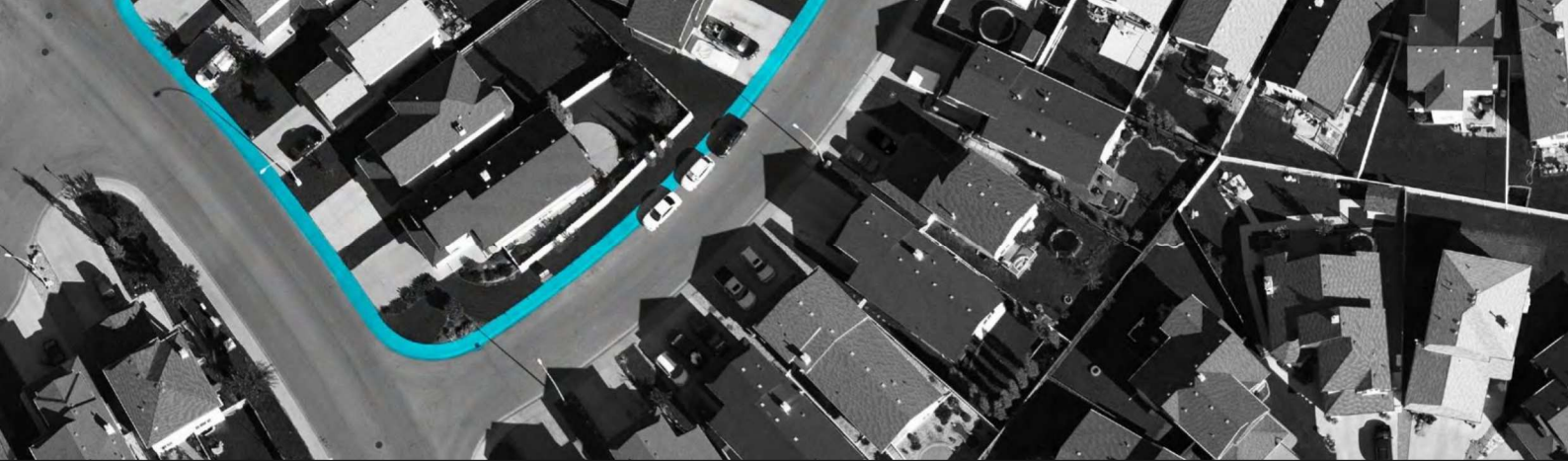




PROPOSED FOOD & DRINK OUTLETS 946-950 GREENBANK RD, NORTH MACLEAN

TRAFFIC IMPACT ASSESSMENT

15 SEPTEMBER 2023

PREPARED FOR
SOOMAL PROPERTY TRUST

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

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1.0 INTRODUCTION

1.1 BACKGROUND

In January 2023 Pekol Traffic and Transport (PTT) was commissioned by Soomal Property Trust to undertake a traffic impact assessment in support of two proposed food and drink outlets (with drive-throughs) at 946-950 Greenbank Road, North Maclean. The location of the subject site is shown in Figure 1.1.

This report has been updated in response to Items 1 and 4 of Economic Development Queensland (EDQ) Further Issues, dated 17 July 2023 and includes the following revisions:

- correct references with respect to the Greenbank Road / Mount Lindesay Highway intersection
- further justification with respect to the proposed servicing arrangements for Tenancy 2
- provision of a turn warrants assessment at the all-movements site access on Greenbank Road

Figure 1.1: SITE LOCALITY



1.2 AIM

The aim of this assessment is to evaluate the proposed development in terms of its access, parking and servicing arrangements, pedestrian / cyclist facilities, peak hour traffic generation and impact on the surrounding road network.

1.3 SCOPE OF REPORT

This report begins by summarising the characteristics of the existing road network (Chapter 2), followed by a description of the scope and scale of the development, including a consideration of the site access, parking provision and design, servicing arrangements and pedestrian / cyclist facilities (Chapter 3). The likely traffic generation of the site is quantified, and its impact to surrounding intersection operations and road safety is considered (Chapter 4). The report concludes with a summary of key findings and recommendations (Chapter 5).

2.0 EXISTING CONDITIONS

2.1 SUBJECT SITE

The subject site is located at 946-950 Greenbank Road, North Maclean and is formally described as Lot 1 on SP267252. According to the Logan Planning Scheme, the site is within a Priority Development Area (ie Greater Flagstone). A service station is currently located on the site, as shown in Figure 2.1.

The site is bounded by vacant land to the north, the Mount Lindesay Highway to the east and Greenbank Road to the south and west. The surrounding area includes a mix of rural residential, industrial and commercial uses.

Figure 2.1: SUBJECT SITE



2.2 ACCESS

Access to the subject site is currently provided via two separate crossovers on Greenbank Road. The northern access is restricted to exit movements only, while the southern access caters for all movements.

2.3 ROAD NETWORK

Key attributes of the surrounding road network are summarised in Table 2.1.

Table 2.1: ROAD NETWORK ATTRIBUTES

ATTRIBUTE	MOUNT LINDESAY HIGHWAY	GREENBANK ROAD
Road Hierarchy	Highway	Rural Collector
Jurisdiction	TMR	Council
Speed Limit	80km/h	80km/h
Predominant Land Uses	Mixed Use	Rural residential
On-Street Parking	No	No
Footpaths	No	Yes
Bicycle Lanes	No	No
Bus Route	Yes	No

The Mount Lindsay Highway / Greenbank Road signalised intersection is located adjacent to the site. This intersection was recently (ie in 2019) upgraded to a signalised intersection. An eastern (fourth) leg was also constructed at the intersection as part of the upgrade to provide a safer connection between Saint Aldwyn Road, Wearing Road and the Mount Lindsay Highway. According to TMR, this upgrade was developed to improve road safety and provide improved connectivity.

2.4 ACTIVE AND PUBLIC TRANSPORT

2.4.1 Pedestrians

There are pedestrian footpaths on the northern side of Greenbank Road, in proximity to the site. There are also pedestrian footpaths provided on both sides of the Service Road. No footpaths are provided on the Mount Lindsay Highway.

2.4.2 Public Transport

A bus stop is located approximately 250m east of the subject site on the Service Road. The stop is serviced by TransLink bus route 540, which hourly services (ie between 6:00am and 6:00pm on weekdays) between Beaudesert and Browns Plains.

2.5 TRAFFIC VOLUMES

To assist in the quantification of existing road network operations proximate to the site, turning movement surveys were conducted from 7:00am to 10:00am and 2:30pm to 5:30pm on Tuesday 28th March 2023 at the adjacent Mount Lindsay Highway / Greenbank Road signalised intersection.

The peak periods for the intersection is shown in Table 2.2, along with the key operational attributes of the intersection. The volumes shown represent all vehicle movements through the intersection in the peak hour periods. The survey data is attached in Appendix A.

Table 2.2: INTERSECTION ATTRIBUTES

ATTRIBUTE	MORNING PEAK	EVENING PEAK
Peak Hour	7:15am – 8:15am	4:15pm – 5:15pm
Volume (vph)	2,330	2,790
% Heavy Vehicles	8.9%	6.0%
Peak Flow Factor	95.7%	98.4%

2.6 INTERSECTION OPERATIONS

2.6.1 Intersection Assessment Parameters

The existing traffic operations at the Mount Lindsay Highway / Greenbank Road signalised intersection have been quantified using SIDRA. The analyses were based on the traffic count data presented in Appendix A, with:

- Peak Flow Factors (PFF), as detailed in Table 2.2
- the observed proportion of heavy vehicles (%HV) for each movement
- minor phase actuation applied to all movements on the Service Road (western leg) and right-turn into the Service Road (southern leg)
- SIDRA default values for other parameters

The results are presented in terms of the degree of saturation (DOS), average delay, 95th percentile vehicle queues, and critical movement at the intersections. The degree of saturation for a movement is defined as the ratio of traffic demand to the capacity of the movement. The critical movement relates to the approach or movement with the highest DOS. Table 2.3 is an extract from the SIDRA manual and defines the operational rating and level of service for all intersection types.

Table 2.3: SIDRA INTERSECTION RATINGS

LEVEL OF SERVICE	DEGREE OF SATURATION		
	SIGNALS	ROUNDBOUT	PRIORITY
LOS A	$x \leq 60\%$	$x \leq 60\%$	$x \leq 60\%$
LOS B	$60\% < x \leq 70\%$	$60\% < x \leq 70\%$	$60\% < x \leq 70\%$
LOS C	$70\% < x \leq 90\%$	$70\% < x \leq 85\%$	$70\% < x \leq 80\%$
LOS D	$90\% < x \leq 95\%$	$85\% < x \leq 95\%$	$80\% < x \leq 90\%$
LOS E	$95\% < x \leq 100\%$	$95\% < x \leq 100\%$	$90\% < x \leq 100\%$
LOS F	$100\% < x$	$100\% < x$	$100\% < x$

2.6.2 Existing Intersection Performance

The existing Mount Lindsay Highway / Greenbank Road signalised intersection and equivalent SIDRA representation are shown in Figure 2.2.

The results of the Mount Lindsay Highway / Greenbank Road signalised intersection analyses are summarised in Table 2.4 and included in Appendix B. The results indicate that the intersection currently experiences LOS C operations during both peak periods.

Figure 2.2: MOUNT LINDESAY HWY/ GREENBANK ROAD INTERSECTION

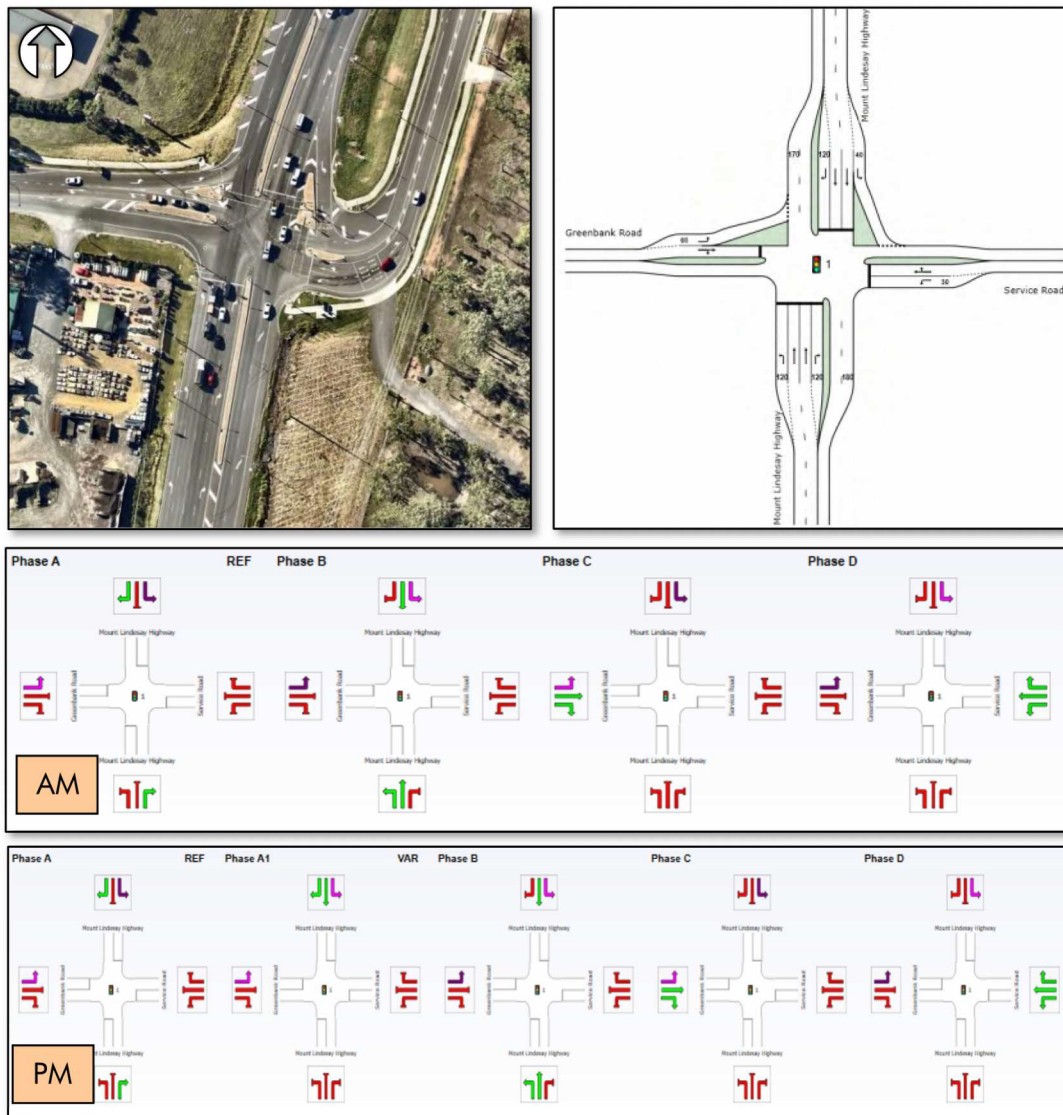


Table 2.4: MOUNT LINDESAY HWY/ GREENBANK ROAD OPERATIONS

PEAK HOUR	DOS	CYCLE TIME	AVG DELAY	95% QUEUE	CRITICAL MOVEMENT
Morning	74.6%	70s	23.6s	15.5veh	Greenbank Road (W) - R
Evening	80.2%	80s	31.7s	20.9veh	Greenbank Road (W) - R

3.0 PROPOSED DEVELOPMENT

3.1 SITE LAYOUT

The proposed development seeks approval for a Material Change of Use (MCU) involving the construction of two food and drink outlets, each with a drive-through, on the northern portion of the subject site. Both outlets comprise a 200m² GFA.

