CAMBRAY CONSULTING

TRAFFIC ENGINEERING + TRANSPORT PLANNING

Proposed Service Station & Car Wash Access Amendments
325 Shaw Road, Shaw

TRAFFIC IMPACT ASSESSMENT REPORT

Prepared for Kingsun Investments Pty Ltd

19 June 2024

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1.0 Introduction

Cambray Consulting was engaged to assess the traffic arrangements for the modification of an approved Service Station development located at 325 Shaw Road, Shaw.

This assessment involved:

- An assessment of the physical layout of the site from a traffic perspective, taking into consideration:
  - Vehicle access arrangements including sizing, location and sight distance adequacy;
  - Carparking provision and layout, and on-site vehicle circulation arrangements; and
  - Servicing requirements and vehicle swept path analyses.
- An assessment of the traffic impact of the proposed development upon the adjacent road network, including:
  - SIDRA Intersection assessment of the proximate road network:
    - The proposed Shaw Road / Site Access;
    - The Dalrymple Road / Shaw Road traffic signals.
  - An Aggregate Delay Assessment as per the Department of Transport and Main Roads (DTMR's) Guidelines to Traffic Impact Assessment (GTIA) document.

The proposed development plan is provided in **Appendix A**.

1.1 Limits of Report

This report takes into account the particular instructions and requirements of our client. Cambray Consulting has taken care in the preparation of this report, however it neither accepts liability nor responsibility whatsoever in respect of:

- Any use of this report by a third party;
- Any third party whose interests may be affected by any decision made regarding the contents of this report; and/or
- Any conclusion drawn resulting from omission or lack of full disclosure by the client or the client's consultants.

1.2 Safety in Design

Within our scope, we have identified safety in design issues and potential hazards, whenever reasonably practicable within our field of expertise. Due to our limited and upfront role on this project, it is not considered reasonably practicable to identify all potential hazards which may occur throughout the life of the project, including during detailed design and construction activities. It is strongly recommended that safety in design issues be reviewed during all ensuing design and construction stages of the project.

1.3 Qualifications

This report was prepared by:

- Simon Nitkiewicz, Principal Transport Engineer – BE Civil (Hons I), BSc Biochem, TMD 842, **RPEQ 31604**.

2.0 Context

The subject site is located at 325 Shaw Road, Shaw and is legally described as Lot 19 on SP107219.

On 21 June 2016 an application for a Material Change of Use for a Service Station was lodged with the City of Townsville Council (Council). The application received approval from:

- The Department of Infrastructure, Local Government and Planning (DILGP) on 8 March 2017 (DILGP reference SDA-0816-032892). Approved Plans are provided in **Appendix B**;
- The City of Townsville Council (Council) on 1 August 2017 (Council reference MI16/0015). Approved plans are provided in **Appendix C**.

An extension application was lodged with Council and subsequently approved on 24 July 2023 (Council reference MCU21/0089.01).

The approved development included an all-movements access to / from Dalrymple Road (Council controlled) and no direct access to / from Shaw Road (TMR Controlled).

This proposal includes an access to / from Shaw Road, limited to left-in, right-in, and left-out movements (i.e. no right-out movements). It is not proposed to make any changes to the Dalrymple Road access that has been approved previously.

2.1 Site Location

The site is located within the City of Townsville Council (Council) local government area The development locality is illustrated in **Figure 2.1**.

Figure 2.1 Site Locality

2.2 Surrounding Road Network

Key characteristics of the adjacent road network are summarised in **Table 2.1.**

Table 2.1 Surrounding Road Network

Road	Jurisdiction	Hierarchy	Speed Limit
Dalrymple Road	Council	Arterial Road	80 km/hr
Shaw Road	TMR	Arterial Road	80 km/hr

3.0 Proposed Development

The site benefits from an existing approval for a Service Station (MI16/0015). It is not proposed to amend the land uses associated with this application, being Service Station with ancillary Shop / Food and Drink Outlet and Car Wash.

Compared to the previous proposal, the key changes from a transport planning perspective are as follows:

- Provision of a new access to / from Shaw Road, accommodating left-in, right-in and left-out movements (i.e. no right-turn out movements); and
- Formalisation of the Car Wash area, with dimensions of wash bays and vacuum bays more in alignment with general tenant specifications.

The proposed development yields are summarised in **Table 3.1**.

Table 3.1 Summary of amended Stage 1 and proposed Stage 2 development yields

Land Use	Development Yield
Service Station	250m^2
Food and Drink Outlet	150m^2
Car Wash	520m^2 (four (4) wash bays and three (3) vacuum bays)

The proposed plan of development is provided in **Appendix A** and an extract of the site layout is provided in **Figure 3.1**.

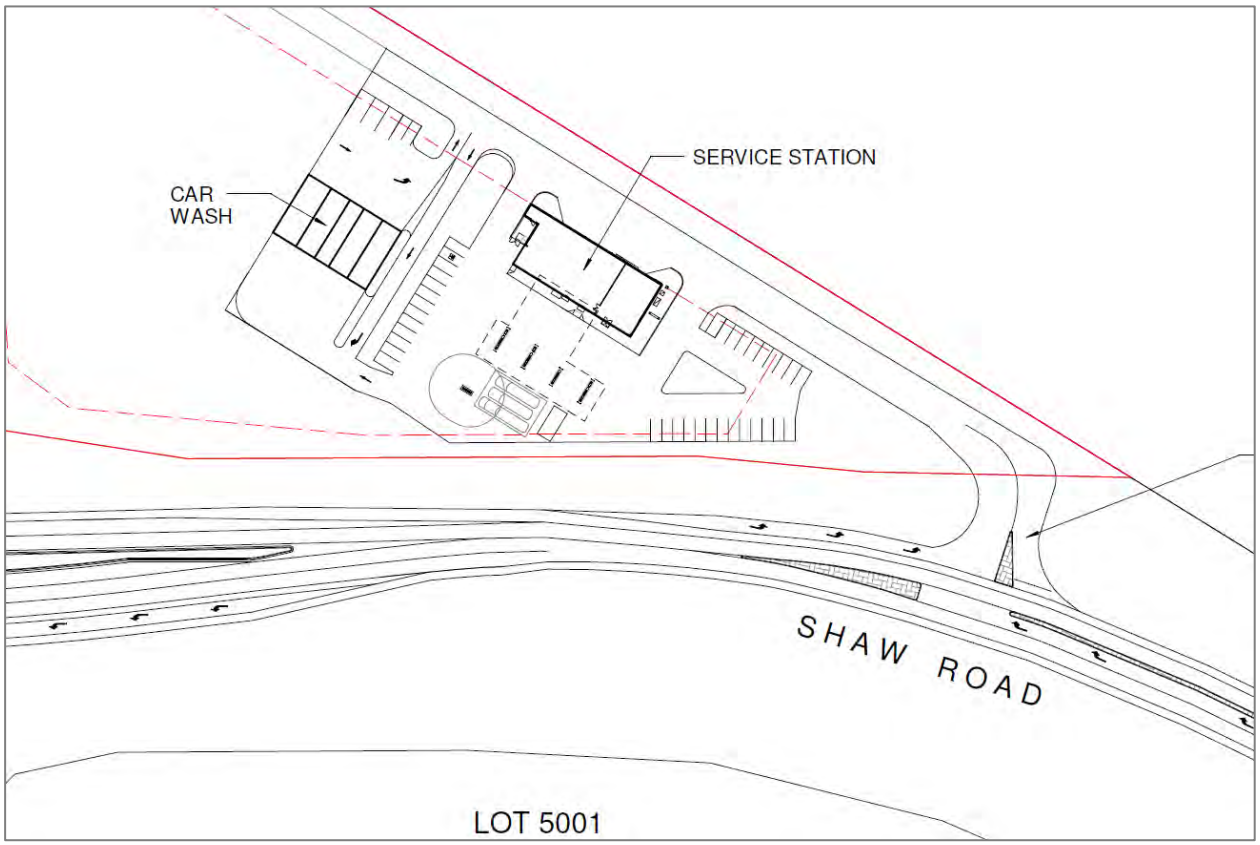


Figure 3.1 Proposed Development

4.0 Shaw Road Access Arrangements

It is proposed to achieve direct access to / from Shaw Road. A concept external layout of the proposed access arrangement is provided in **Appendix D**. Supporting swept paths of a 19m AV are also provided.

The proposed Shaw Road access arrangements include left-in, right-in and left-out movements. No right-turn out movements are proposed.

Figure 4.1 illustrates the proposed layout and site access arrangements for the development.

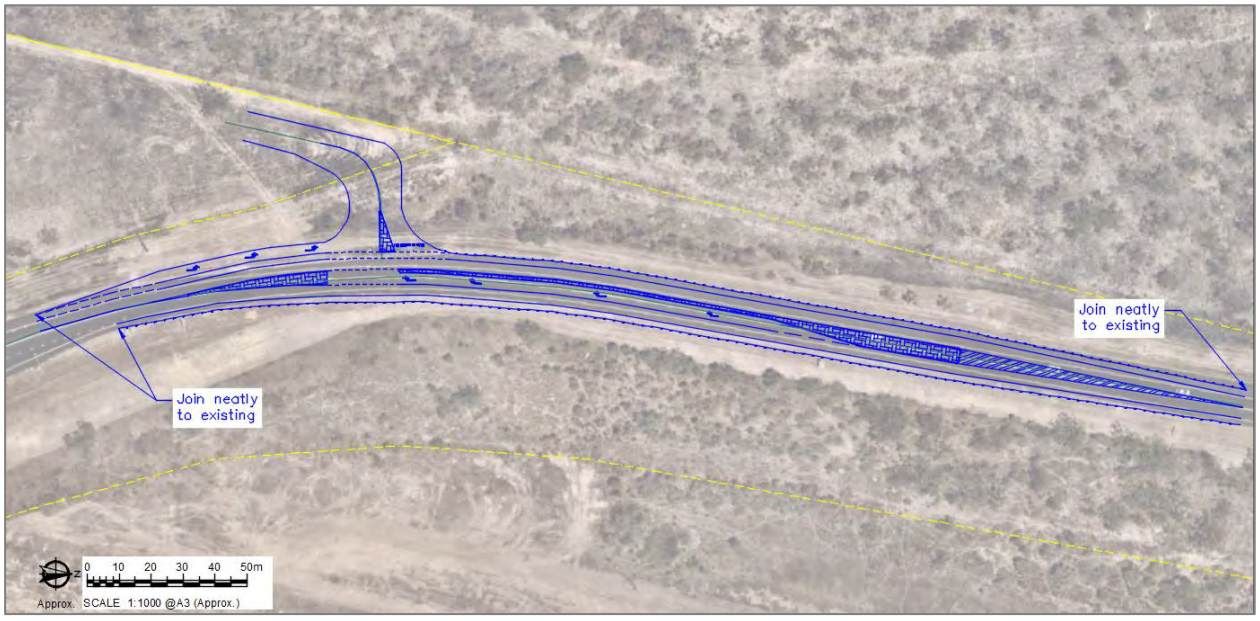


Figure 4.1 Shaw Road Concept External Layout

4.1 Geometric Parameters

Key design parameters for the Shaw Road access concept are provided in **Table 4.1**.

Table 4.1 Myall Street / Ferrells Road

Parameter	Adopted	Comment
AUL – Posted Speed 80 km/hr & design speed 90 km/hr		
Width (turn lane)	3.5m (min)	• This is compliant with RPDM / AGRD4a (2.8m minimum)
Width (through lane)	3.5m (min)	• In line with existing provisions and compliant with RPDM / AGRD4a (3.0m)
Diverge	90.0 (min)	• Design diverge for AUL at 90 km/hr is 90m • Turn warrants indicated AUL(S) reasonable, therefore diverge far exceeds requirements
CHR – Posted Speed 80 km/hr & Design Speed 90 km/hr		
Width (turn lane)	3.5m (min)	• In line with existing provisions and compliant with RPDM / AGRD4a (3.5m proposed > 2.8m minimum)
Diverge + Storage	144.0m	• Storage of 19.0m (AV type vehicle) • Deceleration of 125m – compliant with 'comfortable' condition per RPDM CHR at 90 km/hr, i.e. a high-standard of design

4.2 Shaw Road Sight Distance Review

A desktop sight line investigation has been conducted and indicates:

- Shaw road is visually open and flat approaching the proposed access point (**Figure 4.2**);
- Sight distances are generally unobstructed and able to achieve 214m or more.

The concept functional layout (**Appendix D**) also includes a desktop sight line assessment that shows that the horizontal road geometry supports sight distances in excess of 214m.

Figure 4.2 Sight Line Facing South (from approximately new site access location)

A summary of sight line standards is provided in **Table 4.2**.

Table 4.2 Sight Line Standard

Assessment	Design Speed	Recommended Quantum
RPDM / AGRD4a Safe Intersection Sight Distance (SISD), 2.0 Second Reaction Time	**90 km/hr Approach Speed**	214.0m
RPDM / AGRD4a Minimum Gap Sight Distance (MGSD), 5.0 Second Gap	**90 km/hr Approach Speed**	125.0m
Australian Standard 2890.1: Parking Facilities Off-street Carparking, Desirable 5 Second Gap	**80 km/hr Posted Speed**	111.0m

Based on the above, the proposed access location achieves all noted sight line models, including the minimum sight line standards described in the Australian Standards and even the conservative SISD model, being the highest standard of sight line within RPDM / AGRD4a guidelines.

5.0 Vehicle Parking

The proposed development includes provision of 36 parking spaces, allocated as follows:

- 35 general parking spaces;
- One (1) parking space for persons with a disability.

The proposed parking provision has been reviewed against Council's Parking Rates Planning Scheme Policy as summarised in **Table 5.1**.

Table 5.1 Parking Code Review

Land Use	Yield	Car Park Rate	Car Parking Required
Service Station	250m^2	One (1) space per 40m² of GFA.	6.25
Food and Drink Outlet	150m^2 of GFA Adopted Split: 40% dining (60m^2); 40% prep (60m^2); 20% storage (30m^2).	One (1) space per 10m² of GFA available to the public (including outdoor dining); One (1) space per 50m² of GFA for food preparation; AND One (1) space per 100m² of GFA used for storage.	6+ 1.2+ 0.3= 7.5
Car Wash	4 Wash Bays	Two (2) spaces	2
Total			**16**

Based on the above, the proposed provision of parking spaces complies with the requirements set out in Council's Parking Rates Planning Scheme Policy and is thereby acceptable from a transport planning perspective.

5.1 Disability Parking Requirements

The proposed site layout includes one (1) parking space marked and sized for persons with a disability (PWD space) in accordance with Australian Standards 2890.6:2009 Parking facilities Part 6: Off-street parking for people with disabilities. This equates to greater than one (1) PWD space per 50 ordinary parking spaces and is therefore compliant with the Building Code of Australia (BCA).

6.0 Geometric Configuration Review

The traffic elements of the site layout were reviewed against:

- The City of Townsville Council's Car Parking Planning Scheme Policy;
- AS2890.1: Parking Facilities, Off-street parking (AS2890.1);
- AS2890.6: Parking Facilities, Off-street parking for people with disabilities (AS2890.6).

The results are summarised in **Table 6.1**.

Table 6.1 Geometric layout review

Parameter	Recommended	Proposed
Bay Dimensions (General, Class 3)	2.6m x 5.4m	2.6m x 5.4m
Bay Dimensions (Staff parking spaces)	2.4m x 5.4m (min)	2.4m x 5.4m
Car Parking Aisle	6.6m (min)	6.6m
Service Aisle	6.5m (min)	6.5m
Bay Dimensions (PWD)	2.4m x 5.4m	2.4m x 5.4m
Shared Area (PWD)	2.4m x 5.4m	2.4m x 5.4m
End of Aisle Turnaround	Not Provided* See below	1.0m

The parking module proximate to the service station would benefit from provision of a 1.0m end aisle extension in accordance with AS2890.1, which can be included as a condition of approval (**Figure 6.1**).

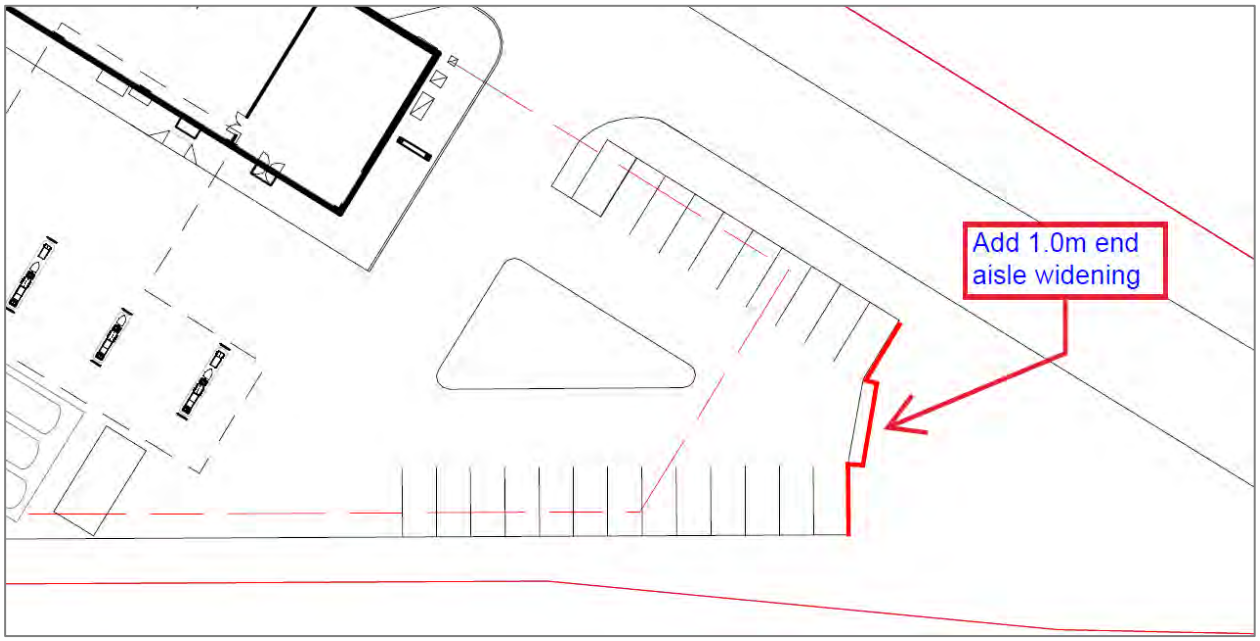


Figure 6.1 End Aisle Extension

In summary, with the above change, the assessed dimensions comply with the relevant Australian Standards (2890.1, 2890.2, 2890.6). On this basis the internal layout is acceptable from a traffic engineering perspective.

