Private Plan Change 81 and Private Plan Change 82

Transportation Hearing Report

August 2022

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TRANSPORTATION SPECIALISTS

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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 81 (PPC81), which has been lodged by Rolleston Industrial Developments Limited
- Private Plan Change 82 (PPC82), which has been lodged by Brookside Road Residential Limited.

As part of my review, I have considered the cumulative transport effects of multiple private plan changes (PPCs) within Rolleston, being

- PPC64: Rolleston, 969 residential lots
- PPC66: Rolleston, rural zone to industrial zone
- PPC70: Rolleston, 800 residential lots plus commercial
- PPC71: Rolleston, 660 residential lots
- PPC73: Rolleston, 2100 residential lots plus commercial
- PPC75: Rolleston, 280 residential lots
- PPC76: Rolleston, 150 residential lots
- PPC78: Rolleston, 750 residential lots
- PPC80: Rolleston, rural to industrial zone
- PPC81: Rolleston, 350 residential lots (subject of this report)
- PPC82: Rolleston, 1320 residential lots (subject of this report).

This report focuses on my review of PPC81 and PPC82, however I include comments on the cumulative effect of the other PPCs to assist Council's understanding of the potential future effects on the transport network should all PPCs be approved. While PPC73 has been declined I understand that this decision has been appealed to the Environment Court. For the purposes of my assessment of cumulative effects on the Rolleston transport network, I included traffic that could be generated by PPC73 if it becomes operative.

Key transport matters identified in my review are

- The cumulative effect of the multiple PPCs on the Rolleston transport network, and the proportional effect of PPC81 and PPC82
- The safety and efficiency effects of PPC81 and PPC82 on key intersections, and what intersection and road upgrades are required to support PPC81 and PPC82
- Connectivity of the Outline Development Plans within the sites, and to the adjacent existing and future transport network
- Consideration of the Rolleston Structure Plan and the Canterbury Regional Policy Statement infrastructure boundary.

In terms of the immediate effects of PPC81 and PPC82, and the proposed ODP

- The Integrated Transport Assessments supporting PPC81 and PPC82 were prepared prior to the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (RMA-EHS), specifically the Medium Density Residential Standards (MDRS). In terms of the assumed yield for PPC81 and PPC82, based on my work as Councils Transport Expert for other Plan Changes within Selwyn I consider the assumed 12 households per hectare to reasonable. I note that there is a difference between development intensity enabled by the MDRS vs what might be reasonably feasible from a market economics perspective. I am not able to comment on whether market economics may drive a more intensive development outcome. To address this, I understand that the requestors are proposing a dwelling threshold at which an updated Integrated Transport Assessment would be required. From a transport effects perspective, I support the proposed dwelling threshold rule for PPC81 and PPC82. However, in my experience this type of rule can have some complexities and potential unintended outcomes, which increase as the number of landowners that are subject to the threshold rule increase. I recommend that Council's Planner consider whether this rule can be efficiently and effectively managed by Council through the consenting process. Refer to my discussion in Section 2
- The State Highway 1 / Dunns Crossing Road / Walkers Road intersection will experience an increase in average delays in the 2033 morning peak due to PPC81 and PPC82, which may classify the western and/or southern approach as operating at LOS F. However, in my opinion a degree of congestion is to be expected within urban areas during peak commuter periods. Critical efficiency effects at intersections tend to be indicated in traffic models by exponential increases in queue lengths, and/or volume to capacity ratios that are approaching or exceeding 1. Neither applies in this situation. I therefore consider that the effects of PPC81 and PPC82 on the State Highway 1 / Dunns Crossing Road / Walkers Road intersection are within the range of what is acceptable during peak periods, should the intersection be upgraded to a dual lane roundabout. However, I consider that the existing safety issues at this intersection mean that any traffic generated by PPC81 or PPC82 prior to the intersection being upgraded will cause unacceptable safety effects. I therefore recommend that no earthworks activity is to be undertaken within PPC81 or PPC82 prior to the commencement of the upgrade of the intersection. Refer to my discussion in Section 7.1
- The PPC81 ITA has identified performance issues with the Dunns Crossing Road / Newman Road intersection, with the average delay on Newman Road increasing from 43 seconds to 52 seconds. However, in my opinion a degree of congestion is to be expected within urban areas during peak commuter periods. I therefore consider that the effects of PPC81 and PPC82 on the Dunns Crossing Road / Newman Road intersection are within the range of what is acceptable during peak periods. Refer to my discussion in Section 7.2
- The traffic modelling for the Dunns Crossing Road / Burnham School Road intersection indicates that this intersection will operate acceptably with PPC81 and PPC82 traffic, once it is upgraded to a signalised intersection. As the ITAs have not assessed the effect of PPC81 or PPC82 on the existing stop-controlled intersection, I recommend that no buildings are permitted to be occupied within PPC81 or PPC82 prior to signalisation. Refer to my discussion in Section 7.3

- I recommend that no buildings are permitted to be occupied within PPC82 prior to the realignment of Brookside Road (west of Dunns Crossing Road) to intersect with the Dunns Crossing Road / Lowes Road intersection, and that the existing section of Brookside Road is redesigned to prevent through movement while maintaining existing vehicle access to adjacent properties. Refer to my discussion in Section 7.4
- The traffic modelling for the Dunns Crossing Road / Lowes Road intersection indicates that this intersection will operate acceptably with PPC81 and PPC82 traffic, once it is upgraded to a roundabout. As the ITAs have not assessed the effect of PPC81 or PPC82 on the existing stop-controlled intersection, I recommend that no buildings are permitted to be occupied within PPC81 or PPC82 prior to the intersection being upgraded. Refer to my discussion in Section 7.5
- The traffic modelling for the Dunns Crossing Road / Selwyn Road / Goulds Road intersection indicates that this intersection will operate acceptably with PPC81 and PPC82 traffic, when it is upgraded to a roundabout with the Goulds Road realignment. As the ITAs have not assessed the safety and efficiency effects of PPC81 and PPC82 on the existing intersection, I recommend that no buildings are permitted to be occupied within PPC81 or PPC82 prior to the intersection being upgraded. I recommend that that a setback be identified within the PPC81 ODP, which controls development within the footprint of the indicative realignment of Selwyn Road and the Selwyn Road/Goulds Road intersection. Refer to my discussion in Section 7.6
- The PPC82 ITA and Clause 23 responses identify that the following upgrades are required prior to any dwellings being occupied on parts of the site with vehicle access to Brookside Road or Edwards Road
    - Edwards Road should be sealed along its entire length
    - The Edwards Road / Ellesmere Junction Road intersection should be realigned.

  However, the ODP only identifies that these upgrades need to be considered at the time of subdivision consent. In my view the requirement to seal Edwards Road and realign the intersection of Edwards Road with Ellesmere Junction Road should be secured as part of the plan change, as delaying this assessment to future subdivision consent stage is unlikely to allow Council to consider the cumulative effects of PPC82, nor address matters such as acquisition of third party land. Refer to my discussion in Section 7.7
- I consider that PPC81 and PPC82 will likely have moderate accessibility by walking, cycling and public transport in the future. This level of accessibility is likely to be comparative to surrounding future developments that are inside the infrastructure boundary specified in the Canterbury Regional Policy Statement, for example the adjacent PPC70. The degree of accessibility by walking, cycling and public transport will depend on urbanisation of surrounding land, including PPC70 and PPC73. Refer to my discussion in Section 7.9
- I consider that the PPC81 and PPC82 ITAs and ODPs provide for an internal street network that generally integrates well with the surrounding existing and potential future transport network, and will provide for all users of the transport system. I recommend several changes to the ODPs (Refer to my discussion in Section 7.10)
    - that the PPC81 ODP identifies that a rural/urban gateway treatment is to be provided on Selwyn Road, near the western extent of PPC81

- that the PPC81 ODP extends the north-south secondary road south to connect with the southern east-west primary road
- that the PPC82 ODP identifies that a rural/urban gateway treatment is to be provided on Brookside Road and Edwards Road, near the western and southern extents of PPC82 respectively
- that the PPC81 ODP identifies that Selwyn Road along the site frontage is a walking and cycling route
- that the PPC82 ODP identifies that Brookside Road and Edwards Road along the site frontage are walking and cycling routes

- I support the upgrades and staging identified Table 1 of the PPC81 ODP, other than (refer to my discussion in Section 7.11)
  - the physical works for the SH1/Dunns Crossing Road intersection upgrade should be underway or complete, prior to any earthworks or construction works commencing within PPC81
  - the Dunns Crossing Road / Newman Road intersection does not need to be upgraded prior to development within PPC81
- I consider that the PPC82 ODP narrative should include the following upgrades (refer to my discussion in Section 7.11)
  - the physical works for the SH1/Dunns Crossing Road intersection upgrade should be underway or complete, prior to any earthworks or construction works commencing within PPC82
  - Dunns Crossing Road / Burnham School Road: in my view no built development should occur within PPC82 prior to the signalisation of this intersection
  - Dunns Crossing Road / Selwyn Road: in my view no built development should occur within PPC82 prior to the upgrade of this intersection. Refer to my discussion in Section 7.6
  - Edwards Road sealing and Edwards Road / Ellesmere Junction Road realignment: in my view these upgrades are required prior to any vehicle connection from PPC82 to Brookside Road or Edwards Road
- I recommend that Council's Planner consider (refer to my discussion in Section 7.11)
  - whether the ODP narrative is robust enough to ensure development is staged with the identified improvements to the transport network, or whether an alternative planning mechanism such as a District Plan rule is more appropriate
  - whether, in relation to "built development", Council can efficiently and effectively monitor "dwelling occupation" as a control for these upgrades, or whether an alternative control such as "prior to the issue of any s224 subdivision certificate" is more appropriate
- PPC81 and PPC82 are inconsistent with the Rolleston Structure Plan and CRPS infrastructure boundary, in that they are outside the anticipated future urban area. Should PPC81 and PPC82 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. However, assessing the effects of such development on the long term planning and funding commitments associated with bulk transport infrastructure is complex and requires assessment of multiple land use scenarios at a District or Regional level. At a District or Regional level assessment the effects of PPC81 and PPC82 are unlikely to be overly apparent. Refer to my discussion in Section 8.

I recommend that Council consider the following matters regarding effects on the wider transport network

- It is not clear to me why the PPC82 Paramics model anticipates a lower total travel demand compared with the PPC81 Paramics model. Concurrently with the development of the PPC81 Paramics model and the PPC82 Paramics model, Waka Kotahi has developed an alternative version of the Paramics model to investigate how the SH1 NZUP project might affect the transport network. I understand that this model includes the conversion of the SH1/Rolleston Drive South intersection into a left in/left out intersection. This is not reflected in the Paramics models that we have relied upon for this report. We have referred to both the PPC81 and the PPC82 Paramics models in our assessment of PPC81 and PPC82, and where relevant identify which model we have relied upon. I note that the PPC81 and PPC82 Paramics models do not incorporate the change to the SH1/Rolleston Drive South intersection, proposed as part of NZUP. Should NZUP implement these changes, it is likely that our reporting of traffic effects on Dunns Crossing Road, Brookside Road, Lowes Road (among others) is under indicated. Refer to my discussion in Section 6
- I recommend that Council consider the proportional effect that each PPC will have on network hotspots and assumed intersection improvements contained in the Rolleston Paramics model, as identified in Table 3. Council should consider whether the proportional effects of PPC81 and PPC82 affect programmed funding within the Long Term Plan, whether new projects should be added to the Long Term Plan, and how Development Contributions are calculated. I note that there are discrepancies between the total travel demand and traffic routing in the PPC81, PPC82 and NZUP Paramics models. Should the Paramics models be used to determine how Development Contributions are calculated, I recommend that inconsistencies between the PPC81, PPC82 and NZUP Paramics models are addressed. Refer to my discussion in Section 6.1
- I recommend that Council consider whether the Lowes Road/Broadlands Drive intersection requires an upgrade prior to 2033, for example to signals or a roundabout, and whether the current Development Contributions policy is sufficient to reflect traffic demand through this intersection generated by PPC82. Refer to my discussion in Section 7.8.

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APPENDICES

1 INTRODUCTION

This report has been completed by Mat Collins (Associate) with assistance from Qing Li (Senior 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[1].

Selwyn District Council (Council) has requested Flow Transportation Specialists (Flow) to assist with the review of transportation matters associated with multiple Private Plan Changes (PPCs) within Rolleston

- PPC64: Rolleston, 969 residential lots. Status: approved consent to subdivide and develop the proposed land for housing under the COVID-19 Recovery (Fast-track Consenting) Referred Projects Order 2020
- PPC70: Rolleston, 800 residential lots plus commercial. Status: Awaiting response to Council's request for further information issued 24 December 2020
- PPC71: Rolleston, 660 residential lots. Status: Hearing closed as of 28 March 2022. Awaiting Commissioners recommendation
- PPC73: Rolleston, 2100 residential lots plus commercial. Status: Declined by Council, currently under appeal
- PPC75: Rolleston, 280 residential lots. Status: Approved by Council, no appeals received. Plan change to be included in Variation
- PPC76: Rolleston, 150 residential lots. Status: Approved by Council, no appeals received. Plan change to be included in Variation
- PPC78: Rolleston, 750 residential lots. Status: Approved by Council, no appeals received. Plan change to be included in Variation
- PPC80: Rolleston, rural to industrial zone. Further Submission period closed Wednesday 22 June 2022. Hearing anticipated late 2022
- PPC82: Rolleston, 1320 residential lots. Further Submission period closed Wednesday 22 June 2022. Hearing anticipated in September 2022.

While PPC73 has been declined I understand that this decision has been appealed to the Environment Court. For the purposes of my assessment of cumulative effects on the Rolleston transport network, I included traffic that could be generated by PPC73 if it becomes operative.

In addition, PPC66 in Rolleston (which seeks to rezone 27ha of rural land to industrial zone) has been included in our consideration of the cumulative traffic effects of the PPCs within the Rolleston area. PPC66 is operative as of 11 February 2022.

[1] Note: This report has primarily been written by Mat Collins. In the instance that I am relying on my expert opinion, I use "I" and "my" throughout the report. In the instance that I am relying on the transport modelling expert option of Qing Li and/or Ian Clark, I use "we" and "our" throughout the report.

Rolleston Industrial Developments Limited (PPC81 requestor) has lodged a PPC to change the Selwyn District Plan to rezone approximately 28 hectares of Rural Outer Plains zoned land to Living MD (PPC81). Brookside Road Residential Limited (PPC82 requestor) has lodged a PPC to change the Selwyn District Plan to rezone approximately 110 hectares of Rural Outer Plains zoned land to Living MD and Business 1 zone (PPC82).

This report details my review of PPC81 and PPC82. Where relevant I also make comments about the cumulative effects of all other Rolleston PPCs so that Council may understand how the future transport network may operate should all PPCs be approved.

The scope of this specialist transport report is to assist Council in determining the transport outcomes of PPC81 and includes the following

- A summary of PPC81 and PPC82 focusing on transport matters
- An overview of transport projects contained within the Long Term Plan (LTP), which are relevant to PPC81
- A summary of the modelled traffic effects of all Rolleston PPCs
- A review of the material provided to support the application for PPC81 and PPC82, and discussion of the potential effects of PPC81 and PPC82
- 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 Novo Group Limited, dated March 2022, including appendices relevant to transport matters (as notified)
- Third party traffic model files, as discussed in Section 5
- Submissions as outlined in Section 9.

2 THE RESOURCE MANAGEMENT (ENABLING HOUSING SUPPLY AND OTHER MATTERS) AMENDMENT ACT 2021

I note that the Integrated Transport Assessments (ITA) supporting PPC81 and PPC82 were prepared before the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (RMA-EHS), specifically the Medium Density Residential Standards (MDRS). The RMA-EHS requires tier 1 territorial authorities incorporate a prescribed approach to development within residential zones.

A territorial authority may make the MDRS less enabling of development in a relevant residential zone only to the extent necessary to accommodate one or more of the qualifying matters listed under section 77I of the Resource Management Act[2]. Transport constraints can be considered a qualifying matter.

As discussed in later sections of my report, I consider that there are constraints on the existing and future transport network. However, in my view these constraints can be addressed through improvements delivered by the developers, territorial authorities, and Waka Kotahi NZTA. Rather than seek an exclusion from the MDRS due to transport constraints, I understand that the requestors are proposing a threshold at which an updated Integrated Transport Assessment would be required[3]

- For PPC81 this rule would apply to any subdivision resulting in more than 350 allotments, or which provides for more than 350 dwellings, in total on the subject land
- For PPC82 this rule would apply to any subdivision resulting in more than 1320 allotments, or which provides for more than 1320 dwellings, in total on the subject land.

In terms of the assumed yield for PPC81 and PPC82, based on my work as Councils Transport Expert for other Plan Changes within Selwyn I consider the assumed 12 households per hectare to reasonable. I note that there is a difference between development intensity enabled by the MDRS vs what might be reasonably feasible from a market economics perspective. I am not able to comment on whether market economics may drive a more intensive development outcome.

From a transport effects perspective, to address the uncertainty of whether market economics may drive more intensive development, I support the proposed threshold rule for two Plan Changes. However, in my experience this type of rule can have some complexities and potential unintended outcomes, which increase as the number of landowners that are subject to the threshold rule increase.

Should the Plan Changes be approved and subdivided, the effectiveness of a threshold rule diminishes as the number of land owners increases. For example

- Subdivision consent can be sought for superlot subdivision, with the superlots then being onsold to a number of smaller developers

[2] Medium Density Residential Standards, A guide for local authorities, Ministry for the Environment, available online https://environment.govt.nz/assets/publications/Files/Medium-Density-Residential-Standards-A-guide-for-territorial-authorities-July-2022.pdf

[3] Information received via email from jeremy@novogroup.co.nz, Subject "PC81 and PC82 amendments", sent Monday, 8 August 2022 3:07 pm

- Subsequent land use consents for those superlots could result in the dwellings threshold being exceeded
- This can create a "first mover advantage" situation. The developer that lodges the land use consent that triggers the dwelling rule can become responsible for wider transport improvements that exceed their proportional share of effects on the transport network – e.g. the ITA required by the threshold rule may identify that a major intersection upgrade is required.

I note that the requestor has suggested that legal mechanisms or other features proposed as part of a subdivision consent application might be able to limit dwelling numbers in order to remain within the rule threshold. Again, from a transport effects perspective I consider that this would be suitable, however I recommend that Council's Planner consider whether this can be efficiently and effectively managed by Council through the consenting process.

Outcome: The Integrated Transport Assessments supporting PPC81 and PPC82 were prepared prior to the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (RMA-EHS), specifically the Medium Density Residential Standards (MDRS). In terms of the assumed yield for PPC81 and PPC82, based on my work as Councils Transport Expert for other Plan Changes within Selwyn I consider the assumed 12 households per hectare to reasonable. I note that there is a difference between development intensity enabled by the MDRS vs what might be reasonably feasible from a market economics perspective. I am not able to comment on whether market economics may drive a more intensive development outcome. To address this, I understand that the requestors are proposing a dwelling threshold at which an updated Integrated Transport Assessment would be required. From a transport effects perspective, I support the proposed dwelling threshold rule for PPC81 and PPC82. However, in my experience this type of rule can have some complexities and potential unintended outcomes, which increase as the number of landowners that are subject to the threshold rule increase. I recommend that Council's Planner consider whether this rule can be efficiently and effectively managed by Council through the consenting process.

3 A SUMMARY OF PPC81

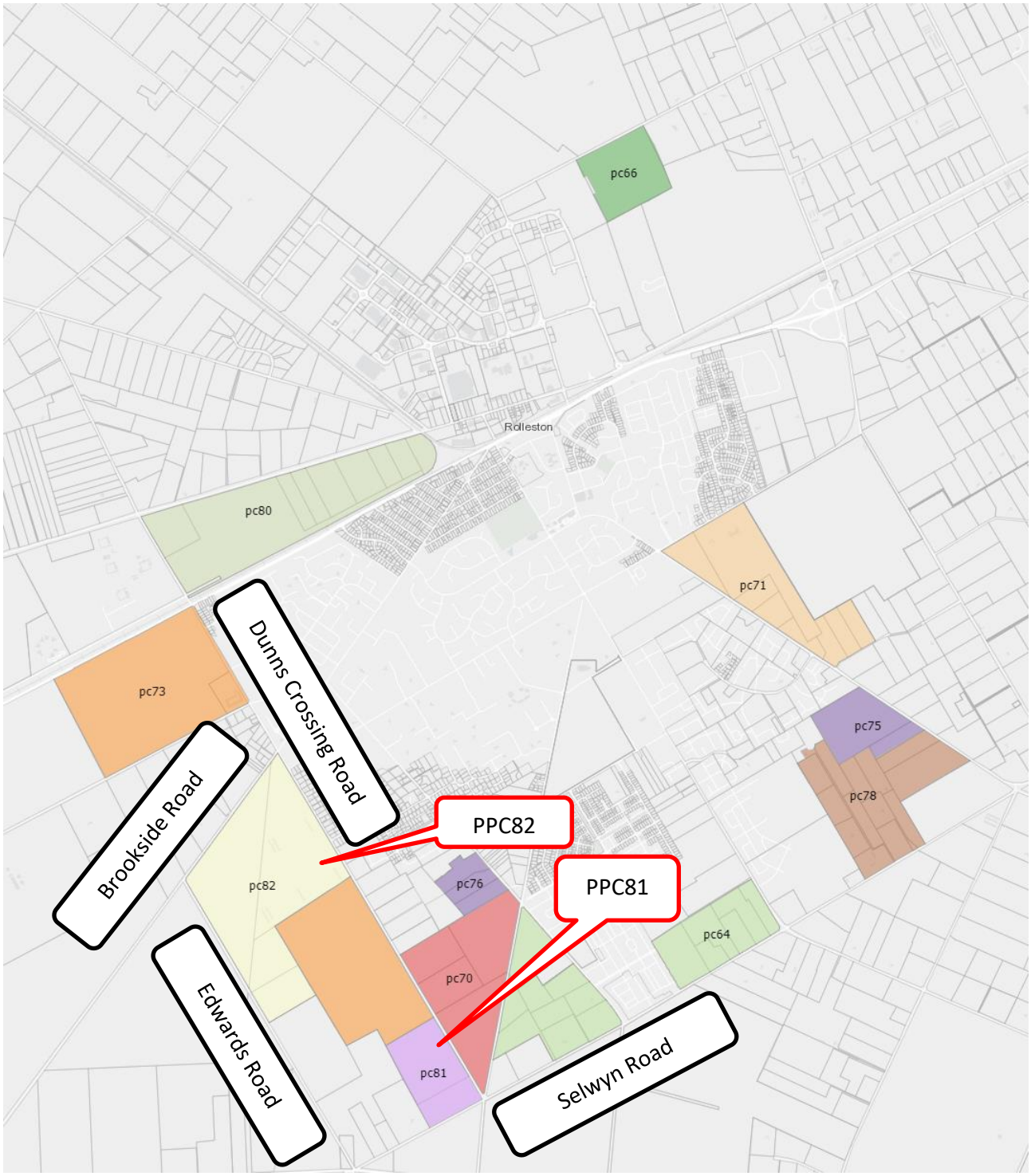
PPC81 proposes to rezone approximately 28 hectares of Rural Outer Plains zoned land to Living MD zone, with an Outline Development Plan (ODP) proposed to guide the form and layout of future development. PPC81 is west of west of PPC70 and PPC64 and south of the Living 3 Zone (Skellerup Block) which is subject to PC73. While PC73 has been declined I understand that this decision has been appealed to the Environment Court . PPC81 has road frontages to Dunns Crossing Road and Selwyn Road, as shown in Figure 1 and Figure 2.

