

Appendix 6

Road Transport Assessment (Updated)

prepared by

The Transport Planning
Partnership

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Monaro Rock Quarry Road Transport Assessment

Prepared for:

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3 August 2026

The Transport Planning Partnership

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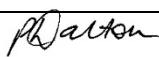
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1 Introduction

This report has been prepared on behalf of Monaro Rock Pty Limited (Monaro Rock) to present the findings of an assessment of the road transport implications of a proposal to develop a hard rock quarry at Royalla, New South Wales (NSW) near the border with the Australian Capital Territory (ACT). The quarry would be located approximately 5 kilometres (km) north of the intersection of Monaro Highway and Old Cooma Road, and is hereafter referred to as the Project.

This assessment has been prepared with a focus on the Project's access arrangements and impacts within the ACT, following consultation with Transport Canberra and City Services (TCCS). It also addresses the Secretary's Environmental Assessment Requirements (SEARs) relating to the road transport environment, as relevant in NSW. 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 relevant agency inputs are set out in Table 1.1.

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

Secretary's Environmental Assessment Requirements	Relevant Section(s)
Traffic & Transport – including:	
accurate predictions of the road traffic generated by the development, including a description of the types of vehicles likely to be used for transportation of quarry products	4.2
a detailed assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road network (as identified above), including undertaking a road safety audit	4.5 4.6 4.8
a description of the measures that would be implemented to mitigate any impacts on road network performance, dilapidation and safety	4.12
concept plans of any proposed upgrades, developed in consultation with the relevant road and rail authorities, in particular the proposed level crossing of the Tuggeranong to Bombala railway corridor in accordance with Transport for NSW guidelines.	4.7 Appendix D 4.9
Transport for New South Wales Input Advice	
1. <i>Traffic Impact Study (TIS): A TIS is required to examine any potential transport related implications of the development. As a guide Table 2.1 of the RTA's Guide to Traffic Generating Developments outlines the key issues that should be considered in preparing a TIS. In addition, regard should be had for the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments and Part 3: Traffic Studies and Analysis Methods. Noting the above, the TIS also needs to address, but not be limited to, the following:</i>	This report
a) TfNSW considers that the traffic related issues relevant to the development should be considered and addressed in 2 distinct stages as follows: i. Construction stage – The transport of materials and equipment/components for the establishment of the quarry including and ancillary infrastructure, the movement and parking of construction related vehicles including workers vehicles during construction, etc.	4.1
ii. Operational stage – The ongoing traffic generation due to the operation, maintenance and servicing of the various elements of the quarry.	4.2

Secretary's Environmental Assessment Requirements	Relevant Section(s)
b) Noting the above stages the following shall be addressed for each stage: i. Details of all traffic types (both heavy and light vehicles) including a description of heavy vehicle types that will be used and the routes that will be taken to enable vehicles that are travelling from the north and south to gain access to the site as well as details on the routes that vehicles wishing to leave the site to go north and/or south will take. This including details on the secondary access road (as noted in Figures 2.2, 2.3, 2.4 and 3.1 of the Scoping Report) and its intended use. ii. Details on the total traffic volumes that are likely to be generated by the development. It should also include details on the distribution of the traffic generated that will come from and go to the north and south. iii. For heavy vehicles, details are required on their size, their associated carrying capacity, etc for both the receipt of materials and the removal of quarried products. This should also include details on the maximum number of vehicles per day and per annum that the development will generate including how these numbers correlate to the daily and annual limits for which approval is being sought. iv. Details on how maximum vehicle numbers will be monitored to ensure ongoing compliance.	4.1 4.2 4.3
c) <i>An assessment of the cumulative impact of traffic from this development and nearby developments on the road network(s) to be used;</i>	4.1 4.4 4.5 4.6
d) <i>An assessment of the suitability of the local road connections with the state classified road network at any access point that will result in vehicles entering and leaving the site from NSW roads as well as details on any works required to mitigate and/or manage potential impacts including a schedule/timeframe for their provision; and</i>	4.1
e) <i>Swept path diagrams to demonstrate the largest vehicles that will be using the quarry access road can undertake all required manoeuvres to enable access to and from the development site.</i>	Appendix D

The remainder of this report is set out as follows:

- Section 2 describes the site location and the existing road transport environment, including the road network, traffic volumes, road crash history and operational characteristics of the roads and intersections;
- Section 3 describes the proposed Project, its vehicular access arrangements, operational forecasts, and routes expected to be used by Project vehicles;
- Section 4 assesses the traffic generation of the Project, and its impacts on future traffic conditions; and
- Section 5 presents the conclusions of the study.

This report has been updated in consideration of the time elapsed since the surveys of background traffic conditions were conducted. This includes reporting of the results of additional traffic surveys conducted in November 2025, and review of background traffic growth on Monaro Highway. The updates are outlined in Sections 2.12 and 2.13.

2 Existing Road Transport Environment

2.1 Site Location

The site is located approximately 5 km northwest of the intersection of Monaro Highway and Old Cooma Road, in Royalla, NSW. It lies within the Queanbeyan-Palerang Regional Council (QPRC) local government area (LGA), close to the NSW/ACT border. The Project's location in the region is shown in Figure 2.1.

2.2 Road Network and Intersections

Monaro Highway extends from Princes Highway at Cann River in Victoria, through NSW and ACT. In NSW, it is a State road (HW19) which extends from the Victorian border to Canberra, via Bombala, Nimmitabel, Cooma, Bredbo, Michelago and Royalla. In the vicinity of the Project Site, Monaro Highway is in the ACT, and is typically a sealed two-way road with sealed shoulders, centre linemarking and edgelines, and overtaking lanes. Between Johnson Drive at Tuggeranong and approximately 2.6 km north of its intersection with Old Cooma Road, Monaro Highway has two southbound travel lanes and one northbound travel lane. South of that point to approximately 1 km south of Old Cooma Road, Monaro Highway has a single travel lane in each direction. A northbound overtaking lane was constructed between Williamsdale Road and Old Cooma Road in July 2020, thus south of Old Cooma Road, Monaro Highway has two northbound and one southbound lane.

Monaro Highway provides direct access to a number of properties in the vicinity of the Project Site, including an access for 8814 Monaro Highway which intersects with Monaro Highway within the merge taper at the southern end of the transition from two to one southbound lanes. Direct access is also provided to/from Monaro Highway approximately 1.1 km north of Old Cooma Road for the Royalla Solar farm at 8785 Monaro Highway, approximately 1.5 km north of Old Cooma Road for the farm at 8827 Monaro Highway. These direct accesses are located where Monaro Highway has a single travel lane in each direction, and are basic T-intersections with no auxiliary turn lanes. Monaro Highway has a posted speed limit of 100 km/h.

North of the Project Site, upgrading of Monaro Highway is underway for a new flyover and interchange at Lanyon Drive at Hume. Work began in January 2022 and is expected to be completed at the end of 2026.

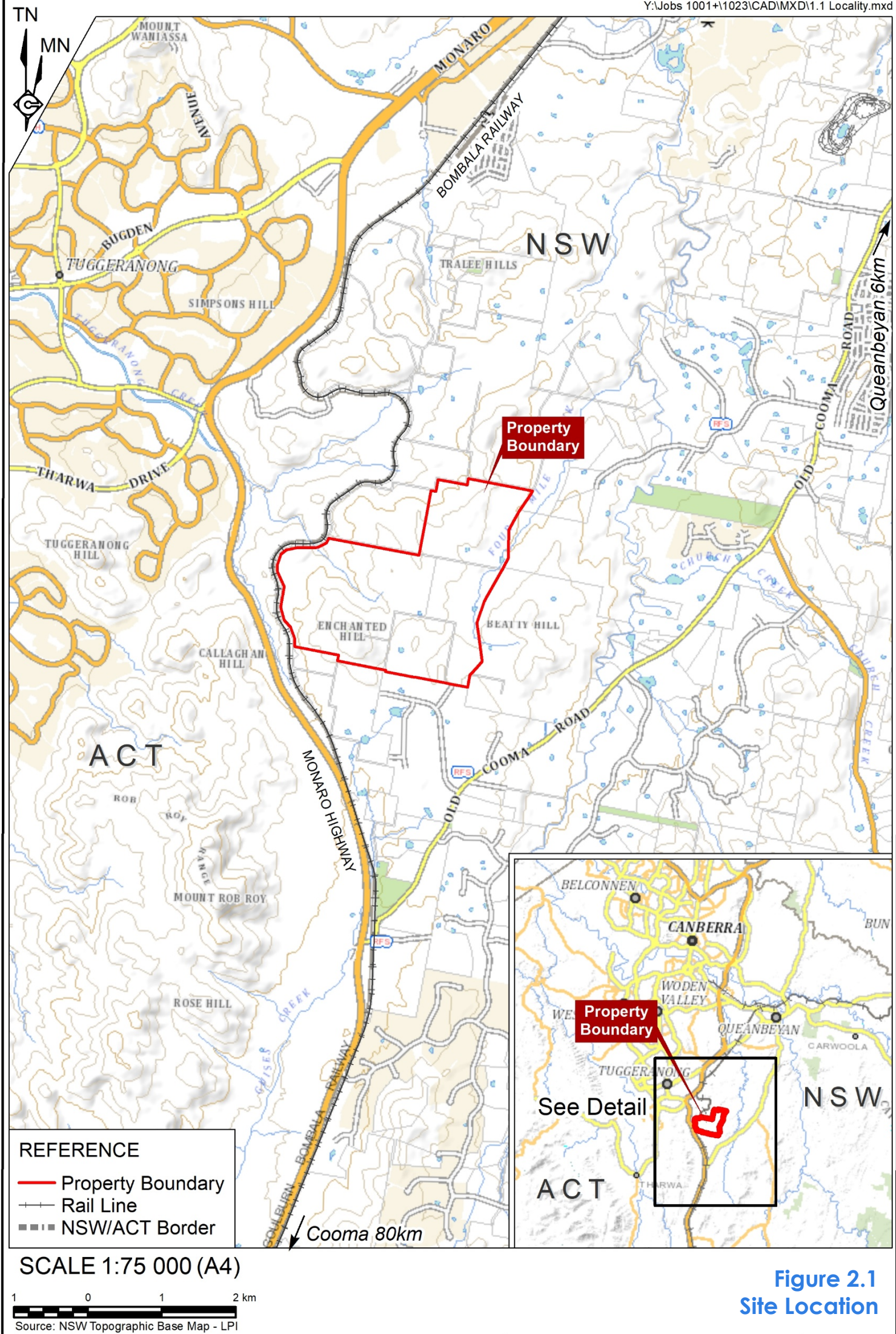


Figure 2.1
Site Location

Old Cooma Road provides a link from Monaro Highway at Royalla to Edwin Land Parkway/Ellerton Drive at Karabar. The route continues north via Cooma Street to Farrer Place/Monaro Street in Queanbeyan. It provides for direct access to residential properties and to local residential streets. In the vicinity of the Project Site, Old Cooma Road is a two-way, two-lane rural road, with centreline and edgelines and narrow sealed shoulders. Old Cooma Road crosses the non-operational Goulburn Bombala Railway approximately 160 m from its intersection with Monaro Highway, and the NSW/ACT border crosses Old Cooma Road between the railway and Monaro Highway.

At its intersection with Monaro Highway, Old Cooma Road forms the minor road of the priority-controlled T-intersection. Old Cooma Road traffic is controlled by a “give way” sign and linemarking, and there is a painted median island at the intersection. Monaro Highway has a channelised right turn bay and channelised left turn lane for vehicles turning into Old Cooma Road. The vehicles turning left into Old Cooma Road are controlled by a “give way” sign and linemarking, and so are required to give way to those vehicles turning right into Old Cooma Road.

Monaro Station Road and **Mates Drive** are local roads that provide property access only, with no through connection. They both have a single travel lane in each direction, a posted speed limit of 70 km/h, and are constructed as rural roads with no kerb and gutter. At its intersection with Old Cooma Road, Monaro Station Road is flared and a southbound auxiliary lane is provided in Old Cooma Road to assist through vehicles to pass around a vehicle which has slowed to turn right into Monaro Station Road. The intersection of Monaro Station Road with Mates Drive is a basic rural T-intersection, with no auxiliary lanes.

2.3 Railway Level Crossings

Old Cooma Road crosses the non-operational Goulburn Bombala Railway at a level crossing east of Monaro Highway. A level crossing is also provided where the vehicular access to 8814 Monaro Highway crosses the non-operational Goulburn Bombala Railway.

Although not formally closed, this part of the Goulburn Bombala Railway south of Queanbeyan has been in disuse since 2007 and there is therefore no interaction between road and rail traffic at the level crossing. A 2020 feasibility study to reopen the line and extend it to link between Canberra Airport and Eden found it would not be viable due to high costs and low benefits.

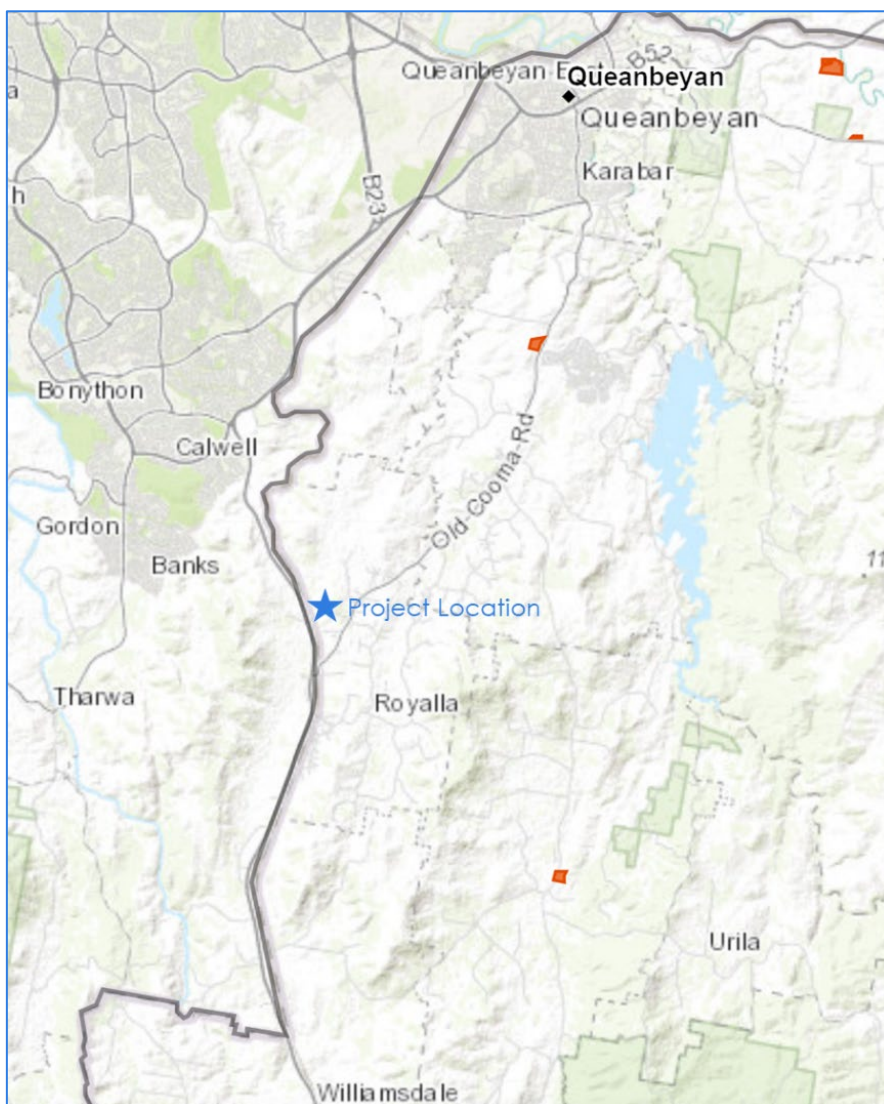
NSW Government funds were allocated in 2022 to complete a development plan for a possible rail trail for the line between Queanbeyan and Bombala, known as the Monaro Rail Trail Project. A funding agreement has also been made between Snowy Monaro Regional Council and the Federal Department of Infrastructure, Transport, Regional Development, Communications and the Arts to enable commencement of rail trail construction at Bombala (Monaro Rail Trail Inc, 2024).

2.4 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 is on or near a road, approved warning signs must be displayed for motorists.

Figure 2.2 shows the location of TSRs in the region. There is a Category 2 TSR (R1001945) on the western side of Old Cooma Road near Googang Road approximately 12 km northeast of its intersection with Monaro 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.

Figure 2.2: Travelling Stock Reserves



Source: NSW Local Land Services (2024)

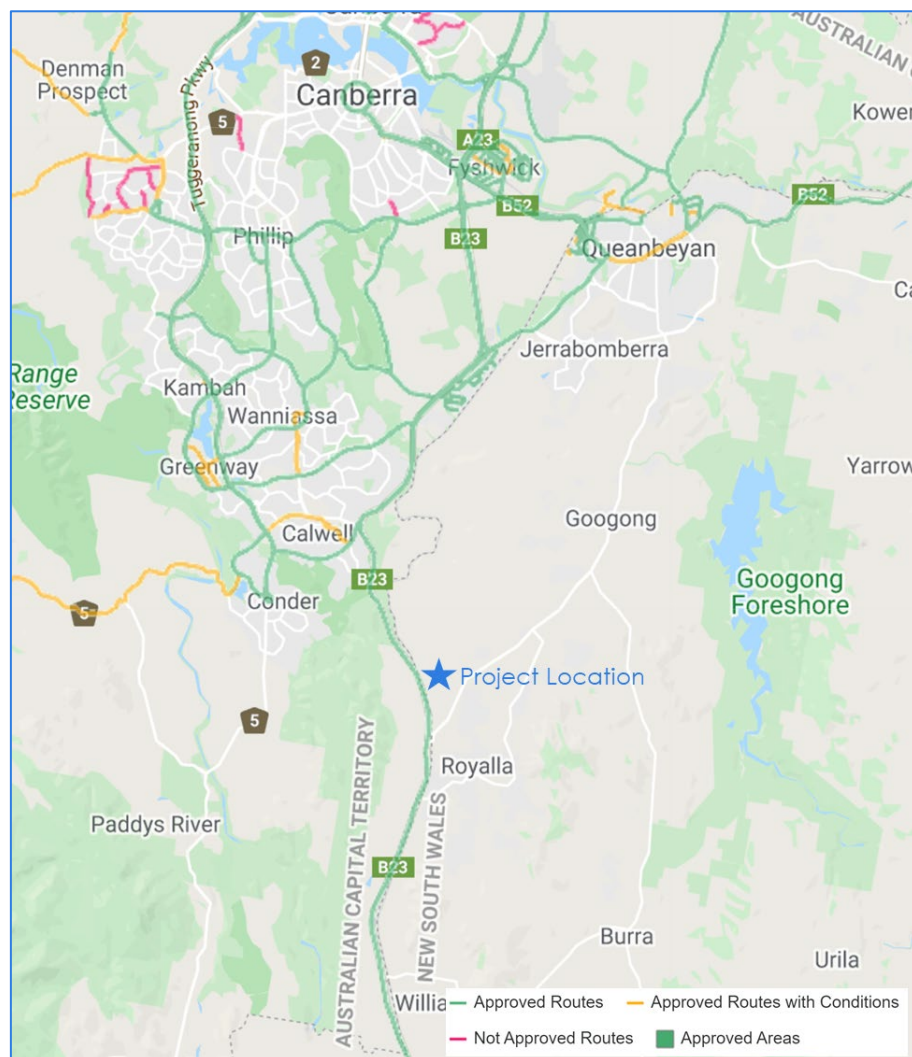
2.5 Approved Heavy Vehicle Routes

The approved heavy vehicle access routes for B-doubles are shown in Figure 2.3, which demonstrates that Monaro Highway is an approved route for B-doubles.

Through Queanbeyan, Kings Highway between Yass Road and Lanyon Drive is an approved route, however travel by B-doubles is not permitted during specified daytime hours. B-double travel is permitted only between the following hours:

- Monday to Wednesday midnight-8am and 6pm to midnight;
- Thursday midnight to 8am and 10pm to midnight;
- Friday and Saturday midnight to 8am and 7pm to midnight; and
- Sunday midnight to 8am.

Figure 2.3: Approved B-double Routes



Source: service.nhvr.gov.au

2.6 Traffic Volumes

2.6.1 Historic Traffic Volumes

Transport for New South Wales 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 station on Monaro Highway is a permanent classifier located on Monaro Highway near Bredbo, approximately 60 km south of Royalla, at which data has been collected since 2015. Noting that due to the distance from Royalla, the data cannot be assumed to closely reflect conditions in proximity to the Project Site, however general variations in demand may be considered indicative of overall conditions in the region.

Table 2.1: TfNSW Traffic Volume Data – Monaro Highway, Bredbo (TfNSW Station 6114)

Data Period	Average Vehicles per Day		
	All Days	Weekdays	Weekends
2015	4,778	4,463	5,640
2016	4,661	3,136	3,990
2017	5,180	4,779	5,969
2018	5,100	4,784	5,780
2019	5,320	5,004	6,029
2020	4,383	4,294	4,471
2021	4,400	4,231	4,537
2022	5,783	5,455	6,373
2023	5,355	5,163	5,691
2024	5,316	4,837	4,889
2025 ^A	5,070	4,837	4,889

^A limited data only.

The data indicate that at that station, weekend traffic volumes are notably higher than weekday volumes. The direction split of the traffic also indicates that on weekdays, there is more southbound traffic than northbound, while the reverse occurs on weekend days.

The data reveals the distinct decrease in traffic volumes during 2020-2021 compared with previous years, which is expected to have been related to travel restrictions in place during those years. Over the period from 2015 to 2024 (being the most recent year for which a full 12 months of data is available), the AADT on Monaro Highway at Bredbo grew at an average compound rate of 1.19 percent (%) per annum.

2.6.2 Project Traffic Surveys 2021

To quantify existing traffic conditions in the vicinity of the Project, a program of traffic surveys was conducted in May-June 2021. The program included automatic tube counters on:

- Monaro Highway north of Old Cooma Road from Thursday 27 May to Wednesday 9 June inclusive;
- Old Cooma Road south of Monaro Station Road from Monday 24 May to Sunday 6 June 2021 inclusive; and
- Monaro Station Road west of Old Cooma Road from Monday 24 May to Sunday 6 June 2021 inclusive.

An intersection turning movement survey was also undertaken at the intersection of Monaro Highway and Old Cooma Road between 6:00 am and 9:00 am and between 3:00 pm and 6:00 pm on Thursday 27 May 2021.

Survey data is summarised in Appendix A of this report, and it is noted that Monday 31 May was a public holiday in the ACT, and the ski season opened at Perisher and Thredbo during the survey period, noting Monaro Highway is the principal route to those locations from Sydney and Canberra. It is further noted that the survey was conducted prior to the implementation of travel restrictions in NSW, as the lockdown restrictions commenced at the end of June 2021.

2.6.3 Surveyed Traffic Volumes 2021

Table 2.2 presents a summary of the daily two-way traffic volumes at the surveyed locations, being the total number of vehicles passing the surveyed location in both directions during each 24-hour period.

Table 2.2: Surveyed Daily Two-Way Traffic Volumes 2021 (vehicles per day)

Date	Day	Monaro Highway	Old Cooma Road	Monaro Station Road
24 May 2021	Monday	-	2,259	65
25 May 2021	Tuesday	-	2,290	62
26 May 2021	Wednesday	-	2,326	57
27 May 2021	Thursday	8,209	2,202	84
28 May 2021	Friday	9,688	2,319	120
29 May 2021	Saturday	8,214	2,084	81
30 May 2021	Sunday	7,619	1,849	83
31 May 2021 ^A	Monday	7,898	2,054	79
1 June 2021	Tuesday	7,643	2,174	81
2 June 2021	Wednesday	7,540	2,244	102
3 June 2021	Thursday	7,377	2,040	63
4 June 2021 ^B	Friday	8,859	2,300	88
5 June 2021	Saturday	7,873	2,097	106
6 June 2021	Sunday	7,702	1,804	101
7 June 2021	Monday	7,891	-	-
8 June 2021	Tuesday	7,940	-	-
9 June 2021	Wednesday	7,323	-	-

^A ACT public holiday.

^B start of NSW ski season, Perisher and Thredbo opened.

The results in Table 2.2 suggest that the ACT public holiday on Monday 31 May impacted daily traffic volumes on the preceding Friday, with it being likely that ACT residents took the opportunity to enjoy a four-day weekend. This is collaborated by the imbalance in traffic volumes by direction, with significantly more vehicles travelling southbound than northbound on Monaro Highway on the Friday and Saturday prior to the holiday Monday, and significantly more vehicles travelling northbound than southbound on the Sunday and public holiday Monday.

The surveyed temporal distribution of traffic throughout the day on weekdays and Saturday is presented in Figure 2.4, which excludes the public holiday Monday and the Friday preceding that weekend, which display distinctly different profiles compared with the other weekdays. It demonstrates that the distribution of traffic on Monaro Highway through the day is distinctly different on weekdays and Saturday. Weekday demands display distinct peaks in two-way traffic in the morning and evening, with lower volumes carried through the middle of the day. Throughout the weekday, two-way volumes on Monaro Highway peaked at around 700 vehicles per hour (two-way), and remained at around 450 to 500 vehicles per hour through the middle of the day. On Saturday, there is no distinct morning and evening peak, with the demand increasing to a peak around mid-morning, then remaining at a similar level until the later afternoon.

Figure 2.4: Hourly Two-Way Traffic Distribution 2021

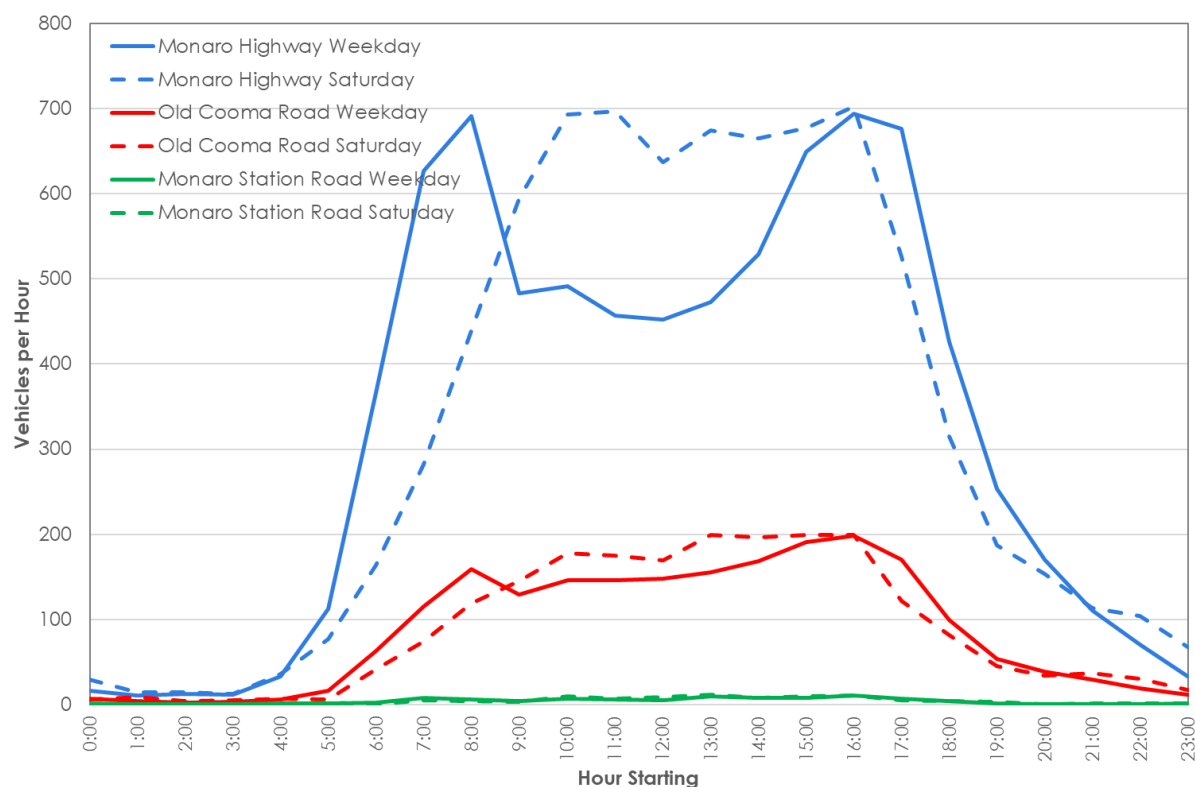


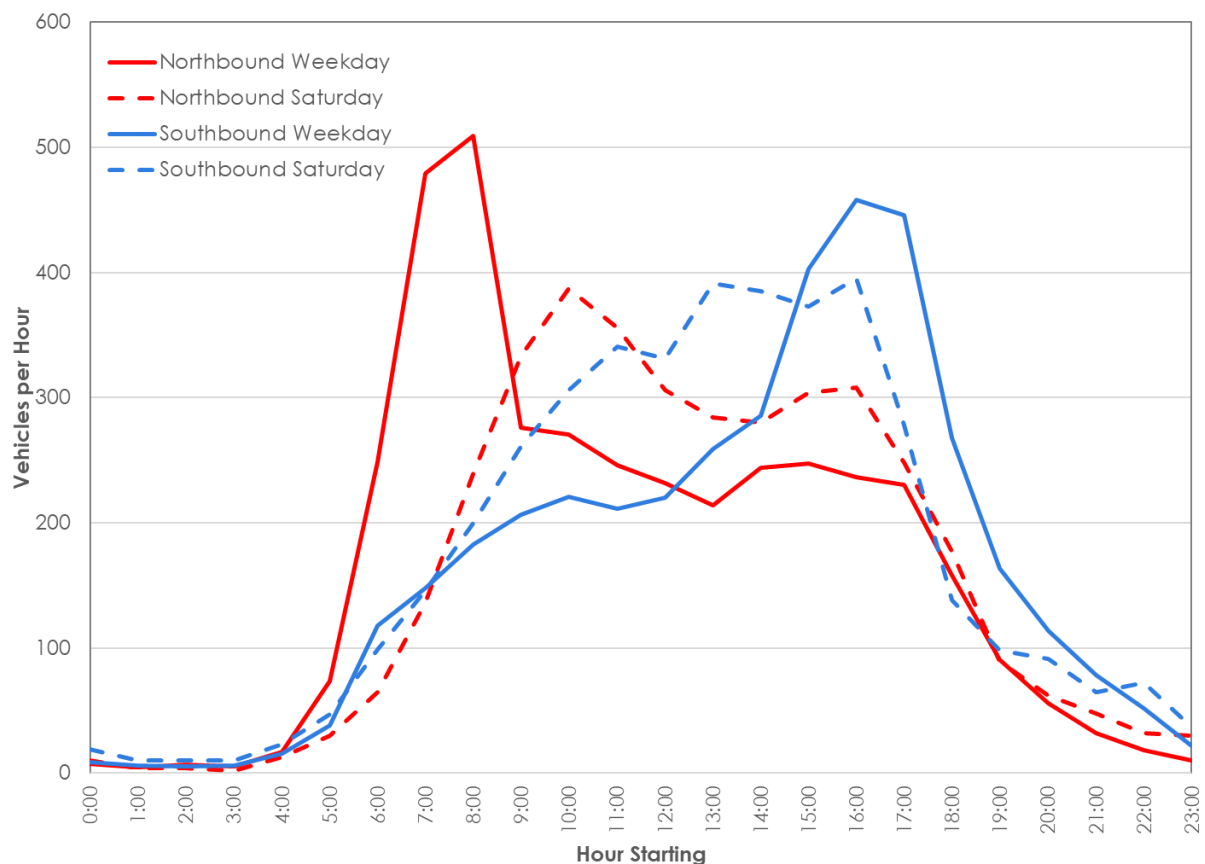
Table 2.3 presents a summary of the peak hourly traffic volumes at the surveyed locations over the average weekday (excluding the public holiday Monday and preceding Friday), being the highest number of vehicles passing the surveyed location in both directions during any one hour before or after midday.

Table 2.3: Surveyed Peak Hourly Two-Way Traffic Volumes 2021 (vehicles per hour)

Road and Location	Hour	Light	Rigid	Articulated	Total
Weekday AM Peak Hour					
Monaro Highway	8:00	622	50	20	692
Old Cooma Road	8:00	148	8	3	159
Monaro Station Road	7:00	5	3	0	8
Weekday PM Peak Hour					
Monaro Highway	16:00	634	42	19	695
Old Cooma Road	16:00	183	12	3	198
Monaro Station Road	16:00	7	3	0	10
Saturday AM Peak					
Monaro Highway	11:00	647	42	8	697
Old Cooma Road	10:00	183	8	1	192
Monaro Station Road	10:00	8	1	1	10
Saturday PM Peak					
Monaro Highway	16:00	663	35	5	703
Old Cooma Road	15:00	183	11	3	197
Monaro Station Road	13:00	10	2	1	13

The data has also been reviewed with consideration to the directional distribution of traffic demands through the day on Monaro Highway. Figure 2.5 presents the northbound and southbound traffic demands on weekdays and Saturday. This demonstrates that the weekday peak demands in two-way traffic on Monaro Highway (as shown in Figure 2.4) are driven by northbound traffic during the morning and southbound traffic during the afternoon. On Saturday, the demand by direction is more evenly spread through the middle of the day, with a small peak in northbound traffic in the morning and southbound traffic in the afternoon.

