

Burnham Quarry

Transport Assessment Report

PREPARED FOR BURNHAM 2020 LTD | AUGUST 2023

We design with community in mind

Revision Schedule

Rev No	Date	Description	Prepared by	Reviewed by	Approved by
1	11/8/23	Final Draft Report	AM	AL	AM
2	24/8/23	Revised to include Partially Operative District Plan	AM	AL	AM
3	31/8/23	Final Report	AM	AL	AM



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Quality Statement

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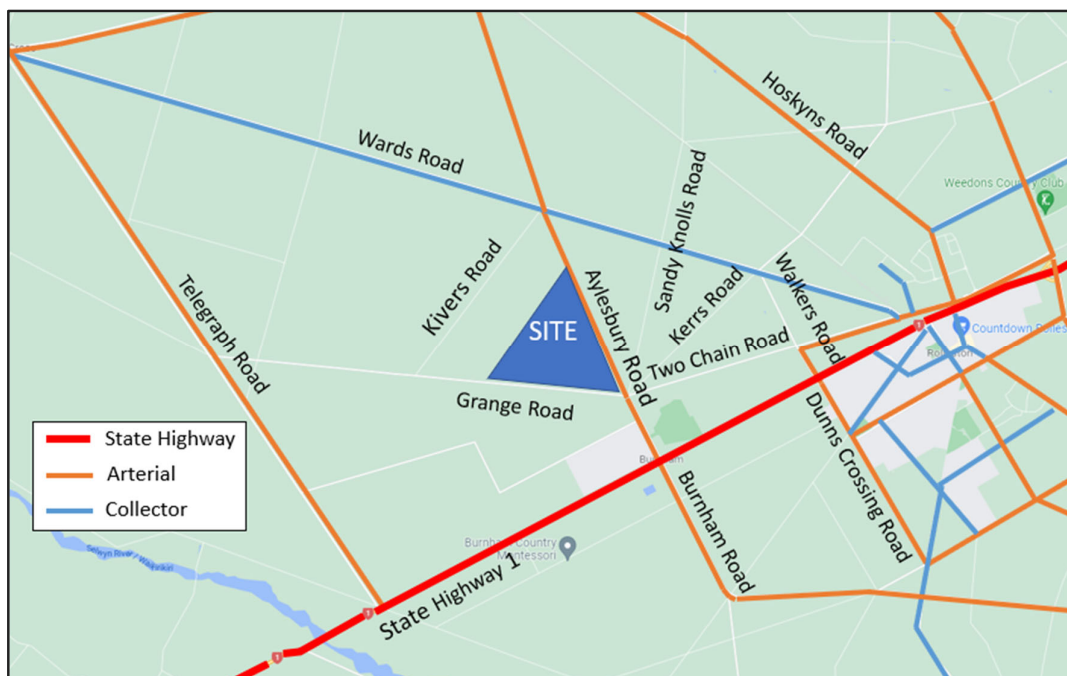
Executive Summary

Proposed Development

Burnham 2020 Ltd is seeking to establish a quarry to the north of Burnham, which will be operated by Winstone Aggregates (part of Fletcher Infrastructure and Concrete Limited). The land area involved is large at 362ha, and the quarry would represent a long-term aggregate resource to the Selwyn District and greater Christchurch area.

Site Location

The quarry site is located in the Selwyn District, west of Aylesbury Road to the north of Two Chain Road (ES Figure 1). It is zoned Rural Outer Plains in the Operative District Plan and General Rural in the Partially Operative District Plan (Decisions Version). Direct access for the quarry is proposed to Aylesbury Road, which forms the eastern boundary to the Site.



ES Figure 1: Site Location and Road Hierarchy Classification

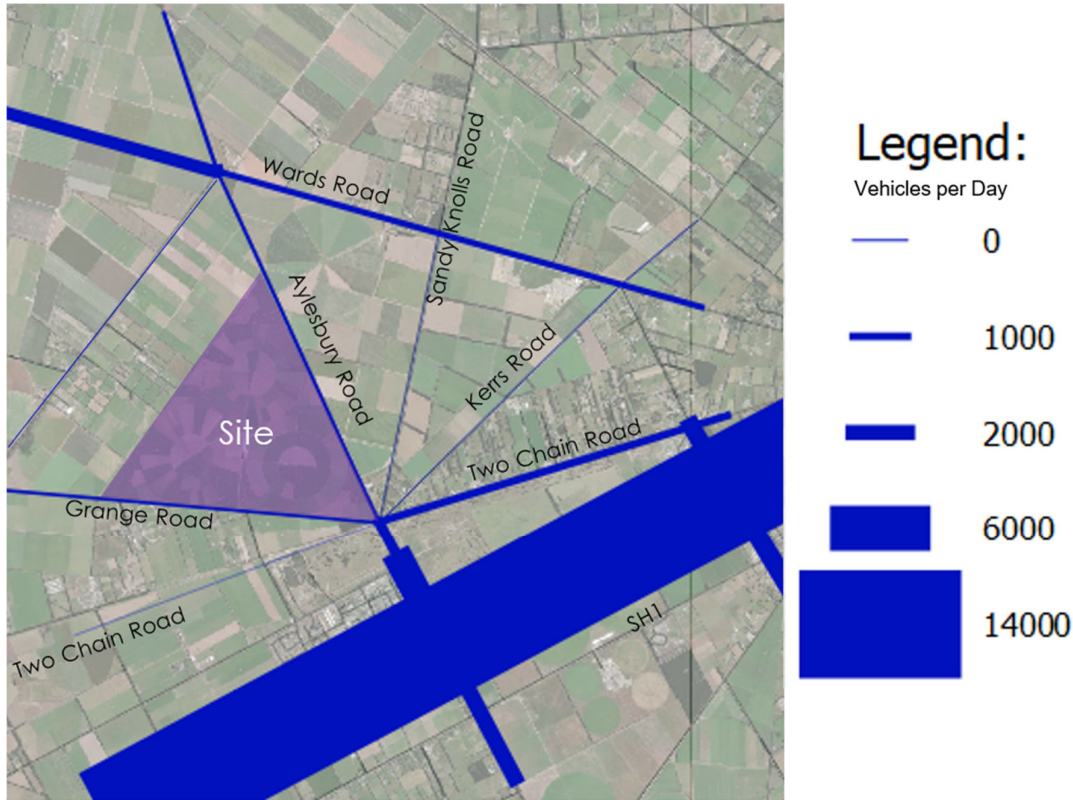
Aylesbury Road provides a connection to Burnham Road south of State Highway 1 (SH1) about 2.7km south of the Site access, and meets State Highway 73 (SH73) about 7.4 km to the north of the Site access. Adjacent to the site Aylesbury Road has a rural formation and speed limit. Between the site and SH1 Aylesbury Road provides access to the Burnham Military Camp, with most activity located on the western side of Aylesbury Road, south of Two Chain Road.

SH1 provides the primary strategic route for the South Island connecting all the major towns along the east coast. Aylesbury Road forms a Stop controlled cross road intersection at SH1, and crosses the Main South railway by way of a level crossing immediately north of SH1.

There is a public bus route that connects Burnham Military Camp to Rolleston, via Two Chain Road and Aylesbury Road. School bus routes operate in the area, although they do not travel down the section of Aylesbury Road adjacent to the site.

Transport Environment

Aylesbury Road past the site carries low traffic volumes of approximately 500 vehicles per day (vpd), even though it carries an Arterial road classification. Traffic volumes increase past the Burnham Military Camp, with traffic volumes of approximately 3,700vpd on a weekday. SH1 carries traffic volumes that are significantly higher, at approximately 14,000vpd, with the magnitude difference in traffic volume able to be seen in ES Figure 2.



ES Figure 2: Daily Traffic Volumes

The SH1 / Aylesbury Road intersection has some peak period congestion on the side roads, with the northern Approach from Aylesbury Road experiencing long queues in the afternoon peak period. There has been a previous history of serious crashes at the intersection leading to implementation of a lower speed limit that is activated by vehicles turning at the intersection.

There are no capacity related issues on the surrounding District Council road network, while the crash history indicates that there have been some vehicle turning/crossing crashes at intersections, and loss of control and turning crashes at locations between intersections. Most serious and fatal crashes have been reported on the State Highway road network, representative of the high traffic volumes.

Planned Infrastructure Changes

Waka Kotahi is planning a roundabout to replace the existing priority-controlled crossroad intersection at SH1 / Aylesbury Road. This will form part of the Road to Zero project on SH1 from Templeton to the Selwyn River. It is understood the project is planned for the period 2024-2027. The single lane intersection form proposed by Waka Kotahi is intended to maximise safety.

Significant changes are proposed by Waka Kotahi and Selwyn District Council for SH1 access at Rolleston to support improved safety and capacity of the connections. The changes are likely to lead to a new roundabout at SH1 / Walkers Road, and an increased function for Walkers Road and Two Chain Road.



Site Access

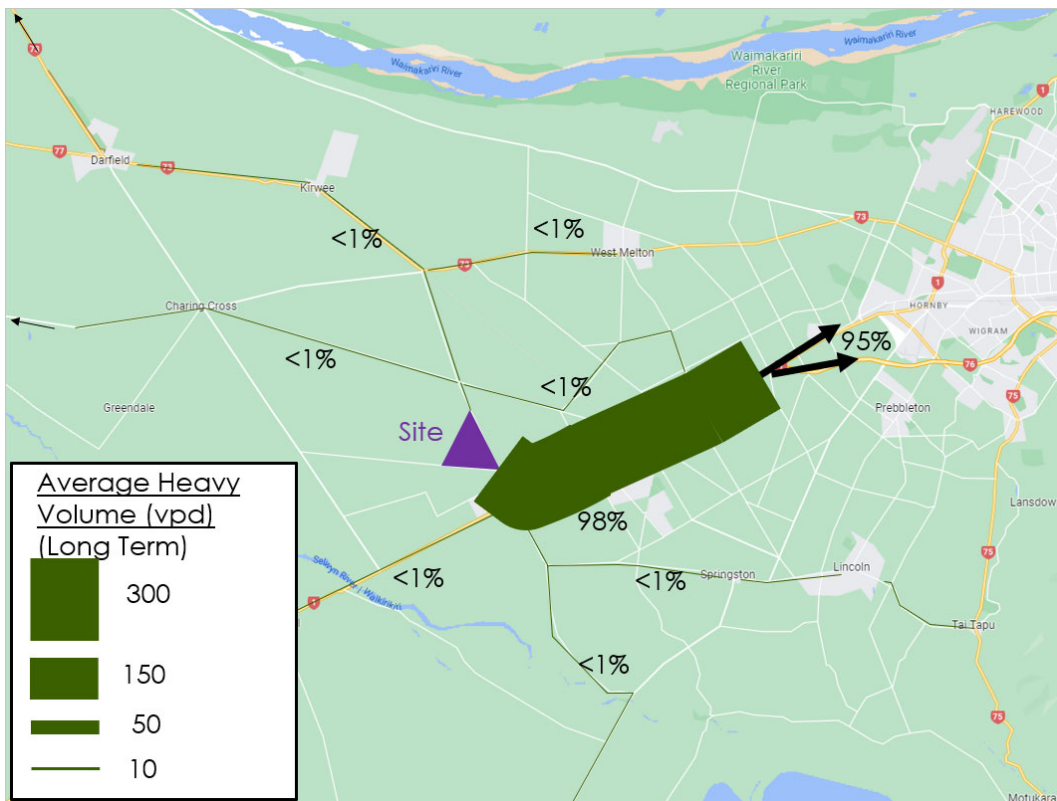
The proposed operations include quarrying, crushing, screening and stockpiling of aggregate, and transportation of processed aggregate from the Site. Access is to be provided mid-way along the Aylesbury Road frontage, remote from residential properties.

The Site access will be located where there is good visibility, where Aylesbury Road is straight, with wide verges. The access is to be designed to comply with District Plan requirements, and support a long term access solution. Further measures such as a concrete edge kerb and a “flag” light at the access have been recommended.

Traffic Generation and Traffic Distribution

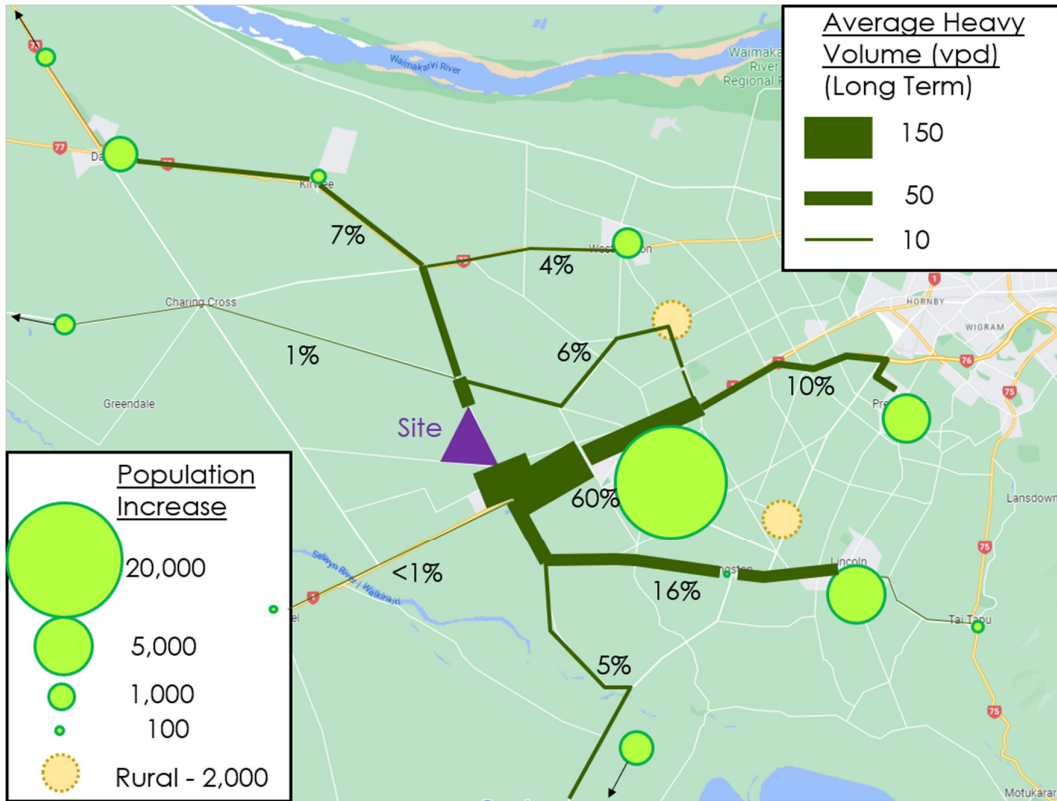
Maximum daily heavy vehicle traffic generation at the gate is proposed to be set through the Resource Consent at 750 heavy vehicle movements per day, which will be reached through progressive increases in demand over a long duration. Based on traffic generation patterns at Winstone Aggregates' former Yaldhurst quarry, the typical heavy traffic generation associated with that peak will be lower (approximately 300vpd on an average operating day, with maximum day of 750vpd).

Winstone anticipates that 95% of the aggregate will have a destination in and around Christchurch, which analysis summarised in ES Figure 3 indicates will rely on Aylesbury Road and SH1 for heavy vehicle movement.



ES Figure 3: Christchurch City Focus Traffic Volume Forecast (Indicative Routes)

It is also noted that the Selwyn District is fast growing, and the growth is anticipated to continue into the future. Council growth projections have been analysed to determine an alternative distribution of growth for the purpose of analysis of traffic distribution from the quarry. The alternative distribution shown in ES Figure 4 indicates a continued high reliance (more than 80% of trips) south of the site on Aylesbury Road, with the remaining trips spread around the surrounding road network.



ES Figure 4: Selwyn District Focus Scenario Long Term Traffic Volume Forecast (Indicative Routes)

Changes in Traffic Volume

The forecast traffic distribution has been added to existing traffic volumes to demonstrate the change compared to existing. There will also be background traffic growth, and that has been allowed for in more detailed intersection analysis.

The largest absolute changes will occur on Aylesbury Road between the site access and SH1, as that will accommodate more than 80% of generated traffic regardless of traffic distribution scenario. The relative change in traffic volumes decreases further from the site. A summary of the traffic pattern changes with the quarry are shown in ES Table 1, and the variation represents the alternative traffic distributions that may occur.

ES Table 1: Forecast changes in Travel Patterns with Quarry

Road Location	Existing Weekday (5 day) Average Volume	Quarry Additional Traffic		Indicative Typical Future Volume
		Average Additional	Long Term Busiest Day Potential	
Routes South				
Aylesbury Road north of SH1	3,700	110-300	750 ^C	3,800-4,000
Aylesbury Road south of Two Chain Road	1,340	110-300	750 ^C	1,450-1650
Aylesbury Road north of Two Chain Road	460	110-300	750 ^C	570-750
Routes East				
Two Chain Road east of Aylesbury Road	1,000	0-20	45 ^S	1,000-1,020
Routes North				
Aylesbury Road south of Wards Road	460	0-55	140 ^S	460-515

The superscript indicates if the peak is associated with a Selwyn focus (S) scenario or Christchurch focus (C) scenario.

Transport effects

Positive Effects

The proposed quarry can lead to positive effects associated with minimising network travel if alternative sources are or would otherwise need to be located further from key destinations for the material. A primary reason major clients are likely to source material from the proposed quarry is likely to be based on minimising transportation distances. In turn, this has a network wide benefit of minimising vehicle kilometres travelled and accident exposure (which is a function of distance travelled).

Road Network Efficiency

A detailed investigation of the existing and future network response to increases in traffic generated by the quarry has been carried out. It shows that the intersection of Aylesbury Road with the access, and other side road intersections along Aylesbury Road will operate with traffic volumes that are sufficiently low that there will be negligible change in performance, and all intersections will operate with a high level of service.

The analysis of SH1 / Aylesbury Road shows that the performance of the intersection will deteriorate as a result of background growth. A recommendation has been included in the assessment that heavy vehicle traffic generation of the site is limited to 250 vpd up until the intersection is improved. That represents approximately 1% increase in traffic movements on the critical Aylesbury Road approach to SH1 in the weekday evening peak period.

The proposed roundabout by Waka Kotahi will address these performance issues, and will continue to operate efficiently over the next ten years. The worst performing approach will be the Aylesbury Road approach in the afternoon peak period, when delays will still represent stable conditions (LOS C).

Intersection Safety

Heavy vehicle tracking tests have been carried out for both the Aylesbury Road / Grange Road / Two Chain Road / Sandy Knolls Road and Aylesbury Road / Wards Road intersections. Whilst turning movements are likely to be very small, it was determined that some movements will not readily accommodate the vehicle tracking of truck and trailers. Some minor improvements are recommended for the two intersections to



ensure the turning movements can be accommodated if quarry generated traffic volumes making the movements exceed 10 vehicles per day.

Aylesbury Road

The section of Aylesbury Road between Two Chain Road and the site access is currently of a narrow width for the volume of traffic proposed to be added by the quarry. It is considered necessary for the road to be upgraded over that length to ensure a durable and safe use of the road. Recognising Council has plans for the road to be upgraded in the long term, and has a role to ensure its arterial network is adequately formed, it is recommended that the Applicant enter a private developer agreement with Council to facilitate this upgrade to the road network which is currently not included in the Long Term Plan.

Pedestrian and Cyclist Impacts

Review of potential effects on cyclists and pedestrians in the surrounding area shows that the quarry would not in itself generate the need for additional infrastructure for these modes of travel, with existing and Council planned facilities around Burnham Military Camp supporting movement in that area.

Transportation Route Management Plan

Although the Site is surrounded by District Council roads, there is expected to be very low use of roads to the north of the Site, or of Two Chain Road. Even under the (unlikely) scenario with the quarry only servicing Selwyn District, traffic volumes will not be inconsistent with the function of the roads, with access to Arterial and Collector Roads achievable. The use of local roads to the levels assessed can be managed with the implementation of a Transportation Route Management Plan, which includes some monitoring actions. It is also recommended that the unsealed local road routes of Kerrs Road and Sandy Knolls Road between Two Chain Road and Wards Road are not used due to their unsealed surfacing type.

District Plan

Operative District Plan

The quarry site is located within the Rural Outer Plains zone of the Operative Selwyn District Plan, and is subject to rules relating to traffic generation, parking and vehicle access contained within the Rural volume of the District Plan. Whilst details of some site elements such as parking will be confirmed through detailed design, there is sufficient space on site to meet District Plan rules on parking layout and manoeuvring.

From a transport perspective, the proposal triggers discretionary activity status with respect to:

- the level of traffic generation from the site, and
- the proposed use of Aylesbury Road (arterial) instead of Grange Road (local) for access.

It also triggers restricted discretionary activity status with respect to the proposed layout of the access which exceeds the requirement for a heavy vehicle access on an arterial road.

It is considered this Integrated Transport Assessment addresses these matters.

Partially Operative District Plan

The Partially Operative District Plan (August 2023 Decisions version) includes the site as General Rural zone. Similar to the Operative District Plan, the site activity and layout triggers restricted discretion within the TRAN rules with respect to:

- the level of traffic generation from the site, and
- the proposed use of Aylesbury Road (arterial) instead of Grange Road (local) for access; and
- the additional widening provided for the access on Aylesbury Road; and
- the peak hour traffic volumes trigger a requirement for a Basic Integrated Transport Assessment.



This Integrated Transport Assessment addresses all of these matters.

Conclusion

Based on the assessment carried out, it is considered the traffic related effects of the proposed quarry will be no more than minor if the following provisions and recommendations are implemented:

- The quarry is not to generate more than 250 heavy vehicle movements per day (on any one day) prior to the SH1 / Aylesbury Road intersection being upgraded to a roundabout, and a comprehensive vehicle routing management plan is required to assess the timing of movement and minimise effects on congestion at the intersection.
- Implementation of a Transportation Route Management Plan that achieves as far as practicable:
 - Minimisation of additional congestion at the Aylesbury Road and Stage Highway intersection.
 - No use of unsealed sections of Kerrs Road or Sandy Knolls Road between Aylesbury Road/Two Chain Road and Wards Road (as per proposed condition of consent)
 - Use of Aylesbury Road as preferred route to connect to/from SH1.
 - Minimise use of Two Chain Road to no more than 45vpd unless upgraded to a standard expected to accommodate heavy vehicles. A further limitation of no more than 10 heavy vehicle movements per day turning between Aylesbury Road (north) and Two Chain Road (east) until kerb adjustments are made to support the left turn from Aylesbury Road (north).
 - Minimise use of Wards Road / Aylesbury Road intersection to no more than 10 truck and trailer movements per day unless upgraded to support the right turn from Aylesbury Road south into Wards Road east.
- After the SH1 / Aylesbury Road intersection has been upgraded, limit the daily heavy traffic volume to a maximum of 750 heavy vehicle movements per day, on any one day;
- Access is to be to Aylesbury Road, and located approximately 1.7km north of Two Chain Road
- The Site access road is to be formed with a traffic lane in each direction at least 3.5m wide, and a sealed shoulder 1.0m wide, over at least the first 100m of the road. That is to minimise the likelihood of transfer of debris onto Aylesbury Road;
- Provide truck waiting areas on entry and exit within the Site, to avoid the need for trucks to wait on Aylesbury Road to enter the Site, or to park on the road while exiting (e.g. for paperwork);
- The access to Aylesbury Road is to be formed to a Waka Kotahi commercial vehicle access standard, including widening on the eastern side of the road, and entry side of the access;
- Aylesbury Road is to be widened between the Site access intersection and Two Chain Road to an 8.0m sealed carriageway width;
- The Aylesbury Road / Two Chain Road intersection is to be upgraded to support the left turn from Aylesbury Road (north) into Two Chain Road (east) not requiring truck and trailer vehicles crossing the centreline. Where this is not provided for, limit vehicles making the movement to no more than 10 truck and trailer movements per day and monitor movements and effects.
- The Wards Road / Aylesbury Road intersection is to be upgraded to support the right turn from Aylesbury Road south into Wards Road east being made without conflicting with westbound traffic on the Wards Road approach. Where this is not provided for, limit vehicle movements making the movement to no more than 10 truck and trailer movements per day and monitor movements and effects.

With those provisions, the quarry proposal can be supported from a transportation engineering perspective.



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Abbreviations

Abbreviation	Full Name
SDC	Selwyn District Council
Vpd	Vehicle movements per day
Vph	Vehicle movements per hour
Waka Kotahi	Waka Kotahi New Zealand Transport Agency



Glossary

Term	Definition
Level of Service	Level of Service is a qualitative stratification of numerical performance measures to provide a simplified system to present road users' perceptions of the quality of service of a road or intersection.
LOS A	A condition of free-flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.
LOS B	In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with level of service A.
LOS C	In the zone of stable flow but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
LOS D	Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.
LOS E	Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.
LOS F	In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.

1 Introduction

Burnham 2020 Ltd Aggregates is seeking to establish a quarry to the north of Burnham, which will be operated by Winstone Aggregates (part of Fletcher Infrastructure and Concrete Limited). The land area involved is large at 362ha, and the quarry would represent a long-term aggregate resource to the Selwyn District and greater Christchurch area. The quarry will supply requirements for projects by Fletcher Infrastructure and Concrete Ltd (Winstone Aggregates) as well as the wider contracting industry.

The quarry site is located in the Selwyn District, west of Aylesbury Road to the north of Two Chain Road. It is zoned Rural Outer Plains zoned land. The proposed operations include quarrying, crushing, screening and stockpiling of aggregate, and transportation of processed aggregate from the Site. Maximum daily heavy vehicle traffic generation at the gate is proposed to be set at 750 heavy vehicle movements per day. Based on traffic generation patterns at Winstone Aggregates former Yaldhurst quarry, the typical heavy traffic generation will be lower (approximately 300vpd on an average operating day).

The proposed quarry site is located with access available to Aylesbury Road well separated from residential activity. Aylesbury Road is a lower volume arterial road, which in turn provides access to SH1 to the north and SH73 to the north. The majority of quarry traffic will pass Burnham Military Camp and cross the railway on Aylesbury Road, and access SH1 via a new roundabout planned to be constructed by Waka Kotahi as part of SH1 safety improvements.

This Integrated Transport Assessment report has been prepared as part of the resource consent application to document and summarises an assessment of the traffic-related effects of the proposed quarry. The assessment undertaken considers the existing transport environment in the area, the changes in transport infrastructure occurring in the area, the traffic generation associated with the proposed quarry, potential transport related effects, and the mitigation proposed.

A key recommendation of this assessment report is that Aylesbury Road between the site access and Two Chain Road should be widened to accommodate the increased heavy vehicle traffic, and that full traffic generation should only occur when the SH1 / Aylesbury Road intersection is formed as a roundabout. Ahead of that intersection upgrade, it is considered a lower maximum of 250 heavy vehicle movements per day should be applied. A heavy vehicle routing management plan is also recommended. With these and other more detailed mitigation recommendations as set out in this report, it is considered the quarry can be supported from and transportation perspective.



2 Site Context

2.1 Site Location

The proposed Burnham Quarry (the “Site”) will be located within a 362ha block of land north of Burnham. The Site is about 1 km north of Burnham Military Camp and to the west of Rolleston in the Selwyn District. The strategic location in relation to Christchurch and the nearby townships of Rolleston and Lincoln is shown in Figure 2-1. Rolleston is about 7 km to the east via State Highway 1 with Lincoln being about 18 km away.