The ODP is shown in Figure 3 and is intended to provide

- Approximately 350 residential lots
- Connections to the surrounding existing and future transport network
- Identification of two intersections with Dunns Crossing Road
- Identification of one key intersection with Selwyn Road.

Dunns Crossing Road along the site frontage is identified as a local road in the Operative District Plan, and an arterial road in the Proposed District Plan. Selwyn Road along the site frontage is identified as a Local Road in the Operative District Plan and in the Proposed District Plan.

Figure 1: Overview of PPC81 and PPC82, with other nearby Rolleston PPCs[4]



[4] 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: PPC81 and PPC82 extent

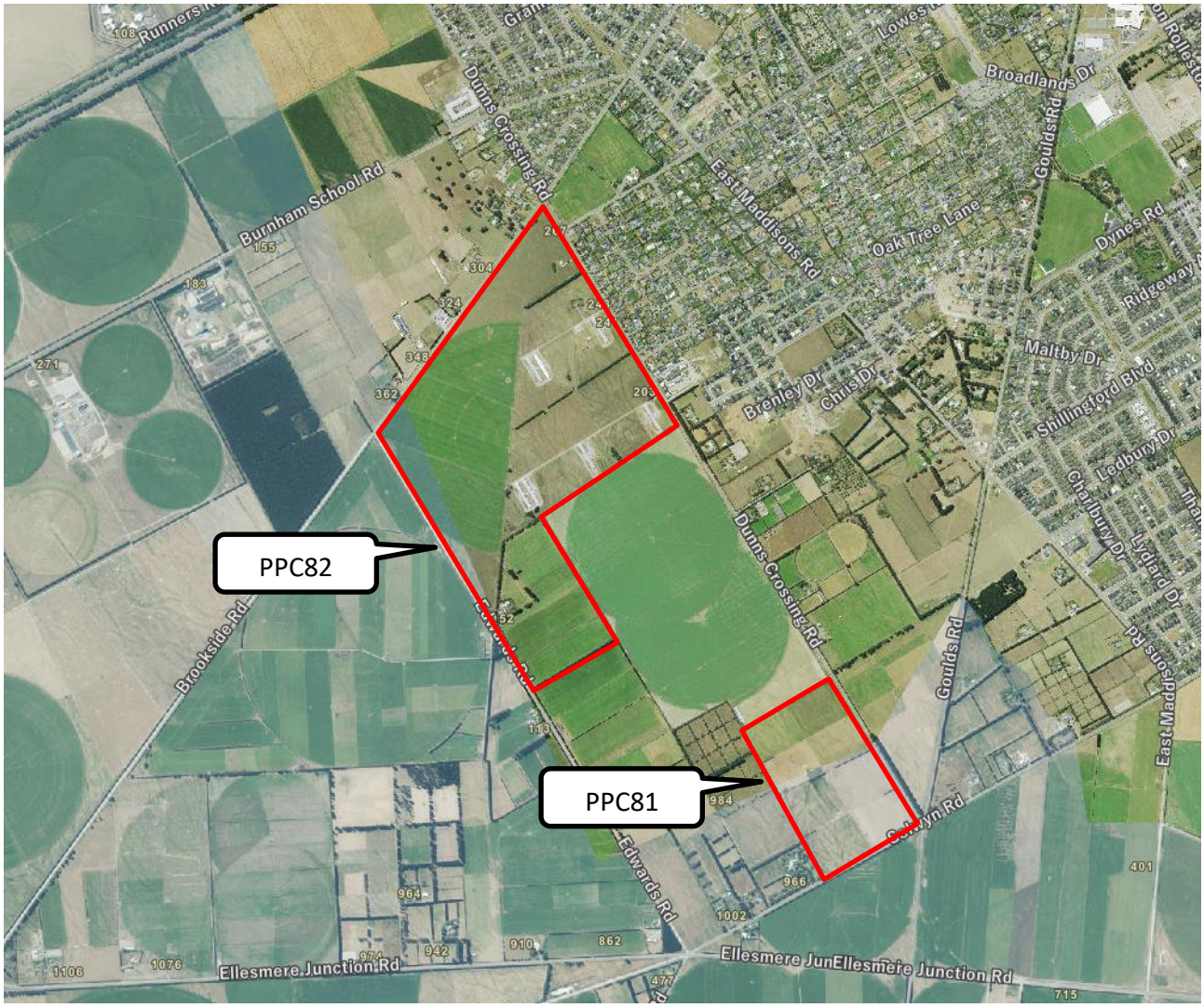
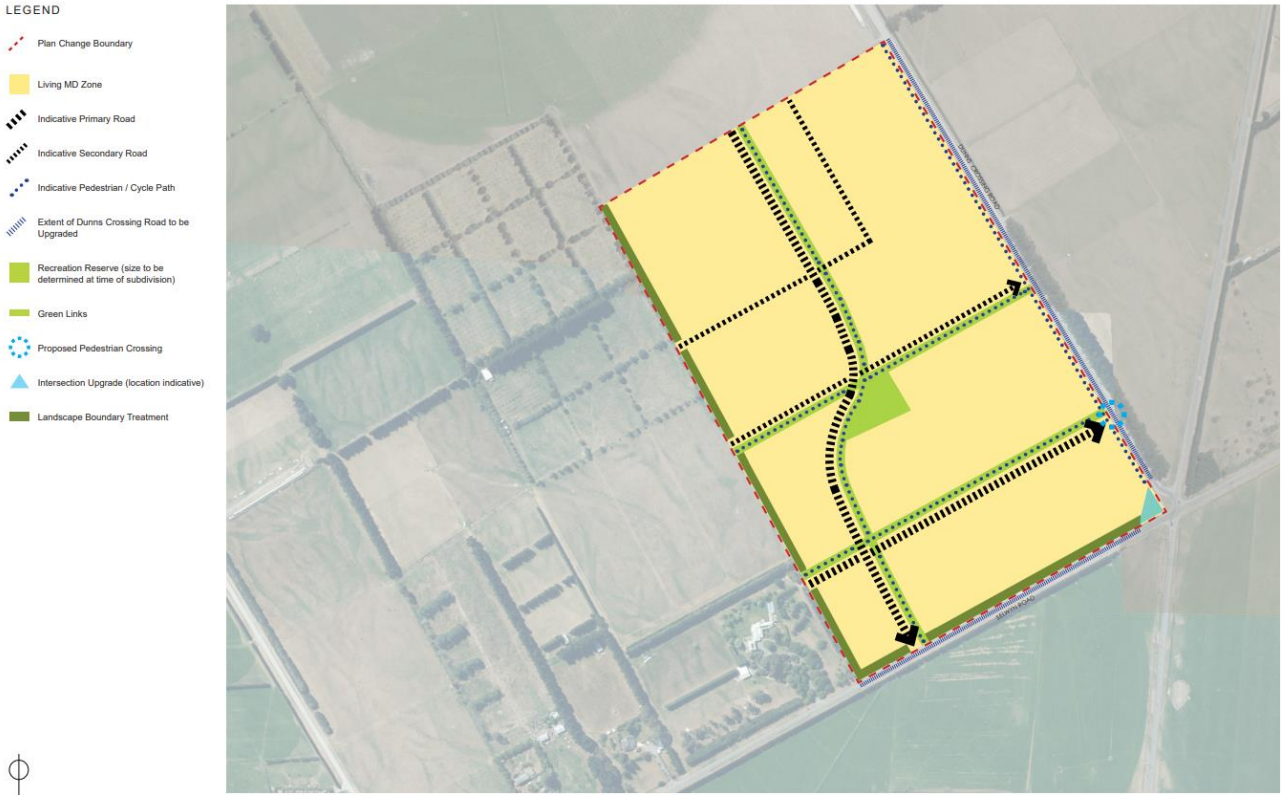


Figure 3: PPC81 ODP



4 A SUMMARY OF PPC82

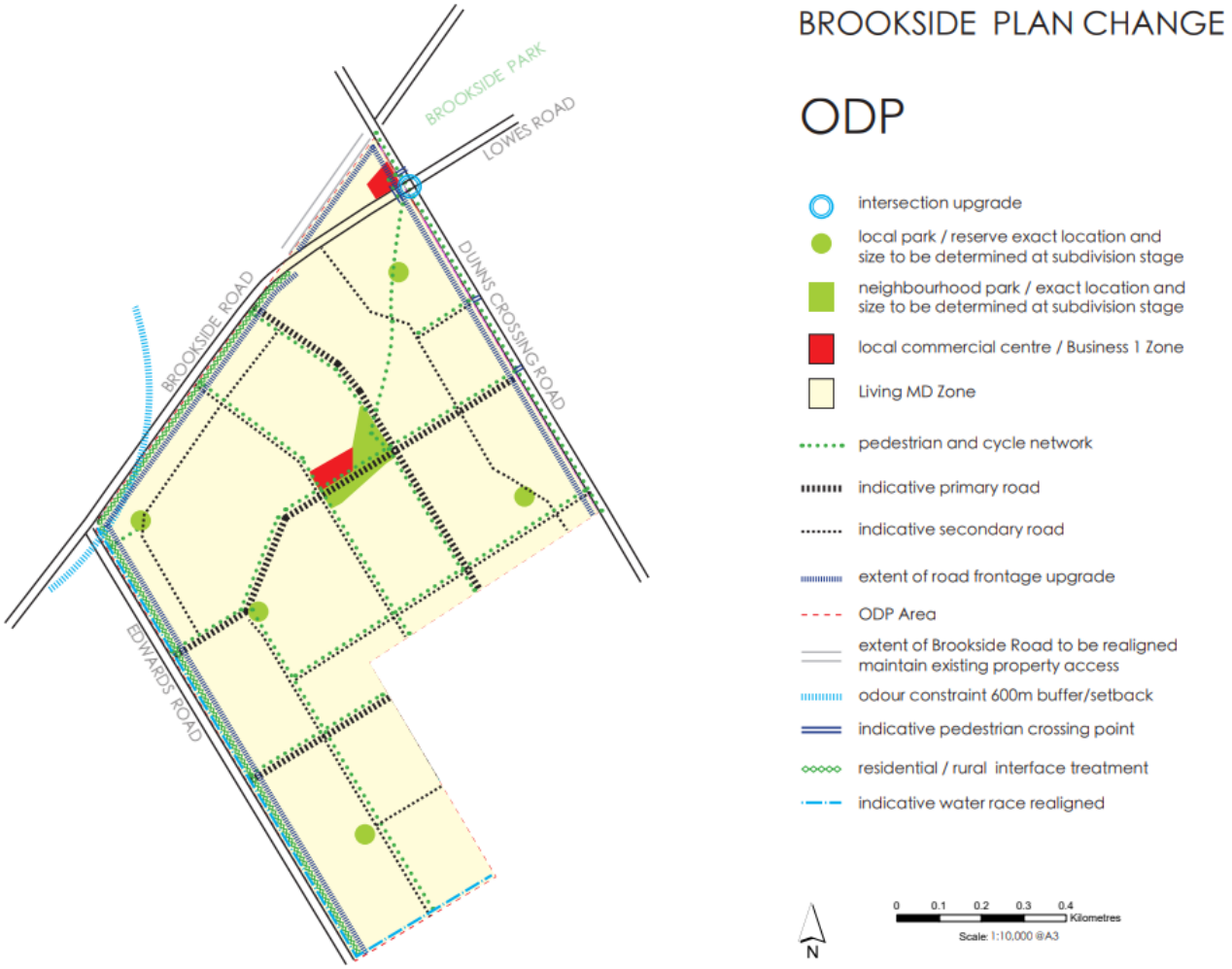
PPC82 proposes to rezone approximately 110 hectares of Rural Outer Plains zoned land to Living MD Zone and Business 1 zone, with an Outline Development Plan (ODP) proposed to guide the form and layout of future development. PPC82 is north of the Living 3 Zone (Skellerup Block) the south of the Living 3 Zone (Holmes Block) which are subject to PC73. While PC73 has been declined I understand that this decision has been appealed to the Environment Court. PPC82 has road frontages to Dunns Crossing Road and Selwyn Road, as shown in Figure 1 and Figure 2.

The ODP is shown in Figure 4 and is intended to provide

- Approximately 1,320 residential lots
- Connections to the surrounding existing and future transport network
- Several new intersections with Dunns Crossing Road, Brookside Road, and Edwards Road
- Upgrade of the Dunns Crossing Road / Lowes Road intersection
- Realignment of Brookside Road, to connect with Lowes Road
- Multiple walking and cycling routes within the development area.

Dunns Crossing Road along the site frontage is identified as a local road south of Lowes Road and an arterial north of Lowes Road in the Operative District Plan. Dunns Crossing Road is identified as an arterial road in the Proposed District Plan. Brookside Road and Edwards Road along the site frontages are identified as local roads in the Operative District Plan and in the Proposed District Plan.

Figure 4: PPC82 ODP



5 ROLLESTON TRANSPORT PROJECTS RELEVANT TO PPC81 AND PPC82

This section discusses various funded and planned transport projects in Rolleston that have relevance to PPC81 and PPC82.

5.1 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 PPC81 and PPC82. I have reproduced these in Table 1 below. Further discussion of how PPC81 and PPC82 are anticipated to affect various parts of the transport network is provided in Section 6.

Table 1: LTP transport projects relevant to PPC81

Project	Scheduled year	Description	Relevance to PPC81	Relevance to PPC82
Traffic Signals at Rolleston Drive/Tennyson Street	2021/22	Safety upgrade, including safer pedestrian crossing	PPC81 contributes less than 1% of peak hour traffic movements in 2033	PPC82 contributes less than 1.5% of peak hour traffic movements in 2033
Foster Park - Park N Ride	2023/24	Improved parking to access express bus services	Supports improved Public Transport access between Rolleston and Christchurch	
Brookside Road/Rolleston Drive Roundabout	2024/25	Safety upgrade	PPC81 contributes less than 1% of peak hour traffic movements in 2033	PPC82 contributes almost 5% of peak hour traffic movements in 2033
Springston Rolleston Road/Selwyn Road intersection	2024/27	Safety upgrade under NLTP (Waka Kotahi)	PPC81 contributes around 1.5% of peak hour traffic movements in 2033	PPC82 contributes around 3% of peak hour traffic movements in 2033
Lowes Road/Levi Drive/Masefield Drive Intersection Upgrade	2025/26	Safety upgrade - link to Southern Motorway Interchange	PPC81 contributes less than 1% of peak hour traffic movements in 2033	PPC82 contributes around 1% of peak hour traffic movements in 2033
Tennyson/Moore Street Roundabout	2026/27	Safety upgrade as part of Moore Street extension	PPC81 contributes less than 1% of peak hour traffic movements in 2033	PPC82 contributes less than 1% of peak hour traffic movements in 2033
Selwyn/Weedons Road Roundabout	2027/28	Safety upgrade - Rolleston southern arterial link	PPC81 contributes less than 1% of peak hour traffic movements in 2033	PPC82 contributes around 1.5% of peak hour traffic movements in 2033

Jones Road Cycleway	2027/28	Between Jones Road and Weedons Road - links to Rolleston to Templeton Cycleway	Minor relevance to PPC81 and PPC82, this is over 6km away, which may be cyclable distance for some people	
Lincoln Rolleston Road/Selwyn Road Intersection Upgrade	2028/29	Safety upgrade - Rolleston southern arterial link	PPC81 contributes less than 1% of peak hour traffic movements in 2033	PPC82 contributes less than 1% of peak hour traffic movements in 2033
Walkers Road/Two Chain Road Roundabout	2028/29	Safety upgrade - Rolleston Industrial Zone southern link	PPC81 contributes less than 1% of peak hour traffic movements in 2033	PPC82 contributes around 1.5% of peak hour traffic movements in 2033
Goulds/East Maddisons Road Roundabout	2029/30	Connects Farrington and new subdivisions to Goulds Road	PPC81 contributes around 3% of peak hour traffic movements in 2033	PPC82 contributes around 2.5% of peak hour traffic movements in 2033
Rolleston to Burnham Cycleway	2029/30	From Elizabeth St to Aylesbury Road along the northside of SH1 and along Runners Road	Some relevance to PPC81 and PPC82, the cycleway is approximately 3km from the sites, this will increase cycle accessibility	
Rolleston 'Park N Ride'	2030/31	New facilities for parking to access to express bus services	Supports improved Public Transport access between Rolleston and Christchurch	
Burnham School Road/Dunns Crossing Road Traffic Signals	2032/33	Project funded beyond the 2021-31 LTP	PPC81 contributes less than 1% of peak hour traffic movements in 2033	PPC82 contributes over 3% of peak hour traffic movements in 2033
Rolleston South to Rolleston Industrial Zone Cycleway	2033/34		Some relevance to PPC81 and PPC82, this is within 5km, which is cyclable distance	
West Melton to Rolleston Cycleway	2034/35			
Lowes Road/Dunns Crossing Road Roundabout	2035/36		PPC81 contributes around 2% of peak hour traffic movements in 2033	PPC82 contributes over 17% of peak hour traffic movements in 2033

Burnham School Road Widening	2042/43		Some relevance, PPC81 generates 1% of peak hour traffic movements at the Burnham School Road/Dunns Crossing Road intersection in 2033	Some relevance, PPC82 generates 3% of peak hour traffic movements at the Burnham School Road/Dunns Crossing Road intersection in 2033

5.2 Transport projects in the New Zealand Upgrade Programme

The New Zealand Upgrade Programme (NZUP) projects in Canterbury are intended to manage growth effects by providing residents with safer and better travel choices, as well as improving freight links to support economic growth and the opening of the Christchurch Southern Motorway through to Rolleston. The NZ Upgrade Programme includes $300 million for six projects to support growth in the south-west sector of Christchurch and neighbouring Selwyn District. Projects relevant to PPC81 and PPC82 are discussed in Table 2.

Table 2: NZUP[5] transport projects relevant to PPC81 and PPC82

Project	Scheduled year	Description	Relevance to PPC81 and PPC82
SH1 Rolleston and Rolleston Flyover[6]	2024/2026	$125 million has been provided to create safer and better access from the residential area across State Highway 1 (SH1) and the Main South Line (railway) to the industrial zone. A new two-lane overbridge will be built to connect the two areas and provide improved walking and cycling facilities. It will cross SH1 from Rolleston Drive to Jones Road. Four intersections along SH1 between Burnham and Rolleston will also be upgraded, with a range of safety improvements to reduce deaths and serious injuries and better manage the forecast future growth in traffic volumes along this section of the highway	Includes upgrade of SH1/Dunns Crossing Road, and potential changes to SH1/Rolleston Drive. The 2033 Rolleston Paramics model assumes that the NZUP projects in Rolleston have been implemented, however it does not include the conversion of the SH1/Rolleston Drive intersection to a left in/left out. Discussion of the SH1/Dunns Crossing Road intersection is provided in Section 1.

[5] NZUP Canterbury Package, available online https://www.nzta.govt.nz/planning-and-investment/nz-upgrade/canterbury-package/

[6] Rolleston flyover and transport improvements media release, July 2022, available online https://www.nzta.govt.nz/media-releases/feedback-sought-on-plan-changes-for-state-highway-1-through-rolleston/

6 MY REVIEW OF TRAFFIC MODELLING FOR THE ROLLESTON AREA

Flow has also used the following existing transport models, provided by Council and the requestors, to assess the potential effect of multiple PPCs within the Rolleston area (as shown in Figure 1)

- 2028 Rolleston Paramics model, produced by Abley on behalf of Council (which excludes the PPCs discussed in Section 1)
- 2033 Rolleston Paramics model, produced by Abley and updated by Abley[7] on behalf of the PPC81 requestor (which includes all PPCs identified in Section 1, other than PPC82)
- 2033 Rolleston Paramics model, produced by Abley and updated by Stantec[8] on behalf of the PPC82 requestor (which includes all PPCs identified in Section 1).

