommend that the ODP narrative reflect this outcome and I suggest that a consent notice (or other such planning mechanism) is placed on 36 Rossington Drive identifying that it is required for a roading connection. Refer to my discussion in Section 5.3
- I recommend that the ODP narrative is amended to specify that cycle facilities are to be provided on Halkett Road, between Wylies Road and Rossington Drive. Refer to my discussion in Section 5.4
- I consider that at least an additional two road connections should be provided to the eastern PPC site boundary, to allow for extension should urbanisation occur. I recommend that the ODP narrative identify that Primary north-south road through the site shall include traffic calming to discourage through traffic between Halkett Road and SH73. Refer to my discussion in Section 5.5
- I recommend that the ODP should be amended to include a cycling and pedestrian route through the central reserve, and to allow future extensions of the cycling and pedestrian network to the east of the PPC site. Refer to my discussion in Section 5.6
- The Site has low accessibility to public transport, with one peak hour bus service on Halkett Road. I consider that additional bus stops along the Site frontage with Halkett Road are unlikely to be required, however I recommend that the applicant consult with Environment Canterbury on this matter. Refer to my discussion in Section 5.7
- I recommend that the ODP narrative identify that the applicant should consult with Council regarding relocation of the speed limit transition on Halkett Road. Refer to my discussion in Section 5.8
- I recommend that amendments are made to the ODP narrative. Refer to my discussion in Section 5.9.

PPC74 is outside the proposed infrastructure boundary identified in the CRPS Map A. Should PPC74 affect the quantum of residential growth within Selwyn District, without a corresponding increase in local employment and access to services, additional impact on the Greater Christchurch transport network can be expected as additional residents in Selwyn travel to access services and employment.

The transport effects of PPC74 at a subregional level, as an urban area outside the anticipated urban boundary, are likely to be minor and I note that West Melton/SH73 is less constrained that other key corridors in Selwyn (such as those around Rolleston, Lincoln and Prebbleton). However, the cumulative effect of large scale urban development outside the anticipated urban boundary (as proposed by multiple plan changes in the Selwyn District) could have a significant effect on the transport network, which may require additional and/or reprioritised funding from public agencies at the local, district or regional level to mitigate. Refer to my discussion in Section 6.

APPENDIX A QTP Future Year Transport Model Outputs report

Quality Transport Planning

Future Year Transport Model Outputs

Selwyn 2031 Update (Selwyn 2051)

October 2021

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Document Issue Record

Version No	Prepared By	Description	Date
V1	John Falconer	Draft – 2021 AM Peak Outputs Only	21 October 2021

Document Verification

Role	Name	Signature	Date
Preparation	John Falconer		21 October 2021
Reviewer			
Approval	John Falconer		21 October 2021

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Contents

Appendices

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1 Introduction

1.1 This report sets out the results of future year scenario transport modelling used to inform the Selwyn 2031 Update (Selwyn 2051).

1.2 The modelling utilises regional transport models (both CTM and CAST) that are jointly owned and operated by the Greater Christchurch Partnership (GCP). The GCP have agreed future year (2028, 2038 and 2048) base input assumptions relating to landuse and network supply agreed at the regional level, to enable a consistent planning approach. From these base scenarios, additional scenarios can be developed (e.g. redistributing where growth occurs and/or the overall scale of growth).

1.3 The purpose of the transport modelling in this application is to help understand both the current and potential future:

- transport patterns of Selwyn District based traffic, including trip origins, destinations and usage by the most common modes (light vehicles, heavy vehicles, bus and cycle), and how this relates to accessibility.
- performance of the Selwyn District transport network in terms of utilisation of road links by mode and the overall Level of Service (LoS) of road links and intersections.
- impact of Selwyn housing and employment on the Greater Christchurch network, including the proportion of traffic using key arterial roads and intersections.

1.4 Collectively, this information will inform the likely transport impacts of future landuse demand (additional population and employment) associated with the scale and location of particular growth areas and how this may vary across alternative scenarios.

1.5 The specific tasks performed by QTP are summarised below:

- Provide analysis of the current state of the transport network, across a range of transport modes (walking, cycling, car, and bus), including:
  a. Accessibility to land-use activities (e.g. employment, KACs, and schools);
  b. Peak time flows (vehicle trips and bus passengers) on road links;
  c. Trip patterns between key locations; and
  d. Identification of intersections and links that are at or near capacity (resulting in poor level of service);
- Assess the impact of current Selwyn housing and employment on the Greater Christchurch transport network; in particular the impact of peak time flows into and out of Selwyn's townships.
- The testing of alternate land-use scenarios, developed in conjunction with SDC.

1.6 The model outputs and outcomes associated with the first two bullets above are documented in the report titled '*Transport Model Outputs for Selwyn 2031 Update (Selwyn 2051) V1.PDF'*. This report documents the last bullet point; the testing of alternate land-use scenarios.

2 Transport Model Application

2.1 Modelling Overview

2.1.1 Greater Christchurch extends over three Territorial Local Authorities (TLAs); Christchurch City, Waimakariri District to the north, and Selwyn District to the south. While each TLA is governed separately, many decisions made by one TLA have an impact on the other two (and other stakeholders), especially in relation to transport.

2.1.2 As part of this, a joint committee known as the Greater Christchurch Partnership Committee (**GCPC**) has formally been established, with representatives from each Partner's organisations to lead and coordinate projects.

2.1.3 The GCPC have collectively prepared forecasts of population, households and employment and at the Territorial Local Authority (TLA) level (within the Greater Christchurch area). These forecasts are reasonably consistent with Statistics NZ (sub-national) population forecasts released in 2017[1]; when applying the Medium Growth projection within Christchurch City and the Medium-High projection to Waimakariri and Selwyn Districts.

2.1.4 In addition to the above 'default' forecasts (hereafter called Scenario 1), this report includes testing of an alternate land-use scenario (hereafter called Scenario 2), which includes an additional 10,000 households located in Selwyn townships by 2038. Population and Household totals for Christchurch City and Waimakariri District remain unchanged (i.e. Scenario 2 has a net gain of 10,000 households relative to Scenario 1 at 2038, all allocated to Selwyn District).

2.1.5 Specific locations (Meshblocks) where residential capacity has been added to Scenario 2 , as supplied by SDC, are included in **Appendix A**.

2.2 Software Capability

2.2.1 The CTM is a traditional regional four stage[2] transport model, covering the Greater Christchurch area and implemented in CUBE Voyager software. It was commissioned in 2005 and completed in 2009. The cost of the model was significant (in the order of $2m), with approximately half of this cost allocated to data collection. The CTM provides a meaningful response to the most critical factors that affect the transport system; travel demand (based on spatial population and landuse activity) and the available transport linkages (network provision) that facilitate movement between locations.

2.2.2 The CAST model, implemented in the SATURN software, uses travel demand estimated by the CTM and provides a much more detailed simulation of intersection operation and interaction, whilst still modelling the operation of the entire Greater Christchurch road network[3]. In this regard the modelling is extremely powerful as it simulates localised impacts whilst also capturing the effects on the wider road network. The detailed simulation modelling is achieved through use of the Cyclical Flow Profile which tracks

[1] Note the CTM and CAST models are currently being updated to 2018 Census data and new forecasts are imminent, however the 2017 forecasts still reasonably represent anticipated spatial growth patterns in the short to medium term.
[2] The four stages being trip generation, trip distribution, mode choice and traffic assignment.
[3] Some local roads such as cul-de-sacs and others without a significant through-traffic potential are not included.

the arrival and departure profiles of vehicles through the network through every 'step' (typically 1 second) of the adopted cycle time.

2.3 Model Limitations

2.3.1 When interpreting transport model outputs, it is important to note that the model attempts to represent complex human behaviour in a pragmatic manner such that it is possible to make reasonable and useful predictions of potential outcomes in the future.

2.3.2 While all such transport models are simplifications of reality, they provide a foundation for quantitative estimates of likely effects and potential benefits that can be helpful for decision-makers. In reality, there are many individual motivators for choosing to travel (or not) in the first place, let alone which mode or routes or modes are taken.

2.3.3 Any tool or model framework which 'aggregates' such individual choices will, inevitably, use generalised assumptions (such as aggregation to zones, 'household types', etc.). In many cases these assumptions may have a degree of error or simply be 'wrong' at an individual level. However, 'on the whole' such models seek to provide a reasonable approximation to the observed or anticipated behaviour of the target population at a particular point in time – and most pertinently for planning purposes, need to respond (sensibly) to key variables, including demographic changes and potential policy interventions or levers.

2.3.4 The transport models have been calibrated to reflect 2006 travel behaviour, with an inherent assumption that this will continue. While over the last few decades this has been proven (empirically) to be a valid assumption, the recent (2021) government policy statements on land transport and housing and urban development suggest (correctly) that significant intervention is needed in the near future to force travel behaviour change in order to address climate change, sustainability issues, urban design and to provide better long-term social outcomes.

2.3.5 The transport models will therefore continue to evolve to reflect latest policy and wider societal changes, with regularly updated planning horizons and modelling techniques based on the best information available at the time.

2.3.6 Indeed, it was the insights provided by transport models that have helped (in part) build the case for change are now seeing.

3 Future Year (2038) Network Model Outputs

3.1 Model Outputs

3.1.1 The full range of model output plots for the modelled 2038 year are included in Appendix B.

3.1.2 A selection of these are duplicated in this section where further discussion and interpretation is warranted. Due to space constraints, these have been reduced in size, however the reader may therefore refer to the full-size versions in the appendix for more detailed information.

3.1.3 Only the morning peak period has been reported because this period has the greatest impact within Selwyn District. The evening peak period generally has similar traffic patterns but in the inverse direction. However, trips travelling from Christchurch to Selwyn during the evening peak (i.e. peak flow direction) are highly constrained by the Christchurch City network, which regulates the rate at which trips cross the border from Christchurch to Selwyn. This limits effects relative to the morning peak.

3.1.4 In line with the project scope, the outputs have been grouped into four themes:

- ***Trip Patterns*** – to understand broadly where people (and goods) are travelling within Greater Christchurch.
- ***Traffic Flows*** – to understand the how traffic flows might change between 2021 and 2038 (for both Scenario 1 and Scenario 2) and also understand the differences at 2038 between Scenario 1 and Scenario 2.
- ***Network Performance*** – to identify how the traffic flows above relate to the available network capacity and the resulting Level of Service (LoS).

