

ANNEXURE F

TRAFFIC ASSESSMENT & RFI RESPONSE

Subject:

FW: Hornby Quadrant Plan Change - Traffic RFI

From: Leckie, Andrew <andrew.leckie@stantec.com>

Sent: Tuesday, 5 November 2024 4:26 pm

To: Mark Johnston <Mark.Johnston@calderstewart.co.nz>

Subject: RE: Hornby Quadrant Plan Change - Traffic RFI

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Hi Mark,

We have copied the CCC queries below and provided responses in orange. We are happy for these to be forwarded onto CCC.

Please let us know if you need anything else.

Kind regards

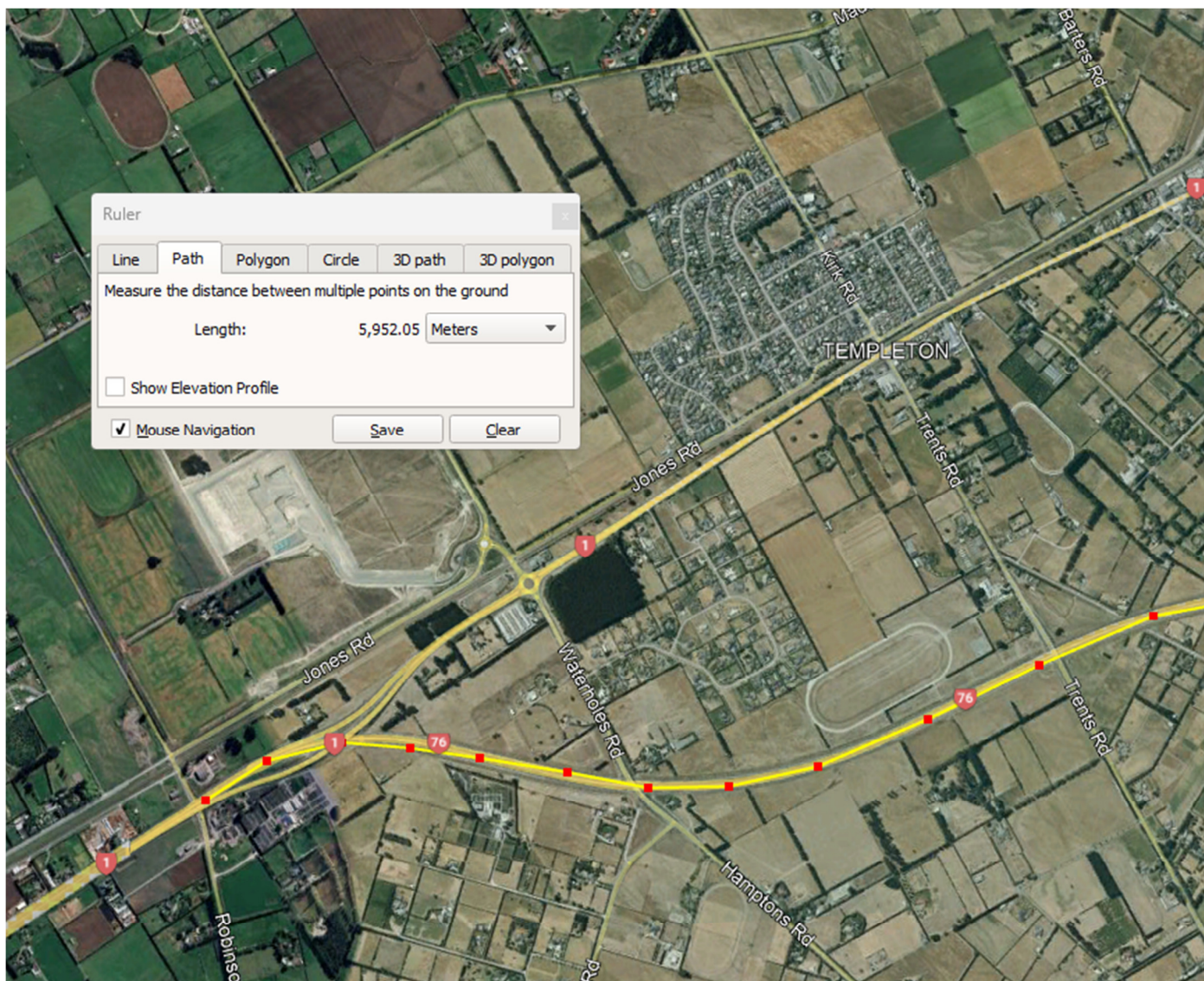
1. Existing traffic volumes are at 2022 – how do these compare to the 2024? **The Southwest Hornby transport model was updated in 2022 to be suitable for use in assessing the Plan Change. The base year (2022) model update, demand redevelopment, observed data summary and resulting model calibration / validation was described in the Stantec report “Southwest Hornby Model Update”. We agreed with NZTA that the base model was appropriate to be applied to projects in the study area. The model was then used to assess future year scenarios. How traffic volumes have changed from 2022 to 2024 is not considered a significant issue because the assessment includes future year scenarios beyond 2024.**
2. Marsh’s Road/SH1 needs to be modelled without restrictions. **If the left in / left out restrictions are removed from the Marshs Road intersection, this will allow more movements to be made at this intersection and thus result in movements being more spread throughout the model. It is therefore considered a conservative approach to include the left in / left out restrictions in the modelling. Removing the restrictions will improve the outcomes and the conservative approach presents greater effects.**
3. Fig 2.1 and 2.2 shows a reduction in traffic volume on Springs Road this needs a more comprehensive reason as to why this is the case **These are outputs from the CAST model which is an agreed RCA traffic model for the Greater Christchurch area. As outlined in our report, we also questioned the low growth predicted by the CAST model in the study area including volumes on Springs Road predicted by CAST in 2038 that are lower than the 2021 levels. Because we found this questionable, in order to test the development operations and performance of key improvements we revised the baseline growth levels to increase the level of strategic traffic volumes in the study area.**
4. Fig 4.5 it does not seem logical that there would be reductions in traffic volumes on the network to the extent shown – why would this be the case? **The connection of Bruce Stewart Drive out to Main South Road / Pound Road represents a major connection in the Hornby road network and changes in traffic patterns in the wider area can be expected. Reasons for changes in modelled traffic volume forecasts are not always obvious, particularly in areas under significant pressure such as Halswell Junction Road and some of its key intersections. However, the main contribution to the reductions is the direct access to**

development sites via Bruce Stewart Drive. The overall conclusion is that the new road connection will provide connectivity benefits throughout the Hornby area.

- Table 5 and Table 6 which show a significant movement of vehicles between SH1 South and the Pound Road Ext – Why is traffic not using SH 76 and Shands Road? **Reported movements between SH1 south and Bruce Stewart Drive are: AM: 127vph right in, 44vph left out. PM: 130vph right in, 191vph left out.**

As shown below, there is approximately 500m extra travel distance between the Main South Road interchange and the Bruce Stewart Drive / Quadrant Drive intersection via SH76 and Shands Road than via Main South Road and Bruce Stewart Drive. Also there are three signalised intersections on Shands Road (motorway exit, Marshs Road and Bruce Stewart Drive) compared with just the one signalised intersection at Main South Road / Pound Road / Bruce Stewart Drive in the other direction. This shows that the Main South Road route could be more attractive for parts of Hornby Quadrant and the traffic distribution in the model looks to reflect this.





6. Figure 7: If congestion occurs at the Pound Road/SH 1 intersection – why would traffic not re-route? **Figure 7 is specifically showing the effect of queuing on Bruce Stewart Drive on modelled performance of vehicle accesses / minor intersections on Bruce Stewart Drive. Average delays on Bruce Stewart Drive representative of a LOS E as forecast during morning and evening peak periods are not unusual for arterial intersections and would not be expected to lead to significant re-routing. The traffic model is setup, calibrated, and validated, to represent re-routing if delays are sufficiently large.**

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Hornby Quadrant Plan Change Integrated Transport Assessment

PREPARED FOR CALDER STEWART DEVELOPMENT LTD | APRIL 2022

We design with community in mind

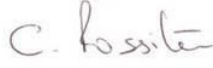
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Quality statement

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1 Introduction

Calder Stewart Limited proposes to re-zone approximately 23ha of rural land to the west of Hornby to enable the development of industrial zoned activities. The site is located south-east of the Main South Road (SH1) / Marshs Road intersection and is surrounded by industrially zoned land to the east and south.

This Integrated Transport Assessment (ITA) has been prepared to assess the proposed Plan Change request and the ability of the surrounding transport network to accommodate the request. The following elements are discussed in this report:

- Site context and background information on the existing transport network and traffic patterns
- Existing road safety performance of the surrounding road network
- Key transport elements of the proposed Plan Change
- Potential traffic generation of industrial development of the site
- Assessment of performance of the surrounding transport network with the Plan Change site developed
- Non-vehicular travel and accessibility by active modes to the Plan Change site
- Assessment against transport related objectives and policies outlined in the Christchurch City Council District Plan (District Plan)

2 Site Context

The location of the site in the context of the surrounding area can be seen in **Figure 2-1** below. The site is located to the west of Hornby with Main South Road (SH1) and Marshs Road forming the northern and western frontages, respectively.



Figure 2-1. Site Location in Context of Surrounding Area (Canterbury Maps)

The zoning of the site and the surrounding area is shown in **Figure 2-2** below. The Plan Change site is zoned entirely Rural Urban Fringe (RuUF), and it excludes the small Open Space Community Park zone and the Commercial Local Zone in the north-western corner. Surrounding land to the east and south has an Industrial Heavy zoning, while the land on the opposite side of SH1 is zoned Industrial General. Marshs Road forms the boundary of Christchurch City, with the land on the opposite side of the road Selwyn District land used for rural or rural-residential purposes.

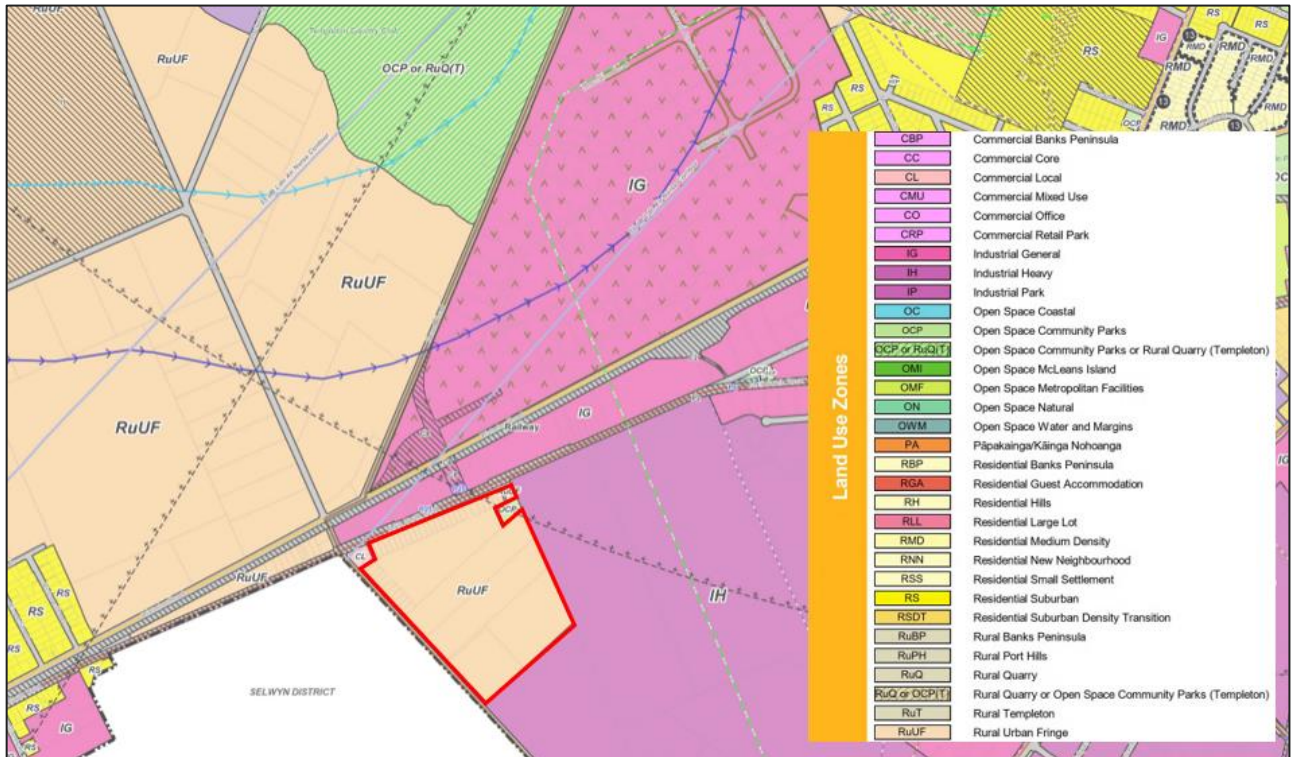


Figure 2-2. Site Location (Outlined in Red) in Context of Surrounding Land Zoning (District Plan)

Figure 2-3 shows the District Plan road hierarchy in the area.

SH1 is classified as a Major Arterial, which aligns with its function as a primary east-west connection into Christchurch.

Marshs Road at the western frontage is currently classified as a Minor Arterial, providing a connection from SH1 to the Christchurch Southern Motorway interchange at Shands Road. However, the District Plan outlines that the section of Marshs Road between SH1 and Shands Road will be replaced as a Minor Arterial by a new road which is indicated in Figure 2-3 running through the Plan Change site.

Pound Road is a Minor Arterial which meets SH1 opposite the Plan Change site. It provides an orbital arterial route around the western edge of the city.

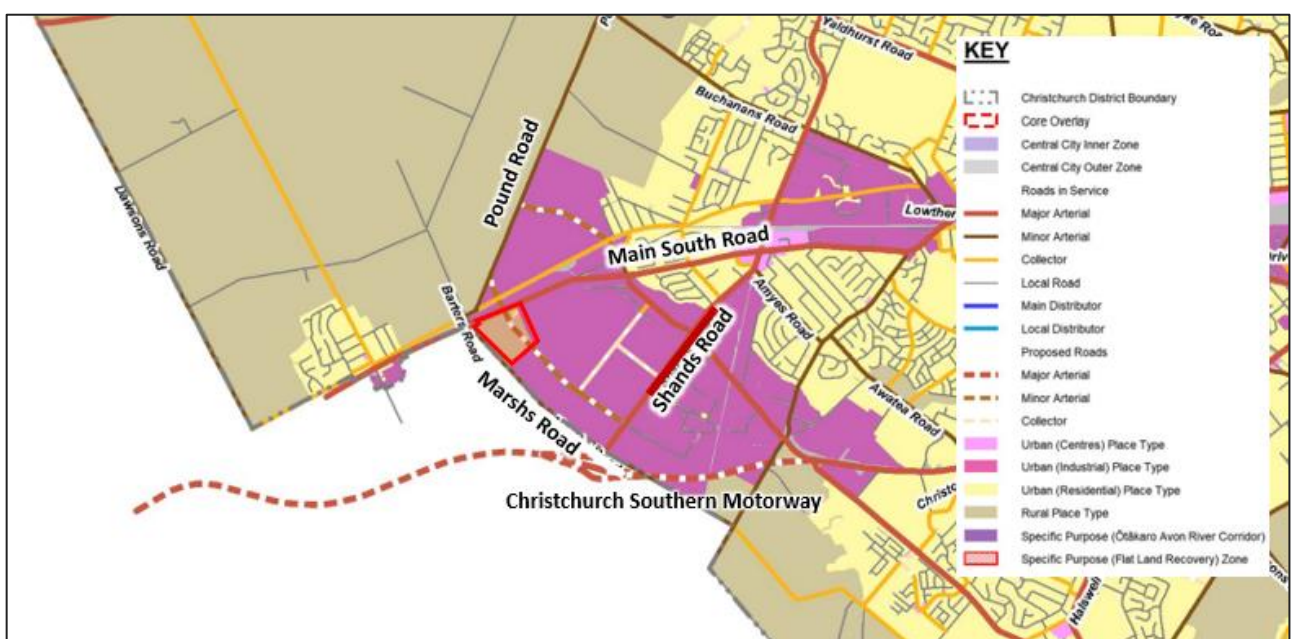


Figure 2-3. Site Location in Context of District Plan Road Hierarchy Classifications

3 Existing Transport Network

3.1 Main South Road / Pound Road Intersection

The Main South Road (SH1) / Pound Road intersection has been formed as a signalised T-intersection. The formation of the intersection is shown in **Figure 3-1** below. There are two through lanes in each direction plus turning lanes on SH1. Pound Road has separate left turn and right turn lanes.



