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Sustainable Transport. Safe Solutions

**Cnr Neerabup Rd & Key Largo Dr, Clarkson
Proposed Commercial Development**

TRANSPORT IMPACT ASSESSMENT



Prepared for:
Clarkson Central Pty Ltd

November 2023

Cnr Neerabup Rd & Key Largo Dr, Clarkson

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Prepared by: Paul Ghantous
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1 Introduction

This Transport Impact Assessment has been prepared by **Urbii** on behalf of **Clarkson Central Pty Ltd** with regards to the proposed commercial development, located at Cnr Neerabup Rd & Key Largo Dr, Clarkson.

The subject site is situated at the north-west corner of Neerabup Road and Key Largo Drive, as shown in Figure 1. It is proposed to develop the site into a commercial development with fast food and fuel station with convenience store.

The aim of this Transport Impact Assessment (TIA) is to assess the impact of the proposal on the existing transport network. The TIA was prepared in accordance with the WAPC *Transport Assessment Guidelines* 2016.



Figure 1: Subject site

2 Existing situation

2.1 Existing site use, access and parking

The subject site is presently vacant with no vehicle access or parking. The subdivision approval for the subject site was granted in May 2023 and is subject to the following two conditions related to vehicular access:

4. Pursuant to Section 150 of the *Planning and Development Act 2005* and Division 3 of the *Planning and Development Regulations 2009* a covenant preventing vehicular access onto Neerabup Road and Key Largo Drive being lodged on the certificate(s) of title of the proposed lot(s) at the full expense of the landowner/applicant. The covenant is to prevent access, to the benefit of City of Wanneroo, in accordance with the Condition plan dated 20 January 2023 (attached) and the covenant is to specify:

"No vehicular access is permitted to and from (as applicable) Neerabup Road and Key Largo Drive." (Local Government)

5. Pursuant to Section 150 of the *Planning and Development Act 2005* and Division 3 of the *Planning and Development Regulations 2009* a covenant preventing vehicular access onto Marmion Avenue and Neerabup Road being lodged on the certificate(s) of title of the proposed lot(s) at the full expense of the landowner/applicant. The covenant is to prevent access, to the benefit of Main Roads Western Australia, in accordance with the Condition plan dated 20 January 2023 (attached) and the covenant is to specify:

"No vehicular access is permitted to and from (as applicable) Marmion Avenue and Neerabup Road." (Main Roads Western Australia)

The associated access restriction plan is included for reference in Appendix A. This plan is stamped 20 January 2023 and indicates that no driveway access should be provided on Key Largo Drive within 31m of the intersection truncation with Neerabup Road.

The City has indicated that it will consider amendment of the condition plan for a driveway to be located closer to Neerabup Road, if supporting technical justification is provided.



The site is surrounded by a mix of residential and commercial land uses, refer to Figure 2 for a context plan showing surrounding land use. Ocean Keys Shopping Centre is located to the north and Woolworths is located to the west.

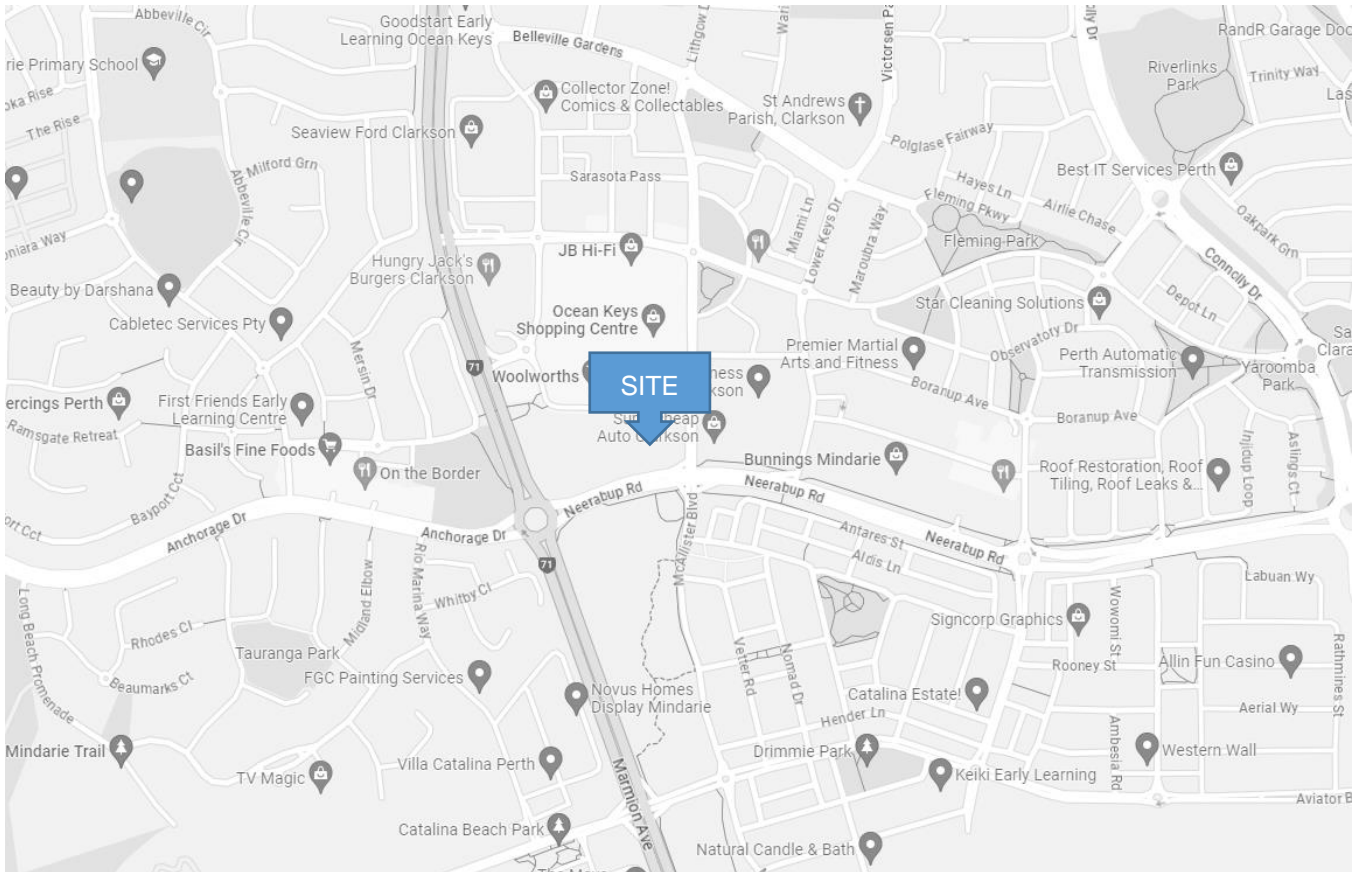


Figure 2: Location context plan

2.2 Surrounding road network and traffic management on roads

Information from online mapping services, Main Roads WA, Local Government, and site visits was collected to assess the existing traffic management on frontage roads.

2.2.1 Neerabup Road

Neerabup Road near the subject site is an approximately 23m wide, four-lane dual carriageway road. It features a wide, kerbed and landscaped median with lighting and tree planting. A path for walking and cycling and on-street cycling lanes are provided on both sides of the road. It is classified as a *Distributor A* road in the Main Roads WA road hierarchy (Figure 4) and currently operates under a posted speed limit of 70km/h (Figure 5). *Distributor A* roads are normally the responsibility of Local Government. They are predominantly for high-capacity movements between industrial, commercial and residential areas (Figure 6).

Neerabup Road is designated as an Other Regional Road (Blue road) in the Metropolitan Region Scheme (MRS) (Figure 3).



Figure 3: Metropolitan Region Scheme zoning plan

2.2.2 Key Largo Drive

Key Largo Drive near the subject site is an approximately 12m wide, two-lane road. A kerbed raised median island is provided with breaks at selected intersections. Footpaths and on-street cycling lanes are provided on both sides of the road. It is classified as a *Local Distributor* road in the Main Roads WA road hierarchy (Figure 4) and currently operates under a default speed limit of 50km/h (Figure 5). *Local Distributor* roads are normally the responsibility of Local Government. They are predominantly for the movement of traffic within local areas and to connect access roads to higher order distributors (Figure 6).



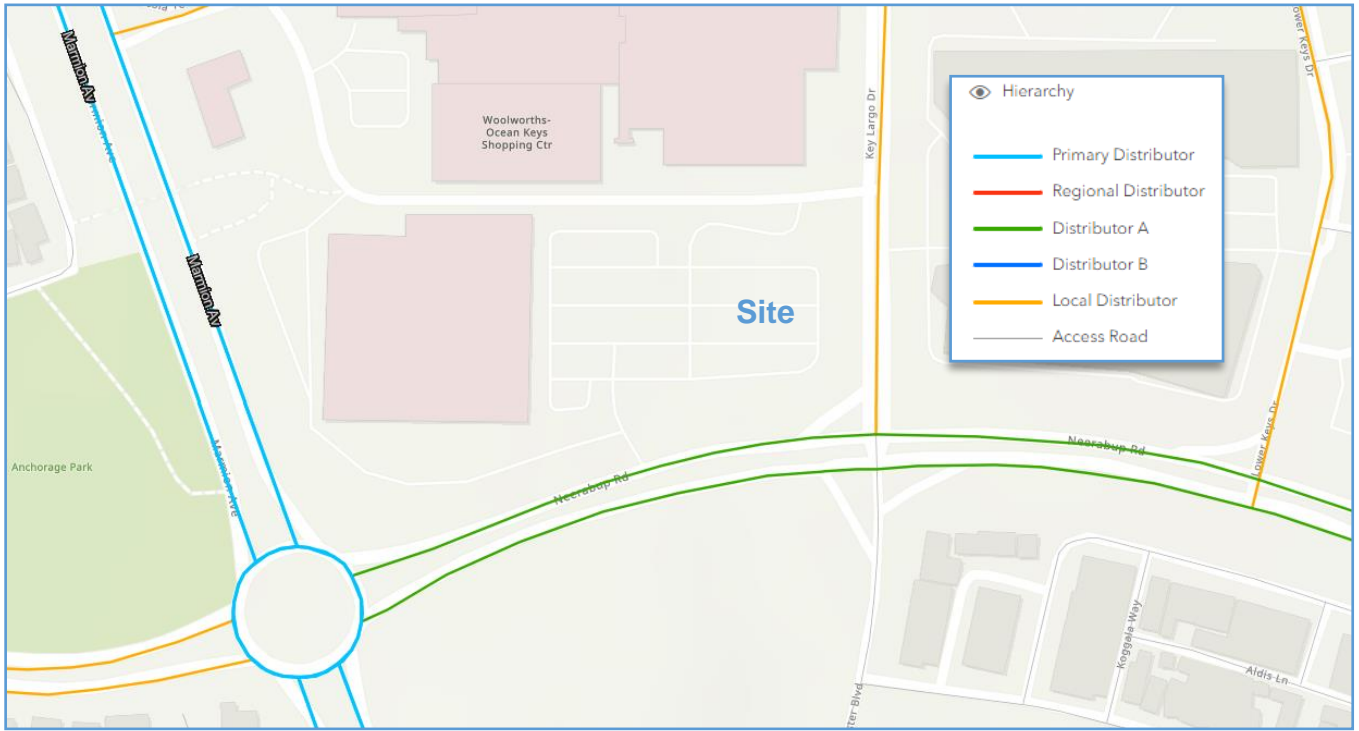


Figure 4: Main Roads WA road hierarchy plan

Source: Main Roads WA Road Information Mapping System (RIM)

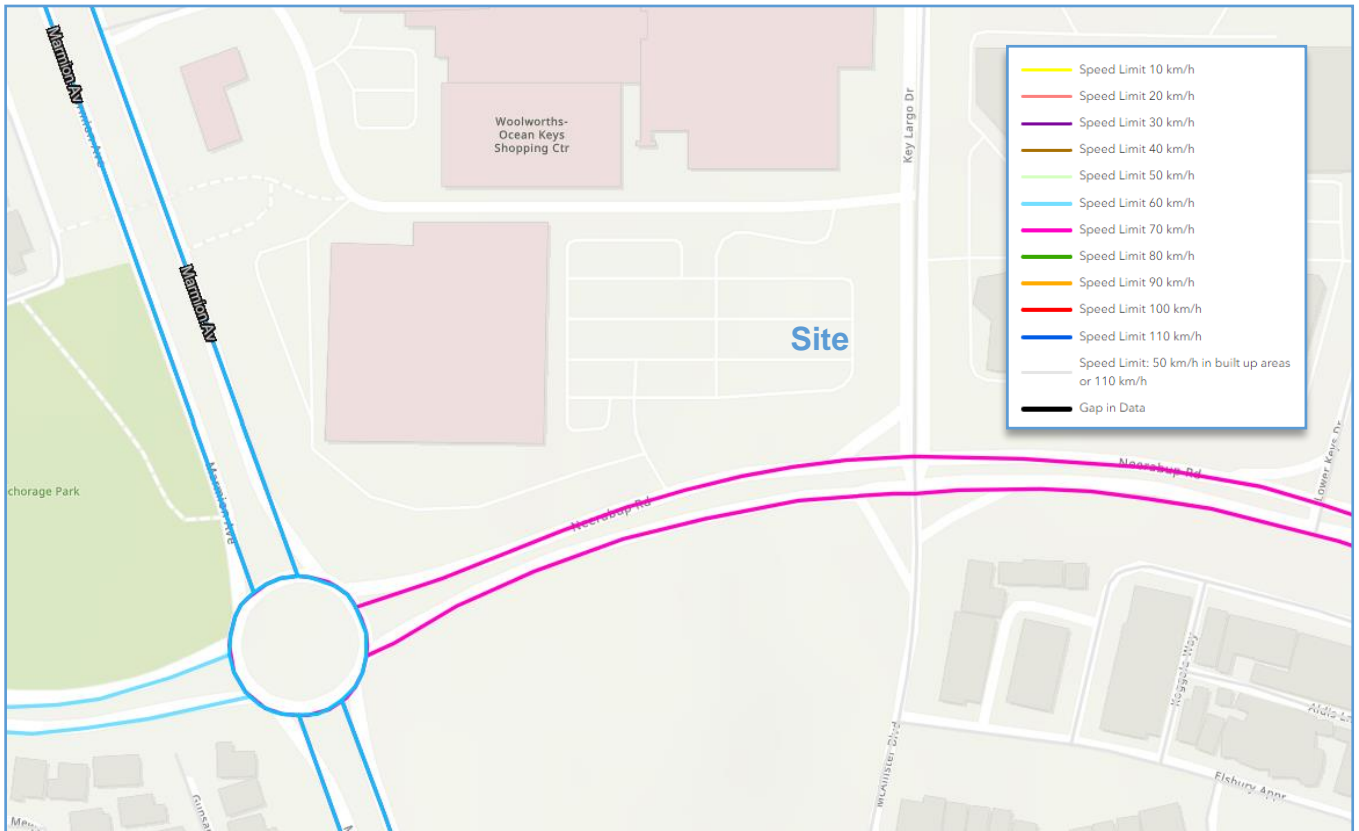


Figure 5: Main Roads WA road speed zoning plan

Source: Main Roads WA Road Information Mapping System (RIM)

**ROAD HIERARCHY FOR WESTERN AUSTRALIA
ROAD TYPES AND CRITERIA (see Note 1)**

CRITERIA	PRIMARY DISTRIBUTOR (PD) (see Note 2)	DISTRICT DISTRIBUTOR A (DA)	DISTRICT DISTRIBUTOR B (DB)	REGIONAL DISTRIBUTOR (RD)	LOCAL DISTRIBUTOR (LD)	ACCESS ROAD (A)
<i>Primary Criteria</i>						
1. Location (see Note 3)	All of WA incl. BUA	Only Built Up Area.	Only Built Up Area.	Only Non Built Up Area. (see Note 4)	All of WA incl. BUA	All of WA incl. BUA
2. Responsibility	Main Roads Western Australia.	Local Government.	Local Government.	Local Government.	Local Government.	Local Government.
3. Degree of Connectivity	High. Connects to other Primary and Distributor roads.	High. Connects to Primary and/or other Distributor roads.	High. Connects to Primary and/or other Distributor roads.	High. Connects to Primary and/or other Distributor roads.	Medium. Minor Network Role Connects to Distributors and Access Roads.	Low. Provides mainly for property access.
4. Predominant Purpose	Movement of inter regional and/or cross town/city traffic, e.g. freeways, highways and main roads.	High capacity traffic movements between industrial, commercial and residential areas.	Reduced capacity but high traffic volumes travelling between industrial, commercial and residential areas.	Roads linking significant destinations and designed for efficient movement of people and goods between and within regions.	Movement of traffic within local areas and connect access roads to higher order Distributors.	Provision of vehicle access to abutting properties
<i>Secondary Criteria</i>						
5. Indicative Traffic Volume (AADT)	In accordance with Classification Assessment Guidelines.	Above 8 000 vpd	Above 6 000 vpd.	Greater than 100 vpd	Built Up Area - Maximum desirable volume 6 000 vpd. Non Built Up Area – up to 100 vpd.	Built Up Area - Maximum desirable volume 3 000 vpd. Non Built Up Area – up to 75 vpd.
6. Recommended Operating Speed	60 – 110 km/h (depending on design characteristics).	60 – 80 km/h.	60 – 70 km/h.	50 – 110 km/h (depending on design characteristics).	Built Up Area 50 - 60 km/h (desired speed) Non Built Up Area 60 – 110 km/h (depending on design characteristics).	Built Up Area 50 km/h (desired speed). Non Built Up Area 50 – 110 km/h (depending on design characteristics).
7. Heavy Vehicles permitted	Yes.	Yes.	Yes.	Yes.	Yes, but preferably only to service properties.	Only to service properties.
8. Intersection treatments	Controlled with appropriate measures e.g. high speed traffic management, signing, line marking, grade separation.	Controlled with appropriate measures e.g. traffic signals.	Controlled with appropriate Local Area Traffic Management.	Controlled with measures such as signing and line marking of intersections.	Controlled with minor Local Area Traffic Management or measures such as signing.	Self controlling with minor measures.
9. Frontage Access	None on Controlled Access Roads. On other routes, preferably none, but limited access is acceptable to service individual properties.	Prefer not to have residential access. Limited commercial access, generally via service roads.	Residential and commercial access due to its historic status. Prefer to limit when and where possible.	Prefer not to have property access. Limited commercial access, generally via lesser roads.	Yes, for property and commercial access due to its historic status. Prefer to limit whenever possible. Side entry is preferred.	Yes.
10. Pedestrians	Preferably none. Crossing should be controlled where possible.	With positive measures for control and safety e.g. pedestrian signals.	With appropriate measures for control and safety e.g. median/islands refuges.	Measures for control and safety such as careful siting of school bus stops and rest areas.	Yes, with minor safety measures where necessary.	Yes.
11. Buses	Yes.	Yes.	Yes.	Yes.	Yes.	If necessary (see Note 5)
12. On-Road Parking	No (emergency parking on shoulders only).	Generally no. Clearways where necessary.	Not preferred. Clearways where necessary.	No – emergency parking on shoulders – encourage parking in off road rest areas where possible.	Built Up Area – yes, where sufficient width and sight distance allow safe passing. Non Built Up Area – no. Emergency parking on shoulders.	Yes, where sufficient width and sight distance allow safe passing.
13. Signs & Linemarking	Centrelines, speed signs, guide and service signs to highway standard.	Centrelines, speed signs, guide and service signs.	Centrelines, speed signs, guide and service signs.	Centrelines, speed signs and guide signs.	Speed and guide signs.	Urban areas – generally not applicable. Rural areas - Guide signs.
14. Rest Areas/Parking Bays	In accordance with Main Roads' Roadside Stopping Places Policy.	Not Applicable.	Not Applicable.	Parking Bays/Rest Areas. Desired at 60km spacing.	Not Applicable.	Not Applicable.