3.2 Trip Patterns

3.2.1 A summary of vehicle trips to and from Selwyn is provided below.

Figure 3-1: Morning Peak 2021 Vehicle Trip Summary

AM Peak 2038 Base – 2hr (0700-0900) Vehicle Trip Summaries by mode

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Light Vehicle	From Selwyn GC to	9,180	2,620	9,700	70	1,330	50	22,950
	To Selwyn GC from	9,180	330	5,090	280	70	50	15,000
	From Selwyn Ext to	1,280	200	1,100	60	40	70	2,750
	To Selwyn Ext from	1,330	260	1,120	50	40	50	2,850
	TOTAL Trips	18,360	2,950	14,790	350	1,400	100	37,950

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Heavy Vehicle	From Selwyn GC to	120	10	360	30	30	30	580
	To Selwyn GC from	120	10	310	30	30	10	510
	From Selwyn Ext to	30	80	270	30	-	30	440
	To Selwyn Ext from	30	80	280	30	-	10	430
	TOTAL Trips	240	20	670	60	60	40	1,090

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
TOTAL	From Selwyn GC to	9,300	2,630	10,060	100	1,360	80	23,530
	To Selwyn GC from	9,300	340	5,400	310	100	60	15,510
	From Selwyn Ext to	1,310	280	1,370	90	40	100	3,190
	To Selwyn Ext from	1,360	340	1,400	80	40	60	3,280
	TOTAL Trips	18,600	2,970	15,460	410	1,460	140	39,040

3.2.2 This figure shows that during the morning peak period:

- Vehicle trip patterns are indicated to remain similar to 2021, but with increased magnitude (from 29,400 tips per day in 2021 to 39,000 in 2038, i.e. +32%).
- Heavy vehicle trips are a very small proportion (3%) of total Selwyn based traffic. This proportion remains similar to 2021.
- There is still high transport demand between Selwyn District and Christchurch in 2038 (with approximately 50% of Selwyn trips having an origin or destination in Christchurch, as was also the case in 2021), with more than 90% of trips indicated to be by private vehicle (despite assumed improved PT services in future years).

3.3 Traffic Flows

3.3.1 The following plots indicate the implication of the trip patterns in relation to the available roads that make up the transport network how these are used.

3.3.2 General traffic flow patterns for 2038 appear to be broadly similar to 2021, but are about 25% (on average) higher as indicated below shown below:

Figure 3-2: Morning Peak 2021 Traffic Flow

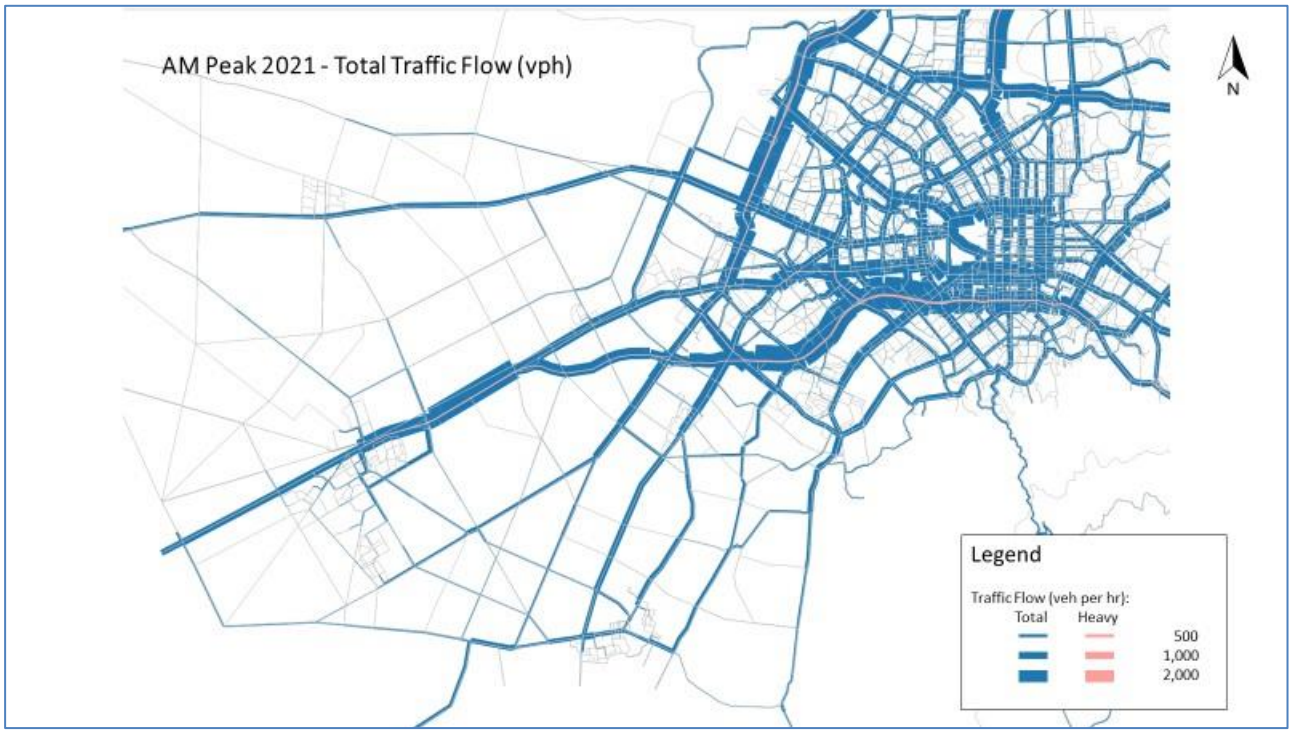
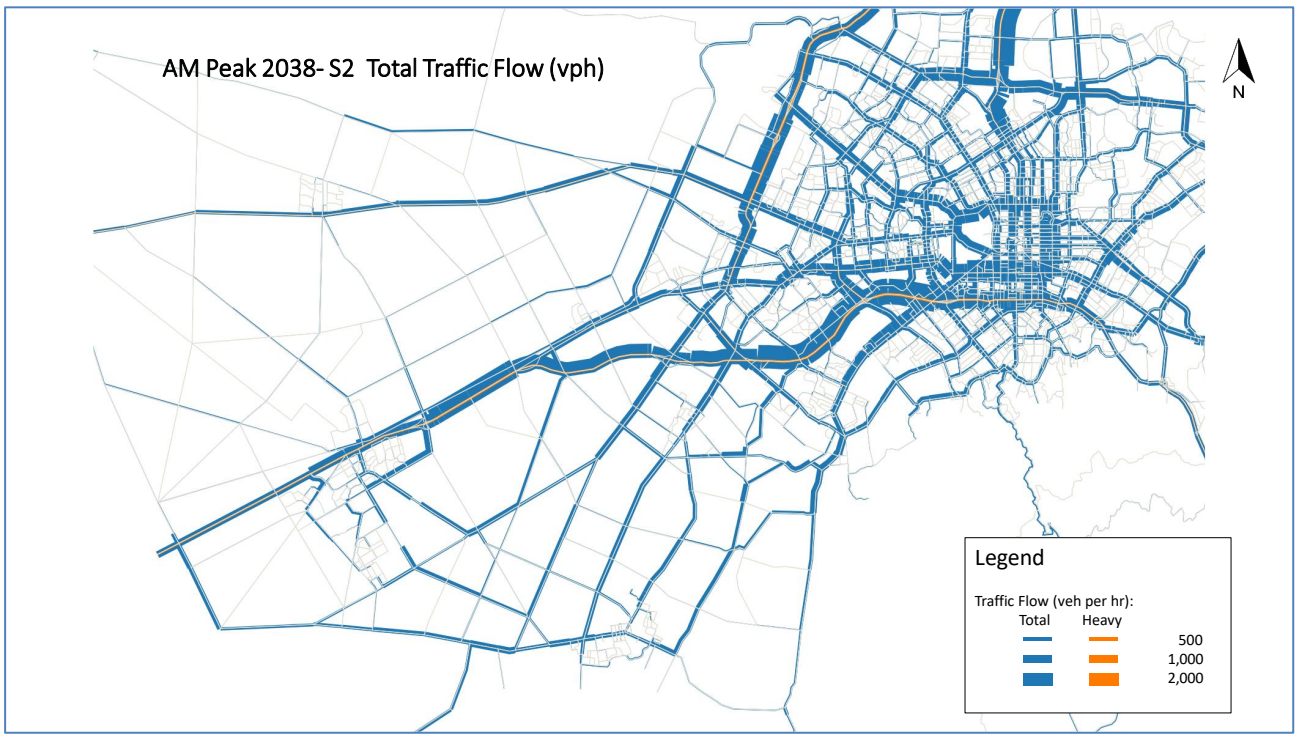


Figure 3-3: Morning Peak 2038 Traffic Flow



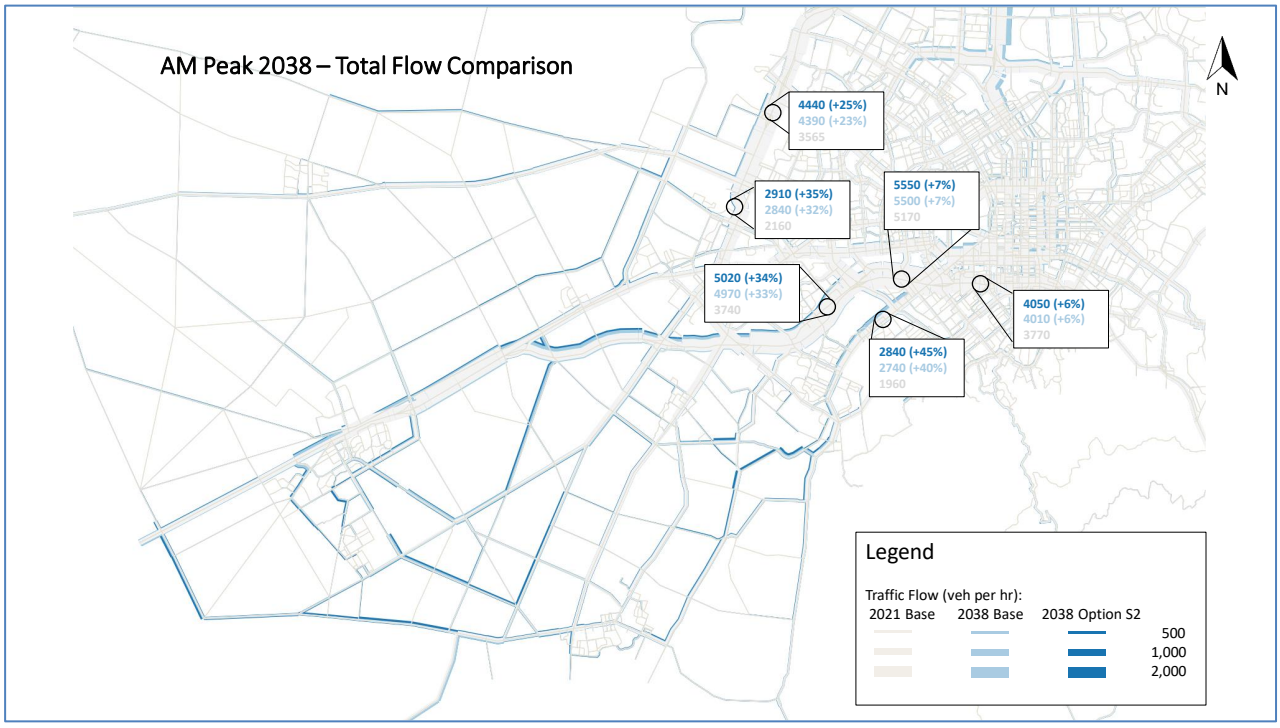
3.3.3 This increase in overall traffic flow is indicated to be almost directly proportional to the population increase as shown in Table 3-1 below.