7.0 Servicing & Swept Path Arrangements

7.1 Servicing Review

The proposed site layout has been configured to accommodate the movements of the following design vehicles:

- 19m Articulated Vehicle (fuel tanker);
- Heavy Rigid Vehicle (general servicing / refuse collection.

Swept paths are provided in **Appendix E** and demonstrate that the adopted design vehicles are able to:

- Access the site in a forward gear;
- Manoeuvre into position (to load/unload, wholly within the site boundary) whilst maintaining acceptable or greater clearances to obstructions; and
- Depart the site in a forward gear.

The proposed development is therefore adequate from a swept path perspective.

8.0 Traffic Volumes

8.1 Background Traffic Volumes

Austraffic were commissioned to undertake traffic surveys at the Shaw Road / Dalrymple Road intersection on Thursday 16 November 2023.

A summary of the traffic survey results is provided in **Table 7.1**. A copy of the data is provided in **Appendix F**.

Table 8.1 Network Peak Demands

Survey Location	Demand [vph]
Weekday 7:30-8:30am	
Shaw Road / Dalrymple Road	2,321
Weekday 4:00-5:00pm	
Shaw Road / Dalrymple Road	2,156

The City of Townsville "TownsvilleMAPS – Community"[1] tool provides projected traffic flows. Within the tool peak hour traffic on Shaw Road, north of the Dalrymple Road / Shaw Road traffic signals are as follows:

- 4,195 total movements (AM and PM peak hour) in 2023;
- 5,298 total movements (AM and PM peak hour) in 2036.

This equates to a linear growth rate of 2% per annum, which has been applied to the recorded survey data to forecast future traffic flows.

Turning movements are provided in **Appendix G**.

8.2 Development Traffic

8.2.1 Development Traffic Generation

Adopted trip generation rates are provided in **Table 8.2.**

Table 8.2 Adopted Trip Generation Rates

Land Use	Weekday AM Peak Hour Trips	Weekday PM Peak Hour Trips	Source
Service Station	66 trips per 100m^2	66 trips per 100m^2	RMS
Food and Drink Outlet	37.4 trips per 100m^2	37.4 trips per 100m^2	TMR Traffic Generation Data
Car Wash (Automatic Bay)	8 trips per Automatic Bay	8 trips per Automatic Bay	ITE & Industry Experience

[1] https://maps.townsville.qld.gov.au/Mapping/index.html?viewer=TownsvilleMAPS_Community.Mapping

The RTA's Guide specifies service station trip generation based on convenience store area rather than Gross Floor Area (GFA). Convenience store area excludes the console, office, storage and amenities and normally occupies in the order of 60% or less of the total GFA of the fuel shop. We conservatively assessed the service station convenience store area as 100% of the GFA.

All car wash bays have been conservatively assessed as automatic wash bays with a higher traffic generation than specified in typical guidelines for manual wash bays.

The trip generation yields of the proposed development are summarised in **Table 4.2**

Table 4.2 Trip Generation Yields

Land Use	Yield	Unit
Service Station	250 m^2	m^2 of Convenience Store Area
Food and Drink Outlet	150 m^2	M^2 of Gross Leasable Floor Area
Car Was Automatic Bay	4 bays*	4 Automatic Wash Bays

**includers 2 manual wash bays conservatively assessed as automatic wash bays*

The proposed uses are convenience-based and a significant proportion of the traffic accessing the site will be motorists already on the road network whom would otherwise pass the development site (linked trips). For service stations and car washes standard industry practice is to adopt a new trip generation rate of 5-10% of total generated trip-ends (the remaining being drop-in trips). For food and drink outlets the Queensland Governments Guidelines for Assessment of Road Impacts of Development (GARID) document provides guidance on the proportion of new and linked trips.

Adopted trip segmentation is summarised in **Table 8.3**.

Table 8.3 Adopted Trip Segmentation Rates

Land Use	Trip Segmentation		Source
	New	Linked	
Service Station	10%	90%	Conservative Industry Approach
Ancillary Food and Drink Outlet	40%	60%	GARID
Car Wash	10%	90%	Conservative Industry Approach

Table 8.4 summarises the estimated Weekday PM Peak hour trip generation. This has also been conservatively applied to the AM peak hour.

Table 8.4 Adopted Peak Hour Trip Generation

Land Use	Trip Segmentation		Total Trips
	New	Linked	
Service Station	17	149	165
Ancillary Food and Drink Outlet	22	34	56
Car Wash	4	28	32
Total	42	211	253

An in / out split of 50% / 50% has been applied.

8.2.2 Development Traffic Distribution

Development trips were assigned to the external network with consideration of the proposed land uses, access movements and recorded background traffic flows. The adopted proportions are summarised below:

- For new trips:
  - 20% to/from the north;
  - 35% to / from the east;
  - 30% to / from the south;
  - 15% to / from the west;
- For linked trips during the AM peak period
  - 15% approach from the north via Shaw Road;
  - 20% approaching from the East via Dalrymple Road;
  - 40% approach from the south via Shaw Road;
  - 25% approach from the west via Dalrymple Road;
- For linked trips during the PM peak period
  - 40% approach from the north via Shaw Road;
  - 20% approaching from the East via Dalrymple Road;
  - 30% approach from the south via Shaw Road;
  - 10% approach from the west via Dalrymple Road.

Turning movements are supplied in **Appendix G**.

8.2.3 Traffic Scenario

The following traffic volume scenarios were developed:

- 2023 Survey (AM and PM peak hour);
- 2025 Background (AM and PM peak hour);
- 2025 Background + Year of Completion (AM and PM peak hour);
- 2035 Background (AM and PM peak hour); and
- 2035 Background + Design Horizon (AM and PM peak hour).

Turning movements are supplied in **Appendix G**.

9.0 Traffic Impact Assessment

9.1 Assessment Criteria

The main criteria utilised to assess intersection performance is the Degree of Saturation (DOS), which is the ratio of maximum demand volume to capacity at an intersection.

Austroads Guide to Traffic Management Part 12 (AGRTM12) provides guidance in relation to the practical capacities based on intersection control and are summarised in **Table 9.1**.

Table 9.1 Adopted Assessment Criteria (DOS)

Intersection Type	Practical DOS Threshold
Priority Controlled	0.80
Roundabouts	0.85
Signals	0.90 “should generally not be exceeded”

For priority control intersections, the critical delay represents the worst average delay for an individual movement. For traffic signals, average delay over all movements should be taken. The NSW Roads and Maritime Services (RMS) Guide to Traffic Engineering Developments provides guidance in relation to average delay and LOS thresholds. The recommended thresholds are reproduced in **Table 9.2.**

Table 9.2 Adopted Assessment Criteria (Average Delay and LOS)

Level of Service (LOS)	Average Delay / Vehicle
A	< 14 seconds
B	15 to 28 seconds
C	29 to 42 seconds
D	43 to 56 seconds
E	57 to 70 seconds
F	> 70 seconds

The Department of Transport and Main Roads (TMR’s) Guide to Traffic Impact Assessment (GTIA) document does not specify thresholds for each specific LOS, however, does acknowledge that the LOS C to D delay threshold is >42 seconds (which is consistent with the RMS guidelines). Albeit, GTIA acknowledges that in contemporary urban networks, many intersections are already operating at a DOS of greater than one, and therefore with delays likely exceeding this threshold.

9.2 Shaw Road / Site Access

The SIDRA layout for the assessed intersection configuration is provided in **Figure 9.1**.

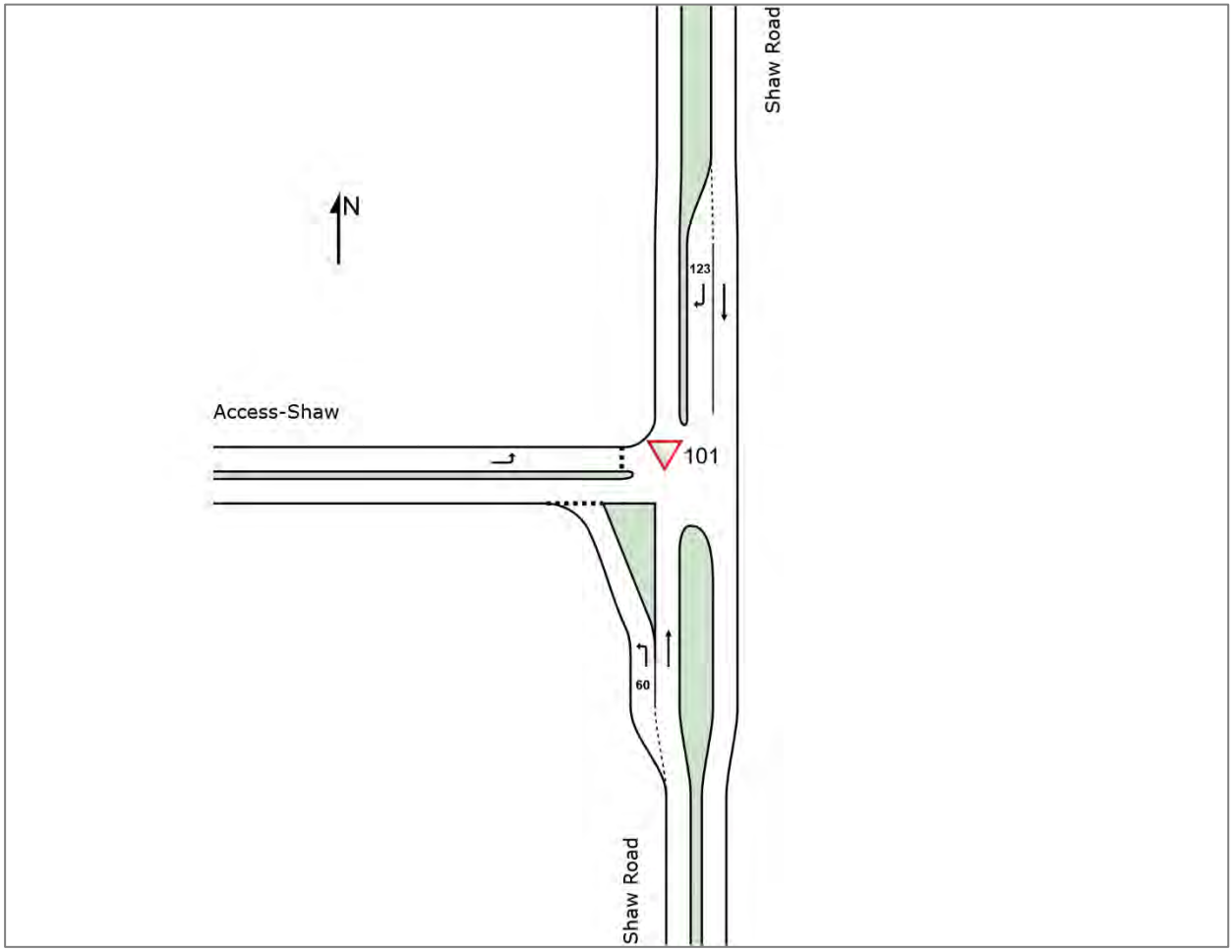


Figure 9.1 Shaw Road / Site Access

The SIDRA analysis results are summarised in **Table 9.3**.

Table 9.3 SIDRA Results – Shaw Road / Site Access

Scenario	Demand (vehs/hr)	DOS	Critical Delay (s)	Critical Queue
Weekday AM Peak Hour (7:30-8:30am)				
2035 BG + Dev	2,009	0.516	11.9	Left turn from access: 2.8m
Weekday PM Peak Hour (4:00-5:00pm)				
2035 BG + Dev	2,016	0.510	11.7	Right turn from Shaw Road: 2.4m

SIDRA Outputs are provided in **Appendix H**.

The results indicate that the access is expected to operate below standard industry degree of saturation thresholds for a priority intersection (i.e. DOS less than 0.80) across a 10-year design horizon for all assessment scenarios.

The assessment also indicates that the access maintains reserve capacity for growth beyond this standard planning horizon.

Based on the above, the access arrangement is acceptable from a traffic operations perspective.

SIDRA outputs are provided in **Appendix I**.

9.3 Dalrymple Road / Shaw Road

The SIDRA layout for the assessed intersection configuration is provided in **Figure 9.2**.

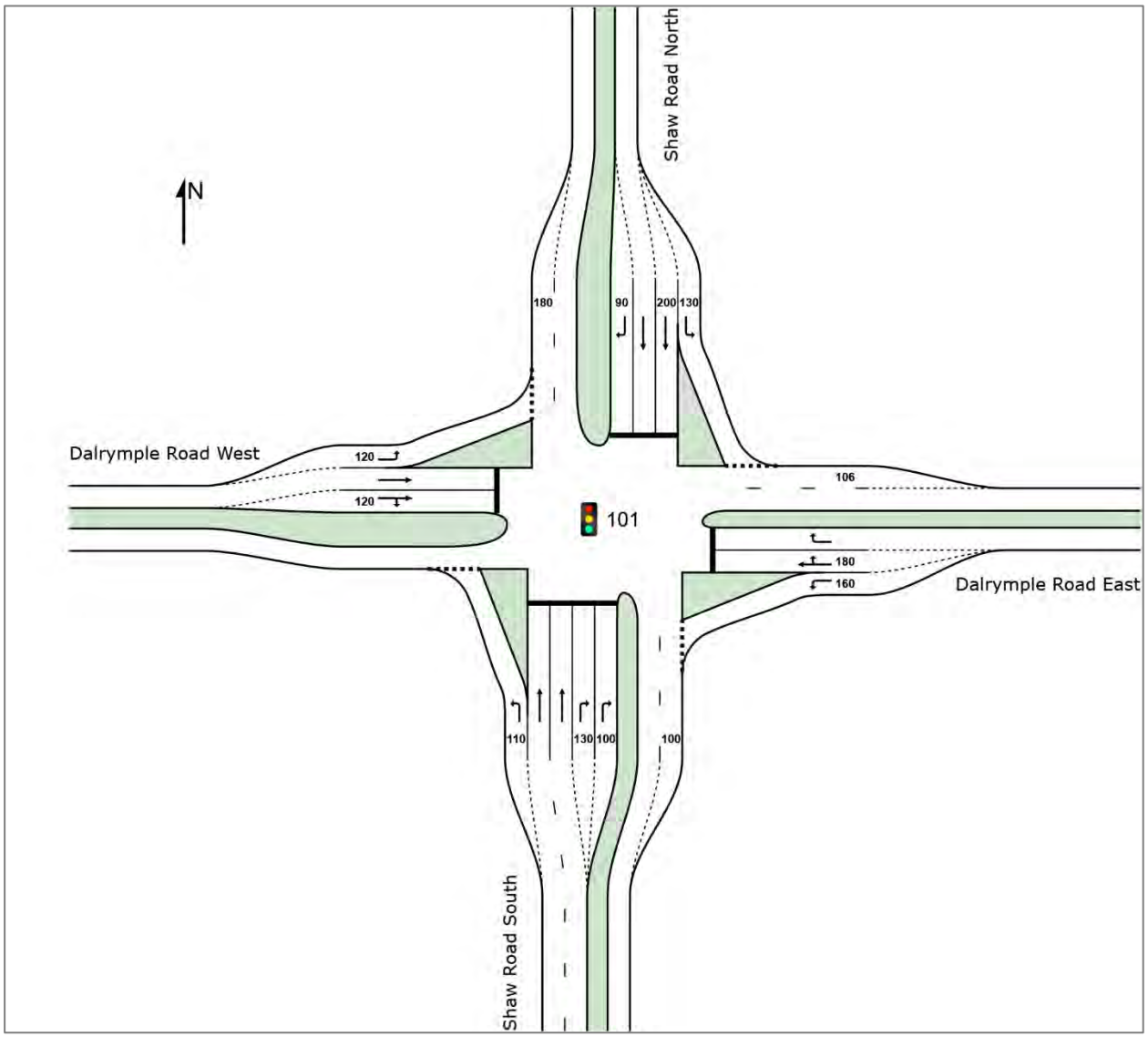


Figure 9.2 Dalrymple Road / Shaw Road SIDRA

SIDRA analysis results are summarised in **Table 9.4**.

Table 9.4 SIDRA Results – Dalrymple Road / Shaw Road

Scenario	Demand (vehs/hr)	DOS	Critical Delay (sec)	95th %ile Queue (m)
Weekday AM Peak Hour (7:30-8:30am)				
2025 BG	2,543	0.619	38.1	117.9m North Approach Through Movement
2025 BG+DEV	2,571	0.635	38.5	123.9 West Approach Through Movement
Weekday PM Peak Hour (4:00-5:00pm)				
2025 BG	2,361	0.567	35.1	113.0m North Approach Through Movement
2025 BG+DEV	2,395	0.612	36.1	110.0 East Approach Through Movement

The results indicate that the intersection is expected to operate below standard industry degree of saturation thresholds for a signalised intersection (i.e. DOS less than 0.9) under all assessment scenarios. Also, the analysis indicates that the development is expected to have a minimal impact on the operations of the intersection as demonstrated by key performance criteria (DOS, queueing, delay) being generally consistent between with and without development scenarios.

Based on the above, the development is acceptable from a traffic impact perspective.

SIDRA outputs are provided in **Appendix D**.

An aggregate delay assessment is provided in **Section 10.0**.

10.0 Aggregate Delay Assessment

The Department of Transport and Main Roads (TMR's) Guide to Traffic Impact assessment (GTIA) sets out the standard process for assessing delay impacts on the State-controlled road network. The desired outcome of the GTIA is to ensure that the sum of intersection delays on base traffic does not significantly worsen due to development.

An assessment of aggregate delay at the Dalrymple Road / Shaw Road traffic signals has been completed with results summarised in **Table 10.1**.

Table 10.1 Aggregate Network Delay

Scenario		Scenario 1 2025 BG vs 2025 BG + Dev
Base Case (2025 BG)		
AM Peak		96958.1
PM Peak		82989.3
With Development (e.g. 2025 BG + Dev)		
AM Peak		97537.9
PM Peak		83270.4
ID		
AM Peak	Δ seconds	579.8
	Δ %	0.6%
PM Peak	Δ seconds	281.1
	Δ %	0.3%
Total	Δ seconds	860.9
	Δ %	0.5%

The assessment indicates that the aggregate delay is 0.5%, far below the typical 5% threshold. This is expected noting the proposal is a small scale convenience based development.

Detailed delay calculations are provided in **Appendix I**.

11.0 Summary and Recommendations

11.1 Physical Layout

The subject site is 325 Shaw Road, Shaw. On 21 June 2016 an application was lodged with the City of Townsville Council over the site for a Material Change of Use for a Service Station. The proposal received approval from both Council and The Department of Infrastructure, Local Government and Planning.

The abovementioned approval included an all-movements access to / from Dalrymple Road (Council controlled) and no direct access to / from Shaw Road (TMR Controlled).