The Site is also centrally located with respect to other large settlements in the Selwyn district such as Darfield, West Melton and Leeston all being within 20 km travel distance.



Figure 2-1: Site Location in Greater Christchurch Context

2.2 Road Hierarchy

Figure 2-2 shows the road network surrounding the Site. State Highway 1 (SH1) is about 2.7 km to the south of the Site access and provides the primary strategic route for the South Island connecting all the major towns along the east coast.

Aylesbury Road which forms the eastern boundary to the Site is classified in the Selwyn Partially Operative District Plan and Operative District Plan as an Arterial Road (Arterial Roads have a primary function of linking major settlements in the district). Aylesbury Road provides a connection to Burnham Road south of SH1 and meets State Highway 73 (SH73) about 7.4 km to the north of the Site access.

Grange Road is a local road and forms the southern border to the Site. It provides a connection between Aylesbury Road and Telegraph Road to the west.

Two Chain Road is an arterial road east of Walkers Road, and a local road between Aylesbury Road and Walkers Road.

Wards Road is classified as a collector road and crosses Aylesbury Road north of the Site. The eastern limit of Wards Road meets Two Chain Road at the edge of the Izone industrial area north of Rolleston. The



western limit of Wards Road meets Telegraph Road and Bealey Road at Charing Cross. The Operative District Plan applies a lower local road classification to Wards Road.

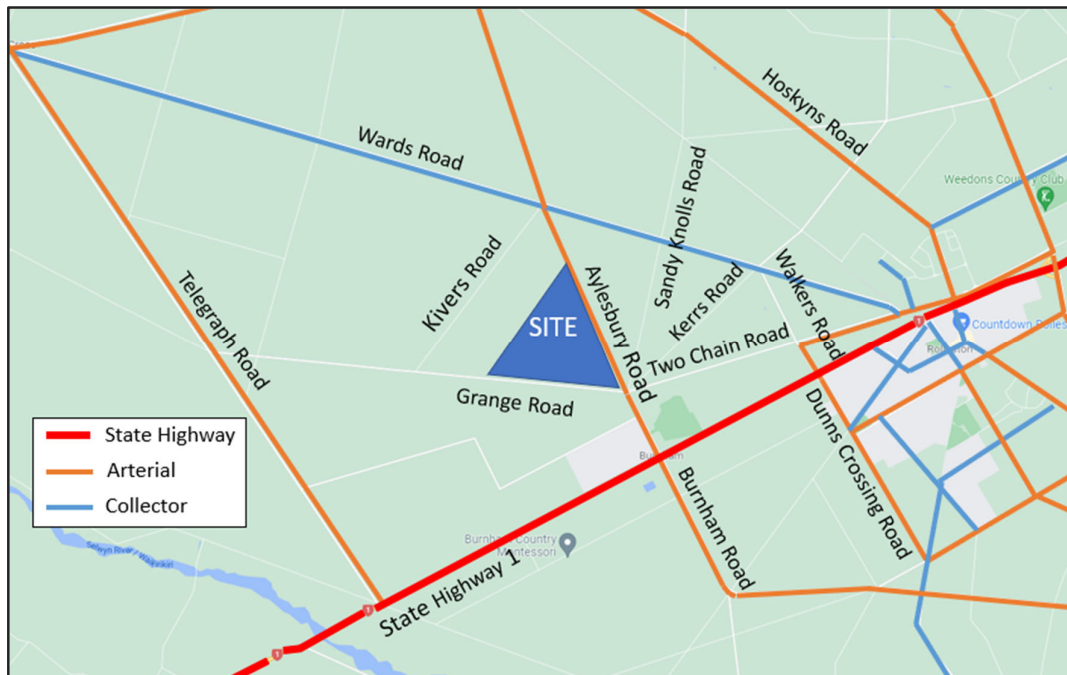


Figure 2-2: Site Location and Road Hierarchy Classification

The Main South Line railway runs parallel to and on the north side of SH1 past Burnham.

2.3 Local Landuse Activity

Figure 2-3 shows the local road network and landuse activities in the area. Most of the roads in the area service rural landuse and are formed to rural standards.

The Site is currently used for dairy farming operations, and it is proposed that will be an ongoing landuse on the balance of the proposed quarry Site. Within the Partially Operative District Plan it has a General Rural Zoning (GRUZ), and in the Operative District Plan it has a Rural Outer Plains zoning.

Figure 2-4 shows in coloured fill nearby landuse site Designations of significance in the Partially Operative Selwyn District Plan, including:

- Burnham Military Camp which is located on the western side of Aylesbury Road covered by the Ministry of Defence designation (MDEF-1) which also extends to cover a large tract of land south of Two Chain Road and north of the railway, both east and west of Aylesbury Road.
- Burnham School (MEDU-22) is located on Godley Road on the south side of Burnham Military Camp.
- The Rolleston Prison (MCOR-1) is located on the western side of Walkers Road, to the south of Two Chain Road, and the Youth Justice Residence (MCHI-1) is adjacent to it.

All of these designated sites have a Partially Operative District Plan GRUZ zoning. Figure 2-4 also shows the Partially Operative Selwyn District Plan zoning of Rolleston (which has mostly been updated to Medium Density Residential as part of Variation 1), with industrial development north of SH1, and residential south of SH1.

The Operative District Plan includes similar land designations on nearby land. Those designations include 441ha of land at Burnham Military Camp Designated DE1 Defence Purposes – Burnham Military Camp, and 63ha of land at Rolleston Prison (MC1).

Some other activities in the area include meat processing sites, equestrian facilities, a quarry, and a winery.



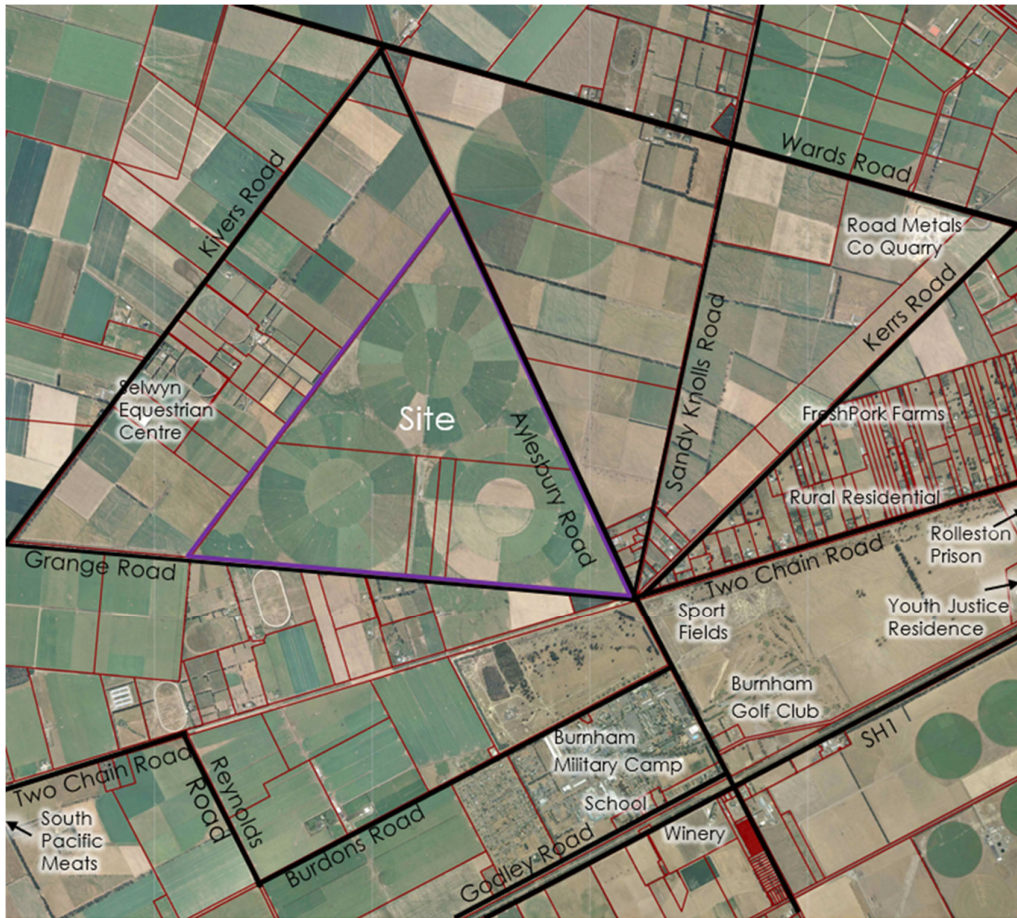


Figure 2-3: Local Landuse Context

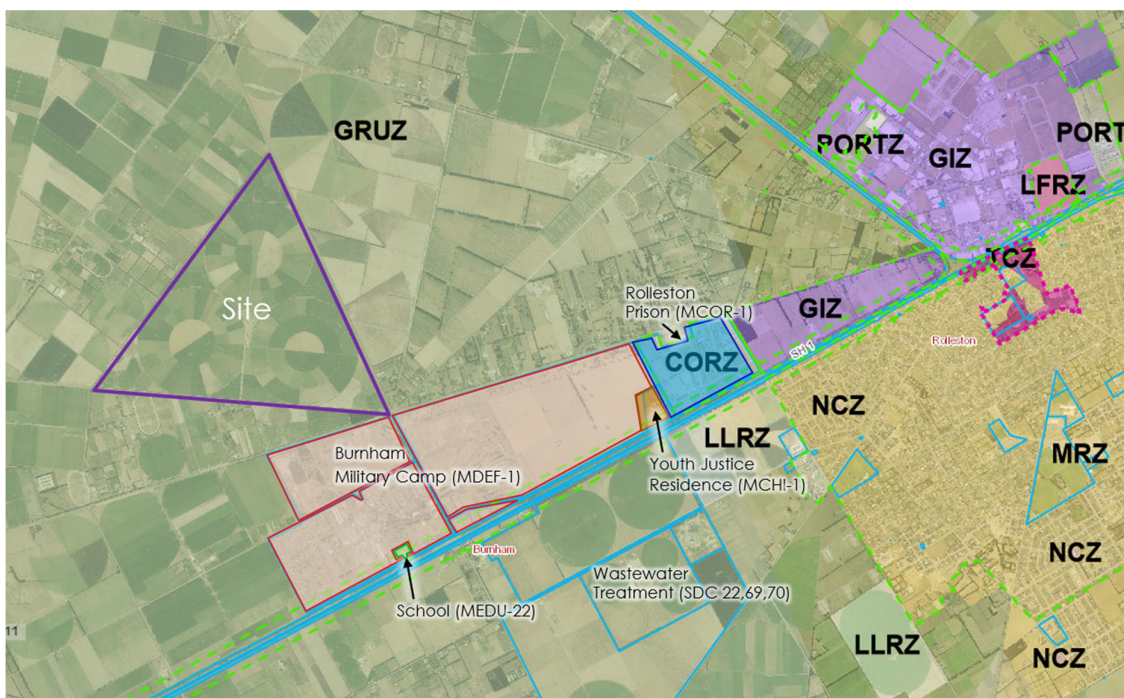


Figure 2-4: Designations and Landuse Zoning in Partially Operative Selwyn District Plan



2.4 Public Transport Network

The 820 Burnham / Lincoln via Rolleston bus route runs approximately hourly in each direction between the military camp and Rolleston via Aylesbury Road and Two Chain Road as shown in Figure 2-5. There are bus stops on Aylesbury Road outside the military camp, on Two Chain Road, just east of the Aylesbury Road intersection, and on Two Chain Road near Walkers Road.

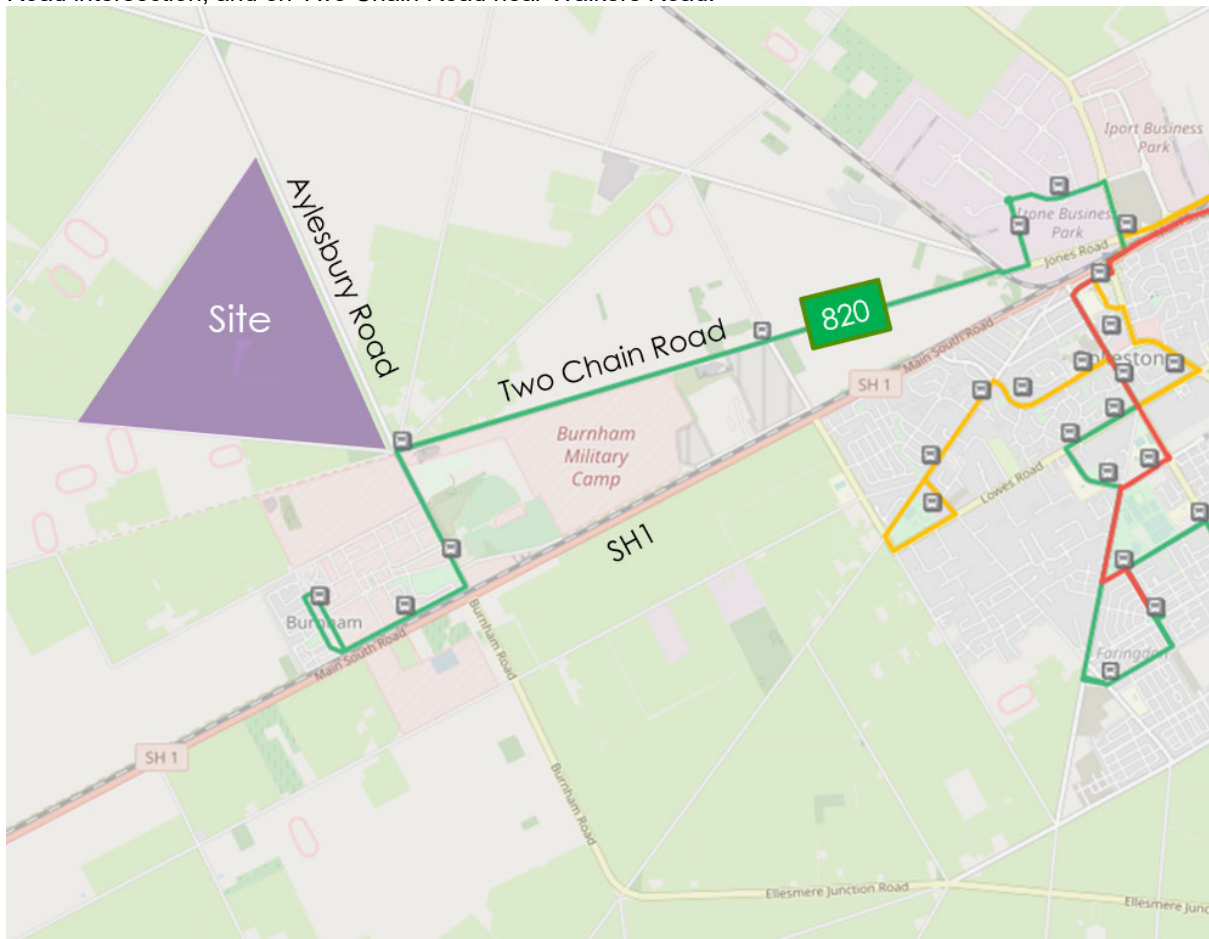


Figure 2-5: 820 Bus Service on Aylesbury Road and Two Chain Road (Source: Metroinfo)

There are two current school bus services which run in the vicinity of the Site, as shown in Figure 2-6. A school bus service for Rolleston College runs along Aylesbury Road between SH1 and Two Chain Road, and then Sandy Knolls Road to the north-east. The other school bus service is for Kirwee Model School and runs on Aylesbury Road, north of Wards Road, and Wards Road to the west of Aylesbury Road. There are currently no school bus routes which run immediately past the Site on Aylesbury Road or along Two Chain Road.

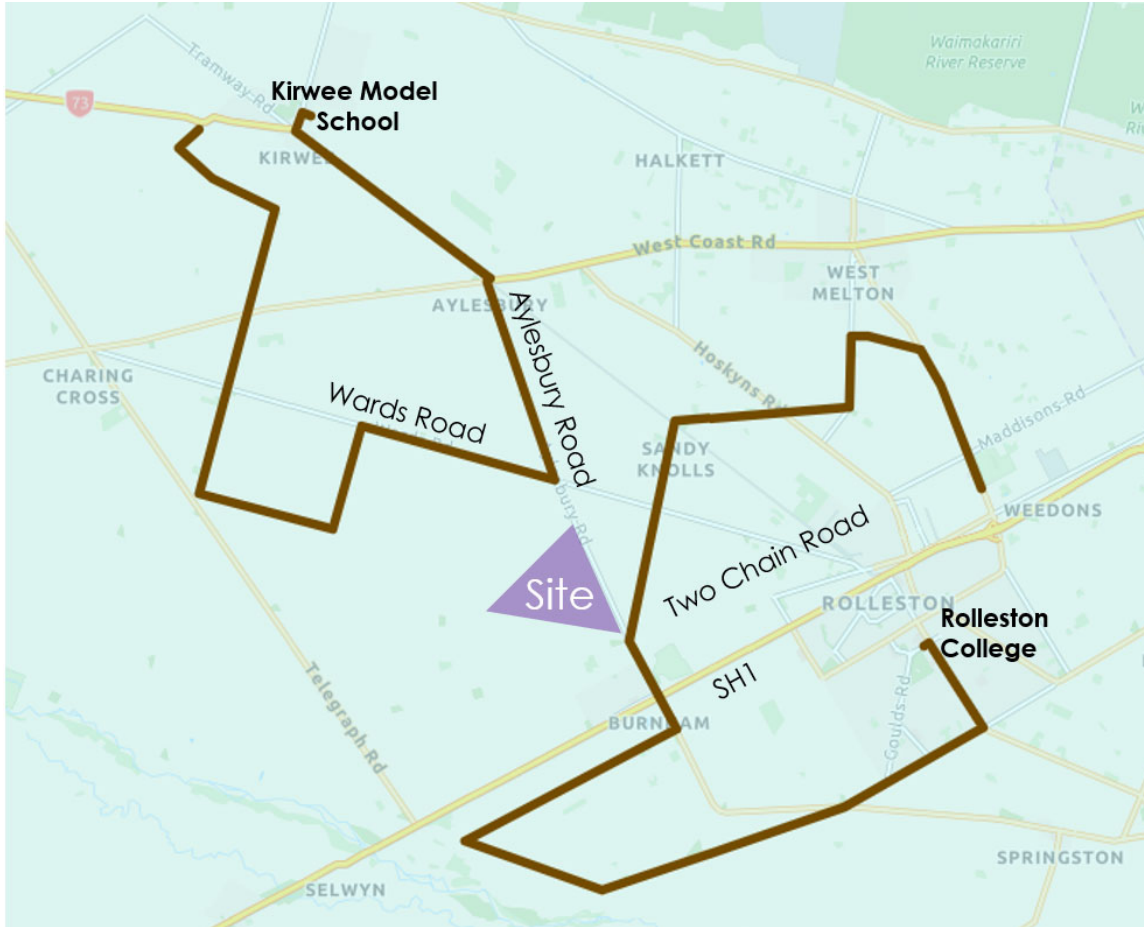


Figure 2-6: School Bus Routes Near Burnham (Source: School Bus Route Maps Website)

3 Existing Transport Environment

3.1 Road Descriptions

The section of Aylesbury Road between SH1 and Burdons Road has a 70km/h speed limit, whilst the remainder of the road network near the Site has a 100km/h speed limit. The following photographs show the current road conditions of various roads that form the local road network. Figure 3-1 demonstrates the conditions of Aylesbury Road (near Burnham Military Camp and north of Two Chain Road), Two Chain Road (east of Aylesbury Road) and Grange Road. The photographs below show that each of the roads has basic delineation in the form of a marked centreline.


	
<p>Aylesbury Road (near camp) – looking north 7.3-8.2m wide road with separate shared path</p>	<p>Aylesbury Road (north of Two Chain Road) – looking south 5.8m wide road</p>
	
<p>Grange Road – looking west 6.1-6.2m wide road</p>	<p>Two Chain Road west of Walkers Road – looking west 5.8-6.0m wide road</p>

Figure 3-1: Photographs of Local Roads

Figure 3-2 provides views to indicate the existing conditions of Sandy Knolls Road, Kerrs Road, Wards Road, Kivers Road and Walkers Road. Of note is that Walkers Road between SH1 and Two Chain Road has recently been upgraded to a 10m wide road and includes edgeline delineation and sealed road shoulders.



	
<p>Sandy Knolls Rd south of Wards Road 6.4m wide road (partly sealed)</p>	<p>Kerrs Road (north of Two Chain Road) 6.1m wide sealed, then unsealed</p>
	
<p>Wards Road east of Aylesbury Road 6.8m wide sealed road</p>	<p>Kivers Road 5.9m sealed road</p>
	
<p>Walkers Road south of Two Chain Road 10m wide road</p>	<p>Walkers Road north of Two Chain Road 6.8-6.9m wide road</p>

Figure 3-2: Photographs of Local Roads



3.2 Intersections

3.2.1 Aylesbury Road / Wards Road

The Aylesbury Road / Wards Road intersection to the north of the Site is a five-legged intersection within a 100km/h speed limit environment. Aylesbury Road has priority over the stop-controlled approaches on Wards Road and Kivers Road.



Figure 3-3: Aylesbury Road / Wards Road Aerial Photo (Source: Canterbury Maps)

The approaches are demarcated by paint marking and signs, and there are no traffic islands. The Wards Road stop-controlled approaches have some see-through effect, and there is some risk that drivers could not notice the stop control.



Figure 3-4: Aylesbury Road / Wards Road Approaches

The Aylesbury Road south and Wards Road east approaches have an acute angle between them, and large trucks would not be able to make some turning movements at the intersection without crossing into opposing traffic lanes.

3.2.2 Aylesbury Road / Two Chain Road

Figure 3-5 shows an aerial view of the Aylesbury Road / Grange Road / Two Chain Road / Sandy Knolls Road intersection at the southern edge of the Site, which is within a 100km/h speed limit area but close to the Burnham 70km/h speed limit zone on Aylesbury Road. This intersection is a 5-legged, stop-controlled intersection with Aylesbury Road having priority. Approximately 40m east of the intersection on Two Chain Road, there is a T-junction priority stop-controlled intersection with Kerrs Road.



Figure 3-5: Aerial Photo of Aylesbury Road / Two Chain Road Intersection (Source: Canterbury Maps)

The photographs in Figure 3-6 show that the intersection is formed with concrete corner kerbs and standard road markings and signage.



Figure 3-6: Aylesbury Road / Two Chain Road / Grange Road Intersection

3.2.3 SH1 / Aylesbury Road

Aylesbury Road meets SH1 at a stop controlled priority crossroad intersection with Burnham Road as shown in Figure 3-7. The intersection is located in an open road 100km/h speed limit environment, although there is a vehicle activated variable speed limit of 70km/h when vehicles are either waiting to turn from SH1 or from the side road.



Figure 3-7: Aerial Photo of Aylesbury Road and SH1 Intersection (Canterbury Maps)



Figure 3-8: Photos of SH1 / Aylesbury Road

3.3 Aylesbury Road Railway Crossing

The Main South Line railway runs parallel to SH1 through Burnham and crosses Aylesbury Road about 40 metres north of the SH1 centreline and 30m north of the limit line on the approach to SH1. The crossing is within the 70km/h speed limit environment.

The position of the level crossing provides space for approximately 5 cars to queue within the 30m between the road and railway limit lines. It is half barrier arm and flashing light controlled with advance warning and rail “x” pavement markings in place. There are no pedestrian or cycle facilities.



Figure 3-9: Photos of Aylesbury Road Railway Level Crossing

The KiwiRail incident database identified two reported near-miss incidents that have occurred at this level crossing in the period January 2012-April 2022. The first incident involved a vehicle disregarding the warning signals and driving through them. The second incident involved the train emergency brakes being activated due to the rear of a truck remaining on the railway tracks.

4 Existing Travel Patterns

4.1 State Highway 1

4.1.1 Average Daily Volumes

Figure 4-1 shows the annual average daily traffic volumes recorded by Waka Kotahi at its count site (01S00376) on SH1 southwest of Burnham over the 2010-22 period. It shows that traffic volumes rose steadily over that period from about 11,000 vehicle movements per day in 2010 to nearly 14,000 vpd in 2019. This represents an annual growth rate of 2.4 percent per annum. Traffic volumes in 2020-22 were lower than in 2019 and can be attributed to the effects of COVID19 which resulted in a large number of low traffic volume days. However, the traffic volumes in 2021 and 2022 were approaching the volumes recorded in 2019.

The most recent count information suggests that heavy vehicles accounted for 13 percent of all vehicle movements on the highway.

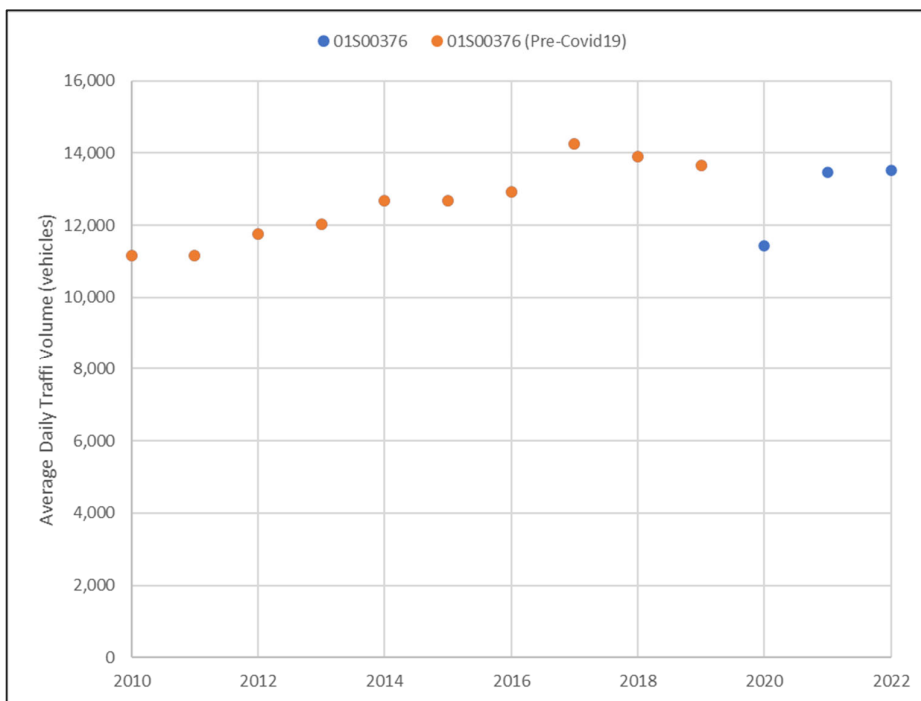


Figure 4-1: Traffic Growth Graph for 2010-2019 at SH1 southwest of Burnham Road

4.1.2 Seasonal Variations

Figure 4-2 shows the daily traffic volumes recorded at the Waka Kotahi count site southwest of Burnham in 2022. While there is a gap across the middle of the year, there is evidence of some seasonal variation with the lowest volumes, 10,000-12,000vpd, occurring in March and rising to 14,000-16,000vpd in the summer. There are consistent spikes in the flows on Fridays with flows that are 2,000-3,000vpd higher than during the rest of the week.