Figure 6: Road types and criteria for Western Australia

Source: Main Roads Western Australia D10#10992



As detailed in Figure 7, there is a full-movement T-intersection provided at the north-east corner of the site, connecting the internal E-W shopping centre access road with Key Largo Drive. Another T-intersection access is located at the northern end of the site, which currently leads into the Woolworths car park. There is an access easement at this location which permits vehicle access into the subject site.

To the south, there is a left-in/left-out access into the Woolworths car park from Neerabup Road. Neerabup Road and Key Largo Drive form a four-way signalised intersection with McAllister Boulevard to the south.

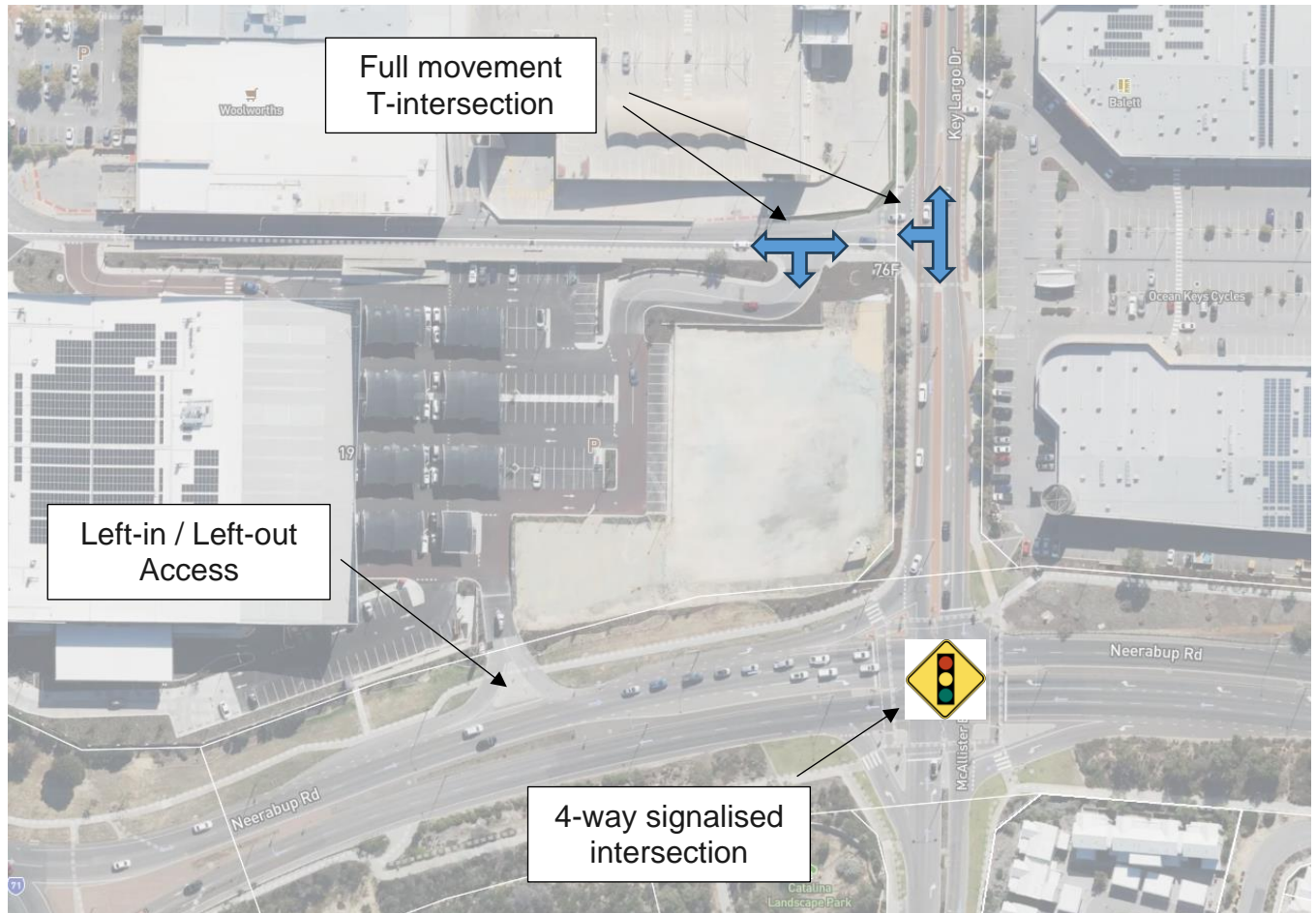


Figure 7: Key local intersections

2.3 Existing traffic volumes on roads and major intersections

SCATS traffic volume data was obtained from Main Roads WA for the signalised intersection of Neerabup Road / Key Largo Drive. The reviewed intersection data indicates that the weekday PM peak hour occurs from 3:00pm to 4:00pm. The weekend peak hour occurs from 12:00pm to 1:00pm (Figure 8).

Traffic Signal Vehicle Counts				
Traffic Signal	LM01076			
From	19/06/2023			
To	25/06/2023			
Day	Date	Peak Period	Peak Hour	All
Monday	19/06/2023	AM	08:00	1854
Monday	19/06/2023	PM	15:00	2015
Tuesday	20/06/2023	AM	08:00	1758
Tuesday	20/06/2023	PM	16:00	2085
Thursday	22/06/2023	AM	07:45	1844
Thursday	22/06/2023	PM	15:15	2091
Friday	23/06/2023	AM	08:00	1736
Friday	23/06/2023	PM	15:00	2088
Saturday	24/06/2023	AM	11:45	2115
Saturday	24/06/2023	PM	12:00	2126
Sunday	25/06/2023	AM	11:30	2039
Sunday	25/06/2023	PM	12:00	2070

Figure 8: SCATS data summary - Neerabup Road / Key Largo Drive

To establish existing base traffic flows on the surrounding road network and nearby intersections, Urbii undertook a drone video survey of turning movements and queuing at the key intersections in the study area.

The drone traffic count survey was undertaken on Friday 15 September 2023 between 3:00pm to 4:00pm and Saturday 16 September 2023 between 12:00pm and 1:00pm.

Data from various sources was then combined to prepare turning movements at various intersections:

- SCATS traffic signal data was collected for Neerabup Road / Key Largo Drive / McAllister Boulevard (MRWA, June 2023).
- Traffic counts extracted from aerial drone surveys (Urbii September 2023).

SCATS counts at the traffic signals were higher than Urbii counts in September 2023 for traffic on Key Largo Drive. The SCATS counts for turning movements in and out of Key Largo Drive were adjusted to match the observed drone survey counts. The base peak hour traffic flows derived for analysis are detailed in Appendix C.

2.4 Existing operation of surrounding intersections

The operation of existing intersections is documented in Section 7.6 of this report.

2.5 Heavy vehicles

Key Largo Drive near the subject site forms part of RAV Network 1 which permits 19m semi-trailers to travel on these roads under general access, or “as of right” status. General access vehicles may operate state-wide provided they are:

- not a road train or b-double;
- within regulation axle mass limits;
- 19 metres or less in combination length (or a maximum 12.5 metres for rigid vehicles);
- total combination mass less than 42.5 tonnes;
- width less than 2.5 metres (excluding mirrors and lights); and
- height less than 4.3 metres.

2.6 Public transport access

Information was collected from Transperth and the Public Transport Authority to assess the existing public transport access to and from the site.

The subject site has access to the following nearby bus services, detailed in Table 1:

Table 1: Existing bus services

Service	Route
474	Joondalup - Clarkson via Kinross (Figure 10)
480	Clarkson Stn - Butler Stn via Marmion Av (Figure 11)
481	Clarkson Stn - Quinns Rocks via Mindarie (Figure 11)
482	Clarkson Stn - Butler Stn via Marmion Av & Santa Barbara Pde (Figure 11)

Bus services provide a viable alternative mode of transport for staff and visitors of the proposed development. Bus stops are accessible on Ocean Keys Boulevard, within 500m walking distance of the subject site (Figure 9).

Bus services provide excellent coverage and connectivity to the rail network.





Figure 9: Walking route to bus stops

Route 470, 471, 473, 474 Map



Figure 10: Transperth bus route 474 map

Source: Transperth

Route 480, 481, 482 Map

Route 482 is operating on a temporary alignment north of Barquentine Av, while awaiting completion of the road network in that area. Roundhouse Pde is unlikely to be directly served in the future once Barquentine Av extends further north.



Figure 11: Transperth bus routes 480, 481, 482 map

Source: Transperth

2.7 Pedestrian access

Information from online mapping services, Main Roads WA, Local Government, and site visits was collected to assess the pedestrian access for the proposed development.

Footpaths are provided on both sides of Neerabup Road and Key Largo Drive adjacent to the subject site. Signalised walk crossings are integrated into the four-way signalised intersection at the south-east corner of the site.

Kerb ramps with median refuge islands are provided at local intersection crossings, which promotes improved access for bicycles, wheelchairs and prams.

2.8 Bicycle access

Information from online mapping services, Department of Transport, Local Government, and/or site visits was collected to assess bicycle access for the proposed development.

The Department of Transport Perth Bicycle Network Map (see Figure 12) shows the existing cycling connectivity to the subject site. Shared paths and on-street cycling lanes are provided on Neerabup Road and Key Largo Drive, which connect to the broader cycling network.

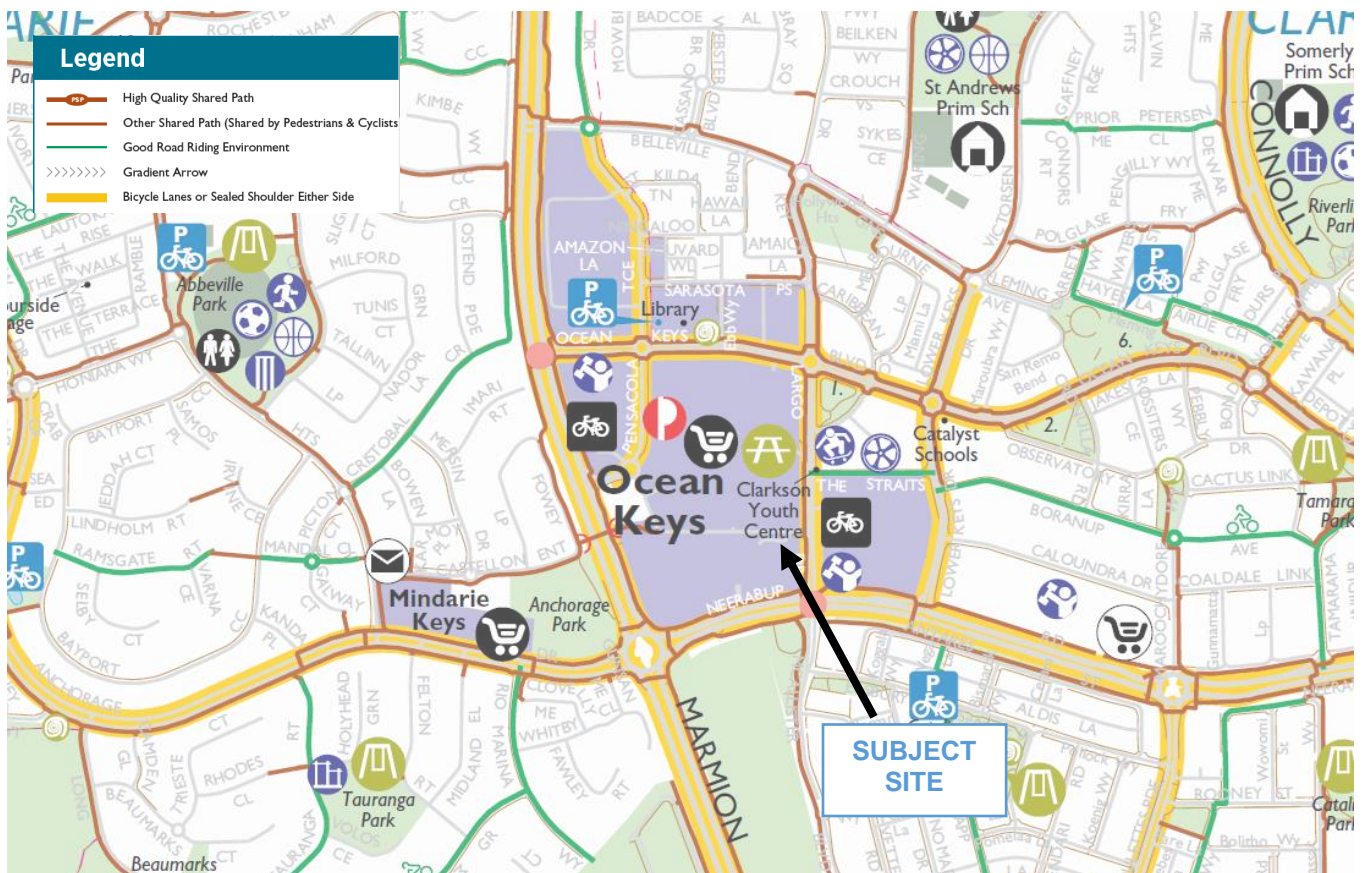


Figure 12: Perth bicycle network plan

2.9 Crash data and safety

The five-year crash history in the vicinity of the site was obtained from Main Roads WA. As detailed in Table 2, 36 crashes were recorded in the locality. The crash map is presented in Figure 13. The majority of crashes were recorded at the signalised intersection of Neerabup Road and Key Largo Drive.

Most crashes were property damage only in severity. The crash data is summarised in Table 2.



Figure 13: 5-year crash map in the locality (2018-2022)

Source: MRWA crash mapping tool.

Table 2: 5-year crash history in the locality (2018-2022)

Severity	No.	%
Fatal	0	0
Hospital	5	13.89
Medical	5	13.89
PDO Major	23	63.89
PDO Minor	3	8.33

Year	No.	%
2018	8	22.22
2019	17	47.22
2020	6	16.67
2022	5	13.89

Nature	No.	%
Head On	0	0
Hit Animal	0	0
Hit Object	0	0
Hit Pedestrian	0	0
Non Collision	0	0
Not Known	0	0
Rear End	6	16.67
Right Angle	8	22.22
Right Turn Thru	21	58.33
Sideswipe Opposite Dirn	0	0
Sideswipe Same Dirn	1	2.78

Light	No.	%
Dark - Street Lights Not Provided	0	0
Dark - Street Lights Off	0	0
Dark - Street Lights On	5	13.89
Dawn Or Dusk	2	5.56
Daylight	27	75.00
Not Known	0	0
Other / Unknown	2	5.56

Conditions	No.	%
Dry	31	86.11
Not Known	0	0
Other / Unknown	1	2.78
Wet	4	11.11

Alignment	No.	%
Curve	4	11.11
Not Known	0	0
Other / Unknown	3	8.33
Straight	29	80.56

Total	No.	%
Total	36	



3 Development proposal

The proposal for the subject site is for a fast-food and service station development, comprising:

- A fast-food restaurant (220m² GFA) with drive through capacity for 13 vehicles plus a waiting bay;
- A convenience store (215m² GFA) and fuel canopy with six fuelling spaces;
- A total of 22 car parking bays shared onsite, including 2 x ACROD bays;
- The fast-food features two order taking points (dual drive through lanes) which then merge downstream for payment and food pick-up;
- A separate delivery and waste collection (loading) bays provided for the convenience store and fast food; and,
- Six bicycle rails which can potentially park up to 12 bicycles (double-sided).

Vehicle access to the site is proposed via one new left-in/left-out crossover on Key Largo Drive and one crossover to the access easement at the northern end of the site, which is shared with Woolworths.

Waste will be collected internally via private waste collection service.

People walking and cycling will access the development from the external footpath network adjacent to the site.

The proposed development plans are included for reference in Appendix B.

4 Vehicle access

The proposed vehicular access arrangements have been reviewed for efficient and safe traffic circulation.

The proposed access arrangements are summarised in Figure 14. Vehicle access to the site is proposed via one new left-in/left-out crossover on Key Largo Drive and one crossover to the access easement at the northern end of the site, which is shared with Woolworths.

