Private Plan Change 68: Urban Holdings, Suburban Estates, Cairnbrae Developments

Transportation Hearing Report

December 2021

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TRANSPORTATION SPECIALISTS

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Project:	**Private Plan Change 68: Urban Holdings, Suburban Estates, Cairnbrae Developments**
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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 68 (PPC68), which has been lodged by Urban Holdings Limited, Suburban Estates Limited, and Cairnbrae Developments Limited.

In terms of the immediate effects of PPC68, and the proposed ODP

- I consider that the ITA has demonstrated that the effects of PPC68 on the adjacent transport network are acceptable when considered in isolation of other PPCs (refer to my discussion in Section 5.1). However,
    - I recommend that no dwellings are occupied within PPC68 until all of Council's planned intersection and carriageway upgrades for Hamptons Road (including the intersection with Springs Road), Shands Road, and Trents Road are either complete or under construction, unless the applicant provides sensitivity modelling to determine how much development can occur without adversely affecting the operation of the existing transport network
    - I recommend that further traffic modelling is undertaken to confirm whether a single lane roundabout at Shands Road / Trents Road performs adequately
- I recommend that the ODP narrative includes the following "The Trents Road and Hamptons Road frontages are to be upgraded to an urban standard in accordance with the Engineering Code of Practice". Further, I recommend that the ODP identify the requirement for the PPC68 developer to deliver a continuous footpath on Hamptons Road and a footpath on Trents Road, between PPC68 and Farthing Drive. Refer to my discussion in Section 5.2
- I recommend that the ODP should be amended to include additional cycling routes within PPC68. I consider that PPC68 should provide cycle facilities on Hamptons Road and Trents Road, however I acknowledge that cycle facilities are not currently provided on the existing urban sections of these roads. Refer to my discussion in Section 5.3

While there are and will be capacity constraints on the Prebbleton transport network during peak periods, regional modelling indicates that Shands Road and Springs Road are expected to experience little change in forecast traffic growth, when comparing a 2038 scenario with 10,000 additional dwellings more than forecast. Refer to my discussion in Section 4.

PPC68 is inconsistent with the Prebbleton Structure Plan, in that it is outside the anticipated urban area. Should PPC68 affect the quantum of residential growth within Selwyn, 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. Refer to my discussion in Section 6.

Should my recommendations be adopted/addressed, I consider that transport effects of PPC68 on the adjacent transport network can be managed through projects in Council's LTP and further assessments during the subdivision consent stage of development.

CONTENTS

APPENDICES

1 INTRODUCTION

This report has been completed by Mat Collins (Associate) with assistance from Qing Li (Principal) and review by Ian Clark (Director). Ian, Qing 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.

Urban Holdings Limited, Suburban Estates Limited, and Cairnbrae Developments Limited (requestor) has lodged a PPC to change the Selwyn District Plan to rezone approximately 67.5 hectares of Rural Inner Plains zoned land to Living Z (PPC68). This report details my review of PPC68.

The scope of this specialist transport report is to assist Council in determining the transport outcomes of PPC68 and includes the following

- A summary of PPC68 focusing on transport matters
- An overview of transport projects contained within the Long Term Plan (LTP), which are relevant to PPC68
- A review of the material provided to support the application for PPC68, and discussion of the potential effects of PPC68
- Summary of submissions, relating to transport matters only
- My recommendations.

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

- Request for Change to the Selwyn District Plan, prepared by Davie, Lovell-Smith, dated 4 November 2021
- Response to Council information requests, including
    - Attachment A: Amended Outline Development Plan R4
    - Attachment C: Abley Note "Plan Change 68 Response to Council Transport Comments", dated 31 May 2021
    - Attachment D: Abley Revised Integrated Traffic Assessment, dated 31 May 2021
- Outline Development Plan and narrative, revision 5
- Submissions as outlined in Section 7.

2 A SUMMARY OF PPC68

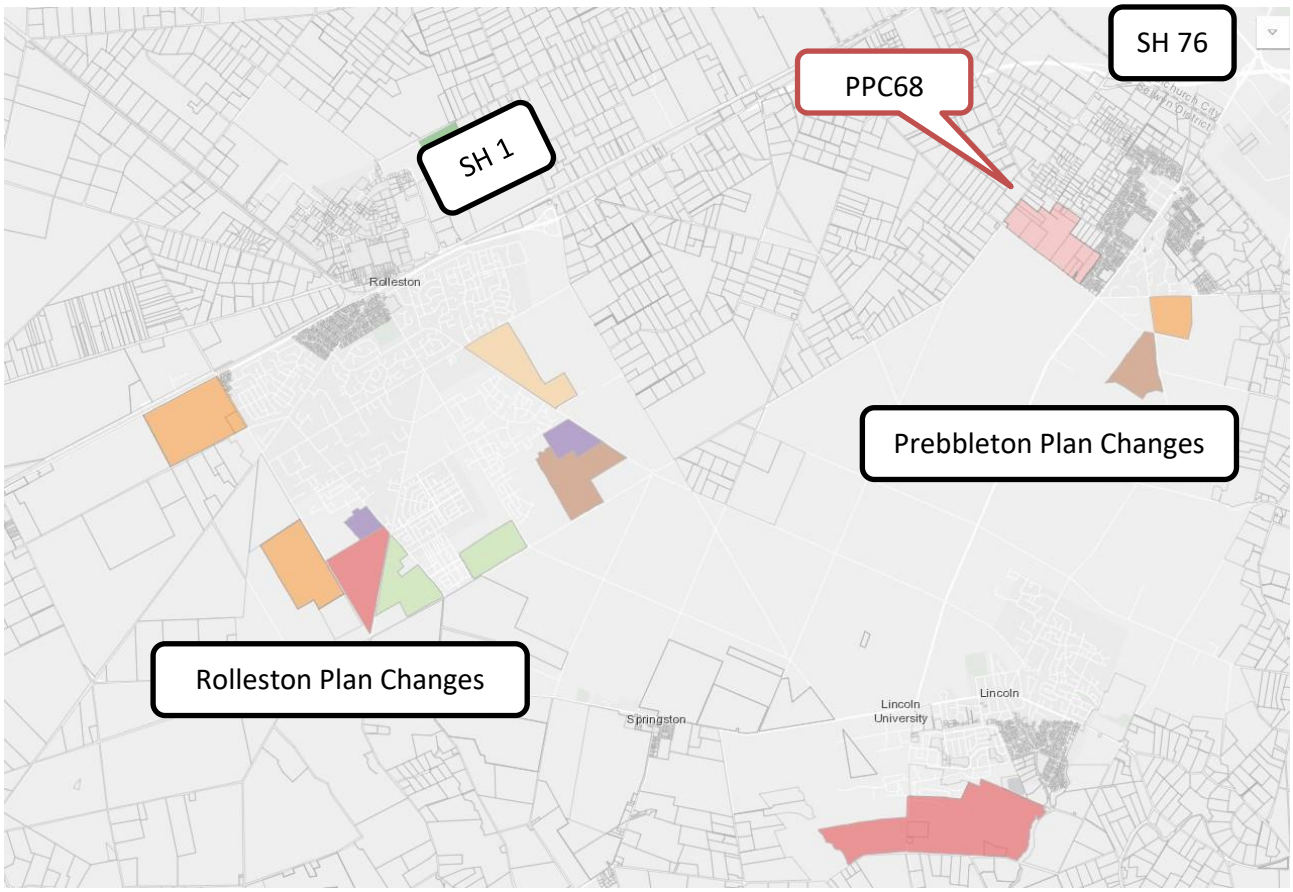
There are currently multiple private plan changes lodged within Rolleston, Lincoln and Prebbleton, as shown in Figure 1. PPC68 is south west of the existing urban area of Prebbleton, and is generally bounded by Shands Road, Hamptons Road, and Trents Road.

PPC68 proposes to rezone approximately 67.5 hectares of Rural Inner Plains zoned land to Living. 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

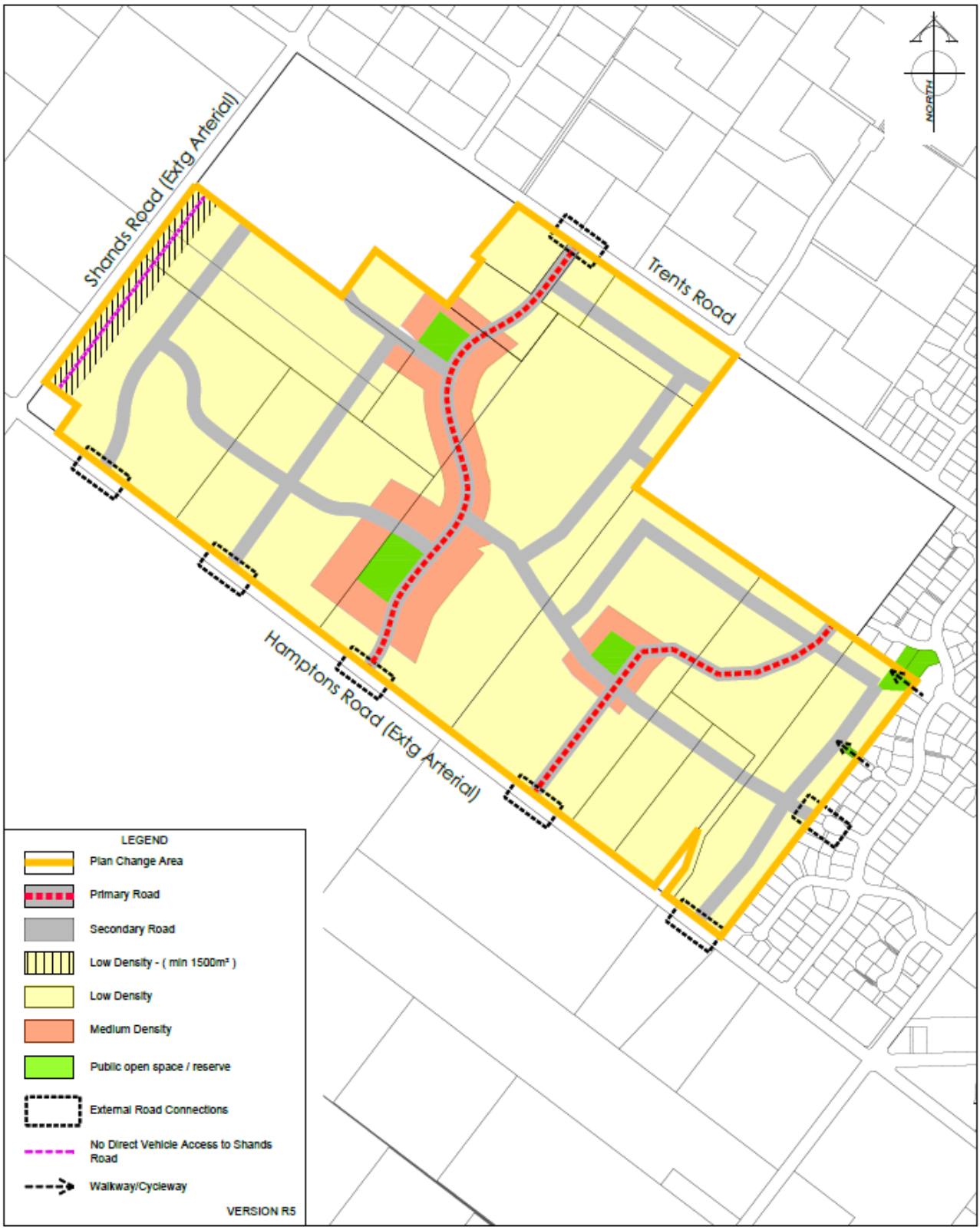
- Approximately 820 residential lots
- A through site connection between Hamptons Road and Trents Road
- An internal network of primary and secondary roads
- A potential connection to Guinea Drive
- Two walking and cycling connections to Peso Plan and Sterling Drive
- Restriction on direct vehicle access to Shands Road.

Figure 1: Overview of PPC68 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: PPC68 Outline Development Plan



3 PREBBLETON TRANSPORT PROJECTS RELEVANT TO PPC68

This section discusses various funded and planned transport projects in Prebbleton that have relevance to PPC68.

3.1 Transport projects in the Long Term Plan

Council has provided a list of transport projects within the LTP that I consider to be relevant to PPC68. I have reproduced these in Table 1 below.