Based on the information available for 2022, the average daily volume was about 13,500 vpd and the 90th percentile volume was about 14,100 vpd. This represents a volume threshold that would normally be exceeded on about 35 days of the year. The count data indicates that these peak days are mostly Fridays.



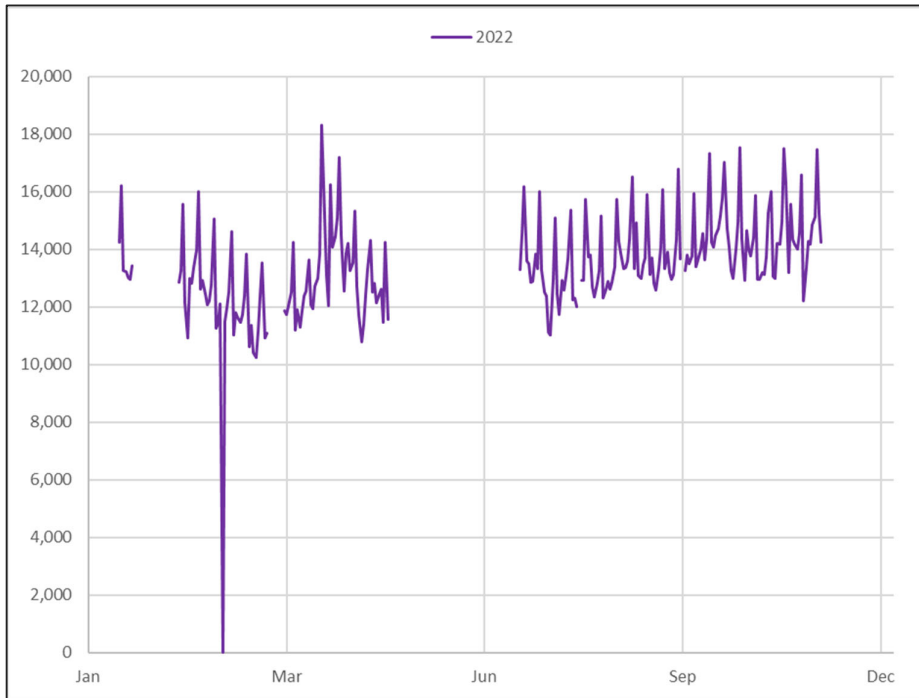


Figure 4-2: SH1 Daily Traffic volumes recorded in 2022 southwest of Burnham

4.1.3 Hourly Traffic Patterns

Figure 4-3 shows the two-way traffic volumes on SH1 southwest of Burnham in the first week of November 2022 which is representative of a week with 90th percentile flows for the year. On weekdays (Monday to Thursday), the flows show peaks of about 1,000 vehicles per hour (vph) in the morning (7:00-8:00am) and 1,200 vph in the afternoon (4:00-5:00pm). The pattern of flows on Friday was different and after an initial steep rise before 8:00am, they rise steadily during the day to an afternoon peak of about 1,400 vph.

At the weekend, there is a broad peak during the day from 9:00am through to 5:00pm with volumes of about 1,000 vph. On Sunday, there is a late afternoon period with higher volumes of 1,300 vph which is likely to be associated with holiday or recreational travel.

Figure 4-4 shows the traffic volumes by direction for the weekdays. During the week, the morning peak volume of 1,000 vph comprises about 55 percent of southbound traffic. There is a greater directional split in the afternoon peak with 40 percent being southbound and 60 percent northbound. On Friday, there was a similar directional split in the morning peak period, but the directional flows were more balanced in the afternoon with 665 vph being southbound and 700 vph recorded travelling north. The difference in flows on Friday is attributed to holiday and recreational trips from Christchurch.

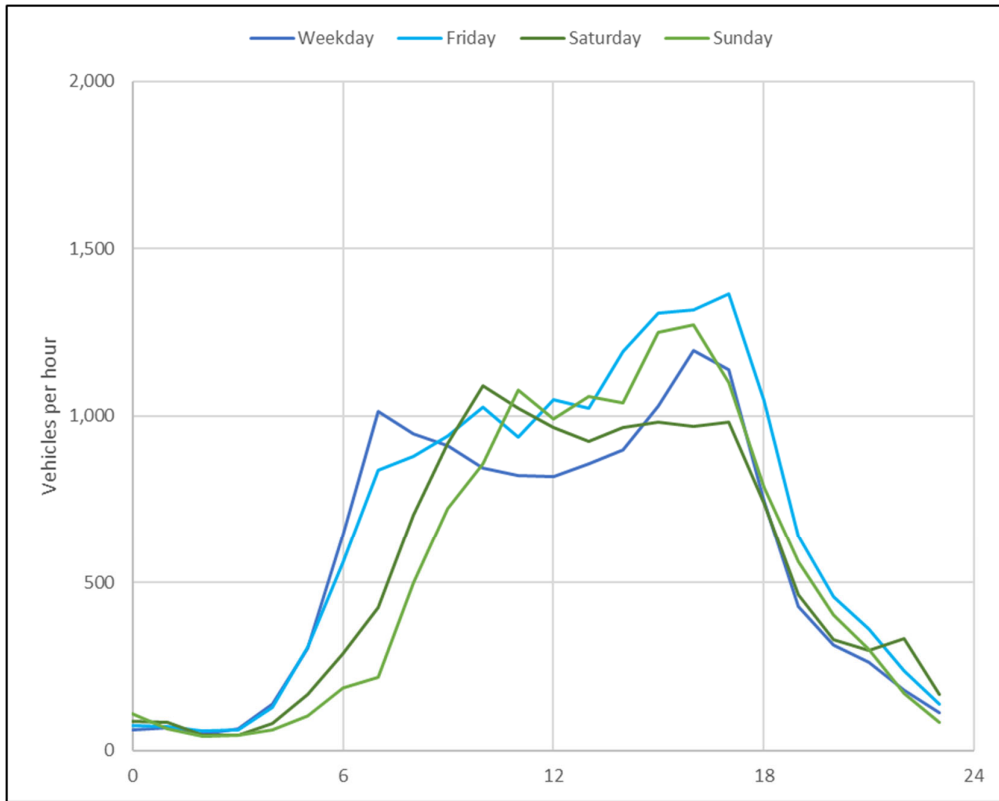


Figure 4-3: Two-way traffic volumes at 01S00376, Oct 31-Nov 6 2022

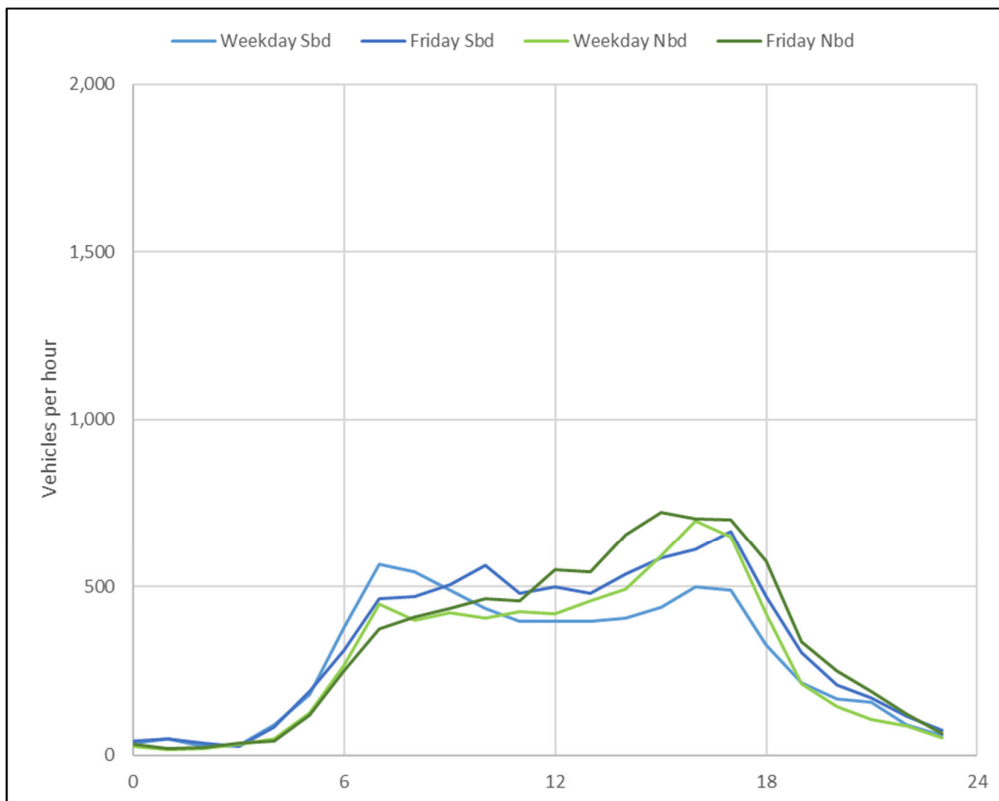


Figure 4-4: Directional Volumes at 01S00376, Oct 31-Nov 6 2022



4.2 Local Road Traffic Volumes

4.2.1 Daily Traffic Volumes

Traffic volumes on roads close to the Site are shown in Figure 4-5 with the widths of the lines proportional to the daily traffic volume. It is clear that the local road traffic volumes near the Site are of an order of magnitude smaller than the SH1 traffic volumes.

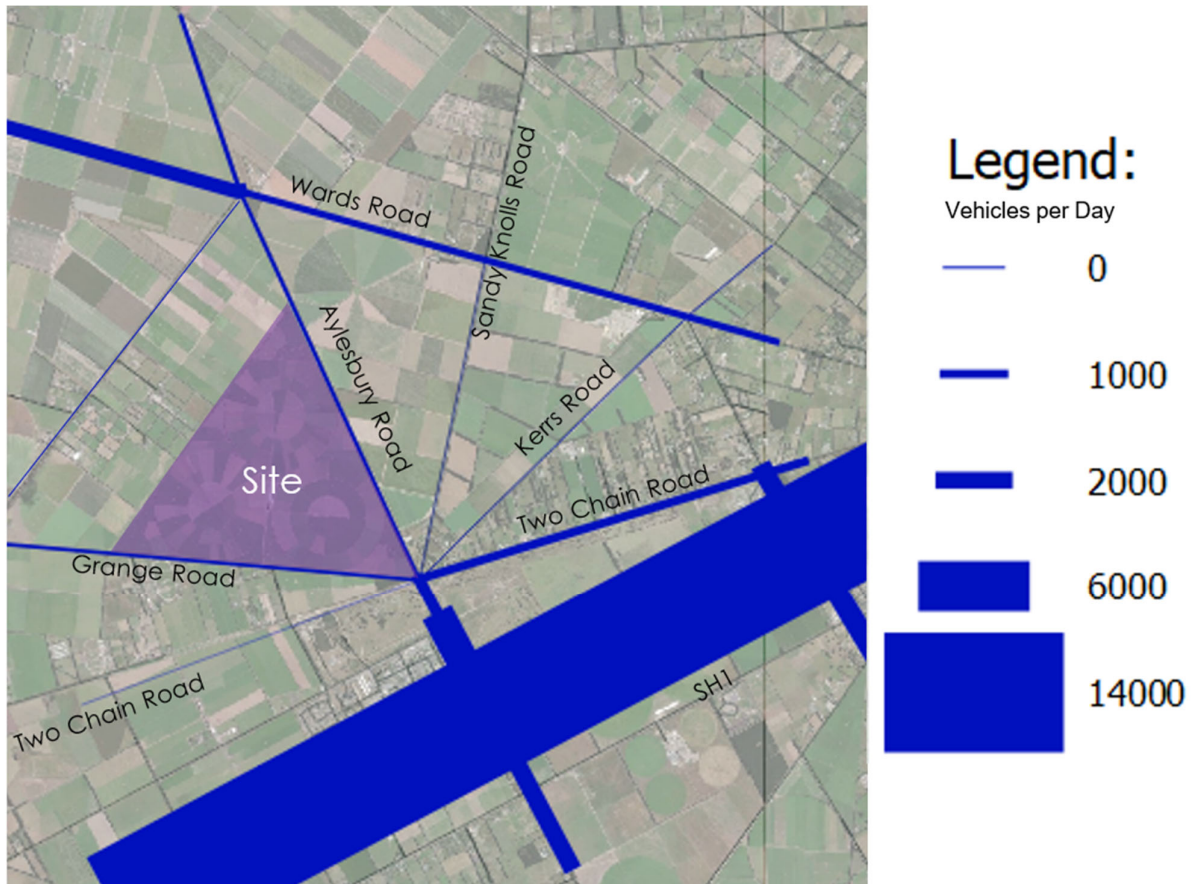


Figure 4-5: Daily Traffic Volumes

The traffic volumes are also presented in Table 4-1. Aylesbury Road north of SH1 is the busiest section of the District Road network. The Burnham military camp is the largest generator of vehicle movements in the area. The traffic volumes on Aylesbury Road fall rapidly north of the Two Chain Road intersection to about 460 vehicles per day.

Table 4-1: Local Road Daily Traffic Volumes (vehicles per day)

Road Location	Weekday (5 day) Average Volume	Average Daily Volume (7 day)	Date
Aylesbury Road north of SH1	3,700	3,350	July 2022
Aylesbury Road south of Two Chain Road	1,340	1,225	July 2022
Aylesbury Road north of Two Chain Road	460	460	July 2022
Two Chain Road east of Aylesbury Road	1,000	880	July 2022
Sandy Knolls Road north of Aylesbury Road	100	100	July 2022
Kerrs Road	160	150	July 2022
Kivers Road	N/A	136	February 2020
Grange Road west of Aylesbury Road	425	400	July 2022
Wards Road east of Aylesbury Road	1,620	1,580	July 2022
Walkers Road north of SH1	2,080	1,895	July 2022

4.2.2 Hourly Traffic Patterns

Figure 4-6, Figure 4-7 and Figure 4-8 show the variation in weekday hourly traffic volumes on Aylesbury Road from north of the SH1 intersection to north of the Two Chain Road intersection. These show the effects of the activity at Burnham military camp as well as some likely contribution from the residential landuse along Kerrs Road, Sandy Knolls Road and Two Chain Road.

Peak hour traffic volumes between the camp entrance and SH1 are about 400 vph with daily volumes of 3,700 vpd. North of Two Chain Road, the peak hourly volumes are 40-50 vph with an average weekday volume of about 450 vpd. Between Two Chain Road and Burnham Military Camp, the peak hour volumes increase to 120 vph in the morning and 160 vph in the afternoon with daily volumes reaching 1,300 vpd.

Figure 4-7 shows the much lower traffic volumes compared to areas to the south. There is a slightly dominant movement pattern from the residential activity on Kerrs Road, Sandy Knolls Road and Two Chain Road towards SH1 in the morning, and from SH1 in the evening. This differs from the movement pattern at the military camp which is predominantly into the camp from SH1 in the morning and reverses in the afternoon.



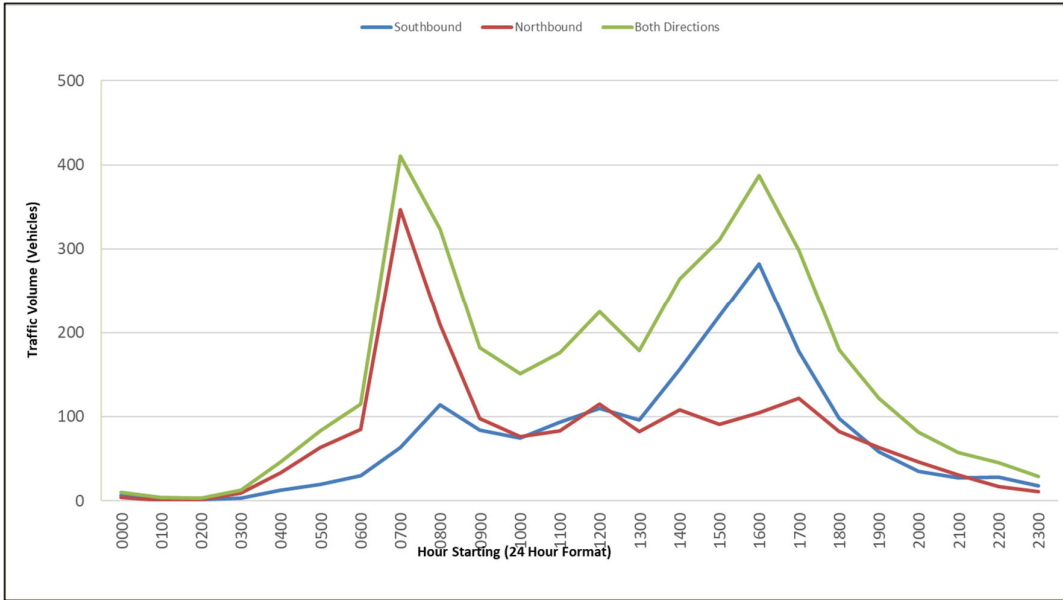


Figure 4-6: Weekday Hourly Traffic Volumes on Aylesbury Road North of SH1

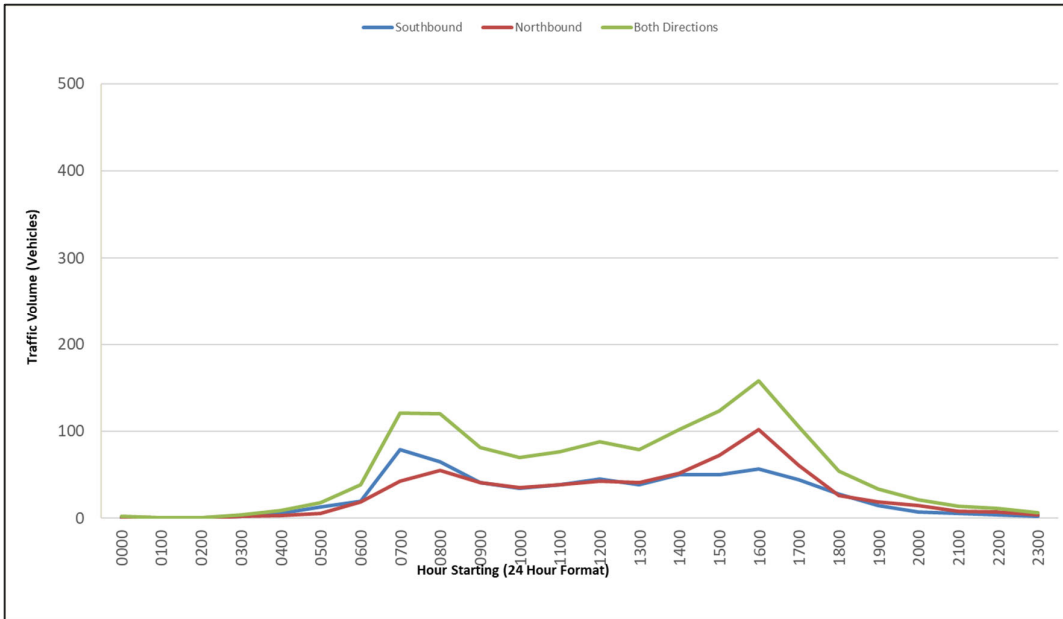


Figure 4-7: Weekday Hourly Traffic Volumes on Aylesbury Road South of Two Chain Road

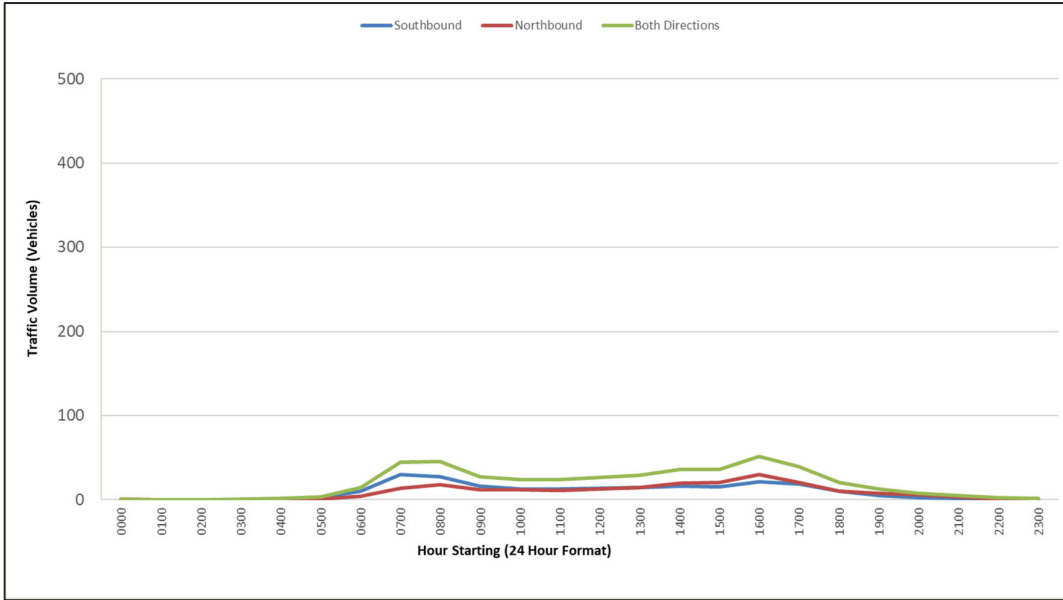


Figure 4-8: Weekday Hourly Traffic Volumes - Aylesbury Road north of Two Chain Road

Heavy vehicles account for 7-17 percent of movements on Aylesbury Road. The wide range reflects the high proportion of truck movements to and from Two Chain Road and the volume of light vehicle movements at the military camp.

Figure 4-9 shows the hourly variation in weekday traffic volumes on Two Chain Road east of Aylesbury Road. There are morning and afternoon peaks of about 100 vph with daily volumes of 1,000 vpd. Heavy vehicles account for about 12 percent of all movements.

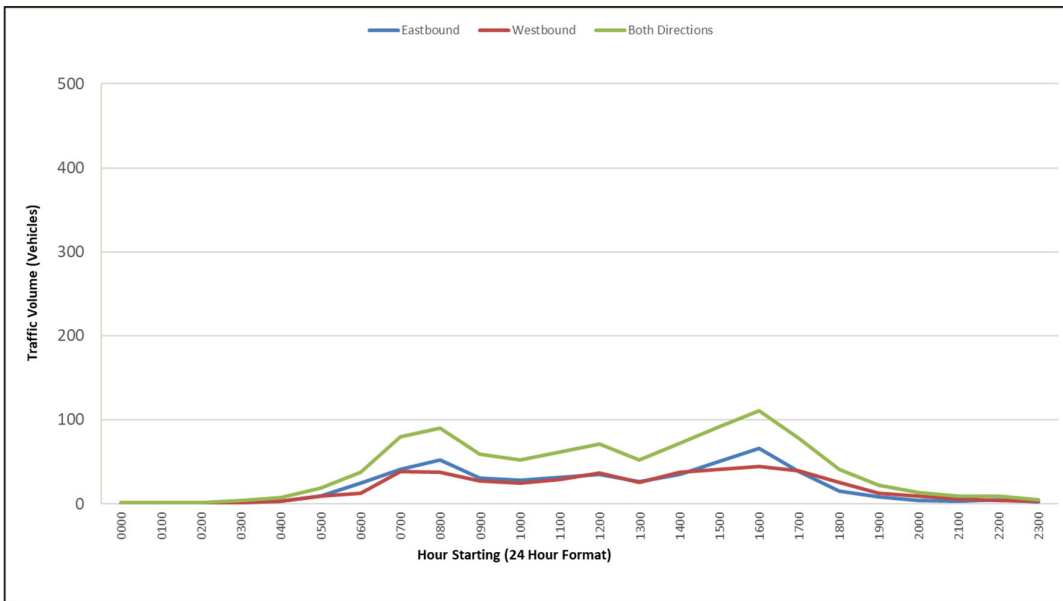


Figure 4-9: Weekday hourly traffic volumes on Two Chain Road east of Aylesbury Road

4.3 Intersection Traffic Volumes

Figure 4-10 shows intersection turn counts for the morning, midday, and evening peak periods at the SH1 / Aylesbury Road / Burnham Road intersection in November 2022. In the morning, there is a high demand for



the right turn into Aylesbury Road which is attributed primarily to activity at the military camp. This is also reflected in the demand for the reverse left turn from Aylesbury Road in the afternoon.

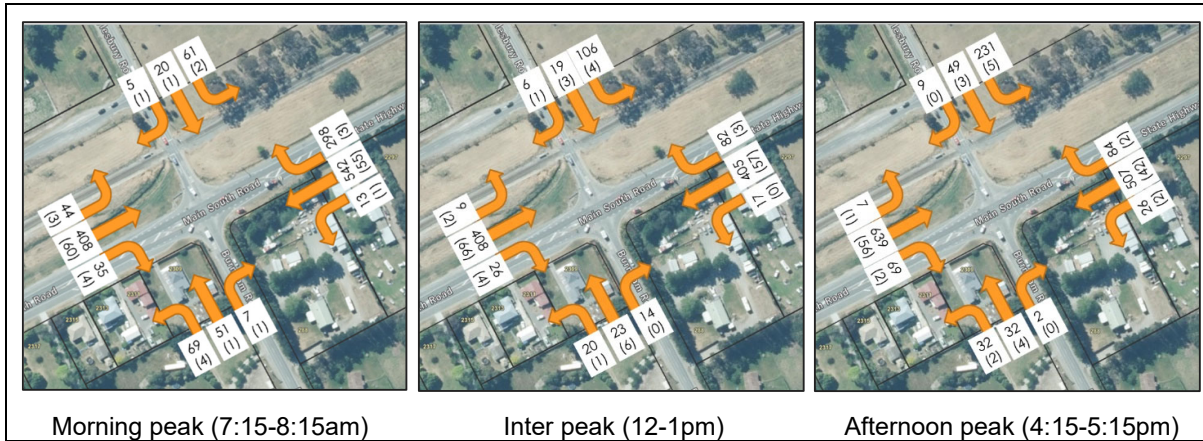


Figure 4-10: SH1 / Aylesbury Road / Burnham Road

Observations of turning movements at the intersection during the afternoon peak period indicate that the intersection operates with a low level of service at this time with long delays and queues extending beyond the railway crossing and Godley Road intersection.



Photograph 4-1: Observed queuing on Aylesbury Road approach to SH1 (November 2022)

Figure 4-11 shows turn counts at the Aylesbury Road / Burdons Road intersection. Dominant movements are to and from the south.

