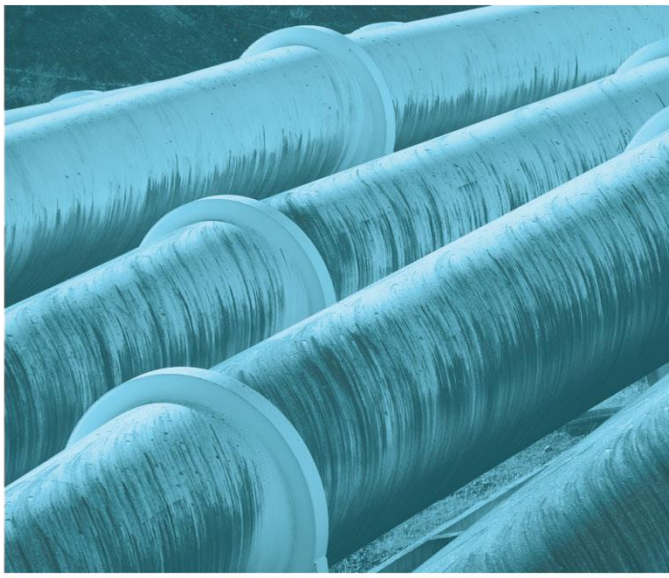
APPENDIX E - ADDENDUM TRAFFIC IMPACT ASSESSMENT

EMM
creating opportunities

Luddenham Advanced Resource Recovery Centre

Addendum Traffic Impact Assessment

Prepared for Coombes Property Group and KLF Holdings
April 2021



EMM
creating opportunities

EMM
creating opportunities

Servicing projects throughout Australia and internationally

SYDNEY
Ground floor, 20 Chandos Street
St Leonards NSW 2065
T 02 9493 9500

NEWCASTLE
Level 3, 175 Scott Street
Newcastle NSW 2300
T 02 4907 4800

BRISBANE
Level 1, 87 Wickham Terrace
Spring Hill QLD 4000
T 07 3648 1200

ADELAIDE
Level 1, 70 Pirie Street
Adelaide SA 5000
T 08 8232 2253

MELBOURNE
Ground floor, 188 Normanby Road
Southbank VIC 3006
T 03 9993 1900

PERTH
Level 6, 191 St Georges Terrace
Perth WA 6000

CANBERRA
PO Box 9148
Deakin ACT 2600

Luddenham Advanced Resource Recovery Centre

Addendum Traffic Impact Assessment

Prepared for Coombes Property Group and KLF Holdings
April 2021

EMM Sydney
Ground floor, 20 Chandos Street
St Leonards NSW 2065

T 02 9493 9500
E info@emmconsulting.com.au

www.emmconsulting.com.au

Luddenham Advanced Resource Recovery Centre

Addendum Traffic Impact Assessment

Report Number

J190749 RP53

Client

Coombes Property Group and KLF Holdings

Date

28 April 2021

Version

v2 Final

Prepared by

Eric Lei
Traffic Engineer
28 April 2021

Approved by

Abdullah Uddin
Associate Traffic Engineer
28 April 2021

This report has been prepared in accordance with the brief provided by the client and has relied upon the information collected at the time and under the conditions specified in the report. All findings, conclusions or recommendations contained in the report are based on the aforementioned circumstances. The report is for the use of the client and no responsibility will be taken for its use by other parties. The client may, at its discretion, use the report to inform regulators and the public.

© Reproduction of this report for educational or other non-commercial purposes is authorised without prior written permission from EMM provided the source is fully acknowledged. Reproduction of this report for resale or other commercial purposes is prohibited without EMM's prior written permission.

Table of Contents

1 Introduction 3

1.1 Background 3

1.2 Project overview 3

1.3 Project refinements 4

1.3.1 Revised transport strategy 4

1.3.2 Proposed road upgrades 6

1.3.3 Revised traffic numbers 7

1.3.4 ARRC layout refinements 8

1.4 Purpose and scope of this report 8

2 Traffic generation 10

2.1 Baseline traffic volumes 10

2.2 Traffic generation 10

2.3 Traffic distribution 12

2.4 Cumulative traffic 13

2.4.1 Quarry reactivation 13

2.4.2 Quarry infilling 13

2.4.3 Cumulative traffic 14

3 Impact assessment 16

3.1 Intersection performance 16

3.2 Mid-block capacity analysis 19

3.2.1 Road capacity 19

3.2.2 Adams Road mid-block traffic impact 20

3.3 Road safety 21

3.4 Internal traffic movements 22

3.5 Queuing analysis 22

4 Summary and conclusion 24

5 References 25

Attachments

Attachment A Summary of meeting with TfNSW and Council on 25 March 2021 A.26

Attachment B Intersection traffic survey B.27

Attachment C Updated STFM outputs C.28

Attachment D Swept paths D.29

Attachment E SIDRA results E.30

Tables

Table 2.1 A comparison of traffic generation between the EIS TIA and Addendum TIA 11

Table 2.2 Cumulative traffic generation 14

Table 3.1 Intersection LOS standards 16

Table 3.2 SIDRA modelling results for The Northern Road/Adams Road 17

Table 3.3 SIDRA modelling results for Elizabeth Drive/Adams Road 17

Table 3.4 SIDRA modelling results for Elizabeth Drive/Luddenham Road 18

Table 3.5 RMS (now TfNSW) roadway hourly capacity for a two-lane two-way rural road (70 km/h speed limit) 19

Table 3.6 Typical mid-block capacities for urban roads with interrupted flow 20

Table 3.7 Urban road peak hour lane flows per direction 20

Table 3.8 Adams Road mid-block traffic (2024) 21

Table 3.9 Adams Road mid-block traffic (2029) 21

Table 3.10 Daily traffic generation (2029) 22

Table 3.11 Queuing analysis 23

Figures

Figure 1.1 Revised transport strategy 5

Figure 1.2 Upgrade to Elizabeth Drive/Adams Road intersection 7

Figure 2.1 2024 baseline traffic volumes 10

Figure 2.2 2029 baseline traffic volumes 10

Figure 2.3 Additional ARRC traffic generation in 2024 12

Figure 2.4 Additional ARRC traffic generation in 2029 12

Figure 2.5 Quarry traffic generation in 2024 13

Figure 2.6 Quarry rehabilitation traffic generation in 2029 14

Figure 2.7 Development with cumulative traffic generation in 2024 15

Figure 2.8 Development with cumulative traffic generation in 2029 15

1 Introduction

1.1 Background

In late 2019, CFT No 13 Pty Ltd, a member of Coombes Property Group (CPG), acquired the property at 275 Adams Road, Luddenham New South Wales (NSW) (Lot 3 in DP 623799, 'the subject property') within the Liverpool City Council municipality. The subject property is host to an existing shale/clay quarry.

CPG in partnership with KLF (the applicants) are seeking to construct and operate an advanced resource recovery centre (the ARRC) on the subject property (the project). The project is classed as a State Significant Development (SSD) under the State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP).

A traffic impact assessment (TIA) was prepared by EMM Consulting Pty Limited (EMM) to support the Environmental Impact Statement (EIS) for the project. The TIA addressed the Secretary's Environmental Assessment Requirements (SEARs) and assessed the potential traffic impacts associated with the project.

Since the submission of the EIS, refinements have been made to the project in response to further detailed design, submissions received on the EIS and in response to further consultation with government agencies. A Submissions Report that responds to submissions made by agencies, organisations, and the community, has been prepared by EMM. The Submissions Report also describes the additional activities undertaken relating to the project since exhibition of the EIS, including a summary of project refinements, further technical studies undertaken, and stakeholder and community engagement activities.

This Addendum TIA forms part of the Submissions Report and has been prepared to assess the potential traffic and transport impacts of the refined project.

Separate to the ARRC project, the applicants have submitted an application to modify the existing quarry consent to allow quarry operations on the subject property to recommence (Modification 5, also referred to as MOD 5). This application is currently being assessed by DPIE. The applicants also intend to lodge a future modification application to modify the quarry consent to allow infilling of the quarry void with non-recyclable construction and demolition waste from the ARRC. Pending approval of MOD 5 and the future modification application, quarry extraction will be carried out concurrently to ARRC construction and operation until December 2024 after which time quarry infill will be carried out concurrently to the ARRC operations until such time as the quarry void is filled and rehabilitated ready for final agribusiness land use.

1.2 Project overview

A detailed description of the project was provided in Chapter 2 of the EIS (EMM 2020a). The key components of the ARRC project are as follows:

- construction and operation of an advanced construction and demolition resource recovery centre;
- accepting and processing up to 600,000 tonnes per annum (tpa) of waste for recycling;
- despatch of approximately 540,000 tpa of recycled product;
- despatch of approximately 60,000 tpa of unrecyclable material either to an offsite licensed waste facility or to the adjacent quarry void (the later will be subject to separate approval);
- upgrade of the access road from the subject property to Adams Road;

- use of the access road from the subject property to Adams Road;
- the ARRC will not accept putrescibles, liquid or hazardous waste; and
- the ARRC will operate up to 24 hours a day, 7 days per week.

1.3 Project refinements

Refinements to the project as described in Chapter 2 of the EIS are detailed in Section 3.1 of the Submissions Report. The traffic-related refinements relevant to this Addendum report are summarised below.

1.3.1 Revised transport strategy

The ARRC is centrally located and will service demand for resource recovery services from existing and developing areas in Western Sydney and the Aerotropolis. Access to the ARRC is required from the north via Elizabeth Drive to provide recycling services to developed areas to the north and east. Access is also required from the south via The Northern Road to service developed areas and developing areas in the Aerotropolis, including the Aerotropolis Core to the south.

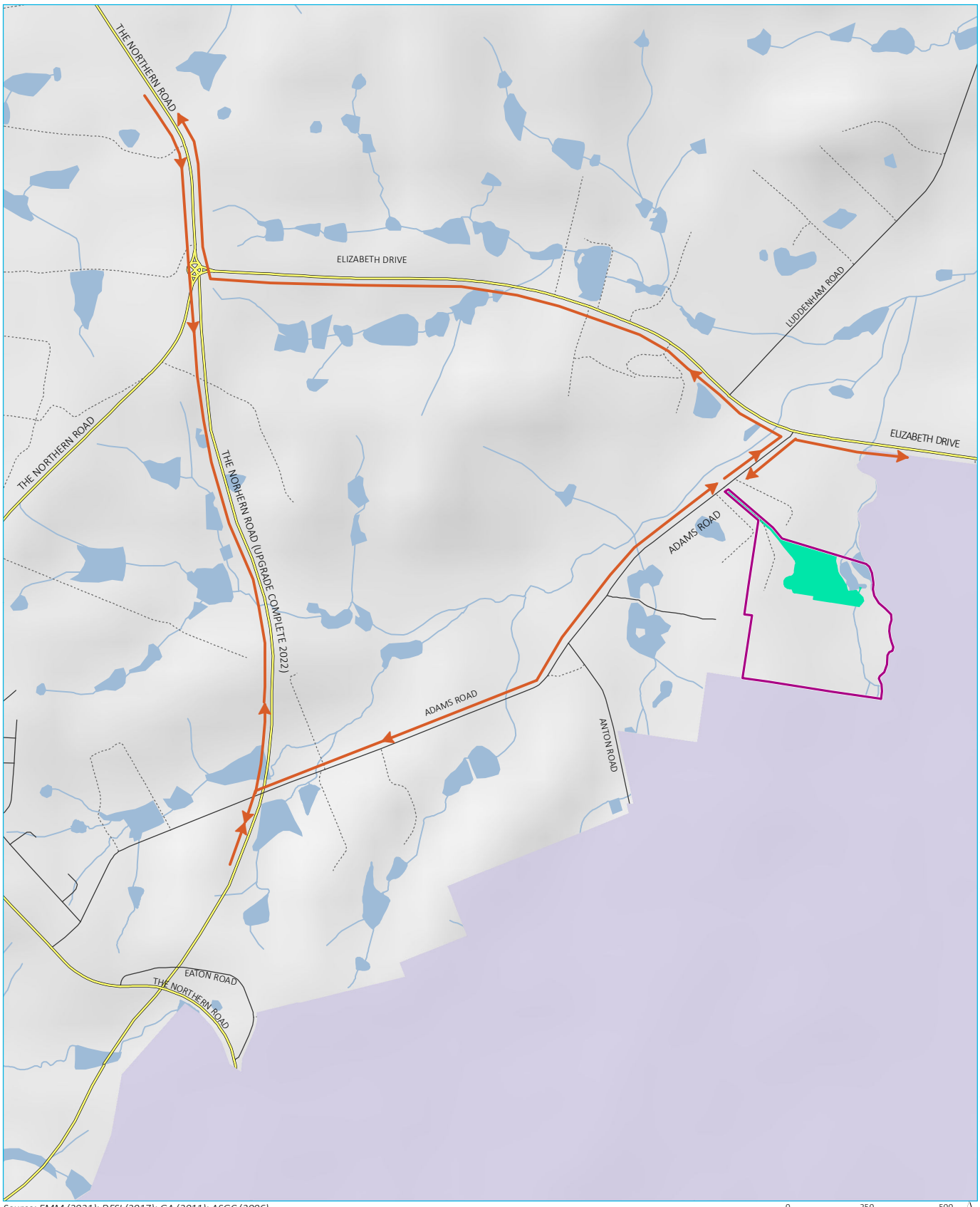
The TIA (EMM 2020b) prepared for the EIS (EIS TIA) presented two traffic distribution scenarios for the ARRC development. The first traffic distribution scenario considered all ARRC-related heavy vehicles (that are greater 3 tonnes) accessing the ARRC from Elizabeth Drive. This scenario assumed the existing load limit on Adams Road would remain south of the site access pending future upgrades. The second traffic distribution scenario considered ARRC-related heavy vehicles accessing the ARRC with an even distribution from Elizabeth Drive and The Northern Road following the upgrade and subsequent lifting of the load limit of Adams Road south of the site access.

Consultation with TfNSW and Liverpool City Council has continued since the submission of the EIS. TfNSW raised safety concerns in relation to the right hand turn for heavy vehicles into Adams Road from Elizabeth Drive.

In response to TfNSW's concerns, CPG and KLF have updated their approach to ARRC access and have developed a revised transport strategy for the ARRC. The revised transport strategy was discussed at a meeting with TfNSW, Liverpool City Council and the Department of Planning, Industry and Environment on 25 March 2021. A summary of the meeting outcomes is presented in Attachment A.

The revised strategy is shown in Figure 3.1 and proposes heavy vehicle and light vehicle access the ARRC via Elizabeth Drive with the exception that no vehicles will access the site via Elizabeth Drive west. Access would also be provided via The Northern Road. Lifting the load limit on Adams Road south of the site would be enabled by CPG and KLF upgrading the pavement between the site access and Anton Road and upgrading the pavement between south of Anton Road by other parties.

The existing culvert on Elizabeth Drive directly west of the Elizabeth Drive/Adams Road intersection is a constraint to providing a right-hand turn treatment capable of meeting Austroads standards. Accordingly, the right-hand turn movement from Elizabeth Drive into Adams Road will be restricted for ARRC development traffic. The intersection will be upgraded by CPG and KLF to improve the other turn movements (left turn into Adams Road, and left and right turns out of Adams Road).



Source: EMM (2021); DFSI (2017); GA (2011); ASGC (2006)

0 250 500 m

GDA 1994 MGA Zone 56

N

\\emmsvr1\EMM\Jobs\2019\J190749 - CPG Luddenham Quarry\GIS\02_Maps\SSD_Recycling_Facility\Traffic\Road_upgrades\RU003_SDDUpgradesOverview_20210408_05.mxd 8/04/2021

KEY

- Study area
- Proposed transport strategy
- Western Sydney airport
- ARRC impact area
- Waterbody
- Major road
- Minor road
- Track
- Watercourse/drainage line

Proposed transport strategy

Luddenham Advanced Resource Recovery Centre
Addendum TIA
Figure 1.1

EMM creating opportunities

1.3.2 Proposed road upgrades

The proposed transport strategy will require the following upgrades:

- Upgrade of turn treatments at the Elizabeth Drive/Adams Road intersection and restriction of the right-hand turn from Elizabeth Drive west into Adams Road as follows (refer proposed layout in Figure 1.2 and preliminary concept sketch in Attachment D):
  - provision of a 90 m deceleration left-hand turn lane into Adams Road to meet the Austroads guidelines;
  - provision of short left hand turn lane on Adams Road into Elizabeth Drive to minimise queueing on Adams Road;
  - widening of existing Elizabeth Drive/Adams Road intersection to accommodate B-double swept paths; and
  - prohibiting the right-hand turn from Elizabeth Drive west into Adams Road for all inbound vehicles – requiring these vehicles to access the ARRC using The Northern Road and the Adams Road south of the ARRC.
- Pavement upgrades on Adams Road between Elizabeth Drive and Anton Road to enable the existing 3-tonne load limit to be lifted. It is noted pavement upgrades will likely be carried out between the site access and Elizabeth Drive as part of the quarry reactivation (MOD 5). Pavement upgrades on Adams Road between The Northern Road and Anton Road will be carried out as part of road upgrades required for the Western Sydney Airport (WSA).
- Road widening will also be required at the site access/Adams Road intersection to allow B-doubles to turn into the ARRC site without encroachment.

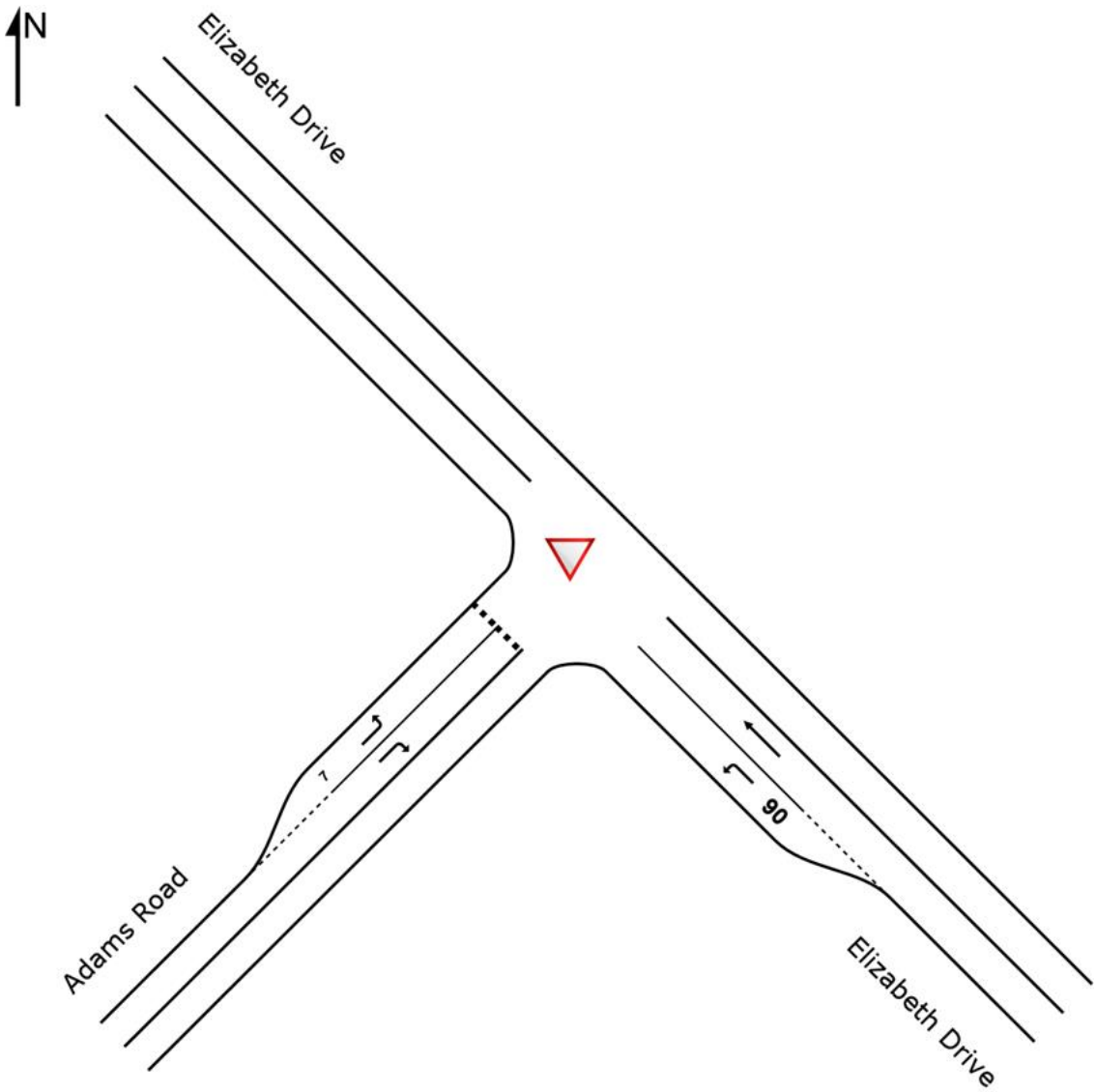


Figure 1.2 Upgrade to Elizabeth Drive/Adams Road intersection

1.3.3 Revised traffic numbers

The TIA assumed extremely conservative incoming average load of 4.4 t based on weighbridge records from KLF's Camellia recycling facility which accepts waste from existing residential and commercial areas. The ARRC will accept some loads from similar sources to KLF's Camellia recycling facility. However, it is expected to accept a far larger portion of waste in large trucks (eg truck and dogs) from industrial, commercial and major infrastructure construction/demolition projects in the rapidly developing areas around the ARRC.

The traffic assumptions were inconsistently reported in the TIA and Section 2.2.3 of the EIS project description.

The EIS project description outlined the following, more realistic assumptions regarding incoming waste:

- approximately 150,000–200,000 tpa bulk waste transfer from other facilities within the KLF group and other recycling facilities that do not have the ability to recycle to level that will be achieved by the ARRC (assumed to arrive in 30 t loads);

- approximately 100,000–200,000 tpa waste from construction, industrial and commercial sites logistically close to the ARRC (conservatively assumed to arrive in 4.4 t loads);
- approximately 100,000–200,000 tpa bulk general solid waste/excavated materials from projects logistically close to the facility (assumed to arrive in 30 t loads).

This Addendum TIA accounts for these more realistic operational assumptions (refer Section 2.2).

1.3.4 ARRC layout refinements

Minor refinements to the ARRC layout and design have also been made in response to submissions received and further conceptual design. Refinements to the ARRC layout relevant to this Addendum include:

- the addition of another inbound weighbridge to remove the potential for queuing to occur on the internal ARRC access road;
- a change to the direction that heavy vehicles dispatching products will travel through the ARRC warehouse (refer to Section 3.4 and swept paths contained in Attachment D);
- minor refinements to the location of ARRC warehouse entry and exit points to accommodate the safe movement of B-doubles through the ARRC site (refer swept paths contained in Attachment D); and
- minor refinements to the layout and access arrangements of the light vehicle carpark to meet car park compliance with the relevant Australian standards.

1.4 Purpose and scope of this report

This Addendum TIA has been prepared to assess the potential traffic and transport impacts of the refined project including consideration of the revised ARRC transport strategy, revised traffic numbers, proposed road upgrades and traffic movements within the ARRC.

At the request of TfNSW, this Addendum TIA uses the latest TfNSW Strategic Travel Forecasting Model (STFM) outputs for the AM and PM peak periods. TfNSW provided updated STFM outputs for traffic volumes on Elizabeth Drive, Luddenham Road and Adams Road north of the site access in February 2021 and STFM outputs for traffic volumes on The Northern Road and Adams Road south of the site access in March 2021.

This Addendum TIA provides an update on the EIS TIA by considering the updated STFM outputs and the updated ARRC development traffic. This Addendum also includes a cumulative assessment of other developments on the subject property, namely the quarry reactivation and quarry rehabilitation at the site.

Two scenarios are considered in this Addendum for the future years 2024 and 2029:

- baseline traffic cases – including surveyed/STFM adjusted traffic; and
- cumulative subject property development traffic cases – including baseline traffic, ARRC development traffic and
    - for 2024, the quarry reactivation traffic; and
    - for 2029, the quarry rehabilitation traffic.

The existing intersection operations as outlined in the EIS TIA are unchanged and therefore not reproduced in this Addendum. For the future years, 2024, 2029, the surveyed 2020 traffic volumes have been adjusted by using the

STFM traffic model. The surveyed traffic volumes and the STFM outputs are presented in Attachment B and Attachment C respectively.

This Addendum addresses the years 2024 and 2029 scenarios due to the uncertainties regarding the future road network and traffic volumes beyond 2029.

2 Traffic generation

2.1 Baseline traffic volumes

The 2024 and 2029 peak hourly baseline traffic volumes are presented in Figure 2.1 and Figure 2.2 respectively.