We note the following

- Paramics model used by the PPC81 ITA did not include urbanisation proposed by PPC82, and predicted a total peak hour demand of 32,850 light vehicles and 1,500 heavy vehicles within the modelled area during the AM peak
- The Paramics model used by the PPC82 ITA includes urbanisation proposed by PPC81, and predicted a total peak hour demand of 32,150 light vehicles and 920 heavy vehicles during the AM peak within the same modelled area
- It is not clear to me why the PPC82 Paramics model anticipates a lower total travel demand compared with the PPC81 Paramics model, when it (the PPC82 model) includes a greater quantum of new development.

We have therefore referred to both the PPC81 and the PPC82 Paramics models in our assessment of PPC81 and PPC82, and where relevant we identify which model we have relied upon in the following subsections.

Flow interrogated the models to understand the potential traffic effects of PPC81 and PPC82, in isolation and as a cumulative effect in conjunction with the other Rolleston PPCs. Further detail on the methodology is provided in Appendix B, and our findings are summarised below.

Concurrently with the development of the PPC81 Paramics model and the PPC82 Paramics model, Waka Kotahi has developed an alternative version of the Paramics model to investigate how the SH1 NZUP project might affect the transport network. I understand that this model includes the conversion of the SH1/Rolleston Drive South intersection into a left in/left out intersection. This is not reflected in the Paramics models that I have relied upon for this report, and it is likely to have a consequential effect on the traffic movements on Dunns Crossing Road, Brookside Road, and Lowes Road, among others.

Outcome: It is not clear to me why the PPC82 Paramics model anticipates a lower total travel demand compared with the PPC81 Paramics model. Concurrently with the development of the PPC81 Paramics

[7] Provided to Flow as part of PPC81 Clause 23 responses, from Nick Fuller via email on Monday, 20 December 2021 10:51 AM, subject: Plan Change 81: Traffic Model Files
[8] Provided to Council as part of PPC82 Clause 23 responses, from Fiona Aston via email on Wednesday, 19 January 2022 5:08 PM, subject: FW: PC82 - RFI Transport Response

model and the PPC82 Paramics model, Waka Kotahi has developed an alternative version of the Paramics model to investigate how the SH1 NZUP project might affect the transport network. I understand that this model includes the conversion of the SH1/Rolleston Drive South intersection into a left in/left out intersection. This is not reflected in the Paramics models that I have relied upon for this report. We have referred to both the PPC81 and the PPC82 Paramics models in our assessment of PPC81 and PPC82, and where relevant we identify which model we have relied upon. I note that the PPC81 and PPC82 Paramics models do not incorporate the change to the SH1/Rolleston Drive South intersection, proposed as part of NZUP. Should NZUP implement these changes, it is likely that our reporting of traffic effects on Dunns Crossing Road, Brookside Road, Lowes Road (among others) is under estimated. In my view, additional effects on these roads (beyond those indicated in the PPC81 and PPC82 Paramics models) would need to be considered under the NZUP project.

6.1 PPC81 and PPC82 proportion of the cumulative network effects of all Rolleston PPCs

We have relied on the PPC81 Paramics model to identify intersections will be operating near to or over capacity by 2033 if all PPCs in Rolleston proceed. We have chosen to use the PPC81 Paramics model as this has a higher total traffic demand than the PPC82 Paramics model, as discussed in Section 6. The PPC81 Paramics model indicates that the following intersections will be operating near to or over capacity by 2033 if all PPCs in Rolleston proceed

- SH1/Weedons Interchange South roundabout
- Dunns Crossing Road/Newman Road
- Lowes Road/Broadlands Drive priority intersection
- Levi Road/Ruby Drive priority intersection
- Levi Road/Strauss Drive priority intersection
- Levi Road/Weedons Road priority intersection
- Dunns Crossing Road/Newman Road priority intersection
- SH1/Tennyson Street
- East Maddisons Road/Brookside Road/Burnham School Road
- Broadlands Drive/Learners Drive
- Springston Rolleston Road/Dynes Road
- Jones Road/(Hoskyns) Retail connector
- Jones Road/Weedons Road roundabout.

To determine the extent to which PPC81 and PPC82 are contributing to the capacity effects at these intersections, Flow interrogated the traffic flows generated by each PPC as a proportion of the modelled vehicle flow through each intersection (presented as the combination of both the 1 hour AM and PM peak hour flows, which are generally between 7am-8am and 5pm-6pm). Further, we have included intersections where improvements have been assumed in the PPC81 and PPC82 Paramics models (for example signalisation or conversion to a roundabout). We have used traffic flows from the PPC82

Paramics model to determine the extent to which PPC81 and PPC82 are contributing to the capacity effects, as the PPC81 Paramics model does not include traffic from PPC82.

These results are presented in Table 3, which I have colour coded to assist interpretation

- no shading: the PPC contributes less than 2.5% of total traffic movements at this intersection, which I consider to be less than minor
- orange shading: the PPC contributes between 2.5% and 5% of total traffic movements at this intersection, which I consider to be minor
- red shading: the PPC contributes more than 5% of total traffic movements at this intersection, which I consider to be more than minor.

In relation to intersections with indicated congestion/high delays in 2033

- SH1/Dunns Crossing Road/Walkers Road roundabout is indicated to be performing poorly. PPC81 and PPC82 have less than minor contribution to congestion effects in 2033. Refer to my discussion in Section 7.1
- Dunns Crossing Road/Newman Road priority intersection is indicated to be performing poorly. PPC82 has a significant contribution to congestion effects in 2033 (over 6% of total traffic movements). Refer to my discussion in Section 7.2
- Lowes Road/Broadlands Drive roundabout is indicated to be performing poorly. PPC82 has a significant contribution to congestion effects in 2033 (nearly 6% of total traffic movements). Refer to my discussion in Section 7.5.

In relation to intersections that are not indicated to have congestion/high delays in 2033, but are assumed to have improvements

- Burnham School Road/Dunns Crossing Road is assumed to be upgraded from a cross road to a signalised intersection. PPC82 generates over 3% of total peak hour movements through this intersection. Refer to my discussion in Section 7.3
- Dunns Crossing Road/Goulds Road/Selwyn Road is assumed to be upgraded from a priority intersection to a roundabout, with Goulds Road realigned. PPC81 generates 4% and PPC82 generates almost 7% of total peak hour movements through this intersection. Refer to my discussion in Section 7.6
- Goulds Road /East Maddisons Road is assumed to be upgraded from a priority intersection to a roundabout, which I understand is being delivered by Council and the Faringdon developer. PPC81 generates almost 3% and PPC82 generates over 2.5% of total peak hour movements through this intersection
- Lowes Road/East Maddisons Road is assumed to be upgraded from a priority intersection to a roundabout. PPC82 generates 8% of total peak hour movements through this intersection
- Rolleston Drive/Brookside Road is assumed to be upgraded from a priority intersection to a roundabout. PPC82 generates almost 5% of total peak hour movements through this intersection. Refer to my discussion in Section 7.4 and Section 7.5.

A Select Link Analysis output from the PPC82 Paramics model is provided in Appendix C, demonstrating traffic flows from PPC81 and PPC82.

Based on the PPC82 Paramics model I consider that PPC81 has a

- minor effect on congestion at the Dunns Crossing Road/Newman Road intersection, and the need to upgrade the intersection to include a left turn lane on the Newman Road approach
- minor effect on the need for an upgrade of the Dunns Crossing Road/Goulds Road/Selwyn Road intersection
- minor effect on the need for an upgrade of the Goulds Road /East Maddisons Road intersection.

Based on the PPC82 Paramics model I consider that PPC82 has a

- significant effect on congestion at the Dunns Crossing Road/Newman Road intersection, and the need to upgrade the intersection to include a left turn lane on the Newman Road approach
- significant effect on congestion at the Lowes Road/Broadlands Drive intersection
- significant effect on the need for an upgrade of the Lowes Road/East Maddisons Road intersection
- significant effect on the need for an upgrade of the Dunns Crossing Road/Goulds Road/Selwyn Road intersection
- minor effect on the need for an upgrade of the Burnham School Road/Dunns Crossing Road intersection
- minor effect on the need for an upgrade of the Goulds Road /East Maddisons Road intersection.

Information on the proportional effect of each PPC may assist Council in its consideration of how the Rolleston PPCs may affect funding within the Long Term Plan (LTP), either by bringing forward the timing of planned infrastructure upgrades, or by introducing new projects that are needed within the LTP (for example, those assumed in the PPC81 and PPC82 Paramics model).

As discussed in Section 6, I note that there are discrepancies between the total travel demand and traffic routing in the PPC81, PPC82 and NZUP Paramics models. Should the Paramics models be used to determine how Development Contributions are calculated, I recommend that inconsistencies between the PPC81, PPC82 and NZUP Paramics models are addressed.

Outcome: I recommend that Council consider the proportional effect that each PPC will have on network hotspots and assumed intersection improvements contained in the Rolleston Paramics model, as identified in Table 3. Council should consider whether the proportional effects of PPC81 and PPC82 affect programmed funding within the Long Term Plan, whether new projects should be added to the Long Term Plan, and how Development Contributions are calculated. I note that there are discrepancies between the total travel demand and traffic routing in the PPC81, PPC82 and NZUP Paramics models. Should the Paramics models be used to determine how Development Contributions are calculated, I recommend that inconsistencies between the PPC81, PPC82 and NZUP Paramics models are addressed.

Table 3: future network hotspots, planned Council projects, and proportional PPC effects

Intersection	Existing Layout	Intersection form assumed in models (2028/2033)	2028 performance without PPCs[9] (red for LOS F)	2033[10] performance with plan changes (red for LOS F)	Percentage of traffic associated with each PPC as a proportion of total traffic movements through each intersection (AM and PM combined)[11]										
					PPC73	PPC64	PPC66	PPC70	PPC71	PPC75	PPC76	PPC78	PPC80	PPC81	PPC82
					%	%	%	%	%	%	%	%	%	%	%
Intersections with congestion/high delays in the 2033 Rolleston Paramics model															
SH1/Dunns Crossing Road/Walkers Road	Priority	Roundabout in both years	LOS A in both AM and PM	LOS F on Dunns Crossing and SH1 west in AM	9.3%	0.8%	0.0%	1.0%	0.5%	0.2%	0.2%	0.5%	3.6%	0.4%	2.1%
Dunns Crossing Road/Granite Road	Priority	Priority (T intersection)/Signals (cross intersection)	LOS A in both AM and PM	LOS E on Granite Rd east in AM	30.2%	2.3%	0.0%	3.1%	0.4%	0.2%	0.5%	0.6%	2.8%	1.2%	6.2%
Dunns Crossing Road/Newman Road	Priority	Priority in both years	LOS A in both AM and PM	LOS F on Newman Rd in AM	24.9%	1.9%	0.0%	2.5%	0.2%	0.1%	0.4%	0.5%	2.8%	1.2%	6.2%
Jones Road/Weedons Road	Roundabout	Roundabout in both years	LOS A in both AM and PM	LOS F on all approaches except Weedons Road South in PM	2.1%	0.9%	0.6%	0.9%	0.7%	0.3%	0.2%	0.8%	2.3%	0.3%	1.0%
Levi Road/Ruby Drive	Priority	Priority in both years	LOS B and C in AM and PM respectively	LOS F in both AM and PM	2.0%	1.9%	0.0%	3.0%	5.5%	0.7%	0.6%	0.8%	0.1%	0.6%	0.8%
Levi Road/Strauss Drive	Priority	Priority in both years	LOS D and C in AM and PM respectively	LOS F on Strauss Dr and Levi Rd east in AM	1.4%	1.6%	0.0%	2.5%	4.0%	0.6%	0.5%	0.6%	0.0%	0.5%	0.5%
Levi Road/Weedons Road	Priority	Priority in both years	LOS F on Weedons Rd South and Levis Rd west in PM	LOS F on Weedons Rd South in both AM and PM, and on Levis Rd west in PM	1.3%	2.1%	0.0%	2.3%	3.6%	0.7%	0.5%	1.5%	0.0%	0.5%	0.3%
Lowes Road/Broadlands Drive	Priority	Priority in both years	LOS B and C in AM and PM respectively	LOS F on Broadlands Dr in AM, Lowes Rd west in PM	12.7%	1.8%	0.0%	3.2%	2.6%	0.6%	0.4%	1.4%	0.4%	0.5%	5.7%
Selwyn Road/Lincoln Rolleston Road	Priority	Priority/ Roundabout	LOS F on Lincoln Rolleston Rd north in PM	LOS B in both AM and PM	4.2%	5.2%	0.0%	2.1%	1.5%	1.5%	0.3%	5.1%	0.0%	0.1%	0.3%
SH1/Weedons Interchange South	Roundabout	Roundabout in both years	LOS F on SH1 West, AM and PM	LOS F on SH1 West and Weedons Rd South, AM and PM	1.4%	1.9%	0.2%	2.0%	3.2%	0.6%	0.4%	1.4%	0.4%	0.4%	0.3%
SH1/Tennyson Street	Priority	Left in and left out	LOS D on SH1 East in PM	LOS F on SH1 East in PM	2.4%	0.4%	0.0%	0.6%	0.5%	0.2%	0.2%	0.5%	1.3%	0.0%	0.0%
Springston Rollestion Road/Broadlands	Roundabout	Roundabout in both years	LOS A in both AM and PM	LOS E on Springston Rolleston Road South and Broadlands Drive West in AM, and Broadlands Drive East in PM	3.6%	4.1%	0.1%	4.3%	2.1%	0.2%	0.6%	1.1%	0.7%	1.0%	0.4%

[9] Performance based on 2028 Paramics model
[10] Performance based on PPC81 Paramics model

[11] Orange shading: the PPC contributes between 2.5% and 5% of total traffic movements at this intersection. Red shading: the PPC contributes more than 5% of total traffic movements at this intersection

Intersection	Existing Layout	Intersection form assumed in models (2028/2033)	2028 performance without PPCs[9] (red for LOS F)	2033[10] performance with plan changes (red for LOS F)	Percentage of traffic associated with each PPC as a proportion of total traffic movements through each intersection (AM and PM combined) [11]										
					PPC73	PPC64	PPC66	PPC70	PPC71	PPC75	PPC76	PPC78	PPC80	PPC81	PPC82
					%	%	%	%	%	%	%	%	%	%	%
East Maddisons Road/Brookside Road/Burnham School Road	Priority	Priority in both years	LOS A in both AM and PM	LOS F on East Maddison Road in AM, and LOS F on Brookside Road East in PM	10.5%	1.8%	0.0%	3.1%	0.6%	0.3%	1.2%	0.8%	0.4%	1.3%	0.0%
Broadlands Drive/Learners Drive	No intersection	Priority in both years	LOS B in both AM and PM	LOS F on Learners Drive in AM	5.3%	4.4%	0.0%	7.1%	2.3%	0.3%	1.1%	0.6%	0.2%	1.5%	0.0%
Springston Rolleston Road/Dynes Road	Priority	Priority in both years	LOS C on Lanner Drive in both AM and PM	LOS F on Dynes Road in AM	1.4%	6.3%	0.0%	1.5%	2.1%	0.1%	0.3%	0.8%	0.4%	0.4%	0.0%
Jones Road/(Hoskyns) Retail connector	No intersection	Roundabout in both years	LOS A in both AM and PM	LOS F on the retail connector and Jones Road East in PM	1.6%	1.8%	0.0%	1.2%	1.3%	0.5%	0.2%	1.2%	3.1%	0.3%	0.0%
Jones Road/Iport Drive	Roundabout	Roundabout in both years	LOS A in both AM and PM	LOS E on Iport Drive in PM	1.1%	0.9%	0.0%	0.7%	0.7%	0.2%	0.1%	0.5%	2.5%	0.2%	0.0%
Other intersection with upgrades assumed in the 2033 Rolleston Paramics model															
Burnham School Road/Dunns Crossing Road	Priority cross road	Signals	LOS A in both AM and PM	LOS B in both AM and PM	35.0%	3.8%	0.0%	4.4%	1.0%	0.4%	0.7%	1.3%	2.2%	0.5%	3.1%
Dunns Crossing Road/Brenley Drive/Skellerup Primary Access	No intersection	Priority T/Priority Cross Road with Right Turn bays	LOS A in both AM and PM	LOS D in AM and C in PM	29.4%	4.0%	0.0%	6.0%	0.4%	0.2%	0.4%	0.8%	1.8%	3.3%	10.0%
Dunns Crossing Road/East West Primary	Priority	Priority/Roundabout	LOS A in both AM and PM	LOS A in both AM and PM	29.9%	5.4%	0.0%	8.5%	1.2%	0.8%	0.4%	1.7%	1.0%	4.0%	6.7%
Dunns Crossing Road/Goulds Road/Selwyn Road	Priority	Priority/Roundabout with Priority control at Goulds /Dunns Crossing Intersection	LOS C in both AM and PM	LOS A in both AM and PM	11.9%	3.4%	0.0%	5.3%	0.7%	0.5%	0.2%	3.1%	0.0%	4.2%	8.2%
Dunns Crossing Road/ODP12 Access/ Skellerup Secondary Access	No intersection	Priority T/Priority Cross Road with Right Turn bays	LOS A in both AM and PM	LOS A in both AM and PM	28.5%	5.7%	0.0%	7.8%	0.1%	0.3%	0.0%	1.2%	1.4%	3.5%	4.4%
Goulds Road /East Maddisons Road	Priority	Priority/Roundabout	LOS A and B in AM and PM respectively	LOS A in both AM and PM	9.6%	7.1%	0.0%	12.9%	2.5%	1.2%	1.3%	2.2%	0.5%	2.8%	2.6%
Lowes Road/Dunns Crossing Road	Priority	Priority/Roundabout	LOS A in both AM and PM	LOS A in both AM and PM	31.1%	3.0%	0.0%	4.3%	1.1%	0.3%	0.5%	0.9%	1.8%	2.0%	17.3%
Lowes Road/East Maddisons Road	Priority	Priority/Roundabout	LOS B and D in AM and PM respectively	LOS B in both AM and PM	15.9%	2.1%	0.0%	2.1%	2.1%	0.6%	1.1%	1.5%	0.9%	0.4%	8.0%
Lowes Road/Levi Drive/Masefield Drive	Roundabout	Signals in both years	LOS B and C in AM and PM respectively	LOS C in both AM and PM	3.5%	1.4%	0.1%	2.1%	4.9%	1.6%	0.4%	3.6%	0.7%	0.5%	1.1%

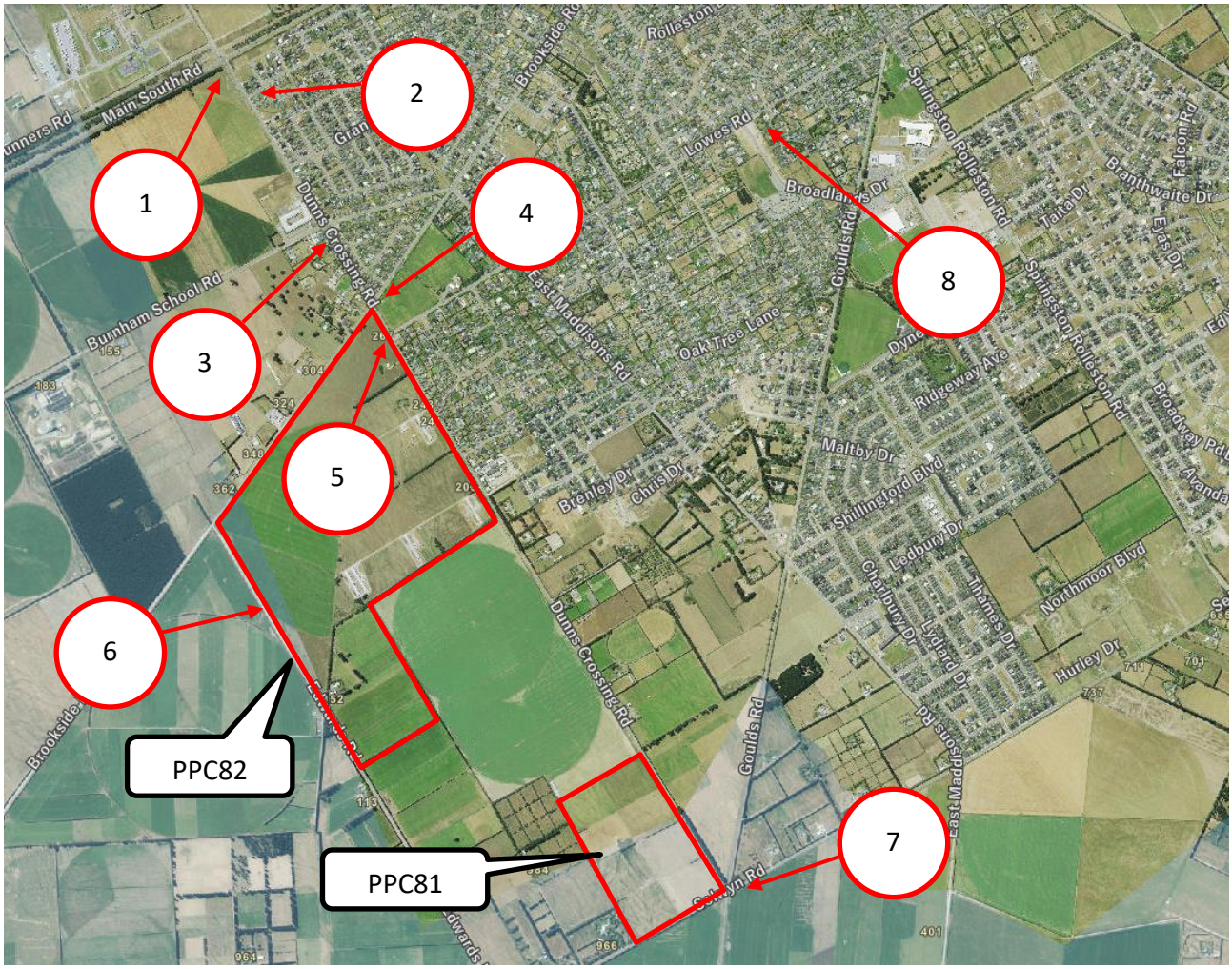
Intersection	Existing Layout	Intersection form assumed in models (2028/2033)	2028 performance without PPCs[9] (red for LOS F)	2033[10] performance with plan changes (red for LOS F)	Percentage of traffic associated with each PPC as a proportion of total traffic movements through each intersection (AM and PM combined)[11]										
					PPC73	PPC64	PPC66	PPC70	PPC71	PPC75	PPC76	PPC78	PPC80	PPC81	PPC82
					%	%	%	%	%	%	%	%	%	%	%
Lowes Road/Tennyson Street	Signals	Signals in both years	LOS B and C in AM and PM respectively	LOS C in both AM and PM	4.5%	3.2%	0.1%	3.3%	1.3%	0.3%	0.5%	0.9%	0.7%	0.8%	1.7%
Rolleston Drive/Brookside Road	Priority	Roundabout in both years	LOS A and C in AM and PM respectively	LOS E and D in AM and PM respectively	7.6%	0.5%	0.1%	1.3%	0.9%	0.3%	0.5%	0.7%	1.1%	0.6%	4.8%
Rolleston Road/Tennyson Street	Roundabout	Signals in both years	LOS B and C in AM and PM respectively	LOS C and D in AM and PM respectively	3.3%	2.8%	0.1%	2.7%	1.3%	0.3%	0.4%	1.0%	0.9%	0.6%	1.3%
Selwyn Road /Weedons Road	Priority	Roundabout in both years	LOS A in both AM and PM	LOS A in both AM and PM	4.1%	4.8%	0.0%	1.9%	1.4%	1.4%	0.3%	4.6%	0.0%	0.7%	1.6%
Springston Rolleston Road/Selwyn Road	Priority	Roundabout in both years	LOS A in both AM and PM	LOS B in both AM and PM	5.7%	9.5%	0.0%	3.2%	0.9%	0.6%	0.4%	3.4%	0.0%	1.6%	3.3%
Tennyson Street/Moore Street	Priority	Roundabout in both years	Not provided	LOS B in both AM and PM	2.2%	1.6%	0.0%	0.9%	0.7%	0.2%	0.1%	0.9%	0.9%	0.2%	0.9%
Walkers Road/Two Chain Road	Priority	Roundabout in both years	LOS A in both AM and PM	LOS A in both AM and PM	3.8%	0.9%	0.2%	0.9%	0.7%	0.3%	0.2%	0.7%	1.8%	0.4%	1.4%

