TRAFFIC IMPACT ASSESSMENT

FOR

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT

WISEMANS FERRY ROAD MAROOTA

VOLUME 1 REPORT

Ref. 20003RV1

21 April 2021

Prepared By

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GLOSSARY

ADT	-	Average Daily Volume (7 day average)
AWT	-	Average Weekday Volume (5 day average)
AUL	-	Auxiliary left turn lane treatment
AUR	-	Auxiliary right turn lane treatment
AVD	-	Average vehicle delay per vehicle in seconds
BAL	-	Basic left turn treatment
BAR	-	Basic right turn treatment
CHR	-	Channelised right treatment/lane
DPIE	-	Department of Planning, Infrastructure and Environment
DS	-	Degree of Saturation, a measure of intersection performance based on the ratio of demand flow to capacity
HMD	-	Highest Movement Delay in seconds
Light Vehicles	-	Austroads 1 and 2 vehicle classifications and motorbikes
LS	-	Level of Service, a measure of intersection performance based on vehicle delay. There are six levels of service from A to F, where Level of Service A represents very good conditions and spare capacity and Level of Service F represents oversaturated conditions.
Heavy Vehicles	-	Austroads 3-12 vehicle classifications
SEARs	-	Secretary's Environmental Assessment Requirements
SIDRA	-	SIDRA Intersection Traffic Model
SSD	-	State Significant Development
TfNSW	-	Transport for NSW (previously RMS and RTA)
vpd	-	Vehicles per day
vph	-	Vehicles per hour
95^{th}% queue	-	95^{th} percentile queue length in metres

EXECUTIVE SUMMARY

1. *This report documents the traffic impacts of the Maroota Friable Sandstone Extraction Project in Wisemans Ferry Road, Maroota.*

2. *The Project proposes to establish a quarry to extract, process and transport up to 500,000tpa of friable sandstone on land, which has frontage to Wisemans Ferry Road, south of Old Northern Road.*

3. *The Project life is expected to be 28 years with approval sought for 30 years. Sales and transportation is proposed between 6.00am and 6.00pm Monday to Saturday, with no operation on Sundays or public holidays.*

4. *The quarry is expected to employ 12 full time and part time staff, as well as 15-20 full time privately contracted truck drivers during its operational phase. Fifteen (15) people will be employed during the site establishment and construction phase.*

5. *Vehicle access to the quarry will be via Patricia Fay Drive. A new product haul road will be constructed from the quarry site to Patricia Fay Drive creating a T junction intersection, some 400 metres west of Wisemans Ferry Road.*

6. *As part of the Project, it is proposed to upgrade the intersection of Wisemans Ferry Road and Patricia Fay Drive to current Austroad Guidelines.*

7. *Transport routes will be via Wisemans Ferry Road and Old Northern Road towards Castle Hill and Wisemans Ferry Road/Cattai Road/Pitt Town Road towards Pitt Town. Both Old Northern Road and Wisemans Ferry Road/Cattai Road/Pitt Town Road are approved 25-26m B double routes.*

8. *The quarry will have its highest traffic generation on weekdays.*

9. *The Project is expected to generate 30 two way light vehicle trips (15 in/15 out) and up to 122 two way heavy vehicle trips (61 in/61 out) on a typical weekday.*

10. *Hourly volumes associated with product transport are expected to average 10-13 truck movements (5-7 in/5-7 out), with a maximum hour of 30 truck movements (15 in/15 out).*

11. *The assessment of the traffic impacts of the Project during the operational phase has found that the impacts on the road network, including the principal intersections will be satisfactory.*

12. *The assessment of cumulative impacts for the Year 2030, with the Project in place has also found that traffic conditions on the road network will remain satisfactory.*

13. *The Project is not expected to have any negative impacts on road safety or other road users.*

14. *Site establishment and construction of the quarry is expected to take 6-12 months and the assessment of the construction impacts has found that the impacts will be satisfactory.*

15. *Following approval of the Project, a Construction Traffic Management Plan will be prepared for the upgrade works to the intersection of Wisemans Ferry Road and Patricia Fay Drive to manage the impacts of the upgrade works.*

1.0 INTRODUCTION

1.1 Overview

Deerubbin Local Aboriginal Land Council (DLALC) is proposing to establish a quarry to extract, process and transport up to 500,000tpa of friable sandstone on land which has a frontage to Wisemans Ferry Road, south of Old Northern Road Maroota.

The Project would be for a period of up to 30 years.

DLALC is seeking approval for the sand quarry through a State Significant Development (SSD) application.

This report documents the traffic impacts of the Project.

1.2 Authority Requirements

The Project's Secretary's Environmental Assessment Requirements (SEAR's) for traffic and road transport are summarised in Table 1.1, together with where each requirement is addressed in this report or elsewhere in the EIS documentation.

TABLE 1.1

TRAFFIC AND ROAD TRANSPORT SEARS

Stakeholder	EIS Requirement Traffic and Road Transport	Comment
Department of Planning, Industry and Environment	(i) Accurate predictions of the road traffic generated by the construction and operation of the development, including a description of the types of vehicles likely to be used for transportation of quarry products;	See Sections 2.9 and 2.10
	(ii) A detailed assessment of potential traffic impacts on the capacity, condition, safety and efficiency of the local and State road network, (as identified above) including a road safety audit.	See Section 4 for Traffic Impact Assessment See Volume 2 report for Road Safety Audit.
	(iii) A description of the measures that would be implemented to mitigate any impacts.	See Section 4.1 and Figures 11A and 11B.
	(iv) A detailed assessment of the cumulative impacts on the local road network having regard for the existing approved and proposed developments in the Maroota area.	See Sections 3.8, 4.4 and 4.5.

TABLE 1.1 continued

TRAFFIC AND ROAD TRANSPORT SEARS

Stakeholder	EIS Requirement Traffic and Road Transport	Comment
Transport for NSW	TfNSW would like the following issues to be included in the transport and traffic impact assessment of the proposed development:	
	1. Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby road network intersections, and the need/associated funding for upgrading or road improvement works (if required). The key intersections to be examined/modelled include: • Patricia Fay Drive and Wisemans Ferry Road • Old Northern Road and Wisemans Ferry Road	See Sections 4.1, 4.2, 4.3, 4.4 and 4.5.
	2. Details of the proposed site access and the parking provisions associated with the proposed development including compliance with the requirements of the relevant Australian Standards (i.e, turn paths, sight distance and requirements, aisle widths, etc).	See Sections 2.7, 4.1 and 4.9.
	3. Details of vehicle circulation, proposed number of car parking spaces and compliance with the appropriate parking codes.	See Figure 3 and Section 4.9.
	4. Details of light and heavy vehicle movements (including vehicle type and likely arrival and departure times). Details of service vehicle movements (including vehicle type and likely arrival and departure times).	See Sections 2.9, 4.2 and 4.3.
	5. To ensure that the above requirements are fully addressed, the transport and traffic study must properly ascertain the cumulative study area traffic impacts associated with the development (and any other known proposed developments in the area). This process provides an opportunity to identify a package of traffic and transport infrastructure measures required to support future development. Regional and local intersection and road improvements, vehicular access options for adjoining sites, public transport needs, the timing and cost infrastructure works and the identification of funding responsibilities associated with the development should be identified.	See Section 4.1 for proposed improvement works and Sections 4.4 and 4.5 for traffic impacts and cumulative impacts.

1.3 Structure of this Report

Structure of Report

This report has been prepared to assess the traffic impacts associated with the project and will inform the preparation of the Environmental Impact Statement (EIS).

The assessment has been undertaken in accordance with the requirements of Roads and Traffic Authority now Transport for NSW *Guide to Traffic Generating Developments October 2002*.

Other technical standards/publications referenced in this assessment include:

- Austroads Guide to Road Design and RMS (now Transport for NSW) supplements.
- Austroads Guide to Traffic Management and RMS (now Transport for NSW) supplements.
- Austroads Guide to Traffic Management Part 12. Traffic Impacts of Developments.

The remaining sections of this report address the following;

- Section 2 – describes the Project;
- Section 3 – examines the existing traffic conditions on the road network;
- Section 4 – evaluates the traffic impacts of the proposed sand quarry including any cumulative impacts; and
- Section 5 – presents conclusions.

2.0 THE PROJECT

2.1 Site

The site (**Figure 1**) is located on the western side of Wisemans Ferry Road just south of Old Northern Road, Maroota. The site is located in the Hills Shire LGA.

The site covers an area of approximately 180 hectares and consists of Lot 7005 DP1055724, Lot 202 DP752025 and Lot 213 DP752025 Wisemans Ferry Road, Maroota. **Figure 2** shows the site.

Vehicle access to the site is via Patricia Fay Drive which forms a cross junction intersection with Wisemans Ferry Road, approximately 400 metres south of Old Northern Road.

The surrounding development in Maroota is a mixture of rural properties and other sand extraction quarries.

2.2 Project Description

The project involves

- The construction of associated site infrastructure and amenities for the quarry's operation;
- The establishment of internal haul roads and product haul road that will connect to Patricia Fay Drive;
- The transport of up to 500,000tpa of quarry product from the site to the Sydney market via Wisemans Ferry Road or Old Northern Road;
- The progressive rehabilitation of the site.

The project life is expected to be 28 years, with approval sought for 30 years. **Figure 3** shows the site layout plan for the Project.

2.3 Infrastructure and Equipment

The Project requires the following infrastructure and equipment.

- Relocatable sand processing plant;
- an amenities/office building providing an office, lunchroom, toilet and shower;
- weighbridge and wheel wash;
- designated parking area for employees and visitors;
- machinery workshop and diesel storage tanks;
- water tank integrated within the production plant;
- surface water dam and groundwater bore;
- portable water supply and enviro-cycle sewage system.

Power and telecommunications will be connected to the office building.

Mobile equipment will include:

- 1 x excavator;
- 1 x 30 tonne truck (rigid or articulated);
- a fuel truck and general greasing vehicle;

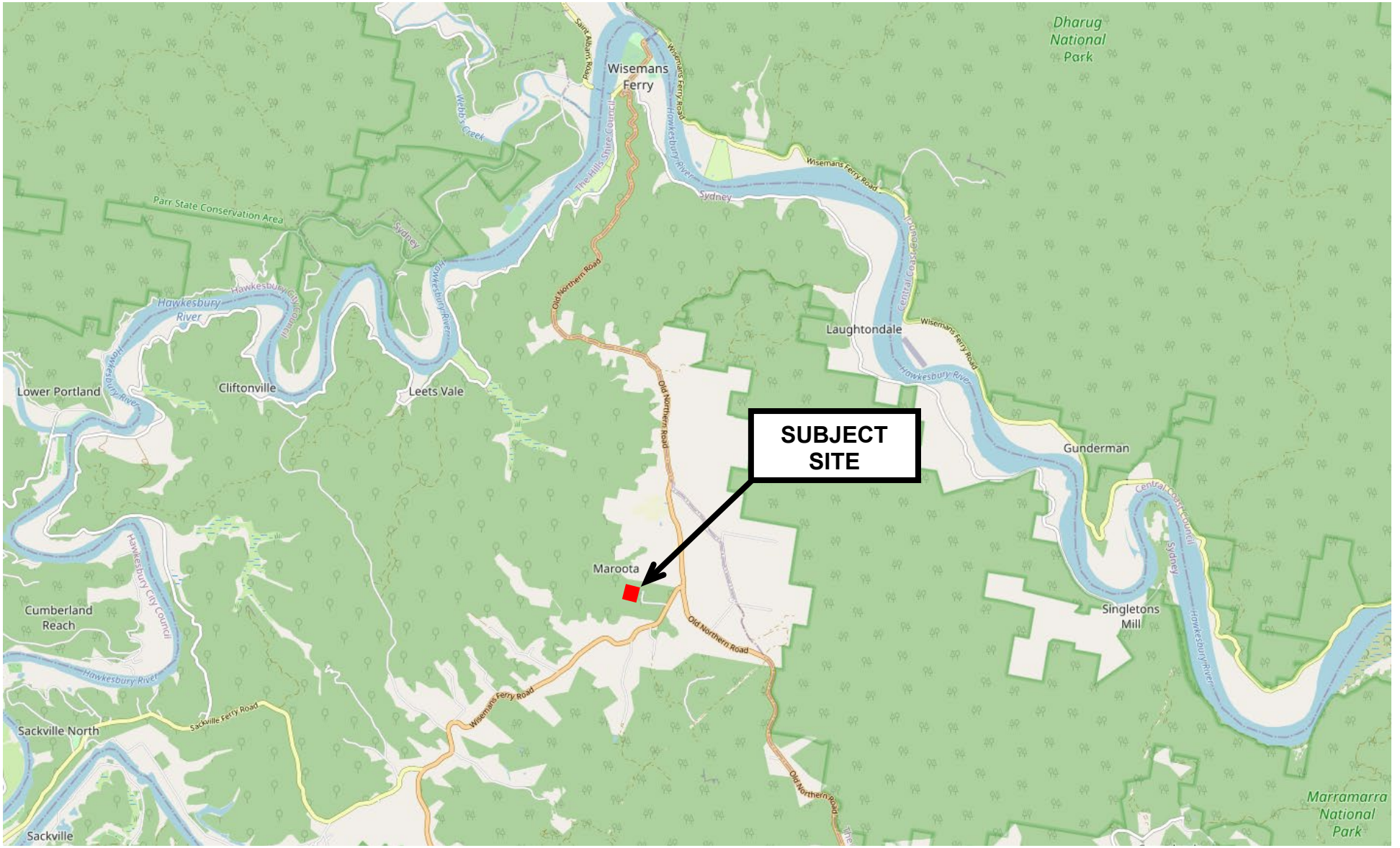

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FIGURE 1

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT
WISEMANS FERRY ROAD, MAROOTA

LOCATION

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FIGURE 2

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT
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SITE