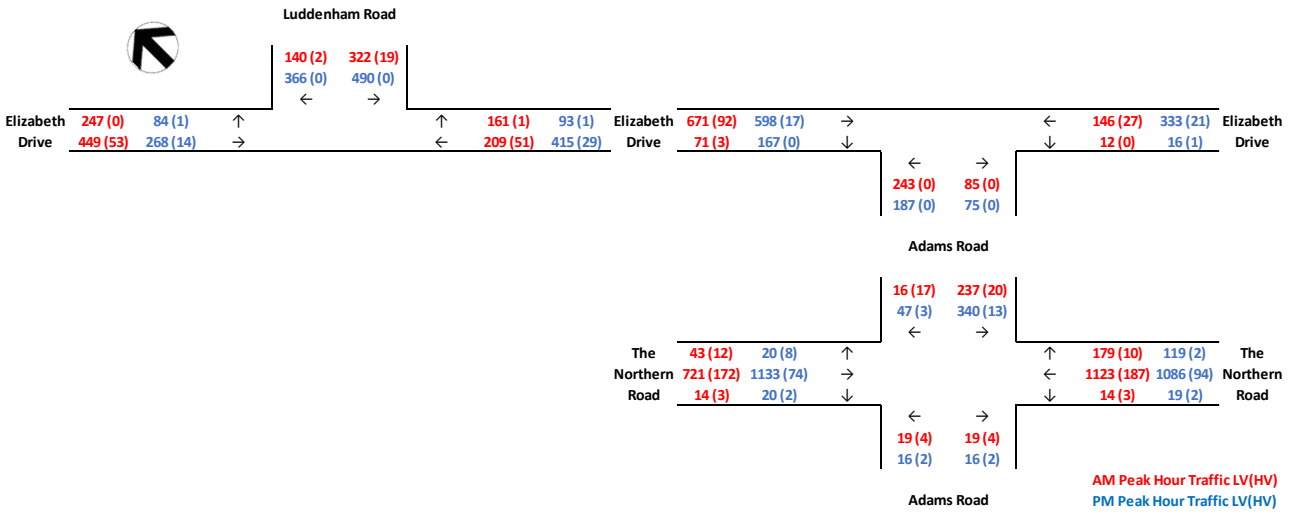


Figure 2.1 2024 baseline traffic volumes

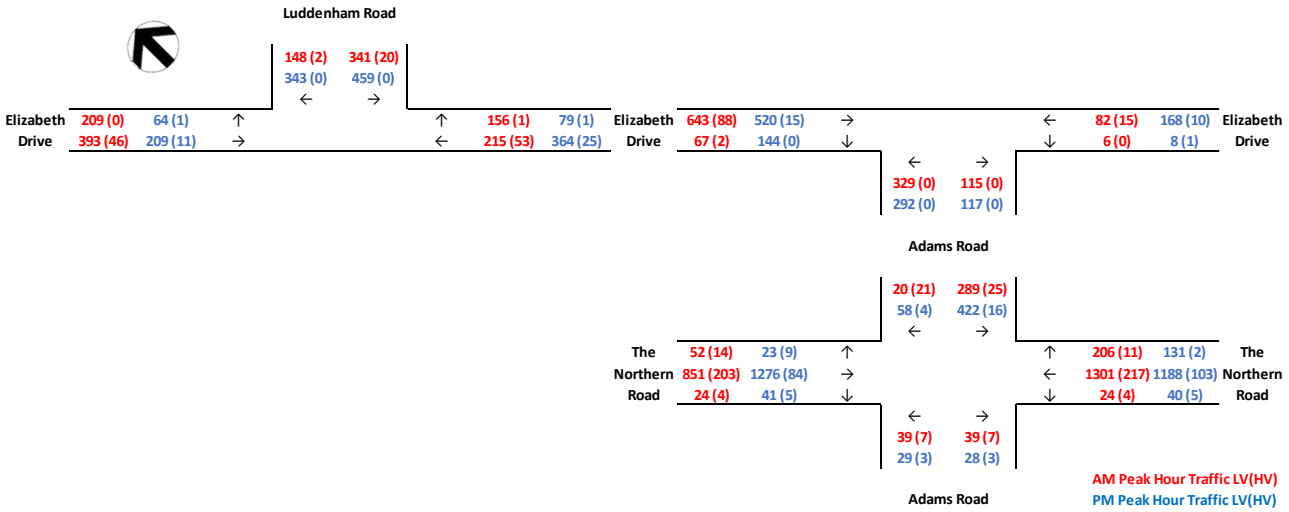


Figure 2.2 2029 baseline traffic volumes

2.2 Traffic generation

As noted in Section 1.3.3, this Addendum accounts for more realistic operational assumptions regarding incoming waste. Specifically, the assumption that 400,000 tpa of waste will arrive via 30 t loads (on average) and 200,000 tpa will arrive by 4.4 t loads (on average).

While light vehicles (ie utility vehicles, cars and trailers) will access the ARRC and will be accommodated within the designated hand unloading area, the numbers of these vehicles are likely to be low due to the ARRC's strategic

location at the vicinity of existing and developing commercial and industrial areas, rather than small scale residential developments.

KLF's operational experiences at its other facilities also note a generally low patronage of light vehicles. Around 10 light vehicles a day are expected to deliver waste which equates to 1 light vehicle per hour. In addition, there will be around 42 light vehicle movements a day associated with ARRC staff and visitors (ie sales representatives).

While it is proposed to operate the ARRC seven days per week, the number of active days in a year has be updated to 300 days (six days per week, minus public holidays) from 252 days in the EIS TIA as this is believed to better represent the split between weekday and weekend traffic.

A comparison of the development traffic assumed in the EIS TIA and in this Addendum is presented in Table 2.1.

Table 2.1 A comparison of traffic generation between the EIS TIA and Addendum TIA

Assumptions	EIS TIA	Addendum TIA
Active days per year	252	300
Incoming waste truck loading capacity		
-400,000 tpa	4.4 t	30 t
-200,000 tpa	4.4 t	4.4 t
Outgoing waste truck loading capacity		
-600,000 tpa	33.5 t	30 t
Daily heavy vehicle traffic movements	1,224	525
AM peak hourly heavy vehicle traffic movements	184	79
PM peak hourly heavy vehicle traffic movements	62	27
Daily light vehicle traffic movements	84	104
AM peak hourly light vehicle traffic movements	42	44
PM peak hourly light vehicle traffic movements	0	2

The ARRC's maximum light and heavy vehicle traffic generation is presented in Table 2.1 However, there will be a reduction in the heavy vehicle traffic numbers in 2024 and 2029 scenarios as follows:

- in 2024 which is the ramp up period, the ARRC is expected to accept up to 300,000 tpa, with the following heavy vehicle traffic generation:
  - daily heavy vehicle traffic movements of 263 movements;
  - AM peak hourly heavy vehicle traffic movements of 40 movements;
  - PM peak hourly heavy vehicle traffic movements of 14 movements;
- in 2029 when quarry rehabilitation is in progress, approximately 10% of the products being unrecyclable materials will be landfilled at the quarry site, where there will only be 540,000 tpa outgoing waste with the following heavy vehicle traffic generation:
  - daily heavy vehicle traffic movements of 512 movements;
  - AM peak hourly heavy vehicle traffic movements of 77 movements; and

- PM peak hourly heavy vehicle traffic movements of 26 movements.

The staff and visitor arrivals to the site are assumed to coincide with the AM peak hour. There will also be 2 light vehicle movements (1 inbound and 1 outbound) per hour throughout the day delivering waste to and from the site.

The AM peak hourly heavy vehicle movements (79 movements) presented in Table 2.1 are made up of 29.4 trucks delivering waste and 10 trucks dispatching waste, totalling 39.4 trucks or 79 movements.

2.3 Traffic distribution

The revised transport strategy is shown in Figure 1.1. As noted in Section 1.3.1,the light and heavy vehicle right turn movements from Elizabeth Drive into Adams Road will be restricted and instead vehicles originating north-west of the site will approach the site via The Northern Road/Adams Road intersection.

Figure 2.3 and Figure 2.4 present the ARRC-related peak hour traffic distribution in 2024 and 2029 respectively.

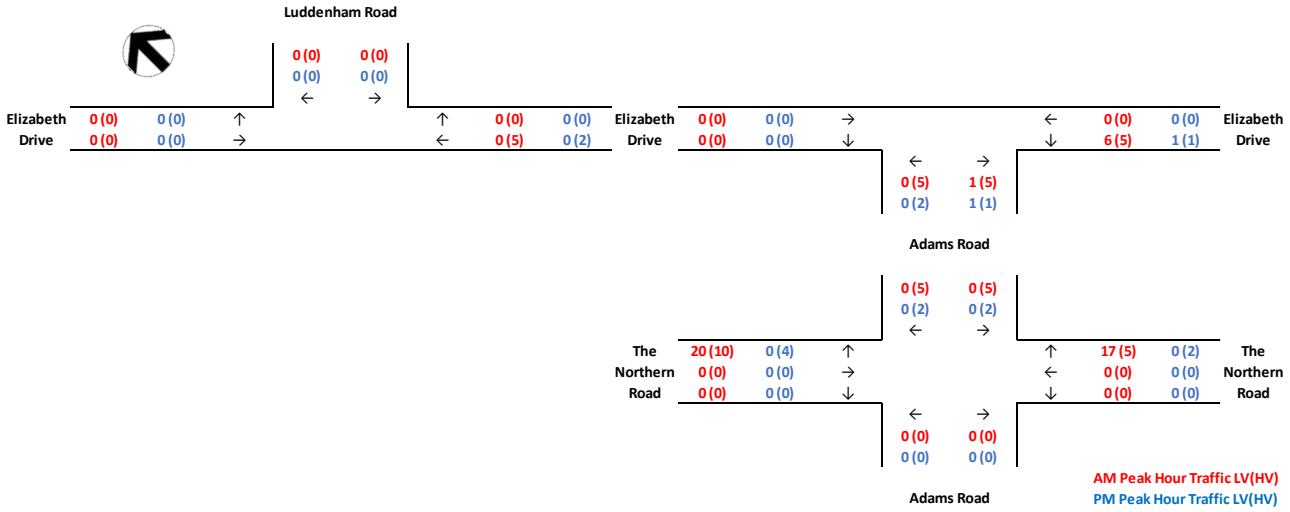


Figure 2.3 Additional ARRC traffic generation in 2024

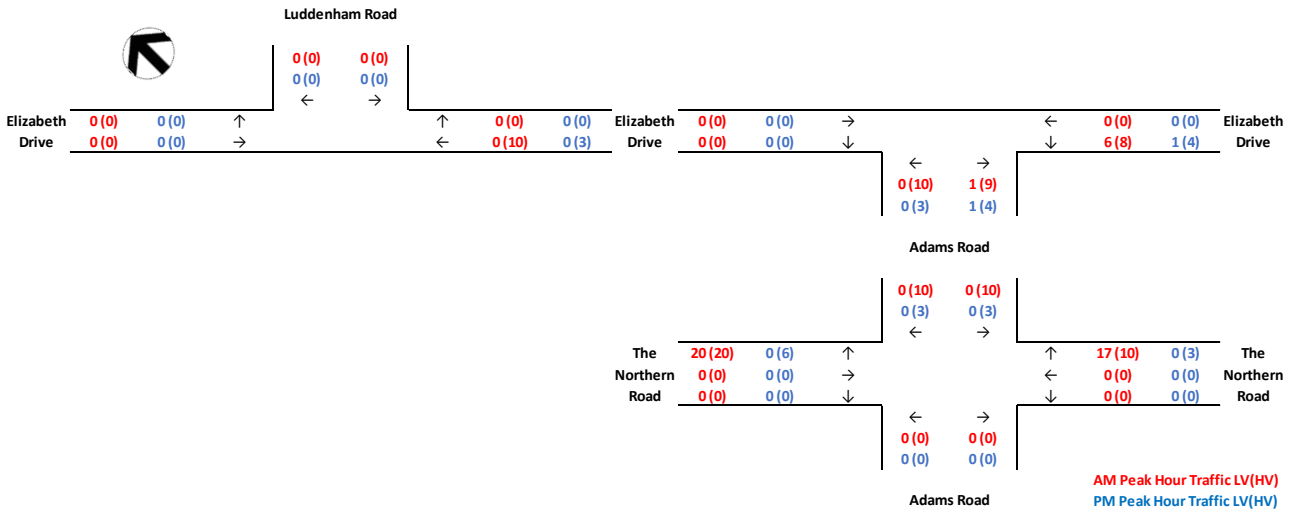


Figure 2.4 Additional ARRC traffic generation in 2029

2.4 Cumulative traffic

2.4.1 Quarry reactivation

Following the reactivation of the quarry (MOD 5), up to 100 heavy vehicle movements per day with a peak of 10 heavy vehicle movements per hour will access the quarry. All MOD 5 heavy vehicle traffic will approach and depart via Elizabeth Drive east (north of the site access). Light vehicles approaching the site from the west will all be via The Northern Road. Quarry operations will cease in December 2024 as per the existing quarry consent. Quarry traffic in 2024 is presented in Figure 2.5

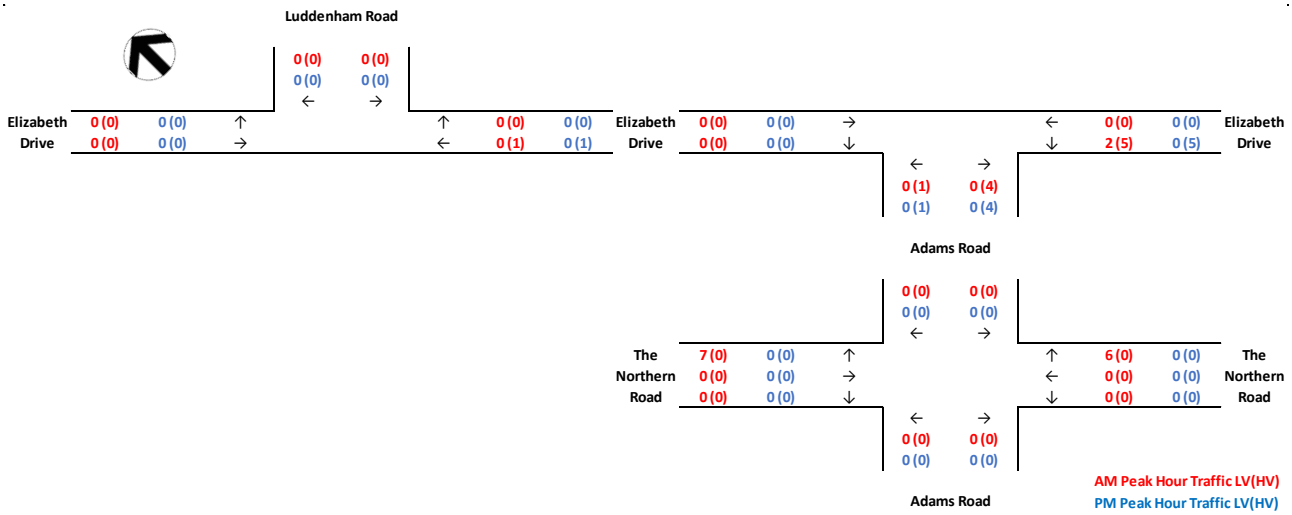


Figure 2.5 Quarry traffic generation in 2024

2.4.2 Quarry infilling

As noted in Section 1.1, the applicants also intend to lodge a future modification application to modify the quarry consent to allow infilling of the quarry void with non-recyclable construction and demolition waste from the ARRC. Assuming approval of the future modification application, quarry infilling will be carried out concurrently to the ARRC operations from 2025 until such time as the quarry void is filled and rehabilitated ready for final agribusiness land use.

It has been assumed that quarry rehabilitation will require 150,000 tpa of material in addition to the non-recyclable residues from the ARRC. Assuming 300 active days in a year and load arriving in 30 t trucks, the process will generate 33 daily truck movements, or 4 truck movements in the peak hours.

The expected traffic distribution of quarry infilling in 2029 is shown in Figure 2.6. As per the revised transport strategy, quarry rehabilitation traffic originating from the west will access the subject property via The Northern Road and Adams Road south of the site access rather than Elizabeth Drive west.

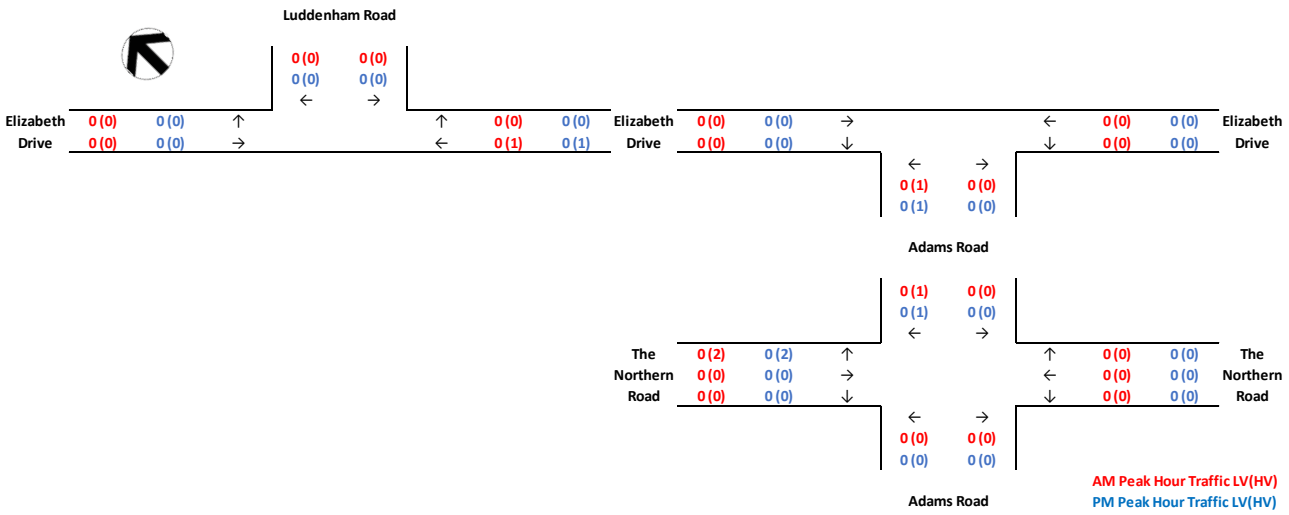


Figure 2.6 Quarry rehabilitation traffic generation in 2029

2.4.3 Cumulative traffic

Cumulative traffic numbers have been derived by combining the baseline TfNSW volumes with the ARRC traffic generation, quarry reactivation (2024) and quarry infilling (2029). Table 2.2 presents the ARRC and the cumulative traffic generation in 2024 and in 2029.

Table 2.2 Cumulative traffic generation

Year	Development	Vehicle type	Daily movements	AM peak hourly movements	PM peak hourly movements
2024	ARRC	Light vehicles	104	44	2
		Heavy vehicles	263	40	14
	Quarry reactivation	Light vehicles	30	15	0
		Heavy vehicles	100	10	10
2029	ARRC	Light vehicles	104	44	2
		Heavy vehicles	512	77	26
	Quarry infilling	Light vehicles	0	0	0
		Heavy vehicles	33	4	4

Cumulative traffic volumes are shown in 2024 and 2029 in Figure 2.7 and Figure 2.8 respectively.

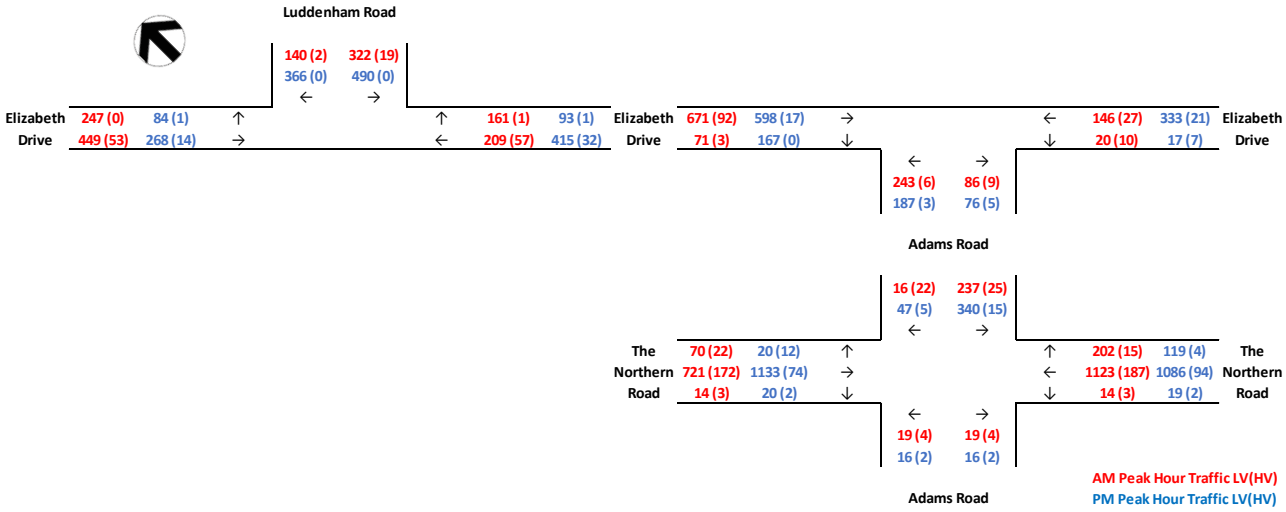


Figure 2.7 Development with cumulative traffic generation in 2024

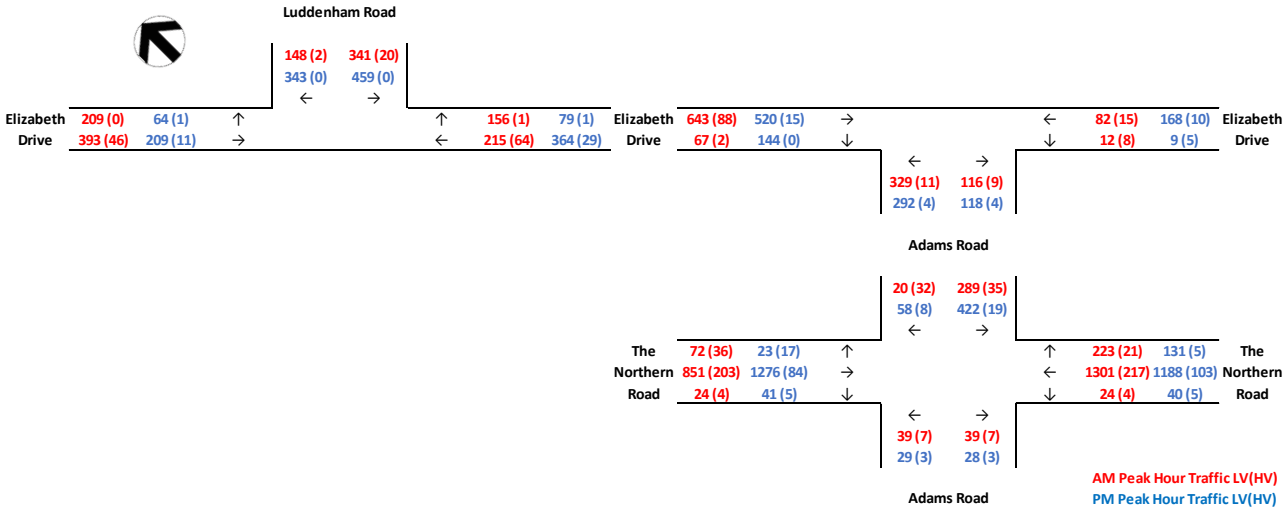


Figure 2.8 Development with cumulative traffic generation in 2029

3 Impact assessment

3.1 Intersection performance

The key intersections have been modelled with the SIDRA Intersection 9.0 software; a micro-analytical tool for individual intersections and linked intersection-network modelling. The modelling is based on the traffic survey data detailed in Section 2. SIDRA provides the following performance indicators:

- Degree of saturation (DOS) – the total usage of the intersection expressed as a factor of 1 with 1 representing 100% use/saturation (eg 0.8 = 80% saturation);
- Average delay (DEL) – the average delay in seconds encountered by all vehicles passing through the intersection. It is often important to review the average delay of each approach as a side road could have a long delay time, while the large free flowing major traffic will provide an overall low average delay;
- Level of service (LOS) – this is a categorisation of average delay, intended for simple reference; and
- 95% queue lengths (Q95) – is defined to be the queue length in metres that has only a 5% probability of being exceeded during the analysed time period. It transforms the average delay into measurable distance units.

The LOS is a good indicator of overall performance for individual intersections, with each level summarised in Table 6.1.

Table 3.1 Intersection LOS standards

Level of service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Priority intersection ('Stop' and 'Give Way')
A	<14	Good operation	Good operations
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	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity. At traffic signals, incidents will cause extensive delays. Roundabouts require other control mode.	At capacity; required other control mode
F	>71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; required other control mode

Source: *RTA Guide to Traffic Generating Development* (RTA 2002)

The SIDRA results for the key affected intersections are presented in the following tables.

Table 3.2 SIDRA modelling results for The Northern Road/Adams Road

Control/ Scenarios	AM Peak					PM Peak				
Signalised	**Traffic volume**	**DEL [seconds] (movement)**	**LOS**	**DOS**	**Q95 [m] (approach)**	**Traffic volume**	**DEL [seconds] (movement)**	**LOS**	**DOS**	**Q95 [m] (approach)**
2024 baseline traffic	2,969	32.4 (overall)	C	0.904	218.4 (south)	3,181	34.2 (overall)	C	0.916	274.4 (north)
2024 dev with cumulative traffic	3,048	32.3 (overall)	C	0.904	218.4 (south)	3,192	34.3 (overall)	C	0.916	274.4 (north)
2029 baseline traffic	3,539	32.2 (overall)	C	0.861	332.9 (south)	3,657	35.5 (overall)	C	0.902	319.9 (north)
2029 dev with cumulative traffic	3,634	33.9 (overall)	C	0.866	339.5 (south)	3,676	33.8 (overall)	C	0.922	305.8 (north)

Key findings:

- the intersection will operate at LOS C in the AM and PM peak hours in 2024 and 2029, with or without the development and cumulative traffic;
- with development and cumulative traffic, the intersection will operate close to capacity but the impact of the development traffic is marginal; and
- the longest queues will occur on The Northern Road, on the south approach during the AM peak hour and on the north approach during the PM peak hour.