Figure 2.5: Monaro Highway Hourly Traffic by Direction 2021

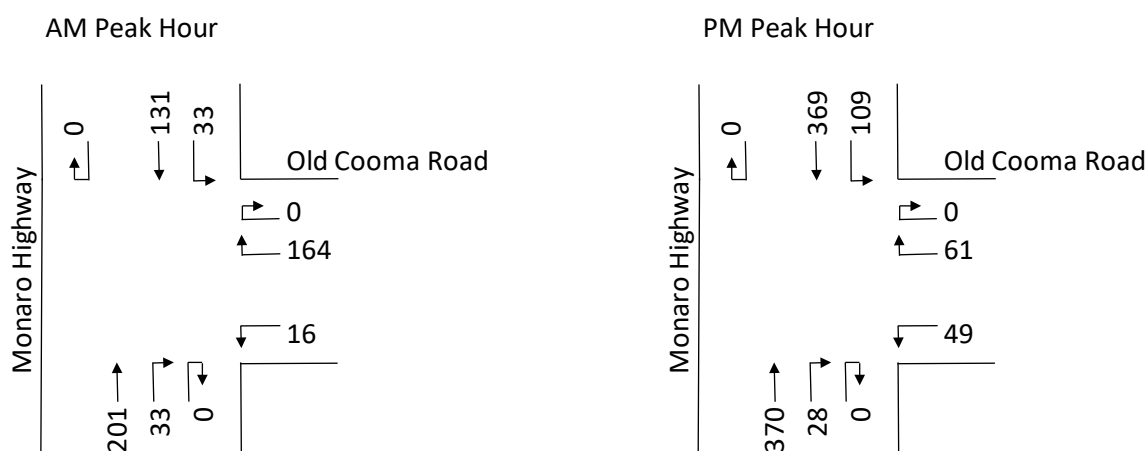


2.6.4 Surveyed Intersection Demands 2021

Analysis of the intersection turning movement survey indicates that the hours during which the highest number of vehicle movements was recorded occurred between 8:00 am and 9:00 am (AM peak), and between 5:00 pm and 6:00 pm (PM peak). The peak hourly movements are presented in Figure 2.6, which indicate that:

- the number of vehicles turning right in to Old Cooma Road was relatively low during both the AM and PM peak hours, at 28 and 33 vehicles per hour respectively;
- during the morning peak hour, there was a demand of 164 vehicles exiting Old Cooma Road by a right turn towards the north; and
- during the evening peak hour, there was a demand of 109 vehicles per hour entering Old Cooma Road from the north.

Figure 2.6: Surveyed Peak Hourly Vehicle Turning Movements 2021



2.7 Road Safety History

Road crash data was obtained from ACT Government for Monaro Highway over the five year period from 1 January 2020 to 31 December 2024 (ACT Government, 2025). The data for Monaro Highway was reviewed, and 22 crashes identified between Old Cooma Road and south of the roundabout at Johnson Drive. Key characteristics of the crashes are summarised in Table 2.4 and crash features are presented in Table 2.5.

Four crashes occurred over approximately 200 m on a bend approximately 2 km south of Johnson Drive. While those four crashes shared a general location, there was little similarity between them, with the exception that two involved a vehicle leaving the road and striking an object. Three crashes occurred at the intersection of Old Cooma Road, all of which occurred in the evening and involved a vehicle turning right colliding with oncoming traffic. The data does not indicate whether the right turns were in to or out of Monaro Highway. Two crashes occurred during foggy conditions, one being a head-on collision that occurred during darkness, and one involving a collision with a pedestrian on the road in daylight. The data do not highlight any specific location with a notably poor crash history which may suggest an inherent concern with the road layout at that location.

Table 2.4: Monaro Highway Crash Summary (2020 to 2024)

	Pedestrian (On Road)	Struck Animal (Not Ridden on Road)	Same Direction Side Swipe	Rear End	Head On	Struck object (Off Road)	No Object Struck (Off Road)	Right Turn into Oncoming Traffic	Other (Vehicle to Vehicle)	Total
Total Crashes	1	2	2	6	2	2	3	3	1	22
Crash Severity										
Injury	1	1	-	2	2	2	2	2	-	12
Property damage only	-	1	2	4	-	-	1	1	1	10
Lighting Conditions										
Daylight	1	-	-	4	1	1	2	1	1	11
Semi-darkness	-	-	-	1	-	-	1	1	-	3
Dark (no street lights)	-	2	2	1	1	1	-	1	-	8
Road Surface Condition										
Good dry surface	1	2	1	6	2	2	2	3	1	20
Wet surface	-	-	1	-	-	-	1	-	-	2
Weather Conditions										
Fine	-	2	1	5	1	2	2	3	1	17
Cloudy or overcast	-	-	-	1	-	-	-	-	-	1
Light rain	-	-	1	-	-	-	-	-	-	1
Heavy rain	-	-	-	-	-	-	1	-	-	1
Fog	1	-	-	-	1	-	-	-	-	2
Year of Crash										
2020	-	-	-	2	-	-	2	-	-	4
2021	1	-	1	-	1	-	-	-	-	3
2022	-	-	-	1	-	1	-	-	-	2
2023	-	1	1	2	-	1	-	-	-	5
2024	-	1	-	1	1	-	1	3	1	8

Table 2.5: Key Features of Road Crashes Monaro Highway Old Cooma Road to Johnson Drive 1 January 2016 to 30 July 2022

CrashID	Date	Time	Type	Direction	Severity	Lighting	Road Condition	Weather
South of Johnson Drive to Project Site Access Location								
302200	14/06/2023	16:10	Rear end collision	0	Injury	Semi-darkness	Good dry surface	Fine
321376	18/08/2024	18:20	Rear end collision	0	Property damage only	Dark	Good dry surface	Cloudy or Overcast
305418	18/08/2023	18:55	Same direction side swipe	0	Property damage only	Dark	Good dry surface	Fine
272953	6/07/2021	7:00	Struck pedestrian (On Road)	South bound	Injury	Daylight	Good dry surface	Fog
330849	25/10/2024	12:25	Head on collision	0	Injury	Daylight	Good dry surface	Fine
298663	19/02/2023	19:40	Struck object (Off Road)	0	Injury	Dark	Good dry surface	Fine
256770	9/06/2021	17:49	Same direction side swipe	South bound	Property damage only	Dark	Wet surface	Light rain
295723	9/12/2022	15:10	Struck object (Off Road)	0	Injury	Daylight	Good dry surface	Fine
226622	5/12/2020	20:00	No object struck (Off Road)	North bound	Property damage only	Semi-darkness	Wet surface	Heavy rain
302129	12/06/2023	12:10	Rear end collision	0	Property damage only	Daylight	Good dry surface	Fine
289664	28/08/2022	12:40	Rear end collision	0	Injury	Daylight	Good dry surface	Fine
313338	19/09/2023	18:30	Struck animal (Not Ridden On Road)	0	Injury	Dark	Good dry surface	Fine
326749	18/12/2024	23:00	Struck animal (Not Ridden On Road)	0	Property damage only	Dark	Good dry surface	Fine
Project Site Access Location to North of Old Cooma Road								
325693	25/11/2024	19:30	Other - vehicle to vehicle	0	Property damage only	Daylight	Good dry surface	Fine
228017	5/10/2020	14:50	Rear end collision	Unknown	Property damage only	Daylight	Good dry surface	Fine
323738	12/10/2024	10:30	No object struck (Off Road)	0	Injury	Daylight	Good dry surface	Fine
226981	1/12/2020	17:40	Rear end collision	South bound	Property damage only	Daylight	Good dry surface	Fine
228332	25/08/2020	13:00	No object struck (Off Road)	North bound	Injury	Daylight	Good dry surface	Fine
256355	8/05/2021	5:40	Head on collision	North/Southbound	Injury	Dark	Good dry surface	Fog

2.8 Canberra Strategic Transport Model Data

During preparation of this assessment, ACT Transport Canberra and City Services was consulted, and requested that the assessment consider data from the Canberra Strategic Transport Model (CSTM) on roads in the vicinity of the Project. TTPP obtained that data for the roads in proximity to the site for existing and future conditions over the potential life of the Project. This included AM and PM peak hour data for 2021, 2026, 2031 and 2041. The outputs are presented in Appendix B, and a summary of that data is provided in Table 2.6, which includes the separate data outputs for road sections where the length of road is divided into more than one link. Table 2.6 also notes where the model outputs indicate that the degree of saturation (the ratio of volume demand to capacity) of a link is 0.85 or greater.

Table 2.6: Summary of CSTM Traffic Volume Data (vehicles per hour)

Year	AM Peak Period (8:00 am to 9:00 am)				PM Peak Period (5:00 pm to 6:00 pm)			
	Northbound		Southbound		Northbound		Southbound	
	Link 1	Link 2	Link 1	Link 2	Link 1	Link 2	Link 1	Link 2
Monaro Highway – Old Cooma Road to Tuggeranong								
2021	1,058	1,083	191	195	210	215	886	905
2026	1,921	2,012	240	257	260	282	1,570	1,639
2031	1,774	1,864	255	271	255	276	1,386	1,451
2041	2,579	2,667	316	329	299	316	2,161	2,219
Old Cooma Road – East of Monaro Highway								
2021	28	15	659	573	564	486	75	36
2026	82	33	1,494	1,159	1,305	1,005	210	61
2031	83	26	1,291	946	1,109	791	226	49
2041	107	27	1,956	1,590	1,856	1,497	325	71
Monaro Highway – South of Old Cooma Road								
2021	410		175		187		374	
2026	472		202		216		431	
2031	545		233		249		497	
2041	725		311		331		662	

Shaded cells indicate degree of saturation 0.85 or greater

Table 2.6 indicates that the CSTM shows significant growth in demands between 2021 and 2026, reduction in demands between 2026 and 2031 and further increases from 2031 to 2041. It also indicates that the CSTM predicts that on Monaro Highway, demand will exceed capacity by 2026 in the morning peak, and by 2041 in the evening peak.

As the Project traffic surveys were conducted in 2021, the modelled 2021 traffic volumes can reasonably be compared to the surveyed volumes on Monaro Highway north of Old Cooma Road and on Old Cooma Road east of Monaro Highway. While Monaro Highway was not surveyed south of Old Cooma Road, the indicative peak hour volumes at that location have

been estimated by considering the results of the intersection survey together with the results of the ATC on Monaro Highway north of the intersection. This comparison is presented in Table 2.7.

Table 2.7: Surveyed vs Modelled 2021 Traffic Volume Data (vehicles per hour)

	AM Peak Period (8:00 am to 9:00 am)				PM Peak Period (5:00 pm to 6:00 pm)			
	Northbound		Southbound		Northbound		Southbound	
	Link 1	Link 2	Link 1	Link 2	Link 1	Link 2	Link 1	Link 2
Monaro Highway – Old Cooma Road to Tuggeranong								
CSTM	1,058	1,083	191	195	210	215	886	905
Survey	509		183		230		446	
Old Cooma Road – East of Monaro Highway								
CSTM	28	15	659	573	564	486	75	36
Survey	109		50		76		95	
Monaro Highway – South of Old Cooma Road								
CSTM	410		175		187		374	
Survey Estimate	408		158		198		393	

The comparison indicates that the CSTM 2021 traffic is not well calibrated to conditions on Monaro Highway nor Old Cooma Road in the vicinity of the Project site, with the modelled peak direction demand on Monaro Highway being more than double the surveyed demands, and between five and ten times the modelled demands on Old Cooma Road.

It is TTPP's experience that the output of strategic models at specific locations can vary significantly from observed conditions at those same locations, as the models are typically calibrated to screen lines which consider demands over a number of routes. Inconsistencies are commonly observed on routes which are not near a screen line and/or are near the boundaries of the model. As the modelled 2021 volumes on Monaro Highway near the Project do not well reflect the conditions on Monaro Highway, it is clearly not reasonable to directly use the model results as the basis of assessment of future conditions at that location.

TTPP has further reviewed the CSTM outputs to consider the growth rate that the model displays for the peak hour traffic demands in the region of the Project. The results of that review are presented in Table 2.8.

Table 2.8: Summary of CSTM Annual Compound Growth Rate (%)

Time	AM Peak Period (8:00 am to 9:00 am)				PM Peak Period (5:00 pm to 6:00 pm)			
	Northbound		Southbound		Northbound		Southbound	
	Link 1	Link 2	Link 1	Link 2	Link 1	Link 2	Link 1	Link 2
Monaro Highway – Old Cooma Road to Tuggeranong								
2021 to 2026	12.7	13.2	4.7	5.7	4.4	5.6	12.1	12.6
2026 to 2031	-1.6	-1.5	1.2	1.1	-0.4	-0.4	-2.5	-2.4
2031 to 2041	3.8	3.6	2.2	2.0	1.6	1.4	4.5	4.3
2021 to 2041	4.6	4.6	2.5	2.6	1.8	1.9	4.6	4.6
Old Cooma Road – East of Monaro Highway								
2021 to 2026	24.0	17.1	17.8	15.1	18.3	15.6	22.9	11.1
2026 to 2031	0.2	-4.7	-2.9	-4.0	-3.2	-4.7	1.5	-4.3
2031 to 2041	2.6	0.4	4.2	5.3	5.3	6.6	3.7	3.8
2021 to 2041	2.9	3.0	5.6	5.2	6.1	5.8	7.6	3.5
Monaro Highway – South of Old Cooma Road								
2021 to 2026	2.9		2.9		2.9		2.9	
2026 to 2031	2.9		2.9		2.9		2.9	
2031 to 2041	2.9		2.9		2.9		2.9	
2021 to 2041	2.9		2.9		2.9		2.9	

With the exception of Monaro Highway south of Old Cooma Road, the growth rate on the roads under review varies significantly over time and by direction. South of Old Cooma Road, the growth rate in peak hour demand is constant at 2.9 %.

2.9 Background Traffic Growth

For the purpose of this assessment, an average compound growth rate of 2.9 % per annum has been assumed to occur on Monaro Highway, as indicated by the CSTM to the south of Old Cooma Road. This is higher than the historic growth in AADT on Monaro Highway at Bredbo between 2015 and 2024 of 1.19 % per annum as discussed in Section 2.6.1, and higher than the base rate of 2.0 % per annum suggested by TCCS (2020).

2.10 Baseline Future Traffic on Monaro Highway

Future horizon assuming 10 and 20 years of growth above the surveyed conditions in 2021 has been adopted for this assessment, in order to consider the longer term impacts of the Project. The resulting traffic volumes estimated for 2031 and 2041 are summarised in Table 2.9.

Table 2.9: Existing and Baseline Future Traffic Volumes on Monaro Highway

	Surveyed 2021			Baseline 2031			Baseline 2041		
	Light	Heavy	Total	Light	Heavy	Total	Light	Heavy	Total
Average Weekday									
AM Peak	622	70	692	829	93	922	1,103	123	1,226
PM Peak	634	61	695	843	80	923	1,123	107	1,230
Daily	6,910	936	7,846	9,198	1,247	10,445	12,241	1,660	13,901
Saturday									
AM Peak	647	50	697	862	67	929	1,146	88	1,234
PM Peak	663	40	703	882	53	935	1,175	71	1,246
Daily	7,326	547	7,873	9,750	729	10,479	12,977	970	13,947

Growth 2.9 % pa compound, refer to Table 2.3 for times at which peak hours occur at each road.

Table 2.9 indicates that with 10 years of background growth from 2021 conditions, Monaro Highway can be expected to carry up to approximately 935 vehicles per hour, and up to approximately 1,246 vehicles per hour with 20 years of background growth.

2.11 Midblock Level of Service on Monaro Highway

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 (2020a) *Guide to Traffic Management Part 3: Traffic Study and Analysis Methods* provides guidelines for the capacity and performance of two lane, two-way rural roads and multilane roads, which in turn, refers to the *Highway Capacity Manual (HCM)* (Transportation Research Board, 2016).

2.11.1 Monaro Highway South of Project Site

To the south of the Project Site and to approximately 1 km south of Old Cooma Road, Monaro Highway has one southbound and one northbound lane, i.e. is a two-lane, two-way rural road. This represents the most constrained conditions with respect to capacity on Monaro Highway, noting it widens to two southbound lanes to the north of the Project Site, and to two northbound lanes south of Old Cooma Road.

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 2.10.

Table 2.10: 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 (2020a)

Monaro Highway to the south of the Project site is considered to be a Class II route in consideration of its proximity to Canberra and Queanbeyan. Table 2.11 summarises the results of the assessment of midblock LOS on the two-lane two-way part of Monaro Highway under existing conditions and with background growth as assumed above.

Table 2.11: Monaro Highway South of Project Site Midblock Level of Service

	Direction	Surveyed 2021		Baseline 2031		Baseline 2041	
		PTSF	LOS	PTSF	LOS	PTSF	LOS
Weekday AM Peak Hour	Northbound	69.2	C	77.9	D	84.6	D
	Southbound	36.3	A	44.5	B	53.2	B
Weekday PM Peak Hour	Northbound	16.3	A	53.5	B	62.0	C
	Southbound	70.0	D	77.0	D	84.3	D
Saturday AM Peak Hour	Northbound	63.8	C	71.2	D	77.1	D
	Southbound	61.8	C	69.1	C	75.6	D
Saturday PM Peak Hour	Northbound	56.4	C	63.7	C	71.4	D
	Southbound	66.2	C	73.9	D	79.9	D

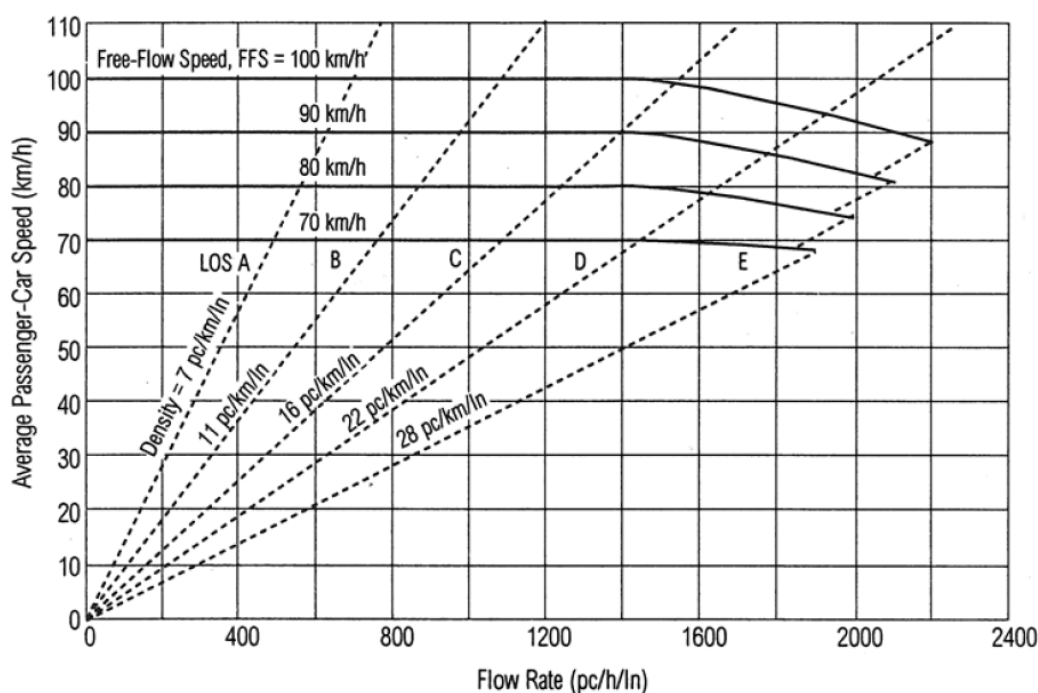
Refer to Table 2.3 for times of the peak hours.

The results in Table 2.11 indicate that with the forecast growth in traffic, the LOS on Monaro Highway is forecast to reach D, which represents conditions that platooning of traffic occurs, and the demand for passing is high, but the capacity to do so is low. In the peak flow directions during weekday peak hours (northbound in the morning and southbound in the evening), the PTSF in 2041 is near the upper end of LOS D, i.e. approaching LOS E.

2.11.2 Monaro Highway North of Project Site

To the north of the Project Site, Monaro Highway has two southbound lanes and one northbound lane. The LOS on multilane roads is evaluated from the vehicle density, calculated as passenger car units per lane, as summarised below.

Figure 2.7: Speed-Flow Curves with LOS Criteria for Multi-lane Roads



Source: Austroads (2020a)

Austrroads (2020a) defines a multi-lane road as having two or more lanes for use by traffic in each direction, with at-grade intersections. As Monaro Highway has only a single travel lane northbound, it does not strictly meet the definition of a multi-lane road. Nevertheless, the southbound (only) density and LOS have been evaluated with respect to the HCM method, with the results summarised in Table 2.12.

Table 2.12: Monaro Highway North of Project Site Southbound Midblock Level of Service

	Surveyed 2021		Baseline 2031		Baseline 2041	
	Density	LOS	Density	LOS	Density	LOS
Weekday AM Peak Hour	1.4	A	1.8	A	2.4	A
Weekday PM Peak Hour	3.2	A	4.2	A	5.6	A
Saturday AM Peak Hour	2.3	A	3.1	A	4.1	A
Saturday PM Peak Hour	2.7	A	3.6	A	4.7	A

Refer to Table 2.3 for times of the peak hours.

Table 2.12 indicates that to the north of the Project Site, the density of southbound traffic on Monaro Highway is expected to result in a good level of service with the forecast growth in traffic.

To the north of the Project Site, the northbound LOS would be consistent with that calculated for northbound traffic on that part of Monaro Highway which is a two-way two-lane road (see Table 2.11).

2.12 Updated Traffic Volumes 2025

2.12.1 Updated Project Traffic Surveys 2025

To quantify current traffic conditions in the vicinity of the Project and gauge the validity of the baseline forecasts presented in the original assessment based on 2021 conditions (as discussed in Sections 2.9 to 2.11), the two-week program of automatic tube counter surveys described in Section 2.6.2 was repeated. The updated surveys were conducted from Thursday 13 November 2025 to Wednesday 26 November 2025 (inclusive) on:

- Monaro Highway at the proposed Quarry access location north of Old Cooma Road;
- Old Cooma Road south of Monaro Station Road; and
- Monaro Station Road west of Old Cooma Road.

The updated survey data is summarised in Appendix C of this report, noting that the survey period did not include any public holidays.

2.12.2 Surveyed Traffic Volumes 2025

Table 2.13 presents a summary of the daily two-way traffic volumes at the surveyed locations, being the total number of vehicles passing the surveyed location in both directions during each 24-hour period.

Table 2.13: Surveyed Daily Two-Way Traffic Volumes 2025 (vehicles per day)

Date	Day	Monaro Highway	Old Cooma Road	Monaro Station Road
13 November 2025	Thursday	9,453	2,734	88
14 November 2025	Friday	10,332	2,905	102
15 November 2025	Saturday	7,556	2,019	70
16 November 2025	Sunday	8,094	2,088	78
17 November 2025	Monday	8,620	2,417	78
18 November 2025	Tuesday	8,382	2,590	93
19 November 2025	Wednesday	8,892	2,764	109
20 November 2025	Thursday	9,042	2,669	109
21 November 2025	Friday	10,387	2,766	73
22 November 2025	Saturday	7,841	2,295	79
23 November 2025	Sunday	8,313	2,033	68
24 November 2025	Monday	8,864	2,624	56
25 November 2025	Tuesday	8,416	2,543	75
26 November 2025	Wednesday	9,826	2,867	87

The surveyed temporal distribution of traffic throughout the day on weekdays and Saturday in 2025 is presented in Figure 2.8. Consistent with the 2021 survey results, weekday demands on Monaro Highway display distinct peaks in two-way traffic in the morning and evening, with lower volumes carried through the middle of the day. Throughout the weekday, two-way volumes on Monaro Highway peaked at around 800 vehicles per hour (two-way), and remained at around 575 to 600 vehicles per hour through the middle of the day. On Saturday, there is no distinct morning and evening peak, with the demand increasing to a peak around mid-morning, then remaining at a similar level until the later afternoon.

On Old Cooma Road, the updated weekday surveys display more distinct morning and evening peaks compared with the 2021 survey, noting that significant residential development has occurred at Googong since 2021, which would be expected to generate additional commuter trips on Old Cooma Road. Noting that Old Cooma Road and Monaro Station Road would be used during the initial construction of the Project (refer to Section 3), the assessment of the future traffic conditions during the Project's construction stage has been updated to refer to the 2025 surveyed conditions.

Figure 2.8: Hourly Two-Way Traffic Distribution 2025

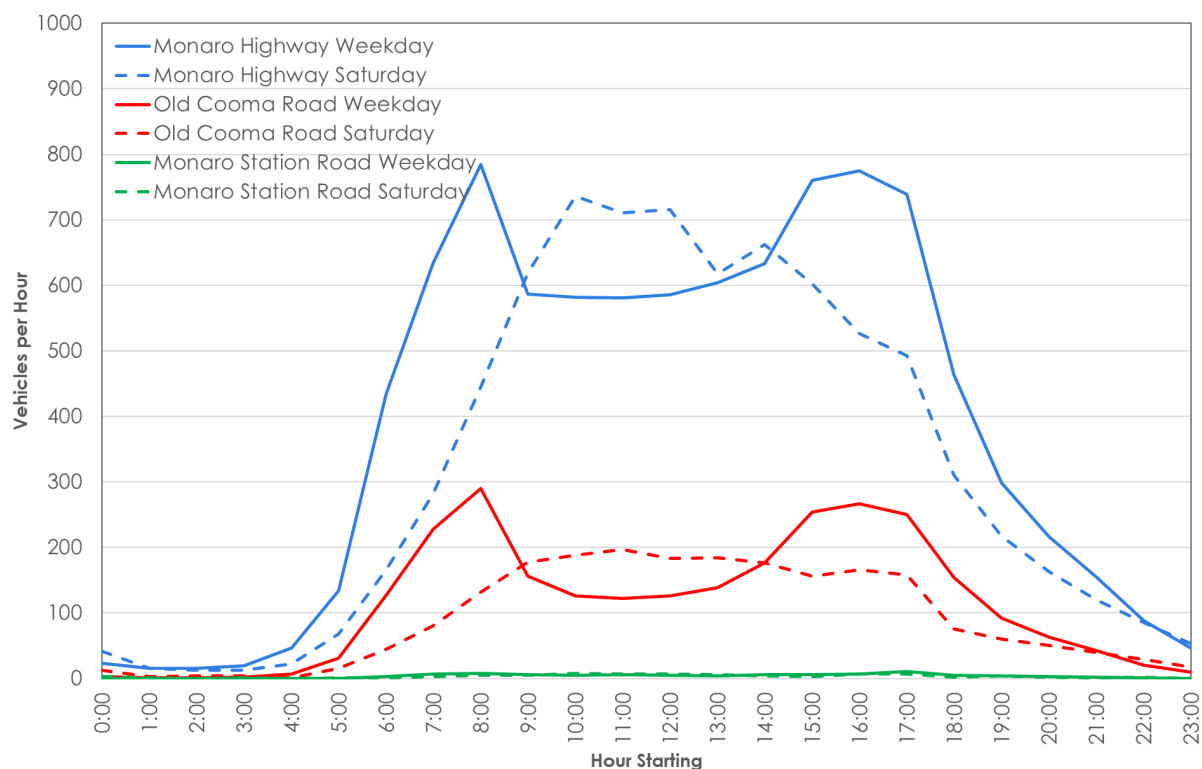


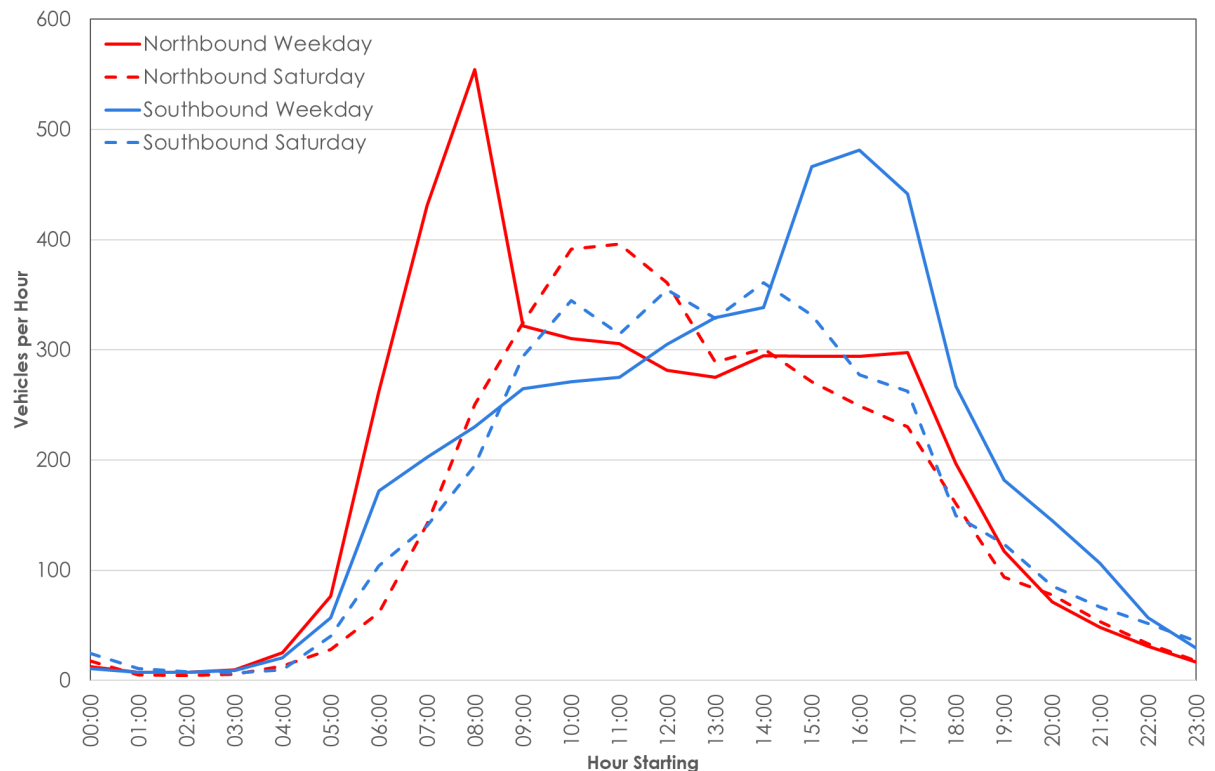
Table 2.14 presents a summary of the peak hourly traffic volumes at the surveyed locations over the average weekday, being the highest number of vehicles passing the surveyed location in both directions during any one hour before or after midday.

Table 2.14: Surveyed Peak Hourly Two-Way Traffic Volumes 2025 (vehicles per hour)

Road and Location	Hour Starting	Light	Rigid	Articulated	Total
Weekday AM Peak Hour					
Monaro Highway	8:00 am	606	145	34	785
Old Cooma Road	8:00 am	251	36	3	290
Monaro Station Road	8:00 am	6	1	0	7
Weekday PM Peak Hour					
Monaro Highway	4:00 pm	590	151	34	775
Old Cooma Road	4:00 pm	218	43	6	267
Monaro Station Road	5:00 pm	10	0	1	11
Saturday AM Peak					
Monaro Highway	10:00 am	595	121	21	737
Old Cooma Road	11:00 am	169	25	3	197
Monaro Station Road	10:00 am	8	1	0	8
Saturday PM Peak					
Monaro Highway	12:00 pm	593	104	19	716
Old Cooma Road	1:00 pm	163	21	1	184
Monaro Station Road	5:00 pm	6	1	0	7

The data has also been reviewed with consideration to the directional distribution of traffic demands through the day on Monaro Highway. Figure 2.9 presents the northbound and southbound traffic hourly demands on weekdays and Saturday (at 15-minute starting times). This demonstrates that the weekday peak demands in two-way traffic on Monaro Highway (as shown in Figure 2.8) are driven by northbound traffic during the morning and southbound traffic during the afternoon. On Saturday, the demand by direction is more evenly spread through the middle of the day, with a small peak in northbound traffic in the morning and southbound traffic in the afternoon.