7 MY REVIEW OF THE NOTIFIED ITAS AND CLAUSE 23 MATERIAL

The PPC81 Integrated Transport Assessment (ITA), prepared by Novo Group, and the PPC82 ITA, prepared by Stantec, provide traffic modelling assessments of several intersections of interest (shown in Figure 5). The ITAs and Clause 23 responses from the requestors also discuss several other topics, which I comment on in the following subsections

1. State Highway 1 / Dunns Crossing Road / Walkers Road intersection
2. Dunns Crossing Road / Newman Road intersection
3. Dunns Crossing Road / Burnham School Road intersection
4. Dunns Crossing Road / Brookside Road intersection
5. Dunns Crossing Road / Lowes Road intersection
6. Edwards Road
7. Dunns Crossing Road / Selwyn Road / Goulds Road intersection
8. Lowes Road/Broadlands Drive intersection
9. Internal street network
10. Recommended mitigations and staging.

Figure 5: Intersections assessed in the ITAs



7.1 State Highway 1 / Dunns Crossing Road / Walkers Road intersection

The intersection of State Highway 1 / Dunns Crossing Road / Walkers Road is located to the north of the sites and is currently a stop-controlled priority crossroads with priority given to State Highway 1. Waka Kotahi has identified it as a high risk intersection, and is currently investigating intersection improvements, which may include converting the intersection to a roundabout (refer to Waka Kotahi's submission on PPC81 and PPC82 for further detail). Construction of the roundabout has funding, and is expected to be initiated in 2024 and completed by 2026.

Our review of the PPC82 Paramics model indicates that PPC81 contributes around half a percent and PPC82 contributes around 2% of peak hour traffic movements at this intersection by 2033.

I have summarised the Paramics model results for this intersection

- Neither ITA has assessed the performance of the existing intersection, as the authors assume that the intersection will be upgraded to a roundabout prior to any development occurring within PPC81 and PPC82
- The PPC81 ITA has assessed the intersection using the PPC81 Paramics model and the PPC82 ITA assessed the intersection using the PPC82 Paramics model, both of which indicated that this intersection will operate acceptably in 2033 without any traffic from PPC81 or PPC82

- The PPC81 ITA indicated that the western approach (SH1) to the intersection will operate at a poor level of performance at Level of Service F (LOS F) in the AM peak in 2033 with full buildout traffic of PPC81
    - The through movement delay is estimated to increase from an average of 67 seconds (without PPC81) to 80 seconds (with PPC81)
    - The right turn movement delay is estimated to increase from an average of 105 seconds (without PPC81) to 118 seconds (with PPC81)
- To further investigate the poor performance indicated in the PPC81 Paramics model, the PPC81 ITA assessed the intersection using SIDRA software, which indicated the following results for the western approach (SH1)
    - the through movement delay is estimated to be 15 seconds, the queue length is estimated at 42m, and the volume to capacity ratio is estimated to be 0.6
    - the right turn movement delay is estimated to be 21 seconds, the queue length is estimated at 42m, and the volume to capacity ratio is estimated to be 0.6
    - The PPC81 ITA concluded that the PPC81 Paramics model may be underestimating the capacity of the roundabout
- The PPC82 ITA indicated that the southern approach (Dunns Crossing Road) to the intersection will operate at a poor level of performance at Level of Service F (LOS F) in the AM peak in 2033 with full buildout traffic from PPC81 and PPC82[12]
    - The left turn movement delay is estimated to increase from an average of 37 seconds (without PPC81 and PPC82) to 153 seconds (with PPC81 and PPC82)
    - The through movement delay is estimated to increase from an average of 37 seconds (without PPC81 and 82) to 147 seconds (with PPC81 and PPC82)

Flow has interrogated the assumptions within the Paramics and SIDRA models, and I make the following observations

- The PPC81 Paramics model assumes that the intersection is realigned and offset from the centreline of SH1, which I understand is consistent with the current NZUP concept design and it may result in lower operating speeds
- The PPC82 Paramics model incorrectly assumes that the future roundabout is centred on the existing intersection, which is not consistent with the current NZUP concept design (note that the PPC82 Paramics model also incorrectly assumes a cross road intersection at Dunns Crossing Road / Newman Road, as discussed in Section 7.2)
- The SIDRA model assumes a 50m internal diameter island, which may be larger than what the current NZUP concept design proposes
- The lane layouts within the Paramics models are different from those in the SIDRA model, I understand that the SIDRA layout is consistent with the current NZUP concept design.

[12] Refer to Stantec Traffic Response to PC82 RFI, dated 18 January 2022

In my view

- the PPC81 and PPC82 Paramics models are identifying performance issues on different approaches to the roundabout, due to the different underlying assumptions that we identify in Section 6
- while SIDRA software is regarded as a suitable tool for roundabout modelling, I note that there is no existing data to verify the roundabout performance as it has not been built yet. Out of necessity, the PPC81 ITA assumes the SIDRA default values for peak flow factors, environmental factors and give way parameters. Each of these can have notable impacts on the performance of the roundabout and the default values may not provide a proper representation of driver behaviour once the roundabout is built.

Indicative queue lengths during the 2033 AM peak are shown for PPC81 and PPC82 in Figure 6 and Figure 7 respectively. In my opinion a degree of congestion is to be expected within urban areas during peak commuter periods. In my view the indicated delays on the western arm (according to the PPC81 Paramics model) and the southern arm (according to the PPC82 Paramics model), while classified as LOS F, do not indicate a critical failure at the intersection.

Critical efficiency effects at intersections tend to be indicated in traffic models by exponential increases in queue lengths, and/or volume to capacity ratios that are approaching or exceeding 1. Neither applies in this situation.

Further, a roundabout intersection at SH1/Dunns Crossing Road (compared with a cross road intersection), allows for safer interaction between movements and therefore has less risk that driver delays will result in negative safety effects.

I note that the ITAs for both PPCs assume that the intersection will be upgraded prior to any dwellings being occupied within the sites. However, in my view the identified safety issues at this intersection are of sufficient concern that any earthworks or construction activity generated by the sites, prior to the upgrade of the intersection, could have potentially significant effects. Once construction works on the intersection are underway, I consider that safety effects of any earthworks or construction activity generated by the sites will be adequately managed, as speeds on SH1 will be reduced during the construction of the intersection.

I therefore recommend that no earthworks or construction activity is permitted within the sites prior to the commencement of construction of the SH1/Dunns Crossing Road intersection upgrade.

Figure 6: PPC81 Paramics Model, indicative queuing in 2033 AM peak

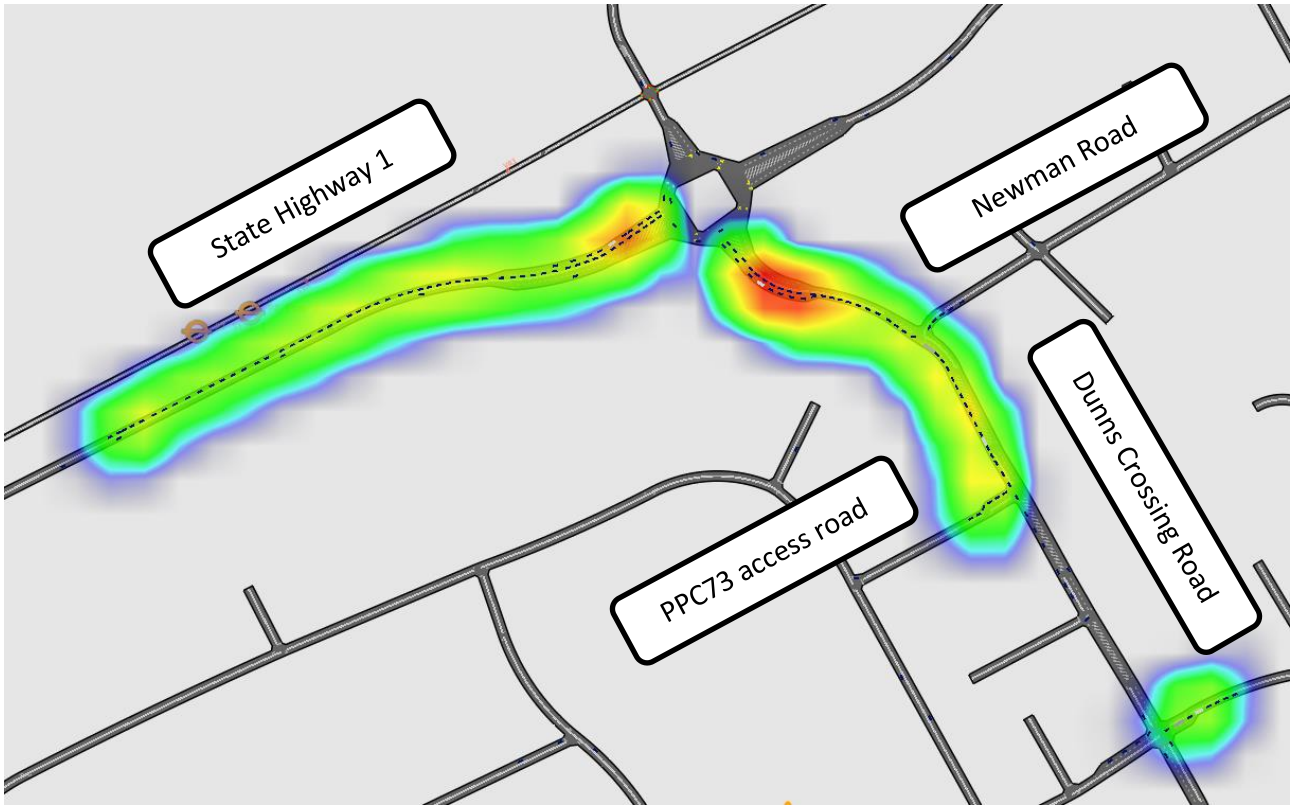
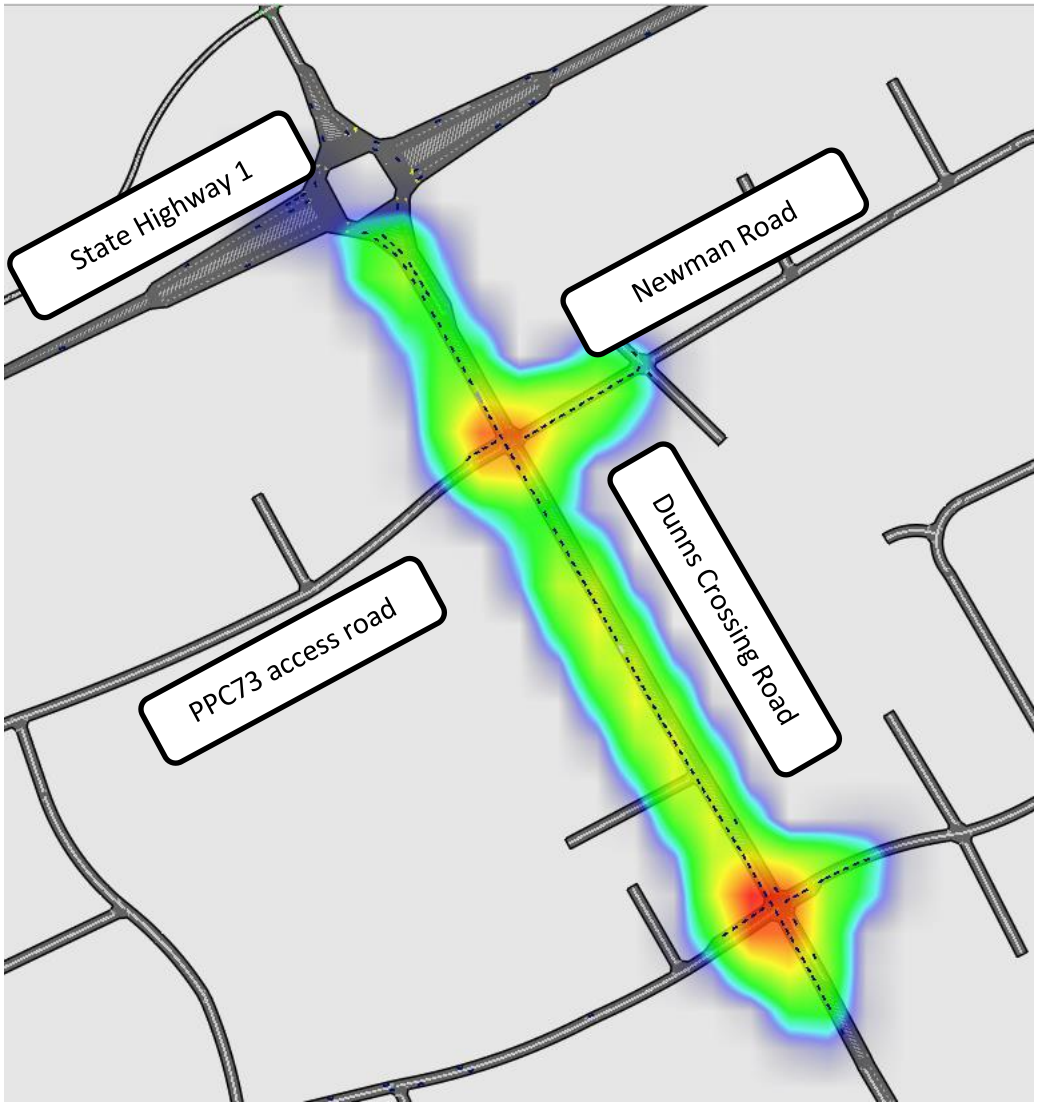


Figure 7: PPC82 Paramics Model, indicative queuing in 2033 AM peak



Outcome: The State Highway 1 / Dunns Crossing Road / Walkers Road intersection will experience an increase in average delays in the 2033 morning peak due to PPC81 and PPC82, which may classify the western and/or southern approach as operating at LOS F. However, in my opinion a degree of congestion is to be expected within urban areas during peak commuter periods. Critical efficiency effects at intersections tend to be indicated in traffic models by exponential increases in queue lengths, and/or volume to capacity ratios that are approaching or exceeding 1. Neither applies in this situation. I therefore consider that the effects of PPC81 and PPC82 on the State Highway 1 / Dunns Crossing Road / Walkers Road intersection are within the range of what is acceptable during peak periods, should the intersection be upgraded to a dual lane roundabout. However, I consider that the existing safety issues at this intersection mean that any traffic generated by PPC81 or PPC82 prior to the intersection being upgraded will cause unacceptable safety effects. I therefore recommend that no earthworks or construction activity is to be undertaken within PPC81 or PPC82 prior to the commencement of the upgrade of the intersection.

7.2 Dunns Crossing Road / Newman Road intersection

The intersection of Dunns Crossing Road / Newman Road is located to the north of the sites and is currently a give way-controlled T-intersection with priority given to Dunns Crossing Road.

Waka Kotahi has identified the nearby State Highway 1 / Dunns Crossing Road / Walkers Road intersection as a high risk intersection, and is currently investigating intersection improvements, which may include the realignment of Dunns Crossing Road and relocation of the existing Dunns Crossing Road / Newman Road intersection.

Our review of the Paramics models indicates that PPC81 contributes around 3% and PPC82 contributes around 6% of peak hour traffic movements at this intersection by 2033.

I note that the PPC81 Paramics model anticipates this intersection being a priority T (as shown in Figure 6), whereas the PPC82 Paramics model anticipates this intersection being a cross road (with a new access road into PPC73, as shown in Figure 7). I note that, during the hearing for PPC73, the access road to PPC73 was relocated further south[13], as shown in Figure 8. Therefore the PPC82 Paramics model is incorrect.

Further, while PPC73 is subject to an appeal at the Environment Court, I note that PPC73 proposed to include Rule 12.1.3.50(a) into the District Plan, to require the upgrade of the Dunns Crossing Road/Newman Road intersection to include a separate left turn lane[14].

I have summarised the modelling results for this intersection

- The PPC81 and PPC82 ITAs assessed the intersection using the respective Paramics model, which indicated that this intersection will operate acceptably in 2033 without any traffic from PPC81 or PPC82
- The PPC81 ITA indicated that the eastern approach to the intersection (Newman Road) will operate at a poor level of performance at Level of Service F (LOS F) in the AM peak in 2033 with full buildout traffic from PPC81, without the separate left turn lane on Newman Road. The average delay is estimated to increase from 43 seconds to 52 seconds
- The PPC82 ITA indicated that the eastern approach to the intersection (Newman Road) will operate acceptably (LOS C) in the AM peak in 2033 with full buildout traffic from PPC82, without the separate left turn lane on Newman Road.

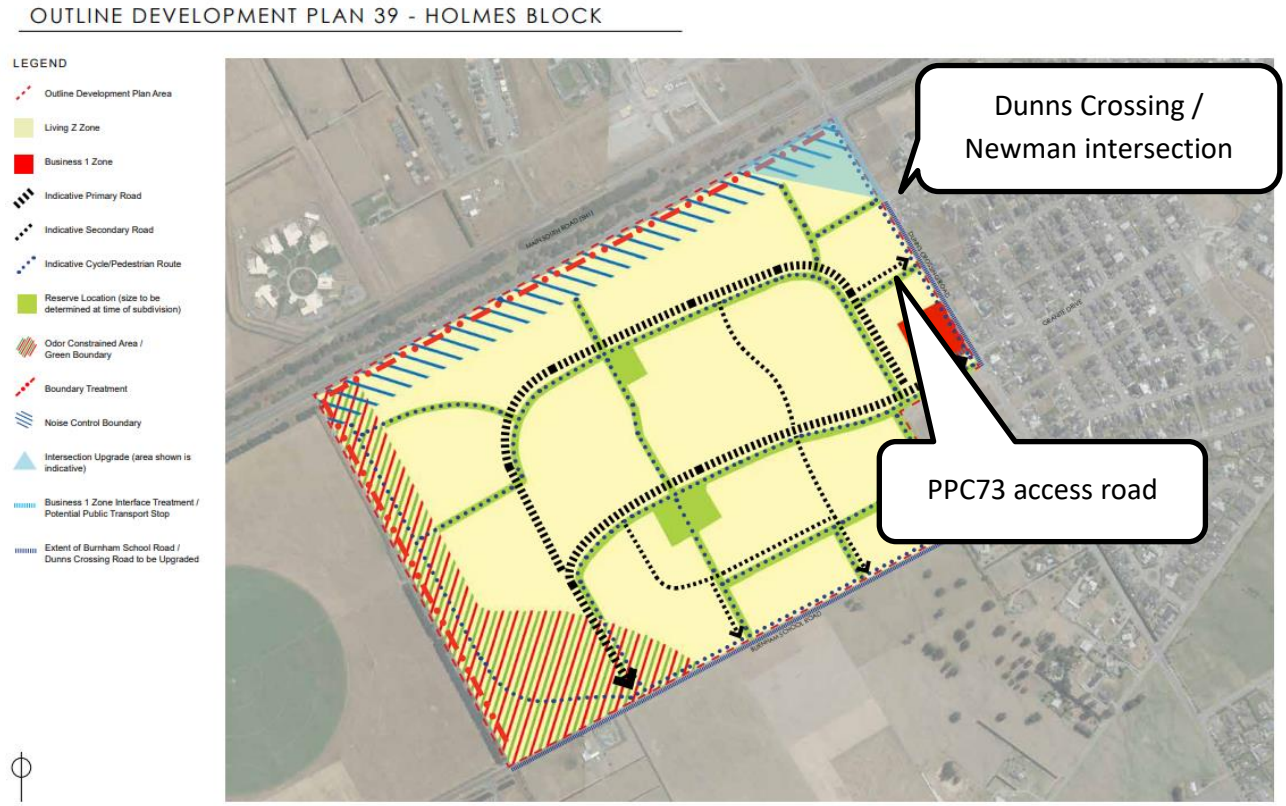
The PPC81 ITA concluded that the delay for Newman Road is a result of queuing from the nearby State Highway 1 / Dunns Crossing Road / Walkers Road, anticipated by the Paramics model, and it notes that the SIDRA model for the State Highway 1 / Dunns Crossing Road / Walkers Road intersection indicates reduced queues which may improve performance at the Dunns Crossing Road / Newman Road intersection.