Table 3.3 SIDRA modelling results for Elizabeth Drive/Adams Road

Control/ Scenarios	AM Peak					PM Peak				
Priority controlled	**Traffic volume**	**DEL [seconds] (movement)**	**LOS**	**DOS**	**Q95 [m] (approach)**	**Traffic volume**	**DEL [seconds] (movement)**	**LOS**	**DOS**	**Q95 [m] (approach)**
2024 baseline traffic	1,421	13.5 (RT from southwest approach)	A	0.482	7.7 (northwest)	1,489	14.2 (RT from southwest approach)	A	0.472	20.7 (northwest)
2024 dev with cumulative traffic	1,457	15.2 (RT from southwest approach)	B	0.483	8.5 (northwest)	1,506	15.3 (RT from southwest approach)	B	0.473	21.1 (northwest)
2029 baseline traffic	1,418	12.3 (RT from southwest approach)	A	0.456	5.9 (southwest)	1,342	11.0 (RT from southwest approach)	A	0.386	10.1 (northwest)

Table 3.3 SIDRA modelling results for Elizabeth Drive/Adams Road

Control/ Scenarios	AM Peak					PM Peak				
2029 dev with cumulative traffic	1,455	13.3 (RT from southwest approach)	B	0.456	6.3 (southwest)	1,357	11.4 (RT from southwest approach)	A	0.387	10.2 (northwest)

Key findings:

- all approaches (including the right turn movement from Adams Road) will operate at LOS A in the AM and PM peak hours in 2024 and 2029 without the development and cumulative traffic;
- with development and cumulative traffic, all approaches will operate at LOS B or better in the AM and PM peak hours with ample of spare capacity (56%) to accommodate additional traffic; and
- the longest queues (up to 21.1 m) will occur in the northwest approach (Elizabeth Drive west) in the AM and PM peak hours in 2024. In 2029, the longest queues will occur in the southwest and northwest approach in the AM and PM peak hours respectively.

Table 3.4 SIDRA modelling results for Elizabeth Drive/Luddenham Road

Control/ Scenarios	AM Peak					PM Peak				
Priority controlled	Traffic volume	DEL [seconds] (movement)	LOS	DOS	Q95 [m] (approach)	Traffic volume	DEL [seconds] (movement)	LOS	DOS	Q95 [m] (approach)
2024 baseline traffic	1,741	18.5 (RT from northeast approach)	B	0.416	16.5 (northeast)	1,854	21.4 (RT from northeast approach)	B	0.780	40.6 (northeast)
2024 dev with cumulative traffic	1,747	18.7 (RT from northeast approach)	B	0.421	16.5 (northeast)	1,857	21.7 (RT from northeast approach)	B	0.785	41.2 (northeast)
2029 baseline traffic	1,667	16.5 (RT from northeast approach)	B	0.391	16.1 (northeast)	1,638	15.1 (RT from northeast approach)	B	0.607	25.4 (northeast)
2029 dev with cumulative traffic	1,679	16.8 (RT from northeast approach)	B	0.393	16.1 (northeast)	1,642	15.3 (RT from northeast approach)	B	0.612	25.7 (northeast)

Key findings:

- all approaches (including the right turn movement from Luddenham Road) will operate at LOS B or better in the AM and PM peak hours in 2024 and 2029, with or without the development and cumulative traffic;
- even with development and cumulative traffic, the intersection will still have 20% spare capacity to accommodate additional traffic; and

- the longest queues (up to 41.2 m) will occur in the northeast approach for the right turning vehicles from Luddenham Road to Elizabeth Drive during the AM and PM peak hours.

Details of the SIDRA results are presented in Attachment E.

3.2 Mid-block capacity analysis

The mid-block levels of service on rural and urban roads are assessed based on a vehicle's average travel speed. At low traffic volumes and under ideal conditions, drivers are able to travel at their desired speed without interference. As traffic volumes increase, and as roadway, terrain and traffic conditions become less than ideal, drivers are affected by the presence of other vehicles on the road and bunches form in the traffic stream.

Elizabeth Drive and The Northern Road are state arterial roads which carry regional traffic. These two roads are currently either being upgraded or planning to be upgraded (Department of Planning, Industry, and Environment 2019), which should have adequate mid-block capacities. The project-related traffic generation will only contribute a small proportion to their baseline traffic volumes. Therefore, in this report the mid-block capacity analysis has only been conducted for Adams Road.

Adams Road is currently a rural road with low to moderate traffic volumes. However, the road will become more urbanised following the development of the Western Sydney Airport. Therefore, for the year 2024 traffic scenarios, mid-block capacity analysis is undertaken as a rural road and for the future 2029 scenarios, the capacity analysis is undertaken as an urbanised road.

3.2.1 Road capacity

i Existing rural nature (2024)

Table 4.5 of *Guide to Traffic Generating Developments* (RTA 2002) provides the two-way hourly traffic capacities (ie number of vehicles per hour) for two-lane roads for different Levels of Service with a design speed of 100 km/h based on different terrain types. The capacities assume 60% of traffic is travelling in one direction and 40% is travelling in the other direction. For an 80 km/h design speed, the capacities are between 85–95% of the capacity for a 100 km/h design speed.

The existing posted speed limit along Adams Road is 70 km/h which indicates a design speed of 80 km/h, as the design speed is generally 10 km/h higher than operating speed. Thus, the capacity of Adams Road is 90% of the capacity for a 100 km/h design speed.

The capacities for each LOS transition (ie the combined number of vehicles travelling in both directions at where the LOS decreases) are provided in Table 3.5.

Table 3.5 RMS (now TfNSW) roadway hourly capacity for a two-lane two-way rural road (70 km/h speed limit)

Terrain	Level of service transition	Effect of percentage of heavy vehicles (in traffic flow)			
		0%	5%	10%	15%
Level	A/B*	284	266	252	239
	B/C	567	531	504	477
	C/D	927	873	828	783

D/E	1,467	1,395	1,332	1,269
E/F	2,367	2,250	2,151	2,061

Notes: *Assumed to be 50% of upper limit of B/C LOS.

ii Future urban nature (2029)

The Austroads *Guide to Traffic Management Part 3: Traffic Studies and Analysis* (Austroads 2016) provides typical mid-block capacities for various types of urban roads. These are provided in Table 3.6.

Table 3.6 Typical mid-block capacities for urban roads with interrupted flow

Type of lane		One-way mid-block capacity per lane (passenger cars per hour)
Median or inner lane	Divided road	1,000
	Undivided road	900
Middle lane (of a 3-lane carriageway)	Divided road	900
	Undivided road	1,000
Kerb lane	Adjacent to parking lane	900
	Occasional parked vehicles	600
	Clearway conditions	900

Source: Austroads (2016).

Based on its existing configuration as an undivided road, Adams Road has an urban capacity of 900 vehicles per hour per lane for clearway conditions, which is not affected by the proportion of heavy vehicles in the traffic flow.

The maximum peak hour flow for each LOS, for one lane of unidirectional travel, based on volume/capacity ratios applicable for rural roads in level terrain with no sight distance restriction on overtaking are provided in Table 3.7. These are indicative figures based on the rural volume/capacity ratios for a maximum lane capacity of 900 vehicles per hour in each direction.

Table 3.7 Urban road peak hour lane flows per direction

Level of service	Flow (passenger cars per hour)
A	120
B	240
C	380
D	570
E	900

3.2.2 Adams Road mid-block traffic impact

The mid-block capacities of Adams Road in 2024 and the predicted peak hour traffic volumes (baseline + cumulative site traffic) provided in Table 3.8

Table 3.8 Adams Road mid-block traffic (2024)

Scenario	Location on Adams Road	Peak hour volume	Heavy vehicle percentage	Level of Service
Baseline	North of site access	414 (AM) / 446 (PM)	0.7% (AM) / 0.2% (PM)	B
	South of site access	534 (AM) / 552 (PM)	11.0% (AM) / 4.7% (PM)	C
Development with cumulative traffic	North of site access	448 (AM) / 462 (PM)	6.3% (AM) / 3.2% (PM)	B
	South of site access	609 (AM) / 562 (PM)	13.8% (AM) / 6.4% (PM)	C

In 2024, Adams Road will operate at a LOS B north of the site access and LOS C south of the site access, with or without the development (Table 3.8).

The mid-block capacities of Adams Road in 2029 and the predicted peak hour traffic volumes (baseline + cumulative site traffic) are provided under urban traffic conditions in Table 3.9.

Table 3.9 Adams Road mid-block traffic (2029)

Scenario	Location on Adams Road	Direction	Peak hour volume	Level of Service
Baseline	North of site access	Northbound	444 (AM) / 409 (PM)	D
		Southbound	75 (AM) / 153 (PM)	B
	South of site access	Northbound	283 (AM) / 165 (PM)	C
		Southbound	355 (AM) / 500 (PM)	D
Development with cumulative traffic	North of site access	Northbound	465 (AM) / 418 (PM)	D
		Southbound	89 (AM) / 158 (PM)	B
	South of site access	Northbound	352 (AM) / 176 (PM)	C
		Southbound	376 (AM) / 507 (PM)	D

In 2024, Adams Road will operate at a LOS D with or without the development (Table 3.9).

3.3 Road safety

Assuming the 4-hour peak periods in the STFM results represent 40% of the daily traffic, the ARRC traffic generation will represent up to 4.77% of the daily traffic in the vicinity of the site in 2029. The ARRC traffic generation will represent a larger proportion of the total traffic in 2029 compared to 2024 because the ARRC is expected to only process up to 300,000 tpa in 2024.

The daily cumulative subject property traffic generation compared to the overall road network traffic is presented in Table 3.10.

Table 3.10 Daily traffic generation (2029)

Location	Baseline daily traffic	ARRC and cumulative daily traffic generation	Post development with cumulative daily traffic	Percentage of increase due to ARRC development
Adams Road north of site access	7,318	235	7,553	3.11%
Adams Road south of site access	8,285	415	8,700	4.77%
Elizabeth Drive	8,155	133	8,288	1.60%
The Northern Road	26,195	211	26,406	0.80%

3.4 Internal traffic movements

The proposed movement of vehicles through the ARRC site has been revised since the submission of the EIS. Inbound vehicles dropping off waste will access the ARRC warehouse via the inbound weighbridges, entering the warehouse via the second entrance of the warehouse's eastern side and exiting via the southern warehouse exit. The majority of vehicles picking up recycled product are expected to have their tares pre-recorded. Accordingly, vehicles picking up recycled product will enter the western entrance of the ARRC and be loaded directly from the product bays before exiting the warehouse via the northern exit on the eastern side and travelling around the outside of the ARRC warehouse to access the outbound weighbridge. A low proportion of vehicles picking up product (ie 1-2 per hour) will need to have their tare's recorded prior to picking up product. These vehicles will drive directly through the warehouse via the western entrance and do a loop around to the outbound weighbridge before re-entering the western warehouse entrance to be loaded.

All outbound vehicles will travel through the outbound weighbridge

Vehicles that have entered the western entrance and picked up product will give way to inbound vehicles before turning right out of the ARRC warehouse, these vehicles travelling around the south-east corner of the ARRC warehouse will then give way to vehicles exiting the southern entrance of the warehouse (ie vehicles that have just unloaded). These priority movements are shown on the revised swept paths contained in Attachment D. These internal swept paths also show vehicles can manoeuvre safely through the ARRC site.

3.5 Queuing analysis

The updated site layout provides two inbound weighbridges and one outbound weighbridge. There are two truck entry points into the ARRC building which separates heavy vehicles unloading waste (waste receival) and loading waste (waste dispatch).

The inbound weighbridges will only be used by trucks delivering waste. During peak operation, there will be up to 29 heavy vehicles delivering waste in the AM peak hour (refer Section 2.2). Assuming a 2-minute wait time (from KLF previous experience) at the weighbridge, the 98th percentile queue will be three vehicles (ie five vehicles including the vehicles at the weighbridges). The driveway leading to the incoming weighbridges will be able to fully accommodate this queue length without any queuing on the internal access road that will be shared with other activities within the subject property (ie quarry reactivation traffic or quarry rehabilitation traffic).

The outbound weighbridge will be used by all heavy vehicles. During peak operation, there will be up to 10 heavy vehicles dispatching waste (refer Section 2.2). When combined with the waste receival trucks, there will be up to 39 trucks in the AM peak hour. Assuming a 90 s wait time at the weighbridge (from KLF previous experience of less wait time on the exit weighbridge as waste inspection not required), the 98th percentile queue will be eight vehicles

(ie nine vehicles including the vehicle at the weighbridge). The revised ARRC layout and internal traffic movement strategy will adequately accommodate this queue length (refer to discussion on priority movements in Section 3.4 and shown in Attachment D).

A summary of the queuing analysis is presented in Table 3.11.

Table 3.11 Queuing analysis

	Inbound	Outbound
Total arriving per hour	29 vehicles	39 vehicles
Wait time	120 s	90 s
Number of weighbridges	2	1
Queue including vehicle at weighbridge (98% confidence interval)	5 vehicles	9 vehicles
Queue excluding vehicle at weighbridge (98% confidence interval)	3 vehicles (2 vehicles before a weighbridge and 1 vehicle before another weighbridge)	8 vehicles (120 m)
Length of driveway before the weighbridges	95 m	60 m to the warehouse southern entry. As noted in Section 3.4, vehicles delivering waste, exiting the southern warehouse exit (maximum of 29 vehicles per hour) will be given priority over vehicles dispatching recycled product. Queuing will be accommodated on the internal access road around the south-eastern corner of the ARRC warehouse.

It is expected that vehicles could take up to 10 minutes to unload waste. The average arrival rate of waste receival trucks of approximately 2 minutes (29 trucks per hour) entail that waste unloading area will need to accommodate a maximum of five trucks unloading simultaneously.

Similarly, assuming loading waste will take up to 10 minutes, the average arrival rate of waste dispatch trucks of approximately 6 minutes (10 trucks per hour) entails that waste loading area will need to accommodate two trucks loading simultaneously, which could be easily accommodated within the recycled product and non-recyclable residues area of the warehouse.

A swept path assessment has been undertaken to confirm site manoeuvrability of the updated ARRC layout. Five heavy vehicles (up to three 26-m B-doubles and two 19-m Articulated Vehicles) are able to unload waste simultaneously and independent to one another. The swept paths are presented in Attachment D.

4 Summary and conclusion

This addendum traffic report addresses the traffic impact associated with ARRC and potential cumulative traffic impacts as a result of the quarry reactivation, quarry rehabilitation, as well as the development of the Aerotropolis.

The outcomes of the assessment are as follows:

- The Northern Road/Adams Road intersection has been upgraded as part of The Northern Road upgrade project and with future signalisation will operate at LOS C in 2024 and 2029 under all traffic scenarios (with or without development and cumulative traffic);
- the Elizabeth Drive/Adams Road intersection will operate at LOS A under all traffic scenarios in 2024 and 2029 without the development traffic. The additional development and cumulative traffic will change the LOS of the right turn movement from Adams Road to LOS B which is acceptable in the Sydney's urbanised areas;
- the Elizabeth Drive/Luddenham Road intersection will operate at LOS B under all traffic scenarios;
- the mid-block traffic on Adams Road at a worst case will have LOS C and D in 2024 and 2029 respectively. The development and cumulative traffic do not alter the mid-block LOS;
- by 2029, the development and cumulative traffic represents up to 4.77% of the daily road network traffic which is marginal given the significant road network alternation and upgrade in the area as part of the aerotropolis development; and
- the queuing analysis indicates ARRC traffic will be fully accommodated within the ARRC driveway and no spillage will occur on the internal road.

5 References

Austroads. 2017. *Guide to Road Design Part 4A: Unsignalised & Signalised Intersections.*

—. 2016. *Guide to Traffic Management Part 3: Traffic Studies and Analysis.*

Department of Planning, Industry, and Environment. 2019. "Western Sydney Aerotropolis Community Consultation Report."

EMM. 2020a. "Luddenham Resource Recovery Centre, Environmental Impact Statement, prepared for Coombes Property Group and KLF Holdings Pty Ltd."

RTA. 2002. *Guide to Traffic Generating Developments.*

Attachment A

Summary of meeting with TfNSW and Council on 25 March 2021

Eric Lei

From: Phil Towler
Sent: Tuesday, March 30, 2021 4:32 PM
To: Janet Krick; Abdullah Uddin; Eric Lei
Subject: FW: Luddenham Quarry - MOD5 and ARRC - transport options

Philip Towler
Associate Director
T 02 9493 9500
M 0409 702 050
www.emmconsulting.com.au

From: Phil Towler
Sent: Thursday, 25 March 2021 4:06 PM
To: Pahee Rathan <Pahee.RATHAN@transport.nsw.gov.au>; Charles Wiafe <WiafeC@liverpool.nsw.gov.au>
Cc: Chris.Ritchie@planning.nsw.gov.au; Michael Coombes <michael@coombesgroup.com.au>; John Scarlis <john@klfholdings.com.au>; Felix Liu <Felix.Liu@transport.nsw.gov.au>; Robert Rutledge <Robert.Rutledge@transport.nsw.gov.au>; Ellen Luu <Ellen.Luu@planning.nsw.gov.au>; William Hodgkinson <William.Hodgkinson@planning.nsw.gov.au>; Rachel Cumming <rachel.cumming@transport.nsw.gov.au>; Louise Moran <louise.m.moran@transport.nsw.gov.au>
Subject: Luddenham Quarry - MOD5 and ARRC - transport options

Good afternoon Pahee and Charles,

Thank you for your time this morning to discuss the transport options for the Luddenham Quarry MOD5 (quarry reactivation) and Advanced Resource Recovery Centre SSD (ARRC). It was very helpful to understand your position and plans regarding the project and wider network upgrades.

Our understanding of the discussion, main outcomes and next steps are as follows:

Changes to the road network:

- Potential upgrades to Elizabeth Drive in the early planning stage – timing of upgrades unknown
- The configuration and timing of realignment of Adams Road to join Luddenham Road are currently unknown
- Adams Road south of Antons Road to be upgraded as part of WSA development – likely to be within the next 1-3 years but exact timing unknown

MOD5:

- Up to 19-m trucks only
- Quarry operations to December 2024
- Quarry trucks will not use Elizabeth Drive west of Adams Road so there will be no right-hand turns into Adams Road from Elizabeth Drive
- TfNSW and Council support:
    - The pavement upgrade (at applicant's cost) to the northern end of Adams Road (Quarry access road to Elizabeth Drive) to allow lifting the load limit on northern Adams Road

    - Line-marking to be improved at the Elizabeth Drive/Adams Road intersection (at applicant's cost) – applicants to provide drawing of proposed line marking
    - No other Elizabeth Drive/Adams Road intersection upgrades for MOD5
- These works will be completed by the applicant as soon as Mod 5 and any other required approvals are granted

ARRC:

PRIOR to upgrade of Elizabeth Drive and/or realignment of northern Adams Road:

- Pavement upgrades/rehabilitation of Adams Road between the Quarry access road and Anton Road (at applicant's cost) to allow the load limit on this section to be lifted and trucks to access The Northern Road:
    - Detailed assessment (similar to that for the northern section of Adams Road) and lifting of the load limit to be advanced in parallel with the ARRC application
    - These works would follow the upgrade of Adams Road south of Anton Road that are being undertaken as part of WSA works, and would be prior to operation of the ARRC

- TfNSW and Council support interim upgrade of Elizabeth Drive/Adams Road intersection (at applicant's cost) as follows:
    - Exit from site into Adams Road in either direction
    - Left-turn from Elizabeth Drive into Adams Road (deceleration lane)
    - Left-turn from Adams Road to Elizabeth Drive (widening proposed to allow left and right turn lanes)
    - Right-turn from Adams Road to Elizabeth Drive contingent on swept path analysis demonstrating 26-m long B-Double trucks stay within lanes
    - No right-turn from Elizabeth Drive to Adams Road for heavy or light vehicles – remove short right-hand turn lane from ARRC proposal

AFTER upgrade of Elizabeth Drive and/or realignment of northern Adams Road:

- Elizabeth Drive/Adams Road intersection:
    - Left-turn from Elizabeth Drive into Adams Road – TfNSW considering position and unlikely to be resolved for some time
    - All other turns – unlikely to be permitted
    - All parties to consider issues when TfNSW forms a view on likely changes in the long term.

Again, thank you for your time and please let me know if any corrections are required to this summary.

Best regards

Phil

Philip Towler
Associate Director
EMM creating opportunities
M 0409 702 050
D 02 9493 9500
Connect with us
SYDNEY | Ground floor, 20 Chandos Street, St Leonards NSW 2065

Please consider the environment before printing my email.
This email and any files transmitted with it are confidential and are only to be read or used by the intended recipient as it may contain confidential information. Confidentiality or privilege is not waived or lost by erroneous transmission. If you have received this email in error, or are not the intended recipient, please notify the sender immediately and delete this email from your computer. You must not disclose, distribute, copy or use the information herein if you are not the intended recipient.

Attachment B

Intersection traffic survey

Project Name Adams Road intesection with The Northern Road
Project Date 11/27/2019

		NORTHERN ROAD WESTBOUND						ADAMS ROAD SOUTHBOUND						NORTHERN ROAD EASTBOUND						
		STRAIGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
	15 Mins	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
27-Nov-19	600-614	100	15	**115**	14	0	**14**	8	2	**10**	0	0	**0**	0	0	**0**	118	24	**142**	281
27-Nov-19	615-629	130	17	**147**	11	2	**13**	19	0	**19**	0	0	**0**	3	0	**3**	166	28	**194**	376
27-Nov-19	630-644	117	24	**141**	23	2	**25**	26	1	**27**	2	0	**2**	3	0	**3**	117	27	**144**	342
27-Nov-19	645-659	121	22	**143**	12	1	**13**	16	1	**17**	1	0	**1**	2	2	**4**	93	24	**117**	295
27-Nov-19	700-714	133	15	**148**	17	0	**17**	9	2	**11**	2	1	**3**	13	1	**14**	120	20	**140**	333
27-Nov-19	715-729	140	12	**152**	26	1	**27**	13	1	**14**	1	2	**3**	10	3	**13**	142	20	**162**	371
27-Nov-19	730-744	150	10	**160**	27	0	**27**	7	0	**7**	2	2	**4**	8	1	**9**	133	19	**152**	359
27-Nov-19	745-759	113	13	**126**	19	0	**19**	21	2	**23**	3	0	**3**	4	0	**4**	127	18	**145**	320
27-Nov-19	800-814	102	20	**122**	22	1	**23**	9	1	**10**	1	0	**1**	3	0	**3**	109	14	**123**	282
27-Nov-19	815-829	107	18	**125**	12	0	**12**	19	1	**20**	1	0	**1**	2	2	**4**	82	16	**98**	260
27-Nov-19	830-844	108	18	**126**	17	0	**17**	16	2	**18**	1	0	**1**	4	3	**7**	98	22	**120**	289
27-Nov-19	845-859	97	23	**120**	10	2	**12**	8	4	**12**	2	1	**3**	8	0	**8**	73	19	**92**	247
		1418	207	**1625**	210	9	**219**	171	17	**188**	16	6	**22**	60	12	**72**	1378	251	**1629**	

	NORTHERN ROAD WESTBOUND						ADAMS ROAD SOUTHBOUND						NORTHERN ROAD EASTBOUND						
	STRAIGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
Hourly	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
600-700	468	78	**546**	60	5	**65**	69	4	**73**	3	0	**3**	8	2	**10**	494	103	**597**	1294
615-715	501	78	**579**	63	5	**68**	70	4	**74**	5	1	**6**	21	3	**24**	496	99	**595**	1346
630-730	511	73	**584**	78	4	**82**	64	5	**69**	6	3	**9**	28	6	**34**	472	91	**563**	1341
645-745	544	59	**603**	82	2	**84**	45	4	**49**	6	5	**11**	33	7	**40**	488	83	**571**	1358
700-800	536	50	**586**	89	1	**90**	50	5	**55**	8	5	**13**	35	5	**40**	522	77	**599**	1383
715-815	505	55	**560**	94	2	**96**	50	4	**54**	7	4	**11**	25	4	**29**	511	71	**582**	1332
730-830	472	61	**533**	80	1	**81**	56	4	**60**	7	2	**9**	17	3	**20**	451	67	**518**	1221
745-845	430	69	**499**	70	1	**71**	65	6	**71**	6	0	**6**	13	5	**18**	416	70	**486**	1151
800-900	414	79	**493**	61	3	**64**	52	8	**60**	5	1	**6**	17	5	**22**	362	71	**433**	1078

Project Name Adams Road intesection with The Northern Road
Project Date 11/27/2019