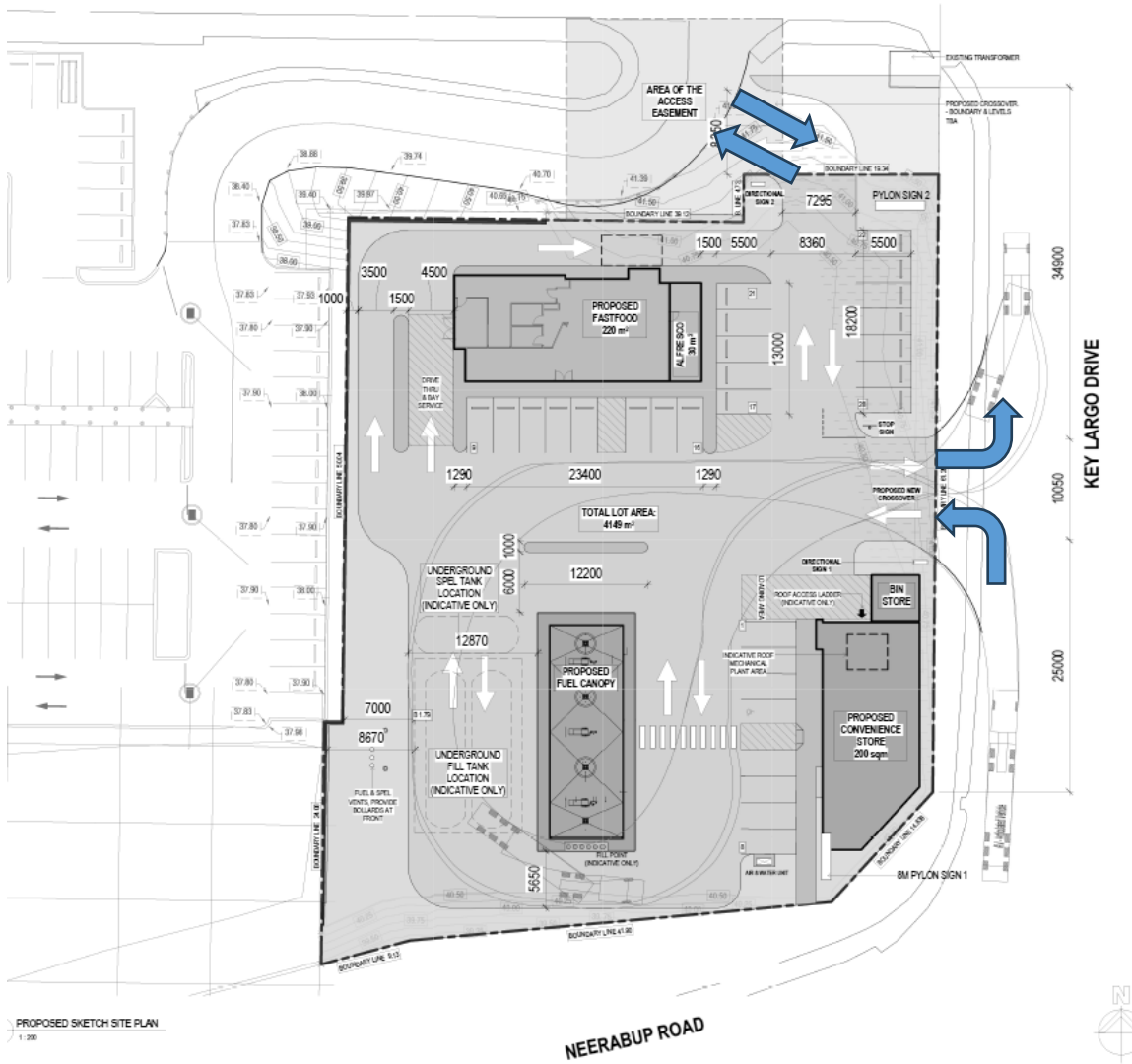


Figure 14: Proposed vehicle access

4.1 Key Largo Dr crossover location assessment

The following extract from the Main Roads WA Driveway Policy was referenced to assess the proximity of the proposed Key Largo Drive crossover to the signalised intersection to the south:

“Functional Area of an Intersection - The functional area of an intersection is the area beyond the physical intersection of two roads that comprises decision and manoeuvre distances on the approaches and departures, plus any required vehicle storage length. Wherever possible, this area should be protected from interference by traffic from accesses. The upstream functional area is that length over which vehicles on the through road are manoeuvring to execute a right or left-turn at the intersecting road. This length is the greater of the distance required for the right or left turn, including storage or the queue length. The downstream distance is that required for a driver to avoid a collision with a vehicle entering the road from an access connection.

Refer to Austroads GTRD Part 4 Intersections and Crossings - General Section 7.2”

Austroads GTRD Part 4 Intersections and Crossings states that Stopping Sight Distance is the method to assess the downstream functional area of an intersection.

For a speed of 50km/h the absolute minimum Stopping Sight Distance (SSD) is 49m (Table 3). As demonstrated in Figure 15, the location of the site exit is 51m away from the traffic light, which exceeds the minimum requirement. Therefore, the distance to the crossover from the signalised intersection is acceptable.

Table 3: Stopping sight distances for cars on sealed roads

Design speed (km/h)	Absolute minimum values Only for specific road types and situations ⁽¹⁾ based on $d = 0.46^{(2),(3)}$			Desirable minimum values for all road types based on $d = 0.36$			Values for major highways and freeways in flat terrain ⁽⁷⁾ based on $d = 0.26$	
	$R_T = 1.5 \text{ s}^{(4)}$	$R_T = 2.0 \text{ s}^{(4)}$	$R_T = 2.5 \text{ s}$	$R_T = 1.5 \text{ s}^{(4)}$	$R_T = 2.0 \text{ s}^{(4)}$	$R_T = 2.5 \text{ s}$	$R_T = 2.0 \text{ s}$	$R_T = 2.5 \text{ s}$
40	30	36	–	34	40	45	–	–
50	42	49	–	48	55	62	–	–
60	56	64	–	64	73	81	–	–
70	71	81	–	83	92	102	113	123
80	88	99	–	103	114	126	141	152
90	107	119	132	126	139	151	173	185
100	–	141	155	–	165	179	207	221
110	–	165	180	–	193	209	244	260
120	–	190	207	–	224	241	285	301
130	–	217	235	–	257	275	328	346

For reference, the distance from the property boundary truncation at the signalised intersection, to the southern kerb line of the crossover is 25m (excluding the entry radius provided for truck movements).

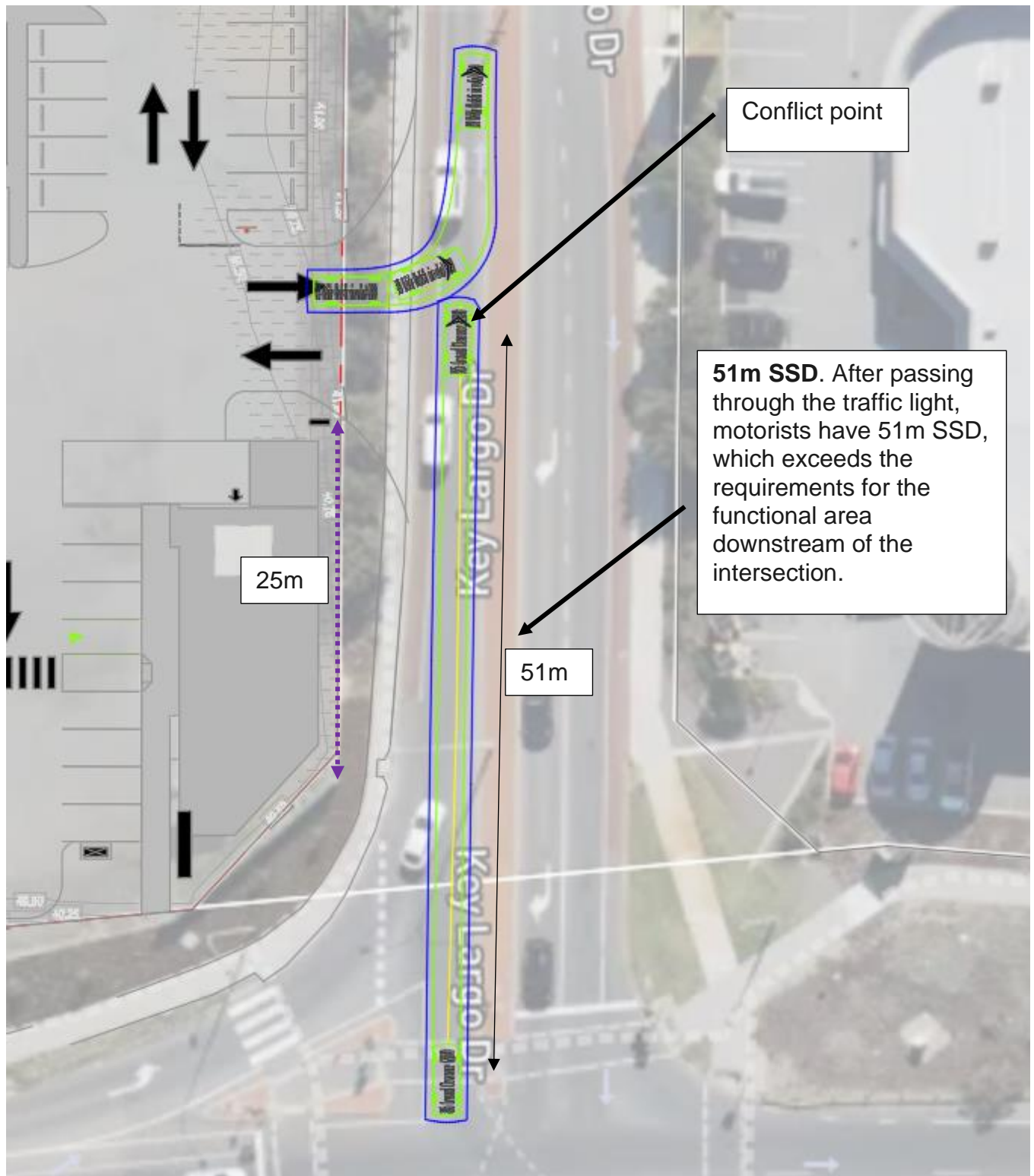


Figure 15: Safe Stopping Distance to Key Largo Drive crossover

The location of the crossover is consistent with traffic advice provided by Riley Consulting for the broader subdivision in 2022. Refer to Figure 16.

The City of Wanneroo requested that an assessment of sightlines for vehicles turning left from Neerabup Road into Key Largo Drive be also undertaken. This assessment has been completed and is documented in a separate technical note: *U23.119.r02 - Cnr Neerabup Rd & Key Largo Dr, Clarkson - Driveway Technical Note*.

The technical note concluded that the location of the development driveway with respect to the left turn movement from Neerabup Road to Key Largo Drive is satisfactory.



Figure 16: Recommended access location at subdivision planning stage

Source: Riley Consulting, 2022

5 Changes to surrounding transport networks

Information from relevant planning documents, Main Roads WA, Department of Transport and / or information provided by the Local Government Authority, has been reviewed for planned changes to the surrounding transport network.

Based on public information available to Urbii, there are limited changes to the local transport network expected in the next ten years.



6 Integration with surrounding area

The proposed land uses and access arrangements are consistent with planning for the area and integrate well with the existing transport network.

7 Traffic assessment

7.1 Assessment period

Two time periods are considered in the traffic assessment:

- Weekday PM peak hour: 3:00pm to 4:00pm.
- Weekend midday peak hour: 12:00pm to 1:00pm.

The analysis was undertaken for the following scenarios:

- Existing situation (without proposed development traffic).
- 2036 (without development traffic).
- 2036 (with development traffic included).

7.2 Existing traffic flows

To establish existing base traffic flows on the surrounding road network and nearby intersections, Urbii undertook a drone video survey of turning movements and queuing at the key intersections in the study area.

The drone traffic count survey was undertaken on Friday 15 September 2023 between 3:00pm to 4:00pm and Saturday 16 September 2023 between 12:00pm and 1:00pm. The base peak hour traffic flows derived for analysis are detailed in Appendix C.

7.3 Traffic generation

The traffic volume that will be generated by the proposed development has been estimated using trip generation rates derived with reference to the following sources:

- Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition.

The trip generation rates adopted are detailed in Table 4.

Table 4: Adopted trip rates for traffic generation

Land use	Trip rate source	Daily rate	Weekday Peak Hour	Weekend Peak Hour	IN	OUT
Fast-Food Restaurant	ITE (934)	507 trips per 100m ²	35 trips per 100m ²	59 trips per 100m ²	50%	50%
Fuel Station and Convenience Store	ITE (945)	205.36 trips per fuelling position	13.99 trips per fuelling position	19.28 trips per fuelling position	50%	50%

Note: Fast Food trip rate converted from 1000sqft to 100m²

The ITE trip Generation Handbook quotes an average passing trade percentage of 50% for fast food land uses and 56% for fuel station with convenience store uses. This TIA adopts a flat passing trade rate of 50% for the entire development.



The estimated traffic generation of the proposed development is detailed in Table 5. The proposed development is estimated to generate a total of 2,500 vehicles per day (vpd), 172 vehicles in the weekday peak hour and 264 vehicles in the weekend peak hour. The net increase in traffic is **+1,250vpd**, **+86vph** (weekday) and **+132vph** (weekend). The traffic generation rounds the fast food floor area up to 250m², to be conservative.

These trips include both inbound and outbound vehicle movements. It is anticipated that most of the vehicle types would be small passenger cars and compact SUVs.

Table 5: Daily and peak hour traffic generation

Fast Food Trips	GFA (m ²)	Daily Trips	Weekday Peak	Weekend Peak	WD Peak		WE Peak	
					IN	OUT	IN	OUT
Combined Trips	250	1268	88	148	44	44	74	74
Primary Trips (50%)		634	44	74	22	22	37	37
Passing Trade (50%)		634	44	74	22	22	37	37

Fuel Station Trips	Fuelling Positions	Daily Trips	Weekday Peak	Weekend Peak	WD Peak		WE Peak	
					IN	OUT	IN	OUT
Combined Trips	6	1232	84	116	42	42	58	58
Primary Trips (50%)		616	42	58	21	21	29	29
Passing Trade (50%)		616	42	58	21	21	29	29

Total Trips		Daily Trips	Weekday Peak	Weekend Peak	WD Peak		WE Peak	
					IN	OUT	IN	OUT
Total Trips		2500	172	264	86	86	132	132
Primary Trips (50%)		1250	86	132	43	43	66	66
Passing Trade (50%)		1250	86	132	43	43	66	66

The following technical advice is provided from the ITE Trip Generation Handbook:

“A key characteristic of a mixed-use development is that trips between the various land uses can be made on site and these internal trips do not utilise the major street system. In some mixed-use developments, these internal trips can be made either by walking or by vehicles using internal roadways without using external streets. An internal capture rate can generally be defined as the percentage of total person trips generated by a site that are made entirely within the site. The trip origin, destination, and travel path are all within the site. The trip reduction for internally captured trips is separate from the reduction for pass-by trips. These are two distinct components of trip-making behaviour, and both could be applicable for a proposed development. The internal trips, if present, should be subtracted before pass-by trip reductions are applied.”

The traffic analysis is conservative as no effect of cross-trade and internal trip capture has been applied for the development.

7.4 Trip distribution and assignment

80% and 20% of passing trade traffic was diverted from northbound and southbound traffic on Key Largo Drive respectively.

The distribution of primary trips was assumed with reference to existing turning movements at nearby intersections and with consideration of existing fuel station locations. As detailed in Figure 17, there are many fuel station options to the south, which will be accessible to people living to the south. Similarly, there are closer alternative options for people north of Hester Avenue. It is expected that the north-east residential catchment will be a significant producer of primary trips to the development. 10% of primary trips were distributed to and from the adjoining Woolworths Car Park and are a form of cross trade with the adjoining site.

The assumed trip distribution and assignment of trips is detailed in the traffic volume diagrams in Appendix C.



Figure 17: Existing fuel station locations near the subject site catchment

Source: Google Maps



7.5 10-year post development forecasting

Forecasting background traffic volumes for the 10 year post development scenario is a complex exercise. Transport demand forecasting is shifting from fixed forecasts to ‘scenario modelling.’ Scenario modelling recognises that there are multiple known and unknown disrupters to transport behaviour in the coming years, for example:

- Increased work from home activity;
- Increased popularity of micromobility devices such as e-scooters;
- Increased provision of public transport such as light rail and trackless trams;
- Electric Vehicles;
- Autonomous Vehicles; and,
- Government Net Zero emission targets.

For simplicity, this transport assessment assumes that traffic on Neerabup Road and Key Largo Drive will increase at the same rate as population forecasts for the overall City of Wanneroo. As shown in Figure 18, City of Wanneroo forecasts an average annual growth rate of 2.69%.

City of Wanneroo	Forecast year					Change between 2021 and 2041	
	2021 ↕	2026 ↕	2031 ↕	2036 ↕	2041 ↕	Total change ↕	Avg. annual % change ↕
City of Wanneroo	216,435	243,874	285,372	326,532	367,775	+151,340	+2.69
Alexander Heights	8,035	7,698	7,545	7,493	7,492	-543	-0.35
Alkimos	10,523	15,779	21,745	27,946	32,321	+21,798	+5.77
Ashby - Sinagra	6,136	7,632	8,908	9,760	10,583	+4,447	+2.76
Banksia Grove	11,790	12,478	13,303	13,288	13,004	+1,214	+0.49
Butler	14,037	15,072	16,377	16,999	16,712	+2,675	+0.88
Carramar	7,427	8,105	8,198	7,997	7,892	+465	+0.30
Clarkson	14,407	14,457	16,027	17,753	18,127	+3,720	+1.15
Darch	7,590	7,586	7,660	7,510	7,359	-231	-0.15
Eglinton	3,848	9,185	16,598	23,835	30,711	+26,863	+10.94
Girrawheen	9,227	9,315	9,180	9,074	8,998	-229	-0.13

Figure 18: Population forecasts for City of Wanneroo

7.6 Analysis of intersections and development access

Reference was made to Austroads guidelines to help identify which modelled intersections should be further assessed in SIDRA. The traffic volume thresholds adopted for further analysis are set out in Figure 19. The development crossover to the internal car park and shared easement T-intersection at the north-west corner of the site are expected to function at a high level of service A. No SIDRA analysis is required for these access points, as they fall below the thresholds in Figure 19.

Major road type ¹	Major road flow (vph) ²	Minor road flow (vph) ³
Two-lane	400	250
	500	200
	650	100
Four-lane	1000	100
	1500	50
	2000	25

Notes:



1. Major road is through road (i.e. has priority).
2. Major road flow includes all major road traffic with priority over minor road traffic.
3. Minor road design volumes include through and turning volumes.