[13] Refer to Summary of Evidence of Nick Fuller for PPC73, paragraph 7, available online at https://www.selwyn.govt.nz/__data/assets/pdf_file/0003/520491/Summary-of-Evidence-Mr-Fuller.pdf

[14] Refer to PPC73 Closing Legal Submission Appendix 1 proposed rules, available online at https://www.selwyn.govt.nz/__data/assets/pdf_file/0006/562866/Appendix-1-Proposed-Rules-Package-and-ODPS.pdf

In my opinion a degree of congestion is to be expected within urban areas during peak commuter periods. In my view the additional average delay on Newman Road (increasing from 43 seconds to 52 seconds), while classified as LOS F, does not indicate a critical failure at the intersection. In my view, development within PPC81 and PPC82 can proceed prior to the upgrade of the Dunns Crossing Road/Newman Road intersection to include a separate left turn lane.

Figure 8: PPC73 ODP for Holmes Block[15], showing PPC73 access road located to the south of Newman Road



Outcome: The PPC81 ITA has identified performance issues with the Dunns Crossing Road / Newman Road intersection, with the average delay on Newman Road increasing from 43 seconds to 52 seconds. However, in my opinion a degree of congestion is to be expected within urban areas during peak commuter periods. I therefore consider that the effects of PPC81 on the Dunns Crossing Road / Newman Road intersection are within the range of what is acceptable during peak periods.

7.3 Dunns Crossing Road / Burnham School Road intersection

The intersection of Dunns Crossing Road / Burnham School Road is located to the north of the sites and is currently a stop-controlled priority crossroads with priority given to Dunns Crossing Road.

Our review of the 2033 Rolleston Model indicates that PPC81 contributes less than 1% and PPC82 contributes around 3% of peak hour traffic movements at this intersection by 2033.

[15] Refer to PPC73 Closing Legal Submission Appendix 1 Outline Development Plan, available online at https://www.selwyn.govt.nz/__data/assets/pdf_file/0006/562866/Appendix-1-Proposed-Rules-Package-and-ODPS.pdf

As identified in Table 1, Council has programmed the upgrade of this intersection for 2032/2033.

I have summarised the modelling results for this intersection

- Neither ITA has assessed the performance of the existing intersection, as the authors assume that the intersection will be upgraded to traffic signals prior to any development occurring within PPC81 or PPC82
- Both ITAs assessed the performance of the future intersection as traffic signals using the respective Paramics models, which indicated that this intersection will operate acceptably in 2033 with full buildout traffic from PPC81 and PPC82.

Outcome: The traffic modelling for the Dunns Crossing Road / Burnham School Road intersection indicates that this intersection will operate acceptably with PPC81 and PPC82 traffic, once it is upgraded to a signalised intersection. As the ITAs have not assessed the effect of PPC81 or PPC82 on the existing stop-controlled intersection, I recommend that no buildings are permitted to be occupied within PPC81 or PPC82 prior to signalisation.

7.4 Dunns Crossing Road / Brookside Road intersection

The intersection of Dunns Crossing Road / Brookside Road is located to the north of the sites and is currently a giveway-controlled priority crossroads with priority given to Dunns Crossing Road.

The PPC81 Paramics model did not indicate performance issues with this intersection in 2033.

The PPC82 Paramics model did identify performance issues with this intersection in 2033. To address these issues, the ITA recommended that Brookside Road (west of Dunns Crossing Road) be realigned to intersect with the Dunns Crossing Road / Lowes Road intersection, as a roundabout.

The PPC82 ITA explains the rationale for this realignment, and we support its recommendation. In my view, the existing vehicle accesses on Brookside Road (272 – 304 Brookside Road) can be maintained, and the PPC82 requestor can further address this during the future subdivision consent stage of development.

Outcome: I recommend that no buildings are permitted to be occupied within PPC82 prior to the realignment of Brookside Road (west of Dunns Crossing Road) to intersect with the Dunns Crossing Road / Lowes Road intersection, and that the existing section of Brookside Road is redesigned to prevent through movement while maintaining existing vehicle access to adjacent properties.

7.5 Dunns Crossing Road / Lowes Road / Brookside Road intersection

The intersection of Dunns Crossing Road / Lowes Road is located to the north of PPC81 and adjacent to PPC82. It is currently a stop-controlled priority tee with priority given to Dunns Crossing Road.

Our review of the Paramics models indicates that PPC81 contributes around 2% of peak hour traffic and PPC82 contributes around 17% of movements at this intersection by 2033. As identified in Table 1, Council has programmed the upgrade of this intersection to a roundabout in 2035/2036.

The PPC81 and PPC82 ITAs assume that this intersection will be upgraded to a roundabout prior to any development occurring within either site. The Paramics models do not indicate performance issues with this intersection in 2033, once it is upgraded to a roundabout.

As mentioned in Section 7.4, PPC82 proposes to realign Brookside Road, west of Dunns Crossing Road, to intersect with the Dunns Crossing Road / Lowes Road intersection. The PPC82 ITA explains the rationale for this realignment, and we support its recommendation.

However, as part of our Clause 23 requests for further information for PPC82, we identified that during the AM peak the northbound queues at the Dunns Crossing Road/Brookside Road intersection are indicated to extend back to the Dunns Crossing Road/Lowes Road roundabout.

Stantec suggested that this could be addressed with a right turn bay for the right turn from Dunns Crossing Road into Brookside Road. We requested further information on this matter, however it was not responded to. We therefore recommend that, in conjunction with the Dunns Crossing Road / Lowes Road upgrade, the requestor for PPC82 deliver a right turn bay at the Dunns Crossing Road / Broadlands Drive intersection.

Outcome: The traffic modelling for the Dunns Crossing Road / Lowes Road intersection indicates that this intersection will operate acceptably with PPC81 and PPC82 traffic, once it is upgraded to a roundabout. As the ITAs have not assessed the effect of PPC81 or PPC82 on the existing stop-controlled intersection, I recommend that no buildings are permitted to be occupied within PPC81 or PPC82 prior to the intersection being upgraded.

7.6 Dunns Crossing Road / Selwyn Road / Goulds Road intersection

The intersection of Dunns Crossing Road / Selwyn Road / Goulds Road is located south of the PPC82 site and on the south eastern corner of the PPC81 site. Dunns Crossing Road forms a give way controlled T-intersection with Goulds Road immediately north of the stop controlled cross road intersection of Goulds Road and Selwyn Road. Both the PPC81 and PPC82 ITAs identified an existing crash trend at the intersection, in which drivers exiting the Goulds Road approaches are failing to give-way to traffic on Selwyn Road.

The 2033 Paramics models assume that this intersection will be changed to a roundabout, with Goulds Road being re-aligned further north to form a T-intersection with Dunns Crossing Road some 100m north of Selwyn Road.

A concept plan for this upgrade was provided by the PPC81 requestor in response to Clause 23 information requests from Council[16], and has been reproduced below in Figure 9. At the time of writing this report, I understand that discussions are ongoing between the requestors for PPC70 and PPC81 to progress this upgrade. To protect for the future upgrade of the intersection, I recommend that a setback be identified within the ODP, which controls development near the intersection, until the final design is confirmed.

[16] Request for Further Information Response Attachment 3, available online at https://www.selwyn.govt.nz/__data/assets/pdf_file/0011/623648/Attachment-3-Transport.pdf

I have summarised the modelling results for this intersection

- Neither ITA has assessed the performance of the existing intersection, as the authors assume that the intersection will be upgraded to a roundabout prior to any development occurring within PPC81 or PPC82
- The ITAs assessed the performance of the future intersection as a roundabout using the Paramics models, which indicated that this intersection will operate acceptably in 2033 with full buildout traffic from PPC81 and PPC82
- As identified in Table 3, PPC81 is indicated to generate over 4% and PPC82 is indicated to generate over 8% of traffic movements through this intersection in 2033.

Outcome: The traffic modelling for the Dunns Crossing Road / Selwyn Road / Goulds Road intersection indicates that this intersection will operate acceptably with PPC81 and PPC82 traffic, when it is upgraded to a roundabout with the Goulds Road realignment. As the ITAs have not assessed the safety and efficiency effects of PPC81 and PPC82 on the existing intersection, I recommend that no buildings are permitted to be occupied within PPC81 or PPC82 prior to the intersection being upgraded. I recommend that that a setback be identified within the PPC81 ODP, which controls development within the footprint of the indicative realignment of Selwyn Road and the Selwyn Road/Goulds Road intersection, as shown in Figure 9.

Figure 9: Concept plan for Dunns Crossing Road / Selwyn Road / Goulds Road intersection realignment and upgrade, and area that should be identified in the ODP for development control

7.7 Edwards Road

The PPC82 ODP proposes two primary road intersections with Edwards Road and to upgrade Edwards Road to an urban standard along the site frontage.

The ITA and Clause 23 responses note that there will be a degree of traffic generated by PPC82 that will route via the southern portion of Edwards Road. In their Clause 23 responses, Stantec recommended that, prior to any dwellings being occupied on parts of the site with vehicle access to Brookside Road or Edwards Road

- Edwards Road should be sealed along its entire length
- The Edwards Road / Ellesmere Junction Road intersection should be realigned, however the ITA notes that this would require third party property, which is not in control of Council or the requestor.

The ITA concludes that these matters can be assessed as part of future subdivision consent, and this is reflected in the ODP narrative. In my view the requirement to seal Edwards Road and realign the intersection of Edwards Road with Ellesmere Junction Road should be secured as part of the plan change, as delaying this assessment to future subdivision consent stage is unlikely to allow Council to consider the cumulative effects of PPC82, nor address matters such as acquisition of third party land.

Outcome: The PPC82 ITA and Clause 23 responses identify that the following upgrades may be required prior to any dwellings being occupied on parts of the site with vehicle access to Brookside Road or Edwards Road

- ***Edwards Road should be sealed along its entire length***
- ***The Edwards Road / Ellesmere Junction Road intersection should be realigned.***

However, the ODP only identifies that these upgrades need to be considered at the time of subdivision consent. In my view the requirement to seal Edwards Road and realign the intersection of Edwards Road with Ellesmere Junction Road should be required as part of the plan change, as delaying this assessment to future subdivision consent stage is unlikely to allow Council to consider the cumulative effects of PPC82, nor address matters such as acquisition of third party land.

7.8 Lowes Road/Broadlands Drive intersection

Neither ITA has assessed the performance of this intersection. Both 2033 Paramics models assume that this intersection remains a priority T-intersection. The Paramics models predict that this intersection will perform at LOS F for some movements during the AM and PM peaks.

As identified in Table 3, PPC82 is expected to generate almost 6% of traffic movements through this intersection in 2033. I understand that Council currently has not programmed any improvements to this intersection.

I recommend that Council consider whether this intersection requires an upgrade, for example to signals or a roundabout, and how PPC82 may contribute through Development Contributions.

Outcome: I recommend that Council consider whether the Lowes Road/Broadlands Drive intersection requires an upgrade prior to 2033, for example to signals or a roundabout, and whether the current Development Contributions policy is sufficient to reflect traffic demand through this intersection generated by PPC82.

7.9 Transport accessibility

The ITAs discuss the current and future transport accessibility of PPC81 and PPC82, noting that

- Existing walking and cycling facilities are limited
- Shared use paths will be provided on the sites frontages with Dunns Crossing Road, as development occurs
- The closest bus service to PPC81 is Route 820, which runs on Goulds Road and East Maddisons Road, between Burnham and Lincoln, and enables transfers to Route 85 between Rolleston and Christchurch. Route 820 runs 7.30am to 8.30pm, on an hourly service
- The closest bus service to PPC82 is Route 5, which runs around Brookside Park, between Rolleston and New Brighton. Services run 6am to 10.30pm on weekdays, every 20 – 30 minutes during peak hour and every 30 – 40 minutes outside of peak hour.

In my view

- The existing accessibility of PPC81 and PPC82 by walking and cycling is poor. This is to be expected given its current rural location
- The existing accessibility of PPC81 by public transport is poor. The closest bus stop to PPC81 is on East Maddison Road, near the Farringdon subdivisions, and is approximately 2km walking distance (an approximately 25 – 30 minute walk). Service frequency is low
- The existing accessibility of PPC82 by public transport is moderate. The closest bus stop to PPC82 is at Brookside Park and is a short walk from PPC82, which provides reasonably regular services to and from Rolleston centre and Christchurch
- The future accessibility of PPC81 and PPC82 by walking and cycling may be moderate, with Dunns Crossing Road being progressively urbanised with walking and cycling facilities as adjacent land develops, assuming PPC70 and PPC73 are approved, should they not be approved there may be gaps in the future walking and cycling network
- The future accessibility of PPC81 by public transport may be improved and the internal street networks for the sites is suitable to run future public transport services
- The future accessibility of PPC82 by public transport will be moderate and may improve. The Route 5 bus service could be extended into PPC82, and the internal street networks for the sites is suitable to run future public transport services
- However, the expansion of the public transport network is subject to planning and funding from the Canterbury Regional Council and may be dependent on adjacent plan changes (including PPC70 and PPC73) being approved in order to generate sufficient demand for expanded bus services

- As discussed in Section 5.1, Council has several scheduled projects that will somewhat support transport accessibility to PPC81 and PPC82 including: Foster Park Park and ride (2023/24); Rolleston to Burnham cycleway (2029/30); and Rolleston Park and Ride (2030/31)
- Overall:
    - I consider that PPC81 and PPC82 will likely have moderate accessibility by walking, cycling and public transport in the future. This level of accessibility is likely to be comparative to surrounding future developments that are inside the infrastructure boundary specified in the Canterbury Regional Policy Statement, for example the adjacent PPC70
    - The degree of accessibility by walking, cycling and public transport will depend on urbanisation of surrounding land, including PPC70 and PPC73. Should PPC70 and PPC73 not be approved, this may affect the economic viability of extending public transport services to PPC81 and PPC82, and the connectivity and permeability of the transport network.

Outcome: I consider that PPC81 and PPC82 will likely have moderate accessibility by walking, cycling and public transport in the future. This level of accessibility is likely to be comparative to surrounding future developments that are inside the infrastructure boundary specified in the Canterbury Regional Policy Statement, for example the adjacent PPC70. The degree of accessibility by walking, cycling and public transport will depend on urbanisation of surrounding land, including PPC70 and PPC73.

7.10 Internal street network

The PPC81 and PPC82 ITAs discuss the internal street network for each site. An overlay of PPC81 with the adjacent PPC70 and PPC73 is shown in Figure 10, and an overlay of PPC82 with the adjacent PPC73 and nearby PPC70 is shown in Figure 11.

I consider that the ITAs and ODPs provide for an internal street network that generally integrate well with the surrounding existing and potential future transport network, and will provide for all users of the transport system.

In the absence PPC70 and PPC73 being approved, I consider that PPC81 and PPC82 provide an adequate transport network for each respective site.

I recommend several changes to the ODPs

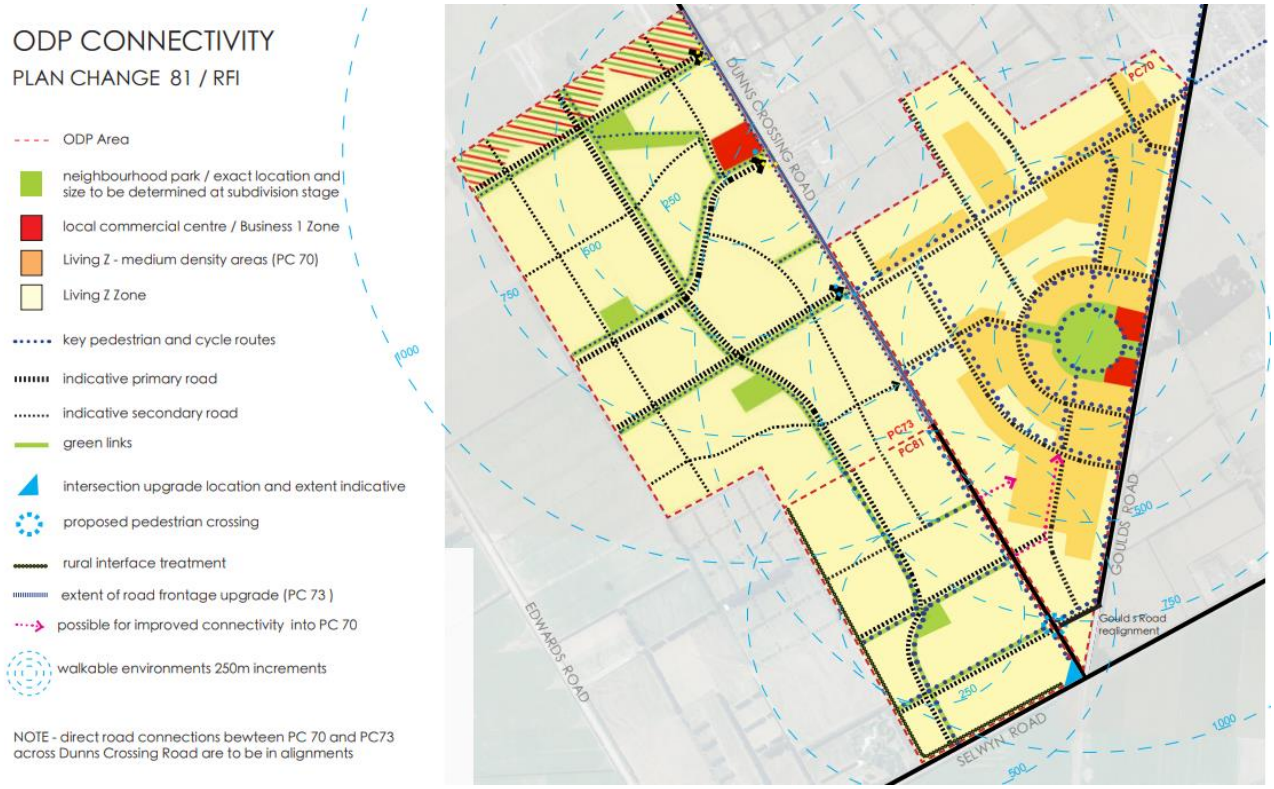
- that the PPC81 ODP identifies that a rural/urban gateway treatment is to be provided on Selwyn Road, near the western extent of PPC81. This will support the transition from a rural to urban environment, and encourage slower vehicle speeds along the urbanised section of Selwyn Road
- that the PPC81 ODP extends the north-south secondary road south to connect with the southern east-west primary road
- that the PPC82 ODP identifies that a rural/urban gateway treatment is to be provided on Brookside Road and Edwards Road, near the western and southern extents of PPC82 respectively. This will support the transition from a rural to urban environment, and encourage slower vehicle speeds along the urbanised sections of Brookside Road and Edwards Road

- that the PPC81 ODP identifies that Selwyn Road along the site frontage is a walking and cycling route
- that the PPC82 ODP identifies that Brookside Road and Edwards Road along the site frontage are walking and cycling routes.

Outcome: I consider that the PPC81 and PPC82 ITAs and ODPs provide for an internal street network that generally integrates well with the surrounding existing and potential future transport network, and will provide for all users of the transport system. I recommend several changes to the ODPs

- ***that the PPC81 ODP identifies that a rural/urban gateway treatment is to be provided on Selwyn Road, near the western extent of PPC81***
- ***that the PPC81 ODP extends the north-south secondary road south to connect with the southern east-west primary road***
- ***that the PPC82 ODP identifies that a rural/urban gateway treatment is to be provided on Brookside Road and Edwards Road, near the western and southern extents of PPC82 respectively***
- ***that the PPC81 ODP identifies that Selwyn Road along the site frontage is a walking and cycling route***
- ***that the PPC82 ODP identifies that Brookside Road and Edwards Road along the site frontage are walking and cycling routes.***

Figure 10: Overlay of PPC81, PPC70 and PPC73 ODPs[17]



[17] Request for Further Information Response Attachment 1, available online at https://www.selwyn.govt.nz/__data/assets/pdf_file/0009/623646/Attachment-1-ODPs.pdf

Figure 11: Overlay of PPC82, PPC70 and PPC73 ODPs[18]

7.11 Recommended mitigations and staging

In response to a Clause 23 information request, the PPC81 requestor provided a summary of transport network upgrades needed to support PPC81, which I have reproduced below in Table 4. I agree with the timing and indicated responsibility of these upgrades, other than:

- the SH1/Dunns Crossing Road intersection. In my view the physical works for the SH1/Dunns Crossing Road intersection upgrade should be underway, prior to any earthworks or construction works commencing within (discussed in Section 7.1)
- the Dunns Crossing Road / Newman Road intersection does not need to be upgraded prior to development within PPC81 (discussed in Section 7.2).

