Appendix 4

Traffic Impact Assessment

prepared by

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Strontian Quarry
Road Transport Assessment

Prepared for:

R.W. Corkery & Co. Pty Limited on behalf of
Milbrae Quarries Pty Limited

26 October 2020

The Transport Planning Partnership

Strontian Quarry

Road Transport Assessment

Client: R.W. Corkery & Co. Pty Limited on behalf of Milbrae Quarries Pty Limited

Version: Final

Date: 26 October 2020

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APPENDICES

1 Introduction

This report has been prepared on behalf of Milbrae Quarries Pty Limited (Milbrae Quarries) to present the findings of an assessment of the road transport implications of a proposal to increase the annual production rate at the Strontian Quarry (the Quarry), located approximately 11 kilometres (km) southeast of Narrandera, New South Wales (NSW).

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) relating to the road transport environment. Inputs to the SEARs from authorities relevant to the road transport environment have also been considered in the preparation of this assessment. The SEARs and agency inputs are set out in Table 1.1.

Table 1.1: Coverage of SEARs and Agency Requirements Relevant to Traffic

Paraphrased Relevant Requirement		Relevant Section(s)
Coverage of Secretary's Environmental Assessment Requirements in the EIS		
• accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products;		Section 4.1
• an assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road networks, detailing the nature of the traffic generated, transport routes, traffic volumes and potential impacts on local and regional roads;		Section 4
• a description of the measures that would be implemented to maintain and/or improve the capacity, efficiency and safety of the road network (particularly the proposed transport routes) over the life of the development;		Section 4.10
• a description of access roads, specifically in relation to nearby Crown roads and fire trails;		Section 3.1 Section 3.3
Agency Inputs – Traffic and Transportation		
Narrandera Shire Council 21 August 2019	School bus safety is a risk matter that needs to be carefully considered. It is likely the bus would pass one of the gravel trucks a couple of times per week. When passing, the bus and the truck will be potentially moving at relatively !ow speed due to approaching or departing the highway intersection at the time. The road at this location has sufficient width for two vehicles to pass, however for school bus safety the developer would be required to fund the following works: • the road shoulders of this section of road be carefully graded • extra gravel be placed on the shoulders • 1 metre extra bitumen width be added each side	Section 4.5 Section 4.6
	The developer would be required to fund the following works between 50m south of the quarry entrance up to the highway intersection (total approximately 300 metres) to safely accommodate the additional truck movements: • Each side of the road to have 2 metre width of shoulder graded smooth and level to the bitumen with additional gravel brought in as required • Each side of the road to have 1 metre additional width of bitumen seal placed, making total bitumen width about 8 metres • At the entrance to quarry the seal and gravel shoulder to curve into the driveway such that large trucks will keep their wheels on the bitumen	Section 4.5 Section 4.6
NSW DPI – Agriculture 11 June 2019	Consideration of the route for movements needs to be taken in to account so that impacts on sensitive receptors are minimised (e.g. noise, dust, volume of traffic). This should include consideration of Travelling Stock Reserves 1 (TSR) and the movement of livestock or farm vehicles along / across the affected roads.	Section 4.8 Section 4.10

Paraphrased Relevant Requirement		Relevant Section(s)
Roads & Maritime Services 20 June 2019	The impacts of the proposed development, including additional traffic generation rate, needs to consider the impacts due to the increased from the approved rate to the proposed 125,000 tonnes per annum.	Section 4
	A Traffic Impact Assessment (TIA) should be prepared to outline measures to address and manage traffic related Issues generated by the development. The documentation submitted should address the potential impacts on the road network associated with the development during the lifetime of the project. the works required to the existing road infrastructure the measures to be implemented to maintain the standard and safety of the of the road network. and the procedures to monitor and ensure compliance. A Transport Management Plan and Driver Code of Conduct may be required to outline measures to manage traffic related issues generated by the development.	This report
	Any Traffic Impact Assessment needs to address the impacts of traffic generated by this development upon the nearby road network, particularly intersections.	Section 4.4
	As a minimum the TIA is to address the existing and anticipated additional traffic generation on the surrounding road network. peak traffic volumes, vehicle types travel routes for vehicles accessing the site and provide recommendations for any mitigation measures such as intersection upgrades, considered necessary to address traffic related impacts.	Section 4.1 Section 4.2 Section 4.5 Section 4.6 Section 4.10
	Roads and Maritime emphasises the need to appropriately consider and minimise the impacts on the development on the existing road network and maintain the level of safety, efficiency and maintenance along the existing road network.	Section 4

The remainder of this report is set out as follows:

- Section 2 describes the existing and proposed operations at the Quarry and its vehicular access arrangements;
- Section 3 describes the existing road transport environment, including traffic volumes, operational performance and road crash history.
- Section 4 assesses traffic impacts of the Proposal, including its peak traffic generation and the effects on operational performance and road safety on access routes. The need for measures to mitigate impacts of the Proposal is discussed.
- Section 5 presents the conclusions of the study.

2 Existing and Proposed Operations

2.1 Site Location

The Quarry is located approximately 11 km southeast of Narrandera, and is accessed via Strontian Road, approximately 250 m south of its intersection with Sturt Highway. The Quarry's location in the region is outlined in red in Figure 2.1.

2.2 Existing Quarry Operations

The Quarry commenced operations in 2012, and is currently operating under Development Consent DA27/2011/12, issued to Milbrae Quarries by Narrandera Shire Council (Council) in 2012. The Quarry currently has approval to extract and process up to 150 tonnes (t) per day or 30,000 tonnes per annum (tpa) of indurated sandstone material. The extracted material is processed on site in crushing and screening campaigns using mobile equipment brought to the Quarry, prior to transportation to their points of use.

While the Quarry operates on a campaign basis, its operating hours are between 6:00 am and 6:00 pm Monday to Friday, and 8:00 am to 5:00 pm on Saturdays. There is typically three or four employees on site each day during extraction and processing campaigns.

The Quarry has an approved maximum extraction rate of 30,000 tpa, with transportation of products from the Quarry being by road, with a maximum of 150 t of products per operating day. This maximum may occur up to 200 days per year, although the Quarry may operate throughout the year if lower volumes are transported. The transport of products uses truck and dog combinations, with a maximum capacity of 38 t and an average payload of 30 t. The current transport of up to 150 t of products per day therefore generates five loads per operating day.

The transport of products uses the Quarry Access Road and Strontian Road, and the distribution of the total demand for quarry products is approximately:

- 60 percent north to Sturt Highway then north towards Narrandera;
- 25 percent north to Sturt Highway then south towards Wagga Wagga; and
- 15 percent south on Strontian Road towards Boree Creek.

The existing Quarry transport routes are presented in Figure 2.2.