Table 1: LTP transport projects relevant to PPC68

Project	Scheduled year	Description
Shands Road / Blakes Road dual lane roundabout	Completed	Safety upgrade – Prebbleton arterial network. Includes the widening of Blakes Road to improve connectivity and safety
Trents Road seal widening	2022/23	Seal widening between Oakley Drive and Shands Road
Shands Road / Trents Road single lane roundabout	2022/23	Safety upgrade – Prebbleton arterial network
Templeton to Prebbleton cycleway	2023/24	Off road cycleway alongside Trents Road – links between planned City and Rail Trail networks
Shands Road / Hamptons Road dual lane roundabout	2024/25	Safety upgrade – Prebbleton arterial network
Hamptons Road seal widening	2024/25	Seal widening between Springs Road and Shands Road
Springs Road / Hamptons Road single lane roundabout	2024/25	Safety upgrade – Prebbleton arterial network
Springs Road safety improvements	2024/27	Safety upgrade to reduce vehicle speeds through Prebbleton, between Hamptons Road and Blakes Road
Springs Road /Tosswill Road traffic signals	2026/27	Safety upgrade – Prebbleton main street

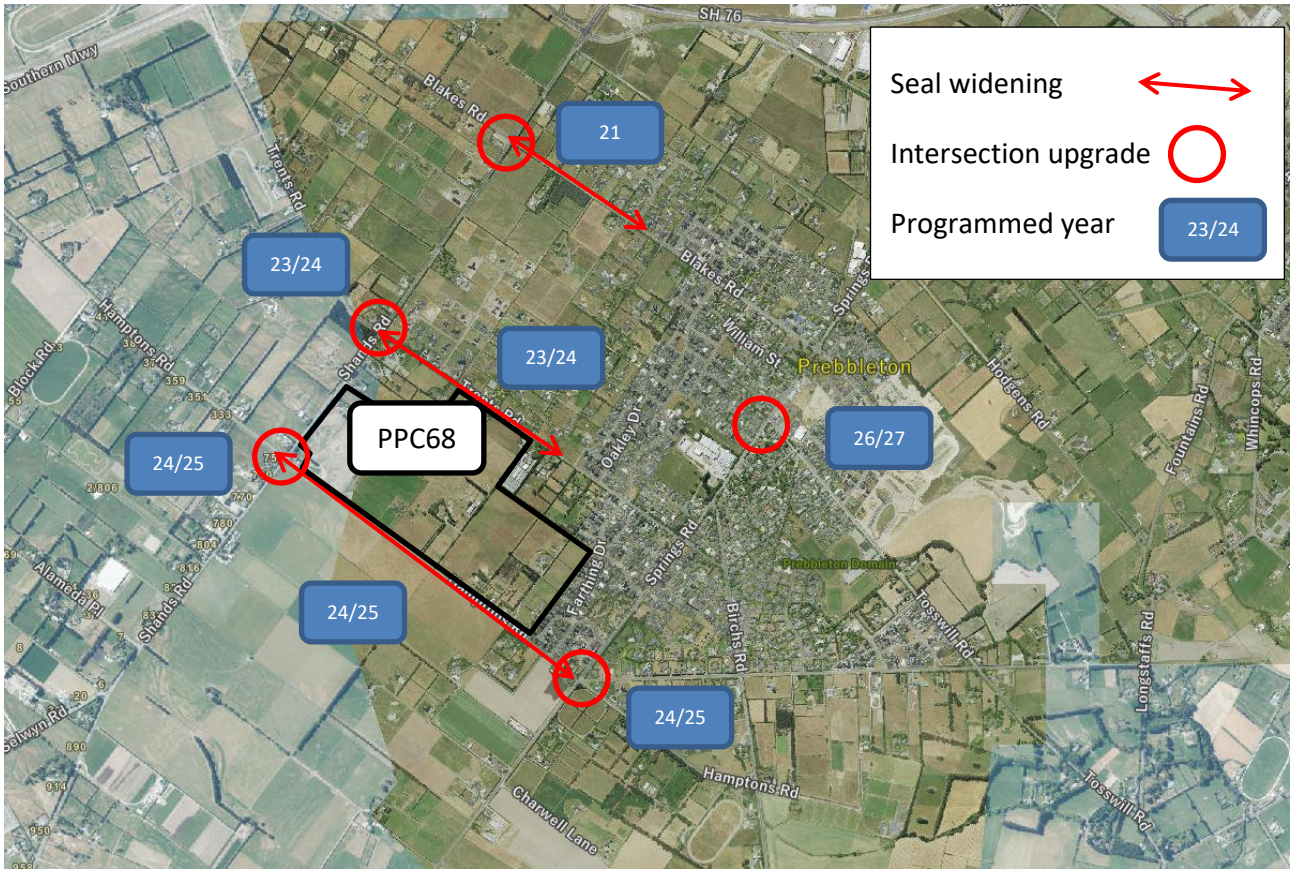
3.2 Prebbleton arterial safety works

Several projects identified in Table 1 form part of a programme aimed at

- improving safety along existing rural arterials
- improving safety and amenity within the Prebbleton town centre.

These projects, and the expected construction phasing, are shown in Figure 2.

Figure 3: Council transport improvements near PPC68 surrounding transport network



4 WIDER AREA EFFECTS OF CURRENT PLAN CHANGES

Currently there are multiple PPCs are being sought with Selwyn District. Of note to PPC68 are the following

- PPC64: Rolleston, 969 residential lots
- PPC66: Rolleston, industrial
- PPC68: Prebbleton, 820 residential lots (subject of this report)
- PPC69: Lincoln, 2000 residential lots plus commercial
- PPC70: Rolleston, 800 residential lots plus commercial
- PPC71: Rolleston, 660 residential lots
- PPC72: Prebbleton, 295 residential lots
- PPC73: Rolleston, 2100 residential lots plus commercial
- PPC75: Rolleston, 280 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 Prebbleton.

Council has recently engaged QTP[4] to test the effects of greater residential growth in Selwyn on the Greater Christchurch transport network, as part of Council's "Selwyn 2051" plan, which I have attached as Appendix A. The transport models 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 format.

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

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

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

- Scenario 1 (2038): growth in Selwyn based on forecasts agreed by 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 (10,900 dwellings) listed above.

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 Shands Road and Springs Road, as these are adjacent to PPC68 and known to be high demand corridors.

QTP found that

- 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 and Christchurch, 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 limited growth is indicated on some routes (such as Springs Road and Shands Road, due to downstream constraints in Christchurch) resulting in other routes seeing a higher increase in traffic (such as Ellesmere Road and Halswell Road)
- For both Scenarios, more than 90% of trips indicated to be by private vehicle
- Scenario 2 is indicated to cause increasingly poor performance on several parts of the Prebbleton network, when compared with Scenario 1, including at
    - Springs Road/Marshes Road intersection
    - Shands Road/Marshes Road intersection.

As can be seen in Figure 4, Scenario 2 is indicated to result in the following increase in morning peak hour flows, compared with Scenario 1

- Approximately 100 veh/hr on Shands Road in each direction
- Approximately 100 veh/hr on Springs Road in each direction.

While these increases seem to be relatively small given that Scenario 2 has an additional 10,000 dwellings compared to Scenario 1, my interpretation of the modelling results is that traffic growth is instead focused on corridors that are currently less utilised (and therefore become more attractive compared to corridors with capacity constraints, such as Springs Road and Shands Road).

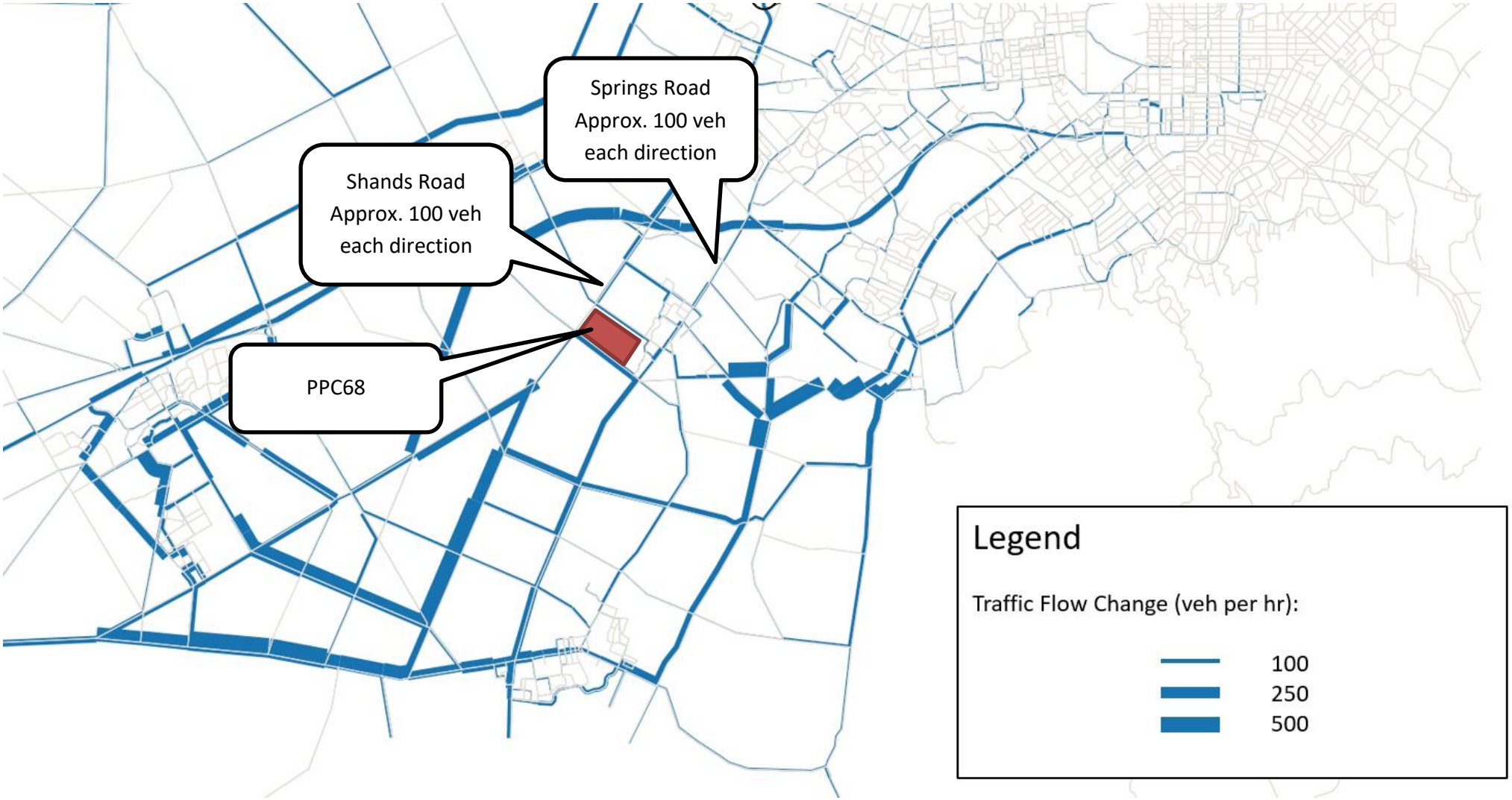
Shands Road and Springs Road through Prebbleton will be congested during peak periods, should capacity improvements be required to address wider growth in Selwyn it is likely that this would occur on Shands Road (as a rural arterial) rather than Springs Road (as an urban arterial through a town centre). However, such investigations and potential works would be driven by wider regional growth rather than as a direct result of PPC68.

Corridors near Prebbleton that are indicated to have much greater growth in Scenario 2 include

- Waterholes Road, Christchurch Southern Motorway (SH76), Main South Road (SH1) in the north/west
- Ellesmere Road, Trices Road, Sabys Road, SH75 in the south/east.

Outcome: While there are and will be capacity constraints on the Prebbleton transport network during peak periods, regional modelling indicates that Shands Road and Springs Road are expected to experience little change in forecast traffic growth, when comparing a 2038 scenario with 10,000 additional dwellings more than forecast.

Figure 4: 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 PPC68

- Traffic modelling and assumed transport upgrades
- Frontage upgrades
- Provision for cycling.

I discuss these matters in the following subsections.

5.1 Traffic modelling

The ITA provides traffic modelling for the following intersections (shown in Figure 5)

1. Springs Road / Trents Road
2. Springs Road / Hamptons Road
3. Shands Road / Hamptons Road
4. Shands Road / Trents Road.

The ITA provides an assessment of these intersections based on 2020 survey data, which has been factored up by 28% to reflect assumed growth within Selwyn, and then traffic from PPC68 added. The ITA also assesses the midblock capacity of Shands Road and Springs Road.

I consider that this methodology is reasonable and is a typical approach when assessing the potential traffic effects from large scale developments, however I note the following

- I consider that Section 7.3 of the ITA somewhat overestimates the midblock capacities of Shands Road and Springs Road (2,700 v/hr assumed by the ITA vs my estimate of 2,070 – 2,530 veh/hr)
- The ITA identifies potential performance issues with existing intersections, however these intersections perform adequately once Council projects (identified in Figure 3) are in place. I therefore recommend that these improvements be constructed prior to the development within PPC68, unless the applicant provides sensitivity modelling to determine how much development can occur without adversely affecting the operation of the existing transport network
- The ITA assumes that the Shands Road / Trents Road will be a double lane roundabout, however Council only intends to implement a single lane roundabout. Further traffic modelling should be undertaken to test whether this affects the conclusions of the ITA.

