Appendix 13: Integrated Transport Assessment

805, 815 & 819 North Road, Lorneville

Private Plan Change Request
Integrated Transport Assessment Report

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Abbreviations

Abbreviations	Full Name
ADT	Annual Average Daily Traffic Volume
ICC	Invercargill City Council
NZTA	New Zealand Transport Agency
vpd	Vehicle movements per day
vph	Vehicle movements per hour

1 Introduction

Tulloch Limited operates an industrial warehouse activity at 815 North Road, Lorneville north of Invercargill. Access to the warehouse site from North Road, which forms part of State Highway 6 (SH6), is currently provided by two one-way driveways. A Private Plan Change Request is proposed to rezone the site and two adjacent lots from Rural to Industrial 1. Primary access to the rezoned land will be via a new single, all-movement intersection to North Road.

Following preliminary consultation in relation to the site access, NZTA raised concerns with forming a new intersection at the location of the existing entrance because of the potential for conflict with right turn movements at the driveway to Prime Range Fresh commercial activities on the opposite side of the highway. This report provides an assessment of alternate access options and identifies a preferred configuration.

The report then provides an assessment of the potential transport effects that could arise from the rezoning. The focus of the report is the location and design of the vehicle access to the rezoned land.

The report has been structured to provide:

- A description of the existing transport environment;
- A description of the existing travel patterns in the area;
- A description of the proposal and activities enabled by the rezoning;
- An assessment of transport effects;
- An assessment of compliance with the relevant rules, policies and objectives of the District Plan.

2 Existing Transport Environment

2.1 Site Context

Figure 2-1 shows the location of the plan change site in the context of the surrounding area. The site is located on the eastern side of North Road which forms part of SH6. State Highway 98 (SH98) and State Highway 99 (SH99) meet SH6 at a roundabout about 600 metres north of the site.

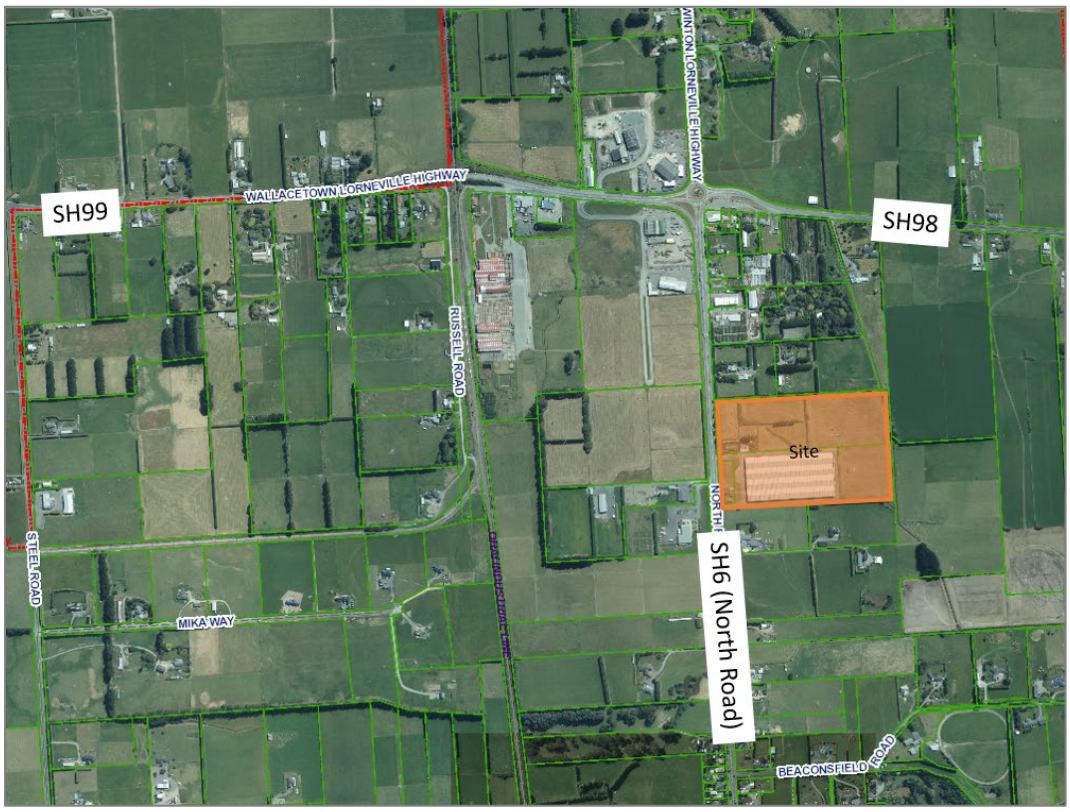


Figure 2-1: Site Location in Context of Surrounding Area (Invercargill City Council Maps)

The existing access to the warehouse site is via two one-way driveways as shown in Photograph 2-1 and Photograph 2-4. The vehicle routes (Photograph 2-2 and Photograph 2-3) around the warehouse operate with one-way, clockwise movement controls as shown in Figure 2-2. There is a separate two-way driveway to the north of the main entrance which provides access to private dwelling.

Figure 2-2 also shows the driveway on the opposite side of the highway approximately midway between the two site driveways that serves the Prime Range Fresh commercial activity.



Photograph 2-1: Warehouse Entry Driveway



Photograph 2-2: Internal driveway (north)



Photograph 2-3: Internal Driveway (South)



Photograph 2-4: Warehouse Exit Driveway

Figure 2-3 shows the land zoning surrounding the site. The site itself is located on rural zoned land. Land to the west of SH6 and south of SH99 is zoned as Business 5. New buildings have been

recently constructed on the rural zoned land in the north-east quadrant of the SH6 / SH98 / SH99 roundabout.



Figure 2-2: Wool store site layout and nearby driveways

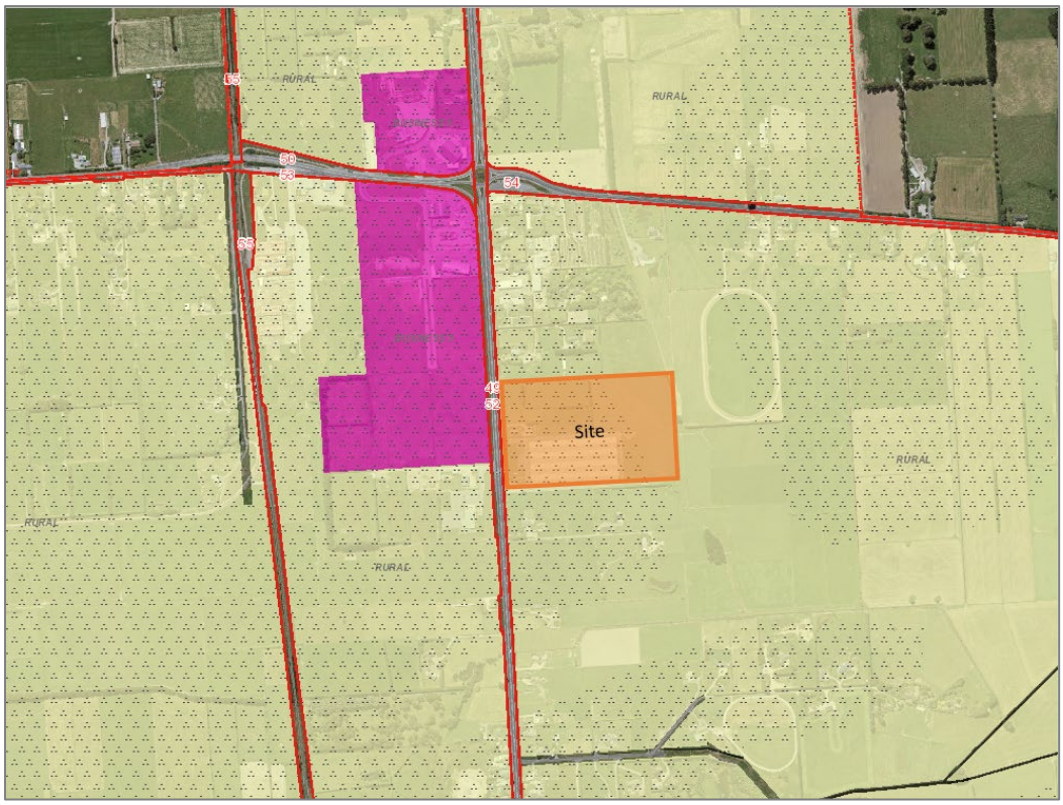


Figure 2-3: Land zoning

2.2 Road Network

Figure 2-4 shows the state highway network for the surrounding area. SH6 forms the primary strategic link for towns along the West Coast to Queenstown and Invercargill. SH98 and SH99 are regional links for Southland. SH6 meets State Highway 1 (SH1) which forms the primary link through towns and cities along the east coast in Invercargill. SH1 continues south from Invercargill to Bluff.