Figure 3-1. Formation of the Main South Road / Pound Road Signalised T-Junction (Canterbury Maps)

There is a right turn phase for traffic turning right into Pound Road, with filter turning not permitted.

Shared pedestrian / cycle paths are provided on both sides of the road on all three legs. Shared crossings are provided across Pound Road and the eastern SH1 leg. Partial protection is provided through the use of red turning arrows.

The speed limit is 70km/h through the intersection.

3.2 Shands Road / New Minor Arterial Road Intersection

The initial length of the new Minor Arterial road off Shands Road has recently been constructed, with a signalised T-intersection now in operation. As shown in **Figure 3-2**, there are two right turn lanes out of the new road towards the motorway interchange, and there is a single left turn lane. There are two through lanes in each direction and turning lanes on Shands Road.



Figure 3-2. New Minor Arterial Road Intersection with Shands Road

3.3 Marshs Road

Marshs Road has an urban formation for approximately 300m south of SH1 and then a rural formation south of that. **Figure 3-3** shows the northern section of the road where the carriageway is approximately 14m wide, allowing for two traffic lanes and wide shoulders. The rural section of the road (**Figure 3-4**) has a varying sealed carriageway width of 6.0m-7.0m. A 60km/h posted speed limit is in place on Marshs Road.



Figure 3-3. Urban Formation of Marshs Road



Figure 3-4. Rural Formation of Marshs Road

3.4 Main South Road / Marshs Road Intersection

Marshs Road meets SH1 at a priority stop-controlled crossroad intersection with SH1 as the priority road and the Barters Road stub on the northern side of SH1. The layout of the intersection (**Figure 3-5**) includes a right turn bay for right turns into Marshs Road and a flush median for the lower volume right turn into Barters Road. Good sightlines are available in each direction from the Marshs Road approach (allowing for the fact that the temporary road works sign to the east is not usually present) as shown in **Figures 3-6** and **3-7**.



Figure 3-5. Aerial View of Layout of Main South Road / Marshs Road / Barters Road Intersection



Figure 3-6. Sightline from Marshs Road to SH1 East



Figure 3-7. Sightline from Marshs Road to SH1 West

3.5 Public Transport Network

There is one bus service which runs close to the site currently, being the Route 5 (Rolleston/New Brighton) service. This service links Rolleston to the City via key locations including Hornby and Riccarton. The service runs along Waterloo Road with approximately two buses in each direction per hour. As shown in **Figure 3-8**, the nearest bus stops are on Waterloo Road east of Pound Road approximately 400m north of the site.



Figure 3-8. Bus Route and Stop Location Near the Development Site (Metro)

3.6 Walking and Cycling Network

The South Express Major Cycle Route is planned to run along Waterloo Road in the vicinity of the site, as indicated in **Figure 3-9**. The cycleway will travel through the suburbs of Hornby, Hei Hei, Sockburn and Riccarton, connecting to other cycleways and South Hagley Park.

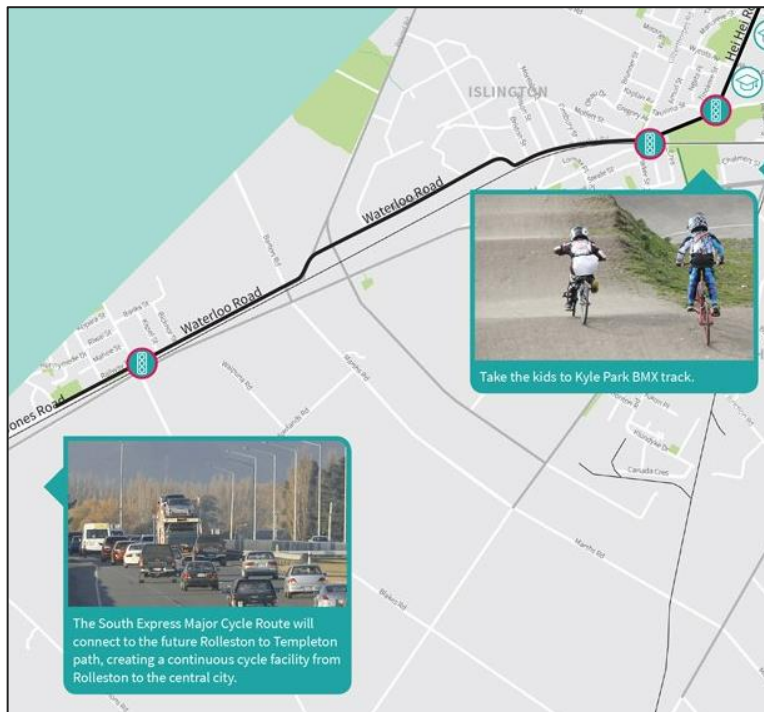


Figure 3-9. Planned South Express Major Cycle Route

There are shared paths on both sides of Pound Road south of Waterloo Road and on both sides of SH1 in the vicinity of the Pound Road intersection.

The Little River Rail Trail cycleway runs along Shands Road and there are shared signalised crossings and a shared path into the industrial land to the south of the site.

4 Existing Traffic Volumes

Table 4-1 outlines daily traffic volumes on the key roads in the area. SH1 carries very high traffic volumes reflective of its status while Pound Road and Shands Road both also carry reasonably high volumes reflective of their arterial statuses. The traffic volume reported for Marshs Road is considered to be low based on the hourly volumes recorded in the SH1 / Marshs Road intersection count reported on below.

Table 4-1: Summary of Traffic Volumes

Road	ADT (Average Daily Traffic)	Count Date	Source
Main South Road (south of Marshs Road)	21,900	August 2022	TMS
Pound Road	8,000	November 2022	Mobile Road
Marshs Road	1,100	November 2022	Mobile Road
Shands Road	10,000	November 2022	Mobile Road

Stantec organised peak hour traffic surveys at the SH1 / Pound Road intersection on 27 October 2022. The following table summarises the peak hour traffic volumes recorded. The counts show that the volumes of turns between SH1 west of the intersection and Pound Road are similar to the straight through volumes on SH1.

Table 4-2: SH1 / Pound Road Peak Hour Traffic Counts

Approach	Movement	AM Vehicles	PM Vehicles
SH1 East	Through	437	728
	Right	135	239
Pound Road	Left	217	121
	Right	450	432
SH1 West	Left	495	427
	Through	497	383

CCC carried out an intersection count at the SH1 / Marshs Road intersection on 8 April 2021. The peak hour counts are summarised below. As expected, the through movements on SH1 are the dominant movements. There is more traffic turning between SH1 west of the intersection and Marshs Road than there is between SH1 east of the intersection and Marshs Road. There are very low volumes turning into and out of Barbers Road.

Table 4-3: SH1 / Marshs Road Peak Hour Traffic Counts

Approach	Movement	AM Vehicles	PM Vehicles
Marshs Road	Left	58	72
	Through	0	1
	Right	24	13
SH1 East	Left	46	64
	Through	742	1,254
	Right	10	1
Barbers Road	Left	1	6
	Through	0	0
	Right	0	1
SH1 West	Left	2	2
	Through	1,101	807
	Right	100	89

5 Road Safety

A search of the Waka Kotahi 'Crash Analysis System' (CAS) database has been undertaken for the purposes of reviewing the road safety records within the vicinity of the development site. The search included the last complete five-year period of 2017 to 2021. The search covered the SH1 / Pound Road intersection, the SH1 / Marshs Road intersection and Marshs Road between SH1 and Shands Road.

Four crashes, including two minor-injury crashes, were reported at the SH1 / Marshs Road intersection. Two of the crashes involved vehicles crossing from Marshs Road being hit by an eastbound vehicle on SH1. The crash history at the intersection does not suggest a particular safety concern however there are general safety concerns with priority intersections on such high-volume roads.

Three non-injury crashes were reported at the SH1 / Pound Road signalised intersection and there were no particular safety concerns identified.

One single vehicle loss of control crash was reported on Marshs Road between SH1 and Shands Road, showing that the narrow carriageway with a rural formation is not resulting in any notable safety concerns currently.

6 Future Environment

6.1 South West Hornby Industrial

Figure 6-1 shows the South West Hornby Industrial Area Outline Development Plan, with the outline of the Plan Change site in red. The new Minor Arterial road is shown extending from Shands Road through the adjacent industrial zoned land to the boundary of the Plan Change site.

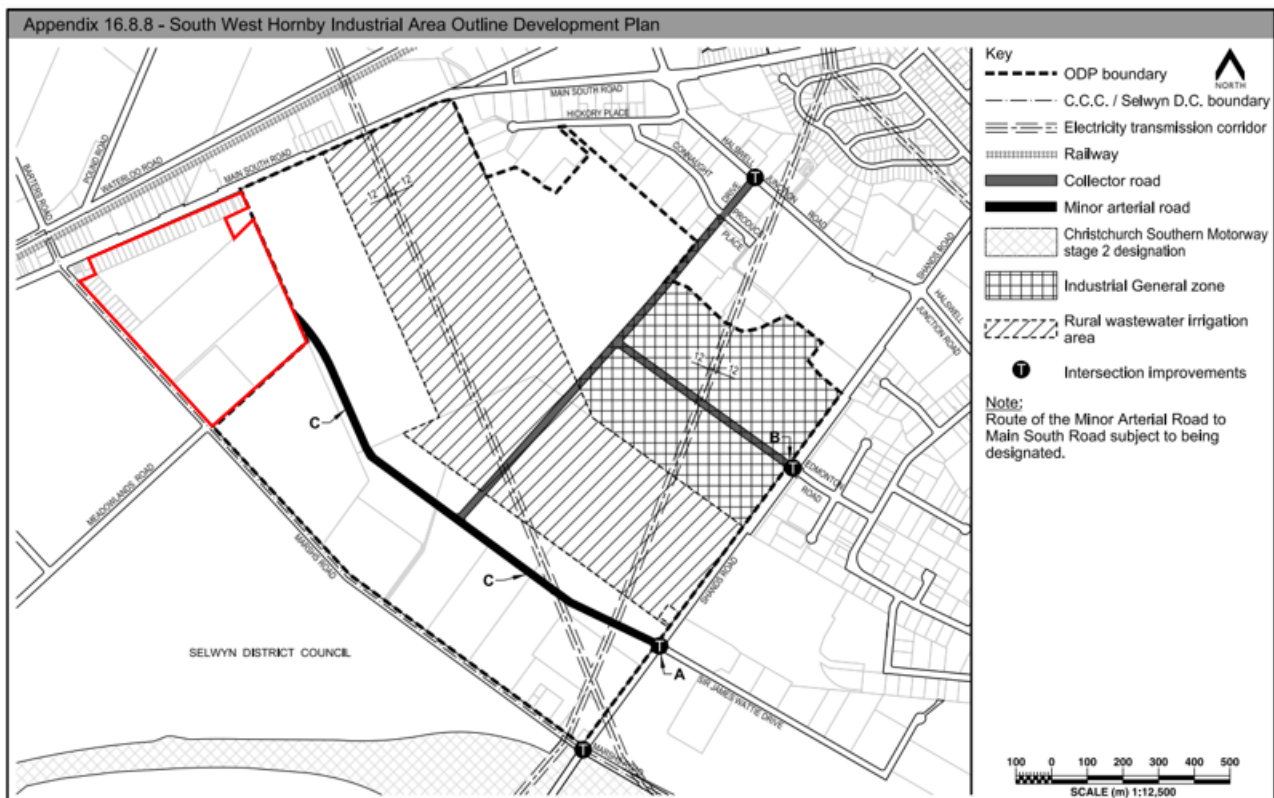


Figure 6-1. South West Hornby Industrial Area ODP

Figure 6-2 shows the proposed formation of the new Minor Arterial road within the industrial land to the south of the site. It is proposed with 4.5m wide traffic lanes and a 3m wide flush median, with no on-street parking being permitted. A shared pedestrian / cycle path is proposed on the eastern side of the road, with a standard footpath on the western side.

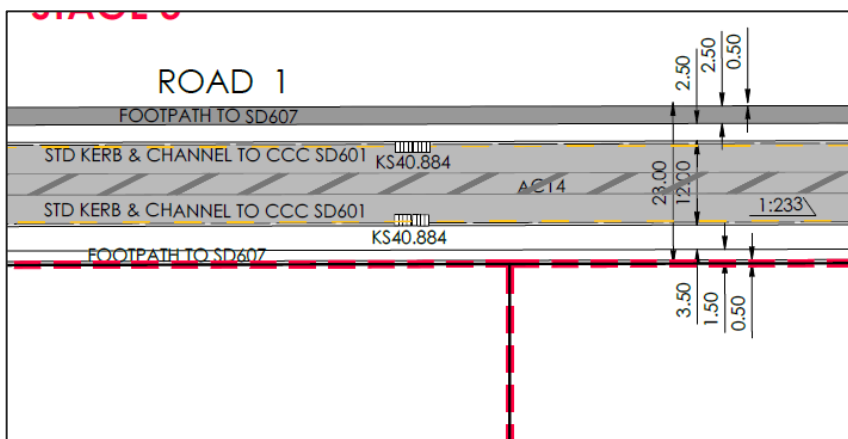


Figure 6-2. Proposed Road Cross-Section for New Minor Arterial Road

6.2 Christchurch Long Term Plan

The Christchurch City Council has \$1.5M allocated for a 'Main South to South-West Hornby New Link' in 2027/28. It is presumed that this would be a road link through the Plan Change site connecting the new Minor Arterial road to SH1. It is understood that the Council would need to acquire land from several owners to achieve this.

The following projects are listed in the Long Term Plan related to Pound Road:

- McLeans Island and Pound Road Corridor Improvement- \$2M, 2021-2024
- Pound Road and Ryans Road Corridor Improvement- \$7.9M, 2022-2030
- Pound and Ryans Intersection Improvement- \$5.2M, 2021-2024

7 Proposed Plan Change

It is proposed that the Plan Change site be rezoned to an Industrial Heavy zoning consistent with the zoning of the surrounding land. **Figure 7-1** shows an amended version of the South West Hornby Industrial Area ODP which incorporates the area of the proposed Plan Change.

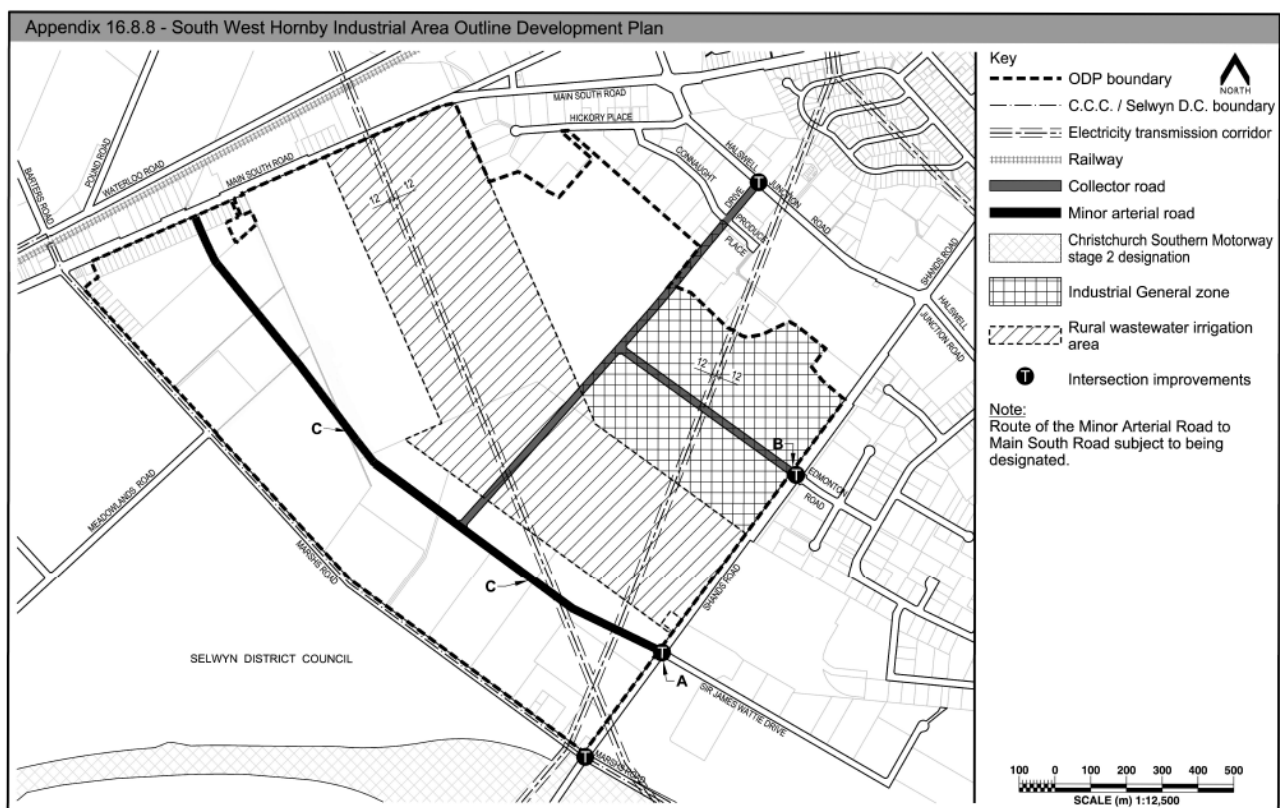


Figure 7-1: Amended South West Hornby Industrial Area ODP

The proposed rezoning and the industrial development that will follow will make it easier for the new Minor Arterial road to be connected through to SH1 opposite Pound Road, and that connection is indicated in the above amended ODP. A preliminary concept intersection design has been carried out to confirm the feasibility of adding a fourth leg to the existing intersection and this is described below.