The proposal would retain the existing service station tenancy and light and heavy vehicle refuelling forecourts.

The proposed site layout is shown in Figure 3.1 with plans of development included in Appendix C.

Figure 3.1: PROPOSED SITE LAYOUT



3.2 ACCESS

The proposed food and drink outlets would be accessed via the existing driveway crossovers on Greenbank Road and the service station. The proposal seeks to retain the existing crossover locations and design. No changes to the existing directional flow arrangements at each access (ie exit only at the northern access and all-movements at the southern access) are proposed.

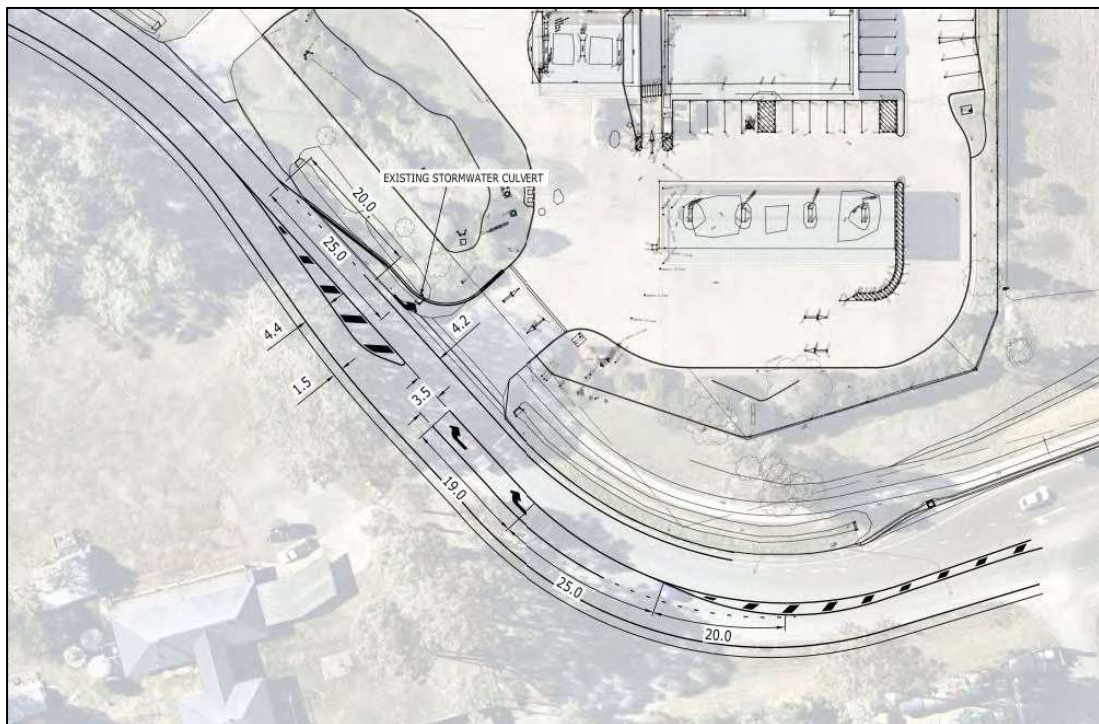
A turn warrants assessment has been undertaken at the all-movements access in accordance with Austroads Guide to Road Design Part 6: Intersections, Interchanges and Crossings Management. The full assessment is included in Section 4.6 and indicates that the following turn treatments are required at the access:

- 25m short-auxiliary left-turn treatment (AUL(s))
- 64m channelised right-turn treatment (CHR)

A functional layout of the all-movements access, which includes the requisite turn treatments, is shown in Figure 3.2. Vehicles approaching the access from the east are expected to be travelling at speeds significantly lower than the posted speed, due to the tight horizontal curve on Greenbank Road just east of the access (ie the recommended posted speed on approach to this curve is 40km/h). Accordingly, the proposed CHR is based on a 50km/h design speed (ie posted speed plus 10km/h). We have conservatively adopted a design speed of 60km/h for the AUL(s), noting that vehicles approaching the access from the west are also expected to be travelling at speeds less than 60km/h.

The extent of pavement widening required to cater for these treatments would not encroach or impact existing street trees on Greenbank Road. However, the AUL(s) treatment would encroach existing stormwater infrastructure on the northern side of Greenbank Road, adjacent to the existing all-movements access. Thus, it is recommended that the impacts to this infrastructure be assessed / quantified by a Stormwater Engineer.

Figure 3.2: PROPOSED TURN TREATMENTS



3.3 PARKING

3.3.1 Requirement

Section 3.3.11 of the Greater Flagstone PDA Development Scheme requires car parking be provided in accordance with Division 5 Parking and Servicing Code of the Beaudesert Shire Planning Scheme 2007. The Beaudesert Parking and Servicing Code requires parking for a Food Establishment be provided at rate of one space per 15m² GFA. Accordingly, a minimum of 27 parking spaces are required to support the proposed food and drink outlets, which comprise a total of 400m² GFA.

3.3.2 Provision

The proposed food and drink outlets would be supported by 34 parking spaces, including two persons with disability (PWD) bays. Thus, the proposed parking provision is in accordance with the Greater Flagstone PDA Development Scheme.

3.3.3 Persons with Disability Spaces

The National Construction Code (NCC) specifies that parking spaces for persons with a disability be provided at a rate of one space per 50, or part thereof, for Class 6 buildings (ie food and drink/ fast food) and be designed and constructed in accordance with Australian Standards AS2890.6¹. The proposed layout provides two PWD parking spaces and complies with NCC requirements for PWD parking provision.

3.3.4 Design

The proposed on-site parking facilities have been designed consistent with the requirements of the Greater Flagstone PDA Development Scheme, Australian Standards AS2890.1² and AS2890.6, in terms of minimum parking space and aisle dimensions, and are typified by:

- parking spaces dimensioned a minimum 2.6m wide by 5.4m long
- PWD spaces dimensioned 2.4m wide by 5.4m long, with an adjacent 2.4m wide shared area
- parking aisles dimensioned a minimum of 6.6m wide
- one-way circulation aisles dimensioned 3.2m wide or greater

3.3.5 Drive-Through Design

The Beaudesert Parking and Servicing Code requires drive-through facilities be designed to cater for at least 12 queued vehicles (measured from the pick-up window). As demonstrated in Figure 3.3, both drive-through facilities would cater for at least 12 queued vehicles in accordance with this requirement.

Figure 3.4 demonstrates that both facilities would cater for the circulation of a large (B99) car.

¹ AS2890.6:2009 Parking Facilities Part 6 "Off-Street Parking for People with Disabilities"

² AS2890.1:2004 Parking Facilities Part 1 "Off-Street Car Parking"

Figure 3.3: DRIVE-THROUGH QUEUING

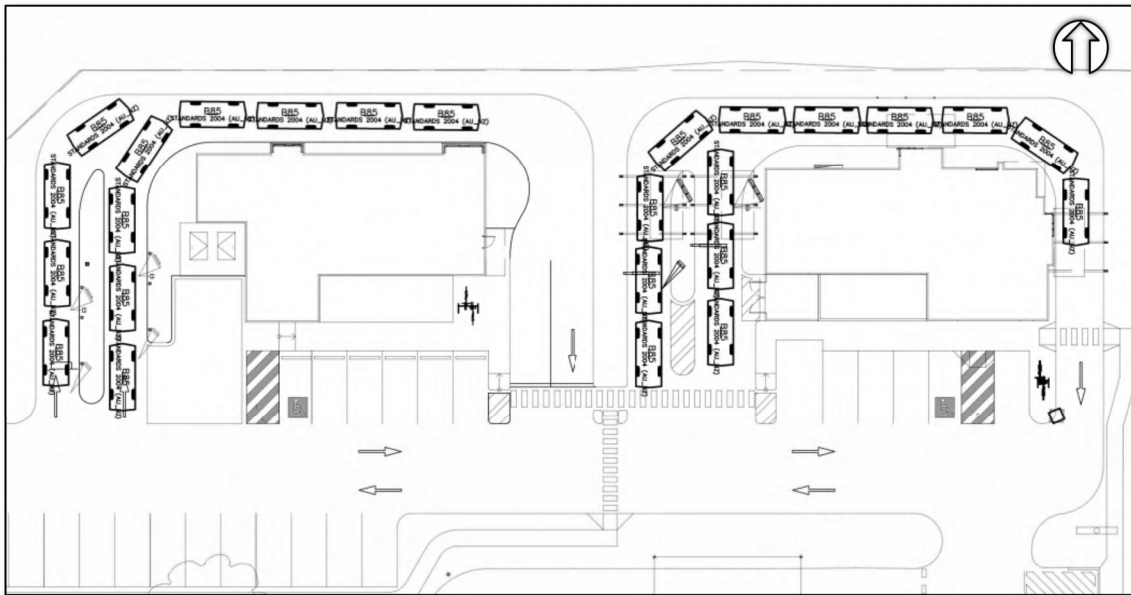
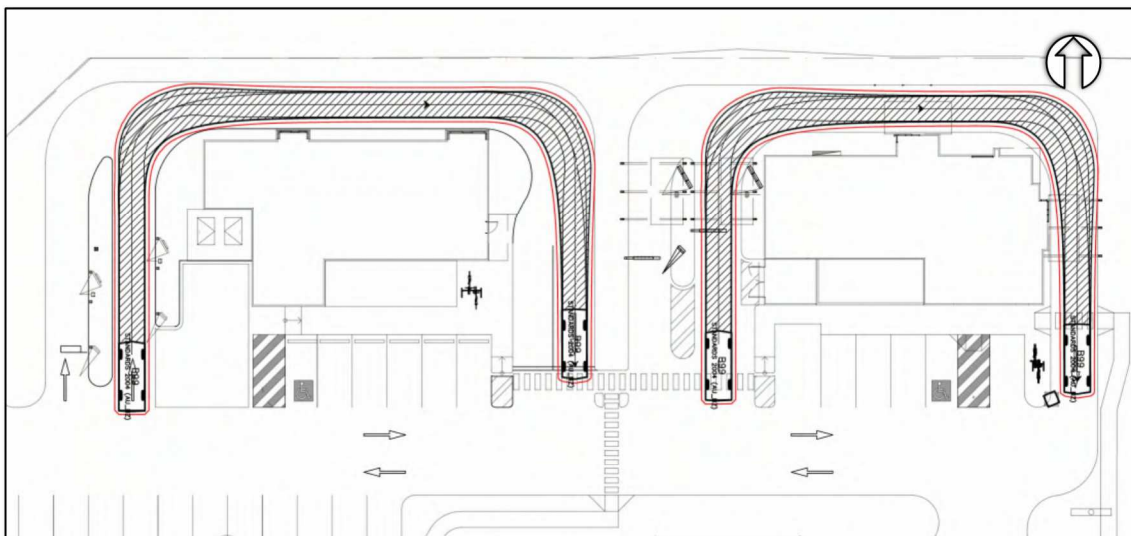


Figure 3.4: DRIVE-THROUGH CIRCULATION



3.4 SERVICING

It is expected that both food and drink tenancies would be regularly serviced by a Small Rigid Vehicle (SRV) and infrequently by a Refuse Collection Vehicle (RCV). A 4.9m wide by 10.8m long dedicated loading bay is located adjacent to Tenancy 1, which would adequately cater for both an SRV and RCV.