All state highways in the area are classified as High Productivity Motor Vehicle (HPMV) routes.

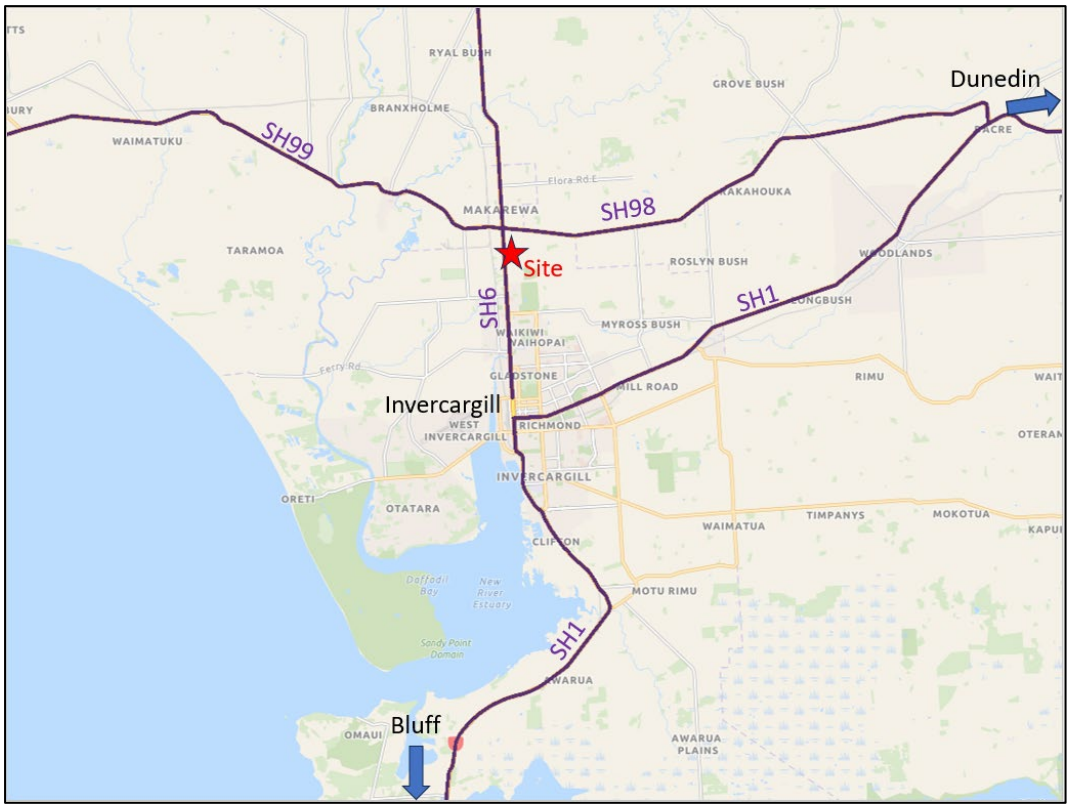


Figure 2-4: State Highway Network

SH6 North Road has been constructed as a two-lane, median divided carriageway with wide sealed shoulders south of the SH6 / SH98 / SH99 roundabout as shown in Photograph 2-5 and Photograph 2-6. There is one through lane in each direction with a flush median and wide shoulders. The central flush median is about three metres wide which provides sufficient width for large trucks to stop clear of through traffic before turning right into driveways. Right turn bays are marked within the median at the local road intersections with Beaconsfield Road and Moore Road. The speed limit on North Road is 80km/h.

The exit driveway has stop signs installed but these are largely hidden by the hedgerows (Photograph 2-7 and Photograph 2-8). A Stop line has not been marked.



Photograph 2-5: SH6 North Road – View north from Wool store site entrance



Photograph 2-6: SH6 North Road – View south from Wool store site entrance



Photograph 2-7: Stop signs at exit from Wool store site



Photograph 2-8: Concealed stop sign at Wool store site exit

2.3 Active Mode Network

There are no footpaths, cycle lanes or bus routes on North Road. The nearest cycle lanes and bus routes to the site are in Invercargill to the south of the site. However, the wide sealed shoulders do provide space for cyclists to travel along SH6 clear of the traffic lane.

3 Existing Travel Patterns

3.1 State Highway Traffic Volumes

Figure 3-1 shows the annual average daily traffic volumes recorded on SH6 between the site and the Lorneville roundabout. The daily volumes have been about 12,500 vehicles per day (vpd) since 2018. The 90th and 98th percentile traffic volumes provide an indication of the volumes during the busiest weeks of the year and in 2024 were about 15,100 vpd and 15,800 vpd respectively. Although there has been some year to year variation in daily volumes, there is no evidence for any growth over the 2018-2024 period.

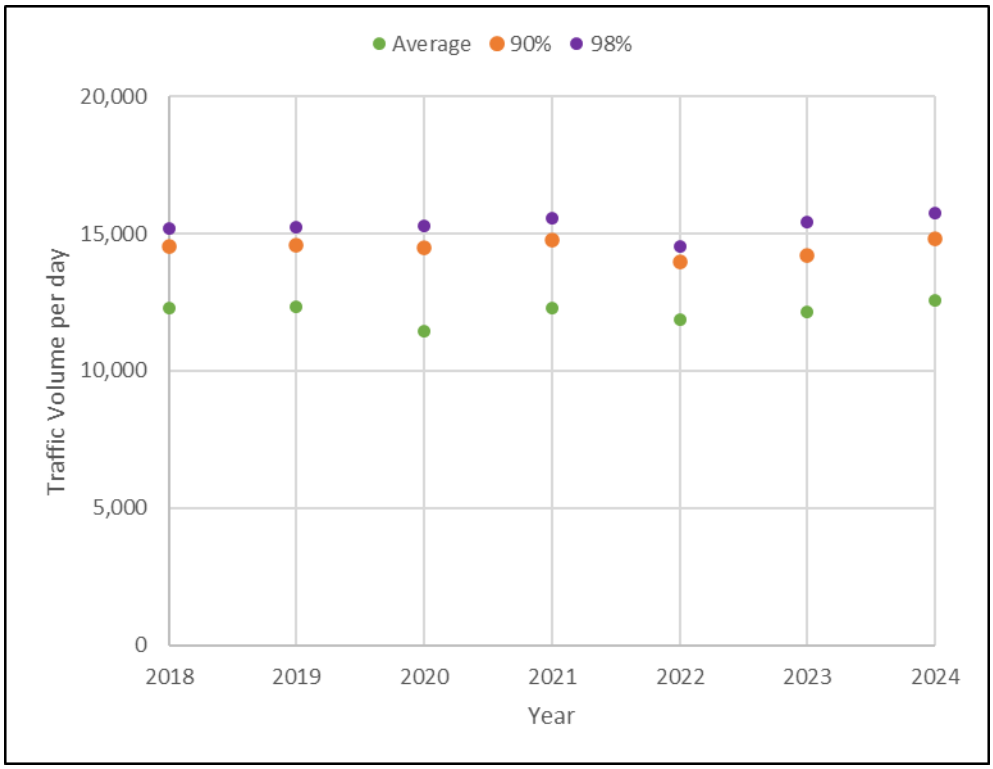


Figure 3-1: Annual Traffic Volumes South of Lorneville Roundabout

Figure 3-2 shows the traffic volumes recorded on SH6 in 2024. The weekday volumes are typically 3,000 to 4,000 vpd higher than at the weekend. The weekday volumes show some seasonal variation with the lowest volumes occurring during the peak holiday period in early January and the highest volumes occurring the November-December period.