		NORTHERN ROAD WESTBOUND						ADAMS ROAD SOUTHBOUND						NORTHERN ROAD EASTBOUND						
		LEFT			STRAIGHT			STRAIGHT			RIGHT			LEFT			RIGHT			
	15 Mins	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
27-Nov-19	1500-1514	102	15	**117**	9	2	**11**	19	2	**21**	3	1	**4**	0	2	**2**	99	11	**110**	265
27-Nov-19	1515-1529	114	25	**139**	18	1	**19**	15	3	**18**	3	1	**4**	3	1	**4**	128	16	**144**	328
27-Nov-19	1530-1544	108	20	**128**	11	2	**13**	27	3	**30**	4	0	**4**	5	0	**5**	107	13	**120**	300
27-Nov-19	1545-1559	136	20	**156**	10	2	**12**	24	0	**24**	1	0	**1**	2	0	**2**	144	18	**162**	357
27-Nov-19	1600-1614	144	16	**160**	15	0	**15**	21	0	**21**	2	1	**3**	2	1	**3**	129	19	**148**	350
27-Nov-19	1615-1629	156	10	**166**	12	2	**14**	31	1	**32**	4	4	**8**	2	0	**2**	147	11	**158**	380
27-Nov-19	1630-1644	128	17	**145**	9	1	**10**	24	4	**28**	2	0	**2**	0	0	**0**	137	10	**147**	332
27-Nov-19	1645-1659	144	15	**159**	12	0	**12**	28	3	**31**	2	0	**2**	1	1	**2**	136	11	**147**	353
27-Nov-19	1700-1714	181	17	**198**	18	0	**18**	39	0	**39**	5	0	**5**	3	0	**3**	130	8	**138**	401
27-Nov-19	1715-1729	169	11	**180**	16	0	**16**	27	0	**27**	3	1	**4**	2	0	**2**	165	9	**174**	403
27-Nov-19	1730-1744	168	10	**178**	24	1	**25**	16	1	**17**	5	0	**5**	5	2	**7**	139	7	**146**	378
27-Nov-19	1745-1759	119	4	**123**	16	0	**16**	11	0	**11**	4	0	**4**	5	0	**5**	120	11	**131**	290
		1669	180	**1849**	170	11	**181**	282	17	**299**	38	8	**46**	30	7	**37**	1581	144	**1725**	

	NORTHERN ROAD WESTBOUND						ADAMS ROAD SOUTHBOUND						NORTHERN ROAD EASTBOUND						
	STRAIGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
Hourly	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
1500-1600	460	80	**540**	48	7	**55**	85	8	**93**	11	2	**13**	10	3	**13**	478	58	**536**	1250
1515-1615	502	81	**583**	54	5	**59**	87	6	**93**	10	2	**12**	12	2	**14**	508	66	**574**	1335
1530-1630	544	66	**610**	48	6	**54**	103	4	**107**	11	5	**16**	11	1	**12**	527	61	**588**	1387
1545-1645	564	63	**627**	46	5	**51**	100	5	**105**	9	5	**14**	6	1	**7**	557	58	**615**	1419
1600-1700	572	58	**630**	48	3	**51**	104	8	**112**	10	5	**15**	5	2	**7**	549	51	**600**	1415
1615-1715	609	59	**668**	51	3	**54**	122	8	**130**	13	4	**17**	6	1	**7**	550	40	**590**	1466
1630-1730	622	60	**682**	55	1	**56**	118	7	**125**	12	1	**13**	6	1	**7**	568	38	**606**	1489
1645-1745	662	53	**715**	70	1	**71**	110	4	**114**	15	1	**16**	11	3	**14**	570	35	**605**	1535
1700-1800	637	42	**679**	74	1	**75**	93	1	**94**	17	1	**18**	15	2	**17**	554	35	**589**	1472

Project Name Adams Road intesection with Elizabeth Road
Project Date 11/27/2019

		ELIZABETH DRIVE WESTBOUND						ELIZABETH DRIVE EASTBOUND						ADAMS ROAD NORTHBOUND						
		LEFT			STRAIGHT			STRAIGHT			RIGHT			LEFT			RIGHT			
	15mins	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
27-Nov-19	600-614	4	0	**4**	73	5	**78**	*115*	*15*	**130**	*7*	*2*	**9**	12	0	**12**	4	0	**4**	237
27-Nov-19	615-629	7	0	**7**	82	3	**85**	*155*	*28*	**183**	*17*	*1*	**18**	16	0	**16**	1	0	**1**	310
27-Nov-19	630-644	7	0	**7**	114	5	**119**	*138*	*27*	**165**	*26*	*1*	**27**	23	0	**23**	9	0	**9**	350
27-Nov-19	645-659	9	0	**9**	70	8	**78**	*131*	*12*	**143**	*19*	*1*	**20**	11	0	**11**	6	0	**6**	267
27-Nov-19	700-714	5	0	**5**	77	19	**96**	*131*	*10*	**141**	*5*	*0*	**5**	17	0	**17**	7	0	**7**	271
27-Nov-19	715-729	4	0	**4**	81	22	**103**	*158*	*18*	**176**	*7*	*0*	**7**	23	0	**23**	4	0	**4**	317
27-Nov-19	730-744	3	0	**3**	77	6	**83**	*158*	*7*	**165**	*8*	*0*	**8**	26	0	**26**	15	1	**16**	301
27-Nov-19	745-759	6	0	**6**	107	7	**114**	*108*	*13*	**121**	*11*	*1*	**12**	24	0	**24**	5	0	**5**	282
27-Nov-19	800-814	3	0	**3**	77	5	**82**	*105*	*13*	**118**	*10*	*0*	**10**	25	0	**25**	9	0	**9**	247
27-Nov-19	815-829	5	1	**6**	94	21	**115**	*95*	*16*	**111**	*14*	*3*	**17**	10	0	**10**	8	0	**8**	267
27-Nov-19	830-844	4	0	**4**	71	11	**82**	*81*	*13*	**94**	*9*	*0*	**9**	15	0	**15**	2	0	**2**	206
27-Nov-19	845-859	0	1	**1**	70	8	**78**	*62*	*17*	**79**	*7*	*4*	**11**	14	0	**14**	5	0	**5**	188
		57	2	**59**	993	120	**1113**	1437	189	**1626**	140	13	**153**	216	0	**216**	75	1	**76**	

	ELIZABETH DRIVE WESTBOUND						ELIZABETH DRIVE EASTBOUND						ADAMS ROAD NORTHBOUND						
	LEFT			STRAIGHT			STRAIGHT			RIGHT			LEFT			RIGHT			
Hourly	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
600-700	27	0	**27**	339	21	**360**	539	82	**621**	69	5	**74**	62	0	**62**	20	0	**20**	1164
615-715	28	0	**28**	343	35	**378**	555	77	**632**	67	3	**70**	67	0	**67**	23	0	**23**	1198
630-730	25	0	**25**	342	54	**396**	558	67	**625**	57	2	**59**	74	0	**74**	26	0	**26**	1205
645-745	21	0	**21**	305	55	**360**	578	47	**625**	39	1	**40**	77	0	**77**	32	1	**33**	1156
700-800	18	0	**18**	342	54	**396**	555	48	**603**	31	1	**32**	90	0	**90**	31	1	**32**	1171
715-815	16	0	**16**	342	40	**382**	529	51	**580**	36	1	**37**	98	0	**98**	33	1	**34**	1147
730-830	17	1	**18**	355	39	**394**	466	49	**515**	43	4	**47**	85	0	**85**	37	1	**38**	1097
745-845	18	1	**19**	349	44	**393**	389	55	**444**	44	4	**48**	74	0	**74**	24	0	**24**	1002
800-900	12	2	**14**	312	45	**357**	343	59	**402**	40	7	**47**	64	0	**64**	24	0	**24**	908

Project Name Adams Road intesection with Elizabeth Road
Project Date 11/27/2019

		ELIZABETH DRIVE WESTBOUND						ELIZABETH DRIVE EASTBOUND						ADAMS ROAD NORTHBOUND						
		LEFT			STRAIGHT			STRAIGHT			RIGHT			LEFT			RIGHT			
	15 Mins	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
27-Nov-19	1500-1514	5	0	**5**	81	19	**100**	79	17	**96**	15	0	**15**	15	1	**16**	5	0	**5**	237
27-Nov-19	1515-1529	5	0	**5**	108	5	**113**	101	7	**108**	21	0	**21**	15	2	**17**	4	0	**4**	268
27-Nov-19	1530-1544	7	0	**7**	115	13	**128**	98	6	**104**	24	1	**25**	12	0	**12**	5	0	**5**	281
27-Nov-19	1545-1559	8	0	**8**	128	13	**141**	111	6	**117**	25	0	**25**	11	0	**11**	4	0	**4**	306
27-Nov-19	1600-1614	5	1	**6**	108	12	**120**	131	7	**138**	14	0	**14**	21	0	**21**	3	0	**3**	302
27-Nov-19	1615-1629	3	0	**3**	168	6	**174**	123	4	**127**	23	0	**23**	26	0	**26**	9	0	**9**	362
27-Nov-19	1630-1644	10	0	**10**	189	9	**198**	108	8	**116**	20	1	**21**	15	1	**16**	6	0	**6**	367
27-Nov-19	1645-1659	6	1	**7**	170	16	**186**	107	1	**108**	34	0	**34**	8	0	**8**	7	0	**7**	350
27-Nov-19	1700-1714	13	0	**13**	183	8	**191**	114	4	**118**	37	0	**37**	12	0	**12**	5	0	**5**	376
27-Nov-19	1715-1729	5	0	**5**	164	7	**171**	122	3	**125**	32	0	**32**	15	0	**15**	6	0	**6**	354
27-Nov-19	1730-1744	10	1	**11**	172	9	**181**	119	5	**124**	25	0	**25**	25	0	**25**	6	0	**6**	372
27-Nov-19	1745-1759	5	0	**5**	94	4	**98**	109	3	**112**	14	0	**14**	11	0	**11**	2	0	**2**	242
		82	3	**85**	1680	121	**1801**	1322	71	**1393**	284	2	**286**	186	4	**190**	62	0	**62**	

	ELIZABETH DRIVE WESTBOUND						ELIZABETH DRIVE EASTBOUND						ADAMS ROAD NORTHBOUND						
	LEFT			STRAIGHT			STRAIGHT			RIGHT			LEFT			RIGHT			
Hourly	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
1500-1600	25	0	**25**	432	50	**482**	389	36	**425**	85	1	**86**	53	3	**56**	18	0	**18**	1092
1515-1615	25	1	**26**	459	43	**502**	441	26	**467**	84	1	**85**	59	2	**61**	16	0	**16**	1157
1530-1630	23	1	**24**	519	44	**563**	463	23	**486**	86	1	**87**	70	0	**70**	21	0	**21**	1251
1545-1645	26	1	**27**	593	40	**633**	473	25	**498**	82	1	**83**	73	1	**74**	22	0	**22**	1337
1600-1700	24	2	**26**	635	43	**678**	469	20	**489**	91	1	**92**	70	1	**71**	25	0	**25**	1381
1615-1715	32	1	**33**	710	39	**749**	452	17	**469**	114	1	**115**	61	1	**62**	27	0	**27**	**1455**
1630-1730	34	1	**35**	706	40	**746**	451	16	**467**	123	1	**124**	50	1	**51**	24	0	**24**	1447
1645-1745	34	2	**36**	689	40	**729**	462	13	**475**	128	0	**128**	60	0	**60**	24	0	**24**	1452
1700-1800	33	1	**34**	613	28	**641**	464	15	**479**	108	0	**108**	63	0	**63**	19	0	**19**	1344

Project Name Luddenham Road Intesection with Elizabeth Road
Project Date 11/27/2019

		ELIZABETH DRIVE WESTBOUND						LUDDENHAM SOUTHBOUND						ELIZABETH DRIVE EASTBOUND						
		STRIAGHT			RIGHT			LEFT			RIGHT			LEFT			*STRAIGHT*			
15 Mins		LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	*LV*	*HV*	***LV+HV***	Totals
27-Nov-19	600-614	53	6	**59**	33	0	**33**	*39*	*3*	**42**	16	1	**17**	49	1	**50**	*88*	*13*	***101***	302
27-Nov-19	615-629	68	3	**71**	36	0	**36**	*56*	*3*	**59**	10	0	**10**	47	0	**47**	*128*	*21*	***149***	372
27-Nov-19	630-644	92	4	**96**	53	0	**53**	*54*	*5*	**59**	19	0	**19**	69	0	**69**	*114*	*20*	***134***	430
27-Nov-19	645-659	47	7	**54**	34	1	**35**	*35*	*2*	**37**	17	0	**17**	49	0	**49**	*117*	*9*	***126***	318
27-Nov-19	700-714	58	17	**75**	43	0	**43**	*24*	*0*	**24**	9	1	**10**	57	0	**57**	*118*	*8*	***126***	335
27-Nov-19	715-729	57	22	**79**	47	0	**47**	*28*	*1*	**29**	16	0	**16**	84	0	**84**	*143*	*15*	***158***	413
27-Nov-19	730-744	55	7	**62**	46	0	**46**	*32*	*0*	**32**	17	0	**17**	72	0	**72**	*135*	*7*	***142***	371
27-Nov-19	745-759	65	9	**74**	69	0	**69**	*26*	*3*	**29**	17	0	**17**	65	1	**66**	*97*	*10*	***107***	362
27-Nov-19	800-814	48	6	**54**	57	1	**58**	*31*	*1*	**32**	11	0	**11**	53	0	**53**	*88*	*8*	***96***	304
27-Nov-19	815-829	60	29	**89**	29	1	**30**	*27*	*2*	**29**	16	0	**16**	40	0	**40**	*84*	*16*	***100***	304
27-Nov-19	830-844	58	9	**67**	37	5	**42**	*23*	*0*	**23**	11	0	**11**	39	3	**42**	*64*	*13*	***77***	262
27-Nov-19	845-859	37	13	**50**	34	2	**36**	*17*	*3*	**20**	20	0	**20**	38	0	**38**	*55*	*17*	***72***	236
		698	132	**830**	518	10	**528**	392	23	**415**	179	2	**181**	662	5	**667**	1231	157	**1388**	

	ELIZABETH DRIVE WESTBOUND						LUDDENHAM SOUTHBOUND						ELIZABETH DRIVE EASTBOUND						
	STRIAGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
Hourly	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
600-700	260	20	**280**	156	1	**157**	184	13	**197**	62	1	**63**	214	1	**215**	447	63	**510**	1422
615-715	265	31	**296**	166	1	**167**	169	10	**179**	55	1	**56**	222	0	**222**	477	58	**535**	1455
630-730	254	50	**304**	177	1	**178**	141	8	**149**	61	1	**62**	259	0	**259**	492	52	**544**	1496
645-745	217	53	**270**	170	1	**171**	119	3	**122**	59	1	**60**	262	0	**262**	513	39	**552**	1437
700-800	235	55	**290**	205	0	**205**	110	4	**114**	59	1	**60**	278	1	**279**	493	40	**533**	1481
715-815	225	44	**269**	219	1	**220**	117	5	**122**	61	0	**61**	274	1	**275**	463	40	**503**	1450
730-830	228	51	**279**	201	2	**203**	116	6	**122**	61	0	**61**	230	1	**231**	404	41	**445**	1341
745-845	231	53	**284**	192	7	**199**	107	6	**113**	55	0	**55**	197	4	**201**	333	47	**380**	1232
800-900	203	57	**260**	157	9	**166**	98	6	**104**	58	0	**58**	170	3	**173**	291	54	**345**	1106

Project Name Luddenham Road Intesection with Elizabeth Road
Project Date 11/27/2019

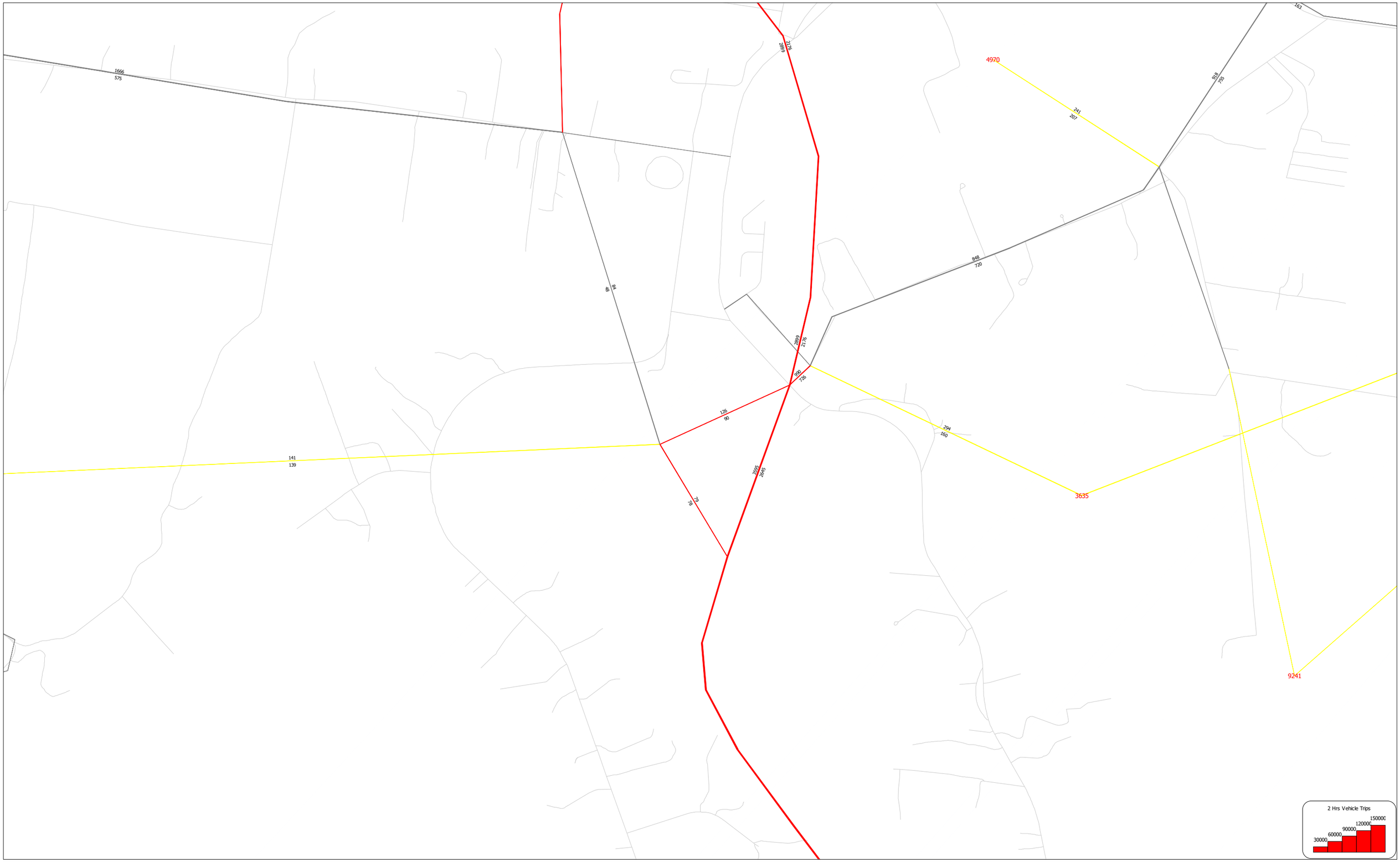
		ELIZABETH DRIVE WESTBOUND						LUDDENHAM SOUTHBOUND						ELIZABETH DRIVE EASTBOUND						
		STRIAGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
	15 Mins	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
27-Nov-19	1500-1514	67	16	**83**	22	3	**25**	37	0	**37**	30	1	**31**	13	0	**13**	57	21	**78**	267
27-Nov-19	1515-1529	85	6	**91**	24	1	**25**	50	0	**50**	42	0	**42**	28	1	**29**	71	11	**82**	319
27-Nov-19	1530-1544	73	9	**82**	30	3	**33**	51	3	**54**	33	3	**36**	20	0	**20**	66	5	**71**	296
27-Nov-19	1545-1559	100	16	**116**	48	0	**48**	63	0	**63**	52	0	**52**	19	1	**20**	65	9	**74**	373
27-Nov-19	1600-1614	96	9	**105**	26	1	**27**	66	1	**67**	46	0	**46**	29	1	**30**	70	7	**77**	352
27-Nov-19	1615-1629	135	7	**142**	44	0	**44**	79	2	**81**	61	2	**63**	21	1	**22**	66	1	**67**	419
27-Nov-19	1630-1644	156	6	**162**	28	3	**31**	54	1	**55**	54	0	**54**	23	1	**24**	60	8	**68**	394
27-Nov-19	1645-1659	143	16	**159**	19	1	**20**	61	0	**61**	45	0	**45**	23	0	**23**	68	1	**69**	377
27-Nov-19	1700-1714	140	7	**147**	34	1	**35**	65	0	**65**	64	0	**64**	21	0	**21**	75	4	**79**	411
27-Nov-19	1715-1729	158	8	**166**	38	0	**38**	84	0	**84**	52	0	**52**	14	1	**15**	70	4	**74**	429
27-Nov-19	1730-1744	164	8	**172**	40	0	**40**	67	0	**67**	46	0	**46**	30	0	**30**	70	5	**75**	430
27-Nov-19	1745-1759	82	4	**86**	27	0	**27**	41	0	**41**	46	3	**49**	23	0	**23**	72	2	**74**	300
		1399	112	**1511**	380	13	**393**	718	7	**725**	571	9	**580**	264	6	**270**	810	78	**888**	

	ELIZABETH DRIVE WESTBOUND						LUDDENHAM SOUTHBOUND						ELIZABETH DRIVE EASTBOUND						
	STRIAGHT			RIGHT			LEFT			RIGHT			LEFT			STRAIGHT			
Hourly	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	LV	HV	**LV+HV**	Totals
1500-1600	325	47	**372**	124	7	**131**	201	3	**204**	157	4	**161**	80	2	**82**	259	46	**305**	1255
1515-1615	354	40	**394**	128	5	**133**	230	4	**234**	173	3	**176**	96	3	**99**	272	32	**304**	1340
1530-1630	404	41	**445**	148	4	**152**	259	6	**265**	192	5	**197**	89	3	**92**	267	22	**289**	1440
1545-1645	487	38	**525**	146	4	**150**	262	4	**266**	213	2	**215**	92	4	**96**	261	25	**286**	1538
1600-1700	530	38	**568**	117	5	**122**	260	4	**264**	206	2	**208**	96	3	**99**	264	17	**281**	1542
1615-1715	574	36	**610**	125	5	**130**	259	3	**262**	224	2	**226**	88	2	**90**	269	14	**283**	1601
1630-1730	597	37	**634**	119	5	**124**	264	1	**265**	215	0	**215**	81	2	**83**	273	17	**290**	1611
1645-1745	605	39	**644**	131	2	**133**	277	0	**277**	207	0	**207**	88	1	**89**	283	14	**297**	1647
1700-1800	544	27	**571**	139	1	**140**	257	0	**257**	208	3	**211**	88	1	**89**	287	15	**302**	1570

Attachment C

Updated STFM outputs

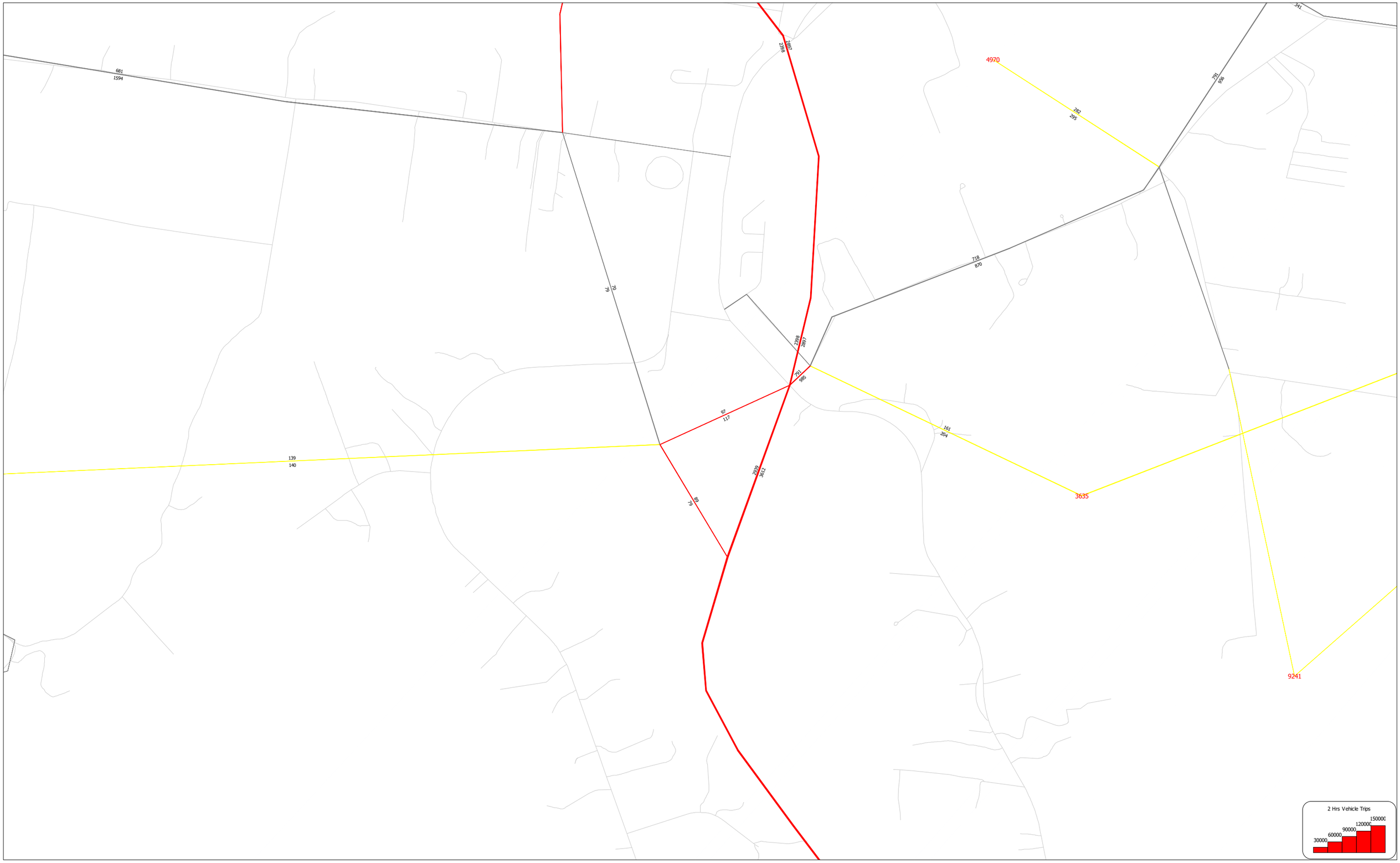
TRAFFIC VOLUMES__



SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 5026: 2026 AM Adams Rd
2021-03-15 02:54