It is now proposed to develop the site and provide an access to / from Shaw Road, limited to left-in, right-in, and left-out movements (i.e. no right-out movements).

Key findings of this report are summarised below:

- No changes are proposed to the Dalrymple Road access that has been previously approved;
- The proposal includes an access to / from Shaw Road limited to left-in, right-in, and left-out movements (i.e. no right-out movements);
- The access is supported by deceleration lanes configured in accordance with TMR's RPDM document;
- The access facilitates sight lines that comply with not only minimum AS2890 standard, but also the Safe Intersection Sight Distance Model per TMR's RPDM;
- On-site carparking provision is in accordance with Council's Planning Scheme;
- On-site traffic element geometry is in accordance with Council's Planning Scheme;
- A swept path assessment shows the design vehicles (being HRV and AV) are able to access and depart the site in a forward gear.

11.2 Traffic Impact Assessment

The traffic assessment indicates that the development is anticipated to generate in the order of 253 vehicle trips during weekday AM and PM peak hours. Of these 42 are new with the balance being linked.

A detailed SIDRA intersection assessment has been completed and indicates:

- The proposed Shaw Road / Site access operates adequately across the 10-year planning horizon, and maintains capacity for future growth;
- The proposed development has a minimal / acceptable impact on network delay, as highlighted by an aggregate delay assessment demonstrating a less than 5% delay impact at the Dalrymple Road / Shaw Road traffic signals.

Based on the above the proposed development is acceptable from a traffic impact perspective.

11.3 Recommendation

In light of the above, we recommend that the development be approved with reasonable and relevant conditions.

If you have any queries or require any further information regarding the above please do not hesitate to contact the undersigned on 07 3221 3503.

Yours faithfully,

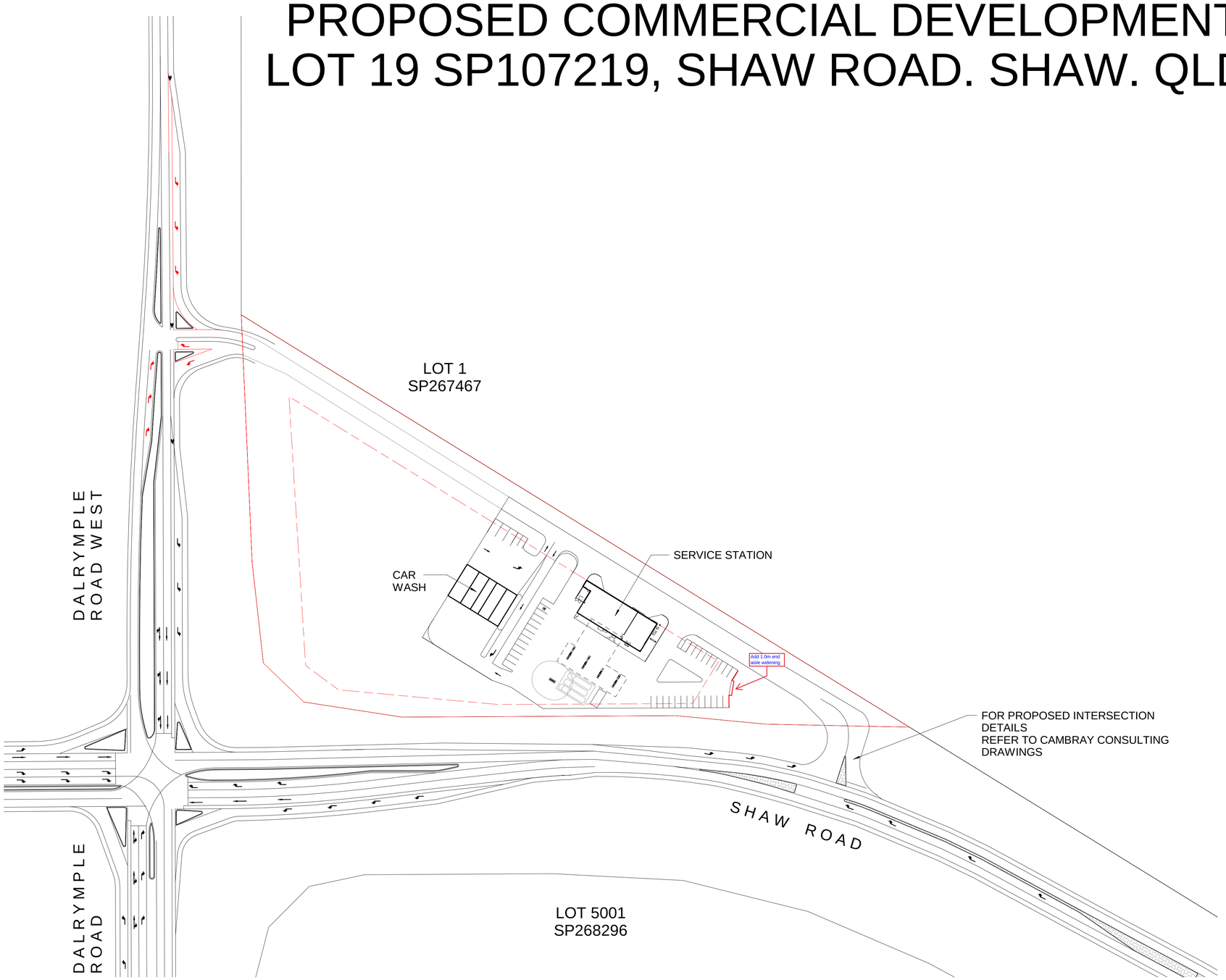
Simon Nitkiewicz
Senior Transport Engineer | Cambray Consulting Pty Ltd
BECivil (Hons I) | BSc Biochem | TMD #842 | RPEQ 31604

APPENDIX A

Proposed Development Plan

PROPOSED COMMERCIAL DEVELOPMENT
LOT 19 SP107219, SHAW ROAD. SHAW. QLD.

NORTH



SITE PLAN
Scale: 1 : 1000

REAL PROPERTY DESCRIPTION

LOT No: 19
PLAN No: SP107219
AREA: 2.56 Ha

Amendments		
Date	Revision	Description
06.04.24	A	FOR APPROVAL DTMR
14.06.24	B	SITE BUILDINGS REVISED

THIS DRAWING IS TO SCALE WHEN PRINTED ON A1 PAPER

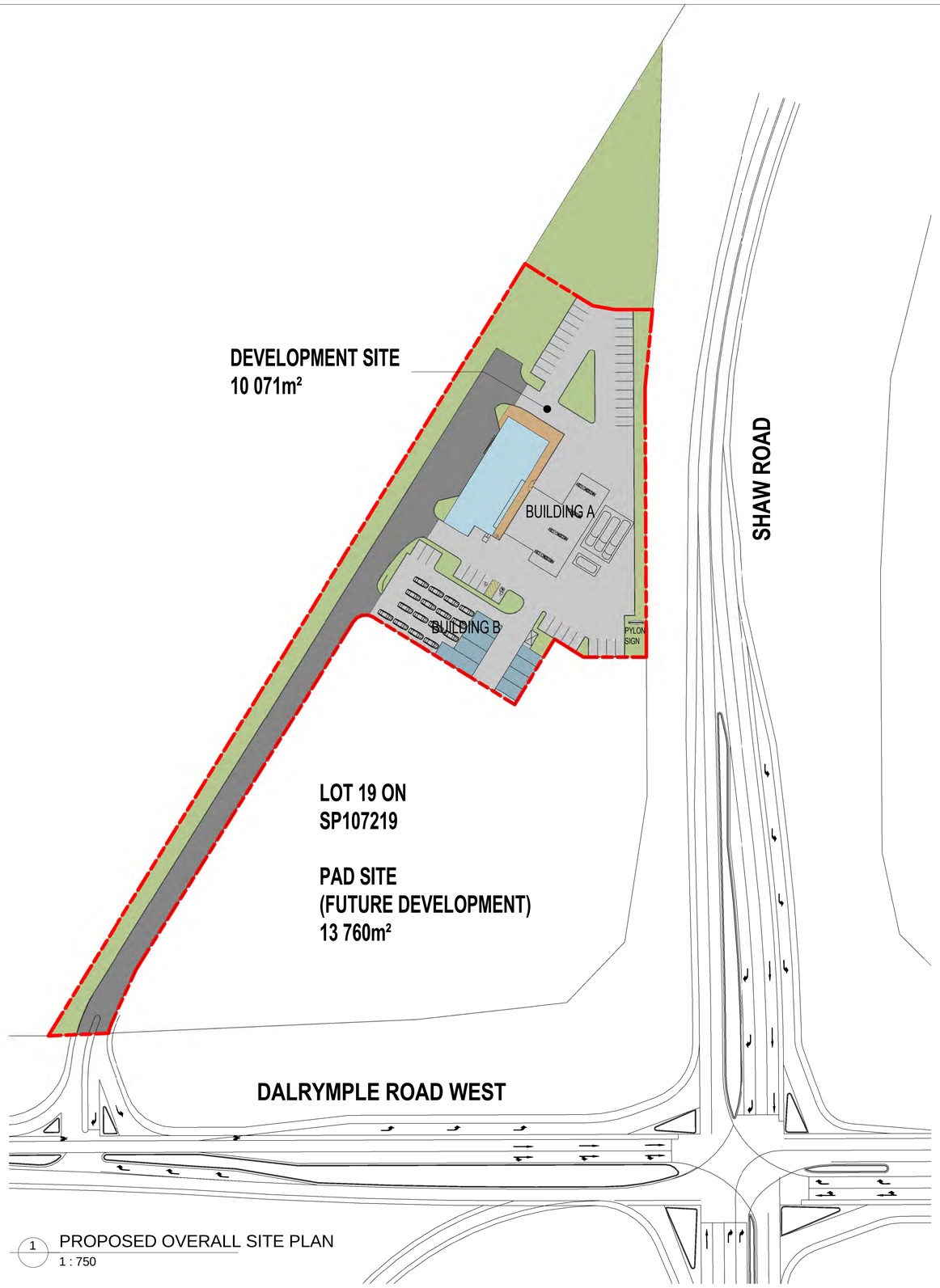
BRETT HODKINSON
BUILDING DESIGN
BHBD Pty. Ltd.
QBCC Lic. No. 15007761 Medium Rise
ABN 52 609 527 451
M: 0402 255 609
E: brett@bhbd.com.au

Drawn	B.H.	KINGSUN	
Checked	B.H.	PROPOSED COMMERCIAL DEVELOPMENT	
Scale	As shown	LOT 19 SP107219, SHAW ROAD. SHAW. QLD.	
Date	APRIL 2024	Project No. 24-06 KIN	Sheet No. A01

APPENDIX B

SARA Approved Layout

Attachment A



1 PROPOSED OVERALL SITE PLAN
1 : 750

PROPOSED LAYOUT AREA SCHEDULE (GROSS FLOOR AREA - G.F.A)		
BUILDING A		
SERVICE STATION	=	247m²
SHOP / FAST FOOD	=	280m²
PARKING SPACES REQUIRED		
527m² (GFA) @ 1 PER 15 =		34
PARKING SPACES PROVIDED		36
BUILDING B (CAR WASH) =		304m²
PARKING SPACES REQUIRED		
QUEUING	=	16
PARKING SPACES	=	2
PARKING SPACES PROVDED (16 QUEUING + 3 SPACES)		19

REAL PROPERTY DESCRIPTION	
LOT:	LOT 19 ON SP107219
COUNTY:	ELPHINSTONE
PARISH:	BOHLE
SITE AREA:	2.582ha

PLANS AND DOCUMENTS referred to in the DEVELOPMENT APPROVAL
Queensland Government
Approval no: SDA-0816-032892
Date: 8 March 2017

ISSUED FOR
APPROVAL

AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	DA APPROVAL	18-06-2016
2	REVISED ISSUE	27-06-2016
3	REVISED ISSUE	28-06-2016
4	REVISED ISSUE	08-12-2016
5	REVISED ISSUE	11-12-2016

PROPOSED COMMERCIAL DEVELOPMENT, LOT 19 ON SP107219

KINGSUN INVESTMENTS PTY LTD

OVERALL SITE PLAN

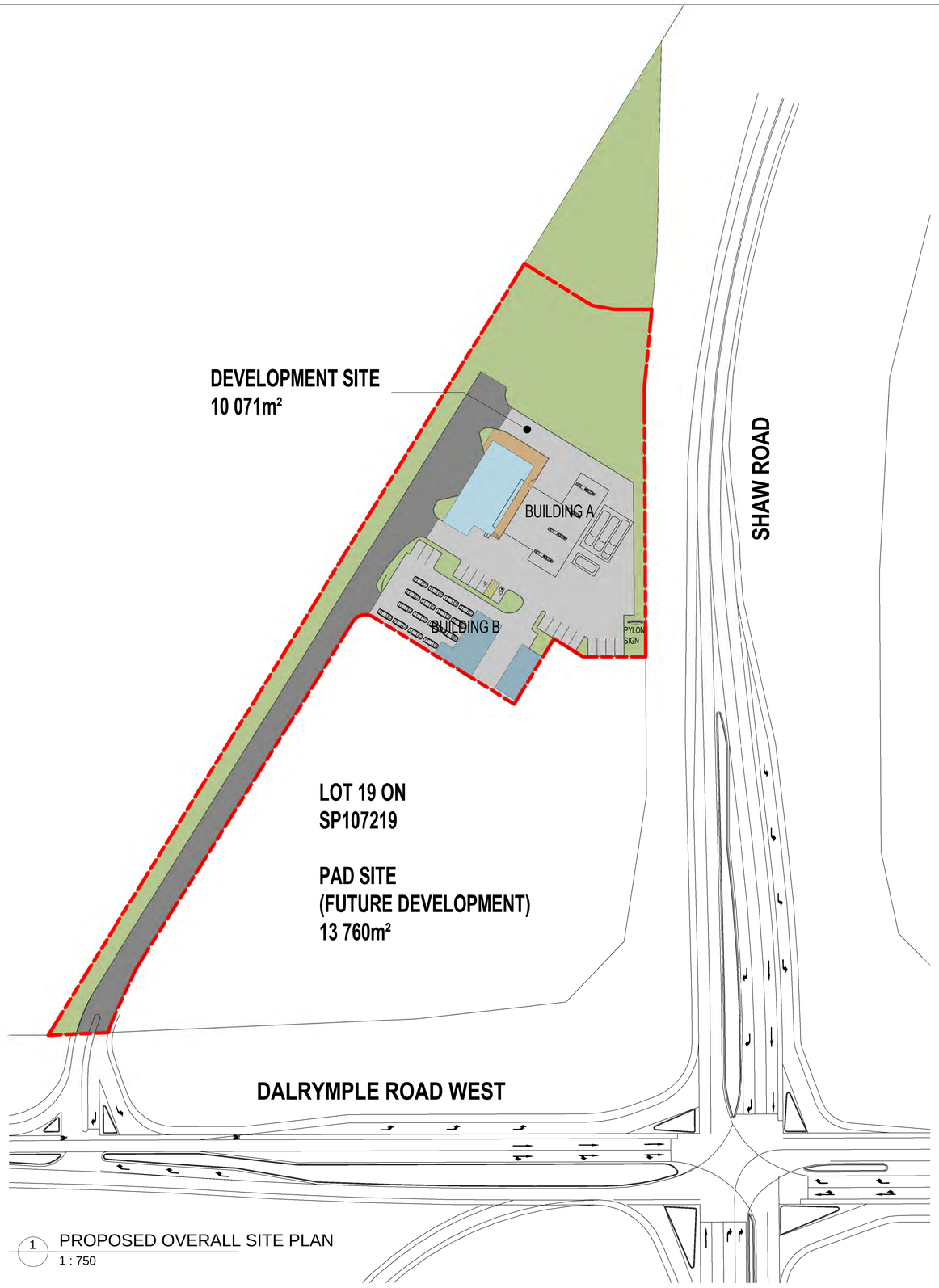
DRAWING NUMBER: DA-002
ISSUE: 5
PROJECT No: 2016-08
SCALE: As indicated
DATE: APR'16
DRAWN: TDK

360 design
p. 07 4927 9942
m. 041 774 8107
e. info@360design.com.au
A.B.N 12 926 793 207
Licenced under QBCC Act 1991
Licence No. 1271179

11-Dec-16 12:00:07 PM Z:\2016\2016-08 Shaw Road\Adwg\2016-08 SITE PLANS - DA Lot 19.rvt

APPENDIX C

Council Approved Layout



1 PROPOSED OVERALL SITE PLAN
1 : 750

PROPOSED LAYOUT AREA SCHEDULE (GROSS FLOOR AREA - G.F.A)		
BUILDING A		
SERVICE STATION	=	250m²
SHOP / FAST FOOD	=	150m²
PARKING SPACES REQUIRED		
400m² (GFA) @ 1 PER 40 =		10
PARKING SPACES PROVIDED		13
BUILDING B (CAR WASH) =		304m²
PARKING SPACES REQUIRED		
QUEUING	=	16
PARKING SPACES	=	2
PARKING SPACES PROVDED (16 QUEUING + 3 SPACES)		19

REAL PROPERTY DESCRIPTION	
LOT:	LOT 19 ON SP107219
COUNTY:	ELPHINSTONE
PARISH:	BOHLE
SITE AREA:	2.582ha

APPROVED
SUBJECT TO CONDITIONS
MI16/0015
25/07/2017
City of Townsville

ISSUED FOR
APPROVAL

07-Jun-17 7:11:20 PM Z:\2016\2016-08 Shaw Road\Adwg\2016-08 SITE PLANS - DA Lot 19.rvt

AMENDMENTS		
ISSUE	DESCRIPTION	DATE
1	DA APPROVAL	18-06-2016
2	REVISED ISSUE	27-06-2016
3	REVISED ISSUE	28-06-2016
4	REVISED ISSUE	08-12-2016
5	REVISED ISSUE	11-12-2016
6	REVISED ISSUE	04-06-2017
7	REVISED ISSUE	06-06-2017

PROPOSED COMMERCIAL DEVELOPMENT, LOT 19 ON SP107219

KINGSUN INVESTMENTS PTY LTD

OVERALL SITE PLAN

DRAWING NUMBER: DA-002
ISSUE: 7
PROJECT No: 2016-08
SCALE: As indicated
DATE: APR'16
DRAWN: TDK

360 design
p. 07 4927 9942
m. 041 774 8107
e. info@360design.com.au
A.B.N 12 926 793 207
Licenced under QBCC Act 1991
Licence No. 1271179

APPENDIX D

Concept External Functional Layout

Join neatly to existing

Join neatly to existing

N

0 10 20 30 40 50m

Approx. SCALE 1:1000 @A3 (Approx.)