Figure 3-3 shows the hourly volumes recorded on SH6 in February 2025 which reflects typical volumes for much of the year. On a weekday, there are clear peaks in the flows, one in the morning (7:30 AM to 8:30 AM) and the other in the late afternoon (4.45 PM to 5:45 PM). Figure 3-4 shows that the dominant flow direction is southbound towards Invercargill in the morning and northbound in the afternoon. This represents typical workplace travel patterns given that Invercargill represents the largest employment centre in the area. At the weekend, there are single broad peaks during the middle of the day.

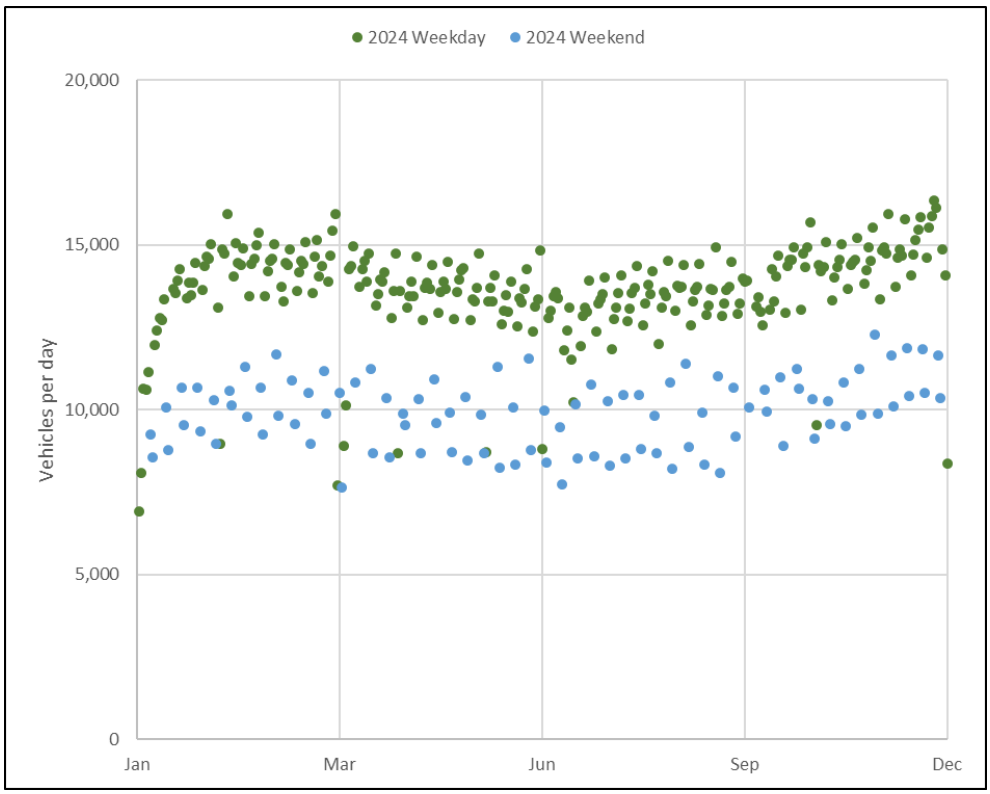


Figure 3-2: Traffic Volumes on SH6, 2024

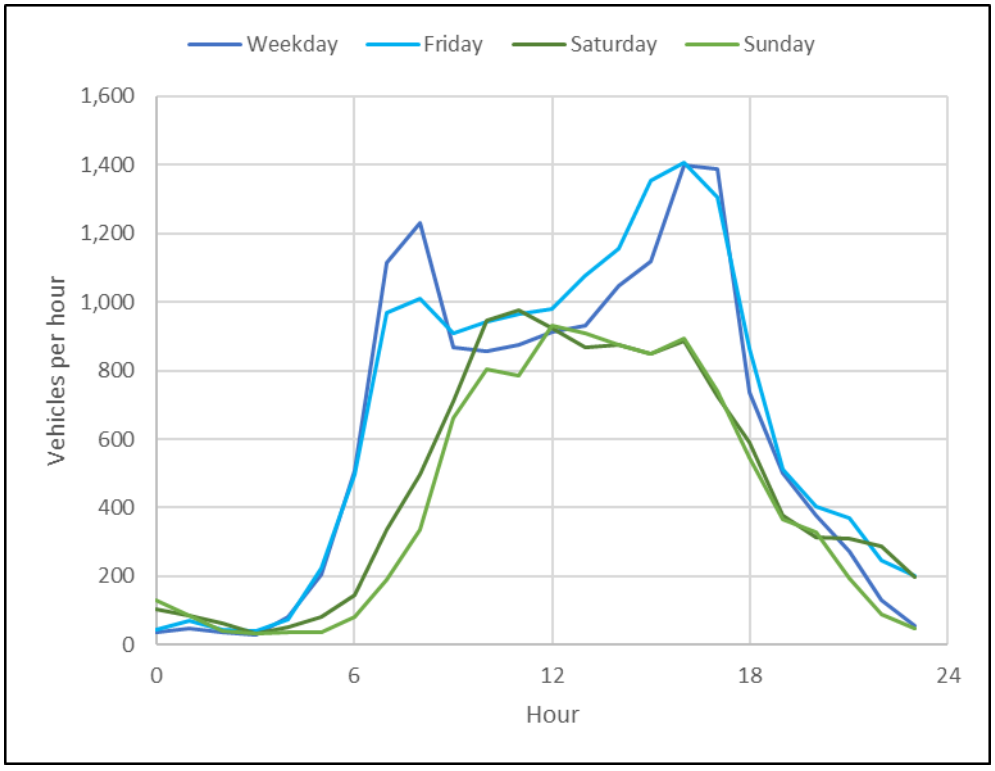


Figure 3-3: Hourly Traffic Volumes on SH6 South of Lorneville Roundabout – February 2025

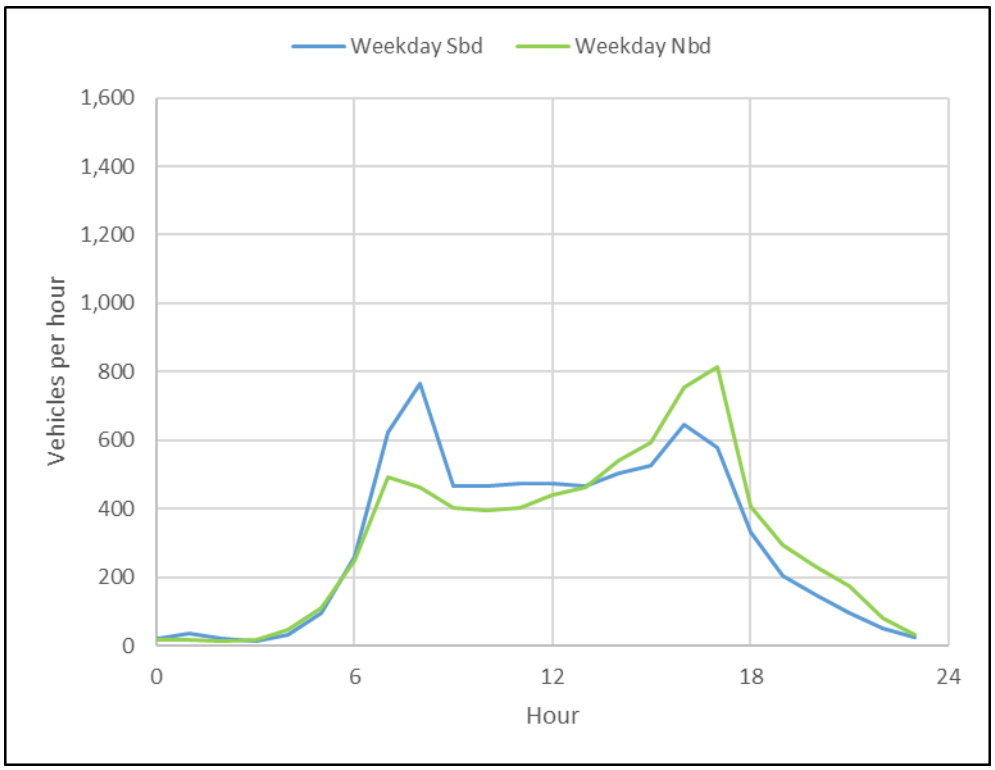


Figure 3-4: Weekday Directional Traffic Volumes on SH6 south of Lorneville Roundabout – February 2025

3.2 Existing Activity

The warehouse employs six full-time staff and two casual staff during the peak season. Staff typically travel independently to the site by vehicle and have an average daily traffic generation of about 12 vpd.