It is proposed that all development within the Plan Change site would be accessed internally i.e. there will be no direct vehicle access to SH1 or Marshs Road.

Local roads to provide access throughout the Plan Change area will connect to the new Minor Arterial road and adjacent development to the south and east. Good local access and connectivity can be ensured through subdivision consenting.

8 Concept SH1 Intersection Design

A preliminary concept intersection design has been prepared to indicate what space will be required for a fourth leg at the SH1 / Pound Road intersection. Waka Kotahi confirmed in a meeting that the intersection was designed to easily be able to accommodate a fourth leg in the future. The concept intersection layout is based on retaining the existing legs, with a right turn lane on the western SH1 leg to be fitted within the existing painted median, and the existing Pound Road left turn lane to be converted to a combined left / through lane. The concept design is shown in **Figure 8-1**.

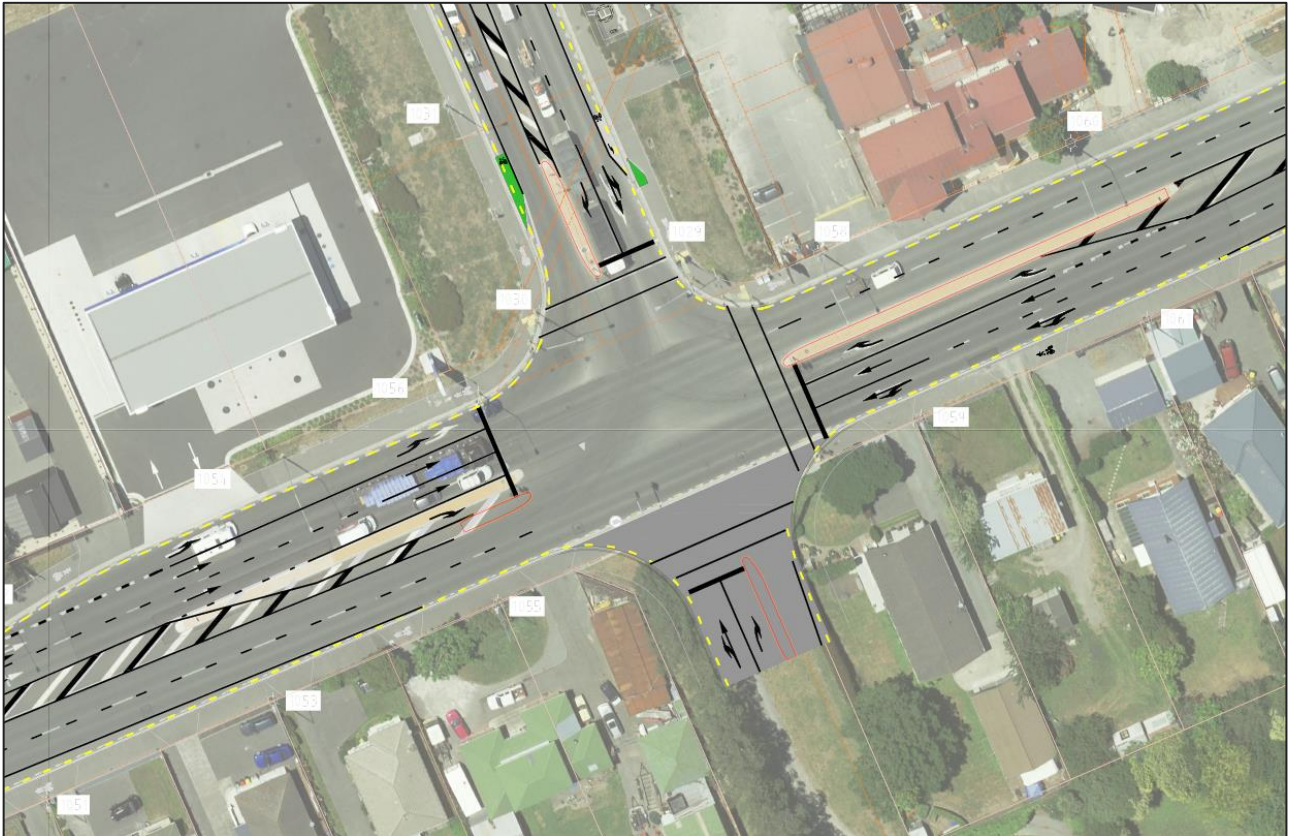


Figure 8-1. Concept Intersection Design with Fourth Leg

The new Minor Arterial road approach is proposed with a combined left / through lane and a right turn lane. With the new leg lined up with the existing Pound Road leg, it appears that property from 687 Main South Road (east of the intersection) will be required but it may not be necessary to take land from 693 Main South Road (west of the intersection).

The concept design includes a shared pedestrian / cycle crossing across the new leg. Other existing pedestrian / cycle crossings would be retained. Details of pedestrian and cycle provisions each side of the new crossing and how they tie into the new leg will be matters for the detailed stages of design.

A matter for consideration through subsequent design stages will be access to / from properties immediately west of the intersection, particularly the NPD service station on the north-western corner of the intersection. Currently, the median island at the intersection extends to just beyond the NPD vehicle crossing, potentially to block right turns out of the site in this location for safety reasons. The traffic island in the concept design is shown only extending 10m back from the intersection, with only paint marking beyond that. The existing painted median width is approximately 4m at the NPD driveway so a narrower island would be necessary here so that at least 3m can be retained for queuing right turn traffic. The median design and the right turn lane marking would be matters for further consideration at subsequent design stages.

A scale version of the intersection concept along with preliminary vehicle tracking for the intersection is contained in **Appendix A**. It is acknowledged that not all of the tracking is contained within the carriageway with desirable clearances to kerblines and some design refinement will be necessary through subsequent design stages. However, the tracking demonstrates that the general arrangement of the intersection will work.

9 Traffic Generation

A traffic generation rate of 0.11 vehicle movements per hour (vph) per 100m² developable site area has previously been recorded in the nearby Sir James Wattie Drive heavy industrial subdivision. This traffic generation rate was subsequently adopted for traffic assessment in the area, including for the South West Hornby Industrial Area re-zoning and for numerous industrial Resource Consent applications in the area.

The civil engineers for Calder Stewart expect that approximately 80% of the Plan Change site would be developable land, with approximately 10% for roading and 10% for stormwater management.

Approximately 18.5ha of developable site area could generate peak hour traffic volumes of approximately 200vph based on the above traffic generation rate.

10 Traffic Assessment

10.1 Modelling Overview

Stantec developed a traffic micro-simulation model of the South West Hornby area as part of planning and designing the new signalised intersections at Shands Road / Sir James Wattie Drive and Shands Road / New Minor Arterial Road. Given the changes that have occurred since the model was developed, including the opening of Stage 2 of the Southern Motorway, the model was updated to allow assessment of the proposed Plan Change. The model update incorporated recent traffic counts on nearby roads, including the Motorway.

A future scenario without development of the Plan Change site was modelled, allowing for development of surrounding land that is zoned but as yet undeveloped. This included approximately 100ha of industrial land within the South West Hornby Industrial Area as well as allowance for undeveloped sites in the Sir James Wattie Drive and Establishment Drive areas. There is no provision for the new Minor Arterial Road to connect to SH1 in the 'without Plan Change' scenario. All traffic movements to / from the South West Hornby area would be via either the new Minor Arterial Road to Shands Road or Quadrant Drive.

The 'with Plan Change' scenario includes traffic generation of industrial development within the Plan Change site and the new Minor Arterial Road connecting through to SH1 opposite Pound Road. The SH1 / Marshs Road intersection allows for left in / left out operation for local access only.

The Transport Modelling Report contained in **Appendix B** provides more in-depth description of the traffic modelling exercise.

10.2 Modelling Results

A summary of the traffic modelling results is presented here, with detailed outputs reported in the Transport Modelling Report.

A key observation from the traffic modelling exercise is that connecting the new Minor Arterial road into SH1 provides a more connected road network for the wider area. This results in travel distance and travel time savings across the model area. This is especially noticeable in the evening peak period, when average travel times to / from zones in the industrial area are approximately 10% lower and average travel distances are 6% shorter.

There are plots in the modelling report showing changes in traffic volumes on the surrounding roads with the Plan Change site developed. Most notably, they show reductions in traffic volumes on Marshs Road and Halswell Junction Road.

The reduction in traffic use of Marshs Road is expected since the turning movements at the SH1 intersection are restricted in the model and the new Minor Arterial road provides a more attractive parallel route once connected at SH1. Removing right turns into and out of Marshs Road at SH1 will address safety concerns with the existing intersection, while reducing traffic volumes on Marshs Road will also have benefits given the rural section of the road is not formed to an arterial road standard.

The reduction in traffic volumes on Halswell Junction Road will take some pressure off key intersections along that road, such as the Shands Road intersection, which are forecast to be operating with relatively high delays in the future.

Traffic modelling outputs for the key intersections in the area show that most intersections will perform similarly with the Plan Change site developed.

The SH1 / Pound Road intersection performance is similar with and without the Plan Change site developed in the morning peak. In the evening peak, when traffic volumes in the area are higher, there are some increased delays but



overall the intersection would continue to operate with a level of service D. It is considered that this is an acceptable overall performance for an arterial road intersection and the wider area connectivity / efficiency benefits outweigh any concerns in this location.

10.3 Timing of Connection to SH1

It is possible that the Plan Change site could be developed from the south given there will be a readily available roading connection to the southern boundary. Until the connection to SH1 is made, any traffic generated by industrial activities within the Plan Change site would be to / from the south and east.

Any such arrangement would be temporary, as Calder Stewart fully intends to construct the road connection to SH1. The proposed Plan Change site and its potential traffic generation are small in the context of the surrounding zoned but undeveloped industrial area. As outlined earlier, there is approximately 100ha of zoned but undeveloped industrial land to the south and east of the site, which can all potentially be developed without the new road connection to SH1. It is concluded that any traffic generated by the Plan Change site prior to the SH1 connection being made will be able to be accommodated on the existing road network. As soon as the SH1 connection is made, there will be the widespread benefits already outlined.

Waka Kotahi raised a specific concern related to an increased use of the existing Marshs Road intersection. Any increased use of Marshs Road resulting from development of the Plan Change site prior to the new SH1 connection being completed would be small given the distance of the intersection from the site (via the existing road network), the relatively low usage of that intersection, and practical constraints on its use during peak times due to high passing traffic volumes. It is reiterated that the Plan Change site is small compared to the already zoned areas adjacent to it.

11 Access by Non-Car Travel

The site is located close to the proposed South Express Major Cycleway making it accessible from nearby residential suburbs.

New roads within the Plan Change site will be able to accommodate footpaths / shared paths connecting to existing footpaths / shared paths in the surrounding industrial areas. A continuation of the shared path along the new Minor Arterial road would be expected through the Plan Change site. Cycling on-road will be acceptable on local roads. Footpath / shared path provision would be a matter for subdivision design.

The existing bus stops on Waterloo Road east of Pound Road are considered to be within an acceptable walking distance of the Plan Change site, making developments within the site accessible by bus. Bus routes respond to demand and while they do not tend to run through industrial areas, the new Minor Arterial road would be capable of accommodating a bus route in the future. With the road cross-section proposed not including parking lanes, buses may need to stop in-lane but there would be ample space in the carriageway for trucks and other vehicles to pass a stationary bus.

The new Minor Arterial road connection to SH1 will also make the adjacent industrial areas more accessible for non-car travel, allowing for more direct walking and cycling connections to / from the cycleway and bus stops on Waterloo Road.

It is concluded that development of the Plan Change site will be appropriately connected to the surrounding area for non-car travel considering its industrial nature and will improve the accessibility of the surrounding industrial areas.

12 District Plan Assessment

The transport related policies and objectives of the District Plan have been reviewed. Objective 7.2.1 relating to an integrated transport system for Christchurch and its related policies are relevant to urban expansion.

It is considered that connecting the new Minor Arterial road to Pound Road provides a more legible and connected road hierarchy in the area.

As outlined, there are safety benefits from reducing reliance on Marshs Road, both at the SH1 intersection and along the length of Marshs Road.

The Plan Change site is a logical completion of the industrial zoning south-east of SH1 and Marshs Road. Development of the site will allow for a connected road network for all modes, including for people cycling from the nearby planned major cycleway or walking from the nearby bus service on Waterloo Road, and therefore reduce dependency on private motor vehicle use.



It is concluded that industrial development of the site is consistent with the relevant objective and policies from the Transport chapter of the District Plan and is entirely sensible from a transport perspective.

13 Conclusion

The proposed Plan Change would see the last small corner of the land to the south / east of the SH1 / Marshs Road intersection zoned for industrial use, consistent with the surrounding zoning. It is considered a logical completion of the industrial area and rezoning will have a number of transport-related benefits as outlined in this report.

Development of the site will allow for the new Minor Arterial road between Shands Road and SH1 to be completed. The connection to SH1 opposite Pound Road will provide a more connected road network for the wider area. It will result in reduced travel distances and times in the wider area and improved accessibility to the neighbouring industrial areas by non-car travel modes; notably cycling from the major cycleway and walking from the bus stops both on Waterloo Road.

Traffic modelling indicates that there will be improvements in the performance of the wider road network resulting from the improved connectivity. There will be benefits from a reduced use of Marshs Road between Shands Road and SH1 given safety concerns at the SH1 intersection and the formation of the existing rural road.

The traffic modelling indicates that the SH1 / Pound Road intersection will be able to operate acceptably during peak times with the fourth leg added. The existing lane arrangements on SH1 and Pound Road will be able to be retained, with a right turn lane added on the western SH1 approach within the existing median. A preliminary concept design suggests that property will be required from the lot to the east of the intersection but may not be required from the lot to the west.