Figure 19: Austroads guidance on the assessment of intersections

Capacity analysis of intersections along Key Largo Drive was undertaken using the SIDRA 9 computer software package. SIDRA 9 is an intersection modelling tool commonly used by traffic engineers for all types of intersections.

A network model was developed with multiple connected intersections. The same network was assumed for existing and post development analysis. The network sites are listed in Table 6. An image of the model network is shown in Figure 20.

Table 6: SIDRA network sites

SITES IN NETWORK		
Site ID	CCG ID	Site Name
 101	NA	1 - Neerabup Rd / Key Largo Dr / McAllister Blvd
 102	NA	2 - Site Crossover / Key Largo Dr
 103	NA	3 - Shopping Centre Access / Key Largo Dr

Signal phasing was based on SCATS data. The operation of the existing traffic signals was checked against observations captured via the aerial drone survey. The SIDRA outputs were checked and matched the observed characteristics on the surrounding network.

The same network model was used for all scenarios with only traffic volumes being changed, for fair and consistent comparison of outputs. A summary of the analysis results is presented in Table 7.

Overall, the SIDRA results indicate that the proposed development will have minimal impact on the road network.

The signalised intersection operates at an overall level of service D during the weekday PM peak hour by 2036. This is due to background traffic growth and the same level of service is reported with and without the development.

Detailed SIDRA outputs for each intersection are provided in Appendix D.

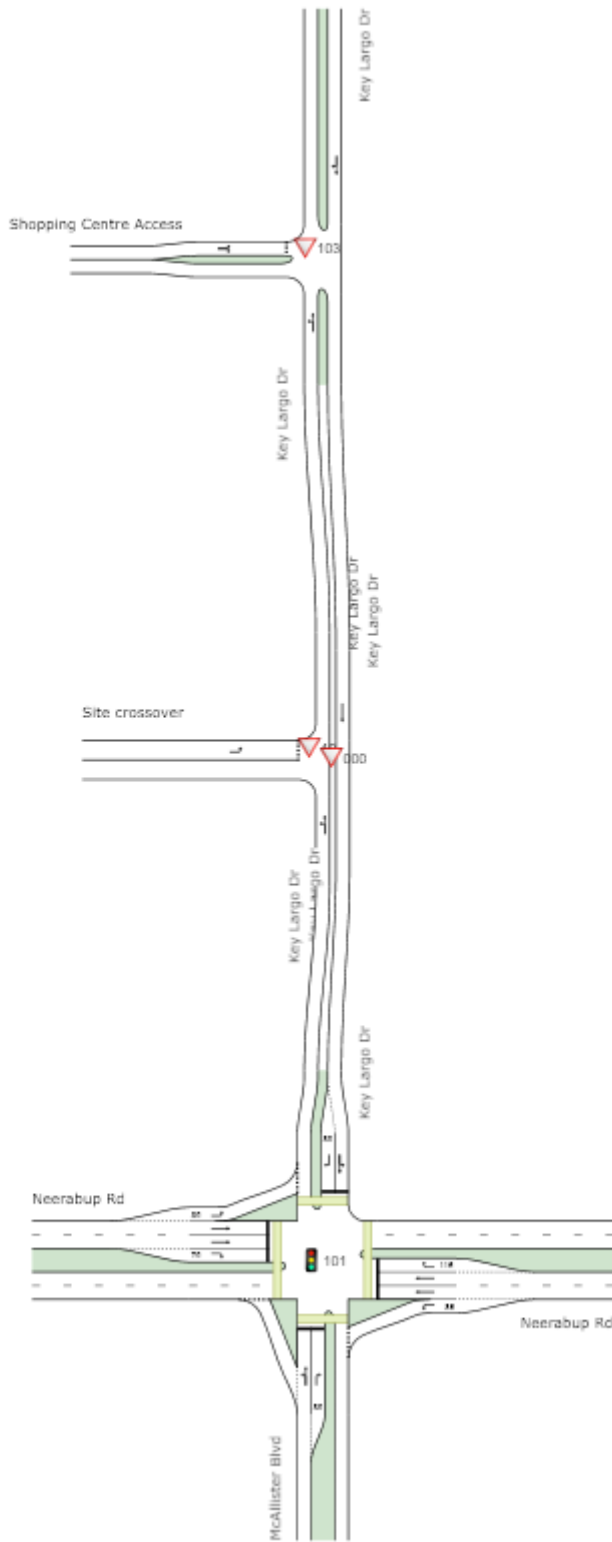


Figure 20: SIDRA network model



Table 7: Summary of SIDRA analysis results

Site 101 - Neerabup Rd / Key Largo Dr / McAllister Blvd - Traffic Signals				
Scenario	v/c	Ave Delay (sec)	LoS	95% Queue (m)
2023 WD Peak	0.827	28.5	C	87.5
2036 WD Peak (without development)	0.968	46.3	D	212.2
2036 WD Peak (with development)	1.009	53.6	D	244.3
2023 WE Peak	0.854	26.3	C	75.2
2036 WE Peak (without development)	0.926	37	D	164
2036 WE Peak (with development)	0.926	37.1	D	164

Site 102 - Site Crossover / Key Largo Dr				
Scenario	v/c	Ave Delay (sec)	LoS	95% Queue (m)
2023 WD Peak				
2036 WD Peak (without development)				
2036 WD Peak (with development)	0.358	0.5	A	2.1
2023 WE Peak				
2036 WE Peak (without development)				
2036 WE Peak (with development)	0.305	0.7	A	2.8

Site 103 - Shopping Centre Access / Key Largo Dr				
Scenario	v/c	Ave Delay (sec)	RT Out LoS	95% Queue (m)
2023 WD Peak	0.274	3	A	8
2036 WD Peak (without development)	0.42	3.3	C	13.7
2036 WD Peak (with development)	0.513	4.2	C	17.9
2023 WE Peak	0.246	3.4	A	7
2036 WE Peak (without development)	0.335	3.4	B	10.7
2036 WE Peak (with development)	0.442	4.4	B	15.7

7.7 Impact on neighbouring areas

The traffic generated by the proposed development is not expected to significantly affect surrounding areas and the proposed land uses are in line with planning for the local area. Therefore, there is not expected to be any impact on neighbouring areas that would require any further consideration.

7.8 Traffic noise and vibration

It requires a doubling of traffic volumes on a road to produce a perceptible 3dB (A) increase in road noise. The proposed development will not increase traffic volumes or noise on surrounding roads anywhere near this level to result in any perceptible increase in noise.

8 Parking demand and supply

8.1 Parking supply

The proposed development plan shows 22 car parking bays, including 2 ACROD bays. There is also extra vehicle storage capacity on site, with 6 spaces at the fuel station filling points, 1 waiting bay near the drive through and 13 spaces for fast food drive through lanes. Overall, there is capacity for at least 42 car spaces on site (parking bays, drive through lanes and fuel filling positions).

8.2 Parking demand

The project town planners have advised that a total of 30.4 parking bays are required based on applicable scheme requirements (Table 8). Overall, there is capacity for at least 42 car spaces on site, which is expected to satisfy the practical operation of the development.

Table 8: Applicable parking requirements

Car parking requirement	Determinant	Required	Proposed
Fast Food Outlet 1 per 4 guests in indoor and outdoor seated areas plus 7 per 100m ² NLA for non-seated areas. Up to 50% of non-seated area parking may be located in drive through queue	74 seats, 40m ² NLA non seated area	18.5 (seating area), 2.8 (non-seating) Total required: 21.3 bays	22 parking bays, 6 refueling bays, 13 drive through bays 1 waiting bay
Service Station 5 bays per service bay plus 7 per 100m ² non-service bay NLA. Up to 50% of non-service bays may be located in refueling positions	No service bays, 130m ² NLA non-service NLA	9.1 bays	
Total required parking bays		30.4 bays	

Source: Planning Solutions

8.3 Drive through queuing assessment

The RTA NSW *Guide to Traffic Generating Developments* recommends that a drive through capacity of 6 car lengths should be provided for the fast-food drive through lane. However, the queue must be able to extend to 8 car lengths without unreasonably disrupting car parking operations or extending onto the street for restaurants with single booths or potential high turnover. The fast-food drive through lane(s) has capacity for 13 cars, which satisfies the guidance from the RTA Guide.



9 Provision for service vehicles

There are two loading bays provided for deliveries and waste collection for the convenience store and fast food.

The maximum size fuel tanker truck may be a 19m Articulated Vehicle (AV). Swept path analysis was undertaken for the AV and for an 8.8m Medium Rigid Vehicle (MRV) in accordance with AS2890.2.

The swept path analysis confirms that service vehicles can enter and exit the site in forward gear, with satisfactory space for internal manoeuvring. A selection of swept path sketches is included in Appendix E.

Semi-mountable aprons are proposed to be provided at the development crossover on Key Largo Drive, to facilitate fuel tanker entry and exit.

10 Public transport assessment

Public transport is accessible via the nearby bus stop on Ocean Keys Boulevard, within 500m walking distance of the subject site.



11 Walking assessment

Footpaths are provided along both sides of Neerabup Road and Key Largo Drive. A signalised walk crossing is provided at the traffic lights to the south. Kerb ramps and pedestrian refuge islands are provided for crossing Key Largo Drive and crossing the shopping centre access road to the north, which promotes improved access for bicycles, wheelchairs and prams.

The WAPC Transport Impact Assessment Guidelines for Developments (2016) provide warrants for installing pedestrian priority crossing facilities. This is based on the volume of traffic as the key factor determining if pedestrians can safely cross a road. The guidelines recommend pedestrian priority crossing facilities be considered once the peak hour traffic exceeds the volumes detailed in Table 9.

The traffic volumes in this table are based on a maximum delay of 45 seconds for pedestrians, equivalent to Level of Service E. Traffic volumes on the road network adjacent to the site are below the threshold for safe pedestrian crossing. Therefore, the pedestrian crossing level of service is satisfactory on the adjacent road network.

Table 9: Traffic volume thresholds for pedestrian crossings

Road cross-section	Maximum traffic volumes providing safe pedestrian gap
2-lane undivided	1,100 vehicles per hour
2-lane divided (with refuge)	2,800 vehicles per hour
4-lane undivided*	700 vehicles per hour
4-lane divided (with refuge)*	1,600 vehicles per hour

12 Cycling assessment

12.1 Bicycle parking and end of trip facilities

A total of 12 bicycle parking spaces are provided for the development.

12.2 Sustainable transport catchment

As detailed in Figure 21, the subject site is well placed for staff and customers to travel by sustainable modes of transport. A comfortable 8km or 20-25min cycle will provide the development with a large catchment.

This range can be further increased through a combination of micro-mobility and train travel with close access to train stations.



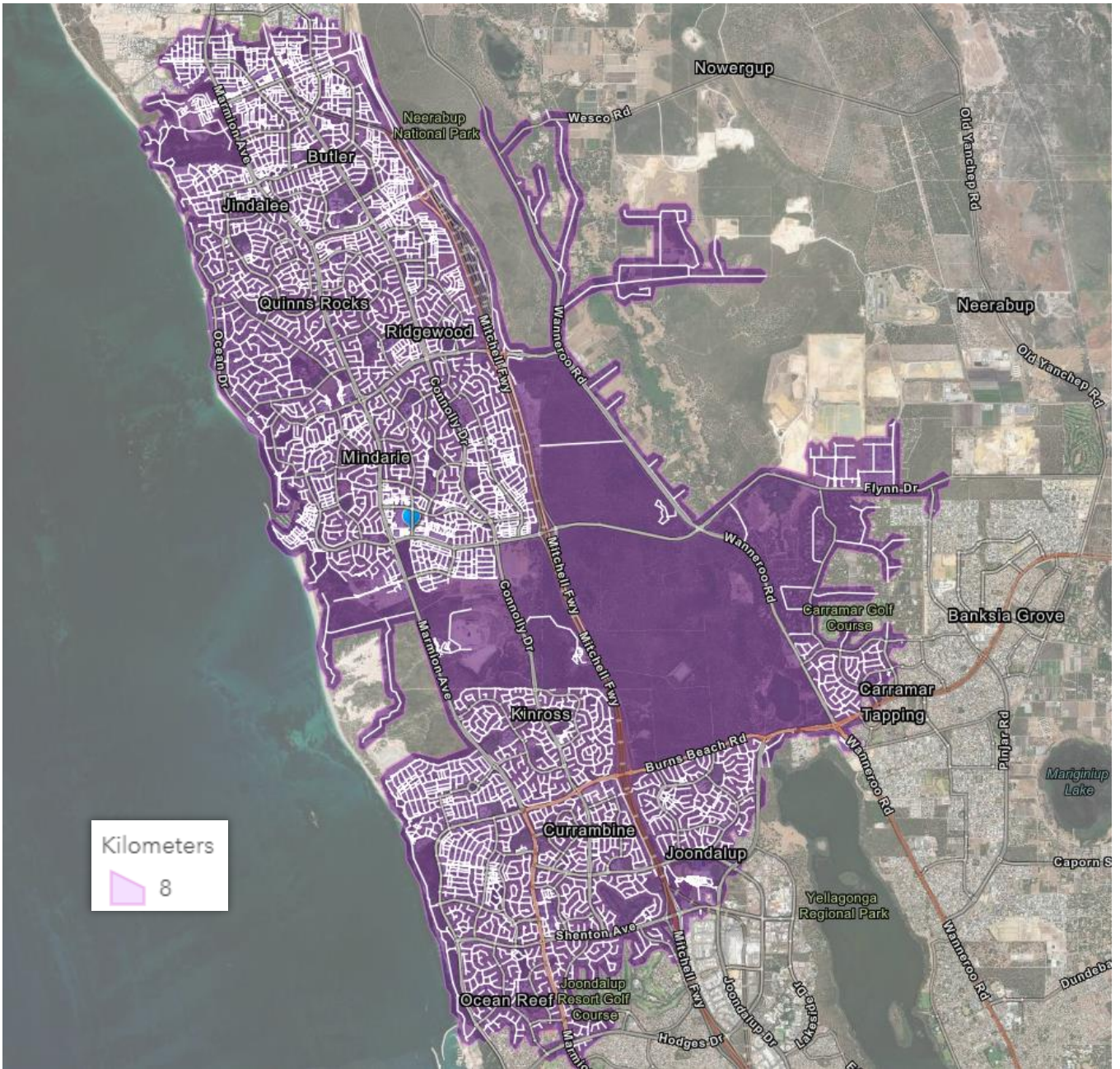


Figure 21: Cycling and micro-mobility catchment

13 Conclusion

This Transport Impact Assessment has been prepared by Urbii on behalf of Clarkson Central Pty Ltd with regards to the proposed commercial development, located at Cnr Neerabup Rd & Key Largo Dr, Clarkson.

It is proposed to develop the site into a commercial development with fast food and fuel station with convenience store.

The site promotes good connectivity with the existing road, cycling and walking network.

The traffic analysis undertaken in this report shows that the traffic generation of the proposed development can be accommodated by the surrounding roads and intersections.

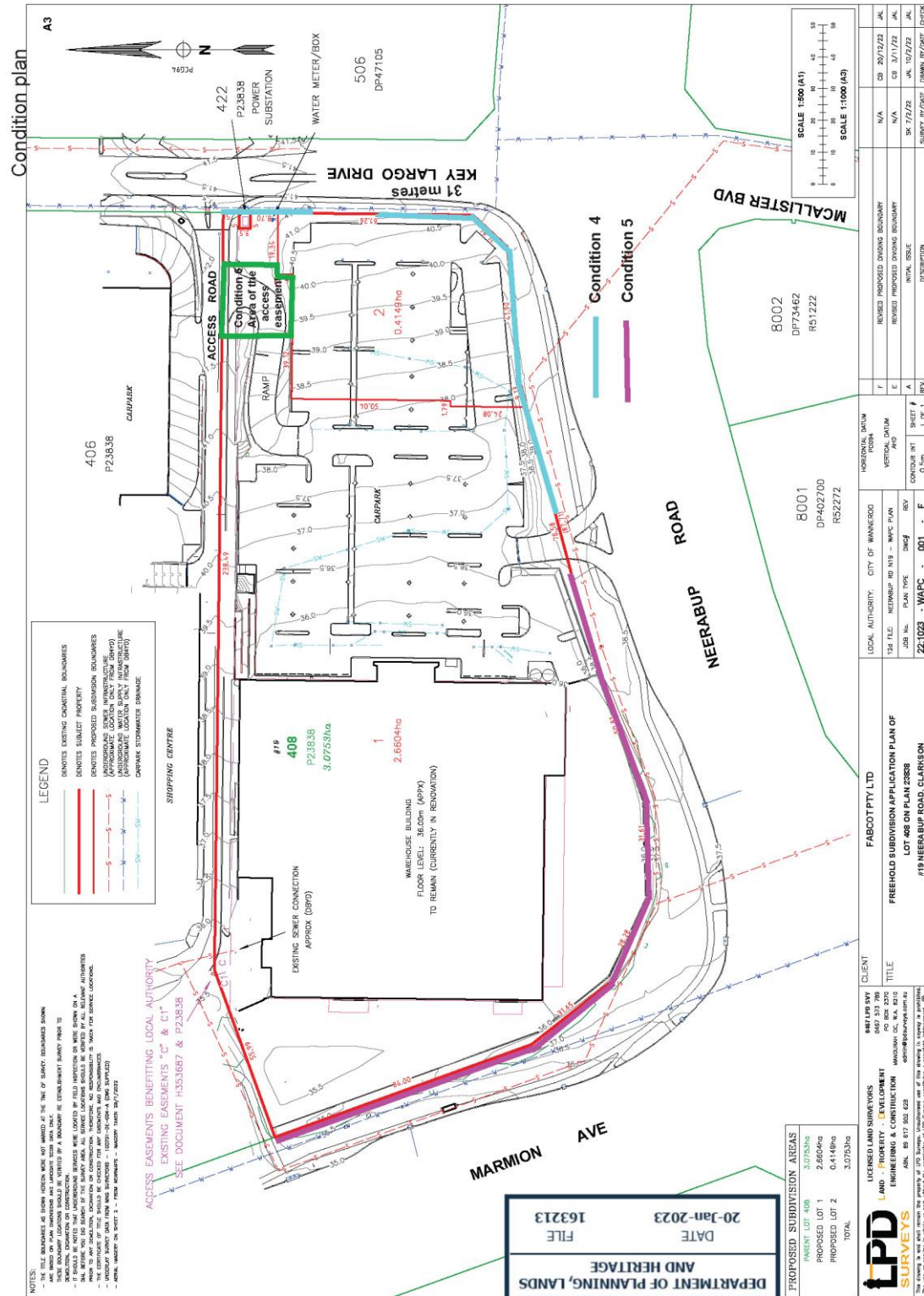
The car parking supply is satisfactory and can accommodate the car parking demand of the proposed development.