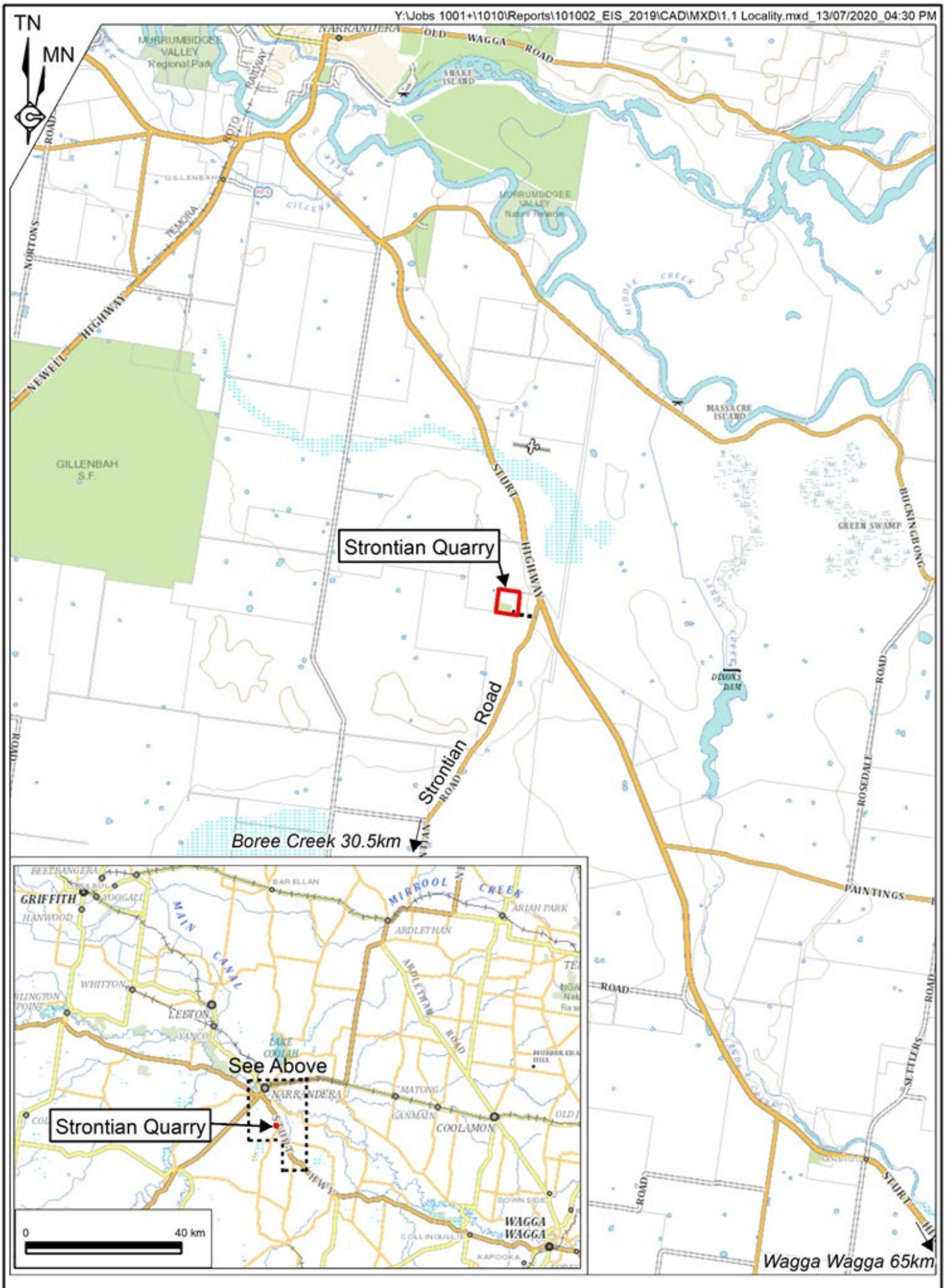


Figure 2.1
Regional Location

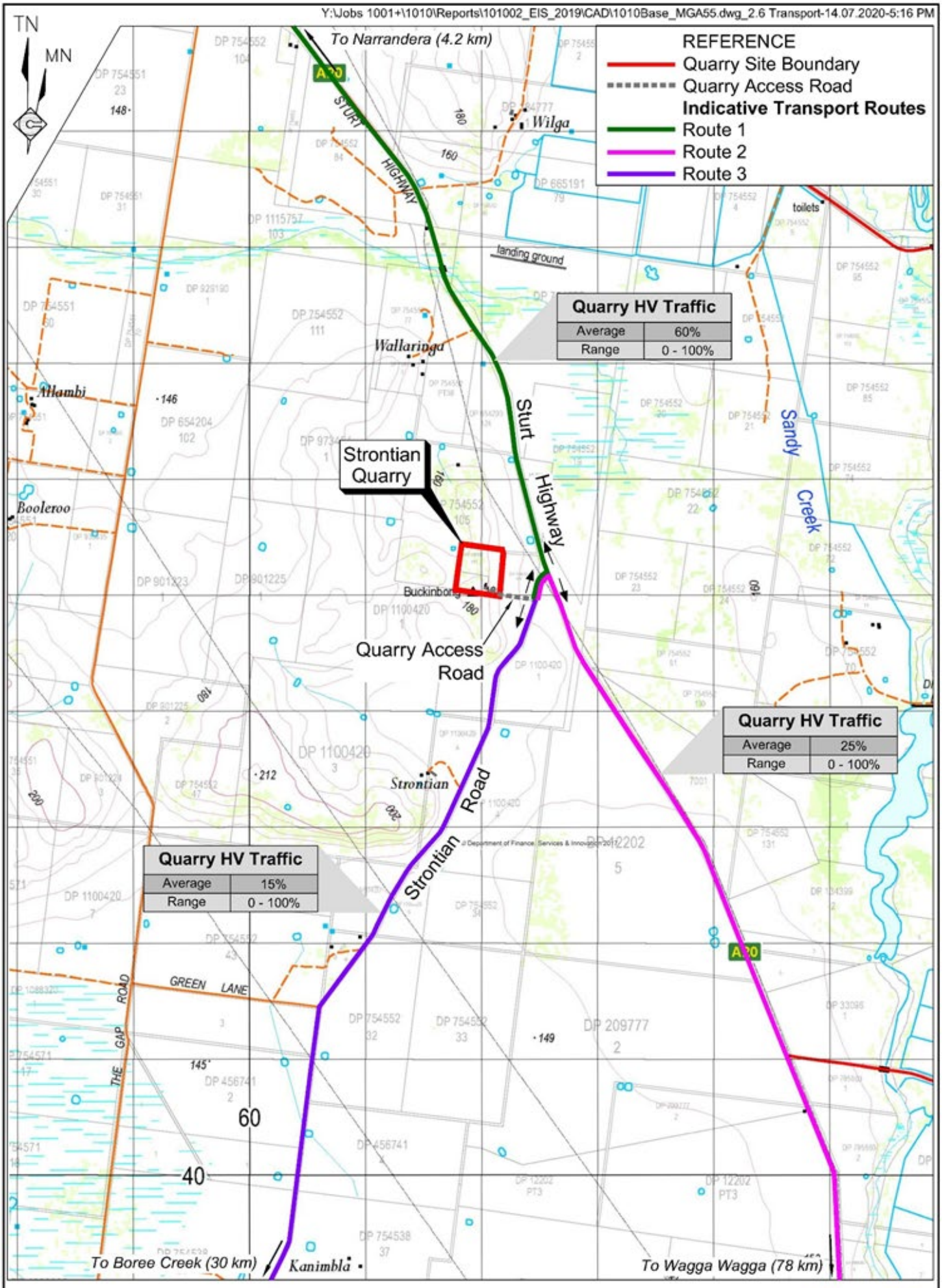


Figure 2.2
Existing and Proposed Quarry Heavy Vehicle Access Routes

2.3 Proposed Quarry Operations

Milbrae Quarries proposes to extract a further 2.97 million tonnes of indurated sandstone material located adjacent to and beneath the current approved extraction area (the Proposal). Extraction would be undertaken at an average rate of 100,000 tpa and a maximum of 125,000 tpa, in order to meet existing and anticipated future market demands. Up to 1,500 tpa of concrete washout and other construction materials would also be imported to the Quarry for recycling and incorporation in quarry products. Upgrades to Strontian Road in the vicinity of the Quarry would be undertaken during site establishment.

Extraction and processing operations would occur on a campaign basis, with approximately four campaigns required per year. Each campaign would be between 20 and 30 days in duration. Products would be stockpiled, and loading and transportation activities would occur throughout the year, with the level of activity at any time being dependent upon demand.

Transport of products would continue to use the existing transport routes via the Quarry Access Road and Strontian Road (Figure 2.2). The distribution of the total demand for quarry products is expected to be similar to the existing conditions (refer to Section 2.2). The operating hours would remain consistent with the current operating hours, and the Proposal would continue to employ three to four people on site each operating day. The Proposal would operate for approximately 30 years from the commencement of operations under the new consent.

3 Existing Road Transport Environment

3.1 Road Network and Intersections

The road network serving the Quarry is described below.

Quarry Access Road is a private roadway which extends westwards from Strontian Road, and is used by all Quarry-generated vehicles. The access road is approximately 8 metres (m) wide, with a sealed surface and gravel shoulders. Access to the Quarry Access Road is controlled by a gate, which restricts the road to a single lane width, although the road width would permit two way access and a locked gate prevents access via the full road width. Sight distance for vehicles approaching the gate in both directions, such that drivers have adequate warning of a vehicle approaching from the opposite direction. The Quarry Access Road has no signposted speed limit and no centre or edge linemarking.

Strontian Road is a sealed two lane, two-way road with unsealed shoulders. It provides a north-south link between Sturt Highway in the north and Boree Creek in the south. In the vicinity of the site, Strontian Road is generally approximately 6 m wide, with localised widening on both sides near the Quarry Access Road to facilitate the movement of trucks turning left from the Quarry into Strontian Road, and to allow a southbound vehicle to pass around a truck which has slowed to turn right into the Quarry. It has gravel shoulders, and no centre or edge linemarking beyond edgelines at the intersection with Sturt Highway. Sight distances available at its intersection with the Quarry Access Road are satisfactory.

Sturt Highway provides a major east-west link from Hume Highway at Tarcutta, via Wagga Wagga, Narrandera, Hay, Balranald, Gol Gol and Buronga to the Victorian border at Mildura, then continues west to Adelaide. In the vicinity of Strontian Road, Sturt Highway has a single travel lane in each direction with sealed shoulders, typically a single broken centre line and unbroken edgelines and guideposts. It has a posted speed limit of 100 km/h.

Its intersection with Strontian Road, Sturt Highway is constructed with a widened sealed shoulder opposite Strontian Road, to allow southbound vehicles to pass around a vehicle which has slowed to turn into Strontian Road. Widened shoulders are also provided to assist vehicles turning left into and out of Strontian Road. There is no "give way" signage or linemarking at the intersection. There is an advance warning sign of the approaching intersection for drivers in Strontian Road, and a bidirectional hazard marker also alerts those drivers to the intersection. Sight distances available for drives at the intersection are satisfactory.

3.2 Travelling Stock Reserves

Travelling Stock Reserves (TSRs) are parcels of Crown land reserved under legislation for use by travelling stock. TSRs provide pasture reserves for travelling or grazing stock, and are also used for public recreation, apiary sites and for conservation and are categorised depending on their level and type of use. Use of TSRs requires a permit, and stock are only to be walked over TSRs during daylight hours, and yarded at night. When stock are on or near a road, approved warning signs must be displayed for motorists.

There is no TSRs along Strontian Road. Within approximately 10 km of Strontian Road along Sturt Highway, there is a Category 2 TSR south of Strontian Road, known as Yorkies Plain (R17805 and R67276) on the eastern side of Sturt Highway. To the north of Strontian Road, there is two Category 2 TSRs along Sturt Highway, known as Poison Waterholes (R2126) which straddles both sides of Sturt Highway, and Millthorpes (R37598) which lies on the eastern side of Sturt Highway. Category 2 TSRs are used for travelling stock, emergency management or biosecurity purposes, but also other reasons, e.g., biodiversity conservation, Aboriginal cultural heritage or recreational purposes.