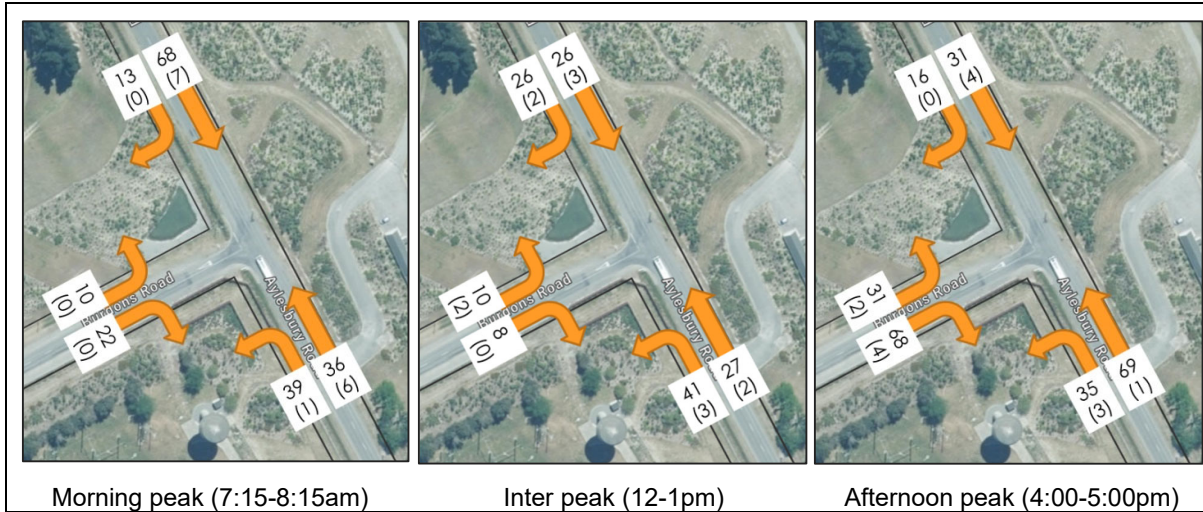


Figure 4-11: Aylesbury Road / Burdons Road Intersection Turn Counts

Figure 4-12 shows turn counts at the Aylesbury Road / Two Chain Road / Grange Road intersection¹. In the morning, the dominant flow direction is towards SH1 but there is a high demand for the right turn movements from Aylesbury Road into Two Chain Road. During the afternoon peak period, the dominant movement pattern is into Sandy Knolls Road, Kerrs Road and Two Chain Road.

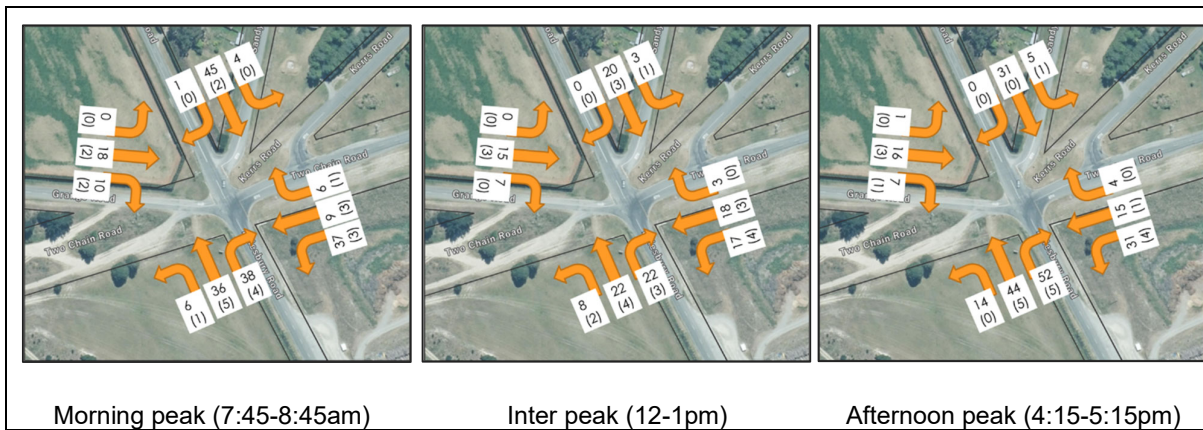


Figure 4-12: Aylesbury Road / Two Chain Road / Grange Road Intersection Turn Counts

¹ Turn counts for Kerrs Road and Sandy Knolls Road have been incorporated into other flows for simplicity.



4.4 Cyclists and pedestrians

As part of the full day traffic counts pedestrians and cyclists using the road network were recorded at the intersections of SH1 / Aylesbury Road and Aylesbury Road / Two Chain Road / Grange Road. The number of cycle and pedestrian movements recorded are set out below.

Table 4-2: Cycle and Pedestrian Counts

Road Location	Cycles	Pedestrians
Aylesbury Road north of SH1		
Morning 6am to 10am	5	0
Inter peak 10am to 3pm	5	0
Late afternoon 3pm to 7pm	9	0
Aylesbury Road / Two Chain Road / Grange Road		
Morning 6am to 10am	2	2
Inter peak 10am to 3pm	1	1
Late afternoon 3pm to 7pm	1	5

Peak period surveys carried out in July 2022 also indicated very few cyclists, over the six hour period (7-9am, 12-2pm, 4-6pm) the following number of cyclists were recorded:

- one at Aylesbury Road / Two Chain Road / Grange Road
- two at Aylesbury Road / Burdons Road
- two at SH1 / Aylesbury Road and
- none at Aylesbury Road / Wards Road

4.5 Railway crossing performance

A review of the intersection traffic counting videos showed there were 6 train movements over the 13 hours surveyed from 6am to 7pm. Typically closure time (from flashing lights activated, to barrier fully up) was between 1 minute and 1 minute 10 seconds. The maximum queue observed was 3 cars northbound, and 3 cars southbound. These queues did not interfere with operation of nearby intersections.

Table 4-3: Observed Train Crossings and Vehicle Queuing

Road Location	Train Direction	Road Closure	Queue Northbound	Queue Southbound
6:14am	Eastbound	1 min 8 sec	3 cars	1 car
9:53am	Westbound	1 min 8 sec	1 car	-
10:45am	Eastbound	58 sec	1 car	2 cars
1:00pm	Westbound	1 min 5 sec	2 cars	2 cars
2:20pm	Westbound	59 sec	1 car	-
3:19pm	Eastbound	40 sec	1 car	3 cars



5 Road safety

A search of the Waka Kotahi NZTA 'Crash Analysis System' (CAS) database has been undertaken for the purpose of reviewing the road safety in the vicinity of the Site. The most complete 5-year period of 2018-2022 was investigated for crashes.

The fatal and serious crashes were mapped, which indicated that the serious crashes are primarily occurring on the State Highway network, with one serious crash at SH1 / Aylesbury Road where a driver failed to give way and collided with a vehicle on SH1. The serious crash on Grange Road west of the Site involved an unlicensed driver travelling at high speed in the early hours of the morning hitting a cow and losing control.

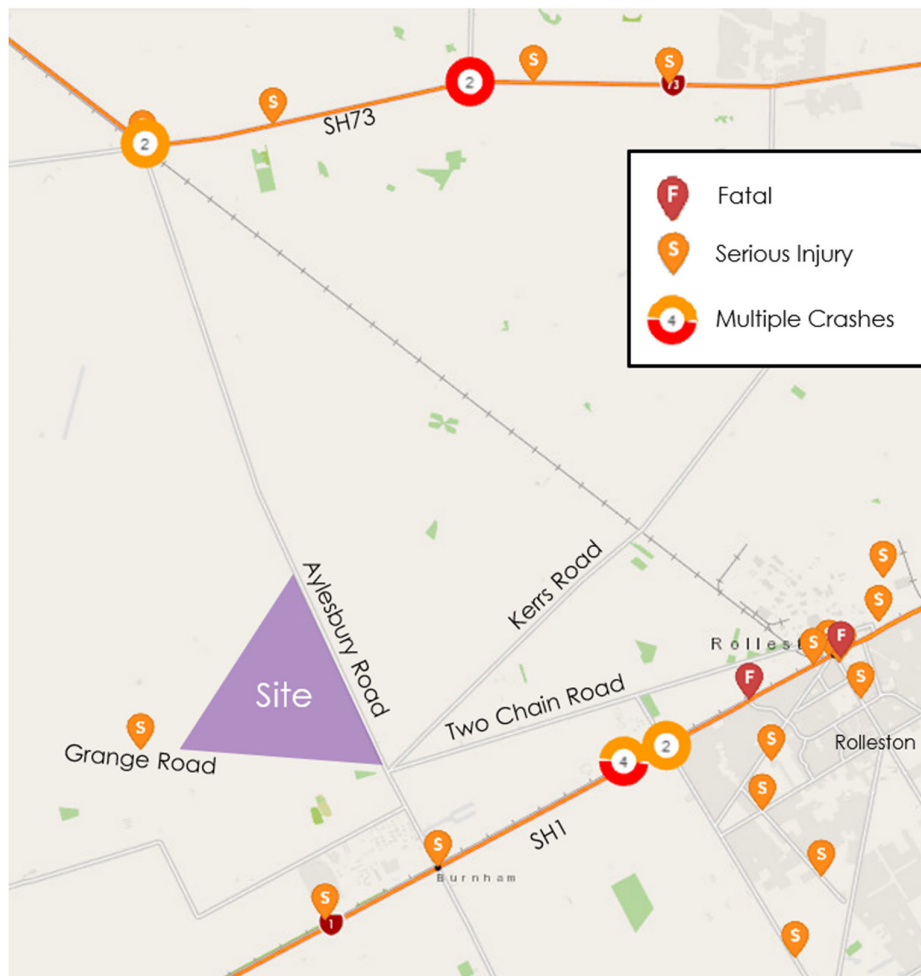


Figure 5-1: Location of Fatal and Serious Injury Crashes

A second and more focused search on roads near the Site was carried out, including all crashes (i.e. including non-injury and minor injury in addition to serious and fatal crashes). The search area is illustrated in Figure 5-2 and includes the area bounded by Two Chain Road, Grange Road, Kivers Road, Wards Road and Walkers Road, as well as Aylesbury Road to the Aylesbury Road / SH1 intersection. This was considered to be the relevant extent for which movements to/from the proposal Site will be concentrated.

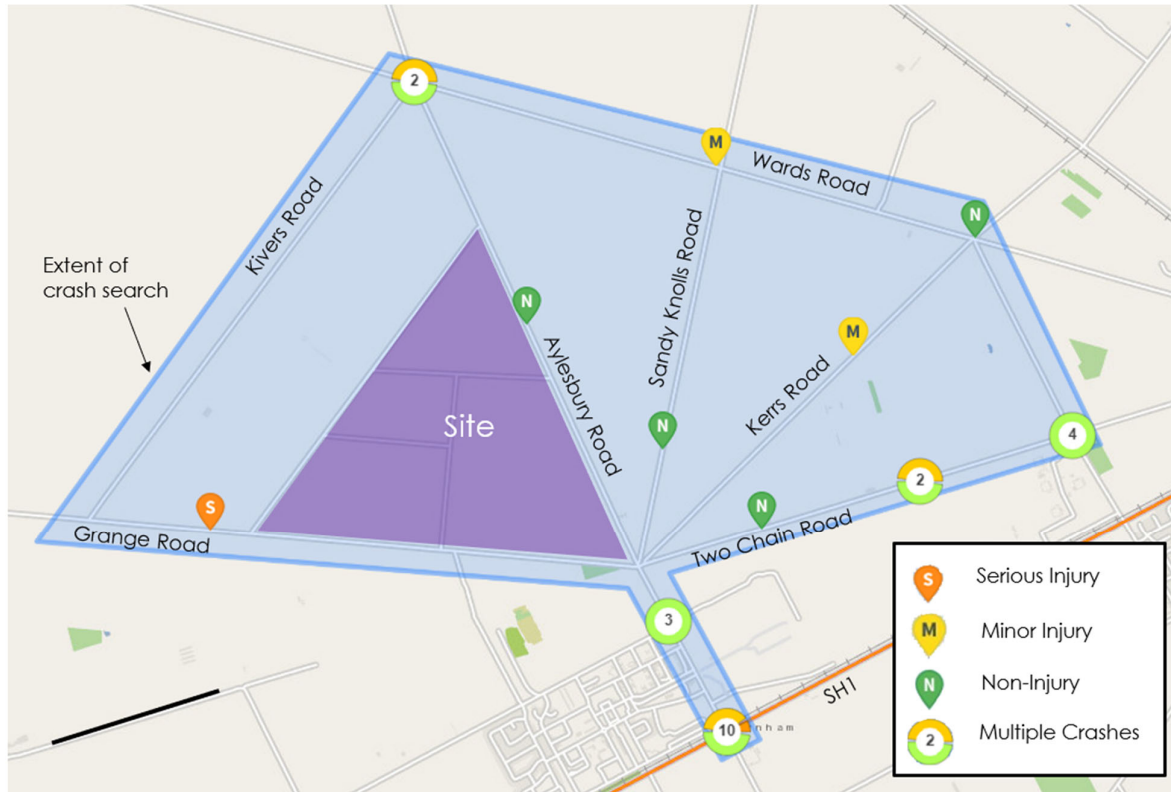


Figure 5-2: Crash Locations Map for Period 2018-2022 (Waka Kotahi CAS)

A total of 28 crashes have been reported within the search area between 2018 and 2022. Of these crashes, 18 were non-injury (i.e., damage only), 8 were minor injury, with the remaining 2 being serious injury crashes.

Eight out of the reported crashes were at or close to the SH1 / Aylesbury Road intersection.

- 2 involved vehicles u-turning being hit by following vehicles
- 2 involved vehicles turning right from SH1 being hit by oncoming vehicles as they turned
- 6 involved vehicles pulling out of either Aylesbury Road or Burnham Road being hit by a vehicle travelling through on SH1.

There were eight other intersection crashes involving a vehicle turning or crossing being hit by a vehicle travelling through.

- Aylesbury Road / Burdons Road - one crash
- Aylesbury Road / Grange Road – one crash
- Aylesbury Road / Wards Road – two crashes
- Two Chain Road / Walkers Road – four crashes
- Wards Road / Kerrs Road – one crash

The midblock crashes involved a range of factors including:

- Losing control on unsealed surface (two crashes) and sealed surface (two crashes)
- Turning or u-turning vehicles being hit by other vehicles following (three crashes)
- Loss of control from hitting an animal (one crash)

Three of the crashes involved trucks, and in all cases the other vehicle involved in the crash collided with the truck after the other vehicle driver made a driving error.

No crashes involved pedestrians, cyclists, horses, or school buses.

6 Planned Infrastructure Changes

6.1 Aylesbury Road Level Crossing

A draft Level Crossing Safety Impact Assessment (LCSIA) was completed by Aurecon in 2022 for KiwiRail and released to Stantec for reference in this transportation assessment. The LCSIA report assessed the need for the crossing, as well as the safety performance. Some of the key points included:

- The “Top down” assessment, which looks at need for crossings assessed that closure of the railway level crossing was not considered reasonably practicable due to the function of Aylesbury Road accessing Burnham Military Camp. It was also assessed that it was not reasonably practical to close an alternative crossing on the nearby road network.
- Grade separation was not reasonably practical as cost would be disproportionate to the risk.
- Warning signs associated with short stacking between the railway and SH1 should be installed.
- Median islands on both approaches should be installed.
- An escape lane on SH1 on the northeastern side of the SH1 intersection with Aylesbury Road should be investigated.
- The condition of the crossing should be improved through various maintenance and minor improvement measures.
- Lighting at the crossing should be investigated.
- The level crossing safety score (LCSS) is currently resulting in “Medium” risk, and in the future (allowing for 10 years of traffic growth at 5% per annum) and after implementation of recommendations the risk remains at Medium. The LCSS score that generates the risk band decreases in the future, which achieves the minimum Criterion 2 requirement for an existing crossing upgrade.

The LCSIA indicates that the general form of the level crossing will largely remain the same, with minor modification, into the future.

6.2 SH1 / Aylesbury Road / Burnham Road

The Waka Kotahi NZTA ‘National Land Transport Fund’ (NLTF) outlines potential and approved investments in programmes and projects pertaining to transport infrastructure nationally.

The NLTF indicates that funding will be provided for Road to Zero projects on SH1 from Templeton to Selwyn River. Details regarding the projects have not been stated. It is understood that it will be similar to those of other Road to Zero projects with a focus on road centreline widening, installation of wire rope barriers and treatment of intersections in accordance with safe system principles.

Discussions with the Canterbury Waka Kotahi Senior Safety Engineer at various stages of the quarry planning have confirmed that a feasibility assessment for the SH1 / Aylesbury Road intersection has been completed as part of the Speed and Infrastructure Programme which includes a project for the intersection and adjacent section of highway. Detailed design is underway however Waka Kotahi is still working through property purchase requirements and consenting matters.

It is understood that the preferred option is a single lane roundabout with inscribed diameter (width including central island and circulating lanes) of 50m, with separation from the railway maintaining a distance of approximately 30m minimum between limit lines, which is likely to provide sufficient storage for a truck, trailer and car. No changes to the railway centreline are expected. The roundabout will provide both a primary safe system intersection transformation response to address safety concerns, and it also provides turnaround opportunity that is required on SH1 as a result of proposed median barrier treatments.

Cost management is likely to be required which could influence the ultimate size, although it is understood the roundabout design will enable the full range of traffic movements at the intersection in a safe and efficient manner. Consultation has not commenced. Funding is in the current NLTP for design and implementation, although it is understood that funding may also need to be included in the next NLTF programme 2024-2027. It is understood that no specific allowance for the potential Winstone quarry has been made in the feasibility planning, although it is a highway / arterial intersection so is expected to be designed to a high safety and efficiency standard that can accommodate traffic growth.



The effect of the intersection upgrade on the railway crossing is yet to be assessed by an updated LCSIA. However it is expected that the upgrade offers the opportunity to address many of the matters raised in the LCSIA.

6.3 Rolleston Access

As a part of the New Zealand Upgrade Programme (NZUP), Waka Kotahi NZTA in collaboration with the SDC and KiwiRail aim to improve highway intersection and rail provisions in the southern Rolleston area. The June 2022 engagement plan included as Figure 6-1 shows the recommended plan that was subject to further consultation and confirmed in December 2022.

Walkers Road and Two Chain Road (to the east of Walkers Road) will become a key commuter and freight route to and from the southwest, as direct access from SH1 at Hoskyns Road would be removed as part of providing a over of SH1 between the industrial and town centre areas. Construction is anticipated to commence in the period 2024 to 2026, starting with a roundabout at SH1 / Walkers Road / Dunns Crossing Road. That roundabout will require realignment of Dunns Crossing Road as shown in Figure 6-2.



Figure 6-1: Waka Kotahi Engagement Brochure (June 2022) indicating Potential Rolleston Access Changes



Figure 6-2: Waka Kotahi Project Overview Map indicating realigned Walkers Road

Complementary projects yet to be confirmed are expected to be funded by the SDC with the assignment of Two Chain Road/Walkers Road and Jones Road as southern freight routes. Infrastructure improvements will be required to support this.

6.4 Rolleston to Burnham Cycleway

The Selwyn District Council's (SDC) Long-Term Plan 2021-2031 includes provision for a new cycleway that would connect Rolleston to Burnham and be completed in 2029/2030 at a forecast cost of \$2.7Million. The Selwyn District Walking and Cycling Strategy Action Plan includes a diagram (see Figure 6-3) indicating the section from the Rolleston industrial area will be a new off-road section north of the railway, before continuing along Runners Road to Aylesbury Road.

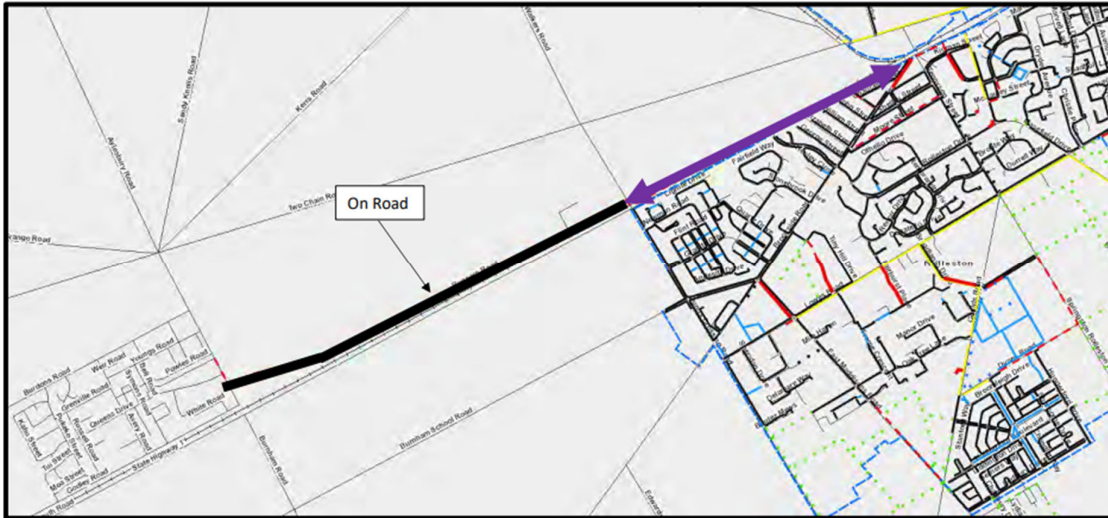


Figure 6-3: SDC Long-term Plan 2021-2031 Cycleway Infrastructure Change

No other specific roading projects are included in the Long Term Plan for the local road network.

6.5 Aylesbury Road and Wards Road

The Selwyn District Council Transportation Activity Management Plan forms part of the Long Term Plan and includes expected project timing within the 2021-2031 period, as well as long term projects expected in the District.

In the period 2021-2031 a relevant improvement is proposed for Two Chain Road:

- Two Chain Road Stage 1 widening 2028/29 Road Upgrade between Walkers Road and Wards Road – Rolleston Industrial southern link.

This project reflects the changes proposed by Waka Kotahi for the Rolleston access project, as well as landuse changes proposed by Plan Change 80.

In the period beyond the initial ten-year period, there is provision for further widening of Two Chain Road, between Aylesbury Road and Wards Road:

- Two Chain Road (Stage 2) Widening 2040/41 Between Walkers Road and Aylesbury Road – Rolleston Township southland from Burnham / SH1
- Aylesbury Road Widening 2044/45 Road Upgrade between Burdons Road and Bealey Road
- Wards Road Widening 2046/47 Road Upgrade between Two Chain Road and Bealey Road

This indicates that the existing road formation is expected to largely remain unchanged for the foreseeable future.

7 Future Population Growth

7.1 Selwyn District

The Selwyn District Long Term Plan includes a forecast of change in population in the Selwyn District, by location. This is of interest from the perspective of potential future areas of demand for material from a quarry.

The forecast is for an increase in population within the district of over 37,000 people between 2023 and 2045, from a 2023 base of approximately 76,000 people.

An analysis of population projections has been carried out, with increases between 2023 to 2045 shown in Figure 7-1. The diagram shows the dominance of Rolleston population growth in Selwyn District.

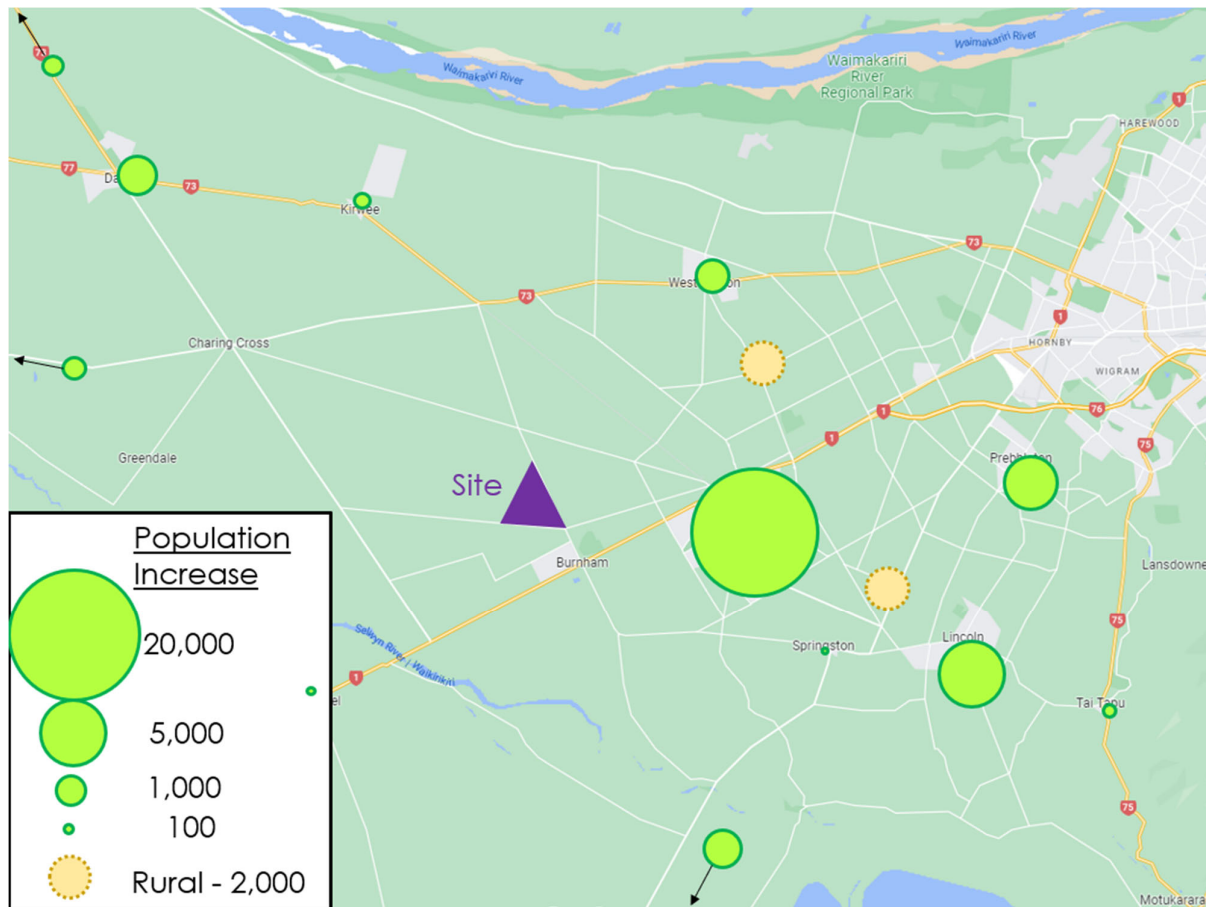


Figure 7-1: Population Growth 2023-2045 (SDC Long-term Plan 2021-2031)

By comparison, the long term year 2048 projections² for Christchurch City indicate changes in population of approximately 75,000 people, and potentially up to 140,000 people based on a high growth scenario. This is from a 2022 base of 389,000 people.

² <https://ccc.govt.nz/culture-and-community/statistics-and-facts/facts-stats-and-figures>

7.2 Burnham Military Camp

The Selwyn District Council Long Term Plan population forecast data does not indicate changes at Burnham. An investigation of Burnham Military Camp census data has been carried out to understand how patterns may have changed in the past, which may inform future considerations of traffic patterns, including worker travel to and from workplaces in the area. Table 7-1 shows the changes in population and workplace employment in Burnham.

Table 7-1: Burnham Camp Population

Year	Usually resident population	Total Workforce in Burnham
2006	1,203	675
2013	1,089	966
2018	1,146	1,236

The data indicates that the residential population has been quite consistent over the Census periods, whereas the number of people working at the Burnham Military Camp has increased quite substantially.

Approximately 98% of people that live in Burnham and work, have their workplace within Burnham, confirming the resident population is directly related to work activities on the Burnham Military Camp site. Of the people that work at Burnham, approximately 60% also live in Burnham. Of those travelling to Burnham for work from other areas, the following general direction of travel is involved:

- West via SH1 5%
- North 12%
- South across SH1 15%
- East via SH1 68%

The reported means of travel to work from outside areas to workplaces in Burnham is approximately 90-95% by private vehicle, and our observations indicated a small number of cyclists.