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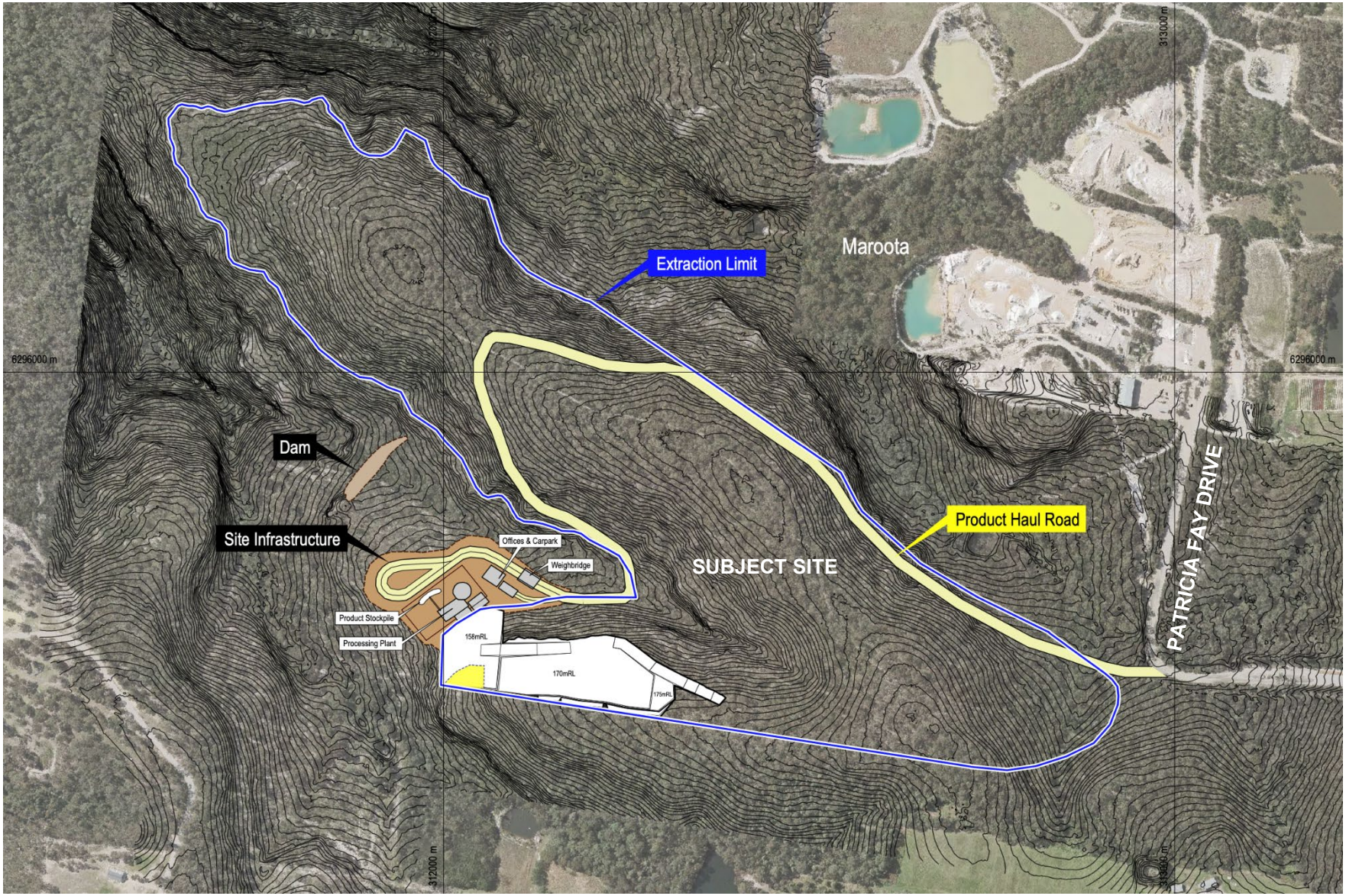

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FIGURE 3

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT
WISEMANS FERRY ROAD, MAROOTA

SITE LAYOUT PLAN FOR PROJECT

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- 1 x D9 dozer (or equivalent); and
- 1 x front end loader.

Product trucks will include 19 metre truck and dog combinations. Light vehicles will include 3 x 4 x 4 utility vehicles.

2.4 Site Establishment

Site establishment is expected to take 6-12 months with the majority of deliveries of equipment and materials to occur in the first 6 months.

2.5 Employment

Operational Phase

During the operational phase the Quarry is expected to employ up to 8 full time employees including the Quarry Manager. In addition, 4 part time staff will also be employed. The truck drivers associated with the transport of product sales will be contractors and are expected to number 15-20 full time privately contracted truck drivers.

Construction Phase

During the site establishment up to 15 full time personnel are estimated to be employed.

2.6 Hours of Operation

The proposed hours of operation are:

Sand Sales and Transportation

- 6:00am to 6:00pm Monday to Saturday; and
- no operation on Sundays or Public Holidays.

Quarry Operations

- 7:00am to 6:00pm Monday to Saturday; and
- no operation on Sundays or Public Holidays.

2.7 Vehicle Access

Vehicle access to the quarry will be from Patricia Fay Drive. An access haul road is proposed to be constructed within the site and will intersect with Patricia Fay Drive on the right angled bench approximately 415 metres west of Wisemans Ferry Road.

Providing the intersection on the bend will maximise sight distance at the intersection in both directions in Patricia Fay Drive. The intersection will be designed and constructed to Australian Standards taking into account the existing electricity and other infrastructure in Patricia Fay Drive.

The product haul road will be approximately 15 metres wide with a road surface of unsealed coarse sandstone and maintained by water cart operations.

2.8 Transport Routes

The two major transport routes are;

- Patricia Fay Drive and Wisemans Ferry Road/Cattai Road/Pitt Town Road towards Pitt Town; and

- Patricia Fay Drive, Wisemans Ferry Road, Old Northern Road towards Castle Hill.

Figure 4 shows the transport routes.

2.9 Truck Size

The proposed product trucks include 19.0 metre long truck and dog combinations which have average loads of 34 tonnes.

Trucks used by local customers and for ex bin sales, may range in size between rigid trucks (small and heavy rigid trucks) and 19.0 metre articulated vehicles.

For the purpose of the assessment, average loads are assumed at 32 tonnes.

2.10 Traffic Generation

Operational Phase

The traffic generation of the proposed quarry in the operational stage is expected to be:

- light vehicle trips associated with employees and any visitors estimated as up to 30 two way trips per day based on 15 in/15 out per day.

- sand product transport which is estimated to be an average of 120 two way heavy vehicle movements based on 60 truck loads per day on weekday and 60 two way truck movements on Saturdays based on 30 loads.

Other vehicles that will come to the Quarry include servicing and maintenance vehicles, as well as fuel and delivery vehicles.

These will number between 2-4 vehicles per week and will be a mix of light vehicles and heavy vehicles (i.e. rigid trucks).

Construction Phase

During the site establishment phase up to 15 full time personnel are expected to be employed and could be on site during the day, resulting in 30 light vehicle trips (15 in/15 out).

Vehicles delivering equipment and materials are expected to number up to 20 heavy vehicles per month (20 in/20 out).

On a busy day up to 10 heavy vehicles may make deliveries (10 in/10 out).

A proportion of these heavy vehicles may be over sized vehicles, with the remainder rigid trucks and 19 metre articulated trucks.

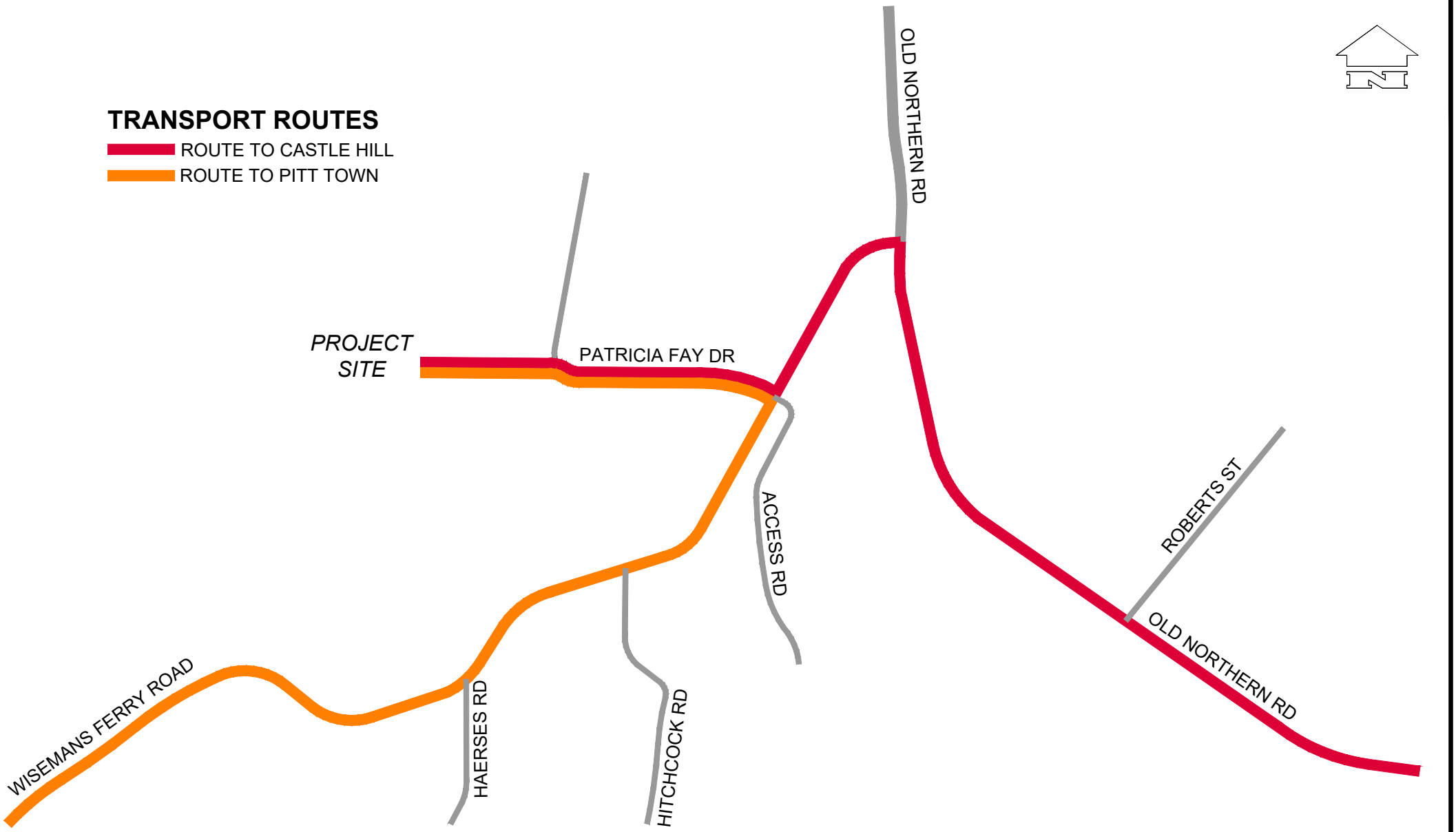

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FIGURE 4

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT
WISEMANS FERRY ROAD, MAROOTA

TRANSPORT ROUTES

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3.0 EXISTING TRAFFIC CONDITIONS ON TRANSPORT ROUTES

3.1 Principal Road Network

The principal road network that forms the transport routes are;

- Patricia Fay Drive;
- Wisemans Ferry Road, north and south of Patricia Fay Drive; and
- Old Northern Road, south of Wisemans Ferry Road.

3.2 Description of Roads

3.2.1 Patricia Fay Drive

Patricia Fay Drive is a local road that serves the PF Formation Sand and Concrete Quarry which is located on the western side of Wisemans Ferry Road.

It is a two lane road with a 90 degree bend which is mostly unsealed, with a short sealed road section approximately 190 metres long at the intersection with Wisemans Ferry Road.

Patricia Fay Drive forms a cross junction intersection with Wisemans Ferry Road, some 400 metres south of Old Northern Road.

The proposed quarry's haul road will form a T junction intersection with Patricia Fay Drive at the 90 degree bend, which is some 200 metres west of Wisemans Ferry Road.

3.2.2 Wisemans Ferry Road Transport Route

Wisemans Ferry Road, Cattai Road and Pitt Town Road is the main route to Windsor via Pitt Town, from Old Northern Road at Maroota. The road is a state road under the control of Transport for NSW (TfNSW).

The northern section of the road is predominantly a two lane rural road which passes through a rural/semi rural environment. In the Maroota area adjacent land uses are sand quarries, and agricultural uses. The southern section at Pitt Town passes through urban development.

The road is an approved 25m/26m B Double route and has a high level of traffic management including centreline, edgeline marking, guide posts and reflectors.

The alignment of the road varies with moderate curves and straight sections at Maroota and South Maroota. The section of the road near Little Cattai Creek has several tight curves and bends.

The speed limit on the Wisemans Ferry Road route is predominantly 80km/h with a 60km/h section in the built up area of Pitt Town.

There is a school zone at Cattai Public School.

Pitt Town Road terminates at a signalised T Junction intersection with Windsor Road.

Intersections along Wisemans Ferry Road near the proposed quarry at Maroota include;

- Old Northern Road (T junction);
- Patricia Fay Drive (cross junction intersection);
- Hitchcock Road (T junction);
- Haerses Road (T junction).

3.2.3 Old Northern Road Transport Route

Old Northern Road links between Wisemans Ferry and Baulkham Hills and is a state road under the control of TfNSW.

Old Northern Road between Maroota and Baulkham Hills is an approved 25m-26m B Double route. The road passes through Glenorie, Dural and Castle Hill.

Old Northern Road between Maroota and Dural is predominantly a two lane road with a high level of traffic management which includes centreline and edgeline marking, sealed shoulders, curve and other warning signs, guidepost and reflectors and auxiliary lanes at principal intersections.

The section between Castle Hill Road and Windsor Road at Baulkham Hills is a four lane divided road with principal intersections controlled by traffic signals.

The speed limits vary along the route as follows;

- 60km/h at Maroota and 80km/h and 90km/h in the rural and semi rural areas;
- 60km/h through the villages of Glenorie, Middle Dural and Dural and the urban area south of Dural.

School zones are located at the following locations along Old Northern Road;

- North of Caines Road, Glenorie;
- Near Mid Dural Road, Middle Dural;
- North of Vineys Road, Dural;
- North of Glenhaven Road, Round Corner;
- North of Castle Hill Road, west of Pennant Hills;
- North of McMullen Avenue, Castle Hill.

Maroota Public School also has a school zone in Old Northern Road, north of Wisemans Ferry Road, but this is not on the main transport route for Old Northern Road.

Intersections on Old Northern Road at Maroota include;

- Wisemans Ferry Road (T junction);
- Roberts Road (T junction).

3.3 Key Intersections

3.3.1 Wisemans Ferry Road Transport Route

The key intersections that will be used by all vehicles including product trucks from the proposed quarry will be:

- Wisemans Ferry Road/Patricia Fay Drive; and
- Old Northern Road/Wisemans Ferry Road.

The existing traffic management at these intersections is described below.

3.3.2 Wisemans Ferry Road/Patricia Fay Drive

This intersection will provide direct access to the proposed quarry via Patricia Fay Drive.

The intersection is located in Wisemans Ferry Road some 400 metres south of Old Northern Road. **Figure 5** shows the location and the intersection.

The speed limit at the intersection in Wisemans Ferry Road is 80km/h. The traffic management at the intersection includes:

- A cross junction intersection with a small length of kerb and guttering at the intersection on the western side;
- A CHR (right turn) lane treatment and an AUL (auxiliary left turn) lane treatment in the northern approach of Wisemans Ferry Road;
- A CHR (right turn) lane treatment and an AUL (auxiliary left turn) lane treatment in the southern approach of Wisemans Ferry Road;
- Patricia Fay Drive is sealed for the first 190 metres from the intersection with a sealed pavement width of 8-9 metres and flaring at the intersection, with Stop Sign Control.

Sight distance in both directions of Wisemans Ferry Road i.e. to and from the intersection is considered satisfactory (i.e, 240 metres to and from the south and 270 metres to and from the north) and meets Austroad requirements for Safe Intersection Sight Distance for the 80km/h speed limit.

The AUL left turn lane into Patricia Fay Drive from the southern approach of Wisemans Ferry Road is short (approximately 60 metres long including taper) and narrow (2.0-2.2 metres) and does not meet current Austroad Guidelines.

Similarly, the CHR (right turn) lane in the northern approach of Wisemans Ferry Road for the right turn into Patricia Fay Drive is also short (approximately 55 metres long including taper).