LANE (1WAY):
1
2
3
4
5

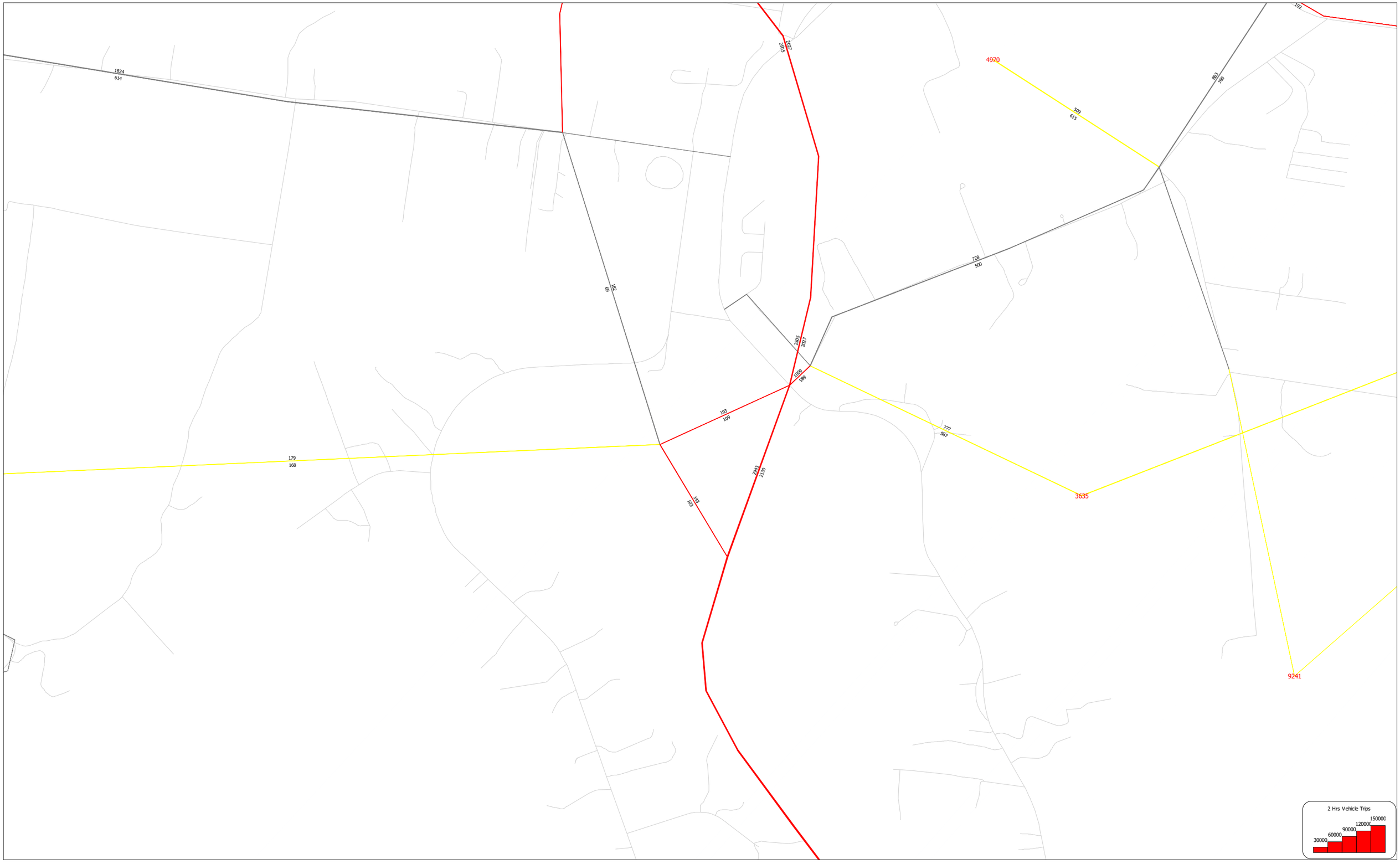
TRAFFIC VOLUMES__



SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 5126: 2026 PM Adams Rd
2021-03-15 02:54

LANE (1WAY):
1
2
3
4
5

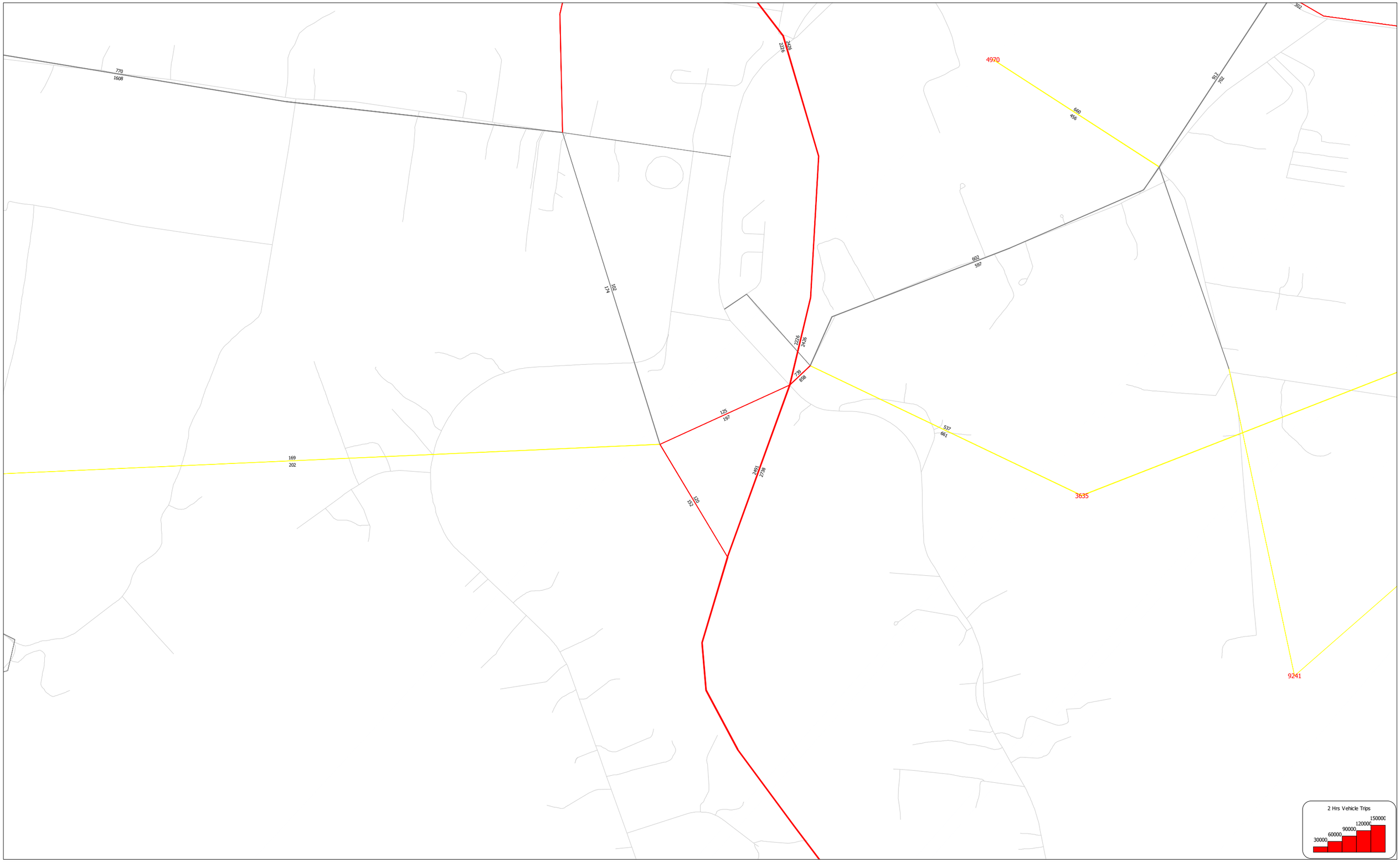
TRAFFIC VOLUMES__



SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 5031: 2031 AM Adams Rd
2021-03-15 02:54

LANE (1WAY):
1
2
3
4
5

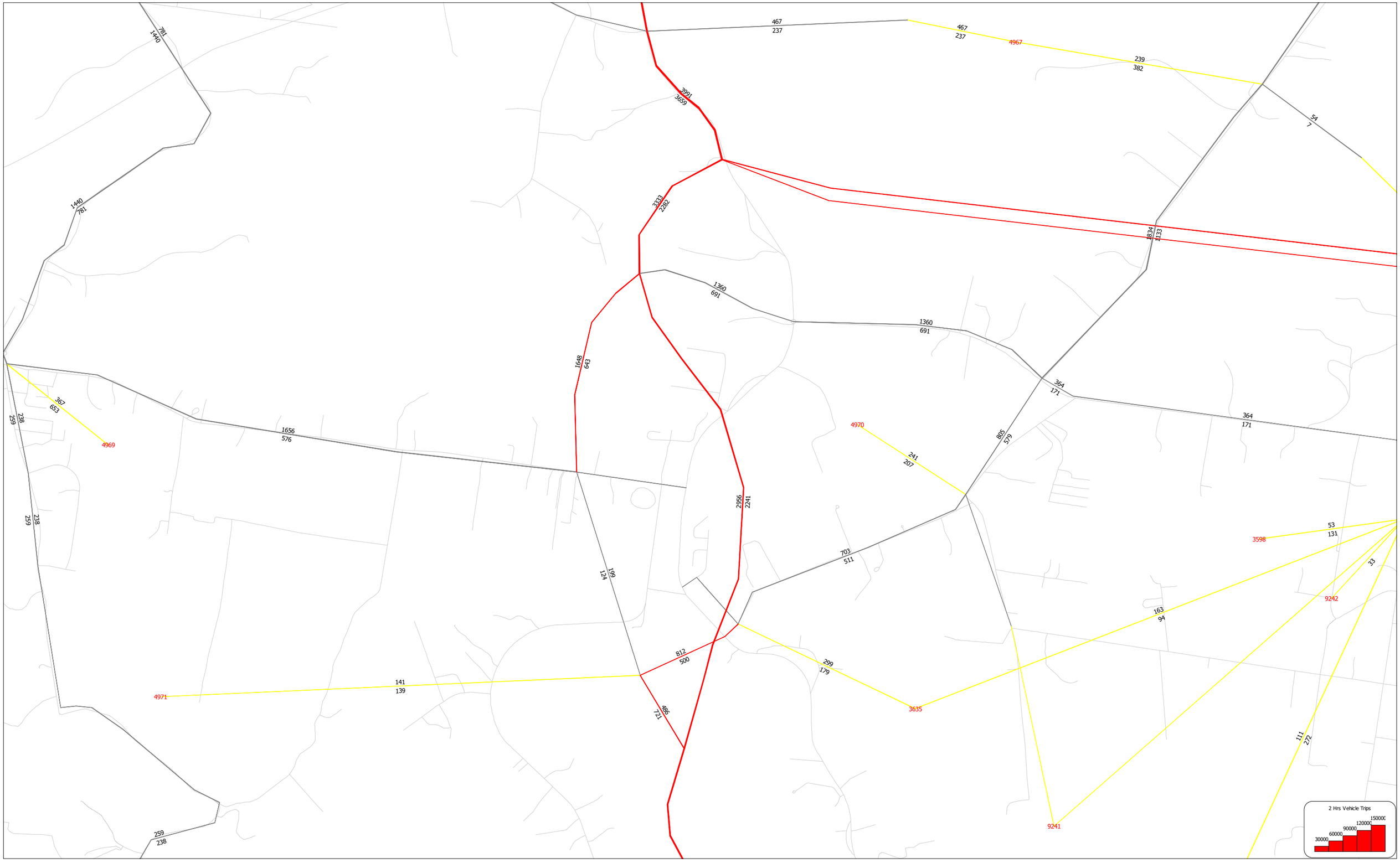
TRAFFIC VOLUMES__



SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 5131: 2031 PM Adams Rd
2021-03-15 02:55

LANE (1WAY):
1
2
3
4
5

TRAFFIC VOLUMES__

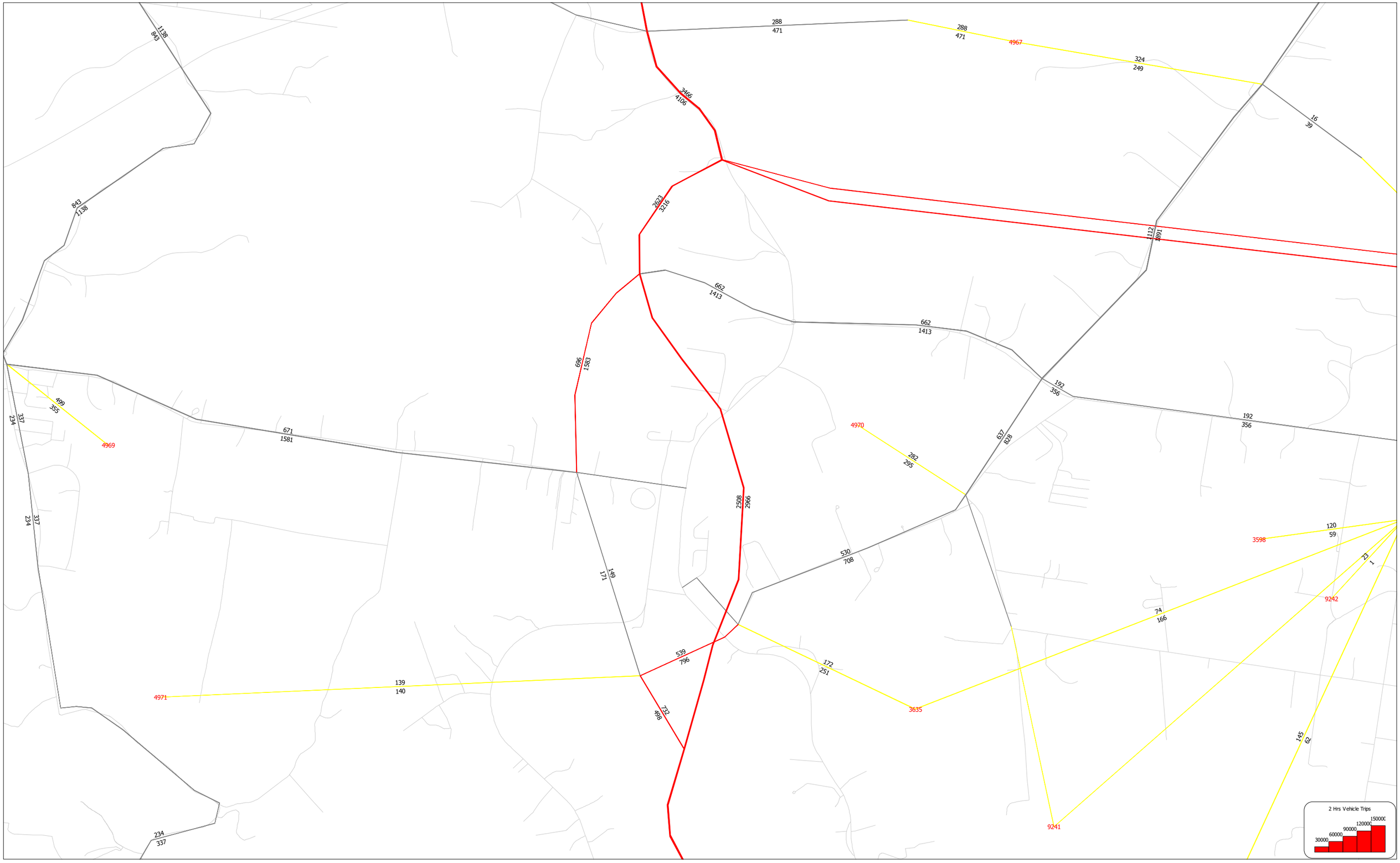


SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 2026: 2026 ROAD NETWORK MODEL(TZP19STMV3.8FMMV7.1)-7-9AM(mf34)
2021-02-18 12:48

LANE (1WAY):

1
2
3
4
5

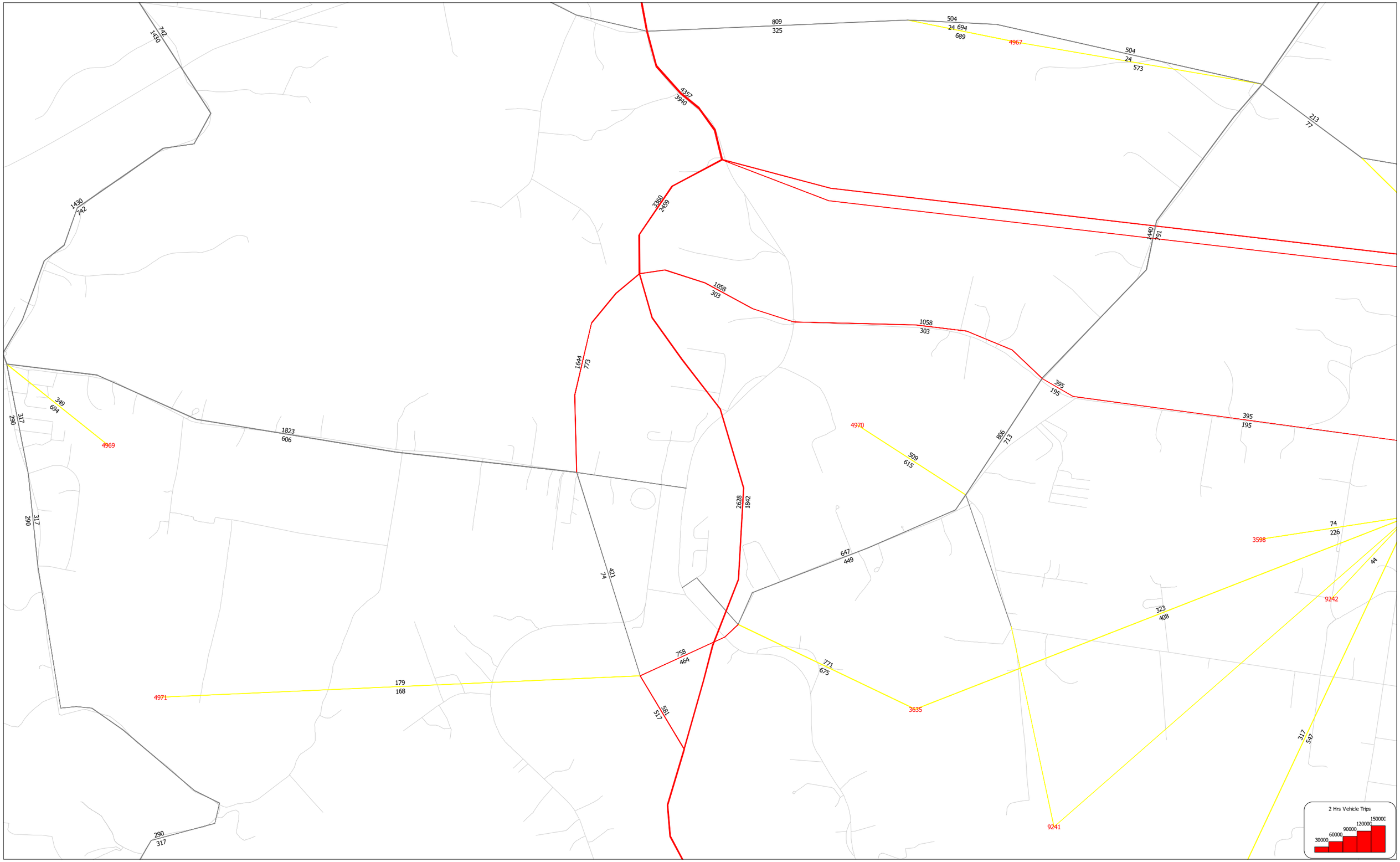
TRAFFIC VOLUMES__



SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 20260: 2026 ROAD NETWORK MODEL(TZP19STMV3.8FMMV7.1)-4-6PM(mf54)
2021-02-18 12:50

LANE (1WAY):
1
2
3
4
5

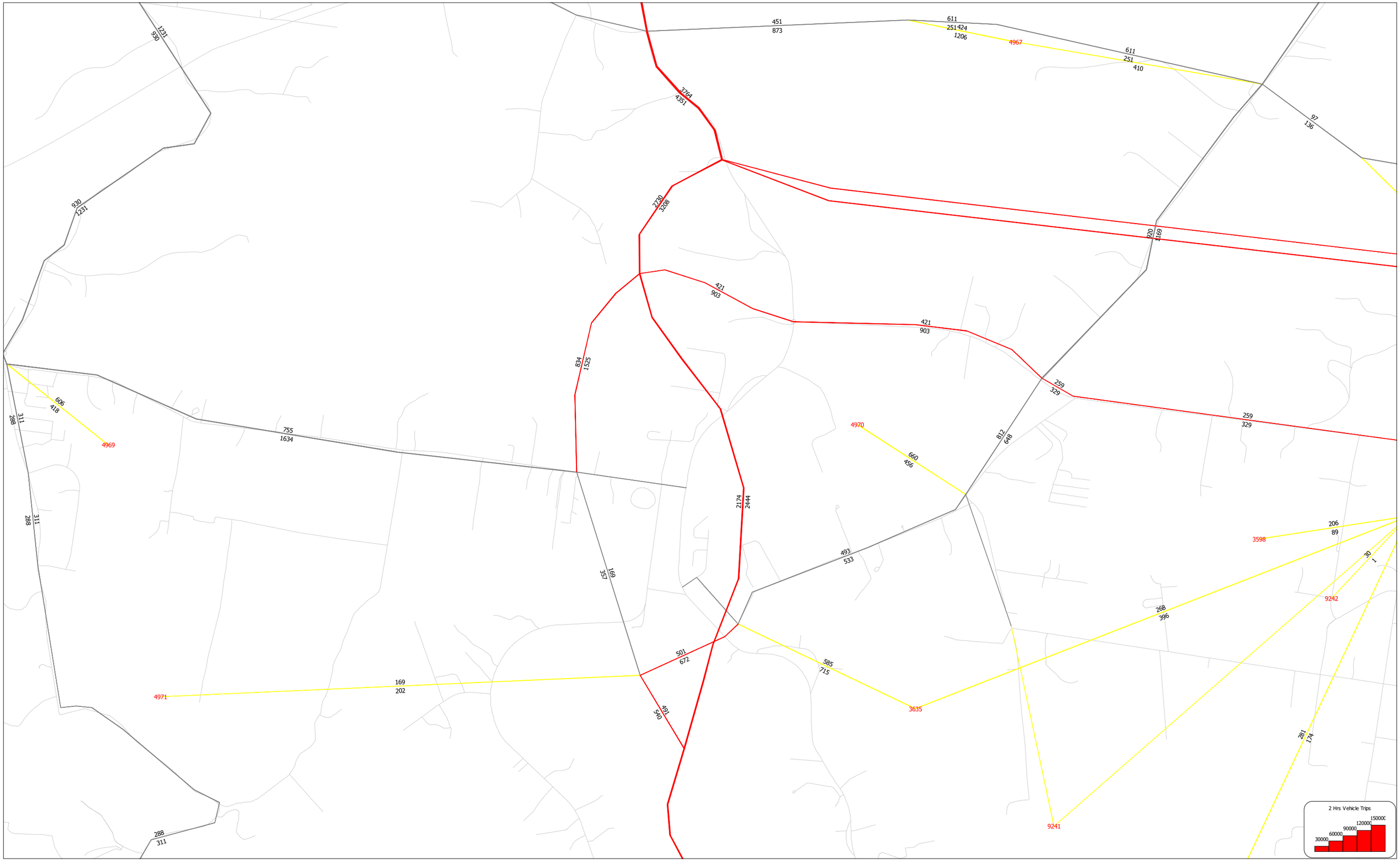
TRAFFIC VOLUMES__



SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 2031: 2031 ROAD NETWORK MODEL(TZP19STMV3.8FMMV7.1)-7-9AM(mf35)
2021-02-18 12:49