Truck movements at the warehouse vary widely across the year. Wool is transported to the warehouse in a wide variety of trucks but is generally shipped using truck and trailer units. During the peak season, there can be 40-50 truck movements each day into the site bringing wool into the warehouse with these trucks generating a similar number of outbound movements. The exports from the site can involve up to 10 truck and trailer movements (in and out combined). Overall, the warehouse activity generates about 100-120 vehicle movements per day (50-60 inbound and 50-60 outbound) during the peak season.

During the off-season, imports to the warehouse typically involve less than 10 inbound truck movements per day and less than 20 movements per day in total.

The peak hourly movement volumes are typically below 10 vph throughout the year.

3.3 Road Safety

Crash records of the surrounding road network for the five-year period 2020 to 2024 have been reviewed using the NZTA Crash Analysis System. During the five-year period, there have been seven crashes reported along North Road between the Lorneville roundabout 500 metres to the north of the

site and Moore Road about 800 metres to the south. One of these resulted in a serious injury, two caused minor injury with no injuries being reported following the other crashes.

The serious injury crash involved a driver travelling north on North Road at high speed, reportedly as high as 140 km/h, before losing control and leaving the road.

One minor injury crash involved a vehicle travelling north on North Road, just south of the Lorneville roundabout, running into the rear end of a stationary vehicle from traffic in the middle of the road. The crash was likely to be attributable to driver error because they were following too close to the vehicle in front.

The second minor injury crash also involved a rear end collision when a southbound vehicle has hit a vehicle that had stopped in the road behind a turning vehicle. The crash was attributed to driver distraction.

There were no crashes associated with turning movements at the driveways to the site. The reported crashes do not raise any specific safety concerns with the road network.

From a Safe System perspective, the wide sealed shoulders reduce the potential for drivers to lose control if they inadvertently move out of the traffic lane. The wide flush median provides separation between opposing traffic lanes which will reduce the potential for head-on type crashes and also provides space for right-turning vehicles to stop in the carriageway clear of through traffic. The wide shoulders also provide space for any cyclists using the highway to travel outside the high speed traffic lane.

The primary safety concern is the short separation between the entry driveway to the site and the driveway on the opposite side of the road. Although only low volumes of movement were observed at both driveways, the short separation means that there will be a conflict between the paths of right turning vehicles if these occur at the same time.

4 Proposed Plan Change

4.1 NZTA Consultation

Consultation with NZTA began in 2020 with a request for preliminary comment on a site layout that was based on retaining the existing crossings but with the northern crossing and internal access lane being vested as a local road. NZTA raised a number of concerns with the proposed access arrangements including:

- *There is a potential that safety issues could occur with the proposed commercial operation and the existing operations on the western side of the highway (Adventure Southland Limited and Prime Range Fresh). The safety issues would mainly be associated with right turning vehicles into the existing access for these existing operations and if vehicles were to turn right into the northern access of the proposed activity.*
- *Any vehicle movements with the proposed activity will need to avoid conflicts from the existing access on the opposite side of the highway.*
- *Right turning vehicle movements could be mitigated if only right turns into the site were to occur at the southern entrance.*
- *No right turn turns in the northern entrance, only left in / left out and potentially right out could occur.*
- *Appropriate signage and road markings (painted right turn bay) would be required to ensure that the southern entrance is identified as the main entrance and that no right turns in could occur at the northern entrance.*
- *Ensure that internal accessways are positioned more than 45m from the intersection.*
- *Ensure that vehicles will not be required to park on the highway or cause obstruction to the highway.*
- *This section of the State Highway is a Limited Access Road under the Government Roading Powers Act 1989. The two entrances to the site have registered vehicle crossings that have conditions associated with them. These conditions do not reflect what is being proposed and would need to be updated once there is agreement on the access situation.*

Following this feedback, a range of alternate access arrangements were considered in relation to how the access to the site as a whole would operate. Appendix A provides a summary of the options that were considered. The revised access arrangements involve forming a new local road intersection about 60 metres north of the existing northern crossing to the wool store and retaining the southernmost crossing for one-way exit movements only.

Appendix B includes details of the design criteria that have been adopted for the new intersection with Appendix C providing an assessment of the arrangements from a Safe System perspective. Appendix D includes drawings of the intersection concept design.

Further comment from NZTA was sought on the revised access arrangements. Although NZTA have indicated a preference for the southernmost crossing to be closed once the new local road intersection has been formed, retention of the crossing is desired by Tulloch to better manage truck movements to the south from the warehouse. Following further discussion, NZTA have indicated that they would accept retention of the southern crossing subject to the crossing being modified to restrict movements to left turn out only. It is anticipated that this would require regulatory signage requiring a

left turn out only, no entry signage from the highway and some reshaping of the crossing with kerbing and islands to physically prevent right turns.

4.2 Concept Masterplan

Tulloch Limited is seeking rezoning of its land at 805, 815 and 819 North Road from rural to industrial. The industrial zoning reflects the existing activity at its warehouse at 815 North Road. The site structure plan in Figure 4-1 shows the extent of the proposed rezoning and the proposed access arrangements.

The existing exit-only driveway from 815 North Road will be retained as a private driveway and continue to operate one-way but will be modified to prevent right turns. A new intersection is proposed on North Road to provide access to the currently undeveloped land. The new intersection will replace the existing entry driveway to 815 North Road and two-way driveway to 819 North Road.