Table 3-1: Estimated increase in population and vehicle trips 2021 to 2038 (Scenario 2)

Greater Christchurch	Forecast Year		Change	
	2021	2038	abs	%
Population	495,027	617,262	+122,235	25%
Vehicle Trips	172,626	218,127	+45,501	26%

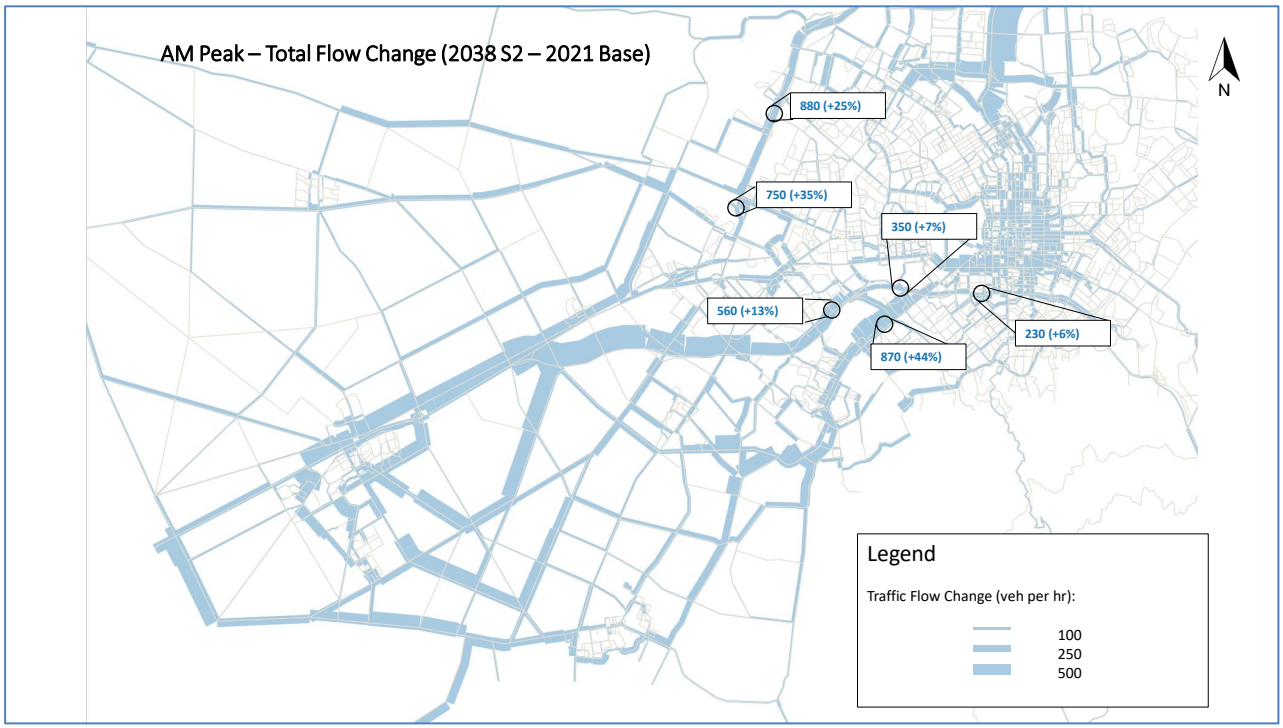
3.3.4 Figure 3-4 below shows just the Selwyn based component of traffic (with incremental changes for both Scenario 1 and 2 between 2021 and 2038).

Figure 3-4: Morning Peak 2038 Selwyn Based Traffic Flow – Incremental Changes



3.3.5 Figures on the following page show the change in 2038 (Scenario 2) relative to 2021 (Figure 3-5 and the change between Scenario 1 and 2 (Figure 3-7). This is the same information presented in Figure 3-4, but with an exaggerated bandwidth scale to better distinguish changes on individual roads.

Figure 3-5: Morning Peak Base Traffic Change (2021 to 2038 Scenario 2)



3.3.6 The above figures indicate that traffic travelling between Selwyn and Christchurch City will distribute itself over all available corridors across the boundary; SH74 West Coast Road, SH1Main South Road, CSM2, Shands Road, Springs Road, Whincops Road and SH75 Halswell Road.

3.3.7 It is apparent that traffic interactions and network constraints within Christchurch City, combined with ongoing development of south-west Christchurch, have a significant impact on how Selwyn traffic distributes to use the most viable routes.

3.3.8 For example, there is only very limited traffic growth on Springs and Sands Roads due to downstream constraints across the border in Christchurch reducing the attractiveness of these routes relative to alternatives. Such alternatives include Ellesmere Road connecting into Halswell Road. While Halswell Road is also indicated to be congested in the future, traffic growth distributes in varying extents to all available routes according to Waldrop's first and second principles[4].

3.3.9 These principles (which also underpin the traffic modelling) state that as networks become increasingly congested, trips spread themselves over multiple routes such that an equilibrium is reached where journey times by all available routes are similar. This also results in all routes being simultaneously degraded to some extent as a consequence of the increased traffic.

3.3.10 As a result of this equilibrium, some interesting route choices can materialise. A good

[4] https://en.wikipedia.org/wiki/John_Glen_Wardrop

example of that is the obvious increase in traffic on Waterholes Road. While overall total traffic flows on Waterholes Road remain relatively low compared to other roads, this route becomes increasingly attractive from south Rolleston to Christchurch, enabled by the roundabout at SH1/Dawsons, where eastbound (peak flow direction) traffic on SH1 have to give way to all traffic using the Waterholes Road route (where the latter turns right at the roundabout towards Christchurch but only having to give way to lesser westbound traffic flow).

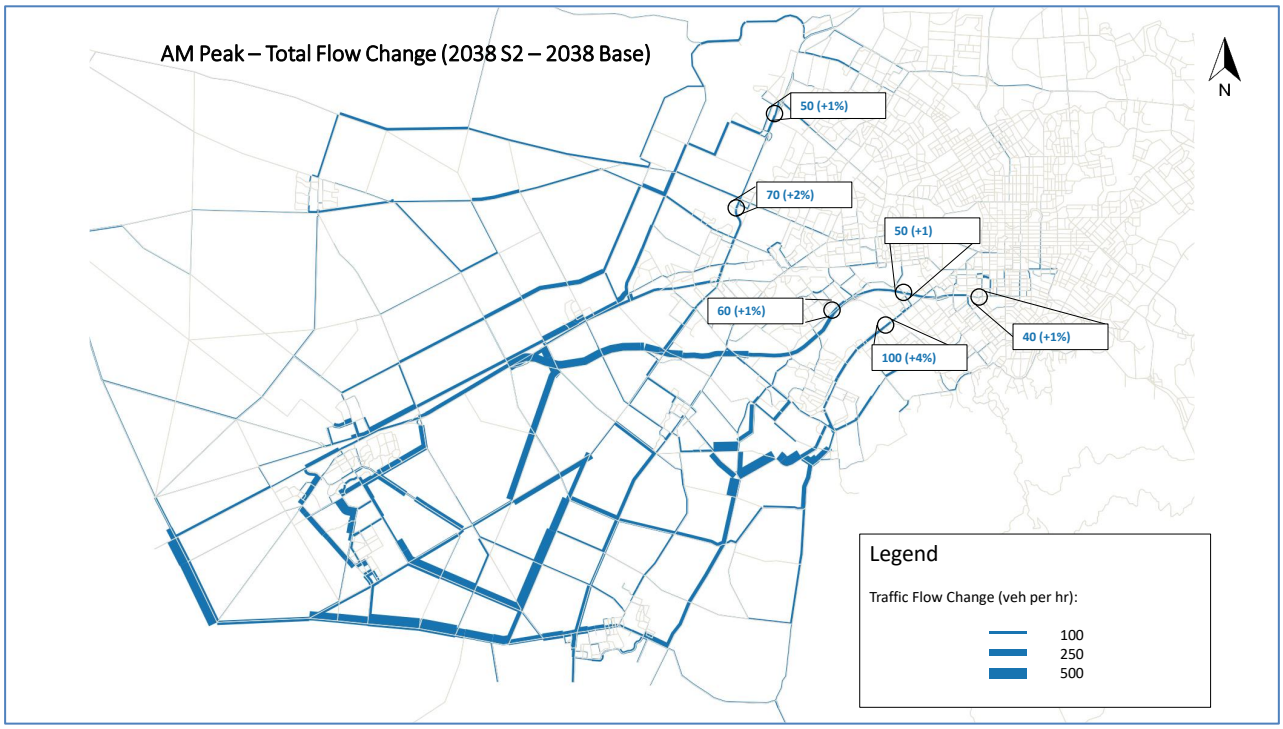
3.3.11 An additional factor (also included in the CAST model) is that trip demand is elastic. That is that demand for travel will change in response to cost[5]. Therefore, trip retiming (peak spreading), changing mode, or deciding not to make a trip, increasingly occur as congestion increases, which provides a dampening effect to increasing travel demand.

3.3.12 This effect, combined with the equilibrium theory described earlier, has resulted in a negligible increase in Brougham Street traffic in the future. This appears to be sensible, given that Brougham Street has already reached capacity during peak periods, resulting in long queues extending up the southern motorway during the morning peak, as recorded in the picture below (picture taken 2km west of Barrington Street during the morning peak in October 2021).

Figure 3-6 – Existing morning peak queuing on southern motorway 2km west of Barrington Street.

[5] This works both ways, where reducing travel delays and 'easing congestion' is likely to simply increase travel demand, and therefore congestion will still exist. This is known as 'induced traffic' and is why no city has ever been able to 'build its way out of congestion' (at least without resorting to some form of road pricing).

Figure 3-7: Morning Peak Base Traffic Change (2021 to 2038 Scenario 2)



3.3.13 The changes in traffic flows between Scenario 1 and Scenario 2 (at 2038) follow a similar pattern to the changes between 2021 and 2038. This is not surprising, given all the added capacity for Scenario 2 was added to the townships (primarily West Melton, Rolleston, Prebbleton and Lincoln), so it tends to simply reinforce existing growth areas which in turn reinforces existing travel patterns[6].

[6] Although theoretically an increasing level of self-sufficiency and opportunities for active modes should also result thereby offsetting some of the indicated traffic growth.

3.4 Network Performance

3.4.1 The following plots identify how traffic flows relate to the available network capacity and the resulting Level of Service (LoS).

3.4.2 Figure 3-8 provides a summary of average intersection delay, for each intersection as a whole, and for the worst movement (almost always a right turn). Link volume to capacity ratio (reflecting how much of the available capacity is being used) is also displayed.

3.4.3 Intersections normally have less overall capacity than adjacent road links. Therefore, intersections are often the limiting factor in terms of network capacity.