In response to a Clause 23 information request, the PPC82 requestor provided a summary of transport network upgrades needed to support PPC82, which I have collated below in Table 4. I disagree with the timing/responsibility of the following upgrades as follows:

[18] Request for Further Information Response for PC82, available online at https://www.selwyn.govt.nz/__data/assets/pdf_file/0008/671354/PC82-RFI-Response-from-Fiona-Aston.pdf

- the physical works for the SH1/Dunns Crossing Road intersection upgrade should be underway, prior to any earthworks or construction works commencing within PPC82 (discussed in Section 7.1)
- the Dunns Crossing Road / Newman Road intersection does not need to be upgraded prior to development within PPC81 (discussed in Section 7.2).
- Dunns Crossing Road / Burnham School Road: in my view no built development should occur within PPC82 prior to the signalisation of this intersection. Refer to my discussion in Section 7.3
- Dunns Crossing Road / Selwyn Road: in my view no built development should occur within PPC82 prior to the upgrade of this intersection. Refer to my discussion in Section 7.6
- Edwards Road sealing and Edwards Road / Ellesmere Junction Road realignment: in my view these upgrades are required prior to any vehicle connection from PPC82 to Brookside Road or Edwards Road. Refer to my discussion in Section 7.7

In relation to the reference to no "built development" above, in my opinion these intersection upgrades do not need to be underway in order to support traffic generated by earthworks/construction activity within PPC81 or PPC82, other than for SH1/Dunns Crossing Road as discussed above. However, I understand that Council may not be able to monitor and enforce planning mechanisms related to "dwelling occupation" effectively and efficiently. I recommend that Council's Planner consider

- whether Council can efficiently and effectively monitor dwelling occupation as a control for these upgrades, or whether an alternative control such as "prior to the issue of any s224 subdivision certificate" is more appropriate
- whether the ODP narrative is robust enough to ensure development is staged with the identified improvements to the transport network, or whether an alternative planning mechanism such as a District Plan rule is more appropriate.

Outcome: I consider that development within PPC81 and PPC82 should be staged to align with several transport network upgrades.

I support the upgrades and staging identified Table 1 of the PPC81 ODP, other than

- ***the physical works for the SH1/Dunns Crossing Road intersection upgrade should be underway, prior to any earthworks or construction works commencing within PPC81 (discussed in Section 7.1)***
- ***the Dunns Crossing Road / Newman Road intersection does not need to be upgraded prior to development within PPC81 (discussed in Section 7.2).***

I consider that the PPC82 ODP narrative should include the following upgrades

- ***the physical works for the SH1/Dunns Crossing Road intersection upgrade should be underway, prior to any earthworks or construction works commencing within PPC82 (discussed in Section 7.1)***
- ***Dunns Crossing Road / Burnham School Road: in my view no built development should occur within PPC82 prior to the signalisation of this intersection. Refer to my discussion in Section 7.3***

- ***Dunns Crossing Road / Selwyn Road: in my view no built development should occur within PPC82 prior to the upgrade of this intersection. Refer to my discussion in Section 7.6***
- ***Edwards Road sealing and Edwards Road / Ellesmere Junction Road realignment: in my view these upgrades are required prior to any vehicle connection from PPC82 to Brookside Road or Edwards Road. Refer to my discussion in Section 7.7.***

I recommend that Council's Planner consider

- ***whether the ODP narrative is robust enough to ensure development is staged with the identified improvements to the transport network, or whether an alternative planning mechanism such as a District Plan rule is more appropriate***
- ***whether Council can efficiently and effectively monitor "dwelling occupation" as a control for these upgrades, or whether an alternative control such as "prior to the issue of any s224 subdivision certificate" is more appropriate.***

Table 4: Transport upgrades identified by the PPC81 requestor[20] and PPC82 requestor[21]

Upgrade	Timing assumed by the requestor		Funding mechanism assumed by the requestor		Flow comments on the timing and funding assumed by the requestors	
	PPC81	PPC82	PPC81	PPC82	PPC81	PPC82
SH1 / Dunns Crossing Road	Prior to occupation of any dwelling in the ODP area.	Prior to occupation of any dwelling within the ODP area	Funded by Waka Kotahi through NZUP	Funded by Waka Kotahi through NZUP	I agree with funding assumption, but I recommend that the physical works for the SH1/Dunns Crossing Road intersection upgrade should be underway, prior to any earthworks or construction works commencing within the sites (discussed in Section 6.1)	
Dunns Crossing Road / Burnham School Road signalisation	Prior to occupation of any dwelling in the ODP area.	Not tied to development within PPC82	Developer agreement (as in the LTP for 2032/2033 and also required for Plan Change 73)	Funded in LTP	Agree with timing and funding assumptions of requestor	I disagree with timing and funding assumptions of requestor. I consider that this upgrade should be in place prior to any built development. Refer to my discussion in Section 7.3.
Dunns Crossing Road / Selwyn Road / Goulds Road – realignment and roundabout	Prior to occupation of any dwelling in the ODP area	Not tied to development within PPC82	Developer agreement as also required for Plan Change 70.	Not currently funded in the LTP or scheduled by Council.	Agree with timing and funding assumptions of requestor	I disagree with timing and funding assumptions of requestor. In my view no built development should occur within PPC82 prior to the upgrade of this intersection. Refer to my discussion in Section 7.6
Dunns Crossing Road / Newman Road – double approach lanes on Newman Road	Prior to occupation of any dwelling in the ODP area	Not identified by PPC82 requestor	To be delivered by PC73 and / or as part of Waka Kotahi works to SH1 / Dunns Crossing Road	Not identified by PPC82 requestor	In my view development can occur within PPC81 prior to the upgrade of the Dunns Crossing Road / Newman Road intersection.	In my view development can occur within PPC82 prior to the upgrade of the Dunns Crossing Road / Newman Road intersection.
Dunns Crossing Road / Lowes Road intersection	Prior to occupation of any dwelling in the ODP area	Prior to occupation of any dwelling within the ODP area	To be delivered by PC82 or brought forward by developer agreements noting it is in the LTP for 2035/36	Developer agreement with Council. Upgrade scheduled by Council, but beyond the current LTP.	Agree with timing and funding assumptions of requestor	Agree with timing and funding assumptions of requestor
Dunns Crossing Road / Brookside Road	Not identified by PPC81 requestor	Prior to occupation of any dwelling within the ODP area	Not identified by PPC81 requestor	Developer funded	Agree with timing and funding assumptions of requestor	Agree with timing and funding assumptions of requestor
Edwards Road sealing, and realignment of Edwards Road / Ellesmere Junction Road intersection	Not identified by PPC81 requestor	Need for the upgrades can be assessed at the time of subdivision for any new connection to Edwards Road or Brookside Road.	Not identified by PPC81 requestor	Developer funded, if required.	Agree with timing and funding assumptions of requestor	I disagree with assessment method proposed by the requestor. In my view these upgrades are required prior to any vehicle connection from PPC82 to Brookside Road or Edwards Road. Refer to my discussion in Section 7.7

[20] PPC81 Request for Further Information Response Attachment 3, available online at https://www.selwyn.govt.nz/__data/assets/pdf_file/0011/623648/Attachment-3-Transport.pdf
[21] PPC82 Request for Further Information Response Attachment D, available online at https://www.selwyn.govt.nz/__data/assets/pdf_file/0010/671356/Stantec-Traffic-Response-to-PC82-RFI.pdf

8 THE ROLLESTON STRUCTURE PLAN AND THE RPS

PPC81 and PPC82 sit outside the anticipated urban area of the Rolleston Structure Plan (shown in Figure 12)[22], as well as the proposed infrastructure boundary specified in the Canterbury Regional Policy Statement (CRPS) Map A[23].

In regard to the potential transport effects of PPC81 and PPC82 on the wider transport network

- The transport effects of PPC81 and PPC82 on the wider transport network, beyond Rolleston, have not been assessed in the ITAs
- If PPC81 and PPC82 do 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 PPC81 and PPC82 drawing growth demand away from other parts of Selwyn), PPC81 and PPC82 are 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 PPC81 and PPC82 (as Plan Changes outside the anticipated urban area) lead 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
- The wider area effects of PPC81 and PPC82 may not be overly apparent in a macro scale regional traffic model. Assessing the effects of PPC81 and PPC82, as developments 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).

Outcome: PPC81 and PPC82 are inconsistent with the Rolleston Structure Plan and CRPS infrastructure boundary, in that they are outside the anticipated future urban area. Should PPC81 and PPC82 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. However, assessing the effects of such development on the long term planning and funding commitments associated with bulk transport infrastructure is complex and requires assessment of multiple land use scenarios at a District or Regional level. At a District or Regional level assessment the effects of PPC81 and PPC82 are unlikely to be overly apparent.

[22] Rolleston Structure Plan, available online https://www.selwyn.govt.nz/__data/assets/pdf_file/0015/14361/Final-Rolleston-Structure-Plan-230909.pdf
[23] Canterbury Regional Policy Statement Map A, available online https://www.ecan.govt.nz/your-region/plans-strategies-and-bylaws/canterbury-regional-policy-statement/

Figure 12: Rolleston Structure Plan with PPC81 and PPC82 location

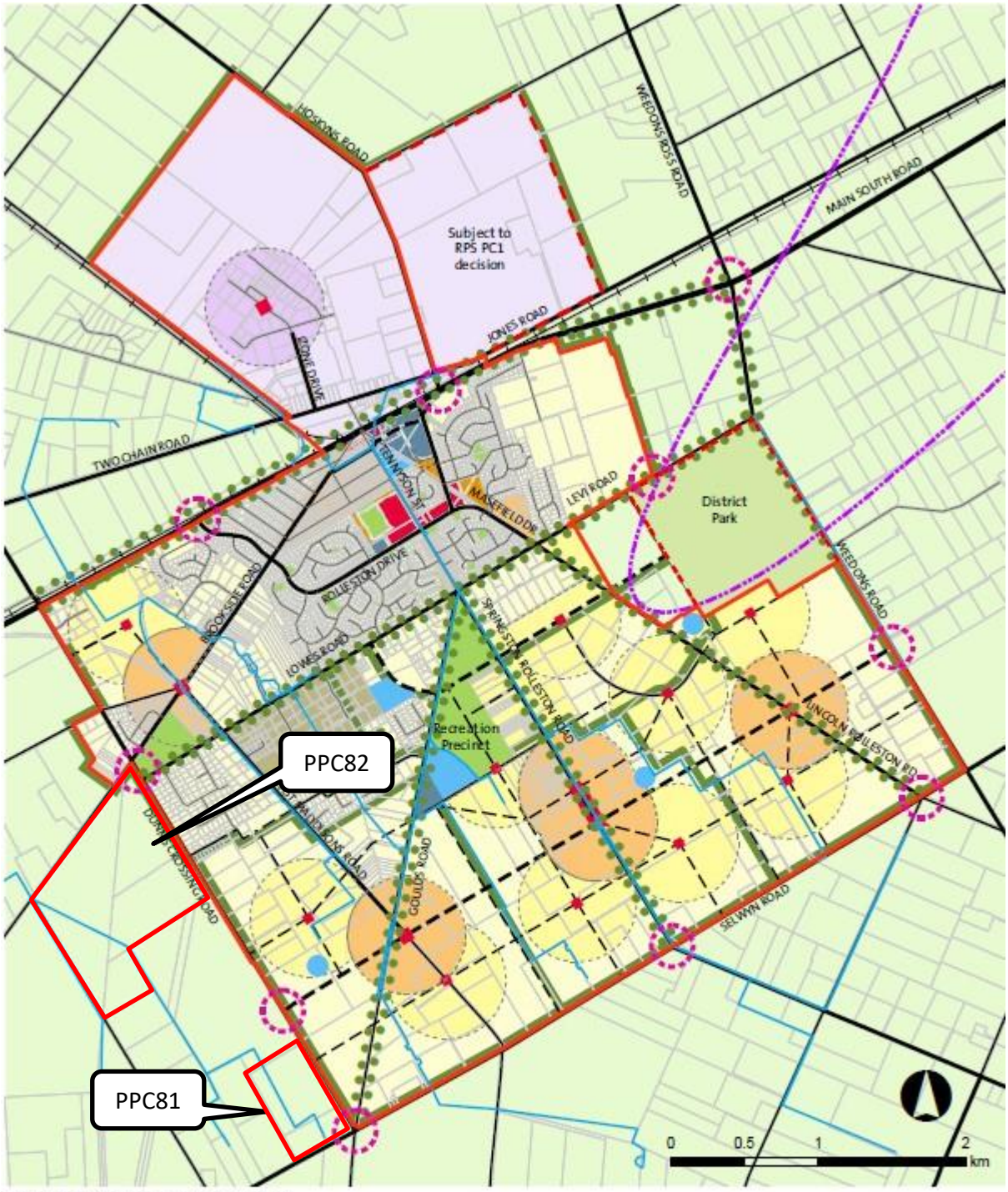


Figure 5.2: Rolleston Structure Plan

- Study Area
- Railway
- National Arterial
- Main (primary) roads
- Proposed main (primary) roads
- Local (secondary) roads
- Proposed local (secondary) roads
- Local (minor) roads
- Walking and Cycling Link
- Town Centre
- Neighbourhood Centre
- Local Centre
- Comprehensive Housing
- Medium Density Residential (20HH/Ha)
- Medium Density Residential (15HH/Ha)
- Low Density Residential (10HH/Ha)
- Low Density Residential (7HH/Ha)
- Community Facilities
- Education Facilities
- Green Corridors and Green Belt
- District Park
- Recreation Precinct and Reserves
- Rural land
- Avenue Planting
- Izone Southern Business Hub
- Water Races
- Noise Contour
- 5 Minute Walk (400m)
- Key Gateways

9 MY REVIEW OF SUBMISSIONS

9.1 Submissions

Multiple submissions related to transport matters were received. Transport matters contained in submissions can be grouped into the following broad topics

- Provision of transport infrastructure
- Walking and cycling
- Public transport
- Wider effects on the transport network, and the effect of unanticipated urban expansion.

Details of the submissions, and my comments, are provided in Table 5 in Appendix A.

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.

10 SUMMARY AND CONCLUSION

I have reviewed the PPC81 and PPC82 application documents, responses to Council information requests, and submissions.

In terms of the immediate effects of PPC81 and PPC82, and the proposed ODPs

- The Integrated Transport Assessments supporting PPC81 and PPC82 were prepared prior to the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (RMA-EHS), specifically the Medium Density Residential Standards (MDRS). To address this, I understand that the requestors are proposing a dwelling threshold at which an updated Integrated Transport Assessment would be required. From a transport effects perspective, I support the proposed dwelling threshold rule for PPC81 and PPC82. However, in my experience this type of rule can have some complexities and potential unintended outcomes, which increase as the number of landowners that are subject to the threshold rule increase. I recommend that Council's Planner consider whether this rule can be efficiently and effectively managed by Council through the consenting process. Refer to my discussion in Section 2
- The State Highway 1 / Dunns Crossing Road / Walkers Road intersection will experience an increase in average delays in the 2033 morning peak due to PPC81 and PPC82, which may classify the western and/or southern approach as operating at LOS F. However, in my opinion a degree of congestion is to be expected within urban areas during peak commuter periods. Critical efficiency effects at intersections tend to be indicated in traffic models by exponential increases in queue lengths, and/or volume to capacity ratios that are approaching or exceeding 1. Neither applies in this situation. I therefore consider that the effects of PPC81 and PPC82 on the State Highway 1 / Dunns Crossing Road / Walkers Road intersection are within the range of what is acceptable during peak periods, should the intersection be upgraded to a dual lane roundabout. However, I consider that the existing safety issues at this intersection mean that any traffic generated by PPC81 or PPC82 prior to the intersection being upgraded will cause unacceptable safety effects. I therefore recommend that no earthworks activity is to be undertaken within PPC81 or PPC82 prior to the commencement of the upgrade of the intersection. Refer to my discussion in Section 7.1
- The PPC81 ITA has identified performance issues with the Dunns Crossing Road / Newman Road intersection, with the average delay on Newman Road increasing from 43 seconds to 52 seconds. However, in my opinion a degree of congestion is to be expected within urban areas during peak commuter periods. I therefore consider that the effects of PPC81 on the Dunns Crossing Road / Newman Road intersection are within the range of what is acceptable during peak periods. Refer to my discussion in Section 7.2
- The traffic modelling for the Dunns Crossing Road / Burnham School Road intersection indicates that this intersection will operate acceptably with PPC81 and PPC82 traffic, once it is upgraded to a signalised intersection. As the ITAs have not assessed the effect of PPC81 or PPC82 on the existing stop-controlled intersection, I recommend that no buildings are permitted to be occupied within PPC81 or PPC82 prior to signalisation. Refer to my discussion in Section 7.3
- I recommend that no buildings are permitted to be occupied within PPC82 prior to the realignment of Brookside Road (west of Dunns Crossing Road) to intersect with the Dunns Crossing Road /

Lowes Road intersection, and that the existing section of Brookside Road is redesigned to prevent through movement while maintaining existing vehicle access to adjacent properties. Refer to my discussion in Section 7.4

- The traffic modelling for the Dunns Crossing Road / Lowes Road intersection indicates that this intersection will operate acceptably with PPC81 and PPC82 traffic, once it is upgraded to a roundabout. As the ITAs have not assessed the effect of PPC81 or PPC82 on the existing stop-controlled intersection, I recommend that no buildings are permitted to be occupied within PPC81 or PPC82 prior to the intersection being upgraded. Refer to my discussion in Section 7.5
- The traffic modelling for the Dunns Crossing Road / Selwyn Road / Goulds Road intersection indicates that this intersection will operate acceptably with PPC81 and PPC82 traffic, when it is upgraded to a roundabout with the Goulds Road realignment. As the ITAs have not assessed the safety and efficiency effects of PPC81 and PPC82 on the existing intersection, I recommend that no buildings are permitted to be occupied within PPC81 or PPC82 prior to the intersection being upgraded. I recommend that that a setback be identified within the PPC81 ODP, which controls development within the footprint of the indicative realignment of Selwyn Road and the Selwyn Road/Goulds Road intersection. Refer to my discussion in Section 7.6
- The PPC82 ITA and Clause 23 responses identify that the following upgrades are required prior to any dwellings being occupied on parts of the site with vehicle access to Brookside Road or Edwards Road
    - Edwards Road should be sealed along its entire length
    - The Edwards Road / Ellesmere Junction Road intersection should be realigned.

  However, the ODP only identifies that these upgrades need to be considered at the time of subdivision consent. In my view the requirement to seal Edwards Road and realign the intersection of Edwards Road with Ellesmere Junction Road should be secured as part of the plan change, as delaying this assessment to future subdivision consent stage is unlikely to allow Council to consider the cumulative effects of PPC82, nor address matters such as acquisition of third party land. Refer to my discussion in Section 7.7
- I recommend that Council consider whether the Lowes Road/Broadlands Drive intersection requires an upgrade prior to 2033, for example to signals or a roundabout, and whether the current Development Contributions policy is sufficient to reflect traffic demand through this intersection generated by PPC82. Refer to my discussion in Section 7.8
- I consider that PPC81 and PPC82 will likely have moderate accessibility by walking, cycling and public transport in the future. This level of accessibility is likely to be comparative to surrounding future developments that are inside the infrastructure boundary specified in the Canterbury Regional Policy Statement, for example the adjacent PPC70. The degree of accessibility by walking, cycling and public transport will depend on urbanisation of surrounding land, including PPC70 and PPC73. Refer to my discussion in Section 7.9
- I consider that the PPC81 and PPC82 ITAs and ODPs provide for an internal street network that generally integrates well with the surrounding existing and potential future transport network, and will provide for all users of the transport system. I recommend several changes to the ODPs (Refer to my discussion in Section 7.10)

- that the PPC81 ODP identifies that a rural/urban gateway treatment is to be provided on Selwyn Road, near the western extent of PPC81
- that the PPC81 ODP extends the north-south secondary road south to connect with the southern east-west primary road
- that the PPC82 ODP identifies that a rural/urban gateway treatment is to be provided on Brookside Road and Edwards Road, near the western and southern extents of PPC82 respectively
- that the PPC81 ODP identifies that Selwyn Road along the site frontage is a walking and cycling route
- that the PPC82 ODP identifies that Brookside Road and Edwards Road along the site frontage are walking and cycling routes

- I support the upgrades and staging identified Table 1 of the PPC81 ODP, other than (refer to my discussion in Section 7.11)
  - the physical works for the SH1/Dunns Crossing Road intersection upgrade should be underway or complete, prior to any earthworks or construction works commencing within PPC81
  - the Dunns Crossing Road / Newman Road intersection does not need to be upgraded prior to development within PPC81
- I consider that the PPC82 ODP narrative should include the following upgrades (refer to my discussion in Section 7.11)
  - the physical works for the SH1/Dunns Crossing Road intersection upgrade should be underway or complete, prior to any earthworks or construction works commencing within PPC82
  - Dunns Crossing Road / Burnham School Road: in my view no built development should occur within PPC82 prior to the signalisation of this intersection. Refer to my discussion in Section 7.3
  - Dunns Crossing Road / Selwyn Road: in my view no built development should occur within PPC82 prior to the upgrade of this intersection
  - Edwards Road sealing and Edwards Road / Ellesmere Junction Road realignment: in my view these upgrades are required prior to any vehicle connection from PPC82 to Brookside Road or Edwards Road
- I recommend that Council's Planner consider (refer to my discussion in Section 7.11)
  - whether the ODP narrative is robust enough to ensure development is staged with the identified improvements to the transport network, or whether an alternative planning mechanism such as a District Plan rule is more appropriate
  - whether, in relation to "built development", Council can efficiently and effectively monitor "dwelling occupation" as a control for these upgrades, or whether an alternative control such as "prior to the issue of any s224 subdivision certificate" is more appropriate

- PPC81 and PPC82 are inconsistent with the Rolleston Structure Plan and CRPS infrastructure boundary, in that they are outside the anticipated future urban area. Should PPC81 and PPC82 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. However, assessing the effects of such development on the long term planning and funding commitments associated with bulk transport infrastructure is complex and requires assessment of multiple land use scenarios at a District or Regional level. At a District or Regional level assessment the effects of PPC81 and PPC82 are unlikely to be overly apparent. Refer to my discussion in Section 8.