LANE (1WAY):
1
2
3
4
5

TRAFFIC VOLUMES__



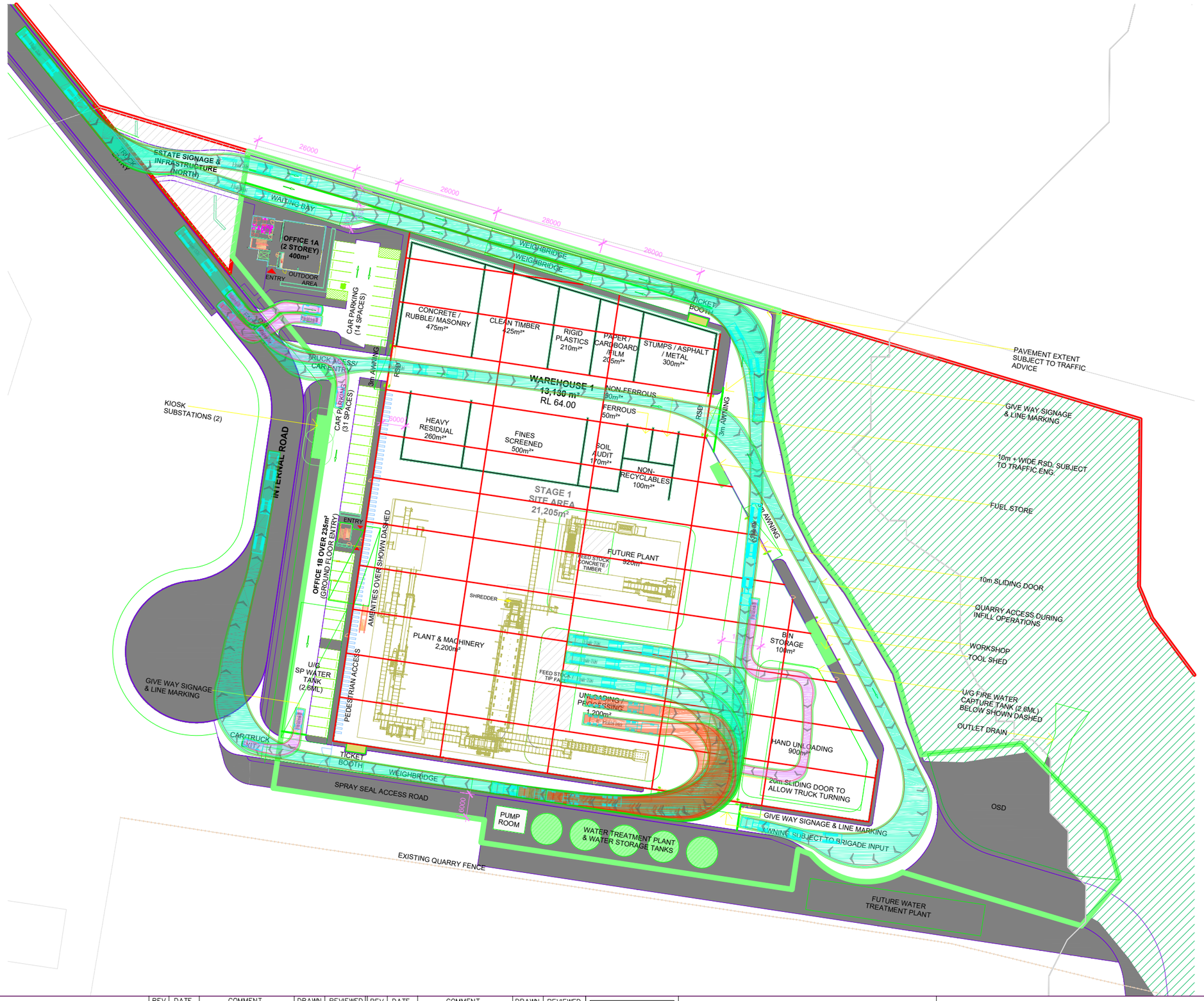
SYDNEY GMA STRATEGIC TRAFFIC FORECASTING MODEL(STFM)
Scenario 20310: 2031 ROAD NETWORK MODEL(TZP19STMV3.8FMMV7.1)-4-6PM(mf55)
2021-02-18 12:50

LANE (1WAY):

1
2
3
4
5

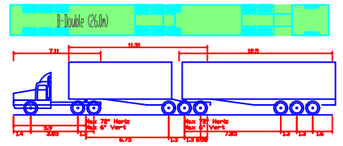
Attachment D

Swept paths

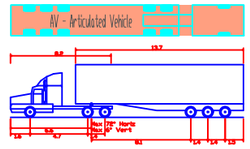


COMMENTS

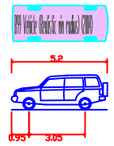
A3



B-Double (26.0m)
Overall Length 26.000m
Overall Width 2.500m
Overall Body Height 4.300m
Min Body Ground Clearance 0.430m
Track Width 2.500m
Lock-to-lock time 9.00s
Curb to Curb Turning Radius 13.000m

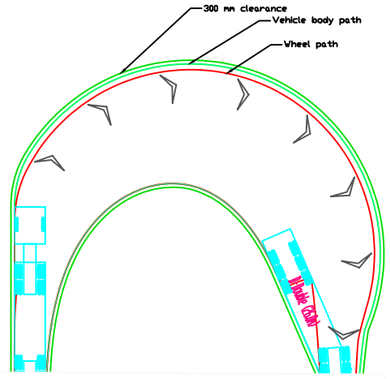


AV - Articulated Vehicle
Overall Length 19.000m
Overall Width 2.500m
Overall Body Height 4.300m
Min Body Ground Clearance 0.430m
Track Width 2.500m
Lock-to-lock time 9.00s
Curb to Curb Turning Radius 12.500m



B99 Vehicle (Realistic min radius) (2004)
Overall Length 5.200m
Overall Width 1.940m
Overall Body Height 1.878m
Min Body Ground Clearance 0.272m
Track Width 1.840m
Lock-to-lock time 4.00s
Curb to Curb Turning Radius 6.250m

B85 Vehicle (Realistic min radius) (2004)
Overall Length 4.910m
Overall Width 1.870m
Overall Body Height 1.421m
Min Body Ground Clearance 0.159m
Track Width 1.770m
Lock-to-lock time 4.00s
Curb to Curb Turning Radius 5.750m



EMM creating opportunities

SYDNEY | Suite 01
Ground Floor
20 Chandos Street,
St Leonards NSW 2065

Phone # 02 9493 9500

www.emmconsulting.com.au

REV	DATE	COMMENT	DRAWN	REVIEWED
3	24/03/21	FOR INFORMATION	EL	AU
2	20/01/21	FOR INFORMATION	EL	AU
1	09/06/20	FOR INFORMATION	EL	AU

PROJECT: Luddenham ARRC

DRAWING TITLE: Site Manoevurability

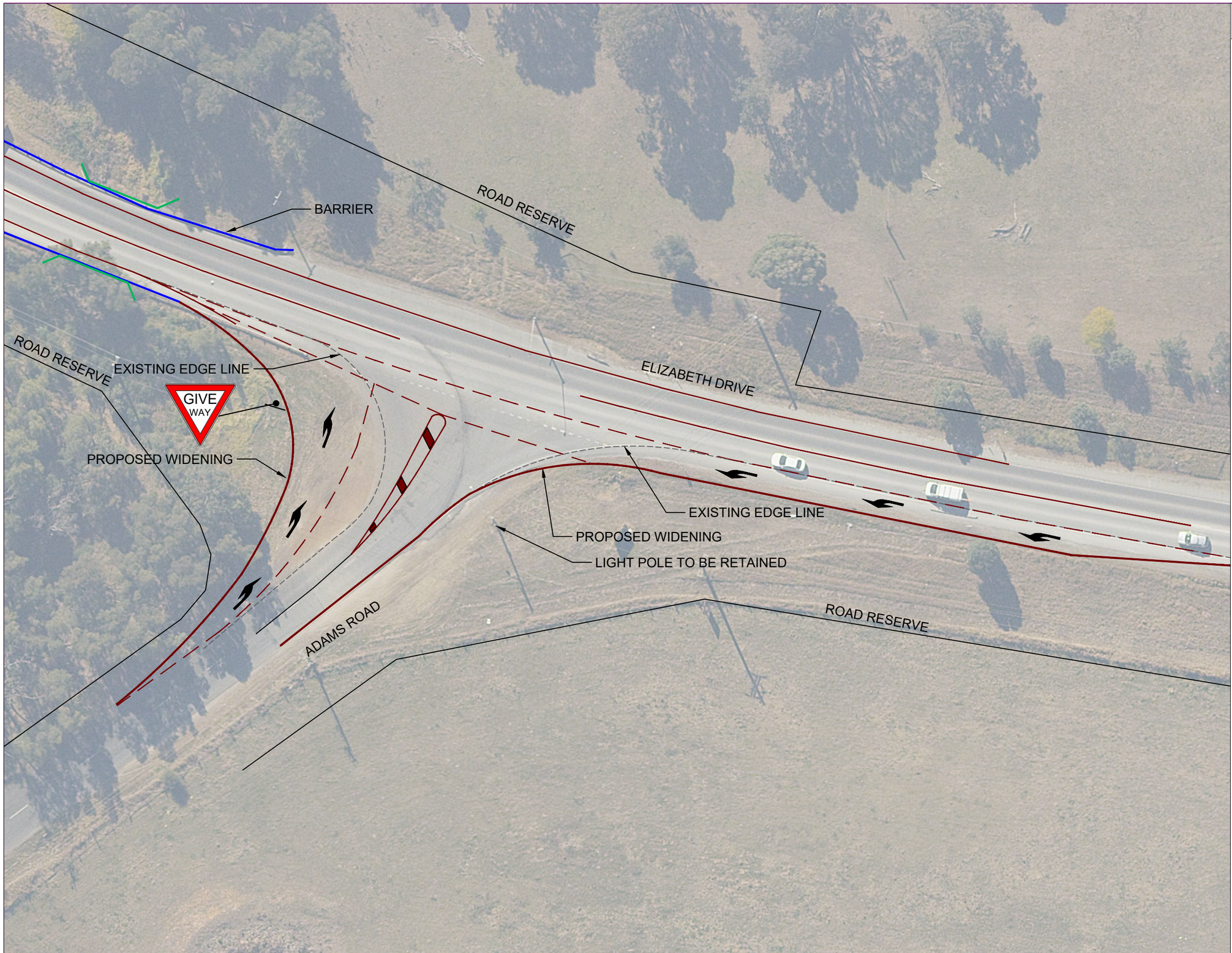
CLIENT: CPG & KLF

DRG. #: EMM-001

PROJECT #: J190749

SCALE: 1:1000

REV: 3



COMMENTS

A3

NOTES:
1. Lanes 3.5 m wide minimum.
2. The left turn bay is 90 m long with a taper of 30 m.

EMM creating opportunities

SYDNEY | Suite 01
Ground Floor
20 Chandos Street,
St Leonards NSW 2065

Phone # 02 9493 9500

www.emmconsulting.com.au

REV	DATE	COMMENT	DRAWN	REVIEWED	REV	DATE	COMMENT	DRAWN	REVIEWED
2	12/04/21	REMOVAL OF RIGHT TURN BAY	EL	AU					
1	09/03/21	FOR INFORMATION	EL	AU					

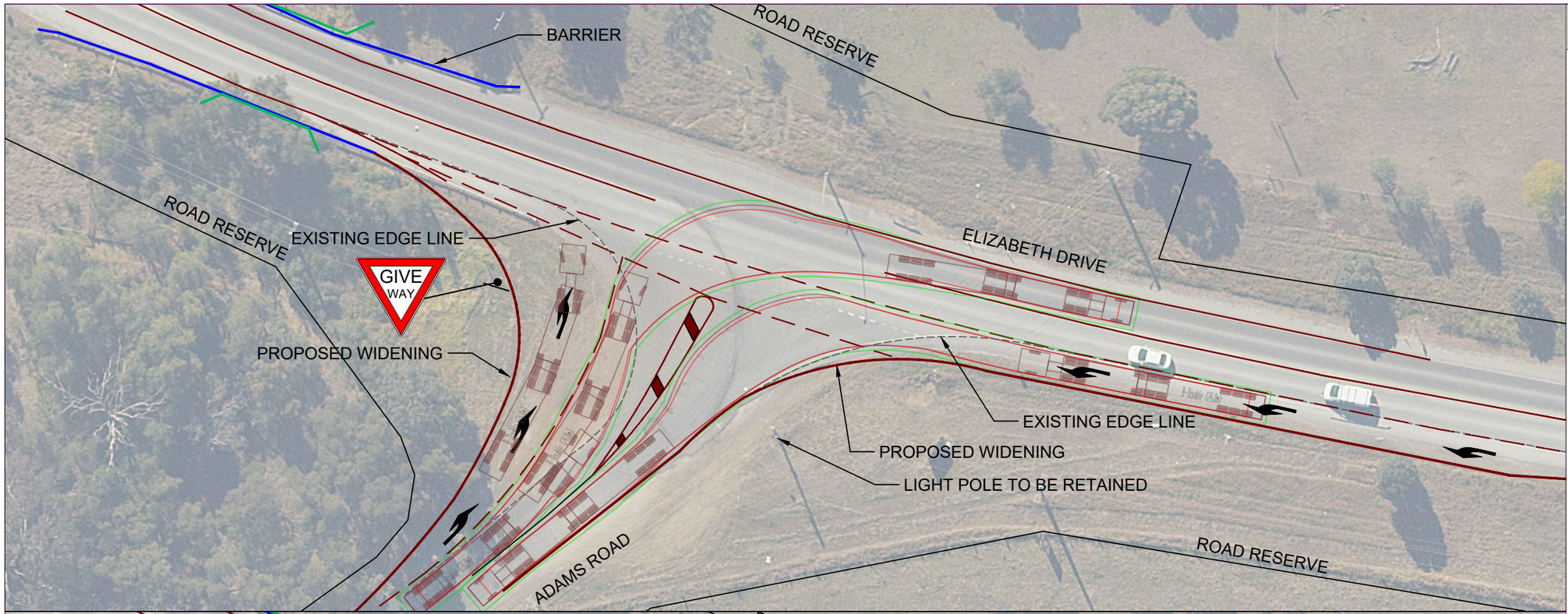
PROJECT:
Luddenham ARRC

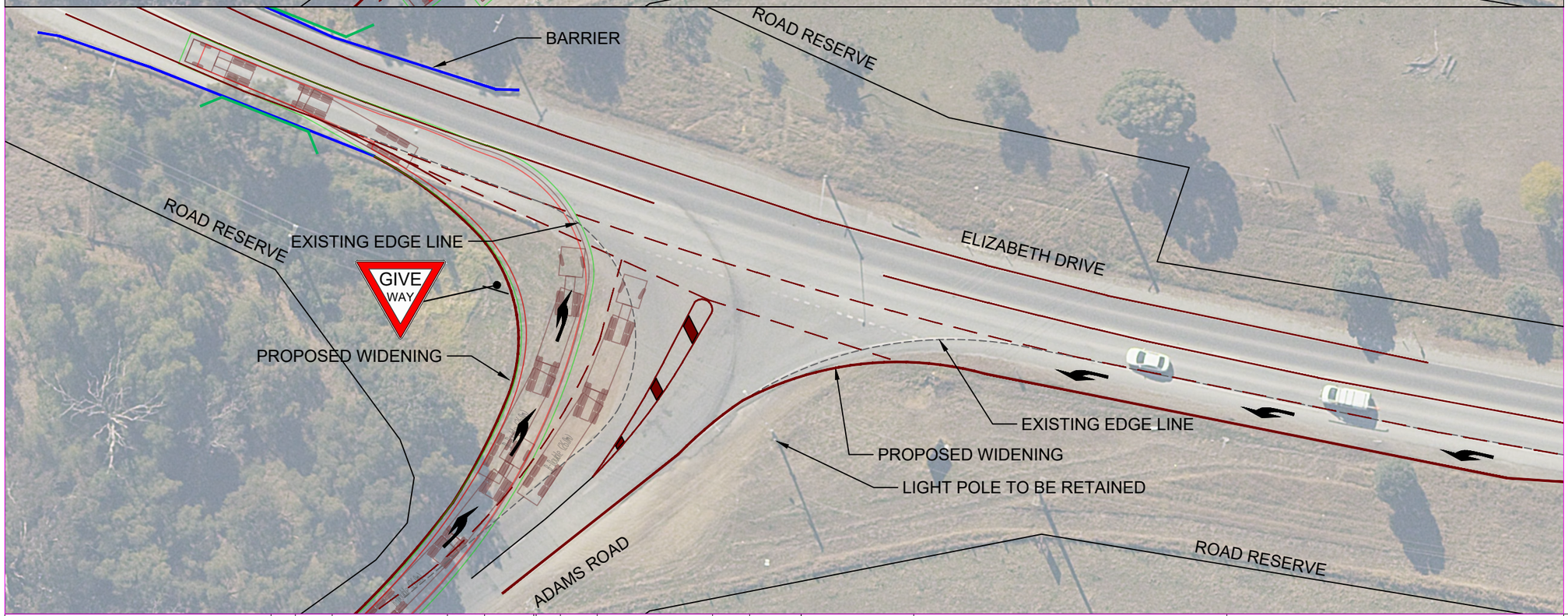
DRAWING TITLE:
Elizabeth Drive/Adams Road intersection design

Concept plan

CLIENT:	CPG&KLF
DRG. #:	EMM-101
PROJECT #:	J190749
SCALE:	1:500

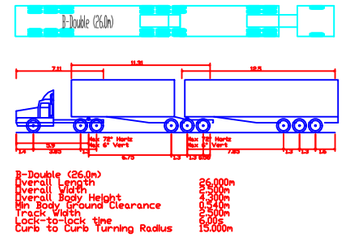
REV: 2

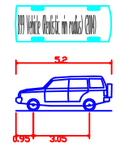




COMMENTS

A3





B99 Vehicle (Realistic min radius) (2004)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.878m
Min Body Ground Clearance	0.272m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.250m

NOTES:

1. Lanes 3.5 m wide minimum.
2. The left turn lane is 90 m long with a taper of 30 m.
3. The Adams Road approach allows for simultaneous left and right turn car movements.
4. Swept path shows vehicle wheel path (red), body overhang (black) and 500 mm clearance (green)

EMM creating opportunities

SYDNEY | Suite 01
Ground Floor
20 Chandos Street,
St Leonards NSW 2065

Phone # 02 9493 9500

www.emmconsulting.com.au

REV	DATE	COMMENT	DRAWN	REVIEWED
2	12/04/21	REMOVAL OF RIGHT TURN BAY	EL	AU
1	09/03/21	FOR INFORMATION	EL	AU

REV	DATE	COMMENT	DRAWN	REVIEWED

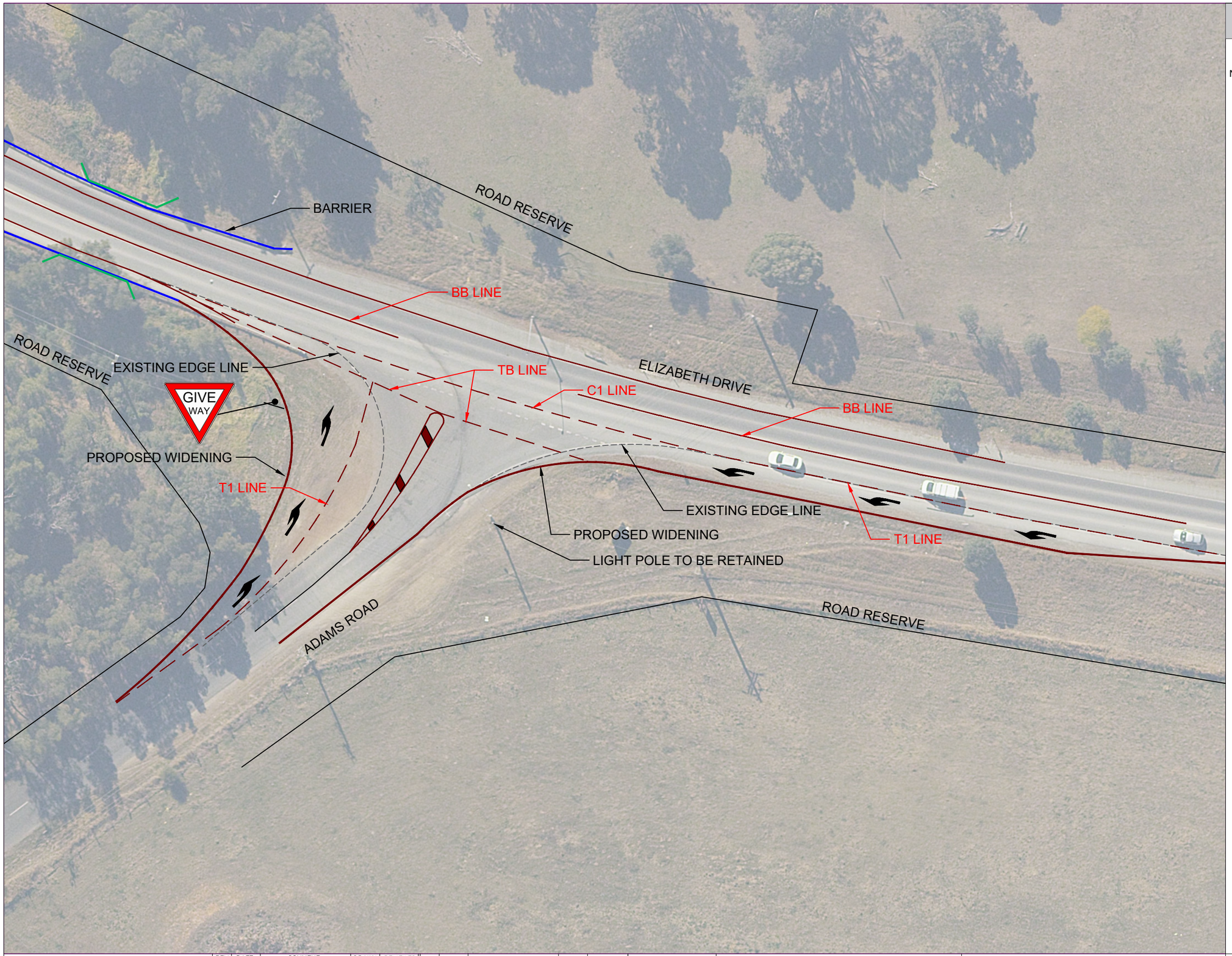
PROJECT: Luddenham ARRC

DRAWING TITLE: Elizabeth Drive/Adams Road intersection design

26 m B-Double swept path

CLIENT:	CPG&KLF
DRG. #:	EMM-102
PROJECT #:	J190749
SCALE:	1:500

REV: 2



COMMENTS

A3

NOTES:
1. Lanes 3.5 m wide minimum.
2. The left turn bay is 90 m long with a taper of 30 m.

EMM creating opportunities

SYDNEY | Suite 01
Ground Floor
20 Chandos Street,
St Leonards NSW 2065

Phone # 02 9493 9500

www.emmconsulting.com.au

REV	DATE	COMMENT	DRAWN	REVIEWED	REV	DATE	COMMENT	DRAWN	REVIEWED
2	12/04/21	REMOVAL OF RIGHT TURN BAY	EL	AU					
1	09/03/21	FOR INFORMATION	EL	AU					

PROJECT:
Luddenham ARRC

DRAWING TITLE:
Elizabeth Drive/Adams Road intersection design

Line Marking Plan

CLIENT:	CPG&KLF
DRG. #:	EMM-103
PROJECT #:	J190749
SCALE:	1:500

REV: 2

Attachment E

SIDRA results

MOVEMENT SUMMARY

Site: 101 [2024 baseline The Northern Rd/ Adams Rd AM scenario 2 (Site Folder: General)]

Network: N201 [2024 baseline AM (Network Folder: Scenario 2)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1b	L3	18	17.6	18	17.6	0.022	16.6	LOS B	0.3	2.8	0.42	0.67	0.42	52.8
2	T1	1380	14.3	1380	14.3	0.809	24.8	LOS B	27.8	218.4	0.92	0.87	0.98	51.8
3a	R1	199	5.3	199	5.3	* 0.540	24.8	LOS B	4.5	32.9	0.94	0.80	0.94	39.1
Approach		1597	13.2	1597	13.2	0.809	24.7	LOS B	27.8	218.4	0.92	0.86	0.97	50.7
NorthEast: Adams Road														
24a	L1	271	7.8	271	7.8	* 0.407	20.3	LOS B	6.4	48.2	0.79	0.77	0.79	50.2
8	T1	1	0.0	1	0.0	0.005	40.7	LOS C	0.0	0.3	0.92	0.56	0.92	37.7
26b	R3	35	51.5	35	51.5	* 0.428	56.4	LOS D	1.6	16.4	1.00	0.74	1.00	30.0
Approach		306	12.7	306	12.7	0.428	24.5	LOS B	6.4	48.2	0.81	0.77	0.81	46.6
North: The Northern Road														
7b	L3	58	21.8	58	21.8	0.111	19.9	LOS B	1.0	8.7	0.68	0.73	0.68	44.7
8	T1	941	19.4	941	19.4	* 0.904	48.0	LOS D	25.1	204.5	1.00	1.07	1.34	39.0
9a	R1	18	17.6	18	17.6	0.118	49.0	LOS D	0.8	6.1	0.95	0.70	0.95	35.8
Approach		1017	19.5	1017	19.5	0.904	46.4	LOS D	25.1	204.5	0.98	1.05	1.30	39.1
SouthWest: Adams Road														
30a	L1	24	17.4	24	17.4	0.056	33.5	LOS C	0.8	6.5	0.78	0.68	0.78	39.6
2	T1	1	0.0	1	0.0	0.005	39.6	LOS C	0.0	0.3	0.92	0.54	0.92	26.4
32b	R3	24	17.4	24	17.4	0.249	53.3	LOS D	1.1	8.8	0.98	0.71	0.98	32.1
Approach		49	17.0	49	17.0	0.249	43.4	LOS D	1.1	8.8	0.88	0.69	0.88	35.3
All Vehicles		2969	15.4	2969	15.4	0.904	32.4	LOS C	27.8	218.4	0.93	0.91	1.06	45.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: The Northern Road											
P11	Stage 1	53	39.3	LOS D	0.1	0.1	0.94	0.94	65.6	34.2	0.52
P12	Stage 2	53	17.1	LOS B	0.1	0.1	0.87	0.87	40.9	30.9	0.76
P1B	Slip/ Bypass	53	39.3	LOS D	0.1	0.1	0.94	0.94	58.0	24.3	0.42
NorthEast: Adams Road											
P3	Full	53	39.3	LOS D	0.1	0.1	0.94	0.94	71.2	41.5	0.58