The eastern leg of the intersection opposite Patricia Fay Drive provides access to part of the Hitchcock Road sand quarry on the eastern side of Wisemans Ferry Road.

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FIGURE 5

INTERSECTION OF WISEMANS FERRY ROAD AND PATRICIA FAY DRIVE, MAROOTA

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The eastern leg is subject to Stop Sign control and is gated with a locked gate. No entry signs are provided on the gates. It is understood that this quarry which is operated by PF Formation does not transport any sand product from this site by road. The eastern leg is currently only used by light vehicles associated with the workers on the site and the occasional heavy quarry vehicle and other vehicles associated with maintenance of equipment on the site.

The CHR (right turn) treatment in the southern approach of Wisemans Ferry Road is 70 metres long including taper. The AUL (auxiliary left turn) lane treatment in the northern approach is 85 metres long.

Isolated (minor) street lighting is provided at the intersection. Multiple truck warning signs are provided in both approaches of Wisemans Ferry Road at the intersection.

3.3.3 Old Northern Road/Wisemans Ferry Road Intersection

This intersection is shown in **Figure 6**. The speed limit at the intersection is 60km/h/ The traffic management includes:

- Single lane approach and departure lanes in the northern and southern legs of Old Northern Road, together with a basic BAL (left turn) treatment in the southern approach of Old Northern Road for the left turn into Wisemans Ferry Road.

- Single lane approach and departure lanes in Wisemans Ferry Road, together with a Basic BAL (left turn) lane treatment for the left turn from Wisemans Ferry Road into Old Northern Road.

Both the BAL left turn treatment are suitable for longer heavy vehicles.

Wisemans Ferry Road is subject to Give Way (Priority) control at the intersection.

Sight distance at the intersection is good with 120 metres of sight distance to and from the north in Old Northern Road and 160 metres of sight distance to and from the south in Old Northern Road. The available sight distance meets Austroads requirements for Safe Intersection Sight Distance for the posted 60km/h speed limit in Old Northern Road.

Isolated (minor) street lighting is provided at the intersection.

3.4 Existing Traffic Conditions on Road Network

3.4.1 Existing Traffic Volumes

It was not feasible to undertake traffic counts in the early to mid part of 2020, due to the COVID restrictions which disrupted traffic patterns on the road network. Therefore, traffic counts undertaken in 2017 have been used in the traffic assessment. A comparison to 2019 traffic counts undertaken by Seca Solutions for the Haerses Road Sand Quarry Modification 3, shows that the 2017 count data is similar to the 2019 counts and therefore is representative of existing traffic conditions.

Daily volumes including vehicle classification counts were undertaken on the road network at Maroota between 21-27 March 2017.

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FIGURE 6

INTERSECTION OF OLD NORTHERN ROAD AND WISEMANS FERRY ROAD, MAROOTA

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The volume and vehicle classification counts were undertaken in Old Northern Road and Wisemans Ferry Road near the project site. **Figure 7** shows the count locations and **Figure 8** shows a summary of the daily volume and vehicle classification counts.

In addition, intersection traffic counts were undertaken during the AM and PM periods on Wednesday 22 March 017 at the key intersections of;

- Old Northern Road/Wisemans Ferry Road; and
- Wisemans Ferry Road/Patricia Fay Drive.

Weekdays will have the highest traffic generation of the proposed quarry and the AM and PM peak hours represent those periods with the highest volumes using the road network.

3.4.2 Daily Volumes on the Road Network

Table 3.1 and **Figure 8** shows the daily traffic volumes and the proportion of heavy vehicles using the road network in the area.

Reference to Table 3.1 shows that on a typical weekday two way traffic volumes in Old Northern Road south east of Roberts Road number 2043 vehicles per day (vpd) with some 17.5% of these vehicles being heavy vehicles (Austroad Classes 3-12).

In Wisemans Ferry Road, south west of Patricia Fay Drive, weekday volumes are in the order of 2039vpd with heavy vehicles representing 21.1% of the total vehicles.

TABLE 3.1

TWO WAY 5 DAY AVERAGE AND 7 DAY AVERAGE TRAFFIC VOLUMES AND VEHICLE CLASSIFICATIONS USING ROAD NETWORK

Location	5 Day Average (Weekday) Traffic Volumes			7 Day Average (ADT) Traffic Volumes		
	Total	No. of Heavy Vehicles[1]	% of Heavy Vehicles	Total	No. of Heavy Vehicles	% of Heavy Vehicles
Old Northern Road, north of Wisemans Ferry Road	2346	460	19.6%	2464	377	15.3%
Old Northern Road, south east of Roberts Road	2043	357	17.5%	2118	314	14.8%
Wisemans Ferry Road, south of Old Northern Road	2006	428	21.3%	1977	348	17.6%
Wisemans Ferry Road, south of Patricia Fay Drive	2039	430	21.1%	2002	336	16.8%
Wisemans Ferry Road, south west of Haerses Road	2008	448	22.3%	1984	357	18.0%

Source: Traffic Counts 21-27 March 2017

1. Austroad Class 3-12

Tables 3.2, 3.3 and 3.4 show the hourly volumes by direction on a typical weekday and average day at the following count locations.

- Old Northern Road south east of Roberts Road;
- Wisemans Ferry Road south of Old Northern Road; and
- Wisemans Ferry Road south of Patricia Fay Drive.

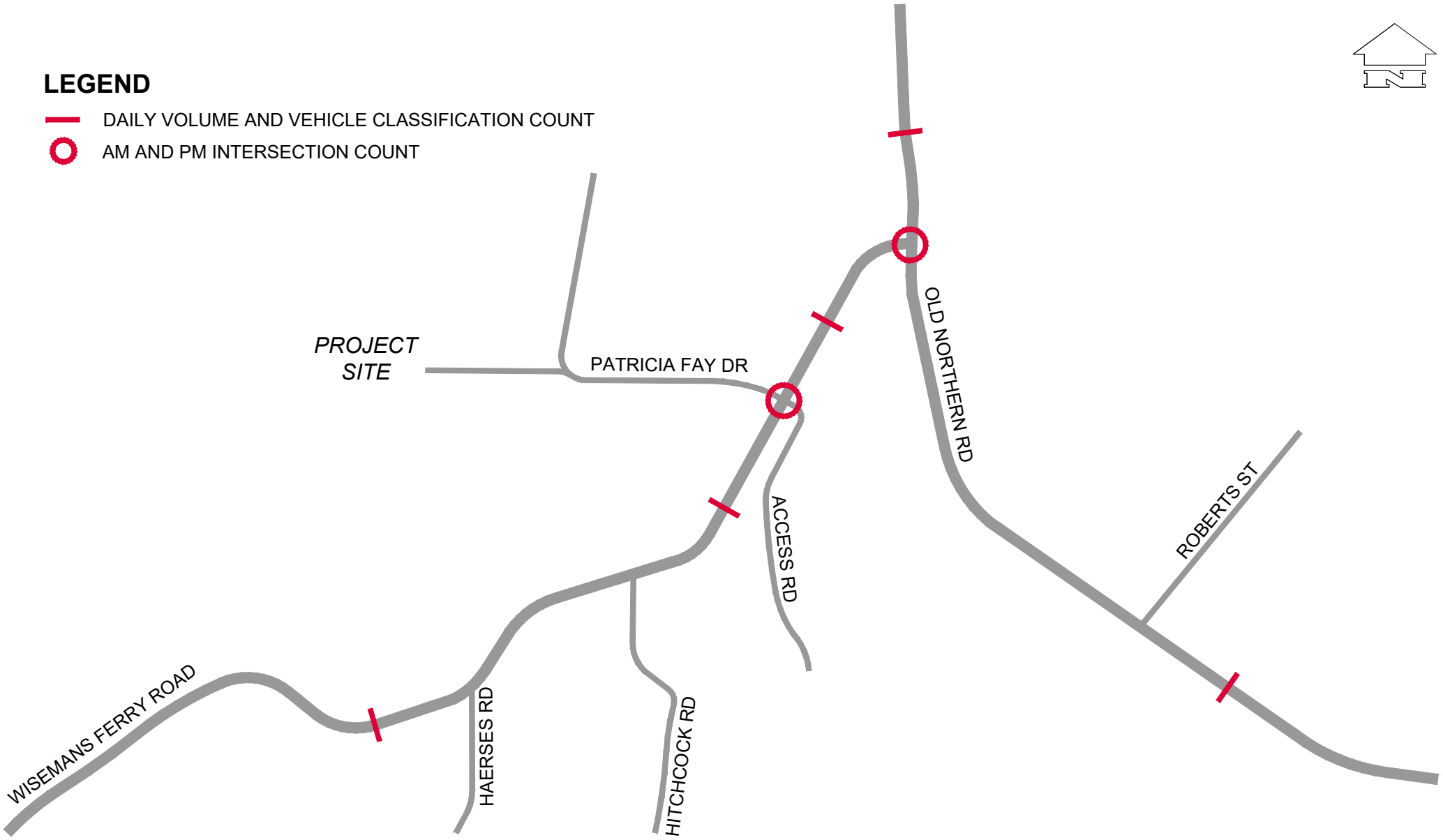

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FIGURE 7

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT
WISEMANS FERRY ROAD, MAROOTA

TRAFFIC COUNT LOCATIONS

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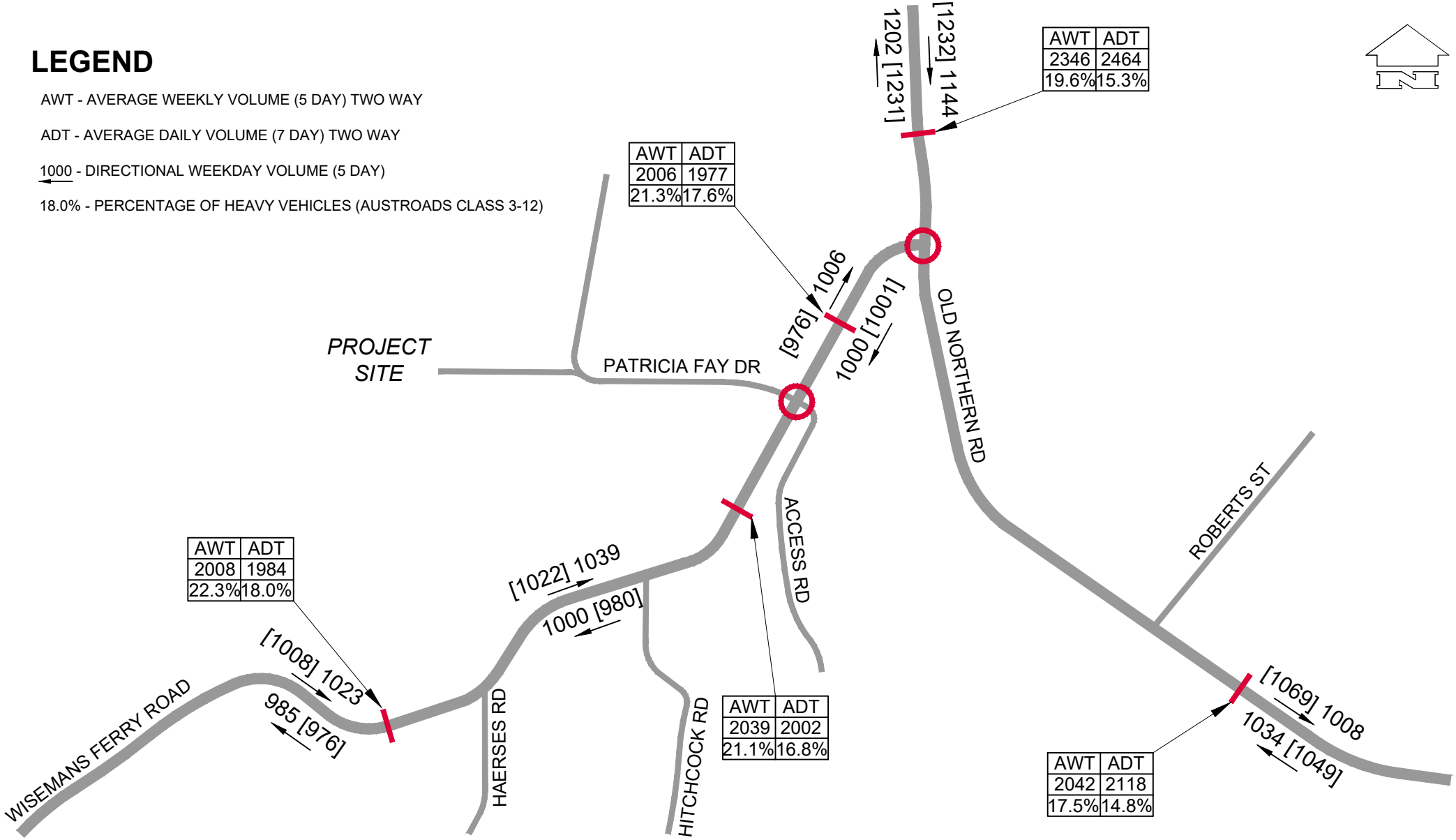
LEGEND

AWT - AVERAGE WEEKLY VOLUME (5 DAY) TWO WAY

ADT - AVERAGE DAILY VOLUME (7 DAY) TWO WAY

1000 - DIRECTIONAL WEEKDAY VOLUME (5 DAY)

18.0% - PERCENTAGE OF HEAVY VEHICLES (AUSTROADS CLASS 3-12)



COUNT DATES 21-27 MARCH 2017

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FIGURE 8

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT
WISEMANS FERRY ROAD, MAROOTA

WEEKDAY AND DAILY TRAFFIC VOLUMES

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TABLE 3.2

HOURLY TRAFFIC VOLUMES IN OLD NORTHERN ROAD, SOUTH EAST OF ROBERTS ROAD FOR AVERAGE WEEKDAY AND AVERAGE DAY

Time	5 Day Average			7 Day Average		
	East^{o}	West*	Total	East^{o}	West*	Total
Midnight – 1am	2	3	5	4	5	9
1am-2am	2	3	5	2	3	7
2am-3am	3	5	8	3	5	8
3am-4am	6	3	9	6	3	9
4am-5am	23	2	25	18	2	20
5am-6am	77	15	92	59	13	72
6am-7am	96	30	126	74	29	103
7am-8am	118	51	169	95	46	141
8am-9am	96	38	134	86	44	130
9am-10am	68	45	113	68	53	121
10am-11am	58	60	118	65	73	138
11am-12 noon	53	56	109	66	74	140
12 noon-1pm	47	57	104	61	76	137
1pm-2pm	60	49	109	74	64	138
2pm-3pm	62	56	118	77	63	140
3pm-4pm	62	90	152	79	85	164
4pm-5pm	58	123	181	76	109	185
5pm-6pm	43	113	156	56	96	152
6pm-7pm	26	97	123	36	82	118
7pm-8pm	19	56	75	23	48	71
8pm-9pm	14	37	51	16	31	47
9pm-10pm	7	23	30	9	22	31
10pm-11pm	3	14	17	8	14	22
11pm-Midnight	7	8	15	8	9	17

Source: Traffic Counts undertaken 21-27 March 2017
**Direction of Travel – towards the Project Site*
^{o}Direction of Travel – away from the Project Site