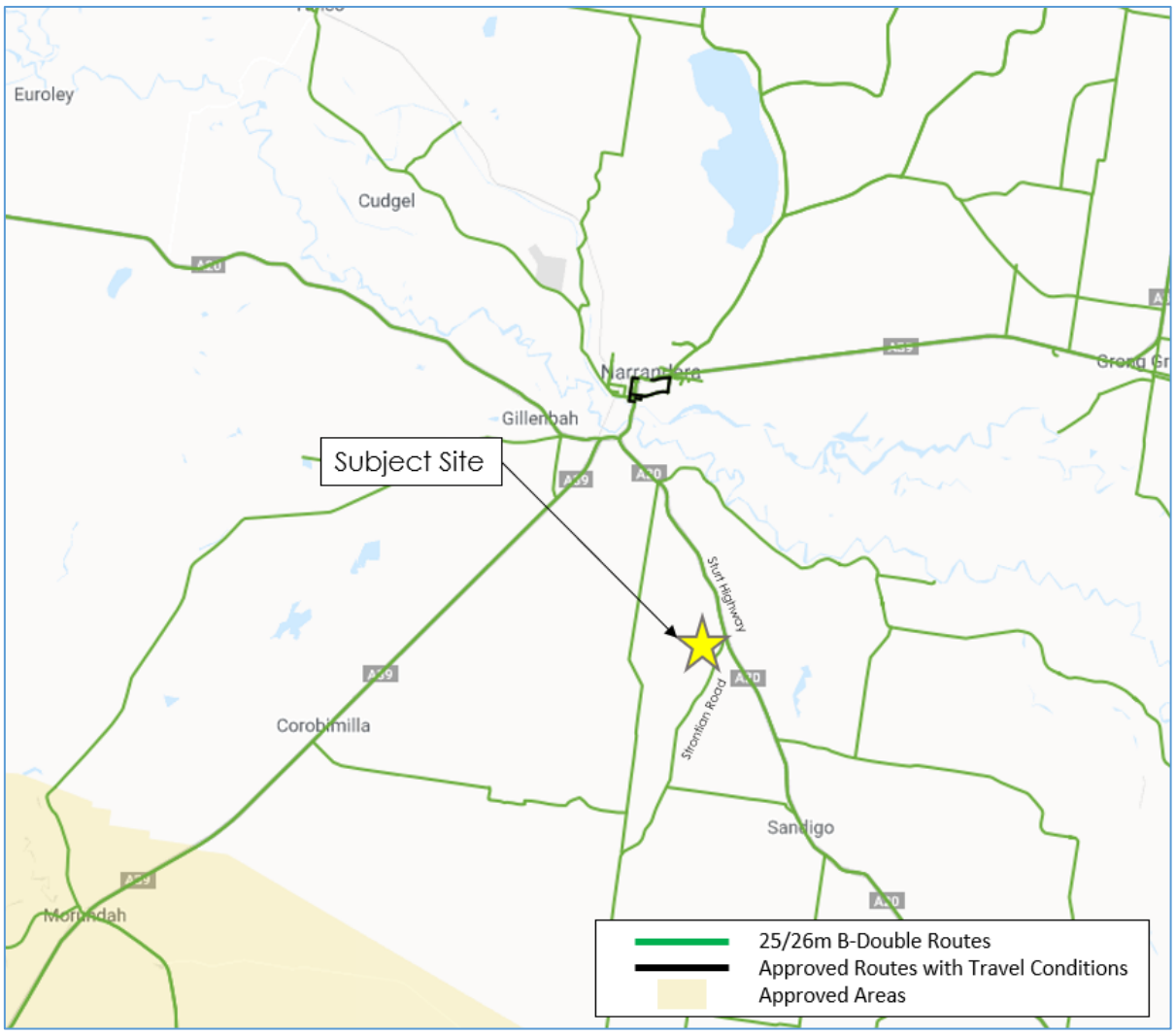
3.3 Fire Trails

NSW Rural Fire Service MIA District office has advised TTPP that there are no fire trails registered in the vicinity of the Quarry or its access routes. No further consideration has therefore been given to the potential impact of the Proposal on fire trails.

3.4 Heavy Vehicle Routes

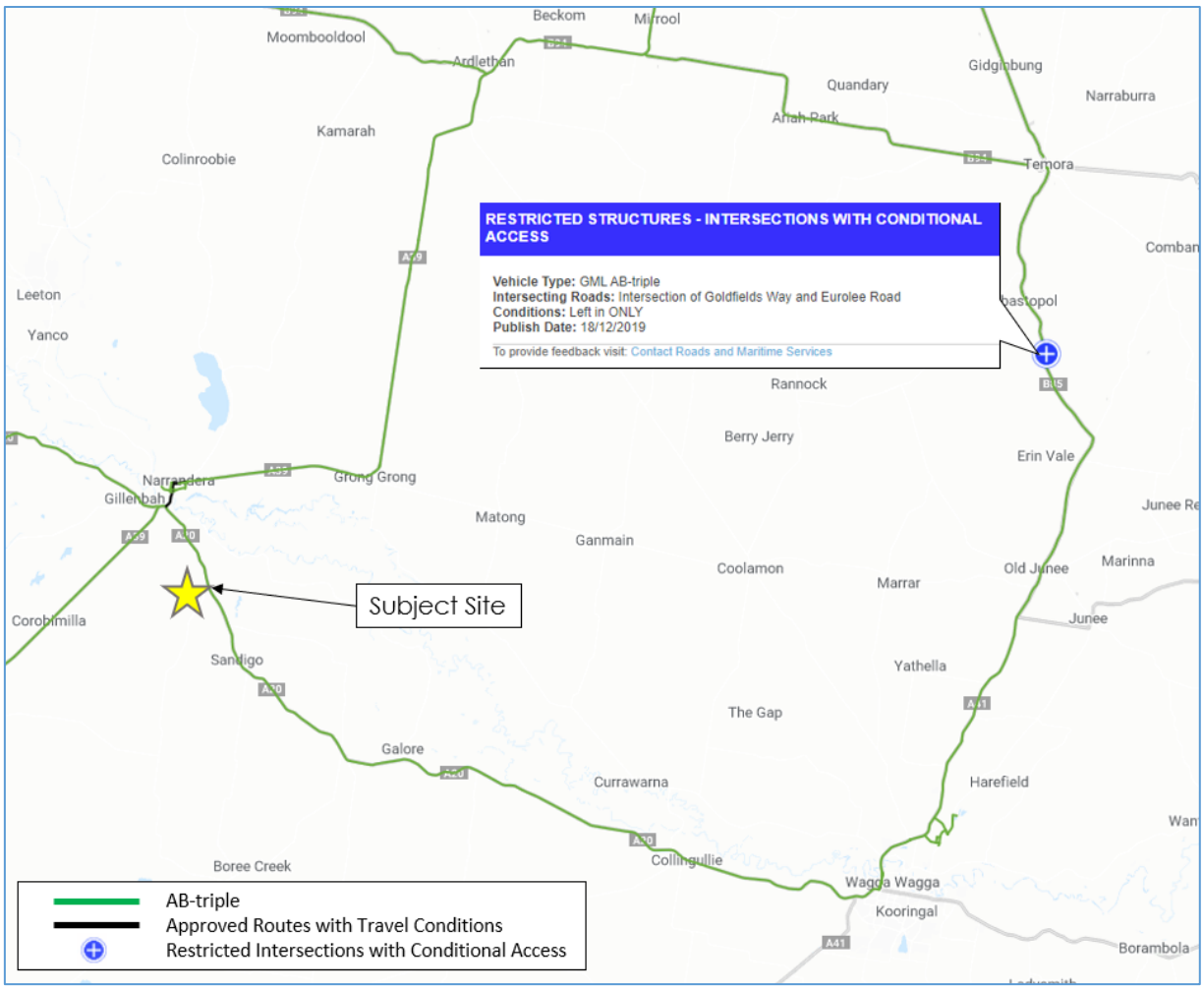
The approved routes for B-double access in the region are shown in Figure 3.1, while Figure 3.2 illustrates the approved road train routes. Sturt Highway and Strontian Road between Sturt Highway and Boree Creek are both approved routes for use by 25/26 m GML B-doubles, and Sturt Highway is approved for use by up to AB-triples subject to conditions. At the intersection of Goldfields Way and Eurolee Road between Junee and Temora, there is a 'Left In Only' condition.

Figure 3.1: NSW Approved Heavy Vehicle Routes



Source: National Heavy Vehicle Regulator (NHVR) Route Planner

Figure 3.2: NSW Approved Road Train Routes



Source: NSW Road Train Network

3.5 Traffic Volumes

3.5.1 Historic Traffic Volumes

Transport for New South Wales (TfNSW) collects and publishes traffic volume data at selected locations on its roads. Available data on roads in the vicinity of the Quarry site were reviewed and collated, noting that only limited data is available in this region. The closest TfNSW count stations are located on Sturt Highway 90m south of Kywong Boree Creek (Station ID: 95072) and 50m south of Newell Highway (Station ID: 95244).

Data have not been collected at station 95072 and 95073 since 2011. Notwithstanding, the available Annual Average Daily Traffic (AADT) data are presented in Table 3.1.

Table 3.1: Historic Traffic Volume Data

Station ID	Data Period	Average Vehicles per Day	
		All Days	Weekday
Sturt Highway (95072)	22 February 2006 – 9 March 2006	1,490	1,591
	1 March 2010 – 23 March 2010	2,043	2,144
Sturt Highway (95073)	2 November 2006 – 7 November 2006	2,238	2,382
	19 July 2010 – 2 August 2010	2,164	2,312
	30 November 2011 – 11 December 2011	2,449	2,678

3.5.2 Traffic Survey Program

To quantify existing traffic conditions in the vicinity of the Proposal, automatic tube counters were used to collect traffic data on:

- Quarry Access Road west of Strontian Road;
- Strontian Road between the Quarry and Sturt Highway; and
- Sturt Highway south of Strontian Road.

The surveys were conducted over one week from Sunday 16 February to Saturday 22 February 2020 inclusive and survey results are presented in Appendix A.

3.5.3 Surveyed Traffic Volumes

The surveys collected details of the day-to-day variation in traffic and the composition of the traffic based on standard vehicle classifications. Light vehicles include motorcycles, cars, vans, four-wheel drives (4WDs), and utilities (including those towing a trailer or caravan). Heavy vehicles include single unit trucks and buses and articulated vehicles such as semitrailers, rigid trucks with trailers, B-doubles and road trains.

Table 3.2 presents a summary of the daily traffic volumes at the surveyed locations, being the total number of vehicles passing the surveyed location in both directions of each 24-hour period.

Table 3.2: Surveyed Daily Traffic Volumes 2020 (vehicles per day)

	Quarry Access Road		Strontian Road		Sturt Highway	
	Light	Heavy	Light	Heavy	Light	Heavy
Monday	12	36	76	27	1,457	708
Tuesday	10	36	74	27	1,445	805
Wednesday	6	31	66	25	1,590	889
Thursday	16	39	88	23	1,633	835
Friday	12	43	84	9	1,842	772
Saturday	0	1	78	8	1,558	477
Sunday	0	2	46	5	1,356	444
Average Day	**8**	**27**	**73**	**18**	**1,554**	**704**
Average Weekday	**11**	**37**	**78**	**22**	**1,593**	**802**

The results in Table 3.2 demonstrate that heavy vehicle volumes on Sturt Highway are noticeably lower on weekdays than on weekend days. As weekdays are the busier days, this assessment will consider the average weekday conditions rather than average daily conditions. At the time of the traffic surveys, the Quarry generated an average of 37 heavy vehicle trips per weekday.

The surveyed temporal distribution of traffic throughout the average weekdays is presented in Figure 3.3. It demonstrates that on Sturt Highway, there is distinct peaks in two-way traffic in the morning and evening, with slightly lower volumes carried through the middle of the day. Strontian Road and the Quarry Access Road have no distinct peaks in traffic.