Figure 2.9: Monaro Highway Hourly Traffic by Direction 2025



2.13 Growth on Monaro Highway 2021 to 2025

To gauge the validity of the forecasts of background traffic conditions on Monaro Highway, the surveyed traffic volumes in November 2025 (refer to Section 2.12) have been compared with the expected volumes based on the 2021 surveys and adopted growth rate of 2.9 % per annum as described in Sections 2.9 and 2.10. Noting that the key impacts of the Project would relate to the peak hourly conditions on Monaro Highway and at the proposed intersection (being the periods during which the highest proportion of capacity is taken up by background traffic), this comparison focusses on the morning and evening peak hourly traffic volumes on Monaro Highway.

For the purpose of this review, the forecasts have been calculated on the basis of four years and six months of growth at 2.9 % per annum (compound) from the volumes surveyed in May-June 2021, on which the assessment has been based.

Table 2.15: Comparison between Forecast and Surveyed Two-Way Traffic on Monaro Highway

	Weekday (vehicles per hour)		Saturday (vehicles per hour)	
	AM Peak	PM Peak	AM Peak	PM Peak
Surveyed May-June 2021	692	694	697	703
Forecast November 2025	787	790	793	800
Surveyed November 2025	785	775	737	716
Surveyed % of Forecast	99.8%	98.2%	93.0%	89.6%
Average Annual Growth Rate	2.85%	2.48%	1.25%	0.41%

the results in Table 2.15 indicate that with regard to peak hourly traffic:

- the November 2025 surveyed average weekday traffic volumes are slightly below but consistent with the forecast peak hourly volumes based on surveyed conditions in mid-2021 with growth at 2.9 % per annum as adopted in the original assessment; and
- the November 2025 surveyed Saturday traffic volumes are below the forecast peak hourly volumes based on surveyed conditions in mid-2021 with growth at 2.9 % per annum as adopted in the original assessment.

Table 2.16 compares the baseline traffic forecasts on Monaro Highway used in the assessment (based on mid-2021 data and an annual growth rate of 2.9 % per annum) and baseline forecasts for the same years based on the surveyed traffic volumes in late 2025, with growth at the average annual rates observed between the 2021 and 2025 survey results.

Table 2.16: Comparison of Baseline Peak Hour Traffic on Monaro Highway (vehicles per hour)

	Forecasts Based on mid-2021 Data and 2.9 % Annual Growth Rate		Forecasts Based on late 2025 Data and 2021 to 2025 Annual Growth Rate	
	AM Peak	PM Peak	AM Peak	PM Peak
Weekday				
Surveyed mid-2021	692	694	-	-
Surveyed late-2025	-	-	785	775
Forecast 2031	922	923	929	897
Forecast 2041	1,226	1,230	1,230	1,146
Saturday				
Surveyed mid-2021	697	703	-	-
Surveyed late-2025	-	-	737	716
Forecast 2031	929	935	794	734
Forecast 2041	1,234	1,246	968	783

The results in this comparison do not highlight any concerns regarding the adopted baseline traffic forecasts based on the 2021 survey results with growth at an average rate of 2.9 % per annum above mid-2021:

- for weekday conditions, the peak hourly forecasts adopted in this assessment are consistent with those forecast by considering surveyed 2025 volumes with growth

continuing at the rate observed between mid-2021 and late-2025. No changes to the baseline weekday traffic forecasts are considered to be warranted; and

- for Saturday conditions, the peak hourly forecasts adopted in this assessment are higher than those forecast by considering surveyed 2025 volumes with growth continuing at the rate observed between mid-2021 and late-2025. While it would be reasonable to reduce the baseline traffic forecasts to better reflect the observed growth rate, adoption of the higher forecasts results in a conservatively high assessment of the future conditions and impacts of the Project.

3 The Project

3.1 Project Description

Monaro Rock is proposing to construct and develop a new hard rock quarry (the Quarry) on the Project Site. The Quarry would initially be developed to provide hard rock aggregates and other products to concrete batching operations associated with Monaro Rock. However, it is planned that the operation would be expanded progressively to provide products to local and regional infrastructure and construction activities.

The Project would have an overall operational life of up to 35 years and a further three to five years to complete rehabilitation activities. Key activities would include:

- occasional blasting to fragment the in-situ resource;
- loading of material onto haul trucks for relocation to the processing plant;
- crushing and shaping of the material at the processing plant;
- temporary storage of products within the Project Site; and
- despatch of products to customers via the public road network.

In addition to these standard hard rock extraction activities, the Project would also include:

- importation of virgin excavated natural material (VENM) and excavated natural material (ENM);
- importation, storage, and processing of concrete waste material;
- operation of a concrete batching plant (including importation of raw materials) and despatch of concrete; and
- operation of an asphalt plant (including the importation of raw materials) and despatch of asphalt.

The main vehicular access to the site would be via the Quarry Access Road, that would intersect with Monaro Highway approximately 3.4 km north of its intersection with Old Cooma Road. A secondary access for use by light vehicles only would be provided via the Secondary Access Road, which would extend from the Infrastructure Area to its intersection with Mates Drive. The Secondary Access Road would be sealed for the first 120 metres (m) from its intersection with Mates Drive.

3.2 Quarry Activities

The Quarry would process and despatch up to 1 million tonnes per annum (Mtpa) of quarry products. The proposed rate of production at the Quarry would be scaled to meet demand with the following indicative production stages anticipated. The actual timing of each increase in maximum production would be dependent on client demand, however it is anticipated that Stage 2 would be commenced within five years of approval:

- Project Site Establishment – processing and despatch of up to 100,000 tonnes per annum (tpa) using mobile processing plant located within the Extraction Area;
- Stage 1 – processing of up to 250,000 tpa using a mobile processing plant located within the Stage P1 Processing Area;
- Stage 2 – once a processing rate of 250,000 tpa is achieved, the Stage P2 Processing Plant area would be constructed, and the processing rate increased up to 500,000 tpa;
- Stage 3 – production using mobile processing equipment would continue up to a rate of 750,000 tpa, at which time (or earlier) a fixed processing plant would be commissioned and built. The fixed processing equipment would then be used for production of up to 1 Mtpa of material.

Extraction and processing operations would occur on a campaign basis throughout the year. The despatch of quarry products would principally use truck and dog trailer combinations, with a load capacity between 32.5 tonnes (t) and 37.5 t. Smaller quantities of products would be despatched using semitrailers with load capacity between 27.5 t and 30 t, and rigid trucks with load capacity between 12.5 t and 18 t.

3.3 Ancillary Activities

3.3.1 Material Importation

VENM/ENM would be imported to support site establishment (such as road construction) and may be imported on an ongoing basis to support rehabilitation of the Project Site. No more than 150,000 tpa of VENM/ENM would be imported. Where possible, importation of VENM/ENM would use trucks returning from the delivery of quarry products to customers, with dedicated trips occurring where that is not feasible. The transportation of VENM/ENM would be measured at the weighbridge.

3.3.2 Concrete Recycling

Up to 20,000 tpa of concrete would be imported to the Project Site and processed for use as a component of blended materials for sale. Where possible, concrete would be imported by backloading trucks returning from concrete plants, with dedicated trips occurring where that is not possible. Up to 10 loads of concrete materials would be transported to the Project Site on any one day. The transportation of concrete for recycling would be measured at the weighbridge.

3.3.3 Concrete Batching Plant

A concrete batching plant would be developed within the Processing and Stockpiling Area, with capacity to produce up to 50,000m³ of concrete per annum, and up to 300m³ of concrete per day. It is anticipated that the concrete batching plant would not be constructed during site establishment, but would commence later in the Quarry life.

Raw materials for concrete production would be delivered in pneumatic tankers, semitrailers and truck and dog trailer combinations. Concrete would be despatched using concrete agitator trucks with a nominal capacity of up to 8.7 m³, and an average load of approximately 6.0 m³. Up to 50 loads of concrete would be despatched on any one day, and the practical capacity of the facility would allow for despatch of up to 13 concrete agitators in any one hour.

3.3.4 Asphalt Plant

An asphalt plant would be constructed within the Processing and Stockpiling Area, with capacity to produce and despatch up to 50,000 t of asphalt per annum and up to 1,000 t of asphalt per day. Construction of the asphalt plant would not occur during site establishment, but would occur later in the Quarry life.

It is anticipated that most aggregates for asphalt production would be sourced within the Project Site, with all other raw materials imported as needed. A variety of heavy vehicles would be required for this purpose, including pneumatic tankers, semitrailers or truck and dog trailer combinations. Walking floor semitrailers and truck and dog combinations would be used to transport asphalt from the Project Site.

Asphalt would be produced in campaigns, so despatch of asphalt would not occur every day. Asphalt would be despatched in various sizes of heavy vehicles depending on customer requirements, and up to 40 loads of asphalt may be despatched on any one day. The transportation of asphalt would be measured at the weighbridge.

3.4 Vehicular Access

It is proposed that all heavy vehicle access to and from the Quarry would be via the dedicated Quarry Access Road that would intersect with Monaro Highway approximately 3.4 km north of its intersection with Old Cooma Road. The Quarry Access Road would cross the Goulburn Bombala Railway to the east of Monaro Highway at a bridge crossing, and would be the main access for the Project.

As shown in Appendix D, the concept design for the intersection of the Quarry Access Road and Monaro Highway is located on that part of Monaro Highway that currently has two southbound lanes and one northbound lane. The intersection arrangement would allow vehicles exiting the Quarry to the north to conduct a staged exit movement, requiring them to give way to southbound traffic on Monaro Highway only, before accelerating and selecting a gap to merge into northbound traffic. Vehicles turning right into the Quarry would have a channelised right-turn short lane to decelerate and wait clear of the northbound through traffic before selecting a gap in the southbound traffic. Vehicles entering the Quarry Access Road via a left turn would be provided with an auxiliary left-turn lane to decelerate clear of the southbound through traffic stream on Monaro Highway.

A secondary access would be provided via the Secondary Access Road, which would extend from the Infrastructure Area to its intersection with Mates Drive, and would be sealed for the first 120 m from Mates Drive. The Secondary Access Road would be used during the initial site establishment stage of the Project for light vehicle access and to transport mobile equipment and construction materials. Once the Quarry Access Road and its intersection with Monaro Highway are constructed, the Secondary Access Road would be used by light vehicles only. Light vehicles would typically use the main access off Monaro Highway, however some workers who reside in the local area such as Googong or along Old Cooma Road may use the Secondary Access Road as it would provide the most direct access between the Project Site and their place of residence.

3.5 Transport Hours

Project construction activities, including transport of equipment to and from the Project Site, would occur between 7:00 am and 6:00 pm Monday to Friday, and between 8:00 am and 1:00 pm on Saturdays. No construction activities or transportation would occur on Sundays or public holidays.

It is proposed that product despatch and material importation activities would occur between 5:00 am and 6:00 pm Monday to Saturday. Concrete and asphalt production and despatch would occur between 7:00 am and 6:00 pm Monday to Friday and between 8:00 am and 1:00 pm on Saturdays. No transportation would occur on Sundays or public holidays.

3.6 Transport Limits

The following limits on operational transport activities are proposed:

- no more than 200 laden trucks would travel to or from the Project Site on any one day and no more than 25 laden trucks would travel to or from the Project Site during any one hour. This includes laden trucks for despatch of quarry products, importation of VENM/ENM, importation of concrete for recycling, importation of raw materials for concrete and asphalt production, and despatch of asphalt from the asphalt plant; and
- in addition to the above, no more than 50 loads of concrete would be despatched on any one day. While no specific limit is proposed on the number of concrete agitator trucks despatched in any one hour, the practical capacity of the facility would allow despatch of no more than 13 concrete agitators in any one hour.

The number of laden trucks generated by the cumulative activities on the Project Site would be managed via the weighbridge, which would include a locking system to prevent more than 25 laden truck movements to or from the Project Site in any one hour, or more than 200 laden truck movements in any one day. The number of laden concrete agitators in any one hour would be practically limited to 13 laden trucks per hour, and the number of loads recorded on-site to ensure the limit of 50 loads in any one day is not exceeded.

3.7 Workforce

When operational, the Project would employ between 14 and 20 personnel full-time during operations, as well as 10 drivers for transport activities.

4 Impacts of the Project

4.1 Construction Activity

Construction is expected to occur over a period of approximately six months, with construction activities occurring between 7:00 am and 6:00 pm Monday to Friday and between 8:00 am and 1:00 pm on Saturdays. No construction activities would occur on Sundays or public holidays.

On a typical day during the construction stage, approximately 20 people would work on-site and drive a light vehicle (e.g. cars, 4WDs, utes), and approximately two heavy vehicle deliveries would occur (e.g. rigid trucks or semitrailers). At the start and end of the construction stage, up to five non-road registered equipment loads such as excavators would be floated to and from the site using low loaders. The float loads may all arrive on one day, and would reasonably be expected to be over-dimensional vehicles (i.e. greater than 2.5 m wide and/or greater than 19 m (or 25 m for B-doubles)). The construction activity would not require any high risk oversize overmass (OSOM) movements as defined by TfNSW (2026).

On a typical construction day, it can therefore be expected that approximately 20 cars and two heavy vehicles would access the site, generating 40 light vehicle and four heavy vehicle trips per day. The light vehicles would typically arrive at around 7:00 am on weekdays and 8:00 am on Saturdays, and depart at around 6:00 pm on weekdays and 1:00 pm on Saturdays. Heavy vehicles making deliveries may arrive and depart at any time throughout the construction hours. The float loads would generate up to 10 heavy vehicle trips on one day at the start and the end of the construction activities.

Until the Quarry Access Road is constructed, construction vehicle access would be via the Secondary Access Road, travelling via Mates Drive, Monaro Station Road and Old Cooma Road. Adequate parking for construction workers would be provided wholly within the site.

Assuming that the initial construction activity using the Secondary Access Road occurs in 2026, and allowing for background growth at a conservatively high rate of 2.9 % (consistent with that applied to Monaro Highway) above the surveyed volumes in 2025 (refer to Section 2.12.2), Figure 4.1 presents the forecast two-way traffic volumes on Old Cooma Road and Monaro Station Road during the construction period. This assumes that:

- the construction workers all arrive in the hour prior to the start of construction hours and depart during the hour following the end of construction hours. To the extent that the arrival and departure of worker would spread over a longer period, this will tend to overestimate the number of trips generated by the workforce during the nominated hours;
- all construction traffic uses Old Cooma Road south of Monaro Station Road. To the extent that some workers or deliveries may approach and depart to/from the north, this will tend to overestimate total traffic on Old Cooma Road; and

- one heavy vehicle would approach and depart the Project Site each and every hour during the proposed construction hours, to account for the possibility of those trips occurring at any time during the construction hours.

Figure 4.1: Forecast Two-Way Traffic During Construction Activity in 2026

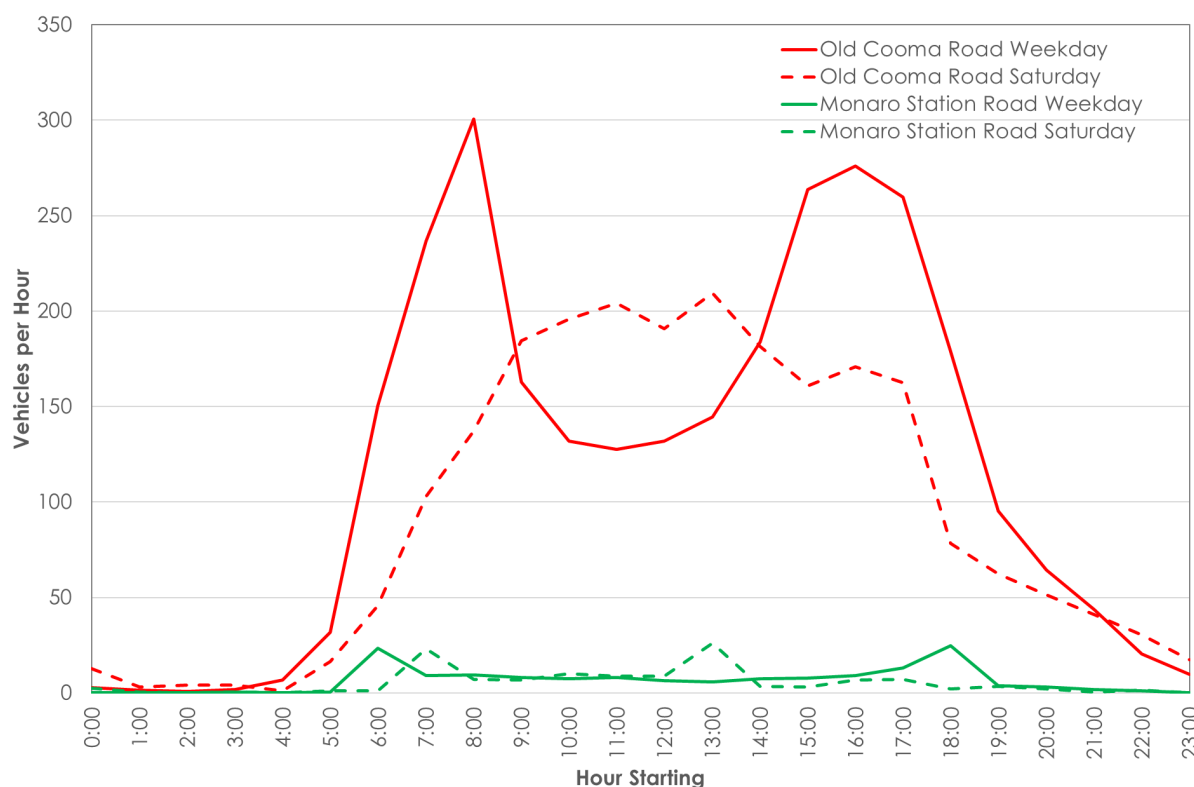


Table 4.1 summarises the peak hour two-way volumes on Old Cooma Road and Monaro Station Road during construction activity, noting that the assumptions outlined above result in the construction activity generating its peak number of trips during the hours starting 6:00 am and 6:00 pm on weekdays and 7:00 am and 1:00 pm on Saturdays.

Table 4.1: Forecast Peak Hour Traffic with and without Construction Activity

	2026 Without Project Construction		2026 With Project Construction	
	Hour Starting	Vehicles per Hour	Hour Starting	Vehicles per Hour
Weekday AM Peak Hour				
Old Cooma Road	8:00 am	299	8:00 am	301
Monaro Station Road	8:00 am	9	6:00 am	23
Weekday PM Peak Hour				
Old Cooma Road	4:00 pm	273	4:00 pm	275
Monaro Station Road	5:00 pm	11	6:00 pm	25
Saturday AM Peak Hour				
Old Cooma Road	11:00 am	203	11:00 am	205
Monaro Station Road	10:00 am	8	10:00 am	10
Saturday PM Peak Hour				
Old Cooma Road	1:00 pm	190	1:00 pm	209
Monaro Station Road	5:00 pm	7	1:00 pm	26

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 forecast traffic volumes with the threshold volumes above, it is evident that the forecast peak hourly volumes on Old Cooma Road and Monaro Station Road are well below the threshold volumes for analysis, and as such, there is no capacity concerns regarding the operation of the intersection during the Project construction activity when the Secondary Access Road is in use.

The future traffic volumes on Old Cooma Road and Monaro Station Road during the construction stage (prior to commissioning of the Quarry Access Road) would be well within the capacity of those roads and intersections. Taking into consideration the normal day-to-day variations in demand, future peak hourly volumes on Old Cooma Road would be generally consistent with existing volumes, and the additional traffic generated by the construction activity would have a negligible impact on traffic conditions. On Monaro Station Road, peak hourly volumes of up to 26 vehicles per hour are forecast assuming all construction workers travel during one hour at the start and end of construction activity. These low volumes are well below the level at which residential amenity would be expected to be impacted by traffic.

Construction activity may generate the need for the movement for oversize or overmass vehicles to transport equipment such as excavators. All oversize loads would be transported during daylight only, with the relevant permits required by the regulatory authorities, including ACT and NSW conditions where relevant, and would access the Quarry to/from the south via Monaro Highway.

As part of the permit for any Project-generated OSOM vehicle movements, the transport contractor would develop a Traffic Management Plan (TMP) that would identify the specific load and vehicle dimensions and mass. The TMP would identify risks and measures to minimise the impact of the movement on the road network, addressing:

- the route to be used;
- escorts and pilot requirements;
- travel restrictions;
- timing of the movement;
- communication with local authorities, police and emergency services; and
- any minor temporary civil works that may be required to accommodate the vehicle.

4.2 Operational Trip Generation

4.2.1 Heavy Vehicles

Table 4.2 summarises the daily average and maximum number of loads of materials and vehicle trips¹ by type that would be generated by the Quarry at its maximum production rate of 1 Mtpa, as described in Section 3.2 and 3.3. Table 4.2 assumes that every laden truck movement either to or from the Project Site would be matched with an unladen trip in the reverse direction. To the extent that backloading of heavy vehicles occurs (such as a truck despatching material to a concrete plant and returning with concrete for recycling), the total number of trips generated may be reduced below that shown in Table 4.2. The maximum number of loads for each type of activity would not all occur on any one day.

¹ Throughout this report and consistent with Austroads definition, a trip is a one way movement. A vehicle entering the Quarry and departing the Quarry generates two vehicle trips.

Table 4.2: Heavy Vehicle Trip Generation by Activity Type at Maximum Quarry Production

Annual Maximum Activity	Average per Day ^A		Maximum per Day	
	Loads	Trips	Loads	Trips
1 Mtpa Quarry product despatch	95	190	200	400
150,000 tpa VENM/ENM importation	13	26	55	110
20,000 tpa Concrete importation	2	4	5	10
Concrete and asphalt raw materials importation	3	6	5	10
50,000 tpa Asphalt despatch	5	10	40	80
50,000m ³ Concrete despatch	28	56	50	100

^A Assumes 302 operating days per year and average load of 35 t, 6m³ per concrete agitator. Cumulative maximum loads per day for all activities would be limited, refer to Table 4.3.

As described in Section 3.6 and summarised in Table 4.3, the total cumulative number of loads transported to and from the Quarry by heavy vehicles would be limited, as shown in Table 4.3. The number of loads of concrete despatched from the Project Site would be limited by the practical capacity of the facility to load a maximum of 13 trucks in one hour.

The number of laden trucks generated by the cumulative activities on the Project Site would be managed via the weighbridge, which would include a locking system to prevent more than 25 laden truck movements to or from the Project Site in any one hour, or more than 200 laden truck movements in any one day. The number of laden concrete agitators in any one hour would be practically limited to 13 laden trucks per hour, and the number of loads recorded on-site to ensure the limit of 50 loads in any one day is not exceeded.

Table 4.3: Maximum Daily Heavy Vehicle Trip Generation

Activity	Vehicle Types	Maximum per Day		Maximum per Hour	
		Loads	Trips	Loads	Trips
Quarry product despatch VENM/ENM importation Concrete importation Asphalt materials importation Asphalt despatch	Truck and dog Semitrailer Rigid truck	200	400	25	50
Concrete despatch	Concrete agitator	50	100	13	26
Total		250	500	38	76

While Table 4.3 presents vehicle trips (assuming each laden truck movement to or from the Project Site would be matched with an unladen trip in the reverse direction), it is proposed that the transportation limits relate to laden truck movements. To the extent that backloading of heavy vehicles occurs, the number of trips generated by the maximum number of laden trucks may be reduced below that shown in Table 4.3.

The maximum conditions for heavy vehicle activity in Table 4.3 would not occur every operating day.

4.2.2 Workforce and Visitors

The workforce of up to 20 employees would travel to and from the Quarry each day, typically in light vehicles. This would generate up to 40 light vehicle trips per day. Employees and drivers would arrive during the morning and depart during the afternoon/evening, with not all employees arriving and departing at the same time of day. Some employees would arrive prior to the start of transport activities, and some would depart following the cessation of transport activities each day. For the purpose of this assessment, it is assumed that the workforce would arrive between 5:00 am and 7:00 am, and depart between 5:00 pm and 7:00 pm.

Occasional non-employee visitors to the Quarry can be expected. For the purpose of this assessment, it has been assumed that typically, an average of two visitors would attend the Quarry each day, generating four light vehicle trips per day. Visitors would be expected to arrive and depart at any time throughout business hours, taken to be between 9:00 am and 5:00 pm. Visitors would be expected to generate no more than two vehicle trips during any one hour.

4.2.3 Total Traffic Generation

As a robust assessment of the potential impacts of the total Project traffic, the maximum traffic generation of the Project assumed for the purpose of this assessment is presented in Table 4.4.

Table 4.4: Maximum Hourly Trip Generation of the Project (vehicle trips per hour)

Time of Day	Heavy Vehicle Transport	Concrete Agitators	Workforce	Visitors	Total Trips
Monday to Friday					
5:00 am to 6:00 am	50	0	10	0	60
6:00 am to 7:00 am	50	0	10	0	60
7:00 am to 9:00 am	50	26	0	0	76
9:00 am to 5:00 pm	50	26	0	2	78
5:00 pm to 6:00 pm	50	26	10	0	86
6:00 pm to 7:00 pm	0	0	10	0	10
Saturday					
5:00 am to 6:00 am	50	0	10	0	60
6:00 am to 7:00 am	50	0	10	0	60
7:00 am to 8:00 am	50	0	0	0	50
8:00 am to 9:00 am	50	26	0	0	76
9:00 am to 1:00 pm	50	26	0	2	78
1:00 pm to 5:00 pm	50	0	0	2	52
5:00 pm to 6:00 pm	50	0	10	0	60
6:00 pm to 7:00 pm	0	0	10	0	10

Maximum hourly trips would not occur in each and every hour throughout the day.

4.3 Operational Traffic Distribution

All heavy vehicles transporting material or products to and from the Project Site would enter and exit the Project Site via the Quarry Access Road to and from Monaro Highway. On a day-to-day basis, the distribution of haulage traffic generated by the Project would vary depending on the ancillary activities occurring each day and the location of customers for the various products. Over an extended period, it is estimated that approximately 90 percent of heavy vehicles would approach and depart to and from the north on Monaro Highway, and 10 percent would approach and depart to and from the south.

Due to the campaign nature of the transport activities, the day-to-day directional distribution of the haulage trucks can vary considerably, with all transport occurring to the north or south on any particular day, although due to the longer term distribution, haulage to and from the south would be infrequent. On any one day, the total trips generated to and from the Project Site may therefore occur on Monaro Highway to the north or the south of the Quarry Access Road, but not north and south of the Quarry Access Road simultaneously. This assessment has therefore considered the impacts of the Project's haulage for the possible scenarios during which all Project traffic travels to and from either the south or north.

Employees are expected to reside in the local region, primarily to the north of the Quarry, and so may be expected to travel to and from the Quarry via either Monaro Highway or Old Cooma Road. Employees who reside locally along Old Cooma Road or Googong may use the Secondary Site Access, however the majority would be expected to use the Quarry Access Road.

Visitors to the Quarry would principally travel from to the north of the Quarry, and so may be expected to travel to and from the Quarry via either Monaro Highway or Old Cooma Road.

4.4 Future Traffic Volumes

The forecast future peak hourly and weekday traffic volumes are summarised in Table 4.5, which applies the maximum Project-generated traffic in one direction on Monaro Highway, i.e. the forecasts may be applied to Monaro Highway north of the Quarry should all workforce, visitor and haulage trips during the peak hour or day occur to and from the north only. Similarly, the forecasts may be applied to Monaro Highway south of the Quarry should all workforce, visitor and haulage trips during the peak hour or day occur to and from the south only. Noting the variation in maximum hourly traffic generated throughout the day by the Project (Table 4.4), the peak hourly traffic demands on Monaro Highway would occur during the same hours as the existing peak hours.

Table 4.5: Baseline and Future Two-Way Traffic Volumes on Monaro Highway

	2031			2041		
	Light	Heavy	Total	Light	Heavy	Total
Baseline Weekday – No Project						
8:00 am to 9:00 am	829	93	922	1,103	123	1,226
4:00 pm to 5:00 pm	843	80	923	1,123	107	1,230
Daily	9,198	1,247	10,445	12,241	1,660	13,901
Baseline Saturday – No Project						
11:00 am to 12:00 pm	862	67	929	1,146	88	1,234
4:00 pm to 5:00 pm	882	53	935	1,175	71	1,246
Daily	9,750	729	10,479	12,977	970	13,947
Weekday – with Project Maximum Heavy Vehicle Activity in One Direction						
8:00 am to 9:00 am	829	169	998	1,103	199	1,302
4:00 pm to 5:00 pm	845	156	1,001	1,125	183	1,308
Daily	9,254	1,747	11,001	12,297	2,160	14,457
Saturday – with Project Maximum Heavy Vehicle Activity in One Direction						
11:00 am to 12:00 pm	864	143	1,007	1,148	164	1,312
4:00 pm to 5:00 pm	884	103	987	1,177	121	1,298
Daily	9,806	1,229	11,035	13,033	1,470	14,503

With the Project operating at the maximum traffic generation conditions, Monaro Highway can be expected to carry approximately 11,000 vehicles per day in 2031, and 14,500 vehicles per day in 2041.

The forecasts in Table 4.5 assume that the Project workforce all travel to and from the Project Site via Monaro Highway and the Quarry Access Road. Workers who reside in the local area to the north of the Project Site may use the Secondary Access Road, as that would be a shorter route. Those workers would travel via Old Cooma Road, Monaro Station Road, and Mates Drive. This would include only a small proportion of the total workforce of up to 20 personnel, so the number of additional trips on that route would be very low, and would comprise light vehicles only. As the surveyed background traffic volumes on Old Cooma Road and Monaro Station Road indicate that those roads have adequate capacity to accommodate the small number of trips that may be generated by the Project workforce, the impacts of the Project on that route have not been considered further in this assessment.

4.5 Midblock Level of Service on Monaro Highway

The impact of the Project on the midblock level of service experienced by drivers on the road network has been assessed using the HCM analysis methods described in Section 2.11.

4.5.1 Monaro Highway South of Project Site

Should all Project traffic travel to and from the south only, the vehicles would travel on that part of Monaro Highway that has a single travel lane in each direction, for which PTSF is the measure of the LOS experienced by drivers. The forecast PTSF and LOS has been assessed for those conditions and the results are summarised in Table 4.6.

Table 4.6: Monaro Highway South of Project Site Midblock Level of Service

	Direction	Baseline – No Project				Project Haulage to/from South Only			
		2031		2041		2031		2041	
		PTSF	LOS	PTSF	LOS	PTSF	LOS	PTSF	LOS
Weekday AM Peak Hour	Northbound	77.9	D	84.6	D	80.4	D	86.8	E
	Southbound	44.5	B	53.2	B	48.2	B	56.3	C
Weekday PM Peak Hour	Northbound	53.5	B	62.0	C	56.1	C	63.9	C
	Southbound	77.0	D	84.3	D	77.7	D	84.9	D
Saturday AM Peak Hour	Northbound	71.2	D	77.1	D	72.2	D	78.1	D
	Southbound	69.1	C	75.6	D	70.3	D	76.7	D
Saturday PM Peak Hour	Northbound	63.7	C	71.4	D	65.8	C	72.8	D
	Southbound	73.9	D	79.9	D	75	D	81.2	D

Refer to Table 2.3 for times of the peak hours.

Table 4.6 indicates that should the maximum haulage activity to and from the south of the Project Site occur concurrent with the peak hour traffic on Monaro Highway in 2041, the PTSF in the peak flow direction on the two-lane, two-way section of Monaro Highway would increase by up to 2.2 % compared with conditions without the Project. That highest increase would occur for northbound traffic on Monaro Highway during the weekday morning peak, which is forecast to reach the lower end of the PTSF range for LOS E.

4.5.2 Monaro Highway North of Project Site

Should all Project traffic travel to and from the north only, the vehicles would travel on that part of Monaro Highway that has a single northbound and two southbound travel lanes. Consistent with Section 2.11.2, the density and LOS for the southbound traffic have been assessed with the maximum Project heavy vehicle trips during the peak hours, and the results are summarised in Table 4.6.

Table 4.7: Monaro Highway North of Project Site Southbound Midblock Level of Service

	Baseline – No Project				Project Haulage to/from North Only			
	2031		2041		2031		2041	
	Density	LOS	Density	LOS	Density	LOS	Density	LOS
Weekday AM Peak Hour	1.8	A	2.4	A	2.2	A	2.8	A
Weekday PM Peak Hour	4.2	A	5.6	A	4.6	A	6.0	A
Saturday AM Peak Hour	3.1	A	4.1	A	3.5	A	4.5	A
Saturday PM Peak Hour	3.6	A	4.7	A	3.9	A	5.1	A

Refer to Table 2.3 for times of the peak hours.

Table 4.7 indicates that should the maximum haulage to and from the north of the Project Site occur concurrent with the peak hour traffic on Monaro Highway in 2041, the density of southbound traffic during peak hours would result in a good level of service.