Figure 3-8: Morning Peak 2038 Network Performance (Scenario 1)

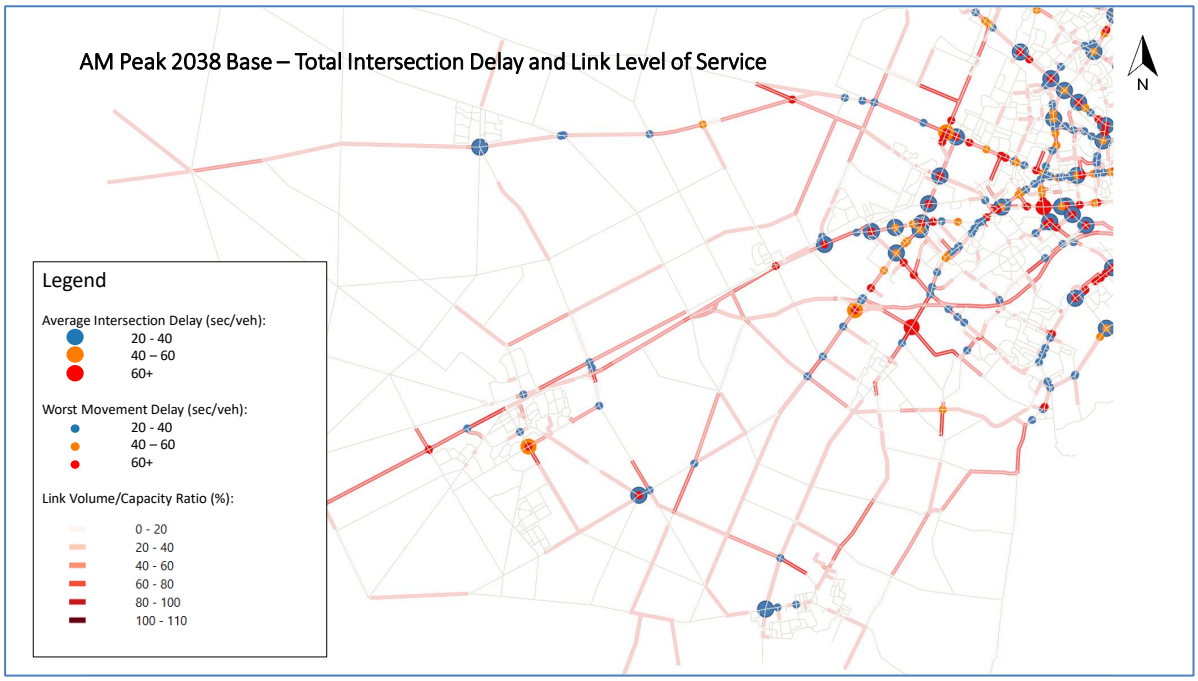
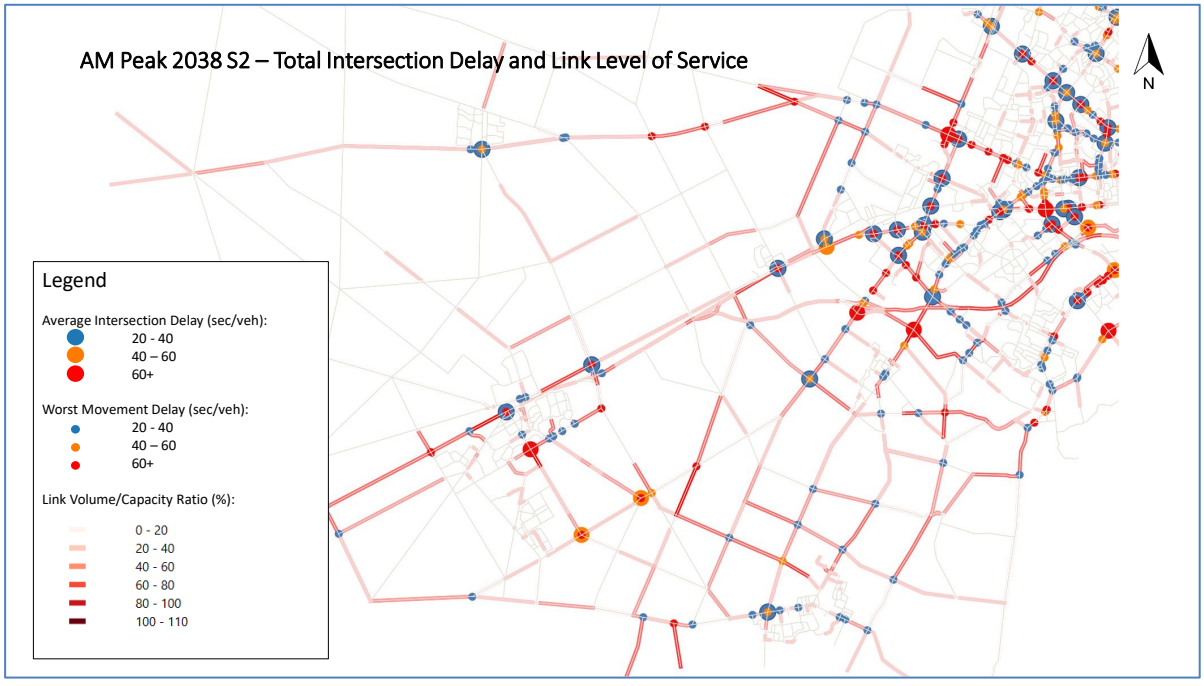


Figure 3-9: Morning Peak 2038 Network Performance (Scenario 2)



3.4.4 There appear to be a few deficiencies and bottlenecks within the Selwyn District portion of greater Christchurch in 2038 Scenario 1. A few potential issues (but note that these are not necessarily unacceptable and may in fact be required to achieve other desired outcomes) that stand out include:

- Tennyson/Lowes/Springston-Rolleston traffic signals.
- Springs Road/Marshs Road roundabout.
- Potential for congestion (due to high V/C) on some sections of SH1, Shands Rd and Springs Road.

3.4.5 It is noted that some deficiencies that occurred in 2021 no longer apply in 2038 due to various infrastructure improvements, especially those associated with the SH1 Rolleston improvements.

3.4.6 Relative to Scenario 1, additional deficiencies are apparent in Scenario 2. These are effectively all related to the increased population and include:

- Additional pressure on Tennyson/Lowes/Springston-Rolleston traffic signals.
- Additional pressure on Springs Road/Marshs Road roundabout.
- Lincoln Rolleston and Selwyn Road priority intersection.
- Springston Rolleston Road/Selwyn Road priority intersection.
- Ellesmere Jct/Gerald/Springs (Lincoln) traffic signals.
- Shands/Marshs traffic signals.
- Toswill/Trices priority intersection.

3.4.7 These ‘deficiencies’ do not necessarily need to be addressed or mitigated however, for the reasons stated in paragraphs 3.3.11 and 3.3.12 (the exception to this would be if there is an obvious safety risk or conflicts with other modes).

3.4.8 These types of deficiencies are also likely to occur at certain points in the network regardless of specific locations where residential growth is added.

3.4.9 From a transport planning point of view, the best strategy for accommodating growth (in the current environment) is therefore to consolidate as much as possible (with increased densities) to improve overall access to Public Transport and enable active modes (which require relatively short distances). This approach may make private vehicle travel less attractive than is currently is, although it will still be reasonably attractive relative to other modes, resulting in a better balance between modes, which in turn leads to more choice.

APPENDIX A – Scenario 2 Inputs

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Input Targets - Selwyn Scenario 1

TLA[1]	Input Total	2006	2013	2018	2028	2038	2048
Selwyn	ERPopulation	21,971	31,530	41,026	55,089	62,780	73,484
	Households	7,691	9,943	14,147	19,675	23,252	28,263
	Adults (15+)	16,963	24,536	32,795	43,777	50,950	60,495
	Workers	12,500	17,553	22,943	31,111	35,386	41,365
	Students	5,265	7,614	9,767	12,546	13,735	15,623
	Non-Students	15,124	21,299	28,855	38,895	45,265	53,743

[1]Note these refer to only the parts of the districts within the CTM/CAST model (UDS/LURP) area.

Input Targets - Selwyn Scenario 2

TLA[1]	Input Total	2006	2013	2018	2028	2038	2048
Selwyn	ERPopulation	21,971	31,530	41,026	71,981	89,912	99,612
	Households	7,691	9,943	14,147	25,708	33,301	38,312
	Adults (15+)	16,963	24,536	32,795	57,200	72,969	82,004
	Workers	12,500	17,553	22,943	40,650	50,680	56,073
	Students	5,265	7,614	9,767	16,392	19,671	21,178
	Non-Students	15,124	21,299	28,855	50,821	64,828	72,852

[1]Note these refer to only the parts of the districts within the CTM/CAST model (UDS/LURP) area.

Added Household Capacity for Scenaro 2

PC	Township	MB	2028	2038	Total
64	Rolleston F SE	4010047	353	236	589
		2719417	249	159	408
67	West Melton S	4011164	39	26	65
		4011163	40	26	66
68	Prebbleton W Hamptons	4011165	492	328	820
69	Lincoln	2720800	600	400	1000
		4010021	600	400	1000
70	Rolleston F FW	2719416	480	320	800
71	Rolleston Flight Contours	4008019	396	264	660
72	Prebbleton Trices	2500100	177	118	295
73	Rolleston L3	2719004	600	400	1000
		2719005	660	440	1100
74	West Melton E	4000454	78	52	130
75	Rolleston E	4008019	168	112	280
76	Rolleston E Maddisons	2719416	93	62	155
77	West Melton W	4000456	150	100	250
		4000452	165	110	275
78	Rolleston SE	4008019	453	303	756
79	Prebbleton	2500200	120	80	200
		2500400	120	80	200
			6033	4016	10049