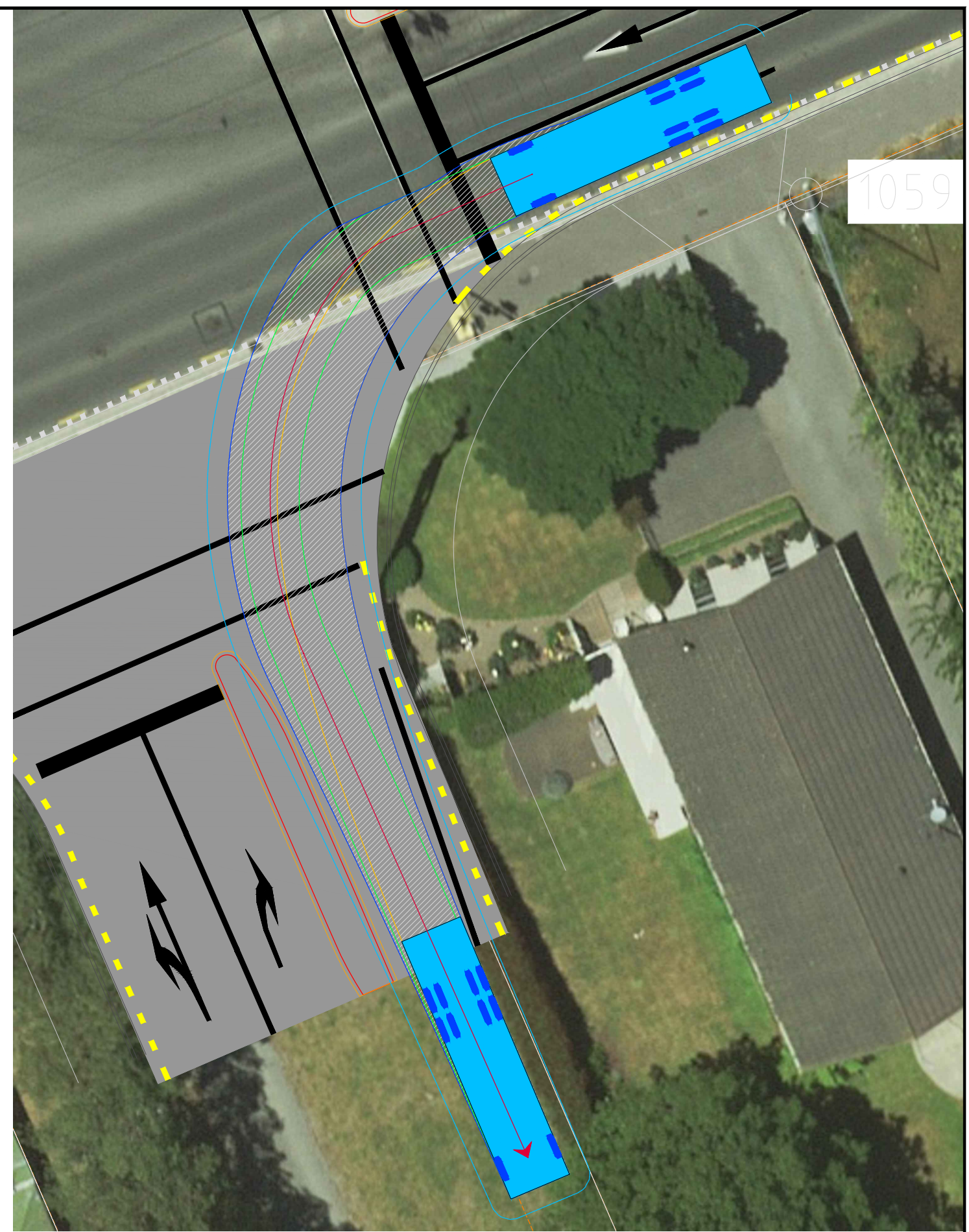
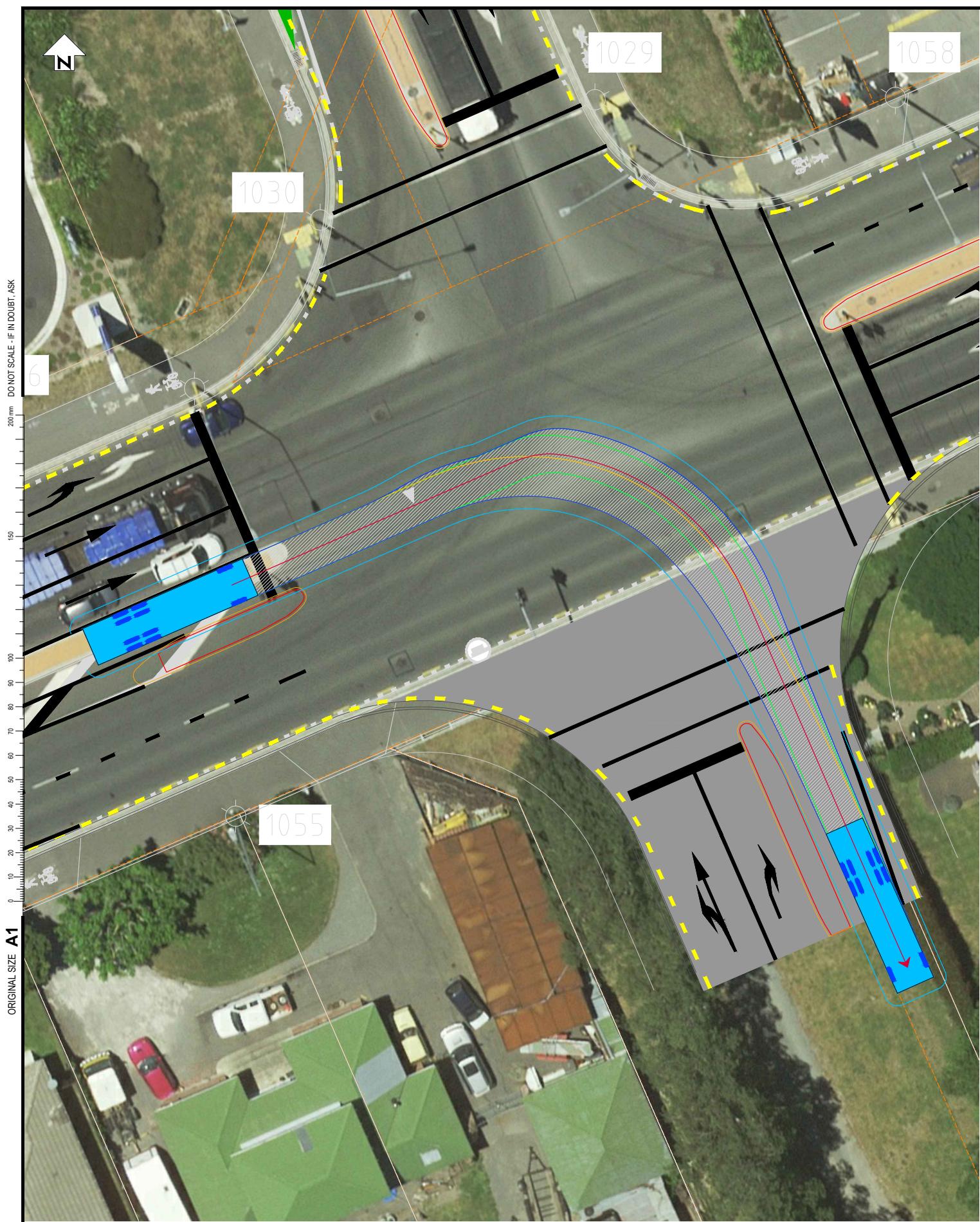
It is concluded that development enabled by the proposed Plan Change and the Minor Arterial road connection to SH1 will provide a range of transport-related benefits and there are no transport-related reasons that re-zoning should not be approved.

Appendices

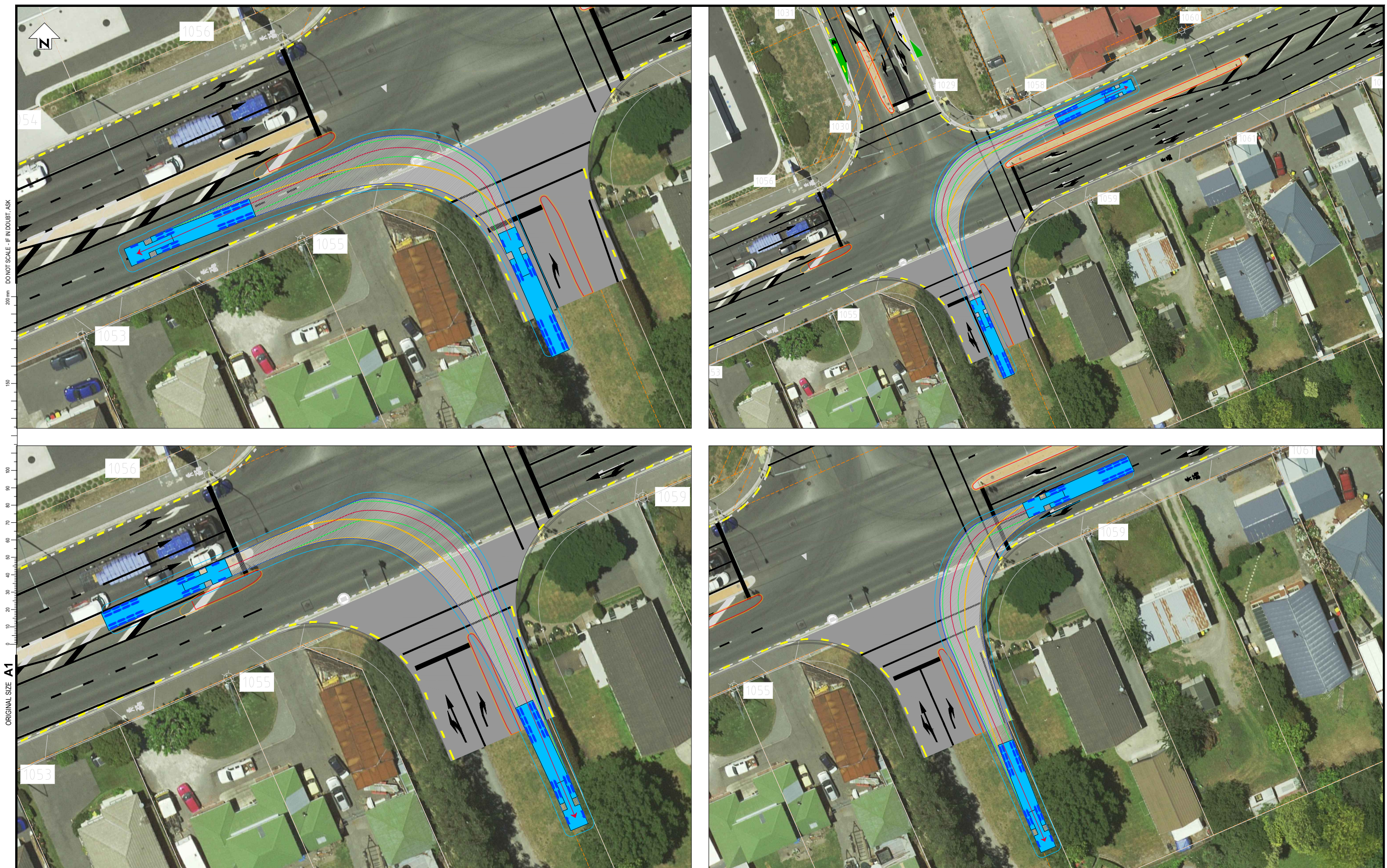
We design with community in mind



Appendix A SH1 / Pound Road Intersection Concept Design



ORIGINAL SIZE A1									
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WORKING PLOT									
Date Stamp									
Scales 1 : 1000 @ A1 / 1 : 500 @ A3									
Drawing No. 310205505-01-001-TR2									
Rev. B									
CALDER STEWART POUND ROAD / SH1 INTERSECTION DESIGN COMPOSITE PLAN									
Client									
Stantec CalderStewart									
SURVEYED									
DESIGNED									
DRAWN Alex Jagodzinski 01.23									
CAD REVIEW									
DESIGN CHECK									
DESIGN REVIEW									
APPROVED NOT APPROVED									
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COMPOSITE PLAN									
POUND ROAD / SH1 INTERSECTION DESIGN									
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Appendix B Transport Modelling Report



Hornby Quadrant Plan Change & Pound Road Extension Microsimulation Transport Modelling Report

This document was prepared by Stantec New Zealand ("Stantec") for the account of Calder Stewart (the "Client"). The conclusions in the Report titled Hornby Quadrant Plan Change & Pound Road Extension Microsimulation Transport Modelling Report are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

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Quality statement

Rev. no	Date	Description	Prepared by	Checked by	Reviewed by	Approved by
1	28-11-22	Southwest Hornby Microsimulation Model Forecasting Report Draft Only	BW	TB	MP	BW
2	20-12-22	Hornby Quadrant PC & Pound Extension Transport Modelling Report	BW / MC		AL	BW

1 Introduction and Background

1.1 Southwest Hornby Transport Assessment

Stantec has been involved in transport analysis and assessment work in the southwest Hornby area for some time. This work has included the development of a Paramics microsimulation model of the study area which has been applied to projects in the area including land use development assessment and infrastructure upgrade investigations. Notably this has included analysis of several recently installed traffic signals along Shands Road.

Land use development in this area has occurred over the past few years, and a Christchurch City Council (CCC) Outline Development Plan (ODP) exists for the area which is provided in Appendix A for reference.

1.2 Quadrant Plan Change and Pound Road Extension

In the southwest Hornby study area there are two current key considerations. Firstly, the potential to rezone land on the southeast corner of Marshs Road and Main South Road (State Highway 1 (SH1)), the 'Hornby Quadrant Plan Change'. Secondly, connecting Pound Road to Shands Road to the southeast which would add a leg to the existing SH1 / Pound Road signalised intersection. These key elements, along with the transport model study area are shown below.



Figure 1-1: Southwest Hornby and Model Study Area (Base Source: ©OpenStreetMap)

1.3 2022 Transport Model Update

The southwest Hornby transport model has been updated so that it is suitable for application to current work in the area. The base year (2022), model update, demand redevelopment, observed data summary, and resulting model calibration / validation is described in Stantec report “Southwest Hornby Model Update”, 22 Nov 2022. This report was provided to Waka Kotahi and email discussion has confirmed that there are no significant issues with the base year model, and it is appropriate to be applied to projects in the study area.

1.4 Development of Local Traffic Forecasts

Described further in Section 2, the Greater Christchurch higher-level regional transport model system predicts relatively low levels of traffic growth through the study area between 2021 and 2038.

A preliminary draft copy of this report was provided to Waka Kotahi. This contained just the background information on the higher-level regional model growth forecasts and resulting flow differences in the study area. This was used to provide background to discussions on the approach to developing forecasts suitable for the current south west Hornby assessment. The approach adopted, which includes revising upwards the lower regional model growth and infilling local development levels, was discussed and agreed with Waka Kotahi.

1.5 Plan Change and Pound Road Extension Assessment

This transport modelling report provides an assessment of the effects of the proposed Quadrant Plan Change and Pound Road Extension. The report provides details of the development of the future year baseline growth, the local development infill, and the Plan Change demands.

The traffic analysis and comparisons are focussed on two scenarios;

- **Do Minimum:** The scenario with increased background traffic growth and infilled local Industrial Zone development, but without the Quadrant Plan Change and without the Pound Road Extension. SH1 / Pound Road remains a 3-arm signalised intersection and SH1 / Marshs Road remains a 4-way all movement priority intersection.
- **With Plan Change and Pound Road Extension:** As above, but with the Quadrant Plan Change traffic generation and with the Pound Road Extension. SH1 / Pound Road becomes a 4-arm signalised intersection and SH1 / Marshs Road becomes Left-In / Left-Out only to/from the north and south approaches.

This report is complimentary to Stantec’s Integrated Transport Assessment report which provides more details on the site, access arrangements, local transport environment, trip generation rates etc.

2 Wider Network Traffic Forecasts

2.1 Greater Christchurch Transport Modelling Structure

2.1.1 CTM Transport Model

The Christchurch Transport Model (CTM) is the regional 4-stage transport planning model. CTM estimates trip demand from land use inputs by travel mode (vehicle, passenger, public transport, and walking / cycling).

Beneath the CTM, the Christchurch Assignment and Simulation Transport (CAST) model has a more detailed zone system and offers a method to provide demand inputs to dynamic operational models (e.g. microsimulation).

2.1.2 CAST Model Inputs

The CAST model has been used to provide the base year travel patterns for the study area and the baseline vehicle traffic growth forecasts. This information has been provided in the form of CAST cordon matrices for the study area.

A zone correspondence system has been developed between the southwest Hornby project microsimulation model and the CAST cordon zones. Some CAST zones have been aggregated in the microsimulation model, particularly in areas away from the area immediately surrounding the Pound Road extension route.

2.2 Southwest Hornby Forecasting Overview

The high-level approach to developing vehicle traffic forecasts follows these steps;

- 'Baseline' growth to be provided by the difference between CAST 2021 and CAST Future Year. Expanded to microsimulation model periods (based on observed data factors), and this growth is then added to the southwest Hornby 2022 base year matrices to create study area baseline future year forecasts.
- 'Assessment' growth to be developed by reviewing the level of growth in key development zones covering the locations identified in the ODP which enable additional land use development above current levels. E.g. the Industrial General Zone between Shands Road and SH1, northeast of the Pound Road extension.