TABLE 3.3

HOURLY TRAFFIC VOLUMES IN WISEMANS FERRY ROAD, SOUTH OF OLD NORTHERN ROAD FOR AVERAGE WEEKDAY AND AVERAGE DAY

Time	5 Day Average			7 Day Average		
	South*	North^{o}	Total	South*	North^{o}	Total
Midnight – 1am	3	4	7	5	4	9
1am-2am	3	2	5	3	2	5
2am-3am	3	2	5	3	2	5
3am-4am	4	5	9	3	4	7
4am-5am	6	17	23	5	14	19
5am-6am	22	67	89	17	53	70
6am-7am	63	66	129	52	53	105
7am-8am	57	86	143	48	71	119
8am-9am	63	85	148	59	76	135
9am-10am	68	64	132	69	64	133
10am-11am	58	55	113	63	60	123
11am-12 noon	59	59	118	66	68	134
12 noon-1pm	61	60	121	70	68	138
1pm-2pm	55	64	119	64	65	129
2pm-3pm	67	62	129	74	64	138
3pm-4pm	90	68	158	88	72	160
4pm-5pm	100	65	165	97	64	161
5pm-6pm	76	62	138	74	58	132
6pm-7pm	54	44	98	53	44	97
7pm-8pm	37	26	63	34	25	59
8pm-9pm	23	19	42	21	20	41
9pm-10pm	14	11	25	15	13	28
10pm-11pm	9	6	15	10	7	17
11pm-Midnight	4	6	10	5	6	11

Source: Traffic Counts undertaken 21-27 March 2017
**Direction of Travel – towards the Project Site*
^{o}Direction of Travel – away from the Project Site

TABLE 3.4

HOURLY TRAFFIC VOLUMES IN WISEMANS FERRY ROAD, SOUTH OF PATRICIA FAY DRIVE FOR AVERAGE WEEKDAY AND AVERAGE DAY

Time	5 Day Average			7 Day Average		
	South^{o}	North*	Total	South^{o}	North*	Total
Midnight – 1am	3	4	7	5	3	8
1am-2am	3	2	5	3	2	5
2am-3am	3	2	5	3	2	5
3am-4am	4	6	10	3	4	7
4am-5am	6	19	25	5	15	20
5am-6am	22	77	99	17	61	78
6am-7am	65	72	137	53	57	110
7am-8am	54	83	137	45	69	114
8am-9am	66	87	153	60	77	137
9am-10am	66	65	131	66	69	135
10am-11am	54	56	110	58	60	118
11am-12 noon	59	60	119	65	72	137
12 noon-1pm	61	65	126	66	76	142
1pm-2pm	55	67	122	62	70	132
2pm-3pm	66	65	131	71	68	139
3pm-4pm	91	69	160	87	74	161
4pm-5pm	104	65	169	99	67	166
5pm-6pm	79	62	141	74	59	133
6pm-7pm	54	45	99	52	45	97
7pm-8pm	36	25	61	33	25	58
8pm-9pm	22	19	41	20	20	40
9pm-10pm	14	12	26	15	13	28
10pm-11pm	9	6	15	10	7	17
11pm-Midnight	4	7	11	5	7	12

Source: Traffic Counts undertaken 21-27 March 2017
**Direction of Travel – towards the Project Site*
^{o}Direction of Travel – away from the Project Site

3.4.3 Weekday AM and PM Peak Hour Traffic Volumes

Figure 9 and **10** shows the existing AM and PM peak hour traffic volumes at the key intersections of Old Northern Road/Wisemans Ferry Road and Wisemans Ferry Road/Patricia Fay Drive, as recorded in the traffic counts.

The peak hours at both intersections occurred between 8.15am – 9.15am and 3.30pm – 4.30pm.

Reference to **Figure 9** shows that traffic volumes using the intersection of Old Northern Road/Wisemans Ferry Road in the AM peak hour (8.15am – 9.15am) are as follows;

- A total of 109vph travelling southbound in Old Northern Road with 59vph turning right into Wisemans Ferry Road;

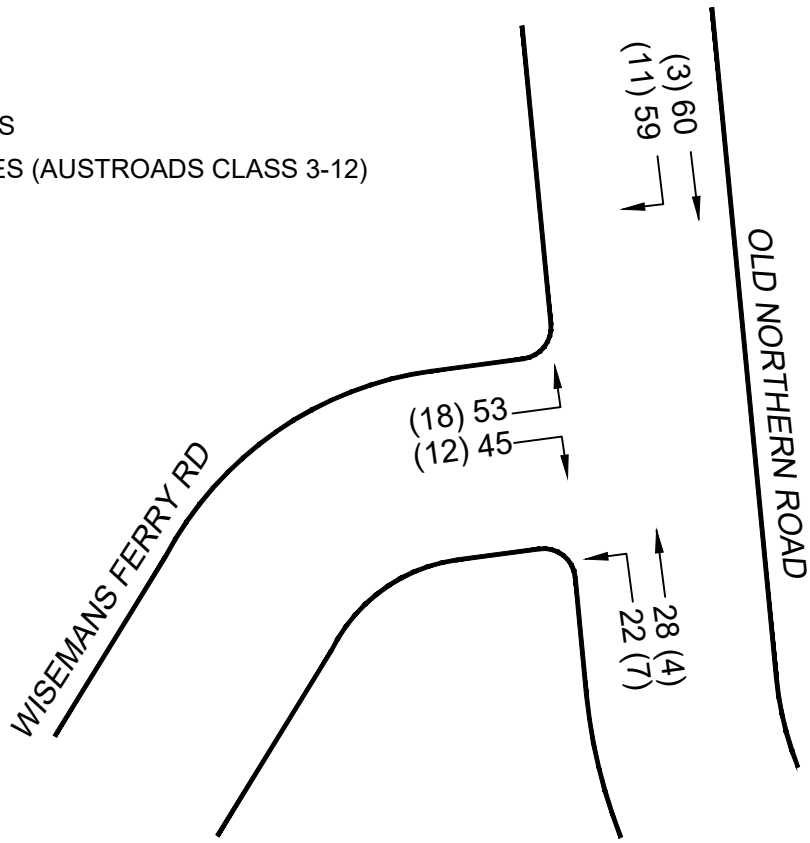
- A total of 50vph travelling northbound in Old Northern Road, with 22vph turning left into Wisemans Ferry Road; and

- Some 53vph and 45vph turn left and right out of Wisemans Ferry Road into Old Northern Road, respectively.

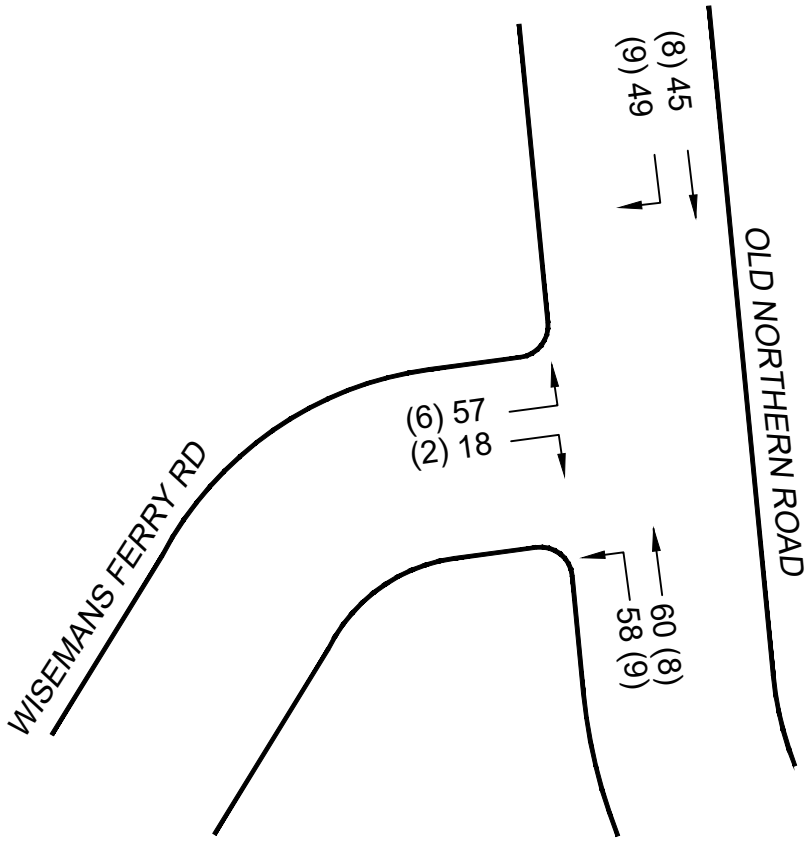
LEGEND

45 TOTAL VOLUMES

(8) HEAVY VEHICLES (AUSTROADS CLASS 3-12)



AM PEAK HOUR 8:15am-9:15am



PM PEAK HOUR 3:30pm-4:30pm

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FIGURE 9

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT

WISEMANS FERRY ROAD, MAROOTA

EXISTING AM AND PM TRAFFIC VOLUMES AT INTERSECTION OF OLD NORTHERN RD AND WISEMANS FERRY RD

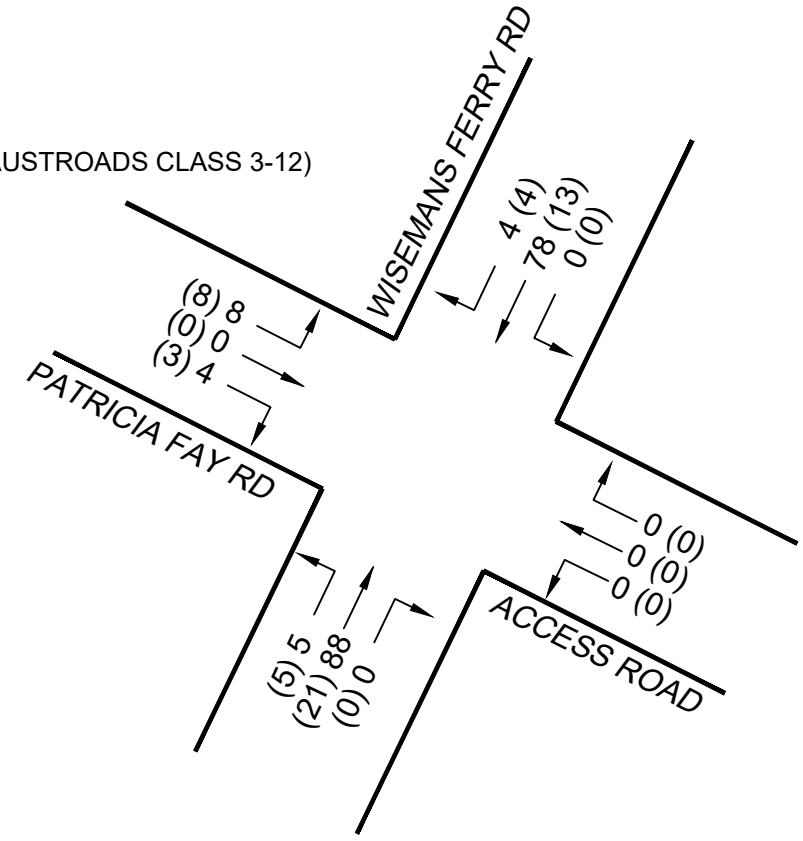
JOB NO.20003

28.9.20

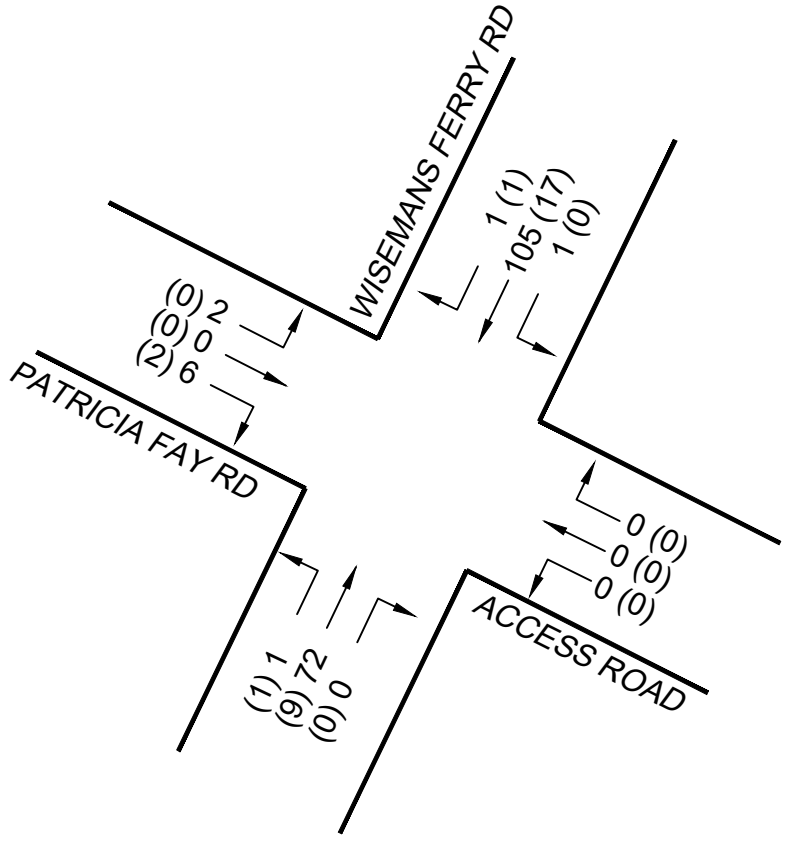
LEGEND

45 TOTAL VOLUMES

(8) HEAVY VEHICLES (AUSTROADS CLASS 3-12)



AM PEAK HOUR 8:15am-9:15am



PM PEAK HOUR 3:30pm-4:30pm

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FIGURE 10

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT

WISEMANS FERRY ROAD, MAROOTA

EXISTING AM AND PM TRAFFIC VOLUMES AT INTERSECTION OF WISEMANS FERRY ROAD AND PATRICIA DRIVE

JOB NO.20003 28.9.20

During the PM peak hour (3.30pm – 4.30pm) traffic volumes using the intersection are as follows:

- A total of 94vph travelling southbound in Old Northern Road, with 49vph turning right into Wisemans Ferry Road;
- A total of 118vph travelling northbound in Old Northern Road, with 58vph turning left into Wisemans Ferry Road; and
- Some 57vph and 18vph turning left and right out of Wisemans Ferry Road into Old Northern Road respectively.

At the Wisemans Ferry Road/Patricia Fay Drive intersection (**Figure 10**) the majority of the traffic volumes using the intersection during the AM and PM peak hours are travelling northbound and southbound in Wisemans Ferry Road, with relatively small volumes turning into Patricia Fay Drive.

During the AM peak hour (8.15am-9.15am), turning volumes into Patricia Fay Drive from Wisemans Ferry Road numbered 5vph turning left and 4vph turning right. During the PM peak hour (3.30pm-4.30pm) one (1) vph turned left and one (1) vph turned right into Patricia Fay Drive.

Traffic volumes turning left and right out of Patricia Fay Drive numbered 8vph turning left and 4vph turning right in the AM peak hour (8.15am-9.15am) and 2vph turning left and 6vph turning right in the PM peak hour (3.30pm-4.30pm).