It is concluded that the findings of this Transport Impact Assessment are supportive of the proposed development.



Appendices

Appendix A: Context plans



Appendix B: Proposed development plan



Appendix C: Traffic volume diagrams

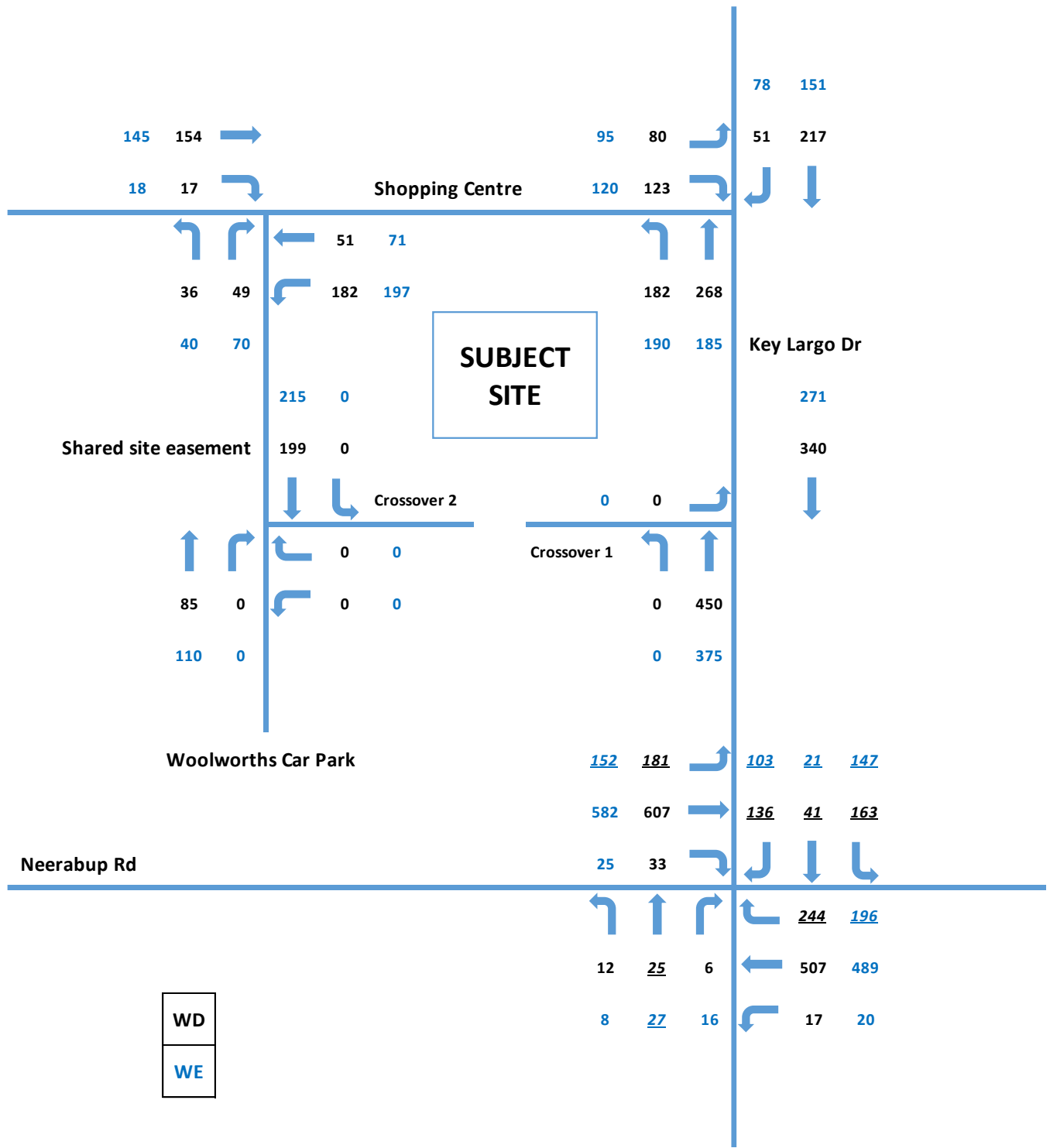


Figure 22: Surveyed existing traffic flows weekday and weekend peak hours

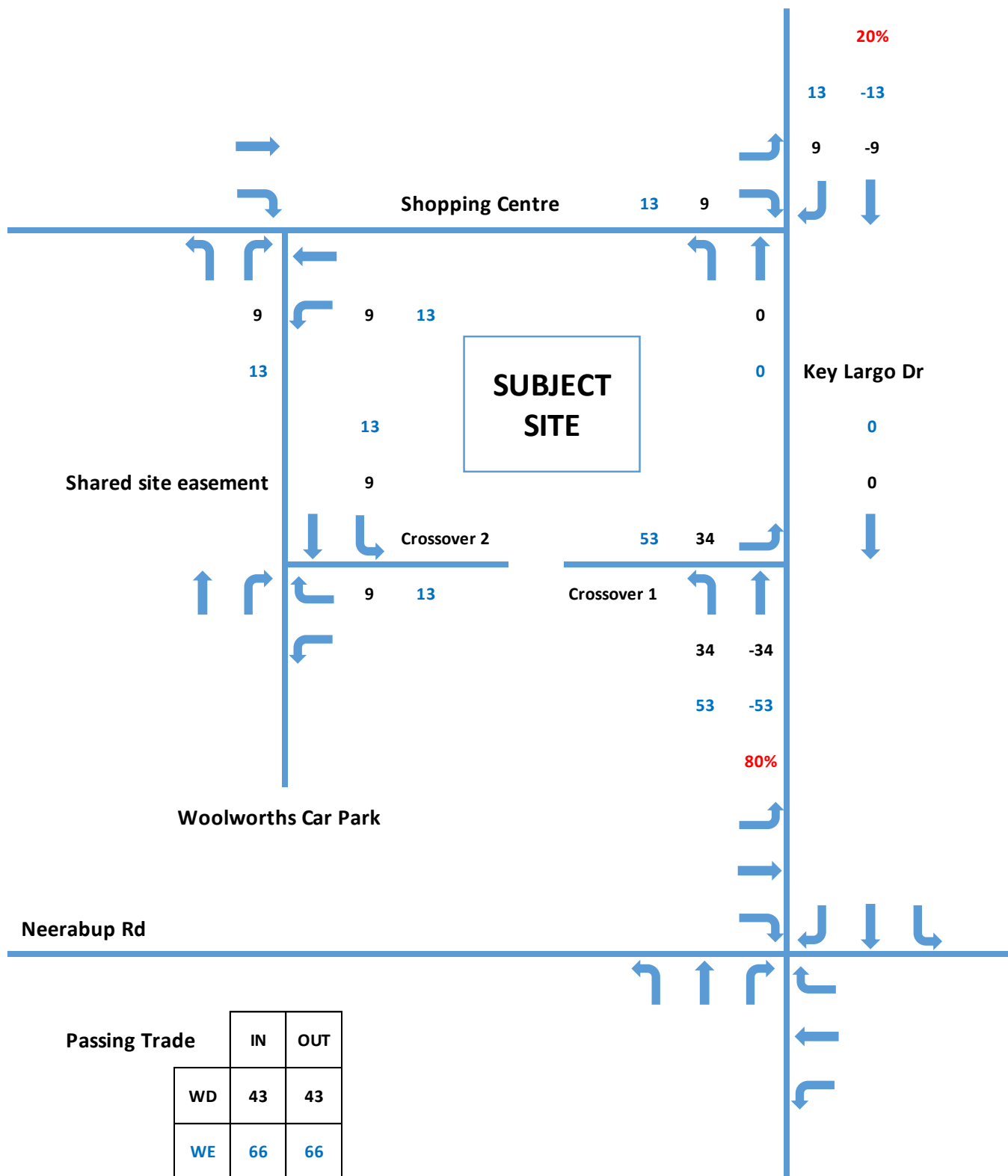


Figure 23: Development traffic distribution – passing trade

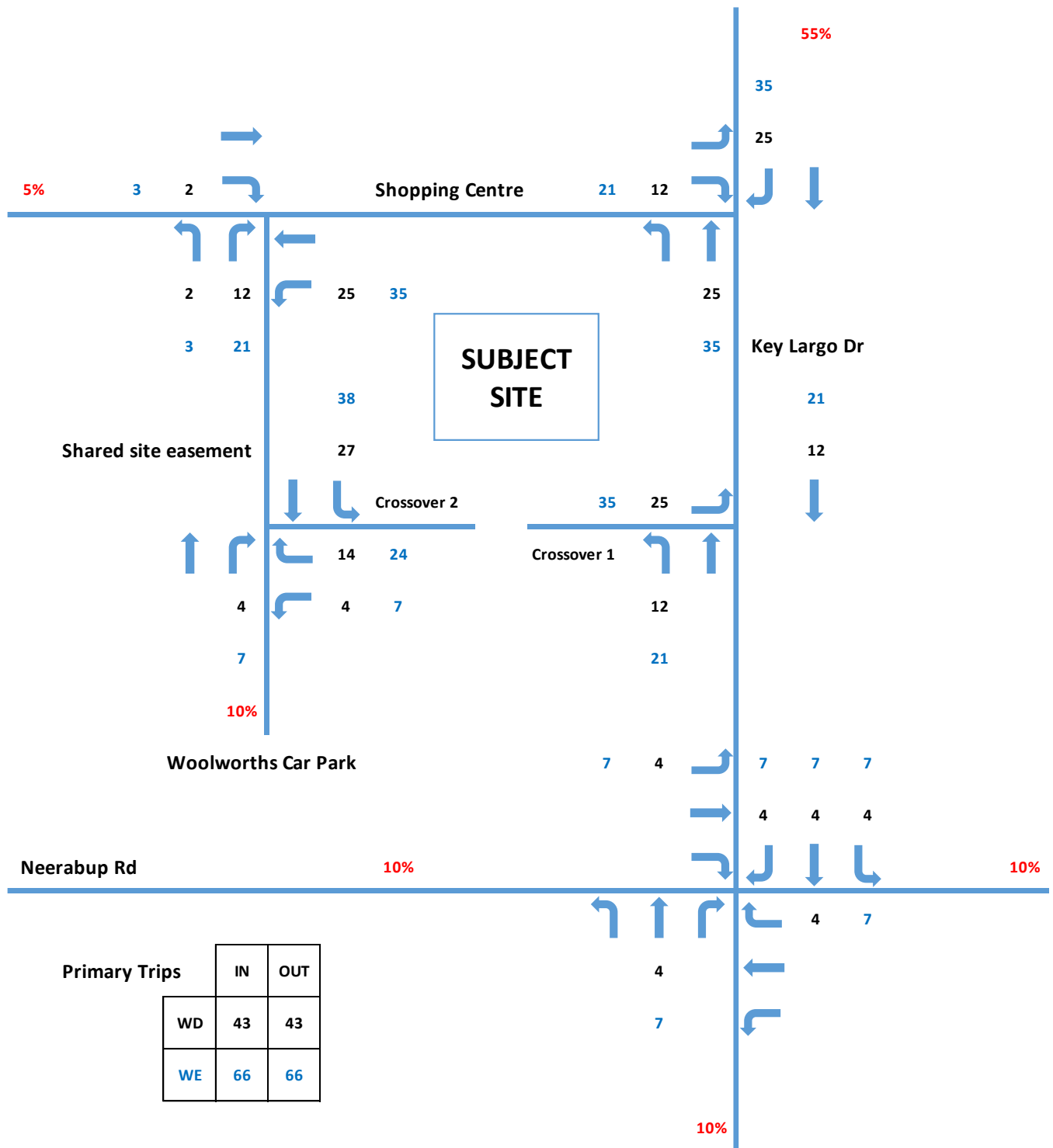


Figure 24: Development traffic distribution – primary trips



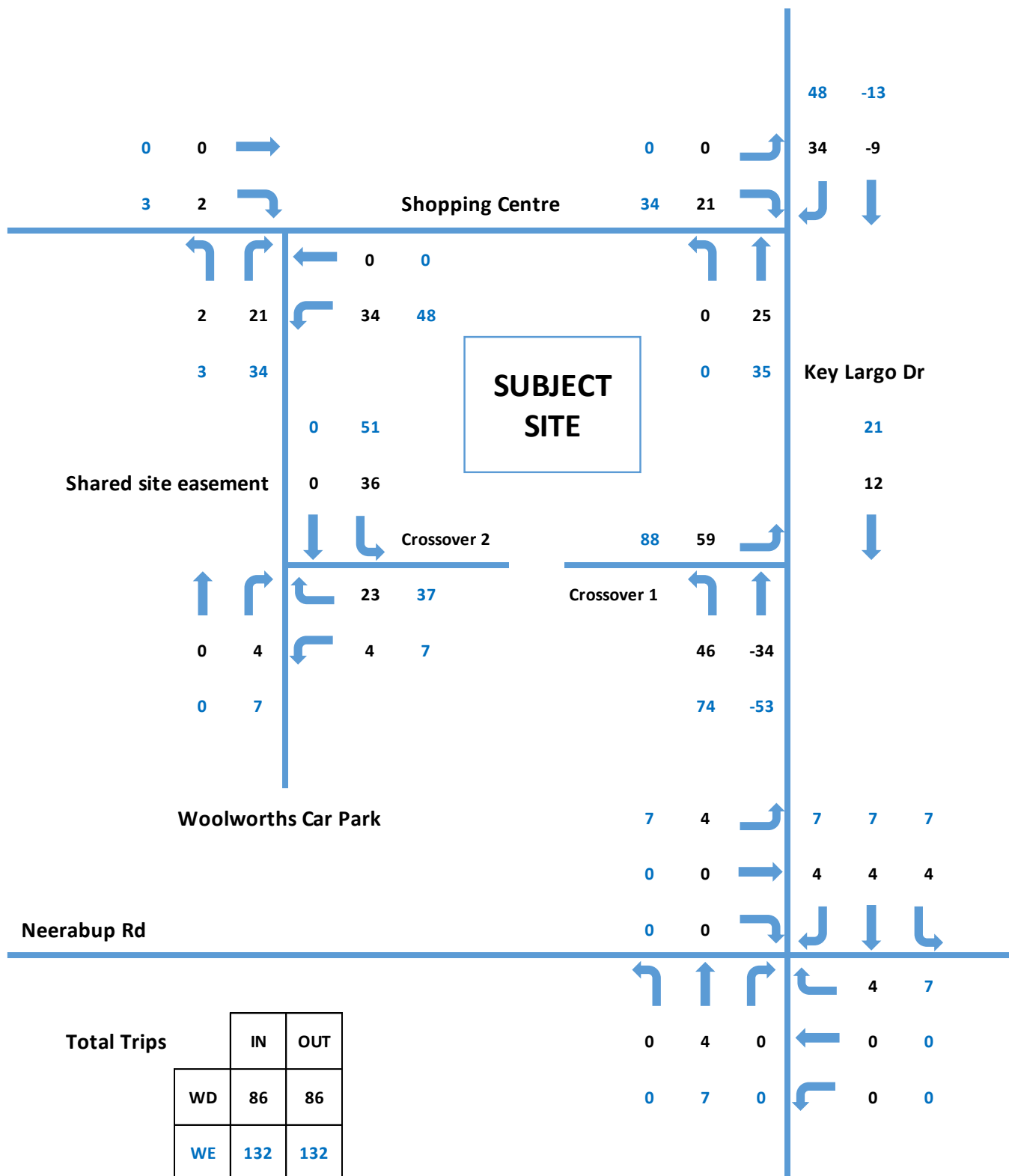


Figure 25: Development traffic – all trips

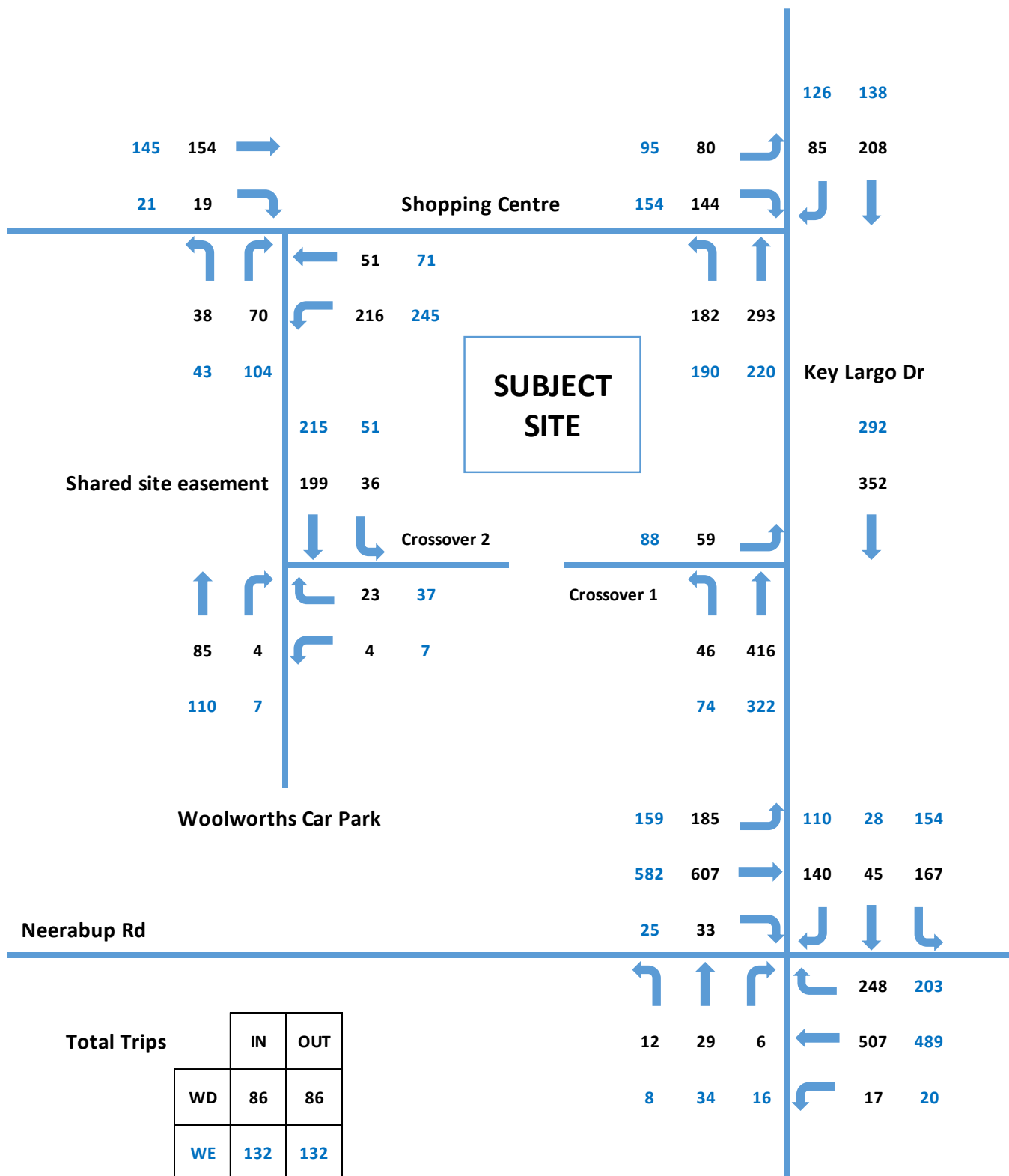


Figure 26: Total post-development traffic volumes



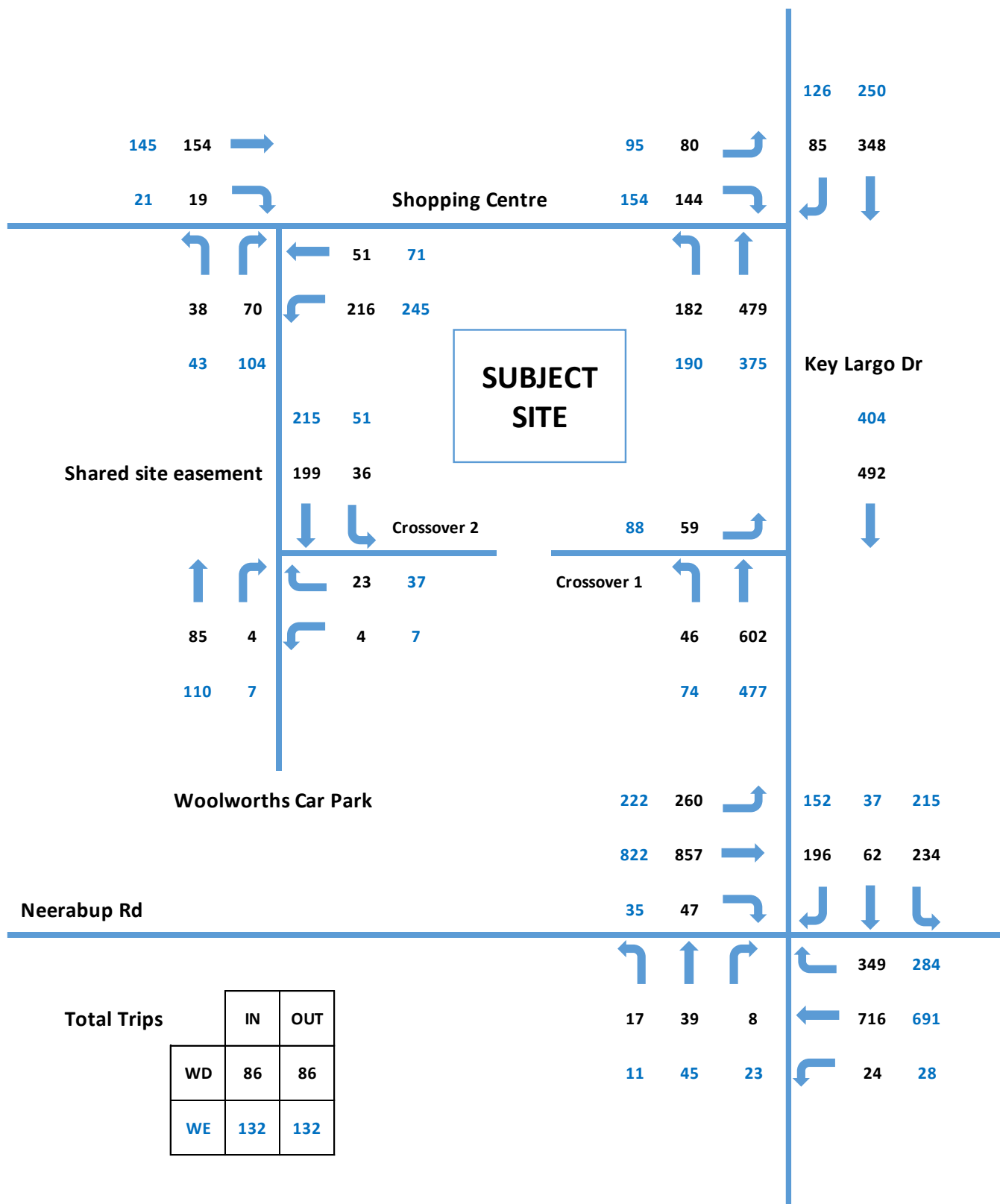


Figure 27: 10-year post-development traffic volumes

Appendix D: SIDRA analysis outputs

SIDRA outputs are presented in the form of Degree of Saturation, Level of Service, Average Delay and 95% Queue. These characteristics are defined as follows:

- **Degree of Saturation (DoS):** is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The Degree of Saturation ranges from close to zero for varied traffic flow up to one for saturated flow or capacity.
- **Level of Service (LoS):** is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. In general, there are 6 levels of service, designated from A to F, with Level of Service A representing the best operating condition (i.e. free flow) and Level of Service F the worst (i.e. forced or breakdown flow).
- **Average Delay:** is the average of all travel time delays for vehicles through the intersection.
- **95% Queue:** is the queue length below which 95% of all observed queue lengths fall.



Existing weekday PM peak hour

MOVEMENT SUMMARY

Site: 101 [1 - Neerabup Rd / Key Largo Dr / McAllister Blvd (Site Folder: General)]

Network: N101 [Existing Weekday PM Peak Hour (Network Folder: General)]

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: McAllister Blvd														
1	L2	13	5.0	13	5.0	0.083	15.8	LOS B	0.7	5.2	0.73	0.59	0.73	35.1
2	T1	26	5.0	26	5.0	* 0.083	11.3	LOS B	0.7	5.2	0.73	0.59	0.73	19.6
3	R2	6	5.0	6	5.0	0.025	31.2	LOS C	0.2	1.3	0.86	0.65	0.86	19.8
Approach		45	5.0	45	5.0	0.083	15.3	LOS B	0.7	5.2	0.75	0.60	0.75	24.9
East: Neerabup Rd														
4	L2	18	5.0	18	5.0	0.013	7.4	LOS A	0.1	0.5	0.21	0.61	0.21	42.3
5	T1	534	8.3	534	8.3	0.666	28.8	LOS C	8.8	66.2	0.97	0.83	1.02	29.5
6	R2	257	5.0	257	5.0	* 0.827	43.2	LOS D	9.8	71.7	1.00	0.94	1.31	12.5
Approach		808	7.2	808	7.2	0.827	32.9	LOS C	9.8	71.7	0.96	0.86	1.10	24.0
North: Key Largo Dr														
7	L2	172	5.0	172	5.0	0.328	22.5	LOS C	5.4	39.5	0.77	0.74	0.77	24.0
8	T1	43	5.0	43	5.0	0.328	17.9	LOS B	5.4	39.5	0.77	0.74	0.77	19.9
9	R2	143	5.0	143	5.0	* 0.310	23.2	LOS C	3.7	27.0	0.83	0.74	0.83	26.8
Approach		358	5.0	358	5.0	0.328	22.2	LOS C	5.4	39.5	0.79	0.74	0.79	24.8
West: Neerabup Rd														
10	L2	191	5.0	191	5.0	0.157	9.0	LOS A	1.6	11.8	0.36	0.67	0.36	41.3
11	T1	639	8.3	639	8.3	* 0.798	32.9	LOS C	11.7	87.5	1.00	0.95	1.21	27.3
12	R2	35	5.0	35	5.0	0.112	33.6	LOS C	1.0	7.5	0.88	0.72	0.88	22.6
Approach		864	7.4	864	7.4	0.798	27.6	LOS C	11.7	87.5	0.85	0.88	1.01	28.5
All Vehicles		2076	6.9	2076	6.9	0.827	28.5	LOS C	11.7	87.5	0.88	0.84	1.00	26.0

MOVEMENT SUMMARY

Site: 102 [2 - Site Crossover / Key Largo Dr (Site Folder: General)]

Network: N101 [Existing Weekday PM Peak Hour (Network Folder: General)]

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	1	0.0	1	0.0	0.249	3.9	LOS A	0.0	0.0	0.00	0.00	0.00	29.9
2	T1	474	5.0	474	5.0	0.249	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		475	5.0	475	5.0	0.249	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.7
West: Site crossover														
10	L2	1	0.0	1	0.0	0.001	1.7	LOS A	0.0	0.0	0.46	0.21	0.46	17.3
Approach		1	0.0	1	0.0	0.001	1.7	LOS A	0.0	0.0	0.46	0.21	0.46	17.3
All Vehicles		476	5.0	476	5.0	0.249	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.4

MOVEMENT SUMMARY

Site: 103 [3 - Shopping Centre Access / Key Largo Dr (Site Folder: General)]

Network: N101 [Existing Weekday PM Peak Hour (Network Folder: General)]

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	192	5.0	192	5.0	0.254	3.9	LOS A	0.0	0.0	0.00	0.21	0.00	47.1
2	T1	282	5.0	282	5.0	0.254	0.0	LOS A	0.0	0.0	0.00	0.21	0.00	43.3
Approach		474	5.0	474	5.0	0.254	1.6	NA	0.0	0.0	0.00	0.21	0.00	46.0
North: Key Largo Dr														
8	T1	228	5.0	228	5.0	0.172	0.8	LOS A	0.6	4.2	0.26	0.12	0.26	38.5
9	R2	54	5.0	54	5.0	0.172	6.9	LOS A	0.6	4.2	0.26	0.12	0.26	46.2
Approach		282	5.0	282	5.0	0.172	2.0	NA	0.6	4.2	0.26	0.12	0.26	42.8
West: Shopping Centre Access														
10	L2	84	5.0	84	5.0	0.274	5.9	LOS A	1.1	8.0	0.49	0.73	0.52	41.6
12	R2	129	5.0	129	5.0	0.274	9.0	LOS A	1.1	8.0	0.49	0.73	0.52	41.4
Approach		214	5.0	214	5.0	0.274	7.8	LOS A	1.1	8.0	0.49	0.73	0.52	41.5