Figure 3.3: Average Weekday Hourly Traffic Distribution

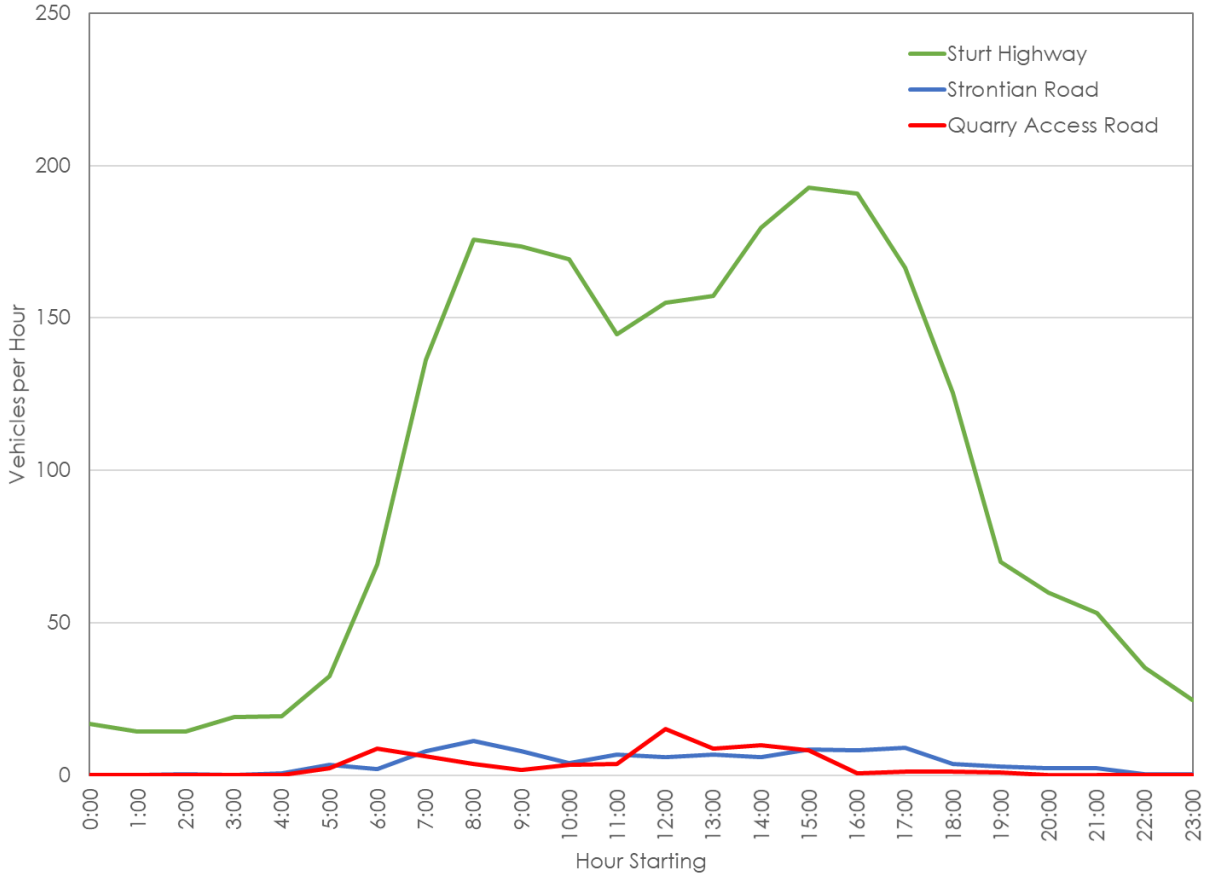


Table 3.3 presents a summary of the surveyed peak hourly traffic volumes at the surveyed locations over the average weekday, being the highest number of vehicles passing the surveyed location in both directions during any one hour before or after midday.

Table 3.3: Surveyed Weekday Peak Hour Traffic Volumes 2020 (vehicles per hour)

	AM Peak Hour			PM Peak Hour		
	Hour	Light	Heavy	Hour	Light	Heavy
Quarry Access Road west of Strontian Road	6:00	0	5	12:00	1	8
Strontian Road south of Sturt Highway	8:00	9	3	17:00	7	2
Sturt Highway south of Strontian Road	8:00	123	52	15:00	145	48

The results in Table 3.3 demonstrate that on weekdays, the highest traffic volumes do not coincide on the three surveyed roads. The overall busiest hour on Sturt Highway occurred during the mid-afternoon, while average weekday peak hour volumes on Strontian Road and the Quarry Access Road were very low.

3.6 Road Safety History

Road crash information was obtained from Transport for New South Wales across the period between 1 July 2015 and 30 June 2019 for those roads in proximity to the Quarry and identified as Quarry heavy vehicle routes. The data include crashes which conform to the national guidelines for reporting and classifying road vehicle crashes based on the following criteria:

- The crash was reported to the police.
- The crash occurred on a road open to the public.
- The crash involved at least one moving vehicle.
- The crash involved at least one person being killed or injured or at least one motor vehicle being towed away.

The review included Strontian Road for approximately 2.5 km south of Sturt Highway, and Sturt Highway over approximately 5 km north and 8 km south of Strontian Road. Key findings of the review of the crash history on those routes which may be used by Quarry heavy vehicles are summarised below. Over the period investigated, eight crashes were reported, all of which occurred on Sturt Highway. Key features of those crashes are presented in Table 3.4.

Table 3.4: Road Crash History Summary

Time and Date	Conditions	Crash Details
13:10 on 1 August 2015	Daytime, overcast weather and wet road surface	A northbound large rigid truck struck the rear end of a northbound 4WD turning right into Paintings Bridge Road.
16:57 on 21 August 2016	Daylight, fine weather and dry road surface	A westbound car left the carriageway to the left on a left hand bend and struck a tree/bush, approximately 2.6 km north of Strontian Road. Loose gravel was present on the shoulder. The driver was distracted by something outside of the vehicle and speeding was nominated as a contributing factor.
16:45 on 11 February 2017	Daylight, raining and wet road surface	A northbound light truck struck the rear end of a northbound car, 500m south of Quilters Road. One person was seriously injured.
14:00 on 22 August 2017	Daylight, fine weather and dry road surface	A southbound station wagon left the straight carriageway to the left and struck a guide post. One person was seriously injured. Fatigue was nominated as a contributing factor.
01:30 on 19 September 2017	Darkness, raining and wet road surface	A northbound car left the straight carriageway to the left and struck a tree/bush, 5km south of Strontian Road. One person was seriously injured. Fatigue was nominated as a contributing factor.
05:46 on 19 February 2018	Dawn, fine weather and dry road surface	A northbound car left the straight carriageway to the left and struck a barrier, 300m south of Quilters Road.
14:00 on 12 February 2019	Daylight, unknown weather and dry road surface	A southbound B-double struck the rear end of a southbound 4WD, 300m south of Quilters Road. Thick raised dust was present at the time.
11:25 on 4 June 2019	Daylight, fine weather and dry road surface	A westbound 4WD left the carriageway to the right on a left hand bend and rolled over, 5km east of Narrandera. Fatigue was nominated as a contributing factor.

Fatigue was nominated as a contributing factor in three of those crashes, and speeding was nominated as a contributing factor in one crash. Of the 11 vehicles involved in the crashes, two were heavy vehicles (one large rigid truck and one B-double).

Five of the crashes involved loss of control of a single vehicle which left the carriageway, four of which then struck an object such as a tree or guardrail. Three of the crashes were rear-end crashes.

The road crash history does not highlight any clustering of crashes that might suggest an inherent concern with the design of the road at that location.

3.7 Background Traffic Growth

Changes to existing traffic conditions can be expected to occur which are not directly attributable to any specific development. For the purpose of this assessment, an average growth rate of 2.0 per cent per annum has been assumed to occur on the Quarry heavy vehicle routes in the future, increasing the background peak hourly and daily traffic volumes over time.

A future horizon assuming ten years of growth has been adopted, and the resulting traffic volumes are summarised in Table 3.5. The baseline conditions in 2030 assume that the Quarry continues to operate at the same level as was occurring during the traffic survey program in 2020. As a robust assessment however, the forecast growth has been applied to all traffic, and therefore assumes that existing Quarry-generated traffic on the public roads would also increase at the same rate.

Table 3.5: Surveyed and Baseline Future Traffic Volumes

	AM Peak[A] (vehicles per hour)		PM Peak[A] (vehicles per hour)		Daily (vehicles per day)	
	Light	Heavy	Light	Heavy	Light	Heavy
Surveyed 2020						
Quarry Access Road west of Strontian Road	0	5	1	8	11	37
Strontian Road south of Sturt Highway	9	3	7	2	78	22
Sturt Highway south of Strontian Road	123	52	145	48	1,593	802
Baseline 2030[B]						
Quarry Access Road west of Strontian Road	0	5	1	8	11	37
Strontian Road south of Sturt Highway	11	4	9	2	95	27
Sturt Highway south of Strontian Road	150	63	177	59	1,942	978

[A] *Time of peak hours at each location are presented in Table 3.3.*
[B] *With Quarry operating at 2020 surveyed level of activity*

Table 3.5 indicates that with ten years of background growth on the public roads, and the Quarry operating at the same level as surveyed in 2020, Sturt Highway can be expected to carry up to 236 vehicles per hour (during the PM peak hour) and 2,920 vehicles per day. Strontian Road north of the Quarry Access Road can be expected to carry up to 15 vehicles per hour (during the AM peak) and 122 vehicles per day.

3.8 Road Network Efficiency

3.8.1 Midblock Level of Service

The capacity of a road is defined as the maximum hourly rate at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under the prevailing roadway, traffic and control conditions. The capacity of a single traffic lane will be affected by factors such as the pavement width and restricted lateral clearances, the presence of heavy vehicles and grades.

Level of Service (LOS) is defined as a qualitative measure describing the operational conditions within a traffic stream as perceived by drivers and/or passengers. A LOS definition generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety. LOS A provides the best traffic conditions, with no restriction on desired travel speed or overtaking. LOS B to D describes progressively worse traffic conditions. LOS E occurs when traffic conditions are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre in the traffic stream. The service flow rate for LOS E is taken as the capacity of a lane or roadway. In rural situations, LOS C is generally considered to be acceptable. At LOS C, most vehicles are travelling in platoons, and travel speeds are curtailed. At LOS D, platooning increases significantly, and the demand for passing is high, but the capacity to do so is low. The LOS experienced by drivers on two-way rural roads is dependent on the drivers' expectations regarding the road.