To the north of the Project Site, with maximum Project traffic to and from the north only, the northbound LOS would be consistent with that calculated for northbound traffic on that part of Monaro Highway which is a two-way two-lane road as shown in Table 4.6.

4.6 Quarry Access Road Intersection Operation

The peak hour operating characteristics of the proposed intersection of Monaro Highway with the Quarry Access Road have been assessed using SIDRA INTERSECTION 10, an analysis program which determines characteristics of intersection operating conditions including the degree of saturation, average delays, and levels of service. The degree of saturation, or x-value, is the ratio of the arrival rate of vehicles to the capacity. The average delay, expressed in seconds per vehicle, is measured over all movements at signalised intersections, and over the movement with the highest average delay at roundabout and priority intersections.

The TCCS *Guidelines for Transport Impact Assessment* (TCCS, 2020) indicate that for SIDRA modelling purposes, TCCS has adopted the NSW Roads and Maritime Services (RMS, now TfNSW) *Traffic Modelling Guidelines* (RMS, 2013). Average vehicle delay is the commonly used measure of intersection performance defined by TfNSW, and Table 4.8 shows the criteria adopted by TfNSW for assessing the level of service.

Table 4.8: Intersection Level of Service Criteria

Level of Service (LoS)	Average Delay per vehicle (sec/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Note: Average delay per vehicle is measured as seconds per vehicle (sec/veh). Adapted from TfNSW (2024).

Table 4.9 presents a summary of the forecast peak hour operating characteristics of the intersection with maximum hourly haulage activity to either the north or south of the Quarry. The model has been developed with consideration of the bunching of traffic on Monaro Highway identified by the ATC surveys, and TTPP's experience with the characteristics of laden Quarry trucks. The analyses assume the intersection geometry is consistent with that of the intersection concept design.

As the intersection is under priority control, the reported average delay is for the movement with the highest average delay per vehicle, and is inclusive of stop-line delay, geometric delay and (for the relevant scenarios) the downstream merge delay for outbound vehicles travelling north. Detailed results, including vehicle queues are presented in Appendix E.

Table 4.9: Operating Conditions Monaro Highway and Quarry Access Road

	Project Transport to/from North Only			Project Transport to/from South Only		
	X-Value	Average Delay ^a	LoS	X-Value	Average Delay ^a	LoS
2031 – with Project Maximum Haulage						
Weekday 8:00 am to 9:00 am	0.386	26.9	B	0.386	18.6	B
Weekday 4:00 pm to 5:00 pm	0.206	31.3	C	0.206	29.5	C
Saturday 11:00 am to 12:00 pm	0.273	27.6	B	0.273	23.9	B
Saturday 4:00 pm to 5:00 pm	0.234	28.5	C	0.234	25.8	B
2041 – with Project Maximum Haulage						
Weekday 8:00 am to 9:00 am	0.514	42.6	D	0.514	21.2	B
Weekday 4:00 pm to 5:00 pm	0.258	40.1	C	0.257	36.5	C
Saturday 11:00 am to 12:00 pm	0.362	35.9	C	0.362	28.7	C
Saturday 4:00 pm to 5:00 pm	0.312	36.7	C	0.312	31.6	C

^a seconds per vehicle for movement with the highest average delay per vehicle.

On the basis of the above assessment results, with growth at 2.9 % per annum and maximum haulage occurring to and from the north only or to the south only, the intersection of Monaro Highway with the Quarry Access Road would have adequate capacity, and turning vehicles would experience acceptable delays. In the longer term, should maximum haulage occur to and from the north only and coincide with the morning peak hour for demands on Monaro Highway, the forecast average delay per vehicle lies between the upper end of the range for LOS C and the lower end of the range for LOS D, with the former indicating satisfactory conditions and the latter indicating that the intersection is nearing its capacity.

Overall the operation of the intersection is expected to be satisfactory, noting that the conditions assessed using SIDRA are conservatively high, as they assume:

- maximum hourly Project haulage coincides with peak hourly background traffic conditions, which would not occur on a day-to-day basis;
- all heavy vehicles generated by the Project transport activities (aside from concrete agitators²) are articulated trucks, which require larger gaps in opposing traffic (generating longer delays) compared with the rigid trucks that would make up a proportion of those heavy vehicles; and
- a background traffic growth rate of 2.9 % per annum on Monaro Highway, which exceeds the historic daily growth rate of 1.19 % between 2015 and 2024 (Section 2.6.1),

² Note: concrete agitators are rigid trucks that would require smaller gaps in opposing traffic compared with articulated trucks.

exceeds the default rate of 2.0 % per annum adopted in TCCS (2020), and exceeds the peak hour growth observed between the surveys conducted in 2021 and 2025 (Section 2.13).

Through traffic on Monaro Highway would not experience delays as a result of the intersection. Should all Project-generated transport occur to and from the south only, the 95th percentile queue of vehicles turning right in to the Quarry Access Road would be less than one vehicle, so would not overflow the storage lane into the northbound through lane.

4.7 Intersection Concept Design

A concept design for the intersection of Monaro Highway and the Quarry Access Road has been prepared with regard to the *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management* (Austroads, 2020b) and *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections* (Austroads, 2023). The concept design is presented in Appendix D. Key features of the concept design have been reviewed with regard to the Austroads guidelines, and are discussed below.

4.7.1 Major Road Treatments

The concept design for the intersection has been reviewed with regard to the current Austroads (2020b) rural intersection design treatments, which are briefly described and illustrated below. The general minimum preferred treatments at rural road intersections are Basic Auxiliary Left (BAL) and Basic Auxiliary Right (BAR) treatments. The rural BAL treatment on the major road has a widened shoulder, which assists turning vehicles to move further off the through carriageway, making it easier for through vehicles to pass. The rural BAR treatment features a widened shoulder on the major road that allows through vehicles, having slowed, to pass to the left of turning vehicles.

Auxiliary turn lane treatments have short lengths of auxiliary lane provided to improve safety, especially on high speed roads. The Auxiliary Right-turn treatment (AUR) is not used in NSW, rather a channelised right-turn treatment with a short turn bay known as a CHR(S) treatment is used. Auxiliary Left-turn (AUL) treatments on the major and minor road are normal indented turn lanes, used only by vehicles turning left.

Channelised "CH" treatments separate conflicting vehicle paths by raised or painted medians and/or islands, and often use auxiliary lanes in conjunction with channelisation. The channelised right-turn (CHR) treatment on the major road provides a continuous lane for through vehicles only, and an auxiliary turn lane for right turning vehicles only. Channelised left-turn (CHL) treatments on the major or minor road provide a separate left turn "slip" lane, separated from the adjacent lane by a painted or raised island.

The guidelines for the level of treatment in the major road at an intersection are given in Austroads (2020b) which contains details of the warrants for rural road turn treatments for high-speed rural roads. The warranted treatment is based on an assessment of the

combination of through and turning movements at the intersection, with higher turning volumes generally requiring higher levels of treatment above the minimum. The warrants are applicable to greenfields intersections, and although not intended for use at accesses and driveways, they may be used as a reference for such.

Figure 4.2: Warrant for Turn Treatment on Major Road at Unsignalised Intersection

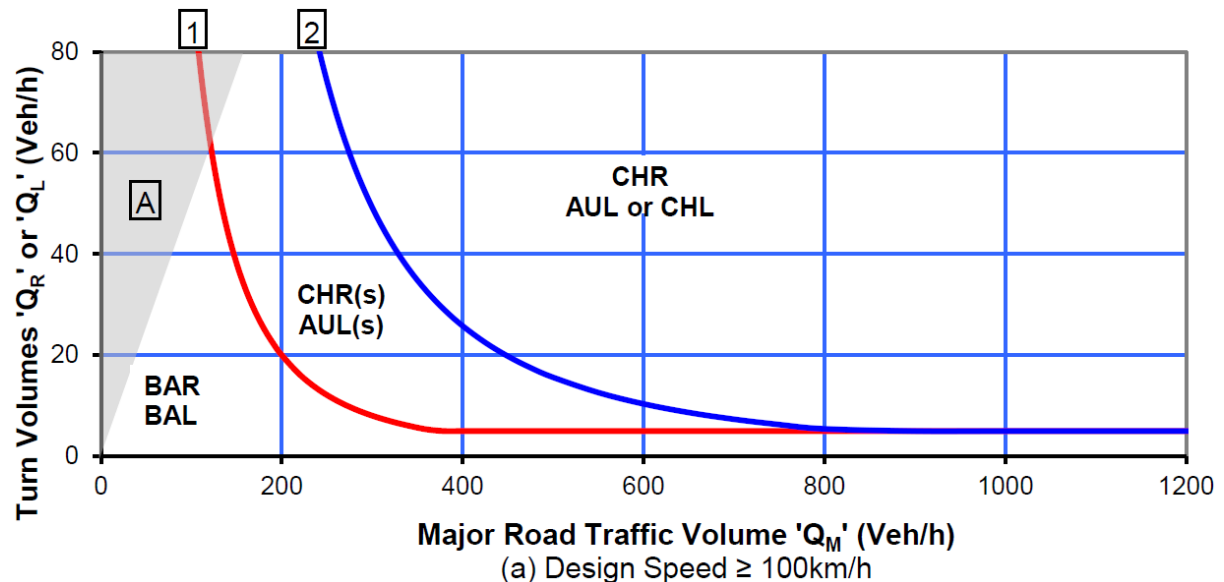


Table 4.10 summarises the peak hour weekday and Saturday demand with maximum haulage activity to/from either the south or the north, taking into consideration that Monaro Highway has a single northbound lane and two southbound lanes at the proposed intersection location.

Table 4.10: Major Road Treatment in Monaro Highway with Maximum Project Haulage 2041

	Left-Turn Treatment in 2041 Maximum Project Haulage to/from North			Right-Turn Treatment in 2041 Maximum Project Haulage to/from South		
	Q_L	Q_M	Treatment	Q_R	Q_M	Treatment
Weekday AM Peak Hour	38	162	AUL(S)	38	1,226	CHR
Weekday PM Peak Hour	38	406	AUL or CHL	38	1,230	CHR
Saturday AM Peak Hour	38	302	AUL(S)	38	1,234	CHR
Saturday PM Peak Hour	38	350	AUL or CHL	38	1,246	CHR

The Austroads warrants suggest that to accommodate maximum haulage to/from either direction, an auxiliary or channelised left-turn treatment and a channelised right-turn treatment should be provided in Monaro Highway. The concept design for the intersection (refer to Appendix D) includes an auxiliary left-turn lane and channelised short right-turn (CHR(S)) lane in Monaro Highway. The CHR(S) lane is below the CHR treatment suggested by the warrant based on the maximum Project transport occurring to and from the south only. Considering that haulage to and from the south would make up only 10 % of Project-generated trips, the conditions forecast in Table 4.10 would occur very infrequently, and the provision of a CHR(S) treatment is considered reasonable.

4.7.2 Intersection Geometry

For the signposted speed limit of 100 km/h on Monaro Highway, a design speed of 110 km/h has been adopted. In the vicinity of the intersection, Monaro Highway has a grade of approximately 4 % down for northbound travel (4 % up for southbound travel).

Left Turn Deceleration Lane

For deceleration from 110 km/h (design speed on Monaro Highway) to 20 km/h (assumed turning speed at entry to Quarry Access Road), Austroads (2023) requires a deceleration length, including diverge taper, of 180 m on level grade at a comfortable deceleration rate of 2.5 m/s². With 4 % up grade for southbound travel on Monaro Highway, a grade adjustment factor of 0.9 applies, reducing the required deceleration length to 162 m. As the left turning traffic would not be opposed by other vehicles, no storage length is required for queuing of vehicles. The proposed deceleration length of 165 m therefore meets the requirements of Austroads (2023).

Right Turn Deceleration Lane

Channelised right-turn (short lane) treatments are based on a 20 % reduction in through road speed at the start of the taper. A 20 % reduction in the design speed of 110 km/h on Monaro Highway is equivalent to 88 km/h. Vehicles turning right into the Quarry Access Road would be required to stop before crossing the southbound carriageway. For deceleration from 88 km/h to stop, Austroads (2023) requires a deceleration length, including diverge taper, of 120 m on level grade at a comfortable deceleration rate of 2.5 m/s². With 4 % down grade for northbound travel on Monaro Highway, a grade adjustment factor of 1.2 applies, increasing the required deceleration length to 144 m. The concept plan includes a deceleration length of 145 m, which complies with the requirement for a CHR(S) deceleration lane. While no additional length is proposed for storage of a design vehicle in the CHR(S) lane, it is noted that right-turn entry to the Quarry is expected to occur only infrequently and the likelihood of a heavy vehicle waiting in the lane when a second vehicle approaches from the south would be low. If required, driver behaviour and/or requirements for minimum headways between vehicles during campaigns of deliveries to the south may be appropriately managed via an operational TMP and Drivers' Code of Conduct.

Right Turn Acceleration Lane

For acceleration from a stopped position on the Quarry Access Road to the design speed of 110 km/h on Monaro Highway, an acceleration lane length, including merge taper, of 610 m is required. With 4 % down grade for northbound travel on Monaro Highway, a grade adjustment factor of 0.6 applies, reducing the required acceleration length to 366 m. As the intersection design would require drivers to conduct a merge from right to left, an additional length representing 3 to 5 seconds of travel time is required, equivalent to a minimum additional length of 92 m at the design speed of 110 km/h. The minimum acceleration lane

length, including the merge taper, is therefore 458 m, and the proposed acceleration lane length of 458 m is satisfactory.

4.7.3 Safe Intersection Sight Distance

Safe Intersection Sight Distance (SISD) is the minimum sight distance which should be provided on the major road at any intersection, allowing 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. SISD allows for an observation time for a driver on the priority legs of the intersection to observe a problem ahead plus the Stopping Sight Distance (SSD). SSD is the distance required to enable a normally alert driver, travelling at the design speed on wet pavement, to perceive, react and brake to a stop before reaching a hazard on the road ahead (Austroads, 2023). SISD 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 (0.2 m less than the 15th percentile height of passenger cars) 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.

For the posted speed limit of 100 km/h, driver reaction time of 2.5 seconds and travel on level grades, Austroads (2023) requires SISD of 262 m on level grade. For northbound travel on a 4 % down grade, this increases to 278 m, and for southbound travel on a 4 % up grade, this decreases to 251 m. As shown on the concept plans, the SISD requirements would be met with appropriate trimming of some existing vegetation on the eastern side of Monaro Highway.

4.8 Road Safety Implications

The review of the road crash history of the Project 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 Project.

As described in Section 4.7, the concept design of the intersection of the Quarry Access Road and Monaro Highway has been developed with due regard to the relevant Austroads guidelines, with respect to the treatments in the major road, the adequacy of acceleration and deceleration lane lengths and SISD. Compliance with the Austroads requirements is reasonably considered to be appropriate to ensure the intersection operates in a safe manner. As requested by TCCS, a Pre-Construction Road Safety Audit (RSA) of the intersection concept design has been undertaken (TPPP, 2025), including consideration of speed management and impacts on pedestrian and cyclists.

TPPP understands that the community has raised concerns regarding road safety, including risks associated with fog during mornings in winter. The review of the road crash history (Section 2.7) found that two crashes occurred during fog, one of which involved a pedestrian on the road about 3 km north of the proposed Quarry Access Road location, and one of which involved a head-on collision in darkness close to the intersection of Old Cooma Road.

The crash history does not identify whether the foggy conditions were a causation factor in either of those crashes. It is recommended that drivers of Project trucks be subject to operational protocols relating to driver behaviour, which may be included in a Project TMP and Drivers' Code of Conduct. The TMP would form part of the employee contract or transport contractual arrangements and would address such matters as management of transport operations during foggy conditions.

It is also understood that community concerns were previously raised with regard to the safety of a new access on Monaro Highway, noting that no details of the intersection design had been developed at that time. As discussed in Section 4.7, the concept design for the Quarry Access Road intersection is based on the requirements of the Austroads road design guidelines, and includes a dedicated acceleration lane for vehicles exiting the Quarry to the north (the principal departure direction) and deceleration lanes for vehicles entering the Quarry Access Road from both the north and south. The provision of those lanes allows turning vehicles to remain clear of the through traffic when slowing to enter the Quarry Access Road from either direction, and for vehicles to accelerate clear of the through traffic after exiting the Quarry Access Road and prior to entering the northbound travel lane on Monaro Highway.

The concept design has been developed to minimise potential safety issues relating to the introduction of a new intersection, as it would minimise the interaction between turning and through vehicles, would meet or exceed sight distance requirements (subject to appropriate trimming of vegetation), and is forecast to operate with acceptable delays under peak conditions.

4.9 Railway Crossing

The Quarry Access Road would cross the (currently non-operational) Goulburn Bombala Railway at a bridge crossing to the east of Monaro Highway. As described in Section 2.3, although the railway is not formally closed, this part of the Goulburn Bombala Railway south of Queanbeyan has been in disuse since 2007 and a 2020 feasibility study to reopen the line and extend it to link between Canberra Airport and Eden found it would not be viable due to high costs and low benefits. A possible rail trail, known as the Monaro Rail Trail, is under investigation for the line between Queanbeyan and Bombala.

The detailed design of the crossing of the Quarry Access Road and the railway alignment would be dependent on the future plans for the Goulburn Bombala Railway, and would be developed with regard to the relevant standards and guidelines.

4.10 Travelling Stock Reserves

The Project access routes do not correlate with any existing TSRs, and so the Project is not anticipated to have any impact on TSRs.

4.11 Heavy Vehicle Routes

As shown in Figure 2.3, Monaro Highway is an approved route for B-doubles. The Quarry would principally use truck and dog combinations, semitrailers and rigid trucks, so would not use vehicles larger than those already approved to use Monaro Highway.

4.12 Mitigation Measures

The assessment results above demonstrate that subject to the access intersection design being in accordance with the Austroads design guidelines as discussed in Section 4.7, no specific measures would be required to accommodate the Project's traffic.

It is recommended that drivers of Project trucks be subject to operational protocols relating to driver behaviour and interaction with other roads users, which may be included in a Project TMP and Drivers' Code of Conduct. The TMP and Driver's Code of Conduct 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;
- management of transport operations during adverse weather conditions;
- driver behaviour expectations at any specific locations or situations on the public road network including near schools.

5 Conclusion

This study has found that the Project would have acceptable impacts on the road network with its maximum hourly heavy vehicle activity in either direction on Monaro Highway. No specific measures would be required to provide additional capacity to accommodate the Project traffic.

The proposed intersection of the Quarry Access Road and Monaro Highway would be designed and constructed in accordance with Austroads guidelines, and would provide adequate capacity for the maximum hourly Project traffic.

Existing approved heavy vehicles routes are of an adequate standard to accommodate the Project's heavy vehicles, noting that the Project intends to make use of existing approved heavy vehicle routes, and so would not introduce heavy vehicles to any roads not currently used by heavy vehicles.

Heavy vehicle movements to and from the Project Site would be managed via controls at the weighbridge to ensure the limits on daily and hourly laden truck movements are not exceeded. It is recommended that the operator be required to keep records of laden truck movements.

It is recommended that a TMP and Drivers' Code of Conduct be developed and implemented including operational protocols relating to heavy vehicle driver behaviour, management of transport operations during adverse weather conditions, and interaction with other haulage trucks, school buses and other roads users.

Appendix A

2021 Traffic Surveys

Job No	AUACT832
Client	TTPP
Site	Monaro Highway
Location	north of Old Cooma Road
Site No	1
Start Date	27-May-21
Description	Volume Summary
Direction	Combined



Hour Starting	Day of Week							W'Day Ave 8196	7 Day Ave 8116
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	31-May	1-Jun	2-Jun	27-May	28-May	29-May	30-May		
AM Peak	683	686	721	687	698	858	689		
PM Peak	820	685	706	722	929	776	785		
0:00	20	10	17	20	25	27	27	18	21
1:00	15	12	15	12	17	10	26	14	15
2:00	10	10	13	19	14	19	7	13	13
3:00	18	8	9	12	18	11	15	13	13
4:00	32	34	30	30	31	21	12	31	27
5:00	49	108	122	142	108	60	34	106	89
6:00	137	372	384	370	346	124	62	322	256
7:00	228	643	639	652	612	287	202	555	466
8:00	318	686	721	687	698	502	294	622	558
9:00	429	473	447	483	586	713	461	484	513
10:00	561	489	438	490	663	858	624	528	589
11:00	683	443	383	484	652	803	689	529	591
12:00	736	392	389	450	622	776	785	518	593
13:00	750	459	409	507	628	660	709	551	589
14:00	820	464	522	535	720	660	724	612	635
15:00	769	647	562	686	858	667	743	704	705
16:00	779	685	706	722	929	615	695	764	733
17:00	661	672	701	702	854	537	597	718	675
18:00	361	437	417	446	495	324	391	431	410
19:00	232	250	263	303	314	159	212	272	248
20:00	162	176	164	206	199	120	135	181	166
21:00	72	101	104	135	160	118	78	114	110
22:00	42	51	55	78	87	80	56	63	64
23:00	14	21	30	38	52	63	41	31	37
Total	7898	7643	7540	8209	9688	8214	7619	8196	8116

7-19	7095	6490	6334	6844	8317	7402	6914	7016	7057
6-22	7698	7389	7249	7858	9336	7923	7401	7906	7836
6-24	7754	7461	7334	7974	9475	8066	7498	8000	7937
0-24	7898	7643	7540	8209	9688	8214	7619	8196	8116

Job No AUACT832
Client TTPP
Site Monaro Highway
Location north of Old Cooma Road
Site No 1
Start Date 3-Jun-21
Description Volume Summary
Direction Combined



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	7-Jun	8-Jun	9-Jun	3-Jun	4-Jun	5-Jun	6-Jun		
AM Peak	709	719	664	679	670	697	739		
PM Peak	682	690	664	644	796	703	760	7878	7852
0:00	14	17	15	16	18	29	31	16	20
1:00	8	10	11	7	11	14	16	9	11
2:00	7	9	11	12	15	14	15	11	12
3:00	12	11	15	8	17	12	11	13	12
4:00	36	30	27	33	40	36	15	33	31
5:00	108	104	102	96	114	77	47	105	93
6:00	375	381	358	350	342	164	71	361	292
7:00	636	669	592	599	588	282	142	617	501
8:00	709	719	664	679	670	439	295	688	596
9:00	482	519	483	469	506	594	530	492	512
10:00	520	486	450	489	569	693	634	503	549
11:00	487	471	457	413	517	697	739	469	540
12:00	525	461	459	412	527	637	703	477	532
13:00	494	479	463	424	545	675	741	481	546
14:00	559	537	491	486	640	665	753	543	590
15:00	635	648	612	612	796	677	760	661	677
16:00	657	690	664	634	796	703	734	688	697
17:00	682	685	542	644	783	526	609	667	639
18:00	405	449	370	363	523	315	357	422	397
19:00	225	227	200	256	306	187	221	243	232
20:00	164	157	118	161	212	153	117	162	155
21:00	86	93	90	116	156	113	88	108	106
22:00	48	58	90	65	117	104	50	76	76
23:00	17	30	39	33	51	67	23	34	37
Total	7891	7940	7323	7377	8859	7873	7702	7878	7852

7-19	6791	6813	6247	6224	7460	6903	6997	6707	6776
6-22	7641	7671	7013	7107	8476	7520	7494	7582	7560
6-24	7706	7759	7142	7205	8644	7691	7567	7691	7673
0-24	7891	7940	7323	7377	8859	7873	7702	7878	7852

Job No	AUACT832
Client	TTPP
Site	Old Cooma Road
Location	between Monaro Highway and Monaro Station Road
Site No	2
Start Date	24-May-21
Description	Volume Summary
Direction	Combined



Hour Starting	Day of Week							W'Day Ave 2279	7 Day Ave 2190
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	24-May	25-May	26-May	27-May	28-May	29-May	30-May		
AM Peak	231	233	256	254	226	202	170		
PM Peak	259	243	254	226	239	199	199		
0:00	7	4	2	3	2	10	11	4	6
1:00	1	4	0	3	0	3	6	2	2
2:00	2	2	2	3	1	4	2	2	2
3:00	3	2	1	2	1	5	6	2	3
4:00	6	12	12	8	9	2	6	9	8
5:00	22	31	28	31	32	12	8	29	23
6:00	125	116	125	117	123	31	12	121	93
7:00	216	231	233	235	194	85	49	222	178
8:00	231	233	256	254	226	133	77	240	201
9:00	140	123	135	100	135	137	119	127	127
10:00	111	90	99	84	117	202	170	100	125
11:00	119	113	81	105	109	181	162	105	124
12:00	98	96	86	99	100	199	199	96	125
13:00	125	101	102	82	120	157	180	106	124
14:00	125	137	114	102	176	163	186	131	143
15:00	200	195	190	206	215	194	173	201	196
16:00	223	243	254	226	239	171	179	237	219
17:00	259	235	246	213	227	129	126	236	205
18:00	113	141	143	128	120	96	69	129	116
19:00	62	73	99	78	57	48	30	74	64
20:00	35	53	42	63	39	29	28	46	41
21:00	22	41	37	32	33	39	18	33	32
22:00	8	11	28	22	27	29	16	19	20
23:00	6	3	11	6	17	25	17	9	12
Total	2259	2290	2326	2202	2319	2084	1849	2279	2190

7-19	1960	1938	1939	1834	1978	1847	1689	1930	1884
6-22	2204	2221	2242	2124	2230	1994	1777	2204	2113
6-24	2218	2235	2281	2152	2274	2048	1810	2232	2145
0-24	2259	2290	2326	2202	2319	2084	1849	2279	2190

Job No	AUACT832
Client	TTPP
Site	Old Cooma Road
Location	between Monaro Highway and Monaro Station Road
Site No	2
Start Date	31-May-21
Description	Volume Summary
Direction	Combined



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	31-May	1-Jun	2-Jun	3-Jun	4-Jun	5-Jun	6-Jun		
AM Peak	169	268	274	251	236	178	173		
PM Peak	221	227	261	196	227	199	201	2162	2102
0:00	6	0	2	3	3	6	12	3	5
1:00	5	0	2	0	0	9	6	1	3
2:00	3	0	1	1	2	4	0	1	2
3:00	3	0	2	1	0	5	2	1	2
4:00	3	9	13	11	11	7	4	9	8
5:00	16	23	37	27	28	6	10	26	21
6:00	40	126	122	114	115	41	10	103	81
7:00	79	199	211	200	195	74	27	177	141
8:00	110	268	274	251	236	119	94	228	193
9:00	136	116	109	129	123	145	120	123	125
10:00	143	92	94	90	110	178	163	106	124
11:00	169	82	91	105	109	175	173	111	129
12:00	167	92	91	74	109	169	147	107	121
13:00	183	96	104	91	125	199	180	120	140
14:00	221	133	125	96	122	196	201	139	156
15:00	193	179	193	170	205	199	184	188	189
16:00	201	223	221	196	227	199	164	214	204
17:00	169	227	261	191	220	122	113	214	186
18:00	75	152	126	107	142	81	64	120	107
19:00	44	61	67	75	86	45	53	67	62
20:00	50	48	44	55	55	34	25	50	44
21:00	24	24	33	22	35	37	34	28	30
22:00	11	15	16	21	30	30	13	19	19
23:00	3	9	5	10	12	17	5	8	9
Total	2054	2174	2244	2040	2300	2097	1804	2162	2102

7-19	1846	1859	1900	1700	1923	1856	1630	1846	1816
6-22	2004	2118	2166	1966	2214	2013	1752	2094	2033
6-24	2018	2142	2187	1997	2256	2060	1770	2120	2061
0-24	2054	2174	2244	2040	2300	2097	1804	2162	2102

Job No	AUACT832
Client	TTPP
Site	Monaro Station Road
Location	west of Old Cooma Road
Site No	3
Start Date	24-May-21
Description	Volume Summary
Direction	Combined



Hour Starting	Day of Week							W'Day Ave 78	7 Day Ave 79
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	24-May	25-May	26-May	27-May	28-May	29-May	30-May		
AM Peak	9	7	7	11	24	10	8		
PM Peak	9	9	8	13	18	15	18		
0:00	1	1	0	1	1	1	2	1	1
1:00	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0
4:00	0	2	2	2	3	0	0	2	1
5:00	0	0	0	0	0	2	0	0	0
6:00	3	1	1	1	1	0	1	1	1
7:00	9	7	7	11	7	1	1	8	6
8:00	7	7	7	7	9	4	8	7	7
9:00	5	1	1	3	24	3	6	7	6
10:00	1	3	2	5	6	10	2	3	4
11:00	6	5	1	3	7	7	6	4	5
12:00	1	2	0	5	13	4	7	4	5
13:00	9	2	2	3	7	15	18	5	8
14:00	5	5	0	5	2	9	9	3	5
15:00	0	3	7	6	6	5	9	4	5
16:00	8	5	8	13	18	6	5	10	9
17:00	4	9	5	9	5	3	6	6	6
18:00	5	5	7	5	6	4	2	6	5
19:00	1	3	1	3	3	4	0	2	2
20:00	0	1	3	0	1	0	0	1	1
21:00	0	0	0	2	1	2	0	1	1
22:00	0	0	3	0	0	0	0	1	0
23:00	0	0	0	0	0	1	1	0	0
Total	65	62	57	84	120	81	83	78	79

7-19	60	54	47	75	110	71	79	69	71
6-22	64	59	52	81	116	77	80	74	76
6-24	64	59	55	81	116	78	81	75	76
0-24	65	62	57	84	120	81	83	78	79

Job No AUACT832
Client TTPP
Site Monaro Station Road
Location west of Old Cooma Road
Site No 3
Start Date 31-May-21
Description Volume Summary
Direction Combined



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	31-May	1-Jun	2-Jun	3-Jun	4-Jun	5-Jun	6-Jun		
AM Peak	11	9	9	9	15	9	10	83	89
PM Peak	13	14	10	12	10	14	14		
0:00	0	0	0	0	0	0	1	0	0
1:00	0	0	0	0	0	0	0	0	0
2:00	0	0	0	0	0	0	0	0	0
3:00	0	0	0	0	0	0	0	0	0
4:00	0	2	3	2	3	0	0	2	1
5:00	0	0	0	0	0	2	1	0	0
6:00	0	1	3	1	2	1	5	1	2
7:00	8	9	9	9	15	9	6	10	9
8:00	5	5	9	3	10	3	2	6	5
9:00	3	4	1	4	2	3	5	3	3
10:00	11	3	5	1	4	9	10	5	6
11:00	1	7	7	8	7	7	5	6	6
12:00	2	2	10	3	1	13	10	4	6
13:00	4	5	9	3	7	8	8	6	6
14:00	11	7	6	2	1	7	12	5	7
15:00	13	4	9	4	4	14	13	7	9
16:00	11	14	9	7	10	14	14	10	11
17:00	6	12	10	12	9	6	6	10	9
18:00	2	6	6	2	7	4	1	5	4
19:00	1	0	0	1	3	1	2	1	1
20:00	1	0	4	0	0	0	0	1	1
21:00	0	0	1	1	2	0	0	1	1
22:00	0	0	1	0	0	3	0	0	1
23:00	0	0	0	0	1	2	0	0	0
Total	79	81	102	63	88	106	101	83	89