Noting my comments above, I agree with the conclusion in Section 7.9 of the ITA, that the effects on the transport network adjacent to PPC68 are acceptable.

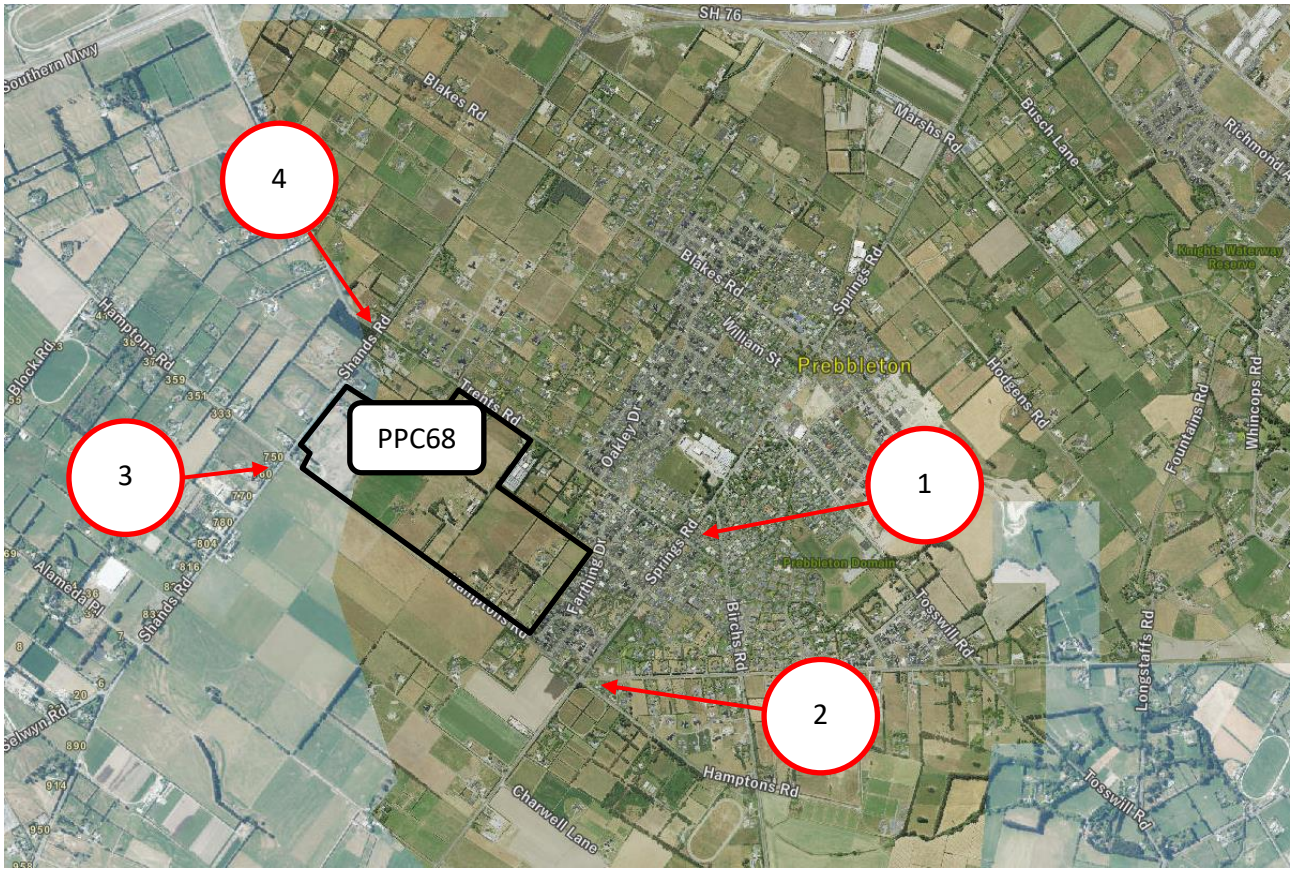
Outcome: I consider that the ITA has demonstrated that the effects of PPC68 on the adjacent transport network are acceptable when considered in isolation of other PPCs. However,

- ***I recommend that no dwellings are occupied within PPC68 until all of Council's planned intersection and carriageway upgrades for Hamptons Road (including the intersection with***

Springs Road), Shands Road, and Trents Road are either complete or under construction, unless the applicant provides sensitivity modelling to determine how much development can occur without adversely affecting the operation of the existing transport network

- ***I recommend that further traffic modelling is undertaken to confirm whether a single lane roundabout at Shands Road / Trents Road performs adequately.***

Figure 5: Intersections assessed in the ITA



5.2 Frontage upgrades

In response to Council information requests, Abley acknowledged that the site frontages to Trents Road and Hamptons Road will be upgraded to an urban standard. I recommend that this be reflected in the ODP narrative.

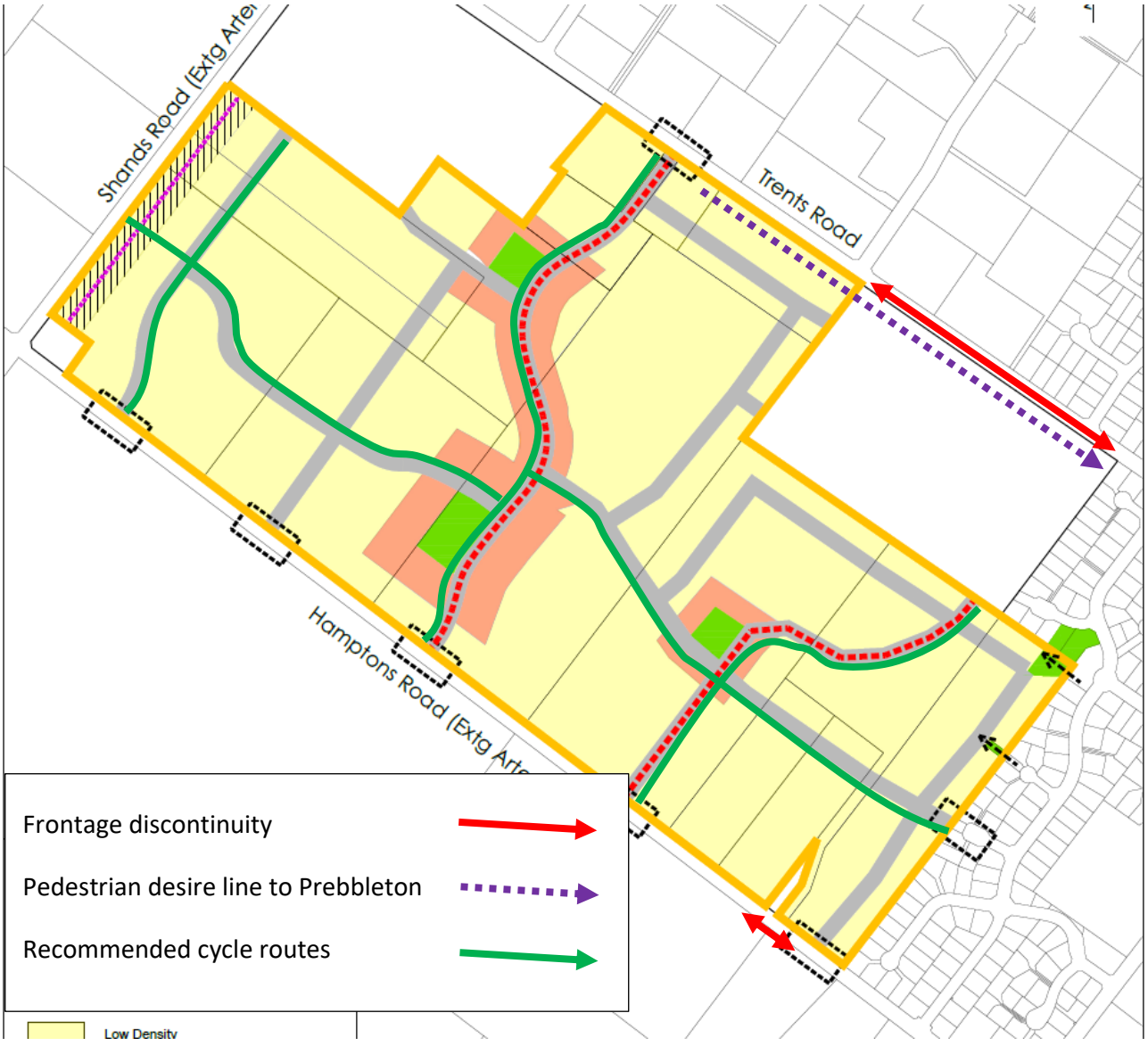
I note that PPC68 will not result in a contiguous urban frontage with existing urban development on Hampton Road or Trents Road, shown in Figure 6. This can affect the legibility and accessibility of the road environment

- for drivers, as the road switches from urban to rural, then back to urban (e.g. the 400m discontinuity on Trents Road)
- for pedestrians, due to interruption of footpaths along the site frontage (e.g. Hamptons Road) and lack of connectivity to existing footpaths (e.g. Trents Road).

Outcome: I recommend that the ODP narrative includes the following "<u>The Trents Road and Hamptons Road frontages are to be upgraded to an urban standard in accordance with the Engineering Code of</u>

Practice". Further, I recommend that the ODP identify the requirement for the PPC68 developer to deliver a continuous footpath on Hamptons Road and a footpath on Trents Road, between PPC68 and Farthing Drive.

Figure 6: Urban frontage discontinuity, and recommended cycle routes



5.3 Provision for cycling

Council intends for Trents Road to form part of the Templeton to Prebbleton cycleway (scheduled for 2023/24). This presents an opportunity for PPC68 to have excellent accessibility by cycling, and therefore strengthens the case for providing quality cycle facilities on internal roads.

I recommend that three north/south cycle routes and one east/west cycle route be shown on the ODP plan (including a future proofed connection to Shands Road), as indicated in Figure 6.

In my view, cycling facilities should be provided on Trents Road and Hamptons Road. However, given the lack of existing cycle facilities on these roads within the existing urban area, the argument for this is somewhat weakened. I consider that my recommendation that frontage upgrades be provided in

accordance with Council's Engineering Code of Practice allows sufficient flexibility to allow consideration of cycle facilities, for example to integrate with Council's planned Templeton to Prebbleton cycleway, during future subdivision applications.

Outcome: I recommend that the ODP should be amended to include additional cycling routes within PPC68. I consider that PPC68 should provide cycle facilities on Hamptons Road and Trents Road, however I acknowledge that cycle facilities are not currently provided on the existing urban sections of these roads.

6 PREBBLETON STRUCTURE PLAN AND INFRASTRUCTURE BOUNDARY

As part of my review, I have considered the Prebbleton Structure Plan (Structure Plan)[11], which was prepared in 2010.

PPC68 sits outside the anticipated urban area of the Structure Plan, as well as the proposed infrastructure boundary specified in the Canterbury Regional Policy Statement (CRPS) Map A[12].

I regard to the potential effects of PPC68 on the wider transport network

- The transport effects of PPC68 on the wider transport network, beyond Prebbleton, have not been assessed in the ITA
- If PPC68 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 PPC68 drawing growth demand away from other parts of Selwyn), PPC68 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 PPC68 (as a Plan Change outside the anticipated urban area) leads to greater residential growth in Selwyn 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
- As discussed in Section 4, modelling undertaken by QTP as part of Council's "Selwyn 2051" plan, provides a useful reference point with a comparison between two future household growth scenarios in Selwyn. This report indicates a fairly linear relationship between population growth and travel demand between Selwyn and Christchurch during the morning peak hour.

Outcome: PPC68 is inconsistent with the Prebbleton Structure Plan, in that it is outside the anticipated urban area. Should PPC68 affect the quantum of residential growth within Selwyn, 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.

[11] Lincoln Structure Plan, available online https://www.selwyn.govt.nz/property-And-building/planning/strategies-and-plans/prebbleton-structure-plan

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

7 MY REVIEW OF SUBMISSIONS

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

- Provision of transport infrastructure
- Discontinuity of the proposed urban area
- Walking and cycling
- Public transport
- Roading connections
- Urban development outside of identified growth boundaries
- Speed limits for existing roads
- Flaws in the ITA.

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 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
General concern about the safety and efficiency effects on existing roads	Refer to my discussion of wider growth effects in Sections 4 and 6, and my review of the immediate effects of PPC68 in Section 5.
Concern regarding the effects of PPC68 on existing queueing and truck unloading on Trents Road, relating 382 Trents Road (submitter 12) and 349 Trents Road (submitter 25).	If queuing and loading/unloading of trucks is currently happening within Trents Road, this may be an infringement of District Plan rules. In my view it may be unsafe for these activities to be occurring in the existing environment, therefore I have discounted any effect that PPC68 may have on them. Should this activity be permitted/consented, then I consider that provision for truck parking within Trents Road can be addressed as part of the future detailed design of the Trents Road upgrade.