8 Proposed Quarry

8.1 Overview

Figure 8-1 provides a broad indication of the proposed quarry layout. The Site covers some 362ha of farmland, and will be developed progressively together with ongoing land rehabilitation.

Vehicle access to the Site for all quarry related traffic is proposed to be Aylesbury Road about midway between the Wards Road and Two Chain Road intersections. A permanent entrance driveway and office and amenities will be included at that location, with stockpiles located nearby.

The initial aggregate extraction will occur immediately south of the Site entrance. The processing plant and aggregate storage stockyards will be toward the centre of the Site. Aggregate extraction will continue in stages south on land bordering Aylesbury Road before moving to land bordering Grange Road and then moving up the western boundary of the Site to the north and back down Aylesbury Road towards the Site entrance. The staging and access location reflect a variety of factors including maintaining an efficient farm operation, managing environmental effects, and achieving access safely and efficiently. The overall quarry life is expected to be in the order of 60 years, depending upon the demand for aggregate from the quarry.

As farming operations will continue on the land, the area of the Site being quarried will move over time and farming activities will continue to access the land via the existing access on Grange Road. This access will not be used by quarry related traffic.

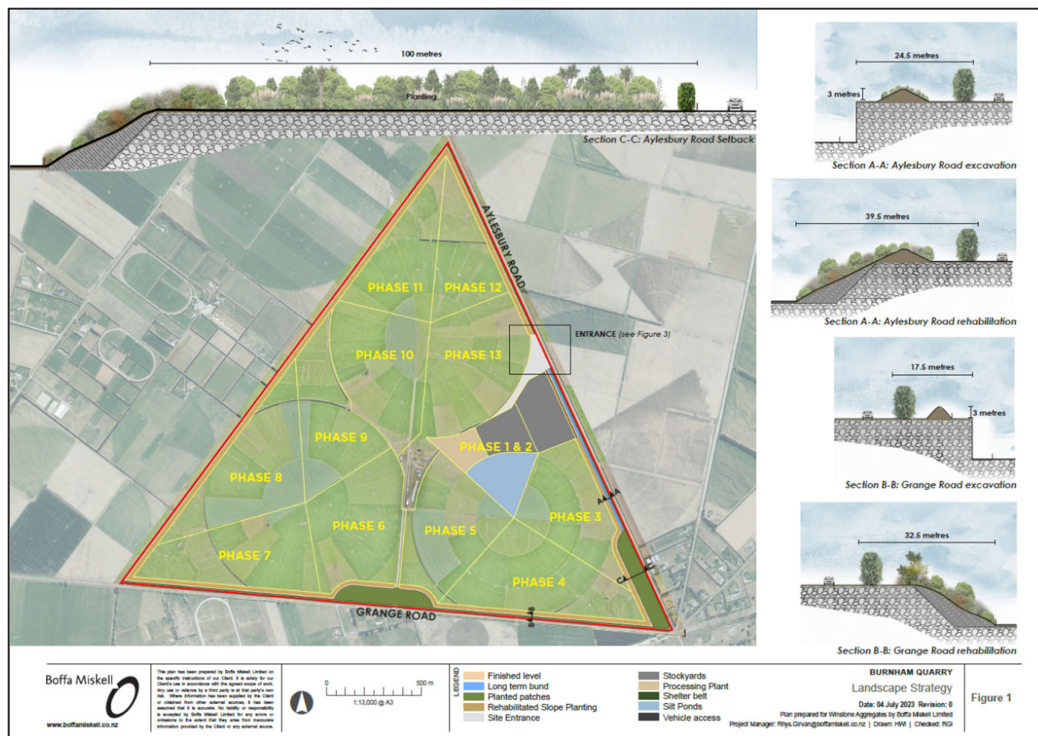


Figure 8-1: Proposed Site layout (Source: Boffa Miskell)

8.2 Site Access Arrangements

The Site access is proposed to be located on Aylesbury Road approximately 1.7km north of Two Chain Road. The positioning of the access is in an area between two central irrigation pivots and enables the staging to be carried out without affecting both pivots. A concept design for the Site access area is shown in Figure 8-2. The access will be formed with priority controls with localised widening of Aylesbury Road at the access as required by standard arterial road rural vehicle access design for non-residential activities.



A weighbridge will be installed within the Site and located so that there is sufficient queuing space to avoid any queuing of vehicles back onto Aylesbury Road.



Figure 8-2: Site Access Concept Design (Source: Boffa Miskell)

For permitted activities, the District Plan indicates a preference for access to Grange Road as a lower order road. As a result of the scale of the activity planned which is higher than permitted activity levels, and the characteristics of the road network, access to Aylesbury Road is considered to be more suitable, and can safely and efficiently be accommodated as assessed later in this report.

8.3 Proposed Traffic Generation Limits

Winstone Aggregates is seeking approval to operate the quarry with a maximum of 750 heavy vehicle movements per day.

These represent directional volumes of any vehicle so include a movement into the Site, and a movement from the Site in the total. In other words, the likely entering volume of vehicles entering the Site will be half the limit, and the exiting volume of vehicle will also be half the limit.

The type of vehicle covered by the proposed limit is any vehicle classed as larger than a light vehicle, with a gross vehicle mass exceeding 3.5 tonnes. For the quarry activity these can include a range of truck types that can service quarries, including medium rigid trucks such as smaller landscape supply vehicles, heavy rigid trucks carrying bulk aggregate, articulated single trailer trucks, and heavy rigid trucks with large trailers.

The limit is set with an expectation that in the long term there may be certain projects, or sustained periods of demand across the region that require this level of heavy vehicle movement. The limits proposed have been calculated by Winstone Aggregates based on their knowledge of market demand, variations in traffic generation patterns, and likely demand from the Burnham quarry over the long term. The aggregate produced by the quarry will increase over time with peak production potentially not being reached for more than 10 years after commissioning.



8.4 Hours of Operation

Table 8-1 shows the normal hours of operation proposed for various activities at the quarry site. Winstone Aggregates is also seeking approval for some activity outside these hours.

Table 8-1: Hours of Operation

When		Allowable Activities	
At all Times		Environmental mitigations (including dust control), light vehicle movements into and on site, operation of site office, site security and light maintenance	
Early-Morning	Monday to Saturday on up to 30 times per annum, excluding Public Holidays.	5am – 7am	Loadout and access / egress of trucks operated by the quarry operator. (10 truck movements per hour)
Sunday Mornings	On up to 15 Sundays per annum (excluding public holidays)	5am – 7am	Loadout and access / egress of trucks operated by the quarry operator.
Morning	Monday to Saturday, excluding Public Holidays.	6am – 7am	Rehabilitation and movement of vehicles within site associated with that activity. Site pre-startup including operational warmup of on-site plant
Day-Time		7am – 8pm	Full range of production activities within current operational area and/or primary and secondary stockyard.

9 Traffic Generation Patterns

9.1 Overview

The assessment of transportation related effects of the quarry is based on the maximum volume of heavy vehicles per day being sought by the resource consent application. That level is 750 heavy vehicle movements per day based on medium to long-term expectations of ongoing demand for aggregate in the greater Canterbury area. In addition, there will be some ancillary light vehicle movements.

This section of the report sets out how the traffic volumes will likely vary across the year based on that maximum volume. This allows additional assessment of transport related effects at levels that will be typically expected.

The quarry will add to Winstone Aggregates aggregate resources in Canterbury, including Winstone's existing Wheatsheaf quarry between Rolleston and Prebbleton access off Selwyn Road. Winstone also previously operated a quarry at Yaldhurst, accessed from Old West Coast Road, but sold the site in 2021 when the rock resource was depleted. The new quarry at Burnham is intended to replace aggregate supply from both the Yaldhurst Quarry and the Wheatsheaf Quarry when it reaches the end of its operational life in – 10 years.

Winstone Aggregates has supplied their forecast that 95% of heavy vehicle traffic generation of the Burnham site will be to Christchurch City. In that regard, the traffic generation patterns at both Yaldhurst (when it was operational) and Wheatsheaf Quarries, which also both largely service Christchurch City are relevant in considering patterns of traffic movement through the seasons and across the day.

Detailed analysis of quarry patterns from a quarry formerly operated by Winstone in Yaldhurst obtained from weighbridge records has been carried out to inform:

- Daily variability, indicating relationship between maximum traffic generation and typical traffic generation on a day to day basis, including percentile daily volumes; and
- Hourly variability, being the relationship between the time of day, and the traffic generation at the site.

The variability observed at the Yaldhurst quarry, has then been applied to the Burnham quarry forecasts of traffic generation through the course of the quarry life to determine traffic forecasts for a range of percentile operating days during a year in which peaks are reached.

In addition, this section of the report also considers the light vehicle movements.

9.2 Heavy Vehicle Generation Variability

9.2.1 Yaldhurst Quarry Patterns

It is expected that the traffic generation of the quarry will operate with seasonal patterns similar to the existing Yaldhurst Quarry previously operated for many decades by Winstone Aggregates. To understand the traffic patterns at that quarry Winstone has supplied analysis of weighbridge records from the 2019 financial year, reported as heavy vehicle movements at that site. By analysing the day-to-day variation in historical movements at Yaldhurst, an assessment of the potential heavy vehicle movement on a day-to-day basis can be applied to the proposed Burnham quarry.

Figure 9-1 shows the average daily number of truck movements associated with aggregate exported from the Yaldhurst quarry from July 2019 to June 2020. The annual average level of production over that time involved approximately 200 truck movements per day. There was about 20 percent variation in monthly average production levels over that period although it is noted that the months with low production coincided with the early Covid19 lockdowns.

The highest production days in each month (excluding March and April due to Covid19 effects) varied from 300-480 vehicle movements with an average of the peak day per month being 360 vehicle movements. This suggests that the busier days at the quarry generated more than double the volume of movements of an



average day. The ratio of average day to busiest day could vary over time depending on local market conditions, such as whether there is a significant road construction campaign close to the quarry. The important point to take from the data is that the busiest day will not be the normal operation, and by definition a significant number of operating days will be around or below the average. Consideration of a maximum is very much a worst-case assessment, and many transport assessments would instead consider a lower design level of operation such as an 85th percentile day for understanding effects on the transport network. Previous assessments at the Yaldhurst Quarry have indicated that would be approximately 75-80% of the maximum day of a fully functional quarry.

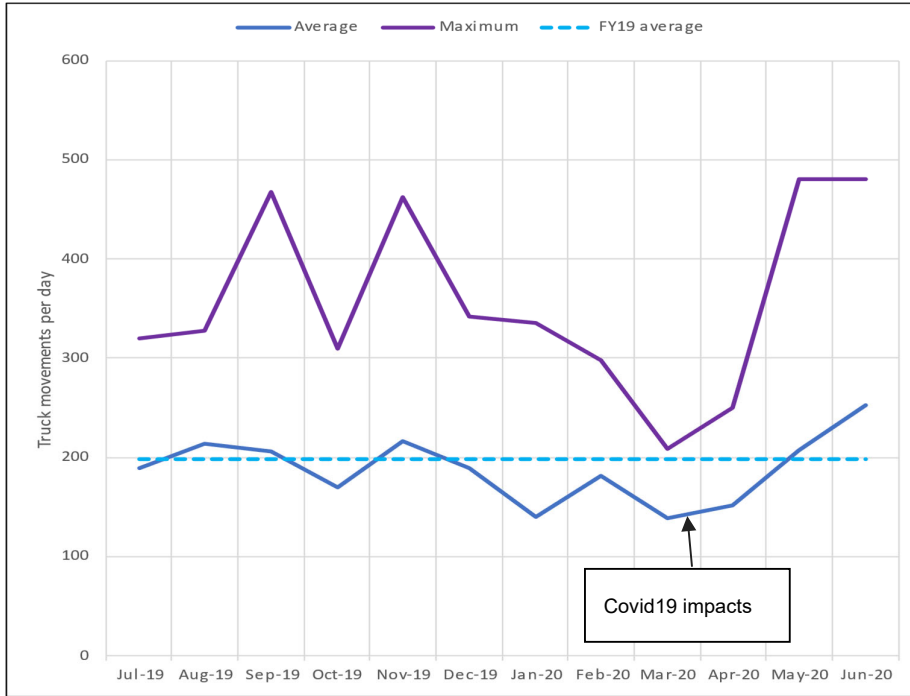


Figure 9-1: Daily truck movements at Winstone Aggregates Yaldhurst Quarry

Figure 9-2 shows the average and maximum hourly number of truck movements associated with the Winstone Aggregates Yaldhurst Quarry in 2019-20. It indicates the hourly average production rate is less than 20 movements per hour (in and out), with peak production reaching 60-70 truck movements per hour. Based on the information provided, on a typical day activity levels at the quarry rise quickly in the early morning after 6am, and remain at a consistent level through to the mid-afternoon before falling after 4pm. Maximum volumes are not experienced in the peak hours of the road network (7-9am, 4-6pm).

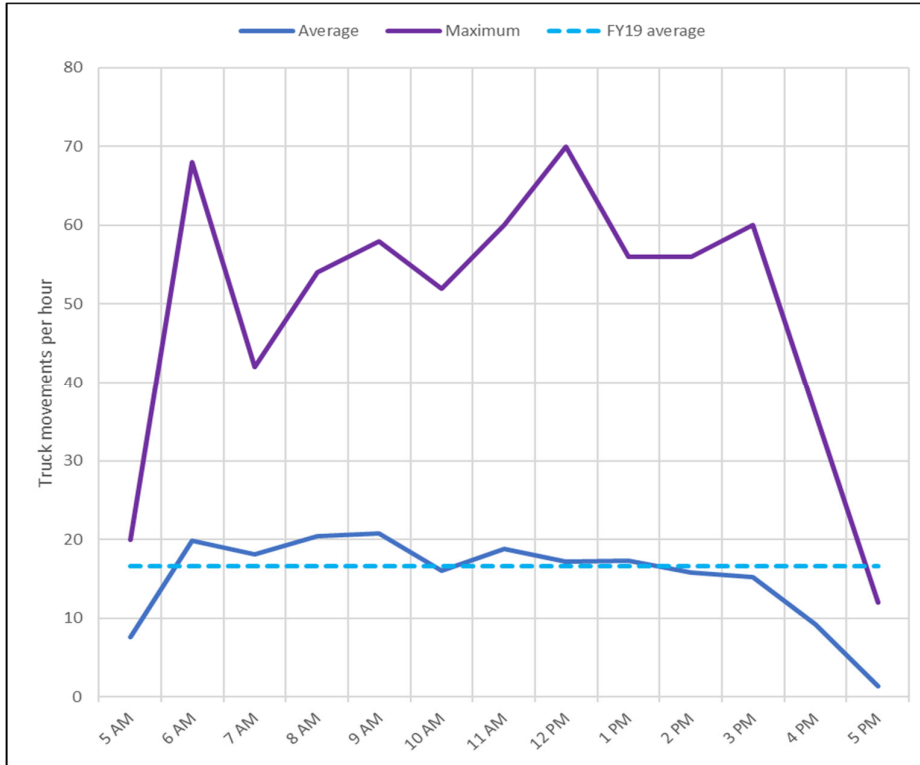


Figure 9-2: Hourly number of truck movements at Winstone Aggregates Yaldhurst Quarry

Further analysis of the average hourly truck movements indicates that during the average day, hourly production rates represented approximately 10% of the daily production rate. For the peak activity, the busiest hour represents approximately 15% of the maximum day.

9.2.2 Forecast Burnham Quarry Traffic Generation Patterns

The resource consent proposes to limit traffic generation at the Site to 750 heavy vehicle movements per day, which will enable the quarry to supply aggregate to satisfy expected demands.

Based on the Yaldhurst Quarry data, it is expected that day to day operation will result in significantly lower trip generation. The data indicates that when fully operational an average traffic generation of approximately 40% of the maximum will be expected, which equates to an average of 300 heavy vehicle movements per day. Peak hours are assessed at the relative percentages observed from the Yaldhurst Quarry data.

Based on the proposed maximum traffic generation, and considering the patterns of traffic generation from the Yaldhurst quarry, Table 9-1 provides calculated forecasts for transport assessment.

Table 9-1: Heavy Vehicle Traffic Generation Forecasts

Daily (vpd)		Peak Hour (vph)	
Busiest Day (Proposed Consented Limit)	Average (40% of Busiest Day)	Busiest Hour (15% of Busiest Day)	Typical (10% of Average Day)
750	300	112	30



9.3 Travel Demands and Patterns

The traffic distribution patterns for the proposed quarry have been assessed under two scenarios. The first scenario is forecast by Winstone and is based on trip patterns Winstone has projected, with the quarry being heavily weighted towards servicing Christchurch.

A second scenario is that the quarry will have a focus on servicing the Selwyn District, recognising other major quarries are located in Christchurch and the eastern edge of Selwyn District. It is likely that a change in quarry strategy would be required for this to occur.

The two scenarios enable a reasonable consideration of the varying potential outcomes for the local and strategic transport networks.

9.3.1 Scenario 1: Christchurch City Focus

Winstone anticipates that 95% of the quarried material could be to and from Christchurch City in the long term, as supplies near to the City are exhausted and Winstone supports its wider business in the city.

The direct route to all parts of Christchurch City is via SH1 east of Aylesbury Road. The remaining percentage would be spread around the Selwyn District, and involve low volumes as each route would accommodate less than 1% of the generated traffic. That is shown in table format in Table 9-2, and in diagrammatic form on **Figure 9-3** for typical and busiest days when the quarry is fully operational and producing at the proposed consent limit.

Table 9-2: Christchurch City Focus - Distribution of Truck Movements

Direction	Percentage Distribution	Vehicles Per Day	
		Average Day	Busiest Day
North-West (Hororata / Glentunnel via Wards Road)	0.1%	0	1
North (Darfield / West Melton via Aylesbury Road)	0.5%	2	4
North-East (Rolleston Industrial via Local Roads)	0.5%	2	4
East (Rolleston, Rolleston Industrial, Prebbleton via SH1)	97.7%	293	733
South (Lincoln, Leeston via Burnham Road)	1.0%	3	8
West (Dunsandel via SH1)	0.2%	1	2

The table indicates that the quarry traffic would effectively almost rely on SH1 to the east, and all other roads will carry minimal quarry traffic, that would barely be perceptible.



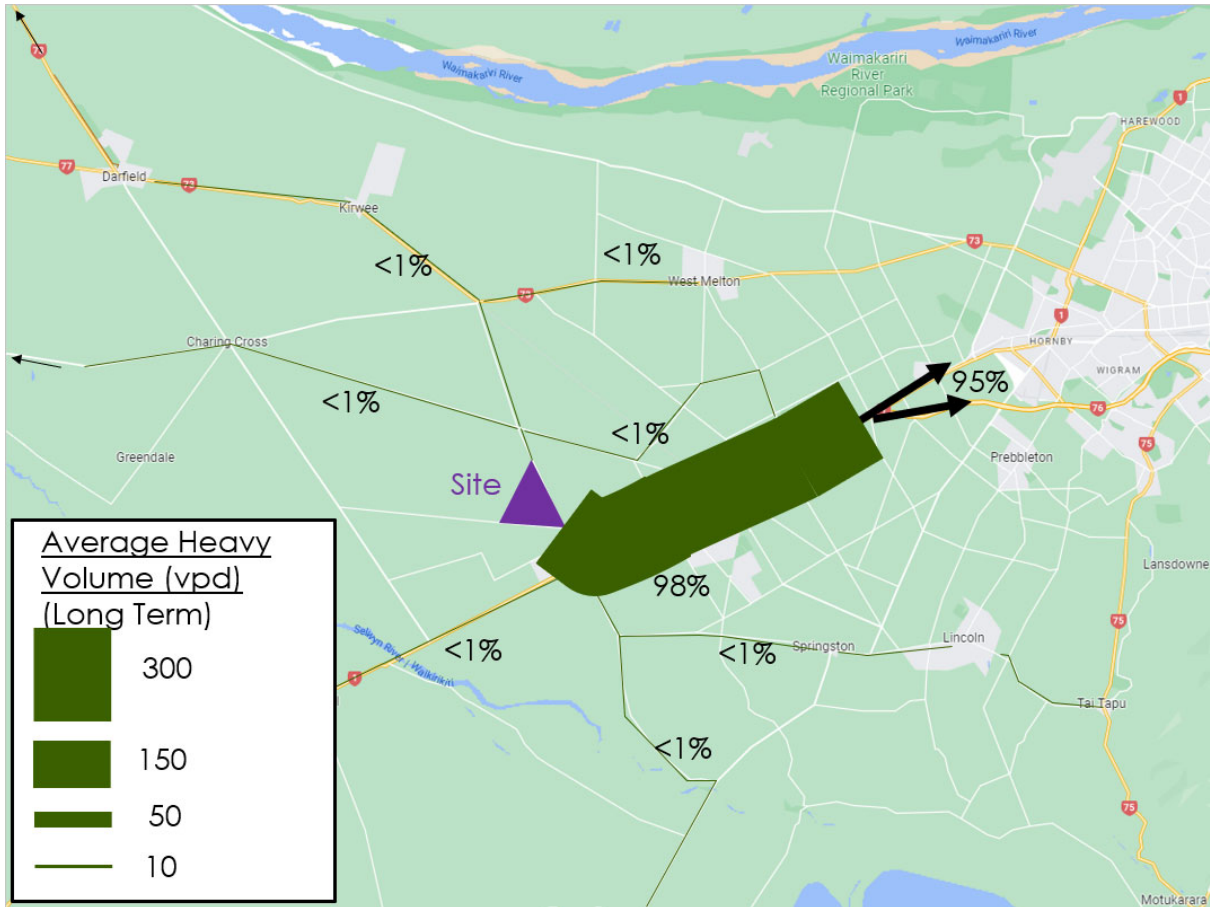


Figure 9-3: Christchurch City Focus Traffic Volume Forecast (Indicative Routes)

Whilst the volumes indicated are mostly less than 5 heavy vehicle movements per day, in practice if a destination is generating traffic movements, there is the potential for vehicle shuttling so that volumes on any particular day could be higher (with a compensating decrease in volume at another destination).

9.3.2 Scenario 2: Selwyn District Focus

Although truck movements will vary from day to day in response to construction project requirements, under this scenario it has been assessed that the pattern of movements will broadly reflect the location and size of growth in population centres. This will likely represent a worst case assessment of traffic on the Council road network. The traffic volumes under this scenario are calculated relative to the population growth in each location, and are presented in Table 9-3 and Figure 9-4 below for typical and busiest days when the quarry is fully operational and producing at the proposed consent limit.

Table 9-3: Selwyn District Focus - Distribution of truck movements (vehicles per day)

Direction	Percentage Distribution	Vehicles Per Day	
		Average Day	Busiest Day
North-West (Hororata / Glentunnel via Wards Road)	1%	3	8
North (Darfield / West Melton via Aylesbury Road)	11%	33	83
North-East (Rolleston Industrial via Local Roads)	6%	18	45
East (Rolleston, Rolleston Industrial, Prebbleton via SH1)	60%	180	450
South (Lincoln, Leeston via Burnham Road)	21%	63	158
West (Dunsandel via SH1)	1%	3	8

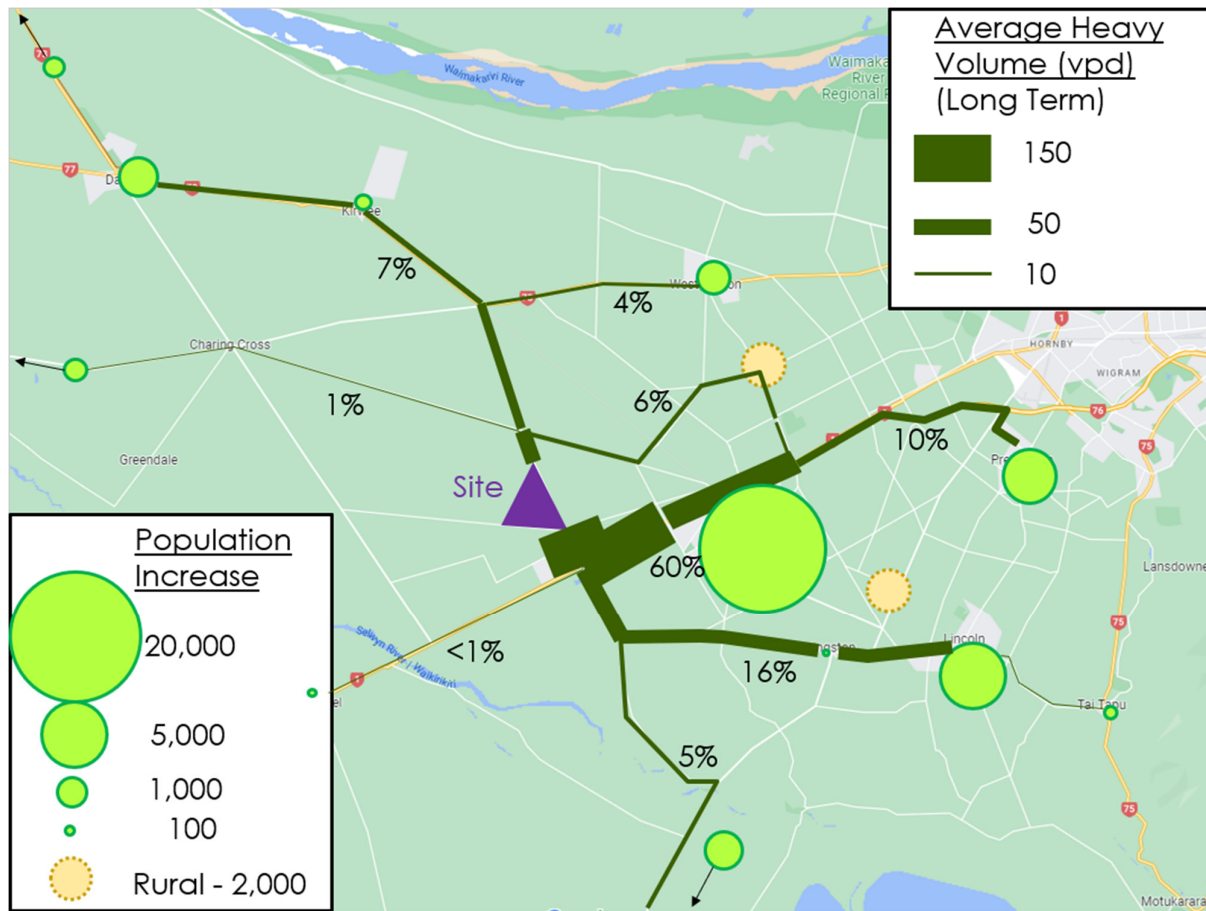


Figure 9-4: Selwyn District Focus Scenario Long Term Traffic Volume Forecast (Indicative Routes)

10 Potential Transport Effects

10.1 Changes in Traffic Volumes

Potential changes in traffic volumes will be most noticeable on the local road network and at intersections connecting with the state highway network.

As described in the preceding section, the Christchurch City focus scenario will result in highest traffic volumes on Aylesbury Road south of the Site connecting to SH1. The Selwyn District focus scenario will result in the highest volumes on other local roads. **Table 10-1** below indicates the potential range of traffic volumes on an average day between the medium and long term, and also the long term peak volume assessed. As any traffic volume is indicative, some rounding has been included. The superscript indicates if the peak is associated with a Selwyn focus (S) scenario or Christchurch focus (C) scenario.