Based on the above traffic counts, the existing traffic generation of PF Formation Sand and Concrete which uses Patricia Fay Drive are:

- 21vph (9 in/12 out) in the AM peak hour with 20 of these vehicles classified as heavy vehicles (i.e. Austroad Classes 3-12); and
- 10vph (2 in/8 out) in the PM peak hour with 4 of these vehicles classified as heavy vehicles (i.e. Austroad Classes 3-12).

3.4.4 Traffic Conditions on the Road Network

As part of the review of traffic conditions on the road network, the operational capacity of the principal intersections on the road network has been assessed using the SIDRA 8 traffic model.

SIDRA is a suitable model to assess the operational performance of intersections. Criteria for interpreting an intersections operation are Level of Service (LS), Degree of Saturation (DS) and Average Vehicle Delay (AVD). For intersections under Priority/Stop Sign control and Roundabout Control, Average Vehicle Delay for Individual Movements (HMD) is relevant.

Table 3.5 below is reproduced from the RTA's Guide to Traffic Generation Developments (October 2002) and provides an explanation of the various levels of service for intersections.

A Level of Service D or better (i.e. A, B, C or D) is generally considered to be minimum design requirement for intersections. The level of service for intersections controlled by Give Way/Stop Signs or under Roundabout Control is determined from the movement with highest average vehicle delay (HMD). For intersections controlled by traffic signals the level of service is determined by the Average Vehicle Delay for all vehicles using the intersection (AVD).

TABLE 3.5

LEVEL OF SERVICE CRITERIA FOR INTERSECTIONS

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	>70	Intersection is oversaturated	Oversaturated, requires other control mode

The results of the modelling are shown in Tables 3.6 and 3.7.

Reference to Table 3.6 which shows the modelling results for the intersection of Old Northern Road/Wisemans Ferry Road shows that the intersection currently operates at a Level of Service A operation (good operation) in both peak hours with low vehicle delays for vehicles in Wisemans Ferry Road of less than 7.0 seconds per vehicle.

Reference to Table 3.7 which shows the modelling results for the intersection of Wisemans Ferry Road/Patricia Fay Drive shows that this intersection operates with a Level of Service B operation in the AM peak hour and a Level of Service A operation in the PM peak hour. This represents a good operation.

Vehicle delays in Patricia Fay Drive are 10.8 to 16.2 seconds per vehicle in AM peak hour and 8.4 to 13.1 seconds per vehicle in the PM peak hour which are satisfactory delays.

SIDRA modelling outputs are contained in Appendix 1.

TABLE 3.6

SIDRA MODELLING RESULTS FOR OLD NORTHERN ROAD/WISEMANS FERRY ROAD INTERSECTION IN WEEKDAY AM AND PM PEAK HOURS FOR EXISTING CONDITIONS – GIVEWAY CONTROL

Approach	AM Peak				PM Peak			
	DS	**AVD**	**LS**	**95th% Queue Length**	**DS**	**AVD**	**LS**	**95th% Queue Length**
South Wisemans Ferry Road								
Left	0.086	6.1	A	3.7	0.056	5.9	A	1.9
Right	0.086	6.6	A	3.7	0.056	6.4	A	1.9
East Old Northern Road								
Left	0.029	5.9	A	0.0	0.066	5.7	A	0.0
Through	0.029	0.0	A	0.0	0.066	0.0	A	0.0
West Old Northern Road								
Through	0.071	0.1	A	2.7	0.056	0.3	A	2.6
Right	0.071	5.9	A	2.7	0.059	6.2	A	2.6
TOTAL – All Vehicles	**0.086**	**4.1**	**A**	**3.7**	**0.066**	**3.8**	**A**	**2.6**

Where: *DS* - *Degree of Saturation*
AVD - *Average Vehicle Delay in Seconds*
LS - *Level of Service*
95th% Queue Length - *95th% Queue Length in Metres*

TABLE 3.7

SIDRA MODELLING RESULTS FOR WISEMANS FERRY ROAD/PATRICIA FAY DRIVE INTERSECTION IN WEEKDAY AM AND PM PEAK HOURS FOR EXISTING CONDITIONS – STOP SIGN CONTROL

Approach	AM Peak				PM Peak			
	DS	AVD	LS	95th% Queue Length	DS	AVD	LS	95th% Queue Length
South Wisemans Ferry Road								
Left	0.005	6.1	A	0.0	0.001	6.1	A	0.0
Through	0.052	0.0	A	0.0	0.040	0.0	A	0.0
Right	0.001	5.7	A	0.0	0.001	5.8	A	0.0
East Unnamed Road								
Left	0.005	8.4	A	0.1	0.005	8.5	A	0.1
Through	0.005	10.0	A	0.1	0.005	10.0	A	0.1
Right	0.005	10.5	A	0.1	0.005	10.4	A	0.1
North Wisemans Ferry Road								
Left	0.001	5.5	A	0.0	0.001	5.5	A	0.0
Through	0.045	0.0	A	0.0	0.060	0.0	A	0.0
Right	0.005	6.9	A	0.4	0.001	6.7	A	0.1
West Patricia Fay Drive								
Left	0.026	10.8	A	2.0	0.018	8.4	A	0.7
Through	0.026	10.5	A	2.0	0.018	10.5	A	0.7
Right	0.026	16.2	B	2.0	0.018	13.1	A	0.7
TOTAL – All Vehicles	**0.052**	**1.4**	**B**	**2.0**	**0.060**	**0.8**	**A**	**0.7**

Where: *DS - Degree of Saturation*
AVD - Average Vehicle Delay in Seconds
LS - Level of Service
95th% Queue Length - 95th% Queue Length in Metres

3.5 Road Safety

3.5.1 Crash Statistics

Road crash data was obtained from TfNSW for the 3 year period, 1 October 2016 to 30 September 2019 for Old Northern Road and Wisemans Ferry Road at Maroota.

For Old Northern Road between Old Telegraph Road, Maroota and Canoelands Road, Canoelands, there were two (2) crashes including one (1) mid block rear end crash east of Roberts Road and one (1) rear end intersection crash at the intersection of Wisemans Ferry Road. Both crashes were non injury crashes.

The rear end intersection crash involved two southbound vehicles in Old Northern Road, one (1) of which was turning right into Wisemans Ferry Road.

For Wisemans Ferry Road, between Old Northern Road and Cliftonville Road there were a total of six (6) crashes, four (4) of which were injury crashes.

Five (5) of the crashes were run off the road type crashes involving a single vehicle (truck, car and motorcycle).

These occurred at different locations between Patricia Fay Drive and Weavers Road.

The other crash was a rear end crash which occurred adjacent the Shell Service Station, north east of Blakers Road.

There were no reported crashes at the intersection of Wisemans Ferry Road/Patricia Fay Drive.

As noted above, there was one non injury crash at the intersection of Old Northern Road/Wisemans Ferry Road.

3.5.2 Road Safety Audit

A Stage 5 Road Safety Audit, which is an audit of the existing roads, was undertaken on the section of Old Northern road and Wisemans Ferry Road between Roberts Road and Blakers Road at Maroota.

The audit examined the existing road alignment, cross sections, road shoulders, intersections, delineation/signage, bridges and culverts, pavement, provision for heavy vehicles and other miscellaneous matters and assessed these against current road practice guidelines and standard, with the objective of identifying any real or potential road safety hazards.

While not normally part of a road safety audit, the most recent 3 year crash statistics for the route were also analysed.

The audit findings identified that the existing CHR and AUL right and left turning lanes in Wisemans Ferry Road for the right and left turns into Patricia Fay Drive do not meet the current Austroad Guidelines for the 80km/h speed limit and should be upgraded.

A separate road safety audit report has been prepared and is presented as Volume 2.

3.6 Pedestrians and Cyclists

There are no formal footpaths and or pedestrian facilities at the intersections of Old Northern Road/Wisemans Ferry Road and Wisemans Ferry Road/Patricia Fay Drive.

Maroota is a rural area and as such pedestrian activity is minimal.

There are no formal bicycle facilities in Old Northern Road and Wisemans Ferry Road at or near Maroota.

3.7 Buses

The 672 bus service between Wisemans Ferry Road and Windsor, via Pitt Town and Oakville which is a loop service operates along Wisemans Ferry Road and the section of Old Northern Road, west of Wisemans Ferry Road. This is a limited bus service that operates on weekdays and Saturdays.

There are also school bus services that operate along Wisemans Ferry Road and sections of Old North Road at and near Maroota.

3.8 Recently Approved Quarries at Maroota and Current Proposals

Since 2016 the following quarries or modifications to existing quarry operations have been approved.

Dixon Sand – Old Northern Road Quarry

This quarry is located off Old Northern Road, north of Wisemans Ferry Road. DA 250-09-01 Modification 5, approved in 2017 increased operations until 2042. Transport is permitted between 5.45am to 6.00pm Monday to Saturday. Condition 7 permits up to 180 truck movements per day and up to 40 truck movements between 5.45am to 7.00am. This includes truck movements between this site and the Haerses Road Sand Quarry.

Telegraph Road Quarry

This is an approved quarry (1380/2014) located off Old Telegraph Road near Roberts Road, approved in 2017 for a maximum 100,000tpa of sand per year. A maximum of 10 truck movements each day entering and exiting the site between 6.00am and 7.00am are permitted. This quarry is not operating.

PF Formations – Old Northern Road Quarry

This is an approved quarry located in Old Northern Road, opposite Maroota Public School, north of Wisemans Ferry Road.

Approval 2136_2018_JP (2019) allows approximately 3 million tonnes of product to be extracted over 20 years.

The maximum number of truck loads is 35 loads (70 truck movements) a day, averaged over one calendar month with a maximum of 10 truck movements per hour between 6.00am – 7.00am. Transport is approved between 6.00am – 6.00pm Monday to Sunday. This quarry is not operating.

Haerses Road Quarry – Dixon Sand

This quarry is located off Haerses Road. This quarry has Modification 1 (2018) and 2 (2019) approved.

The approval allows extraction of up to 250,000 tonnes of quarry product per year, and the importation of up to 100,000tpa of VENM and ENM. Transport is approved between 6.00am – 6.00pm Monday to Saturday.

A transport limit of no more than 190,000tpa of product being transported to the Old Northern Road Quarry for processing, is a condition of consent.

The approval limits truck movements at the site (either arrival or dispatch) including truck movements to and from the Old Northern Road quarry to

- 56 truck movements per day; and
- 20 truck movements between 6.00am – 7.00am

Development Proposals

Haerses Road Quarry – Dixon Sand

Dixon Sand has lodged a development application for Modification 3 for the Haerses Road Sand Quarry. Modification 3 is currently being assessed.

The proposal seeks to;

- Increase the extraction rate from 250,000tpa to 495,000tpa; and increase the clean fill VENM and ENM importation from 100,00tpa to 250,000tpa; and

- Increase the truck movements from 56 per day to 180 per day (90 in/90 out).

The existing limit between 6.00am and 7.00am of a maximum of 10 truck movements will be maintained.

As part of the modification, it is proposed to upgrade the intersection at Wisemans Ferry Road/Haerses Road to provide a CHR right turn bay treatment to current guidelines/standards for the right turn into Haerses Road. It was noted in a site inspection on 29 September 2020 that this upgrade works at the intersection appeared to have been completed.

The Traffic Impact Assessment (TIA) for Modification 3 prepared by Seca Solutions assessed a maximum of 20 trucks per hour entering and exiting the Haerses Road Quarry (20 in/20 out) with 50% arriving and departing to/from the north via Wisemans Ferry Road and Old Northern Road.

The traffic assessment identified annual traffic growth between 2014 and 2019 in Wisemans Ferry Road and Old Northern Road of 4% per year and 1.8% per year, respectively.

4.0 ASSESSMENT OF TRAFFIC IMPACTS OF THE PROJECT

4.1 Proposed Improvement Works

As part of the Project, it is proposed to upgrade the intersection of Wisemans Ferry Road/Patricia Fay Drive to current Austroad guidelines to improve the left and right turn lanes from Wisemans Ferry Road into Patricia Fay Drive.

The proposed works are shown in the concept design plan (**Figures 11A** and **11B**) and include:

- Increasing the length and width of the AUL left turn lane in the southern approach of Wisemans Ferry Road to achieve a 3.5 metre wide lane which is 95 metres long, including taper: and

- Increasing the length of the CHR right turn lane in the northern approach of Wisemans Ferry Road to 121 meters, including taper.

The improvement works will be designed and constructed to cater for a 19 metre long truck and dog combination vehicle turning into and out of Patricia Fay Drive as demonstrated in **Figures 11A** and **11B**.

4.2 Daily Traffic Generation

Maroota Sands Project will have the highest traffic generation on weekdays with:

- 30 light vehicles per day associated with employees/visitors (i.e. 15 in/15 out);

- 120 two way heavy vehicle trips per day associated with sand product transport (60 in/60 out); and

- 2 additional two way heavy vehicle trips associated with deliveries/maintenance.

The traffic generation on Saturdays is expected to be:

- 24 light vehicle trips associated with employees (12 in/12 out); and

- 60 two way heavy vehicle trips associated with sand product transport (30 in/30 out).

4.3 Hourly Traffic Generation

Table 4.1 shows the expected average number of two way sand product truck movements generated by the Project on an average weekday and Saturday.

Reference to Table 4.1 shows the highest average two way truck movements during a 2 hour period is estimated as 20-25 truck movements (average of 10-13 truck movements per hour).

For the purposes of the traffic assessment, it is assumed as a worst case scenario, that up to 30 two way truck movements could occur during a busy one (1) hour period based on 15 inbound trucks and 15 outbound trucks.