Stage development to align with Council's planned works for Trents Road, Hamptons Road, and Shands Road	I agree, refer to my discussion in Section 5.1.
Additional traffic effects on Springs Road through Prebbleton town centre	Refer to my discussion in Section 4.
Concern with safety and efficiency effects at Springs Road / Trents Road and Shands Road / Trents Road intersections	These intersections are programmed for upgrade within the next few years, refer to Section 3.
Request for traffic calming on Springs Road, Trents Road and Hamptons Road	Hamptons Road and Springs Road upgrades are programmed by Council, refer to Section 3. Should PPC68 be approved I anticipate that Council will consider whether traffic calming measures are required, however I do not expect that these will be provided on Hamptons Road, as this is intended to function as a bypass road for Prebbleton. Traffic calming on Trents Road is possible, but would need to be considered in a wider context by Council, as traffic calming needs to be implemented at a network level rather than at a corridor level to ensure a legible and effective result.
Traffic effects on Prebbleton School	In my view, PPC68 is unlikely to have direct effects on Prebbleton School. While PPC68 will generate additional traffic movements on Springs Road, the main vehicle access and pick up/drop off is located on Blakes Road. Additional traffic generated by PPC68 to/from the school would likely fall within the assessment of traffic effects undertaken by the MoE when the school was designated, as I anticipate that such an assessment would have been based on an expected roll cap for the school. Should expansion of the school be required due to PPC68, I consider that the resulting traffic effects would be assessed as part of the outline plan of works. Finally, Council intends to "de-tune" Springs Road, in favour of through traffic using Shands Road. Therefore I consider that traffic modelling of the Springs Road/Blake Road intersection is not required. However, I note my concerns about the capacity of Springs Road/Shands Road, as discussed in Section 4.
Concern about traffic effects during construction.	This is a matter that can be considered during future subdivision consent applications.

Opposition to direct vehicle access to Hamptons Road and Trents Road	I am not concerned about direct vehicle access to Trents Road. As Hamptons Road is classified as an arterial road, direct vehicle access can be considered during future subdivision consents, as there are District Plan rules to manage the effects of vehicle crossings onto arterial roads.

7.2 Discontinuity of the proposed urban area

Some submitters raised concerns with PPC68 not including adjacent rural parcels within the plan change boundaries. Refer to my discussion in Section 5.2.

7.3 Inclusion of adjacent areas within PPC68

Some submitters requested that the boundary of PPC68 be extended to include various adjacent parcels of land. The ITA does not anticipate Living Z Zone for the parcels identified submissions, therefore the wider effects on the transport network that would result from the rezoning of those parcels are not understood.

Based on a total of around 10 hectares of additional rezoned land, this would result in around 120 additional dwellings and 108 peak hour vehicle trips. Based on the vehicle trip distribution (as summarised in Appendix B1.5 – B1.6 of the ITA) and the traffic modelling results (as detailed in Appendix C of the ITA), once Council's proposed intersections upgrades are complete I consider that the additional rezoning is unlikely to have a consequential effect to the conclusions of the ITA.

Including other parcels within PPC68 may help address issues created by non-contiguous urban frontages on Trents Road and Hamptons Road, as discussed in Section 5.2.

Therefore, subject to my recommendations in Section 5.1, I consider that there is merit to extending the boundary of PPC68 to include other parcels within the wider land block within the bounds of Shands Road, Hamptons Road and Trents Road.

7.4 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
Lack of a safe pedestrian access along Trents Road	Refer to my discussion in Sections 5.2 and 5.3.
General comments about enabling walking and cycling	
Requests for cycling facilities on Trents Road and Hamptons Road	

Concern about pedestrian/cyclist ability to cross Springs Road/Trents Road and Springs Road/Hamptons Road	These intersections will be upgraded to roundabouts by 2025 (refer to Section 3). I anticipate that this upgrade will include pedestrian crossing facilities.
Concern for the ability of pedestrians, including school children, to cross Springs Road	Refer to my discussion about the potential traffic demands for Springs Road and Shands Road in Section 4. I consider that should these demands eventuate, improvements to allow safe crossings on Springs Road would be required. However, I note that PPC68 is only a partial contributor to this traffic growth.
Concern about pedestrian crossing ability at Springs Road/Birchs Road	I agree with the submitters concerns, however I consider that PPC68 is unlikely to generate many pedestrian movements on the eastern side of Springs Road in this location. Further, this is an existing issue that I consider to be the responsibility of Council to address.

7.5 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 Prebbleton 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 PPC68 allows for future public transport services to run through the site.
Existing public transport services are poor	
Seeking a minimum density of 15 households/hectare to support public transport provisions.	I agree with the submitter that higher residential densities can support greater mode share for public transport. However, residential densities should be determined after considering a number of factors, not just public transport catchments. I am not opposed to higher densities, however the ITA has assessed the stated yields of PPC68. Should yields be increased, the ITA would need to be updated to determine what effect a higher yield for PPC68 would have on the transport network.

7.6 Roading connections

Aspects of submissions that discussed roading connections, and my responses, are provided in Table 5.

Table 5: Commentary on submissions related to roading connections to PPC68

Submission point	Flow comment
Feasibility of roading connections to rural parcels adjacent to PPC68	I consider that there are no physical constraints that would prevent the future extension of these roads, however asset constraints (such as existing buildings) may be an issue for adjacent land owners.
Oppose the location of the "Primary Road" intersection on Trents Road, as it might affect truck access to 345 Trents Road.	I consider that the new intersection would not require turning restrictions for the existing property access. In regard to trucks parking/queuing on Trents Road, refer to Section 7.1.

7.7 Discontinuity of the proposed urban area

Some submitters raised concerns about PPC68 being outside the anticipated urban area. Refer to my discussion in Section 6.

7.8 Speed limits for existing roads

Some submitters raised concerns about the existing speed limit for roads near PPC68. I note that only the Road Controlling Authority can alter speed limits, and I expect the Council will reduce speed limits on surrounding roads where warranted.

7.9 Flaws in the ITA

Aspects of submissions that flaws in the ITA, and my responses, are provided in Table 5.

Table 6: Commentary on submissions related to roading connections to PPC68

Submission point	Flow comment
The ITA used flawed traffic data for Springs Road and Shands Road.	I consider that the traffic data provided in Section 2.6 of the ITA and survey data discussed in Section 7 of the ITA are appropriate.
The ITA used a flawed traffic growth rate of 2.8%, and that the ITA under reports effects on Shands Road and Springs Road	Refer to my discussion in Sections 4 and 5.1
The ITA does not consider the cumulative effects of multiple plan changes within Selwyn	Refer to my discussion in Sections 4 and 6
The ITA identifies that Trents Road has a width of 20.4m, but the width is only 6.5m	The ITA is referring to the boundary to boundary width, not the carriageway width.

8 SUMMARY AND CONCLUSION

I have reviewed the PPC68 application documents, responses to Council information requests, and submissions.

In terms of the immediate effects of PPC68, and the proposed ODP

- I consider that the ITA has demonstrated that the effects of PPC68 on the adjacent transport network are acceptable when considered in isolation of other PPCs (refer to my discussion in Section 5.1). However,
    - I recommend that no dwellings are occupied within PPC68 until all of Council's planned intersection and carriageway upgrades for Hamptons Road (including the intersection with Springs Road), Shands Road, and Trents Road are either complete or under construction, unless the applicant provides sensitivity modelling to determine how much development can occur without adversely affecting the operation of the existing transport network
    - I recommend that further traffic modelling is undertaken to confirm whether a single lane roundabout at Shands Road / Trents Road performs adequately
- I recommend that the ODP narrative includes the following "The Trents Road and Hamptons Road frontages are to be upgraded to an urban standard in accordance with the Engineering Code of Practice". Further, I recommend that the ODP identify the requirement for the PPC68 developer to deliver a continuous footpath on Hamptons Road and a footpath on Trents Road, between PPC68 and Farthing Drive. Refer to my discussion in Section 5.2
- I recommend that the ODP should be amended to include additional cycling routes within PPC68. I consider that PPC68 should provide cycle facilities on Hamptons Road and Trents Road, however I acknowledge that cycle facilities are not currently provided on the existing urban sections of these roads. Refer to my discussion in Section 5.3

While there are and will be capacity constraints on the Prebbleton transport network during peak periods, regional modelling indicates that Shands Road and Springs Road are expected to experience little change in forecast traffic growth, when comparing a 2038 scenario with 10,000 additional dwellings more than forecast. Refer to my discussion in Section 4.

PPC68 is inconsistent with the Prebbleton Structure Plan, in that it is outside the anticipated urban area. Should PPC68 affect the quantum of residential growth within Selwyn, 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. Refer to my discussion in Section 6.

Should my recommendations be adopted/addressed, I consider that transport effects of PPC68 on the adjacent transport network can be managed through projects in Council's LTP and further assessments during the subdivision consent stage of development.

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

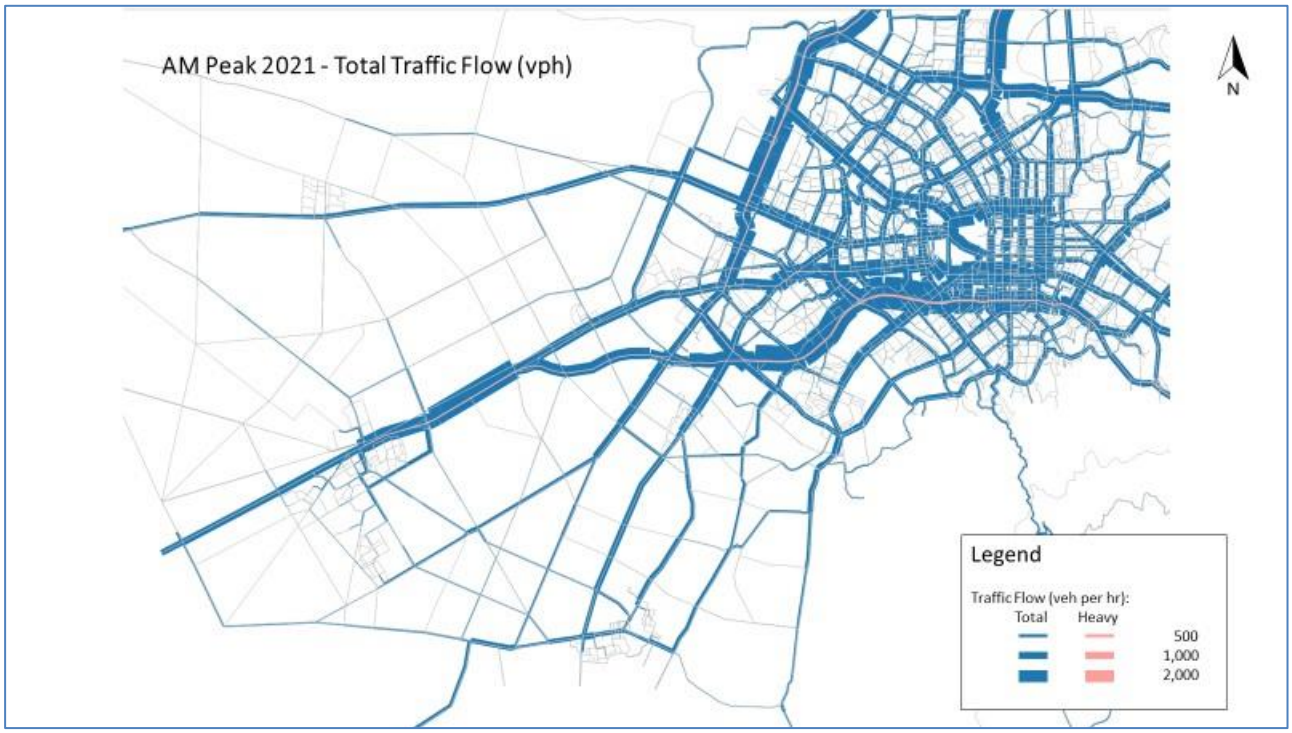
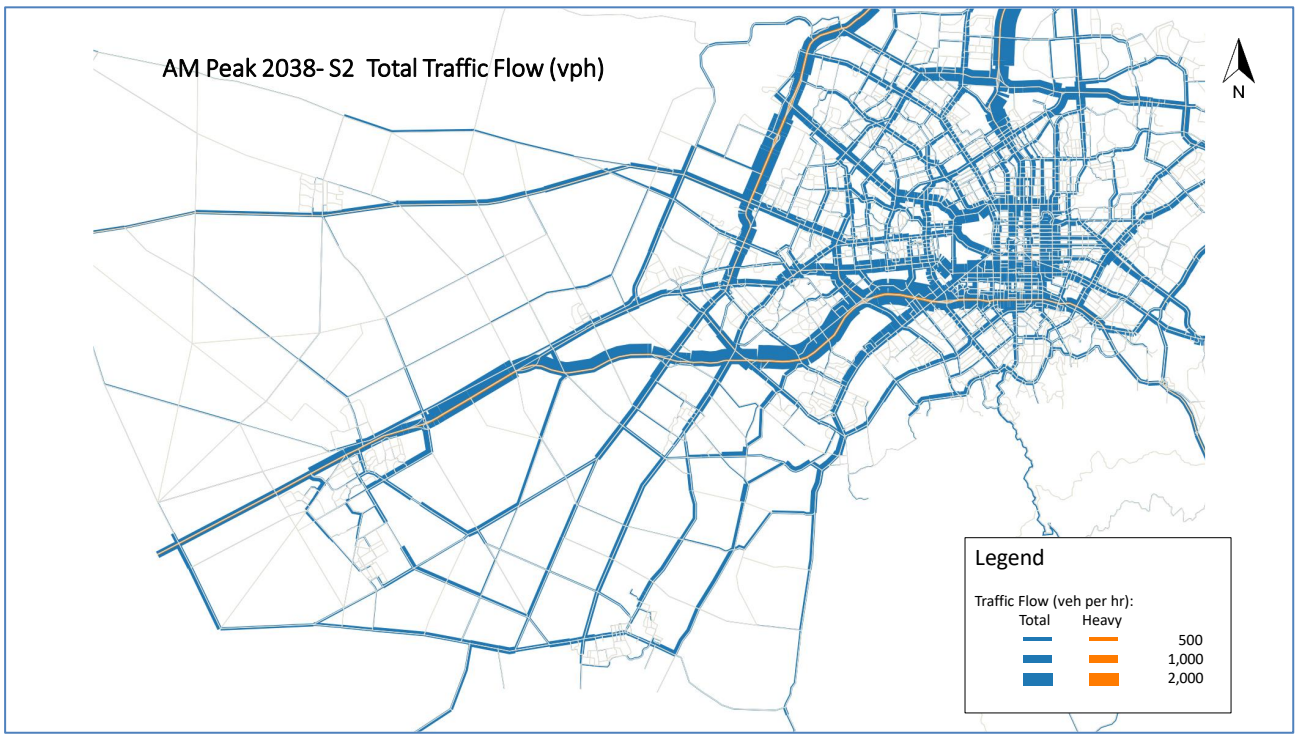