All Vehicles		969	5.0	969	5.0	0.274	3.0	NA	1.1	8.0	0.18	0.30	0.19	43.7



Existing weekend midday peak hour

MOVEMENT SUMMARY

Site: 101 [1 - Neerabup Rd / Key Largo Dr / McAllister Blvd (Site Folder: General)]

Network: N101 [Existing Weekend Midday Peak Hour (Network Folder: General)]

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: McAllister Blvd														
1	L2	8	5.0	8	5.0	0.087	15.3	LOS B	0.6	4.3	0.78	0.60	0.78	36.1
2	T1	28	5.0	28	5.0	* 0.087	10.7	LOS B	0.6	4.3	0.78	0.60	0.78	20.6
3	R2	17	5.0	17	5.0	0.064	28.2	LOS C	0.4	3.2	0.87	0.68	0.87	21.1
Approach		54	5.0	54	5.0	0.087	16.9	LOS B	0.6	4.3	0.81	0.62	0.81	23.5
East: Neerabup Rd														
4	L2	21	5.0	21	5.0	0.016	7.4	LOS A	0.1	0.5	0.23	0.62	0.23	42.2
5	T1	515	8.3	515	8.3	0.688	26.2	LOS C	7.6	56.8	0.98	0.86	1.08	31.2
6	R2	206	5.0	206	5.0	* 0.854	41.6	LOS D	7.1	52.0	1.00	0.99	1.49	12.8
Approach		742	7.3	742	7.3	0.854	30.0	LOS C	7.6	56.8	0.96	0.89	1.17	25.9
North: Key Largo Dr														
7	L2	155	5.0	155	5.0	0.265	19.2	LOS B	3.7	27.0	0.74	0.73	0.74	25.9
8	T1	22	5.0	22	5.0	0.265	14.6	LOS B	3.7	27.0	0.74	0.73	0.74	21.6
9	R2	108	5.0	108	5.0	* 0.233	20.0	LOS B	2.3	17.0	0.82	0.73	0.82	28.8
Approach		285	5.0	285	5.0	0.265	19.1	LOS B	3.7	27.0	0.77	0.73	0.77	26.8
West: Neerabup Rd														
10	L2	160	5.0	160	5.0	0.130	8.5	LOS A	1.1	7.8	0.35	0.67	0.35	42.2
11	T1	613	8.3	613	8.3	* 0.819	30.5	LOS C	10.0	75.2	1.00	0.97	1.30	28.6
12	R2	26	5.0	26	5.0	0.109	32.3	LOS C	0.7	5.2	0.91	0.71	0.91	23.2
Approach		799	7.5	799	7.5	0.819	26.1	LOS C	10.0	75.2	0.87	0.90	1.10	29.7
All Vehicles		1880	7.0	1880	7.0	0.854	26.3	LOS C	10.0	75.2	0.89	0.86	1.07	27.6

MOVEMENT SUMMARY

Site: 102 [2 - Site Crossover / Key Largo Dr (Site Folder: General)]

Network: N101 [Existing Weekend Midday Peak Hour (Network Folder: General)]

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	1	0.0	1	0.0	0.207	3.9	LOS A	0.0	0.0	0.00	0.00	0.00	29.9
2	T1	395	5.0	395	5.0	0.207	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		396	5.0	396	5.0	0.207	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.6
West: Site crossover														
10	L2	1	0.0	1	0.0	0.001	1.3	LOS A	0.0	0.0	0.41	0.18	0.41	17.5
Approach		1	0.0	1	0.0	0.001	1.3	LOS A	0.0	0.0	0.41	0.18	0.41	17.5
All Vehicles		397	5.0	397	5.0	0.207	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.4

MOVEMENT SUMMARY

Site: 103 [3 - Shopping Centre Access / Key Largo Dr (Site Folder: General)]

Network: N101 [Existing Weekend
Midday Peak Hour (Network Folder:
General)]

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	200	5.0	200	5.0	0.212	3.9	LOS A	0.0	0.0	0.00	0.27	0.00	46.7
2	T1	195	5.0	195	5.0	0.212	0.0	LOS A	0.0	0.0	0.00	0.27	0.00	42.0
Approach		395	5.0	395	5.0	0.212	2.0	NA	0.0	0.0	0.00	0.27	0.00	45.7
North: Key Largo Dr														
8	T1	159	5.0	159	5.0	0.155	1.0	LOS A	0.7	5.0	0.35	0.22	0.35	34.3
9	R2	82	5.0	82	5.0	0.155	6.4	LOS A	0.7	5.0	0.35	0.22	0.35	45.2
Approach		241	5.0	241	5.0	0.155	2.8	NA	0.7	5.0	0.35	0.22	0.35	42.2
West: Shopping Centre Access														
10	L2	100	5.0	100	5.0	0.246	5.4	LOS A	1.0	7.0	0.39	0.66	0.39	42.5
12	R2	126	5.0	126	5.0	0.246	7.7	LOS A	1.0	7.0	0.39	0.66	0.39	42.4
Approach		226	5.0	226	5.0	0.246	6.7	LOS A	1.0	7.0	0.39	0.66	0.39	42.4
All Vehicles		862	5.0	862	5.0	0.246	3.4	NA	1.0	7.0	0.20	0.36	0.20	43.7



2036 weekday PM peak hour (without development traffic)

MOVEMENT SUMMARY

Site: 101 [1 - Neerabup Rd / Key Largo Dr / McAllister Blvd (Site Folder: General)]

Network: N101 [2036 Weekday PM Peak Hour (Network Folder: General)]

Without Development

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: McAllister Blvd														
1	L2	18	5.0	18	5.0	0.135	23.9	LOS C	1.6	11.6	0.80	0.64	0.80	28.6
2	T1	37	5.0	37	5.0	* 0.135	19.4	LOS B	1.6	11.6	0.80	0.64	0.80	14.1
3	R2	8	5.0	8	5.0	0.041	40.3	LOS D	0.3	2.4	0.88	0.66	0.88	16.8
Approach		63	5.0	63	5.0	0.135	23.4	LOS C	1.6	11.6	0.81	0.64	0.81	19.5
East: Neerabup Rd														
4	L2	25	5.0	25	5.0	0.019	7.4	LOS A	0.1	0.9	0.19	0.62	0.19	42.4
5	T1	754	8.3	754	8.3	0.789	37.6	LOS D	16.8	125.8	0.99	0.93	1.12	25.1
6	R2	363	5.0	363	5.0	* 0.949	68.9	LOS E	21.5	156.7	1.00	1.06	1.57	8.4
Approach		1142	7.2	1142	7.2	0.949	46.9	LOS D	21.5	156.7	0.98	0.96	1.24	18.7
North: Key Largo Dr														
7	L2	242	5.0	242	5.0	0.497	30.6	LOS C	10.7	78.3	0.85	0.79	0.85	20.0
8	T1	61	5.0	61	5.0	0.497	26.0	LOS C	10.7	78.3	0.85	0.79	0.85	16.2
9	R2	202	5.0	202	5.0	* 0.452	30.6	LOS C	7.1	51.6	0.87	0.78	0.87	23.1
Approach		505	5.0	505	5.0	0.497	30.0	LOS C	10.7	78.3	0.86	0.78	0.86	20.9
West: Neerabup Rd														
10	L2	269	5.0	269	5.0	0.229	10.8	LOS B	3.7	27.3	0.41	0.69	0.41	38.2
11	T1	902	8.3	902	8.3	* 0.968	67.4	LOS E	28.3	212.2	1.00	1.23	1.61	16.7
12	R2	49	5.0	49	5.0	0.129	37.9	LOS D	1.8	13.0	0.85	0.74	0.85	21.0
Approach		1221	7.4	1221	7.4	0.968	53.7	LOS D	28.3	212.2	0.86	1.09	1.31	18.3
All Vehicles		2932	6.9	2932	6.9	0.968	46.3	LOS D	28.3	212.2	0.91	0.98	1.19	18.9