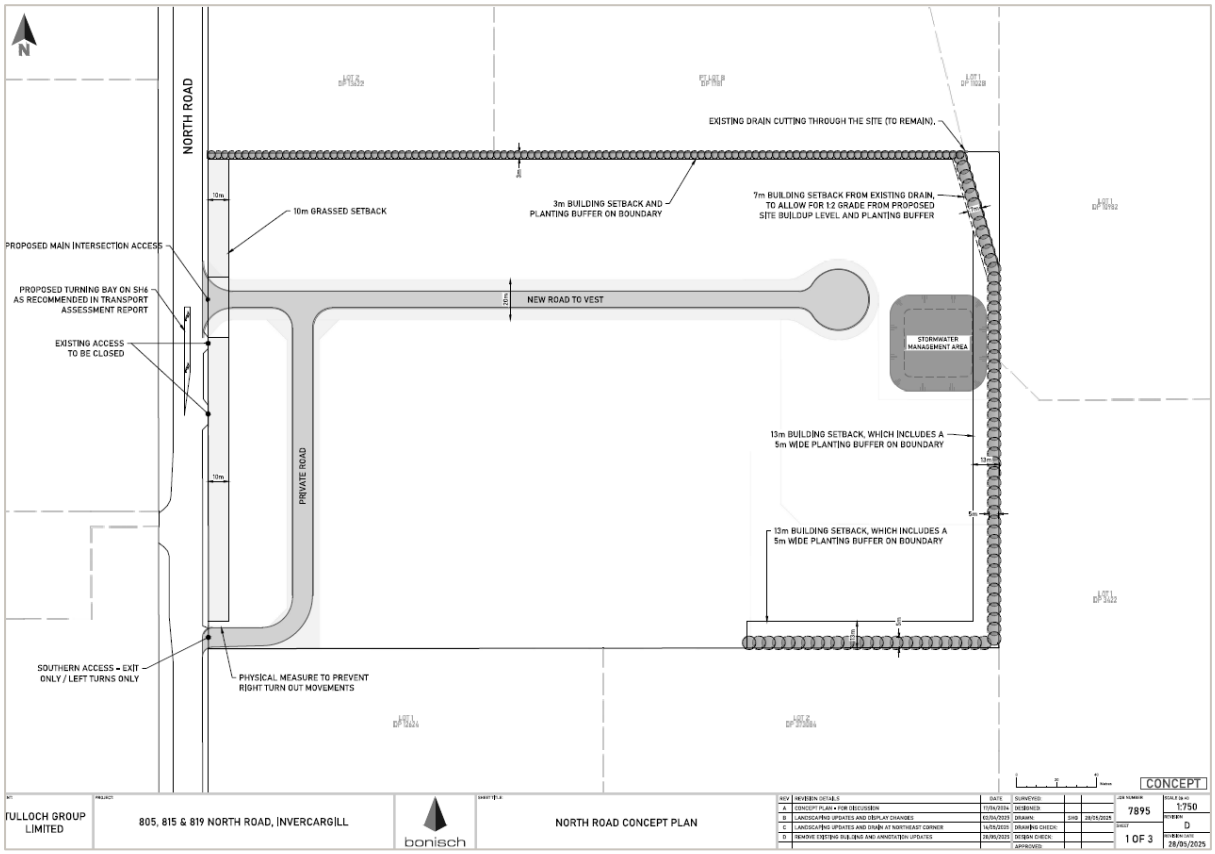


Figure 4-1: Plan change site structure plan

4.3 Traffic Generation

The plan change site has a total area of about 9.7 ha with the existing wool store activity occupying about 3 ha, inclusive of the driveways. The rezoning would create about 5.6 ha of developable land after allowing for the existing wool store, new road reserve and other reserves.

The traffic generation of the site will be dependent upon the nature of activities that are established. Warehouse type activity such as the wool store generate lower volumes of movement than manufacturing or contractor type activities.

The 2018 New Zealand Trip and Parking Database includes traffic generation rates for industrial parks and suggest that the peak hour generation rate could be in the range 21-23 vph per hectare. Since this information is based on surveys collected in 2004-5, reference to other sources have also been considered.

The Institute of Transportation Engineers (ITE) Trip Generation web-based application reports traffic generation rates for light industrial activity of 0.41 vph per 1,000 sq ft of floor area which represents a rate of about 17 vph per hectare based on 40 percent site coverage.

The Trip Rate Information Computer System (TRICS) is a database of trip rates for developments used in the United Kingdom for transport planning purposes. This reports traffic generation rates for an Industrial Estate of 6.3 vph per hectare.

The wide range of rates is likely to be a reflection of the very wide range of activities that exist in industrial zones. For the purposes of this assessment, a peak hour traffic generation rate of 17 vph per hectare has been adopted. Based on that rate, new development at the site would generate about 95 vph at peak times. This means that peak hour volumes with full development of the site inclusive of the existing activity at the wool store will be 95-110 vph.

Light industrial activity typically has a short duration traffic generation peak early in the morning, 7:00 AM to 8:00 AM, as workers arrive but a broader peak in the afternoon that can extend from 2:00 PM through to 6:00 PM. This reflects the different working hours that often are adopted in the industry compared with office based activity. During the morning peak, 80-90 percent of vehicle movements are typically made into the site with this reversing during the afternoon.

The daily traffic generation of industrial activity is typically in the range of 5 to 8 times the peak hour volume. On this basis, the site as a whole could generate 500-900 vpd on average.

5 Assessment of Transport Effects

5.1 Site Access

The SIDRA intersection analysis software has been used to assess the likely delays and operational performance of a new priority intersection. The analysis has been based on about 80% of movements being to or from the south during the peak periods. Table 5-1 shows the longest delays are for the lowest volume movement, that is the right turn out, could be about 20 seconds on average. The forecast delays during the afternoon / evening peak period are shown in Table 5-2. The average delay for the right turn out movement in the afternoon is about 25 seconds because of the higher two-way volumes on SH6 at that time. Average delays for all other turning movements are low, typically less than 10 seconds. Overall, this suggests that a priority intersection would provide an acceptable level of service.

Table 5-1: Intersection Performance - Morning Peak (8:00 AM)

Approach	Movement	Volume (vph)	Delay (s) / LOS
SH6 Invercargill	Through	430	n/a
	Right	60	11 (B)
New Road	Left	20	4 (A)
	Right	5	20 (C)
SH6 Lorneville	Left	10	7 (A)
	Through	710	n/a

Table 5-2: Intersection Performance – Afternoon / Evening Peak (4:00 PM)

Approach	Movement	Volume (vph)	Delay (s) / LOS
SH6 Invercargill	Through	700	n/a
	Right	20	10 (A)
New Road	Left	70	4 (A)
	Right	10	25 (D)
SH6 Lorneville	Left	5	7 (A)
	Through	630	n/a

5.2 Road Safety

Although a priority intersection would operate with low levels of delay, the 80 km/h speed limit means that in the event of a crash, the consequences are likely to involve serious injuries or a fatality. The NZTA Moneterised Benefit and Cost Manual (MBCM) includes crash rate forecast models. The crash rate model for a high speed priority intersection has been used to assess likely crash rates at the proposed new intersection.

The forecast average crash rate is about 0.1 injury crashes per annum based on the new industrial zone generating 900 vpd on average. This crash rate is not considered sufficiently high to warrant construction of a roundabout.

5.3 Traffic Volumes

Full development of the plan change site could result in an average daily traffic generation of up to 900 vpd. It is expected that about 80% of all movements will be to or from the South. This means that the traffic volumes on SH6 south of the plan change site could increase by up to 700 vpd. The total volumes on the highway will still be well within the capacity of the highway.

The higher traffic volumes at peak times will contribute to small increases in average delays at all driveways and intersections south of the site.

6 District Plan

6.1 Transport Objectives

Development of transport infrastructure and land use takes place in an integrated and planned manner which:

1. Integrates transport planning with land use.
2. Protects the function, safety, efficiency and effectiveness of the transport network.
3. Minimises potential for reverse sensitivity effects to arise from changing land uses.
4. Provides for positive, social, recreational, cultural and economic outcomes.
5. Minimises, where practical, the adverse public health and environmental effects.

The existing wool store operation represents an industrial activity and has been established on rural land. The proposed rezoning will allow for expansion of industrial activities on the adjacent land. Since the site is located beside the state highway, it provides direct access to the strategic road network which will limit the potential for new industrial activity affecting residential activity within the wider area.

Access to the industrial zone will be via a new intersection that is formed in accordance with Austroads design standards. The design provides drivers with good visibility from limit lines which will enable drivers to clearly assess approaching traffic before turning. Since the zone will attract usage by large, articulated vehicles, the intersection has been designed to accommodate two-way movement of that size of vehicle. Overall, it is considered that the design will allow the intersection to operate safely and with the little effect on the operation of the highway.

6.2 Transport Policies

6.2.1 TRA-P1 Infrastructure

To provide for the safe and efficient operation, improvement and protection of transport infrastructure.

Access to the industrial zone is proposed via a new intersection rather than a vehicle crossing. This represents an appropriate approach to the access design because of the high volume of movements that is anticipated compared with the current situation. This will not affect the movement of existing traffic on the state highway and will allow turning movements to be undertaken safely.

6.2.2 TRA-P2 Noise

To manage the impact of noise associated with the airport, seaport, State Highway and railway networks.

