

FABCOT

PROPOSED WOOLWORTHS SUPERMARKET  
MARMION AVENUE / NEERABUP ROAD, MINDARIE  
TRAFFIC AND PARKING ASSESSMENT

(Revised DA)

September 2021



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Issued on	9 September 2021	Amendments	Date
Version	V3	V2 Green site assessment added	28/5
Reference	1085	V3 Revised DA application	9/9/21

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## 1. EXECUTIVE SUMMARY

- 1.1. Riley Consulting has been commissioned by Fabcot Pty Ltd to prepare a traffic report for a proposed Woolworth's supermarket and speciality retail at 19 Neerabup Road, Clarkson (Mindarie).
- 1.2. The proposed development was approved at the Joint Assessment Development Panel on 8<sup>th</sup> July 2021. Further to the approval, consideration has been given to providing a more sustainable store by utilising the existing building on the subject site.
- 1.3. The overall floor area of the new proposal is slightly less than the approved development and as a result the forecast traffic demands reduce by 2% to 5% during the peak periods of site activity. As the forecast traffic demands reduce, the revised development proposal will have less traffic impact than identified for the approved development.
- 1.4. The key findings of the traffic review for the approved development are as follows and remain valid for the revised development application:
  - 1.4.1. The proposed development of a Woolworths supermarket on the subject site will replace an existing Woolworths supermarket located to the southern end of the Ocean Keys Shopping Centre. The entrances of the two stores are in the order of 100 metres apart.
  - 1.4.2. As the car parks share the same access roads, the proposed store will re-distribute traffic accessing the existing store. Based on the *RTA Guide to Traffic Generating Developments*, the proposed store could increase local traffic by about 1,313 movements per day. During the Thursday evening peak an additional 128 vehicle movements are forecast.
  - 1.4.3. The forecast traffic generation has an increase of less than 10% to the affected surrounding road network capacity and under the *WAPC Transport Assessment Guidelines for Developments*, the development would be deemed to have no material traffic impact.
  - 1.4.4. Under the WAPC guidelines, local intersections are not materially affected based on the forecast traffic increases to road approaches and turning lanes.
  - 1.4.5. Assessment of the proposed access to the site indicates that acceptable Levels of Service can be expected during peak periods of site activity.
  - 1.4.6. Analysis of the surrounding road network indicates that adequate capacity exists to accommodate the proposed development. All

affected intersections are shown to continue to operate in an acceptable manner.

- 1.4.7. Appropriate car parking is provided for the proposed development.

**Further Assessment**

- 1.4.8. Additional analysis has been undertaken to assess the proposed development traffic as new to the local road network and the development of pad sites as showrooms (not part of this DA). The assessment indicates that the intersection of Neerabup Road / Key Largo Drive will experience lower than desirable Levels of Service and operation close to capacity. Structure planning for the precinct identified that the provision of a left turn lane on Key Largo Drive approaching Neerabup Road would address future issues. Sidra assessment of a short left turn lane as indicated will address and reduced Levels of Service and capacity issues identified. Therefore previously identified structure planning network changes are still valid.
- 1.4.9. It is considered that the development of the proposed Woolworths store would not create the nexus for the left turn lane to be constructed as the development has minimal impact to this movement. However, the lane will provide additional capacity for right turning and through traffic from Key Largo Drive, which in turn reduces the traffic signal green time required.
- 1.4.10. A summary table of the traffic impacts under each scenario assessed in this report is shown below for convenience.
- 1.4.11. It can be seen from the summary table that under all scenarios the intersection of Neerabup Road and Key Largo Drive will operate within capacity with queue lengths that would not be considered excessive. However, continued residential development of the locality may change these findings.

**Summary of Traffic Scenarios Impacts to Neerabup Road / Key Largo Drive**

<b>Scenario</b>	<b>Worst LoS</b>	<b>Worst V/C</b>	<b>Max Queue (veh)</b>
Existing Conditions	D	0.857	12.8
<i>10 year design life</i>	<i>E</i>	<i>0.887</i>	<i>20.4</i>
Redistribution of Supermarket traffic	E	0.935	8.7
<i>10 year design life</i>	<i>E</i>	<i>0.904</i>	<i>23.0</i>
Supermarket traffic all new	E	0.884	11.2
<i>10 year design life (Supermarket all-new)</i>	<i>F</i>	<i>0.982</i>	<i>38.8</i>
Supermarket and pad sites	E	0.912	12.3
All sites + left turn lane Key Largo Drive	D	0.799	8.3
<i>10 year design life</i>	<i>D</i>	<i>0.849</i>	<i>19.6</i>

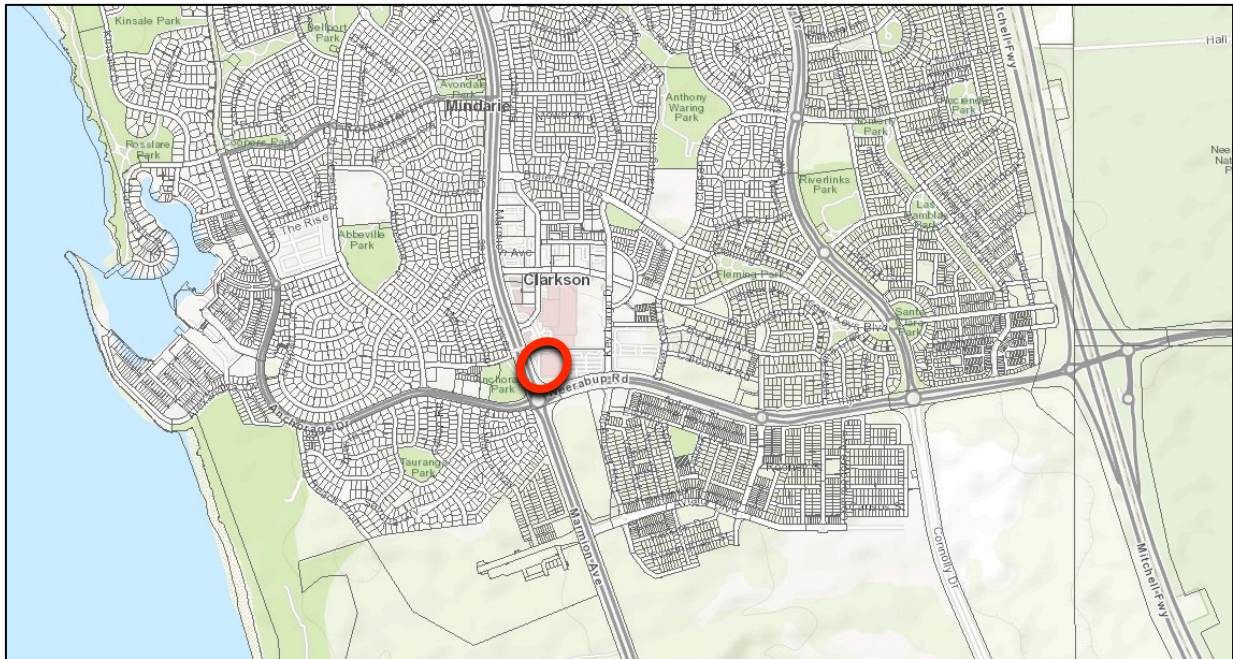
Not all Sidra scenarios are attached to this report but can be provided.

## 2. CHECKLIST

ITEM	PROVIDED	COMMENTS/PROPOSALS
Summary	✓	
Introduction/Background	✓	
name of applicant and consultant	✓	
development location and context	✓	
brief description of development proposal	✓	
background information	✓	
Existing situation	✓	
existing site uses (if any)	✓	
existing parking and demand (if appropriate)		N/A
existing access arrangements	✓	
existing site traffic	✓	
surrounding land uses	✓	
surrounding road network	✓	
traffic management on frontage roads	✓	
traffic flows on surrounding roads (usually AM and PM peak hours)	✓	
traffic flows at major intersections (usually AM and PM peak hours)	✓	Thursday PM
operation of surrounding intersections		No material change
existing pedestrian/cycle networks	✓	
existing public transport services	✓	
crash data	✓	
<b>Development proposal</b>	✓	
proposed land uses	✓	
table of land uses and quantities	✓	
access arrangements	✓	
parking provision	✓	
end of trip facilities	✓	
intersection layouts and controls	✓	
pedestrian/cycle networks and crossing facilities	✓	
public transport services	✓	
<b>Integration with surrounding area</b>	✓	
surrounding major attractors/ generators	✓	
committed developments and transport proposals	✓	
proposed changes to land uses within 1200 metres	✓	
adequacy of existing transport networks	✓	
deficiencies in existing transport networks	✓	
remedial measures to address deficiencies	✓	
<b>Analysis of transport networks</b>	✓	
assessment years	✓	
time periods	✓	
development generated traffic and distribution	✓	
parking supply and demand	✓	
base and 'with development' traffic flows	✓	
analysis of development accesses impact on surrounding roads impact on intersections	✓	
road safety	✓	
public transport access	✓	
pedestrian / cycle access/amenity	✓	
<b>Conclusions</b>	✓	

### 3. THE SITE AND SURROUNDING ROAD NETWORK

- 3.1. Riley Consulting has been commissioned by Fabcot to consider the traffic and transport impacts of developing a Woolworth's supermarket on the corner of Marmion Avenue and Neerabup Road, Mindarie.
- 3.2. Figure 1 indicatively shows the site location.



**Figure 1 Site Location (PlanWA)**

- 3.3. The subject site is located at 19 Neerabup Road, Clarkson. The subject site is the corner lot between Marmion Avenue and Neerabup Road.
- 3.4. The site was previously occupied by a Bunning's warehouse, which relocated further east on Neerabup Road.
- 3.5. Roads of importance to the proposed development are discussed below.

#### **Marmion Avenue**

- 3.6. Marmion Avenue is classified as a distributor type A road in the Main Roads *Functional Road Hierarchy*. It is constructed as a four lane divided road for the majority of its length. It has a posted speed limit of 80kph.
- 3.7. Traffic data available on the Main Roads web site indicates 22,935 vehicles per day (vpd) to the north of Neerabup Road and 23,896vpd south of Portofino Promenade. The data is attached at Appendix A. During the weekday, MRWA traffic data indicate 1,878 vehicles in the evening peak compared to the weekend peak of 1,729 vehicles.