The sections below provide further information on the development of the forecasts and the resulting traffic growth levels.

2.3 Review of CAST Model Study Area Growth Estimates

The CAST 2038 cordon matrices have been extracted as a starting point to developing forecasts for the study area. 2038 is a longer-term horizon than initially anticipated. Initial discussions with Waka Kotahi indicated that a "plus 10-year growth" scenario would likely be used for the assessment, i.e. around 2032. Available forecasts years from CAST are 2028 and 2038, it was decided to initially review the 2038 growth in the study area to determine whether this would provide a suitable baseline forecast.

The CAST model cordon matrices demonstrate low vehicle demand growth in the study area between 2021 and 2038. The total 2-hour (addition of the three A, B, C CAST time-slices) vehicle growth between these years is just 4.2% (0.3% per annum) in the AM period and just 5.8% (0.4% per annum) in the PM period.

Flow difference plots between 2021 and 2038 for the AM and PM peaks are provided in the figures below. Blue indicates negative growth, i.e. anticipated 2038 traffic volumes which are lower than 2021 levels, and green indicates growth above 2021 levels. The southwest Hornby study area is indicated with an orange border.

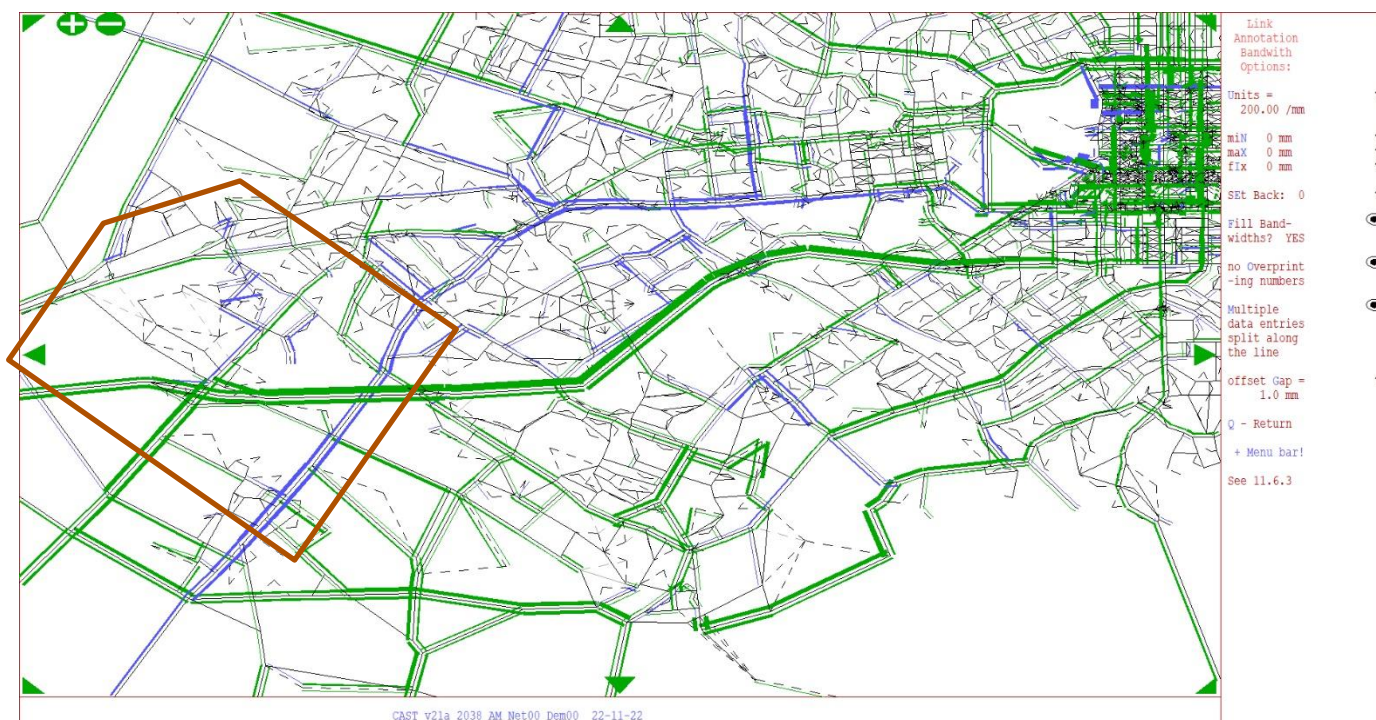


Figure 2-1: CAST 2021 to 2038 Flow Differences, AM Peak

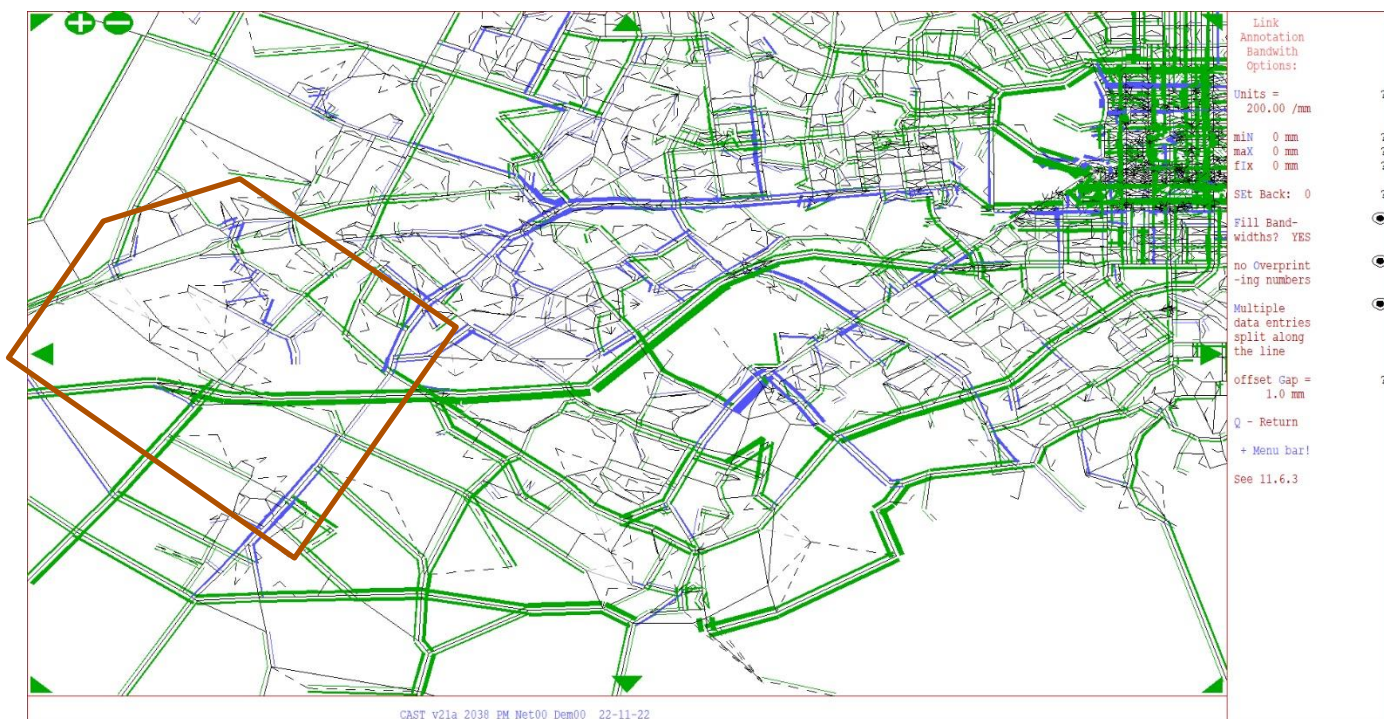


Figure 2-2: CAST 2021 to 2038 Flow Differences, AM Peak

In the context of the south west Hornby transport assessment work, the key reasons for the low growth in this study area in the CAST cordon matrices appear to be;

- Low or negative growth within the Industrial development areas immediately to the northwest and southeast of Shands Road.
- Low-to-minimal growth in traffic volumes on SH1 travel to/from the Hornby mall area.

- Predicted 2038 traffic volumes are lower than 2021 levels on Springs Road, with vehicles appearing to reroute to the Trices Road, Sparks Road, Cashmere Road corridor.

This low level of baseline growth is not deemed a suitable basis for a robust design test of the proposed 4-arm Pound Road / SH1 intersection. The baseline growth has been revised, as described below.

2.4 Baseline Growth Revision Process

In order to test land use development operations and the performance of key improvements (e.g. 4-arm Pound Road / SH1 intersection), revisions to the baseline CAST growth have been made to increase the level of strategic traffic volumes in the study area.

The zones in the study area have been classified by type into 6 classifications; CSM2, external arterial, external local road, industrial, residential, and 'growth' zones (where more significant land use development may occur). The expansion factors have been adjusted based on these movement classifications in order to reduce the effects of low and negative growth in the CAST matrices. For example, growth to/from the CSM2 and external arterials has been factored so the resulting traffic growth estimates lead to increasing volumes from the current (2021/22) levels. Lower growth factors have been used for movements such as residential-to-residential trips.

The resulting revised baseline flow increases and decreases are provided in Appendix B for the microsimulation study area for the full AM and PM periods. The result of the above process is increases in traffic volumes on the majority of arterial routes and minimal-to-no reductions. The exception is a small reduction in the PM period on Springs Road southwest of Marshs Road in the southwest travel direction.

Final demand matrices totals are provided in Section 3.2.

3 South West Hornby Development Growth

3.1 Local and Plan Change Traffic Growth

Additional to the baseline growth described above, 'in fill' development growth has been added in seven key zones. These zones are shown in Figure 3-1 below. Zones 26, 27, 28, and 45 are zoned for industrial use but currently undeveloped, and zones 14, 46 and 24 are partially developed (estimated to be 85% developed). Zone 45 is the Quadrant Plan Change area.

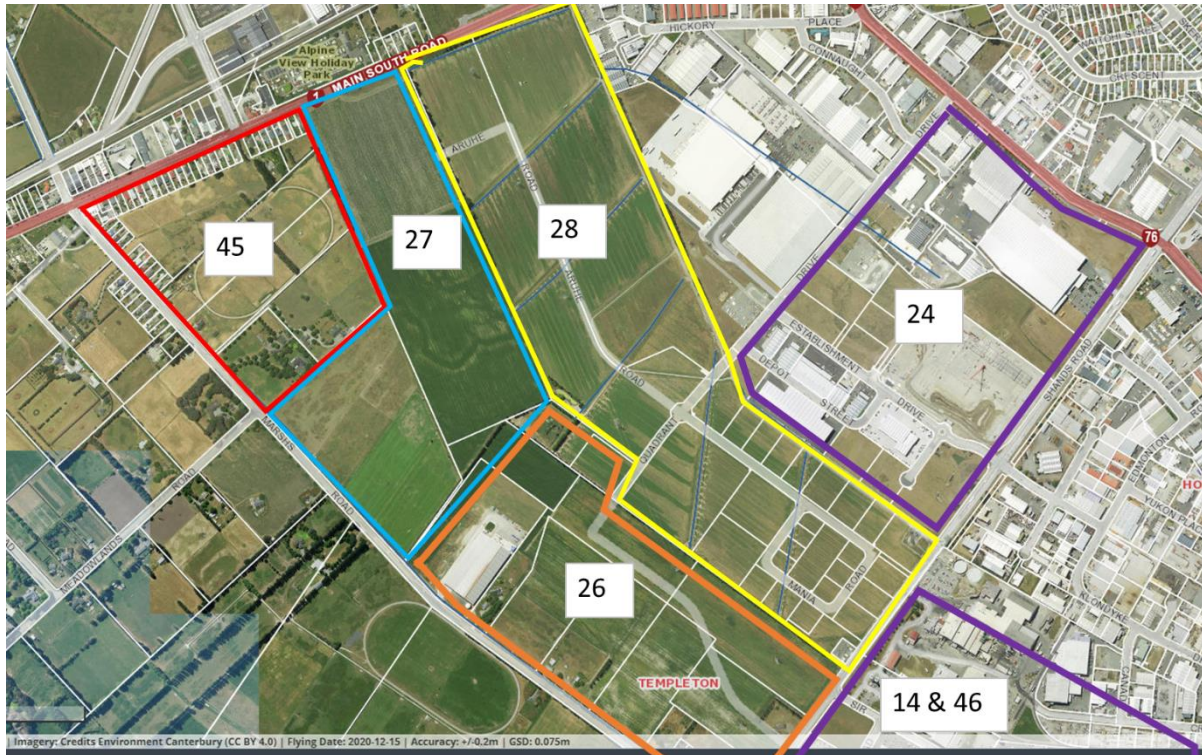


Figure 3-1: Key Development Areas (Base Source: ECAN)

The increase in demand for zones 14, 24 and 46 were calculated by increasing the current demands by 15%. The four undeveloped zones were calculated by multiplying 80% of the total area by the vehicle-per-hour trip rate of 0.11 per 100m² developable site area. 80% is the developable site area, the remaining 20% is anticipated to be used for roading and stormwater.

The Integrated Transport Assessment provides more information on the development areas, site locations, and trip generation rates.

The total demands based on developable area is shown in Table 3-1 below.

Table 3-1: Traffic Generation per Hour by Development Zone

Zone	Area (ha)	Developable (80% of area) (ha)	Traffic Gen (vph)
26	37.0	29.60	325.60
27	32.4	25.92	285.12
28	57.6	46.08	506.88
45	23.2	18.56	204.16

Expansion factors were calculated from the observed traffic data and were applied to the final trip generation. Factors of 3.05 and 2.95 for AM and PM respectively were used to expand the peak hour generation to each of the full model periods (AM 06:00 – 10:00 and PM 15:00 – 18:30). Vehicle type proportions (Light, Medium Goods, and Heavy Goods vehicles) and in/out proportions for AM and PM periods were calculated and applied also. These proportions were developed from the existing traffic count data and the traffic patterns in the local industrial zones in the base year matrices. These proportions are described in Table 3-2 and Table 3-3 below.

Table 3-2: Vehicle Type Proportions to and from development zones

Vehicle Type Proportions	AM			PM		
	Light	MGV	HGV	Light	MGV	HGV
From Development Zones	75.0%	17.5%	7.5%	92.5%	5.0%	2.5%
To Development Zones	85.0%	10.0%	5.0%	72.5%	18.5%	9.0%

Table 3-3: In/Out Proportions to and from development zones

In/Out Split	AM			PM		
	Light	MGV	HGV	Light	MGV	HGV
From Development Zones	30.0%	35.0%	40.0%	82.5%	70.0%	65.0%
To Development Zones	70.0%	65.0%	60.0%	17.5%	30.0%	35.0%

Distribution of trips to and from the development zones were calculated based on an average of distributions to and from surrounding zones with similar land use.

3.2 Total Demand Matrix Growth

The tables below provide the total demand matrix growth figures for the study area, the growth, percentage growth, and percentage growth per annum. Note that the CAST numbers specified are the two-hour modelled periods, made up of the three CAST time-slices in each period, and the Paramics numbers are the 4-hour AM period and 3.5-hour PM period.