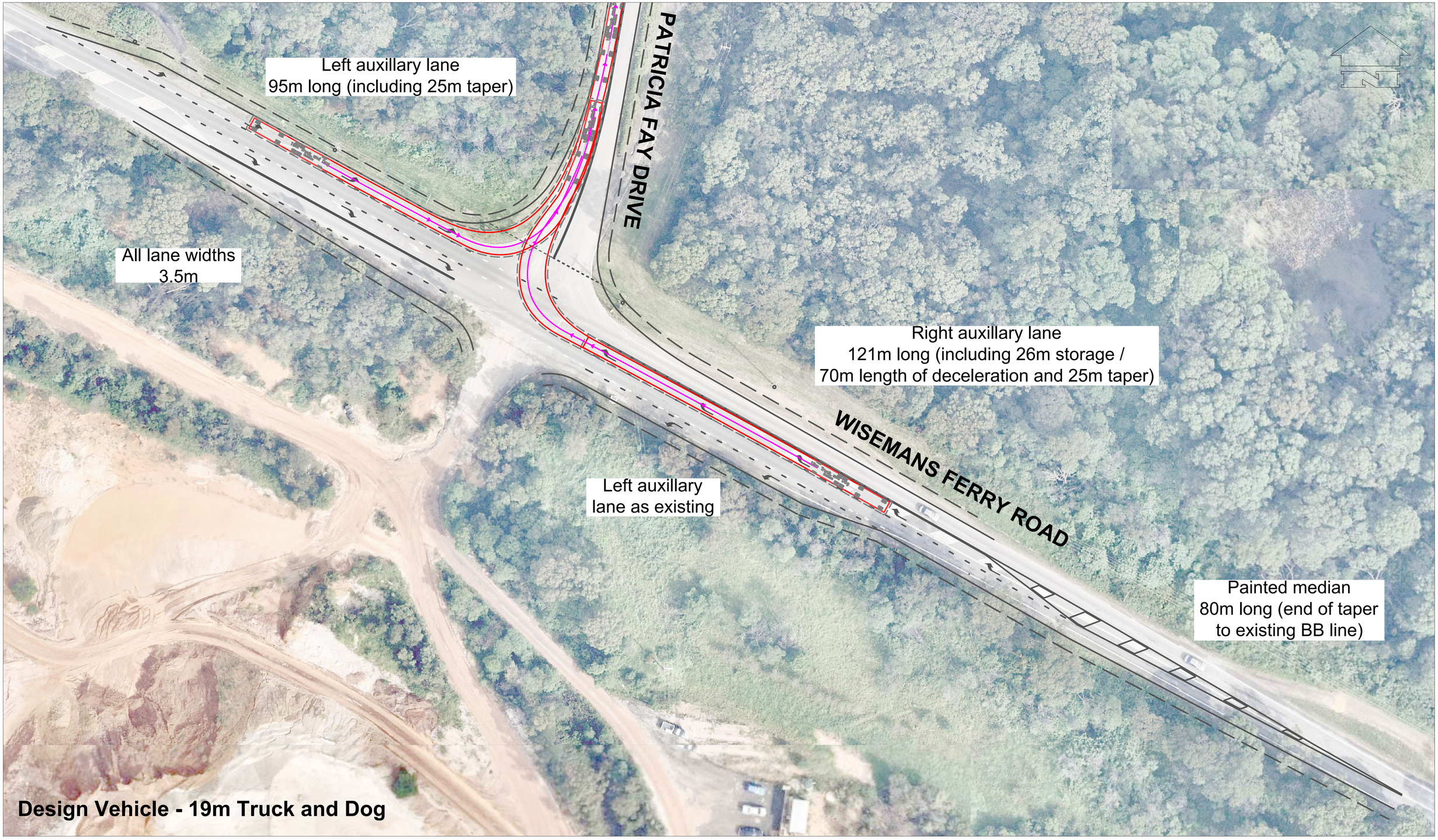

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FIGURE 11A

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT
WISEMANS FERRY ROAD, MAROOTA

CONCEPT PLAN OF PROPOSED UPGRADE WORKS AT WISEMANS FERRY RD AND PATRICIA FAY DR ENTRY TURN PATHS

JOB NO.20003

30.9.20

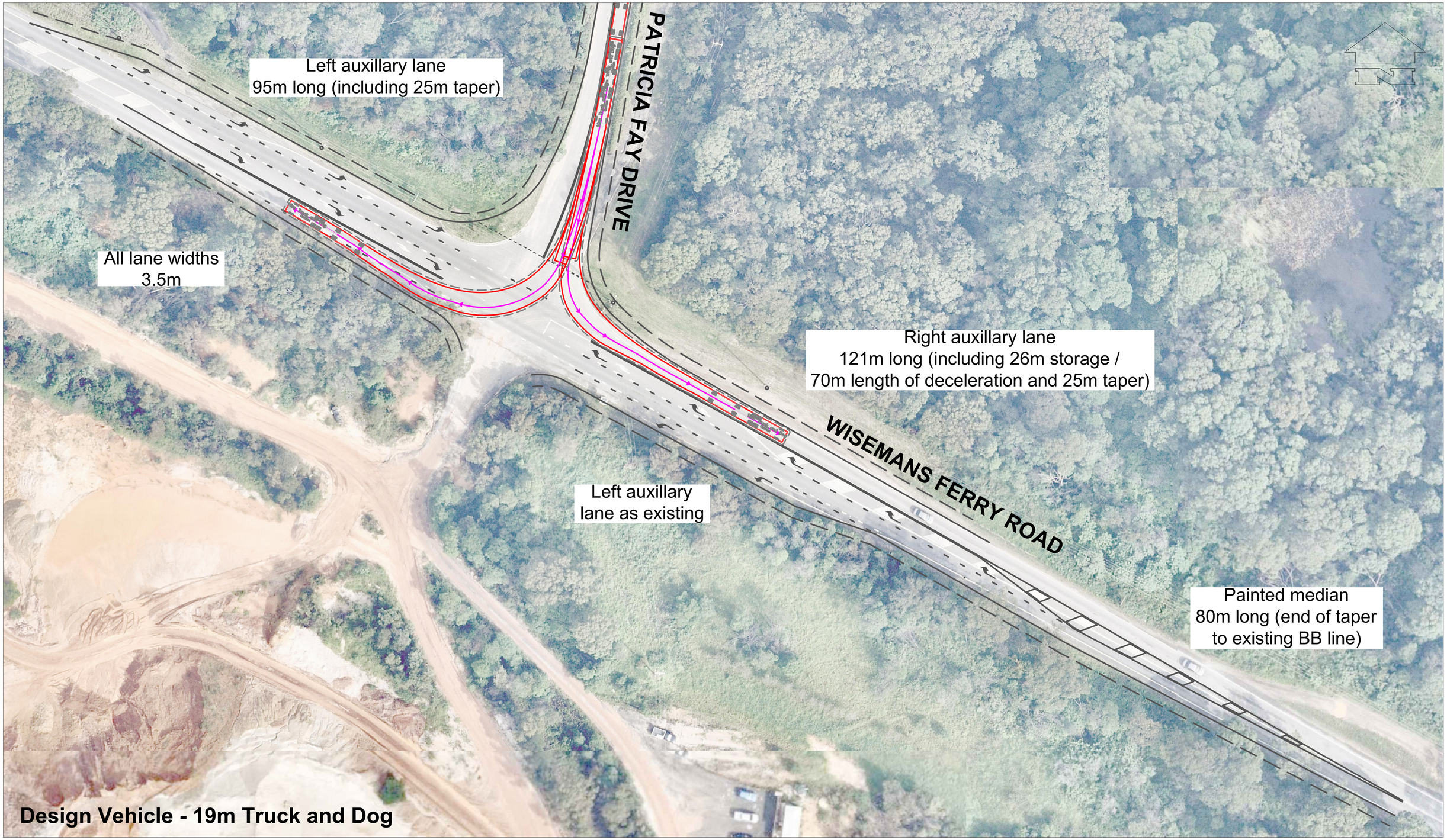

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FIGURE 11B

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT
WISEMANS FERRY ROAD, MAROOTA

CONCEPT PLAN OF PROPOSED UPGRADE WORKS AT WISEMANS FERRY RD AND PATRICIA FAY DR

EXIT TURN PATHS

JOB NO.20003

30.9.20

TABLE 4.1

ESTIMATED TWO WAY SAND PRODUCT TRUCK MOVEMENTS ON AN AVERAGE WEEKDAY AND AVERAGE SATURDAY

Time	Monday to Friday	Saturday
6.00am – 8.00am	20	20
8.00am – 10.00am	25	15
10.00am – 12.00pm	25	15
12.00pm – 2.00pm	20	10
2.00pm – 4.00pm	16	-
4.00pm – 6.00pm	14	-
Total per day	**120**	**60**

4.4 Assessment of Traffic Impacts

4.4.1 Traffic Distribution

It is expected that the heavy vehicle trips generated by the Project will be evenly split between Wisemans Ferry Road towards Pitt Town and Old Northern Road towards Castle Hill. Some light vehicle trips associated with employment may originate from the Maroota local area.

4.4.2 Impact of Road Network on Weekdays

The Project would result in the following increases in traffic using the road network on weekdays.

- 76 two way vehicle movements per day (vpd) including 60 heavy vehicle movements in Wisemans Ferry Road north of Patricia Fay Drive and in Old Northern Road south east of Wisemans Ferry Road; and
- 76 two way vehicle movements per day (vpd) including 62 heavy vehicle movements in Wisemans Ferry Road south of Patricia Fay Drive.

With the Project in place the proportional increase in traffic volumes using the road network as compared to the existing traffic volumes would be:

- Old Northern Road, south east of Roberts Road – 3.7% of total weekday volumes and 16.8% of heavy vehicles;
- Wisemans Ferry Road, south of Old Northern Road – 3.8%% of total weekday volumes and 14.0% of heavy vehicles; and
- Wisemans Ferry Road, south west of Patricia Fay Drive – 3.7% of total weekday volumes and 14.4% of heavy vehicles.

Both Old Northern Road and Wisemans Ferry Road at Maroota carry relatively low traffic volumes and the additional traffic generated by the Project will be easily accommodated on the road network with no change to the level of service.

4.4.3 Impact on Principal Intersections

The Project during the maximum hour may generate 30 two way heavy vehicle trips (15 in/15 out) associated with product transport.

Figure 12 shows the truck movements assigned to the road network based on the traffic assignment outlined in Section 4.4.1.

To examine the impact at the principal intersections of the additional traffic from the Project during the weekday AM and PM peak hour, SIDRA traffic modelling has been undertaken.

The modelling has adopted the maximum hour traffic volumes (**Figure 12**) overlaid onto the existing AM and PM peak hours, shown in **Figures 9** and **10.**

The results of the modelling are shown in Tables 4.2 and 4.3.

Reference to Tables 4.2 and 4.3 shows that

- The intersection of Old Northern Road/Wisemans Ferry Road will continue to operate at a Level of Service A operation in the weekday AM and PM peak hours with minimal changes to delay at the intersection with the additional traffic from the Project (Table 4.1).
- The intersection of Wisemans Ferry Road/Patricia Fay Drive will operate at a Level of Service B operation with a small increase in vehicle delay with the Project in place (Table 4.3). The highest vehicle delay will be to the right turn out of Patricia Fay Drive which will be in the order of 16.9 to 18.8 seconds per vehicle. This represents a satisfactory to good operation.

In summary, both intersections will continue to operate at a good level of service with plenty of spare capacity.

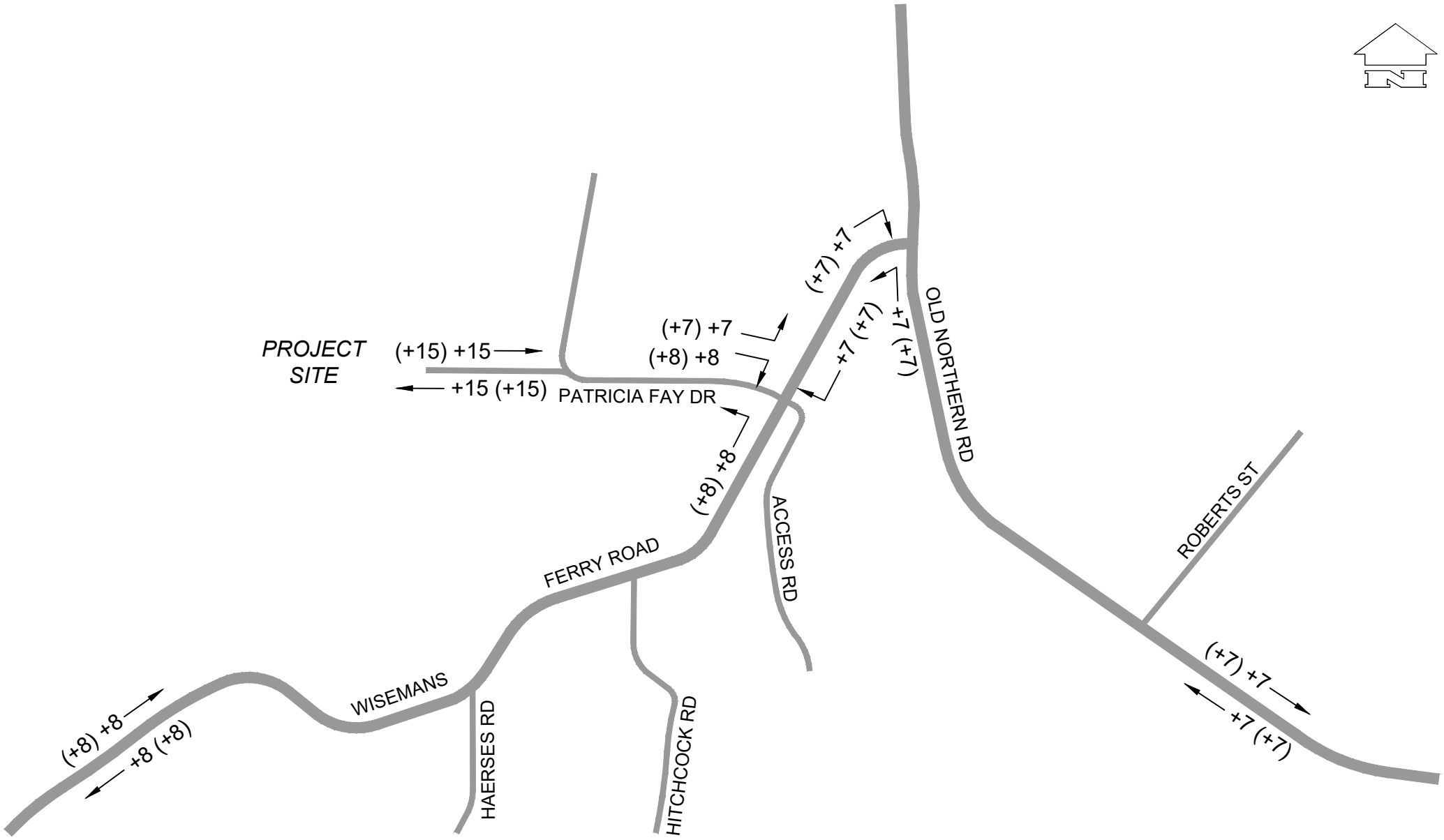
Appendix 1 contained the SIDRA modelling outputs.