APPENDIX B – 2038 AM Plots

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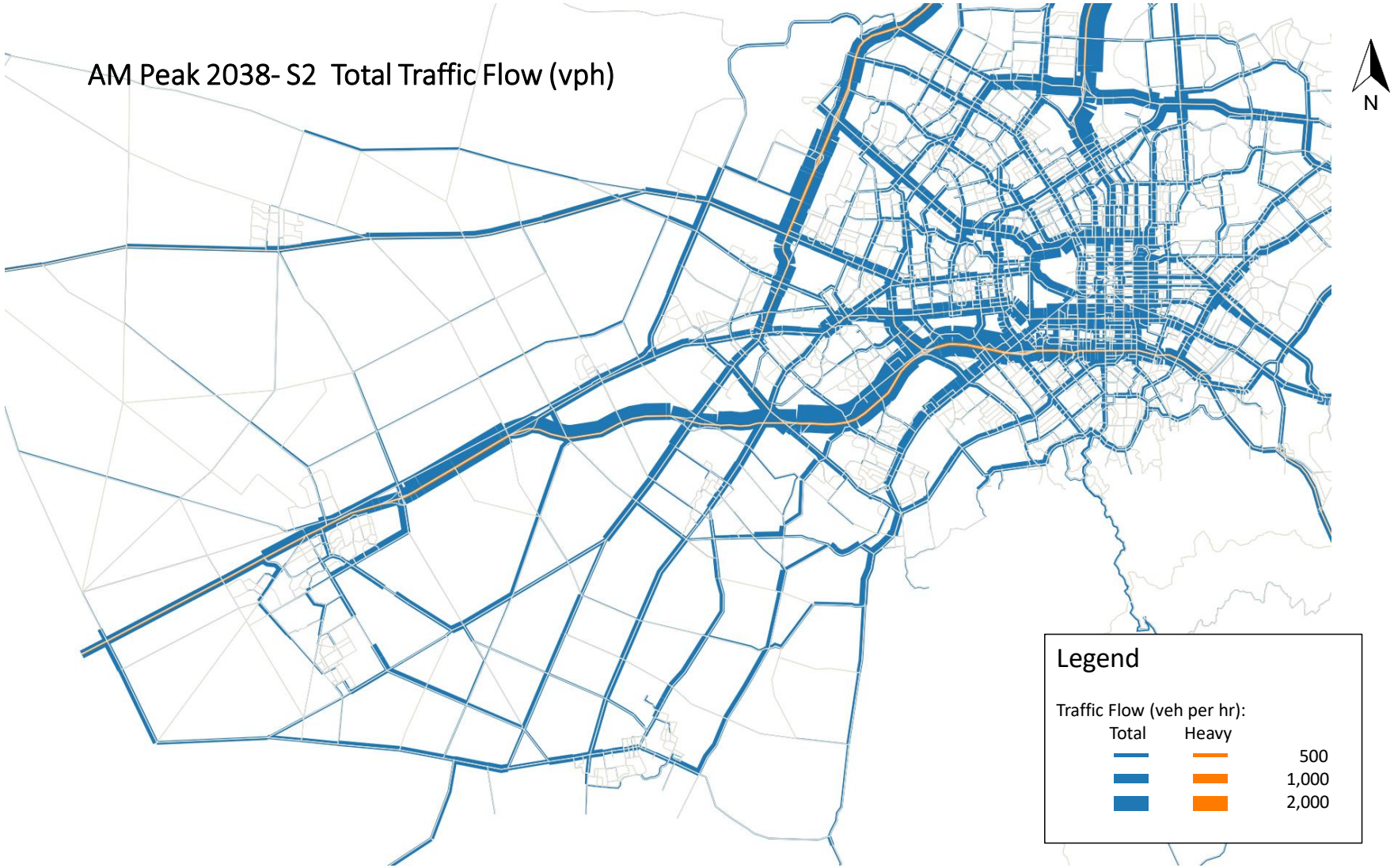
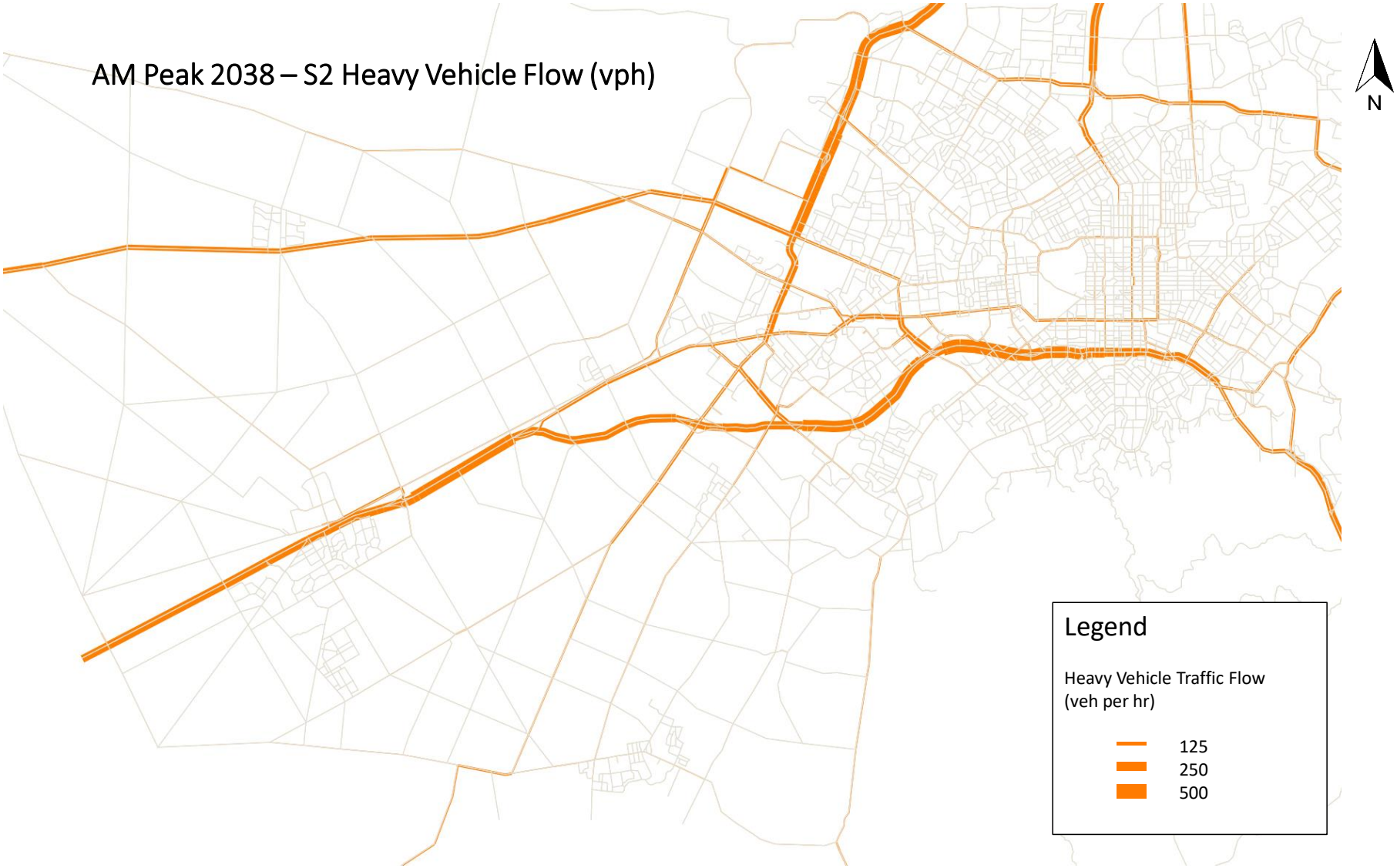
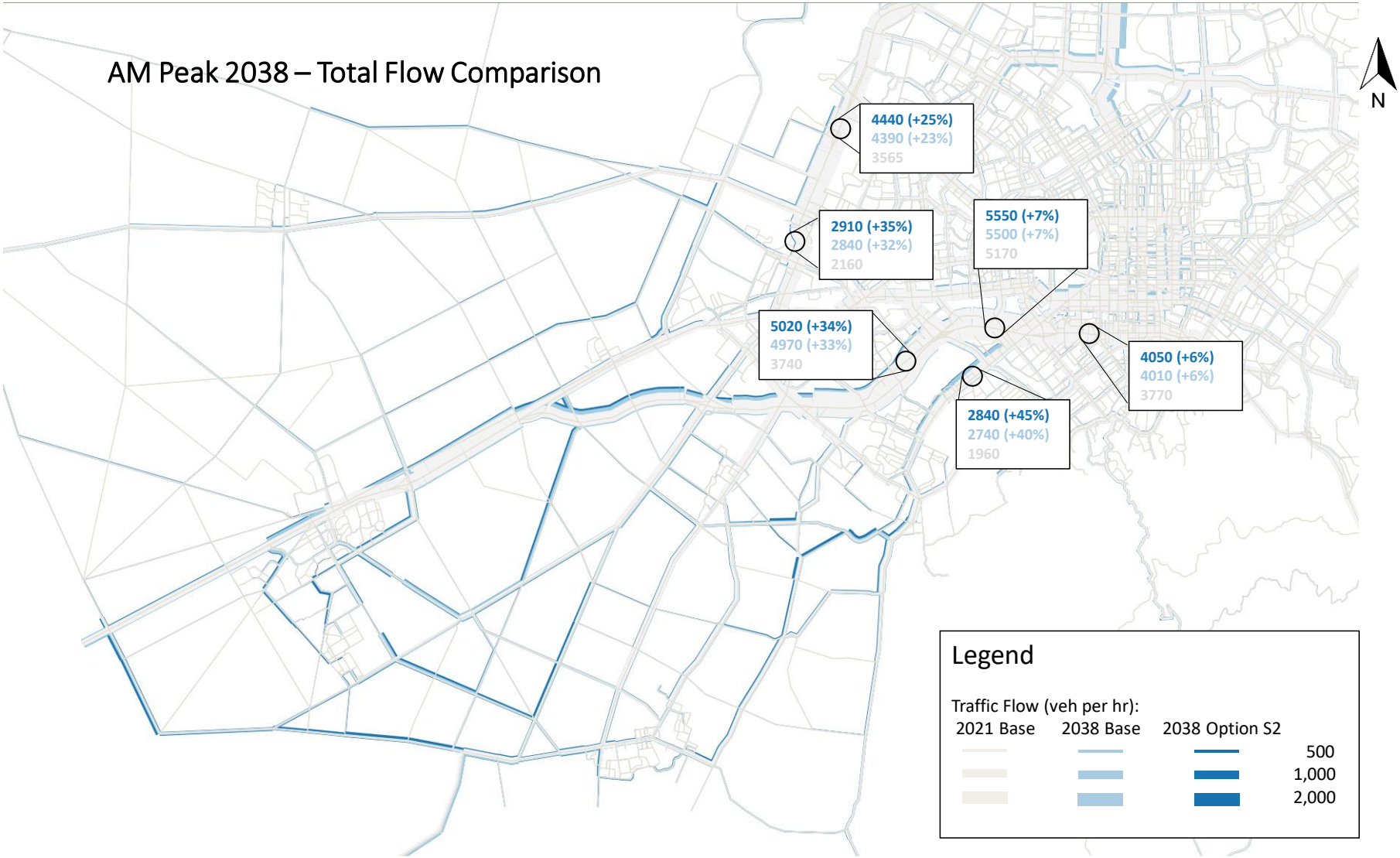
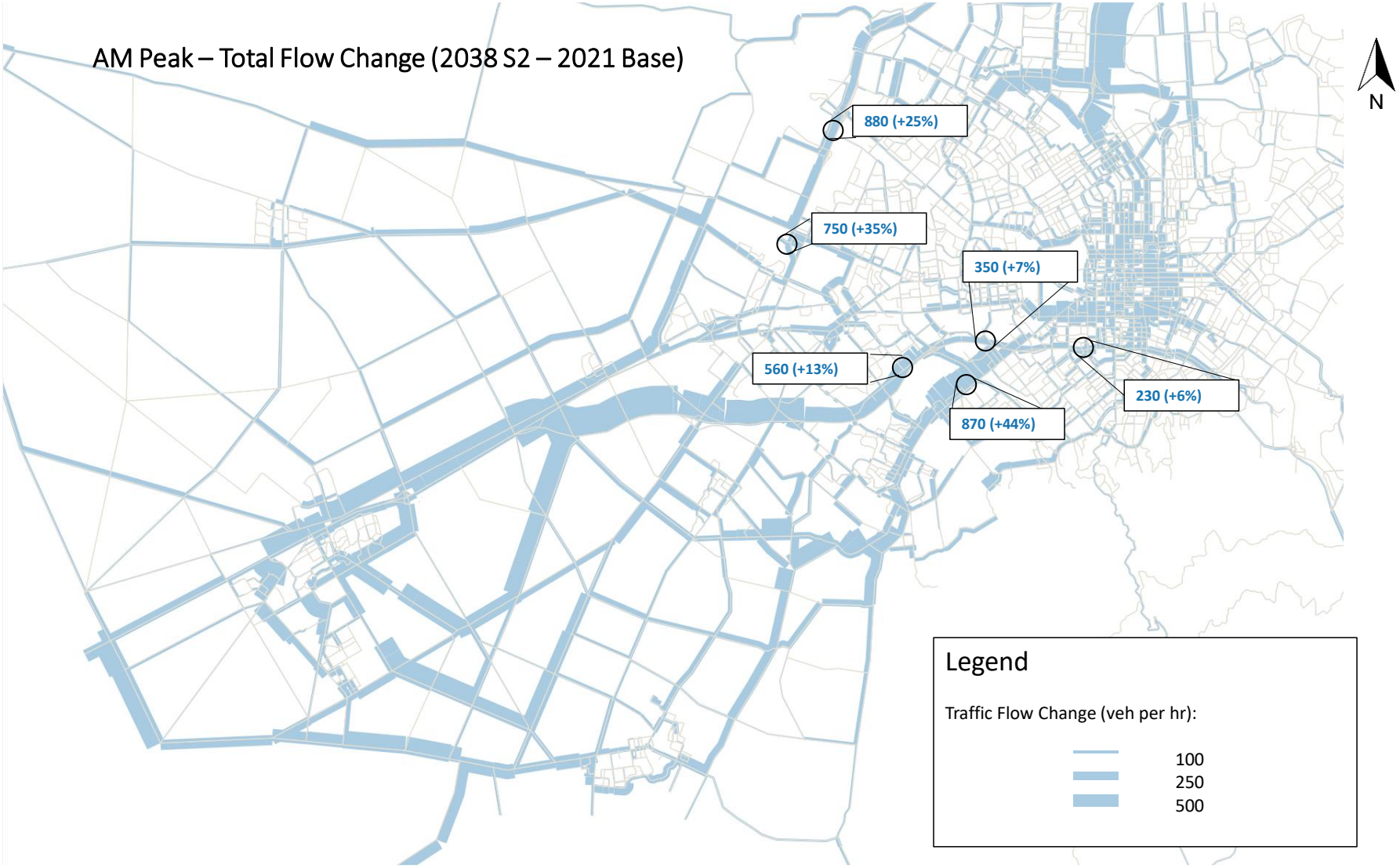
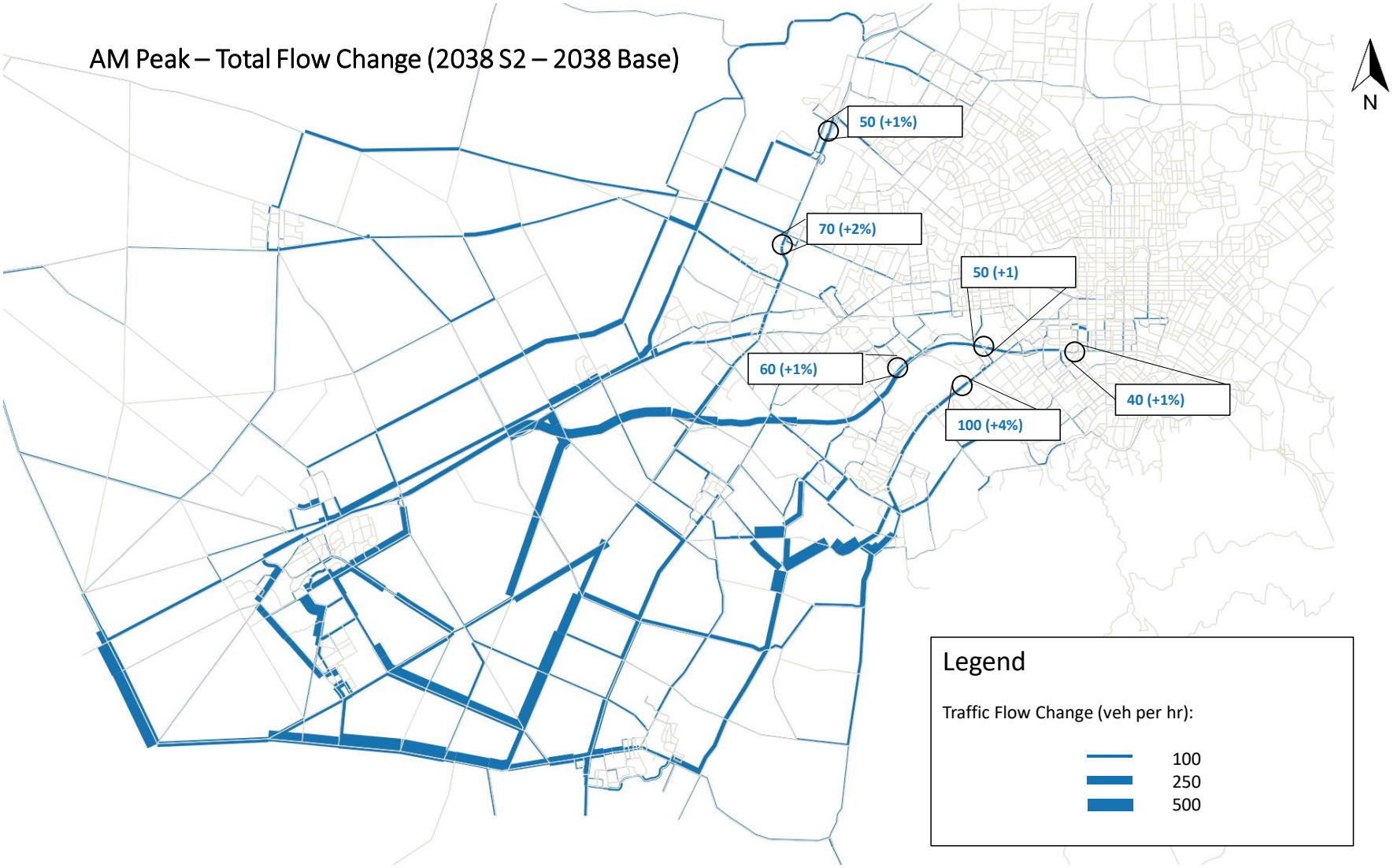