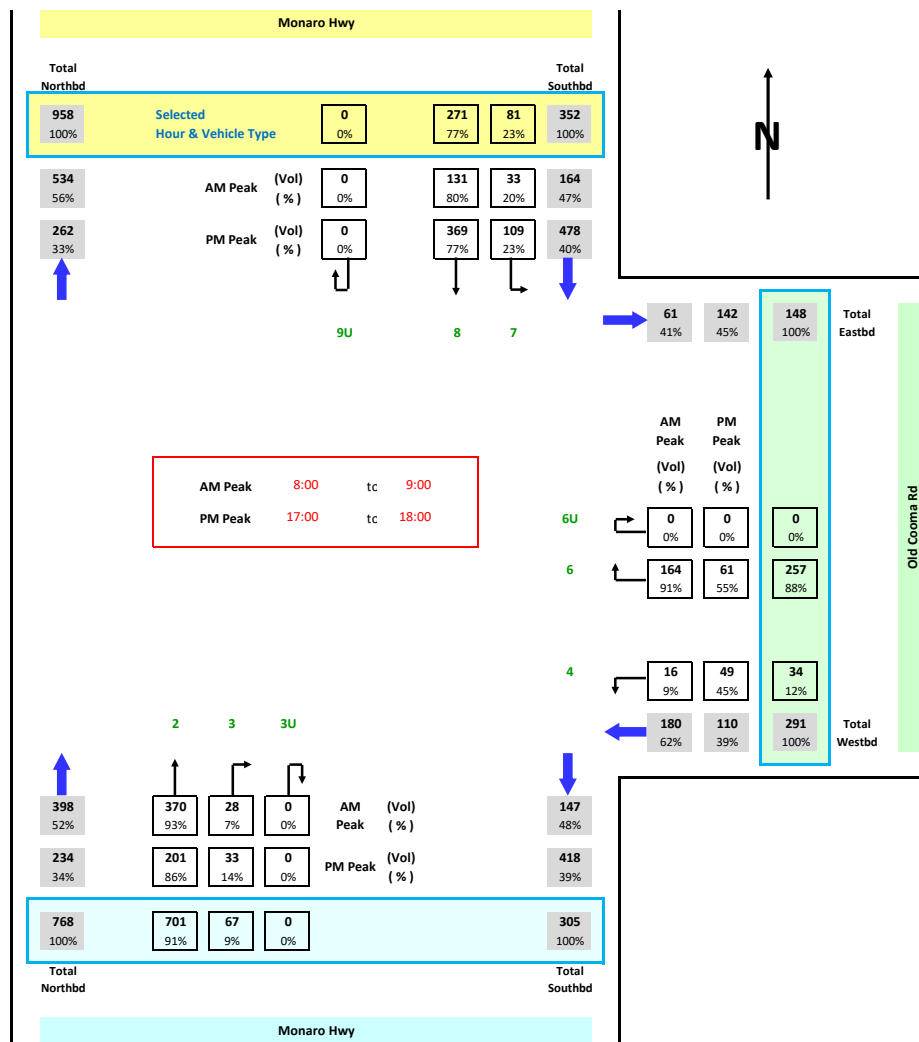
7-19	77	78	90	58	77	97	92	76	81
6-22	79	79	98	61	84	99	99	80	86
6-24	79	79	99	61	85	104	99	81	87
0-24	79	81	102	63	88	106	101	83	89

Job No. : AUACT832
Client : The Transport Planning Partnership Pty Ltd
Suburb : Royalla
Location : 1. Old Cooma Rd / Monaro Highway

Day/Date : Thu, 27th May 2021
Weather : Fine
Description : Classified Intersection Count
Intersection Diagram

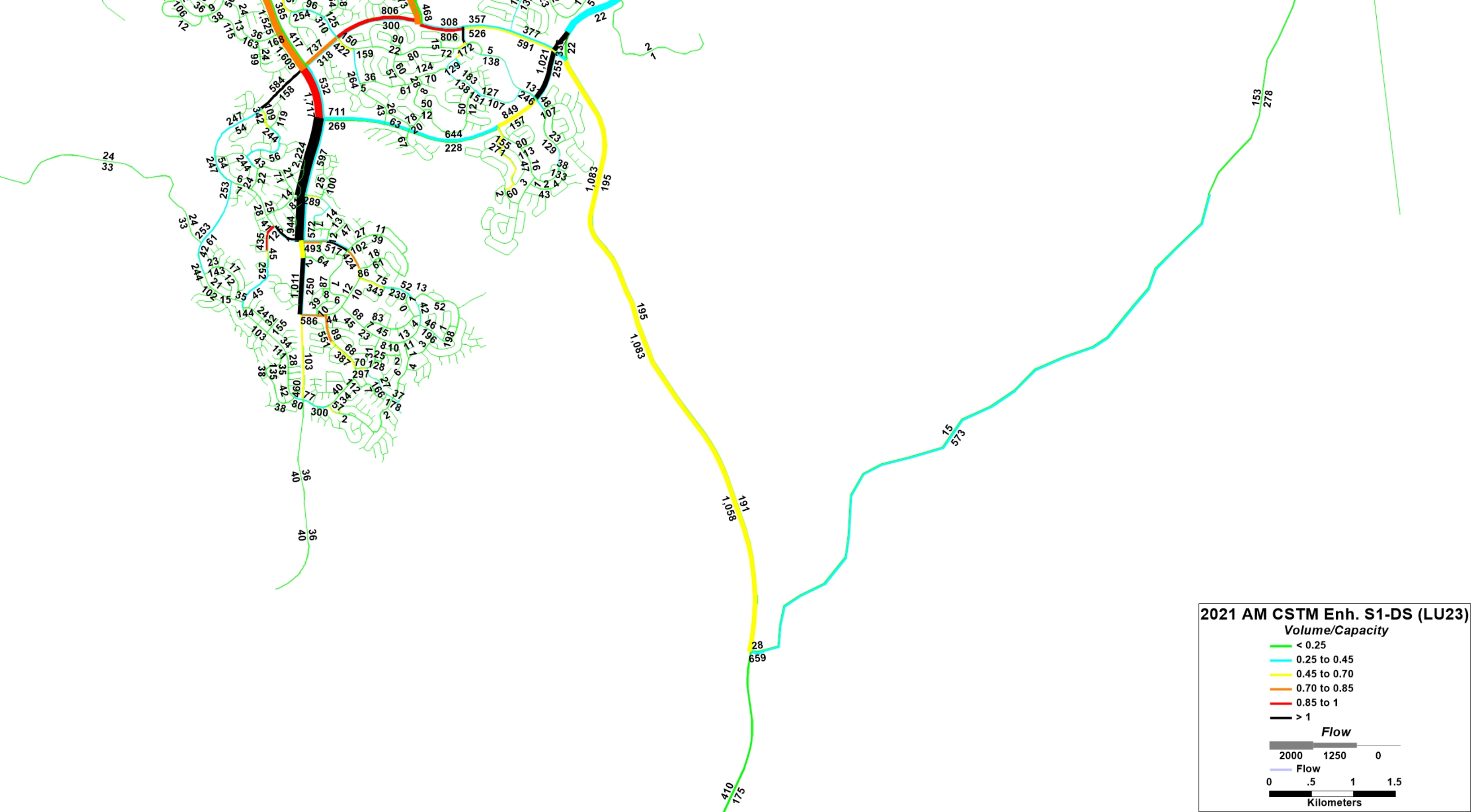


Hour Starting Vehicle Type
AM Totals All Vehicles



Appendix B

CSTM Outputs



2021 AM CSTM Enh. S1-DS (LU23)

Volume/Capacity

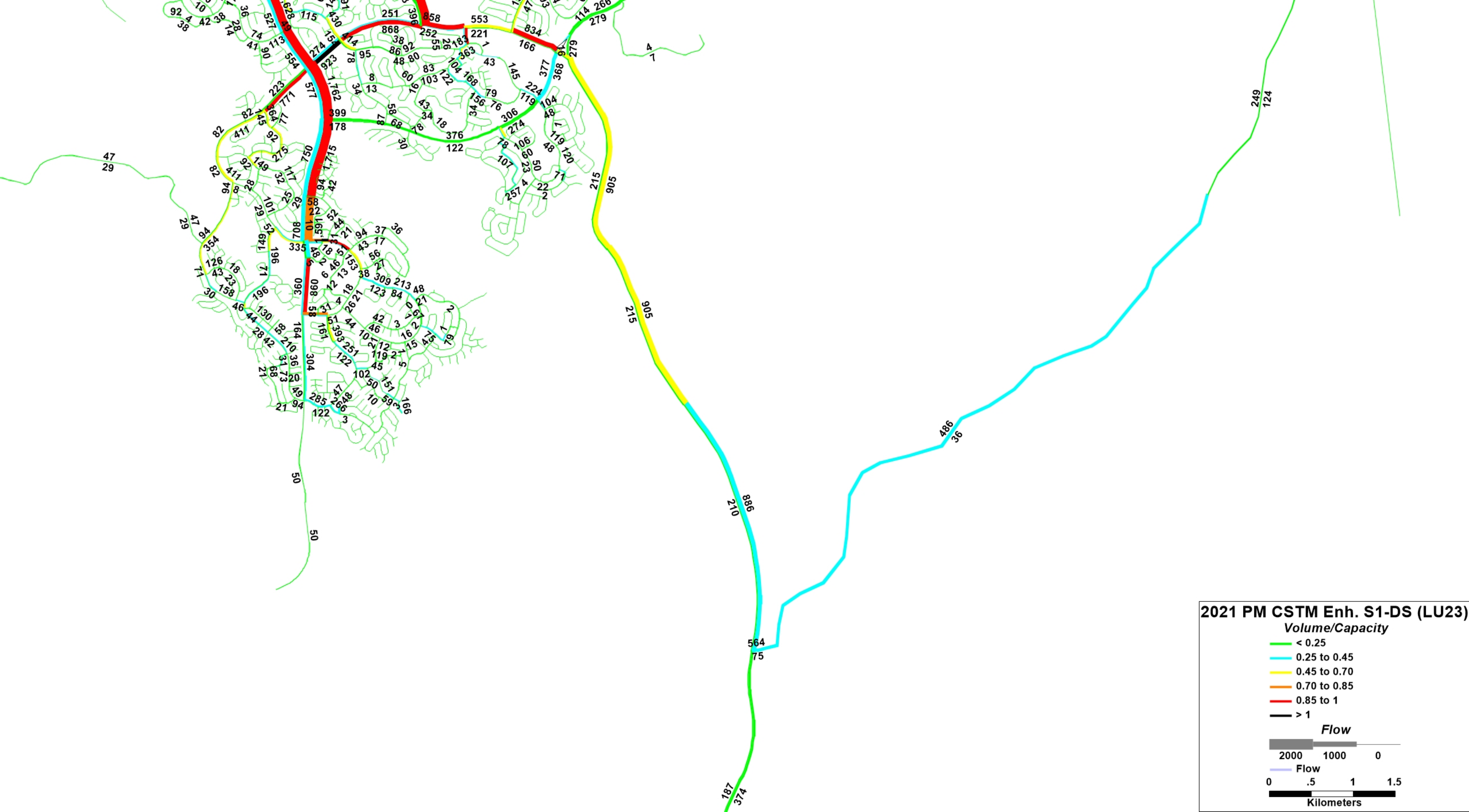
- < 0.25
- 0.25 to 0.45
- 0.45 to 0.70
- 0.70 to 0.85
- 0.85 to 1
- > 1

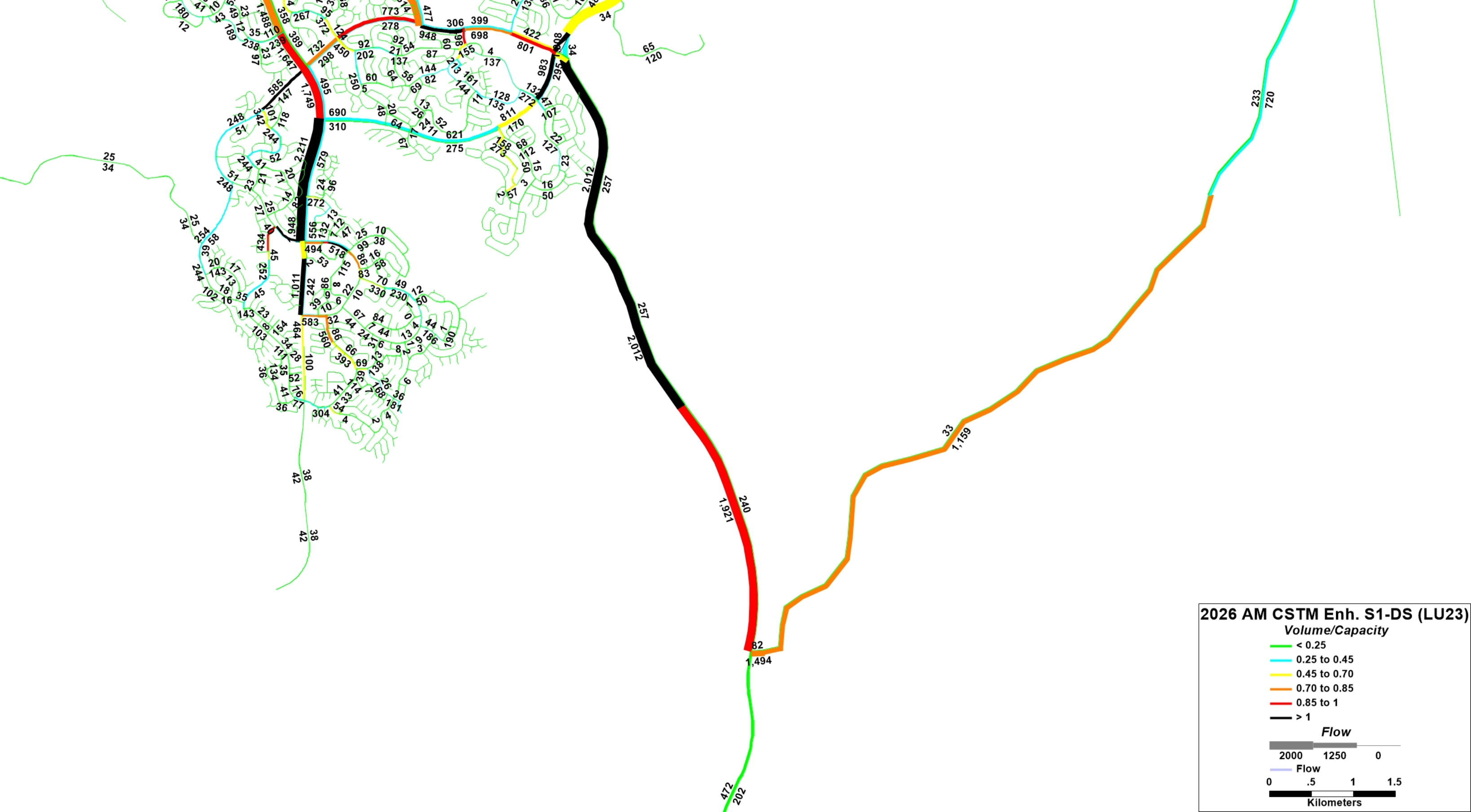
Flow

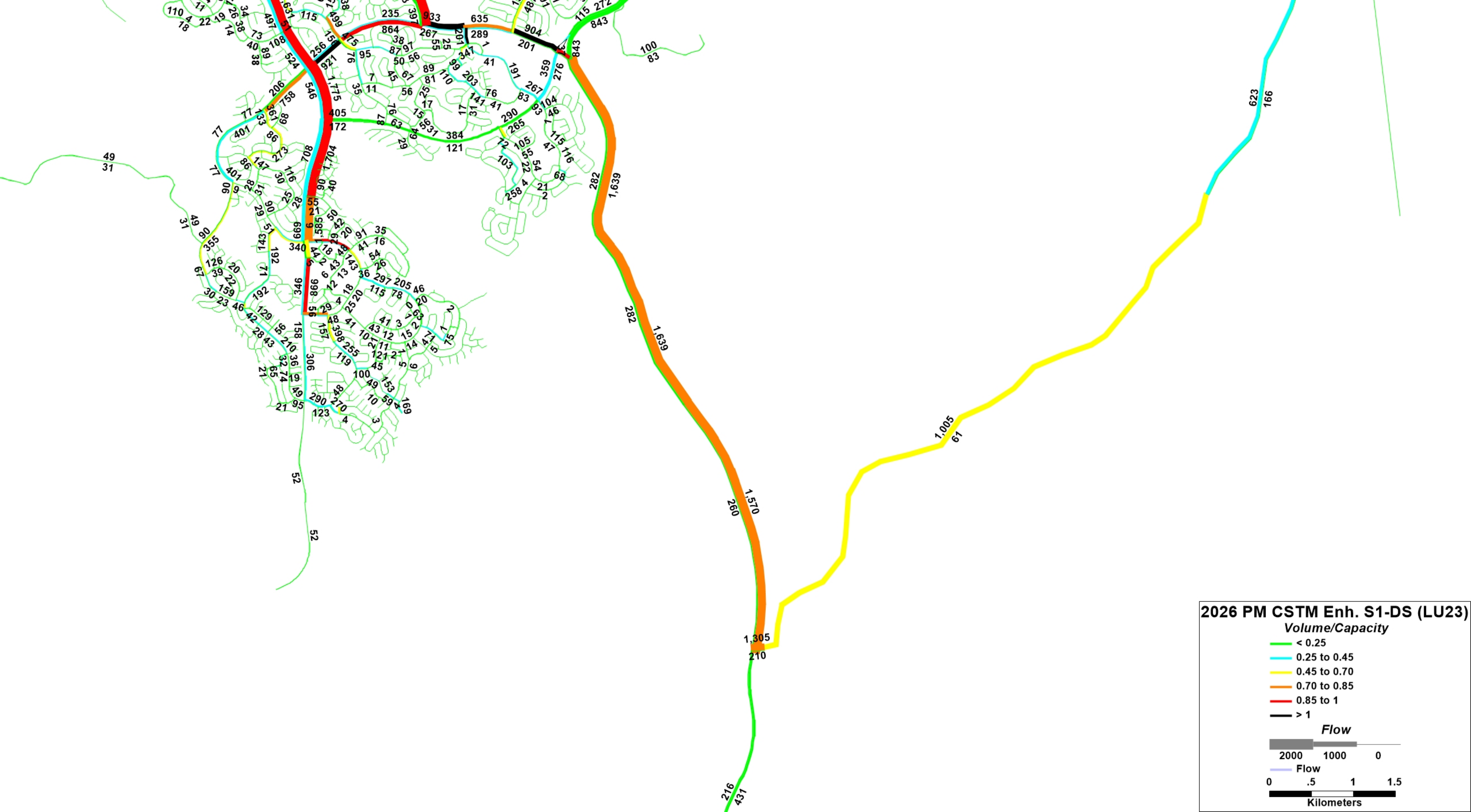
2000 1250 0

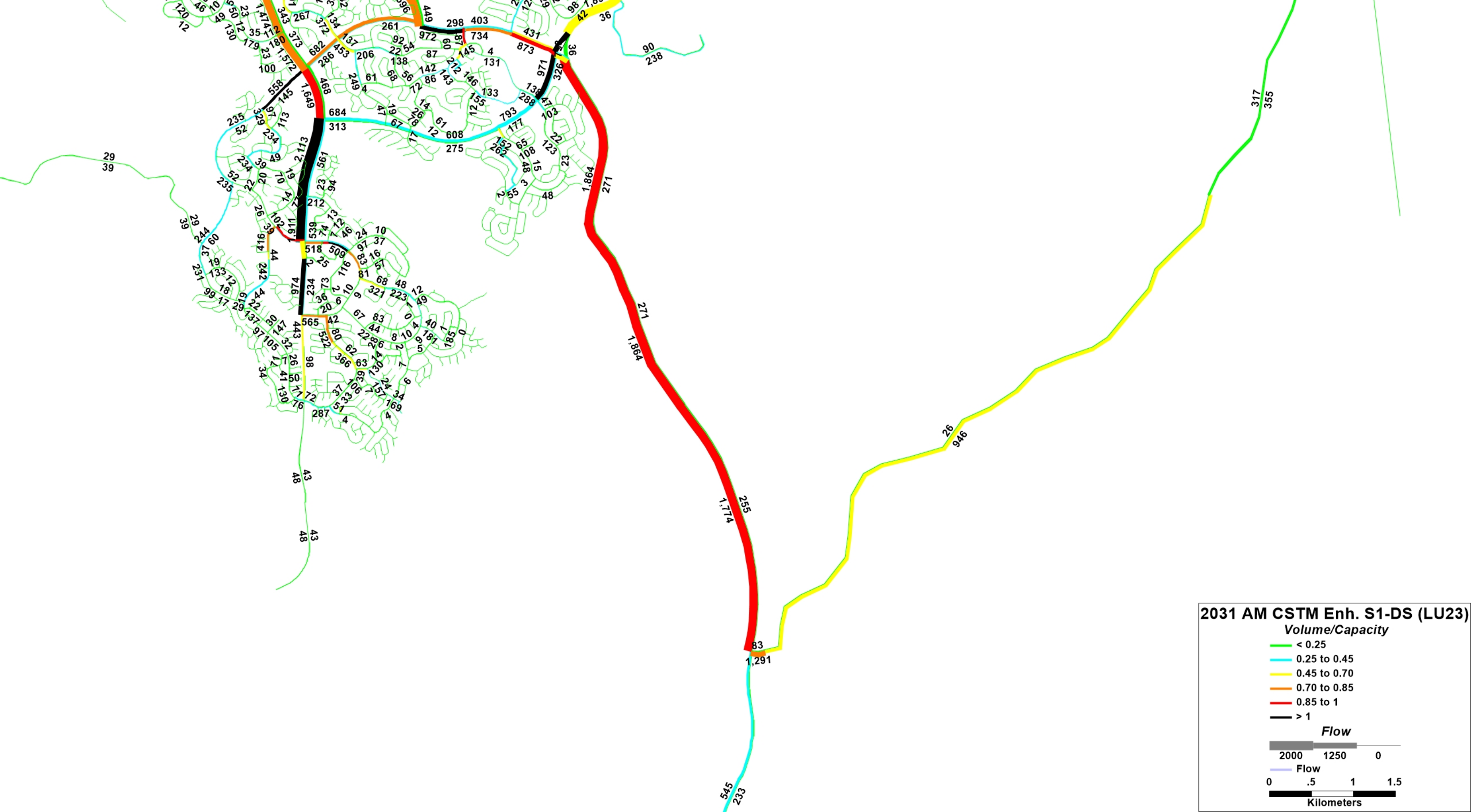
Flow 0 .5 1 1.5

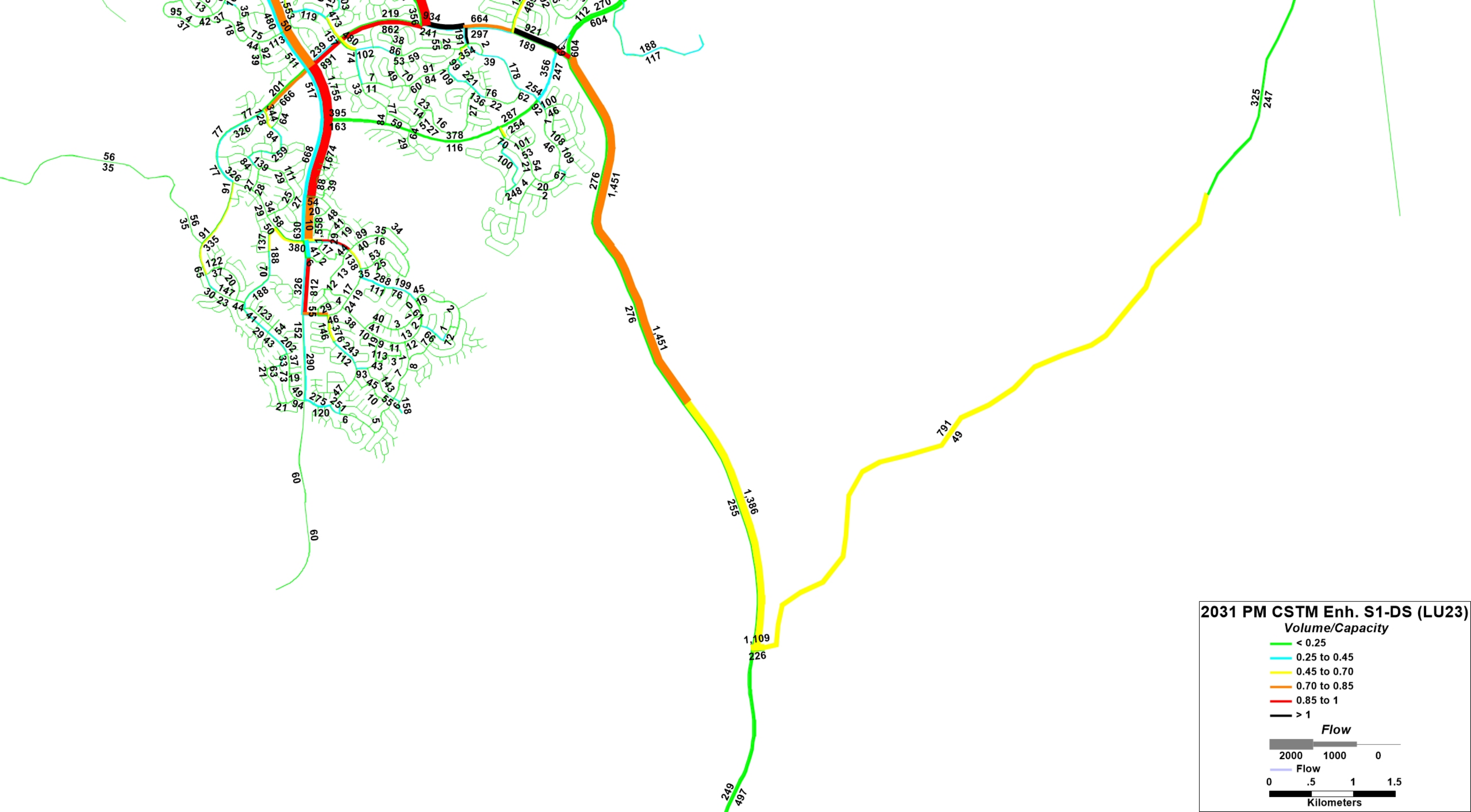
Kilometers



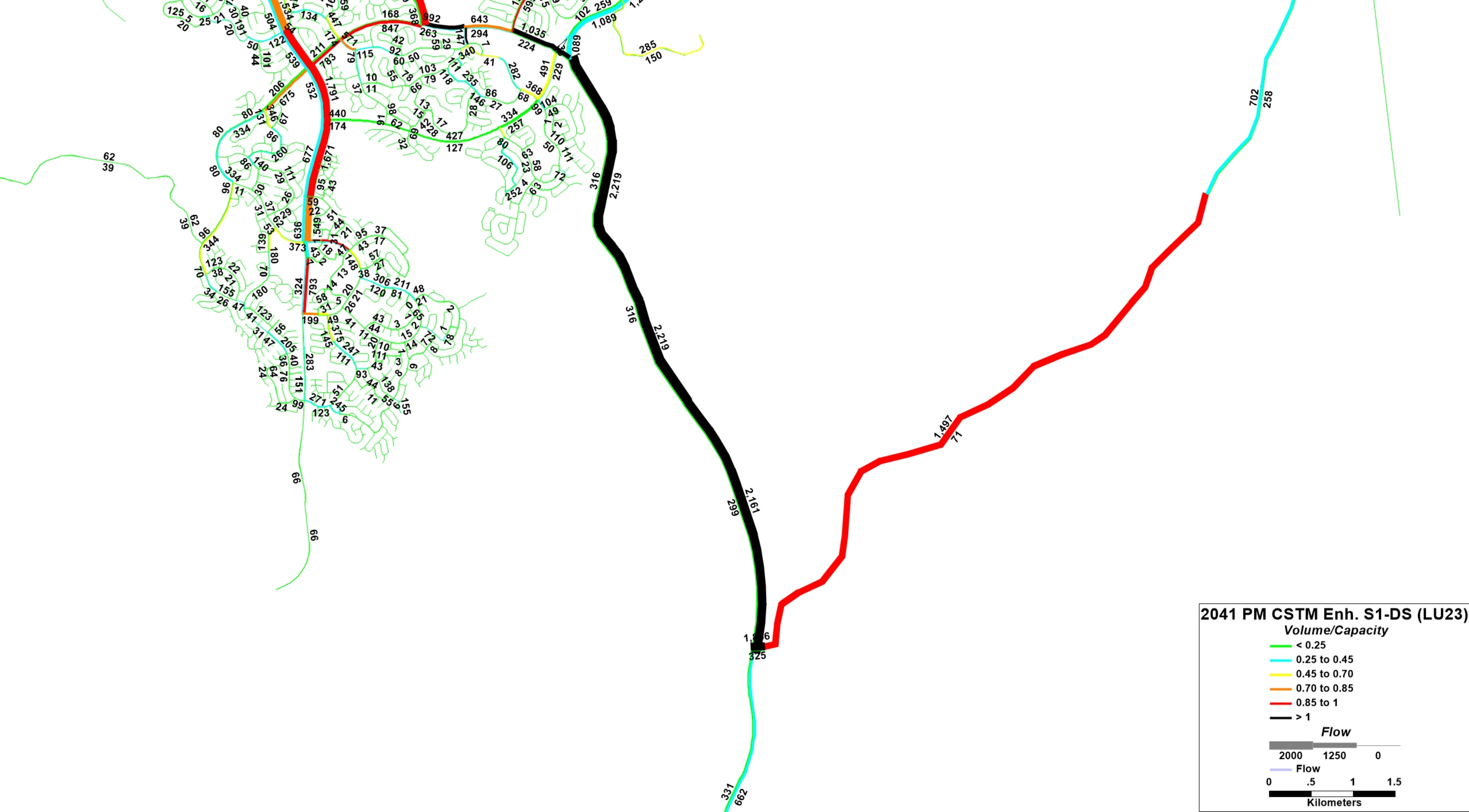








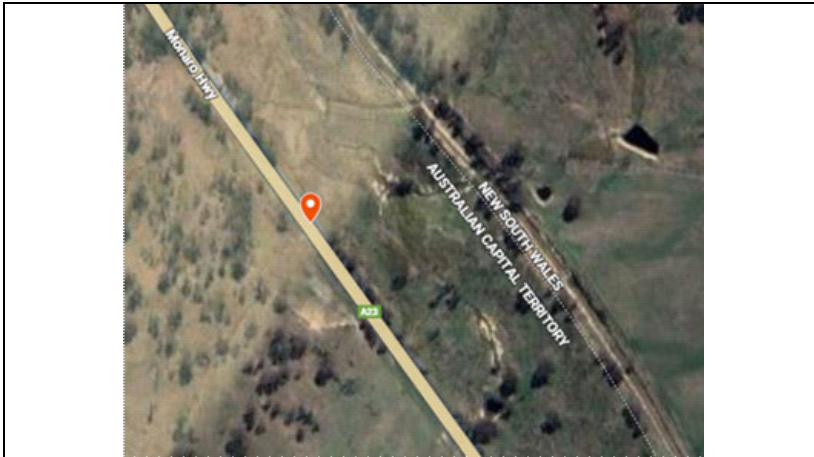




Appendix C

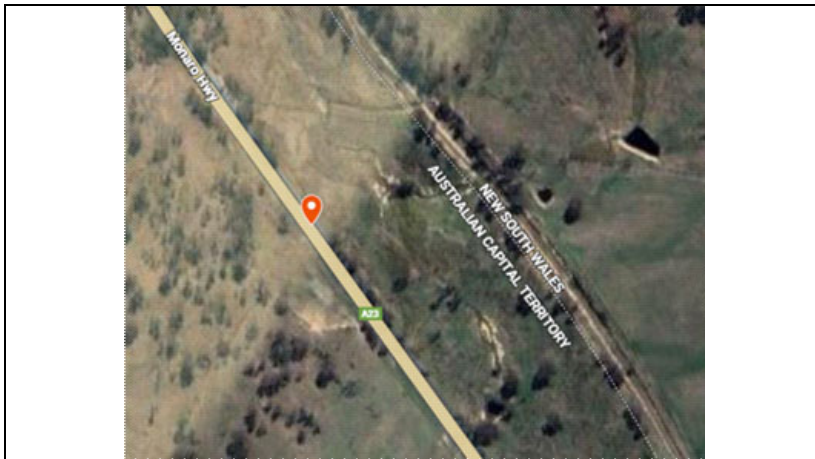
2025 Traffic Surveys

Client	TTPP	
360TS Project No.	25341	
Location	Royalla	
Road Name	Monaro Hwy	
Description	south of Monaro Station Rd	
Coordinates	-35.471953, 149.139370	
PSL (kph)	100	
Start Day/Date	Thu 13/11/25	
End Day/Date	Wed 19/11/25	