TABLE 4.2

SIDRA MODELLING RESULTS FOR OLD NORTHERN ROAD/WISEMANS FERRY ROAD INTERSECTION IN WEEKDAY AM AND PM PEAK HOURS WITH PROJECT – GIVEWAY CONTROL

Approach	AM Peak				PM Peak			
	DS	**AVD**	**LS**	**95th% Queue Length**	**DS**	**AVD**	**LS**	**95th% Queue Length**
South Wisemans Ferry Road								
Left	0.096	6.1	A	4.4	0.067	5.9	A	2.5
Right	0.096	6.8	A	4.4	0.067	7.0	A	2.5
East Old Northern Road								
Left	0.035	6.1	A	0.0	0.072	5.8	A	0.0
Through	0.035	0.0	A	0.0	0.072	0.0	A	0.0
West Old Northern Road								
Through	0.071	0.2	A	2.8	0.060	0.4	A	2.6
Right	0.071	5.9	A	2.8	0.060	6.2	A	2.6
TOTAL – All Vehicles	**0.096**	**4.3**	**A**	**4.4**	**0.072**	**4.0**	**A**	**2.6**

Where: *DS* - *Degree of Saturation*
AVD - *Average Vehicle Delay in Seconds*
LS - *Level of Service*
95th% Queue Length - *95th% Queue Length in Metres*



TRANSPORT AND URBAN PLANNING

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FIGURE 12

MAROOTA FRIABLE SANDSTONE EXTRACTION PROJECT

WISEMANS FERRY ROAD, MAROOTA

TRAFFIC VOLUMES OF PROJECT IN MAXIMUM HOUR

JOB NO.20003

28.9.20

TABLE 4.3

SIDRA MODELLING RESULTS FOR WISEMANS FERRY ROAD/PATRICIA FAY DRIVE INTERSECTION IN WEEKDAY AM AND PM PEAK HOURS WITH PROJECT – STOP SIGN CONTROL

Approach	AM Peak				PM Peak			
	DS	AVD	LS	95th% Queue Length	DS	AVD	LS	95th% Queue Length
South Wisemans Ferry Road								
Left	0.012	6.1	A	0.0	0.008	6.6	A	0.0
Through	0.052	0.0	A	0.0	0.040	0.0	A	0.0
Right	0.001	5.7	A	0.0	0.001	5.8	A	0.0
East Unnamed Road								
Left	0.005	8.4	A	0.1	0.005	8.5	A	0.1
Through	0.005	10.5	A	0.1	0.005	10.4	A	0.1
Right	0.005	10.8	A	0.1	0.005	10.7	A	0.1
North Wisemans Ferry Road								
Left	0.001	5.5	A	0.0	0.001	5.5	A	0.0
Through	0.045	0.0	A	0.0	0.060	0.0	A	0.0
Right	0.014	7.1	A	1.2	0.009	6.8	A	0.8
West Patricia Fay Drive								
Left	0.067	10.9	A	5.4	0.058	11.2	A	3.9
Through	0.067	11.0	A	5.4	0.058	11.0	A	3.9
Right	0.067	18.8	B	5.4	0.058	16.9	B	3.9
TOTAL – All Vehicles	**0.067**	**2.7**	**B**	**5.4**	**0.060**	**2.3**	**B**	**3.9**

Where: *DS* - *Degree of Saturation*
AVD - *Average Vehicle Delay in Seconds*
LS - *Level of Service*
95th% Queue Length - *95th% Queue Length in Metres*

On the wider road network the additional maximum of up to 14 two way heavy vehicles per hour (7 in each direction) using Old Northern Road, south east of Wisemans Ferry Road and 16 two way heavy vehicles per hour (8 in each direction) using Wisemans Ferry Road south of Patricia Fay Drive will have small impacts on the level of service of these roads.

Old Northern Road, south east of Roberts Road on a weekday between 6.00am and 6.00pm carries between 104 and 169 two way vehicles per hour (Table 3.2) and can easily accommodate the additional 14 vehicles per hour generated by the Project.

Wisemans Ferry Road south of Patricia Fay Drive on a weekday between 6.00am and 6.00pm carries between 110 and 169 two way vehicles per hour (Table 3.4) and can also easily accommodate the additional 16 vehicles per hour (vph) generated by the Project.

4.5 Cumulative Impacts

The cumulative impacts of the Project at the principal intersections has been examined for the year 2030, based on a 4% lineal increase per year in traffic volumes using Old Northern Road and Wisemans Ferry Road (i.e. 52% increase since 2017). This will account for background traffic growth including the approved quarries which are not operating. A 4% lineal measure in traffic volumes in both roads assumes a high traffic growth scenario to 2030.

In addition, the additional traffic from Haerses Road Quarry Modification 3 proposal has also been included at both intersections. This is an additional 10 trucks per hour in both directions using Wisemans Ferry Road (north of Haerses Road) and Old Northern Road.

The SIDRA modelling has been undertaken for the AM and PM peak hours using the above 2030 traffic volumes, as well as the additional traffic generated by the Project in the maximum hour, as shown in **Figure 12**.

The results of the modelling are shown in Tables 4.4 and 4.5 and show that both intersections will retain a good to satisfactory operation in 2030 with the future traffic growth and with the Project in place.

The intersection of Old Northern Road/Wisemans Ferry Road will continue to operate at a Level of Service A operation. The intersection of Wisemans Ferry Road/Patricia Fay Drive will continue to operate at a Level of Service B operation.

Appendix 1 contains the SIDRA modelling outputs.

TABLE 4.4

SIDRA MODELLING RESULTS FOR OLD NORTHERN ROAD/WISEMANS FERRY ROAD INTERSECTION IN 2030 WEEKDAY AM AND PM PEAK HOURS WITH PROJECT – GIVEWAY CONTROL

Approach	AM Peak				PM Peak			
	DS	AVD	LS	95th% Queue Length	DS	AVD	LS	95th% Queue Length
South Wisemans Ferry Road								
Left	0.170	6.1	A	8.3	0.120	6.0	A	4.8
Right	0.170	7.7	A	8.3	0.120	7.9	A	4.8
East Old Northern Road								
Left	0.060	6.2	A	0.0	0.115	5.9	A	0.0
Through	0.060	0.0	A	0.0	0.115	0.0	A	0.0
West Old Northern Road								
Through	0.111	0.3	A	4.6	0.076	3.1	A	3.1
Right	0.111	6.1	A	4.6	0.076	3.1	A	3.1
TOTAL – All Vehicles	**0.170**	**4.7**	**A**	**8.3**	**0.120**	**4.8**	**A**	**4.8**

Where: *DS - Degree of Saturation*
AVD - Average Vehicle Delay in Seconds
LS - Level of Service
95th% Queue Length - 95th% Queue Length in Metres

TABLE 4.5

SIDRA MODELLING RESULTS FOR WISEMANS FERRY ROAD/PATRICIA FAY DRIVE INTERSECTION IN 2030 WEEKDAY AM AND PM PEAK HOURS WITH PROJECT – STOP SIGN CONTROL

Approach	AM Peak				PM Peak			
	DS	AVD	LS	95th% Queue Length	DS	AVD	LS	95th% Queue Length
South Wisemans Ferry Road								
Left	0.012	6.1	A	0.0	0.008	6.6	A	0.0
Through	0.088	0.0	A	0.0	0.070	0.0	A	0.0
Right	0.011	6.0	A	0.0	0.001	6.1	A	0.0
East Unnamed Road								
Left	0.006	8.6	A	0.1	0.006	8.9	A	0.1
Through	0.006	12.3	A	0.1	0.006	12.2	A	0.1
Right	0.006	12.9	A	0.1	0.006	12.9	A	0.1
North Wisemans Ferry Road								
Left	0.001	5.5	A	0.0	0.001	5.5	A	0.0
Through	0.077	0.0	A	0.0	0.099	0.0	A	0.0
Right	0.015	7.7	A	1.3	0.010	7.3	A	0.9
West Patricia Fay Drive								
Left	0.090	11.9	A	7.0	0.079	11.9	A	5.1
Through	0.090	13.4	A	7.0	0.079	13.4	A	5.1
Right	0.090	26.2	B	7.0	0.079	23.2	B	5.1
TOTAL – All Vehicles	**0.090**	**2.2**	**B**	**7.0**	**0.099**	**1.8**	**B**	**5.1**

Where: *DS* - *Degree of Saturation*
AVD - *Average Vehicle Delay in Seconds*
LS - *Level of Service*
95th% Queue Length - *95th% Queue Length in Metres*

4.6 Construction Impacts

Site Establishment

Site establishment is expected to take 6-12 months with the majority deliveries of equipment and materials to occur in the first 12 months. Vehicle access to the site will be from Patricia Fay Drive.

Vehicle trips to and from the site will be;

- Up to 30 light vehicle trips per day (15 in/15 out) associated with the workforce;
- An estimated 20 deliveries per month by heavy vehicles (20 in/20 out) resulting in 40 two way truck movements;
- With a maximum of 10 heavy vehicles delivery vehicles per day (10 in/10 out) providing 20 two way heavy vehicle movements per day.

A proportion of heavy vehicles may be oversized vehicles. These vehicles will have the appropriate permits.

The traffic impacts during the site establishment phase will be less than the impacts for the operational phase, due to the lower traffic generation.

Based on this, the traffic impacts of the site establishment phase are assessed as satisfactory.

Upgrade Works at Wisemans Ferry Road/Patricia Fay Drive Intersection.

Following approval of the Project, a separate Construction Traffic Management Plan will be prepared for the upgrade works at the intersection, to manage the impacts of the construction works at the intersection.

The Construction Traffic Management Plan will detail any staging and will include Traffic Control Plans to manage traffic at the intersection, during the intersection upgrade works.

4.7 Pedestrians, Cyclists and Buses

The Project is not expected to have any negative impacts on other road users including pedestrians, cyclists and buses.

4.8 Road Safety

The Project is not expected to have any negative impacts on road safety.

Both the transport routes of Old Northern Road and Wisemans Ferry Road/Cattai Road/Pitt Town Road are state roads and approved 25m/26m B double routes.

As part of the Project, the intersection of Wisemans Ferry Road/Patricia Fay Drive will be upgraded to current Austroads Guidelines, which will improve potential road safety at the intersection.

4.9 Internal Works

The product haul road will be 15 metres wide and designed and constructed to appropriate standards to cater for heavy vehicles, with a road surface of unsealed coarse sandstone.

The intersection of the Product haul road with Patricia Fay Drive will be designed to Australian Standards and will take into account the existing infrastructure in Patricia Fay Drive.

The car park provided adjacent the office and amenities building will provide sufficient parking for employees and visitors. The car park will be generally designed in accordance with AS2890.1 requirements, with regard to size of car parking spaces and aisle widths, etc. An appropriate hard wearing surface will be provided.

5.0 CONCLUSIONS

This report documents the traffic impacts of the Maroota Friable Sandstone Extraction Project in Wisemans Ferry Road Maroota.

The Project proposes to establish a quarry to extract, process and transport up to 500,000tpa of friable sandstone on land, which has frontage to Wisemans Ferry Road, south of Old Northern Road.

Vehicle access to the quarry will be via Patricia Fay Drive. A new Product haul road will be constructed from the quarry site to Patricia Fay Drive creating a T junction intersection, some 400 metres west of Wisemans Ferry Road.

As part of the Project, it is proposed to upgrade the intersection of Wisemans Ferry Road and Patricia Fay Drive to current Austroad Guidelines.

Transport routes will be via Wisemans Ferry Road and Old Northern Road towards Castle Hill and Wisemans Ferry Road/Cattai Road/Pitt Town Road towards Pitt Town. Both Old Northern Road and Wisemans Ferry Road/Cattai Road/Pitt Town Road are approved 25-26m B double routes.

The Project is expected to generate 30 two way light vehicle trips (15 in/15 out) and up to 122 two way heavy vehicle trips (61 in/61 out) on a typical weekday.

Hourly volumes associated with product transport are expected to average 10-13 truck movements (5-7 in/5-7 out) with a maximum hour of 30 truck movements (15 in/15 out).

The assessment of the traffic impacts of the Project in both the construction and operational phases has found that the impacts on the road network including the principal intersections will be satisfactory.

The assessment of cumulative impacts for the year 2030 has also found that traffic conditions on the road network will remain satisfactory.

The Project is not expected to have any negative impacts on road safety or other road users.

REFERENCES

1. Austroads Guide to Road Design
2. RMS Guide to Traffic Generating Development October 2002
3. Austroads Guide to Traffic Management
4. RMS Austroads Guide Supplements – Austroads Guide to Traffic Management
5. RMS Supplement to Austroads Guide to Road Design
6. Austroads Guide to Traffic Management Part 12 – Traffic Impact of Developments
7. RMS Crash Data for Old Northern Road and Wisemans Ferry Road at Maroota for the period 1 October 2016 to 30 September 2019

APPENDIX 1

SIDRA MODELLING OUTPUTS

MOVEMENT SUMMARY

▽ Site: 101 [Old Northern Rd & Wiseman Ferry Rd - Ex AM]

Ex AM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	53	34.0	0.086	6.1	LOS A	0.3	3.7	0.10	0.56	0.10	51.9
3	R2	45	26.7	0.086	6.6	LOS A	0.3	3.7	0.10	0.56	0.10	51.9
Approach		98	30.6	0.086	6.3	LOS A	0.3	3.7	0.10	0.56	0.10	51.9
East: Old Northern Rd												
4	L2	22	31.8	0.029	5.9	LOS A	0.0	0.0	0.00	0.26	0.00	55.0
5	T1	28	14.3	0.029	0.0	LOS A	0.0	0.0	0.00	0.26	0.00	58.0
Approach		50	22.0	0.029	2.6	NA	0.0	0.0	0.00	0.26	0.00	56.6
West: Old Northern Rd												
11	T1	60	5.0	0.071	0.1	LOS A	0.3	2.7	0.14	0.28	0.14	57.1
12	R2	59	18.6	0.071	5.9	LOS A	0.3	2.7	0.14	0.28	0.14	54.4
Approach		119	11.8	0.071	3.0	NA	0.3	2.7	0.14	0.28	0.14	55.7
All Vehicles		267	20.6	0.086	4.1	NA	0.3	3.7	0.10	0.38	0.10	54.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Old Northern Rd & Wiseman Ferry Rd - Ex PM]

Ex PM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	57	10.5	0.056	5.9	LOS A	0.2	1.9	0.15	0.55	0.15	52.7
3	R2	18	11.1	0.056	6.4	LOS A	0.2	1.9	0.15	0.55	0.15	52.4
Approach		75	10.7	0.056	6.0	LOS A	0.2	1.9	0.15	0.55	0.15	52.6
East: Old Northern Rd												
4	L2	58	15.5	0.066	5.7	LOS A	0.0	0.0	0.00	0.29	0.00	55.2
5	T1	60	13.3	0.066	0.0	LOS A	0.0	0.0	0.00	0.29	0.00	57.4
Approach		118	14.4	0.066	2.8	NA	0.0	0.0	0.00	0.29	0.00	56.3
West: Old Northern Rd												
11	T1	45	17.8	0.059	0.3	LOS A	0.3	2.6	0.22	0.29	0.22	56.5
12	R2	49	18.4	0.059	6.2	LOS A	0.3	2.6	0.22	0.29	0.22	53.9
Approach		94	18.1	0.059	3.4	NA	0.3	2.6	0.22	0.29	0.22	55.1
All Vehicles		287	14.6	0.066	3.8	NA	0.3	2.6	0.11	0.36	0.11	54.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Wisemans Ferry Rd & Patricia Fay Dr -Ex AM]

ExAM
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	5	100.0	0.005	6.1	LOS A	0.0	0.0	0.00	0.57	0.00	51.6
2	T1	88	23.9	0.052	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	1	0.0	0.001	5.7	LOS A	0.0	0.0	0.18	0.54	0.18	52.7
Approach		94	27.7	0.052	0.4	NA	0.0	0.0	0.00	0.04	0.00	77.3
East: Road												
4	L2	1	0.0	0.005	8.4	LOS A	0.0	0.1	0.27	0.86	0.27	51.0
5	T1	1	0.0	0.005	10.0	LOS A	0.0	0.1	0.27	0.86	0.27	51.0
6	R2	1	0.0	0.005	10.5	LOS A	0.0	0.1	0.27	0.86	0.27	51.0
Approach		3	0.0	0.005	9.6	LOS A	0.0	0.1	0.27	0.86	0.27	51.0
North: Wisemans Ferry Rd												
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	78	16.7	0.045	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
9	R2	4	100.0	0.005	6.9	LOS A	0.0	0.4	0.25	0.53	0.25	50.8
Approach		83	20.5	0.045	0.4	NA	0.0	0.4	0.01	0.03	0.01	77.4
West: Patricia Fay Dr												
10	L2	8	100.0	0.026	10.8	LOS A	0.1	2.0	0.34	0.90	0.34	48.5
11	T1	1	0.0	0.026	10.5	LOS A	0.1	2.0	0.34	0.90	0.34	50.3
12	R2	4	75.0	0.026	16.2	LOS B	0.1	2.0	0.34	0.90	0.34	47.8
Approach		13	84.6	0.026	12.4	LOS A	0.1	2.0	0.34	0.90	0.34	48.4
All Vehicles		193	28.0	0.052	1.4	NA	0.1	2.0	0.03	0.11	0.03	73.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Wisemans Ferry Rd & Patricia Fay Dr -Ex PM]