I recommend that Council consider the following matters regarding effects on the wider transport network

- It is not clear to me why the PPC82 Paramics model anticipates a lower total travel demand compared with the PPC81 Paramics model. Concurrently with the development of the PPC81 Paramics model and the PPC82 Paramics model, Waka Kotahi has developed an alternative version of the Paramics model to investigate how the SH1 NZUP project might affect the transport network. I understand that this model includes the conversion of the SH1/Rolleston Drive South intersection into a left in/left out intersection. This is not reflected in the Paramics models that I have relied upon for this report. We have referred to both the PPC81 and the PPC82 Paramics models in our assessment of PPC81 and PPC82, and where relevant we identify which model we have relied upon. I note that the PPC81 and PPC82 Paramics models do not incorporate the change to the SH1/Rolleston Drive South intersection, proposed as part of NZUP. Should NZUP implement these changes, it is likely that our reporting of traffic effects on Dunns Crossing Road, Brookside Road, Lowes Road (among others) is under indicated. Refer to my discussion in Section 6
- I recommend that Council consider the proportional effect that each PPC will have on network hotspots and assumed intersection improvements contained in the Rolleston Paramics model, as identified in Table 3. Council should consider whether the proportional effects of PPC81 and PPC82 affect programmed funding within the Long Term Plan, whether new projects should be added to the Long Term Plan, and how Development Contributions are calculated. I note that there are discrepancies between the total travel demand and traffic routing in the PPC81, PPC82 and NZUP Paramics models. Should the Paramics models be used to determine how Development Contributions are calculated, I recommend that inconsistencies between the PPC81, PPC82 and NZUP Paramics models are addressed. Refer to my discussion in Section 6.1.

APPENDIX A Submission summary

Table 5: Submission summary and commentary

Summary of submission	Flow comment	Flow position
The impact of traffic on the Dunns Crossing Road/Walkers Road/ State Highway 1 intersection, including cumulative effects resulting from other plan changes. [24]	Refer to my discussion of the effects on the Dunns Crossing Road/Walkers Road/ State Highway 1 intersection in Sections 7.1 and 7.11. Refer to my comments regarding NZUP, in particularly the left in / left out intersection at SH1/Rolleston Drive proposed by Waka Kotahi, in Section 5.	Subject to the recommendations of my report being adopted, I consider that the effects of PPC81 and PPC82 will be adequately addressed. Dunns Crossing Road will experience an increase in traffic. I have considered the effects of the multiple Plan Changes within Rolleston, and consider them to be within the range of what is to be expected within a typical urban area. However, I have not assessed how the proposed left in / left out intersection at SH1/Rolleston Drive, proposed by Waka Kotahi, might affect Dunns Crossing Road. I note that Council recently provided a submission to Waka Kotahi outlining concerns about potential effects on Dunns Crossing Road[25].
The impact of traffic on surrounding roads, including in and around West Rolleston School, the roads not being suitable for this extra traffic, the increased congestion that will result, and the cost of any upgrades required falling on ratepayers. [26]	Refer to my discussion of effects in Section 7. Refer to my discussion of the proportional contribution to traffic in Section 6. Refer to my discussion of transport upgrade responsibilities in Section 7.11.	
The speed of traffic on Dunns Crossing Road and its impact on pedestrians and cyclists, including elderly and school children, and lack of pedestrian pathways and lighting.[27]	Dunns Crossing Road will be urbanised along the site frontages with PPC81 and PPC82 by the developer. I anticipate that Council will lower the speed limit on Dunns Crossing Road as adjacent land urbanises. I note that the requestors are unable to lower the speed limit, as this can only be done by the Road Controlling Authority. I consider that my recommended improvements to the transport network will address effects on pedestrians and cyclists, to within the range of what is to be expected within a typical urban area.	Subject to the recommendations of my report being adopted, I consider that the effects of PPC81 and PPC82 will be adequately addressed.
Roads being too narrow to cope with extra traffic (PC82 only).[28]	Dunns Crossing Road will be urbanised along the site frontages with PPC81 and PPC82 by the developer. This will likely be in accordance with Council's Engineering Standards, which detail carriageway widths and the provision of on-street parking.	Subject to the recommendations of my report being adopted, I consider that the effects of PPC81 and PPC82 will be adequately addressed.
The need to consider effects on the transport network in the vicinity of the Burnham Military Camp (PC82 only).[29]	Refer to my discussion of effects in Section 7. Refer to my discussion of the proportional contribution to traffic in Section 6. Refer to my discussion of transport upgrade responsibilities in Section 7.11. Refer to my discussion of development outside of the identified urban boundary in Section 8.	Subject to the recommendations of my report being adopted, I consider that the effects of PPC81 and PPC82 will be adequately addressed. Dunns Crossing Road will experience an increase in traffic. I have considered the effects of the multiple Plan Changes within Rolleston, and consider them to be within the range of what is to be expected within a typical urban area. However, I have not assessed how the proposed left in / left out intersection at SH1/Rolleston Drive, proposed by Waka Kotahi, might affect Dunns Crossing Road.

[24] M. & J. Douglas (PC81-0001 & PC82-0005), Waka Kotahi (PC81-0006 & PC82-0013), I. Robertson (PC82-0016).
[25] Selwyn District Council Submission on Rolleston NZUp Project, prepared by the Office of the Mayor, dated 4 August 2022
[26] M. & J. Douglas (PC81-0001 & PC82-0005), J. Horne (PC81-0009 & PC82-0017), J. Munro (PC82-0006), C. McConachy (PC82-0004).
[27] M. Green (PC82-0002), K. Green (PC82-0003), I. Robertson (PC82-0016).
[28] J. Munro (PC82-0006), I. Robertson (PC82-0016).
[29] NZDF (PC82-0011).

The lack of integrated transport options resulting in dependency on private motor vehicle use. [30]	Refer to my discussion of transport options in Section 7.9.	I consider that the existing area has poor access to transport options. It may have moderate access to transport options in the future. However, the expansion of the public transport network is subject to planning and funding from the Canterbury Regional Council and may be dependent on adjacent plan changes (including PPC70 and PPC73) being approved in order to generate sufficient demand for expanded bus services.
The increase in carbon emissions from traffic associated with the plan change, given the reliance on private vehicle use arising from limited job opportunities and local amenities in the Rolleston Township. [31]	Refer to my discussion of wider effects on the transport network in Section 8. I have not specifically assessed how PPC81 and PPC82 might affect carbon emissions.	I have not specifically assessed how PPC81 might affect carbon emissions.
The lack of existing or additional planned public transport to service the Site within an acceptable walkable catchment. [32]	Refer to my discussion of transport options in Section 7.9.	I consider that the existing area has poor access to transport options. It may have moderate access to transport options. However, the expansion of the public transport network is subject to planning and funding from the Canterbury Regional Council and may be dependent on adjacent plan changes (including PPC70 and PPC73) being approved in order to generate sufficient demand for expanded bus services.
The reliance on other plan changes being accepted and developed to achieve connectivity to the wider township. [33]	Refer to my discussion in Section 7.9.	The expansion of the public transport network is subject to planning and funding from the Canterbury Regional Council and may be dependant on adjacent plan changes being approved in order to generate sufficient demand for services. The expansion of the walking and cycling network will be dependant on adjacent plan changes being approved in order to deliver a connected shared use path on Dunns Crossing Road, and through adjacent development areas.
Waka Kotahi (PC81-0006 & PC82-0013) also identified the following matters as requiring further consideration: ◆ the consistency of the request with the provisions of the NPSUD and what improvements could be made to reduce vehicle-related carbon emissions from the residential development of the site. ◆ opportunities for multi-modal transport through and adjoining the Site and connecting to the wider network.	Refer to my discussion of wider effects on the transport network in Section 8. I have not specifically assessed how PPC81 and PPC82 might affect carbon emissions. Refer to my discussion of site connectivity in Section 7.10.	I have not specifically assessed how PPC81 and PPC82 might affect carbon emissions. I consider that the internal street layout does not preclude mutli-modal transport options through the site, and that connectivity to the wider transport network has been provided for.

[30] Environment Canterbury (PC81-0008 & PC82-0015).
[31] M. & J. Douglas (PC81-0001 & PC82-0005), Waka Kotahi (PC81-0006 & PC82-0013).
[32] M. & J. Douglas (PC81-0001& PC82-0005), Waka Kotahi (PC81-0006 & PC82-0013), Environment Canterbury (PC81-0008 & PC82-0015).
[33] Waka Kotahi (PC81-0006 & PC82-0013).

Waka Kotahi (PC81-0006 & PC82-0013) notes that the Dunns Crossing Road/Walkers Road/ State Highway 1 intersection provides access to both sides of SH1 for a range of activities, and is a high-risk intersection with existing safety concerns. It notes that these safety issues are proposed to be addressed through an upgrade likely to be progressed in 2024 and completed by 2026. In relation to PC81, while accepting that the proponent has recognised the existing issues and proposed to limit the density of the site to not more than 350 households, beyond which an integrated transport assessment, to consider impacts on the safety and efficiency of SH1 would be required, it considers it unclear as to what trigger has been included within the plan change to require this assessment when the threshold is reached. It states that given the existing safety issues, any intensification of development which increases traffic movements through this intersection before it is upgraded will increase safety risks.	Refer to my discussion of Dunns Crossing Road/Walkers Road/ State Highway 1 in Section 7.1 and Section 7.11.	I share the submitters concerns about the potential safety effects on the Dunns Crossing Road/Walkers Road/ State Highway 1 intersection, should development occur prior to the planned upgrade.
Hill Street Ltd (PC81-0004 & PC82-0012) express support for the connectivity shown in both ODPs which would allow for a road corridor to extend into their land, located to the west of PC81 and to the south of PPC82.	Refer to my discussion of site connectivity in Section 7.10.	I support the submitters position.
CCC (PC81-0007 & PC82-0014) considers that as the PPC81 site is outside identified growth areas, it is important to consider infrastructure and the downstream effects on the Greater Christchurch transport network, stating that appropriate transport infrastructure is fundamental to ensuring a well-connected urban environment and good accessibility for all people. They consider that without a funded and established public transport network to service the site, it is likely that this development will impact on the ability of the Council to manage the downstream transport network.	Refer to my discussion of effects on the wider transport system in Section 6 and Section 8. I consider that the ODPs provide for a transport network within each site that does not preclude the provision of public transport services. In my view, the funding and implementation of a public transport system is a matter for Rolleston as a whole, rather than a site specific matter relating to this plan change. I consider it would be difficult to require the requestor to fund and implement a public transport system to service PPC81 and PPC82, nor is it likely that such services would be provided by a third party prior to any development occurring.	I neither support nor oppose the submission point.
In relation to PPC82, the Ministry of Education (PC82-0008) notes that the Integrated Traffic Assessment included in the application does not provide any specific information regarding the effects of traffic on nearby schools and education facilities. In addition, it notes that transport connections which rely on the development of the Skellerup Block (PC73) may not be relied upon given PC73 has been declined. They request that that specific information is provided on the potential and actual traffic and safety effects on the nearby schools and education facilities.	Refer to my discussion of effects on the wider transport system in Section 6 and Section 8. My assessment has considered PPC81 and PPC82 both in isolation, and in conjunction with other plan changes (such as PPC73). In my view the immediate connectivity of PPC81 and PPC82 would benefit from the approval of PPC73 (by creating a contiguous urban area), however the approval of PPC73 would also generate additional effects on the wider transport network. In my view there are both pros and cons to PPC81 and PPC82, should PPC73 be approved.	My assessment and recommendations have included the consideration of PPC81 and PPC82 both in isolation, and in conjunction with other plan changes (such as PPC73). Subject to the recommendations of my report being adopted, I consider that the effects of PPC81 and PPC82 will be adequately addressed. Dunns Crossing Road will experience an increase in traffic. I have considered the effects of the multiple Plan Changes within Rolleston, and consider them to be within the range of what is to be expected within a typical urban area. However, I have not assessed how the proposed left in / left out intersection at SH1/Rolleston Drive, proposed by Waka Kotahi, might affect Dunns Crossing Road.
Stonehenge Trust (PC82-0010) support PC82 in principle, but seek that effects that the development will have on rural activity are minimised, including by the sealing of Edwards Road prior to the development commencing; and by all development occurring from a single entrance from Brookside Road.	Refer to my discussion in Section 7.7. I have concerns that effects on Edwards Road, including the intersection with Ellesmere Junction Road, may not be adequately addressed.	I support the submitters concerns.

APPENDIX B Traffic modelling technical note

flow
TRANSPORTATION SPECIALISTS

technical note

PROJECT	**SELWYN DISTRICT PLAN CHANGE**
SUBJECT	**TRAFFIC MODELLING REVIEW**
TO	**SELWYN DISTRICT COUNCIL**
FROM	QING LI (FLOW)
REVIEWED BY	MAT COLLINS (FLOW)
DATE	16 AUGUST 2022

1 INTRODUCTION

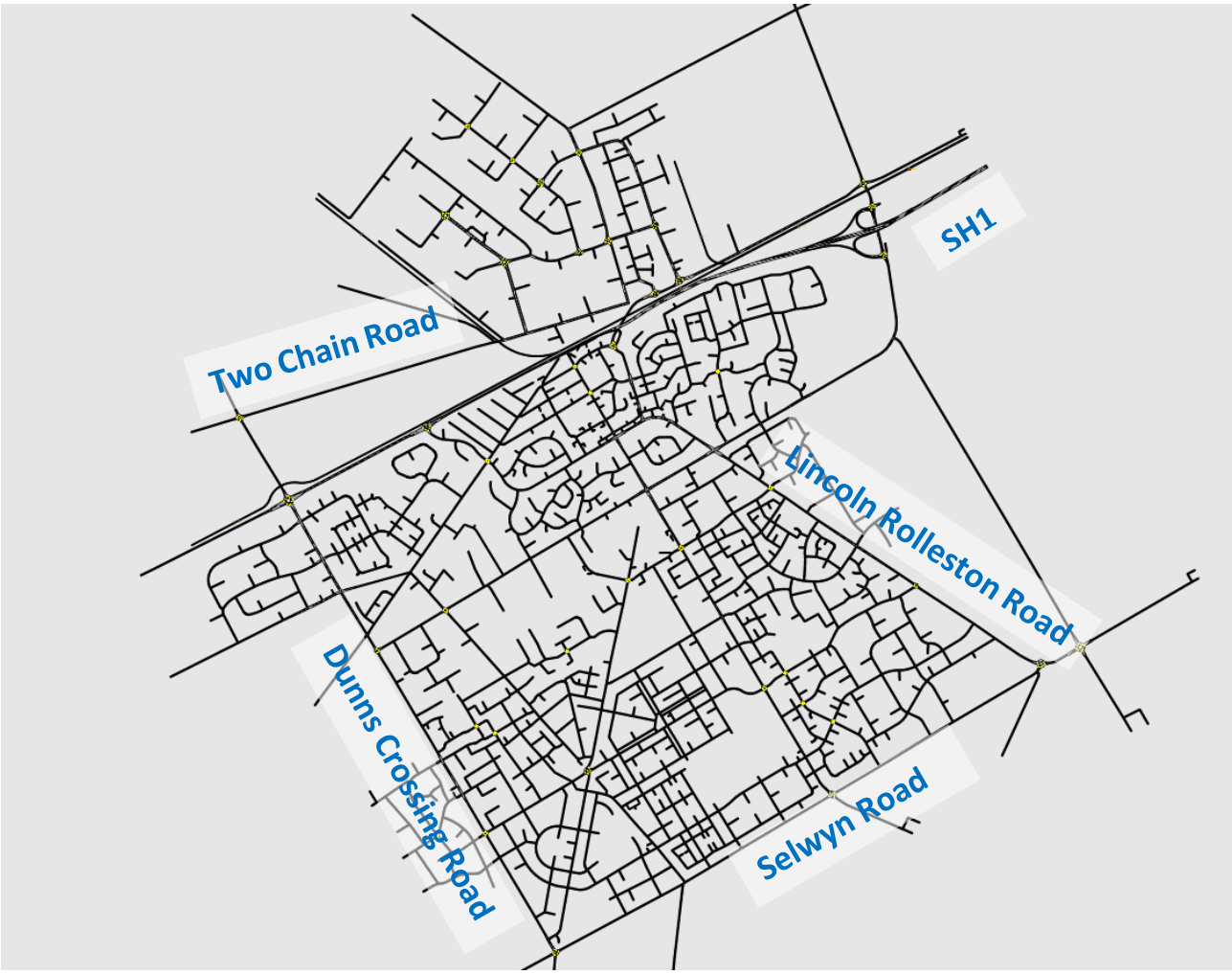
This technical note provides a summary of the model investigation completed for the proposed Private Plan Changes (PPCs) in Rolleston, Selwyn District. The assessment has been based on the Paramics model developed by Abley Limited (Abley). This model was originally developed in May 2021 and it assumes a 2033 background traffic/network scenario and the full development of the Outline Development Plans (ODPs). Since then, Stantec has used the model to assist the transport assessment of the proposed PPC82.

The latest model includes the following Private Plan Changes (PPCs) in Rolleston

- PPC64: Rolleston, 969 residential lots
- PPC66: Rolleston, rural zone to industrial zone
- PPC70: Rolleston, 800 residential lots plus commercial
- PPC71: Rolleston, 660 residential lots
- PPC73: Rolleston, 2100 residential lots plus commercial
- PPC75: Rolleston, 280 residential lots
- PPC76: Rolleston, 150 residential lots
- PPC78: Rolleston, 750 residential lots
- PPC80: Rolleston, industrial zone
- PPC81: Rolleston, 350 residential lots
- PPC82: Rolleston, 1,320 residential lots

The development of the original model and the associated transport network assessment is summarised in the Abley technical note "Rolleston Plan Change Modelling (May 2021)". An overview of the original Paramics model is provided in Figure 1 overleaf.

Figure 1: Rolleston Plan Change Paramics Model



In August 2021, Flow Transportation Specialists (Flow) was commissioned by Selwyn District Council to review the traffic effects associated with PPC73, and subsequently PPC80, 81 and 82 in late 2021/early 2022. We have therefore obtained the 2033 Plan Change model to understand the cumulative effects of the various plan changes. A high level review of the model has been completed and discussed in an earlier version of this technical note (also provided in Section 2 below).

2 HIGH LEVEL REVIEW OF THE PARAMICS MODEL

As part of our review of the Paramics mode we noted the following

- The model assumes 2033 background traffic informed by the 2028 and 2038 Christchurch Assignment and Simulation Transportation (CAST) model. In our view this is appropriate
- Traffic generation of each PPCs in the Rolleston area has been based on the land use/trip rates information provided in the Integrated Transport Assessments (ITAs) prepared for each PPC (if available). A common vehicle trip rate of 0.9 trips per hour per household has been applied to all

PPCs in both the morning and evening peaks. We consider that this trip rate is reasonable, given the existing low public transport (PT) and active mode shares in the area[1]

- In addition, we also note that the model has assumed a PT modal shift of some 6% to 8% between Rolleston and Christchurch (SH1 East) and 2.5% for trips to/from Lincoln (including walking and cycling). A 5% mode shift to walking and cycling within Rolleston has also been assumed. These adjustments have resulted in reductions of some 5% to 10% to the raw traffic generation for each PPC area, we consider that this is reasonable, however it is likely that improvements to PT and active modes access will be required within Rolleston to achieve this mode share
- The traffic distribution of each PPC in the 2033 model has been based on the origins and destinations of existing residential trips
- The network assumptions included in the 2033 Plan Change model were based on Council's Long Term Plan (up to 2032-33). The model also assumes the SH1 changes proposed west of the SH1/Weedons Road interchange as part of the Government's NZUP programme. This is reasonable as the 2021 update from Waka Kotahi states that construction is due to start in 2024[2]
- We note the following from these assumptions
    - As discussed in Section 3 of the Abley technical note, the Business Case for the Rolleston component of the NZUP programme is on-going and its outcome may change the access/route choice options between the Rolleston area and SH1
    - The model predicts that the SH1/Weedons Road interchange will operate with high delays with the existing layout, and roundabout metering signals have been assumed in the model at the Weedons Road southern roundabout to reduce delays. We note that these appeared to be a temporary solution and congestion is still predicted in the 2033 model with the PPCs

In summary, we consider that the 2033 Rolleston Paramics Plan Change model is fit for purpose for our high level assessment of the potential effects of the eleven PPCs in the Rolleston area.

In addition, the Abley technical note also included the results of a 2028 model which assumed no PPC developments in Rolleston. To investigate the background traffic growth predicted between the 2028 and 2033 models, we have compared the total traffic demands in the non-PPC zones between the two models.

[1] 2018 Census Main Means of Travel to Work data (retrieved from https://commuter.waka.app/) suggested a mode share of 3%, 7% and 3% for PT, walking and cycling respectively for the Rolleston Central, North East, North West, South West and South East areas.

[2] https://www.nzta.govt.nz/planning-and-investment/nz-upgrade/canterbury-package/

Table 1: Background Traffic Demand Comparison

Peak	Morning Peak		Evening Peak	
Years	**2028**	**2033**	**2028**	**2033**
Total Traffic Demands	21,300	21,400	24,410	24,530

The above table indicates that background traffic demands are not predicted to change significantly between 2028 and 2033. We however note that some of the growth between 2028 and 2033 may have been reduced by the PT/active mode shift assumptions in the 2033 models. The assumed pass-by trips for the PPCs may also have reduced background traffic in the 2033 models.