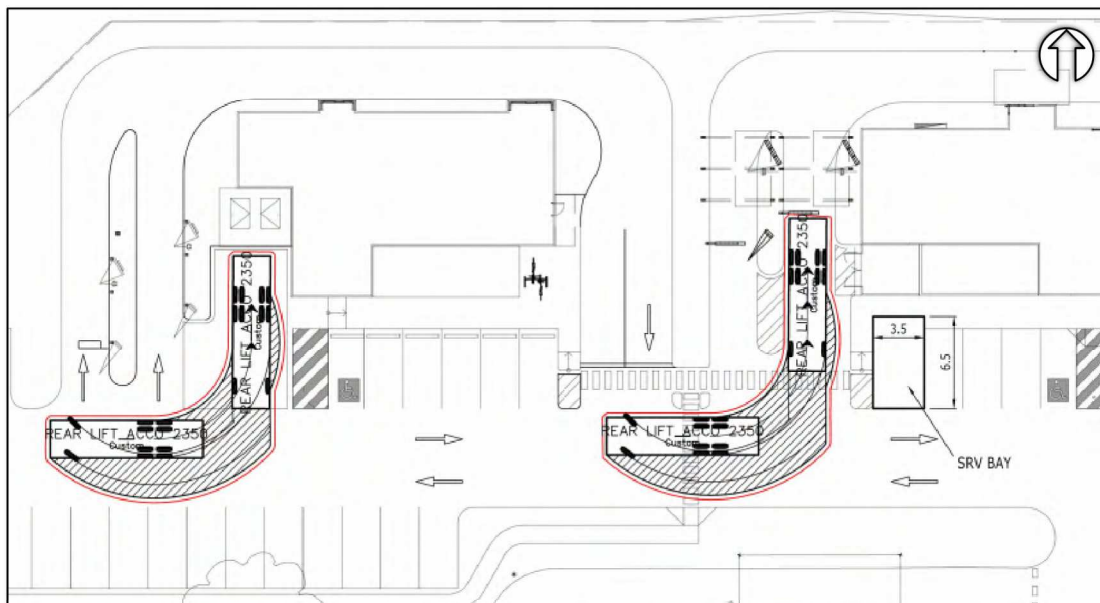
A dedicated SRV bay, dimensioned 3.5m wide by 6.4m long, is proposed adjacent to Tenancy 2. This bay would adequately cater for the regular service vehicle. However, refuse would be collected from the inside drive-through lane for Tenancy 2. It is our view that the proposed servicing arrangement is appropriate for Tenancy 2, given that:

- refuse collection would be infrequent (ie around twice per week)

- refuse would be collected by a private contractor and a refuse management plan could be readily implemented to ensure refuse is not collected during peak times (ie when demand to use the drive-through lane is highest) and that the inside drive-through lane is not accessible to customers during collection times
- 10 cars would be able to queue within the Tenancy 2 drive-through (clear of the adjacent circulation aisles) while a refuse collection vehicle stands within the inside lane, which is considered a sufficient queue provision for an off-peak time (ie when refuse is expected to be collected)
- the RCV would not obstruct pedestrian movements as it stands within the drive through lane
- a dedicated service bay would be provided (separate to the drive-through) catering for the regular service vehicle

A swept path of an RCV servicing each tenancy is shown in Figure 3.5.

Figure 3.5: RCV SWEPT PATHS



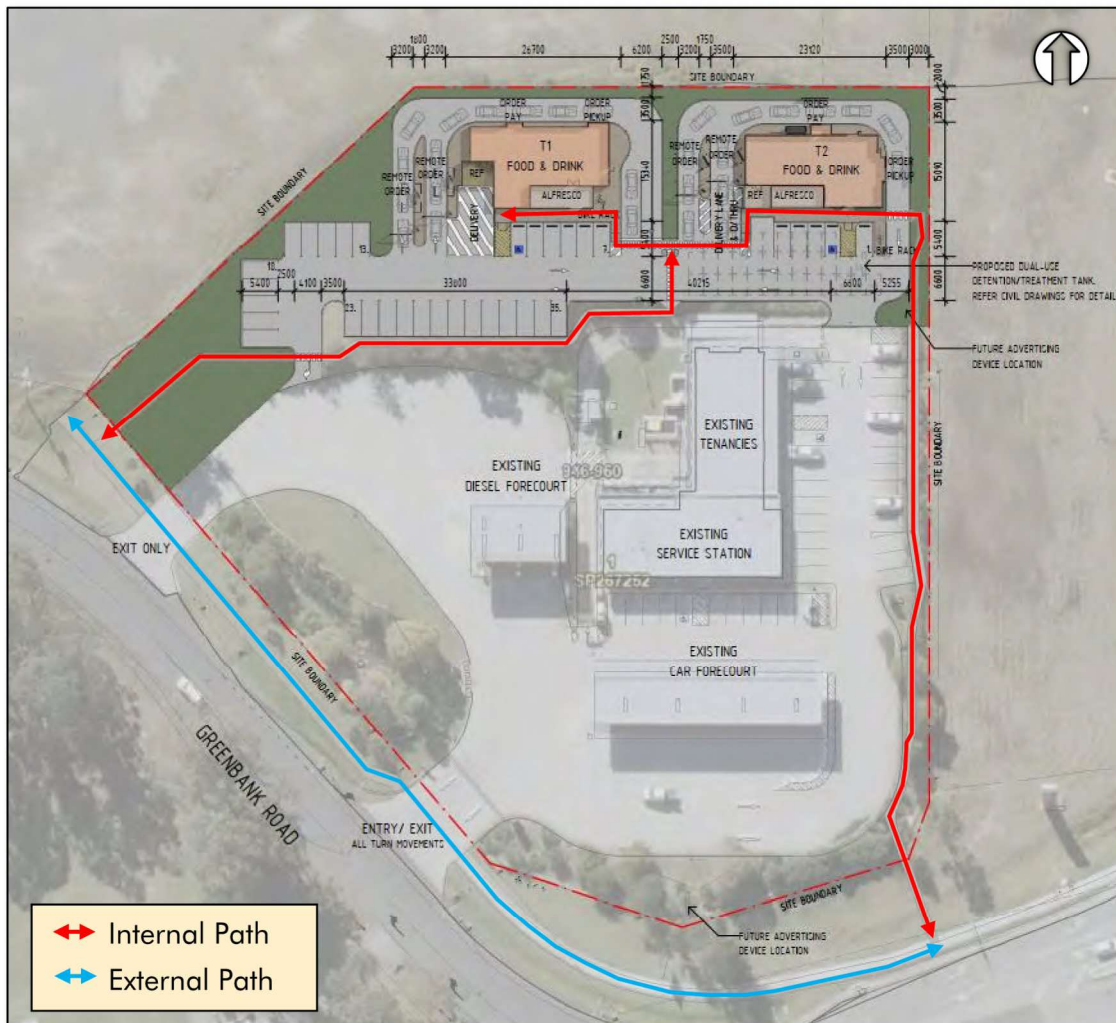
3.5 ACTIVE TRANSPORT

3.5.1 Pedestrians

There are currently no dedicated pedestrian accesses serving the site. It is expected that the proposed food and drink outlets will generate pedestrian movements to / from the site. The proposed site layout has been revised to include internal pedestrian pathways that connect each fast-food tenancy to (a) the existing service station tenancy and (b) Greenbank Road. The internal pedestrian pathways are highlighted in Figure 3.6.

A pedestrian pathway is also proposed along the entire Greenbank Road frontage, as request by EDQ.

Figure 3.6: PROPOSED PEDESTRIAN PATHWAYS



3.5.2 Cyclists

Neither the Greater Flagstone PDA Development Scheme and the Beaudesert Shire Planning Scheme specify a minimum bicycle parking requirement for food and drink uses. However, five bicycle parking spaces have been provided in proximity to the tenancies to promote active transport to / from the site. All bicycle parking spaces could be provided in the form of rails / racks (ie Class 3 parking), provided in close proximity to building entry points. Bicycle rails / racks at this location would:

- be well-lit
- be conveniently located (ie close to building entry points)
- be easily seen by motorists
- would not impede the opening of doors from parked cars
- have a high level of casual surveillance

4.0 TRAFFIC OPERATIONS

4.1 DEVELOPMENT STAGING

4.1.1 *Timing*

TMR's Guide to Traffic Impact Assessment (GTIA) requires the year of opening to be considered when assessing the traffic impact of developments on intersections on the state-controlled road network. Therefore, the following development staging has been adopted:

- traffic counts: 2023
- development application: 2023
- construction and occupation: 2025

4.1.2 *Assessment Scenarios*

The following assessment scenarios have been adopted:

- opening year (2025) pre-development
- opening year (2025) post-development

4.1.3 *Background Traffic Growth*

TMR's Annual Average Daily Traffic (AADT) data for the Mount Lindesay Highway in the vicinity of the subject site (Counter Site: 10098) indicates an average traffic growth rate of 2.1% per annum over the most recent 10-year period for which data is available (ie 2012-2022). Accordingly, a background traffic growth rate of 2.1% per annum has been adopted. The application of this rate equates to a 4.2% increase in traffic volumes over the next two years (ie 2023 to 2025).

4.2 TRAFFIC GENERATION

4.2.1 *Existing*

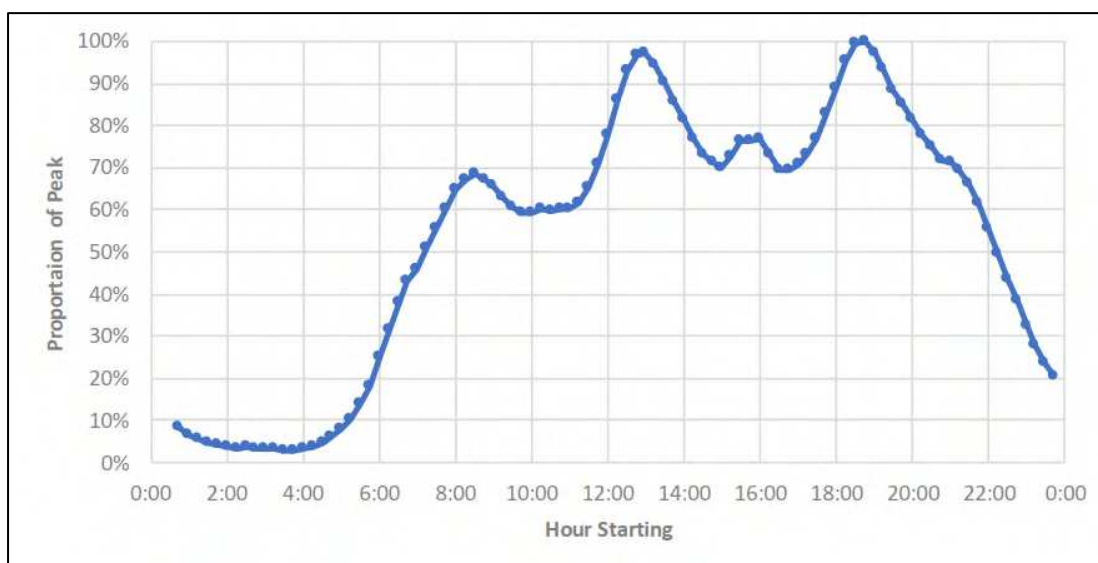
The site currently comprises a service station and food and drink outlet (ie subway) with drive-through. It is understood that service station comprises 280m² GFA and the food and drink outlet comprises 250m² GFA. These uses were operating on the day of the traffic count surveys.

A peak hour traffic generation rate of 46 trips per 100m² GFA has been adopted for the service station use, based on the Queensland Government traffic generation data available via the Open Data Portal. This generation rate is based on surveys throughout Queensland 2006 and 2018. The rate has been derived by taking the 85th percentile traffic generation rate for all the service station sites during the weekday peak period.

The peak hour traffic generation for the existing Subway tenancy has been estimated based on rates published by the New South Wales Roads and Traffic Authority Guide to Traffic Generating Developments. The RTA recommends a traffic generation rate of 100 trips per hour be adopted for smaller fast-food chains (ie Subway, KFC, Hungry Jacks, Guzman and Gomez etc).

We have also reviewed TMR's traffic generation data, available via the Open Data Portal, to estimate the traffic generation for the existing fast-food outlet by time of day. The TMR traffic generation data includes 26 fast-food outlets (with a drive-through), with data collected between 2006 and 2018. According to the data, the critical peak for a fast-food outlet typically occurs around 7:00pm (ie outside of the commuter peak hours). The traffic generation data has been interrogated to produce a daily traffic generation profile, as summarised in Figure 4.1. The adjacent road network peaks between 7:15am – 8:15am and 4:15pm – 5:15pm, in the morning and evening peaks respectively. We have therefore applied a trip reduction factor of 0.7 to estimate Subway traffic during the weekday morning and evening commuter peak hours.

Figure 4.1: DAILY FAST-FOOD TRAFFIC GENERATION PROFILE



4.2.2 Proposed

The proposal seeks to provide two additional fast-food outlets on-site. Five McDonalds restaurants (ie larger fast-food chain) are located within a 10km radius of the site, two of which are located on the Mount Lindesay Highway (ie the subject site is approximately halfway between these two chains). Accordingly, both proposed outlets are expected to cater for smaller fast-food chains (ie similar to the existing Subway). (ie KFC, Hungry Jacks, Guzman and Gomez etc). Accordingly, a peak traffic generation rate of 100 trips per hour be adopted for each proposed tenancy. Similar to the existing outlet, a 0.7 factor has been applied to the peak traffic generation to estimate proposed development traffic during the commuter peak hours.