It can be seen that the traffic volumes to be assessed will vary widely, with primary influences being where material is being used, and the level of production (with long term volumes higher than short/medium term).

However it is clear that Aylesbury Road will carry the bulk of the heavy vehicle movements. Some route choices exist to service different destinations, and it is not expected that the routes taken would be controlled. In some cases, routes may vary based on the time of day (and associated interaction with other traffic at intersections) or perceptions of the most desirable route.

The effects of potential changes in traffic patterns are discussed in the following sections of the report.



Table 10-1: Forecast changes in Travel Patterns with Quarry

Road Location	Existing Weekday (5 day) Average Volume	Quarry Additional Traffic		Indicative Typical Future Volume
		Average Additional	Long Term Busiest Day Potential	
Routes South				
Aylesbury Road north of SH1	3,700	110-300	750 ^C	3,800-4,000
Aylesbury Road south of Two Chain Road	1,340	110-300	750 ^C	1,450-1650
Aylesbury Road north of Two Chain Road	460	110-300	750 ^C	570-750
Routes East				
Two Chain Road east of Aylesbury Road	1,000	0-20	45 ^S	1,000-1,020
Walkers Road north of SH1	2,080, increasing to 8,000vpd with planned growth*	Not expected to be used		8,000-8,300
Routes North				
Aylesbury Road north of Wards Road	460 estimated	0-40	85 ^S	460-500
Aylesbury Road south of Wards Road	460	0-55	140 ^S	460-515
Wards Road east of Aylesbury Road	1,620	0-20	45 ^S	1,620-1,640
Wards Road west of Aylesbury Road	1,620 estimated	0-3	10 ^S	1,620-1,625
Other Roads Unlikely to be Used				
Sandy Knolls Road north of Aylesbury Road	100	Not expected to be used		100
Kerrs Road	160	Not expected to be used		160
Kivers Road	N/A	Not expected to be used		N/A
Grange Road west of Aylesbury Road	425	Not expected to be used		425

*Walkers Road will change to a primary arterial freight route to and from the Rolleston Industrial Area, such that volumes will increase over time. The PC80 ITA indicated long term peak traffic volumes of up to 790vph to 870vph indicative of daily traffic volumes of 8,000vpd on Walkers Road. Without PC80, traffic volumes are forecast to be approximately 5,500vpd.



10.2 Positive Effects

The Site is situated in a location that is in reasonably close proximity to both SH1 and SH73, enabling efficient transport of material via the state highway network to Christchurch, Rolleston, and potentially Darfield. It is also well located with respect to Lincoln and other Selwyn towns. As demonstrated by the existing extraction from quarries in the area, such as Road Metals Co Ltd quarry on Wards Road, there is a clear demand for aggregate from a quarry in this area from a range of developments in the District.

As is typical of quarry activities, if major clients choose to take material from the Site, a primary reason is likely to be based on minimising transportation distances. In turn, this has a network wide benefit of minimising accident exposure (which is a function of distance travelled). The Site location is also well located on an existing arterial road to minimise reverse sensitivity effects from truck movement. Arterial roads have a function of supporting heavy vehicle and through traffic movement.

Regardless of this application, there would continue to be a demand for heavy vehicles to transport aggregate to and from the various destinations within the District, or to and from Christchurch. Although material from other quarries would most likely utilise different travel routes, dependent on the source and destinations of the product, such routes would inevitably still rely on the local road network through the District, and on the State Highway network.

10.3 Site Access

10.3.1 Access Design Concept

The volume of heavy traffic generated by the Site requires a high standard of access. The proposed access is located to easily comply with District Plan standards with respect to proximity to intersections, and there are no other dwelling or commercial activity property accesses in the vicinity. The use of the arterial Aylesbury Road is considered most suitable as the alternative Grange Road is a lower standard and function, and the level of traffic generation proposed is less consistent with the local road function of Grange Road.

The position of the Site access on Aylesbury Road is located to provide an optimal long-term solution for quarrying and rehabilitation of the Site. It is on an arterial road to minimise turns at local intersections. Whilst access in the southeast corner of the Site could enable shorter overall travel distance on the road network, travel to a central processing area would still be required within the Site, and such a location would have likely have greater adverse effects on the amenity of nearby dwellings.

There is unrestricted sight distance on Aylesbury Road and currently there are low traffic volumes of approximately 500 vehicles per day that will allow exiting traffic to select large gaps and accelerate away from the Site with minimal interaction or effect on through traffic.

It is recommended that the Site access is developed as generally shown in Figure 10-1. The Site access widening is designed to the Waka Kotahi Planning Policy Manual "Diagram E" standard for a 100km/h speed limit road. This standard is considered suitable for a high vehicle generating commercial vehicle access on a lower volume arterial road and exceeds the Selwyn District Plan requirement (Operative District Plan Rural Volume Diagram E10.D and Partially Operative District Plan TRAN-Diagram 7). It ensures that trucks can manoeuvre on the sealed widening surface.

While the development will involve laden heavy vehicles leaving the Site, it is considered that this aspect does not necessitate acceleration lanes on Aylesbury Road. It is considered that the access will safely accommodate the low volume of passing through traffic.



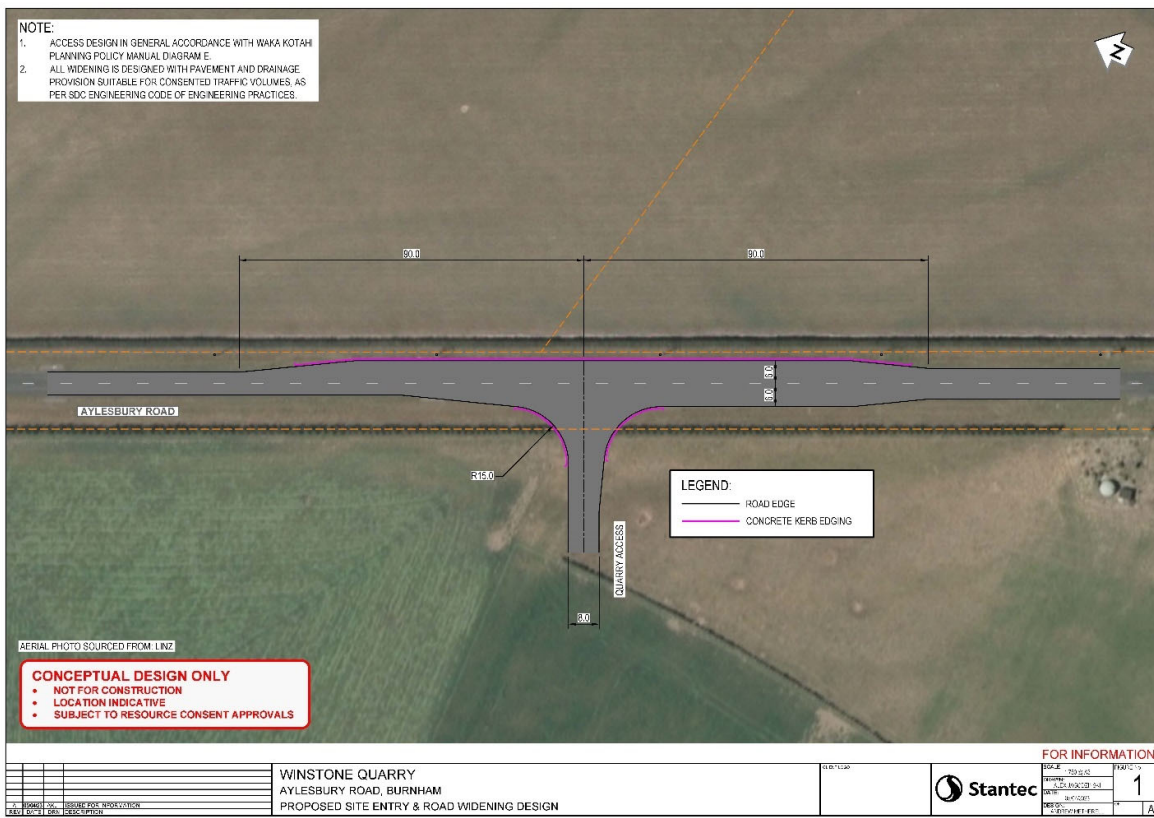


Figure 10-1: Aylesbury Road Site Access Widening

It is recommended that the widening is constructed to a high pavement and drainage standard to ensure that the widened pavement achieves a long service life without cracking or potential water damage. In some cases at other quarries, the road berm near the widening has been damaged by trucks tracking over the berm, and it is understood this particularly occurs if trucks park up on the widening, which could occur while a driver carries out paper work or waits for quarry opening. A concrete edge kerb on the edge of the widened road can significantly improve the durability of the widening, and define the widening location.

The access will be used at times of darkness, particularly in winter, and a “flag light” is recommended to highlight the location and position of access features. Delineation of the access with localised edge road markings would be beneficial, although that would require agreement with Council engineers given there are no edge markings elsewhere on Aylesbury Road.

10.3.2 Access Management

Quarry accesses require avoidance and management measures to minimise the likelihood of aggregate debris being deposited at the access as vehicles turn exiting the Site. The material can lead to a range of issues such as reduced skid resistance and potential for stones to be flicked up at passing vehicles. The primary mitigation measure is sealing the site access well into the Site (e.g. up to the weighbridge) and avoiding any uncontrolled access from unsealed internal access routes to the site access road close to the road boundary. Quarry operational procedures should ideally extend to the site access with regular monitoring of the access for deposited material, road sweeping of the access road, sweeping of the Aylesbury Road widening (under an approved Traffic Management Plan), and/or other on-site measures to minimise the deposit of materials.



10.4 Road Network Efficiency

The changes and total traffic volumes presented in **Table 10-1** as a result of the proposed quarry are at a level that does not alter the function of the various roads on a typical day, or even on a peak day. At the traffic volumes anticipated, movement on the District Road network will remain of a very high level of service.

Only Aylesbury Road north of SH1 carries traffic volumes higher than 3,000 vpd, and as indicated by existing performance the existing levels of traffic do not interfere with efficiency of movement along Aylesbury Road, or accessing Aylesbury Road from side roads. By comparison, it is noted that the parallel route of Walkers Road is forecast to carry approximately 8,000vpd. The key efficiency related location of interest in the network is the intersection with SH1, which already has some capacity constraints at peak times.

Once on the State Highway network, the volumes of Site related traffic form a minimal percentage of overall traffic, such that any effects are negligible.

10.5 Intersection Efficiency

10.5.1 Assessment Year and Growth Assumptions

As discussed earlier, the performance of intersections is the primary efficiency related matter in the transport network, and poor efficiency can also impact safety performance. Intersection performance can be sensitive to changes in traffic volumes associated with both general traffic growth and contributions from large developments. To enable suitable assessment of potential effects, a transport assessment for resource consent typically looks at the current transport network and the reasonably foreseeable future state of the environment. Given the planned changes to the road network, scale of the development and potential that it will take time to reach operating capacity, it is considered appropriate to consider effects in the future that provide for traffic growth and rather than relying on effects assessed against the current transport environment.

Industry guidance such as the NZTA Research Report 442 Integrated Transport Assessment suggests that resource consents should typically consider a future year at least five years from when the activity is proposed, and potentially more where development may occur over a longer timeframe. It also notes where no comprehensive transportation network traffic forecasts are available, then the assessment year should not be more than 10 years ahead given the uncertainty of predicted development. Council and Waka Kotahi transport plans typically set out planned investment for a period of up to 10 years into the future.

On this basis, the assessment has considered assessment years of 2030 and 2035. For year 2030, the assessment has assumed that the quarry may be operating at approximately 45% of its capacity based on indications from Winstone, and for 2035 it is assumed the quarry will be operating at its maximum capacity as sought by this consent application.

Table 10-2: Heavy Vehicle Traffic Generation for Intersection Assessment

Year	Quarry Operation	Daily (vpd)		Peak Hour (vph)	
		Busiest Day	Average	Busiest Hour	Average
Year 2030	45% capacity	338	135	50	14
Year 2035	100% capacity	750	300	112	30

Based on SH1 traffic growth patterns and Long Term Plan population projections for Selwyn District, 2% per annum linear growth has been assessed to establish future “without quarry” traffic volumes across the road network. It is considered these scenarios enable a robust exploration of potential traffic effects and how they may change over time. No adjustment has been made for Friday conditions, as based on experience with other quarry assessment the quarry is not expected to reach peak operating conditions on a Friday



afternoon. It is however noted that the road controlling authorities would need to consider a Friday scenario in determining the suitability of intersection design for accommodating traffic without a quarry consented.

For the analysis, the peak period profile of existing quarries has been considered and the full peak hour traffic generation has been applied to the morning (AM) peak hour, and 50% of the peak hour traffic generation of the Site has been applied for the evening (PM) peak hour. It is noted that for the absolute peak hour of production this is conservative, as in practice it is also not likely to coincide with the morning peak hour.

By way of summary of the analysis that follows:

- The local road network intersections and Site access are forecast to efficiently accommodate the quarry traffic into the future.
- The SH1 / Aylesbury Road intersection is already operating at or close to capacity at certain times of the day, and the analysis confirms that in the 2030 scenario, there would be very poor performance and traffic entering SH1 will need to divert to other intersections or adjust the time of travel. The 2035 scenario has not been modelled with the existing intersection form, as a roundabout has been proposed by Waka Kotahi.
- At 2035 with a roundabout layout, the SH1 / Aylesbury Road intersection is forecast to operate efficiently with the quarry.

The local roads where traffic increases will be experienced are straight and flat with wide grass verges, offering excellent sight distance at the access points such that exiting vehicles can continue to safely choose appropriate gaps in traffic to enter the traffic stream. Existing private property access along the local roads will be similarly unaffected in terms of the ability to access and egress the road network efficiently.

The level of service criteria based on the average delay for vehicles is set out in **Table 10-3** below.

Table 10-3: Level of Service Criteria

LOS Criteria	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
Description	Minimal Delay		Modest Delays		Congested / Long Delays	
Stop Control Delay (s/veh)	$d \leq 10$	$10 < d \leq 15$	$15 < d \leq 25$	$25 < d \leq 35$	$35 < d \leq 50$	$50 < d$
Roundabout Delay (s/veh)	$d \leq 10$	$10 < d \leq 20$	$20 < d \leq 35$	$35 < d \leq 50$	$50 < d \leq 70$	$70 < d$

10.5.2 SH1 / Aylesbury Road / Existing Layout

The intersection model has been calibrated to queues observed in the morning and evening peak periods. To achieve reasonable calibration the intersection is modelled with a single lane approach even though in practice 2-3 vehicles can wait side by side in a left turn lane and a through/right turn lane. When the model is applied with a separate left turn lane, the delays are lower and will be representative of the delay at the stop line but do not represent the effect of the single lane queuing. It is noted that through and right turn movements still have high delays with the two lane queueing model. Whilst a micro-simulation method would enable more realistic queuing (and hence delay calculation) the expected change to a roundabout in the near term means that the more complex modelling method is not justified at this time. Rather, some engineering judgement is applied to the SIDRA Intersection modelling outputs.

The summary of the assessment for the various scenarios is included in Table 10-4 below.



Table 10-4: SH1 / Aylesbury Road (Existing Layout) Level of Service Assessment

Scenario	Performance <i>delay in s/veh (95%ile queue in veh), and LOS (colour)</i>			
	Existing	Year 2030 (Quarry at 45% capacity)		
		No Quarry	Average Day Quarry (Christchurch Focus)	Average Day Quarry (Selwyn Focus)
AM PEAK				
Aylesbury Road North Approach	27 (2)	53 (3)	55 (4)	66 (4)
Burnham Road South Approach	53 (4)	>180 (28)	>180 (29)	>180 (>30)
INTER PEAK				
Aylesbury Road North Approach	14 (1)	16 (2)	17 (2)	17 (2)
Burnham Road South Approach	21 (1)	27 (1)	27 (1)	28 (1)
PM PEAK				
Aylesbury Road North Approach	99 (20)	>180 (>30)	>180 (>30)	>180 (>30)
Burnham Road South Approach	38 (2)	83 (3)	89 (3)	94 (4)

The assessment demonstrates that the existing intersection layout already performs poorly in the morning and evening peak periods and the performance will worsen in the future as a result of general growth. The effect of the quarry traffic is generally not significant, although the ability of the intersection to accommodate additional traffic is compromised by its generally poor performance, and higher numbers of heavy vehicles in the long queue would create some additional instability of intersection performance.

If quarry traffic was to use the intersection, then overall volume of movements generated, and timing of movements would need to consider minimising movements on side roads in the peak periods. It is difficult to be prescriptive to a limit when there are times of the day that performance is poor and small changes in traffic volume can have a pronounced impact. However, recognising that the intersection is planned to be upgraded in the next few years, it is considered reasonable to enable the site establishment and initial site production subject to limitations on the overall traffic generated by the Site. Often, a development could be considered to have a small effect at changes in traffic volumes less than 5%, subject to local performance. The existing traffic volume on Aylesbury Road is some 3,700vpd on a weekday, and the following volumes represent percentages of quarry production and percentage of existing traffic volumes.

Table 10-5: Aylesbury Road Approach to SH1 Interim Limits Investigation

Possible Maximum Production Ahead of Intersection Upgrade	Percentage of Proposed Quarry Production Maximum (750vpd)	Equivalent Average Quarry Volume (vpd)	Average Quarry Generation as Percentage of Daily Aylesbury Road Existing Volume	Average PM Peak Additional Quarry Traffic Southbound on Aylesbury (vph)	Average PM Peak Percent Change to Aylesbury Southbound (289vph existing)
100vpd	13%	40vpd	1.1%	1	<1%
150vpd	20%	60vpd	1.6%	2	<1%
200vpd	27%	80vpd	2.2%	2	<1%
250vpd	33%	100vpd	2.7%	3	1%

It can be seen that the potential contribution to the PM peak traffic congestion will be very small if a staged quarry development traffic volume was permitted to proceed with the existing intersection form. The cumulative effect of the quarry on the critical PM peak traffic volume on Aylesbury Road will be indistinguishable from background traffic, with on average one heavy vehicle every 20 minutes using the Aylesbury Road approach to the intersection if 250vpd was adopted as a maximum generation for the quarry. This represents an average 1% change in the critical side road traffic movement in the PM peak



hour when queuing is most pronounced. This is expected to be well within the variation already occurring on a day-to-day basis. As the intersection that is already planned to be upgraded, is remote to the Site and onto a state highway, an interim site traffic generation is considered appropriate. This represents one third of the full capacity of the quarry.

An alternative consideration would be only permitting left turns from side roads at the intersection at peak times by utilising a variable sign (such as used on the Larsens Road approach to SH75 in Christchurch). This would enable the intersection to operate effectively at peak times, although it involves large detours for traffic potentially creating u-turn issues elsewhere, and is inconsistent with the arterial road classifications of both Burnham Road and Aylesbury Road. Based on the discussions with Waka Kotahi, it is understood that alternative lower capital cost treatments such as this are not being considered.

10.5.3 SH1 / Aylesbury Road / Roundabout Layout

Waka Kotahi is planning a single lane roundabout for SH1 / Aylesbury Road / Burnham Road, expected to be constructed within the next few years, with the project already having funding and that is expected to be extended into the NLTP 2024-2027. The roundabout is primarily a safety treatment that will address the existing delay issues, as well as supporting the Road to Zero corridor treatment that includes proposed central medians on SH1, which will require u-turns to be accommodated at the intersection for those accessing SH1 via left turn only at accesses and minor intersections.

A SIDRA model has been developed for a single lane roundabout, and tests have been carried out with the second scenario of the quarry at full operating capacity in 2035. The assessment with a single lane roundabout is included in Table 10-6.



Table 10-6: 2035 SH1 / Aylesbury Road (Roundabout) Level of Service Assessment

Scenario	Performance <i>delay in s/veh (95%ile queue in veh), and LOS (colour)</i>				
	Year 2035 (Quarry at 100% capacity)				
	No Quarry	Average Day Quarry (Christchurch Focus)	Average Day Quarry (Selwyn Focus)	Busiest Day Quarry (Christchurch Focus)	Busiest Day Quarry (Selwyn Focus)
AM PEAK					
Aylesbury Road North Approach	9 (1)	9 (1)	9 (1)	10 (2)	10 (2)
SH1 East Approach	9 (11)	9 (12)	9 (12)	9 (15)	9 (14)
Burnham Road South Approach	18 (3)	20 (3)	20 (4)	28 (5)	27 (5)
SH1 West Approach	12 (8)	13 (8)	13 (8)	16 (10)	15 (10)
INTER PEAK					
Aylesbury Road North Approach	8 (1)	9 (1)	9 (1)	9 (2)	9 (1)
SH1 East Approach	7 (3)	7 (3)	7 (3)	8 (3)	8 (3)
Burnham Road South Approach	10 (1)	10 (1)	10 (1)	11 (1)	11 (1)
SH1 West Approach	7 (3)	7 (3)	7 (3)	7 (3)	7 (3)
PM PEAK					
Aylesbury Road North Approach	17 (6)	18 (7)	18 (6)	22 (8)	21 (8)
SH1 East Approach	8 (5)	8 (5)	8 (5)	8 (6)	8 (5)
Burnham Road South Approach	10 (1)	10 (1)	10 (1)	10 (1)	10 (1)
SH1 West Approach	8 (6)	8 (7)	8 (7)	8 (8)	8 (7)

The assessment shows that the quarry has minimal effect on the operational performance of the intersection under typical average day operating conditions. When the busiest day traffic generation is assessed, a slight change in performance occurs on the side road approaches although that does not impact the overall efficiency of the roundabout, with SH1 still operating with very good LOS A. It is emphasised that the busiest day traffic volumes assessed represent a worst case scenario for assessment purposes noting the expected infrequent occasion of quarry generated traffic volumes at or near the peak hour volume assessed.

The detailed analysis outputs indicate that in the morning peak period the capacity of the single lane roundabout is close to being reached on both state highway approaches. At the traffic volumes assessed there is still sufficient capacity such that changes in traffic volume have small changes in performance, although it is likely that the roundabout would start to experience some additional queuing and delays beyond the 10-year assessment period. As noted earlier, this is beyond the foreseeable future transport environment for transport assessment and will be a matter for road controlling authorities to consider. It is noted that the single lane intersection form proposed by Waka Kotahi is intended to maximise safety, and as such there is intended to be some compromise on its ability to accommodate peak traffic volumes efficiently. This reflects the road safety strategy that has a focus on minimising adverse road safety outcomes, which is typically considered to be better achieved with a single lane roundabout compared to a multi-lane roundabout (as is currently implemented elsewhere on SH1).

10.5.4 Site Access

The proposed site access has been analysed in SIDRA under a future 2035 assessment year with the possible busiest operating day at the quarry. As the critical movement will be the right turn from the site the “Christchurch focus” scenario has been analysed. The summary outputs shown in Table 10-7 confirm that the access will operate efficiently at the busiest times of the day, with no vehicle queuing and very good levels of service. The proposed widening at the access allows other vehicles travelling through to do so with negligible effect from quarry related turning traffic.

Table 10-7: Aylesbury Road / Site Access Level of Service Assessment

Scenario	Turn	Performance <i>delay in s/veh (95%ile queue in veh), and LOS (colour)</i>
		Year 2035 (Quarry at 100% capacity) Busiest Day Quarry (Christchurch Focus)
AM PEAK		
Aylesbury Road North Approach	Right	11 (0)
Site Access	Left	5 (0)
	Right	6 (0)
Aylesbury Road South Approach	Left	10 (0)
PM PEAK		
Aylesbury Road North Approach	Right	11 (0)
Site Access	Left	5 (0)
	Right	6 (0)
Aylesbury Road South Approach	Left	10 (0)

10.5.5 Aylesbury Road / Burdons Road

The Aylesbury Road / Burdons Road intersection has been analysed in SIDRA Intersection for a future year 2035, in the busiest morning and evening peak periods. The quarry does not add to turning volumes at the intersection, and therefore any change in performance would be a consequence of additional through traffic. The summary of the analysis as included in Table 10-8 shows the change in performance will be negligible, and Level of Service A will be retained on all movements in the future even on the busiest day for the quarry. A comparable result would be expected at each of the other side roads and accesses on Aylesbury Road north of SH1.

Table 10-8: Aylesbury Road / Burdons Road Level of Service Assessment

Scenario	Turn	Performance <i>delay in s/veh (95%ile queue in veh), and LOS (colour)</i>			
		Year 2045 (Quarry at 100% capacity)			
		2022	2035 without quarry	2035 Average Day Quarry (Christchurch Focus)	2035 Busiest Day Quarry (Christchurch Focus)
AM PEAK					
Aylesbury Road North Approach	Right	6 (0)	6 (0)	6 (0)	6 (0)
Burdons Road	Left	6 (0)	6 (0)	6 (0)	6 (0)
	Right	6 (0)	6 (0)	8 (0)	8 (0)
Aylesbury Road South Approach	Left	6 (0)	6 (0)	6 (0)	6 (0)
PM PEAK					
Aylesbury Road North Approach	Right	6 (0)	6 (0)	6 (0)	6 (0)
Burdons Road	Left	6 (0)	6 (1)	6 (1)	6 (1)
	Right	7 (0)	7 (1)	7 (1)	8 (1)
Aylesbury Road South Approach	Left	6 (0)	6 (0)	6 (0)	6 (0)

10.5.6 Aylesbury Road / Two Chain Road

The Aylesbury Road / Two Chain Road intersection has been analysed in SIDRA Intersection for both the existing scenario and a future year 2035, without and with the quarry, in the busiest morning and evening peak periods. The quarry does not add to turning volumes at the intersection, and therefore any change in performance would be a consequence of additional through traffic. The summary of the analysis as included in Table 10-9 shows the change in performance will be negligible, and Level of Service A will be retained for all movements in the future even on the busiest day for the quarry.

Table 10-9: Aylesbury Road / Two Chain Road Level of Service Assessment

Scenario	Performance <i>delay in s/veh (95%ile queue in veh), and LOS (colour)</i>		
	2022	2035 No Quarry	2035 Busiest Day Quarry at 100% (Christchurch Focus)
AM PEAK			
Two Chain Road Approach	7 (0)	8 (0)	8 (0)
Grange Road Approach	7 (0)	7 (0)	9 (0)
PM PEAK			
Two Chain Road Approach	7 (0)	7 (0)	8 (0)
Grange Road Approach	7 (0)	8 (0)	8 (0)

10.6 Intersection Safety Review

10.6.1 Aylesbury Rd / Grange Rd / Two Chain Rd / Sandy Knolls Rd

The existing safety record for the intersection indicated no existing road safety issues. The intersection carries traffic volumes that are easily accommodated with good levels of performance. Although Sandy Knolls Road is located close to Two Chain Road at the intersection, traffic movements are low and the proximity and slow-moving speed required to turn minimises crash risk.