MOVEMENT SUMMARY

Site: 102 [2 - Site Crossover / Key Largo Dr (Site Folder: General)]

Network: N101 [2036 Weekday PM Peak Hour (Network Folder: General)]

Without Development

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	1	0.0	1	0.0	0.351	3.9	LOS A	0.0	0.0	0.00	0.00	0.00	29.9
2	T1	669	5.0	669	5.0	0.351	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.7
Approach		671	5.0	671	5.0	0.351	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.7
West: Site crossover														
10	L2	1	0.0	1	0.0	0.001	2.8	LOS A	0.0	0.0	0.55	0.30	0.55	16.2
Approach		1	0.0	1	0.0	0.001	2.8	LOS A	0.0	0.0	0.55	0.30	0.55	16.2
All Vehicles		672	5.0	672	5.0	0.351	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.5

MOVEMENT SUMMARY

Site: 103 [3 - Shopping Centre Access / Key Largo Dr (Site Folder: General)]

Network: N101 [2036 Weekday PM Peak Hour (Network Folder: General)]

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	192	5.0	192	5.0	0.356	3.9	LOS A	0.0	0.0	0.00	0.15	0.00	47.6
2	T1	478	5.0	478	5.0	0.356	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	45.0
Approach		669	5.0	669	5.0	0.356	1.1	NA	0.0	0.0	0.00	0.15	0.00	46.5
North: Key Largo Dr														
8	T1	376	5.0	376	5.0	0.265	1.2	LOS A	0.9	6.9	0.25	0.09	0.27	37.3
9	R2	54	5.0	54	5.0	0.265	9.2	LOS A	0.9	6.9	0.25	0.09	0.27	46.0
Approach		429	5.0	429	5.0	0.265	2.2	NA	0.9	6.9	0.25	0.09	0.27	41.1
West: Shopping Centre Access														
10	L2	84	5.0	84	5.0	0.420	8.4	LOS A	1.9	13.7	0.69	0.95	0.96	38.1
12	R2	129	5.0	129	5.0	0.420	15.1	LOS C	1.9	13.7	0.69	0.95	0.96	37.4
Approach		214	5.0	214	5.0	0.420	12.4	LOS B	1.9	13.7	0.69	0.95	0.96	37.7
All Vehicles		1313	5.0	1313	5.0	0.420	3.3	NA	1.9	13.7	0.19	0.26	0.24	42.3



2036 weekend midday peak hour (without development traffic)

MOVEMENT SUMMARY

Site: 101 [1 - Neerabup Rd / Key Largo Dr / McAllister Blvd (Site Folder: General)]

Network: N101 [2036 Weekend Midday Peak Hour (Network Folder: General)]

Site Category: (None)

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: McAllister Blvd														
1	L2	12	5.0	12	5.0	0.136	22.4	LOS C	1.4	9.9	0.82	0.64	0.82	29.9
2	T1	40	5.0	40	5.0	* 0.136	17.8	LOS B	1.4	9.9	0.82	0.64	0.82	15.2
3	R2	24	5.0	24	5.0	0.106	36.5	LOS D	0.8	6.1	0.88	0.70	0.88	17.9
Approach		76	5.0	76	5.0	0.136	24.5	LOS C	1.4	9.9	0.84	0.66	0.84	18.9
East: Neerabup Rd														
4	L2	29	5.0	29	5.0	0.022	7.3	LOS A	0.1	0.8	0.19	0.62	0.19	42.5
5	T1	727	8.3	727	8.3	0.778	33.8	LOS C	14.5	108.4	0.99	0.92	1.12	26.8
6	R2	292	5.0	292	5.0	* 0.858	49.1	LOS D	13.0	94.8	1.00	0.96	1.33	11.2
Approach		1048	7.3	1048	7.3	0.858	37.3	LOS D	14.5	108.4	0.97	0.92	1.15	22.4
North: Key Largo Dr														
7	L2	219	5.0	219	5.0	0.407	26.8	LOS C	7.6	55.5	0.81	0.77	0.81	21.6
8	T1	32	5.0	32	5.0	0.407	22.2	LOS C	7.6	55.5	0.81	0.77	0.81	17.6
9	R2	153	5.0	153	5.0	* 0.346	27.0	LOS C	4.6	33.8	0.85	0.75	0.85	24.7
Approach		403	5.0	403	5.0	0.407	26.5	LOS C	7.6	55.5	0.83	0.76	0.83	22.6
West: Neerabup Rd														
10	L2	226	5.0	226	5.0	0.185	9.5	LOS A	2.4	17.3	0.37	0.68	0.37	40.4
11	T1	865	8.3	865	8.3	* 0.926	49.9	LOS D	21.9	164.0	1.00	1.13	1.48	20.8
12	R2	37	5.0	37	5.0	0.108	36.1	LOS D	1.2	8.9	0.86	0.72	0.86	21.6
Approach		1128	7.5	1128	7.5	0.926	41.3	LOS D	21.9	164.0	0.87	1.03	1.24	22.3
All Vehicles		2656	7.0	2656	7.0	0.926	37.0	LOS D	21.9	164.0	0.90	0.94	1.13	22.3

MOVEMENT SUMMARY

Site: 102 [2 - Site Crossover / Key Largo Dr (Site Folder: General)]

Network: N101 [2036 Weekend Midday Peak Hour (Network Folder: General)]

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	1	0.0	1	0.0	0.293	3.9	LOS A	0.0	0.0	0.00	0.00	0.00	29.9
2	T1	558	5.0	558	5.0	0.293	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		559	5.0	559	5.0	0.293	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.7
West: Site crossover														
10	L2	1	0.0	1	0.0	0.001	2.1	LOS A	0.0	0.0	0.50	0.25	0.50	17.0
Approach		1	0.0	1	0.0	0.001	2.1	LOS A	0.0	0.0	0.50	0.25	0.50	17.0
All Vehicles		560	5.0	560	5.0	0.293	0.0	NA	0.0	0.0	0.00	0.00	0.00	49.5

MOVEMENT SUMMARY

▼ Site: 103 [3 - Shopping Centre Access / Key Largo Dr (Site Folder: General)]

■ Network: N101 [2036 Weekend
Midday Peak Hour (Network Folder:
General)]

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	200	5.0	200	5.0	0.298	3.9	LOS A	0.0	0.0	0.00	0.19	0.00	47.3
2	T1	358	5.0	358	5.0	0.298	0.0	LOS A	0.0	0.0	0.00	0.19	0.00	43.9
Approach		558	5.0	558	5.0	0.298	1.4	NA	0.0	0.0	0.00	0.19	0.00	46.2
North: Key Largo Dr														
8	T1	277	5.0	277	5.0	0.234	1.3	LOS A	1.0	7.3	0.35	0.16	0.35	34.9
9	R2	82	5.0	82	5.0	0.234	7.8	LOS A	1.0	7.3	0.35	0.16	0.35	45.4
Approach		359	5.0	359	5.0	0.234	2.8	NA	1.0	7.3	0.35	0.16	0.35	41.2
West: Shopping Centre Access														
10	L2	100	5.0	100	5.0	0.335	6.8	LOS A	1.5	10.7	0.55	0.80	0.68	40.4
12	R2	126	5.0	126	5.0	0.335	11.2	LOS B	1.5	10.7	0.55	0.80	0.68	40.0
Approach		226	5.0	226	5.0	0.335	9.3	LOS A	1.5	10.7	0.55	0.80	0.68	40.2
All Vehicles		1143	5.0	1143	5.0	0.335	3.4	NA	1.5	10.7	0.22	0.30	0.24	42.9



2036 weekday PM peak hour (with development traffic)

MOVEMENT SUMMARY

Site: 101 [1 - Neerabup Rd / Key Largo Dr / McAllister Blvd (Site Folder: General)]

Network: N101 [2036 Weekday PM Peak Hour (Network Folder: General)]

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Practical Cycle Time)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: McAllister Blvd														
1	L2	18	5.0	18	5.0	0.151	25.0	LOS C	1.8	13.0	0.81	0.65	0.81	27.9
2	T1	41	5.0	41	5.0	* 0.151	20.5	LOS C	1.8	13.0	0.81	0.65	0.81	13.7
3	R2	8	5.0	8	5.0	0.041	40.3	LOS D	0.3	2.4	0.88	0.66	0.88	16.8
Approach		67	5.0	67	5.0	0.151	24.2	LOS C	1.8	13.0	0.82	0.65	0.82	18.7
East: Neerabup Rd														
4	L2	25	5.0	25	5.0	0.019	7.4	LOS A	0.1	0.9	0.19	0.62	0.19	42.4
5	T1	754	8.3	754	8.3	0.825	40.6	LOS D	17.5	131.6	1.00	0.96	1.18	23.9
6	R2	367	5.0	367	5.0	* 0.960	72.6	LOS E	22.4	163.6	1.00	1.08	1.62	8.0
Approach		1146	7.2	1146	7.2	0.960	50.1	LOS D	22.4	163.6	0.98	0.99	1.30	17.8
North: Key Largo Dr														
7	L2	246	5.0	246	5.0	0.494	29.9	LOS C	10.9	79.5	0.84	0.79	0.84	20.4
8	T1	65	5.0	65	5.0	0.494	25.3	LOS C	10.9	79.5	0.84	0.79	0.84	16.5
9	R2	206	5.0	206	5.0	* 0.442	29.6	LOS C	7.1	51.7	0.86	0.77	0.86	23.5
Approach		518	5.0	518	5.0	0.494	29.2	LOS C	10.9	79.5	0.85	0.78	0.85	21.3
West: Neerabup Rd														
10	L2	274	5.0	274	5.0	0.232	11.1	LOS B	3.9	28.7	0.42	0.70	0.42	37.7
11	T1	902	8.3	902	8.3	* 1.009	88.1	LOS F	32.6	244.3	1.00	1.35	1.83	13.4
12	R2	49	5.0	49	5.0	0.129	37.9	LOS D	1.8	13.0	0.85	0.74	0.85	21.0
Approach		1225	7.4	1225	7.4	1.009	68.9	LOS E	32.6	244.3	0.86	1.18	1.48	15.1
All Vehicles		2957	6.8	2957	6.8	1.009	53.6	LOS D	32.6	244.3	0.91	1.03	1.28	16.9

MOVEMENT SUMMARY

Site: 102 [2 - Site Crossover / Key Largo Dr (Site Folder: General)]

Network: N101 [2036 Weekday PM Peak Hour (Network Folder: General)]

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	48	0.0	48	0.0	0.358	3.9	LOS A	0.0	0.0	0.00	0.04	0.00	29.3
2	T1	634	5.0	634	5.0	0.358	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	46.9
Approach		682	4.6	682	4.6	0.358	0.3	NA	0.0	0.0	0.00	0.04	0.00	43.7
West: Site crossover														
10	L2	62	0.0	62	0.0	0.069	2.9	LOS A	0.3	2.1	0.55	0.44	0.55	16.1
Approach		62	0.0	62	0.0	0.069	2.9	LOS A	0.3	2.1	0.55	0.44	0.55	16.1
All Vehicles		744	4.3	744	4.3	0.358	0.5	NA	0.3	2.1	0.05	0.07	0.05	38.3

MOVEMENT SUMMARY

Site: 103 [3 - Shopping Centre Access / Key Largo Dr (Site Folder: General)]

Network: N101 [2036 Weekday PM Peak Hour (Network Folder: General)]

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Safn	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: Key Largo Dr														
1	L2	192	5.0	192	5.0	0.370	3.9	LOS A	0.0	0.0	0.00	0.15	0.00	47.6
2	T1	504	5.0	504	5.0	0.370	0.0	LOS A	0.0	0.0	0.00	0.15	0.00	45.1
Approach		696	5.0	696	5.0	0.370	1.1	NA	0.0	0.0	0.00	0.15	0.00	46.6
North: Key Largo Dr														
8	T1	366	5.0	366	5.0	0.311	2.2	LOS A	1.7	12.3	0.39	0.15	0.47	31.9
9	R2	89	5.0	89	5.0	0.311	9.8	LOS A	1.7	12.3	0.39	0.15	0.47	44.6
Approach		456	5.0	456	5.0	0.311	3.7	NA	1.7	12.3	0.39	0.15	0.47	38.7
West: Shopping Centre Access														
10	L2	84	5.0	84	5.0	0.513	9.7	LOS A	2.5	17.9	0.75	1.03	1.17	36.7
12	R2	152	5.0	152	5.0	0.513	17.4	LOS C	2.5	17.9	0.75	1.03	1.17	35.8
Approach		236	5.0	236	5.0	0.513	14.6	LOS B	2.5	17.9	0.75	1.03	1.17	36.2
All Vehicles		1387	5.0	1387	5.0	0.513	4.2	NA	2.5	17.9	0.25	0.30	0.35	40.9



2036 weekend midday peak hour (with development traffic)

MOVEMENT SUMMARY

Site: 101 [1 - Neerabup Rd / Key Largo Dr / McAllister Blvd (Site Folder: General)]

Network: N101 [2036 Weekend Midday Peak Hour (Network Folder: General)]

Site Category: (None)

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: McAllister Blvd														
1	L2	12	5.0	12	5.0	0.161	23.1	LOS C	1.6	11.8	0.84	0.65	0.84	29.5
2	T1	47	5.0	47	5.0	*0.161	18.5	LOS B	1.6	11.8	0.84	0.65	0.84	14.9
3	R2	24	5.0	24	5.0	0.107	36.5	LOS D	0.8	6.1	0.88	0.70	0.88	17.9
Approach		83	5.0	83	5.0	0.161	24.4	LOS C	1.6	11.8	0.85	0.67	0.85	18.4
East: Neerabup Rd														
4	L2	29	5.0	29	5.0	0.022	7.3	LOS A	0.1	0.8	0.19	0.62	0.19	42.5
5	T1	727	8.3	727	8.3	0.778	33.8	LOS C	14.5	108.4	0.99	0.92	1.12	26.8
6	R2	299	5.0	299	5.0	*0.880	51.4	LOS D	13.7	100.4	1.00	0.99	1.39	10.8
Approach		1056	7.3	1056	7.3	0.880	38.1	LOS D	14.5	108.4	0.97	0.93	1.17	22.1
North: Key Largo Dr														
7	L2	226	5.0	226	5.0	0.431	27.0	LOS C	8.1	59.3	0.82	0.78	0.82	21.5
8	T1	39	5.0	39	5.0	0.431	22.4	LOS C	8.1	59.3	0.82	0.78	0.82	17.5
9	R2	160	5.0	160	5.0	*0.364	27.1	LOS C	4.9	35.6	0.85	0.76	0.85	24.7
Approach		425	5.0	425	5.0	0.431	26.6	LOS C	8.1	59.3	0.83	0.77	0.83	22.5
West: Neerabup Rd														
10	L2	234	5.0	234	5.0	0.192	9.5	LOS A	2.5	18.0	0.37	0.68	0.37	40.3
11	T1	865	8.3	865	8.3	*0.926	49.9	LOS D	21.9	164.0	1.00	1.13	1.48	20.8
12	R2	37	5.0	37	5.0	0.108	36.1	LOS D	1.2	8.9	0.86	0.72	0.86	21.6
Approach		1136	7.5	1136	7.5	0.926	41.1	LOS D	21.9	164.0	0.87	1.03	1.23	22.3
All Vehicles		2700	6.9	2700	6.9	0.926	37.1	LOS D	21.9	164.0	0.90	0.94	1.13	22.1

MOVEMENT SUMMARY

Site: 102 [2 - Site Crossover / Key Largo Dr (Site Folder: General)]

Network: N101 [2036 Weekend Midday Peak Hour (Network Folder: General)]

Site Category: (None)

Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	78	0.0	78	0.0	0.305	3.9	LOS A	0.0	0.0	0.00	0.07	0.00	28.8
2	T1	502	5.0	502	5.0	0.305	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	44.6
Approach		580	4.3	580	4.3	0.305	0.5	NA	0.0	0.0	0.00	0.07	0.00	39.8
West: Site crossover														
10	L2	93	0.0	93	0.0	0.089	2.1	LOS A	0.4	2.8	0.50	0.37	0.50	17.0
Approach		93	0.0	93	0.0	0.089	2.1	LOS A	0.4	2.8	0.50	0.37	0.50	17.0
All Vehicles		673	3.7	673	3.7	0.305	0.7	NA	0.4	2.8	0.07	0.11	0.07	33.9

MOVEMENT SUMMARY

Site: 103 [3 - Shopping Centre Access / Key Largo Dr (Site Folder: General)]

Network: N101 [2036 Weekend
Midday Peak Hour (Network Folder:
General)]

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL 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: Key Largo Dr														
1	L2	200	5.0	200	5.0	0.317	3.9	LOS A	0.0	0.0	0.00	0.18	0.00	47.4
2	T1	395	5.0	395	5.0	0.317	0.0	LOS A	0.0	0.0	0.00	0.18	0.00	44.3
Approach		595	5.0	595	5.0	0.317	1.3	NA	0.0	0.0	0.00	0.18	0.00	46.3
North: Key Largo Dr														
8	T1	263	5.0	263	5.0	0.288	2.4	LOS A	1.7	12.5	0.49	0.27	0.55	29.9
9	R2	133	5.0	133	5.0	0.288	8.4	LOS A	1.7	12.5	0.49	0.27	0.55	43.9
Approach		396	5.0	396	5.0	0.288	4.4	NA	1.7	12.5	0.49	0.27	0.55	39.6
West: Shopping Centre Access														
10	L2	100	5.0	100	5.0	0.442	7.8	LOS A	2.2	15.7	0.63	0.91	0.91	39.0
12	R2	162	5.0	162	5.0	0.442	13.3	LOS B	2.2	15.7	0.63	0.91	0.91	38.4
Approach		262	5.0	262	5.0	0.442	11.2	LOS B	2.2	15.7	0.63	0.91	0.91	38.6
All Vehicles		1253	5.0	1253	5.0	0.442	4.4	NA	2.2	15.7	0.29	0.36	0.36	41.7