The likely segmentation of trips associated with the proposed food and drink outlets has been determined based on guidance in Austroads' Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments (2020). The resulting segmentation of development generated traffic is as follows:

- New trips (ie from all directions): 40%
- Undiverted (ie from Greenbank Road): 35%
- Diverted (ie from the Mount Lindesay Highway): 25%

4.2.3 Summary

The proposed increase in site traffic generation during the commuter peak hours is summarised in Table 4.1. The proposal is expected to generate 140 additional trips to the site.

Table 4.1: COMMUTER PEAK HOUR TRAFFIC GENERATION

TENANCY	COMMUTER PEAK GENERATION RATE	NEW	UNDIVERTED	DIVERTED	TOTAL TRIPS (VPH)
Existing					
Service Station	46 trips per 100m ² GFA	13vph	26vph	90vph	129vph
Food and Drink Outlet	0.7 x 100 trips	28vph	18vph	25vph	70vph
Proposed					
Food and Drink Outlets 1 & 2	2 x (0.7 x 100 trips per hour)	55vph	50vph	35vph	140vph

4.3 DIRECTIONAL DISTRIBUTION

The likely distribution of development related traffic on the surrounding road network has been estimated based on the directional split inherent in the traffic surveys. The adopted distribution in terms of new trips, diverted trips and undiverted drop-in trips is provided for the weekday morning and evening peaks in Appendix D.

New trips are expected to arrive / depart the site from all directions. The distribution of new trips is heavily dependent on the directional split inherent in the traffic surveys. The weekday morning and evening distributions, as shown in Figures 4.2 and 4.3, indicate that the majority of new traffic will arrive / depart via the Mount Lindesay Highway. However, in years to come (when sites within the Greater Flagstone PDA are developed to the north-west of the site) it is expected that a significant proportion of traffic will arrive / depart to / from the west via Greenbank Road. Accordingly, the adopted distribution conservatively estimates turning movements at the Mount Lindesay Highway / Greenbank Road signalised intersection.

Figure 4.2: MORNING PEAK NEW TRIPS DISTRIBUTION

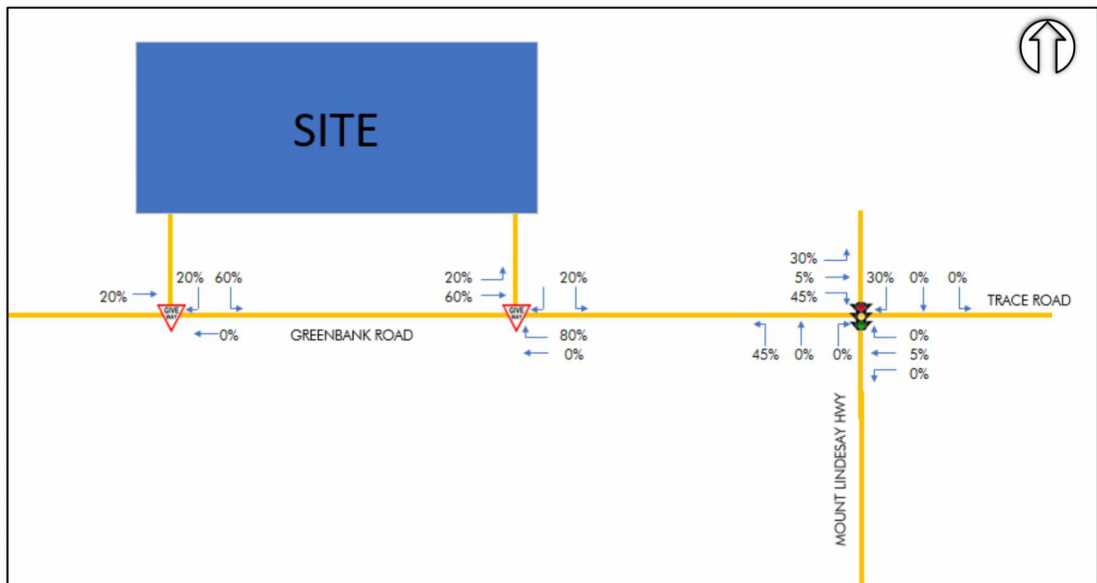
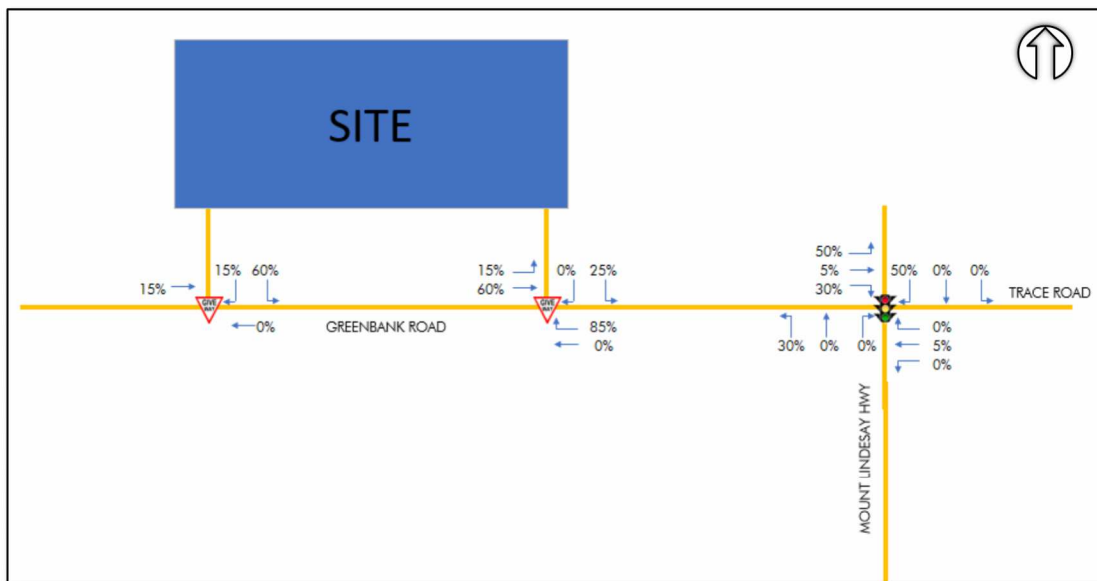


Figure 4.3: EVENING PEAK NEW TRIPS DISTRIBUTION



4.4 INTERSECTION OPERATIONS

The likely impact of the proposed development on the peak hour operations at the Mount Lindsay Highway / Greenbank Road intersection has been assessed using SIDRA. These analyses are based on the peak hour turning movement forecasts presented in Appendix D and the SIDRA intersection representation shown in Figure 2.2.

The results of the analyses are summarised in Table 4.2 and attached in Appendix B. The results indicate that the intersection is expected to experience LOS C operations during all pre and post development scenarios. Additional development traffic at the intersection is expected to have a marginal impact on operations during both peak periods (ie degree of saturation, queuing and average intersection delay). The detailed SIDRA output also demonstrates that all 95th percentile

queues would be contained within the available storage of the channelised right-turn lanes at the intersection. The existing right-turn lanes are therefore considered adequate to cater for additional development traffic.

Table 4.2: 2025 MOUNT LINDESAY HWY / GREENBANK RD OPERATIONS

PEAK HOUR	DOS	CYCLE TIME	AVG DELAY	95% QUEUE	CRITICAL MOVEMENT
Morning					
Pre-Development	77.0%	70s	24.6s	16.1veh	Greenbank Road (W) - Right
Post-Development	77.8%	70s	24.6s	16.1veh	Greenbank Road (W) - Right
Evening					
Pre-Development	82.8%	80s	31.9s	21.1veh	Greenbank Road (W) - Right
Post-Development	89.3%	80s	32.9s	20.7veh	Service Road (E) - Left

4.5 IMPACT ASSESSMENT

The methodology behind calculating the impact of a development in terms of intersection delay is discussed in Section 11.2 of TMRs' Guide to Traffic Impact Assessment (GTIA). Consistent with the GTIA, net-change in delay is calculated across the impact assessment area for the opening year (2024).

TMRs' GTIA outlines the following desired outcome with respect to intersection delay:

'The desired outcome is to ensure that the sum of intersection delays on base traffic in the impact assessment area does not significantly worsen (ie does not increase average delay by more than 5% in aggregate). In other words, the additional delays created by traffic generated by the development need to be mitigated by upgrades to intersection in the impact assessment area which reduce delays (in aggregate) to at least pre-development levels.'

Net-change in delay is calculated by summing the total vehicle minutes at the intersection for all design peak periods assessed for the pre-development and post-development cases. The post-development case is calculated by multiplying the post-development average delay by movement to the pre-development volumes on each movement. The expected net change in delay has been calculated for the Mount Lindesay Highway / Greenbank Road intersection, as shown in Table 4.3 and in Appendix E.

Table 4.3: NET CHANGE IN DELAY

PEAK HOUR	PRE-DEV VOLUME	TOTAL DELAY		INCREASE IN DELAY
		PRE-DEV	POST-DEV	
Weekday Morning	2,430vph	984 veh-mins	990 veh-mins	+0.7%
Weekday Evening	2,905vph	1,543 veh-mins	1,580 veh-mins	+2.9
Total	5,330vph	2,526 veh-mins	2,578 veh-mins	+2.0%

As demonstrated the post development scenarios are expected to result in a 2.0% increase in delay across the weekday morning and evening peak periods compared to the pre-development scenarios. Therefore, no mitigation treatments are required to comply with TMRs' GTIA, as the expected net change in delay does not exceed 5.0%.

4.6 TURN WARRANT ASSESSMENT

A turn warrants assessment has been undertaken at the all-movements site access in accordance with Normal Design Domain warrants included in Austroads Guide To Road Design Part 6: Intersections, Interchanges and Crossings Management. The assessment considers a 10-year design horizon (ie opening year plus 10 years) and is based on estimated traffic volumes on Greenbank Road during 2035. Future background traffic volumes have been estimated by applying a traffic growth rate of 2.1% per annum, which equates to a 25.2% increase in background traffic over the next 12 years (ie 2023 – 2035).

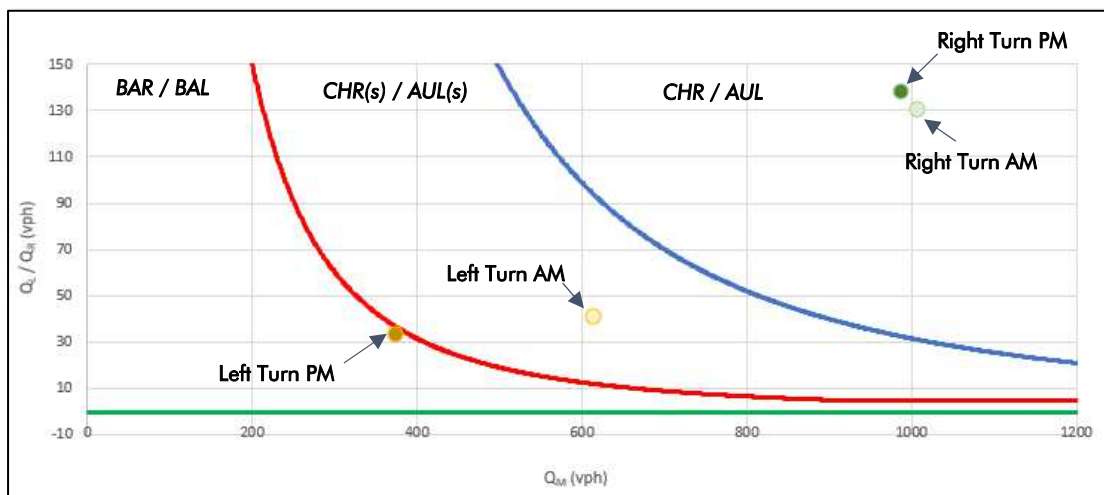
The predicted 2035 post-development peak turning movements at the Greenbank Road all-movements are summarised in Appendix D. The results of the turn warrants assessment for the 2035 post-development weekday morning and evening peak hour scenarios is shown in Figure 4.4.

The following turn treatments are warranted:

- short-auxiliary left-turn treatment (AUL(s))
- channelised right-turn treatment (CHR)

The all-movements access has been revised to include the warranted turn treatments as shown in Figure 3.2. These turn treatments have been designed in accordance with Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections.

Figure 4.4: TURN WARRANTS ASSESSMENT



4.6 ROAD SAFETY

4.6.1 Road Crash History

Historic crash data (between 2001 and 2021) was sourced from TMR for the Mount Lindesay Highway / Greenbank Road intersection. However, as discussed, this intersection was recently upgraded to a signalised intersection to primarily improve road safety. It is expected that TMR reviewed historic crash data and crash trends at the intersection when designing the upgrade. Accordingly, we have excluded all crashes prior to 2019 when assessing crash trends at the signalised intersection.

Since the upgrade, there have been two crashes reported at the intersection. Both crashes were rear-end crashes (DCA Code: 301) and resulted in a medical treatment. No hospitalisations have been reported at the intersection since the upgrade. Considering there were 46 reported crashes at the intersection before 2019, signalising the intersection has likely resolved many of the historic underlying safety concerns.