The Austroads (2017a) *Guide to Traffic Management Part 3: Traffic Studies and Analysis* provides guidelines for the capacity and performance of two lane, two-way rural roads, which in turn, refers to the *Highway Capacity Manual* (HCM) (Transportation Research Board, 2016).

The LOS experienced by drivers on two-way rural roads is dependent on the drivers' expectations regarding the road, and three classes of road are defined in the HCM. Class I roads are those on which motorists expect to travel at relatively high speeds. They most often serve long-distance trips or provide connecting links between facilities that serve long-distance trips. Class II roads are those on which motorists do not necessarily expect to travel at high speeds, and may function as access routes to Class I facilities, serve as scenic or recreational routes or pass through rugged terrain. Class III roads serve moderately developed areas, and may be portions of a Class I or Class II highway that pass through small

towns or developed recreational areas, where local traffic mixes with through traffic, and the density of unsignalised roadside access points increases.

On Class I roads, LOS is defined in terms of Percent Time Spent Following (PTSF) and Average Travel Speed (ATS), with the worst of these criteria being adopted as the LOS. On Class II roads, LOS is defined only in terms of PTSF. The PTSF is a measure of the level of opportunities to overtake, and is estimated from the demand traffic volumes, the directional distribution of that traffic, and the percentage of no-passing zones. On Class III roads, LOS is defined in terms of Percent of Free-Flow Speed (PFFS), which is the ratio of ATS to the free-flow speed, representing the ability of vehicles to travel at or near the posted speed limit. The LOS criteria for two lane roads are as shown in Table 3.6.

Table 3.6: LOS Criteria for Two Lane Two Way Roads

Level of Service	Class I		Class II	Class III
	Average Travel Speed (km/h)	PTSF (percent)	PTSF (percent)	PFFS (percent)
A	> 90	≤ 35	≤ 40	> 91.7
B	> 80 – 90	> 35 – 50	> 40 – 55	> 83.3 – 91.7
C	> 70 – 80	> 50 – 65	> 55 – 70	> 75.0 – 83.3
D	> 60 – 70	> 65 – 80	> 70 – 85	> 66.7 – 75.0
E	≤ 60	≥ 80	≥ 85	≤ 66.7

Source: Austroads (2017a)

Strontian Road is considered to be a Class II route, while Sturt Highway may be either Class I or Class II, as drivers would expect some level of delay. For the purpose of this assessment, it has been analysed as a Class I road, which means drivers are more sensitive to the effects of interaction with other traffic on the route. Table 3.7 summarises the results of the assessment of midblock LOS on the surveyed roads. The HCM method does not apply to the Quarry Access Road due to its low operating speed, and it is noted that the peak hour volumes are sufficiently low that drivers would experience negligible interaction with other drivers at all times.

Table 3.7: Average Weekday Midblock Level of Service

Road	Direction[A]	AM Peak Hour[B]		PM Peak Hour[B]	
		PTSF (%)	LOS	PTSF (%)	LOS
Surveyed 2020					
Strontian Road south of Sturt Highway	Inbound	8	A	13	A
	Outbound	21	A	19	A
Sturt Highway south of Strontian Road	Inbound	28	A	26	A
	Outbound	25	A	31	A
Baseline 2030					
Strontian Road south of Sturt Highway	Inbound	7	A	14	A
	Outbound	22	A	19	A
Sturt Highway south of Strontian Road	Inbound	32	A	29	A
	Outbound	29	A	35	A

[A] *Direction of travel relative to the Quarry.*
[B] *Time of the peak hours at each location are presented in Table 3.3.*

The results indicate that midblock levels of service on Strontian Road and Sturt Highway are currently good during the surveyed morning and evening peak hours. With background growth in traffic demands which are unrelated to the Proposal, levels of service would remain at their current levels, with drivers experiencing only minor delays as a result of other traffic.

3.8.2 Operation of Intersections

At unsignalised intersections with minor roads, where there are relatively low volumes of through and turning vehicles, capacity considerations are usually not significant, and detailed analysis of capacity is not warranted. As a guide, at volumes below the following combinations of maximum hourly volumes at a cross intersection with a two lane two-way road, capacity analysis is not warranted:

- major road 400 vehicles per hour, minor road 250 vehicles per hour;
- major road 500 vehicles per hour, minor road 200 vehicles per hour; and
- major road 650 vehicles per hour, minor road 100 vehicles per hour.

Comparing the surveyed and baseline traffic volumes with the threshold volumes above, it is evident that the peak hourly volumes are well below the threshold volumes for analysis, and as such, there is no capacity concerns regarding the operation of the intersection of Strontian Road with Sturt Highway and with the Quarry Access Road.

4 Impacts of the Proposal

4.1 Traffic Generation

The Proposal anticipates an annual production rate of an average of 100,000 tpa up to a maximum of 125,000 tpa of sandstone material. On this basis, Table 4.1 compares the average daily trips generated by the haulage of material for the proposed average and maximum annual production rates. This assumes continuous transportation throughout 50 weeks per year, 12 hours per weekday and nine hours per Saturday, i.e. total 3,450 operating hours per year. For clarity, a trip is a one way movement, so an empty truck arriving at the Quarry and departing generates two vehicle trips.

As haulage would occur on a campaign basis, the number of trips during any particular hour or day would vary from the average. A maximum of 12 trucks would be loaded and depart the site in any one hour, generating up to 24 vehicle trips per hour with the return of empty trucks. This maximum would only occur for very short periods only, with a maximum of 48 truckloads departing the Quarry on any one day, which would generate up to 96 vehicle trips per day as shown in Table 4.1.

Table 4.1: Average and Maximum Proposal Material Haulage Trip Generation

	Average Production 100,000 tpa	Maximum Production 125,000 tpa
Loads per year (average 30 t per load)	3,333	4,167
Vehicle trips per year	6,666	8,334
Average Trip Generation		
Average Loads per hour	1.0	1.2
Average Vehicle Trips per Hour	**2.0**	**2.4**
Loads per Weekday	12	15
Average Vehicle Trips per Weekday	**24**	**30**
Loads per Saturday	9	11
Vehicle Trips per Saturday	18	22
Maximum Trip Generation		
Maximum Loads per Hour	12	12
Maximum Vehicle Trips per Hour	**24**	**24**
Maximum Loads per Day	48	48
Maximum Vehicle Trips per Day	**96**	**96**

The importation of up to 1,500 tpa of concrete washout and other construction materials would require approximately five loads per month, however to the extent practicable, would be undertaken by backloading of trucks, so would not generate additional vehicle movements. Deliveries of consumables (e.g., diesel fuel for the on-site equipment) would generate an occasional heavy vehicle. Such deliveries would normally be scheduled to

avoid peak campaign periods, and so would not typically occur when the peak haulage trips are also being generated. As the assessment which follows considers peak haulage conditions, no additional allowance has therefore been made in the peak conditions assessment for trips generated by importation of products or deliveries of consumables.

The traffic generated by the Proposal workforce would remain unchanged from that of the existing workforce. The maximum of four employees would generate up to eight light vehicle trips per day, with up to four vehicle arrivals in the morning and four vehicle departures in the evening. It would generally be expected that the peak hourly product transport trips would not coincide with the movement of the workforce to and from the site, as the workforce would typically arrive prior to commencement of haulage and depart following completion of haulage. However for the purpose of this assessment, it has been assumed that they may occur simultaneously.

The surveyed traffic on the Quarry Access Road (Table 3.2) indicates that there was an average of 11 light vehicle trips per day, suggesting some additional miscellaneous visitor trips are generated throughout the day. This assessment assumes that two visitors may attend the site per day, generating four vehicle trips per day.

The maximum traffic generation of the Proposal assumed for the purpose of this assessment is therefore:

Maximum Hourly

- 4 light vehicle trips per hour; and
- 24 heavy vehicle trips per hour.

Maximum Weekday

- 12 light vehicle trips per day; and
- 96 heavy vehicle trips per day.

4.2 Traffic Distribution

Transport of products would continue to primarily use the existing transport route via the Quarry Access Road, Strontian Road and Sturt Highway, as presented in Figure 2.2. As described in Section 2.3, on average, 60 percent of quarry trucks would travel to the north on Sturt Highway, 25 percent would travel south on Sturt Highway and 15 percent would travel south on Strontian Road.

Due to the campaign nature of quarrying transport activity, the day-to-day distribution of the haulage trucks can vary considerably. On any one day, all Proposal-generated heavy vehicles may approach and depart in one direction, depending on the destination of materials being transported on that day. Therefore on any one day, 100 percent of haulage trips may travel to the north on Sturt Highway, or 100 percent may travel south on Sturt Highway, or 100 percent may travel south on Strontian Road.

Table 4.2 summarises the distribution of haulage trips on the road network for all haulage occurring on each of the three product destination routes, for both an average day at the average haulage rate, and a maximum day at the maximum haulage rate. As above, these trips would not occur simultaneously on all three access routes.

Table 4.2: Peak Hour and Daily Haulage Trip Distribution for Varying Product Destinations

	Product Destinations North via Sturt Highway (60% of Total Demand)		Product Destinations South via Sturt Highway (25% of Total Demand)		Product Destinations South via Strontian Road (15% of Total Demand)	
	Peak Hour	Daily	Peak Hour	Daily	Peak Hour	Daily
Average Trips at Proposal Average Haulage Rate						
Quarry Access Road	2	24	2	24	2	24
Strontian Road south of Quarry Access Road	0	0	0	0	2	24
Strontian Road north of Quarry Access Road	2	24	2	24	0	0
Sturt Highway north of Strontian Road	2	24	0	0	0	0
Sturt Highway south of Strontian Road	0	0	2	24	0	0
Maximum Trips at Proposal Maximum Haulage Rate						
Quarry Access Road	24	96	24	96	24	96
Strontian Road south of Quarry Access Road	0	0	0	0	24	96
Strontian Road north of Quarry Access Road	24	96	24	96	0	0
Sturt Highway north of Strontian Road	24	96	0	0	0	0
Sturt Highway south of Strontian Road	0	0	24	96	0	0

Over an extended period, the haulage trips would be spread across the three access routes, with the total annual trips expected to be as presented in Table 4.3 for average and maximum production rates, of which half would be laden trucks and half unladen trucks.