Since the proposed industrial zone is located beside the state highway and will contribute to a small increase in traffic volumes, it could contribute to higher traffic noise on the highway. However, any increase is consistent with the purpose of the highway which is intended for carrying high volumes of traffic.

6.2.3 TRA-P3 Roading Hierarchy

To have regard to the Council's Roading Hierarchy when considering subdivision, use and development of land.

The subdivision site has frontage to the state highway only and access is proposed to the highway. This will ensure that any new industrial activities do not generate heavy commercial vehicle movements onto roads where these would not be anticipated. On that basis, the development of the subdivision and proposed road is considered to be consistent with the overall road hierarchy for the district.

6.2.4 TRA-P4 Standards

To set development standards for vehicle access, loading, parking and manoeuvring facilities.

There are no reasons why development within the site will not be able to meet the District Plan standards in relation to parking and loading.

6.2.5 TRA-P5 Adverse Effects

To manage subdivision, use and development adjacent to transport infrastructure in such a way as to avoid, remedy or mitigate potential effects, including reverse sensitivity effects on transportation infrastructure.

The proposed plan change involves rezoning of land from rural to industrial and does not involve any subdivision. Access to the new zone is proposed at a new intersection that will mitigate any potential effects on existing driveways on North Road. The provision of direct access to the state highway via the new local road will ensure that heavy vehicle movements at the site will not generate traffic effects on adjacent properties.

6.2.6 TRA-P6 State Highways

To have regard to any New Zealand Transport Agency standards regarding the location of new accesses on to, and egresses from, State Highways where the speed limit exceeds 50 kph.

The new intersection will be designed to meet NZTA requirements. Its location will provide appropriate separation from the nearby driveway to the Prime Range Fresh activity to allow a right turn bay to be marked.

6.2.7 TRA-P7 Cross Boundary Effects

To promote the management of the effects of activities which occur outside the District on the transportation networks of the District.

This policy is not applicable to this application because the proposed rezoning and activities enabled by the rezoning are within the District.

6.2.8 TRA-T8 Public Health

To manage transport activities and surrounding land use activities to protect public health and environmental values.

The plan change site is located adjacent to the state highway and will promote use of the highway for access. This will enable consolidation of industrial activities which will reduce the potential for generating effects on the surrounding land use activities.

6.2.9 TRA-T9 Integration

To integrate the planning of land use with existing transport infrastructure and provide for future transportation requirements.

The plan change site is located opposite the Business 5 zoned land and will provide an opportunity for industrial activity to be established close to that zone. The site location adjacent to the state highway will promote use of the highway for access.

6.2.10 TRA-T10 Public Transport, Walking and Cycling

To promote the use of public transport, and walking and cycling networks.

Since the site is located remote from existing public transport, walking and cycling networks, it is not practical to promote use of these travel modes.

6.2.11 TRA-T11 Significant Transport Networks

To recognise that the Invercargill Airport, seaport, railway, State Highways, and the arterial roads which link this infrastructure are regionally significant transportation networks and are essential to the ongoing viability and functioning of the District.

The plan change site is located adjacent to the state highway and will promote use of the highway for access. This will ensure that new activities can easily access the strategic road network and contribute to the viability and functioning of the District.

6.3 Transport Rules

The size of the plan change site means that there are no reasons why compliance with the rules relating to provision of parking and loading cannot be met (TRA-R1 to TRA-R10).

Under TRA-R11, construction of a new intersection on the State Highway represents a Discretionary Activity because the speed limit is greater than 50 km/h. The matters of discretion include:

The location of the vehicle accesses and egresses

1. The dimensions, formation and surfacing of the vehicle accesses and egresses

2. Any additional works that may be required on site or on the roadway itself to avoid, remedy or mitigate any potential traffic safety problems.

The proposed location of the new intersection provides sufficient separation from nearby driveways to allow a right turn bay to be marked within the flush central median and minimise the potential conflict with right turn movements at nearby driveways. The new road can be constructed to a standard that is suitable for the volumes of heavy vehicle movement anticipated within the proposed industrial zone.

Appendix D includes a concept design for the new intersection. The construction of the new intersection does not involve major alterations to the state highway. New kerbs will be constructed at the intersection and the existing line markings altered to include a right turn bay.

7 Conclusion

Tulloch Limited operates an industrial warehouse activity on rural zoned land at 815 North Road, Lorneville north of Invercargill. A Private Plan Change Request is proposed to rezone the site and two adjacent lots from Rural to Industrial. Following preliminary consultation with NZTA, site access to the rezoned land will be via a new single, all-movement intersection to North Road about 115 metres north of the driveway proving access to commercial activity on the western side of the highway. The separation of the new intersection from the nearest driveway on the western side of the highway (Prime Range Fresh) will minimize the potential for conflict between right turns and is sufficient to allow a right turn bay to be marked at the new intersection.

Based on the size of the proposed industrial zone, it will have potential to generate 500 -900 vpd depending on the activities that are established. The priority intersection will provide sufficient capacity for this volume of movement. The right turn out movement will experience the greatest delays and are likely to be in the range 20-25 seconds at peak times if traffic generation is at the upper end of the forecast range.

The location of the proposed industrial zone adjacent to the highway ensures direct access to the strategic road network is possible which will reduce the potential for reverse sensitivity effects.

Overall, it has been concluded that the plan change proposal can be supported from a transport perspective subject to the following access arrangements being implemented in accordance with the annotated structure plan:

1. A new local road and intersection with SH6 being formed in accordance with an outline development plan that provides a minimum separation of 115 metres from the nearest driveway on the western side of SH6.
2. A right turn bay being marked on the state highway at the new intersection.
3. Regulatory signage being installed at the southern crossing permitting left turn out movements only.
4. Physical measures such as kerbs or raised islands to prevent right turn out movements at the southern crossing.

Appendices

Appendix A Site Access Assessment

A.1 Primary Site Access Requirements

Create a new local road through the site that provides access to all potential future lots and meets the state highway at an all movement intersection.

The new road needs to accommodate two-way movement of large, articulated vehicles.

A.2 Access Options

A.2.1 Use Existing Driveways

Figure A 1 shows an indicative layout for new local roads based on the existing driveway locations. A full intersection would be formed at the northern driveway location with the existing exit only driveway being retained.



Figure A 1: Potential Road layout based on existing driveways

This option would require the road to be formed with at least two small radius curves to provide an access route to new industrial land. It creates a short section of road between the highway and the wool store for vehicle queuing.

This option would not address the concerns raised by NZTA in relation to the conflicting right turns at the new intersection and driveway on the western side of the highway.

A.2.2 Restricted Movement Intersections

Figure A 2 shows one way to eliminate the potential conflict with right turn movements on the highway. This involves creating two new intersections with movements at the northern driveway restricted to left-in / right-out and movements at the southern intersection restricted to right-in / left-out.

Although this option could resolve the NZTA concern, it creates a more complex internal movement network and will increase the volume of movements across the western side of the wool store building which is used for access by the Segard Masurel business. Truck movements associated with this activity require the whole of the yard space along the west side of the building for manoeuvring which would conflict with the movement of general traffic.



Figure A 2: Potential Road with restricted movement intersections

A.2.3 New Intersection and Road

Figure A 3 shows an access option based on a new road being formed through the northern part of the site and meeting the highway at a new all-movement intersection. Under this option, the existing northern crossing would be closed. Entry to the existing wool store would be via the new road with truck exiting via the existing southern driveway. Access to the Segard Masurel business could be via new right of way.

Since access arrangements based on this road configuration would provide good access to new industrial zoned land and have the least effect on the operation of the existing activities, this represents the preferred layout from a transport perspective.



Figure A 3: New Road and intersection

Appendix B Intersection Design

B.1 Design Warrant

Figure B 1 shows the Austroads design warrants for turning treatments at priority intersections for a design speed of 70-100 km/h. A channelised treatment for right turns from the highway is considered appropriate at the new intersection because peak hour turning volumes will exceed 5 vph and the major road volumes during the day are greater than 800 vph.