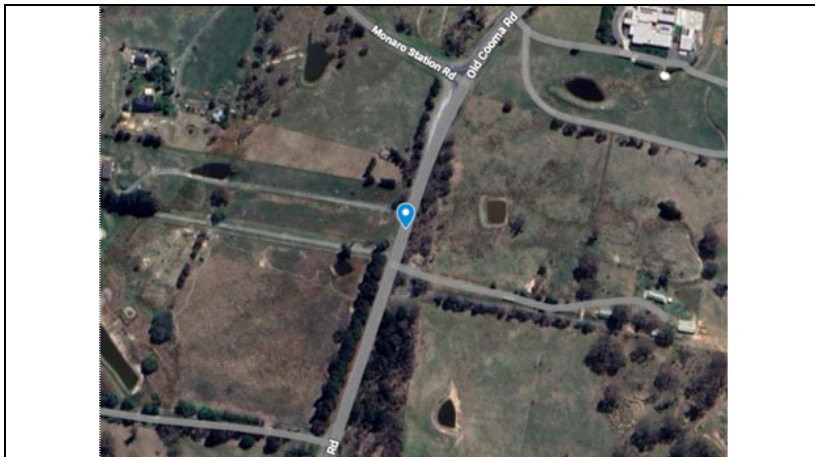
Datetime	Thu 13/11/25	Fri 14/11/25	Sat 15/11/25	Sun 16/11/25	Mon 17/11/25	Tue 18/11/25	Wed 19/11/25	Virtual Week	Virtual Weekday	Virtual Weekend
0:00	68	30	49	27	17	11	11	30	27	38
1:00	39	9	13	32	13	13	13	19	17	23
2:00	35	16	6	16	15	11	8	15	17	11
3:00	23	17	10	9	30	24	19	19	23	10
4:00	42	42	19	25	43	50	49	39	45	22
5:00	144	109	63	36	142	138	120	107	131	50
6:00	423	456	166	102	431	417	444	348	434	134
7:00	655	597	293	179	612	674	649	523	637	236
8:00	739	776	462	308	796	766	815	666	778	385
9:00	586	658	610	562	566	548	535	581	579	586
10:00	535	673	761	674	605	501	564	616	576	718
11:00	485	725	740	780	556	515	524	618	561	760
12:00	553	676	714	780	572	495	562	622	572	747
13:00	598	749	609	765	582	500	524	618	591	687
14:00	638	783	626	789	600	520	628	655	634	708
15:00	783	874	570	715	694	665	766	724	756	643
16:00	789	901	489	717	705	688	725	716	762	603
17:00	738	754	467	546	652	727	704	655	715	507
18:00	466	529	274	393	416	460	443	426	463	334
19:00	315	364	204	253	235	256	272	271	288	229
20:00	319	254	159	146	133	179	209	200	219	153
21:00	264	176	118	135	97	111	175	154	165	127
22:00	149	103	87	70	79	80	82	93	99	79
23:00	67	61	47	35	29	33	51	46	48	41
TOTAL	9453	10332	7556	8094	8620	8382	8892	8761	9137	7831

Client	TTPP	
360TS Project No.	25341	
Location	Royalla	
Road Name	Monaro Hwy	
Description	south of Monaro Station Rd	
Coordinates	-35.471953, 149.139370	
PSL (kph)	100	
Start Day/Date	Thu 20/11/25	
End Day/Date	Wed 26/11/25	



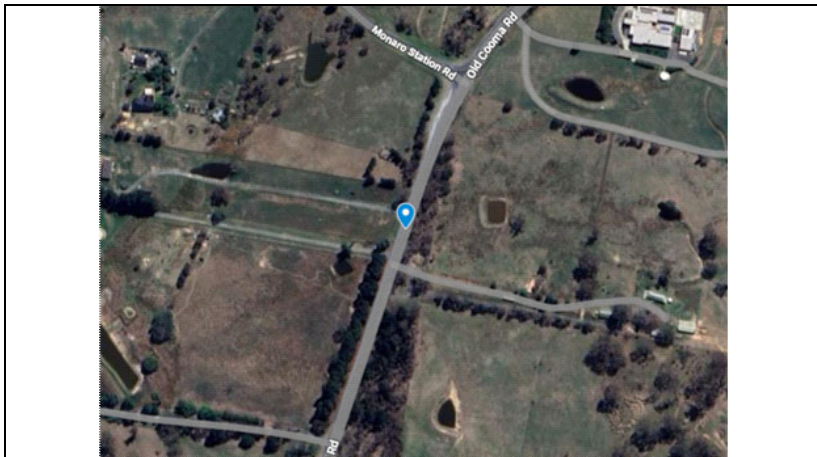
Datetime	Thu 20/11/25	Fri 21/11/25	Sat 22/11/25	Sun 23/11/25	Mon 24/11/25	Tue 25/11/25	Wed 26/11/25	Virtual Week	Virtual Weekday	Virtual Weekend
0:00	17	25	35	38	17	16	21	24	19	37
1:00	12	16	19	21	13	14	10	15	13	20
2:00	10	11	19	15	13	19	15	15	14	17
3:00	13	10	15	8	21	13	22	15	16	12
4:00	40	45	26	14	41	61	48	39	47	20
5:00	119	138	73	32	140	151	137	113	137	53
6:00	477	395	165	84	446	424	435	347	435	125
7:00	679	566	272	146	629	658	622	510	631	209
8:00	749	774	429	286	854	777	799	667	791	358
9:00	604	649	627	517	612	517	590	588	594	572
10:00	564	681	712	633	561	528	603	612	587	673
11:00	602	702	681	884	576	491	634	653	601	783
12:00	528	713	717	894	536	530	695	659	600	806
13:00	577	716	626	833	600	489	709	650	618	730
14:00	571	735	698	812	592	535	731	668	633	755
15:00	694	931	635	824	722	645	827	754	764	730
16:00	751	910	564	723	741	716	826	747	789	644
17:00	748	882	519	554	716	704	765	698	763	537
18:00	493	541	346	362	408	426	456	433	465	354
19:00	295	377	230	259	279	269	327	291	309	245
20:00	252	245	167	194	148	182	243	204	214	181
21:00	146	173	122	91	107	129	170	134	145	107
22:00	72	97	84	58	59	76	82	75	77	71
23:00	29	55	60	31	33	46	59	45	44	46
TOTAL	9042	10387	7841	8313	8864	8416	9826	8956	9306	8085

Client	TTPP	
360TS Project No.	25341	
Location	Royalla	
Road Name	Old Cooma Rd	
Description	south of Monaro Station Rd	
Coordinates	-35.482870, 149.163346	
PSL (kph)	100	
Start Day/Date	Thu 13/11/25	
End Day/Date	Wed 19/11/25	



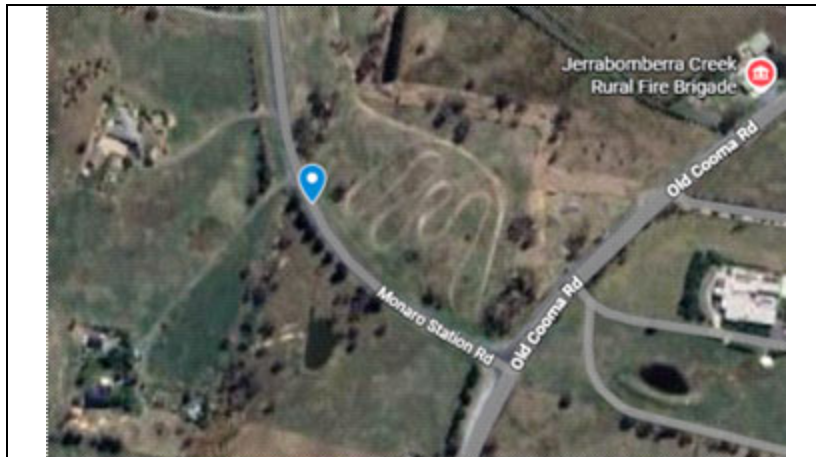
Datetime	Thu 13/11/25	Fri 14/11/25	Sat 15/11/25	Sun 16/11/25	Mon 17/11/25	Tue 18/11/25	Wed 19/11/25	Virtual Week	Virtual Weekday	Virtual Weekend
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1:00	4	0	3	8	1	2	1	3	2	6
2:00	2	1	0	7	2	0	0	2	1	4
3:00	2	0	2	4	3	0	2	2	1	3
4:00	4	6	0	9	7	8	8	6	7	5
5:00	30	27	16	10	36	33	37	27	33	13
6:00	130	128	34	28	110	118	145	99	126	31
7:00	233	220	87	48	208	227	245	181	227	68
8:00	290	290	116	85	300	292	303	239	295	101
9:00	142	198	170	153	152	165	119	157	155	162
10:00	104	172	189	174	115	109	125	141	125	182
11:00	96	155	192	203	98	144	113	143	121	198
12:00	130	149	180	174	105	133	136	144	131	177
13:00	121	164	177	194	100	137	143	148	133	186
14:00	162	220	165	194	186	136	169	176	175	180
15:00	278	294	147	189	212	234	263	231	256	168
16:00	284	285	151	171	238	249	291	238	269	161
17:00	274	212	142	153	220	255	260	217	244	148
18:00	154	148	60	109	157	154	162	135	155	85
19:00	101	88	53	66	79	77	97	80	88	60
20:00	78	61	49	48	34	58	66	56	59	49
21:00	72	55	39	36	30	33	42	44	46	38
22:00	33	18	23	12	11	16	25	20	21	18
23:00	9	13	12	7	6	5	10	9	9	10
TOTAL	2734	2905	2019	2088	2417	2590	2764	2502	2682	2062

Client	TTPP	
360TS Project No.	25341	
Location	Royalla	
Road Name	Old Cooma Rd	
Description	south of Monaro Station Rd	
Coordinates	-35.482870, 149.163346	
PSL (kph)	100	
Start Day/Date	Thu 20/11/25	
End Day/Date	Wed 26/11/25	



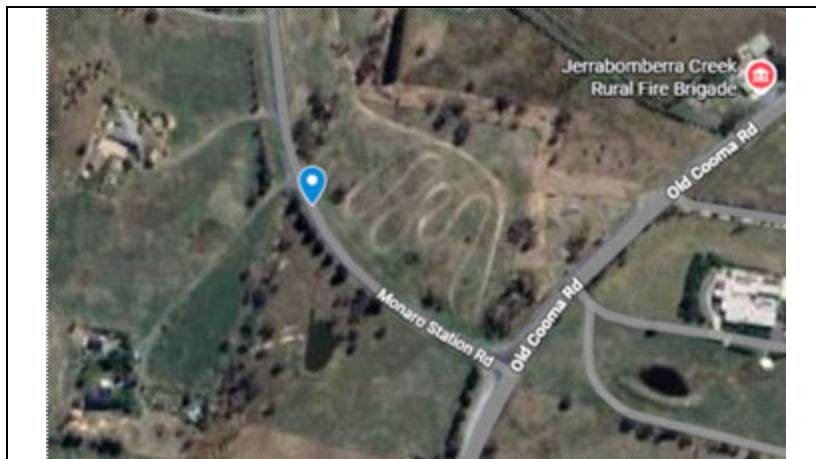
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1:00	2	0	3	9	1	1	2	3	1	6
2:00	0	1	8	3	1	2	0	2	1	6
3:00	0	1	6	1	3	0	8	3	2	4
4:00	6	5	2	3	7	8	7	5	7	3
5:00	31	24	16	3	27	32	30	23	29	10
6:00	143	124	55	14	122	119	129	101	127	35
7:00	252	216	74	47	219	226	235	181	230	61
8:00	267	270	147	78	325	293	272	236	285	113
9:00	158	177	185	136	163	145	143	158	157	161
10:00	114	142	188	159	124	117	139	140	127	174
11:00	122	155	201	208	118	100	119	146	123	205
12:00	120	132	187	185	105	109	145	140	122	186
13:00	124	142	191	197	138	127	191	159	144	194
14:00	175	191	188	181	166	163	198	180	179	185
15:00	222	278	166	182	247	236	278	230	252	174
16:00	256	259	181	176	259	252	290	239	263	179
17:00	252	246	174	144	274	265	247	229	257	159
18:00	162	133	92	105	150	150	173	138	154	99
19:00	98	116	68	84	88	71	111	91	97	76
20:00	88	64	51	62	40	62	75	63	66	57
21:00	45	46	41	23	28	34	40	37	39	32
22:00	25	24	36	21	12	18	18	22	19	29
23:00	6	19	22	7	6	9	12	12	10	15
TOTAL	2669	2766	2295	2033	2624	2543	2867	2542	2693	2172

Client	TTPP	
360TS Project No.	25341	
Location	Royalla	
Road Name	Monaro Station Rd	
Description	north of Old Cooma Rd	
Coordinates	-35.48035, 149.16206	
PSL (kph)	70	
Start Day/Date	Thu 13/11/25	
End Day/Date	Wed 19/11/25	



Datetime	Thu 13/11/25	Fri 14/11/25	Sat 15/11/25	Sun 16/11/25	Mon 17/11/25	Tue 18/11/25	Wed 19/11/25	Virtual Week	Virtual Weekday	Virtual Weekend
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2:00	0	0	0	2	0	0	0	0	0	1
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	1	1	0	0	1	1	1	1
6:00	4	2	0	2	4	4	4	3	4	1
7:00	7	8	1	1	8	8	6	6	7	1
8:00	7	8	2	0	9	8	7	6	8	1
9:00	7	6	6	1	4	7	6	5	6	4
10:00	3	5	13	2	4	4	7	5	5	8
11:00	7	4	4	4	12	11	7	7	8	4
12:00	4	3	7	5	4	1	12	5	5	6
13:00	2	5	3	8	3	3	8	5	4	6
14:00	5	7	3	7	6	8	8	6	7	5
15:00	4	12	2	13	6	5	7	7	7	8
16:00	9	8	8	7	5	4	10	7	7	8
17:00	18	13	7	9	6	12	7	10	11	8
18:00	2	4	3	7	3	6	8	5	5	5
19:00	2	10	3	0	2	6	3	4	5	2
20:00	5	2	1	2	2	2	4	3	3	2
21:00	1	3	1	3	0	3	2	2	2	2
22:00	1	0	2	1	0	1	2	1	1	2
23:00	0	0	0	0	0	0	0	0	0	0
TOTAL	88	102	70	78	78	93	109	88	96	78

Client	TTPP	
360TS Project No.	25341	
Location	Royalla	
Road Name	Monaro Station Rd	
Description	north of Old Cooma Rd	
Coordinates	-35.48035, 149.16206	
PSL (kph)	70	
Start Day/Date	Thu 20/11/25	
End Day/Date	Wed 26/11/25	



Datetime	Thu 20/11/25	Fri 21/11/25	Sat 22/11/25	Sun 23/11/25	Mon 24/11/25	Tue 25/11/25	Wed 26/11/25	Virtual Week	Virtual Weekday	Virtual Weekend
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3:00	0	0	1	0	0	0	4	1	1	1
4:00	0	0	0	0	0	0	0	0	0	0
5:00	0	0	1	1	0	0	1	0	0	1
6:00	4	3	2	1	3	2	4	3	3	2
7:00	9	5	5	0	3	10	6	5	7	3
8:00	6	6	8	1	4	13	5	6	7	5
9:00	10	3	3	4	6	5	5	5	6	4
10:00	16	5	3	7	3	3	2	6	6	5
11:00	6	0	9	4	6	1	6	5	4	7
12:00	9	4	6	10	3	2	2	5	4	8
13:00	8	2	9	8	5	0	2	5	3	9
14:00	6	4	4	4	1	2	7	4	4	4
15:00	4	6	4	3	2	4	6	4	4	4
16:00	7	8	5	11	3	8	8	7	7	8
17:00	10	11	7	8	6	12	13	10	10	8
18:00	5	2	1	1	7	4	6	4	5	1
19:00	2	6	4	3	2	3	1	3	3	4
20:00	3	6	3	1	1	1	3	3	3	2
21:00	1	1	0	0	1	1	4	1	2	0
22:00	2	1	1	1	0	4	0	1	1	1
23:00	1	0	0	0	0	0	1	0	0	0
TOTAL	109	73	79	68	56	75	87	78	80	79

Appendix D

Quarry Access Intersection Concept Design

MONARO ROCK QUARRY

ACCESS ROAD

CONCEPT DESIGN - FOR DISCUSSION PURPOSES ONLY

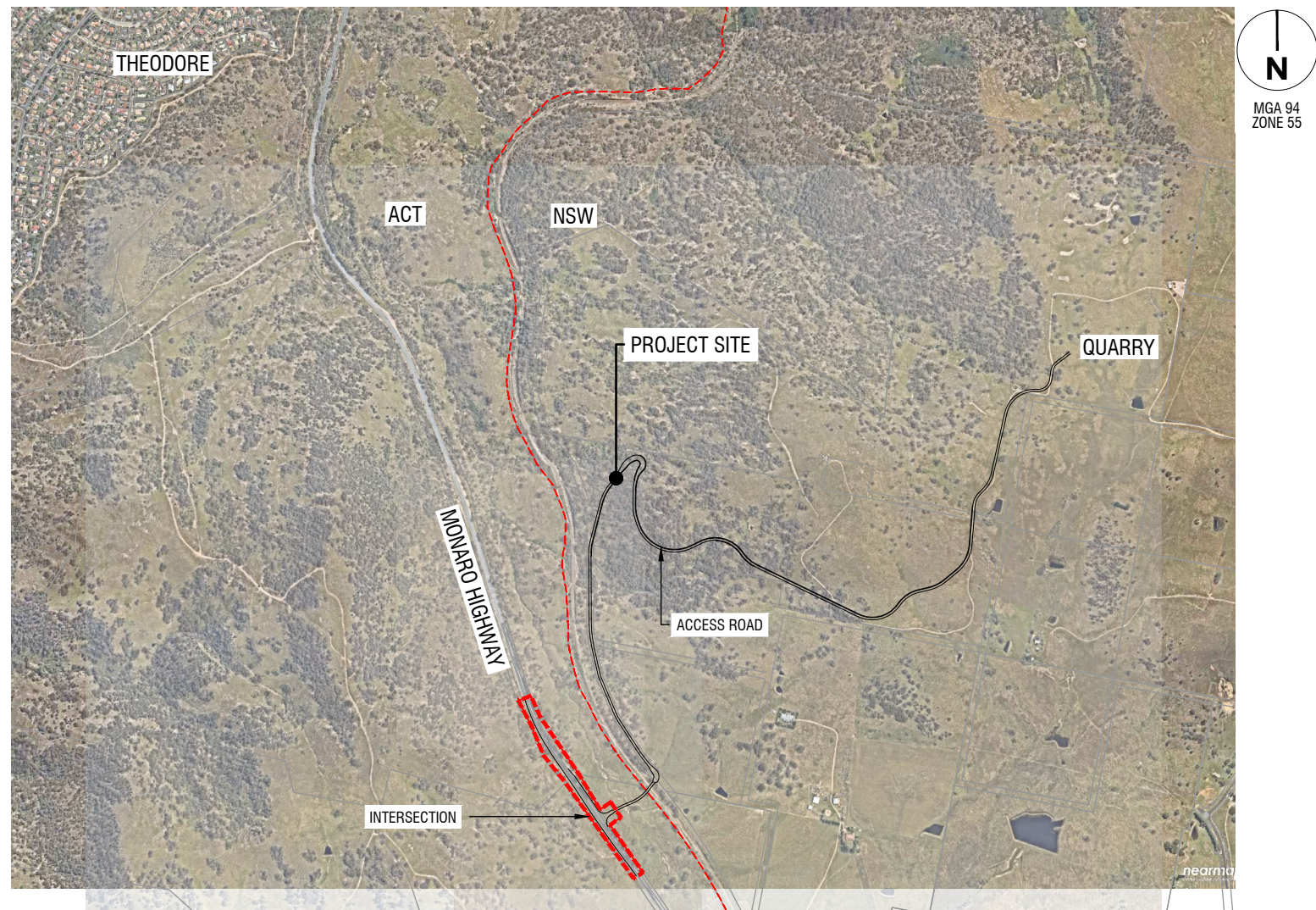
PROJECT NUMBER: 309735

CIVIL ENGINEERING DRAWINGS

FOR MONARO ROCK

GENERAL NOTES:

1. ALL LEVELS ARE TO AUSTRALIAN HEIGHT DATUM AND ALL COORDINATES ARE TO MAP GRID OF AUSTRALIA (MGA) 94, ZONE 55.
2. ALL EXISTING SURFACE LEVELS PROVIDED BY LONERGAN SURVEYING SHOWN ON THE ENGINEERING DRAWINGS HAVE BEEN INTERPOLATED FROM A DIGITAL TERRAIN MODEL. THESE LEVELS HAVE BEEN USED AS THE BASIS FOR ALL ENGINEERING DESIGN AND DETERMINATION OF QUANTITIES.
3. ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT AUTHORITIES REQUIREMENTS.
4. THE LOCATION OF EXISTING SERVICES SHOULD BE DETERMINED BY THE CONTRACTOR PRIOR TO COMMENCING ANY EXCAVATION BY CONTACTING ALL LOCAL SERVICE AUTHORITIES. HAVE BEEN PLOTTED FROM SUPPLIED DATA. ANY EXISTING SERVICES SHOWN ARE OFFERED AS A GUIDE ONLY.



WARNING

BEWARE OF UNDERGROUND/OVERHEAD SERVICES
THE LOCATION OF SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN. SPECIAL CONSIDERATION SHOULD BE GIVEN TO CONSTRUCTION PROCEDURES UNDER OVERHEAD ELECTRICITY TRANSMISSION LINES.

1 **LOCALITY PLAN**
Scale 1:10000 @ A1



WARNING

BEWARE OF UNDERGROUND/OVERHEAD SERVICES
THE LOCATION OF SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN. SPECIAL CONSIDERATION SHOULD BE GIVEN TO CONSTRUCTION PROCEDURES UNDER OVERHEAD ELECTRICITY TRANSMISSION LINES.

[illegible]

Scale

1:10000@A1 0 100 200 300 400 500
SCALE
1:20000@A3 0 100 200 300 400 500

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**MONARO
ROCK**

Designed

Checked

Authorised

Date _____

**MONARO ROCK QUARRY
ACCESS ROAD**
COVER SHEET

QPRC / TCCS
CONCEPT DESIGN

Drg No

309735CA001

3V

—

DRAWING SCHEDULE	
NO.	DESCRIPTION
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100	100.000

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CA001	COVER SHEET	-
CA002	DRAWING SCHEDULE	-
CA005	EXISTING SERVICES PLAN	
CA010	INTERSECTION DETAILS GENERAL ARRANGEMENT	-
CA011	INTERSECTION DETAILS DETAIL PLAN - SHEET 1	-
CA012	INTERSECTION DETAILS DETAIL PLAN - SHEET 2	-
CA015	INTERSECTION DETAILS SIGHT DISTANCE PLAN - SHEET 1	-
CA016	INTERSECTION DETAILS SIGHT DISTANCE PLAN - SHEET 2	-
CA020	INTERSECTION DETAILS TURNING MOVEMENTS PLAN - SHEET 1	-
CA021	INTERSECTION DETAILS TURNING MOVEMENTS PLAN - SHEET 2	-
CA022	INTERSECTION DETAILS TURNING MOVEMENTS PLAN - SHEET 3	-
CA023	INTERSECTION DETAILS TURNING MOVEMENTS PLAN - SHEET 4	-
CA030	ROAD LAYOUT PLAN SHEET 1	
CA031	ROAD LAYOUT PLAN SHEET 2	
CA032	ROAD LAYOUT PLAN SHEET 3	
CA033	ROAD LAYOUT PLAN SHEET 4	
CA034	ROAD LAYOUT PLAN SHEET 5	
CA035	TYPICAL CROSS SECTIONS SHEET 1	
CA036	TYPICAL CROSS SECTIONS SHEET 2	
CA037	TYPICAL CROSS SECTIONS SHEET 3	
CA038	TYPICAL CROSS SECTIONS SHEET 4	
CA039	TYPICAL CROSS SECTIONS SHEET 5	
CA100	ROAD LONGITUDINAL SECTIONS SHEET 1	
CA101	ROAD LONGITUDINAL SECTIONS SHEET 2	
CA102	ROAD LONGITUDINAL SECTIONS SHEET 3	
CA140	ROAD CROSS SECTIONS SHEET 1	
CA141	ROAD CROSS SECTIONS SHEET 2	
CA142	ROAD CROSS SECTIONS SHEET 3	
CA143	ROAD CROSS SECTIONS SHEET 4	
CA144	ROAD CROSS SECTIONS SHEET 5	
CA180	TURNING MOVEMENTS PLAN SHEET 1	
CA181	TURNING MOVEMENTS PLAN SHEET 2	
CA182	TURNING MOVEMENTS PLAN SHEET 3	
CA190	SIGHT DISTANCE PLAN SHEET 1	
CA191	SIGHT DISTANCE PLAN SHEET 2	
CA200	GRADING PLAN	
CA410	CATCHMENT PLAN SHEET 1	
CA411	CATCHMENT PLAN SHEET 2	
CA412	CATCHMENT PLAN SHEET 3	
CA850	ENVIRONMENTAL CONTROLS CONCEPT PLAN SHEET 1	
CA851	ENVIRONMENTAL CONTROLS CONCEPT PLAN SHEET 2	
CA900	CONSTRAINTS PLAN	-

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Scale

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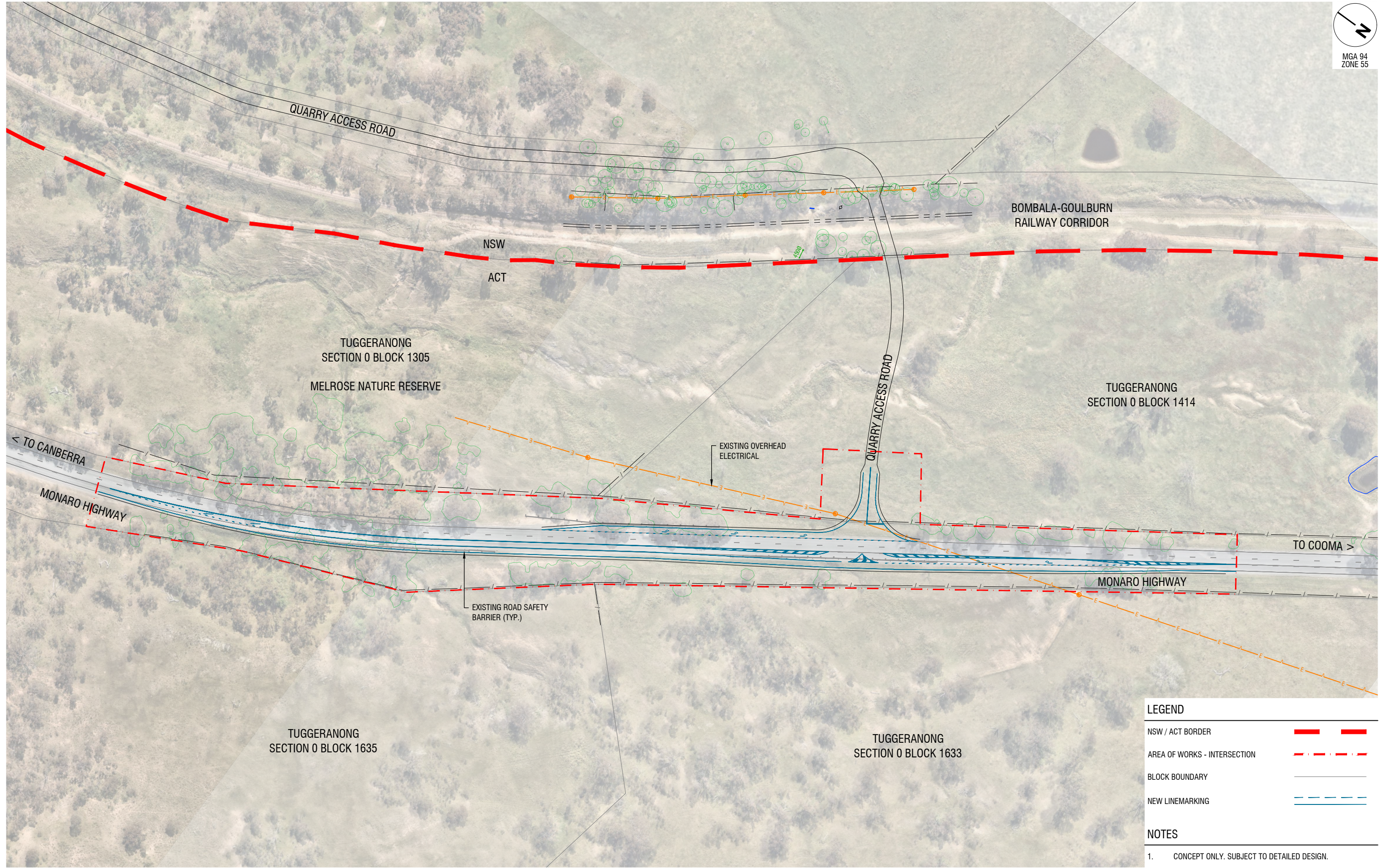
Date _____

MONARO ROCK QUARRY ACCESS ROAD DRAWING SCHEDULE

QPRC / TCCS
CONCEPT DESIGN

—

File name 309735CA002.dwg layout name CA002 plotted by Susan Beff
File location G:\30\309735\Civil\ACAD plot date 19/05/2025 10:54 AM



LEGEND

NSW / ACT BORDER

AREA OF WORKS - INTERSECTION

BLOCK BOUNDARY

NEW LINEMARKING

NOTES

1. CONCEPT ONLY. SUBJECT TO DETAILED DESIGN.

file name: 309735CA010.dwg, layout name: CA010, plotted by: Susan Beff, file location: G:\30\309735\CA010\CA010.plt, date: 19/05/2025 10:54 AM

Revisions			
Rev	Amendments	Approved	Date

Scale

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SCALE

1:2000@A3

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0 10 20 30 40 50

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MONARO ROCK

Designed

Checked

Authorised

Date

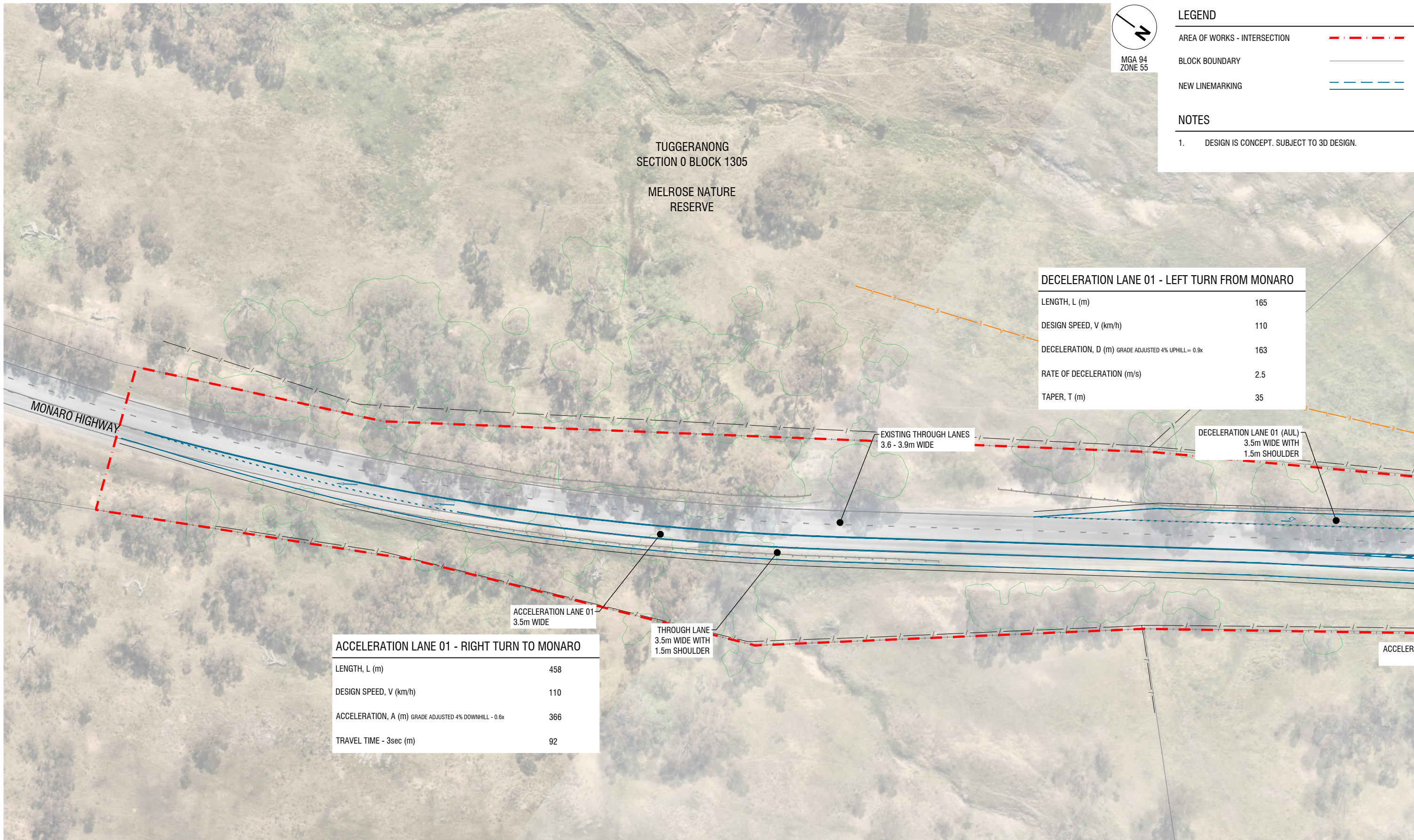
MONARO ROCK QUARRY
ACCESS ROAD
INTERSECTION DETAILS
GENERAL ARRANGEMENT
QPRC / TCCS
CONCEPT DESIGN

Org No

309735CA010

Rev

-



LEGEND

AREA OF WORKS - INTERSECTION	
BLOCK BOUNDARY	
NEW LINEMARKING	

NOTES

1. DESIGN IS CONCEPT. SUBJECT TO 3D DESIGN.

DECELERATION LANE 01 - LEFT TURN FROM MONARO

LENGTH, L (m)	165
DESIGN SPEED, V (km/h)	110
DECELERATION, D (m) GRADE ADJUSTED 4% UPHILL = 0.9x	163
RATE OF DECELERATION (m/s)	2.5
TAPER, T (m)	35