CAMBRAYconsulting
Traffic Engineering and Transport Planning
Suite 2601, 21 Mary Street Brisbane Q 4000
t : 07 3221 3503 | e : contact@cambray.com.au

DRAWING TITLE
Proposed Commercial Development
Functional Layout
Shaw Road

LOCATION
325 Shaw Road
Shaw, QLD 4817

REV	DATE	AMENDMENT / ISSUE	DWN	CHK
A	-	-	-	-

DISCLAIMER
This concept takes into account the instructions and requirements of our client. Cambray has taken care in preparing this concept, however it neither accepts liability nor responsibility whatsoever in respect of; any use of this document by any third party, any third party whose interests may be affected by any decision made regarding the contents of this document and/or any conclusion drawn resulting from omission or lack of full discloser by the client or the client's consultants.

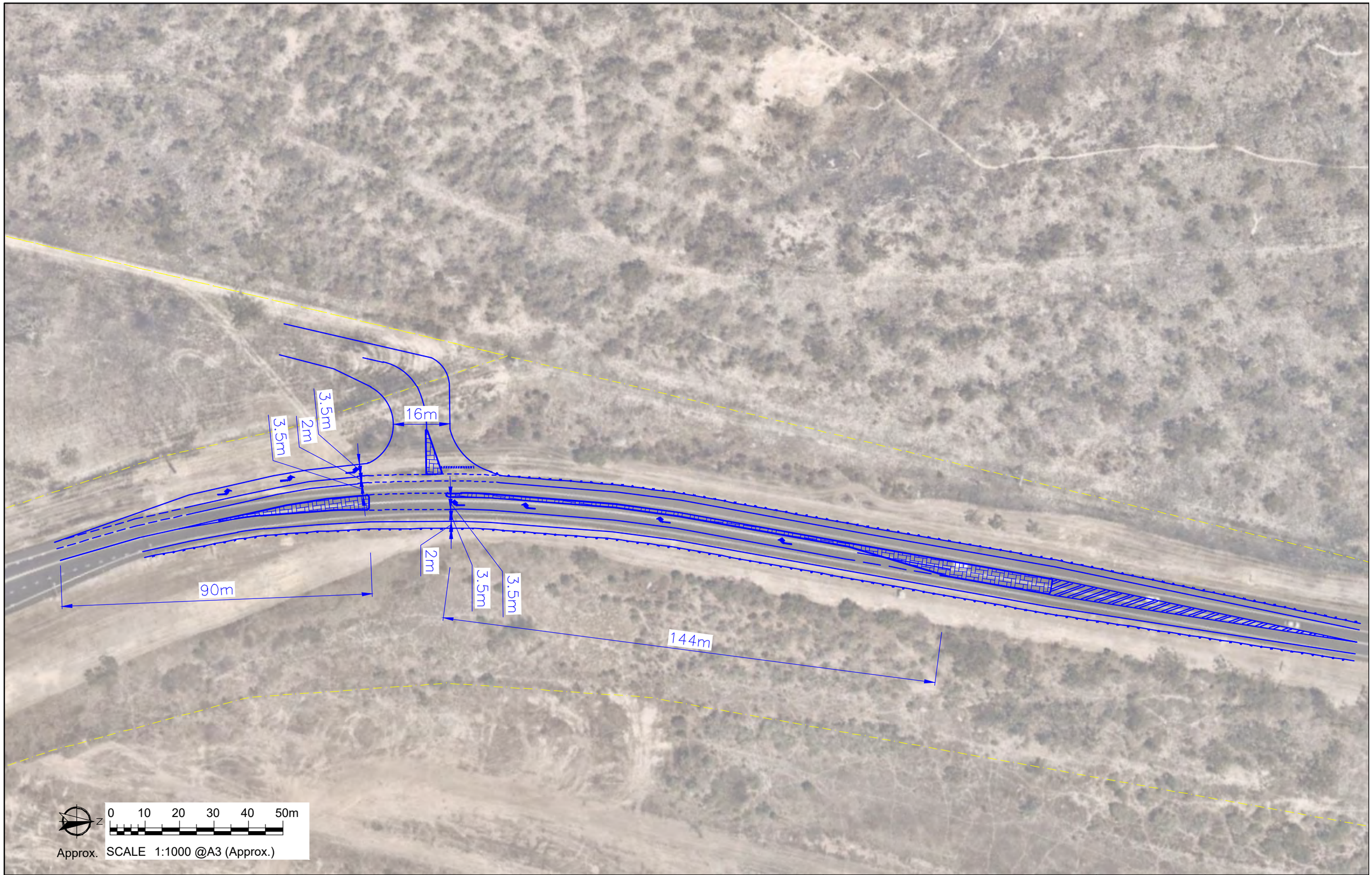
PRELIMINARY
NOT FOR CONSTRUCTION

JOB No. // DRAWING No.
KIN0323-01//
SK01

DATE
10.01.24

~Scale (A3)
As shown

PREPARED FOR
For Discussion



CAMBRAYconsulting
Traffic Engineering and Transport Planning
Suite 2601, 21 Mary Street Brisbane Q 4000
t : 07 3221 3503 | e : contact@cambray.com.au

DRAWING TITLE
Proposed Commercial Development
Functional Layout
Shaw Road
Dimensions

LOCATION
325 Shaw Road
Shaw, QLD 4817

REV	DATE	AMENDMENT / ISSUE	DWN	CHK
A	.	-	-	-

DISCLAIMER
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PRELIMINARY
NOT FOR CONSTRUCTION

JOB No. // DRAWING No.
KIN0323-01//
SK02

DATE
10.01.24

~Scale (A3)
As shown

PREPARED FOR
For Discussion

SERV

FOR PROPOSED INT
DETAILS
REFER TO CAMBR
DRAWINGS

SHAW ROAD

N

0 5 10 20 25m

Approx. SCALE 1:500 @A3 (Approx.)

CAMBRAYconsulting
Traffic Engineering and Transport Planning
Suite 2601, 21 Mary Street Brisbane Q 4000
t : 07 3221 3503 | e : contact@cambray.com.au

DRAWING TITLE
Proposed Commercial Development
Functional Layout
Shaw Road
Swept Path Assessment - 19m AV

LOCATION
325 Shaw Road
Shaw, QLD 4817

REV	DATE	AMENDMENT / ISSUE	DWN	CHK
A	-	-	-	-

DISCLAIMER
This concept takes into account the instructions and requirements of our client. Cambray has taken care in preparing this concept, however it neither accepts liability nor responsibility whatsoever in respect of; any use of this document by any third party, any third party whose interests may be affected by any decision made regarding the contents of this document and/or any conclusion drawn resulting from omission or lack of full discloser by the client or the client's consultants.

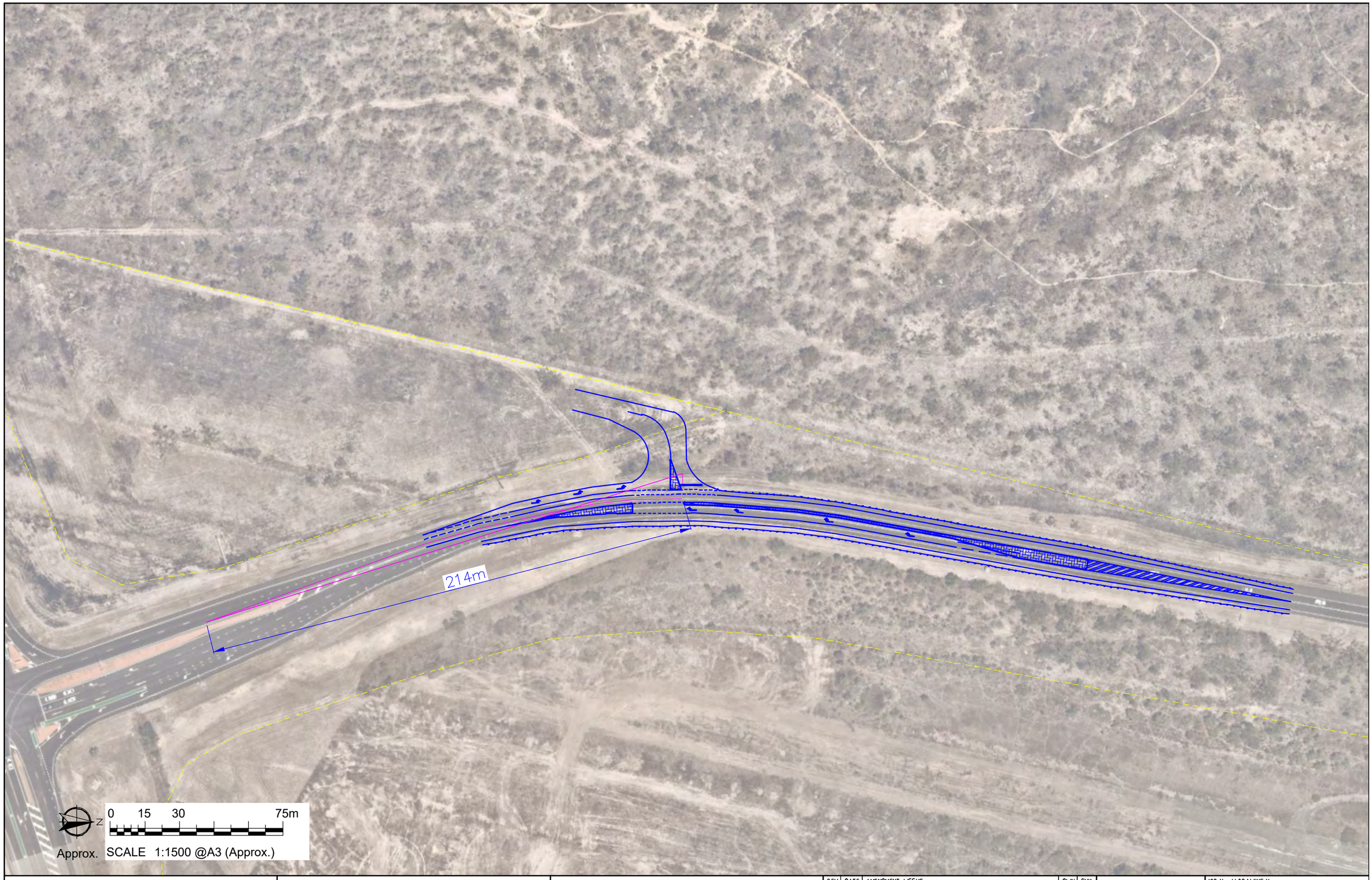
PRELIMINARY
NOT FOR CONSTRUCTION

JOB No. // DRAWING No.
KIN0323-01//
SK03

DATE
10.01.24

~Scale (A3)
As shown

PREPARED FOR
For Discussion



CAMBRAYconsulting
Traffic Engineering and Transport Planning
Suite 2601, 21 Mary Street Brisbane Q 4000
t : 07 3221 3503 | e : contact@cambray.com.au

DRAWING TITLE
Proposed Commercial Development
Functional Layout
Shaw Road
Safe Intersection Sight Distance

LOCATION
325 Shaw Road
Shaw, QLD 4817

REV	DATE	AMENDMENT / ISSUE	DWN	CHK
A	-	-	-	-

DISCLAIMER
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PRELIMINARY
NOT FOR CONSTRUCTION

JOB No. // DRAWING No.
KIN0323-01//
SK02

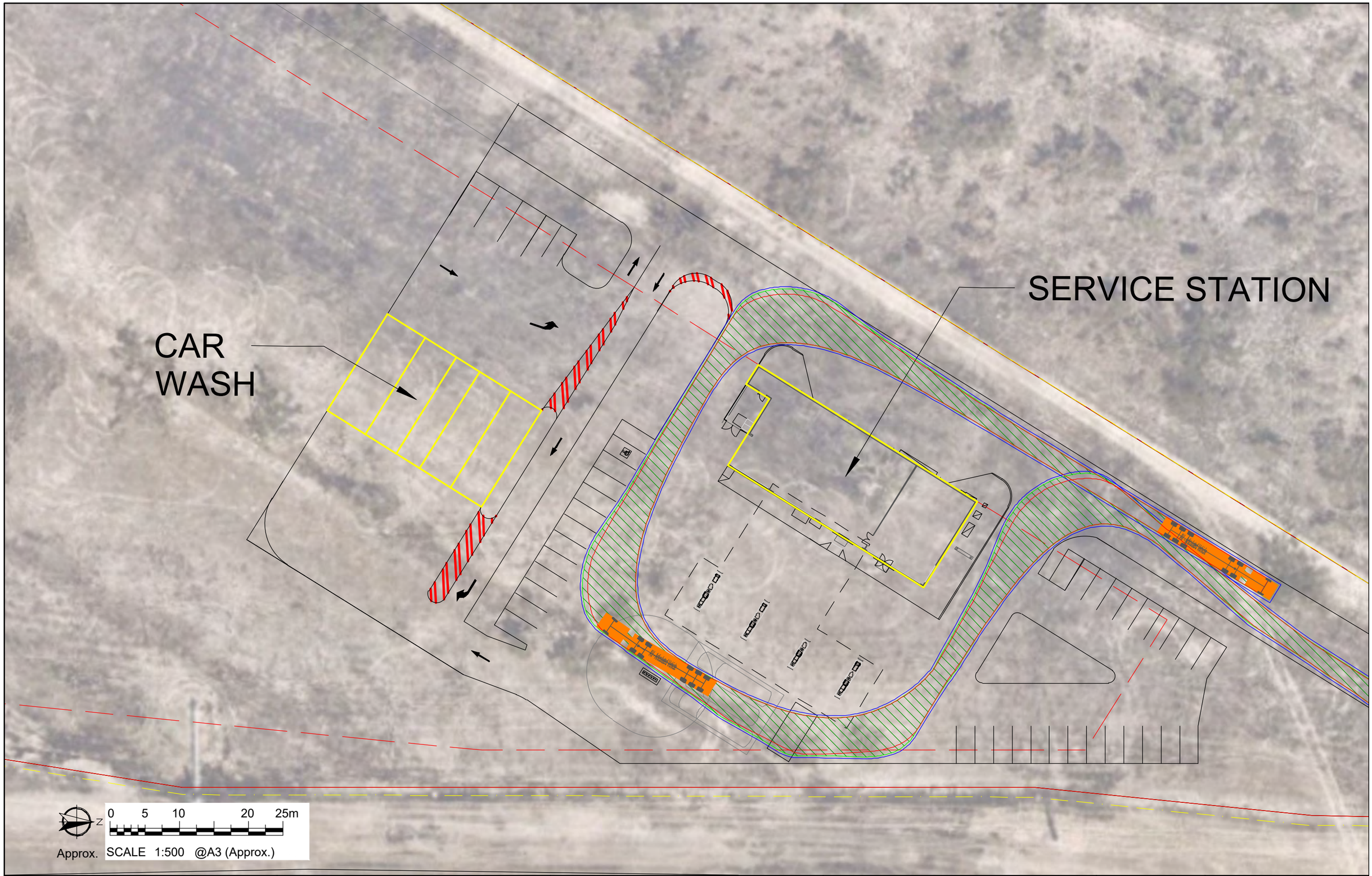
DATE
10.01.24

~Scale (A3)
As shown

PREPARED FOR
For Discussion

APPENDIX E

Swept Path Assessment



CAMBRAYconsulting
Traffic Engineering and Transport Planning
Suite 2601, 21 Mary Street Brisbane Q 4000
t : 07 3221 3503 | e : contact@cambray.com.au

DRAWING TITLE
Proposed Service Station & Car Wash
Swept Path Assessment
19m AV

LOCATION
325 Shaw Road
Shaw, QLD 4817

REV	DATE	AMENDMENT / ISSUE	DWN	CHK
A	-	-	-	-

DISCLAIMER
This concept takes into account the instructions and requirements of our client. Cambray has taken care in preparing this concept, however it neither accepts liability nor responsibility whatsoever in respect of; any use of this document by any third party, any third party whose interests may be affected by any decision made regarding the contents of this document and/or any conclusion drawn resulting from omission or lack of full discloser by the client or the client's consultants.