3.8. Reference to Appendix B indicates Marmion Avenue would be considered to have capacity for 40,500vpd operating at Level of Service D. Higher traffic demands would be possible, but are undesirable.

3.9. Footpaths are provided to both sides of Marmion Avenue.

#### **Neerabup Road**

3.10. Neerabup Road is classified as a distributor type A road in the Main Roads *Functional Road Hierarchy*. It is constructed as a four lane divided road and provides access between Marmion Avenue and the Mitchell Freeway. It has a posted speed limit of 70kph.

3.11. Traffic data on the Main Roads website shows 18,295vd west of Marmion Avenue. The data is attached at Appendix A.

3.12. Traffic signals control the intersection of Key Largo Drive / McAlister Boulevard. Recent MRWA Scats data (peak extract) is attached at Appendix A.

3.13. Neerabup Road would also have capacity to carry 40,500vpd operating at Level of Service D.

3.14. Footpaths are provided to both sides of Neerabup Road.

#### **Key Largo Drive**

3.15. Key Largo Drive is classified as a local distributor road in the Main Roads *Functional Road Hierarchy*. It is constructed with a single pavement comprising two traffic lanes, with an additional southbound lane approaching the traffic signals at Neerabup Road.

3.16. Traffic data extracted from the MRWA traffic signal loops at Neerabup Road indicates a demand of about 10,500vpd. As a single carriageway road it would have capacity to carry 13,500vpd at Level of Service D (Appendix B).

3.17. Key Largo Drive provides the main southern entry to the Ocean Keys shopping centre.

3.18. A footpath is provided to the western side of Key Largo Drive (adjacent to the subject site).

#### **Pensacola Terrace (Northern Access Lane)**

3.19. Pensacola Terrace is classified as a local distributor in the Main Roads *Functional Road Hierarchy*. It is constructed with a single pavement of approximately 7.2 metres. It has a posted speed limit of 50kph.

3.20. Pensacola Terrace provides access to and from Marmion Avenue to the south side of the Ocean Keys shopping centre and links to Key Largo Boulevard. Movements at Marmion Avenue are restricted to left in / left out.



- 3.21. A roundabout controls is intersection with the northern access road linking back to Key Largo Drive and provides access to the shopping centre car parks and the subject site.
- 3.22. No traffic data is available for Pensacola Terrace. A peak hour count to the rear of the existing Woolworths store indicated 205 two-way movements. This suggests the lane to the north of the subject site is carrying about 2,000vpd. A Thursday peak hour count has been undertaken of the access lane intersection with Key Largo Drive for the purpose of this assessment and is attached at Appendix A.
- 3.23. As a single lane road, a capacity of 13,500vpd would be derived based on operation at Level of Service D. The spur leading to the subject site is not included in the hierarchy and is provided with a 6 metre wide pavement.

#### **Anchorage Drive**

- 3.24. Anchorage Drive is classified as a local distributor road in the Main Roads Functional Road Hierarchy. It is constructed as a four lane divided road between Marmion Avenue and Ocean Falls Boulevard. It has a posted speed limit of 60kph.
- 3.25. Traffic data available on the Main Roads web site indicates 16,749vpd to the west of Marmion Avenue (2020/21). The traffic data is attached at Appendix A.
- 3.26. Based on Appendix B it is estimated that Anchorage Drive would have capacity to carry 36,000vpd operating at Level of Service D.

#### **Crash Data**

- 3.27. Reference to MRWA crash data indicates that the roundabout at the intersection of Marmion Avenue and Neerabup Road has experienced 101 crashes in the past 5 years. The data shows that rear end crashes are most common (48.5%) with right angle movements comprising 23% of the total. Four crashes have required hospital attention and 57% of crashes have resulted in major damage. There have been no fatal crashes.
- 3.28. The intersection of Marmion Avenue / Pensacola Terrace has experienced 2 damage only crashes in the past 5 years.
- 3.29. The intersection of Neerabup Road and Key Largo Drive has experienced 42 crashes in the past 5 years. 74% of crashes are right turning movements. 3 crashes have required hospital attendance. There have been no fatalities.
- 3.30. It is hard to quantify if the proposed supermarket development would lead to an increase in crashes on the local road network. The proposed supermarket will attract patronage from the local area who are already using the local roads to access the existing store close-by. Given the increase to more localised trips, it is

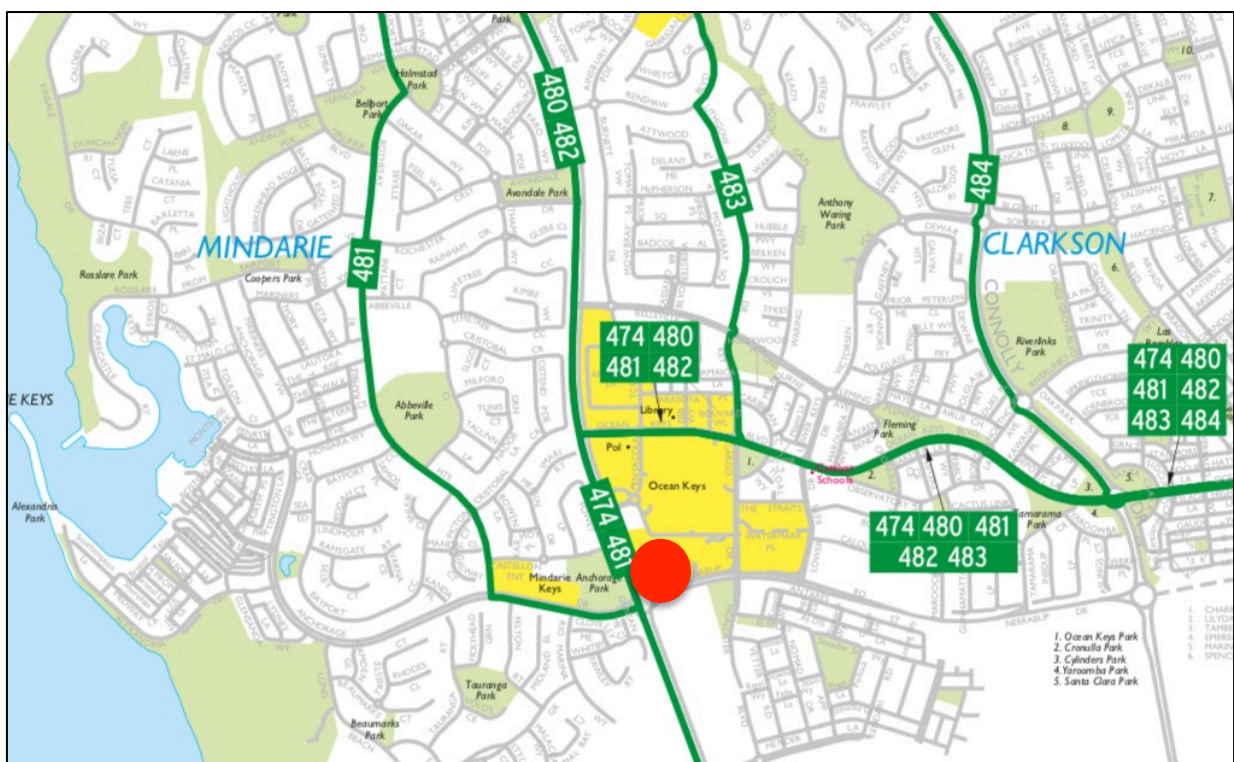
considered that the proposed supermarket would not be expected to impact local road safety in a detrimental manner.

**Other Development**

- 3.31. The subject site is one of the last land parcels available for large scale commercial development in the local area. A Bunning’s warehouse formally occupied the site.
- 3.32. In 2018 GTA prepared a structure plan traffic report for the subject land based on the development of 10,000m<sup>2</sup> of commercial land uses.
- 3.33. To the south of Neerabup Road, a new residential precinct is under construction that will continue to increase local traffic demands, of which the new development will attract home-based trips.

**Public Transport**

- 3.34. Reference to the Transperth web site indicates there are 2 bus services operating adjacent to the subject site. The bus service, route 474, operates along Marmion Avenue between Clarkson railway station and Joondalup town centre. It operates on an hourly basis Monday to Friday.
- 3.35. Route 481 operates on Marmion Avenue and Anchorage Drive between Clarkson railway station and Quinns Rocks. It operates on a half hourly basis during the week and hourly at weekends.
- 3.36. Figure 2 shows the local bus services.



**Figure 2 Local Bus Services**

### Cycling

- 3.37. An acceptable cycling environment exists in the Mindarie precinct, with on-street cycle lanes provided to Marmion Avenue and Neerabup Road.
- 3.38. A cycle route is provided to the north of the subject site to access the underpass to Marmion Avenue, creating a safe link between the residential area and the Ocean Keys shopping precinct.
- 3.39. Figure 3 shows the local cycling network.



**Figure 3 Local Cycling Network**

### Changes to Surrounding Transport Networks

- 3.40. There are no changes currently proposed to the local road network that would affect the proposed development.
- 3.41. An approved development is located to the south side of Neerabup Road that will see continued residential expansion. However, the locality of Mindarie is close to full development.

### Integration with Surrounding Area

- 3.42. The site is located at the southern edge of Ocean Keys shopping centre and fits well with surrounding development.
- 3.43. The site has been previously used as a Bunning’s warehouse and higher levels of traffic attraction are consistent with the previous and proposed land uses. It is calculated that the Bunning’s store had a floor area of about 9,500m<sup>2</sup>.

### Assessment Years and Time Periods

- 3.44. The proposed development is considered for the year of opening.