The quarry is expected to add to through traffic volumes on Aylesbury Road, which would not require changes to the intersection layout. There is a possibility that a small proportion of the quarry generated traffic could use Two Chain Road east of Aylesbury Road for access between the quarry and the Rolleston Industrial areas north of SH1. If large heavy vehicles turn at the intersection to use the local road network to connect to Rolleston industrial area, the left turn kerb from Aylesbury Road into Two Chain Road would desirably be adjusted to enable the truck and trailer to turn left without crossing the centreline on either Two Chain Road or Aylesbury Road. This is indicated in **Figure 10-2**.

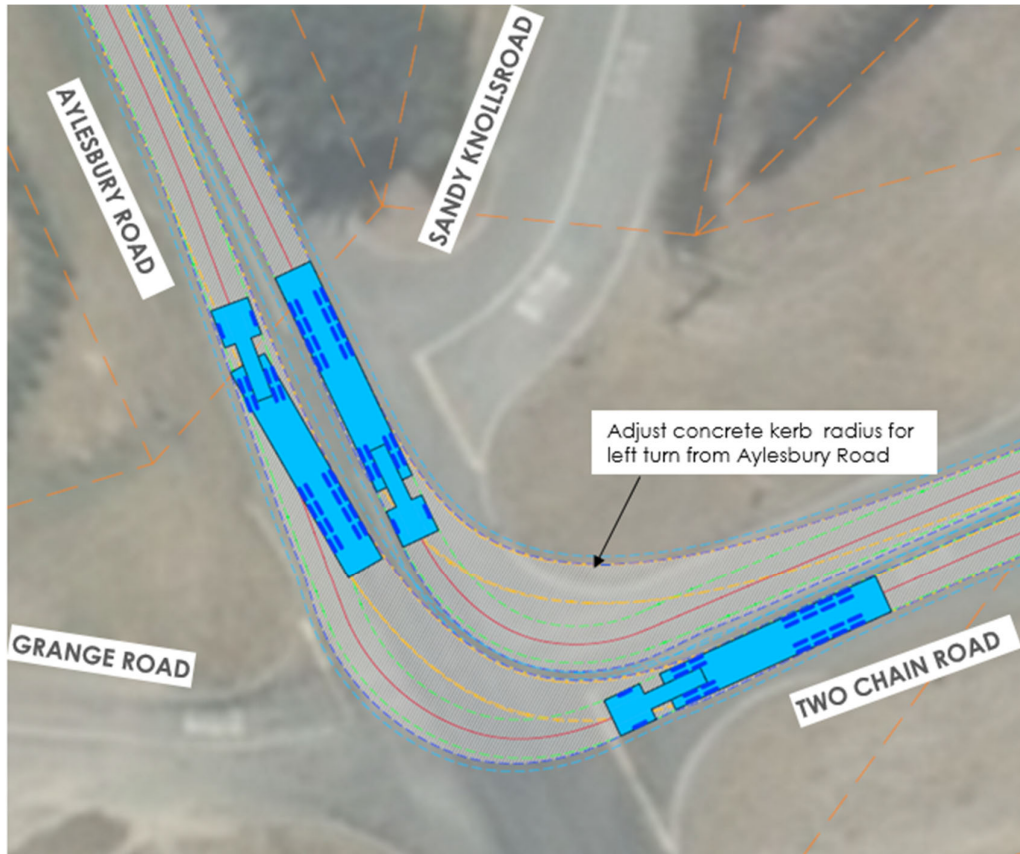


Figure 10-2: Adjustment to Aylesbury Road – Two Chain Road northeast corner kerb

The traffic volumes indicate that trucks already regularly make this movement, and the quarry could under the Selwyn Focus scenario add a similar volume again. To ensure that the intersection is capable of accommodating left turning trucks, it is considered the kerb adjustment should be provided as part of the quarry development if it is intended that trucks will use Two Chain Road.

10.6.2 Aylesbury Road / Wards Road Intersection

The Aylesbury Road / Wards Road intersection alignment has a poor alignment from a safety perspective, with a high potential for those travelling along Wards Road to miss the Stop sign control. There has been one minor injury and one non-injury crash at the intersection. There are no current plans for the intersection in the Selwyn District Infrastructure Plan. Seal widening improvements on both Aylesbury Road and Wards Road are currently planned for a period more than 20 years in the future which could be expected to also address intersection safety if required.

The quarry will, depending on the distribution of traffic that results, lead to some change in traffic movements through the intersection. With a Christchurch focused (Scenario 1) traffic distribution, less than 1% of the site traffic generation will use the intersection. This will result in between approximately 0 and 8 vehicle movements per day. The intersection currently provides for more than 2,000 vehicle movements per day, such that the change in use of the intersection will be negligible.

If the quarry generates a Selwyn focus (Scenario 2) traffic distribution, there is the potential for approximately 18% of the traffic generation to use the intersection. When the quarry is fully operational, that could result in approximately 54 vehicle movements per day on an average day, and approximately 135 vehicle movements per day on the busiest day. Of the quarry traffic using the intersection, the estimates for turning movements are set out in Table 10-10:

Table 10-10: Aylesbury Road / Wards Road Traffic Movements (Selwyn District Focus)

Movement	% of Site Generation (two-way)	From site		To Site	
		Average Day	Busiest Day	Average Day	Busiest Day
Aylesbury Road – Wards Rd east	6%	9	23	9	23
Aylesbury Road – Wards Road west	1%	1	4	1	4

The functional ability of the intersection to accommodate traffic under this Selwyn focus scenario has been investigated by considering articulated truck vehicle tracking (also representative of truck and trailer). **Figure 10-3** shows the movements from the Site turning onto Wards Road, and **Figure 10-4** shows the movements to the Site turning from Wards Road onto Aylesbury Road.

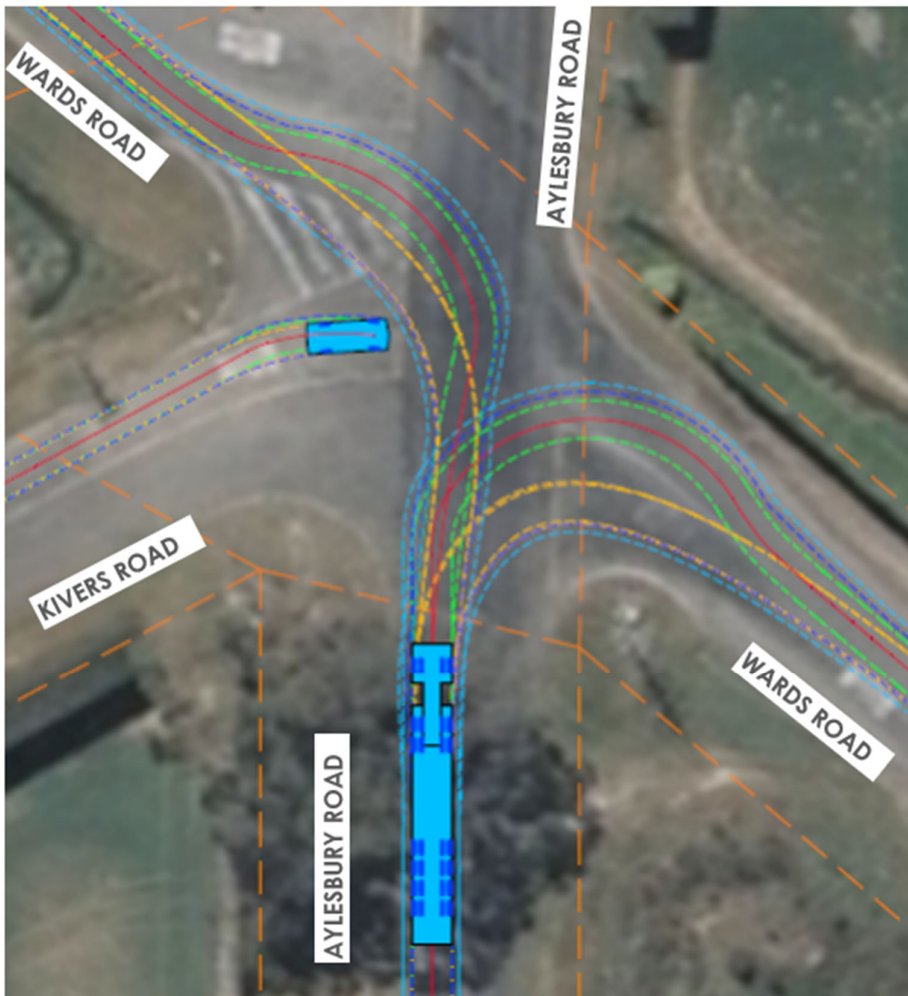


Figure 10-3: Aylesbury Road / Wards Road: Northbound Semi-Trailer Vehicle Tracking

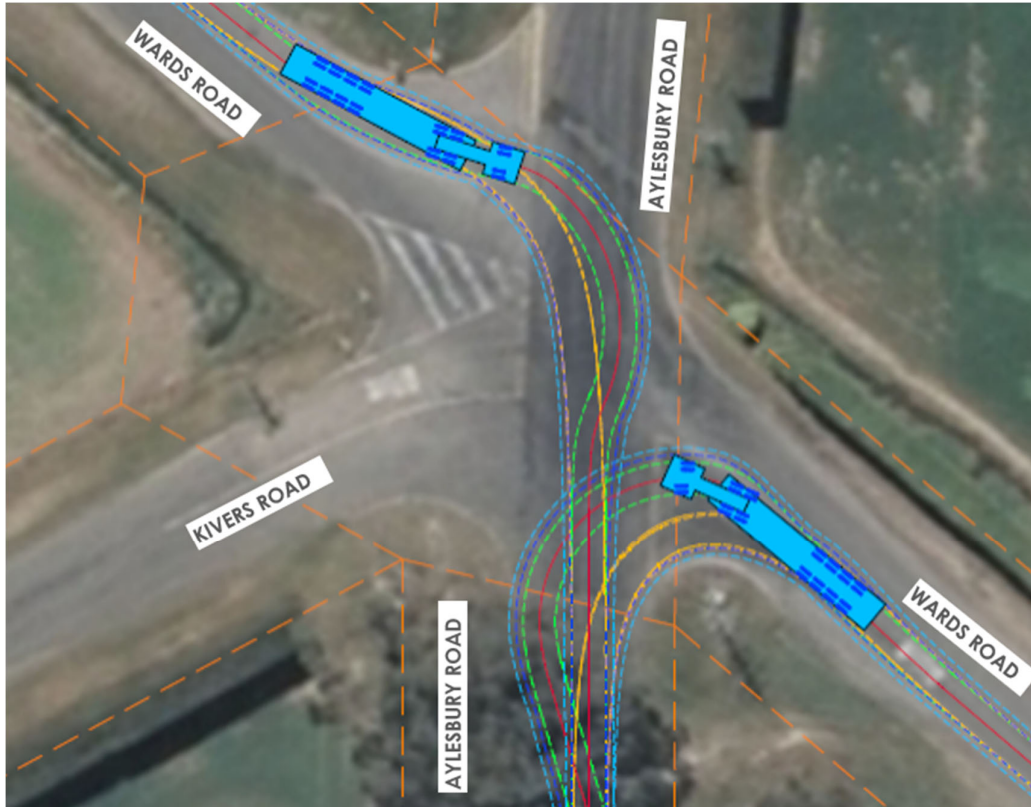


Figure 10-4: Aylesbury Road / Wards Road: Southbound Semi-Trailer Vehicle Tracking

The vehicle tracking demonstrates that the acute angle between Wards Road east and Aylesbury Road south creates some difficulty for the truck and trailer to make the manoeuvre within the marked lanes.

The left turn from Wards Road east is not critical as a truck driver can wait for a suitable gap on Aylesbury Road before making the turn. Given the low volume of traffic through the intersection, it is considered the truck crossing the centreline on Aylesbury Road would not affect its safe and efficient operation.

The right turn movement from Aylesbury Road south onto Wards Road east is more challenging in that the movement conflicts with the opposing direction where vehicles may either be at or approaching the stop line. If the movement is very occasional, such as with the Christchurch focus or even on an average day with the Selwyn focus (less than 1 movement per hour) it is unlikely to create significant concerns. However, as the regularity of the movement increases there is a greater risk of drivers being required to enable reverse priority to avoid the physical conflict.

As no improvements have been planned by Council, some mitigation or management is considered necessary for this movement, particularly if quarry traffic volumes making the movements exceed approximately 10 vehicles per day, with feasible options including:

- Widening Wards Road east approach (north and possibly south side) and/or Aylesbury Road (west approach) at the intersection sufficiently to enable the right turn from Aylesbury Road into Wards Road east to be made without impacting the westbound Wards Road traffic lane;
- In the absence of physical mitigation, managing volume of traffic movements generated by the quarry that could use Wards Road to/from the east so that it does not exceed approximately one movement per hour, recognising the intersection is between an arterial road and collector road (Partially Operative District Plan classifications) so some use should be enabled 'as of right'. This would need to be addressed in a traffic management plan and include suitable monitoring to determine actual effects.

10.7 Effect on Other Road Users

10.7.1 Cyclists

The SDC is proposing to construct an off road cycleway north of the railway on Runners Road between Burnham and the Rolleston Industrial area. Aylesbury Road already has an off-road shared path connection past Burnham, on the eastern side of the road south of Burdons Road to Runners Road. The proposed expansion of the network with connection to Rolleston will enable Burnham residents to access Rolleston separated from the main road network. The change in traffic past Burnham will have a negligible effect on the cycle network.

Aylesbury Road past the Site is a defined rural arterial road and does not form part of the cycle network that has been planned by the Council. Currently there are very low cyclist volumes as indicated by the traffic surveys. In that regard, use of the road by heavy vehicles is considered suitable. Where cyclists do choose to use the road, they will need to share the lane with other vehicles, which is common across the District. The primary route used by quarry traffic is straight with excellent forward visibility so that drivers will be able to make a suitable judgement on whether it is safe to pass.

The additional heavy traffic on other nearby District Council rural roads will be low, at levels consistent with existing use, and the roads do not form part of the proposed Council cycling network.

10.7.2 Pedestrians

The quarry will predominantly generate increased traffic volumes on the section of Aylesbury Road between the site access and SH1.

Occasional pedestrian use of Aylesbury Road north of Burdons Road will primarily be associated with recreational walking, with a small number of dog walking movements observed in the traffic counts. Pedestrians will already either use the wide berm, or are able to use the berm as vehicles pass. As a rural arterial road, formal provision of pedestrian infrastructure is not expected and the change in traffic patterns will not result in pedestrian usage of the road being markedly different from existing. In that regard, it is considered unlikely that the quarry will have any influence on the need for infrastructure to service that part of the road network.

Through traffic volumes on the surrounding roads will remain at a sufficiently low level that pedestrians can easily choose gaps in traffic to safely cross the road, with good visibility to approaching vehicles.

There are some locations of possible focused pedestrian crossing demand on the section of Aylesbury Road past Burnham as summarised on **Figure 10-5**. Based on the existing traffic surveys and observations, the pedestrian movements are infrequent. Currently the only location with a crossing point is location 3, where the path simply joins the road shoulder on both sides of the road.





Figure 10-5: Burnham Pedestrian Crossing Demand Locations

Reference has been made to the Waka Kotahi Pedestrian Network Guidance. In terms of crossing delay, it notes that even without any physical aid pedestrian crossing delay would be “very good” at traffic volumes up to approximately 400vph which is the existing traffic volume north of SH1. Kerb extensions would enable “very good” crossing performance to still be achieved at traffic volumes of approximately 600vph. This indicates there is not an immediate need to provide a facility from a pedestrian delay perspective.

The guidance notes that vehicle operating speeds over 30km/h increase the severity of injury or likelihood of death in crashes involving pedestrians. Higher speeds make it more difficult for pedestrians to judge safe gaps and require longer sight distances. The current speed limit of 70km/h therefore does not support safe pedestrian crossing movement and consideration of reduced speed limit along this section of road would be a first step to reducing risk.

The guidance recommends that where a speed limit is 60km/h or less, crossing treatment options include raised signalised crossings, signalised crossings, or pedestrian/median refuges. Given the very low crossing demand, it is considered unlikely that signalised crossings would be contemplated. Rather, a standard treatment would likely involve a pedestrian/median refuge which would involve some localised widening of the road. As the road is an arterial road, and crossing demand is generated by non-quarry activities, and the change in peak hour volumes resulting from the quarry is small, it is considered such a facility would not be the responsibility of the proposed quarry operator as part of traffic effects mitigation.

On the wider road network, most travel will be on the state highway and arterial road network. On those roads pedestrian facilities are either provided in urban areas, or on rural roads infrastructure for pedestrians and horse traffic is not provided and those routes are not important pedestrian connections due to the existing levels of traffic.

10.8 Amenity Effects

The transport related amenity effect of the proposed quarry has been addressed to a large extent through positioning of the vehicle access away from dwellings, and access being provided direct to an arterial road which is a road type expected to accommodate through traffic including heavy vehicle movements. The arterial road network then connects to the state highway network and will accommodate most heavy vehicle movement from the quarry. Future traffic volumes will remain at a level where vehicles can access the road network from private property efficiently and safely.

There is a high level of rural residential activity alongside Two Chain Road, and the road carries a local road classification between Two Chain Road and Aylesbury Road. The proposed changes to Rolleston access and Plan Change 80 industrial development further east could result in changes to Two Chain Road, and ultimately a change in road classification. At this stage, however, it is understood no change is proposed.

Based on the convenience of movement and comparative standard of the direct route to SH1 via Aylesbury Road, the proposed quarry is expected to only utilise Two Chain Road as an option for local movements to the Rolleston Industrial area, potentially in combination with Wards Road and Kerrs Road to access the northern part of the area. The changes in traffic volumes are modest, likely representing less than 1% of generated traffic with the “Christchurch focus” distribution scenario, and approximately 6% of generated traffic spread across the available Two Chain Road and Wards Road routes with the “Selwyn focus” distribution. This level of change will not alter the function or resident use of these roads compared with existing.

It is however recommended that the unsealed local road routes of Kerrs Road and Sandy Knolls Road between Two Chain Road and Wards Road are not used due to their unsealed surfacing type. The roads in their current formation do not support regular use by heavy vehicles.

10.9 Road Asset Improvements

Aylesbury Road between the site access and Two Chain Road is currently a narrow road (currently 5.8m wide sealed width) for accommodating two way heavy vehicle movement into the future. The primary concern with an increase in heavy vehicles is that there will be increasing edge break. Large sections of edge break can contribute to an increased rate of pavement deterioration. From a road safety perspective, the road width itself does not significantly contribute to changes in road safety as drivers have good visibility of oncoming vehicles.

Assessment of the sealed road carriageway width desirable for the narrow section of Aylesbury Road between Two Chain Road and Aylesbury Road has been made with consideration to relevant guidance including:

- SDC Operative District Plan ‘Rule E10 Transport’, Table E10.5 (for new rural roads)
- Partially Operative District Plan ‘TRAN – Schedule 3 (for new roads in the GRUZ)
- Austroads ‘Guide to Road Design: Part 3 – Geometric Design’ Table 4.5
- NZS4404:2010 Land Development and Subdivision Infrastructure Table 3.2

For a road with AADT of 500-1000 vehicles per day, the following road cross-section guidance is available as indicated in **Table 10-11**.



Table 10-11: Road Cross-section Guidance

Activity	Traffic Lanes	Sealed Shoulders	Total Sealed Carriageway	Additional Unsealed Shoulder
SDC Operative District Plan – Rule E10 Transport, Table E10.5 Rural Arterial	-	-	7.5m	-
SDC Partially Operative District Plan - Rural Arterial	-	-	8.5m-9.0m	-
Austrroads Full standard (500-1,000vpd AADT)	6.2m - 7.0m	0.5m each side	7.2m- 8.0m	1.0m each side
NZS4404:2010 Rural Make and Move (E6) (Volume ~ 1,000vpd)	5.5m – 5.7m	0.5m each side	6.5m – 6.7m	0.5m each side

Wider roads cost more to construct and maintain, so a width needs to be suitably justified based on the traffic conditions expected. Although an arterial road classification exists, the road is likely to maintain a low traffic function for through traffic in the future.

It is considered a conservative cross section should be considered over the section subject to the largest change in traffic volume of Aylesbury Road from the site access to Two Chain Road to ensure a long life outcome is achievable following any widening. In this case, it is considered the 8m wide road width required by Austrroads (the standard applied for highways) would be necessary to accommodate the safe movement of trucks two-way, and address any potential long term pavement degradation and edge break risk from the narrow section of this road.

Other sections of the road are either already sufficiently wide to accommodate two-way traffic or will retain very low traffic volumes such that the quarry development would not generate effects that warrant widening. Two Chain Road east of Aylesbury Road is currently at a lower width standard and it is considered the assessed level of traffic (up to 45 heavy vehicle movements per day) can be managed through a Transportation Route Management Plan as described later.

Noting that the road is classified as an arterial road, and it is Council responsibility to ensure arterial roads are of suitable standard for the function, it is considered the Applicant should enter a Private Developer Agreement (PDA) with Council in respect of the contribution it makes to bringing forward a road upgrade that is warranted over this section of road regardless of the proposed quarry.

10.10 Railway Level Crossing

Aylesbury Road is an arterial road, and the change in traffic volumes resulting from the quarry is not significant when considered against that road function. It is expected that at the time of the design and implementation of the Waka Kotahi roundabout at SH1 / Aylesbury Road, Waka Kotahi or Council will be required to update the KiwiRail level crossings safety assessment (LCSIA) including taking account of the potential traffic volume changes. A range of design measures would be available to consider how to manage the queues generated by either SH1 (which already exist and will continue to occur in the long term regardless of the quarry), and any queue back from the railway line.



11 Effects Summary

The Site is well located on an arterial road that provides connections to SH1 Main South Road and SH73 West Coast Road. This enables most of the travel to and from the quarry to occur on the state highway and arterial road network.

Most traffic is expected to have a desired route along Aylesbury Road between the Site and SH1, and for that reason this is the area most sensitive to potential effects of changes in traffic volumes.

The existing form of intersection at SH1 / Aylesbury Road / Burnham Road is at capacity at peak times and some substantial queuing can occur. The additional of the quarry traffic is likely to exacerbate that queuing if quarry traffic coincides with the morning and evening peak period of traffic entering and exiting the Burnham Military Camp. Waka Kotahi has indicated it will be upgrading the intersection to a single lane roundabout as part of their transport network safety improvements. The intersection improvement is likely to occur in the 2024-2027 NLTP period. It is recommended that the 750vpd proposed heavy vehicle movement limit for the Site be reduced to 250 heavy vehicle movements per day until the intersection has been upgraded.

Assessment of future traffic conditions shows that the roundabout will perform well in the foreseeable future with moderate delays possible on side road approaches during peak periods in the 2035 scenario. Typical and peak quarry traffic generation will have a minor effect on performance. The level of delay is unlikely to generate safety issues. It was identified that the roundabout will be nearing its traffic carrying capacity at volumes slightly higher than those assessed, such that there is a risk that a single lane roundabout may generate some longer queuing in the long term (beyond that modelled as the foreseeable future). Any adjustments to design will be a matter for road controlling authorities to consider in future proofing design of intersection upgrades regardless of the quarry application.

The performance of the local road intersections, including those servicing Burnham Military Camp, and accesses on Aylesbury Road will continue to be at a very good level of service even on the busiest operational days at the quarry in the longer term. No changes are proposed to those intersections as a result of quarry development. Similarly, no changes are proposed for pedestrian or cycle infrastructure, as the most sensitive location past Burnham Camp already has shared paths and they will connect to a future path linking to Rolleston.

The width of Aylesbury Road south of Two Chain Road is adequate to accommodate quarry related traffic. The road is straight and there is excellent forward visibility. It is considered necessary for the section between Two Chain Road and the Site access to be widened to enable safe two-way heavy vehicle movement that minimises effects on the road pavement performance. A width of 8m is recommended based on industry standards, which essentially requires approximately 1m of widening on each side of the road over a length of approximately 1.5km. As the road is an arterial road, it is recommended that Winstone discuss the potential for inclusion of the widening in the Long Term Plan, or consider a private development agreement with Council as widening would normally be a Council role and responsibility, and essentially the quarry brings forward in time that need.

The proposed Site access will be formed to a standard that is consistent with an access standard typical of a commercial vehicle access on a state highway. That minimises the potential for pavement degradation at the access and offers a long term solution for the access. Additional provision of concrete kerbing, drainage design, and flag lighting is recommended.

Some additional road delineation could be considered for Aylesbury Road to support the increase in traffic in accordance with standards that would be expected through Waka Kotahi provisions. This would include either localised or full route edge line markings on the widened section of road, and markings to highlight the Site access.

Although the Site is surrounded by District Council roads, there is expected to be very low use of roads to the north of the Site, or of Two Chain Road. Even under the (unlikely) scenario with the quarry only servicing Selwyn District, traffic volumes will not be inconsistent with the function of the roads, with access to Arterial and Collector Roads achievable. It is however recommended that the unsealed local road routes of Kerrs Road and Sandy Knolls Road between Two Chain Road and Wards Road are not used due to their unsealed surfacing type. The use of Two Chain Road can also be managed to the levels assessed through implementation of a Transportation Route Management Plan.



Due to the constrained nature of the intersection at Aylesbury Road / Wards Road, quarry related heavy vehicle turning movements are recommended to be limited to one additional heavy vehicle movement per hour ahead of kerb adjustments at intersections. Similarly, the same provision should be made at the kerbing between Aylesbury Road (north) and Two Chain Road (east).

It is considered that with the local modifications proposed at the access and to the route connecting the site to SH1, and the planned modifications to SH1 / Aylesbury Road, the additional quarry traffic can be safely and efficiently accommodated within the transport network.



12 Transportation Route Management Plan

A transportation route management plan is sometimes adopted where a road is determined as unsuitable for heavy vehicle traffic, or where certain routes have been identified as most suitable and are to be encouraged to minimise or avoid effects on other parts of the road network.

It is important to note that the assessment has not identified any significant adverse traffic effects if some traffic utilises local routes as that level of use is predicted to only relate to small proportions of heavy vehicles, which are typical and expected to be provided for on rural roads.

In the local area, it is considered that a transportation route management plan could further support the movement of trucks by preferred routes, and particularly the route to and from SH1 via Aylesbury Road for most origin and destination points. By conveying preferred route information to those using the quarry, the assessed level of effects are more likely to be reduced (or at most realised). In this case, that would include the following provisions:

- No use of unsealed sections of Kerrs Road or Sandy Knolls Road between Aylesbury Road/Two Chain Road and Wards Road (as per proposed condition of consent)
- Use of Aylesbury Road as preferred route to connect to/from SH1.
- Minimise use of Two Chain Road unless upgraded to a standard expected to accommodate heavy vehicles. Before upgrades, Two Chain Road would only be used as an option for local movements to the Rolleston Industrial area expected to be approximately 45 heavy vehicle movements per day. A further limitation of 10 heavy vehicles per day is recommended to apply until minor kerb adjustments are made at the Aylesbury Road / Two Chain Road intersection.
- Limit use of Wards Road east of Aylesbury Road to 10 heavy vehicle movements per day until the recommended minor kerb adjustments are made at the Aylesbury Road / Wards Road intersection.

Monitoring of the management plan effectiveness can be achieved through occasional traffic surveys matching heavy vehicles entering / exiting the quarry with the movement made at the Aylesbury Road / Two Chain Road / Sandy Knolls Road / Kerrs Road intersection.