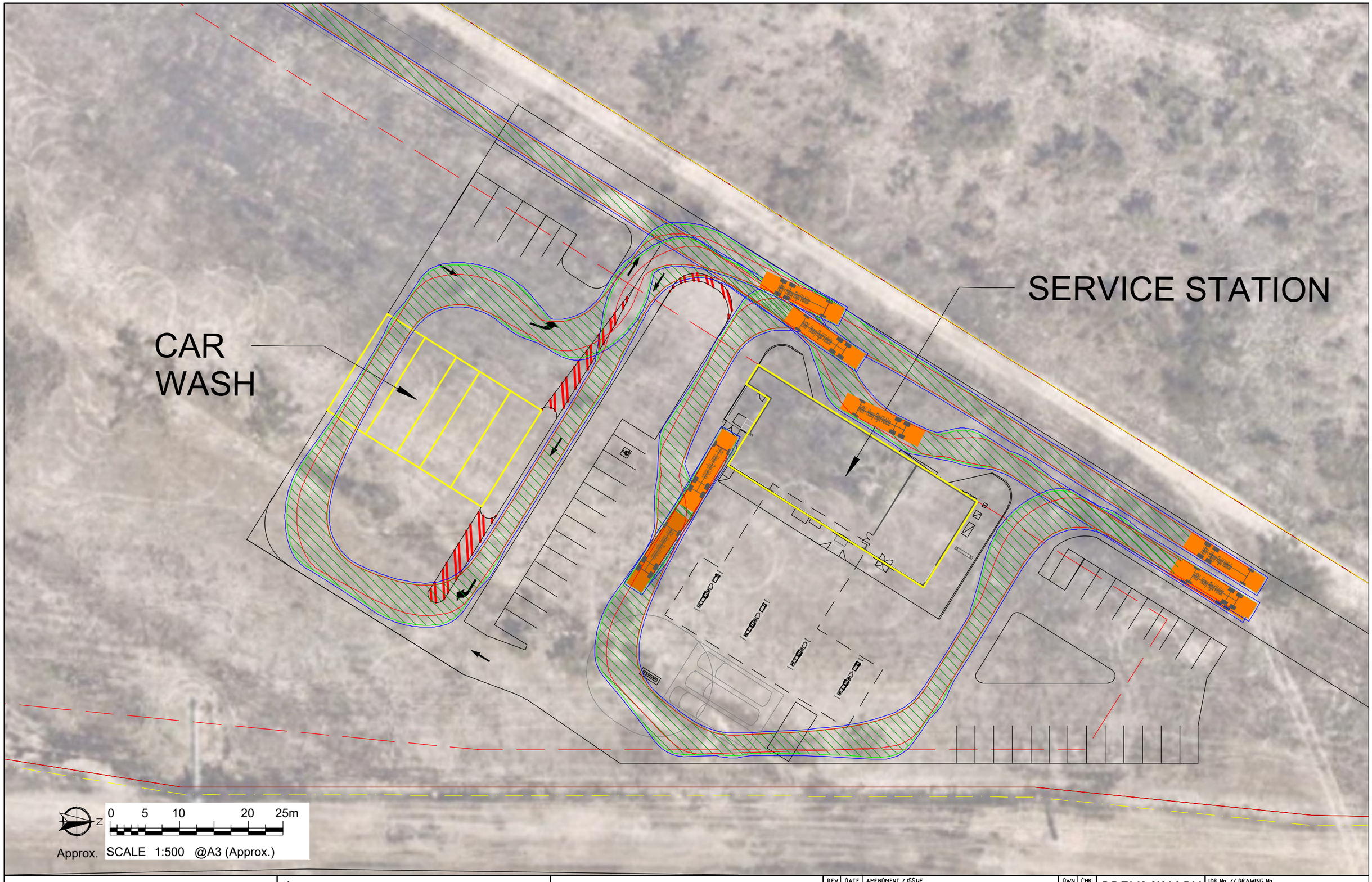
PRELIMINARY
NOT FOR CONSTRUCTION

JOB No. // DRAWING No.
KIN0323-01//
SK07

DATE
19.06.24

~Scale (A3)
As shown

PREPARED FOR
For Discussion



CAMBRAYconsulting
Traffic Engineering and Transport Planning
Suite 2601, 21 Mary Street Brisbane Q 4000
t : 07 3221 3503 | e : contact@cambray.com.au

DRAWING TITLE
Proposed Commercial Development
Swept Path Assessment
HRV

LOCATION
325 Shaw Road
Shaw, QLD 4817

REV	DATE	AMENDMENT / ISSUE	DWN	CHK
A	-	-	-	-

PRELIMINARY
NOT FOR CONSTRUCTION

JOB No. // DRAWING No.
KIN0323-01//
SK08

DATE
19.06.24

~Scale (A3)
As shown

PREPARED FOR
For Discussion

APPENDIX F

Traffic Count Data

AUSTRAFFIC VIDEO INTERSECTION COUNT

Site No.: 1 **Weather:** Fine

Location: Dalrymple Road/Shaw Road, Shaw

Day/Date: Thursday, 16 November 2023

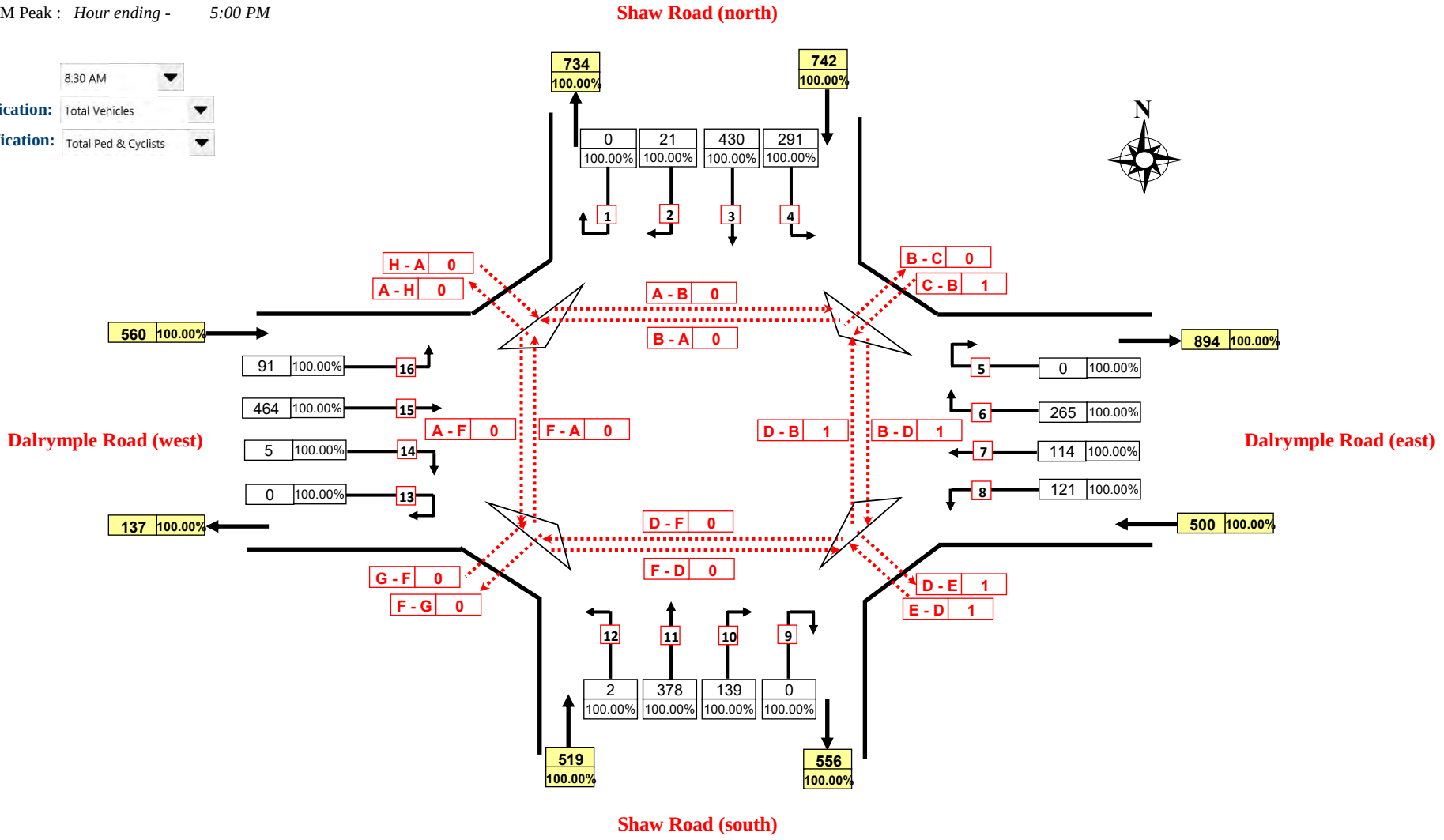
Summary: AM Peak : *Hour ending - 8:30 AM*

PM Peak : *Hour ending - 5:00 PM*

Hour Ending: 8:30 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: Dalrymple Road/Shaw Road, Shaw

Day/Date: Thursday, 16 November 2023

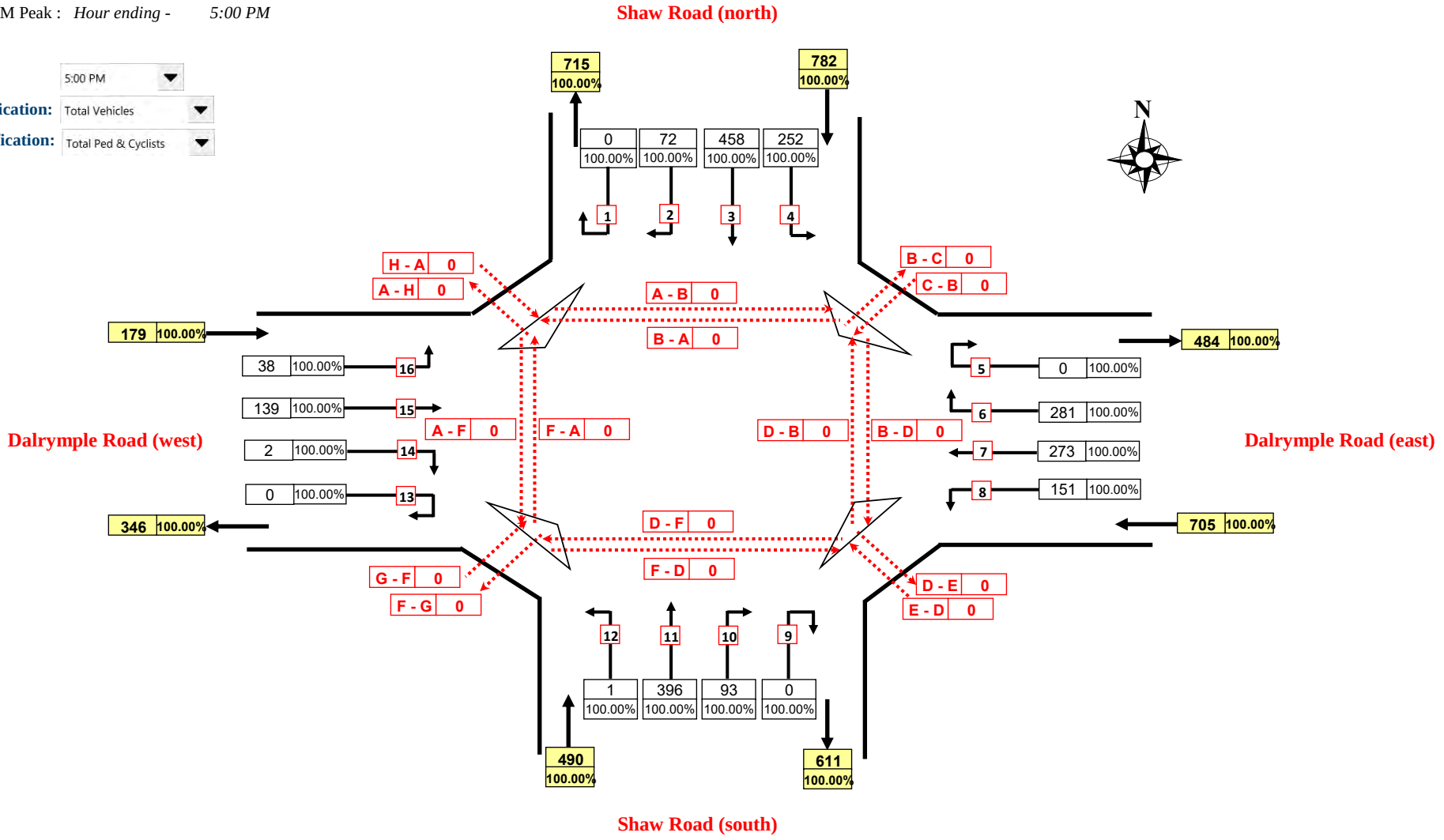
Summary: AM Peak : *Hour ending - 8:30 AM*

PM Peak : *Hour ending - 5:00 PM*

Hour Ending: 5:00 PM

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

APPENDIX G

Turning Movements

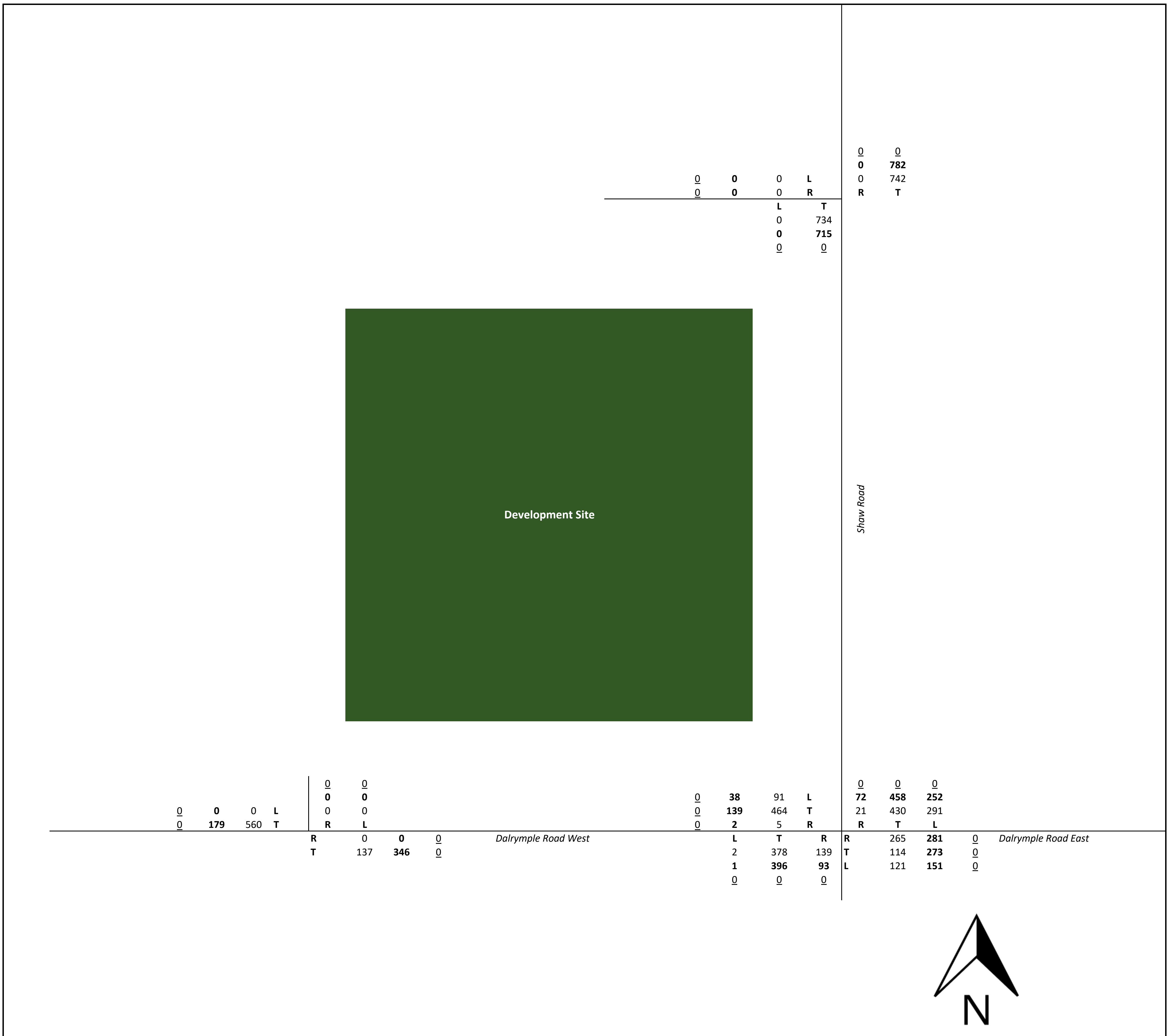


Figure No	***Figure Name:***	***2023 Survey Data***	***Job Name:***	***325 Shaw Road, Shaw***
1	***Job Number:***	***KIN0323-01***	***Date:***	***19/06/2024***
	Prepared by:	***SN***	***Reviewed By:***	***SN***

Legend					
00	***AM Peak***	***L***	***Left Turn Movement***	***R***	***Right Turn Movement***
(00)	***PM Peak***	***T***	***Through Movement***	***U***	***U-Turn Movement***

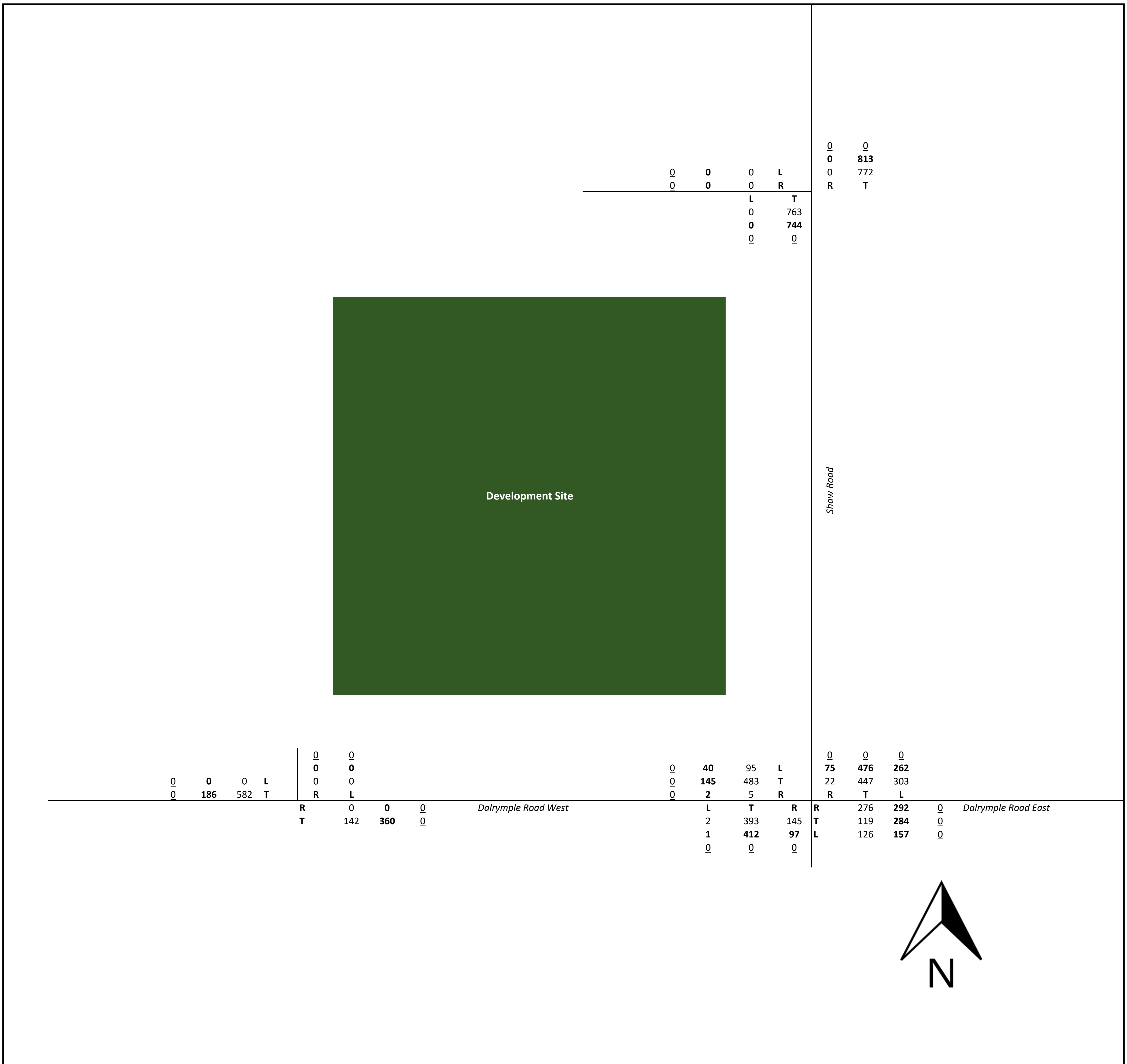


Figure No	Figure Name:	Est. Year of Completion (2025) Background Volumes	Job Name:	325 Shaw Road, Shaw
2	Job Number:	KIN0323-01	Date:	19/06/2024
	Prepared by:	SN	Reviewed By:	SN

Legend					
00	AM Peak	L	Left Turn Movement	R	Right Turn Movement
(00)	PM Peak	T	Through Movement	U	U-Turn Movement