Table 4.3: Annual Haulage Trips on the Road Network (vehicle trips per annum)

	Proposal Average Production 100,000 tpa	Proposal Maximum Production 125,000 tpa
Quarry Access Road	6,666	8,334
Strontian Road south of Quarry Access Road	1,000	1,250
Strontian Road north of Quarry Access Road	5,666	7,084
Sturt Highway north of Strontian Road	4,000	5,000
Sturt Highway south of Strontian Road	1,666	2,084

The employees and visitors are assumed to travel via Sturt Highway, with half travelling to and from the north and half travelling to and from the south.

4.3 Future Traffic Volumes

The forecast future peak hourly and weekday traffic volumes are summarised in Table 4.4. These forecasts assume that all Proposal-generated heavy vehicles travel north on Strontian Road and south on Sturt Highway. It further assumes that the peak hourly light vehicle traffic (Section 4.1) would occur during each of the existing peak hours identified by the traffic surveys (Table 3.3).

Table 4.4: Future Weekday Traffic Volumes at Maximum Haulage

	AM Peak (vehicles per hour)[A]		PM Peak (vehicles per hour)[A]		Daily (vehicles per day)	
	Light	Heavy	Light	Heavy	Light	Heavy
2020 with Maximum Proposal Haulage						
Quarry Access Road west of Strontian Road	4	24	4	24	12	96
Strontian Road south of Sturt Highway	13	27	11	26	90	118
Sturt Highway south of Strontian Road	125	76	147	72	1,599	898
2030 with Maximum Proposal Haulage						
Quarry Access Road west of Strontian Road	4	24	4	24	12	96
Strontian Road south of Sturt Highway	15	28	13	26	107	123
Sturt Highway south of Strontian Road	152	87	179	83	1,948	1,074

All product haulage assumed to be via Strontian Road and Sturt Highway south.
[A] The times of the peak hours on each road are identified in Table 3.3.

On those occasions when all product transportation is to/from the north along Sturt Highway, the volumes on Sturt Highway north of Strontian Road would be similar to those presented for Sturt Highway south of Strontian Road in Table 4.4. On those occasions when all product

haulage is to/from the south via Strontian Road, the daily traffic on Strontian Road south of the Quarry Access Road would be similar to (but likely somewhat less than) that presented in Table 4.4 for Strontian Road north of the Quarry Access Road.

4.4 Future Road Network Efficiency

4.4.1 Future Midblock Level of Service

The impact of the Proposal on the midblock level of service experienced by drivers on the Quarry transport routes has been assessed using the HCM analysis method described in Section 3.8.1. The results are summarised in Table 4.5.

Table 4.5: Midblock Level of Service Maximum Proposal Haulage

Road and Location	Direction	AM Peak Hour		PM Peak Hour	
		PTSF	LOS	PTSF	LOS
2020 with Proposal					
Strontian Road south of Sturt Highway	Inbound	8	A	8	A
	Outbound	6	A	6	A
Sturt Highway south of Strontian Road	Inbound	17	A	18	A
	Outbound	18	A	17	A
2030 with Proposal					
Strontian Road south of Sturt Highway	Inbound	8	A	8	A
	Outbound	6	A	6	A
Sturt Highway south of Strontian Road	Inbound	17	A	19	A
	Outbound	19	A	17	A

The results indicate that midblock levels of service on Strontian Road and Sturt Highway would remain good during the morning and evening peak hours with the combined effects of background traffic growth and additional Proposal-generated traffic. Drivers would experience only minor delays as a result of interaction with other traffic.

4.4.2 Future Operation of Intersections

The Proposal would increase the number of vehicles turning into and out of the existing intersection of Strontian Road with the Quarry Access Road, and Sturt Highway with Strontian Road. Comparing the future peak hour traffic volumes on these roads with the Proposal traffic (Table 4.4) with the threshold volumes for intersection performance described in Section 3.8.2, it is evident that the future peak hourly volumes are well below the threshold volumes for analysis, and as such, there is no capacity concern regarding the operation of the intersections of Strontian Road with Sturt Highway and the Quarry Access Road.

4.5 Intersection Treatments

The forecast long-term peak hour traffic demands at the key intersections have been compared against the major road treatments required by Austroads *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management (2020)*. With regard to the typical design level traffic at the intersections, and considering the expected day-to-day variations in both the routes used by the haulage trucks and the number of trucks, this comparison has considered the average hourly truck generation rather than the maximum hourly trips which may only occur occasionally.

As demonstrated in Table 4.1, on an average day at the average production rate, the Proposal would generate an average of one additional heavy vehicle per hour turning from Strontian Road into the Quarry Access Road, or turning from Sturt Highway into Strontian Road (for destinations north or south along Sturt Highway). On the average day at the maximum production rate, this would increase to an average of 1.2 additional heavy vehicles per hour.

Based on the Austroads warrants for major road intersection treatments in high speed environments, with the additional Proposal traffic, the basic left and right turn (BAL and BAR) treatments would be warranted in Sturt Highway at Strontian Road, and in Strontian Road at the Quarry Access Road. These treatments are warranted under existing traffic demands, thus no upgrading of the intersection treatments would be warranted by the Proposal, noting that the existing treatments in Sturt Highway at Strontian Road are consistent with the minimum requirements, and upgrades to Strontian Road will be undertaken during the site establishment (Section 4.6).

4.6 Strontian Road Upgrade

The Proposal includes upgrades to Strontian Road in the vicinity of the Quarry Access Road that would be undertaken during site establishment, principally to widen and seal the road and minimise the risk of interactions between Quarry-generated heavy vehicle traffic and other road users. It is proposed that Strontian Road would be upgraded from a point approximately 50 m south of its intersection with the Quarry Access Road to its intersection with Sturt Highway. Strontian Road would be upgraded to include an 8.0 m wide sealed bitumen surface plus a 1.0 m wide gravel shoulder on each side of the road. This width allows for two 3.5 m wide travel lanes, and a 0.5 m wide shoulder each side, with 1.0 m wide gravel shoulder on each side. As Strontian Road is a designated school bus route, the proposed upgrade standard has been developed to ensure that heavy vehicles can pass safely on that section of road.

The proposed upgrade has been developed with reference to the Austroads *Guide to Road Design Part 3: Geometric Design*, which provides guidance on rural road carriageway widths based on expected average daily traffic demands. It recommends a minimum desirable lane width of 3.35 m to allow heavy vehicles to pass without moving to the outer edge of the

lane. On designated heavy vehicle routes (or where heavy vehicles make up more than 15 percent of traffic), the seal should be a minimum of 7.0 m wide.

The proposed upgrade standard is consistent with the Austroads requirement for rural roads carrying a design AADT of 500 to 1,000 vehicles per day, noting that with the maximum Proposal haulage, the forecast daily volume on Strontian Road is below that range, at 208 vehicles per day in 2020 and 230 vehicles per day in 2030 (Table 4.4). On most days, volumes would be below these forecasts, however the higher standard is considered appropriate considering the proportion of heavy vehicles and the presence of the school buses.

Based on the Austroads guide, and considering Council's input regarding school bus safety, the upgrade of Strontian Road to a minimum seal width of 8.0 m with 1.0 m wide gravel shoulder on each side is considered appropriate.

The detailed design of the upgrade to Strontian Road at its intersection with the Quarry Access Road would take into consideration the the Austroads *Guide to Road Design Part 4: Intersections and Crossings – General* rural property access treatments suitable for articulated vehicles, to enhance safety for the turning vehicles and minimise interference to through traffic. To achieve this, it is recommended that:

- the existing reduction to a single lane through the Quarry gate be removed to allow an inbound heavy vehicle to pass an outbound heavy vehicle on the approach to Strontian Road; and
- the intersection design allow for the Quarry trucks to turn left from the Quarry Access Road into Strontian Road without crossing the centreline of Strontian Road.

At rural property accesses, it is desirable that sight distances meet the same requirements as intersections. Safe Intersection Sight Distance (SISD) is the minimum sight distance which should be provided on the major road at any intersection, and is measured from a driver's eye height of (car 1.1 m, truck 2.4 m) to an object height of 1.25 m and assumes the driver on a minor road is situated 7.0 m (minimum 5.0 m) from the potential conflict point on the major road. SISD allows for approaching drivers to see an articulated vehicle which has properly commenced a manoeuvre from a leg without priority, but its length creates an obstruction. For a design speed of 100 km/h, Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* indicates that the desirable minimum SISD is 248 m for the general minimum driver reaction time of 2.0 s and assuming a level road surface.

Observations on site suggest that the available sight distance between northbound drivers and a driver on the Quarry Access Road (Figure 4.1) exceeds 248 m, which is satisfactory. As all southbound traffic on Strontian Road would approach the Quarry Access Road from the intersection with Sturt Highway, the approach speed of southbound traffic would be below 100 km/h, and the available sight distance of approximately 240 m (Figure 4.2) is satisfactory.

Figure 4.1: Sight Distance South Along Strontian Road from Quarry Access Road

Figure 4.2: Sight Distance North Along Strontian Road from Quarry Access Road

4.7 Road Safety Implications

The review of the road crash history of the Quarry access routes does not highlight any clustering of crashes that might suggest an inherent concern with the design of the road at that location that may be exacerbated by the increased traffic demands of the Proposal. The proposed upgrades to Strontian Road in the vicinity of the Quarry Access Road (Section 4.6) would enhance safety for the turning vehicles and minimise interference to through traffic.

4.8 Travelling Stock Reserves

The additional traffic generated by the Proposal may on some days, use those parts of Sturt Highway where there are existing Category 2 TSRs (Section 3.2). On average at maximum production, the Proposal would contribute 30 heavy vehicle trips per weekday, which compares with an average of eight heavy vehicle trips for the existing transport of 30,000 tpa. The additional average trips per day generated by the Proposal are low in the context of the background heavy vehicle volumes of over 800 heavy vehicles per day on Sturt Highway.