Figure 3-3: Morning Peak 2038 Traffic Flow



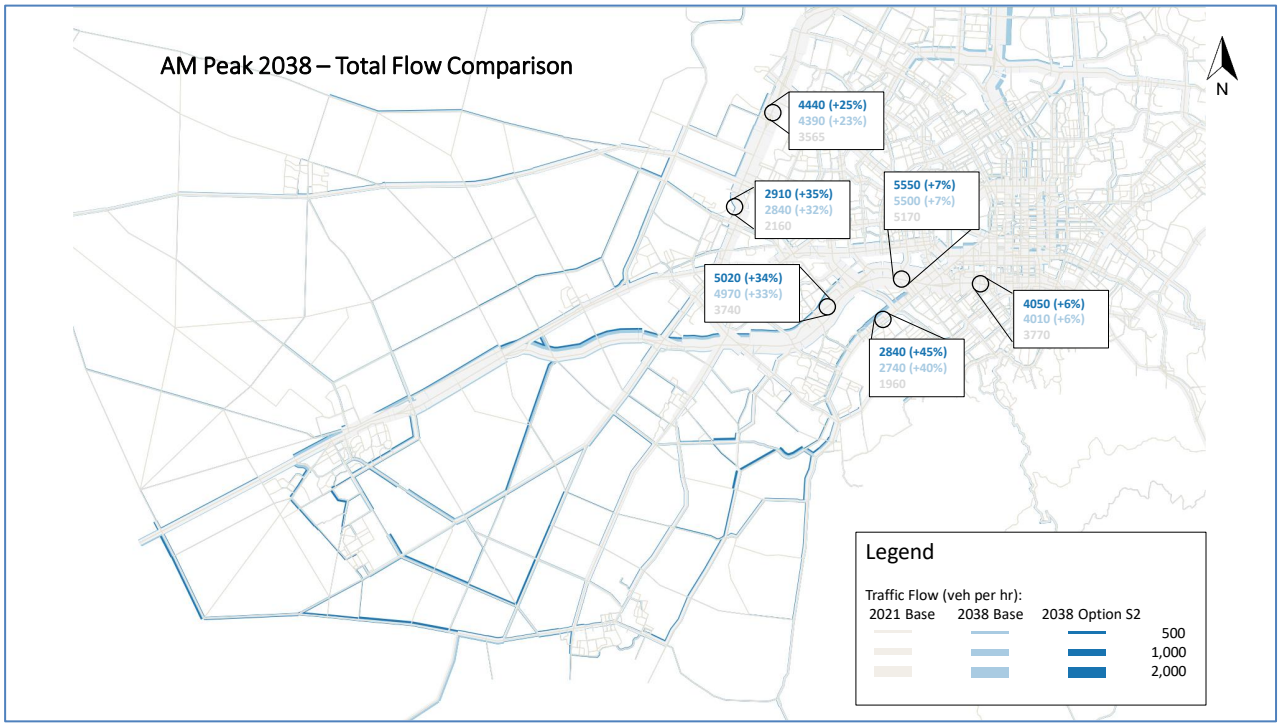
3.3.3 This increase in overall traffic flow is indicated to be almost directly proportional to the population increase as shown in Table 3-1 below.

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%

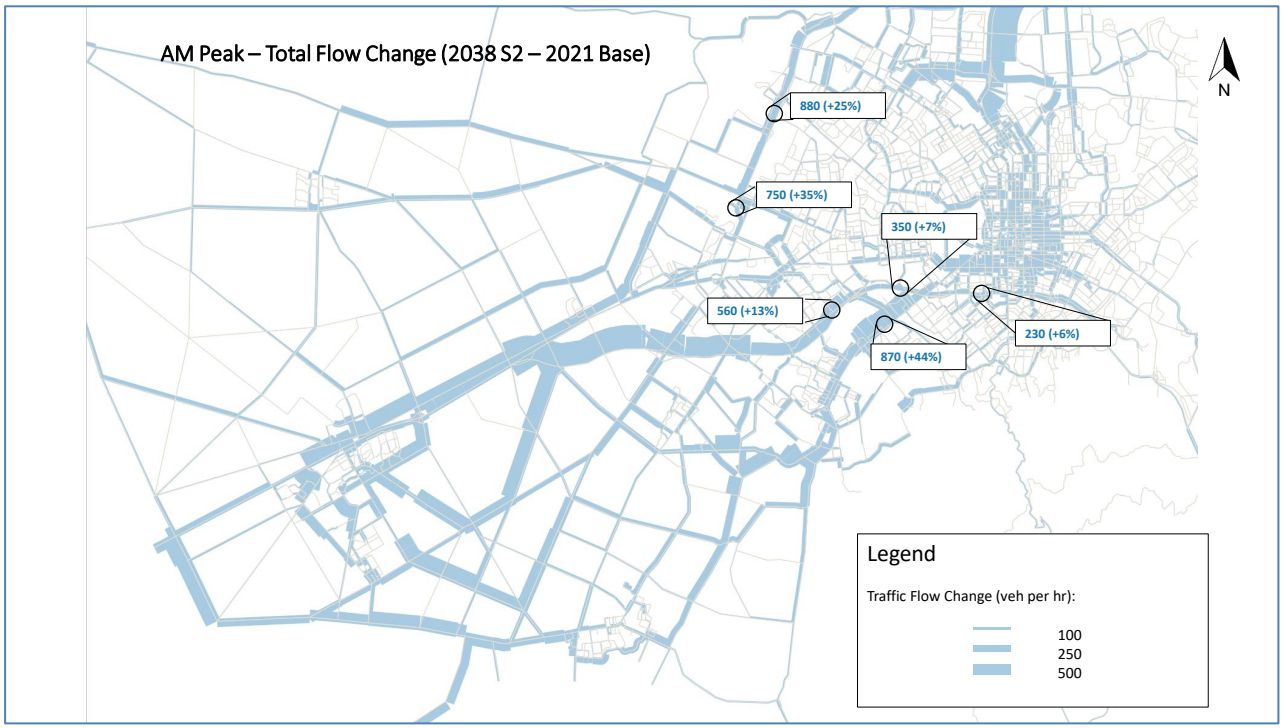
3.3.4 Figure 3-4 below shows just the Selwyn based component of traffic (with incremental changes for both Scenario 1 and 2 between 2021 and 2038).

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).

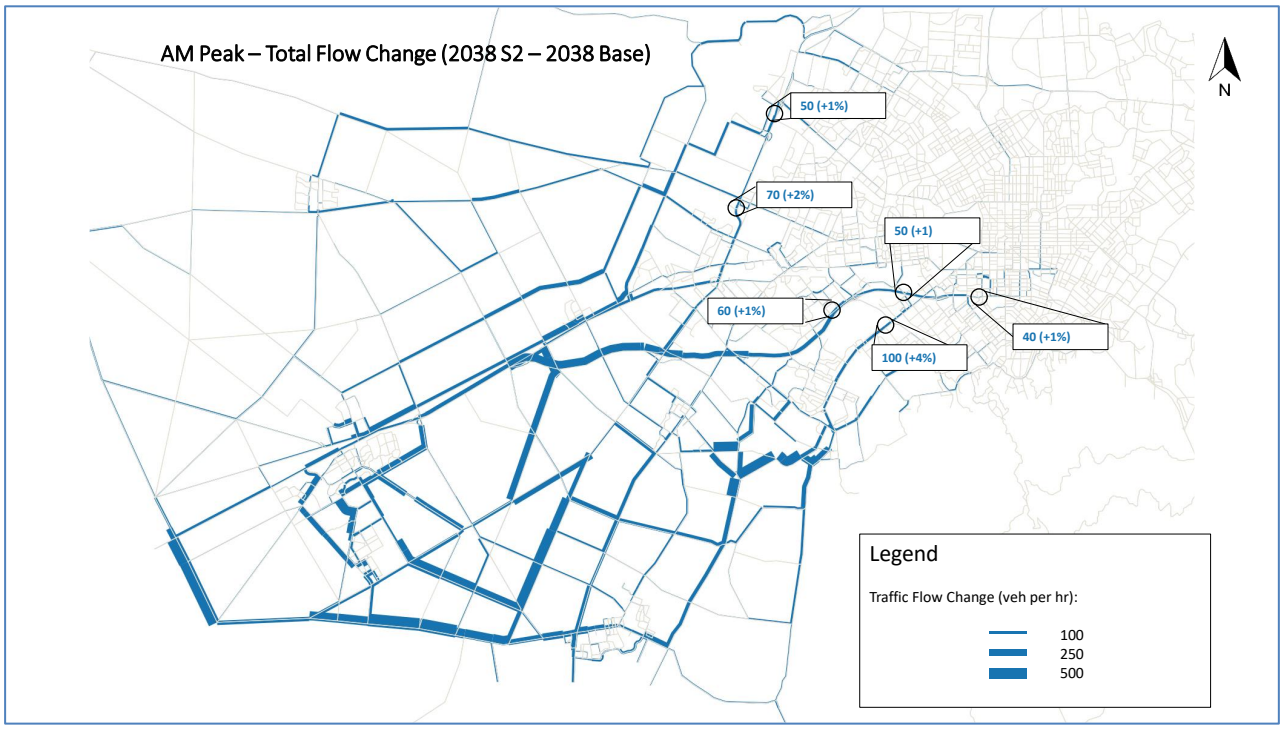
3.3.11 An additional factor (also included in the CAST model) is that trip demand is elastic. That is that demand for travel will change in response to cost[5]. Therefore, trip retiming (peak spreading), changing mode, or deciding not to make a trip, increasingly occur as congestion increases, which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