AM Peak 2038- S2 Total Traffic Flow (vph)
N
Legend
Traffic Flow (veh per hr):
Total
Heavy
500
1,000
2,000

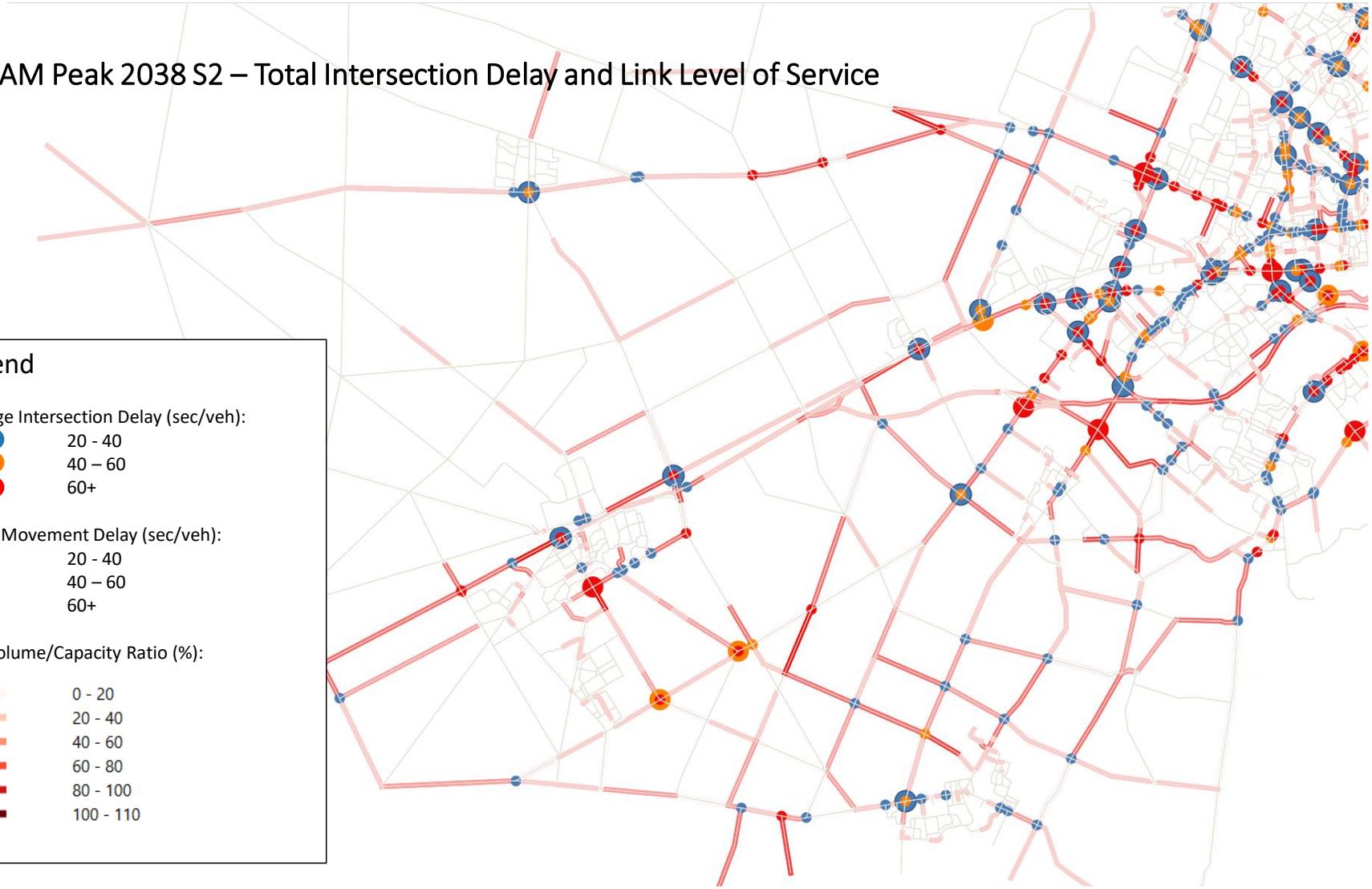

AM Peak 2038 – S2 Heavy Vehicle Flow (vph)
N
Legend
Heavy Vehicle Traffic Flow
(veh per hr)
125
250
500


AM Peak 2038 – Total Flow Comparison
N
4440 (+25%)
4390 (+23%)
3565
2910 (+35%)
2840 (+32%)
2160
5550 (+7%)
5500 (+7%)
5170
5020 (+34%)
4970 (+33%)
3740
4050 (+6%)
4010 (+6%)
3770
2840 (+45%)
2740 (+40%)
1960
Legend
Traffic Flow (veh per hr):
2021 Base
2038 Base
2038 Option S2
500
1,000
2,000