- 3.45. Shopping centres traditionally experience peak demand on Thursday evenings between 5pm and 6pm and Saturday mornings between 11am and 12pm.
- 3.46. Reference to local traffic data indicates that Marmion Avenue and Neerabup Road experience peak demands between 3pm and 4pm during the week and 12pm to 1pm at the weekend. It can be seen that the road network peak does not coincide with the peak demand of the proposed development.
- 3.47. However, reference to Ocean Keys Boulevard traffic signals data suggests the town centre peaks between 5pm and 6pm on a Thursday and then 1pm to 2pm on a Saturday. However, traffic demands on the surrounding road network are approximately 10% lower during the Saturday peak suggesting that acceptable operation during the Thursday PM peak will equate to acceptable operation during the Saturday peak.
- 3.48. For the purpose of traffic assessment the data for Thursday evening peak between 4pm and 5pm is used, as local road network traffic demands are slightly higher than the 5pm-6pm peak of the proposed development.
- 3.49. As the proposed development is a relocation of an existing adjacent supermarket, long term planning horizon assessment is not considered to be necessary. However, the City of Wanneroo has requested some alternative scenarios be tested, which are included.

#### **4. THE PROPOSED DEVELOPMENT**

- 4.1. It is proposed to develop the site to provide a Woolworths supermarket, a liquor store and speciality retail opportunity. In total a gross floor area of 5,526m<sup>2</sup> is expected. At grade parking is to be provided with access to Neerabup Road and the northern service lane.
- 4.2. It is noted that the site plan indicates pad sites fronting Key Largo Boulevard and the northern access lane. The pad sites are indicative of possible future uses, but do not form part of the development application.
- 4.3. Figure 4 shows the indicative concept plan for the site (Ref 2248-03-site plan B). Refer to the development application plans for detail.

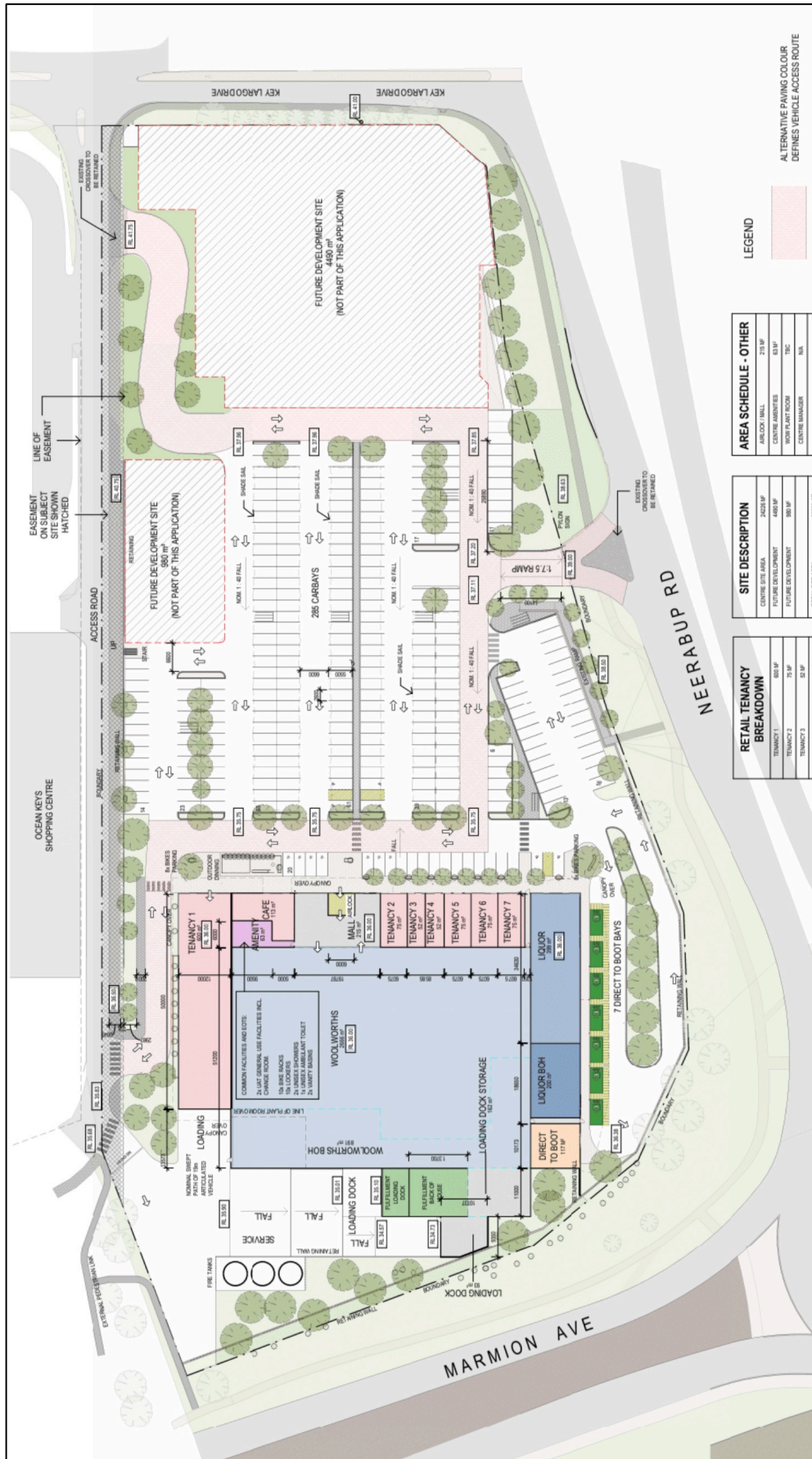


Figure 4 Site Layout Extract (refer to DA Plans)

## 5. TRAFFIC GENERATION AND DISTRIBUTION

- 5.1. The proposed development will relocate an existing Woolworths supermarket in Ocean Keys shopping centre to an adjacent site formally occupied by a Bunning's warehouse.
- 5.2. It would be normal in a traffic assessment to remove the previous use traffic generation of the site prior to distributing the traffic generated by the proposed development. However, in this instance, the old use of the site ceased many years ago and the use relocated further east on Neerabup Road. Therefore the previous use traffic is still on the local road network.
- 5.3. As the development will relocate an existing supermarket, it is appropriate to consider the existing supermarket traffic on the surrounding road network. However, it could be argued that the relocation of the store would actually have no traffic increase as customers are on the road network accessing the site next door. The relocation would only result in a redistribution of traffic on the network to the new access and egress points.
- 5.4. For the purpose of this traffic study, the existing supermarket floor area is used to identify the expected existing traffic demands and the new store floor area is used to identify what traffic increase could be anticipated. The difference between the two floor areas is distributed over the local road network to identify any potential traffic impacts.

### Existing Supermarket

- 5.5. The Woolworths supermarket in the Ocean Keys shopping centre has a floor area of about 3,647m<sup>2</sup> and has a primary access from a car park situated off Pensacola Terrace and a rooftop car park accessed from the northern lane (adjacent to the subject site). It is anticipated that the majority of shoppers to Woolworths will use these access points during peak trading periods.

### Trip Rates

- 5.6. For the purpose of the traffic assessment, reference is made to the RTA (NSW) *Guide to Traffic Generating Developments* (RTA Guide). Whilst the guide is now old (2002) and is not reflective of current trading, it is perhaps still the most reliable source for mixed shopping land uses within an Australian shopping centre.
- 5.7. The formula within the guide is used to identify the peak hour shopping centre trip rates for the various land uses to assist an understanding of how traffic demands can be expected to change. The model suggest:
  - Thursday  $V=155(\text{supermarket}) + 46 (\text{speciality}) / 1,000\text{m}^2 \text{ GLFA}$
  - Saturday  $V=147 (\text{supermarket}) + 108 (\text{speciality}) / 1,000\text{m}^2 \text{ GLFA}$

- Daily  $V=1475$  (supermarket) + 555 (speciality) / 1,000m<sup>2</sup> GLFA

5.8. The RTA Guide advises that generation rates given are based on (GFLA) which provides a better indication of trip generation than gross floor area. As a general guide, the RTA advises that 100m<sup>2</sup> gross floor area equals 75m<sup>2</sup> gross leasable floor area. These factors are applied to the Gross Floor Areas advised by the architect.

### Existing Store

5.9. The existing store has a gross floor area of 3,647m<sup>2</sup> which equates to an area of about 2,735m<sup>2</sup> GLFA. Based on the RTA model the existing supermarket would be expected to generate:

Thursday PM peak	424 trips
Saturday Peak	402 trips
Daily	4,034 trips

### Approved Development

5.10. The proposed development will comprise of a Woolworths supermarket with a liquor store, speciality outlets and a cafe. The gross floor areas are as follows:

• Supermarket	3,812m <sup>2</sup>
• Liquor Store	599m <sup>2</sup> (inc BoH)
• Direct to boot + fulfilment centre	267m <sup>2</sup>
• Tenancies	1,118m <sup>2</sup>
• Total net area	5,796m <sup>2</sup>

5.11. As applied to the existing store, the gross floor areas are factored to reflect the GLFA. The liquor store is considered as supermarket floor area, which will tend to over estimate the potential traffic attraction (particularly when 200m<sup>2</sup> is a store room). The derived RTA GLFA floor areas for the purpose of trip generation are; Supermarket (food and liquor) 3,309m<sup>2</sup> Speciality 837m<sup>2</sup>. Applying the RTA formula indicates the following traffic generation:

• Thursday PM peak	552 trips
• Saturday Peak	576 trips
• Daily	5,347 trips

### Revised Development Application

5.12. The revised development application considers the following land uses;

• Supermarket	3,968m <sup>2</sup>
• Mini Major	450m <sup>2</sup>
• Direct to boot + fulfilment centre	176m <sup>2</sup>
• Tenancies	752m <sup>2</sup>
• Total net area	5,526m <sup>2</sup>

5.13. Applying the RTA formula indicates the following traffic generation:

• Thursday PM peak	540 trips
• Saturday Peak	547 trips
• Daily	5,200 trips

5.14. The revised development application is shown to reduce the overall floor area of the proposal by 250m<sup>2</sup>. Based on the RTA trip rate the revised development will generate up to 5% less vehicle movements during the peak periods of activity when compared to the approved development.

5.15. As forecast traffic demands are less than the approved development traffic demands, the findings of this traffic report will not change as a result of the amended development proposal.

**5.16. *It is concluded that the traffic impact assessment submitted for the approved development is appropriate to be used in support of the proposed revised development application.***

### Pass-by Trade

5.17. Reference to Austroads suggests that a supermarket / shopping centre can attract up to 50% of patronage from traffic already passing the site<sup>1</sup>.

5.18. In regard to the proposed development, it is feasible that all traffic is already passing the site accessing the existing store and other local stores, as the local area is an expanding residential precinct.