North: The Northern Road											
P31	Stage 1	53	39.3	LOS D	0.1	0.1	0.94	0.94	65.6	34.2	0.52
P32	Stage 2	53	39.3	LOS D	0.1	0.1	0.94	0.94	63.1	30.9	0.49
P3B	Slip/ Bypass	53	17.1	LOS B	0.1	0.1	0.87	0.87	35.8	24.3	0.68
SouthWest: Adams Road											
P1	Full	53	39.3	LOS D	0.1	0.1	0.94	0.94	70.4	40.5	0.57
All Pedestrians		421	33.7	LOS D	0.1	0.1	0.92	0.92	58.8	32.6	0.55

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: EMM CONSULTING | Licence: NETWORK / 1PC | Processed: Wednesday, March 31, 2021 4:33:26 PM
Project: T:\Jobs\2019\J190749 - CPG Luddenham Quarry\Technical studies\Transport\SIDRA\210331 Addendum TIA.sip9

MOVEMENT SUMMARY

Site: 101 [2024 baseline Elizabeth Dr/ Adams Rd AM scenario 2 (Site Folder: General)]

Network: N201 [2024 baseline AM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
21	L2	13	0.0	13	0.0	0.007	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	61.6
22	T1	182	15.6	182	15.6	0.099	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		195	14.6	195	14.6	0.099	0.5	NA	0.0	0.0	0.00	0.04	0.00	78.4
NorthWest: Elizabeth Drive														
28	T1	803	12.1	803	12.1	0.482	0.2	LOS A	1.0	7.7	0.10	0.06	0.11	77.3
29	R2	78	4.1	78	4.1	0.482	8.3	LOS A	1.0	7.7	0.10	0.06	0.11	72.3
Approach		881	11.4	881	11.4	0.482	0.9	NA	1.0	7.7	0.10	0.06	0.11	77.2
SouthWest: Adams Road														
30	L2	256	0.0	256	0.0	0.141	6.9	LOS A	0.6	4.3	0.26	0.59	0.26	54.7
32	R2	89	0.0	89	0.0	0.204	13.5	LOS A	0.6	4.0	0.74	0.91	0.78	55.5
Approach		345	0.0	345	0.0	0.204	8.6	LOS A	0.6	4.3	0.38	0.67	0.39	55.0
All Vehicles		1421	9.0	1421	9.0	0.482	2.7	NA	1.0	7.7	0.16	0.21	0.16	70.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2024 baseline Elizabeth Dr/ Luddenham Rd AM scenario 2 (Site Folder: General)]

Network: N201 [2024 baseline AM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
22	T1	274	19.6	274	19.6	0.154	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
23	R2	171	0.6	171	0.6	0.226	11.3	LOS A	1.0	6.8	0.65	0.87	0.66	55.6
Approach		444	12.3	444	12.3	0.226	4.4	NA	1.0	6.8	0.25	0.34	0.25	68.4
NorthEast: Luddenham Road														
24	L2	359	5.6	359	5.6	0.404	10.9	LOS A	2.2	16.5	0.61	0.91	0.80	54.5
26	R2	149	1.4	149	1.4	0.416	18.5	LOS B	1.6	11.5	0.81	0.99	1.09	53.9
Approach		508	4.3	508	4.3	0.416	13.1	LOS A	2.2	16.5	0.67	0.93	0.88	54.3
NorthWest: Elizabeth Drive														
27	L2	260	0.0	260	0.0	0.135	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
28	T1	528	10.6	528	10.6	0.279	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		788	7.1	788	7.1	0.279	2.3	NA	0.0	0.0	0.00	0.21	0.00	72.0
All Vehicles		1741	7.6	1741	7.6	0.416	6.0	NA	2.2	16.5	0.26	0.45	0.32	65.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

Site: 101 [2024 baseline The Northern Rd/ Adams Rd PM scenario 2 (Site Folder: General)]

Network: N201 [2024 baseline PM (Network Folder: Scenario 2)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1b	L3	22	9.5	22	9.5	0.025	16.5	LOS B	0.4	3.3	0.40	0.67	0.40	52.9
2	T1	1243	8.0	1243	8.0	0.657	19.3	LOS B	22.2	166.0	0.79	0.71	0.79	56.2
3a	R1	127	1.7	127	1.7	* 0.396	28.0	LOS B	3.5	24.7	0.93	0.77	0.93	36.6
Approach		1393	7.5	1393	7.5	0.657	20.1	LOS B	22.2	166.0	0.80	0.72	0.80	54.7
NorthEast: Adams Road														
24a	L1	372	3.7	372	3.7	* 0.604	31.3	LOS C	11.2	80.9	0.89	0.88	0.89	44.7
8	T1	1	0.0	1	0.0	0.005	44.9	LOS D	0.0	0.3	0.92	0.56	0.92	36.1
26b	R3	53	6.0	53	6.0	* 0.561	61.5	LOS E	2.7	20.2	1.00	0.77	1.06	31.9
Approach		425	4.0	425	4.0	0.604	35.1	LOS C	11.2	80.9	0.90	0.87	0.91	42.6
North: The Northern Road														
7b	L3	29	28.6	29	28.6	0.051	18.8	LOS B	0.5	4.8	0.60	0.70	0.60	46.1
8	T1	1272	6.2	1272	6.2	* 0.916	49.1	LOS D	37.2	274.4	1.00	1.07	1.28	38.5
9a	R1	23	9.1	23	9.1	0.143	53.3	LOS D	1.1	8.2	0.95	0.71	0.95	34.4
Approach		1324	6.8	1324	6.8	0.916	48.5	LOS D	37.2	274.4	0.99	1.06	1.26	38.5
SouthWest: Adams Road														
30a	L1	19	11.1	19	11.1	0.043	36.3	LOS C	0.7	5.4	0.79	0.67	0.79	38.9
2	T1	1	0.0	1	0.0	0.005	43.8	LOS D	0.0	0.3	0.92	0.54	0.92	24.9
32b	R3	19	11.1	19	11.1	0.208	58.6	LOS E	1.0	7.3	0.98	0.70	0.98	31.1
Approach		39	10.8	39	10.8	0.208	47.4	LOS D	1.0	7.3	0.88	0.68	0.88	34.4
All Vehicles		3181	6.8	3181	6.8	0.916	34.2	LOS C	37.2	274.4	0.89	0.88	1.01	44.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: The Northern Road											
P11	Stage 1	53	44.3	LOS E	0.1	0.1	0.94	0.94	70.6	34.2	0.48
P12	Stage 2	53	19.9	LOS B	0.1	0.1	0.88	0.88	43.7	30.9	0.71
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	63.0	24.3	0.39
NorthEast: Adams Road											
P3	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	76.2	41.5	0.54

North: The Northern Road											
P31	Stage 1	53	44.3	LOS E	0.1	0.1	0.94	0.94	70.6	34.2	0.48
P32	Stage 2	53	44.3	LOS E	0.1	0.1	0.94	0.94	68.0	30.9	0.45
P3B	Slip/ Bypass	53	19.9	LOS B	0.1	0.1	0.88	0.88	38.6	24.3	0.63
SouthWest: Adams Road											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	75.4	40.5	0.54
All Pedestrians		421	38.2	LOS D	0.1	0.1	0.93	0.93	63.3	32.6	0.52

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

Site: 101 [2024 baseline Elizabeth Dr/ Adams Rd PM scenario 2 (Site Folder: General)]

Network: N201 [2024 baseline PM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
21	L2	18	5.9	18	5.9	0.010	7.1	LOS A	0.0	0.0	0.00	0.63	0.00	61.6
22	T1	373	5.9	373	5.9	0.191	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		391	5.9	391	5.9	0.191	0.4	NA	0.0	0.0	0.00	0.03	0.00	78.8
NorthWest: Elizabeth Drive														
28	T1	647	2.8	647	2.8	0.472	1.2	LOS A	2.9	20.7	0.33	0.16	0.42	73.2
29	R2	176	0.0	176	0.0	0.472	9.7	LOS A	2.9	20.7	0.33	0.16	0.42	62.2
Approach		823	2.2	823	2.2	0.472	3.0	NA	2.9	20.7	0.33	0.16	0.42	72.1
SouthWest: Adams Road														
30	L2	197	0.0	197	0.0	0.129	7.5	LOS A	0.5	3.8	0.39	0.64	0.39	53.9
32	R2	79	0.0	79	0.0	0.194	14.2	LOS A	0.6	3.9	0.76	0.91	0.79	55.0
Approach		276	0.0	276	0.0	0.194	9.4	LOS A	0.6	3.9	0.49	0.72	0.50	54.4
All Vehicles		1489	2.8	1489	2.8	0.472	3.5	NA	2.9	20.7	0.27	0.23	0.33	68.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

Site: 101 [2024 baseline Elizabeth Dr/ Luddenham Rd PM scenario 2 (Site Folder: General)]

Network: N201 [2024 baseline PM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
22	T1	467	6.5	467	6.5	0.242	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
23	R2	99	1.1	99	1.1	0.080	8.4	LOS A	0.4	2.5	0.45	0.66	0.45	58.5
Approach		566	5.6	566	5.6	0.242	1.5	NA	0.4	2.5	0.08	0.12	0.08	75.1
NorthEast: Luddenham Road														
24	L2	516	0.0	516	0.0	0.415	8.7	LOS A	2.5	17.7	0.48	0.72	0.53	57.8
26	R2	385	0.0	385	0.0	0.780	21.4	LOS B	5.8	40.6	0.88	1.24	2.12	52.0
Approach		901	0.0	901	0.0	0.780	14.1	LOS A	5.8	40.6	0.65	0.94	1.21	54.2
NorthWest: Elizabeth Drive														
27	L2	89	1.2	89	1.2	0.047	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	65.0
28	T1	297	5.0	297	5.0	0.152	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		386	4.1	386	4.1	0.152	1.6	NA	0.0	0.0	0.00	0.15	0.00	73.6
All Vehicles		1854	2.6	1854	2.6	0.780	7.7	NA	5.8	40.6	0.34	0.52	0.61	62.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

Site: 101 [2029 baseline The Northern Rd/ Adams Rd AM scenario 2 (Site Folder: General)]

Network: N201 [2029 baseline AM (Network Folder: Scenario 2)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1b	L3	29	14.3	29	14.3	0.032	16.3	LOS B	0.6	4.7	0.38	0.68	0.38	52.9
2	T1	1599	14.4	1599	14.4	* 0.861	28.7	LOS C	42.4	332.9	0.89	0.89	0.98	49.1
3a	R1	228	5.1	228	5.1	* 0.716	33.3	LOS C	7.8	57.1	1.00	0.84	1.06	33.2
Approach		1857	13.2	1857	13.2	0.861	29.1	LOS C	42.4	332.9	0.90	0.88	0.98	47.6
NorthEast: Adams Road														
24a	L1	331	8.0	331	8.0	0.558	31.6	LOS C	11.4	85.1	0.87	0.85	0.87	43.7
8	T1	1	0.0	1	0.0	0.005	49.1	LOS D	0.1	0.4	0.92	0.56	0.92	34.7
26b	R3	43	51.2	43	51.2	* 0.649	70.3	LOS E	2.6	25.8	1.00	0.81	1.18	26.9
Approach		375	12.9	375	12.9	0.649	36.1	LOS C	11.4	85.1	0.89	0.84	0.91	40.8
North: The Northern Road														
7b	L3	69	21.2	69	21.2	0.107	19.1	LOS B	1.3	11.1	0.59	0.72	0.59	45.6
8	T1	1111	19.3	1111	19.3	0.800	34.2	LOS C	27.7	225.9	0.95	0.89	1.00	45.7
9a	R1	29	14.3	29	14.3	0.207	59.5	LOS E	1.5	12.2	0.97	0.72	0.97	32.5
Approach		1209	19.3	1209	19.3	0.800	33.9	LOS C	27.7	225.9	0.93	0.87	0.98	45.3
SouthWest: Adams Road														
30a	L1	48	15.2	48	15.2	0.119	42.6	LOS D	2.0	16.2	0.82	0.72	0.82	36.5
2	T1	1	0.0	1	0.0	0.005	48.0	LOS D	0.1	0.4	0.92	0.54	0.92	23.6
32b	R3	48	15.2	48	15.2	0.600	67.2	LOS E	2.8	22.2	1.00	0.78	1.10	28.7
Approach		98	15.1	98	15.1	0.600	54.8	LOS D	2.8	22.2	0.91	0.75	0.96	32.1
All Vehicles		3539	15.3	3539	15.3	0.861	32.2	LOS C	42.4	332.9	0.91	0.87	0.97	45.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: The Northern Road											
P11	Stage 1	53	49.3	LOS E	0.2	0.2	0.95	0.95	75.6	34.2	0.45
P12	Stage 2	53	23.0	LOS C	0.1	0.1	0.89	0.89	46.7	30.9	0.66
P1B	Slip/ Bypass	53	49.3	LOS E	0.2	0.2	0.95	0.95	68.0	24.3	0.36
NorthEast: Adams Road											
P3	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	81.2	41.5	0.51

North: The Northern Road											
P31	Stage 1	53	49.3	LOS E	0.2	0.2	0.95	0.95	75.6	34.2	0.45
P32	Stage 2	53	49.3	LOS E	0.2	0.2	0.95	0.95	73.0	30.9	0.42
P3B	Slip/ Bypass	53	23.0	LOS C	0.1	0.1	0.89	0.89	41.7	24.3	0.58
SouthWest: Adams Road											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	80.4	40.5	0.50
All Pedestrians		421	42.7	LOS E	0.2	0.2	0.93	0.93	67.8	32.6	0.48

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: EMM CONSULTING | Licence: NETWORK / 1PC | Processed: Wednesday, March 31, 2021 4:33:50 PM
Project: T:\Jobs\2019\J190749 - CPG Luddenham Quarry\Technical studies\Transport\SIDRA\210331 Addendum TIA.sip9

MOVEMENT SUMMARY

Site: 101 [2029 baseline Elizabeth Dr/ Adams Rd AM scenario 2 (Site Folder: General)]

Network: N201 [2029 baseline AM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
21	L2	6	0.0	6	0.0	0.003	6.9	LOS A	0.0	0.0	0.00	0.63	0.00	61.6
22	T1	102	15.5	102	15.5	0.056	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach		108	14.6	108	14.6	0.056	0.4	NA	0.0	0.0	0.00	0.04	0.00	78.6
NorthWest: Elizabeth Drive														
28	T1	769	12.0	769	12.0	0.456	0.1	LOS A	0.7	5.7	0.07	0.06	0.07	77.7
29	R2	73	2.9	73	2.9	0.456	7.6	LOS A	0.7	5.7	0.07	0.06	0.07	73.4
Approach		842	11.3	842	11.3	0.456	0.7	NA	0.7	5.7	0.07	0.06	0.07	77.6
SouthWest: Adams Road														
30	L2	346	0.0	346	0.0	0.178	6.6	LOS A	0.8	5.9	0.20	0.57	0.20	55.1
32	R2	121	0.0	121	0.0	0.233	12.3	LOS A	0.7	4.9	0.70	0.90	0.76	56.6
Approach		467	0.0	467	0.0	0.233	8.1	LOS A	0.8	5.9	0.33	0.66	0.34	55.7
All Vehicles		1418	7.8	1418	7.8	0.456	3.1	NA	0.8	5.9	0.15	0.25	0.15	69.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2029 baseline Elizabeth Dr/ Luddenham Rd AM scenario 2 (Site Folder: General)]

Network: N201 [2029 baseline AM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
22	T1	282	19.8	282	19.8	0.159	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
23	R2	165	0.6	165	0.6	0.190	10.4	LOS A	0.8	5.8	0.61	0.83	0.61	56.7
Approach		447	12.7	447	12.7	0.190	3.8	NA	0.8	5.8	0.23	0.31	0.23	69.4
NorthEast: Luddenham Road														
24	L2	380	5.5	380	5.5	0.391	10.2	LOS A	2.2	16.1	0.58	0.86	0.72	55.7
26	R2	158	1.3	158	1.3	0.385	16.5	LOS B	1.5	10.7	0.77	0.97	1.01	55.6
Approach		538	4.3	538	4.3	0.391	12.1	LOS A	2.2	16.1	0.64	0.89	0.80	55.6
NorthWest: Elizabeth Drive														
27	L2	220	0.0	220	0.0	0.114	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
28	T1	462	10.5	462	10.5	0.244	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		682	7.1	682	7.1	0.244	2.3	NA	0.0	0.0	0.00	0.20	0.00	72.1
All Vehicles		1667	7.7	1667	7.7	0.391	5.9	NA	2.2	16.1	0.27	0.45	0.32	65.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

Site: 101 [2029 baseline The Northern Rd/ Adams Rd PM scenario 2 (Site Folder: General)]

Network: N201 [2029 baseline PM (Network Folder: Scenario 2)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1b	L3	47	11.1	47	11.1	0.050	16.0	LOS B	0.9	7.1	0.37	0.69	0.37	53.1
2	T1	1360	8.0	1360	8.0	0.672	19.1	LOS B	25.9	193.7	0.78	0.70	0.78	56.4
3a	R1	140	1.5	140	1.5	* 0.509	32.8	LOS C	4.7	33.3	0.97	0.78	0.97	33.5
Approach		1547	7.6	1547	7.6	0.672	20.2	LOS B	25.9	193.7	0.78	0.71	0.78	54.5
NorthEast: Adams Road														
24a	L1	461	3.7	461	3.7	* 0.824	49.0	LOS D	18.8	135.6	0.99	1.03	1.10	37.1
8	T1	1	0.0	1	0.0	0.005	49.1	LOS D	0.1	0.4	0.92	0.56	0.92	34.7
26b	R3	65	6.5	65	6.5	* 0.767	70.5	LOS E	3.9	28.8	1.00	0.85	1.31	29.6
Approach		527	4.0	527	4.0	0.824	51.6	LOS D	18.8	135.6	0.99	1.01	1.13	36.0
North: The Northern Road														
7b	L3	34	28.1	34	28.1	0.052	18.0	LOS B	0.6	5.6	0.54	0.69	0.54	46.9
8	T1	1433	6.2	1433	6.2	* 0.902	44.9	LOS D	43.4	319.9	1.00	1.04	1.19	40.3
9a	R1	48	10.9	48	10.9	0.333	60.2	LOS E	2.6	19.7	0.98	0.74	0.98	32.3
Approach		1515	6.9	1515	6.9	0.902	44.8	LOS D	43.4	319.9	0.99	1.02	1.16	40.1
SouthWest: Adams Road														
30a	L1	34	9.4	34	9.4	0.079	41.2	LOS C	1.4	10.6	0.81	0.70	0.81	37.3
2	T1	1	0.0	1	0.0	0.005	48.0	LOS D	0.1	0.4	0.92	0.54	0.92	23.6
32b	R3	33	9.7	33	9.7	0.391	65.4	LOS E	1.8	13.9	1.00	0.73	1.00	29.5
Approach		67	9.4	67	9.4	0.391	53.0	LOS D	1.8	13.9	0.90	0.71	0.90	32.9
All Vehicles		3657	6.8	3657	6.8	0.902	35.5	LOS C	43.4	319.9	0.90	0.88	0.99	44.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: The Northern Road											
P11	Stage 1	53	49.3	LOS E	0.2	0.2	0.95	0.95	75.6	34.2	0.45
P12	Stage 2	53	23.0	LOS C	0.1	0.1	0.89	0.89	46.7	30.9	0.66
P1B	Slip/ Bypass	53	49.3	LOS E	0.2	0.2	0.95	0.95	68.0	24.3	0.36
NorthEast: Adams Road											
P3	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	81.2	41.5	0.51

North: The Northern Road											
P31	Stage 1	53	49.3	LOS E	0.2	0.2	0.95	0.95	75.6	34.2	0.45
P32	Stage 2	53	49.3	LOS E	0.2	0.2	0.95	0.95	73.0	30.9	0.42
P3B	Slip/ Bypass	53	23.0	LOS C	0.1	0.1	0.89	0.89	41.7	24.3	0.58
SouthWest: Adams Road											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	80.4	40.5	0.50
All Pedestrians		421	42.7	LOS E	0.2	0.2	0.93	0.93	67.8	32.6	0.48

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: EMM CONSULTING | Licence: NETWORK / 1PC | Processed: Wednesday, March 31, 2021 4:34:02 PM
Project: T:\Jobs\2019\J190749 - CPG Luddenham Quarry\Technical studies\Transport\SIDRA\210331 Addendum TIA.sip9

MOVEMENT SUMMARY

Site: 101 [2029 baseline Elizabeth Dr/ Adams Rd PM scenario 2 (Site Folder: General)]

Network: N201 [2029 baseline PM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
21	L2	9	11.1	9	11.1	0.005	7.1	LOS A	0.0	0.0	0.00	0.63	0.00	61.6
22	T1	187	5.6	187	5.6	0.096	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		197	5.9	197	5.9	0.096	0.4	NA	0.0	0.0	0.00	0.03	0.00	78.8
NorthWest: Elizabeth Drive														
28	T1	563	2.8	563	2.8	0.386	0.3	LOS A	1.4	10.1	0.20	0.14	0.20	74.6
29	R2	152	0.0	152	0.0	0.386	7.9	LOS A	1.4	10.1	0.20	0.14	0.20	65.5
Approach		715	2.2	715	2.2	0.386	1.9	NA	1.4	10.1	0.20	0.14	0.20	73.8
SouthWest: Adams Road														
30	L2	307	0.0	307	0.0	0.169	6.9	LOS A	0.8	5.6	0.28	0.59	0.28	54.5
32	R2	123	0.0	123	0.0	0.206	11.0	LOS A	0.6	4.5	0.64	0.86	0.66	57.7
Approach		431	0.0	431	0.0	0.206	8.1	LOS A	0.8	5.6	0.38	0.67	0.39	55.9
All Vehicles		1342	2.0	1342	2.0	0.386	3.7	NA	1.4	10.1	0.23	0.29	0.23	67.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: EMM CONSULTING | Licence: NETWORK / 1PC | Processed: Wednesday, March 31, 2021 4:34:02 PM
Project: T:\Jobs\2019\J190749 - CPG Luddenham Quarry\Technical studies\Transport\SIDRA\210331 Addendum TIA.sip9

MOVEMENT SUMMARY

Site: 101 [2029 baseline Elizabeth Dr/ Luddenham Rd PM scenario 2 (Site Folder: General)]

Network: N201 [2029 baseline PM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
22	T1	409	6.4	409	6.4	0.213	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
23	R2	84	1.3	84	1.3	0.062	8.0	LOS A	0.3	2.0	0.39	0.62	0.39	58.7
Approach		494	5.5	494	5.5	0.213	1.4	NA	0.3	2.0	0.07	0.11	0.07	75.2
NorthEast: Luddenham Road														
24	L2	483	0.0	483	0.0	0.364	8.0	LOS A	1.9	13.1	0.41	0.66	0.41	58.4
26	R2	361	0.0	361	0.0	0.607	15.1	LOS B	3.6	25.4	0.75	1.04	1.31	57.1
Approach		844	0.0	844	0.0	0.607	11.1	LOS A	3.6	25.4	0.55	0.82	0.79	57.6
NorthWest: Elizabeth Drive														
27	L2	68	1.5	68	1.5	0.036	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	64.9
28	T1	232	5.0	232	5.0	0.118	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		300	4.2	300	4.2	0.118	1.6	NA	0.0	0.0	0.00	0.14	0.00	73.6
All Vehicles		1638	2.4	1638	2.4	0.607	6.4	NA	3.6	25.4	0.30	0.48	0.43	64.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

Site: 101 [2024 dev The Northern Rd/ Adams Rd AM scenario 2 (Site Folder: General)] Network: N201 [2024 dev AM (Network Folder: Scenario 2)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1b	L3	18	17.6	18	17.6	0.022	16.6	LOS B	0.3	2.8	0.42	0.67	0.42	52.8
2	T1	1380	14.3	1380	14.3	0.809	24.8	LOS B	27.8	218.4	0.92	0.87	0.98	51.8
3a	R1	228	6.9	228	6.9	* 0.626	25.3	LOS B	5.3	39.2	0.96	0.81	0.97	38.7
Approach		1626	13.3	1626	13.3	0.809	24.8	LOS B	27.8	218.4	0.92	0.86	0.97	50.5
NorthEast: Adams Road														
24a	L1	276	9.5	276	9.5	* 0.420	20.5	LOS B	6.6	50.1	0.79	0.77	0.79	49.8
8	T1	1	0.0	1	0.0	0.005	40.7	LOS C	0.0	0.3	0.92	0.56	0.92	37.7
26b	R3	40	57.9	40	57.9	* 0.508	57.2	LOS E	1.9	19.9	1.00	0.76	1.05	29.3
Approach		317	15.6	317	15.6	0.508	25.2	LOS B	6.6	50.1	0.82	0.77	0.82	45.7
North: The Northern Road														
7b	L3	97	23.9	97	23.9	0.185	20.4	LOS B	1.8	15.1	0.70	0.75	0.70	44.3
8	T1	941	19.4	941	19.4	* 0.904	48.0	LOS D	25.1	204.5	1.00	1.07	1.34	39.0
9a	R1	18	17.6	18	17.6	0.118	49.0	LOS D	0.8	6.1	0.95	0.70	0.95	35.8
Approach		1056	19.7	1056	19.7	0.904	45.5	LOS D	25.1	204.5	0.97	1.04	1.28	39.2
SouthWest: Adams Road														
30a	L1	24	17.4	24	17.4	0.056	33.5	LOS C	0.8	6.5	0.78	0.68	0.78	39.6
2	T1	1	0.0	1	0.0	0.005	39.6	LOS C	0.0	0.3	0.92	0.54	0.92	26.4
32b	R3	24	17.4	24	17.4	0.249	53.3	LOS D	1.1	8.8	0.98	0.71	0.98	32.1
Approach		49	17.0	49	17.0	0.249	43.4	LOS D	1.1	8.8	0.88	0.69	0.88	35.3
All Vehicles		3048	15.8	3048	15.8	0.904	32.3	LOS C	27.8	218.4	0.93	0.91	1.06	45.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: The Northern Road											
P11	Stage 1	53	39.3	LOS D	0.1	0.1	0.94	0.94	65.6	34.2	0.52
P12	Stage 2	53	17.1	LOS B	0.1	0.1	0.87	0.87	40.9	30.9	0.76
P1B	Slip/ Bypass	53	39.3	LOS D	0.1	0.1	0.94	0.94	58.0	24.3	0.42
NorthEast: Adams Road											
P3	Full	53	39.3	LOS D	0.1	0.1	0.94	0.94	71.2	41.5	0.58