4.6.2 Risk Assessment

A road safety risk assessment has been undertaken in accordance with TMR's GTIA. The GTIA outlines that:

'Safety is not readily quantifiable as efficiency and is scored based on expert opinion on the changes to likelihood and / or consequence of a risk being realised. The condition of road cannot be defined absolutely as being safe or unsafe. Rather, road safety is a relative measure benchmarked against an existing condition or an acceptable risk threshold.'

The traffic safety risks were identified and then scored using the risk scoring matrix outlined in the GTIA, as shown in Figure 4.5. These identified risks relate to the increase in traffic movements at the nearby Mount Lindesay Highway / Greenbank Road intersection.

Figure 4.5: SAFETY RISK SCORE MATRIX

		Potential consequence				
		Property only (1)	Minor injury (2)	Medical treatment (3)	Hospitalisation (4)	Fatality (5)
Potential likelihood	Almost certain (5)	M	M	H	H	H
	Likely (4)	M	M	M	H	H
	Moderate (3)	L	M	M	M	H
	Unlikely (2)	L	L	M	M	M
	Rare (1)	L	L	L	M	M

L: Low risk
 M: Medium risk
 H: High risk

The proposed development is expected to most significantly increase left and right-turn volumes in and out of Greenbank Road in both peaks, as summarised in Table 4.4.

Table 4.4: INCREASE IN TURNING VOLUMES

MOVEMENT	PRE DEV		POST DEV		VEHICLE INCREASE			
	AM	PM	AM	PM	AM	%INC	PM	%INC
Left into Greenbank	191	242	215	256	24	12.5%	14	5.5%
Right into Greenbank	90	313	104	338	14	15.5%	25	7.9%
Through into Greenbank	21	42	22	43	1	4.7%	1	2.3%
Left from Greenbank	246	109	266	130	20	8.1%	21	19.2%
Right from Greenbank	230	220	249	240	19	8.3%	20	9.1%
Through from Greenbank	16	20	17	21	1	6.3%	1	5.0%

Accordingly, the road safety assessment specifically addresses the:

- risk of rear-end crashes along the adjacent section of the Mount Lindesay Highway associated with vehicles turning left into Greenbank Road
- risk of rear-end crashes along the adjacent section of the Mount Lindesay Highway associated with vehicles turning right into Greenbank Road
- risk of rear-end crashes along the adjacent section of Greenbank Road associated with vehicles turning left into the Mount Lindesay Highway
- risk of side-swipe crashes along the adjacent section of Greenbank Road associated with vehicles turning left into the Mount Lindesay Highway
- risk of rear-end crashes along the adjacent section of Greenbank Road associated with vehicles turning right into the Mount Lindesay Highway

The consequence of each crash is based on crash risk scores included in TMRs' Manual of Uniform Traffic Control Devices (MUTCD) for different crash types (ie DCA Codes).

The outcomes of the road safety assessment are identified in Table 4.5. The introduction of development traffic at the signalised intersection would result in a minor increase in likelihood of rear end crashes on the Mount Lindesay Highway and Greenbank Road. However, this small increase in likelihood is not expected to significantly worsen the safety of the adjacent road network.

Therefore, the proposed development is expected to have a negligible impact to road safety on the adjacent road network and as such, no upgrades to network are considered necessary under the proposal.

Table 4.5: ROAD SAFETY RISK ASSESSMENT

RISK ITEM	PRE-DEV			POST -DEV		
	LIKELIHOOD	CONSEQUENCE	RISK SCORE	LIKELIHOOD	CONSEQUENCE	RISK SCORE
risk of rear-end crashes associated with vehicles turning left into Greenbank Road	1	2	L	2	2	L
risk of rear-end crashes associated with vehicles turning right into Greenbank Road	1	2	L	2	2	L
risk of rear-end crashes associated with vehicles turning left out of Greenbank Road	1	2	L	2	2	L
risk of side-swipe crashes associated with vehicles turning left out of Greenbank Road	1	2	L	2	2	L
risk of rear-end crashes associated with vehicles turning right out of Greenbank Road	1	2	L	2	2	L

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The proposed development at 946-950 Greenbank Road, North Maclean has been evaluated in terms of the site access arrangements, parking provision and design, servicing arrangements, pedestrian / cyclist facilities and likely traffic impact. The main points to note are:

- the development application seeks approval for a Material Change of Use for two food and drink outlets, each with a drive-through
- vehicular access is proposed via two existing driveways on Greenbank Road
- a AUL(s) and CHR treatment would be provided at the existing all-movements access on Greenbank Road to cater for the increase in entry turn movements
- no other changes to the existing accesses are considered necessary to cater for the proposal
- a total of 34 car parking spaces are proposed on-site, including two PWD bays, which accords with the Greater Flagstone PDA Development Scheme
- the on-site parking layout has been designed generally in accordance with the Greater Flagstone PDA Development Scheme and AS2890.1
- each drive-through facility would provide sufficient queue storage
- the proposal would cater for on-site servicing for an RCV (for refuse collection) and an SRV (for food deliveries)
- five bicycle parking spaces are proposed in proximity to the tenancies
- the proposal is expected to generate in the order of 140 trips during the commuter peak hours, of which 56 trips would be 'new'
- additional development traffic is expected to have a negligible impact on intersection operations at the Mount Lindesay Highway / Greenbank Road intersection
- additional development traffic is expected generate a 2.0% increase in total delay on the surrounding road network across the weekday peak periods, which is less than TMRs' 5% threshold as outlined in the GTIA
- the proposed development is not expected to significantly impact road safety on the adjacent State-controlled network in accordance with TMRs' GTIA

5.2 RECOMMENDATIONS

Based on our review, it is recommended that the impacts of the recommended turn treatments at the all-movements access be assessed / quantified by a Stormwater Engineer.

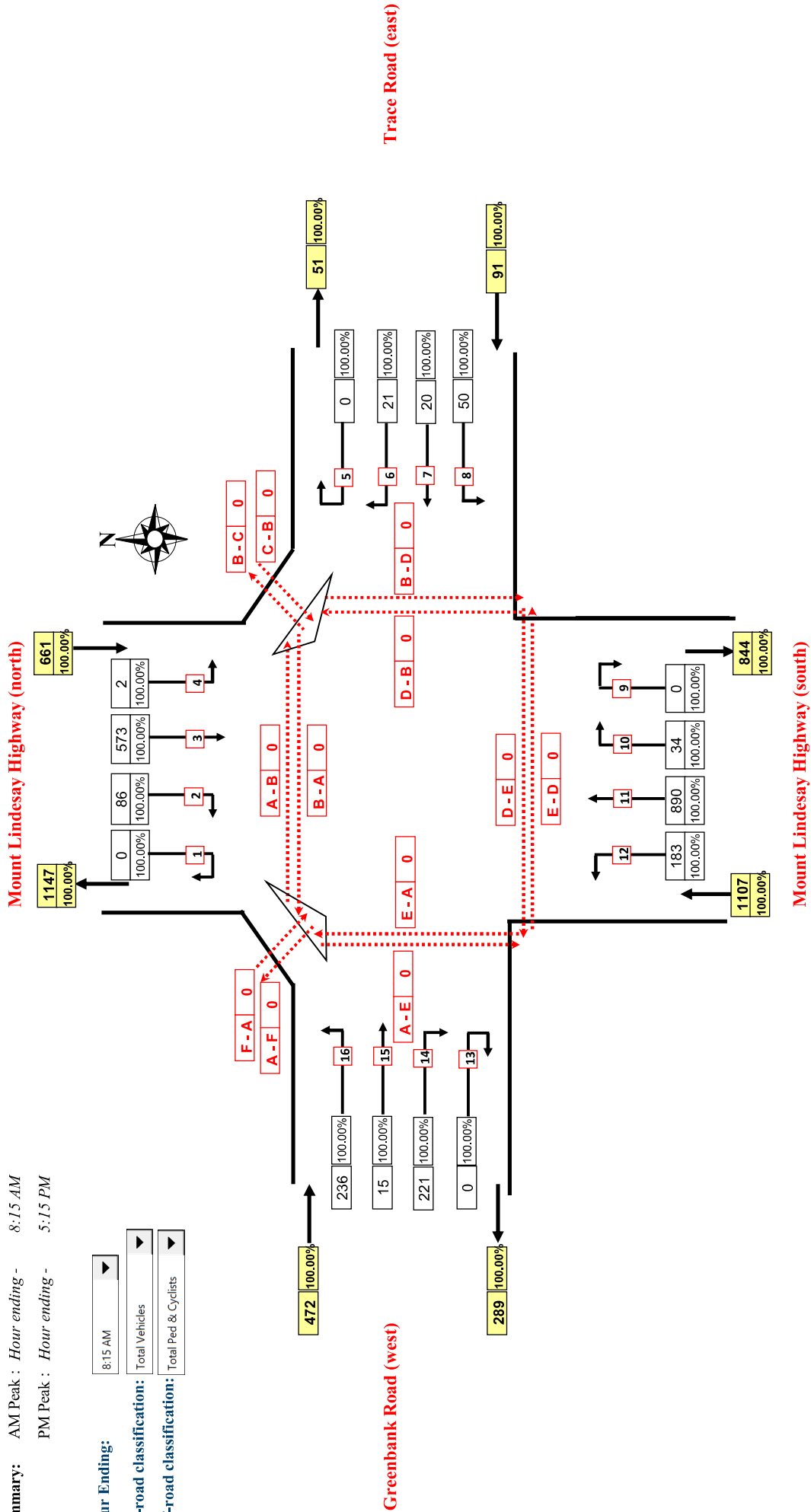
APPENDIX A: TRAFFIC COUNT SURVEYS

AUSTRAFFIC VIDEO INTERSECTION COUNT



Site No.: 1 Weather: Fine
Location: Mount Lindesay Highway/Greenbank Road, North Maclean
Day/Date: Tuesday, 28 March 2023
Summary: AM Peak : Hour ending - 8:15 AM
PM Peak : Hour ending - 5:15 PM

Hour Ending: 8:15 AM
On-road classification: Total Vehicles
Off-road classification: Total Ped & Cyclists



Note: 3.28% = proportion of selected vehicle classification as a percentage of total vehicles

AUSTRAFFIC VIDEO INTERSECTION COUNT

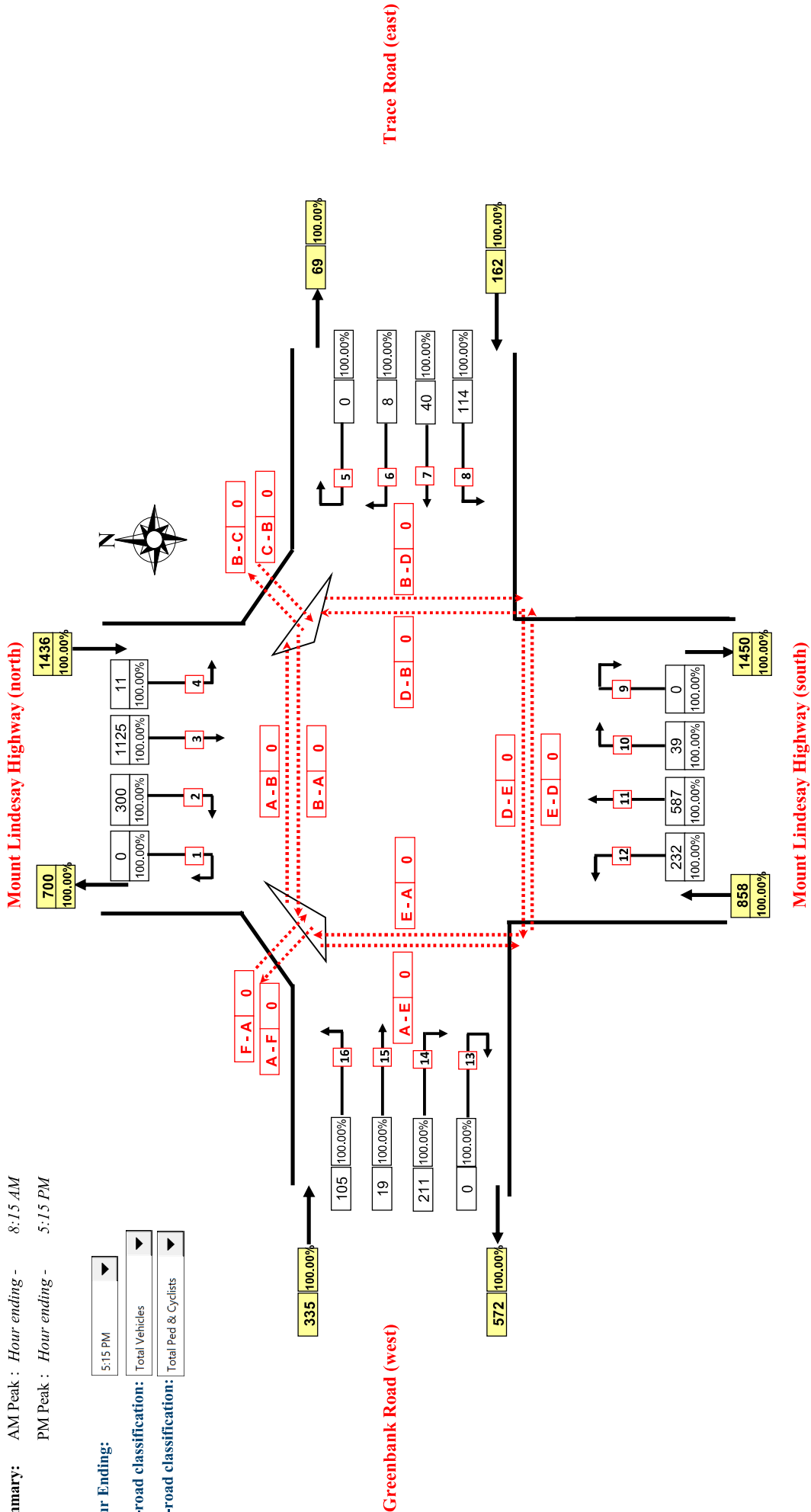


Site No.: 1 Weather: Fine
Location: Mount Lindesay Highway/Greenbank Road, North Maclean
Day/Date: Tuesday, 28 March 2023
Summary: AM Peak : Hour ending - 8:15 AM
PM Peak : Hour ending - 5:15 PM