The additional traffic generated by the Proposal would not have a significant impact on the TSRs on or near Sturt Highway. The use of the TSRs for travelling stock would continue to be subject to the usual permit conditions, with warning signs to be provided to motorists where stock are on or near the road. It is recommended that haulage truck drivers be made aware of the presence of the TSRs as part of their contractual arrangements, discussed in Section 4.10.

4.9 Car Parking

The office and amenities area would accommodate a light vehicle parking area, suitable to accommodate the demand for parking by the workforce and visitors.

4.10 Mitigation Measures

The assessment results above demonstrate that no additional measures would be required to provide additional capacity to accommodate the Proposal-related traffic. The Proposal would use existing approved heavy vehicle routes, and so would not introduce heavy vehicles to any roads not currently used by heavy vehicles. The upgrades to Strontian Road would be designed and constructed in accordance with the relevant Austroads requirements and in consultation with Council and/or TfNSW as relevant.

As described, it is recommended that the existing reduction to a single lane through the gate on the Quarry Access Road be removed to allow an inbound heavy vehicle to pass an outbound heavy vehicle. This will minimise the potential for delays to passing traffic along Strontian Road.

It is recommended that a Traffic Management Plan (TMP) be included within the Environmental Management Plan for the operations. The TMP would apply to the drivers of the haulage trucks, and include operational protocols relating to driver behaviour and interaction with other roads users. The TMP would form part of the employee contract or transport contractual arrangements and would address such matters as:

- compliance with access routes;
- road rules, laws and regulations, including the use of mobile phones;
- respecting the rights of other road users and displaying courtesy to other motorists;
- maintaining safe following distances between vehicles, and increasing separation in poor weather;
- vehicle condition and maintenance;
- medical fitness of the driver;
- covering of loads;
- reporting of any unsafe driving practices or incidents;

- maintaining communication with other drivers to alert other drivers to local conditions (such as the presence of stock on or near the road) and to minimise the potential for trucks to form convoys on the public roads; and
- driver behaviour expectations at any specific locations or situations on the public road network including near schools and TSRs.

5 Conclusion

This study has found that the haulage of up to 125,000 tpa of sandstone material from the Strontian Quarry with a maximum of 12 truckloads per hour and 48 truckloads per day would be accommodated on the surrounding road network with acceptable impacts on the capacity, efficiency and safety of the road network. It is recommended that:

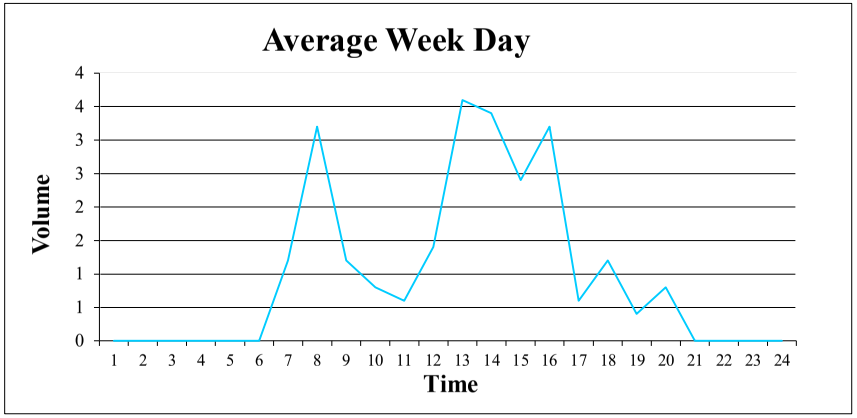
- the upgrades to Strontian Road be designed and constructed in accordance with Austroads guidelines, with Strontian Road to be widened to a general standard of 8.0 m sealed carriageway and 1.0 m wide gravel shoulders each side, and its intersection with the Quarry Access Road to be consistent with rural property access treatments for articulated vehicles, including widening of the gate on the Quarry Access Road to permit inbound and outbound trucks to pass each other near Strontian Road; and
- a TMP be developed as part of the Environmental Management Plan for the operations, and implemented throughout the life of the Proposal. The TMP would include operational protocols relating to driver behaviour and interaction with other haulage trucks, school buses and other roads users.

Appendix A

Traffic Surveys

Site 1 Strontian Quarry Access Rd [40] — Eastbound

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	W/Day	W/End	7 Day
Time	16/02/2020	17/02/2020	18/02/2020	19/02/2020	20/02/2020	21/02/2020	22/02/2020	Ave.	Ave.	Ave
0:00	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0
5:00	0	0	0	0	0	0	0	0	0	0
6:00	0	0	1	1	1	3	0	1	0	1
7:00	0	4	3	3	4	2	0	3	0	2
8:00	0	1	0	1	1	3	0	1	0	1
9:00	0	0	1	0	0	3	0	1	0	1
10:00	2	0	1	0	0	2	0	1	1	1
11:00	0	1	0	0	3	3	0	1	0	1
12:00	0	5	5	2	2	4	0	4	0	3
13:00	0	3	3	4	4	3	0	3	0	2
14:00	0	3	3	0	4	2	0	2	0	2
15:00	0	5	4	5	2	0	0	3	0	2
16:00	0	0	0	0	0	3	0	1	0	0
17:00	0	2	2	2	0	0	0	1	0	1
18:00	0	0	0	0	2	0	0	0	0	0
19:00	0	0	0	0	4	0	0	1	0	1
20:00	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
Total	**2**	**24**	**23**	**18**	**27**	**28**	**0**	**24**	**1**	**17**

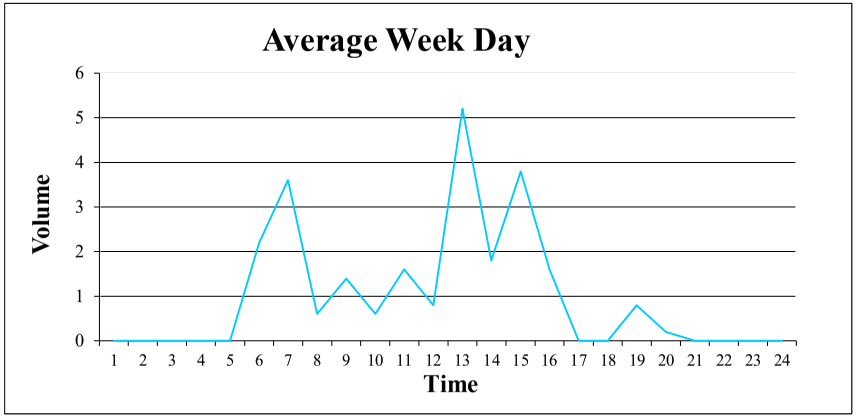


Summary

	from	to	
AM Peak	7:00 AM	8:00 AM	**4**
PM Peak	12:00 PM	1:00 PM	**5**
		Week Day Average	**24**
		Weekend Day Average	**1**
		7 Day Average	**17**

Site 1 Strontian Quarry Access Rd [40] — Westbound

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	W/Day	W/End	7 Day
Time	16/02/2020	17/02/2020	18/02/2020	19/02/2020	20/02/2020	21/02/2020	22/02/2020	Ave.	Ave.	Ave
0:00	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0
5:00	0	2	2	2	2	3	0	2	0	2
6:00	0	4	4	4	4	2	0	4	0	3
7:00	0	0	0	1	1	1	0	1	0	0
8:00	0	0	1	0	1	5	0	1	0	1
9:00	0	1	0	0	0	2	1	1	1	1
10:00	0	0	2	0	3	3	0	2	0	1
11:00	0	1	1	0	0	2	0	1	0	1
12:00	0	9	6	6	3	2	0	5	0	4
13:00	0	0	0	0	6	3	0	2	0	1
14:00	0	5	6	3	3	2	0	4	0	3
15:00	0	2	1	3	0	2	0	2	0	1
16:00	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	4	0	0	1	0	1
19:00	0	0	0	0	1	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
Total	**0**	**24**	**23**	**19**	**28**	**27**	**1**	**24**	**1**	**17**

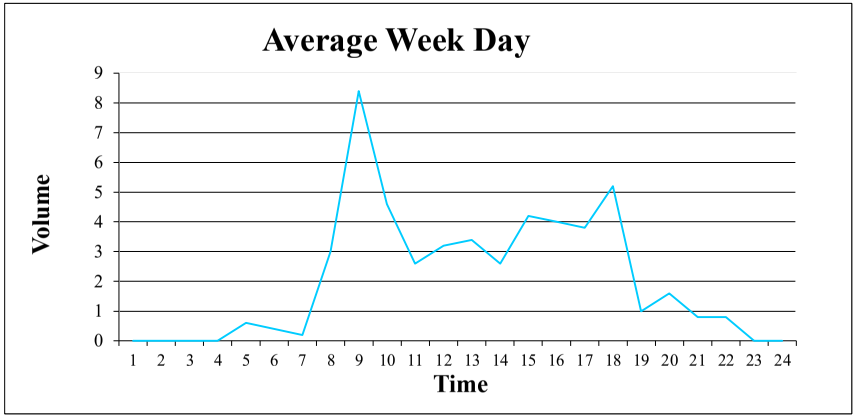


Summary

	from	to	
AM Peak	8:00 AM	9:00 AM	**5**
PM Peak	12:00 PM	1:00 PM	**9**
		Week Day Average	**24**
		Weekend Day Average	**1**
		7 Day Average	**17**

Site 2.2 Strontian Rd N of Quarry Access Rd [80] — Northbound

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	W/Day	W/End	7 Day
Time	16/02/20	17/02/2020	18/02/2020	19/02/2020	20/02/2020	21/02/2020	22/02/2020	Ave.	Ave.	Ave
0:00	1	0	0	0	0	0	0	0	1	0
1:00	0	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0
4:00	0	1	1	1	0	0	0	1	0	0
5:00	0	0	0	0	1	1	0	0	0	0
6:00	0	1	0	0	0	0	1	0	1	0
7:00	0	3	2	1	7	2	0	3	0	2
8:00	1	8	9	12	10	3	4	8	3	7
9:00	2	4	9	2	4	4	2	5	2	4
10:00	5	2	3	3	4	1	7	3	6	4
11:00	2	7	4	0	1	4	2	3	2	3
12:00	3	1	1	4	7	4	0	3	2	3
13:00	0	2	4	4	3	0	7	3	4	3
14:00	0	5	4	4	4	4	8	4	4	4
15:00	3	6	4	4	3	3	2	4	3	4
16:00	4	1	3	5	3	7	1	4	3	3
17:00	1	7	4	5	4	6	6	5	4	5
18:00	1	2	1	0	1	1	3	1	2	1
19:00	1	2	0	0	4	2	0	2	1	1
20:00	0	3	0	1	0	0	1	1	1	1
21:00	2	3	1	0	0	0	0	1	1	1
22:00	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
Total	**26**	**58**	**50**	**46**	**56**	**42**	**44**	**50**	**35**	**46**