Ex PM
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	1	100.0	0.001	6.1	LOS A	0.0	0.0	0.00	0.57	0.00	51.6
2	T1	72	12.5	0.040	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	1	0.0	0.001	5.8	LOS A	0.0	0.0	0.21	0.53	0.21	52.6
Approach		74	13.5	0.040	0.2	NA	0.0	0.0	0.00	0.01	0.00	78.8
East: Road												
4	L2	1	0.0	0.005	8.5	LOS A	0.0	0.1	0.30	0.85	0.30	51.0
5	T1	1	0.0	0.005	10.0	LOS A	0.0	0.1	0.30	0.85	0.30	51.0
6	R2	1	0.0	0.005	10.4	LOS A	0.0	0.1	0.30	0.85	0.30	51.1
Approach		3	0.0	0.005	9.6	LOS A	0.0	0.1	0.30	0.85	0.30	51.0
North: Wisemans Ferry Rd												
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	105	16.2	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
9	R2	1	100.0	0.001	6.7	LOS A	0.0	0.1	0.21	0.51	0.21	50.9
Approach		107	16.8	0.060	0.1	NA	0.0	0.1	0.00	0.01	0.00	79.2
West: Patricia Fay Dr												
10	L2	2	0.0	0.018	8.4	LOS A	0.1	0.7	0.35	0.87	0.35	50.1
11	T1	1	0.0	0.018	10.5	LOS A	0.1	0.7	0.35	0.87	0.35	50.1
12	R2	6	33.3	0.018	13.1	LOS A	0.1	0.7	0.35	0.87	0.35	49.0
Approach		9	22.2	0.018	11.8	LOS A	0.1	0.7	0.35	0.87	0.35	49.4
All Vehicles		193	15.5	0.060	0.8	NA	0.1	0.7	0.02	0.07	0.02	76.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Old Northern Rd & Wiseman Ferry Rd - AM & Prop]

AM with Project
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	53	34.0	0.096	6.1	LOS A	0.4	4.4	0.11	0.56	0.11	51.8
3	R2	52	36.5	0.096	6.8	LOS A	0.4	4.4	0.11	0.56	0.11	51.4
Approach		105	35.2	0.096	6.4	LOS A	0.4	4.4	0.11	0.56	0.11	51.6
East: Old Northern Rd												
4	L2	29	48.3	0.035	6.1	LOS A	0.0	0.0	0.00	0.29	0.00	54.2
5	T1	28	14.3	0.035	0.0	LOS A	0.0	0.0	0.00	0.29	0.00	58.0
Approach		57	31.6	0.035	3.1	NA	0.0	0.0	0.00	0.29	0.00	56.0
West: Old Northern Rd												
11	T1	60	5.0	0.071	0.2	LOS A	0.3	2.8	0.15	0.28	0.15	57.1
12	R2	59	18.6	0.071	5.9	LOS A	0.3	2.8	0.15	0.28	0.15	54.4
Approach		119	11.8	0.071	3.0	NA	0.3	2.8	0.15	0.28	0.15	55.7
All Vehicles		281	24.6	0.096	4.3	NA	0.4	4.4	0.10	0.39	0.10	54.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Old Northern Rd & Wiseman Ferry Rd - PM & Prop]

PM with Project
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	57	10.5	0.067	5.9	LOS A	0.3	2.5	0.16	0.55	0.16	52.7
3	R2	25	36.0	0.067	7.0	LOS A	0.3	2.5	0.16	0.55	0.16	51.3
Approach		82	18.3	0.067	6.2	LOS A	0.3	2.5	0.16	0.55	0.16	52.3
East: Old Northern Rd												
4	L2	65	24.6	0.072	5.8	LOS A	0.0	0.0	0.00	0.30	0.00	54.8
5	T1	60	13.3	0.072	0.0	LOS A	0.0	0.0	0.00	0.30	0.00	57.4
Approach		125	19.2	0.072	3.0	NA	0.0	0.0	0.00	0.30	0.00	56.0
West: Old Northern Rd												
11	T1	45	17.8	0.060	0.4	LOS A	0.3	2.6	0.23	0.30	0.23	56.5
12	R2	49	18.4	0.060	6.2	LOS A	0.3	2.6	0.23	0.30	0.23	53.9
Approach		94	18.1	0.060	3.4	NA	0.3	2.6	0.23	0.30	0.23	55.1
All Vehicles		301	18.6	0.072	4.0	NA	0.3	2.6	0.12	0.37	0.12	54.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Wisemans Ferry Rd & Patricia Fay Dr - AM & Prop]

AM with Proposal
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	13	100.0	0.012	6.1	LOS A	0.0	0.0	0.00	0.57	0.00	51.6
2	T1	88	23.9	0.052	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	1	0.0	0.001	5.7	LOS A	0.0	0.0	0.18	0.54	0.18	52.7
Approach		102	33.3	0.052	0.8	NA	0.0	0.0	0.00	0.08	0.00	74.4
East: Road												
4	L2	1	0.0	0.005	8.4	LOS A	0.0	0.1	0.28	0.86	0.28	50.8
5	T1	1	0.0	0.005	10.5	LOS A	0.0	0.1	0.28	0.86	0.28	50.9
6	R2	1	0.0	0.005	10.8	LOS A	0.0	0.1	0.28	0.86	0.28	50.9
Approach		3	0.0	0.005	9.9	LOS A	0.0	0.1	0.28	0.86	0.28	50.9
North: Wisemans Ferry Rd												
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	78	16.7	0.045	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
9	R2	11	100.0	0.014	7.1	LOS A	0.1	1.2	0.27	0.54	0.27	50.7
Approach		90	26.7	0.045	0.9	NA	0.1	1.2	0.03	0.07	0.03	74.3
West: Patricia Fay Dr												
10	L2	15	100.0	0.067	10.9	LOS A	0.3	5.4	0.38	0.89	0.38	47.7
11	T1	1	0.0	0.067	11.0	LOS A	0.3	5.4	0.38	0.89	0.38	49.5
12	R2	12	91.7	0.067	18.8	LOS B	0.3	5.4	0.38	0.89	0.38	46.6
Approach		28	92.9	0.067	14.0	LOS A	0.3	5.4	0.38	0.89	0.38	47.3
All Vehicles		223	37.7	0.067	2.7	NA	0.3	5.4	0.07	0.19	0.07	69.0

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Wisemans Ferry Rd & Patricia Fay Dr - PM & Prop]

PM with Project
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	9	88.9	0.008	6.6	LOS A	0.0	0.0	0.00	0.56	0.00	50.0
2	T1	72	12.5	0.040	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	1	0.0	0.001	5.8	LOS A	0.0	0.0	0.21	0.53	0.21	52.6
Approach		82	20.7	0.040	0.8	NA	0.0	0.0	0.00	0.07	0.00	74.6
East: Road												
4	L2	1	0.0	0.005	8.5	LOS A	0.0	0.1	0.31	0.85	0.31	50.9
5	T1	1	0.0	0.005	10.4	LOS A	0.0	0.1	0.31	0.85	0.31	50.9
6	R2	1	0.0	0.005	10.7	LOS A	0.0	0.1	0.31	0.85	0.31	50.9
Approach		3	0.0	0.005	9.9	LOS A	0.0	0.1	0.31	0.85	0.31	50.9
North: Wisemans Ferry Rd												
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	105	16.2	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
9	R2	8	100.0	0.009	6.8	LOS A	0.0	0.8	0.23	0.53	0.23	50.8
Approach		114	21.9	0.060	0.5	NA	0.0	0.8	0.02	0.04	0.02	76.6
West: Patricia Fay Dr												
10	L2	9	77.8	0.058	11.2	LOS A	0.2	3.9	0.36	0.96	0.36	46.6
11	T1	1	0.0	0.058	11.0	LOS A	0.2	3.9	0.36	0.96	0.36	49.3
12	R2	14	71.4	0.058	16.9	LOS B	0.2	3.9	0.36	0.96	0.36	47.1
Approach		24	70.8	0.058	14.5	LOS B	0.2	3.9	0.36	0.96	0.36	47.0
All Vehicles		223	26.5	0.060	2.3	NA	0.2	3.9	0.05	0.16	0.05	70.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Old Northern Rd & Wiseman Ferry Rd - 2030 AM & Prop]

2030 AM with Project
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	81	34.6	0.170	6.1	LOS A	0.7	8.3	0.16	0.58	0.16	51.5
3	R2	88	39.8	0.170	7.7	LOS A	0.7	8.3	0.16	0.58	0.16	50.9
Approach		169	37.3	0.170	6.9	LOS A	0.7	8.3	0.16	0.58	0.16	51.2
East: Old Northern Rd												
4	L2	51	54.9	0.060	6.2	LOS A	0.0	0.0	0.00	0.31	0.00	53.9
5	T1	43	14.0	0.060	0.0	LOS A	0.0	0.0	0.00	0.31	0.00	58.0
Approach		94	36.2	0.060	3.4	NA	0.0	0.0	0.00	0.31	0.00	55.7
West: Old Northern Rd												
11	T1	91	5.5	0.111	0.3	LOS A	0.5	4.6	0.21	0.28	0.21	56.8
12	R2	90	18.9	0.111	6.1	LOS A	0.5	4.6	0.21	0.28	0.21	54.1
Approach		181	12.2	0.111	3.2	NA	0.5	4.6	0.21	0.28	0.21	55.5
All Vehicles		444	26.8	0.170	4.7	NA	0.7	8.3	0.15	0.40	0.15	53.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Old Northern Rd & Wiseman Ferry Rd - 2030 PM & Prop]

2030 PM & Project
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	87	10.3	0.120	6.0	LOS A	0.5	4.8	0.22	0.57	0.22	52.5
3	R2	45	46.7	0.120	7.9	LOS A	0.5	4.8	0.22	0.57	0.22	50.7
Approach		132	22.7	0.120	6.6	LOS A	0.5	4.8	0.22	0.57	0.22	51.9
East: Old Northern Rd												
4	L2	105	29.5	0.115	5.9	LOS A	0.0	0.0	0.00	0.31	0.00	54.6
5	T1	91	13.2	0.115	0.0	LOS A	0.0	0.0	0.00	0.31	0.00	57.4
Approach		196	21.9	0.115	3.2	NA	0.0	0.0	0.00	0.31	0.00	55.9
West: Old Northern Rd												
11	T1	69	17.4	0.076	0.6	LOS A	0.3	3.1	0.27	0.25	0.27	56.8
12	R2	49	18.4	0.076	6.6	LOS A	0.3	3.1	0.27	0.25	0.27	54.2
Approach		118	17.8	0.076	3.0	NA	0.3	3.1	0.27	0.25	0.27	55.7
All Vehicles		446	21.1	0.120	4.2	NA	0.5	4.8	0.14	0.37	0.14	54.6

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Wisemans Ferry Rd & Patricia Fay Dr - 2030 AM & Prop]

2030 AM with Proposal
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	13	100.0	0.012	6.1	LOS A	0.0	0.0	0.00	0.57	0.00	51.6
2	T1	144	29.2	0.088	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	1	0.0	0.001	6.0	LOS A	0.0	0.0	0.24	0.53	0.24	52.6
Approach		158	34.8	0.088	0.5	NA	0.0	0.0	0.00	0.05	0.00	76.3
East: Road												
4	L2	1	0.0	0.006	8.6	LOS A	0.0	0.1	0.39	0.84	0.39	50.0
5	T1	1	0.0	0.006	12.3	LOS A	0.0	0.1	0.39	0.84	0.39	50.0
6	R2	1	0.0	0.006	12.9	LOS A	0.0	0.1	0.39	0.84	0.39	50.1
Approach		3	0.0	0.006	11.3	LOS A	0.0	0.1	0.39	0.84	0.39	50.0
North: Wisemans Ferry Rd												
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	129	23.3	0.077	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
9	R2	11	100.0	0.015	7.7	LOS A	0.1	1.3	0.35	0.56	0.35	50.4
Approach		141	29.1	0.077	0.6	NA	0.1	1.3	0.03	0.05	0.03	76.2
West: Patricia Fay Dr												
10	L2	15	100.0	0.090	11.9	LOS A	0.3	7.0	0.51	0.90	0.51	45.5
11	T1	1	0.0	0.090	13.4	LOS A	0.3	7.0	0.51	0.90	0.51	47.2
12	R2	12	91.7	0.090	26.2	LOS B	0.3	7.0	0.51	0.90	0.51	44.6
Approach		28	92.9	0.090	17.9	LOS B	0.3	7.0	0.51	0.90	0.51	45.2
All Vehicles		330	37.0	0.090	2.2	NA	0.3	7.0	0.06	0.13	0.06	71.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
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 [Wisemans Ferry Rd & Patricia Fay Dr - 2030 PM & Prop]

2030 PM with Project
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Wisemans Ferry Rd												
1	L2	9	88.9	0.008	6.6	LOS A	0.0	0.0	0.00	0.56	0.00	50.0
2	T1	120	20.0	0.070	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
3	R2	1	0.0	0.001	6.1	LOS A	0.0	0.0	0.28	0.53	0.28	52.4
Approach		130	24.6	0.070	0.5	NA	0.0	0.0	0.00	0.04	0.00	76.5
East: Road												
4	L2	1	0.0	0.006	8.9	LOS A	0.0	0.1	0.42	0.84	0.42	50.0
5	T1	1	0.0	0.006	12.3	LOS A	0.0	0.1	0.42	0.84	0.42	50.0
6	R2	1	0.0	0.006	12.9	LOS A	0.0	0.1	0.42	0.84	0.42	50.1
Approach		3	0.0	0.006	11.4	LOS A	0.0	0.1	0.42	0.84	0.42	50.0
North: Wisemans Ferry Rd												
7	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	170	21.2	0.099	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	80.0
9	R2	8	100.0	0.010	7.3	LOS A	0.0	0.9	0.31	0.54	0.31	50.6
Approach		179	24.6	0.099	0.4	NA	0.0	0.9	0.01	0.03	0.01	77.7
West: Patricia Fay Dr												
10	L2	9	77.8	0.079	11.9	LOS A	0.3	5.1	0.50	0.98	0.50	44.5
11	T1	1	0.0	0.079	13.4	LOS A	0.3	5.1	0.50	0.98	0.50	46.9
12	R2	14	71.4	0.079	23.2	LOS B	0.3	5.1	0.50	0.98	0.50	44.9
Approach		24	70.8	0.079	18.6	LOS B	0.3	5.1	0.50	0.98	0.50	44.8
All Vehicles		336	27.7	0.099	1.8	NA	0.3	5.1	0.05	0.11	0.05	73.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.