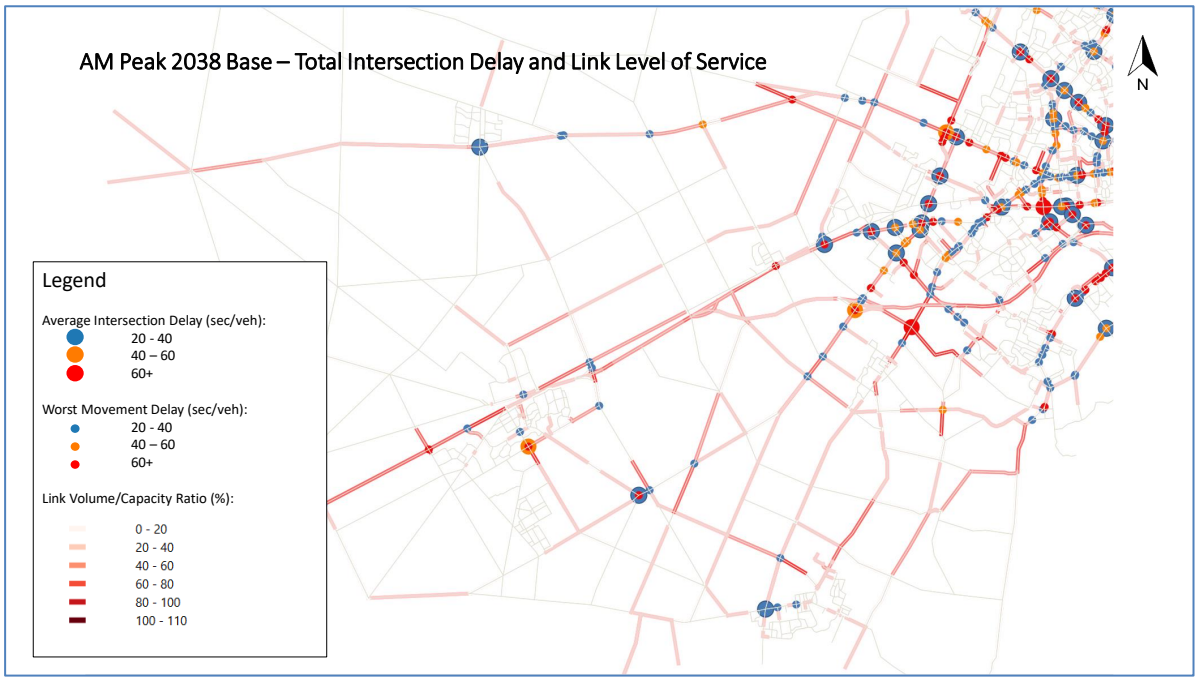
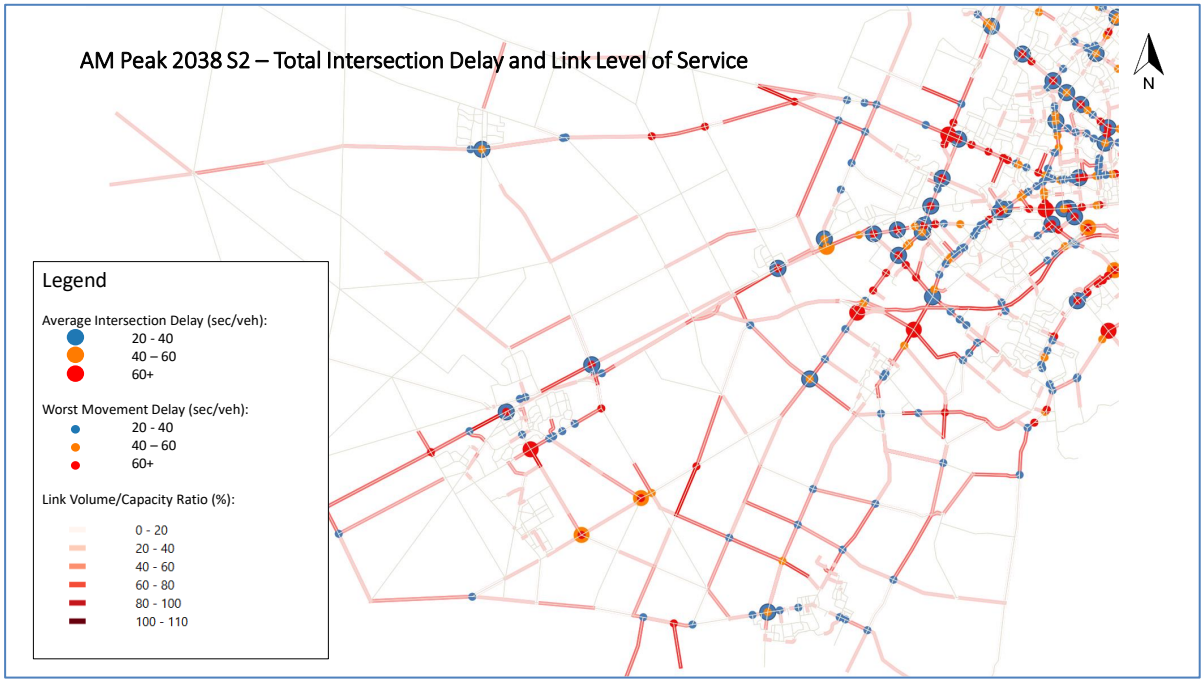


Figure 3-9: Morning Peak 2038 Network Performance (Scenario 2)