5.19. Structure planning of new residential areas would have forecast appropriate trips to the town centre.

5.20. For the purpose of this traffic report, no pass-by trips are assumed and the difference in traffic between the existing store and the new store will be assumed as new trips.

### Resultant Traffic Generation Based on Approved Development

5.21. Table 1 shows the forecast traffic generation of the proposed development and the resulting new trips that could access the local road network.

<sup>1</sup> Includes pass-by and diverted trips. ITE USA suggests 40%,



**Table 1 Forecast Traffic Generation**

Land Use	Daily trips	PM Peak	Saturday peak
Existing Supermarket	4,034	424	402
Development	5,347	552	576
<b>New Trips</b>	<b>+1,313</b>	<b>+128</b>	<b>+174</b>

**Distribution and Assignment**

- 5.22. Traffic attracted to the proposed supermarket will be drawn from the surrounding residential dwellings and from traffic using the Mitchell Freeway during the peaks.
- 5.23. As discussed, a Woolworths store is located to the north side of the northern access road and assessment of the traffic using that store and the existing peak traffic movements associated with Ocean Keys shopping centre has been undertaken.
- 5.24. Based on the data available, Table 2 shows the derived peak hour distribution. The assumptions have been applied to the existing store and the new store to determine the expected traffic increases to the surrounding road network.

**Table 2 Distribution Assumptions (Peak Hours)**

Peak	Movement	North	South	East	West
Thursday	Arrive	36%	20%	31%	13%
	Depart	52%	6%	28%	14%
Saturday	Arrive	43%	20%	31%	6%
	Depart	52%	1%	28%	19%
<b>Average</b>		<b>46%</b>	<b>12%</b>	<b>30%</b>	<b>13%</b>

- 5.25. The changes to the local road network traffic demands are shown in Appendix D.

**6. DAILY TRAFFIC IMPACT BASED ON APPROVED DEVELOPMENT**

- 6.1. Reference to the WAPC Transport Assessment Guidelines for Developments - (Volume 4) states that:  
*“where a traffic increase as a result of a proposed development is less than 10% of current road capacity, it would not normally have a material impact”.*
- 6.2. Table 1 shows the expected traffic increase as a result of the existing store relocating to the new site. In total it is calculated that the new store will generate an additional 1,313 vehicle movements per day to the surrounding road network.
- 6.3. Table 3 provides an assessment of the impact that the forecast traffic increases may have. The forecast is based on the impact to the roads operational capacity

at Level of Service D. In reality the actual capacity is as shown in Appendix B for a Level of Service F.

**Table 3 Daily Increases to Local Road Network**

Road	Increase	Capacity	% Capacity
Marmion Avenue north	341	40,500	0.84%
Marmion Avenue south	105	40,500	0.26%
Anchorage Drive	171	40,500	0.42%
Neerabup Road	420	40,500	1.04%
Key Largo Drive	263	13,500	1.94%

The increase of 13 vehicles to McAlister Boulevard is not shown above as structure planning will have accounted for shopping trips on this link.

- 6.4. It can be seen from Table 3 that the traffic increases to the surrounding road network are less than 10% of the capacity at a Level of Service D and therefore would be considered to have no material traffic impact based on the WAPC *Transport Assessment Guidelines for Developments*.
- 6.5. It is concluded that from a daily traffic flow perspective the proposed development can be accommodated by the local road network.

## 7. PEAK HOUR IMPACT BASED ON APPROVED DEVELOPMENT

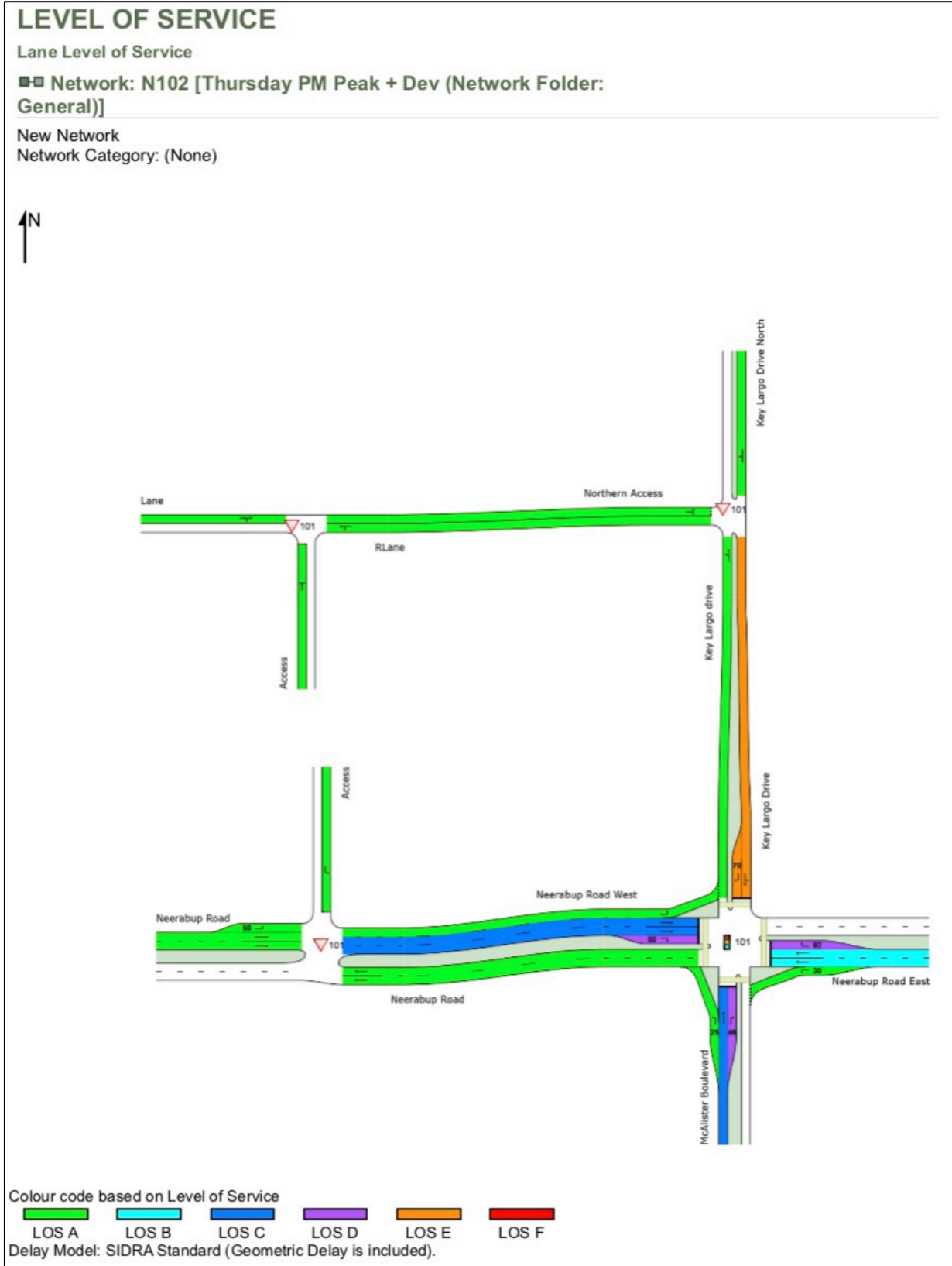
- 7.1. The assessment of the proposed development is shown to have little material traffic impact based on the change to daily traffic flows when measured against the WAPC guidelines.
- 7.2. During the peak periods of development activity, some impacts may occur to local intersections.
- 7.3. Reference to the WAPC *Transport Assessment Guidelines for Developments - (Volume 4)* states that the traffic assessment should cover “*all intersections where flows on any leg would increase by 10 per cent, or any movement by 20 per cent.*”
- 7.4. Traffic demand plans have been created to distribute the peak hour movements of the existing store and the proposed new store. The plans have been used to identify the expected change to turning movements at affected intersections. The forecast changes are shown in Appendix D for the Thursday and Saturday peaks.

- 7.5. The largest change to traffic demands is the increase to vehicles entering the store from Neerabup Road as would be expected. Changes to existing intersection approaches and turning movements are considered in Table 4 below and are shown in Appendix D. The table considers the highest change in any traffic movement.

**Table 4 Peak Intersection Changes**

Approach	Increase	Flow	% Change
Neerabup Rd Eastbound	+80	811	9.8%
Key Largo Drive northbound	+17	395	4.3%
Marmion Avenue Northbound	+15	1,480	<1%
Ocean Keys Boulevard	+13	557	2.3%

- 7.6. Table 4 demonstrates that no movement is forecast to experience an increase of more than 10% of the current peak hour flow and no turn movement changes by more than 20%. Therefore no further assessment is required under the WAPC guidelines.
- 7.7. Whilst no assessment is required under the WAPC assessment guidelines, Sidra analysis of the Neerabup Road / Key Largo Drive intersection is undertaken to ensure that intersection will continue to operate in an appropriate manner.
- 7.8. Sidra network has been used to consider the existing operation and the operation with the proposed development for the Thursday evening peak. The Sidra summary is attached at Appendix E.
- 7.9. Figure 5 shows the Level of Service plans for the local road network operation with the proposed development. The existing operation is shown in Appendix E.



**Figure 5 Sidra LoS Network Lane Operation With Development**

7.10. Figure 5 indicates that the only change will be to Key Largo Drive, which is shown to reduce from LoS D to LoS E. In reality the Sidra model shows that an

increase in delay of about 10 seconds occurs to this approach, which changes the LoS (noting that RTA LoS criteria would retain LoS D).

- 7.11. Assessment of possible signal phasing changes indicates that the approach Levels of Service could be maintained. However, as Mindarie is still expanding to the south with new residential development, it can be expected that future changes to the traffic signals will be required regardless of the subject site development.