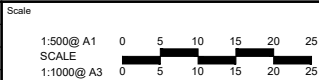
ACCELERATION LANE 01 - RIGHT TURN TO MONARO

LENGTH, L (m)	458
DESIGN SPEED, V (km/h)	110
ACCELERATION, A (m) GRADE ADJUSTED 4% DOWNHILL - 0.6x	366
TRAVEL TIME - 3sec (m)	92

MONARO HIGHWAY / QUARRY ACCESS ROAD INTERSECTION PLAN
(SEAGULL TREATMENT)
SCALE 1:500

file name: 309735CA010.dwg, layout name: C4011, plotted by: Susan Raff
file location: G:\309735\309735\CA010.dwg, plot date: 19/05/2025 10:55 AM

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Checked _____
Authorised _____
Date _____

MONARO ROCK QUARRY
ACCESS ROAD
INTERSECTION DETAILS
DETAIL PLAN - SHEET 1
QPRC / TCCS
CONCEPT DESIGN

Org No
309735CA011

Rev
-

file name: 309735CA010.dwg, layout name: C4012, plotted by: Susan Beff
file location: G:\309735CA\309735CA010.dwg, plot date: 19/05/2025 10:55 AM

DECELERATION LANE 01 - LEFT TURN FROM MONARO

LENGTH, L (m)	165
DESIGN SPEED, V (km/h)	110
DECELERATION, D (m) GRADE ADJUSTED 4% UPHILL - 0.9x	163
RATE OF DECELERATION (m/s)	2.5
TAPER, T (m)	35

DECELERATION LANE 01 (AUL)
3.5m WIDE WITH
1.5m SHOULDER

2m WIDE MEDIAN
TAPERED OVER 100m

QUARRY ACCESS ROAD

QUARRY ACCESS ROAD
LANES 4m WITH 1.5m
SHOULDERS

RURAL BAL TREATMENT
FOR LEFT TURN

2m WIDE MEDIAN
TAPERED OVER 100m

EXISTING THROUGH LANES
3.6 - 3.9m WIDE

MONARO HIGHWAY

ACCELERATION LANE 01
3.5m WIDE

ACCELERATION LANE 01 - RIGHT TURN TO MONARO

LENGTH, L (m)	458
DESIGN SPEED, V (km/h)	110
ACCELERATION, A (m) GRADE ADJUSTED 4% DOWNHILL - 0.6x	366
TRAVEL TIME - 3sec (m)	92

THROUGH LANE
3.5m WIDE WITH
1.5m SHOULDER

DECELERATION LANE 02 - CHR(S)
3.5m WIDE WITH 1.5m SHOULDER

DECELERATION LANE 02 - RIGHT TURN FROM MONARO

LENGTH, L (m)	145
DESIGN SPEED, V (km/h) 20% REDUCTION APPLIED	88
DECELERATION LENGTH, D (m) GRADE ADJUSTED 4.5% DOWNHILL - 1.2x	144
RATE OF DECELERATION (m/s)	2.5
TAPER, T (m)	35
STORAGE, S (m)	0

MONARO HIGHWAY / QUARRY ACCESS ROAD INTERSECTION PLAN
(SEAGULL TREATMENT)
SCALE 1:500



LEGEND

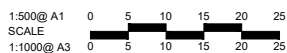
AREA OF WORKS - INTERSECTION	
BLOCK BOUNDARY	
NEW LINEMARKING	

NOTES

- REFER DRAWING 309735CA011 FOR NOTES

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Scale



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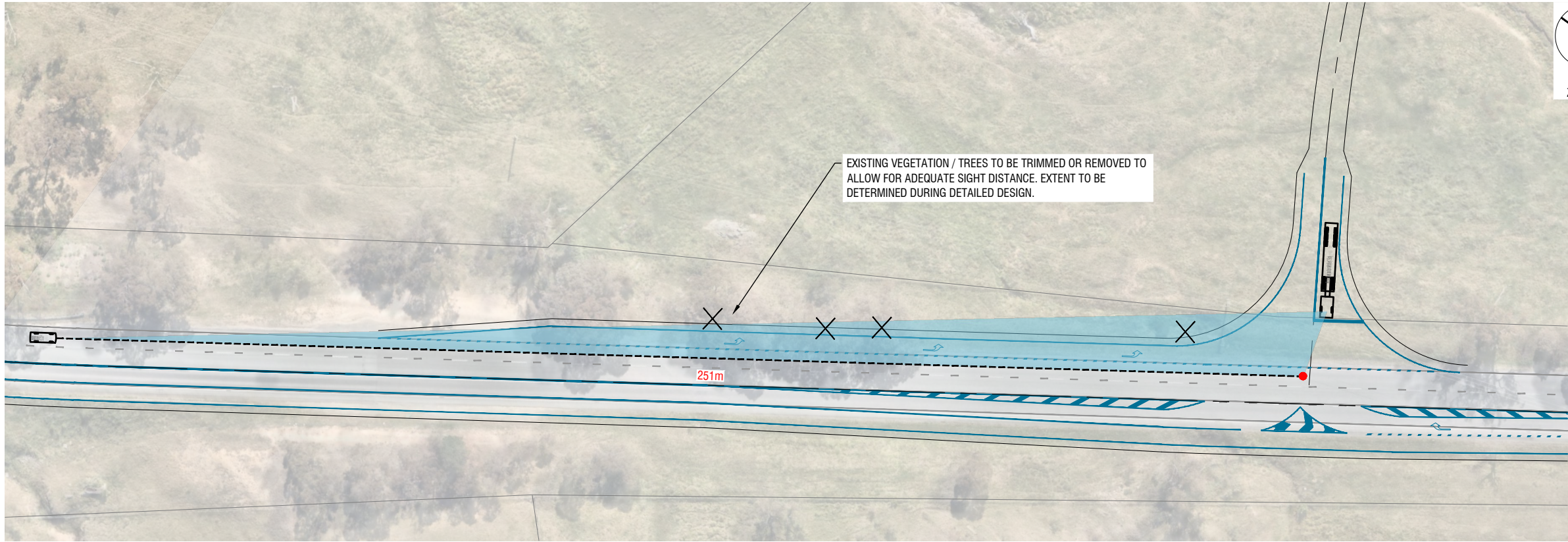
Designed	Checked
Authorised	Date

**MONARO ROCK QUARRY
ACCESS ROAD
INTERSECTION DETAILS
DETAIL PLAN - SHEET 2**
QPRC / TCCS
CONCEPT DESIGN

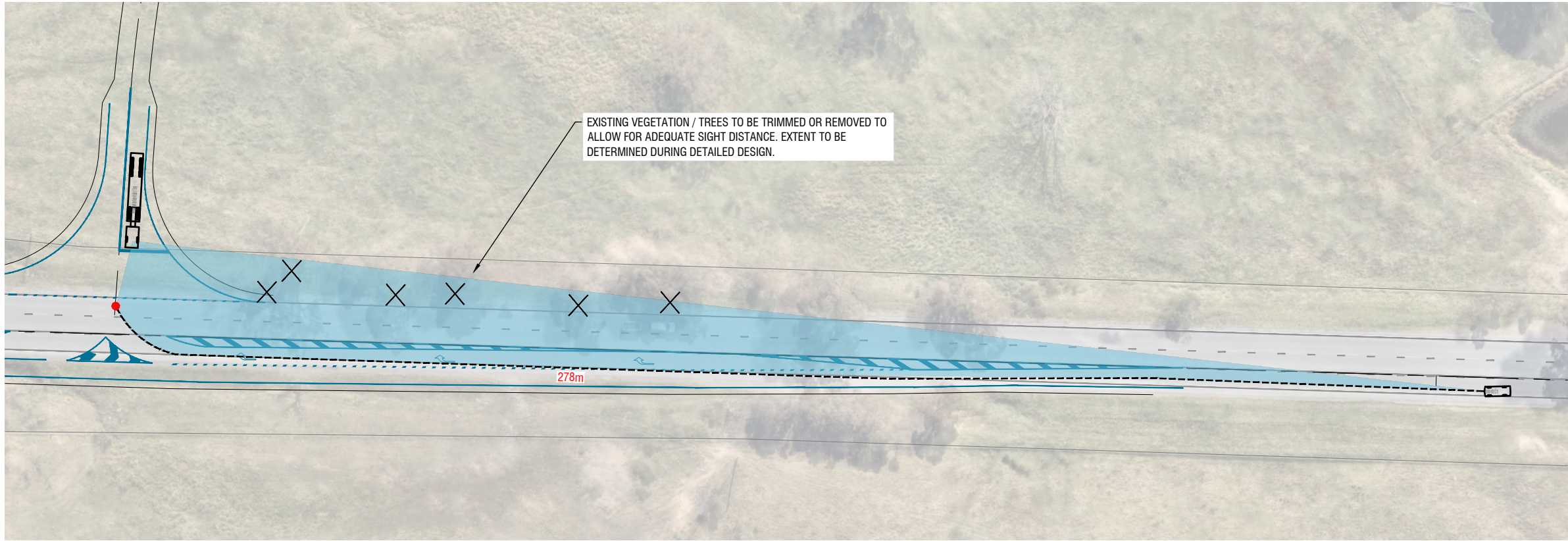
Orig No
309735CA012

Rev
-

Rev	Amendments	Approved	Date
-			



SISD - MONARO HIGHWAY / QUARRY ACCESS ROAD
SCALE 1:250



SISD - MONARO HIGHWAY / QUARRY ACCESS ROAD
SCALE 1:250

LEGEND	
BLOCK BOUNDARY	
NEW LINEMARKING	
SIGHT DISTANCE TRIANGLE	
VEHICLE CONFLICT POINT	

- NOTES
- APPROACH SITE DISTANCE CALCULATED AS STOPPING SIGHT DISTANCE AS PER AUSTRROADS GUIDE TO ROAD DESIGN PART 3, SECTION 5.3
 - SAFE INTERSECTION SIGHT DISTANCE CALCULATED AS PER AUSTRROADS GUIDE TO ROAD DESIGN PART 4A, SECTION 3.2.2
 - SIGHT DISTANCE ON HORIZONTAL CURVES CALCULATED AS PER AUSTRROADS GUIDE TO ROAD DESIGN PART 3, SECTION 5.4

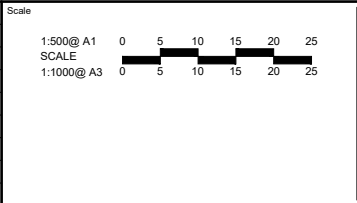
ABBREVIATIONS	
ASD	APPROACH SIGHT DISTANCE
SISD	SAFE INTERSECTION SIGHT DISTANCE
S	SIGHT DISTANCE
Rt	REACTION TIME
V	OPERATING SPEED
d	COEFFICIENT OF DECELERATION
a	LONGITUDINAL GRADE
Dt	DECISION TIME
R	RADIUS FROM CENTRE OF INSIDE LANE
O	OFFSET FROM OBSTRUCTION

SISD REQUIRED

Dt (sec)	5.5
V (km/h)	100
d	0.36
a UPHILL (%)	4.0
a DOWNHILL (%)	-4.5
SSD UPHILL (m)	251
SSD DOWNHILL (m)	278

file name: 309735CA015.dwg, layout name: C40115, plotted by: Susan Bratt
file location: G:\309735CA\309735CA.dwg, plot date: 19/05/2025 10:55 AM

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**MONARO ROCK QUARRY
ACCESS ROAD
INTERSECTION DETAILS
SIGHT DISTANCE PLAN - SHEET 1**
QPRC / TCCS
CONCEPT DESIGN

Orig No
309735CA015

Rev
-



NOTES

1. REFER TO 309735CA015 FOR ABBREVIATIONS, LEGEND AND NOTES

ASD REQUIRED

Rt (sec)	2.0
V (km/h)	40
d	0.29
a (%)	2.5
ASD (m)	42.2

ASD - MONARO HIGHWAY / QUARRY ACCESS ROAD
SCALE 1:250

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Rev	Amendments	Approved	Date
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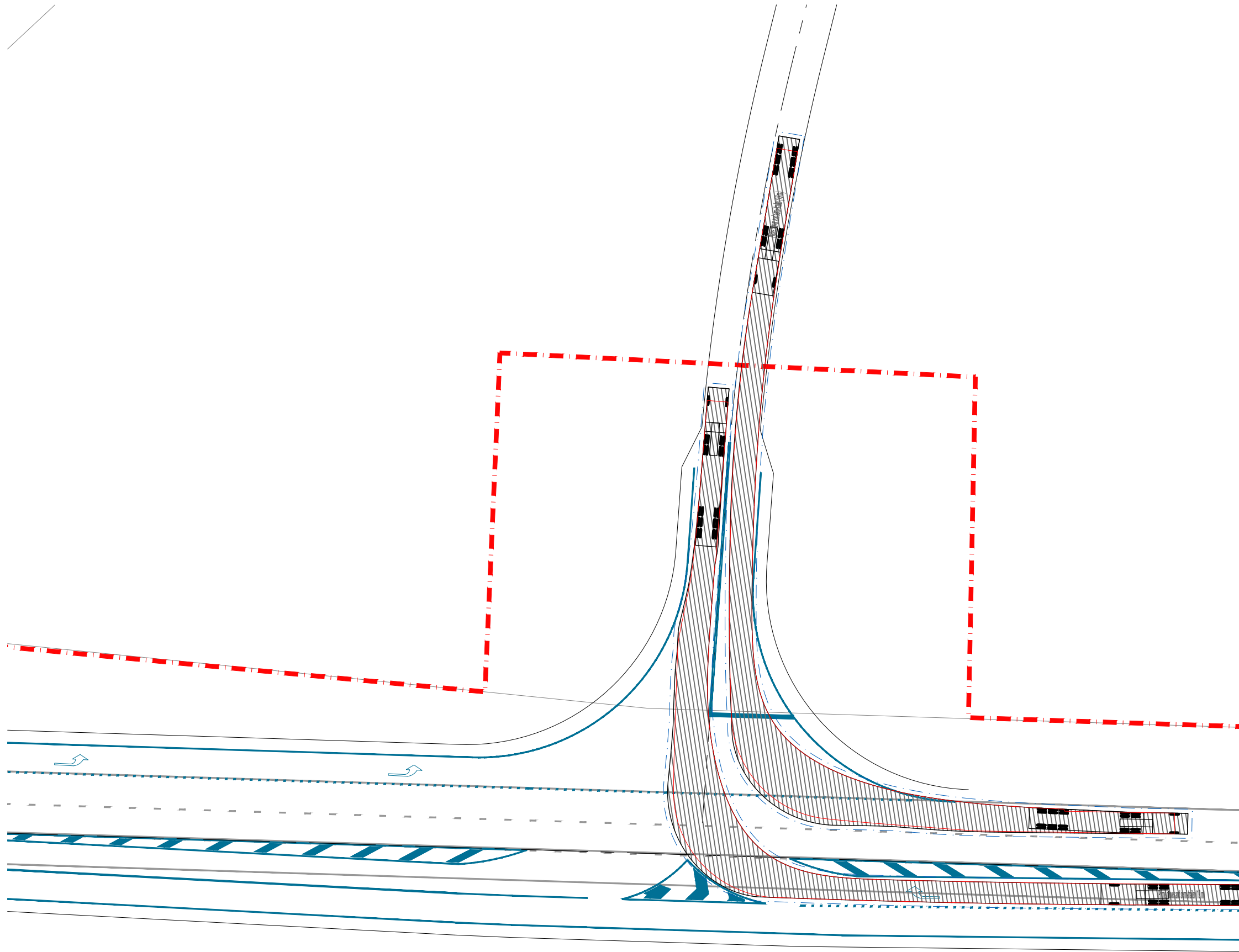


Designed	Checked
Authorised	Date

**MONARO ROCK QUARRY
ACCESS ROAD
INTERSECTION DETAILS
SIGHT DISTANCE PLAN - SHEET 2**
QPRC / TCCS
CONCEPT DESIGN

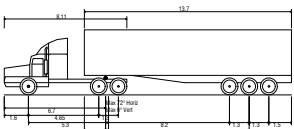
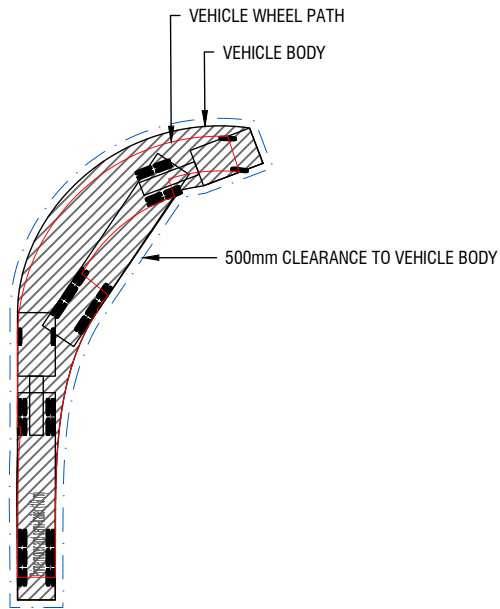
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LEGEND	
AREA OF WORKS - INTERSECTION	
BLOCK BOUNDARY	
NEW LINEMARKING	

NOTES	
1.	VEHICLE TURNS ARE IN ACCORDANCE WITH AUSTRROADS



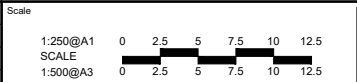
PRIME MOVER AND SEMI-TRAILER (19 m)	
OVERALL LENGTH	19.000m
OVERALL WIDTH	2.500m
OVERALL BODY HEIGHT	4.300m
MIN BODY GROUND CLEARANCE	0.540m
TRACK WIDTH	2.500m
LOCK-TO-LOCK TIME	6.00s
KERB TO KERB TURNING RADIUS	12.500m

MONARO HIGHWAY / QUARRY ACCESS ROAD - RIGHT IN, LEFT OUT
SCALE 1:250

DESIGN VEHICLE DETAILS - 19m SEMI
SCALE 1:250

Rev	Amendments	Approved	Date
-			

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Designed	Checked
Authorised	Date



**MONARO ROCK QUARRY
ACCESS ROAD
INTERSECTION DETAILS
TURNING MOVEMENTS PLAN - SHEET 1**
QPRC / TCCS
CONCEPT DESIGN

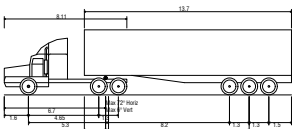
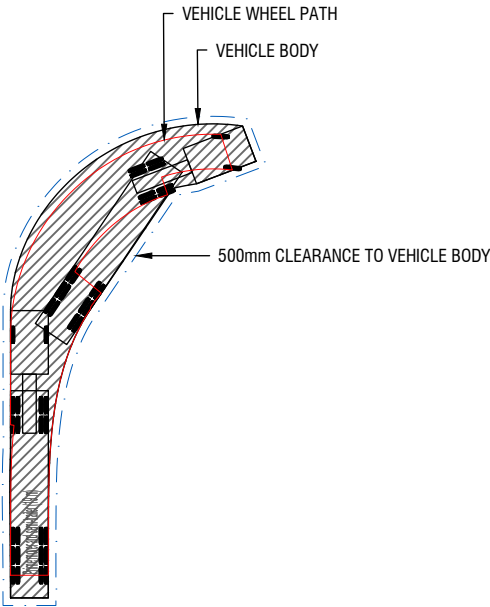
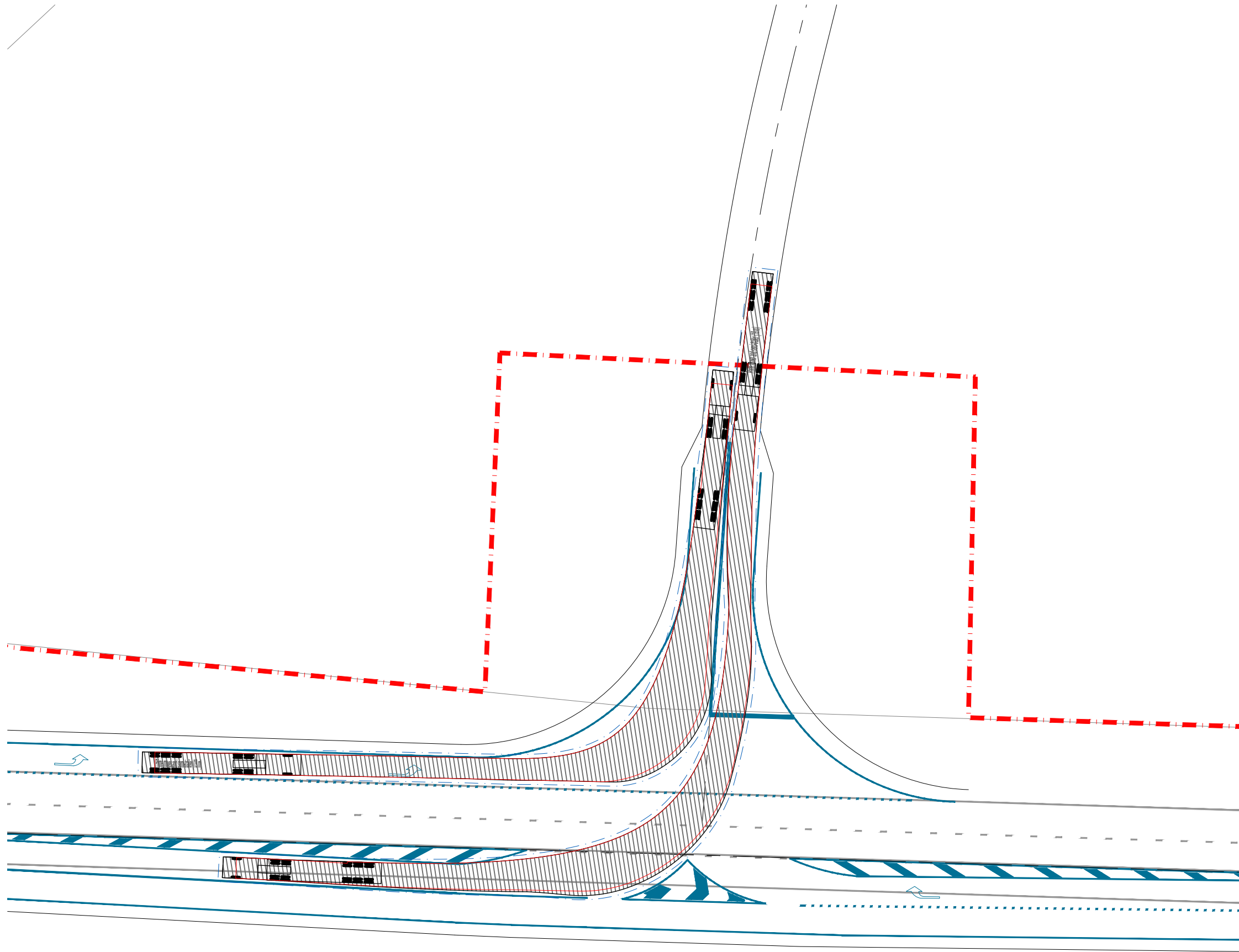
Orig No
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Rev
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- NOTES
1. REFER TO DRAWING 309735CA020 FOR NOTES AND LEGEND

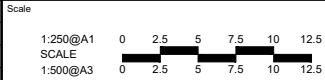


PRIME MOVER AND SEMI-TRAILER (19 m)
OVERALL LENGTH 19.000m
OVERALL WIDTH 2.500m
OVERALL BODY HEIGHT 4.300m
MIN BODY GROUND CLEARANCE 0.540m
TRACK WIDTH 2.500m
LOCK-TO-LOCK TIME 6.00s
KERB TO KERB TURNING RADIUS 12.500m

MONARO HIGHWAY / QUARRY ACCESS ROAD - LEFT IN, RIGHT OUT
SCALE 1:250

DESIGN VEHICLE DETAILS - 19m SEMI
SCALE 1:250

DRAFT



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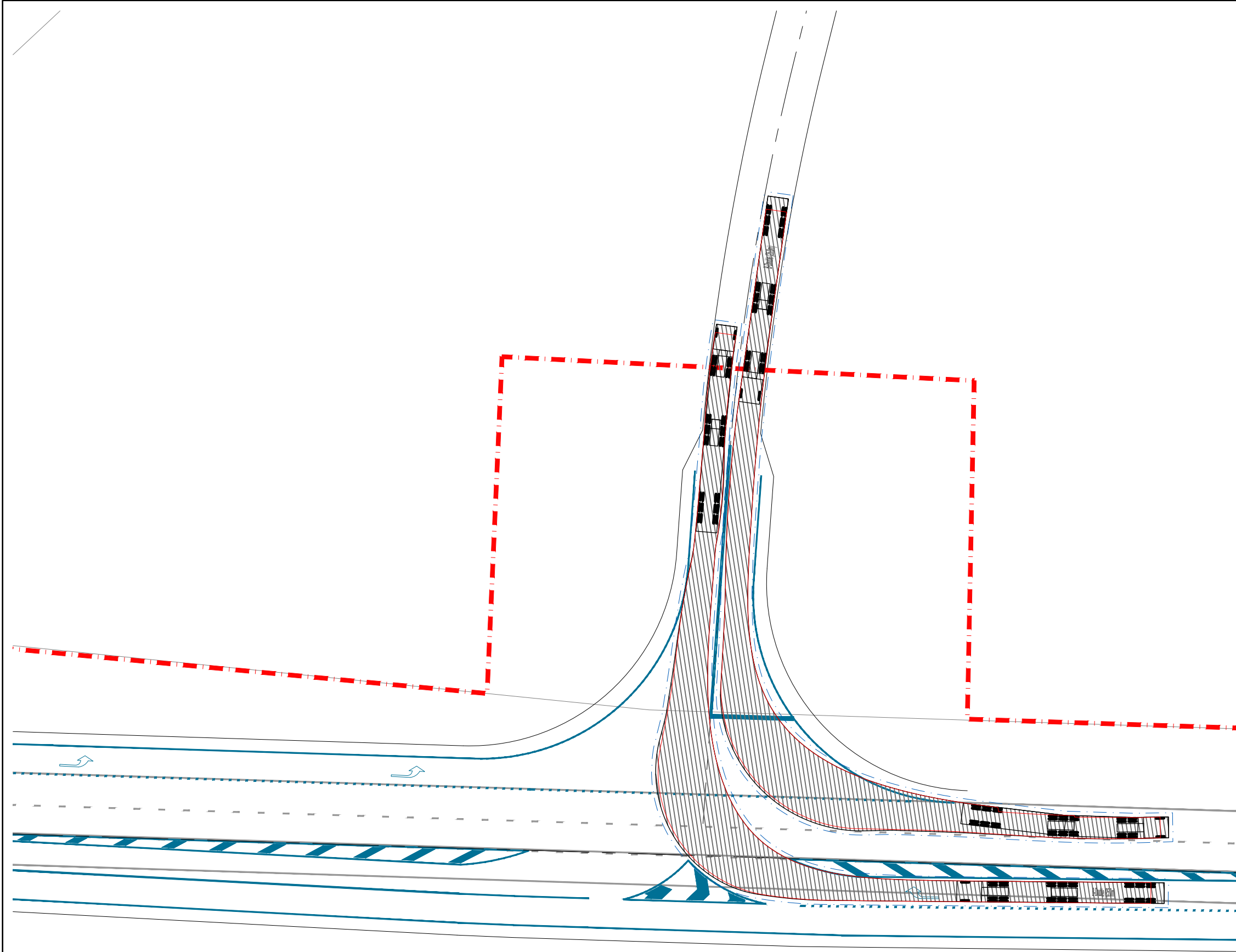
Designed _____
Checked _____
Authorised _____
Date _____

**MONARO ROCK QUARRY
ACCESS ROAD
INTERSECTION DETAILS
TURNING MOVEMENTS PLAN - SHEET 2**
QPRC / TCCS
CONCEPT DESIGN

Org No
309735CA021

Rev
-

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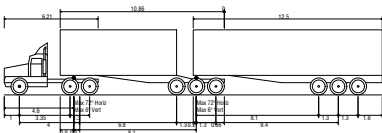
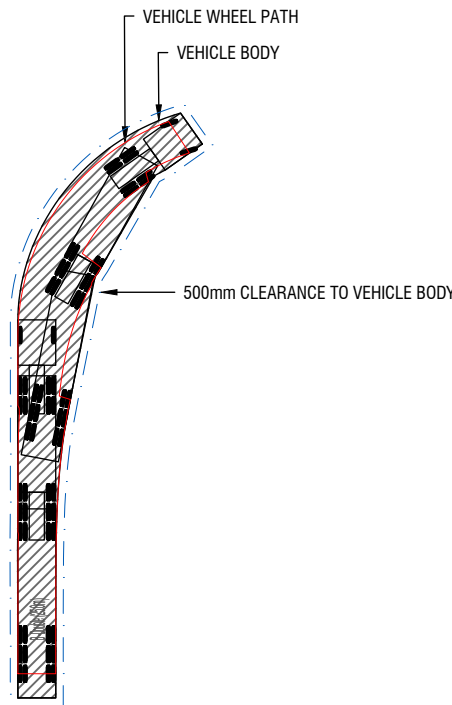


LEGEND

- AREA OF WORKS - INTERSECTION
- BLOCK BOUNDARY
- NEW LINEMARKING

NOTES

1. VEHICLE TURNS ARE IN ACCORDANCE WITH AUSTRROADS

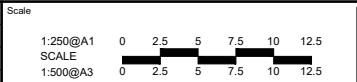


B DOUBLE (25 m)	
OVERALL LENGTH	25.000m
OVERALL WIDTH	2.500m
OVERALL BODY HEIGHT	4.300m
MIN BODY GROUND CLEARANCE	0.540m
TRACK WIDTH	2.500m
LOCK-TO-LOCK TIME	6.00s
KERB TO KERB TURNING RADIUS	15.000m

MONARO HIGHWAY / QUARRY ACCESS ROAD - RIGHT IN, LEFT OUT
SCALE 1:250

DESIGN VEHICLE DETAILS - 25m B DOUBLE
SCALE 1:250

Rev	Amendments	Approved	Date
-			



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Designed

Checked

Authorised

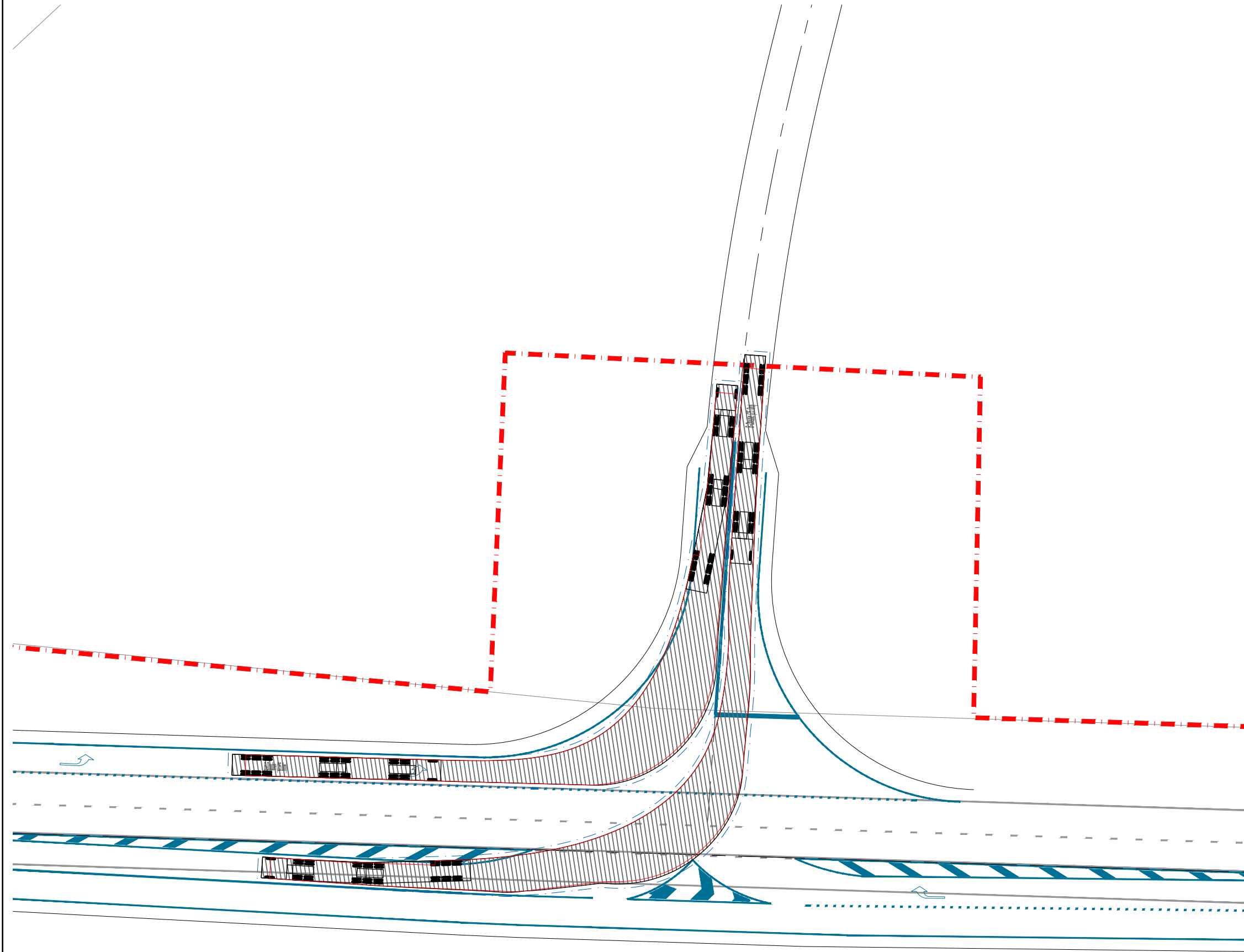
Date

**MONARO ROCK QUARRY
ACCESS ROAD
INTERSECTION DETAILS
TURNING MOVEMENTS PLAN - SHEET 3**
QPRC / TCCS
CONCEPT DESIGN

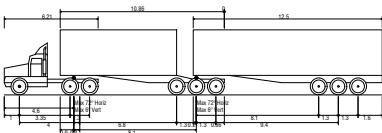
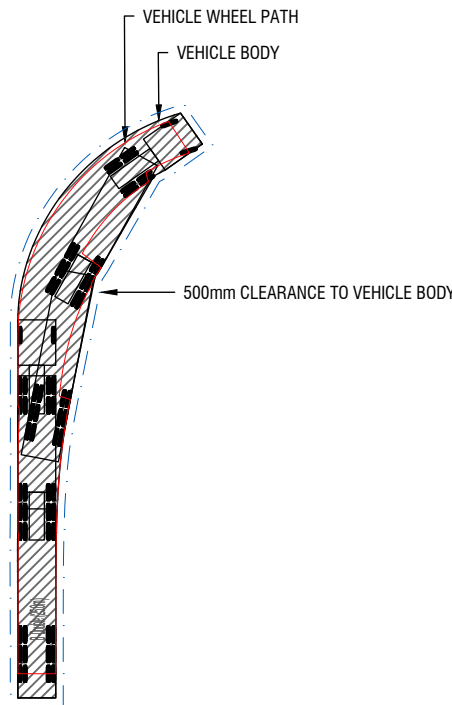
Org No
309735CA022