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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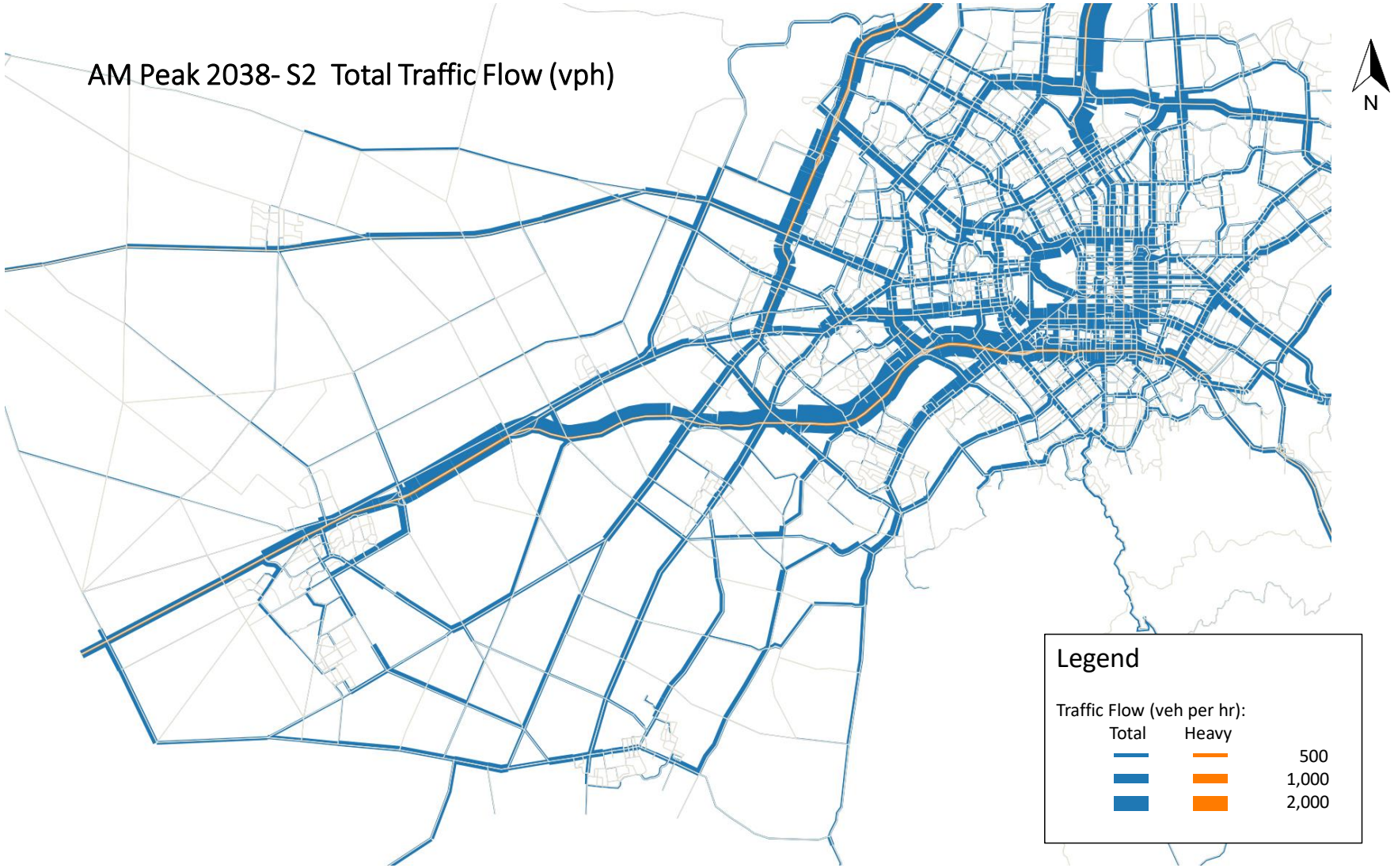
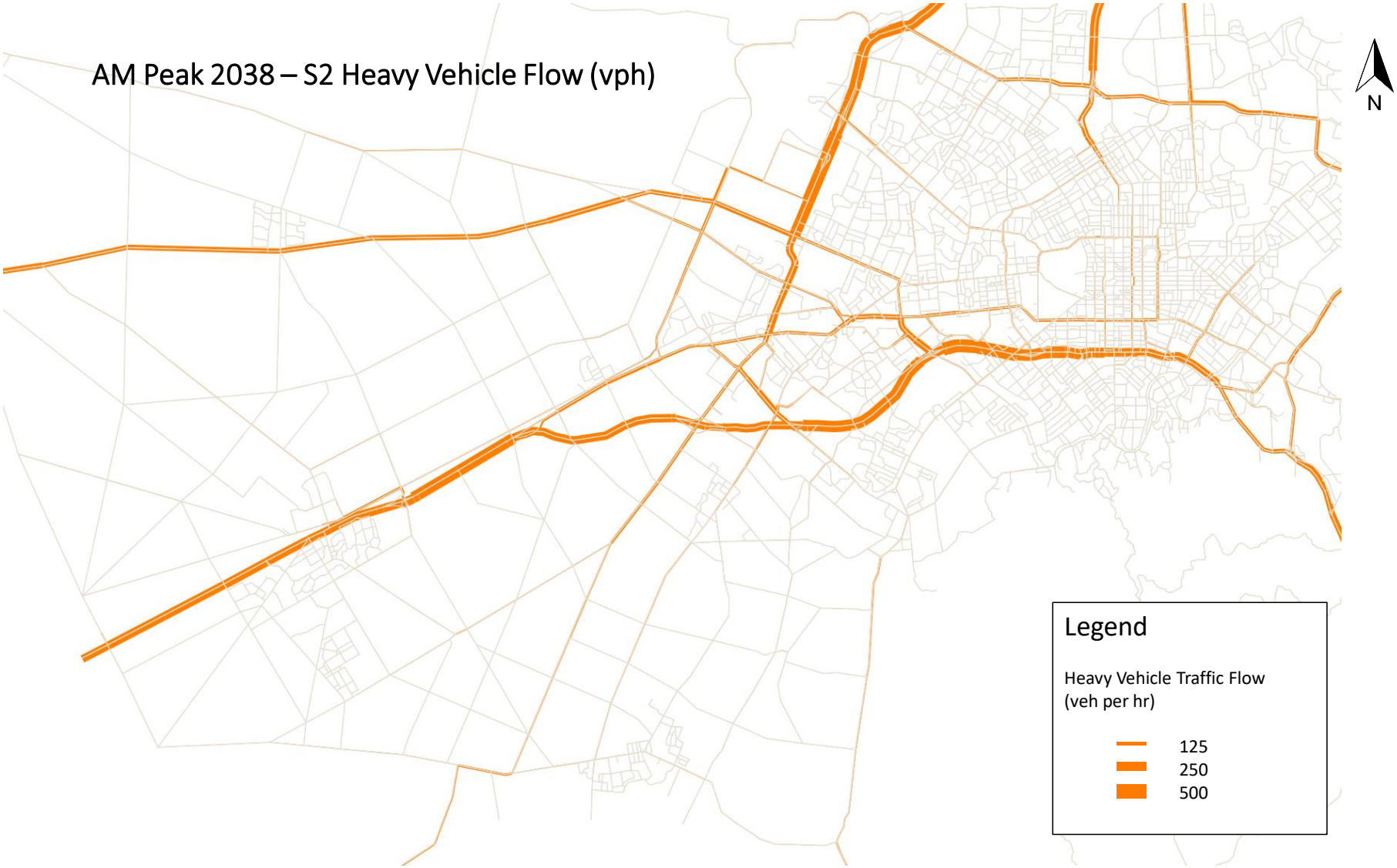
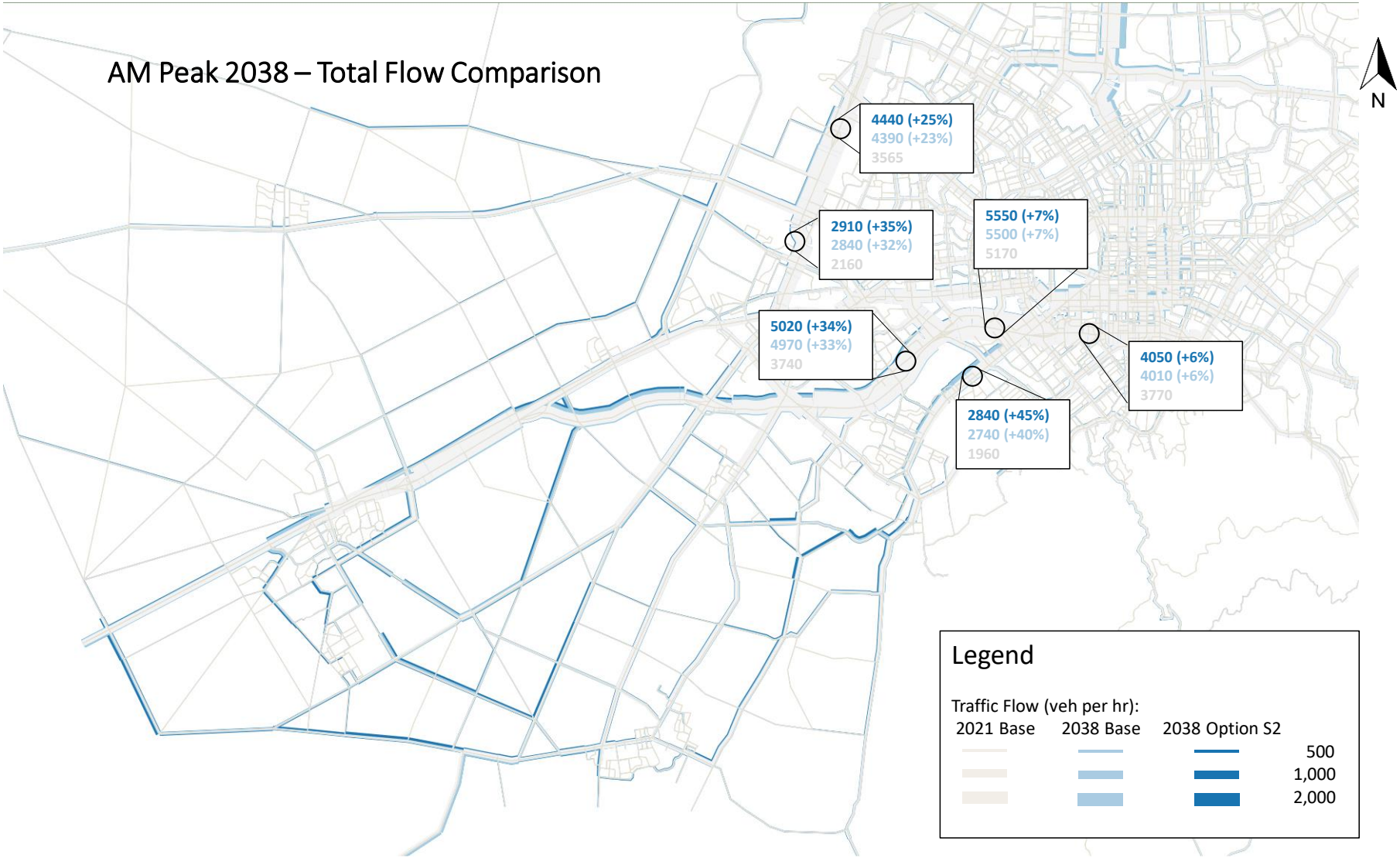
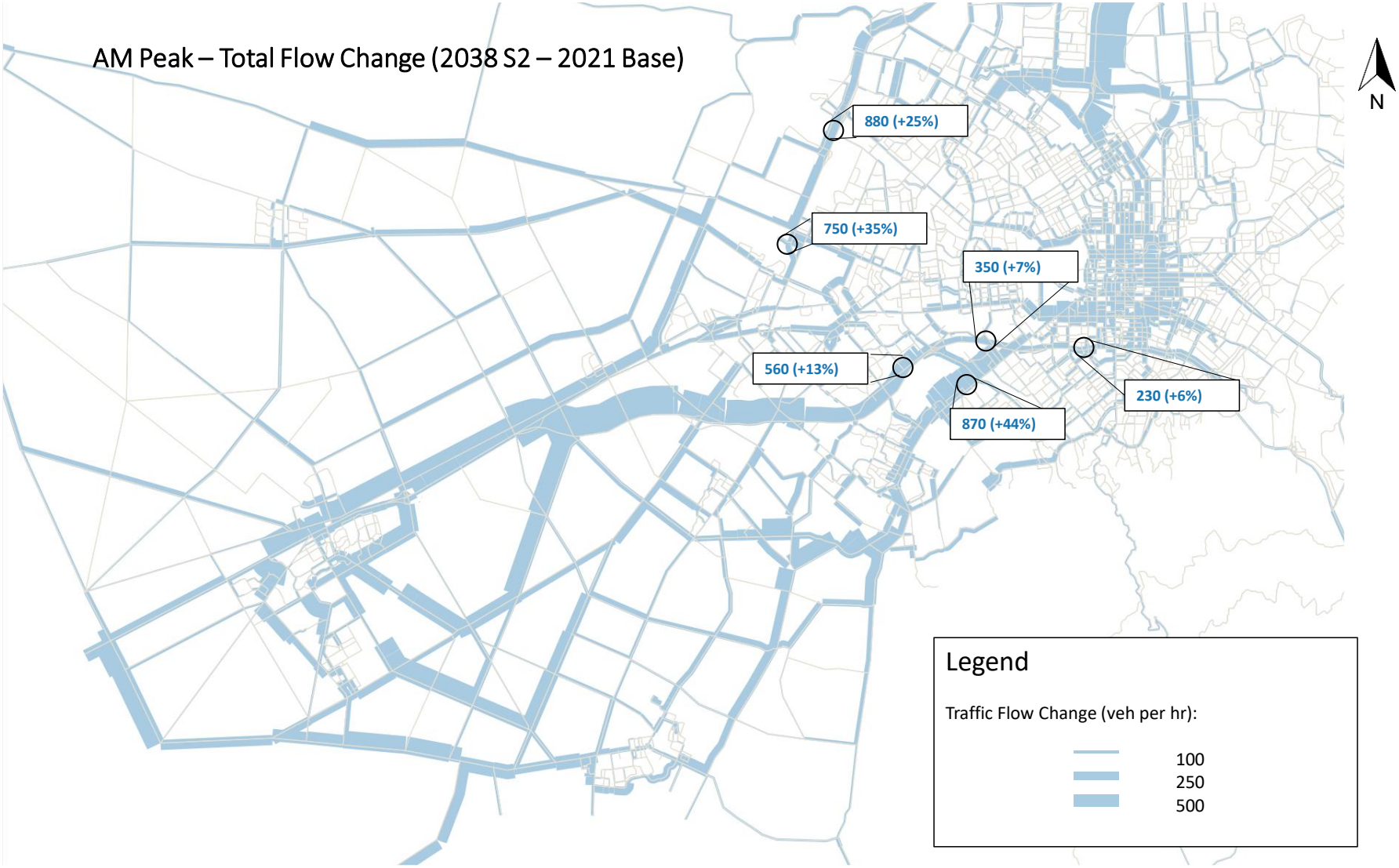
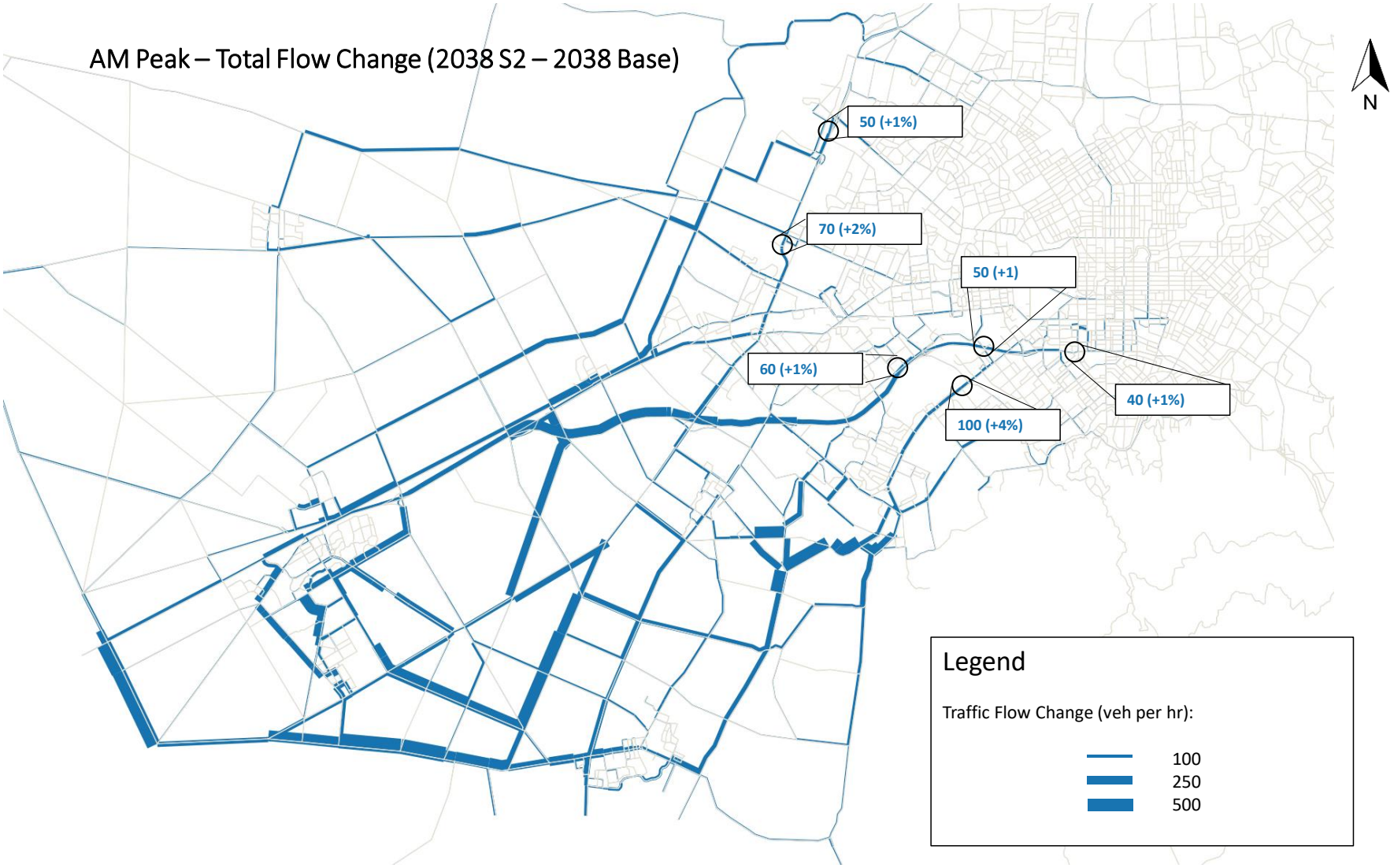

AM Peak 2038- S2 Total Traffic Flow (vph)
N
Legend
Traffic Flow (veh per hr):
Total
Heavy
500
1,000
2,000

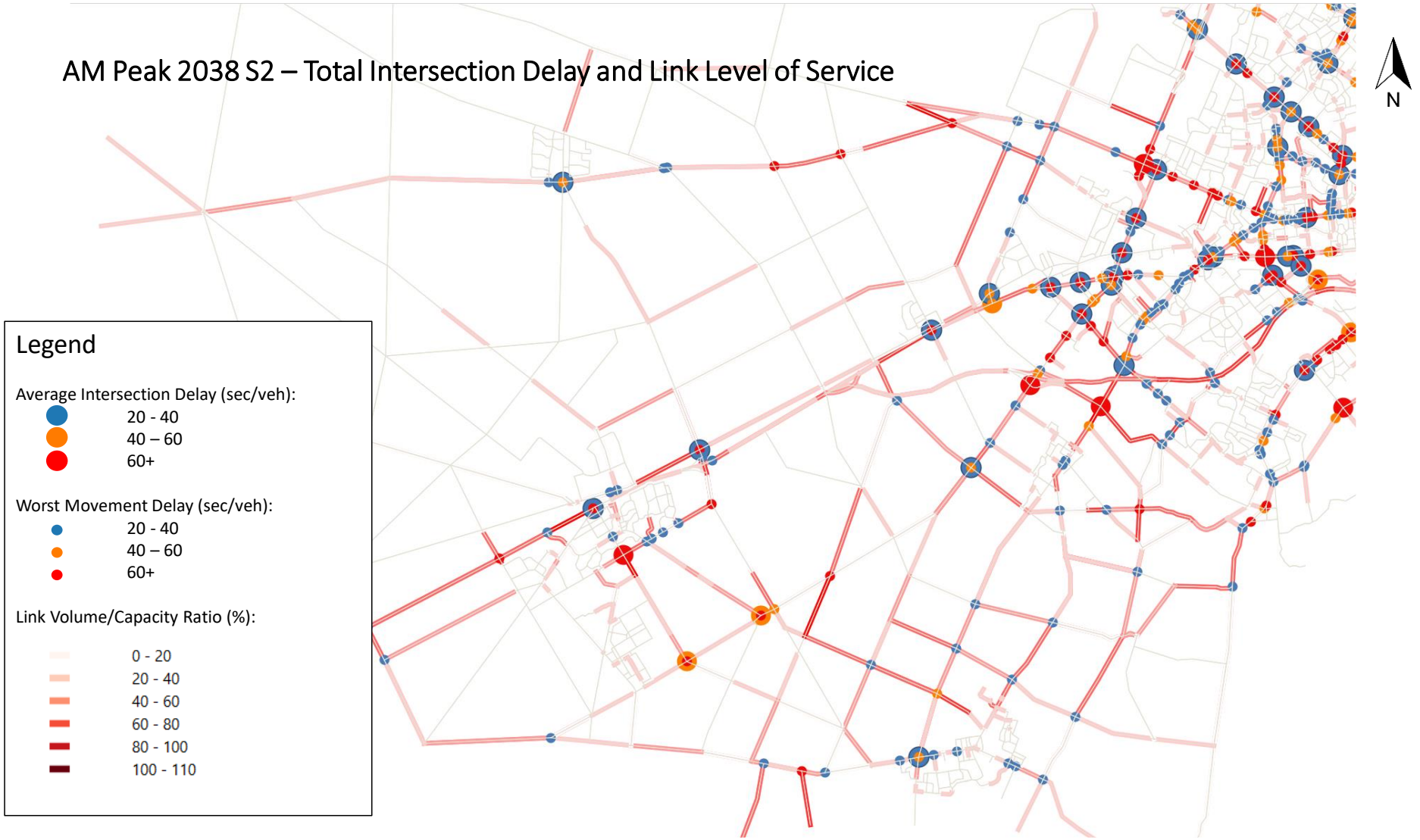

AM Peak 2038 – S2 Heavy Vehicle Flow (vph)
N
Legend
Heavy Vehicle Traffic Flow
(veh per hr)
125
250
500