Table 3-4: AM Period Study Area Demand Matrix Growth

AM Peak Period	Light	MGV	HGV	Heavy	Total
CAST 2021	20,066			3,964	24,030
CAST 2038	21,006			4,088	25,094
Total Growth	939			124	1,064
Total % Growth	4.5%			3.0%	4.2%
% Growth per annum	0.3%			0.2%	0.3%
Paramics 2022	33,570	2,539	1,443	3,982	37,553
Paramics Baseline 2038	41,240	3,816	2,185	6,001	47,241
Total Growth	7,669	1,277	742	2,019	9,688
Total % Growth	18.6%	33.5%	34.0%	33.6%	20.5%
% Growth per annum	1.2%	2.1%	2.1%	2.1%	1.3%
Paramics inc. Local Development 2038	44,964	4,384	2,460	6,845	51,808
Total Growth from Base 2022	11,393	1,845	1,017	2,862	14,256
Total % Growth from Base 2022	25.3%	42.1%	41.3%	41.8%	27.5%
% Growth per annum	1.6%	2.6%	2.6%	2.6%	1.7%

Table 3-5: PM Period Study Area Demand Matrix Growth

PM Peak Period	Light	MGV	HGV	Heavy	Total
CAST 2021	22,723			2,487	25,210
CAST 2038	24,130			2,621	26,751
Total Growth	1,407			133	1,541
Total % Growth	5.8%			5.1%	5.8%
% Growth per annum	0.3%			0.3%	0.4%
Paramics 2022	34,917	1,923	1,108	3,032	37,949
Paramics Baseline 2038	42,721	2,728	1,555	4,283	47,004
Total Growth	7,804	805	447	1,252	9,055
Total % Growth	18.3%	29.5%	28.7%	29.2%	19.3%
% Growth per annum	1.1%	1.8%	1.8%	1.8%	1.2%
Paramics inc. Local Development 2038	46,673	3,115	1,762	4,877	51,550
Total Growth from Base 2022	11,756	1,192	653	1,845	13,601
Total % Growth from Base 2022	25.2%	38.3%	37.1%	37.8%	26.4%
% Growth per annum	1.6%	2.4%	2.3%	2.4%	1.6%

The tables above demonstrate that the revision to the baseline forecast results in just over 1% traffic growth per annum and with the addition of local growth areas, this increases to just over 1.5% growth per annum. In comparison to the baseline forecast, the local development in-fill generates approximately an additional 4,500 vehicles in total in the AM and PM model periods, which is an 8.8% increase from the baseline.

4 Assessment of Traffic Effects

4.1 Assessment Scenarios

4.1.1 Do Minimum Network

The assessment of effects has been carried out by comparing the Quadrant Plan Change and Pound Road Extension to the future year scenario without these elements, referred to as the “Do Minimum”. The Do Minimum is the base year network with the demand growth described above, and the following changes;

- Expansion of the Industrial Area ODP roading network, including connection of Quadrant Drive to the current road which extends northwest from Shands Road (immediately north of Marshs).
- Development connections and accesses for the three existing developable zones in the area (26, 27, and 28).
- Addition of a PM peak roundabout meter on the northwest approach to the Springs Road / Halswell Junction Road roundabout. Very similar to the AM meter, this is implemented to reduce delays on Springs Road by briefly interrupting traffic on Halswell Junction Road to create gaps for the Springs Road southwest-bound traffic to enter the roundabout.

As noted, all other elements of the Do Minimum are as per the current network. This includes the SH1 / Marshs Road intersection which remains a 4-arm priority intersection with all movements allowed.

4.1.2 With Quadrant Plan Change and Pound Road Extension

The ‘With Quadrant Plan Change and Pound Road Extension’ scenario is as per the Do Minimum, with the following changes;

- Inclusion of traffic demand which includes the trip generation for the Plan Change area (Zone 45) as described in Section 3 above.
- Pound Road extended to the southeast to connect from SH1 through the Industrial Area.
- A 4-arm signalised intersection at SH1 / Pound Road. A concept design is provided with the Integrated Transport Assessment, the layout is as per the current intersection with the addition of a right turn bay from SH1 west. The new south approach includes a shared through-left lane and separate right turn lane (right turn bay around 60m long).
- The SH1 / Pound Road extension signal phasing assumes a ‘standard’ diamond phasing, as per the current SH1 signal movement phasing.
- The Marshs Road / SH1 priority intersection is converted to Left-In / Left-Out only. It is assumed that Waka Kotahi will develop a design / layout at this intersection, as a ‘worst-case’ it has been assumed that ‘LILLO’ treatment will be applied to both the south and north approaches. Enabling right turn movements via traffic signals at SH1 / Pound Road and restricting these at the SH1 / Marshs Road priority intersection provides a safety improvement.

4.2 High-Level Do Minimum Operation

The figures below provide a broad indication of key areas of congestion in the future Do Minimum network. These images are taken from one run of the microsimulation model at one moment in time, they only provide a high-level indication of network issues.



Figure 2: AM Peak Do Minimum Indicative Congestion Levels



Figure 3: PM Peak Do Minimum Indicative Congestion Levels

The images demonstrate that in the Do Minimum there is a level of delay / congestion along Halswell Junction Road and, to a lesser extent, Shands Road. There are two distinct locations coming under pressure in both the AM and PM peaks; the Shands Road / Halswell Junction Road signals and the Springs Road / Halswell Junction Road roundabout.

4.3 Pound Road Extension Wider Benefits

The Pound Road Extension will provide a number of benefits to the local transport network. Along with the safety improvement noted above associated with the Marshs Road / SH1 priority intersection, this includes access and connectivity benefits to other local industrial areas, reduced traffic flow and pressure at key intersections, and reduced delays and travel times within the study area. The sections below provide transport modelling results which demonstrate these benefits.

4.3.1 Traffic Volume Changes

Flow difference plots between the two future year models with and without the Plan Change and Pound Road Extension have been provided for the AM and PM full model periods in the figures below.



Figure 4-4: AM Increase and Decrease of Flow, DoMin vs Plan Change & Pound Rd Extension Models



Figure 4-5: PM Increase and Decrease of Flow, DoMin vs Plan Change & Pound Rd Extension Models

The figures above demonstrate the Pound Road extension relieves traffic flow pressures in several key locations, along Halswell Junction Road and accessing SH1 via the existing priority intersection at Marshs Road.

4.3.2 Network Connectivity Improvements

In order to assess the benefits provided by the Pound Road Extension, the network travel times and distances to/from the adjacent Industrial development areas (excluding the Quadrant Plan change zone) have been analysed for the two future models with and without the Plan Change and associated Pound Road Extension. The zones used in the assessment are highlighted in the figure below.



Figure 4-6: Future Year Model, Plan Change Zone and Surrounding Zones for Analysis

The tables below provide the network travel times, distances, and speeds for trips to/from the zones highlighted yellow in the above figure with and without the Quadrant Plan and Pound Road Extension. Trips to/from the Quadrant Plan Change area (zone 45) have not been included.

Table 4-1: AM Period Network Statistics for Zones Surrounding the Plan Change Area

AM Network Stats	Inbound				Outbound			
	DoMin	PC & Pnd Rd Ext	Diff	% Diff	DoMin	PC & Pnd Rd Ext	Diff	% Diff
Average Travel Time (min)	6.79	6.68	-0.11	-2%	5.13	5.02	-0.10	-2%
Average Distance (km)	4.40	4.26	-0.14	-3%	3.55	3.38	-0.17	-5%
Average Speed (km/hr)	38.9	38.2	-0.7	-2%	41.6	40.2	-1.4	-3%

Table 4-2: PM Period Network Statistics for Zones Surrounding the Plan Change Area

PM Network Stats	Inbound				Outbound			
	DoMin	PC & Pnd Rd Ext	Diff	% Diff	DoMin	PC & Pnd Rd Ext	Diff	% Diff
Average Travel Time (min)	7.65	6.86	-0.78	-10%	7.60	6.93	-0.67	-9%
Average Distance (km)	4.36	4.10	-0.25	-6%	4.30	4.02	-0.28	-6%
Average Speed (km/hr)	34.2	35.9	1.7	5%	33.9	34.8	0.9	3%

The tables above indicate that the Pound Road Extension is providing connectivity benefits and reducing congestion / delays in the area (more detail on delays is provided in the Intersection Performance analysis below). In the PM period these benefits are reasonably significant; a 10% reduction in travel time to/from zones in the Industrial area across the full 3.5-hour modelled period.

4.4 Intersection Performance

4.4.1 Key Intersection Approach Level of Service

The Level of Service (LOS) for the key intersections throughout the area was calculated for the AM and PM peak hours. The volume, delay and LOS by approach and overall intersection can be found in Table 4-3 and Table 4-4 below. A full breakdown of LOS by movement at each intersection can be found in Appendix C .

Table 4-3: Intersection Approach Level of Service for AM 2038

AM LOS	Approach	DoMin 2038			Plan Change & Pound Rd Ext 2038		
		Vol	Delay (sec)	LoS	Vol	Delay (sec)	LoS
SH1 / Pound Rd / Pound Rd Ext	North	883	56	E	941	42	D
	East	833	30	C	870	34	C
	South	-	-	-	197	42	D
	West	1,142	26	C	1,209	38	D
OVERALL INTERSECTION (weighted average)		2,858	36	D	3,217	39	D
Pound Rd / Waterloo Rd	North	674	112	F	676	39	D
	East	140	29	C	165	25	C
	South	668	20	B	687	20	B
	West	593	31	C	596	33	C
OVERALL INTERSECTION (weighted average)		2,074	53	D	2,124	30	C
SH1 / Marshs Rd	North	41	171	F	29	57	F
	East	1,297	26	D	1,176	2	A
	South	71	246	F	35	21	C
	West	1,198	28	D	1,199	6	A
OVERALL INTERSECTION (weighted average)		2,607	246	F	2,439	57	F
Shands Rd / Pound Rd Ext	North	624	7	A	586	6	A
	South	1,812	16	B	1,858	17	B
	West	186	27	C	308	32	C
OVERALL INTERSECTION (weighted average)		2,622	15	B	2,751	16	B
Shands Rd / Marshs Rd	North	556	21	C	669	22	C
	East	211	48	D	203	46	D
	South	2,405	6	A	2,451	7	A
	West	162	48	D	20	40	D
OVERALL INTERSECTION (weighted average)		3,334	13	B	3,344	13	B
Shands Rd / CSM Southern Ramps	North	527	35	C	527	36	D
	East	245	136	F	253	144	F
	South	2,426	3	A	2,451	3	A
	West	611	170	F	605	198	F
OVERALL INTERSECTION (weighted average)		3,809	43	D	3,837	48	D
Shands Rd / CSM Northern Ramps	North	496	5	A	497	5	A
	South	2,153	14	B	2,187	15	B
	West	279	47	D	288	50	D
OVERALL INTERSECTION (weighted average)		2,928	15	B	2,972	16	B
Shands Rd / Sir James Wattie Dr	North	731	5	A	690	5	A
	East	134	99	F	140	88	F
	South	1,454	13	B	1,415	12	B
OVERALL INTERSECTION (weighted average)		2,318	15	B	2,245	15	B
Shands Rd / Edmonton Rd / Establishment Dr	North	824	25	C	797	26	C
	East	121	67	E	119	67	E
	South	1,506	28	C	1,469	26	C
	West	93	60	E	77	64	E
OVERALL INTERSECTION (weighted average)		2,545	30	C	2,461	29	C
Quadrant Dr / Pound Rd Ext	North	82	4	A	281	5	A
	East	88	2	A	74	3	A
	South	546	3	A	612	3	A
	West	68	8	A	68	8	A
OVERALL INTERSECTION (weighted average)		784	3	A	1,034	4	A
SH1 / Halswell Junction Rd	North	405	26	C	358	26	C
	East	822	20	B	830	21	C
	South	770	14	B	726	13	B
	West	913	21	C	926	21	C
OVERALL INTERSECTION (weighted average)		2,909	20	B	2,840	19	B
Shands Rd / Halswell Junction Rd	North	574	196	F	590	191	F
	East	742	54	D	753	54	D
	South	1,086	128	F	1,122	116	F
	West	1,310	53	D	1,290	50	D
OVERALL INTERSECTION (weighted average)		3,712	97	F	3,754	93	F



Table 4-4: Intersection Approach Level of Service for PM 2038

PM LOS	Approach	DoMin 2038			Plan Change & Pound Rd Ext 2038		
		Vol	Delay (sec)	LoS	Vol	Delay (sec)	LoS
SH1 / Pound Rd / Pound Rd Ext	North	908	39	D	949	34	C
	East	1,155	42	D	1,133	64	E
	South	-	-	-	380	64	E
	West	1,053	29	C	1,137	41	D
OVERALL INTERSECTION (weighted average)		3,115	37	D	3,599	49	D
Pound Rd / Waterloo Rd	North	749	39	D	754	37	D
	East	429	33	C	475	31	C
	South	791	20	B	805	21	C
	West	461	47	D	459	47	D
OVERALL INTERSECTION (weighted average)		2,430	33	C	2,492	33	C
SH1 / Marshs Rd	North	59	375	F	58	28	D
	East	1,579	18	C	1,552	3	A
	South	250	222	F	127	33	D
	West	1,090	100	F	1,092	6	A
OVERALL INTERSECTION (weighted average)		2,977	375	F	2,829	33	D
Shands Rd / Pound Rd Ext	North	1,191	3	A	1,244	8	A
	South	708	14	B	747	16	B
	West	925	38	D	981	51	D
OVERALL INTERSECTION (weighted average)		2,824	17	B	2,972	24	C
Shands Rd / Marshs Rd	North	1,867	16	B	2,029	21	C
	East	270	120	F	270	101	F
	South	752	9	A	806	9	A
	West	355	48	D	111	47	D
OVERALL INTERSECTION (weighted average)		3,243	26	C	3,216	25	C
Shands Rd / CSM Southern Ramps	North	1,355	34	C	1,417	23	C
	East	173	39	D	198	38	D
	South	1,412	1	A	1,508	1	A
	West	454	33	C	456	55	D
OVERALL INTERSECTION (weighted average)		3,394	20	B	3,579	19	B
Shands Rd / CSM Northern Ramps	North	1,267	8	A	1,332	6	A
	South	644	12	B	695	12	B
	West	195	33	C	195	34	C
OVERALL INTERSECTION (weighted average)		2,106	12	B	2,223	11	B
Shands Rd / Sir James Wattie Dr	North	1,198	21	C	1,265	22	C
	East	423	53	D	411	59	E
	South	725	27	C	721	27	C
OVERALL INTERSECTION (weighted average)		2,346	29	C	2,397	30	C
Shands Rd / Edmonton Rd / Establishment Dr	North	849	35	C	830	33	C
	East	317	43	D	366	49	D
	South	1,028	78	E	1,009	73	E
	West	395	66	E	425	66	E
OVERALL INTERSECTION (weighted average)		2,589	58	E	2,630	56	E
Quadrant Dr / Pound Rd Ext	North	297	5	A	554	7	A
	East	420	2	A	392	4	A
	South	204	2	A	215	3	A
	West	229	7	A	233	7	A
OVERALL INTERSECTION (weighted average)		1,150	4	A	1,394	6	A
SH1 / Halswell Junction Rd	North	531	29	C	494	28	C
	East	875	27	C	878	27	C
	South	970	46	D	927	32	C
	West	874	24	C	942	24	C
OVERALL INTERSECTION (weighted average)		3,250	32	C	3,241	28	C
Shands Rd / Halswell Junction Rd	North	794	195	F	738	241	F
	East	711	367	F	709	173	F
	South	1,016	68	E	961	108	F
	West	1,445	50	D	1,395	56	E
OVERALL INTERSECTION (weighted average)		3,966	141	F	3,803	127	F

The tables above reinforce that the Pound Road extension, including the 4-arm signalised Pound Road / SH1 intersection, improves the operation of the network. This improvement occurs with the addition of the Quadrant Plan Change traffic.

The key elements of the intersection performance that can be identified from the tables above, including differences between the Do Minimum and With Plan Change & Pound Road Extension scenarios, are;

- The Pound Road / SH1 4-arm signalised intersection performs with a similar level of delay to the existing 3-arm signals.
- Delays reduce significantly at the SH1 / Marshs Road priority intersection, due to this intersection being assumed to be Left-In / Left-Out only (i.e. right turn delays are removed).
- Although delays remain high at the Shands Road / Halswell Junction Road intersection, the pressure at this intersection (overall volume) reduces and delays reduce. This is most notable in the PM peak.

Other than the points above, all other intersections perform at a similar level.

4.4.2 Detailed Intersection Performance

The sections below provided the detailed turning movement volumes and delays at the SH1 / Pound Road intersection and at the two main access points from the Quadrant Plan Change area onto the Pound Road extension.