13 Operative Selwyn District Plan

The quarry site is located within the Rural Outer Plains zone of the Operative Selwyn District Plan, and is subject to rules relating to traffic generation, parking and vehicle access contained within the Rural volume of the District Plan. An assessment of the proposed development against the relevant transport rules is presented in Appendix A.

Whilst details of some site elements such as parking will be confirmed through detailed design, there is sufficient space on site to meet District Plan rules on parking layout and manoeuvring.

From a transport perspective, the proposal triggers discretionary activity status with respect to:

- Rule 4.5.1.8 - the level of traffic generation from the site, and
- Rule 9.13.1.2(a) - the proposed use of Aylesbury Road (arterial) instead of Grange Road (local) for access

It also triggers restricted discretionary activity status under Rule 4.5.1.6 with respect to the proposed layout of the access which exceeds the requirement for a heavy vehicle access on an arterial road, as well as the proposed use of Aylesbury Road (arterial) instead of Grange Road (local) for access. The matters of restricted discretion for Council to consider are set out below:

4.5.3.1 Whether the crossing is sufficiently removed from an intersection having regard to traffic volumes on the roads, and any other factors that will prevent conflict and confusion between vehicles turning at the crossing or at the intersection;

4.5.3.2 The adequacy of available sight distances having regard to the 85th percentile operating speed of vehicles on the road;

4.5.3.3 Whether there is a need to separate entry and exit in order to reduce potential traffic confusion and conflict;

4.5.3.4 Whether the physical form of the road will minimise the adverse effects of access (e.g. whether the road offers good visibility; whether a solid median barrier will stop unsafe right turns or a flush median will assist right hand turns etc);

4.5.3.5 Whether particular mitigation measures such as a deceleration or turning lane are required due to speed or volume of vehicles on the road;

4.5.3.6 The design of the crossing to enable traffic exiting the site to safely enter the traffic stream;

4.5.3.7 The location and design of the crossing in relation to pedestrian and cycle safety;

4.5.3.8 Whether there is adequate queuing and parking space on site so that vehicles do not queue over vehicle crossings or on the State Highway or Arterial Road;

4.5.3.9 Any potential cumulative effects of extra access points on the function of the State Highway or Arterial Road;

4.5.3.10 Any relevant accident history of the State Highway in the vicinity of the site; and

4.5.3.11 The particular traffic characteristics of an existing or proposed activity, including expected traffic generation, types of vehicles etc

This report has addressed these matters relating to access location, access design, traffic effects of access, and the type and extent of traffic generation that has influenced the access design location and formation proposals. Council will be able to consider these matters of restricted discretion.

Permitted activities accessing a formed and sealed Arterial Road may generate up to 30 equivalent car movements per day (ecm/d). The Site will generate traffic well above this level. The Council discretion includes but is not limited to the following assessment matters in the District Plan associated with non-compliance with Rule 9.13.1:

9.13.2.1 Any works required to the road to upgrade it to the standards set out in the Council's Engineering Code of Practice;

9.13.2.2 Any potential adverse effects of traffic on the amenity values of surrounding residents and on other uses of the road, including (but not limited to) stock droving;



9.13.2.3 In respect to the integration of land use and transport, the appropriateness of the location within the existing and planned road network;

9.13.2.4 The position and design of any vehicle crossing or vehicle access and egress;

9.13.2.5 Any positive effects which may offset any adverse effects;

9.13.2.6 Any other relevant matters including relevant objective and policies; and

9.13.2.7 Any monitoring or review conditions.

This report has addressed matters relating to traffic generation and access formation, allowing Council to consider these matters of assessment.



14 Partially Operative District Plan

The Partially Operative District Plan (Decisions Version) is still subject to an appeal period.

A detailed review of the transport rules (TRAN) as included in the current ePlan (23 August 2023 revision) is included in Appendix B.

The transport rule assessment identified areas of non compliance with permitted activity standards that require assessment against Restricted Discretionary Activity status matters. It is considered these matters have been addressed through this Integrated Transport Assessment, and further assessment within this section has not been carried out to minimise repetition. The matters of assessment are reproduced below.

TRAN R4 (Vehicle crossings): sets the trip generation of the site permitted for an activity in the rural zone, which will be exceeded.

TRAN MAT2

- 1. Any effects on the ease and safety of vehicle manoeuvring.*
- 2. Whether the boundaries of a site support the formation of the vehicle crossing or accessway.*
- 3. Whether the site can gain access from another road that is not a State Highway or Arterial Road listed in APP2 – State Highway, Arterial and Collector Road Classifications List.*
- 4. The design and location of the vehicle crossing or accessway.*
- 5. The anticipated number and type of vehicles, cycles, pedestrians or stock movements.*
- 6. Any visual effects on road design and amenity values from not forming the vehicle crossing or accessway to the specified standards*

The vehicle crossing design and location has been assessed as suitable for accommodating the high level of traffic to be generated by the proposed quarry development.

TRAN REQ2 Access to Aylesbury Road rather than Grange Road triggers discretion as follows:

- a. Whether there is a need to separate entry and exit points to reduce potential traffic confusion and conflict*
- b. TRAN-MAT1 Effects on the wider network*
 - 1. Any effects on the visibility and safety of pedestrians, cyclists or motorists.*
 - 2. Any effects, including cumulative effects, on traffic safety or the efficiency of land transport infrastructure.*
 - 3. The outcome of any consultation with the NZTA where the activity or works directly affect a State Highway.*
 - 4. The outcome of any consultation with KiwiRail where the activity or works directly affect the rail network.*
 - 5. Whether the physical form of the road will minimise any effect on access.*
 - 6. Any relevant crash history of the road in the vicinity of the site.*
 - 7. Any characteristics of a proposed activity or site that make compliance unnecessary, including expected traffic generation volumes and the types of vehicles.*
- c. TRAN-MAT2.4 The design and location of the vehicle crossing or accessway*

The access to Aylesbury Road is preferred for a heavy vehicle generating activity of this scale, as the road function better aligns with movement of heavy vehicles. Traffic volumes on Aylesbury Road are low such that the safety and efficiency of the arterial road function will not be compromised.

TRAN-REQ5 vehicle crossing design with additional widening triggers discretion as follows:

- TRAN-MAT1.7. Any characteristics of a proposed activity or site that make compliance unnecessary, including expected traffic generation volumes and the types of vehicles.*

TRAN MAT2

- 1. Any effects on the ease and safety of vehicle manoeuvring.*
- 2. Whether the boundaries of a site support the formation of the vehicle crossing or accessway.*



3. *Whether the site can gain access from another road that is not a State Highway or Arterial Road listed in APP2 – State Highway, Arterial and Collector Road Classifications List.*
4. *The design and location of the vehicle crossing or accessway.*
5. *The anticipated number and type of vehicles, cycles, pedestrians or stock movements.*
6. *Any visual effects on road design and amenity values from not forming the vehicle crossing or accessway to the specified standards*

The access design and location have been chosen to minimise effects on the road network, the location is remote from other accesses, and the higher standard of design supports higher volumes of heavy vehicle movements. It is comparable to other high heavy vehicle generating accesses on the Selwyn rural road network.

Under TRAN-R8 the level of trip generation will trigger the Basic ITA requirement, with TRAN-MAT8 (Basic) matters of discretion as follows:

1. *Whether the provision of access and on-site manoeuvring areas associated with the activity, including vehicle loading and servicing deliveries, affects the safety, efficiency, accessibility (including for people whose mobility is restricted) of the site, and the land transport network (including considering the network classification of the frontage road)*
2. *Whether the design and layout of the proposed activity promotes opportunities for travel other than private cars, including by providing safe and convenient access for travel using more active modes.*
3. *Whether the ITA has been prepared by a suitably qualified and experienced transport specialist.*
4. *Need for an ITA - Any characteristics of a proposed activity or site that are out of scope of an existing ITA but where expected traffic generation and access to existing multi modal connections mean requiring an ITA, in a manner set out in this rule, is unnecessary.*

The Basic ITA matters have a focus on access to the site and the site itself, whereas due to the overall activity status of the consent application, a wider consideration of the transport network and influences on other modes of travel has been made, more akin to a full ITA. As the type of activity will predominantly generate heavy vehicle movements in a rural area, the focus of access design and internal site design has been on safely accommodating the vehicular traffic that will be generated. Access to multimodal connections is limited for the site itself, and the focus is on assessment of effects for other multimodal users.



15 Conclusion

The proposed Burnham quarry will generate a large volume of heavy traffic, albeit not inconsistent with other major quarries in the region. The heavy traffic volume will be capped at 750 vehicle movements per day. Based on the Winstone Aggregates prior operation of the Yaldhurst Road quarry patterns, that is expected to result in a median operational day traffic volume of approximately 300 heavy vehicles per day. This is assessed as a demand requirement that may be reached in approximately 10 years, with lower levels of traffic generation expected over the first 10 years of establishment.

The Site is well located with respect to the strategic road network. There is direct access to the arterial Aylesbury Road, which connects to SH1 at its southern end and SH73 at its northern end. Approximately 95% of the generated heavy traffic is forecast to travel directly between the site and SH1 before travelling on SH1 toward Christchurch. An alternative scenario has also been developed which has a Selwyn District focus and that also indicates over 80% of all movements are likely to be to the SH1 / Aylesbury Road intersection before utilising other parts of the strategic transport network.

Access to SH1 will be constrained in the immediate short term as the existing stop sign controlled intersection with Aylesbury Road is already operating with congestion for short periods in the morning and evening peaks. The intersection also has safety concerns which a high volume of heavy vehicles could exacerbate. If the roundabout proposed by Waka Kotahi is constructed, the intersection performance will improve, and the effect of the additional heavy vehicle traffic on performance will be negligible in the short term, and potentially minor in the future.

All of the local road intersections in the area operate with very good levels of efficiency, and that is forecast to continue in the long term with the quarry. No significant changes to intersection control or intersection formation are proposed as a result of the quarry proposal. A kerb adjustment on the northeast corner of the Aylesbury Road / Two Chain Road intersection would assist with ensuring left turns from Aylesbury Road north can be completed without crossing the centreline of either road.

The addition of quarry traffic on Aylesbury Road past Burnham Military Camp will not in itself generate the need for additional infrastructure for pedestrians, although it is noted that the posted road speed limit does not support safe pedestrian crossing movement and desirably a lower speed limit would be contemplated so that infrastructure to assist crossing can be installed. That would be a matter for consideration by the Selwyn District Council separate to this consent.

Access to the quarry Site is to be located on a lower volume section of the arterial Aylesbury Road. A high standard of vehicle crossing intersection is proposed to ensure heavy vehicles are able to manoeuvre safely and mitigate any potential issue on the road pavement. No efficiency issues are expected.

The section of Aylesbury Road between Two Chain Road and the site access is currently of a narrow width for the volume of traffic proposed to be added by the quarry. It is considered necessary for the road to be upgraded over that length to ensure a durable and safe use of the road. Recognising Council has plans for the road to be upgraded in the long term, and has a role to ensure its arterial network is adequately formed, it is recommended that the Applicant enter a private developer agreement with Council to facilitate this upgrade to the road network which is currently not included in the Long Term Plan.

The internal site layout will be optimised to ensure material is not deposited on the road, and if on occasion that does occur such as due to a poorly secured load, it is recommended site management processes include the ability to sweep the road under an approved temporary traffic management plan.

The remaining generated traffic will spread across various Council roads such that the additional volume on any one road will remain low. Having considered the road classifications, and existing and future traffic volumes, it is considered that the effects of the quarry are insufficient to generate the need for the Applicant to undertake additional road improvements.

It is considered the traffic related effects of the proposed quarry will be no more than minor if the following provisions and recommendations are implemented:



- The quarry is not to generate more than 250 heavy vehicle movements per day (on any one day) prior to the SH1 / Aylesbury Road intersection being upgraded to a roundabout, and a comprehensive vehicle routing management plan is required to assess the timing of movement and minimise effects on congestion at the intersection.
- Implementation of a Transportation Route Management Plan that achieves as far as practicable:
 - Minimisation of additional congestion at the Aylesbury Road and Stage Highway intersection.
 - No use of unsealed sections of Kerrs Road or Sandy Knolls Road between Aylesbury Road/Two Chain Road and Wards Road (as per proposed condition of consent)
 - Use of Aylesbury Road as preferred route to connect to/from SH1.
 - Minimise use of Two Chain Road to no more than 45vpd unless upgraded to a standard expected to accommodate heavy vehicles. A further limitation of no more than 10 heavy vehicle movements per day turning between Aylesbury Road (north) and Two Chain Road (east) until kerb adjustments are made to support the left turn from Aylesbury Road (north).
 - Minimise use of Wards Road / Aylesbury Road intersection to no more than 10 truck and trailer movements per day unless upgraded to support the right turn from Aylesbury Road south into Wards Road east.
- After the SH1 / Aylesbury Road intersection has been upgraded, limit the daily heavy traffic volume to a maximum of 750 heavy vehicle movements per day, on any one day;
- Access is to be to Aylesbury Road, and located approximately 1.7km north of Two Chain Road
- The Site access road is to be formed with a traffic lane in each direction at least 3.5m wide, and a sealed shoulder 1.0m wide, over at least the first 100m of the road. That is to minimise the likelihood of transfer of debris onto Aylesbury Road;
- Provide truck waiting areas on entry and exit within the Site, to avoid the need for trucks to wait on Aylesbury Road to enter the Site, or to park on the road while exiting (e.g. for paperwork);
- The access to Aylesbury Road is to be formed to a Waka Kotahi commercial vehicle access standard, including widening on the eastern side of the road, and entry side of the access;
- Aylesbury Road is to be widened between the Site access intersection and Two Chain Road to an 8.0m sealed carriageway width;
- The Aylesbury Road / Two Chain Road intersection is to be upgraded to support the left turn from Aylesbury Road (north) into Two Chain Road (east) not requiring truck and trailer vehicles crossing the centreline. Where this is not provided for, limit vehicles making the movement to no more than 10 truck and trailer movements per day and monitor movements and effects.
- The Wards Road / Aylesbury Road intersection is to be upgraded to support the right turn from Aylesbury Road south into Wards Road east being made without conflicting with westbound traffic on the Wards Road approach. Where this is not provided for, limit vehicle movements making the movement to no more than 10 truck and trailer movements per day and monitor movements and effects.

With those provisions, the establishment of the quarry in this location will not prevent the roading network operating safely and functioning as intended, and the quarry proposal can be supported from a transportation engineering perspective.



Appendices



Appendix A Operative District Plan Assessment

Rule	Requirement	Provided	Compliance
Rule 4 - Roading			
4.4.1	<p>Road and Engineering Standards The forming, installation, upgrading, maintenance or replacement of any road shall be a permitted activity if the following standards are met:</p> <p>4.4.1.1 Any part of any road does not have a gradient greater than: (a) 1:6 vertical; or (b) 1:20 horizontal.</p> <p>4.4.1.2 Any road is formed to the relevant standards set out in Appendix E10.3, except that E10.3.1 shall not apply to works to existing roads undertaken by Council pursuant to the Local Government Act.</p>	Road improvements will be carried out to satisfy the 7.5-9m wide required by Table E10.5.	Yes
4.5.1.1	<p>Access Gradient Any part of any vehicular accessway does not have a gradient greater than: (a) 1:6 vertical; or (b) 1:20 horizontal.</p>	Topography is flat	Yes
4.5.1.2	<p>Access Design Standard Any vehicular accessway is formed to the relevant design and formation standards set out in Appendix 10.</p>	See Appendix 10 standards below	Yes
4.5.1.3	<p>Access Separation and Sight Distance Any vehicular accessway complies with the relevant separation and sight distance standards set out in Appendix 10.</p>	See Appendix 10 standards below	Yes
4.5.1.4	<p>Gate Position Any vehicle crossing which has a gate positioned across the vehicle crossing, has the gate either opening inwards towards the property and away from the road; or setback a minimum distance of 10 metres from the road boundary.</p>	The gate position will be set well back from the road	Yes
4.5.1.5	<p>Vehicle Crossing Vehicle crossings providing vehicle access to a sealed road is sealed: (a) For the full length of the vehicle crossing; and (b) From the edge of the carriageway to the property entrance or for the first 10 metres.</p>	Fully sealed access road beyond property boundary	Yes
4.5.1.6	Any access to a State Highway or Arterial Road complies with the following: (a) No legal access is available from another lower classification road;	(a) Access to Aylesbury Road, an arterial road, rather than the local Grange Road.	Restricted Discretionary Activity (Refer Section 13)



Rule	Requirement	Provided	Compliance
	(c) The vehicle accessway or vehicle crossing complies with the performance criteria given in Appendix E10.2.2, 10.2.3 and E10.2.4; (d) Provision is made for manoeuvring on site, so that reverse manoeuvring onto the State Highway or Arterial Road is not required.	(c) Proposed standard includes more widening than requirement (consistent with E10.C1 for a state highway access) (d)Manoeuvring can be provided on-site.	of this report for discussion of the restricted discretion matters at 4.5.3)
4.5.1.8	Site Access Preferences Any site with more than one road frontage to a road that is formed and maintained by Council, shall have access to the formed and maintained (and legal) road with the lowest classification.	Access to Aylesbury Road, an arterial road, rather than the local Grange Road	Discretionary Activity
4.6.1.3	Parking Any other activity [other than residential] is a permitted activity if, all car parking required by the Plan and loading spaces is located on-site or on land adjoining the site and not on the road reserve.	All loading spaces and parking spaces provided on-site	Yes
4.6.1.4	Car Parking Dimensions All car parking and loading spaces shall be formed to the relevant standard set out in Appendix 10.	See Appendix 10 standards below	Yes
4.6.2.1	Vehicle Manoeuvring Any other activity [other than residential] is a permitted activity if, all vehicle manoeuvring area is of sufficient size to enable any vehicle to turn on the site and not have to reverse onto the road.	On-site manoeuvring provided	Yes
4.6.3	Disabled Car Parking Any activity which involves the provision of goods or services to the general public shall be a permitted activity if the following conditions are met: 4.6.3.1 One disabled carpark is provided with the first 10 carparking spaces; and one additional disabled carpark space for every additional 50 carparking spaces provided. 4.6.3.2 The disabled carparks are: (a) Located as close to the entrance to the building or the site of the activity as practical; (b) Sited on a level surface; and (c) Clearly marked as being for mobility-impaired persons.	Can be provided	Yes
Rule 9 – Activities			
9.13.1.2 (a)	The maximum no. of vehicle movements for a permitted activity is 30ecm/d when accessed from a formed and sealed Arterial Road (averaged over any one-week period).	Greater than 30ecm/d	Discretionary Activity Refer Section 13 of this report for discussion of the discretion matters at 9.13.2)



Rule	Requirement	Provided	Compliance
Rule 10 – Transport			
E10.1.1	Minimum car park dimensions: Long term: 2.4m by 5.4m, aisle of 6.2m Medium term: 2.5m by 5.4m, aisle of 5.8m Disabled Parking: 3.2m by 5.4m, aisle of 6.2m (long term) or 5.8m (medium term).	Can be provided in compliance	Yes
E10.1.2.1	Any area for on-site parking or loading shall be available at all times for staff and visitors during the hours of operation and shall not be diminished by any subsequent erection of any structure, storage of goods, or any other use.	Can be provided in compliance	Yes
E10.1.4.1	The gradient of any on-site parking or loading area for any non-residential activity, shall be no more than: (a) At 90° to the angle of parking - 1:16; or (b) Parallel to the angle of parking - 1:20	Can be provided in compliance	Yes
E10.1.5.1	The manoeuvring area to and from any parking space shall accommodate at least the design motor car.	Can be provided in compliance	Yes
E10.1.5.2	The manoeuvring area to and from any loading space shall accommodate at least the design motor car.	Accommodating truck and trailers	Yes
E10.1.5.3	No loading space shall obstruct any on-site car parking space or any vehicle or pedestrian access.	Can be provided in compliance	Yes
E10.1.5.4	No vehicle shall be required to reverse out of any site onto a road.	Can be provided in compliance	Yes
E10.2.2.1	The required minimum distance from the site access on Aylesbury Road to the nearest intersection is 100m (Sandy Knolls Road).	Provided in compliance	Yes
E10.2.2.2	No part of any vehicle crossing shall be located closer than 30m to the intersection of any railway line.	Provided in compliance	Yes
E10.2.2.4	Any activity which generates more than 40 vehicle movements in any one day, no part of any vehicle crossing onto any arterial road shall be located closer than 60m to the departure side of any intersection; and/or 30m to the approach side of any intersection.	Provided in compliance	Yes
E10.2.3.1	Vehicle crossings onto classified roads must provide the required minimum sight distance of 282m in 100km/h speed limit area.	Provided in compliance	Yes

Rule	Requirement	Provided	Compliance
E10.2.4.4.1	Vehicle access to any site from any road or service lane shall be by way of a vehicle crossing constructed at the owner's or the developer's expense	Will be constructed at Applicant's expense	Yes
E10.2.4.4.5	Vehicle crossings to any site shall be constructed in accordance with Diagram E10.D if the crossing is to provide access to a commercial activity or is a heavy vehicle access.	Proposed standard more than requirement (consistent with E10.C1 for a state highway access)	Restricted Discretionary Activity (See 4.5.1.6)



Appendix B Partially Operative District Plan (Decisions Version) Assessment

Rule	Requirement	Provided	Compliance
TRAN Chapter Rules			
TRAN-R4 GRUZ	<p>Vehicle Crossings</p> <p>a)The vehicle crossing is located no closer to an intersection with a State Highway or arterial road than;</p> <p>i. 60m to the departure side of any intersection; and</p> <p>ii. 30m to the approach side of any intersection; and</p> <p>b)The vehicle crossing does not service any:</p> <p>i. Service station;</p> <p>ii. Truck stop; or</p> <p>iii. Activity that generates more than 40vm/d.</p> <p>And this activity complies with the following rule requirements:</p> <p>TRAN-REQ2 Access restrictions</p> <p>TRAN-REQ3 Number of vehicle crossings</p> <p>TRAN-REQ4 Siting of vehicle crossings</p> <p>TRAN-REQ5 Vehicle crossing design and construction</p> <p>TRAN-REQ6 Vehicle crossing surface</p>	<p>Access separation from intersections is satisfied.</p> <p>Access will accommodate more than 40vm/d</p> <p>Refer to assessment of TRAN-REQ2 to REQ6</p>	Restricted Discretion (TRAN-MAT2)
TRAN-REQ2	<p>Vehicle Crossing Access Restrictions</p> <p>10. Where a vehicle crossing is formed within an arterial road it shall comply with the following:</p> <p>No alternative legal access is available from a collector road or local road; and</p> <p>b. Sufficient on-site manoeuvring is available so reversing onto the arterial road shall not occur.</p>	<p>Access to arterial road rather than local road (Grange Road)</p> <p>On-site manoeuvring provided.</p>	Restricted Discretion (TRAN-REQ2.11) with Matters for Discretion in TRAN-REQ2.13.

Rule	Requirement	Provided	Compliance
TRAN-REQ3	<p>Number of vehicle crossings</p> <p>There is no more than two vehicle crossings per road frontage per site.</p>	Single access for quarry activity proposed	Yes
TRAN-REQ4	<p>Siting of vehicle crossings</p> <p>1. Vehicle crossing(s) shall:</p> <p>a. comply with TRAN-TABLE4 Intersection Separation as illustrated in TRAN-DIAG1 Intersection Separation; and</p> <p>b. be located a minimum distance of 10m from the end of any splitter or approach island to a roundabout; and</p> <p>c. comply with TRAN-TABLE5 Sight Distances as illustrated in TRAN-DIAG2 Sight Distances. ; and</p> <p>d) not be formed within a State Highway.</p>	Requirements satisfied	Yes
	<p>5. Vehicle crossing(s) shall be no closer than 30m to the intersection of any railway line when measured from the nearest edge of the vehicle crossing to the limit line at the level rail crossing.</p>	Requirements satisfied	Yes
	<p>7. Where a vehicle crossing(s) is to be formed it shall comply with the minimum access separation distances listed in TRAN-TABLE6A - Accessway separation from other accessways (200m required)</p>	Separation from other accesses well in excess of 200m	Yes
TRAN-REQ5	<p>Vehicle Crossing Design and Construction</p> <p>5. Vehicle crossing(s) (excluding those on a State Highway) shall comply with the following standards:</p> <p>b. TRAN-DIAGRAM6 - Vehicle crossing design standards - Arterial and Collector roads where</p>	A higher standard vehicle crossing is proposed with widening both sides of the road and widening on the approach from the south.	Restricted Discretion (TRAN-REQ5.6) with Matters of Discretion in TRAN-REQ5.7 (TRAN-MAT1.7 and MAT2)



Rule	Requirement	Provided	Compliance
	<p>the vehicle crossing provides access to either:</p> <p>i. a residential unit not on a local road; or</p> <p>ii. any other activity on a local road, arterial road, or collector road.</p>		
TRAN-REQ6	<p>Vehicle Crossing Surface</p> <p>1. Vehicle crossings where they adjoin a sealed carriageway shall be sealed for the full width and length of the vehicle crossing between the carriageway and the site boundary.</p>	Access will be sealed	Yes
TRAN-R6	<p>Parking, manoeuvring and loading areas</p> <p>3. Any parking, manoeuvring and loading areas associated with any activity that is not a residential activity.</p> <p>Where the activity complies with the following rule requirements (for GRUZ):</p> <p>TRAN-REQ8 Location of parking spaces</p> <p>TRAN-REQ9 On-site parking</p> <p>TRAN-REQ10 Mobility parks</p> <p>TRAN-REQ11 Cycle parks and facilities</p> <p>TRAN-REQ12 Vehicle loading areas</p> <p>TRAN-REQ13 Parking and loading gradients</p> <p>TRAN-REQ14 Access gradients</p> <p>TRAN-REQ15 Queuing spaces</p> <p>TRAN-REQ16 Vehicle manoeuvring</p> <p>TRAN-REQ17 Surface of parking and loading areas</p> <p>TRAN-REQ28 Landscape Strip for Parking Areas</p>	<p>Matters can be complied with through site design , as follows:</p> <p>REQ8: Parking will be on-site</p> <p>REQ9: N/A</p> <p>REQ10: Will be able to comply</p> <p>REQ11: N/A</p> <p>REQ12: N/A</p> <p>REQ13 and 14: Flat site in entrance area can comply</p> <p>REQ15: N/A</p> <p>REQ16: No reverse manoeuvring to road, parking spaces can meet requirements.</p> <p>REQ17: Any area accessed by the public for sale of aggregate will be metalled or sealed</p> <p>REQ28: N/A</p>	Yes
TRAN-R7	<p>Rural vehicle movements and associated parking</p> <p>Permitted vehicle movements accessing Aylesbury Road (formed, sealed, maintained by</p>	N/A	N/A

Rule	Requirement	Provided	Compliance
	SDC, <u>arterial</u> road) are not defined		
TRAN-R8	High trip generating activities Basic ITA threshold: 50 vehicles per peak hour Full ITA threshold: 120 vehicles per peak hour	Peak movements on busiest day expected to be 112vph, average approximately 30vph in a peak hour (refer Table 9-1 or ITA)	Restricted Discretion (TRANR8.2) TRANR8.2.3.a Basic ITA threshold Required per TRAN-MAT8





DESIGN WITH COMMUNITY IN MIND

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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