North: The Northern Road											
P31	Stage 1	53	39.3	LOS D	0.1	0.1	0.94	0.94	65.6	34.2	0.52
P32	Stage 2	53	39.3	LOS D	0.1	0.1	0.94	0.94	63.1	30.9	0.49
P3B	Slip/ Bypass	53	17.1	LOS B	0.1	0.1	0.87	0.87	35.8	24.3	0.68
SouthWest: Adams Road											
P1	Full	53	39.3	LOS D	0.1	0.1	0.94	0.94	70.4	40.5	0.57
All Pedestrians		421	33.7	LOS D	0.1	0.1	0.92	0.92	58.8	32.6	0.55

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: EMM CONSULTING | Licence: NETWORK / 1PC | Processed: Wednesday, March 31, 2021 4:33:32 PM
Project: T:\Jobs\2019\J190749 - CPG Luddenham Quarry\Technical studies\Transport\SIDRA\210331 Addendum TIA.sip9

MOVEMENT SUMMARY

Site: 101 [2024 dev Elizabeth Dr/ Adams Rd AM scenario 2 (Site Folder: General)]

Network: N201 [2024 dev AM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
21	L2	32	33.3	32	33.3	0.020	7.6	LOS A	0.0	0.0	0.00	0.63	0.00	61.6
22	T1	182	15.6	182	15.6	0.099	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		214	18.2	214	18.2	0.099	1.1	NA	0.0	0.0	0.00	0.09	0.00	76.6
NorthWest: Elizabeth Drive														
28	T1	803	12.1	803	12.1	0.483	0.2	LOS A	1.1	8.5	0.11	0.06	0.12	77.2
29	R2	78	4.1	78	4.1	0.483	8.5	LOS A	1.1	8.5	0.11	0.06	0.12	72.1
Approach		881	11.4	881	11.4	0.483	1.0	NA	1.1	8.5	0.11	0.06	0.12	77.1
SouthWest: Adams Road														
30	L2	262	2.4	262	2.4	0.147	6.9	LOS A	0.6	4.5	0.25	0.59	0.25	54.7
32	R2	100	9.5	100	9.5	0.257	15.2	LOS B	0.7	5.6	0.77	0.93	0.86	52.1
Approach		362	4.4	362	4.4	0.257	9.2	LOS A	0.7	5.6	0.40	0.68	0.42	53.6
All Vehicles		1457	10.6	1457	10.6	0.483	3.0	NA	1.1	8.5	0.17	0.22	0.18	69.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

Site: 101 [2024 dev Elizabeth Dr/ Luddenham Rd AM scenario 2 (Site Folder: General)] Network: N201 [2024 dev AM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
22	T1	280	21.4	280	21.4	0.159	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
23	R2	171	0.6	171	0.6	0.226	11.3	LOS A	1.0	6.8	0.65	0.87	0.66	55.6
Approach		451	13.6	451	13.6	0.226	4.3	NA	1.0	6.8	0.25	0.33	0.25	68.5
NorthEast: Luddenham Road														
24	L2	359	5.6	359	5.6	0.404	10.9	LOS A	2.2	16.5	0.61	0.91	0.80	54.5
26	R2	149	1.4	149	1.4	0.421	18.7	LOS B	1.6	11.7	0.82	0.99	1.10	53.8
Approach		508	4.3	508	4.3	0.421	13.2	LOS A	2.2	16.5	0.67	0.93	0.89	54.2
NorthWest: Elizabeth Drive														
27	L2	260	0.0	260	0.0	0.135	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
28	T1	528	10.6	528	10.6	0.279	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		788	7.1	788	7.1	0.279	2.3	NA	0.0	0.0	0.00	0.21	0.00	72.0
All Vehicles		1747	8.0	1747	8.0	0.421	6.0	NA	2.2	16.5	0.26	0.45	0.32	65.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2024 dev The Northern Rd/ Adams Rd PM scenario 2 (Site Folder: General)] Network: N201 [2024 dev PM (Network Folder: Scenario 2)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1b	L3	22	9.5	22	9.5	0.025	16.5	LOS B	0.4	3.3	0.40	0.67	0.40	52.9
2	T1	1243	8.0	1243	8.0	0.657	19.3	LOS B	22.2	166.0	0.79	0.71	0.79	56.2
3a	R1	129	3.3	129	3.3	* 0.407	28.1	LOS B	3.6	25.6	0.93	0.77	0.93	36.6
Approach		1395	7.6	1395	7.6	0.657	20.1	LOS B	22.2	166.0	0.80	0.72	0.80	54.7
NorthEast: Adams Road														
24a	L1	374	4.2	374	4.2	* 0.610	31.4	LOS C	11.3	81.8	0.89	0.88	0.89	44.5
8	T1	1	0.0	1	0.0	0.005	44.9	LOS D	0.0	0.3	0.92	0.56	0.92	36.1
26b	R3	55	9.6	55	9.6	* 0.596	62.0	LOS E	2.9	21.8	1.00	0.78	1.10	31.5
Approach		429	4.9	429	4.9	0.610	35.4	LOS C	11.3	81.8	0.90	0.87	0.92	42.3
North: The Northern Road														
7b	L3	34	37.5	34	37.5	0.061	19.0	LOS B	0.6	5.9	0.60	0.70	0.60	46.0
8	T1	1272	6.2	1272	6.2	* 0.916	49.1	LOS D	37.2	274.4	1.00	1.07	1.28	38.5
9a	R1	23	9.1	23	9.1	0.143	53.3	LOS D	1.1	8.2	0.95	0.71	0.95	34.4
Approach		1328	7.1	1328	7.1	0.916	48.4	LOS D	37.2	274.4	0.99	1.06	1.25	38.5
SouthWest: Adams Road														
30a	L1	19	11.1	19	11.1	0.043	36.3	LOS C	0.7	5.4	0.79	0.67	0.79	38.9
2	T1	1	0.0	1	0.0	0.005	43.8	LOS D	0.0	0.3	0.92	0.54	0.92	24.9
32b	R3	19	11.1	19	11.1	0.208	58.6	LOS E	1.0	7.3	0.98	0.70	0.98	31.1
Approach		39	10.8	39	10.8	0.208	47.4	LOS D	1.0	7.3	0.88	0.68	0.88	34.4
All Vehicles		3192	7.1	3192	7.1	0.916	34.3	LOS C	37.2	274.4	0.89	0.88	1.01	44.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: The Northern Road											
P11	Stage 1	53	44.3	LOS E	0.1	0.1	0.94	0.94	70.6	34.2	0.48
P12	Stage 2	53	19.9	LOS B	0.1	0.1	0.88	0.88	43.7	30.9	0.71
P1B	Slip/ Bypass	53	44.3	LOS E	0.1	0.1	0.94	0.94	63.0	24.3	0.39
NorthEast: Adams Road											
P3	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	76.2	41.5	0.54

North: The Northern Road											
P31	Stage 1	53	44.3	LOS E	0.1	0.1	0.94	0.94	70.6	34.2	0.48
P32	Stage 2	53	44.3	LOS E	0.1	0.1	0.94	0.94	68.0	30.9	0.45
P3B	Slip/ Bypass	53	19.9	LOS B	0.1	0.1	0.88	0.88	38.6	24.3	0.63
SouthWest: Adams Road											
P1	Full	53	44.3	LOS E	0.1	0.1	0.94	0.94	75.4	40.5	0.54
All Pedestrians		421	38.2	LOS D	0.1	0.1	0.93	0.93	63.3	32.6	0.52

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

Site: 101 [2024 dev Elizabeth Dr/ Adams Rd PM scenario 2 (Site Folder: General)]

Network: N201 [2024 dev PM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
21	L2	25	29.2	25	29.2	0.016	7.5	LOS A	0.0	0.0	0.00	0.63	0.00	61.6
22	T1	373	5.9	373	5.9	0.191	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		398	7.4	398	7.4	0.191	0.5	NA	0.0	0.0	0.00	0.04	0.00	78.4
NorthWest: Elizabeth Drive														
28	T1	647	2.8	647	2.8	0.473	1.3	LOS A	3.0	21.1	0.33	0.16	0.43	73.1
29	R2	176	0.0	176	0.0	0.473	9.8	LOS A	3.0	21.1	0.33	0.16	0.43	62.1
Approach		823	2.2	823	2.2	0.473	3.1	NA	3.0	21.1	0.33	0.16	0.43	72.0
SouthWest: Adams Road														
30	L2	200	1.6	200	1.6	0.132	7.5	LOS A	0.6	4.0	0.39	0.64	0.39	53.9
32	R2	85	6.2	85	6.2	0.227	15.3	LOS B	0.7	4.9	0.78	0.93	0.84	52.7
Approach		285	3.0	285	3.0	0.227	9.8	LOS A	0.7	4.9	0.51	0.73	0.52	53.3
All Vehicles		1506	3.7	1506	3.7	0.473	3.7	NA	3.0	21.1	0.28	0.24	0.33	68.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2024 dev Elizabeth Dr/ Luddenham Rd PM scenario 2 (Site Folder: General)] Network: N201 [2024 dev PM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
22	T1	471	7.2	471	7.2	0.245	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
23	R2	99	1.1	99	1.1	0.080	8.4	LOS A	0.4	2.5	0.45	0.66	0.45	58.5
Approach		569	6.1	569	6.1	0.245	1.5	NA	0.4	2.5	0.08	0.11	0.08	75.1
NorthEast: Luddenham Road														
24	L2	516	0.0	516	0.0	0.415	8.7	LOS A	2.5	17.7	0.48	0.72	0.53	57.8
26	R2	385	0.0	385	0.0	0.785	21.7	LOS B	5.9	41.2	0.88	1.24	2.16	51.8
Approach		901	0.0	901	0.0	0.785	14.3	LOS A	5.9	41.2	0.65	0.94	1.23	54.1
NorthWest: Elizabeth Drive														
27	L2	89	1.2	89	1.2	0.047	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	65.0
28	T1	297	5.0	297	5.0	0.152	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		386	4.1	386	4.1	0.152	1.6	NA	0.0	0.0	0.00	0.15	0.00	73.6
All Vehicles		1857	2.7	1857	2.7	0.785	7.7	NA	5.9	41.2	0.34	0.52	0.62	62.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2029 dev The Northern Rd/ Adams Rd AM scenario 2 (Site Folder: General)] Network: N201 [2029 dev AM (Network Folder: Scenario 2)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1b	L3	29	14.3	29	14.3	0.032	16.3	LOS B	0.6	4.7	0.38	0.68	0.38	52.9
2	T1	1599	14.4	1599	14.4	* 0.866	29.5	LOS C	43.2	339.5	0.90	0.89	0.99	48.6
3a	R1	257	8.6	257	8.6	* 0.746	33.2	LOS C	8.8	65.8	1.00	0.86	1.08	33.3
Approach		1885	13.6	1885	13.6	0.866	29.8	LOS C	43.2	339.5	0.90	0.89	0.99	47.0
NorthEast: Adams Road														
24a	L1	341	10.8	341	10.8	0.555	28.6	LOS C	11.6	88.9	0.86	0.82	0.86	45.0
8	T1	1	0.0	1	0.0	0.005	49.1	LOS D	0.1	0.4	0.92	0.56	0.92	34.7
26b	R3	55	61.5	55	61.5	* 0.865	77.7	LOS F	3.5	37.4	1.00	0.95	1.60	25.1
Approach		397	17.8	397	17.8	0.865	35.5	LOS C	11.6	88.9	0.88	0.84	0.96	40.5
North: The Northern Road														
7b	L3	114	33.3	114	33.3	0.194	20.4	LOS B	2.3	20.5	0.64	0.74	0.64	44.5
8	T1	1111	19.3	1111	19.3	0.838	39.2	LOS C	29.9	243.6	0.98	0.95	1.08	43.0
9a	R1	29	14.3	29	14.3	0.207	59.5	LOS E	1.5	12.2	0.97	0.72	0.97	32.5
Approach		1254	20.5	1254	20.5	0.838	38.0	LOS C	29.9	243.6	0.95	0.92	1.04	42.7
SouthWest: Adams Road														
30a	L1	48	15.2	48	15.2	0.119	42.6	LOS D	2.0	16.2	0.82	0.72	0.82	36.5
2	T1	1	0.0	1	0.0	0.005	48.0	LOS D	0.1	0.4	0.92	0.54	0.92	23.6
32b	R3	48	15.2	48	15.2	0.600	67.2	LOS E	2.8	22.2	1.00	0.78	1.10	28.7
Approach		98	15.1	98	15.1	0.600	54.8	LOS D	2.8	22.2	0.91	0.75	0.96	32.1
All Vehicles		3634	16.5	3634	16.5	0.866	33.9	LOS C	43.2	339.5	0.91	0.89	1.00	44.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: The Northern Road											
P11	Stage 1	53	49.3	LOS E	0.2	0.2	0.95	0.95	75.6	34.2	0.45
P12	Stage 2	53	23.0	LOS C	0.1	0.1	0.89	0.89	46.7	30.9	0.66
P1B	Slip/ Bypass	53	49.3	LOS E	0.2	0.2	0.95	0.95	68.0	24.3	0.36
NorthEast: Adams Road											
P3	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	81.2	41.5	0.51

North: The Northern Road											
P31	Stage 1	53	49.3	LOS E	0.2	0.2	0.95	0.95	75.6	34.2	0.45
P32	Stage 2	53	49.3	LOS E	0.2	0.2	0.95	0.95	73.0	30.9	0.42
P3B	Slip/ Bypass	53	23.0	LOS C	0.1	0.1	0.89	0.89	41.7	24.3	0.58
SouthWest: Adams Road											
P1	Full	53	49.3	LOS E	0.2	0.2	0.95	0.95	80.4	40.5	0.50
All Pedestrians		421	42.7	LOS E	0.2	0.2	0.93	0.93	67.8	32.6	0.48

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com
Organisation: EMM CONSULTING | Licence: NETWORK / 1PC | Processed: Wednesday, March 31, 2021 4:33:56 PM
Project: T:\Jobs\2019\J190749 - CPG Luddenham Quarry\Technical studies\Transport\SIDRA\210331 Addendum TIA.sip9

MOVEMENT SUMMARY

Site: 101 [2029 dev Elizabeth Dr/ Adams Rd AM scenario 2 (Site Folder: General)]

Network: N201 [2029 dev AM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
21	L2	21	40.0	21	40.0	0.014	7.7	LOS A	0.0	0.0	0.00	0.63	0.00	61.6
22	T1	102	15.5	102	15.5	0.056	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
Approach		123	19.7	123	19.7	0.056	1.3	NA	0.0	0.0	0.00	0.11	0.00	76.1
NorthWest: Elizabeth Drive														
28	T1	769	12.0	769	12.0	0.456	0.1	LOS A	0.8	5.8	0.07	0.06	0.07	77.7
29	R2	73	2.9	73	2.9	0.456	7.7	LOS A	0.8	5.8	0.07	0.06	0.07	73.2
Approach		842	11.3	842	11.3	0.456	0.7	NA	0.8	5.8	0.07	0.06	0.07	77.5
SouthWest: Adams Road														
30	L2	358	3.2	358	3.2	0.187	6.7	LOS A	0.9	6.3	0.19	0.57	0.19	55.1
32	R2	132	7.2	132	7.2	0.276	13.3	LOS A	0.8	6.3	0.73	0.92	0.82	54.0
Approach		489	4.3	489	4.3	0.276	8.5	LOS A	0.9	6.3	0.34	0.67	0.36	54.7
All Vehicles		1455	9.6	1455	9.6	0.456	3.4	NA	0.9	6.3	0.16	0.27	0.17	68.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2029 dev Elizabeth Dr/ Luddenham Rd AM scenario 2 (Site Folder: General)] Network: N201 [2029 dev AM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
22	T1	294	22.9	294	22.9	0.168	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
23	R2	165	0.6	165	0.6	0.190	10.4	LOS A	0.8	5.8	0.61	0.83	0.61	56.7
Approach		459	14.9	459	14.9	0.190	3.7	NA	0.8	5.8	0.22	0.30	0.22	69.6
NorthEast: Luddenham Road														
24	L2	380	5.5	380	5.5	0.391	10.2	LOS A	2.2	16.1	0.58	0.86	0.72	55.7
26	R2	158	1.3	158	1.3	0.393	16.8	LOS B	1.6	11.0	0.78	0.97	1.03	55.3
Approach		538	4.3	538	4.3	0.393	12.2	LOS A	2.2	16.1	0.64	0.89	0.81	55.5
NorthWest: Elizabeth Drive														
27	L2	220	0.0	220	0.0	0.114	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	65.4
28	T1	462	10.5	462	10.5	0.244	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		682	7.1	682	7.1	0.244	2.3	NA	0.0	0.0	0.00	0.20	0.00	72.1
All Vehicles		1679	8.3	1679	8.3	0.393	5.8	NA	2.2	16.1	0.26	0.45	0.32	65.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2029 dev The Northern Rd/ Adams Rd PM scenario 2 (Site Folder: General)] Network: N201 [2029 dev PM (Network Folder: Scenario 2)]

Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: The Northern Road														
1b	L3	47	11.1	47	11.1	0.049	16.1	LOS B	1.0	7.4	0.36	0.69	0.36	53.0
2	T1	1360	8.0	1360	8.0	0.647	18.9	LOS B	26.8	200.7	0.74	0.67	0.74	56.6
3a	R1	143	3.7	143	3.7	0.512	35.4	LOS C	5.3	38.6	0.97	0.79	0.97	32.0
Approach		1551	7.7	1551	7.7	0.647	20.3	LOS B	26.8	200.7	0.75	0.68	0.75	54.4
NorthEast: Adams Road														
24a	L1	464	4.3	464	4.3	* 0.834	53.1	LOS D	20.5	148.4	1.00	1.05	1.11	35.6
8	T1	1	0.0	1	0.0	0.005	53.3	LOS D	0.1	0.4	0.92	0.56	0.92	33.3
26b	R3	69	12.1	69	12.1	* 0.922	86.7	LOS F	4.9	38.0	1.00	0.97	1.67	25.9
Approach		535	5.3	535	5.3	0.922	57.4	LOS E	20.5	148.4	1.00	1.04	1.18	33.9
North: The Northern Road														
7b	L3	42	42.5	42	42.5	0.067	18.5	LOS B	0.8	8.1	0.53	0.70	0.53	46.6
8	T1	1433	6.2	1433	6.2	* 0.862	37.8	LOS C	41.5	305.8	0.96	0.94	1.05	43.7
9a	R1	48	10.9	48	10.9	* 0.327	64.6	LOS E	2.8	21.4	0.98	0.74	0.98	31.1
Approach		1523	7.4	1523	7.4	0.862	38.1	LOS C	41.5	305.8	0.95	0.92	1.03	43.2
SouthWest: Adams Road														
30a	L1	34	9.4	34	9.4	0.080	44.6	LOS D	1.5	11.6	0.81	0.70	0.81	36.0
2	T1	1	0.0	1	0.0	0.005	52.2	LOS D	0.1	0.4	0.92	0.55	0.92	22.4
32b	R3	33	9.7	33	9.7	0.427	71.4	LOS F	2.0	15.3	1.00	0.73	1.00	28.2
Approach		67	9.4	67	9.4	0.427	57.7	LOS E	2.0	15.3	0.91	0.71	0.91	31.6
All Vehicles		3676	7.3	3676	7.3	0.922	33.8	LOS C	41.5	305.8	0.87	0.84	0.93	44.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: The Northern Road											
P11	Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95	80.6	34.2	0.42
P12	Stage 2	53	26.0	LOS C	0.1	0.1	0.90	0.90	49.8	30.9	0.62
P1B	Slip/ Bypass	53	54.3	LOS E	0.2	0.2	0.95	0.95	73.0	24.3	0.33
NorthEast: Adams Road											
P3	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	86.2	41.5	0.48

North: The Northern Road											
P31	Stage 1	53	54.3	LOS E	0.2	0.2	0.95	0.95	80.6	34.2	0.42
P32	Stage 2	53	54.3	LOS E	0.2	0.2	0.95	0.95	78.0	30.9	0.40
P3B	Slip/ Bypass	53	26.0	LOS C	0.1	0.1	0.90	0.90	44.7	24.3	0.54
SouthWest: Adams Road											
P1	Full	53	54.3	LOS E	0.2	0.2	0.95	0.95	85.4	40.5	0.47
All Pedestrians		421	47.2	LOS E	0.2	0.2	0.94	0.94	72.3	32.6	0.45

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

Site: 101 [2029 dev Elizabeth Dr/ Adams Rd PM scenario 2 (Site Folder: General)]

Network: N201 [2029 dev PM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
21	L2	15	35.7	15	35.7	0.010	7.6	LOS A	0.0	0.0	0.00	0.63	0.00	61.6
22	T1	187	5.6	187	5.6	0.096	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		202	7.8	202	7.8	0.096	0.6	NA	0.0	0.0	0.00	0.05	0.00	78.2
NorthWest: Elizabeth Drive														
28	T1	563	2.8	563	2.8	0.387	0.3	LOS A	1.4	10.2	0.20	0.14	0.20	74.6
29	R2	152	0.0	152	0.0	0.387	7.9	LOS A	1.4	10.2	0.20	0.14	0.20	65.4
Approach		715	2.2	715	2.2	0.387	2.0	NA	1.4	10.2	0.20	0.14	0.20	73.7
SouthWest: Adams Road														
30	L2	312	1.4	312	1.4	0.173	6.9	LOS A	0.8	5.8	0.28	0.59	0.28	54.5
32	R2	128	3.3	128	3.3	0.223	11.4	LOS A	0.7	5.1	0.65	0.87	0.69	56.5
Approach		440	1.9	440	1.9	0.223	8.2	LOS A	0.8	5.8	0.39	0.67	0.40	55.4
All Vehicles		1357	2.9	1357	2.9	0.387	3.8	NA	1.4	10.2	0.23	0.30	0.24	66.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 9.0 | Copyright © 2000-2020 Akcelik and Associates Pty Ltd | sidrasolutions.com

MOVEMENT SUMMARY

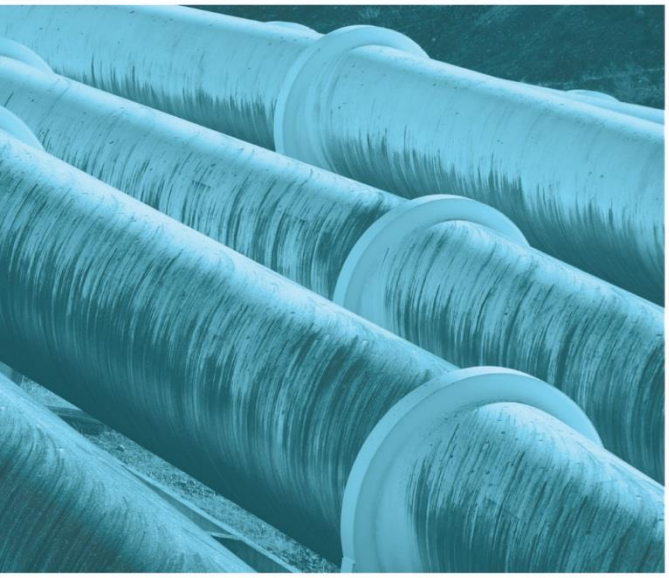
Site: 101 [2029 dev Elizabeth Dr/ Luddenham Rd PM scenario 2 (Site Folder: General)] Network: N201 [2029 dev PM (Network Folder: Scenario 2)]

Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Elizabeth Drive														
22	T1	414	7.4	414	7.4	0.216	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
23	R2	84	1.3	84	1.3	0.062	8.0	LOS A	0.3	2.0	0.39	0.62	0.39	58.7
Approach		498	6.3	498	6.3	0.216	1.4	NA	0.3	2.0	0.07	0.11	0.07	75.3
NorthEast: Luddenham Road														
24	L2	483	0.0	483	0.0	0.364	8.0	LOS A	1.9	13.1	0.41	0.66	0.41	58.4
26	R2	361	0.0	361	0.0	0.612	15.3	LOS B	3.7	25.7	0.75	1.05	1.33	57.0
Approach		844	0.0	844	0.0	0.612	11.1	LOS A	3.7	25.7	0.55	0.82	0.80	57.5
NorthWest: Elizabeth Drive														
27	L2	68	1.5	68	1.5	0.036	7.0	LOS A	0.0	0.0	0.00	0.63	0.00	64.9
28	T1	232	5.0	232	5.0	0.118	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.9
Approach		300	4.2	300	4.2	0.118	1.6	NA	0.0	0.0	0.00	0.14	0.00	73.6
All Vehicles		1642	2.7	1642	2.7	0.612	6.4	NA	3.7	25.7	0.30	0.48	0.43	64.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Network Data dialog (Network 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



www.emmconsulting.com.au