4.4.2.1 4-Arm SH1 / Pound Road Signals

Table 5: AM Peak SH1 / Pound Road Intersection Movement Performance

AM Movement LOS	Approach	Mvmt	DoMin 2038			Plan Change & Pound Ext 2038		
			Vol	Delay (sec)	LoS	Vol	Delay (sec)	LoS
SH1 / Pound Rd / Pound Rd Ext	North	L	235	55	D	215	41	D
		T	-	-	-	139	41	D
		R	648	56	E	587	43	D
	East	L	-	-	-	121	30	C
		T	660	29	C	602	34	C
		R	173	37	D	148	36	D
	South	L	-	-	-	44	56	E
		T	-	-	-	63	58	E
		R	-	-	-	90	24	C
	West	L	494	14	B	473	23	C
		T	649	35	C	609	48	D
		R	-	-	-	127	49	D
OVERALL INTERSECTION(weighted average)			2,858	36	D	3,217	39	D

The table above indicates the 4-arm Pound Road / SH1 signalised intersection performs reasonably well in the AM peak. There are no significant delays on any movements.

Table 6: PM Peak SH1 / Pound Road Intersection Movement Performance

PM Movement LOS	Approach	Mvmt	DoMin 2038			Plan Change & Pound Ext 2038		
			Vol	Delay (sec)	LoS	Vol	Delay (sec)	LoS
SH1 / Pound Rd / Pound Rd Ext	North	L	263	35	C	229	33	C
		T	-	-	-	181	33	C
		R	646	41	D	539	37	D
	East	L	-	-	-	63	62	E
		T	933	42	D	867	67	E
		R	221	42	D	208	55	D
	South	L	-	-	-	191	77	E
		T	-	-	-	45	80	E
		R	-	-	-	132	36	D
	West	L	562	17	B	548	28	C
		T	491	43	D	460	51	D
		R	-	-	-	130	60	E
OVERALL INTERSECTION(weighted average)			3,115	37	D	3,592	49	D

The table above indicates that the 4-arm signalised intersection is busy in the PM peak and a number of movements operate with LoS E and 60-70 second delay. The overall intersection performs at LoS D and the total intersection delay does not increase significantly compared to the 3-Arm Do Minimum scenario.

4.4.2.2 Pound Road Extension Access Intersections

The tables below provide the movement volumes and LoS for the two access intersections onto the Pound Road extension, south of SH1. Traffic from the Quadrant Plan Change accesses the network from these two points and the southern access includes a proportion of traffic from the adjacent development area.

Table 7: AM Pound Road Extension Access Intersection Movement Performance

AM Movement LOS	Approach	Mvmt	Plan Change & Pound Ext 2038		
			Vol	Delay (sec)	LoS
Development Access Nth / Pound Rd Ext	North	T	325	1	A
		R	64	2	A
	South	L	39	0	
		T	167	2	A
	West	L	30	9	A
		R	17	10	A
OVERALL INTERSECTION(weighted average)			641	10	A
Development Access Sth / Pound Rd Ext	North	L	72	1	A
		T	269	0	
	East	L	19	6	A
		R	37	10	A
	South	T	169	2	A
		R	53	3	A
OVERALL INTERSECTION(weighted average)			621	10	A

Table 8: PM Pound Road Extension Access Intersection Movement Performance

PM Movement LOS	Approach	Mvmt	Plan Change & Pound Ext 2038		
			Vol	Delay (sec)	LoS
Development Access Nth / Pound Rd Ext	North	T	349	1	A
		R	26	5	A
	South	L	10	11	B
		T	330	47	E
	West	L	53	56	F
		R	44	12	B
OVERALL INTERSECTION(weighted average)			813	56	F
Development Access Sth / Pound Rd Ext	North	L	33	1	A
		T	360	0	
	East	L	66	6	A
		R	80	31	D
	South	T	264	17	C
		R	14	3	A
OVERALL INTERSECTION(weighted average)			818	31	D

In the PM peak, the delays reported above are effected by the queue back and delay from the SH1 / Pound Road intersection. This delay is not significant, 70-80 seconds on the south approach. To measure delay on a specific movement, paths are added to the traffic model and are extended into the link downstream of the intersection to identify the specific movement. This is shown in the image below, the purple highlighted section is for the right turn out of the southern access intersection. The queue shown in the image below is sporadic, occurring occasionally for a short period of time during the pm peak. The delay at the access points is not associated with difficulties crossing this queue, it is associated with traffic turning out of the accesses and joining the back of this moving queues. At the northern access intersection the delay on the through movement from the south and the left turn from the west, and at the southern intersection the delay on the right turn from the east and the through movement from the south, are all affected by the queue back from the SH1 / Pound Road signals. The delays turning in / out of the access intersections themselves remain low.

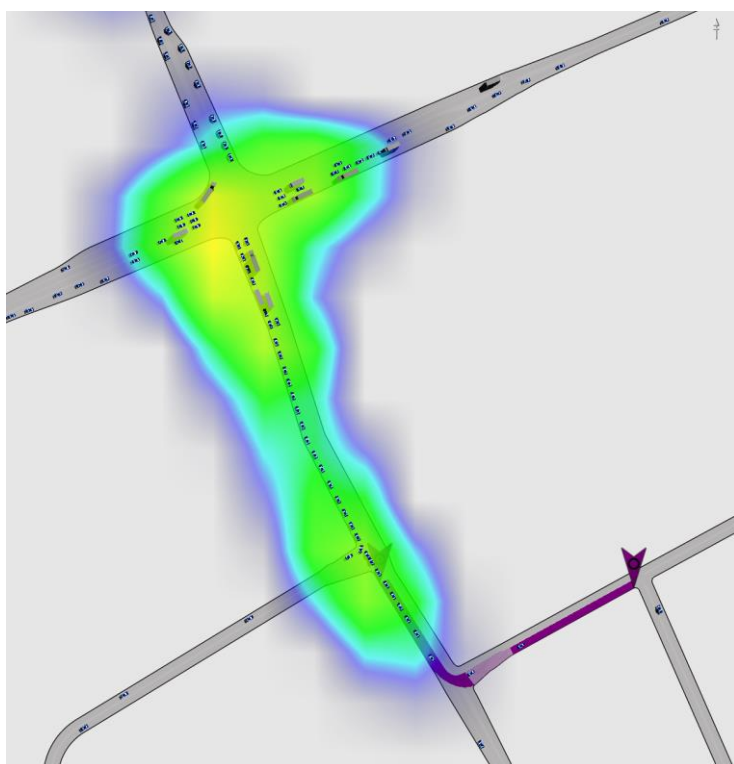


Figure 7: Influence of SH1 / Pound Road Queue Back on Delays at Access Intersections

5 Summary and Conclusions

5.1 Southwest Hornby Transport Modelling Assessment

Industrial land use development has occurred over the last few years in the south west Hornby area. Stantec has been involved in transport assessments in the area for some time. This work has included the development and application of a microsimulation traffic model covering the south west Hornby study area.

5.2 Quadrant Plan Change and Pound Road Extension

Current key considerations in the study area include the potential to rezone land on the southeast corner of the Marsh Road / SH1 intersection, the 'Quadrant Plan Change', and the extension of Pound Road from SH1 to Shands Road to the southeast. The extension of Pound Road would transform the current 3-arm signalised SH1 / Pound Road intersection to 4-arm signals.

5.3 2022 Base Model and 2038 Forecasts

The base year south west Hornby microsimulation traffic model has been recalibrated and revalidated to 2022 traffic count and travel time data. This process has been carried out to ensure the model reflects the current environment, notably the traffic volumes using the Christchurch Southern Motorway and SH1. The 2022 base year model has been deemed appropriate to transport assessment applications in the study area.

Traffic growth forecasts have been developed from the greater Christchurch regional transport modelling system. The 'core' study area demand growth predicted through this system is relatively low. Baseline growth has been adjusted to maintain key arterial traffic volumes at / above current volumes and local development in-fill has been added on-top of the adjusted baseline growth.

The future year model has been applied to assess the operation and key outcomes for two scenarios;

- **Do Minimum:** The network without the Pound Road extension and without the Quadrant Plan Change. In this scenario, the existing SH1 / Marshs Road intersection remains an 'all movement' priority-controlled intersection.
- **With Quadrant Plan Change and Pound Road extension:** Network with the trip generation associated with the Quadrant Plan Change, with the Pound Road extension, 4-arm SH1 / Pound Road signals, and assumed that in this scenario SH1 / Marshs Road intersection becomes Left-In / Left-Out only.

5.4 Summary of Operational Findings

The following key operational and network performance outcomes have been identified;

- In the Do Minimum, the Shands Road / Halswell Junction Road and Springs Road / Halswell Junction Road intersections are under some pressure and demonstrate high delays / queuing.
- The Pound Road extension provides reasonable network travel time and distance benefits to the study area, for example improved access and connectivity to / from the development sites within the Industrial Area.
- The Pound Road extension relieves pressure in some locations in the network, notably the Shands Road / Halswell Junction Road signals in the PM peak.
- The Pound Road / SH1 4-Arm signalised intersection performs reasonably well in the AM and PM peak periods, the overall intersection delay is 40 – 50 seconds, LoS D.
- Delays reduce at the Marshs Road / SH1 intersection due to restricting the intersection to Left-In / Left-Out.
- The development access intersections along the Pound Road Extension operate with no significant delays.

5.5 Key Conclusion

The key conclusion from the above analysis is that the assumed 4-Arm Pound Road / SH1 signalised intersection operates effectively, the Pound Road extension provides benefits and relieves congestion in the network, and the network can readily accommodate the anticipated Quadrant Plan Change traffic without any significant performance issues.

Appendix A SW Hornby Industrial Area ODP

The figure below shows the Outline Development Plan for the South West Hornby Industrial Area, including the proposed minor arterial road connecting from Sir James Wattie Drive to the northwest.

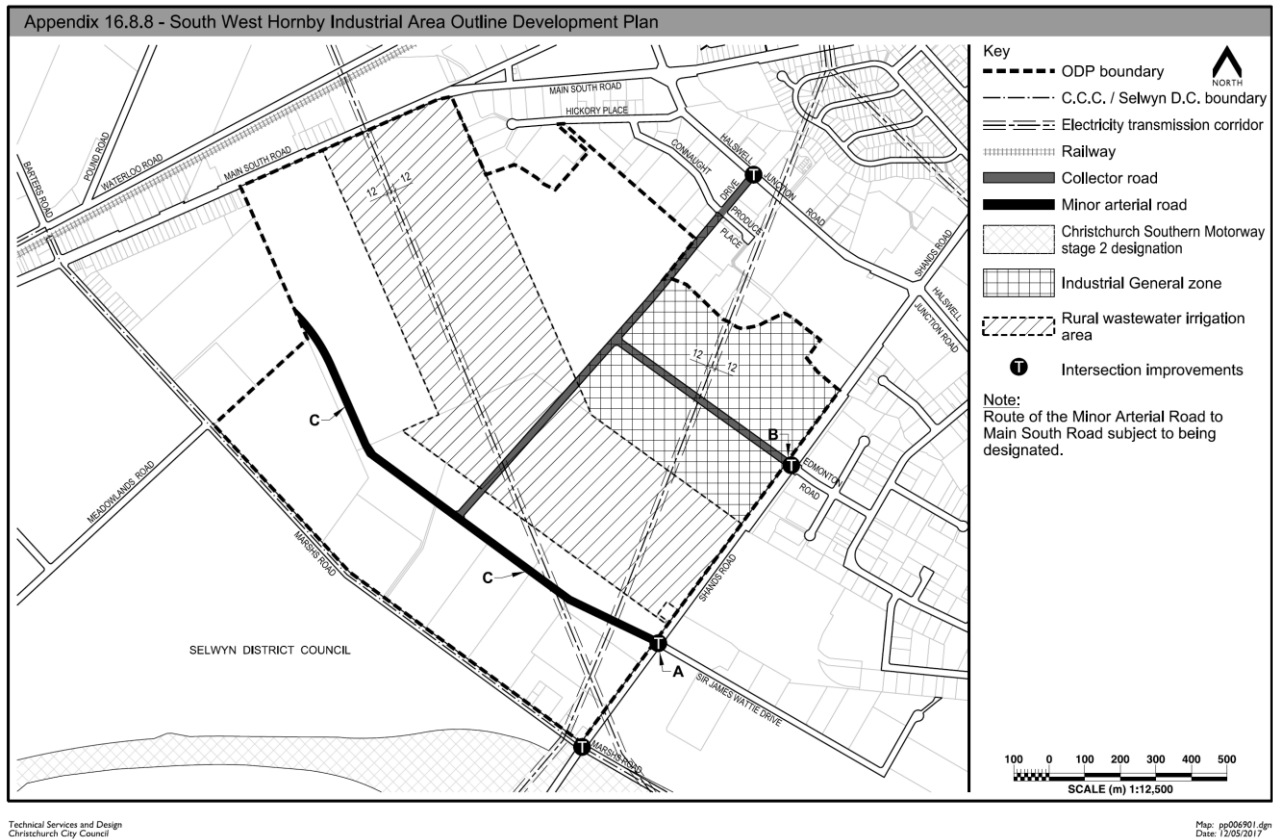


Figure 5-1: South West Hornby Industrial Area Outline Development Plan

Appendix B Revised Baseline Growth Vols

The images below provide the microsimulation model study area link flow growth, for the full AM and PM periods, based on the revisions (increases) to the CAST predicted growth levels. The difference is between the calibrated 2022 base year and the 2038 revised baseline model scenario.

B.1 Full AM Period Study Area Baseline Changes

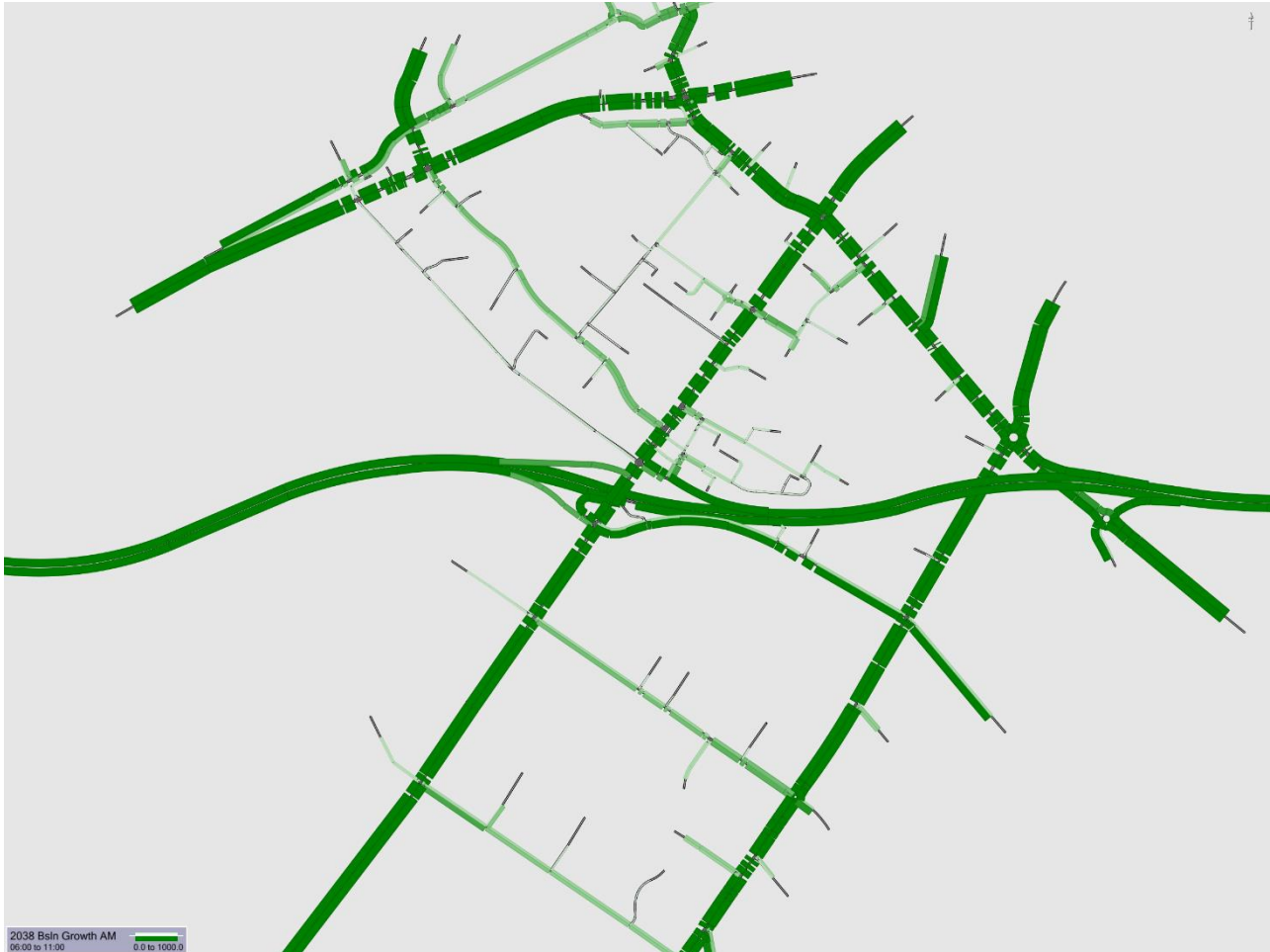


Figure 5-2: AM Period Revised Baseline Growth Traffic Volume Increases



Figure 5-3: AM Period Revised Baseline Growth Traffic Volume Decreases

B.2 Full PM Period Study Area Baseline Changes



Figure 5-4: PM Period Revised Baseline Growth Traffic Volume Increases



Figure 5-5: PM Period Revised Baseline Growth Traffic Volume Decreases

Appendix C Movement Level of Service

The tables below provide the volume, delay and LOS for the AM and PM peak hours for the Do Minimum 2038 and Development 2038 models.