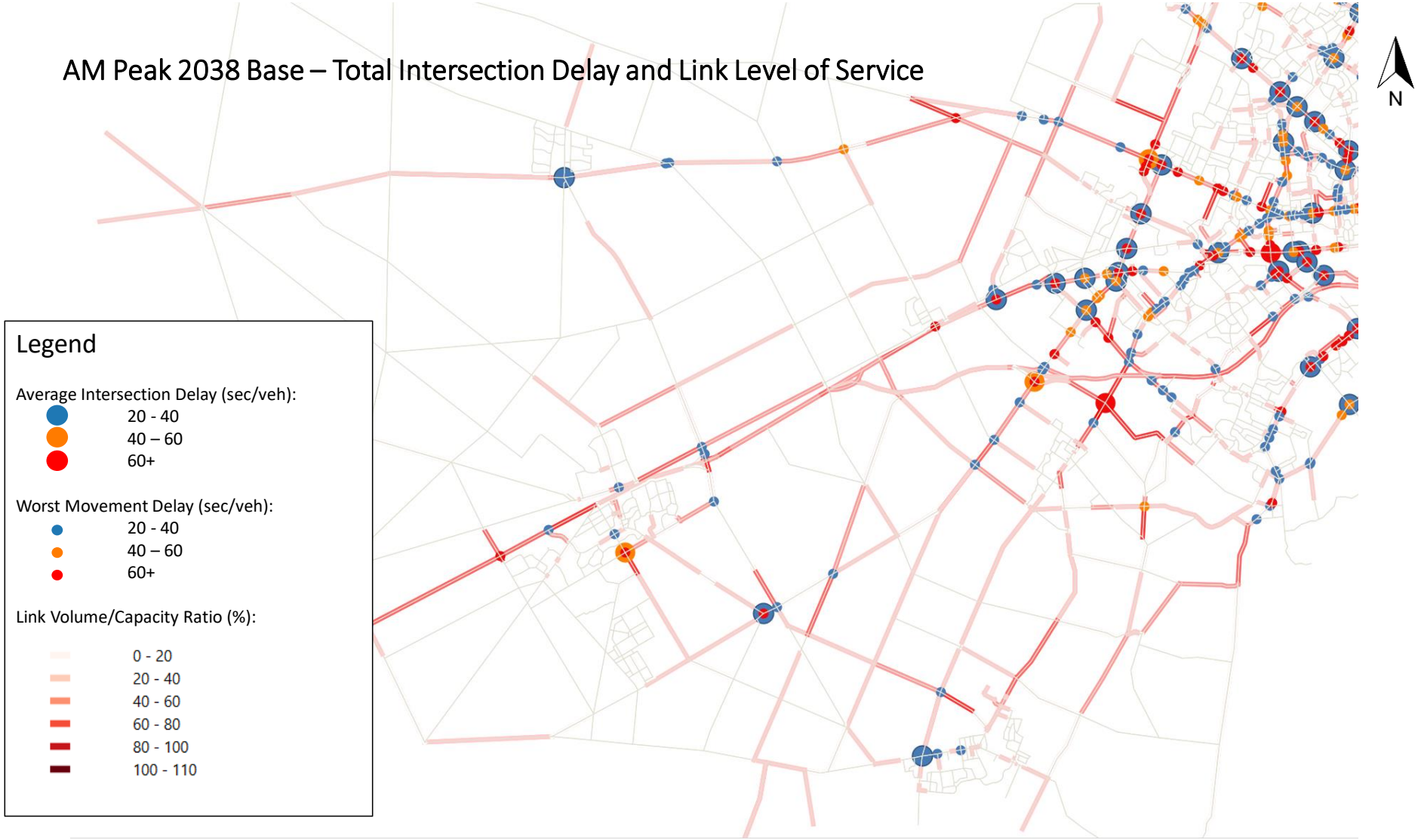



AM Peak – Total Flow Change (2038 S2 – 2038 Base)
N
50 (+1%)
70 (+2%)
50 (+1)
60 (+1%)
40 (+1%)
100 (+4%)
Legend
Traffic Flow Change (veh per hr):
100
250
500

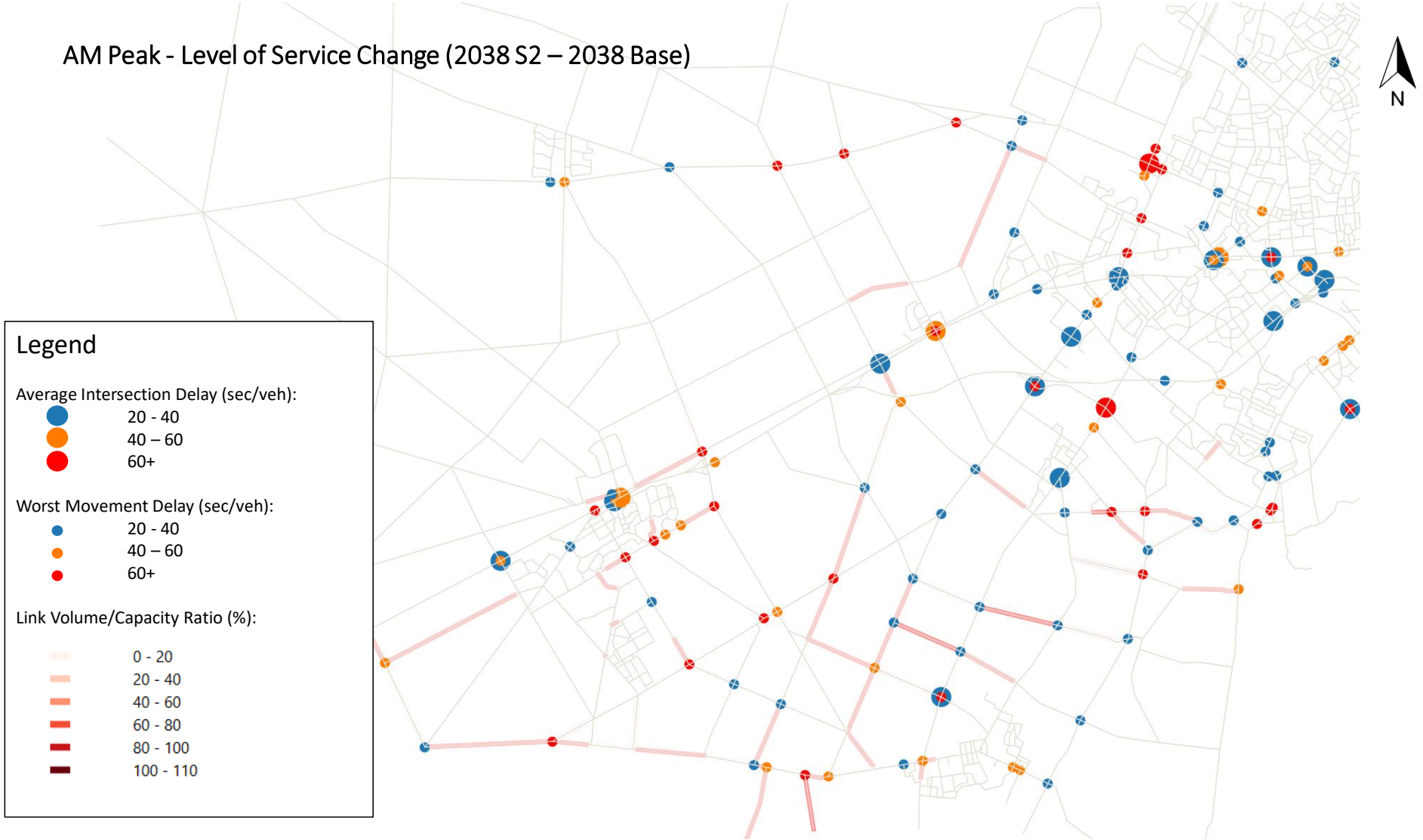
AM Peak 2038 S2 – Total Intersection Delay and Link Level of Service



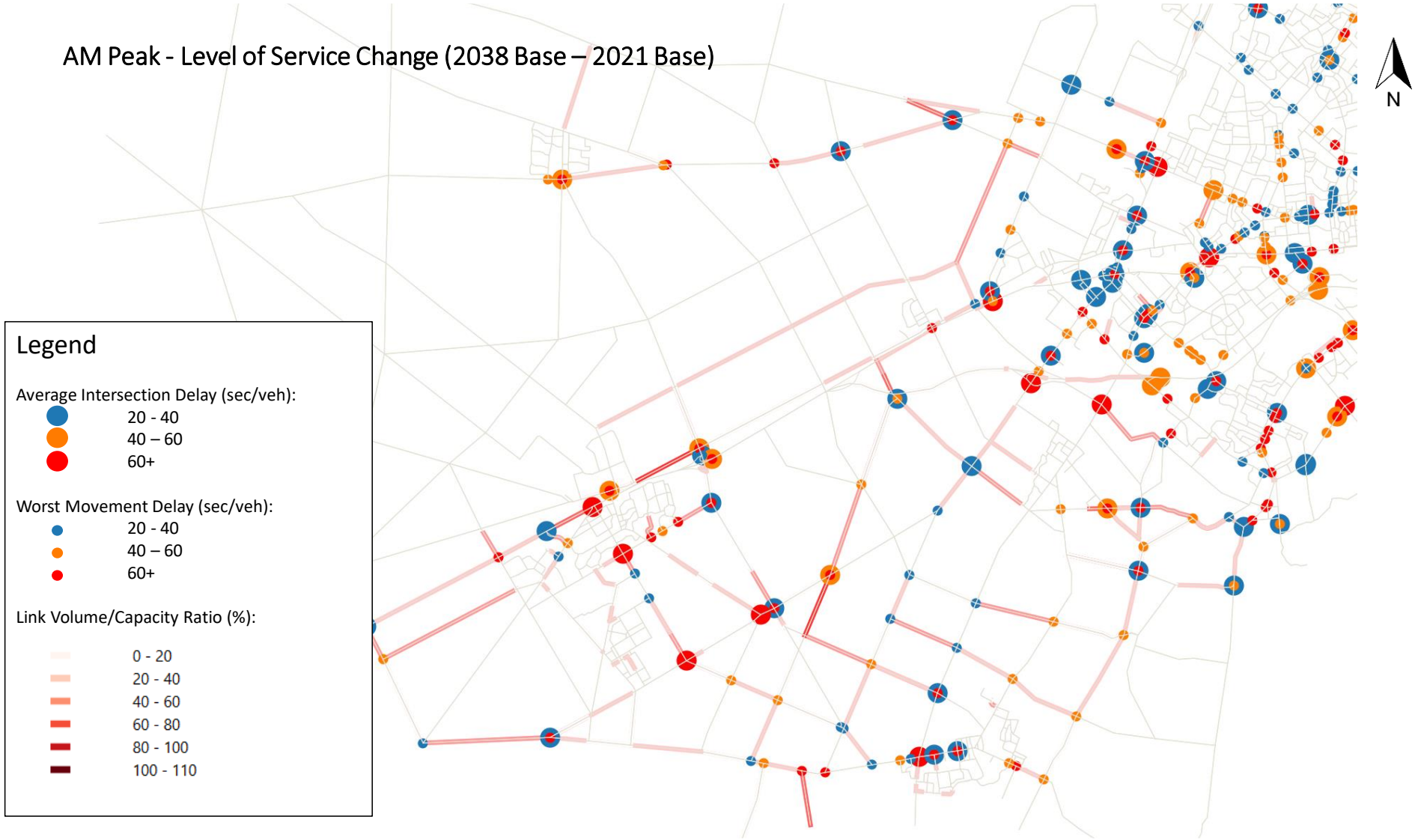
AM Peak 2038 Base – Total Intersection Delay and Link Level of Service



AM Peak - Level of Service Change (2038 S2 – 2038 Base)



AM Peak - Level of Service Change (2038 Base – 2021 Base)



AM Peak 2038 S2 – 2hr (0700-0900) Person Trip Summaries by mode

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Light Vehicle	From Selwyn GC to	22,240	4,650	18,580	100	2,340	120	48,030
	To Selwyn GC from	22,240	520	6,950	230	90	60	30,090
	From Selwyn Ext to	2,260	200	1,190	50	60	90	3,850
	To Selwyn Ext from	2,340	260	1,220	40	60	60	3,980
	TOTAL Trips	44,480	5,170	25,530	330	2,430	180	78,120