Rev
-

file name: 309735CA020.dwg, layout name: C4023, plotted by: Susan Raff
file location G:\309735CA\309735CA020.dwg, plot date: 19/05/2025 10:55 AM



- NOTES
- REFER TO DRAWING 309735CA020 FOR NOTES AND LEGEND

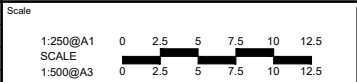


B DOUBLE (25 m)	
OVERALL LENGTH	25.000m
OVERALL WIDTH	2.500m
OVERALL BODY HEIGHT	4.300m
MIN BODY GROUND CLEARANCE	0.540m
TRACK WIDTH	2.500m
LOCK-TO-LOCK TIME	6.00s
KERB TO KERB TURNING RADIUS	15.000m

MONARO HIGHWAY / QUARRY ACCESS ROAD - LEFT IN, RIGHT OUT
SCALE 1:250

DESIGN VEHICLE DETAILS - 25m B DOUBLE
SCALE 1:250

Rev	Amendments	Approved	Date
-			



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Authorised	Date

**MONARO ROCK QUARRY
ACCESS ROAD
INTERSECTION DETAILS
TURNING MOVEMENTS PLAN - SHEET 4**
QPRC / TCCS
CONCEPT DESIGN

Org No
309735CA023

Rev
-

Appendix E

SIDRA Results

MOVEMENT SUMMARY

 **Site: [1] AM-AWD-N-2031** (Monaro Quarry 2031 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2031 Average Weekday 8:00am - 9:00am
With Maximum Project Trips to/from North
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]		[Total HV]					[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Monaro Hwy															
5	T1	All MCs	714	7.7	714	7.7	0.386	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.7
6	R2	All MCs	1	0.0	1	0.0	0.001	9.8	LOS A	0.0	0.0	0.31	0.63	0.31	46.6
Approach			715	7.7	715	7.7	0.386	0.1	NA	0.0	0.0	0.00	0.00	0.00	99.6
East: Quarry															
1	L2	All MCs	1	0.0	1	0.0	0.117	7.5	LOS A	0.4	7.4	0.48	1.06	0.48	41.0
2	R2	All MCs	39	97.4	39	97.4	0.117	26.9	LOS B	0.4	7.4	0.48	1.06	0.48	33.0
Approach			40	95.0	40	95.0	0.117	26.4	LOS B	0.4	7.4	0.48	1.06	0.48	33.2
North: Monaro Hwy															
3	L2	All MCs	39	97.4	39	97.4	0.048	3.7	LOS A	0.0	0.0	0.00	0.43	0.00	37.6
4	T1	All MCs	257	16.8	257	16.8	0.077	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
Approach			296	27.4	296	27.4	0.077	0.5	NA	0.0	0.0	0.00	0.06	0.00	82.0
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.002	12.9	LOS A	0.0	0.1	0.60	0.74	0.60	46.5
Approach			1	0.0	1	0.0	0.002	12.9	LOS A	0.0	0.1	0.60	0.74	0.60	46.5
All Vehicles			1052	16.5	1052	16.5	0.386	1.2	NA	0.4	7.4	0.02	0.06	0.02	87.5

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [2] AM-AWD-S-2031** (Monaro Quarry 2031 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2031 Average Weekday 8:00am - 9:00am
With Maximum Project Trips to/from South
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	Dist]				km/h
			veh/h	%	veh/h	%				veh	m				
South: Monaro Hwy															
5	T1	All MCs	714	7.7	714	7.7	0.386	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.7
6	R2	All MCs	39	97.4	39	97.4	0.116	18.6	LOS B	0.3	6.2	0.44	0.77	0.44	41.6
Approach			753	12.3	753	12.3	0.386	1.0	NA	0.3	6.2	0.02	0.04	0.02	93.0
East: Quarry															
1	L2	All MCs	39	97.4	39	97.4	0.085	13.8	LOS A	0.3	5.9	0.36	1.04	0.36	33.7
2	R2	All MCs	1	0.0	1	0.0	0.085	8.9	LOS A	0.3	5.9	0.36	1.04	0.36	44.2
Approach			40	95.0	40	95.0	0.085	13.7	LOS A	0.3	5.9	0.36	1.04	0.36	33.9
North: Monaro Hwy															
3	L2	All MCs	1	0.0	1	0.0	0.001	3.4	LOS A	0.0	0.0	0.00	0.48	0.00	38.1
4	T1	All MCs	257	16.8	257	16.8	0.077	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	100.0
Approach			258	16.7	258	16.7	0.077	0.0	NA	0.0	0.0	0.00	0.00	0.00	99.3
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.002	12.9	LOS A	0.0	0.1	0.60	0.74	0.60	46.5
Approach			1	0.0	1	0.0	0.002	12.9	LOS A	0.0	0.1	0.60	0.74	0.60	46.5
All Vehicles			1052	16.5	1052	16.5	0.386	1.3	NA	0.3	6.2	0.03	0.07	0.03	88.4

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [3] PM-AWD-N-2031** (Monaro Quarry 2031 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2031 Average Weekday 4:00pm - 5:00pm
With Maximum Project Trips to/from North
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Number Stop of Cycles Rate to Depart	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	Dist]			km/h
			veh/h		veh/h					veh	m			
South: Monaro Hwy														
5	T1	All MCs	332	14.6	332	14.6	0.191	0.0	LOS A	0.0	0.0	0.00	0.00	99.9
6	R2	All MCs	1	0.0	1	0.0	0.002	11.9	LOS A	0.0	0.0	0.49	0.65	45.3
Approach			333	14.6	333	14.6	0.191	0.1	NA	0.0	0.0	0.00	0.00	99.5
East: Quarry														
1	L2	All MCs	1	0.0	1	0.0	0.206	9.2	LOS A	0.7	12.9	0.70	1.09	36.7
2	R2	All MCs	39	97.4	39	97.4	0.206	31.3	LOS C	0.7	12.9	0.70	1.09	30.2
Approach			40	95.0	40	95.0	0.206	30.8	LOS C	0.7	12.9	0.70	1.09	30.3
North: Monaro Hwy														
3	L2	All MCs	39	97.4	39	97.4	0.048	3.7	LOS A	0.0	0.0	0.00	0.43	37.6
4	T1	All MCs	640	5.6	640	5.6	0.174	0.0	LOS A	0.0	0.0	0.00	0.00	99.9
Approach			679	10.9	679	10.9	0.174	0.2	NA	0.0	0.0	0.00	0.02	91.2
West: Dummy														
10	L2	All MCs	1	0.0	1	0.0	0.001	9.8	LOS A	0.0	0.0	0.41	0.78	48.7
Approach			1	0.0	1	0.0	0.001	9.8	LOS A	0.0	0.0	0.41	0.78	48.7
All Vehicles			1053	15.2	1053	15.2	0.206	1.3	NA	0.7	12.9	0.03	0.06	86.8

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [4] PM-AWD-S-2031** (Monaro Quarry 2031 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2031 Average Weekday 4:00pm - 5:00pm
With Maximum Project Trips to/from South
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Number Stop of Cycles to Depart	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	Dist]			km/h
South: Monaro Hwy														
5	T1	All MCs	332	14.6	332	14.6	0.191	0.0	LOS A	0.0	0.0	0.00	0.00	99.9
6	R2	All MCs	39	97.4	39	97.4	0.206	29.5	LOS C	0.6	10.8	0.71	0.91	37.5
Approach			371	23.3	371	23.3	0.206	3.1	NA	0.6	10.8	0.07	0.10	85.0
East: Quarry														
1	L2	All MCs	49	98.0	49	98.0	0.149	18.5	LOS B	0.6	11.2	0.54	1.05	32.0
2	R2	All MCs	1	0.0	1	0.0	0.149	11.7	LOS A	0.6	11.2	0.54	1.05	41.5
Approach			50	96.0	50	96.0	0.149	18.4	LOS B	0.6	11.2	0.54	1.05	32.1
North: Monaro Hwy														
3	L2	All MCs	1	0.0	1	0.0	0.001	3.4	LOS A	0.0	0.0	0.00	0.48	38.1
4	T1	All MCs	640	5.6	640	5.6	0.174	0.0	LOS A	0.0	0.0	0.00	0.00	99.9
Approach			641	5.6	641	5.6	0.174	0.0	NA	0.0	0.0	0.00	0.00	99.7
West: Dummy														
10	L2	All MCs	1	0.0	1	0.0	0.001	9.8	LOS A	0.0	0.0	0.41	0.78	48.7
Approach			1	0.0	1	0.0	0.001	9.8	LOS A	0.0	0.0	0.41	0.78	48.7
All Vehicles			1063	16.0	1063	16.0	0.206	2.0	NA	0.6	11.2	0.05	0.08	85.9

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [5] AM-SAT-N-2031** (Monaro Quarry 2031 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2031 Saturday 11:00am - Midday
With Maximum Project Trips to/from North
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	Dist]				km/h
South: Monaro Hwy															
5	T1	All MCs	500	9.7	500	9.7	0.273	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.8
6	R2	All MCs	1	0.0	1	0.0	0.002	10.9	LOS A	0.0	0.0	0.41	0.64	0.41	45.9
Approach			501	9.7	501	9.7	0.273	0.0	NA	0.0	0.0	0.00	0.00	0.00	99.6
East: Quarry															
1	L2	All MCs	1	0.0	1	0.0	0.161	8.2	LOS A	0.5	10.0	0.60	1.09	0.60	38.4
2	R2	All MCs	39	97.4	39	97.4	0.161	27.6	LOS B	0.5	10.0	0.60	1.09	0.60	31.4
Approach			40	95.0	40	95.0	0.161	27.1	LOS B	0.5	10.0	0.60	1.09	0.60	31.5
North: Monaro Hwy															
3	L2	All MCs	39	97.4	39	97.4	0.048	3.7	LOS A	0.0	0.0	0.00	0.43	0.00	37.6
4	T1	All MCs	478	4.6	478	4.6	0.128	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach			517	11.6	517	11.6	0.128	0.3	NA	0.0	0.0	0.00	0.03	0.00	88.8
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.001	10.9	LOS A	0.0	0.0	0.50	0.76	0.50	47.9
Approach			1	0.0	1	0.0	0.001	10.9	LOS A	0.0	0.0	0.50	0.76	0.50	47.9
All Vehicles			1059	13.8	1059	13.8	0.273	1.2	NA	0.5	10.0	0.02	0.06	0.02	87.2

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [6] AM-SAT-S-2031** (Monaro Quarry 2031 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2031 Saturday 11:00am - Midday
With Maximum Project Trips to/from South
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]	[Total HV]	[Total HV]	[Total HV]	v/c	sec		[Veh.]	[Dist]				km/h
			veh/h	%	veh/h	%				veh	m				
South: Monaro Hwy															
5	T1	All MCs	500	9.7	500	9.7	0.273	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.8
6	R2	All MCs	39	97.4	39	97.4	0.160	23.9	LOS B	0.4	8.4	0.61	0.87	0.61	39.5
Approach			539	16.0	539	16.0	0.273	1.8	NA	0.4	8.4	0.04	0.06	0.04	89.9
East: Quarry															
1	L2	All MCs	39	97.4	39	97.4	0.100	15.9	LOS B	0.4	7.1	0.46	1.04	0.46	32.9
2	R2	All MCs	1	0.0	1	0.0	0.100	10.3	LOS A	0.4	7.1	0.46	1.04	0.46	42.9
Approach			40	95.0	40	95.0	0.100	15.8	LOS B	0.4	7.1	0.46	1.04	0.46	33.1
North: Monaro Hwy															
3	L2	All MCs	1	0.0	1	0.0	0.001	3.4	LOS A	0.0	0.0	0.00	0.48	0.00	38.1
4	T1	All MCs	478	4.6	478	4.6	0.128	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach			479	4.6	479	4.6	0.128	0.0	NA	0.0	0.0	0.00	0.00	0.00	99.6
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.001	10.9	LOS A	0.0	0.0	0.50	0.76	0.50	47.9
Approach			1	0.0	1	0.0	0.001	10.9	LOS A	0.0	0.0	0.50	0.76	0.50	47.9
All Vehicles			1059	13.8	1059	13.8	0.273	1.5	NA	0.4	8.4	0.04	0.07	0.04	87.9

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [7] PM-SAT-N-2031** (Monaro Quarry 2031 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2031 Saturday 4:00pm - 5:00pm
With Maximum Project Trips to/from North
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]		[Total HV]					[Veh.]	Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Monaro Hwy															
5	T1	All MCs	432	8.8	432	8.8	0.234	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
6	R2	All MCs	1	0.0	1	0.0	0.002	11.2	LOS A	0.0	0.0	0.44	0.64	0.44	45.7
Approach			433	8.8	433	8.8	0.234	0.0	NA	0.0	0.0	0.00	0.00	0.00	99.6
East: Quarry															
1	L2	All MCs	1	0.0	1	0.0	0.177	8.4	LOS A	0.6	10.9	0.64	1.08	0.64	37.8
2	R2	All MCs	39	97.4	39	97.4	0.177	28.5	LOS B	0.6	10.9	0.64	1.08	0.64	30.9
Approach			40	95.0	40	95.0	0.177	28.0	LOS B	0.6	10.9	0.64	1.08	0.64	31.1
North: Monaro Hwy															
3	L2	All MCs	39	97.4	39	97.4	0.048	3.7	LOS A	0.0	0.0	0.00	0.43	0.00	37.6
4	T1	All MCs	553	3.2	553	3.2	0.146	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach			592	9.4	592	9.4	0.146	0.3	NA	0.0	0.0	0.00	0.03	0.00	90.1
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.001	10.3	LOS A	0.0	0.0	0.46	0.77	0.46	48.3
Approach			1	0.0	1	0.0	0.001	10.3	LOS A	0.0	0.0	0.46	0.77	0.46	48.3
All Vehicles			1065	12.4	1065	12.4	0.234	1.2	NA	0.6	10.9	0.02	0.06	0.02	87.1

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [8] PM-SAT-S-2031** (Monaro Quarry 2031 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2031 Saturday 4:00pm - 5:00pm
With Maximum Project Trips to/from South
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]		[Total HV]					[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Monaro Hwy															
5	T1	All MCs	432	8.8	432	8.8	0.234	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
6	R2	All MCs	39	97.4	39	97.4	0.176	25.8	LOS B	0.5	9.2	0.65	0.88	0.65	38.7
Approach			471	16.1	471	16.1	0.234	2.2	NA	0.5	9.2	0.05	0.07	0.05	88.3
East: Quarry															
1	L2	All MCs	39	97.4	39	97.4	0.106	16.6	LOS B	0.4	7.5	0.49	1.04	0.49	32.7
2	R2	All MCs	1	0.0	1	0.0	0.106	10.8	LOS A	0.4	7.5	0.49	1.04	0.49	42.5
Approach			40	95.0	40	95.0	0.106	16.5	LOS B	0.4	7.5	0.49	1.04	0.49	32.9
North: Monaro Hwy															
3	L2	All MCs	1	0.0	1	0.0	0.001	3.4	LOS A	0.0	0.0	0.00	0.48	0.00	38.1
4	T1	All MCs	553	3.2	553	3.2	0.146	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach			554	3.2	554	3.2	0.146	0.0	NA	0.0	0.0	0.00	0.00	0.00	99.6
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.001	10.3	LOS A	0.0	0.0	0.46	0.77	0.46	48.3
Approach			1	0.0	1	0.0	0.001	10.3	LOS A	0.0	0.0	0.46	0.77	0.46	48.3
All Vehicles			1065	12.4	1065	12.4	0.234	1.6	NA	0.5	9.2	0.04	0.07	0.04	87.8

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [9] AM-AWD-N-2041** (Monaro Quarry 2041 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2041 Average Weekday 8:00am - 9:00am
With Maximum Project Trips to/from North
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]		[Total HV]					[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Monaro Hwy															
5	T1	All MCs	949	7.6	949	7.6	0.514	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	99.6
6	R2	All MCs	1	0.0	1	0.0	0.002	10.3	LOS A	0.0	0.0	0.37	0.63	0.37	46.3
Approach			950	7.6	950	7.6	0.514	0.1	NA	0.0	0.0	0.00	0.00	0.00	99.5
East: Quarry															
1	L2	All MCs	1	0.0	1	0.0	0.139	7.8	LOS A	0.5	8.6	0.54	1.09	0.54	39.6
2	R2	All MCs	39	97.4	39	97.4	0.139	42.6	LOS D	0.5	8.6	0.54	1.09	0.54	32.1
Approach			40	95.0	40	95.0	0.139	41.7	LOS C	0.5	8.6	0.54	1.09	0.54	32.3
North: Monaro Hwy															
3	L2	All MCs	39	97.4	39	97.4	0.048	3.7	LOS A	0.0	0.0	0.00	0.43	0.00	37.6
4	T1	All MCs	341	16.7	341	16.7	0.102	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach			380	25.0	380	25.0	0.102	0.4	NA	0.0	0.0	0.00	0.04	0.00	85.4
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.002	16.4	LOS B	0.0	0.1	0.68	0.76	0.68	44.3
Approach			1	0.0	1	0.0	0.002	16.4	LOS B	0.0	0.1	0.68	0.76	0.68	44.3
All Vehicles			1372	15.0	1372	15.0	0.514	1.4	NA	0.5	8.6	0.02	0.04	0.02	89.8

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [10] AM-AWD-S-2041** (Monaro Quarry 2041 Growth at 2.9%pa)
Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2041 Average Weekday 8:00am - 9:00am
With Maximum Project Trips to/from South
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]		[Total HV]					[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Monaro Hwy															
5	T1	All MCs	949	7.6	949	7.6	0.514	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	99.6
6	R2	All MCs	39	97.4	39	97.4	0.138	21.2	LOS B	0.4	7.2	0.54	0.84	0.54	40.5
Approach			988	11.2	988	11.2	0.514	0.9	NA	0.4	7.2	0.02	0.03	0.02	94.1
East: Quarry															
1	L2	All MCs	39	97.4	39	97.4	0.093	14.9	LOS B	0.4	6.4	0.42	1.04	0.42	33.3
2	R2	All MCs	1	0.0	1	0.0	0.093	12.4	LOS A	0.4	6.4	0.42	1.04	0.42	43.5
Approach			40	95.0	40	95.0	0.093	14.8	LOS B	0.4	6.4	0.42	1.04	0.42	33.5
North: Monaro Hwy															
3	L2	All MCs	1	0.0	1	0.0	0.001	3.4	LOS A	0.0	0.0	0.00	0.48	0.00	38.1
4	T1	All MCs	341	16.7	341	16.7	0.102	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach			342	16.6	342	16.6	0.102	0.0	NA	0.0	0.0	0.00	0.00	0.00	99.5
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.002	16.4	LOS B	0.0	0.1	0.68	0.76	0.68	44.3
Approach			1	0.0	1	0.0	0.002	16.4	LOS B	0.0	0.1	0.68	0.76	0.68	44.3
All Vehicles			1372	15.0	1372	15.0	0.514	1.1	NA	0.4	7.2	0.03	0.06	0.03	90.5

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [11] PM-AWD-N-2041** (Monaro Quarry 2041 Growth at 2.9%pa)
Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2041 Average Weekday 4:00pm - 5:00pm
With Maximum Project Trips to/from North
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Number Stop of Cycles Rate to Depart	Aver. Speed	
			[Total HV]		[Total HV]					[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m			km/h	
South: Monaro Hwy															
5	T1	All MCs	441	14.6	441	14.6	0.253	0.0	LOS A	0.0	0.0	0.00	0.00	99.9	
6	R2	All MCs	1	0.0	1	0.0	0.002	13.1	LOS A	0.0	0.0	0.55	0.67	44.6	
Approach			442	14.5	442	14.5	0.253	0.1	NA	0.0	0.0	0.00	0.00	99.6	
East: Quarry															
1	L2	All MCs	1	0.0	1	0.0	0.258	11.4	LOS A	0.9	16.7	0.77	1.13	34.8	
2	R2	All MCs	39	97.4	39	97.4	0.258	40.1	LOS C	0.9	16.7	0.77	1.13	28.9	
Approach			40	95.0	40	95.0	0.258	39.4	LOS C	0.9	16.7	0.77	1.13	29.0	
North: Monaro Hwy															
3	L2	All MCs	39	97.4	39	97.4	0.048	3.7	LOS A	0.0	0.0	0.00	0.43	0.00	37.6
4	T1	All MCs	854	5.7	854	5.7	0.233	0.0	LOS A	0.0	0.0	0.00	0.00	99.9	
Approach			893	9.7	893	9.7	0.233	0.2	NA	0.0	0.0	0.00	0.02	0.00	93.1
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.001	10.6	LOS A	0.0	0.0	0.48	0.77	0.48	48.1
Approach			1	0.0	1	0.0	0.001	10.6	LOS A	0.0	0.0	0.48	0.77	0.48	48.1
All Vehicles			1376	13.7	1376	13.7	0.258	1.3	NA	0.9	16.7	0.02	0.05	0.03	89.1

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [12] PM-AWD-S-2041** (Monaro Quarry 2041 Growth at 2.9%pa)
Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2041 Average Weekday 4:00pm - 5:00pm
With Maximum Project Trips to/from South
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance														
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Number Stop of Cycles to Depart	Aver. Speed
			[Total HV]	[Total HV]										
			veh/h	%	veh/h	%	v/c	sec		[Veh. veh	[Dist] m			km/h
South: Monaro Hwy														
5	T1	All MCs	441	14.6	441	14.6	0.253	0.0	LOS A	0.0	0.0	0.00	0.00	99.9
6	R2	All MCs	39	97.4	39	97.4	0.257	36.5	LOS C	0.7	13.8	0.78	0.95	35.4
Approach			480	21.3	480	21.3	0.257	3.0	NA	0.7	13.8	0.06	0.08	87.0
East: Quarry														
1	L2	All MCs	49	98.0	49	98.0	0.170	21.1	LOS B	0.7	13.3	0.60	1.06	31.2
2	R2	All MCs	1	0.0	1	0.0	0.170	13.2	LOS A	0.7	13.3	0.60	1.06	40.2
Approach			50	96.0	50	96.0	0.170	20.9	LOS B	0.7	13.3	0.60	1.06	31.3
North: Monaro Hwy														
3	L2	All MCs	1	0.0	1	0.0	0.001	3.4	LOS A	0.0	0.0	0.00	0.48	38.1
4	T1	All MCs	854	5.7	854	5.7	0.233	0.0	LOS A	0.0	0.0	0.00	0.00	99.9
Approach			855	5.7	855	5.7	0.233	0.0	NA	0.0	0.0	0.00	0.00	99.7
West: Dummy														
10	L2	All MCs	1	0.0	1	0.0	0.001	10.6	LOS A	0.0	0.0	0.48	0.77	48.1
Approach			1	0.0	1	0.0	0.001	10.6	LOS A	0.0	0.0	0.48	0.77	48.1
All Vehicles			1386	14.3	1386	14.3	0.257	1.8	NA	0.7	13.8	0.04	0.07	88.2

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [13] AM-SAT-N-2041** (Monaro Quarry 2041 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2041 Saturday 11:00am - Midday
With Maximum Project Trips to/from North
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				km/h
South: Monaro Hwy															
5	T1	All MCs	663	9.5	663	9.5	0.362	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.8
6	R2	All MCs	1	0.0	1	0.0	0.002	11.8	LOS A	0.0	0.0	0.48	0.65	0.48	45.4
Approach			664	9.5	664	9.5	0.362	0.1	NA	0.0	0.0	0.00	0.00	0.00	99.6
East: Quarry															
1	L2	All MCs	1	0.0	1	0.0	0.201	9.1	LOS A	0.7	12.5	0.69	1.09	0.72	36.9
2	R2	All MCs	39	97.4	39	97.4	0.201	35.9	LOS C	0.7	12.5	0.69	1.09	0.72	30.3
Approach			40	95.0	40	95.0	0.201	35.2	LOS C	0.7	12.5	0.69	1.09	0.72	30.4
North: Monaro Hwy															
3	L2	All MCs	39	97.4	39	97.4	0.048	3.7	LOS A	0.0	0.0	0.00	0.43	0.00	37.6
4	T1	All MCs	636	4.6	636	4.6	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach			675	10.0	675	10.0	0.171	0.2	NA	0.0	0.0	0.00	0.02	0.00	91.1
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.002	12.4	LOS A	0.0	0.1	0.58	0.74	0.58	46.9
Approach			1	0.0	1	0.0	0.002	12.4	LOS A	0.0	0.1	0.58	0.74	0.58	46.9
All Vehicles			1380	12.2	1380	12.2	0.362	1.2	NA	0.7	12.5	0.02	0.04	0.02	89.5

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [14] AM-SAT-S-2041** (Monaro Quarry 2041 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2041 Saturday 11:00am - Midday
With Maximum Project Trips to/from South
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]		[Total HV]					[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Monaro Hwy															
5	T1	All MCs	663	9.5	663	9.5	0.362	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.8
6	R2	All MCs	39	97.4	39	97.4	0.200	28.7	LOS C	0.6	10.4	0.70	0.90	0.71	37.7
Approach			702	14.4	702	14.4	0.362	1.6	NA	0.6	10.4	0.04	0.05	0.04	91.4
East: Quarry															
1	L2	All MCs	39	97.4	39	97.4	0.113	17.7	LOS B	0.4	8.1	0.52	1.04	0.52	32.3
2	R2	All MCs	1	0.0	1	0.0	0.113	11.3	LOS A	0.4	8.1	0.52	1.04	0.52	41.9
Approach			40	95.0	40	95.0	0.113	17.5	LOS B	0.4	8.1	0.52	1.04	0.52	32.5
North: Monaro Hwy															
3	L2	All MCs	1	0.0	1	0.0	0.001	3.4	LOS A	0.0	0.0	0.00	0.48	0.00	38.1
4	T1	All MCs	636	4.6	636	4.6	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach			637	4.6	637	4.6	0.171	0.0	NA	0.0	0.0	0.00	0.00	0.00	99.7
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.002	12.4	LOS A	0.0	0.1	0.58	0.74	0.58	46.9
Approach			1	0.0	1	0.0	0.002	12.4	LOS A	0.0	0.1	0.58	0.74	0.58	46.9
All Vehicles			1380	12.2	1380	12.2	0.362	1.4	NA	0.6	10.4	0.04	0.06	0.04	90.0

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [15] PM-SAT-N-2041** (Monaro Quarry 2041 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2041 Saturday 4:00pm - 5:00pm
With Maximum Project Trips to/from North
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	Dist]				km/h
South: Monaro Hwy															
5	T1	All MCs	575	8.8	575	8.8	0.312	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.8
6	R2	All MCs	1	0.0	1	0.0	0.002	12.3	LOS A	0.0	0.0	0.51	0.66	0.51	45.1
Approach			576	8.8	576	8.8	0.312	0.1	NA	0.0	0.0	0.00	0.00	0.00	99.6
East: Quarry															
1	L2	All MCs	1	0.0	1	0.0	0.222	9.9	LOS A	0.8	14.1	0.73	1.11	0.78	36.1
2	R2	All MCs	39	97.4	39	97.4	0.222	36.7	LOS C	0.8	14.1	0.73	1.11	0.78	29.8
Approach			40	95.0	40	95.0	0.222	36.1	LOS C	0.8	14.1	0.73	1.11	0.78	29.9
North: Monaro Hwy															
3	L2	All MCs	39	97.4	39	97.4	0.048	3.7	LOS A	0.0	0.0	0.00	0.43	0.00	37.6
4	T1	All MCs	737	3.3	737	3.3	0.195	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach			776	8.0	776	8.0	0.195	0.2	NA	0.0	0.0	0.00	0.02	0.00	92.2
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.002	11.5	LOS A	0.0	0.0	0.53	0.75	0.53	47.5
Approach			1	0.0	1	0.0	0.002	11.5	LOS A	0.0	0.0	0.53	0.75	0.53	47.5
All Vehicles			1393	10.8	1393	10.8	0.312	1.2	NA	0.8	14.1	0.02	0.04	0.02	89.5

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: [16] PM-SAT-S-2041** (Monaro Quarry 2041 Growth at 2.9% pa)

Output produced by SIDRA INTERSECTION Version: 10.0.3.210

2041 Saturday 4:00pm - 5:00pm
With Maximum Project Trips to/from South
Site Category: (None)
Stop (Two-Way)
Site Scenario: 1 | Local Volumes

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Qued	Eff. Stop Rate	Number of Cycles to Depart	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh.]	Dist]				km/h
South: Monaro Hwy															
5	T1	All MCs	575	8.8	575	8.8	0.312	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.8
6	R2	All MCs	39	97.4	39	97.4	0.222	31.6	LOS C	0.6	11.7	0.73	0.92	0.77	36.8
Approach			614	14.4	614	14.4	0.312	2.0	NA	0.6	11.7	0.05	0.06	0.05	90.0
East: Quarry															
1	L2	All MCs	39	97.4	39	97.4	0.120	18.7	LOS B	0.5	8.7	0.55	1.05	0.55	32.0
2	R2	All MCs	1	0.0	1	0.0	0.120	12.0	LOS A	0.5	8.7	0.55	1.05	0.55	41.3
Approach			40	95.0	40	95.0	0.120	18.5	LOS B	0.5	8.7	0.55	1.05	0.55	32.2
North: Monaro Hwy															
3	L2	All MCs	1	0.0	1	0.0	0.001	3.4	LOS A	0.0	0.0	0.00	0.48	0.00	38.1
4	T1	All MCs	737	3.3	737	3.3	0.195	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach			738	3.3	738	3.3	0.195	0.0	NA	0.0	0.0	0.00	0.00	0.00	99.7
West: Dummy															
10	L2	All MCs	1	0.0	1	0.0	0.002	11.5	LOS A	0.0	0.0	0.53	0.75	0.53	47.5
Approach			1	0.0	1	0.0	0.002	11.5	LOS A	0.0	0.0	0.53	0.75	0.53	47.5
All Vehicles			1393	10.8	1393	10.8	0.312	1.4	NA	0.6	11.7	0.04	0.06	0.04	89.9

Site Level of Service (LOS) Method: Delay (NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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