CAMBRAY consulting
Traffic Engineering and Transport Planning

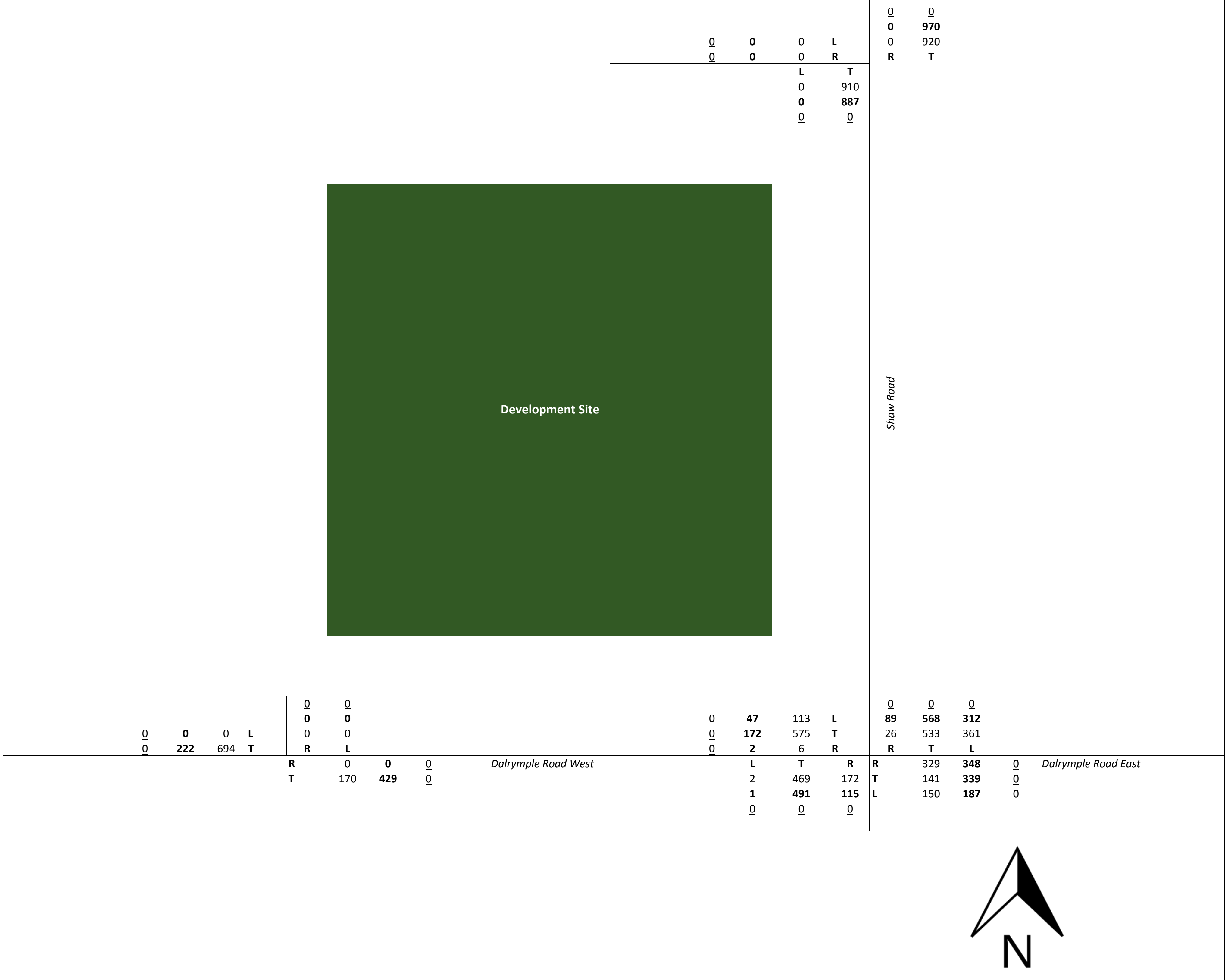


Figure No	*Figure Name:*	*Est. Design Horizon (2035) Background Volumes*	*Job Name:*	*325 Shaw Road, Shaw*
3	*Job Number:*	*KIN0323-01*	*Date:*	*19/06/2024*
	Prepared by:	*SN*	*Reviewed By:*	*SN*

Legend

00	*AM Peak*	*L*	*Left Turn Movement*	*R*	*Right Turn Movement*
(00)	*PM Peak*	*T*	*Through Movement*	*U*	*U-Turn Movement*

CAMBRAY consulting
Traffic Engineering and Transport Planning

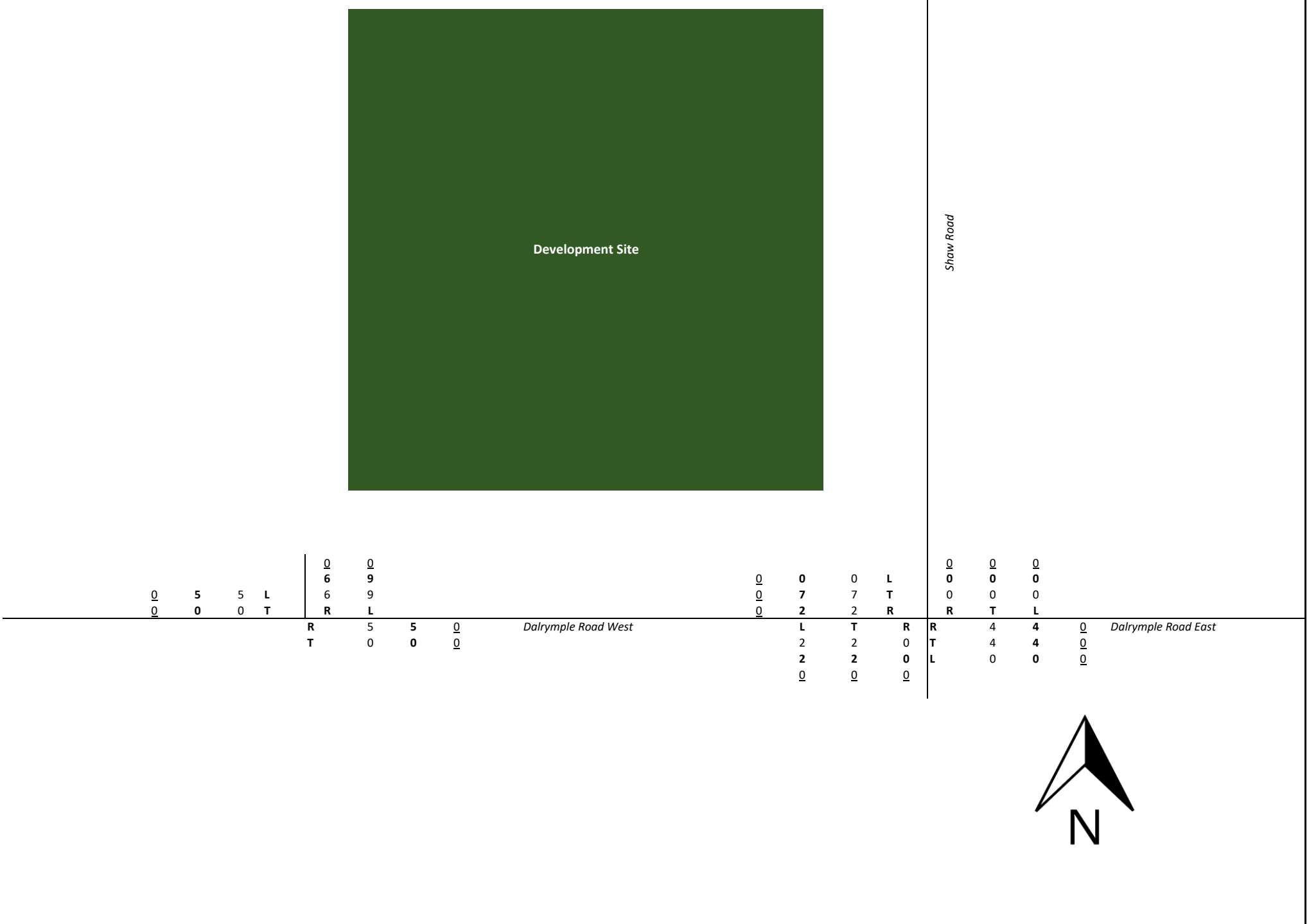


Figure No	Figure Name:	New Development Trips	Job Name:	325 Shaw Road, Shaw
4	Job Number:	KIN0323-01	Date:	19/06/2024
	Prepared by:	SN	Reviewed By:	SN

Legend					
00	AM Peak	L	Left Turn Movement	R	Right Turn Movement
(00)	PM Peak	T	Through Movement	U	U-Turn Movement

CAMBRAY consulting
Traffic Engineering and Transport Planning

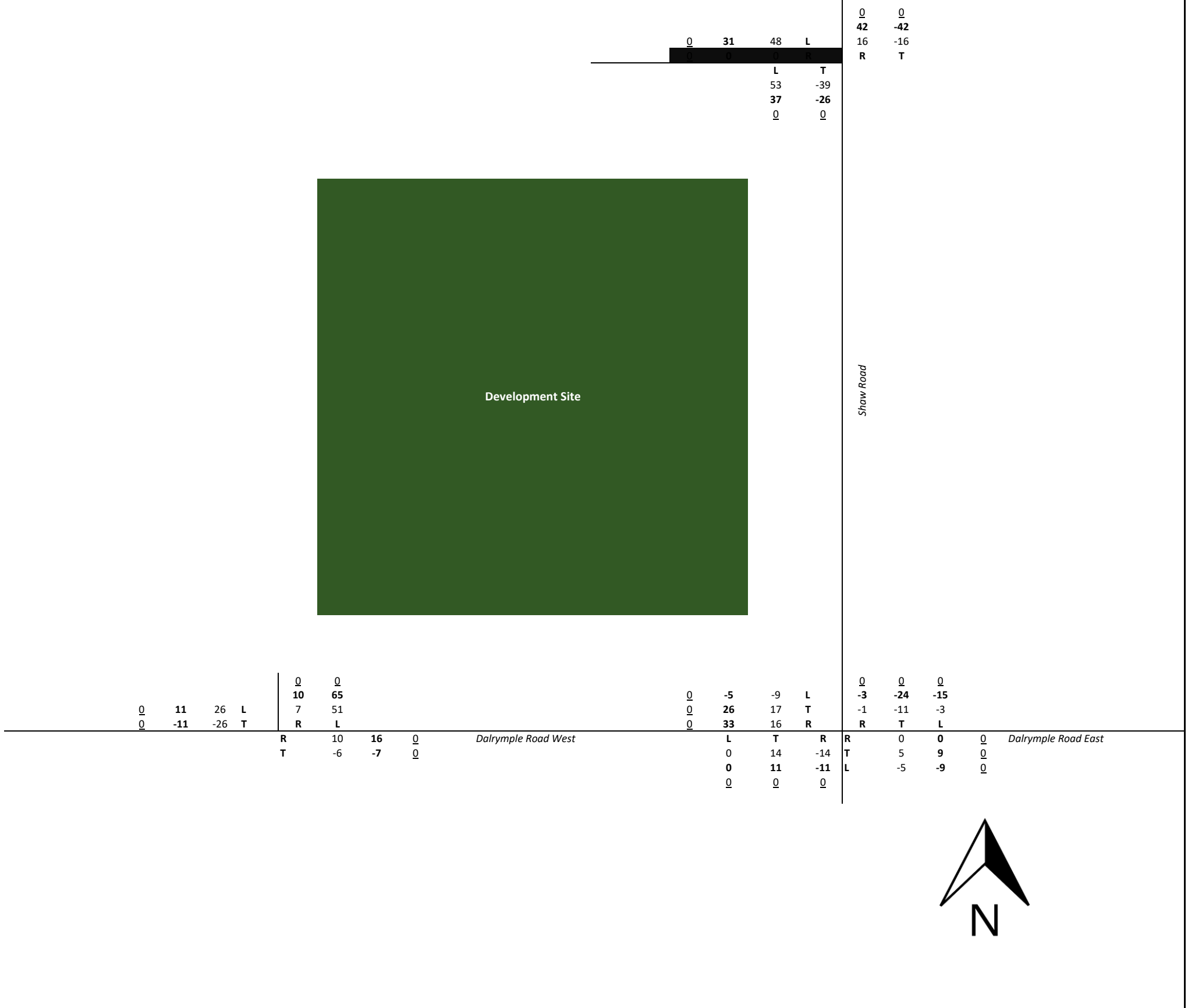


Figure No	Figure Name:	Linked Development Trips	Job Name:	325 Shaw Road, Shaw
5	Job Number:	KIN0323-01	Date:	19/06/2024
	Prepared by:	SN	Reviewed By:	SN

Legend

00	AM Peak	L	Left Turn Movement	R	Right Turn Movement
(00)	PM Peak	T	Through Movement	U	U-Turn Movement

CAMBRAY consulting
Traffic Engineering and Transport Planning

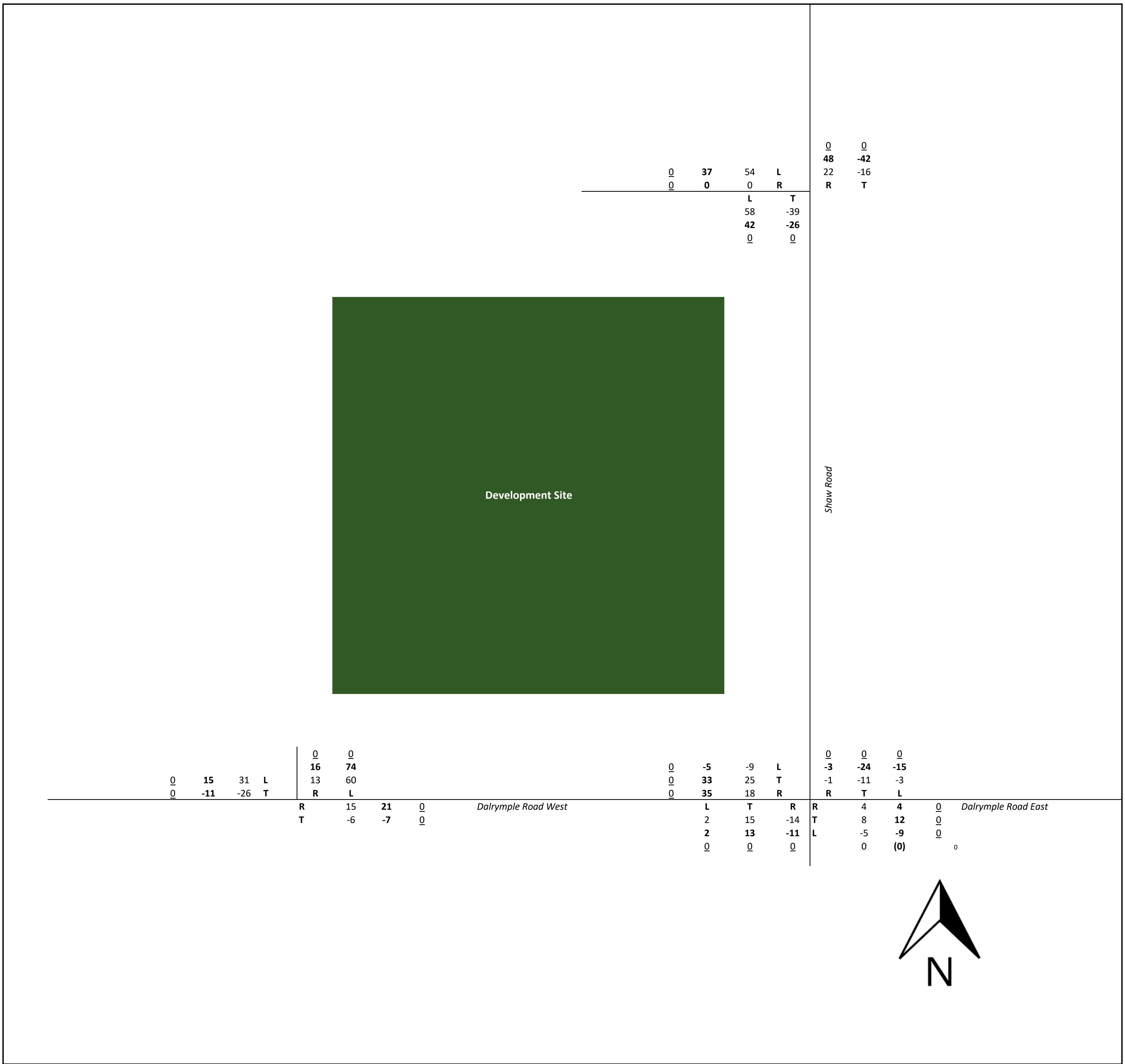


Figure No	Figure Name:	Total Development Trips	Job Name:	325 Shaw Road, Shaw
6	Job Number:	KIN0323-01	Date:	19/06/2024
	Prepared by:	SN	Reviewed By:	SN

Legend					
00	AM Peak	L	Left Turn Movement	R	Right Turn Movement
(00)	PM Peak	T	Through Movement	U	U-Turn Movement