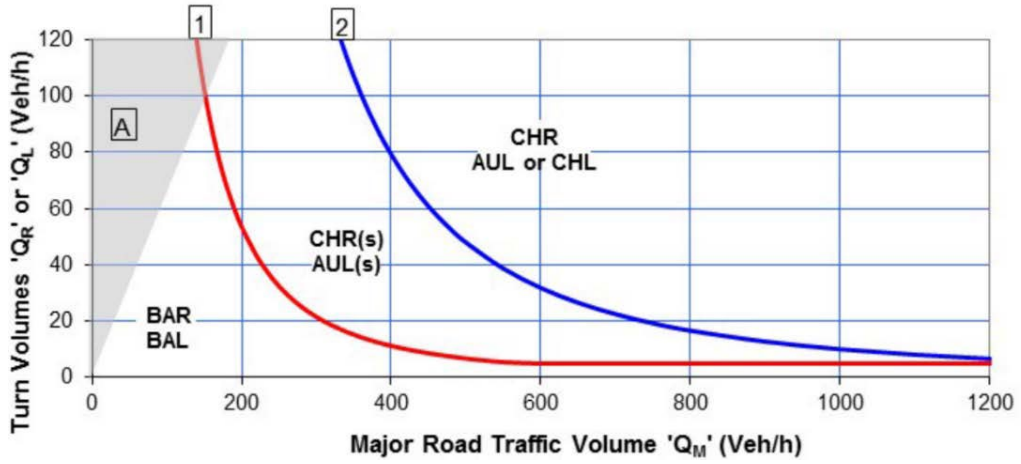


Figure B 1: AGTM6 Warrant for Turning Treatments – 70km/h < design speed < 100 km/h

B.2 Right Turn Treatment

Since the Austroads Guide to Road Design Part 4A does not include specific design guidelines for a rural, median divided road such as SH6 along the site frontage, the intersection design has been based on providing sufficient space to enable back-to-back right turn bays to be formed in relation to the driveway on the west side of SH6. The design parameters are set out in Table B 1.

Table B 1: Design Parameters - Right Turn Treatment

Design Parameter	Value
Design speed	80 km/h
Lane Width	3.5m (existing)
Flush median width	3.0 m (existing)
Storage length	25m
Taper length	20m
Deceleration length (including taper)	65m

Based on these design parameters, the new road should be located no closer than 110 metres north of the driveway on the western side of the highway.

Appendix C Safe System Assessment

C.1 Summary

The construction of a new, all movement intersection on SH6 is considered to be the most appropriate way to provide access to the rezoned land while maintaining access to the existing activities. Although the intersection will increase the number of conflict points at the site entrance, its relocation to the north will increase the separation from other driveways. From a Safe System perspective, the effects on safety are expected to be largely neutral.

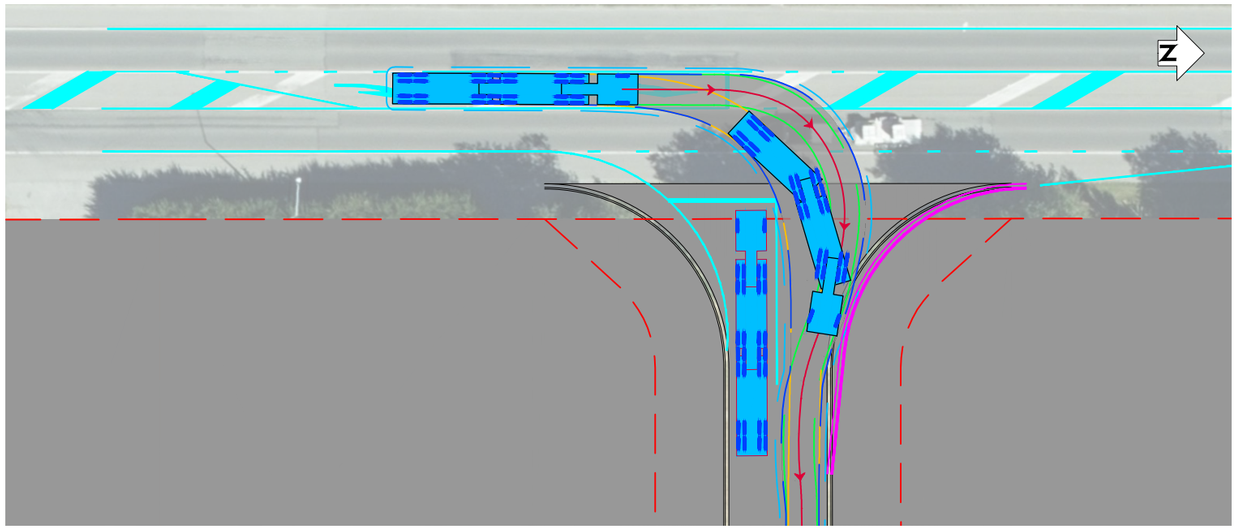
Table C 1: Existing Situation

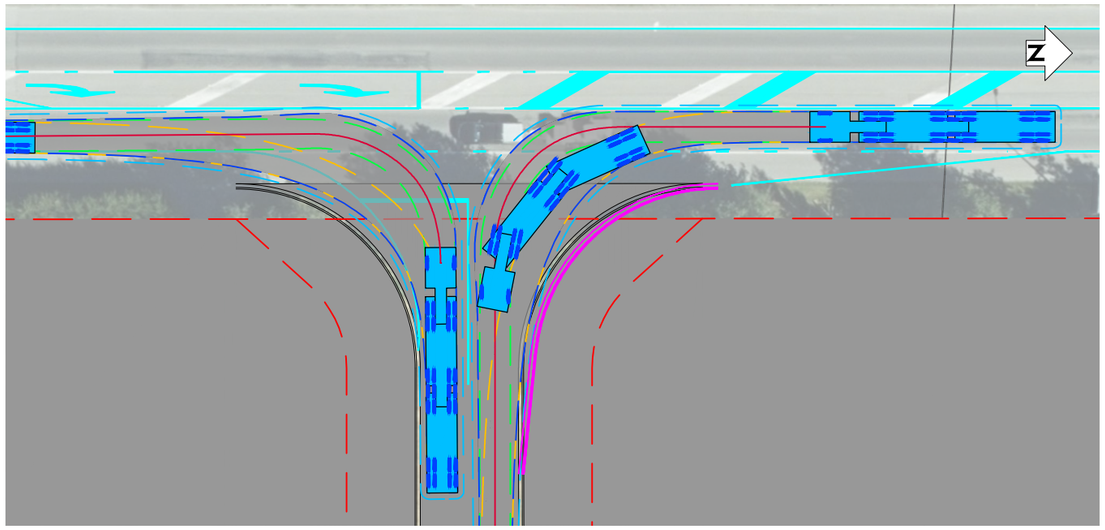
	Run-off road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclists
Exposure Comments:	SH6 – 13,000 vpd	SH6 – 13,000 vpd	SH6 – 13,000 vpd Driveways – 100 vpd	Nearby driveways Driveways – 100 vpd	SH6 – < 10 per day	SH6 – < 10 per day	SH6 – < 150 per day
Exposure Score:	4/4	4/4	4/4	1/4	1/4	1/4	4/4
Likelihood Comments:	Factors that increase the likelihood include: • Grassed berms	Factors that increase the likelihood include: • No median barriers	Factors that increase the likelihood include: • Conflicting right turns	Factors that increase the likelihood include: • Short separation • Conflicting right turns	Factors that increase the likelihood include: • No footpaths	Factors that increase the likelihood include: • Truck volumes	Factors that increase the likelihood include: • Truck Volumes
	Factors that decrease the likelihood include: • Wide sealed shoulders • Straight road alignment • Lighting	Factors that decrease the likelihood include: • Wide flush median • Straight road alignment • lighting	Factors that decrease the likelihood include: • Wide flush median • Wide, one-way driveways • Stop controls • Good sightlines	Factors that decrease the likelihood include: • Straight road alignment • Good visibility between driveways • Wide sealed shoulders	Factors that decrease the likelihood include: • Wide sealed shoulders	Factors that decrease the likelihood include: • Wide sealed shoulders	Factors that decrease the likelihood include: • Wide sealed shoulders
Likelihood Score:	2/4	1/4	2/4	2/4	1/4	1/4	2/4
Severity Comments:	Factors that increase the severity include: • 80 km/h speed limit • Trees and power poles •	Factors that increase the severity include: • 80 km/h speed limit •	Factors that increase the severity include: • 80 km/h speed limit •	Factors that increase the severity include: • 80 km/h speed limit	Factors that increase the severity include: • 80 km/h speed limit • Truck volumes	Factors that increase the severity include: • 80 km/h speed limit • Truck volumes	Factors that increase the severity include: • 80 km/h speed limit • Truck volumes
	Factors that decrease the severity include: • •	Factors that decrease the severity include: • •	Factors that decrease the severity include: • •	Factors that decrease the severity include: • Decelerating vehicles •	Factors that decrease the severity include: •	Factors that decrease the severity include: •	Factors that decrease the severity include: •
Severity Score:	4/4	4/4	3/4	3/4	4/4	4/4	4/4
Product **(multiply scores above for crash type)**	**32/64**	**16/64**	**24/64**	**6/64**	**4/64**	**4/64**	**32/64**
			TOTAL				**118/448**