Hour Ending:

On-road classification:

Off-road classification:



Note: = proportion of selected vehicle classification as a percentage of total vehicles

APPENDIX B: SIDRA INTERSECTION ANALYSES

USER REPORT FOR SITE

All Movement Classes



Project: Mount Lindesay HWY_Greenbank Road

**Template: Default Site User
Report**

Site: 1 [Existing AM Peak (Site Folder: General)]

Mount Lindesay Highway / Greenbank Road

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Cycle Time)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Two-Phase

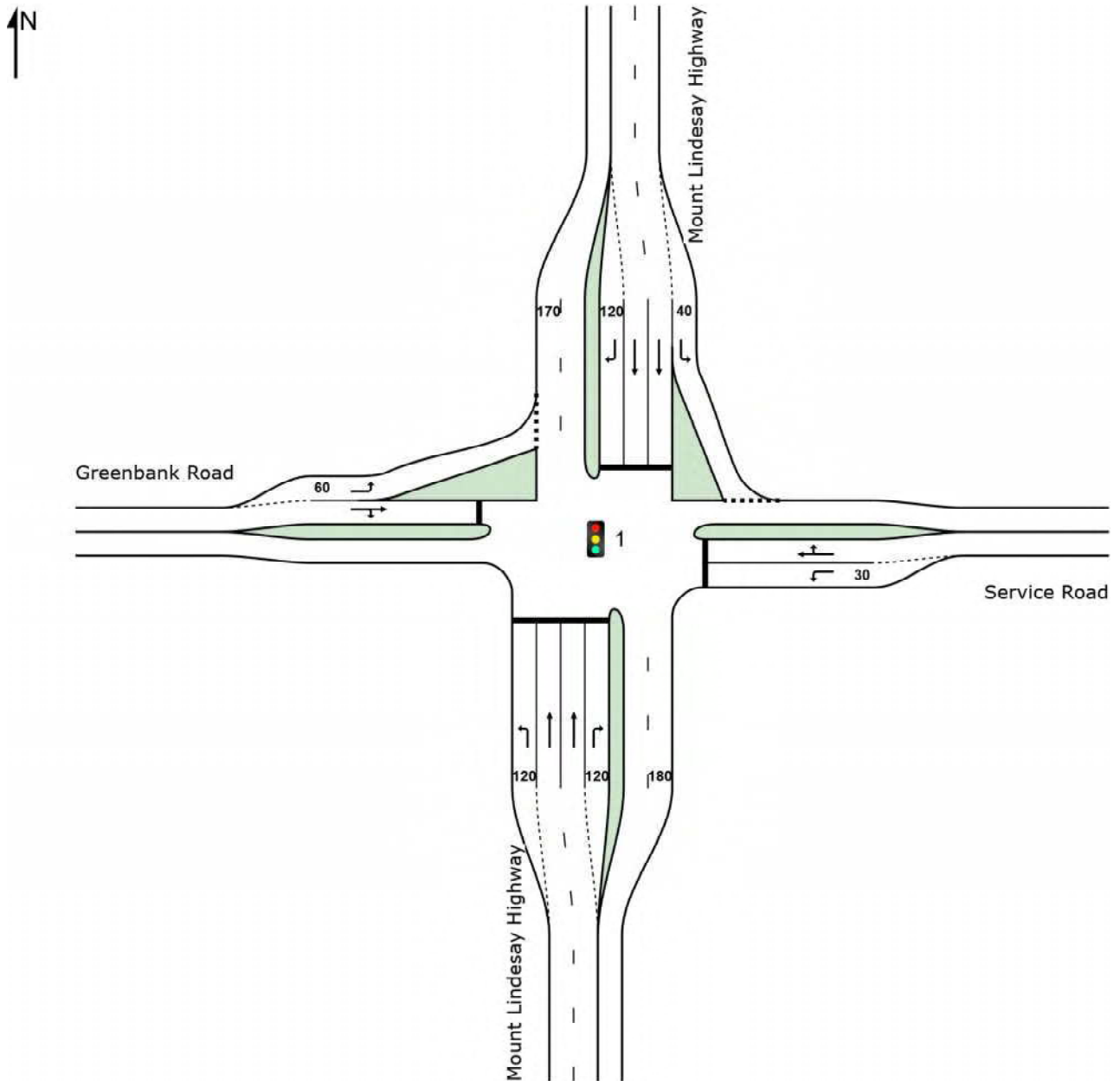
Reference Phase: Phase A

Input Phase Sequence: A, B, C, D

Output Phase Sequence: A, B, C, D

Site Layout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
						v/c	sec							km/h
South: Mount Lindesay Highway														
1	L2	183	9.0	193	9.0	0.285	23.9	LOS C	5.2	39.3	0.73	0.76	0.73	42.1
2	T1	890	6.0	937	6.0	* 0.676	22.1	LOS C	16.1	118.3	0.87	0.77	0.87	44.2
3	R2	34	12.0	36	12.0	0.239	44.8	LOS D	1.4	10.7	0.97	0.73	0.97	33.9
Approach		1107	6.7	1165	6.7	0.676	23.1	LOS C	16.1	118.3	0.85	0.76	0.85	43.4
East: Service Road														
4	L2	50	18.0	53	18.0	* 0.640	51.7	LOS D	2.3	18.5	1.00	0.80	1.19	31.8
5	T1	20	10.0	21	10.0	0.533	45.0	LOS D	1.9	15.7	1.00	0.76	1.08	33.9
6	R2	21	38.0	22	38.0	0.533	51.4	LOS D	1.9	15.7	1.00	0.76	1.08	32.9
Approach		91	20.9	96	20.9	0.640	50.1	LOS D	2.3	18.5	1.00	0.78	1.14	32.5
North: Mount Lindesay Highway														
7	L2	2	0.0	2	0.0	0.001	6.2	LOS A	0.0	0.0	0.17	0.56	0.17	53.7
8	T1	573	13.0	603	13.0	0.441	19.7	LOS B	8.9	69.6	0.78	0.67	0.78	45.4
9	R2	86	14.0	91	14.0	* 0.613	47.2	LOS D	3.7	29.2	1.00	0.81	1.09	33.1
Approach		661	13.1	696	13.1	0.613	23.2	LOS C	8.9	69.6	0.81	0.69	0.82	43.3
West: Greenbank Road														
10	L2	236	7.0	248	7.0	0.258	10.2	LOS B	3.3	24.6	0.45	0.68	0.45	50.7
11	T1	15	7.0	16	7.0	* 0.695	34.3	LOS C	9.6	70.6	0.98	0.86	1.06	36.5
12	R2	221	6.0	233	6.0	0.695	40.0	LOS D	9.6	70.6	0.98	0.86	1.06	35.9
Approach		472	6.5	497	6.5	0.695	25.0	LOS C	9.6	70.6	0.72	0.77	0.75	42.1
All Vehicles		2331	9.0	2454	9.0	0.695	24.6	LOS C	16.1	118.3	0.82	0.74	0.84	42.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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).

Queue Model: SIDRA Standard.

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)

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

Organisation: PEKOL TRAFFIC AND TRANSPORT | Licence: PLUS / 1PC | Created: Monday, 18 September 2023 10:18:19 AM

Project: P:\2022-23\23-304 946-950 Greenbank Road, North Maclean\Calcs\SIDRA\Mount Lindesay HWY_Greenbank Road.sip9

USER REPORT FOR SITE

All Movement Classes

 Project: Mount Lindesay HWY_Greenbank Road

Template: Default Site User Report

Site: 1 [2025 AM Peak (Site Folder: General)]

Mount Lindesay Highway / Greenbank Road

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, B, C, D

Output Phase Sequence: A, B, C, D

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Mount Lindesay Highway														
1	L2	191	9.0	200	9.0	0.320	25.0	LOS C	5.0	37.9	0.77	0.78	0.77	45.6
2	T1	927	6.0	969	6.0	* 0.758	23.0	LOS C	16.5	121.4	0.93	0.84	0.98	53.5
3	R2	35	12.0	37	12.0	0.249	41.9	LOS D	1.3	9.7	0.97	0.73	0.97	37.6
Approach		1153	6.7	1205	6.7	0.758	23.9	LOS C	16.5	121.4	0.90	0.82	0.94	51.4
East: Service Road														
4	L2	52	18.0	54	18.0	* 0.770	48.9	LOS D	2.2	17.6	1.00	0.87	1.46	32.6
5	T1	21	10.0	22	10.0	0.647	41.5	LOS D	1.8	14.9	1.00	0.80	1.24	35.0
6	R2	22	38.0	23	38.0	0.647	48.1	LOS D	1.8	14.9	1.00	0.80	1.24	33.9
Approach		95	20.9	99	20.9	0.770	47.1	LOS D	2.2	17.6	1.00	0.84	1.36	33.4
North: Mount Lindesay Highway														
7	L2	2	0.0	2	0.0	0.001	7.9	LOS A	0.0	0.0	0.19	0.62	0.19	58.9
8	T1	597	13.0	624	13.0	0.495	19.3	LOS B	8.6	67.1	0.83	0.70	0.83	56.3
9	R2	90	14.0	94	14.0	* 0.650	44.5	LOS D	3.5	27.1	1.00	0.82	1.15	36.6
Approach		689	13.1	720	13.1	0.650	22.6	LOS C	8.6	67.1	0.85	0.72	0.87	52.6
West: Greenbank Road														
10	L2	246	7.0	257	7.0	0.263	10.1	LOS B	3.1	23.0	0.48	0.69	0.48	50.8
11	T1	16	7.0	17	7.0	* 0.720	31.0	LOS C	8.9	65.7	0.99	0.88	1.11	37.7
12	R2	230	6.0	240	6.0	0.720	36.8	LOS D	8.9	65.7	0.99	0.88	1.11	37.1
Approach		492	6.5	514	6.5	0.720	23.2	LOS C	8.9	65.7	0.73	0.79	0.79	42.9
All Vehicles		2429	9.0	2538	9.0	0.770	24.3	LOS C	16.5	121.4	0.86	0.79	0.91	48.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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).

Queue Model: SIDRA Standard.

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)

Site: 1 [2025 AM Peak WD (Site Folder: General)]

Mount Lindesay Highway / Greenbank Road

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, B, C, D

Output Phase Sequence: A, B, C, D

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total HV] veh/h %		DEMAND FLOWS [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. Dist] veh m		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mount Lindesay Highway														
1	L2	215	9.0	225	9.0	0.360	25.3	LOS C	5.8	43.4	0.78	0.79	0.78	45.4
2	T1	916	6.0	957	6.0	* 0.749	22.7	LOS C	16.1	118.6	0.92	0.83	0.96	53.7
3	R2	35	12.0	37	12.0	0.249	41.9	LOS D	1.3	9.7	0.97	0.73	0.97	37.6
Approach		1166	6.7	1218	6.7	0.749	23.8	LOS C	16.1	118.6	0.90	0.82	0.93	51.3
East: Service Road														
4	L2	52	18.0	54	18.0	* 0.770	48.9	LOS D	2.2	17.6	1.00	0.87	1.46	32.6
5	T1	22	10.0	23	10.0	0.660	41.6	LOS D	1.8	15.2	1.00	0.80	1.26	35.0
6	R2	22	38.0	23	38.0	0.660	48.2	LOS D	1.8	15.2	1.00	0.80	1.26	33.9
Approach		96	20.8	100	20.8	0.770	47.1	LOS D	2.2	17.6	1.00	0.84	1.37	33.4
North: Mount Lindesay Highway														
7	L2	2	0.0	2	0.0	0.001	7.9	LOS A	0.0	0.0	0.19	0.62	0.19	58.9
8	T1	591	13.0	618	13.0	0.490	19.3	LOS B	8.5	66.3	0.83	0.70	0.83	56.4
9	R2	104	14.0	109	14.0	* 0.751	46.1	LOS D	4.1	32.4	1.00	0.87	1.30	36.0
Approach		697	13.1	728	13.1	0.751	23.2	LOS C	8.5	66.3	0.85	0.73	0.89	52.0
West: Greenbank Road														
10	L2	266	7.0	278	7.0	0.284	10.1	LOS B	3.4	25.3	0.48	0.69	0.48	50.8
11	T1	17	7.0	18	7.0	* 0.778	33.0	LOS C	10.1	74.2	1.00	0.93	1.20	36.9
12	R2	249	6.0	260	6.0	0.778	38.7	LOS D	10.1	74.2	1.00	0.93	1.20	36.4
Approach		532	6.5	556	6.5	0.778	24.2	LOS C	10.1	74.2	0.74	0.81	0.84	42.4
All Vehicles		2491	9.0	2603	9.0	0.778	24.6	LOS C	16.1	118.6	0.86	0.79	0.92	48.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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).