## 8. GREEN FIELD SITE ASSESSMENT BASED ON APPROVED DEVELOPMENT

- 8.1. The City of Wanneroo has requested that the subject land be assessed as though it were a green field site. As a result, the base traffic flows, which include the existing Woolworth supermarket are retained and the proposed development is considered as a new supermarket to the area. This should reflect a scenario where the existing Woolworths supermarket is re-let to another major brand supermarket (considered to be an unlikely outcome).
- 8.2. Assessment as a new supermarket has used the same trip rate and overall traffic generation and applied the ITE pass-by trips of 40% (10<sup>th</sup> edition). Pass-by trips are not applied to movements turning towards the shopping centre. The use of the lower pass-by percentage (40% compared to Austroads 50%) will allow greater robustness to the assessment.
- 8.3. Table 4 reproduces Table 3 to consider the daily traffic impacts with all traffic being considered as new to the surrounding road network.

**Table 4 Daily Increases to Local Road Network All Traffic new**

Road	Increase	Capacity	% Capacity
Marmion Avenue north	1,290	40,500	3.1%
Marmion Avenue south	428	40,500	1%
Anchorage Drive	695	40,500	1.7%
Neerabup Road	1,711	40,500	4.2%
Key Largo Drive	1,069	13,500	7.9%

- 8.4. Table 4 shows that with all traffic considered as new to the surrounding road network, the changes will be less than 10% of road capacity. Under WAPC guidelines the proposed development will have no material traffic impact.

- 8.5. Appendix F shows the forecast traffic demands and the resultant traffic demands used in Sidra. The Sidra network plans and movement summaries are also included. Figure 6 shows the Network Level of Service.
- 8.6. The Sidra network model has been run to assess the impacts of the scenario and demonstrates that acceptable operation of the local road network can be expected. All approach lanes operate within capacity, but some lanes experience poorer Levels of Service as discussed below.
- 8.7. The intersection of Key Largo Drive and the Northern Access Road is shown to operate at Level of Service A for all approaches.
- 8.8. At the intersection of Neerabup Road, Key Largo Drive is shown to operate at Level of Service E approaching the traffic signals. Of importance to the road network operation is the queue on Key Largo Drive, which is shown to extend 56 metres from the stop line. The queue will not interfere with the northern access road intersection, which is approximately 90 metres from Neerabup Road.

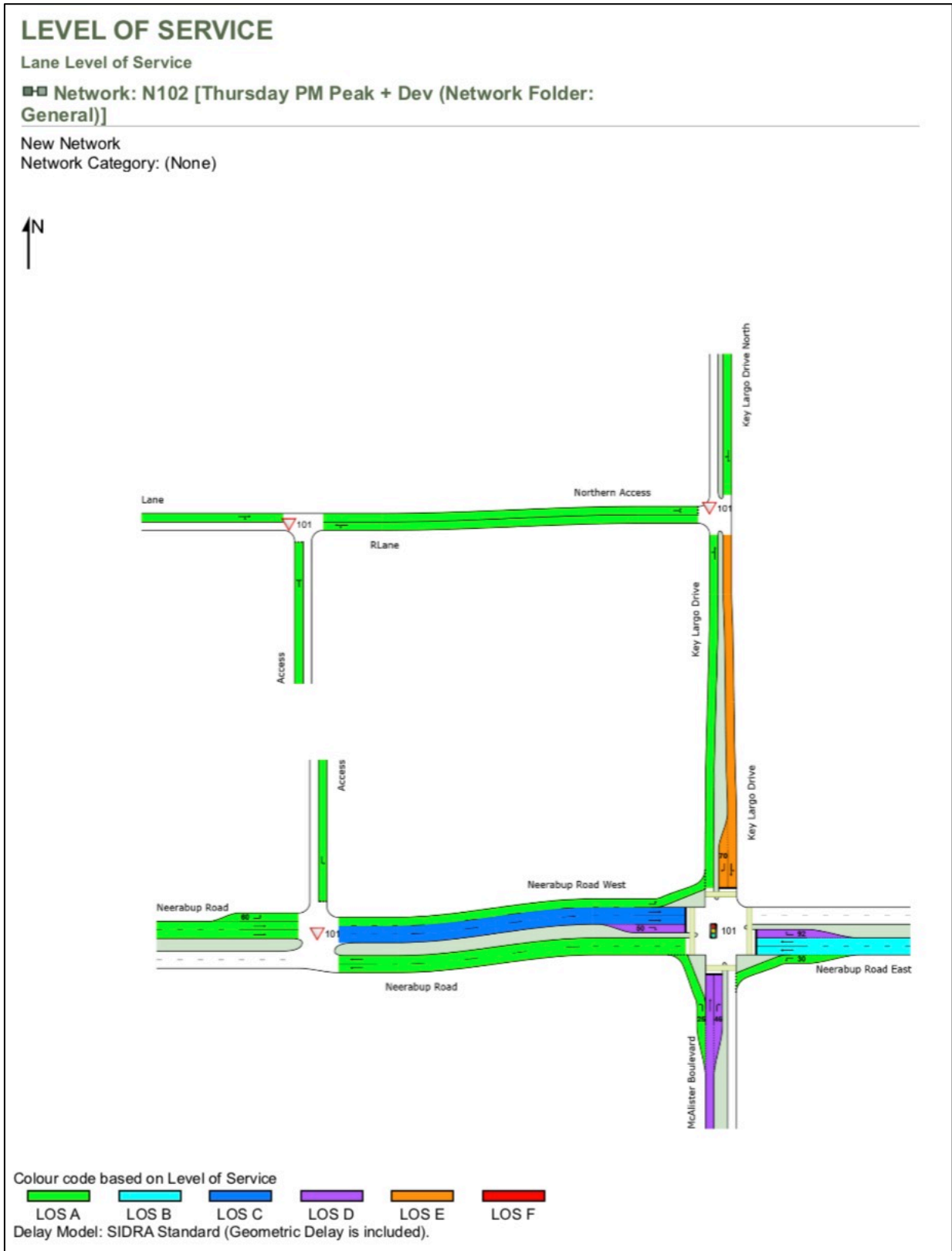


Figure 6 Sidra LoS Network Lane Operation With Development Traffic “New”

## 9. LONG-TERM ASSESSMENT BASED ON APPROVED DEVELOPMENT

- 9.1. It is noted that the proposed development of a Woolworths supermarket and speciality retail will replace an existing Woolworths supermarket within the Ocean Keys shopping centre. The development is also proposed upon land formally occupied by a Bunnings hardware store and adequate road network capacity should be available.
- 9.2. However, a new tenant for the vacant floor area within the shopping centre would be sought and as a result, some traffic increases may mature and is the reasoning behind the green field site assessment provided.
- 9.3. At this time it is speculation as to the future tenant, however, given that major food retailers are represented in the locality, it is unlikely that a major food retailer would lease the old supermarket in the shopping centre. It is most likely that a lesser traffic generating land use such as a discount store or department store type land use would occupy the building (or split into smaller tenancies).
- 9.4. Reference to the RTA guide suggests that during the peak periods, land uses such as discount and speciality stores generate about 70% less traffic than a supermarket. A department store is indicated to generate about 87% less traffic than a supermarket.
- 9.5. It can be seen that in the longer term, traffic demands as a result of the proposed Woolworths relocation may not actually change significantly.

### Assessment of Pad Sites

- 9.6. As indicated, there are pad sites that are NOT part of the proposed development application. However, the City of Wanneroo has requested that some form of assessment be provided. A basic assessment is attached at Appendix G.
- 9.7. The assessment suggests that the long term road network planning provided in the GTA structure plan traffic report is still valid.

## 10. ACCESS

- 10.1. Access to the proposed store will be taken using the existing cross overs to Neerabup Road and the northern lane and the provision of an additional cross over to the northern lane at its western end. The access arrangements reflect the intent of the local area plan in regard to access and movement through the subject land.
- 10.2. The access to Neerabup Road is restricted to left-in /left-out movements and was created for the previous use of the site (Bunning's). The access is appropriately located in regard to separation to Marmion Avenue and Key Largo Drive. An



existing left turn slip lane is provided for the access and a median splitter island to prohibit right turn movements. Analysis of the access indicates that Level of Service A is provided to all traffic movements (refer Figure 5 / 6).

10.3. Access to Neerabup Road is shown in Figure 7.



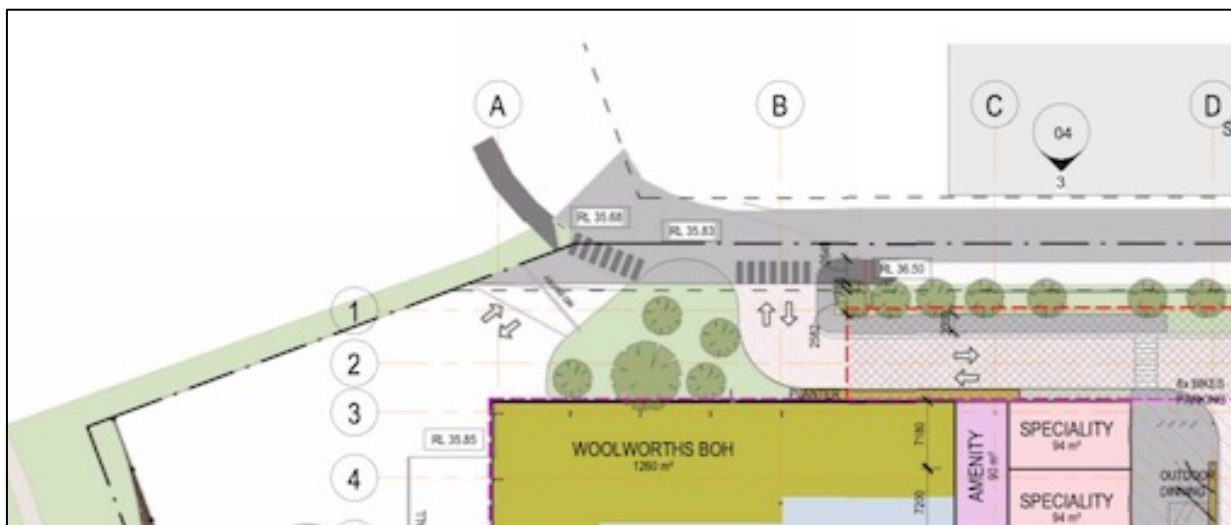
**Figure 7 Access to Neerabup Road**

- 10.4. Access to the northern lane will utilise the existing constructed access.
- 10.5. Analysis of the access to the lane indicates that during peak periods Level of Service A is provided to all movements. No interaction with Key Largo Boulevard is shown to occur (refer Figure 5/6). Analysis of the access uses all traffic distributed to the northern access road. However, the traffic movements at the access will be reduced due to the new western access to the northern access road.
- 10.6. The access is shown in Figure 8.