Appendix E: Swept path diagrams

Swept path diagrams are included in this section of the report. Different coloured lines are employed to represent the various envelopes of the vehicle swept path, as described below:

Cyan represents the wheel path of the vehicle

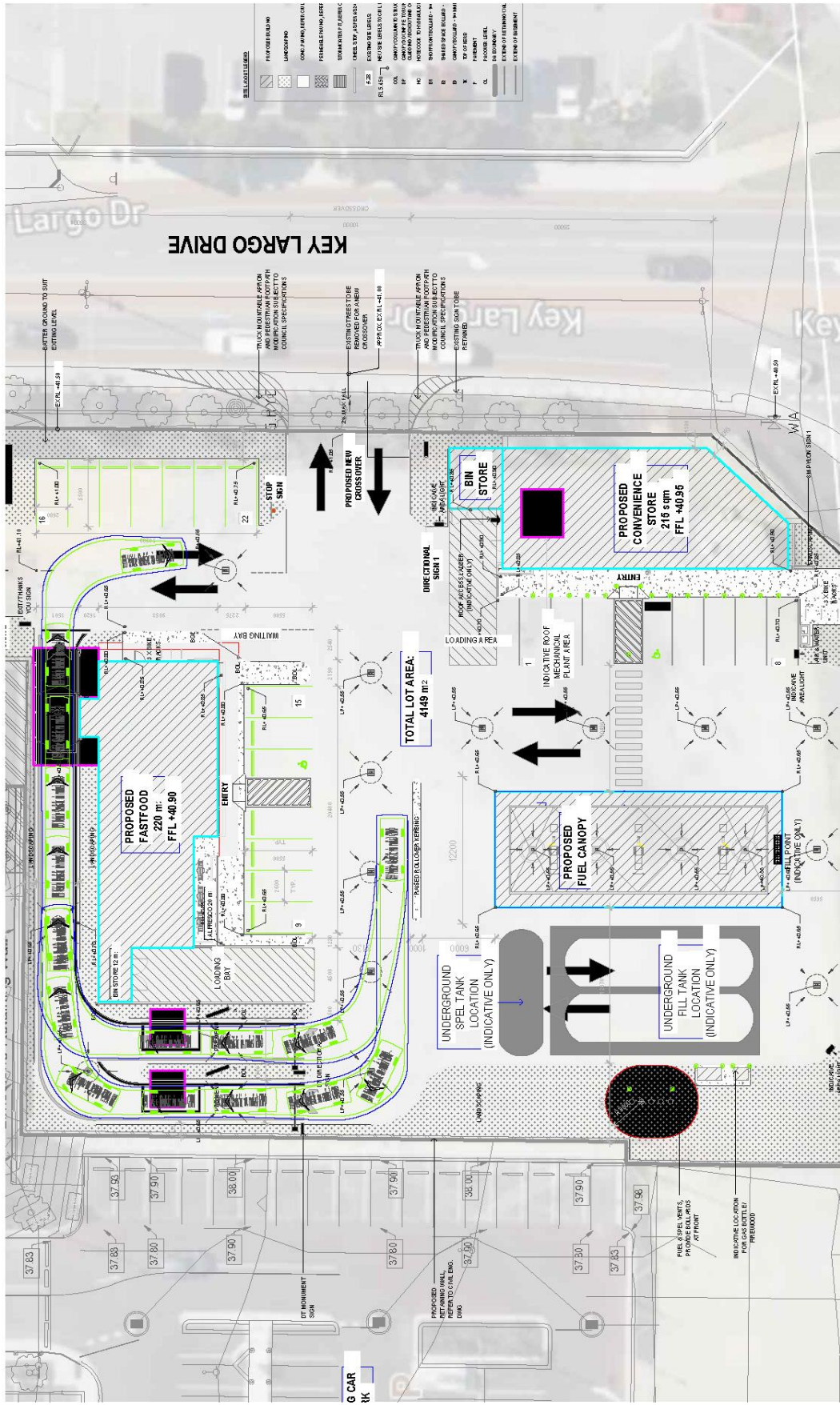
Green represents the vehicle body envelope

Blue represents a 300mm/500mm buffer line, offset from the vehicle swept path

Design vehicles tested include:

- AS2890.1: B99 Car
- AS2890.2: 19m Articulated Vehicles (AVs)
- AS2890.2: 8.8m Medium Rigid Vehicles (MRVs)

The swept path diagrams are also provided separately in high-quality, A3 PDF format.



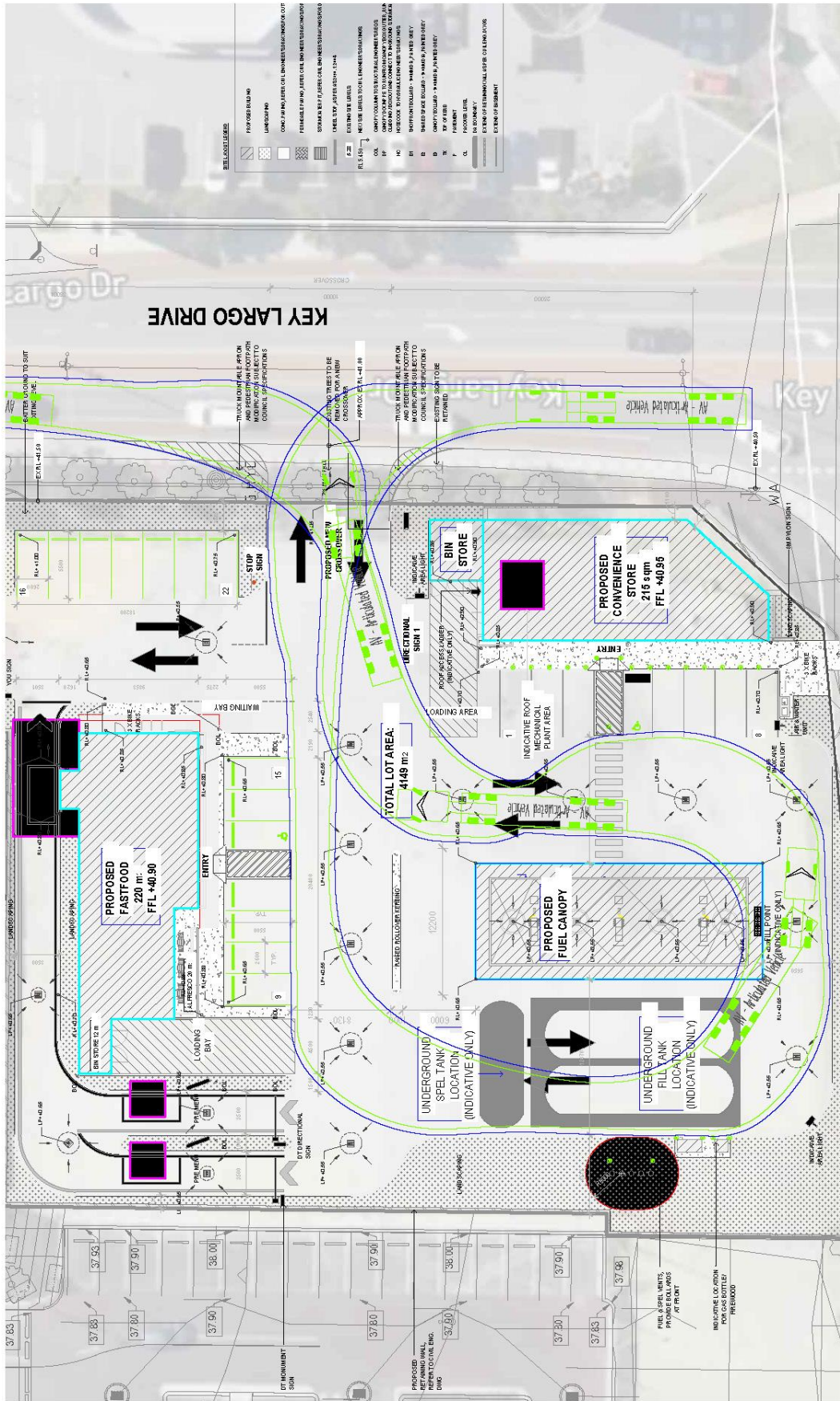
Date:	09/11/2023
Scale:	@ A3
Revision:	sk02

Project:	U23 119 - Cnr Neerabup Rd & Key Largo Dr, Clarkson Proposed Commercial Development
Drawing Title:	Siteplan analysis A52800 1 - 800 Car

Drawn by:	Paul Chantous
Client:	Clarkson Central Pty Ltd

Revision notes:	
Rev:	1
Date:	09/11/2023
Mark:	Dark blue line represents a 300mm buffer.

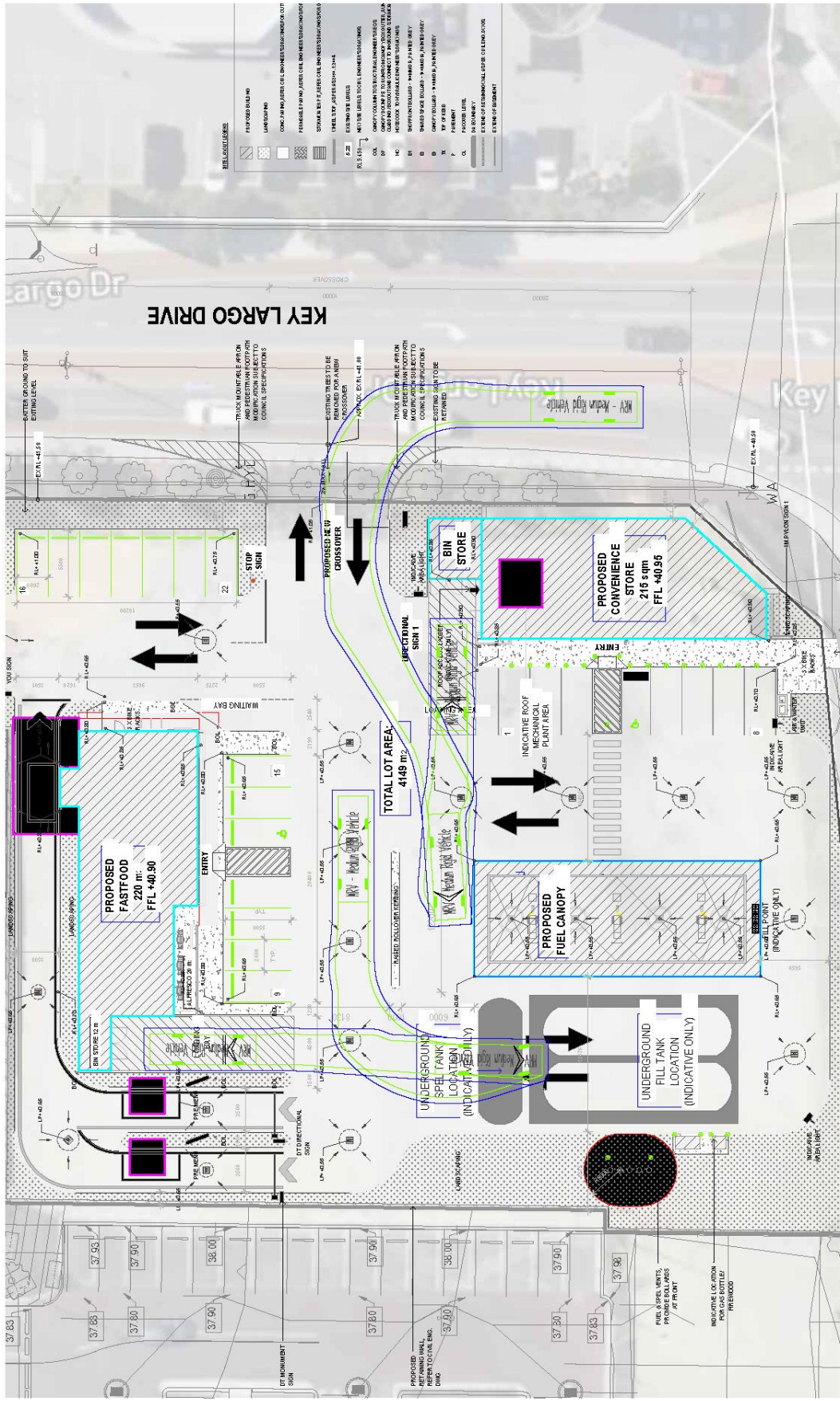




Project	U23.119 - Cnr Neerabup Rd & Key Largo Dr, Clarkson Proposed Commercial Development
Date	08/11/2023
Scale	@ A3
Revision	1:300
Revision:	sk03

Drawn by:	Paul Chantous
Client:	Clarkson Central Pty Ltd
Project:	U23.119 - Cnr Neerabup Rd & Key Largo Dr, Clarkson Proposed Commercial Development
Drawing Title:	Siteplan analysis AS2880.2 - 10m Adjusted Vehicle (AV)

Revision notes:	
Rev:	1
Date:	08/11/2023
Mark:	Dark blue line represents a 100mm buffer.



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19/04/2023 10:00 AM
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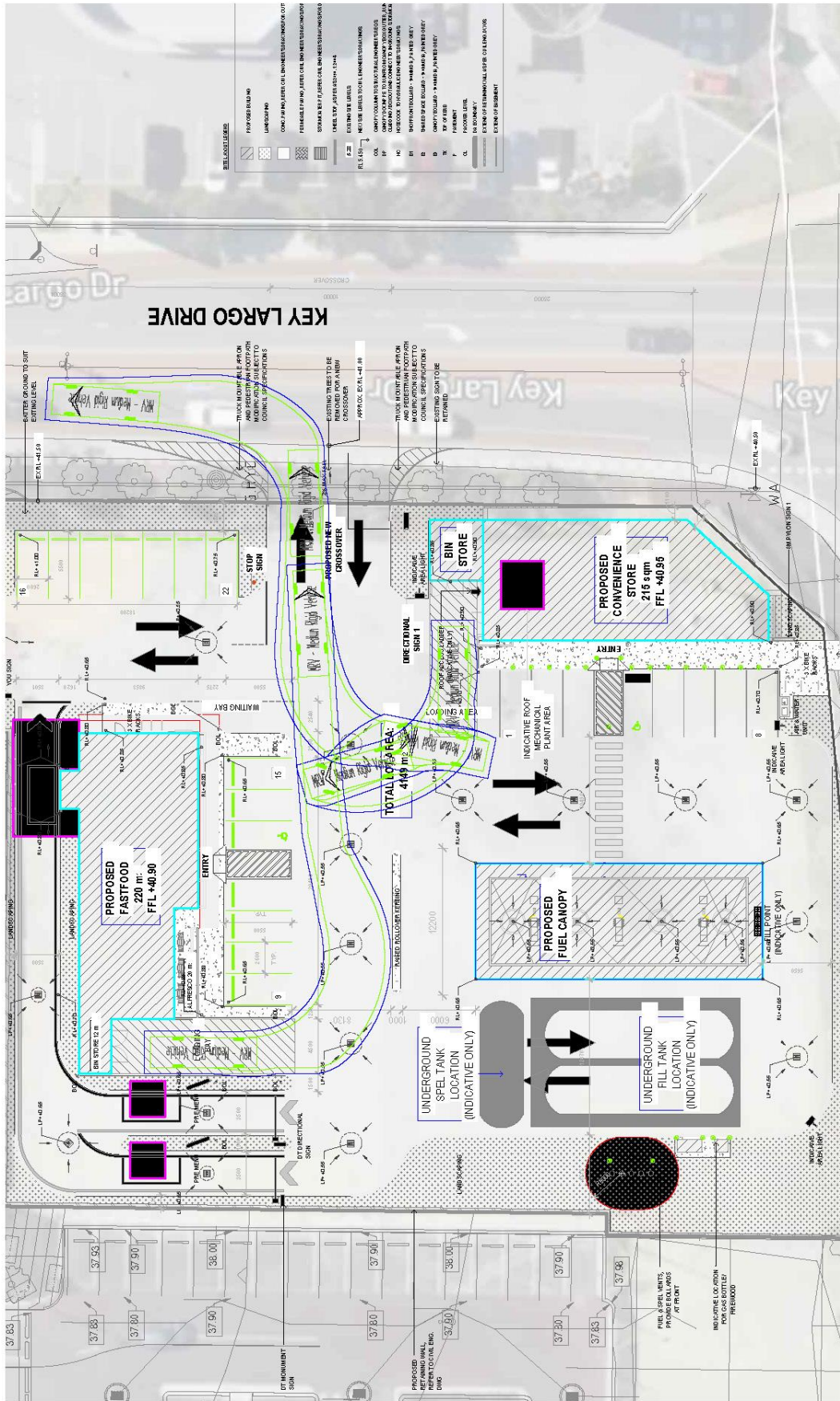
Date:	08/11/2023
Scale:	@ A3
Revision:	sk04

Project:	U23 119 - Cnr Neerabup Rd & Key Largo Dr, Clarkson Proposed Commercial Development
Drawing Title:	Siteplan analysis AS2880.2 - 8.5m Medium Rigid Vehicle (MRV)

Drawn by:	Paul Chantous
Client:	Clarkson Central Pty Ltd

Revision notes:	
Rev:	1
Date:	08/11/2023
Mark:	Dark blue line represents a 100mm buffer.





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Date:	09/11/2023
Scale:	@ A3
Revision:	sk05

Project:	U23.119 - Cnr Neerabup Rd & Key Largo Dr, Clarkson Proposed Commercial Development
Drawing Title:	Siteplan analysis AS2880.2 - 8.5m Medium Rigid Vehicle (MRV)

Drawn by:	Paul Chantous
Client:	Clarkson Central Pty Ltd

Revision notes:	
Rev:	Date:
1	09/11/2023
Mark:	Dark blue line represents a 100mm buffer.