Document Set ID: 24517870
Version: 1, Version Date: 27/06/2024

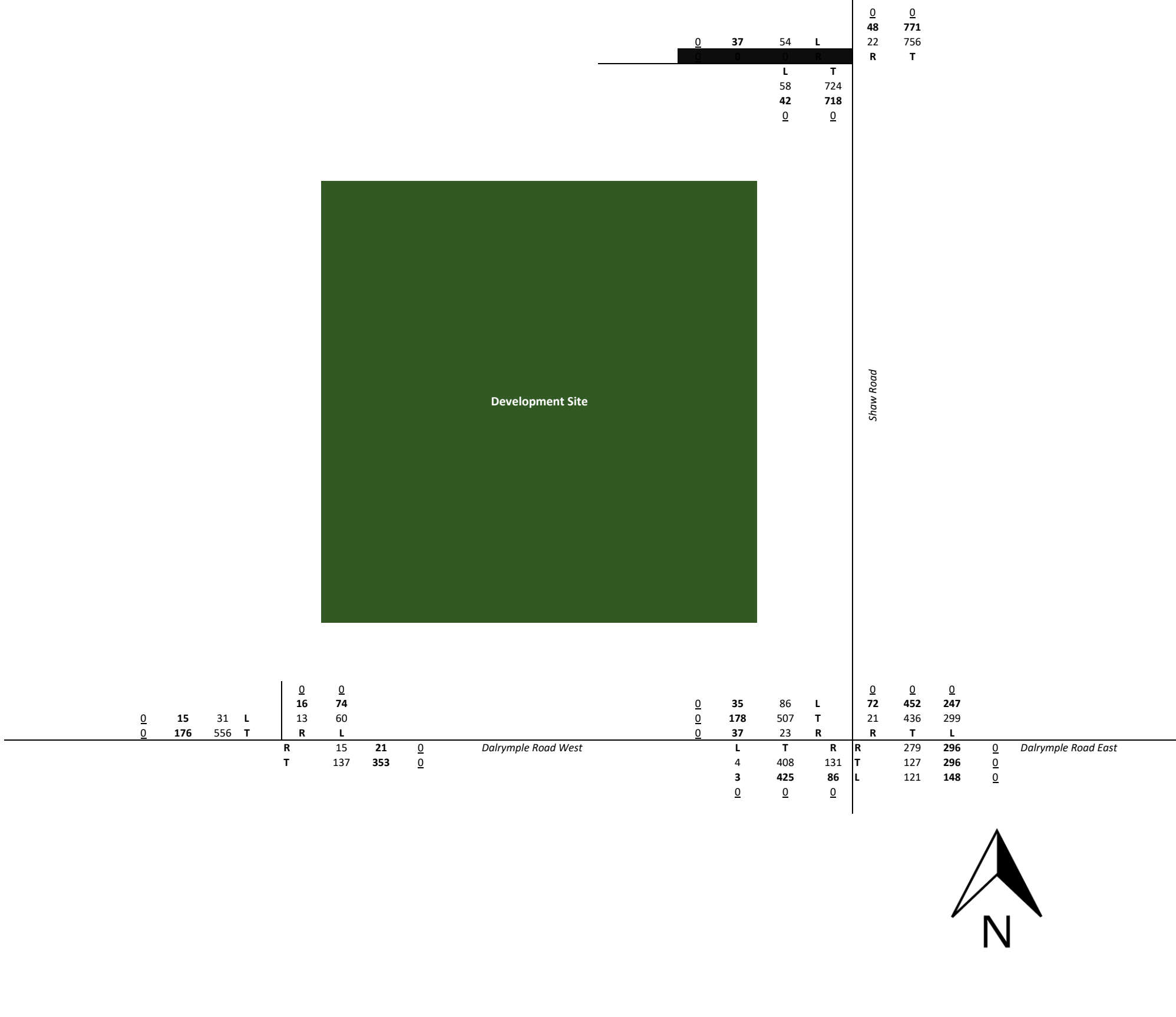


Figure No	Figure Name:	YoC BG + Dev trips	Job Name:	325 Shaw Road, Shaw
7	Job Number:	KIN0323-01	Date:	19/06/2024
	Prepared by:	SN	Reviewed By:	SN

Legend

00	AM Peak	L	Left Turn Movement	R	Right Turn Movement
(00)	PM Peak	T	Through Movement	U	U-Turn Movement

CAMBRAY consulting
Traffic Engineering and Transport Planning

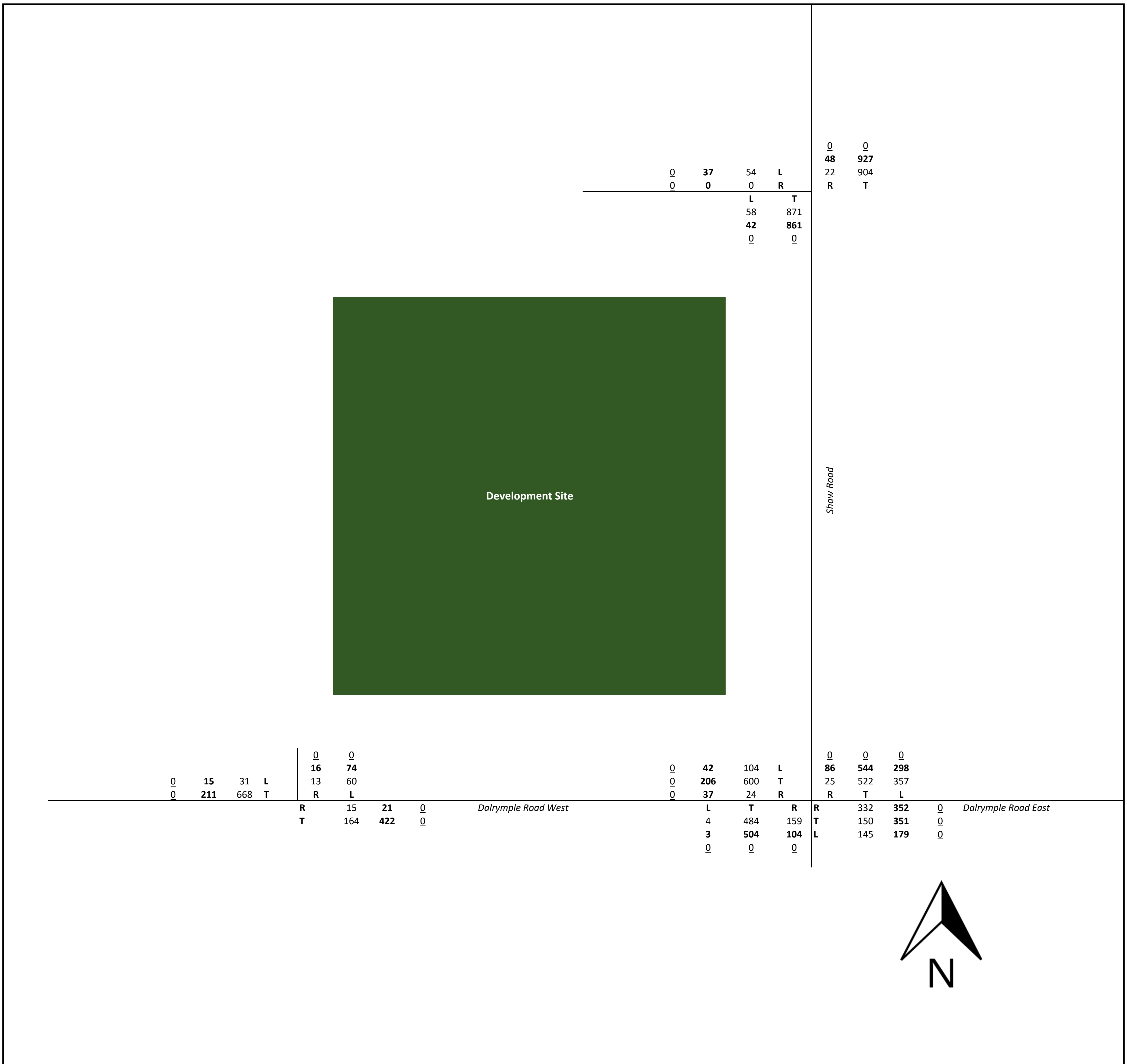


Figure No	*Figure Name:*	*DesH BG + Dev Trips*	*Job Name:*	*325 Shaw Road, Shaw*
8	*Job Number:*	*KIN0323-01*	*Date:*	*19/06/2024*
	Prepared by:	*SN*	*Reviewed By:*	*SN*

		Legend			
00	*AM Peak*	*L*	*Left Turn Movement*	*R*	*Right Turn Movement*
(00)	*PM Peak*	*T*	*Through Movement*	*U*	*U-Turn Movement*

CAMBRAY consulting Traffic Engineering and Transport Planning

APPENDIX H

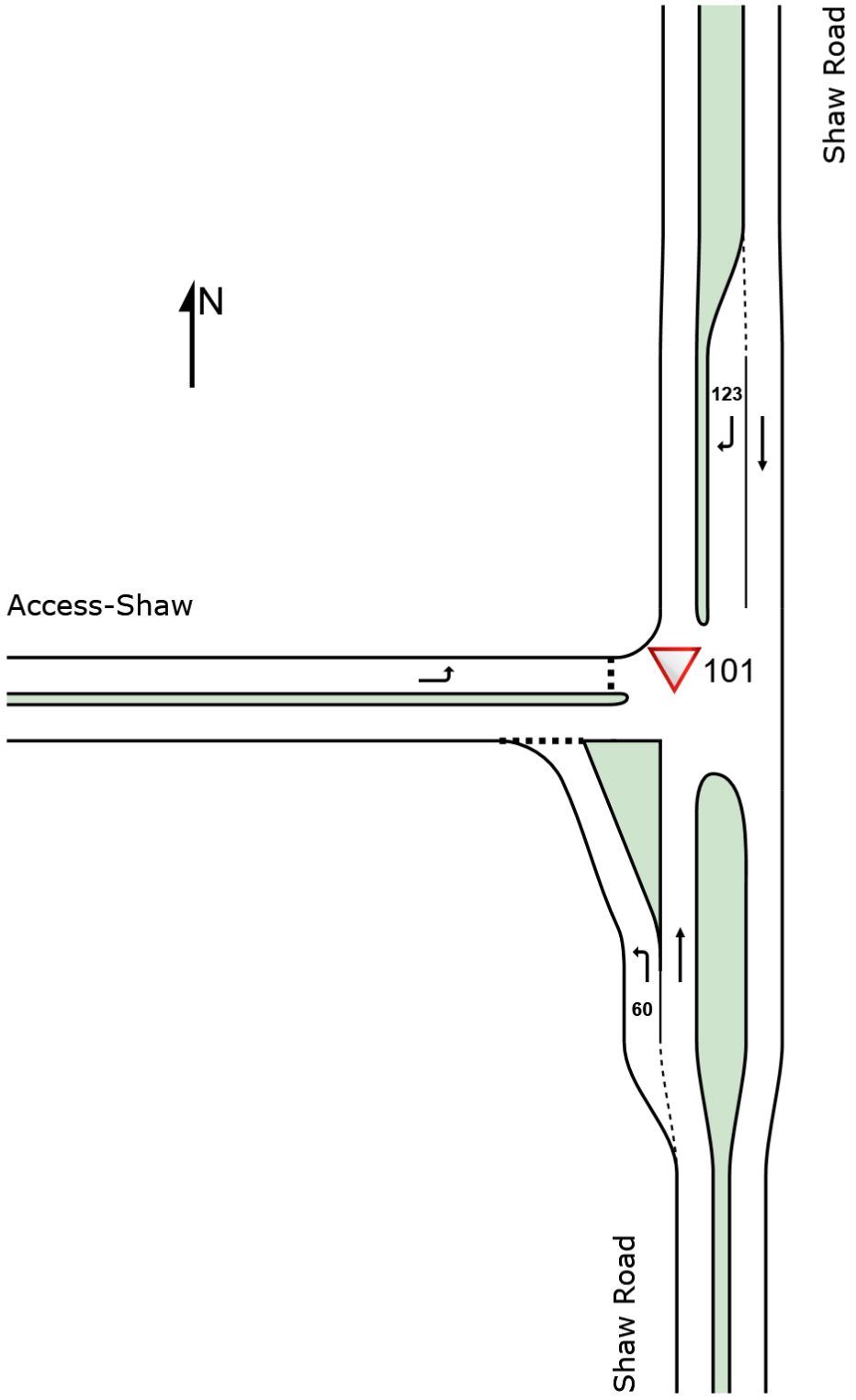
SIDRA Output

SITE LAYOUT

Site: 101 [Shaw Access 2035 AM BG+Dev (Site Folder: Shaw Left Out only)]

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

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



MOVEMENT SUMMARY

Site: 101 [Shaw Access 2035 AM BG+Dev (Site Folder: Shaw Left Out only)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shaw Road															
1	L2	All MCs	61	1.0	61	1.0	0.038	5.7	LOS A	0.2	1.1	0.08	0.52	0.08	44.5
2	T1	All MCs	917	9.3	917	9.3	0.498	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach			978	8.7	978	8.7	0.498	0.5	LOS A	0.2	1.1	0.00	0.03	0.00	59.0
North: Shaw Road															
8	T1	All MCs	952	8.8	952	8.8	0.516	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.5
9	R2	All MCs	23	1.0	23	1.0	0.046	11.9	LOS B	0.2	1.1	0.72	0.88	0.72	42.0
Approach			975	8.6	975	8.6	0.516	0.5	NA	0.2	1.1	0.02	0.02	0.02	59.1
West: Access-Shaw															
10	L2	All MCs	57	1.0	57	1.0	0.120	10.2	LOS B	0.4	2.8	0.73	0.88	0.73	43.3
Approach			57	1.0	57	1.0	0.120	10.2	LOS B	0.4	2.8	0.73	0.88	0.73	43.3
All Vehicles			2009	8.4	2009	8.4	0.516	0.8	NA	0.4	2.8	0.03	0.05	0.03	58.6

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

MOVEMENT SUMMARY

Site: 101 [Shaw Access 2035 PM BG+Dev (Site Folder: Shaw Left Out only)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shaw Road															
1	L2	All MCs	44	1.0	44	1.0	0.028	5.8	LOS A	0.1	0.8	0.13	0.52	0.13	44.2
2	T1	All MCs	906	6.6	906	6.6	0.485	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach			951	6.3	951	6.3	0.485	0.4	LOS A	0.1	0.8	0.01	0.02	0.01	59.2
North: Shaw Road															
8	T1	All MCs	976	3.1	976	3.1	0.510	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
9	R2	All MCs	51	1.0	51	1.0	0.095	11.7	LOS B	0.3	2.4	0.72	0.89	0.72	42.1
Approach			1026	3.0	1026	3.0	0.510	0.8	NA	0.3	2.4	0.04	0.04	0.04	58.8
West: Access-Shaw															
10	L2	All MCs	39	1.0	39	1.0	0.078	9.7	LOS A	0.3	1.8	0.71	0.87	0.71	43.8
Approach			39	1.0	39	1.0	0.078	9.7	LOS A	0.3	1.8	0.71	0.87	0.71	43.8
All Vehicles			2016	4.5	2016	4.5	0.510	0.8	NA	0.3	2.4	0.03	0.05	0.03	58.7

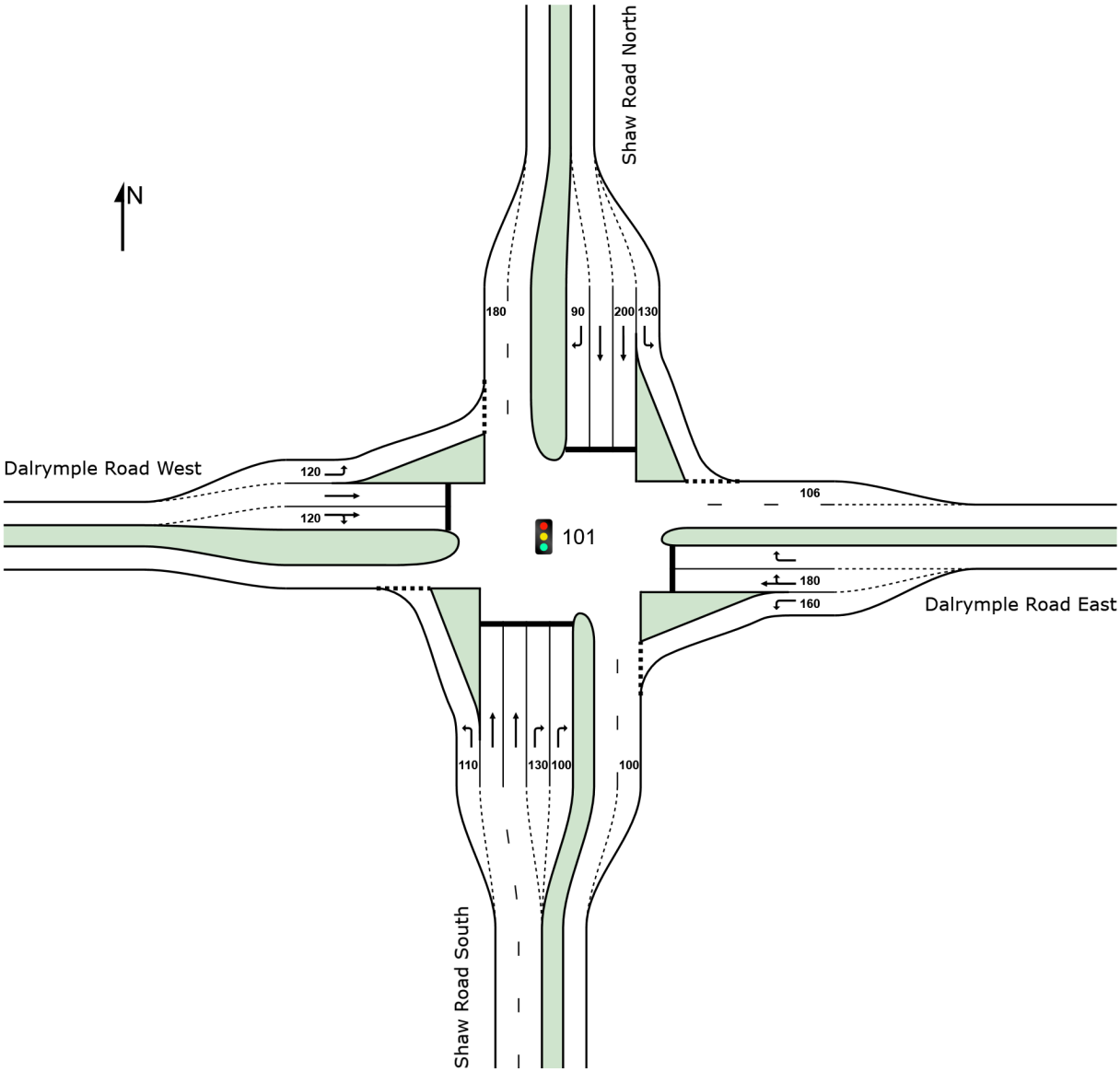
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of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

SITE LAYOUT

Site: 101 [Shaw / Dalrymple 2025 AM BG (Site Folder: Shaw Left Out only)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



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Project: C:\Projects\KIN0323\01\3. Deliverables\1. Reports\1. TIA\KIN0323-19.06.2024.sip9

PHASING SUMMARY

Site: 101 [Shaw / Dalrymple 2025 AM BG (Site Folder: Shaw Left Out only)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Phase1
Input Phase Sequence: A, D, E, F
Output Phase Sequence: A, D, E, F
Reference Phase: Phase A

Phase Timing Summary

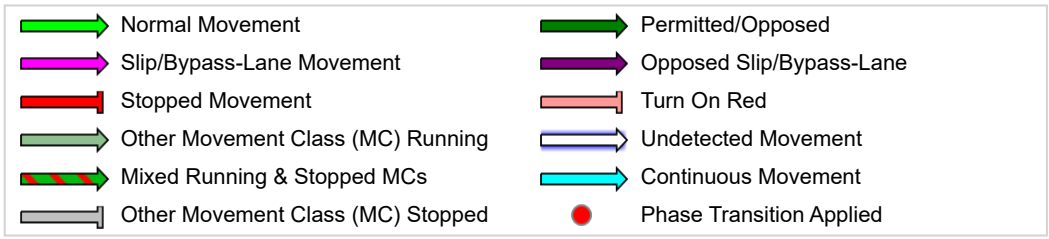
Phase	A	D	E	F
Phase Change Time (sec)	0	38	76	104
Green Time (sec)	32	32	22	10
Phase Time (sec)	38	38	28	16
Phase Split	32%	32%	23%	13%
Phase Frequency (%)	100.0	100.0	100.0	100.0