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

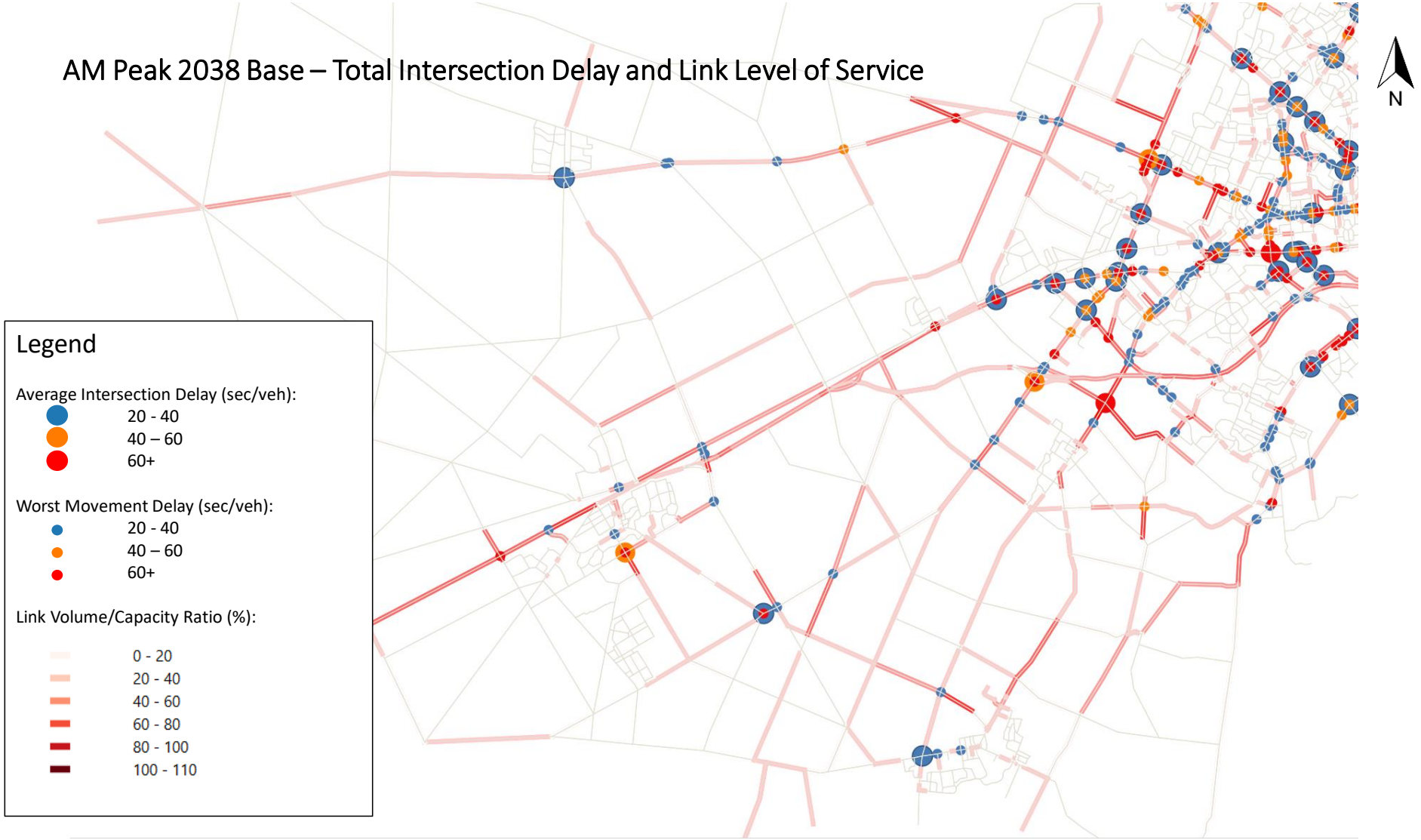




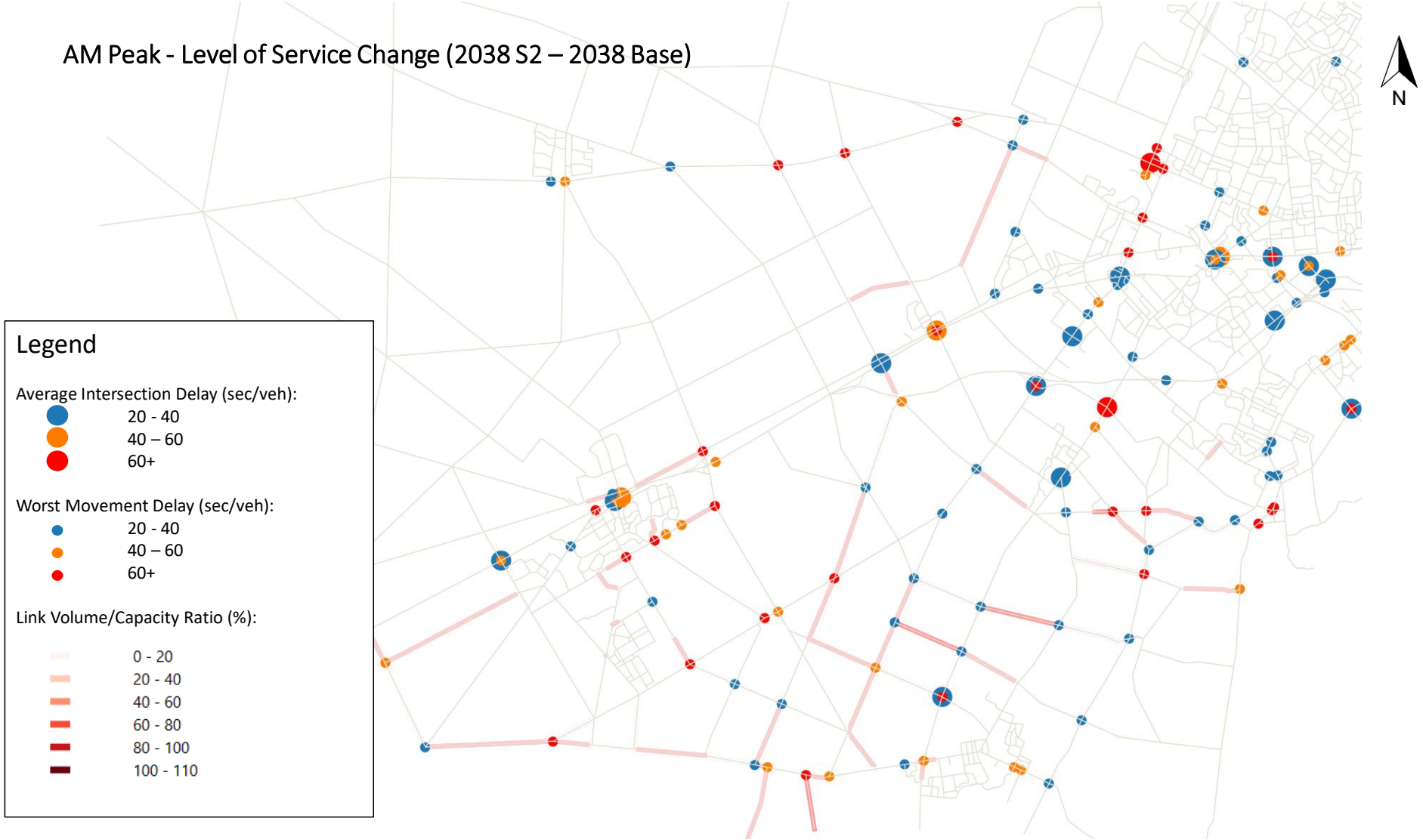
AM Peak 2038 S2 – Total Intersection Delay and Link Level of Service



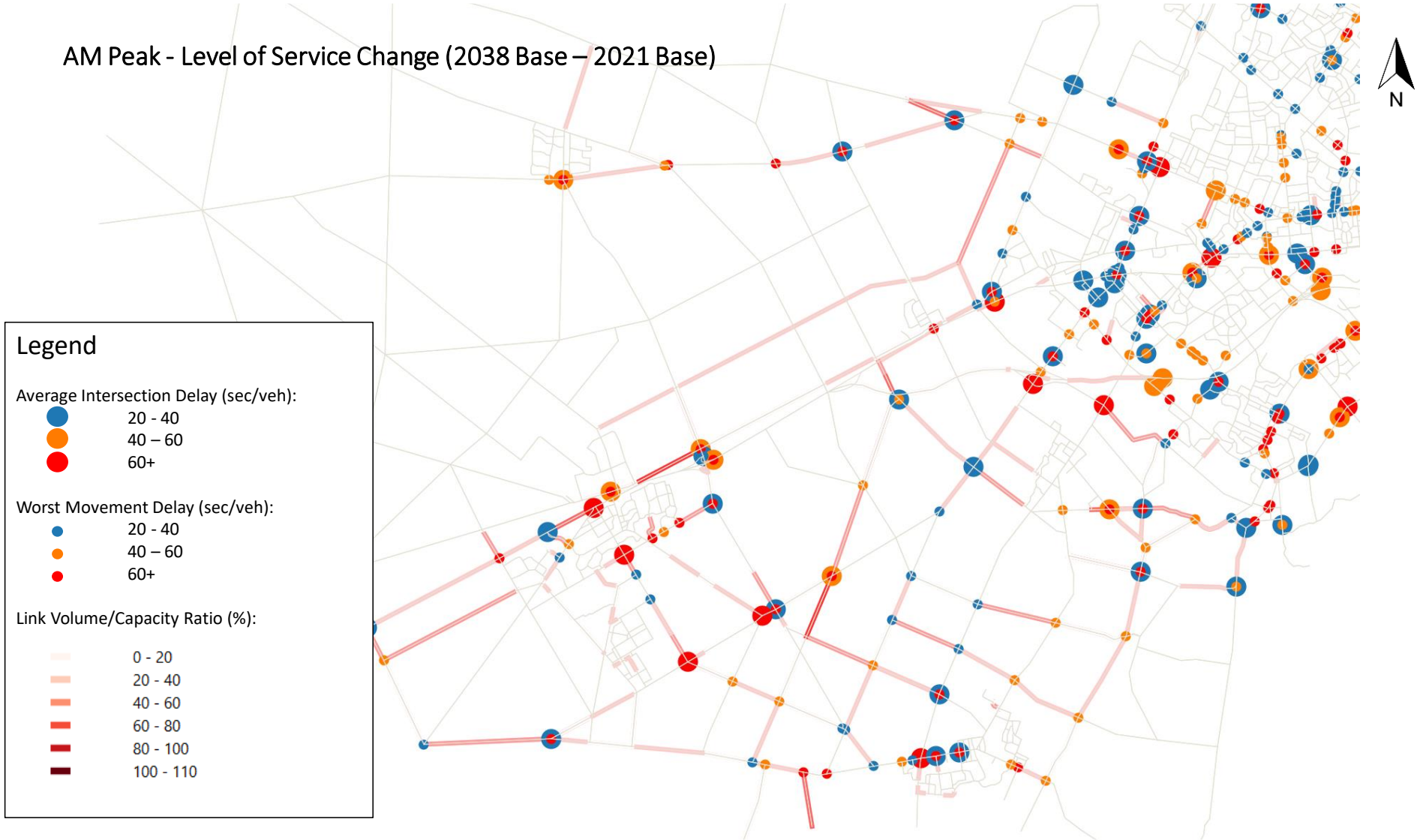
AM Peak 2038 Base – Total Intersection Delay and Link Level of Service



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%