**Figure 8 Access the Northern Lane (East)**

- 10.7. A new access to the northern access lane is proposed adjacent to the service area access as shown in Figure 9. The access will provide convenient access to and from Marmion Avenue and is in close proximity to the existing Woolworths basement car park. The access location is convenient for shopping centre customers to access the Woolworths car park.
- 10.8. The access will also provide a clear and safer pedestrian route between the proposed development and the footpath linking to the Ocean Keys Shopping Centre.
- 10.9. As assessment of all traffic using a single access to the northern access lane has been undertaken, it is evident that both accesses will operate very well.
- 10.10. Visibility in accordance with AS2890.1 is provided at all access locations.



**Figure 9 Access the Northern Lane (West)**

**Service Vehicle Access**

- 10.11. Service vehicles will access the loading dock located to the west side of the proposed store. The dock can be accessed from the northern lane either from Marmion Avenue (Pensacola Terrace) or Key Largo Drive.
- 10.12. It is expected that at least one 19 metre articulated vehicle and about 10 rigid vehicles will access the site each day (up to 12 metres). During holiday periods up to 3 articulated vehicles may need to access the site during the day. It is expected that the number of deliveries will be slightly higher than the existing store located to the opposite side of the lane, due to the additional tenancies co-located on the site.
- 10.13. The loading dock is located off the northern access lane, opposite the existing Woolworths store loading dock. The access roads to the loading dock are already in use by 19 metre articulated vehicles for the existing Woolworths and were used by the previous use of the site (Bunning’s). No swept path assessment of the external road network is therefore considered to be required.
- 10.14. Assessment of the internal loading area indicates ample room for vehicles to enter the site and access the loading dock, then leave in forward gear. Figure 10 shows the delivery vehicle turn paths.
- 10.15. Access to the subject site can be achieved in an appropriate manner.



**Figure 10 Delivery Vehicle Swept Path**

## 11. PARKING

- 11.1. Car parking for the proposed new store is required to meet the City of Wanneroo's Town Planning Scheme, which requires that a shopping centre (<10,000m<sup>2</sup> NLA) should provide 7 bays for every 100m<sup>2</sup> NLA. However, advice from the City is that the shopping centre rate of 5.25 bays per 100m<sup>2</sup> should be applied.
- 11.2. Based on the architects plans, the derived NLA floor areas are;
- |             |                                       |       |
|-------------|---------------------------------------|-------|
| Supermarket | 3,158m <sup>2</sup> (@5.25/100)       | 165.7 |
| Speciality  | 652m <sup>2</sup> (@5.25/100)         | 34.2  |
| Café        | 100m <sup>2</sup> (80 persons @ 1 /4) | 20    |
- 11.3. Based on the derived NLA it can be seen that the proposed development would require (219.93) 220 bays to comply.
- 11.4. Reference to the architects plan for the site shows that 271 parking bays are provided on-site, comprising 263 standard bays, 6 powered bays, 6 parent bays and 6 direct to boot bays.
- 11.5. The number of car parking bays provided on site exceeds the requirements of the City of Wanneroo's Town Planning Scheme.

### Car Park Layout

- 11.6. The car has been laid out to allow easy entry from Neerabup Road and reduce the potential for car parking manoeuvres to interfere with the car park entry.
- 11.7. Access through the car park is not direct and fast movements between the accesses should not occur and thus rat-running through the car park will be minimised.
- 11.8. All parking bays are to be provided in accordance with AS2890.1.
- 11.9. It is to be noted that Woolworths have a policy that the car park should not include trip hazards, such as wheel stops and kerbing wherever possible. Where a wheel stop is considered to be beneficial, a bollard will be used as an alternative.
- 11.10. To the southern side of the store is a direct to boot facility (click and collect). The facility operates with a clockwise traffic direction. Whilst an anti-clockwise movement would normally be anticipated, the arrangement of the facility is based on Woolworths standard facility layouts that have been developed with the safety of staff and customers in mind.

### Cycle Parking

- 11.11. Cycle parking is required to be provided at the rate of 1 cycle bay for every 300m<sup>2</sup> GFA for staff and 1 bay per 500m<sup>2</sup> GFA for visitors. With a floor area of 5,526m<sup>2</sup> 18 staff and 11 visitor cycle bays should be provided.

- 11.12. The Architects plan indicates that 10 staff bays are provided with end of trip facilities. Two groups of 8 cycle racks are provided to the north and south of the proposed building (16 racks in total) offering safe and visible customer cycle parking.
- 11.13. It is noted that a shortfall of staff cycle bays may be perceived. However staff working at the supermarket will operate on shifts and the need for multiple showers will not exist. It is noted that many staff will be younger working a few hours each day (after school etc). Showers are provided for staff that may require such facilities. It is noted that the cycle parking requirement equally applies to all development and obviously an office land use with all staff typically working 9 til 5 would have a significantly greater need for EoT facilities. On this basis it is considered that the facilities provided would be adequate.
- 11.14. The shortfall in staff cycle racks is offset by ample visitor cycle racks located in appropriate and safe locations convenient to the working locations.

## **12. PUBLIC TRANSPORT, PEDESTRIANS AND CYCLISTS**

- 12.1. The proposed store has its frontage and pedestrian access to Neerabup Road and Pensacola Terrace. Appropriate footpaths are already provided and an underpass provides a safe crossing of Marmion Avenue.
- 12.2. As a stand-alone supermarket, it is unlikely that many customers would specifically walk to the store for groceries, but can be expected to walk between Ocean Keys shopping centre and the residential area west of Marmion Avenue. An appropriate path network is provided to the store.

### **Cycling**

- 12.3. There are cycle lanes in the locality and an underpass to Marmion Avenue that provides a safe link to the western residential area.
- 12.4. Bicycle parking is provided to the eastern side of the proposed store in proximity to the southern tenancy and the café. The cycle racks are conveniently located close to the store entry.
- 12.5. Good provision for cyclists is provided by the proposed development.

### **Public Transport**

- 12.6. As discussed, local bus routes service the locality. It is not anticipated that the proposed development would warrant the provision of additional services.
- 12.7. The proposed supermarket is ideally located for local people to undertake convenience shopping on their way home from work.

### **13. ROAD SAFETY**

- 13.1. The existing local road network is shown to be experiencing some crashes, which is not surprising given the high traffic demands. It is unlikely that any development would affect current crash levels at existing intersections, unless a significant volume occurred to an uncontrolled movement.
- 13.2. The proposed store would be attractive to local people who are cognisant of the surrounding road network. The majority of customers can be expected to already be passing the subject site using alternative facilities. It is expected that the majority of traffic to the new store will be a redistribution of existing customers using the adjacent Woolworths supermarket.
- 13.3. Given the traffic increase is more localised trips, it is considered that the proposed supermarket would not be expected to impact local road safety in a detrimental manner. Further, no material traffic impacts have been forecast.

## 14. CONCLUSION'S

- 14.1. The proposed development of a Woolworths supermarket at the corner of Marmion Avenue and Neerabup Road will replace an existing store currently located within the Ocean Keys shopping centre. The existing store is adjacent to the proposed store site.
- 14.2. The traffic forecasts used in this report are based on the RTA (NSW) shopping centre data which forecasts higher traffic generation than the ITE Trip Generation manual (USA) and data provided in the WAPC *Transport Assessment Guidelines*. This traffic report therefore provides a very robust assessment of the potential traffic impacts that may occur.
- 14.3. It is noted that whilst this report contemplates an increase in traffic as a result of the changes in floor areas, as an established centre the traffic demands may not change significantly.
- 14.4. The analysis of the forecast traffic increase indicates that, based on the WAPC guidelines, no material traffic impact is expected. Local roads and intersections are shown to experience changes to turning movements below the thresholds identified by the WAPC that would require further analysis.
- 14.5. Analysis of the Neerabup Road / Key Largo Drive intersection indicates that operation within capacity is retained and only minor increases to delay are indicated. As new development expands to the south, the traffic signals will need to be adjusted to cater for that increased demand.
- 14.6. If the proposed development traffic is considered as new to the local road network, the impacts are still non-material based on the WAPC guidelines. The impact to the intersection of Key Largo Drive / Neerabup Road is also quite similar, although some Levels of Service are undesirable.
- 14.7. It is concluded therefore that the local road network can accommodate the forecast traffic increases without significant detrimental impact. All approach traffic lanes operate within capacity and queues do not extend to affect upstream intersections.

### Consideration of Pad Sites

- 14.8. Further analysis including the potential development of pad sites on the subject site is included in Appendix G. The use of the pad sites is unknown and their development is not part of this DA.
- 14.9. Analysis of the pad sites with the supermarket as new traffic indicates that the intersection of Key Largo Drive / Neerabup Road will experience some pressure. However, the intersection will operate at Level of Service E and within capacity.