Queue Model: SIDRA Standard.

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)

Site: 1 [Existing PM Peak (Site Folder: General)]

Mount Lindesay Highway / Greenbank Road

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, A1*, B, C, D

Output Phase Sequence: A, A1*, B, C, D

(* Variable Phase)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Mount Lindesay Highway														
1	L2	232	3.0	244	3.0	0.597	36.3	LOS D	8.8	63.1	0.95	0.82	0.95	36.9
2	T1	587	12.0	618	12.0	* 0.796	35.0	LOS D	13.3	102.8	0.99	0.92	1.13	38.1
3	R2	34	3.0	36	3.0	0.787	56.3	LOS E	1.7	12.0	1.00	0.83	1.53	30.7
Approach		853	9.2	898	9.2	0.796	36.2	LOS D	13.3	102.8	0.98	0.89	1.09	37.4
East: Service Road														
4	L2	114	4.0	120	4.0	* 0.760	50.2	LOS D	5.1	37.2	1.00	0.89	1.26	32.6
5	T1	40	3.0	42	3.0	0.327	39.5	LOS D	2.0	15.4	0.98	0.73	0.98	36.4
6	R2	8	63.0	8	63.0	0.327	45.9	LOS D	2.0	15.4	0.98	0.73	0.98	34.8
Approach		162	6.7	171	6.7	0.760	47.4	LOS D	5.1	37.2	0.99	0.84	1.18	33.6
North: Mount Lindesay Highway														
7	L2	11	0.0	12	0.0	0.008	6.2	LOS A	0.0	0.3	0.17	0.58	0.17	53.7
8	T1	1125	5.0	1184	5.0	0.756	22.6	LOS C	20.9	152.5	0.90	0.82	0.92	44.2
9	R2	300	5.0	316	5.0	* 0.783	41.3	LOS D	12.8	93.5	1.00	0.91	1.16	35.1
Approach		1436	5.0	1512	5.0	0.783	26.4	LOS C	20.9	152.5	0.91	0.84	0.97	42.0
West: Greenbank Road														
10	L2	105	7.0	111	7.0	0.097	8.6	LOS A	1.1	8.1	0.35	0.64	0.35	51.8
11	T1	19	5.0	20	5.0	* 0.822	41.3	LOS D	10.4	75.5	1.00	0.96	1.28	34.1
12	R2	211	4.0	222	4.0	0.822	47.6	LOS D	10.4	75.5	1.00	0.96	1.28	33.7
Approach		335	5.0	353	5.0	0.822	35.1	LOS D	10.4	75.5	0.80	0.86	0.99	37.8
All Vehicles		2786	6.4	2933	6.4	0.822	31.7	LOS C	20.9	152.5	0.93	0.86	1.02	39.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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).

Queue Model: SIDRA Standard.

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)

Site: 1 [2025 PM Peak (Site Folder: General)]

Mount Lindesay Highway / Greenbank Road

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, A1*, B, C, D

Output Phase Sequence: A, A1*, B, C, D

(* Variable Phase)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
						v/c	sec							km/h
South: Mount Lindesay Highway														
1	L2	242	3.0	246	3.0	0.601	36.4	LOS D	8.9	63.6	0.95	0.82	0.95	36.9
2	T1	612	12.0	622	12.0	* 0.802	35.3	LOS D	13.5	104.1	0.99	0.92	1.13	38.0
3	R2	35	3.0	36	3.0	0.782	56.3	LOS E	1.7	11.9	1.00	0.83	1.52	30.7
Approach		889	9.2	903	9.2	0.802	36.4	LOS D	13.5	104.1	0.98	0.89	1.10	37.4
East: Service Road														
4	L2	119	4.0	121	4.0	* 0.765	50.4	LOS D	5.2	37.5	1.00	0.89	1.27	32.6
5	T1	42	3.0	43	3.0	0.328	39.5	LOS D	2.0	15.5	0.98	0.73	0.98	36.4
6	R2	8	63.0	8	63.0	0.328	45.9	LOS D	2.0	15.5	0.98	0.73	0.98	34.8
Approach		169	6.5	172	6.5	0.765	47.5	LOS D	5.2	37.5	0.99	0.85	1.19	33.6
North: Mount Lindesay Highway														
7	L2	11	0.0	11	0.0	0.007	6.2	LOS A	0.0	0.3	0.17	0.58	0.17	53.7
8	T1	1172	5.0	1191	5.0	0.760	22.8	LOS C	21.1	154.4	0.90	0.82	0.93	44.1
9	R2	313	5.0	318	5.0	* 0.788	41.6	LOS D	13.0	94.7	1.00	0.92	1.17	35.0
Approach		1496	5.0	1520	5.0	0.788	26.6	LOS C	21.1	154.4	0.92	0.84	0.97	41.9
West: Greenbank Road														
10	L2	109	7.0	111	7.0	0.097	8.6	LOS A	1.1	8.1	0.35	0.64	0.35	51.8
11	T1	20	5.0	20	5.0	* 0.828	41.7	LOS D	10.6	76.5	1.00	0.97	1.29	34.0
12	R2	220	4.0	224	4.0	0.828	48.0	LOS D	10.6	76.5	1.00	0.97	1.29	33.5
Approach		349	5.0	355	5.0	0.828	35.4	LOS D	10.6	76.5	0.80	0.86	1.00	37.7
All Vehicles		2903	6.4	2950	6.4	0.828	31.9	LOS C	21.1	154.4	0.93	0.86	1.03	39.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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).

Queue Model: SIDRA Standard.

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)

Site: 1 [2025 PM Peak WD (Site Folder: General)]

Mount Lindesay Highway / Greenbank Road

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Timings based on settings in the Site Phasing & Timing dialog

Phase Times determined by the program

Phase Sequence: Two-Phase

Reference Phase: Phase A

Input Phase Sequence: A, A1*, B, C, D

Output Phase Sequence: A, A1*, B, C, D

(* Variable Phase)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
						v/c	sec							km/h
South: Mount Lindesay Highway														
1	L2	256	3.0	260	3.0	0.673	38.4	LOS D	9.8	70.4	0.97	0.85	1.02	36.1
2	T1	605	12.0	615	12.0	* 0.839	37.9	LOS D	14.0	107.8	1.00	0.96	1.20	37.0
3	R2	35	3.0	36	3.0	0.782	56.3	LOS E	1.7	11.9	1.00	0.83	1.52	30.7
Approach		896	9.1	911	9.1	0.839	38.7	LOS D	14.0	107.8	0.99	0.93	1.16	36.5
East: Service Road														
4	L2	119	4.0	121	4.0	* 0.893	57.5	LOS E	5.7	41.0	1.00	1.02	1.63	30.7
5	T1	43	3.0	44	3.0	0.389	41.0	LOS D	2.1	16.1	0.99	0.74	0.99	35.8
6	R2	8	63.0	8	63.0	0.389	47.4	LOS D	2.1	16.1	0.99	0.74	0.99	34.3
Approach		170	6.5	173	6.5	0.893	52.8	LOS D	5.7	41.0	1.00	0.93	1.44	32.0
North: Mount Lindesay Highway														
7	L2	11	0.0	11	0.0	0.007	6.2	LOS A	0.0	0.3	0.17	0.58	0.17	53.7
8	T1	1161	5.0	1180	5.0	0.753	22.5	LOS C	20.7	151.3	0.90	0.82	0.92	44.3
9	R2	338	5.0	343	5.0	* 0.807	41.9	LOS D	14.2	103.7	1.00	0.93	1.19	34.9
Approach		1510	5.0	1535	5.0	0.807	26.7	LOS C	20.7	151.3	0.92	0.84	0.97	41.8
West: Greenbank Road														
10	L2	130	7.0	132	7.0	0.114	8.7	LOS A	1.3	9.8	0.36	0.64	0.36	51.7
11	T1	21	5.0	21	5.0	* 0.836	41.6	LOS D	11.5	83.6	1.00	0.97	1.30	34.0
12	R2	240	4.0	244	4.0	0.836	47.9	LOS D	11.5	83.6	1.00	0.97	1.30	33.6
Approach		391	5.1	397	5.1	0.836	34.5	LOS C	11.5	83.6	0.79	0.86	0.98	38.1
All Vehicles		2967	6.3	3015	6.3	0.893	32.9	LOS C	20.7	151.3	0.93	0.87	1.06	38.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site 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).

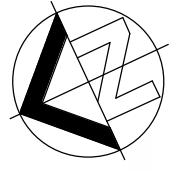
Queue Model: SIDRA Standard.

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)

APPENDIX C: PLANS OF DEVELOPMENT



PROPERTY DESCRIPTION

LOT 1 ON SP267252
LOCALITY: NORTH MACLEAN
COUNCIL: LOGAN CITY

DEVELOPMENT ASSESSMENT

TOTAL SITE AREA - 12080m²
LANDSCAPE AREA - 2821m²
BUILDING SITE COVER (INCLUDES ALL ROOFED AREAS) - 15%

IMPERVIOUS AREAS

(CALCULATED OVER DEVELOPED SITE AREA)
· PRE SITE DEVELOPMENT (APPROX) - 6130m² (INCLUDES BUILDING ROOFED AREAS)
· POST SITE DEVELOPMENT (INCLUDES BUILDING ROOFED AREAS) - 9259m²

BUILDING AREAS - GFA

· EXISTING SERVICE STATION - 280m²
· EXISTING FOOD & DRINK - 250m²
· T1 - FOOD & DRINK OUTLET - 200m²
· T2 - FOOD & DRINK OUTLET - 200m²
TOTAL GFA - 930m²

EXTERNAL STRUCTURE AREAS

· T1 ALFRESCO SEATING - 30m²
· T2 ALFRESCO SEATING - 30m²
· T1 REFUSE ENCLOSURE - 7m²
· T2 REFUSE ENCLOSURE - 11m²
TOTAL EXTERNAL STRUCTURES - 78m²

CAR PARKING

· PARKING REQUIRED - T.B.C
· PARKING PROVIDED - 71
· T1 D/THRU QUEUING - 12
· T2 D/THRU QUEUING - 12

NOTE:

1. ALL EXTERNAL MATERIALS & FINISHES SHOWN INDICATIVE ONLY & SUBJECT TO FINAL TENANT STANDARDS
2. ALL DIMENSIONS MEASURED FROM FINISHED GROUND FLOOR LEVEL UNLESS NOTED OTHERWISE
3. ALL SIGNAGE INCLUDING LOCATIONS & HEIGHTS ARE SUBJECT TO A SEPARATE SIGNAGE APPLICATION & APPROVAL BY LOCAL AUTHORITY
4. LANDSCAPING IS SHOWN FOR "ARTIST IMPRESSION" PURPOSES ONLY. REFERENCE SHOULD BE MADE TO THE LANDSCAPE DRAWINGS PREPARED BY THE RELEVANT CONSULTANT



VERVE SCHEDULES DISCLAIMER:
1. ALL SCHEDULES SHOULD BE CHECKED WITH THE REMANBER OF THE DRAWING SET.
2. SCHEDULED RATES AND AREAS ARE INTENDED FOR ASSISTANCE ONLY. NO RESPONSIBILITY IS TAKEN FOR THE ACCURACY OF QUANTITIES.
3. ANY DISCREPANCIES IN SCHEDULES SHOULD BE IDENTIFIED TO THE AUTHOR NOTED.
4. ALL AREAS ARE GROSS AREAS, UNLESS NOTED OTHERWISE