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

REF: Reference Phase

VAR: Variable Phase



PHASING SUMMARY

Site: 101 [Shaw / Dalrymple 2025 AM BG+Dev (Site Folder: Shaw Left Out only)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Phase1
Input Phase Sequence: A, D, E, F
Output Phase Sequence: A, D, E, F
Reference Phase: Phase A

Phase Timing Summary

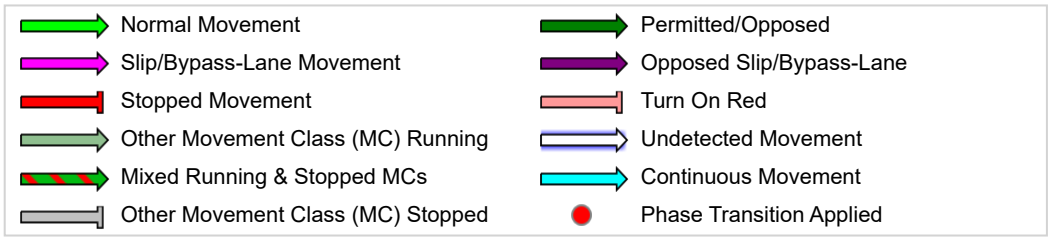
Phase	A	D	E	F
Phase Change Time (sec)	0	37	77	105
Green Time (sec)	31	34	22	9
Phase Time (sec)	37	40	28	15
Phase Split	31%	33%	23%	13%
Phase Frequency (%)	100.0	100.0	100.0	100.0

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

REF: Reference Phase

VAR: Variable Phase



PHASING SUMMARY

Site: 101 [Shaw / Dalrymply 2025 PM BG (Site Folder: Shaw Left Out only)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Phase1
Input Phase Sequence: A, D, E, F
Output Phase Sequence: A, D, E, F
Reference Phase: Phase A

Phase Timing Summary

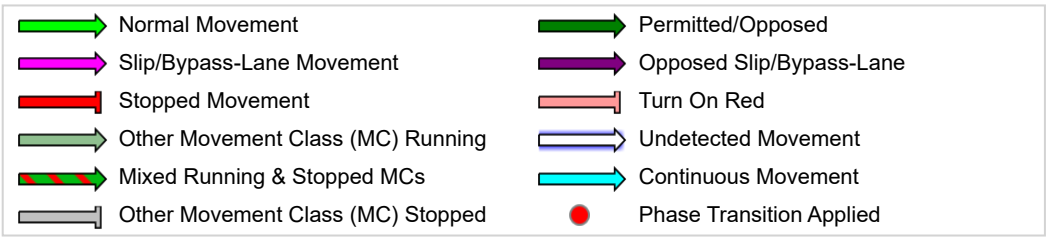
Phase	A	D	E	F
Phase Change Time (sec)	0	42	62	105
Green Time (sec)	36	14	37	9
Phase Time (sec)	42	20	43	15
Phase Split	35%	17%	36%	13%
Phase Frequency (%)	100.0	100.0	100.0	100.0

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

REF: Reference Phase

VAR: Variable Phase



PHASING SUMMARY

Site: 101 [Shaw / Dalrymply 2025 PM BG+Dev (Site Folder: Shaw Left Out only)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Phase1
Input Phase Sequence: A, D, E, F
Output Phase Sequence: A, D, E, F
Reference Phase: Phase A

Phase Timing Summary

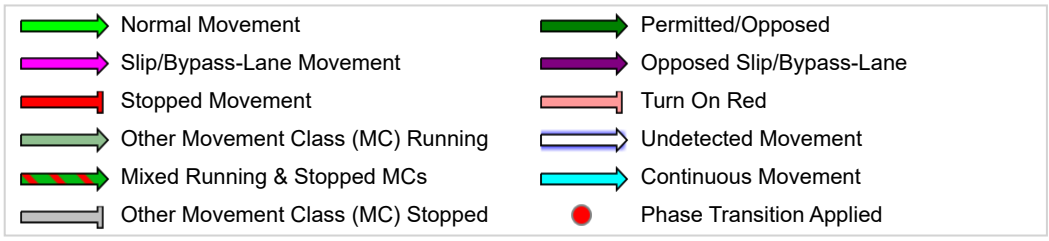
Phase	A	D	E	F
Phase Change Time (sec)	0	42	62	105
Green Time (sec)	36	14	37	9
Phase Time (sec)	42	20	43	15
Phase Split	35%	17%	36%	13%
Phase Frequency (%)	100.0	100.0	100.0	100.0

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

REF: Reference Phase

VAR: Variable Phase



MOVEMENT SUMMARY

Site: 101 [Shaw / Dalrymple 2025 AM BG (Site Folder: Shaw Left Out only)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shaw Road South															
1	L2	All MCs	2	0.0	2	0.0	0.001	6.6	LOS A	0.0	0.1	0.17	0.56	0.17	49.5
2	T1	All MCs	414	14.0	414	14.0	0.434	40.1	LOS D	10.1	79.1	0.88	0.73	0.88	33.5
3	R2	All MCs	153	1.4	153	1.4	* 0.616	66.0	LOS E	5.7	40.0	0.99	0.79	1.02	28.5
Approach			568	10.6	568	10.6	0.616	46.9	LOS D	10.1	79.1	0.91	0.75	0.91	31.8
East: Dalrymple Road East															
4	L2	All MCs	133	5.0	133	5.0	0.107	9.2	LOS A	1.6	11.8	0.28	0.63	0.28	50.9
5	T1	All MCs	125	2.6	125	2.6	* 0.619	49.4	LOS D	11.6	83.7	0.97	0.81	0.97	27.1
6	R2	All MCs	291	4.5	291	4.5	0.619	55.5	LOS E	11.6	83.7	0.97	0.82	0.97	28.3
Approach			548	4.2	548	4.2	0.619	42.9	LOS D	11.6	83.7	0.81	0.77	0.81	32.2
North: Shaw Road North															
7	L2	All MCs	319	4.8	319	4.8	0.273	11.7	LOS B	5.5	39.9	0.38	0.67	0.38	47.8
8	T1	All MCs	471	11.4	471	11.4	* 0.613	40.9	LOS D	15.3	117.9	0.91	0.76	0.91	33.1
9	R2	All MCs	23	9.5	23	9.5	0.160	62.8	LOS E	1.3	9.9	0.96	0.71	0.96	19.2
Approach			813	8.8	813	8.8	0.613	30.1	LOS C	15.3	117.9	0.70	0.73	0.70	37.2
West: Dalrymple Road West															
10	L2	All MCs	100	3.3	100	3.3	0.092	11.4	LOS B	1.6	11.3	0.34	0.64	0.34	42.6
11	T1	All MCs	508	2.2	508	2.2	* 0.608	41.1	LOS D	16.0	114.3	0.91	0.77	0.91	30.7
12	R2	All MCs	5	20.0	5	20.0	0.608	47.4	LOS D	16.0	114.3	0.93	0.80	0.93	29.3
Approach			614	2.5	614	2.5	0.608	36.3	LOS D	16.0	114.3	0.81	0.75	0.81	31.8
All Vehicles			2543	6.7	2543	6.7	0.619	38.1	LOS D	16.0	117.9	0.80	0.75	0.80	33.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 101 [Shaw / Dalrymple 2025 AM BG+Dev (Site Folder: Shaw Left Out only)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shaw Road South															
1	L2	All MCs	4	0.0	4	0.0	0.003	6.8	LOS A	0.0	0.2	0.18	0.57	0.18	49.4
2	T1	All MCs	429	14.0	429	14.0	0.465	41.3	LOS D	10.7	83.6	0.89	0.75	0.89	33.1
3	R2	All MCs	138	1.4	138	1.4	*0.619	67.1	LOS E	5.2	36.5	1.00	0.78	1.03	28.3
Approach			572	10.9	572	10.9	0.619	47.2	LOS D	10.7	83.6	0.91	0.76	0.92	31.6
East: Dalrymple Road East															
4	L2	All MCs	127	5.0	127	5.0	0.104	9.4	LOS A	1.6	11.8	0.29	0.63	0.29	50.8
5	T1	All MCs	134	2.6	134	2.6	*0.635	49.6	LOS D	12.0	86.4	0.98	0.82	0.98	27.1
6	R2	All MCs	294	4.5	294	4.5	0.635	55.7	LOS E	12.0	86.4	0.98	0.82	0.98	28.2
Approach			555	4.2	555	4.2	0.635	43.6	LOS D	12.0	86.4	0.82	0.78	0.82	31.9
North: Shaw Road North															
7	L2	All MCs	315	4.8	315	4.8	0.271	11.8	LOS B	5.4	39.3	0.38	0.67	0.38	47.8
8	T1	All MCs	459	11.4	459	11.4	*0.618	41.7	LOS D	15.1	115.8	0.91	0.77	0.91	32.8
9	R2	All MCs	22	9.5	22	9.5	0.169	64.2	LOS E	1.3	9.6	0.97	0.71	0.97	18.9
Approach			796	8.7	796	8.7	0.618	30.5	LOS C	15.1	115.8	0.70	0.73	0.70	37.0
West: Dalrymple Road West															
10	L2	All MCs	91	3.3	91	3.3	0.084	11.7	LOS B	1.5	10.5	0.35	0.64	0.35	42.3
11	T1	All MCs	534	2.2	534	2.2	*0.625	39.8	LOS D	17.2	123.9	0.90	0.77	0.90	31.2
12	R2	All MCs	24	20.0	24	20.0	0.625	46.2	LOS D	17.2	123.9	0.93	0.80	0.93	29.6
Approach			648	3.0	648	3.0	0.625	36.1	LOS D	17.2	123.9	0.82	0.75	0.82	32.0
All Vehicles			2571	6.8	2571	6.8	0.635	38.5	LOS D	17.2	123.9	0.81	0.75	0.81	33.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 101 [Shaw / Dalrymply 2025 PM BG (Site Folder: Shaw Left Out only)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shaw Road South															
1	L2	All MCs	1	0.0	1	0.0	0.001	8.7	LOS A	0.0	0.1	0.27	0.57	0.27	47.5
2	T1	All MCs	434	9.8	434	9.8	0.394	36.6	LOS D	10.1	76.5	0.84	0.71	0.84	34.9
3	R2	All MCs	102	2.2	102	2.2	0.461	65.6	LOS E	3.7	26.6	0.99	0.75	0.99	28.5
Approach			537	8.4	537	8.4	0.461	42.0	LOS D	10.1	76.5	0.87	0.71	0.87	33.3
East: Dalrymple Road East															
4	L2	All MCs	165	4.0	165	4.0	0.129	9.0	LOS A	2.0	14.5	0.28	0.63	0.28	51.0
5	T1	All MCs	299	1.1	299	1.1	*0.524	36.8	LOS D	15.1	106.5	0.88	0.76	0.88	32.1
6	R2	All MCs	307	2.9	307	2.9	0.524	42.6	LOS D	15.1	106.5	0.88	0.81	0.88	31.8
Approach			772	2.4	772	2.4	0.524	33.2	LOS C	15.1	106.5	0.75	0.75	0.75	35.5
North: Shaw Road North															
7	L2	All MCs	276	1.6	276	1.6	0.187	7.3	LOS A	2.4	16.7	0.22	0.62	0.22	50.5
8	T1	All MCs	501	4.4	501	4.4	*0.556	37.2	LOS D	15.6	113.0	0.87	0.74	0.87	34.5
9	R2	All MCs	79	0.0	79	0.0	*0.567	66.6	LOS E	4.7	33.0	1.00	0.78	1.02	18.6
Approach			856	3.1	856	3.1	0.567	30.3	LOS C	15.6	113.0	0.67	0.70	0.67	36.5
West: Dalrymple Road West															
10	L2	All MCs	42	0.0	42	0.0	0.046	12.2	LOS B	0.7	4.8	0.35	0.63	0.35	42.1
11	T1	All MCs	153	1.4	153	1.4	*0.416	54.2	LOS D	5.2	37.1	0.96	0.75	0.96	26.4
12	R2	All MCs	2	0.0	2	0.0	0.416	60.1	LOS E	5.2	37.1	0.97	0.76	0.97	25.7
Approach			197	1.1	197	1.1	0.416	45.3	LOS D	5.2	37.1	0.83	0.72	0.83	28.1
All Vehicles			2361	3.9	2361	3.9	0.567	35.1	LOS D	15.6	113.0	0.76	0.72	0.76	34.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 101 [Shaw / Dalrymply 2025 PM BG+Dev (Site Folder: Shaw Left Out only)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Shaw Road South															
1	L2	All MCs	3	0.0	3	0.0	0.002	8.7	LOS A	0.0	0.3	0.27	0.58	0.27	47.5
2	T1	All MCs	447	9.8	447	9.8	0.407	36.8	LOS D	10.4	79.2	0.85	0.71	0.85	34.9
3	R2	All MCs	91	2.2	91	2.2	0.408	65.3	LOS E	3.3	23.5	0.99	0.74	0.99	28.6
Approach			541	8.5	541	8.5	0.408	41.4	LOS D	10.4	79.2	0.87	0.72	0.87	33.4
East: Dalrymple Road East															
4	L2	All MCs	156	4.0	156	4.0	0.123	9.5	LOS A	2.0	14.8	0.29	0.63	0.29	50.7
5	T1	All MCs	312	1.1	312	1.1	*0.539	37.0	LOS D	15.6	110.0	0.88	0.76	0.88	32.0
6	R2	All MCs	312	2.9	312	2.9	0.539	42.8	LOS D	15.6	110.0	0.88	0.82	0.88	31.7
Approach			779	2.4	779	2.4	0.539	33.8	LOS C	15.6	110.0	0.77	0.76	0.77	35.1
North: Shaw Road North															
7	L2	All MCs	260	1.6	260	1.6	0.175	7.2	LOS A	2.1	14.6	0.21	0.61	0.21	50.6
8	T1	All MCs	476	4.4	476	4.4	*0.528	36.9	LOS D	14.6	106.2	0.86	0.73	0.86	34.6
9	R2	All MCs	76	0.0	76	0.0	*0.544	66.4	LOS E	4.5	31.6	1.00	0.77	1.00	18.7
Approach			812	3.1	812	3.1	0.544	30.1	LOS C	14.6	106.2	0.66	0.69	0.66	36.6
West: Dalrymple Road West															
10	L2	All MCs	37	0.0	37	0.0	0.041	12.5	LOS B	0.6	4.3	0.36	0.63	0.36	41.9
11	T1	All MCs	187	1.4	187	1.4	*0.612	55.5	LOS E	7.9	55.6	0.98	0.78	0.99	25.9
12	R2	All MCs	39	0.0	39	0.0	0.612	61.8	LOS E	7.9	55.6	1.00	0.80	1.01	24.9
Approach			263	1.0	263	1.0	0.612	50.4	LOS D	7.9	55.6	0.90	0.76	0.90	26.8
All Vehicles			2395	3.8	2395	3.8	0.612	36.1	LOS D	15.6	110.0	0.77	0.73	0.77	34.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

APPENDIX I

Aggregate Delay Assessment

SIDRA Delay

Intersection	Average Delay (seconds)															
	South				East				North				West			
Shaw / Dalrymple	L	T	R		L	T	R		L	T	R		L	T	R	
Base Case (2025 BG)																
AM Peak	6.6	40.1	66.0		9.2	49.4	55.5		11.7	40.9	62.8		11.4	41.1	47.4	
PM Peak	8.7	36.6	65.6		9.0	36.8	42.6		7.3	37.2	66.6		12.2	54.2	60.1	
WE Peak																
With Development (2025 BG + Dev)																
AM Peak	6.8	41.3	67.1		9.4	49.6	55.7		11.8	41.7	64.2		11.7	39.8	46.2	
PM Peak	8.7	36.8	65.3		9.5	37.0	42.8		7.2	36.9	66.4		12.5	55.5	61.8	
WE Peak																

Background Volumes

Intersection	Volumes															
	South				East				North				West			
Shaw / Dalrymple	L	T	R		L	T	R		L	T	R		L	T	R	
Base Case (2025 BG)																
AM Peak	2	414	153		133	125	291		319	471	23		100	508	5	
PM Peak	1	434	102		165	299	307		276	501	79		42	153	2	
WE Peak																

Total Network Delay

		Σ Delay
Base Case (2025 BG)		
AM Peak		96958.1
PM Peak		82989.3
With Development (2025 BG + Dev)		
AM Peak		97537.9
PM Peak		83270.4
ID		
AM Peak	Δ seconds	579.8
	Δ %	0.6%
PM Peak	Δ seconds	281.1
	Δ %	0.3%
Total	Δ seconds	860.9
	Δ %	0.5%

GTIA Delay Calculation

Intersection		Total Delay																Σ Delay
		South				East				North				West				
Shaw / Dalrymple		L	T	R		L	T	R		L	T	R		L	T	R		
Base Case (2025 BG)																		
AM Peak		13.2	16601.4	10098.0		1223.6	6175.0	16150.5		3732.3	19263.9	1444.4		1140.0	20878.8	237.0		96958.1
PM Peak		8.7	15884.4	6691.2		1485.0	11003.2	13078.2		2014.8	18637.2	5261.4		512.4	8292.6	120.2		82989.3
WE Peak		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0
With Development (2025 BG + Dev)																		
AM Peak		13.6	17098.2	10266.3		1250.2	6200.0	16208.7		3764.2	19640.7	1476.6		1170.0	20218.4	231.0		97537.9
PM Peak		8.7	15971.2	6660.6		1567.5	11063.0	13139.6		1987.2	18486.9	5245.6		525.0	8491.5	123.6		83270.4
WE Peak		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0
ID																		
AM Peak	Δ seconds	0.4	496.8	168.3		26.6	25.0	58.2		31.9	376.8	32.2		30.0	-660.4	-6.0		579.8
	Δ %	3.0%	3.0%	1.7%		2.2%	0.4%	0.4%		0.9%	2.0%	2.2%		2.6%	-3.2%	-2.5%		0.6%
PM Peak	Δ seconds	0.0	86.8	-30.6		82.5	59.8	61.4		-27.6	-150.3	-15.8		12.6	198.9	3.4		281.1
	Δ %	0.0%	0.5%	-0.5%		5.6%	0.5%	0.5%		-1.4%	-0.8%	-0.3%		2.5%	2.4%	2.8%		0.3%
WE Peak	Δ seconds																	
	Δ %																	

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