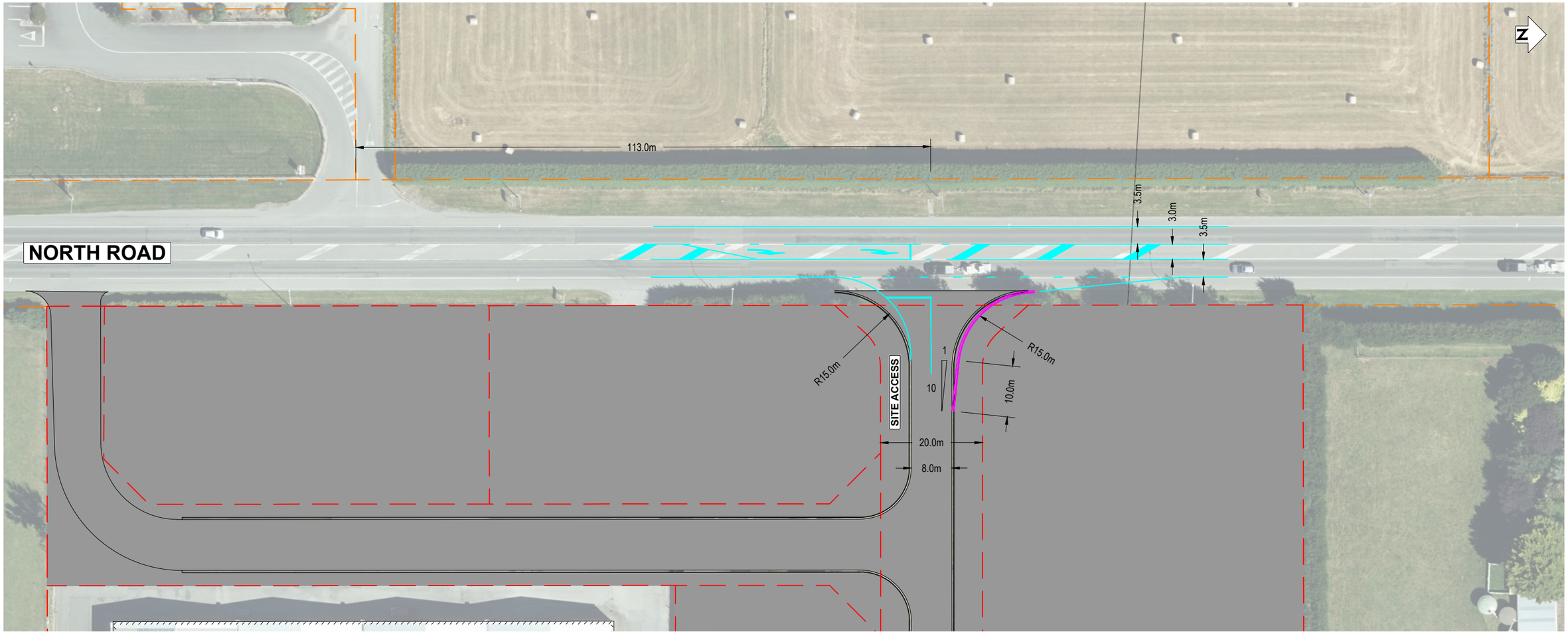
Table C 2: North Road with new intersection

	Run-off road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclists
Exposure Comments:	SH6 – 13,000 vpd	SH6 – 13,000 vpd	SH6 – 13,000 vpd ~~Driveways – 100 vpd~~ New local road – 1,000 vpd	Nearby driveways Driveways – 100 vpd	SH6 – < 10 per day	SH6 – < 10 per day	SH6 – < 150 per day
Exposure Score:	4/4	4/4	4/4	1/4	1/4	1/4	4/4
Likelihood Comments:	Factors that increase the likelihood include: • Grassed berms •	Factors that increase the likelihood include: • No median barriers •	Factors that increase the likelihood include: • ~~Conflicting right turns~~ • More conflict points with intersection	Factors that increase the likelihood include: • ~~Short separation~~ • ~~Conflicting right turns~~	Factors that increase the likelihood include: • No footpaths •	Factors that increase the likelihood include: • Truck volumes •	Factors that increase the likelihood include: • Truck Volumes •
	Factors that decrease the likelihood include: • Wide sealed shoulders • Straight road alignment • Lighting	Factors that decrease the likelihood include: • Wide flush median • Straight road alignment • lighting	Factors that decrease the likelihood include: • Wide flush median • ~~Wide, one-way driveways~~ • Stop controls • Good sightlines • Right turn bay	Factors that decrease the likelihood include: • Straight road alignment • Good visibility between driveways • Wide sealed shoulders • Separation > 115m	Factors that decrease the likelihood include: • Wide sealed shoulders	Factors that decrease the likelihood include: • Wide sealed shoulders	Factors that decrease the likelihood include: • Wide sealed shoulders
Likelihood Score:	2/4	1/4	2/4	1/4	1/4	1/4	2/4
Severity Comments:	Factors that increase the severity include: • 80 km/h speed limit • Trees and power poles •	Factors that increase the severity include: • 80 km/h speed limit •	Factors that increase the severity include: • 80 km/h speed limit •	Factors that increase the severity include: • 80 km/h speed limit	Factors that increase the severity include: • 80 km/h speed limit • Truck volumes	Factors that increase the severity include: • 80 km/h speed limit • Truck volumes	Factors that increase the severity include: • 80 km/h speed limit • Truck volumes
	Factors that decrease the severity include:	Factors that decrease the severity include:	Factors that decrease the severity include:	Factors that decrease the severity include: • Decelerating vehicles	Factors that decrease the severity include:	Factors that decrease the severity include:	Factors that decrease the severity include:
Severity Score:	4/4	4/4	3/4	3/4	4/4	4/4	4/4
Product (multiply scores above for crash type)	**32/64**	**16/64**	**24/64**	**3/64**	**4/64**	**4/64**	**32/64**
			TOTAL				**115/448**

Appendix D Intersection Concept Design







DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

SURVEYED	
DESIGNED	
DRAWN	
CAD REVIEW	
DESIGN CHECK	
DESIGN REVIEW	NOT APPROVED
APPROVED	
PROF REGISTRATION:	

Stantec

Client:

805 NORTH ROAD
LORNEVILLE

PROPOSED SITE ACCESS
CONCEPT LAYOUT

Status Stamp: WORKING PLOT

Date Stamp: 26.06.2024

Scales: 1:250@A1 1:500@A3

Drawing No.: 310206118_001_001

Rev.: A

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