3 PREDICTED HOT SPOTS WITHIN ROLLESTON

To identify the intersections that may operate under pressure in future, we have relied on the model results provided in the Abley technical note for PPC 73. We note that a few more PPCs have been proposed in the area since the PPC 73 traffic assessment and these may have increased the anticipated traffic volumes in Rolleston area. We also note that additional intersection/road improvements may have been discussed in each individual PPC traffic assessments but they may not capture the cumulative effects of the other PPCs. As such, the intersections looked at in our assessment should be viewed as indicative and an updated network wide intersection assessment will be required to identify all the network 'hot spots' related to the proposed PPCs.

Table 2 overleaf provides the intersections which are predicted to operate at Level of Service (LOS) F, for one or more approaches during the morning and/or evening peak periods. We have undertaken Select Link Analysis to determine the traffic flows through each of these intersections, which provides understanding of the proportion of traffic flows associated with each PPC. This analysis has also been done for the intersections with layout improvements assumed in the 2033 Plan Change models.

We have used the following colour code to assist interpretation:

- no shading: the PPC is predicted to contribute less than 2.5% towards the traffic volumes at this intersection
- orange shading: the PPC contributes between 2.5% and 5% towards the traffic volumes at this intersection
- red shading: the PPC contributes more than 5% towards the traffic volumes at this intersection.

The predicted intersection performance in 2028, without the proposed PPCs in the Rolleston area, has also been obtained from the Abley technical note and provided in the table for comparison, except for the Broadlands Drive/Learners Drive intersection which we have extracted from the 2028 model. In this assessment, we have focused on the peak hours, being 7 am – 8 am in the morning and 5 pm – 6 pm in the evening.

Table 2: 2033 network performance and individual PPC effects

Intersection	Existing Layout	Intersection form assumed in models (2028/2033)	2028 performance without PPCs[3] (red for LOS F)	2033[4] performance with plan changes (red for LOS F)	Percentage of traffic associated with each PPC as a proportion of total traffic movements through each intersection (AM and PM combined) [5]										
					PPC73	PPC64	PPC66	PPC70	PPC71	PPC75	PPC76	PPC78	PPC80	PPC81	PPC82
					%	%	%	%	%	%	%	%	%	%	%
Intersections with congestion/high delays in the 2033 Rolleston Paramics model															
SH1/Dunns Crossing Road/Walkers Road	Priority	Roundabout in both years	LOS A in both AM and PM	LOS F on Dunns Crossing and SH1 west in AM	9.3%	0.8%	0.0%	1.0%	0.5%	0.2%	0.2%	0.5%	3.6%	0.4%	2.1%
Dunns Crossing Road/Granite Road	Priority	Priority (T intersection)/Signals (cross intersection)	LOS A in both AM and PM	LOS E on Granite Rd east in AM	30.2%	2.3%	0.0%	3.1%	0.4%	0.2%	0.5%	0.6%	2.8%	1.2%	6.2%
Dunns Crossing Road/Newman Road	Priority	Priority in both years	LOS A in both AM and PM	LOS F on Newman Rd in AM	24.9%	1.9%	0.0%	2.5%	0.2%	0.1%	0.4%	0.5%	2.8%	1.2%	6.2%
Jones Road/Weedons Road	Roundabout	Roundabout in both years	LOS A in both AM and PM	LOS F on all approaches except Weedons Road South in PM	2.1%	0.9%	0.6%	0.9%	0.7%	0.3%	0.2%	0.8%	2.3%	0.3%	1.0%
Levi Road/Ruby Drive	Priority	Priority in both years	LOS B and C in AM and PM respectively	LOS F in both AM and PM	2.0%	1.9%	0.0%	3.0%	5.5%	0.7%	0.6%	0.8%	0.1%	0.6%	0.8%
Levi Road/Strauss Drive	Priority	Priority in both years	LOS D and C in AM and PM respectively	LOS F on Strauss Dr and Levi Rd east in AM	1.4%	1.6%	0.0%	2.5%	4.0%	0.6%	0.5%	0.6%	0.0%	0.5%	0.5%
Levi Road/Weedons Road	Priority	Priority in both years	LOS F on Weedons Rd South and Levis Rd west in PM	LOS F on Weedons Rd South in both AM and PM, and on Levis Rd west in PM	1.3%	2.1%	0.0%	2.3%	3.6%	0.7%	0.5%	1.5%	0.0%	0.5%	0.3%
Lowes Road/Broadlands Drive	Priority	Priority in both years	LOS B and C in AM and PM respectively	LOS F on Broadlands Dr in AM, Lowes Rd west in PM	12.7%	1.8%	0.0%	3.2%	2.6%	0.6%	0.4%	1.4%	0.4%	0.5%	5.7%
Selwyn Road/Lincoln Rolleston Road	Priority	Priority/ Roundabout	LOS F on Lincoln Rolleston Rd north in PM	LOS B in both AM and PM	4.2%	5.2%	0.0%	2.1%	1.5%	1.5%	0.3%	5.1%	0.0%	0.1%	0.3%
SH1/Weedons Interchange South	Roundabout	Roundabout in both years	LOS F on SH1 West, AM and PM	LOS F on SH1 West and Weedons Rd South, AM and PM	1.4%	1.9%	0.2%	2.0%	3.2%	0.6%	0.4%	1.4%	0.4%	0.4%	0.3%
SH1/Tennyson Street	Priority	Left in and left out	LOS D on SH1 East in PM	LOS F on SH1 East in PM	2.4%	0.4%	0.0%	0.6%	0.5%	0.2%	0.2%	0.5%	1.3%	0.0%	0.0%
Springston Rollestion Road/Broadlands	Roundabout	Roundabout in both years	LOS A in both AM and PM	LOS E on Springston Rolleston Road South and Broadlands Drive West in AM, and Broadlands Drive East in PM	3.6%	4.1%	0.1%	4.3%	2.1%	0.2%	0.6%	1.1%	0.7%	1.0%	0.4%

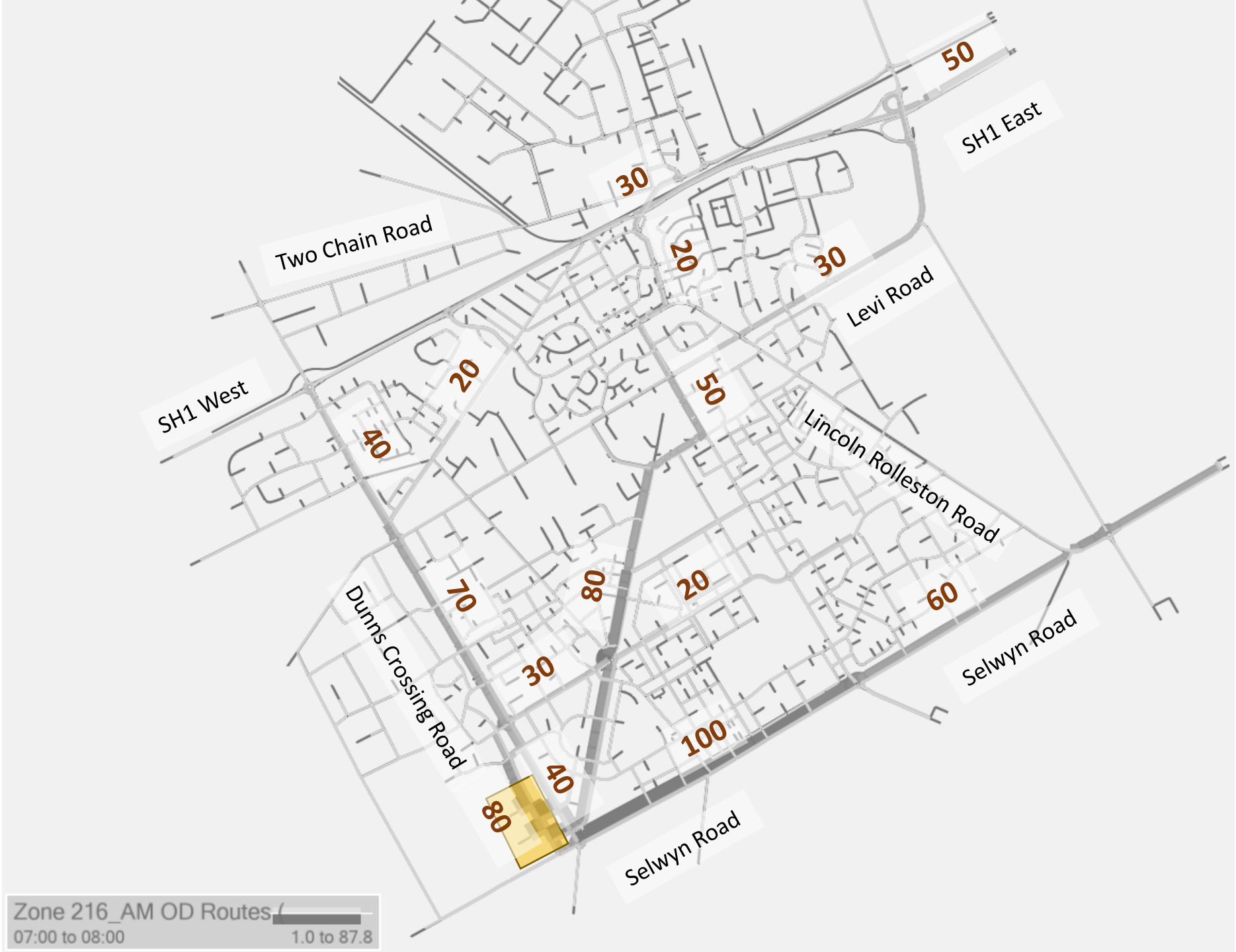
[3] Performance based on 2028 Paramics model
[4] Performance based on PPC81 Paramics model

[5] Orange shading: the PPC contributes between 2.5% and 5% of total traffic movements at this intersection. Red shading: the PPC contributes more than 5% of total traffic movements at this intersection

Intersection	Existing Layout	Intersection form assumed in models (2028/2033)	2028 performance without PPCs[3] (red for LOS F)	2033[4] performance with plan changes (red for LOS F)	Percentage of traffic associated with each PPC as a proportion of total traffic movements through each intersection (AM and PM combined) [5]										
					PPC73	PPC64	PPC66	PPC70	PPC71	PPC75	PPC76	PPC78	PPC80	PPC81	PPC82
					%	%	%	%	%	%	%	%	%	%	%
East Maddisons Road/Brookside Road/Burnham School Road	Priority	Priority in both years	LOS A in both AM and PM	LOS F on East Maddison Road in AM, and LOS F on Brookside Road East in PM	10.5%	1.8%	0.0%	3.1%	0.6%	0.3%	1.2%	0.8%	0.4%	1.3%	0.0%
Broadlands Drive/Learners Drive	No intersection	Priority in both years	LOS B in both AM and PM	LOS F on Learners Drive in AM	5.3%	4.4%	0.0%	7.1%	2.3%	0.3%	1.1%	0.6%	0.2%	1.5%	0.0%
Springston Rolleston Road/Dynes Road	Priority	Priority in both years	LOS C on Lanner Drive in both AM and PM	LOS F on Dynes Road in AM	1.4%	6.3%	0.0%	1.5%	2.1%	0.1%	0.3%	0.8%	0.4%	0.4%	0.0%
Jones Road/(Hoskyns) Retail connector	No intersection	Roundabout in both years	LOS A in both AM and PM	LOS F on the retail connector and Jones Road East in PM	1.6%	1.8%	0.0%	1.2%	1.3%	0.5%	0.2%	1.2%	3.1%	0.3%	0.0%
Jones Road/Iport Drive	Roundabout	Roundabout in both years	LOS A in both AM and PM	LOS E on Iport Drive in PM	1.1%	0.9%	0.0%	0.7%	0.7%	0.2%	0.1%	0.5%	2.5%	0.2%	0.0%
Other intersection with upgrades assumed in the 2033 Rolleston Paramics model															
Burnham School Road/Dunns Crossing Road	Priority cross road	Signals	LOS A in both AM and PM	LOS B in both AM and PM	35.0%	3.8%	0.0%	4.4%	1.0%	0.4%	0.7%	1.3%	2.2%	0.5%	3.1%
Dunns Crossing Road/Brenley Drive/Skellerup Primary Access	No intersection	Priority T/Priority Cross Road with Right Turn bays	LOS A in both AM and PM	LOS D in AM and C in PM	29.4%	4.0%	0.0%	6.0%	0.4%	0.2%	0.4%	0.8%	1.8%	3.3%	10.0%
Dunns Crossing Road/CRETS collector	Priority	Priority/Roundabout	LOS A in both AM and PM	LOS A in both AM and PM	29.9%	5.4%	0.0%	8.5%	1.2%	0.8%	0.4%	1.7%	1.0%	4.0%	6.7%
Dunns Crossing Road/Goulds Road/Selwyn Road	Priority	Priority/Roundabout with Priority control at Goulds /Dunns Crossing Intersection	LOS C in both AM and PM	LOS A in both AM and PM	11.9%	3.4%	0.0%	5.3%	0.7%	0.5%	0.2%	3.1%	0.0%	4.2%	8.2%
Dunns Crossing Road/ODP12 Access/ Skellerup Secondary Access	No intersection	Priority T/Priority Cross Road with Right Turn bays	LOS A in both AM and PM	LOS A in both AM and PM	28.5%	5.7%	0.0%	7.8%	0.1%	0.3%	0.0%	1.2%	1.4%	3.5%	4.4%
Goulds Road /East Maddisons Road	Priority	Priority/Roundabout	LOS A and B in AM and PM respectively	LOS A in both AM and PM	9.6%	7.1%	0.0%	12.9%	2.5%	1.2%	1.3%	2.2%	0.5%	2.8%	2.6%
Lowes Road/Dunns Crossing Road	Priority	Priority/Roundabout	LOS A in both AM and PM	LOS A in both AM and PM	31.1%	3.0%	0.0%	4.3%	1.1%	0.3%	0.5%	0.9%	1.8%	2.0%	17.3%
Lowes Road/East Maddisons Road	Priority	Priority/Roundabout	LOS B and D in AM and PM respectively	LOS B in both AM and PM	15.9%	2.1%	0.0%	2.1%	2.1%	0.6%	1.1%	1.5%	0.9%	0.4%	8.0%
Lowes Road/Levi Drive/Masefield Drive	Roundabout	Signals in both years	LOS B and C in AM and PM respectively	LOS C in both AM and PM	3.5%	1.4%	0.1%	2.1%	4.9%	1.6%	0.4%	3.6%	0.7%	0.5%	1.1%
Lowes Road/Tennyson Street	Signals	Signals in both years	LOS B and C in AM and PM respectively	LOS C in both AM and PM	4.5%	3.2%	0.1%	3.3%	1.3%	0.3%	0.5%	0.9%	0.7%	0.8%	1.7%

Intersection	Existing Layout	Intersection form assumed in models (2028/2033)	2028 performance without PPCs[3] (red for LOS F)	2033[4] performance with plan changes (red for LOS F)	Percentage of traffic associated with each PPC as a proportion of total traffic movements through each intersection (AM and PM combined) [5]										
					PPC73	PPC64	PPC66	PPC70	PPC71	PPC75	PPC76	PPC78	PPC80	PPC81	PPC82
					%	%	%	%	%	%	%	%	%	%	%
Rolleston Drive/Brookside Road	Priority	Roundabout in both years	LOS A and C in AM and PM respectively	LOS E and D in AM and PM respectively	7.6%	0.5%	0.1%	1.3%	0.9%	0.3%	0.5%	0.7%	1.1%	0.6%	4.8%
Rolleston Road/Tennyson Street	Roundabout	Signals in both years	LOS B and C in AM and PM respectively	LOS C and D in AM and PM respectively	3.3%	2.8%	0.1%	2.7%	1.3%	0.3%	0.4%	1.0%	0.9%	0.6%	1.3%
Selwyn Road /Weedons Road	Priority	Roundabout in both years	LOS A in both AM and PM	LOS A in both AM and PM	4.1%	4.8%	0.0%	1.9%	1.4%	1.4%	0.3%	4.6%	0.0%	0.7%	1.6%
Springston Rolleston Road/Selwyn Road	Priority	Roundabout in both years	LOS A in both AM and PM	LOS B in both AM and PM	5.7%	9.5%	0.0%	3.2%	0.9%	0.6%	0.4%	3.4%	0.0%	1.6%	3.3%
Tennyson Street/Moore Street	Priority	Roundabout in both years	Not provided	LOS B in both AM and PM	2.2%	1.6%	0.0%	0.9%	0.7%	0.2%	0.1%	0.9%	0.9%	0.2%	0.9%
Walkers Road/Two Chain Road	Priority	Roundabout in both years	LOS A in both AM and PM	LOS A in both AM and PM	3.8%	0.9%	0.2%	0.9%	0.7%	0.3%	0.2%	0.7%	1.8%	0.4%	1.4%

APPENDIX C Traffic modelling Select Link Analysis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Two Chain Road
20
30
Levi Road
SH1 West
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50
40
Lincoln Rolleston Road
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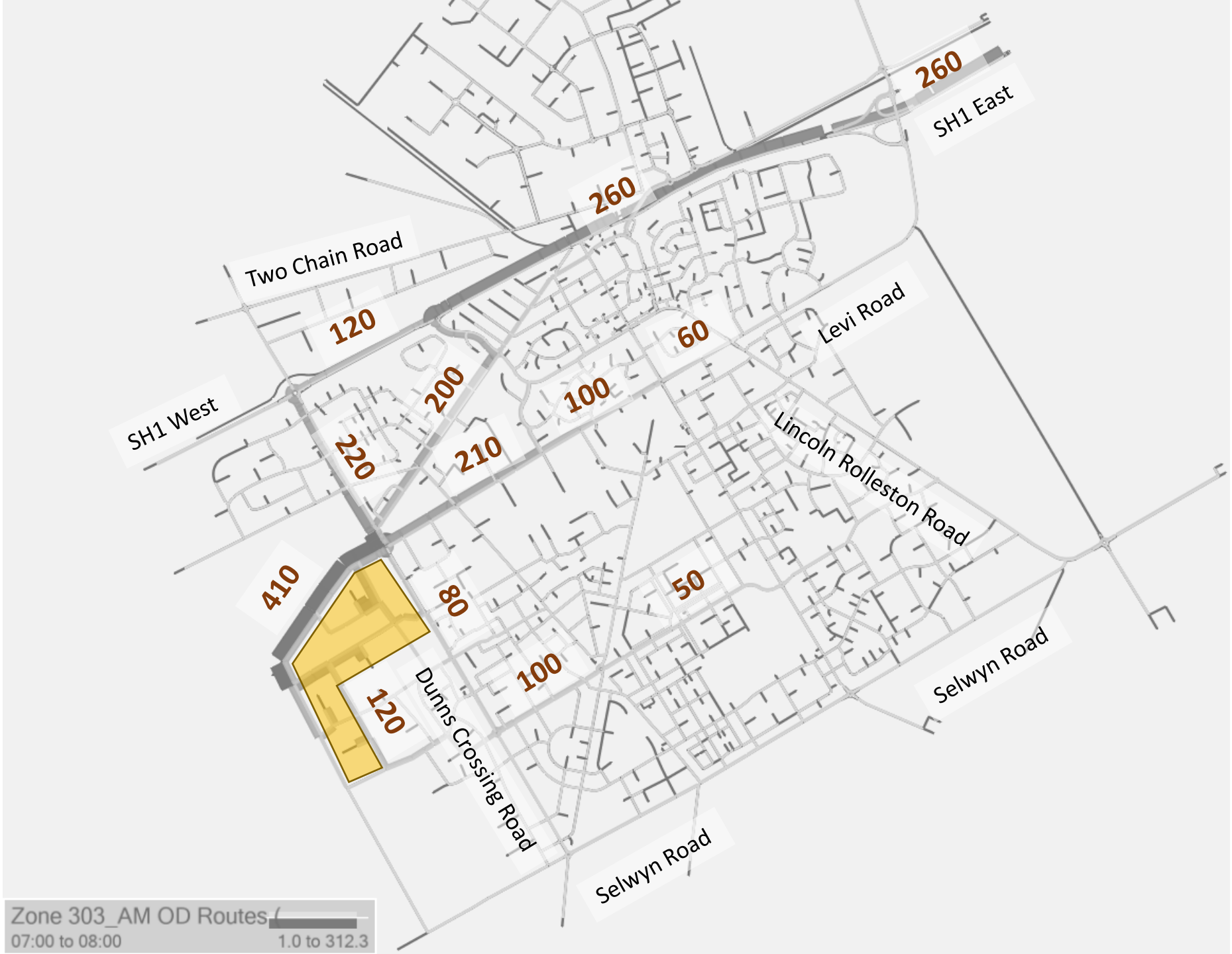
80
20
60
Dunns Crossing Road
Selwyn Road
30
100
40
80
Selwyn Road
Zone 216_AM OD Routes
07:00 to 08:00
1.0 to 87.8


SH1 East
SH1 West
Two Chain Road
Levi Road
Lincoln Rolleston Road
Dunns Crossing Road
Selwyn Road
Selwyn Road
30
20
5
20
20
30
40
70
70
10
60
30
90
40
60
Zone 216_PM OD Routes
17:00 to 18:00
1.0 to 70.8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SH1 East
260
Two Chain Road
120
SH1 West
200
220
210
100
60
Levi Road
Lincoln Rolleston Road
410
80
50
100
120
Dunns Crossing Road
Selwyn Road
Selwyn Road
Zone 303_AM OD Routes
07:00 to 08:00
1.0 to 312.3


490
SH1 East
200
Two Chain Road
160
70
Levi Road
210
90
SH1 West
280
150
Lincoln Rolleston Road
440
50
100
100
140
Dunns Crossing Road
Selwyn Road
Selwyn Road
Zone 303_PM OD Routes
17:00 to 18:00
1.0 to 291.8