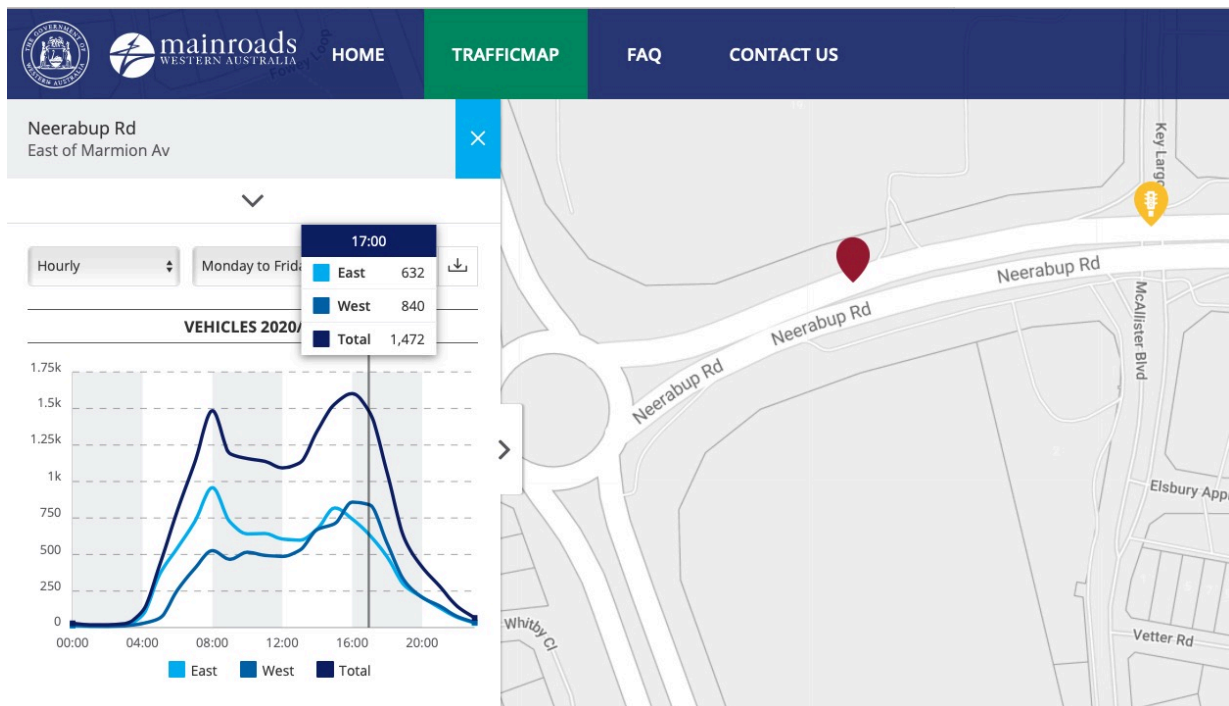
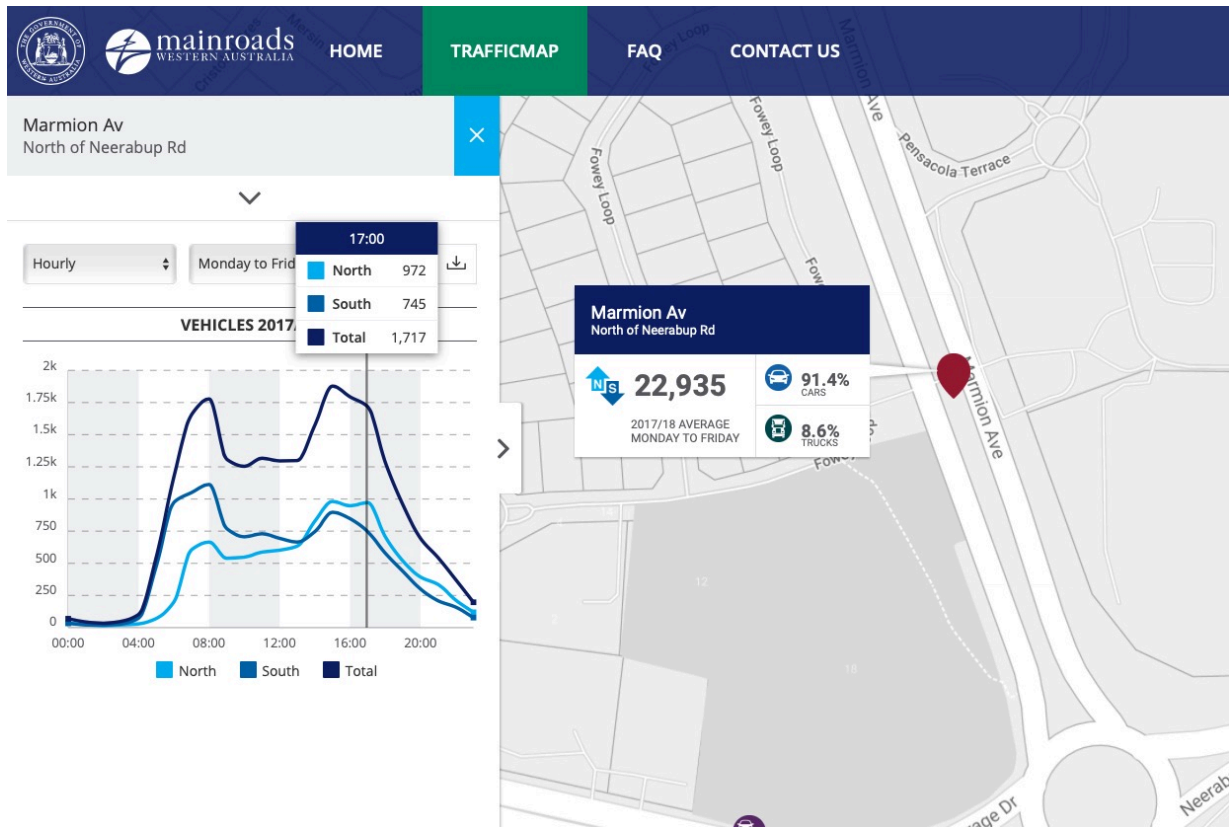
- 14.10. Assessment of the future intersection improvement outlined in the GTA structure plan traffic report has been undertaken. The improvement indicated the provision of a left turn slip lane on Key Largo Drive approaching Neerabup Road. The proposal is shown to improve the forecast Levels of Service.
- 14.11. It is concluded that the road network changes identified in the GTA structure plan traffic report are still appropriate.

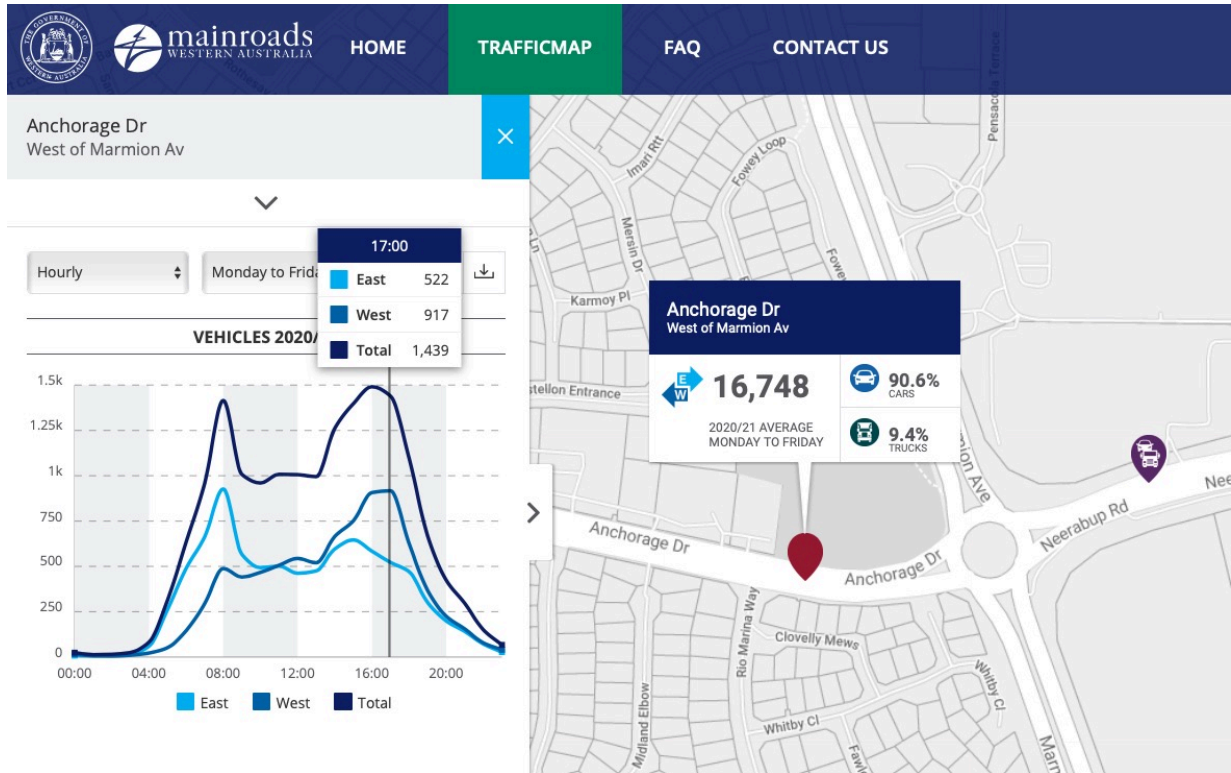
**Consideration of Revised Development Application**

- 14.12. This traffic impact assessment is based on the floor areas identified for the recently approved application for a Woolworths supermarket and associated retail based activities. It is proposed to utilise the existing building on the subject site and as such, a revised Development Application is required.
- 14.13. The overall floor area of the new proposal is slightly less than the approved development and as a result the forecast traffic demands reduce by 2% to 5% during the peak periods of site activity. As the forecast traffic demands reduce, the revised development proposal will have less traffic impact than identified for the approved development.