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
PublicTransport	From Selwyn GC to	30	450	270	10	-	-	760
	To Selwyn GC from	30	10	70	-	-	-	110
	From Selwyn Ext to	-	-	-	-	-	-	-
	To Selwyn Ext from	-	-	-	-	-	-	-
	TOTAL Trips	60	460	340	10	-	-	870

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Cycle	From Selwyn GC to	910	60	220	-	-	-	1,190
	To Selwyn GC from	910	-	40	-	-	-	950
	From Selwyn Ext to	-	-	-	-	-	-	-
	To Selwyn Ext from	-	-	-	-	-	-	-
	TOTAL Trips	1,820	60	260	-	-	-	2,140

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
TOTAL	From Selwyn GC to	23,180	5,160	19,070	110	2,340	120	49,980
	To Selwyn GC from	23,180	530	7,060	230	90	60	31,150
	From Selwyn Ext to	2,260	200	1,190	50	60	90	3,850
	To Selwyn Ext from	2,340	260	1,220	40	60	60	3,980
	TOTAL Trips	46,360	5,690	26,130	340	2,430	180	81,130

AM Peak 2038 S2 – 2hr (0700-0900) Person Trip Summaries by mode (%)

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Light Vehicle	From Selwyn GC to	46%	10%	39%	0%	5%	0%	100%
	To Selwyn GC from	74%	2%	23%	1%	0%	0%	100%
	From Selwyn Ext to	59%	5%	31%	1%	2%	2%	100%
	To Selwyn Ext from	59%	7%	31%	1%	2%	2%	100%
	TOTAL Trips	57%	7%	33%	0%	3%	0%	100%

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
PublicTransport	From Selwyn GC to	4%	59%	36%	1%	0%	0%	100%
	To Selwyn GC from	27%	9%	64%	0%	0%	0%	100%
	From Selwyn Ext to							
	To Selwyn Ext from							
	TOTAL Trips	7%	53%	39%	1%	0%	0%	100%

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Cycle	From Selwyn GC to	76%	5%	18%	0%	0%	0%	100%
	To Selwyn GC from	96%	0%	4%	0%	0%	0%	100%
	From Selwyn Ext to							
	To Selwyn Ext from							
	TOTAL Trips	85%	3%	12%	0%	0%	0%	100%

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
TOTAL	From Selwyn GC to	46%	10%	38%	0%	5%	0%	100%
	To Selwyn GC from	74%	2%	23%	1%	0%	0%	100%
	From Selwyn Ext to	59%	5%	31%	1%	2%	2%	100%
	To Selwyn Ext from	59%	7%	31%	1%	2%	2%	100%
	TOTAL Trips	57%	7%	32%	0%	3%	0%	100%

AM Peak 2038 S2 – 2hr (0700-0900) Vehicle Trip Summaries by mode

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Light Vehicle	From Selwyn GC to	12,770	3,840	13,440	80	1,670	80	31,880
	To Selwyn GC from	12,770	370	4,820	200	70	50	18,280
	From Selwyn Ext to	1,610	140	850	40	40	70	2,750
	To Selwyn Ext from	1,670	180	870	30	40	50	2,840
	TOTAL Trips	25,540	4,210	18,260	280	1,740	130	50,160

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Heavy Vehicle	From Selwyn GC to	140	20	380	30	30	30	630
	To Selwyn GC from	140	10	330	40	30	10	560
	From Selwyn Ext to	30	80	270	30	-	30	440
	To Selwyn Ext from	30	80	280	30	-	10	430
	TOTAL Trips	280	30	710	70	60	40	1,190

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
TOTAL	From Selwyn GC to	12,910	3,860	13,820	110	1,700	110	32,510
	To Selwyn GC from	12,910	380	5,150	240	100	60	18,840
	From Selwyn Ext to	1,640	220	1,120	70	40	100	3,190
	To Selwyn Ext from	1,700	260	1,150	60	40	60	3,270
	TOTAL Trips	25,820	4,240	18,970	350	1,800	170	51,350

AM Peak 2038 S2 – 2hr (0700-0900) Vehicle Trip Summaries by mode (%)

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Light Vehicle	From Selwyn GC to	40%	12%	42%	0%	5%	0%	100%
	To Selwyn GC from	70%	2%	26%	1%	0%	0%	100%
	From Selwyn Ext to	59%	5%	31%	1%	1%	3%	100%
	To Selwyn Ext from	59%	6%	31%	1%	1%	2%	100%
	TOTAL Trips	51%	8%	36%	1%	3%	0%	100%

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Heavy Vehicle	From Selwyn GC to	22%	3%	60%	5%	5%	5%	100%
	To Selwyn GC from	25%	2%	59%	7%	5%	2%	100%
	From Selwyn Ext to	7%	18%	61%	7%	0%	7%	100%
	To Selwyn Ext from	7%	19%	65%	7%	0%	2%	100%
	TOTAL Trips	24%	3%	60%	6%	5%	3%	100%

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
TOTAL	From Selwyn GC to	40%	12%	43%	0%	5%	0%	100%
	To Selwyn GC from	69%	2%	27%	1%	1%	0%	100%
	From Selwyn Ext to	51%	7%	35%	2%	1%	3%	100%
	To Selwyn Ext from	52%	8%	35%	2%	1%	2%	100%
	TOTAL Trips	50%	8%	37%	1%	4%	0%	100%

AM Peak 2038 Base – 2hr (0700-0900) Person Trip Summaries by mode

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Light Vehicle	From Selwyn GC to	16,740	3,150	13,020	80	1,860	70	34,920
	To Selwyn GC from	16,740	460	7,180	340	90	60	24,870
	From Selwyn Ext to	1,800	270	1,540	90	60	90	3,850
	To Selwyn Ext from	1,860	360	1,570	70	60	60	3,980
	TOTAL Trips	33,480	3,610	20,200	420	1,950	130	59,790

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
PublicTransport	From Selwyn GC to	30	300	190	-	-	-	520
	To Selwyn GC from	30	10	70	-	-	-	110
	From Selwyn Ext to	-	-	-	-	-	-	-
	To Selwyn Ext from	-	-	-	-	-	-	-
	TOTAL Trips	60	310	260	-	-	-	630

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Cycle	From Selwyn GC to	340	30	130	-	-	-	500
	To Selwyn GC from	340	-	40	-	-	-	380
	From Selwyn Ext to	-	-	-	-	-	-	-
	To Selwyn Ext from	-	-	-	-	-	-	-
	TOTAL Trips	680	30	170	-	-	-	880

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
TOTAL	From Selwyn GC to	17,110	3,480	13,340	80	1,860	70	35,940
	To Selwyn GC from	17,110	470	7,290	340	90	60	25,360
	From Selwyn Ext to	1,800	270	1,540	90	60	90	3,850
	To Selwyn Ext from	1,860	360	1,570	70	60	60	3,980
	TOTAL Trips	34,220	3,950	20,630	420	1,950	130	61,300

AM Peak 2038 Base – 2hr (0700-0900) Person Trip Summaries by mode (%)

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Light Vehicle	From Selwyn GC to	48%	9%	37%	0%	5%	0%	100%
	To Selwyn GC from	67%	2%	29%	1%	0%	0%	100%
	From Selwyn Ext to	47%	7%	40%	2%	2%	2%	100%
	To Selwyn Ext from	47%	9%	39%	2%	2%	2%	100%
	TOTAL Trips	56%	6%	34%	1%	3%	0%	100%

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
PublicTransport	From Selwyn GC to	6%	58%	37%	0%	0%	0%	100%
	To Selwyn GC from	27%	9%	64%	0%	0%	0%	100%
	From Selwyn Ext to							
	To Selwyn Ext from							
	TOTAL Trips	10%	49%	41%	0%	0%	0%	100%

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Cycle	From Selwyn GC to	68%	6%	26%	0%	0%	0%	100%
	To Selwyn GC from	89%	0%	11%	0%	0%	0%	100%
	From Selwyn Ext to							
	To Selwyn Ext from							
	TOTAL Trips	77%	3%	19%	0%	0%	0%	100%

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
TOTAL	From Selwyn GC to	48%	10%	37%	0%	5%	0%	100%
	To Selwyn GC from	67%	2%	29%	1%	0%	0%	100%
	From Selwyn Ext to	47%	7%	40%	2%	2%	2%	100%
	To Selwyn Ext from	47%	9%	39%	2%	2%	2%	100%
	TOTAL Trips	56%	6%	34%	1%	3%	0%	100%

AM Peak 2038 Base – 2hr (0700-0900) Vehicle Trip Summaries by mode

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Light Vehicle	From Selwyn GC to	9,180	2,620	9,700	70	1,330	50	22,950
	To Selwyn GC from	9,180	330	5,090	280	70	50	15,000
	From Selwyn Ext to	1,280	200	1,100	60	40	70	2,750
	To Selwyn Ext from	1,330	260	1,120	50	40	50	2,850
	TOTAL Trips	18,360	2,950	14,790	350	1,400	100	37,950

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Heavy Vehicle	From Selwyn GC to	120	10	360	30	30	30	580
	To Selwyn GC from	120	10	310	30	30	10	510
	From Selwyn Ext to	30	80	270	30	-	30	440
	To Selwyn Ext from	30	80	280	30	-	10	430
	TOTAL Trips	240	20	670	60	60	40	1,090

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
TOTAL	From Selwyn GC to	9,300	2,630	10,060	100	1,360	80	23,530
	To Selwyn GC from	9,300	340	5,400	310	100	60	15,510
	From Selwyn Ext to	1,310	280	1,370	90	40	100	3,190
	To Selwyn Ext from	1,360	340	1,400	80	40	60	3,280
	TOTAL Trips	18,600	2,970	15,460	410	1,460	140	39,040

AM Peak 2038 Base -2hr (0700-0900) Vehicle Trip Summaries by mode (%)

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Light Vehicle	From Selwyn GC to	40%	11%	42%	0%	6%	0%	100%
	To Selwyn GC from	61%	2%	34%	2%	0%	0%	100%
	From Selwyn Ext to	47%	7%	40%	2%	1%	3%	100%
	To Selwyn Ext from	47%	9%	39%	2%	1%	2%	100%
	TOTAL Trips	48%	8%	39%	1%	4%	0%	100%

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
Heavy Vehicle	From Selwyn GC to	21%	2%	62%	5%	5%	5%	100%
	To Selwyn GC from	24%	2%	61%	6%	6%	2%	100%
	From Selwyn Ext to	7%	18%	61%	7%	0%	7%	100%
	To Selwyn Ext from	7%	19%	65%	7%	0%	2%	100%
	TOTAL Trips	22%	2%	61%	6%	6%	4%	100%

	Location	Selwyn District	Christchuch Central City	Christchuch Other	Wiamakariri District	Selwyn External	Wimakariri External	TOTAL
TOTAL	From Selwyn GC to	40%	11%	43%	0%	6%	0%	100%
	To Selwyn GC from	60%	2%	35%	2%	1%	0%	100%
	From Selwyn Ext to	41%	9%	43%	3%	1%	3%	100%
	To Selwyn Ext from	41%	10%	43%	2%	1%	2%	100%
	TOTAL Trips	48%	8%	40%	1%	4%	0%	100%