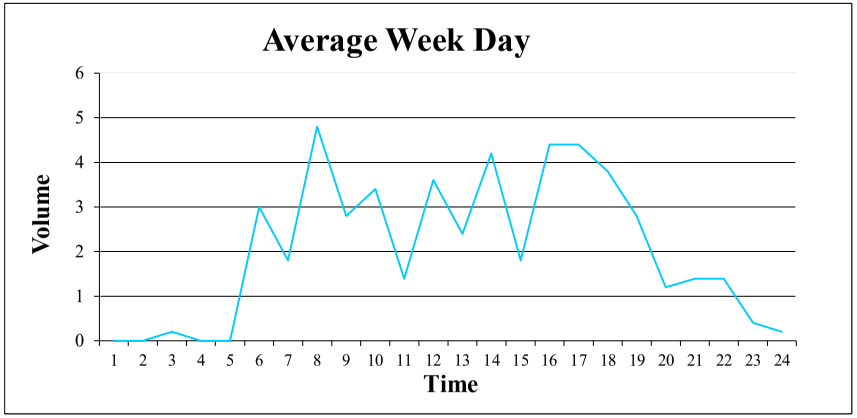


Summary

	from	to	
AM Peak	8:00 AM	9:00 AM	**12**
PM Peak	12:00 PM	1:00 PM	**7**
		Week Day Average	**50**
		Weekend Day Average	**35**
		7 Day Average	**46**

Site 2.2 Strontian Rd N of Quarry Access Rd [80] — Southbound

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	W/Day	W/End	7 Day
Time	16/02/20	17/02/2020	18/02/2020	19/02/2020	20/02/2020	21/02/2020	22/02/2020	Ave.	Ave.	Ave
0:00	0	0	0	0	0	0	0	0	0	0
1:00	0	0	0	0	0	0	0	0	0	0
2:00	0	1	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0	0
4:00	0	0	0	0	0	0	0	0	0	0
5:00	0	3	3	4	2	3	0	3	0	2
6:00	0	1	2	2	3	1	0	2	0	1
7:00	0	6	3	4	7	4	0	5	0	3
8:00	0	3	1	3	3	4	0	3	0	2
9:00	6	2	4	2	5	4	6	3	6	4
10:00	0	2	1	2	1	1	3	1	2	1
11:00	0	5	6	1	3	3	3	4	2	3
12:00	3	5	1	2	4	0	3	2	3	3
13:00	0	2	6	3	7	3	3	4	2	3
14:00	5	0	5	2	0	2	3	2	4	2
15:00	2	3	3	3	5	8	5	4	4	4
16:00	1	2	6	7	6	1	4	4	3	4
17:00	2	3	5	7	1	3	4	4	3	4
18:00	4	3	2	1	5	3	3	3	4	3
19:00	1	1	2	0	0	3	0	1	1	1
20:00	1	3	1	1	1	1	1	1	1	1
21:00	0	0	0	0	2	5	1	1	1	1
22:00	0	0	0	1	0	1	1	0	1	0
23:00	0	0	0	0	0	1	2	0	1	0
Total	**25**	**45**	**51**	**45**	**55**	**51**	**42**	**49**	**34**	**45**

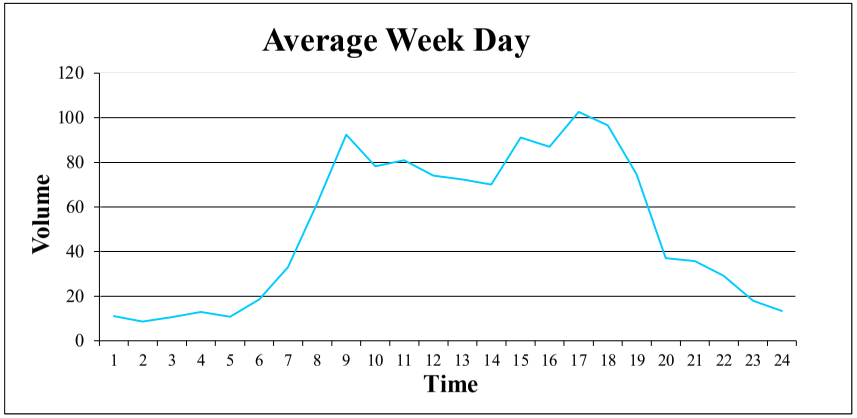


Summary

	from	to	
AM Peak	7:00 AM	8:00 AM	**7**
PM Peak	3:00 PM	4:00 PM	**8**
		Week Day Average	**49**
		Weekend Day Average	**34**
		7 Day Average	**45**

Site 2.3 Sturt Hwy S of Strontian Rd [100] — Northbound

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	W/Day	W/End	7 Day
Time	16/02/20	17/02/2020	18/02/2020	19/02/2020	20/02/2020	21/02/2020	22/02/2020	Ave.	Ave.	Ave
0:00	8	9	10	13	7	16	9	11	9	10
1:00	2	2	12	15	7	7	10	9	6	8
2:00	5	5	15	12	6	15	11	11	8	10
3:00	1	3	12	15	21	14	18	13	10	12
4:00	7	5	13	12	15	9	15	11	11	11
5:00	4	19	18	23	21	12	16	19	10	16
6:00	5	46	29	29	36	25	16	33	11	27
7:00	31	72	64	63	64	45	25	62	28	52
8:00	42	92	106	93	90	81	34	92	38	77
9:00	34	83	84	95	72	57	59	78	47	69
10:00	59	81	73	92	99	60	72	81	66	77
11:00	34	71	67	85	81	66	61	74	48	66
12:00	55	82	57	80	65	78	68	72	62	69
13:00	87	67	69	68	58	88	70	70	79	72
14:00	84	86	78	92	105	95	97	91	91	91
15:00	81	89	72	101	70	103	85	87	83	86
16:00	108	93	98	104	107	111	91	103	100	102
17:00	77	92	97	88	99	107	108	97	93	95
18:00	54	59	60	85	62	107	69	75	62	71
19:00	36	47	32	28	31	47	39	37	38	37
20:00	26	44	30	29	33	43	32	36	29	34
21:00	19	28	25	29	27	37	22	29	21	27
22:00	12	16	15	25	13	21	12	18	12	16
23:00	14	6	12	16	19	14	11	13	13	13
Total	**885**	**1197**	**1148**	**1292**	**1208**	**1258**	**1050**	**1221**	**968**	**1148**

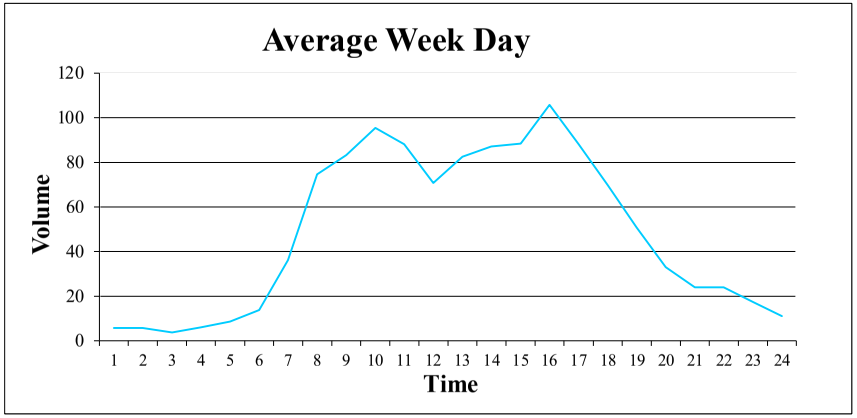


Summary

	from	to	
AM Peak	8:00 AM	9:00 AM	**106**
PM Peak	4:00 PM	5:00 PM	**111**
		Week Day Average	**1221**
		Weekend Day Average	**968**
		7 Day Average	**1148**

Site 2.3 Sturt Hwy S of Strontian Rd [100] — Southbound

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	W/Day	W/End	7 Day
Time	16/02/20	17/02/2020	18/02/2020	19/02/2020	20/02/2020	21/02/2020	22/02/2020	Ave.	Ave.	Ave
0:00	9	7	5	7	4	6	4	6	7	6
1:00	7	6	3	6	5	9	2	6	5	5
2:00	2	3	2	6	3	5	3	4	3	3
3:00	2	1	10	11	4	4	5	6	4	5
4:00	1	9	5	7	12	10	5	9	3	7
5:00	5	11	7	13	19	19	12	14	9	12
6:00	21	42	29	36	34	40	22	36	22	32
7:00	38	73	74	80	66	80	70	75	54	69
8:00	53	67	85	81	87	96	82	83	68	79
9:00	68	84	91	117	83	102	117	95	93	95
10:00	77	70	91	86	92	102	89	88	83	87
11:00	81	63	81	70	67	73	73	71	77	73
12:00	53	63	73	89	77	111	63	83	58	76
13:00	61	67	84	68	113	104	57	87	59	79
14:00	81	72	79	88	98	105	68	88	75	84
15:00	67	85	97	102	127	118	48	106	58	92
16:00	78	51	84	89	120	97	51	88	65	81
17:00	64	55	59	73	74	88	37	70	51	64
18:00	40	41	50	52	53	58	34	51	37	47
19:00	32	30	29	29	38	39	31	33	32	33
20:00	30	23	27	24	21	25	29	24	30	26
21:00	19	20	13	31	24	32	22	24	21	23
22:00	16	16	16	12	20	23	24	17	20	18
23:00	10	9	8	10	19	10	37	11	24	15
Total	**915**	**968**	**1102**	**1187**	**1260**	**1356**	**985**	**1175**	**950**	**1110**



Summary

	from	to	
AM Peak	9:00 AM	10:00 AM	**117**
PM Peak	3:00 PM	4:00 PM	**127**
		Week Day Average	**1175**
		Weekend Day Average	**950**
		7 Day Average	**1110**

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