CONSULTING ENGINEER

VERVE
BUILDING DESIGN CO.
OFFICE 1/100 WYNDHAM RD, LUTWICH QLD 4030
PH (07) 3607 1942
E info@vervedesign.com.au

imagine create deliver

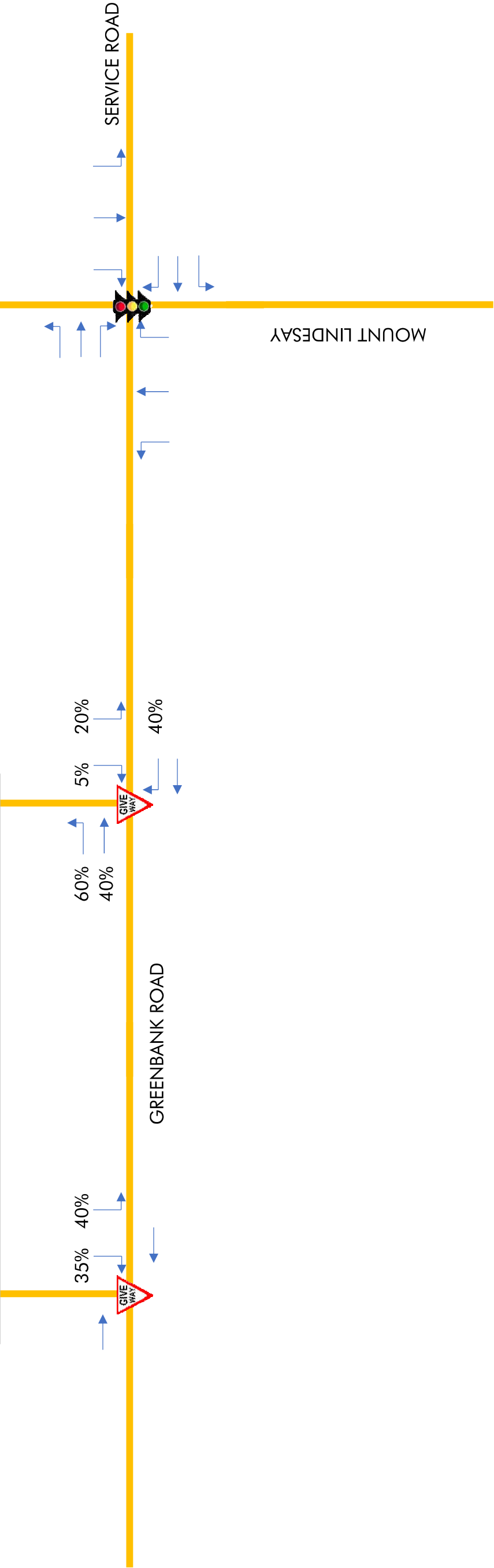
- ☐ commercial / industrial / retail
- ☐ fast food restaurant design
- ☐ travel centre / service stations
- ☐ project concept to completion

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Do not scale the drawing.
Check all dimensions on site prior to commencement of works.

Revision and approvals		Project Description	
Rev	Date	Appr	Description
P1	24.03.2023	GN	PRELIMINARY ISSUE FOR COMMENT
P2	14.04.2023	GN	PRELIMINARY ISSUE
A	26.05.2023	GN	DA ISSUE
B	29.08.2023	GN	ISSUE IN RESPONSE TO COUNCIL LR
C	14.09.2023	TH	ISSUE IN RESPONSE TO COUNCIL LR

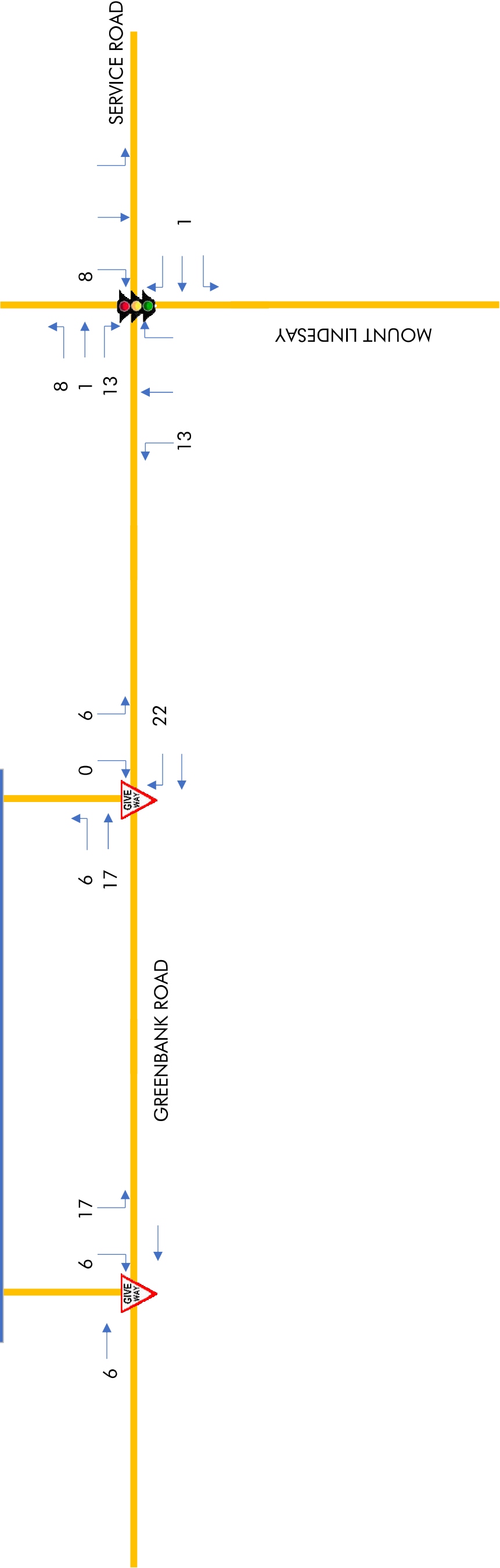
Drawing Title		Revision	
PROP. SITE PLAN		Job Number - Drawing Number	C
		22181	DA02
		Date	MARCH 2023
		Drawn	GN
		Author	GN

APPENDIX D: TURNING MOVEMENT FORECASTS

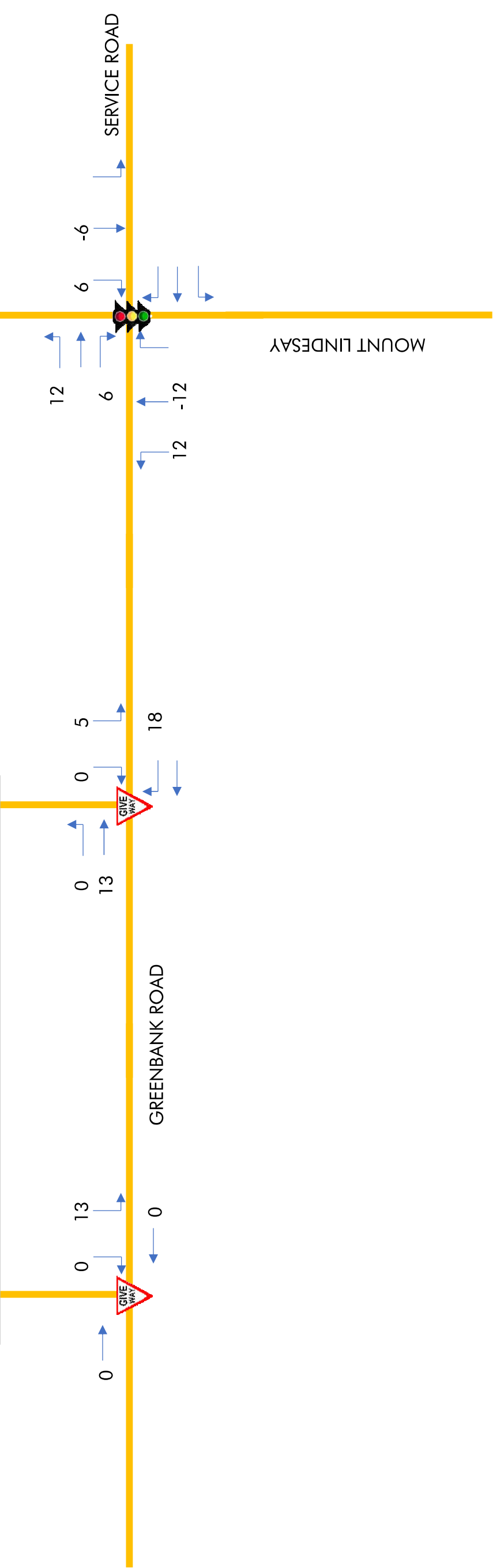


MOUNT LINDESA

Client		Soomal Property Trust		Project		'46-950 Greenbank Road, North Macleay	
Date		15/09/2023		Figure		Job No.	
				Figure 12		23-304	
						Development Traffic Distribution (UnDiverted Trips) - Morning Peak Hour	



PTT TRAFFIC & TRANSPORT ENGINEERING PTT ABN 96 067 593 962 P 07 3839 6771 Level 2, 62 Astor Tce, Spring Hill QLD 4000 WWW.PTT.COM.AU	Client		Soomal Property Trust	Project	'46-950 Greenbank Road, North Macleay	
	Date	15/09/2023	Figure	Figure 14	Job No.	23-304
	Development Traffic Generation (New Trips) - Morning Peak Hour					



PTT TRAFFIC & TRANSPORT ENGINEERING PTT P 07 3839 6771 ABN 96 067 593 962 WWW.PTT.COM.AU Level 2, 62 Astor Tce, Spring Hill QLD 4000	Client		Soomal Property Trust	Project	'46-950 Greenbank Road, North Macleay	
	Date	15/09/2023	Figure	Figure 16	Job No.	23-304
	Development Traffic Generation (Diverted Trips) - Morning Peak Hour					

APPENDIX E: NET WORSENING CALCULATIONS

NET WORSENING - INTERSECTION DELAY

Project Mount Lindesay Hwy/Greenbank Road
Author CG
Date 5/05/2023

AM PRE-DEVELOPMENT						
Intersection	Approach	Movement	Volume	Av Delay	Tot Delay	
Mount Lindesay Hwy/Greenbank Road	Gympie Road (South)	L2	191	25	4775	
		T1	927	23	21321	
		R2	35	41.9	1467	
	Trace Road (E)	L2	52	48.9	2543	
		T1	21	41.5	872	
		R2	22	48.1	1058	
	Mount Lindesay Hwy (N)	L2	2	7.9	16	
		T1	597	19.3	11522	
		R2	90	44.5	4005	
	Greenbank Road (W)	L2	246	10.1	2485	
		T1	16	31	496	
		R2	230	36.8	8464	
			SUB-TOTAL VEH-SEC		59023	
			SUB-TOTAL VEH-MIN		983.71	
PM PRE-DEVELOPMENT						
Intersection	Approach	Movement	Volume	Av Delay	Tot Delay	
Mount Lindesay Hwy/Greenbank Road	Gympie Road (South)	L2	242	36.4	8809	
		T1	612	35.3	21604	
		R2	35	56.3	1971	
	Trace Road (E)	L2	119	50.4	5998	
		T1	42	39.5	1659	
		R2	8	45.9	367	
	Mount Lindesay Hwy (N)	L2	11	6.2	68	
		T1	1172	22.8	26722	
		R2	313	41.6	13021	
	Greenbank Road (W)	L2	109	8.6	937	
		T1	20	41.7	834	
		R2	220	48	10560	
			SUB-TOTAL VEH-SEC		92549	
			SUB-TOTAL VEH-MIN		1542.48	
			TOTAL		2526	

AM POST-DEVELOPMENT						
Intersection	Approach	Movement	Volume	Av Delay	Tot Delay	
Mount Lindesay Hwy/Greenbank Road	Gympie Road (South)	L2	191	25.3	4832	
		T1	927	22.7	21043	
		R2	35	41.9	1467	
	Trace Road (E)	L2	52	48.9	2543	
		T1	21	41.6	874	
		R2	22	48.2	1060	
	Mount Lindesay Hwy (N)	L2	2	7.9	16	
		T1	597	19.3	11522	
		R2	90	46.1	4149	
	Greenbank Road (W)	L2	246	10.1	2485	
		T1	16	33	528	
		R2	230	38.7	8901	
SUB-TOTAL VEH-SEC				59419		
SUB-TOTAL						990.3
PM POST-DEVELOPMENT						
Intersection	Approach	Movement	Volume	Av Delay	Tot Delay	
Mount Lindesay Hwy/Greenbank Road	Gympie Road (South)	L2	242	38.4	9293	
		T1	612	37.9	23195	
		R2	35	56.3	1971	
	Trace Road (E)	L2	119	57.5	6843	
		T1	42	41	1722	
		R2	8	47.4	379	
	Mount Lindesay Hwy (N)	L2	11	6.2	68	
		T1	1172	22.5	26370	
		R2	313	41.9	13115	
	Greenbank Road (W)	L2	109	8.7	948	
		T1	20	41.6	832	
		R2	220	47.9	10538	
SUB-TOTAL VEH-SEC				95273		
SUB-TOTAL						1587.9
TOTAL						2578.2
% Net Worsening						2.0%