Table 9: AM Peak Hour Movement Volume, Delay, and LoS

AM Movement LOS	Approach	Mvmf	DoMin 2038			Plan Change & Pound Ext 2038		
			Vol	Delay (sec)	LoS	Vol	Delay (sec)	LoS
SH1 / Pound Rd / Pound Rd Ext	North	L	235	55	D	215	41	D
		T	-	-	-	139	41	D
		R	648	56	E	587	43	D
	East	L	-	-	-	121	30	C
		T	660	29	C	602	34	C
		R	173	37	D	148	36	D
	South	L	-	-	-	44	56	E
		T	-	-	-	63	58	E
		R	-	-	-	90	24	C
	West	L	494	14	B	473	23	C
		T	649	35	C	609	48	D
		R	-	-	-	127	49	D
OVERALL INTERSECTION(weighted average)			2,858	36	D	3,217	39	D
Shands Rd / Sir James Wattie Dr	North	L	137	3	A	139	3	A
		T	594	6	A	551	6	A
	East	L	30	41	D	35	44	D
		R	104	115	F	105	102	F
	South	T	1,428	11	B	1,387	10	A
		R	26	124	F	28	132	F
OVERALL INTERSECTION(weighted average)			2,318	15	B	2,245	15	B
Shands Rd / Pound Rd Ext	North	T	457	3	A	447	4	A
		R	167	16	B	138	15	B
	South	L	447	12	B	532	15	B
		T	1,365	18	B	1,326	18	B
	West	L	86	23	C	85	20	B
		R	100	31	C	223	37	D
OVERALL INTERSECTION(weighted average)			2,622	15	B	2,751	16	B
Pound Rd / Waterloo Rd	North	L	23	92	F	14	26	C
		T	611	115	F	622	40	D
		R	40	73	E	40	25	C
	East	L	70	41	D	92	30	C
		T	55	16	B	57	18	B
		R	16	23	C	16	22	C
	South	L	58	14	B	57	14	B
		T	509	17	B	506	16	B
		R	101	40	D	123	41	D
	West	L	242	19	B	242	21	C
		T	155	20	B	133	22	C
		R	196	54	D	222	51	D
OVERALL INTERSECTION(weighted average)			2,074	53	D	2,124	30	C
Shands Rd / Edmonton Rd / Establishment Dr	North	L	73	14	B	73	13	B
		T	658	21	C	625	20	B
		R	93	67	E	99	72	E
	East	L	51	73	E	48	73	E
		T	19	81	F	18	76	E
		R	51	56	E	53	60	E
	South	L	150	23	C	139	22	C
		T	1,203	28	C	1,180	26	C
		R	154	35	C	150	33	C
	West	L	51	64	E	47	69	E
		T	16	69	E	9	81	F
		R	25	46	D	21	44	D
OVERALL INTERSECTION(weighted average)			2,545	30	C	2,461	29	C
Shands Rd / Marshs Rd	North	L	168	17	B	243	18	B
		T	375	22	C	419	24	C
		R	13	46	D	8	38	D
	East	L	80	35	C	76	36	D
		T	12	29	C	8	27	C
		R	119	59	E	119	53	D
	South	L	60	0		30	0	
		T	1,665	2	A	1,736	3	A
		R	679	17	B	685	17	B
	West	L	30	40	D	4	28	C
		T	91	40	D	13	39	D
		R	42	69	E	3	59	E
OVERALL INTERSECTION(weighted average)			3,334	13	B	3,344	13	B

AM Movement LOS	Approach	Mvmt	DoMin 2038			Plan Change & Pound Ext 2038		
			Vol	Delay (sec)	LoS	Vol	Delay (sec)	LoS
Quadrant Dr / Pound Rd Ext	North	L	18	4	A	51	5	A
		T	63	4	A	213	5	A
		R	1	2	A	17	4	A
	East	L	49	2	A	41	2	A
		T	15	2	A	13	3	A
		R	24	3	A	20	4	A
	South	L	152	2	A	143	2	A
		T	175	3	A	273	3	A
		R	219	3	A	196	3	A
	West	L	0	6	A	12	4	A
		T	13	7	A	9	7	A
		R	55	8	A	47	9	A
OVERALL INTERSECTION(weighted average)			784	3	A	1,034	4	A
Development Access Nth / Pound Rd Ext	North	T	-	-	-	325	1	A
		R	-	-	-	64	2	A
	South	L	-	-	-	39	0	
		T	-	-	-	167	2	A
	West	L	-	-	-	30	9	A
		R	-	-	-	17	10	A
OVERALL INTERSECTION(weighted average)			-	-	-	641	10	A
Development Access Sth / Pound Rd Ext	North	L	-	-	-	72	1	A
		T	-	-	-	269	0	
	East	L	19	4	A	19	6	A
		R	-	-	-	37	10	A
	South	T	-	-	-	169	2	A
		R	49	1	A	53	3	A
OVERALL INTERSECTION(weighted average)			68	4	A	621	10	A
SH1 / Marshs Rd	North	L	28	80	F	29	57	F
		T	8	171	F	0	0	
		R	6	93	F	0	0	
	East	L	99	2	A	11	2	A
		T	1,155	3	A	1,165	2	A
		R	43	26	D	0	0	
	South	L	41	41	E	35	21	C
		T	5	246	F	0	0	
		R	26	245	F	0	0	
	West	L	14	3	A	13	3	A
		T	1,092	6	A	1,186	6	A
		R	92	28	D	0	0	
OVERALL INTERSECTION(weighted average)			2,607	246	F	2,439	57	F
SH1 / Halswell Junction Rd	North	L	90	21	C	76	20	B
		T	239	26	C	216	25	C
		R	76	36	D	65	36	D
	East	L	210	4	A	188	4	A
		T	530	23	C	559	24	C
		R	82	36	D	84	35	C
	South	L	410	1	A	409	1	A
		T	265	27	C	232	27	C
		R	95	38	D	85	35	C
	West	L	82	6	A	92	6	A
		T	521	19	B	552	19	B
		R	310	28	C	283	29	C
OVERALL INTERSECTION(weighted average)			2,909	20	B	2,840	19	B
Shands Rd / Halswell Junction Rd	North	L	53	133	F	68	141	F
		T	394	123	F	428	129	F
		R	127	446	F	94	510	F
	East	L	167	41	D	166	34	C
		T	517	50	D	524	42	D
		R	59	125	F	63	210	F
	South	L	190	124	F	190	101	F
		T	627	114	F	679	98	F
		R	270	165	F	253	176	F
	West	L	184	27	C	150	24	C
		T	903	36	D	912	32	C
		R	224	145	F	228	135	F
OVERALL INTERSECTION(weighted average)			3,712	97	F	3,754	93	F
Shands Rd / CSM Southern Ramps	North	L	39	18	B	37	20	B
		T	427	38	D	428	39	D
		R	61	26	C	62	25	C
	East	L	15	50	D	13	48	D
		T	108	73	E	108	74	E
		R	123	202	F	132	210	F
	South	L	191	0		191	0	
		T	2,153	3	A	2,187	3	A
		R	82	1	A	74	1	A
	West	L	367	168	F	369	197	F
		T	25	130	F	21	163	F
		R	219	178	F	214	204	F
OVERALL INTERSECTION(weighted average)			3,809	43	D	3,837	48	D
Shands Rd / CSM Northern Ramps	North	T	496	5	A	497	5	A
	South	T	2,153	14	B	2,187	15	B
	West	L	247	48	D	258	51	D
		R	32	38	D	30	39	D
OVERALL INTERSECTION(weighted average)			2,928	15	B	2,972	16	B

Table 10: PM Peak Hour Movement Volume, Delay, and LoS

PM Movement LOS	Approach	Mvmt	DoMin 2038			Plan Change & Pound Ext 2038		
			Vol	Delay (sec)	LoS	Vol	Delay (sec)	LoS
SH1 / Pound Rd / Pound Rd Ext	North	L	263	35	C	229	33	C
		T	-	-	-	181	33	C
		R	646	41	D	539	37	D
	East	L	-	-	-	63	62	E
		T	933	42	D	867	67	E
		R	221	42	D	208	55	D
	South	L	-	-	-	191	77	E
		T	-	-	-	45	80	E
		R	-	-	-	132	36	D
	West	L	562	17	B	548	28	C
		T	491	43	D	460	51	D
		R	-	-	-	130	60	E
OVERALL INTERSECTION(weighted average)			3,115	37	D	3,592	49	D
Shands Rd / Sir James Wattie Dr	North	L	63	19	B	77	17	B
		T	1,135	21	C	1,208	21	C
	East	L	63	23	C	65	23	C
		R	360	58	E	360	43	D
	South	T	666	26	C	631	14	B
		R	59	36	D	79	42	D
OVERALL INTERSECTION(weighted average)			2,346	29	C	2,420	23	C
Shands Rd / Pound Rd Ext	North	T	1,121	3	A	1,226	8	A
		R	70	5	A	45	6	A
	South	L	154	3	A	167	3	A
		T	554	17	B	566	18	B
	West	L	171	24	C	144	29	C
		R	753	41	D	839	55	D
OVERALL INTERSECTION(weighted average)			2,824	17	B	2,987	24	C
Pound Rd / Waterloo Rd	North	L	6	17	B	3	7	A
		T	501	27	C	507	24	C
		R	241	66	E	242	63	E
	East	L	232	36	D	271	33	C
		T	156	28	C	157	29	C
		R	42	31	C	42	29	C
	South	L	161	17	B	167	17	B
		T	559	19	B	564	20	B
		R	71	36	D	77	37	D
	West	L	152	24	C	152	24	C
		T	137	25	C	136	24	C
		R	172	85	F	172	91	F
OVERALL INTERSECTION(weighted average)			2,430	33	C	2,491	33	C
Shands Rd / Edmonton Rd / Establishment Dr	North	L	30	27	C	33	27	C
		T	770	32	C	761	33	C
		R	49	76	E	46	67	E
	East	L	176	44	D	195	52	D
		T	6	47	D	6	48	D
		R	134	40	D	165	46	D
	South	L	15	71	E	18	54	D
		T	993	78	E	972	68	E
		R	20	78	E	22	76	E
	West	L	220	72	E	181	71	E
		T	23	64	E	24	60	E
		R	152	58	E	236	63	E
OVERALL INTERSECTION(weighted average)			2,589	58	E	2,659	55	D
Shands Rd / Marshs Rd	North	L	603	14	B	734	22	C
		T	1,054	14	B	1,241	20	B
		R	210	28	C	83	24	C
	East	L	85	40	D	82	42	D
		T	9	31	C	7	36	D
		R	176	163	F	178	146	F
	South	L	43	0		27	0	
		T	510	1	A	560	1	A
		R	198	32	C	203	32	C
	West	L	34	38	D	9	22	C
		T	192	38	D	54	38	D
		R	130	66	E	44	65	E
OVERALL INTERSECTION(weighted average)			3,243	26	C	3,221	26	C

PM Movement LOS	Approach	Mvmt	DoMin 2038			Plan Change & Pound Ext 2038		
			Vol	Delay (sec)	LoS	Vol	Delay (sec)	LoS
Quadrant Dr / Pound Rd Ext	North	L	49	4	A	73	6	A
		T	247	6	A	469	7	A
		R	0	7	A	11	5	A
	East	L	403	2	A	297	3	A
		T	6	3	A	4	4	A
		R	11	4	A	91	6	A
	South	L	54	2	A	43	2	A
		T	61	2	A	81	3	A
		R	89	3	A	87	3	A
	West	L	0	3	A	57	4	A
		T	38	6	A	26	6	A
		R	191	7	A	149	8	A
OVERALL INTERSECTION(weighted average)			1,150	4	A	1,387	5	A
Development Access Nth / Pound Rd Ext	North	T	-	-	-	349	1	A
		R	-	-	-	26	5	A
	South	L	-	-	-	10	11	B
		T	-	-	-	330	47	F
	West	L	-	-	-	53	56	F
OVERALL INTERSECTION(weighted average)			-	-	-	813	56	F
Development Access Sth / Pound Rd Ext	North	L	-	-	-	33	1	A
		T	-	-	-	360	0	
	East	L	72	4	A	66	6	A
		R	-	-	-	80	31	D
	South	T	-	-	-	264	17	C
		R	21	1	A	14	3	A
OVERALL INTERSECTION(weighted average)			94	4	A	818	31	D
SH1 / Marshs Rd	North	L	39	248	F	57	30	D
		T	12	375	F	0	0	
		R	8	196	F	0	0	
	East	L	248	4	A	95	2	A
		T	1,309	4	A	1,467	3	A
		R	22	18	C	0	0	
	South	L	212	47	E	115	42	E
		T	2	166	F	0	0	
		R	36	222	F	0	0	
	West	L	9	14	B	9	2	A
		T	985	14	B	1,085	6	A
		R	96	100	F	0	0	
OVERALL INTERSECTION(weighted average)			2,977	375	F	2,829	42	E
SH1 / Halswell Junction Rd	North	L	199	24	C	198	25	C
		T	253	28	C	228	28	C
		R	79	42	D	68	44	D
	East	L	99	6	A	90	4	A
		T	646	25	C	657	26	C
		R	131	53	D	132	59	E
	South	L	496	2	A	476	1	A
		T	275	33	C	281	31	C
		R	198	176	F	194	113	F
	West	L	73	6	A	91	6	A
		T	453	20	B	489	20	B
		R	348	32	C	365	31	C
OVERALL INTERSECTION(weighted average)			3,250	32	C	3,270	28	C
Shands Rd / Halswell Junction Rd	North	L	102	175	F	97	248	F
		T	565	160	F	529	246	F
		R	127	369	F	98	220	F
	East	L	192	327	F	186	180	F
		T	485	370	F	485	191	F
		R	34	549	F	41	327	F
	South	L	227	36	D	211	37	D
		T	419	35	C	426	37	D
		R	369	126	F	318	239	F
	West	L	290	38	D	171	36	D
		T	935	37	D	1,015	38	D
		R	221	126	F	215	150	F
OVERALL INTERSECTION(weighted average)			3,966	141	F	3,793	130	F
Shands Rd / CSM Southern Ramps	North	L	404	26	C	457	16	B
		T	730	38	D	765	23	C
		R	221	39	D	228	35	C
	East	L	43	37	D	47	38	D
		T	78	41	D	80	38	D
		R	53	37	D	65	35	C
	South	L	311	0		321	0	
		T	644	1	A	680	1	A
		R	457	1	A	511	1	A
	West	L	96	24	C	99	33	C
		T	1	23	C	1	39	D
		R	357	35	C	354	56	E
OVERALL INTERSECTION(weighted average)			3,394	20	B	3,607	18	B
Shands Rd / CSM Northern Ramps	North	T	1,267	8	A	1,361	6	A
	South	T	644	12	B	680	12	B
	West	L	107	31	C	109	32	C
		R	88	35	C	88	33	C
OVERALL INTERSECTION(weighted average)			2,106	12	B	2,238	11	B

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Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of place and of belonging. That's why at Stantec, we always design with community in mind.

We care about the communities we serve—because they're our communities too. This allows us to assess what's needed and connect our expertise, to appreciate nuances and envision what's never been considered, to bring together diverse perspectives so we can collaborate toward a shared success.

We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

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