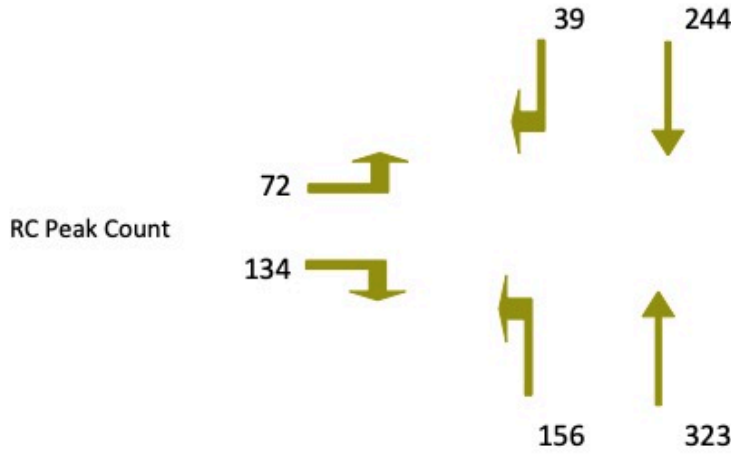


## APPENDIX A TRAFFIC DATA





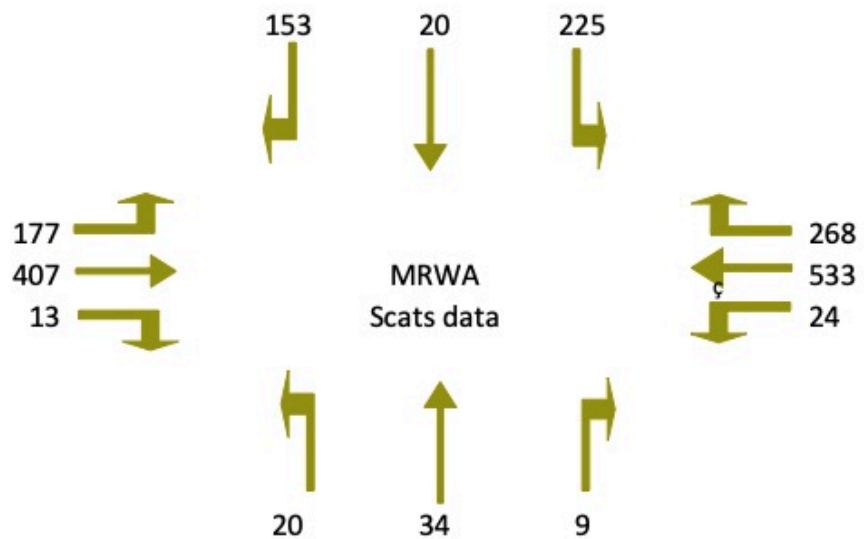
**Neerabup Road / Key Largo Drive  
Thursday PM Peak Hour  
Existing Traffic Demands**



**Subject Site**

**Key Largo Drive**

**Neerabup Road**



**McAlister Boulevard**

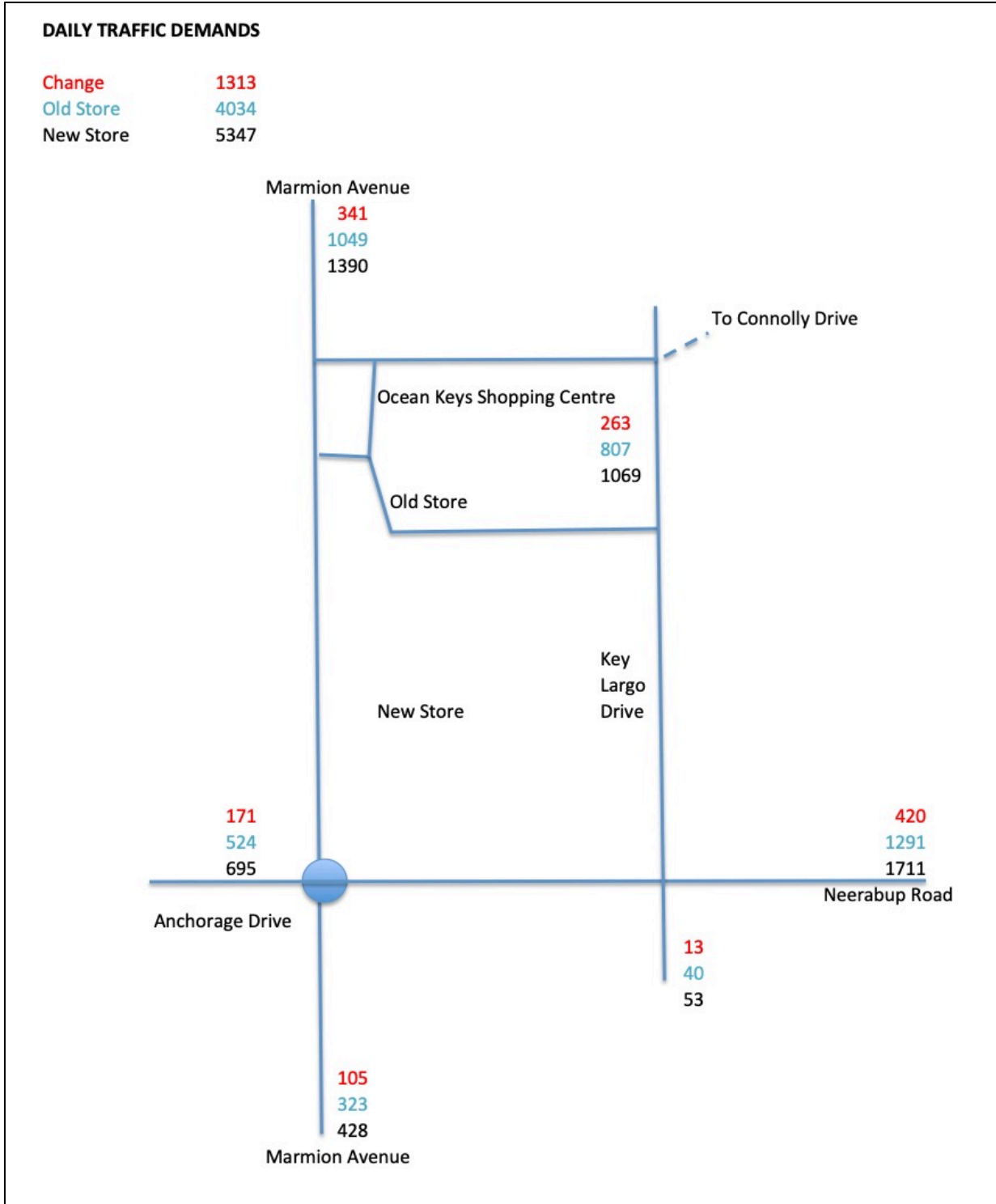
**APPENDIX B DAILY LEVELS OF SERVICE BY ROAD TYPE**

LOS	Single Carriageway	2-Lane Boulevard	Dual Carriageway (4-Lanes)	Dual Carriageway (4-lane Clearway)
A	2,400vpd	2,600vpd	24,000vpd	27,000vpd
B	4,800vpd	5,300vpd	28,000vpd	31,500vpd
C	7,900vpd	8,700vpd	32,000vpd	36,000vpd
D	13,500vpd	15,000vpd	36,000vpd	40,500vpd
E	22,900vpd	25,200vpd <sup>4</sup>	40,000vpd	45,000vpd
F	>22,900vpd	>25,200vpd <sup>4</sup>	>40,000vpd	>45,000vpd

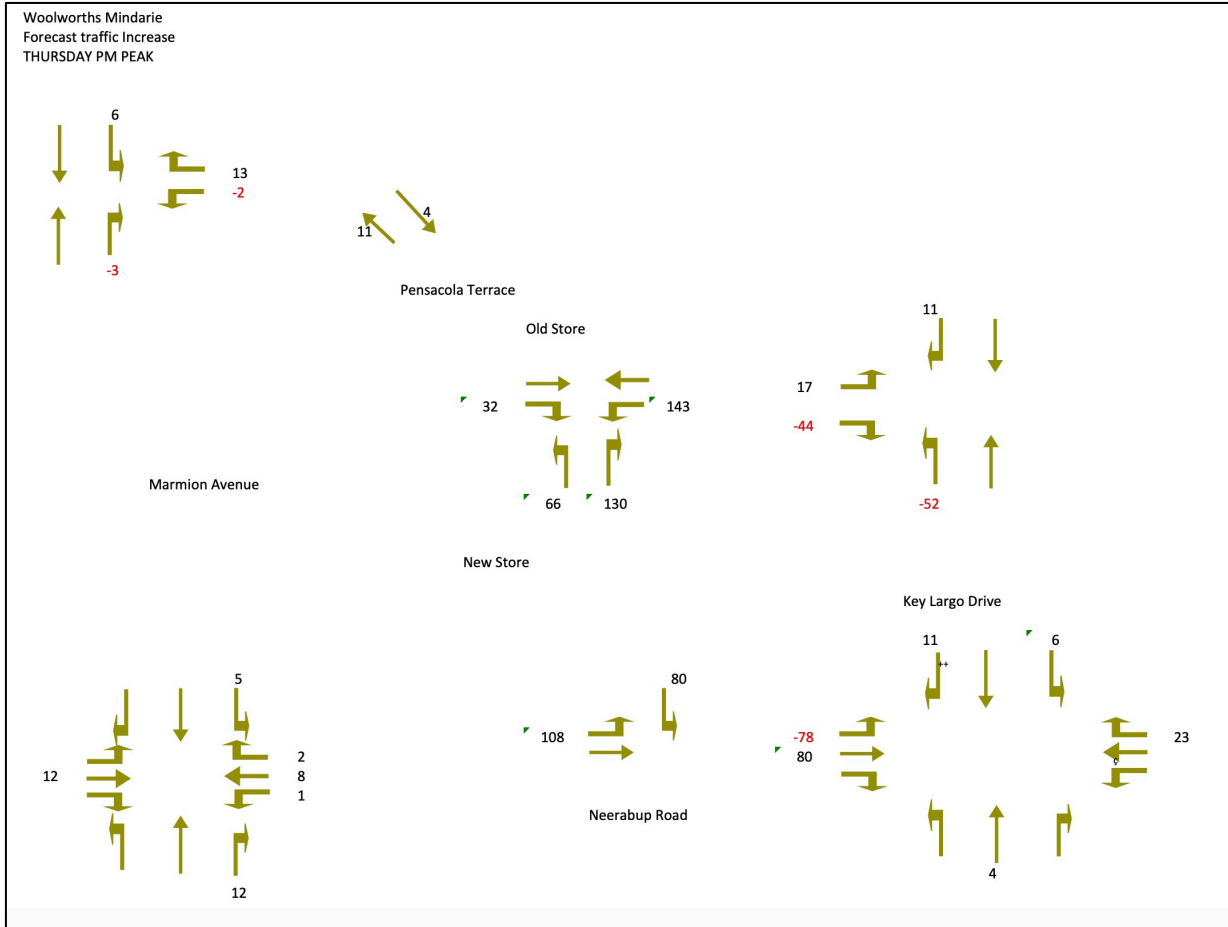
For the purposes of planning, the capacity of a road can be taken as the value between Level of Service E and F. However, a Level of Service D is the lowest preferred operational Level of Service.

Austrroads only considers hourly capacity rates ranging from 900v/hr per lane to 1,800 v/hr. True capacity would be these values x 24hrs. However, a factor of 10 is typically applied.

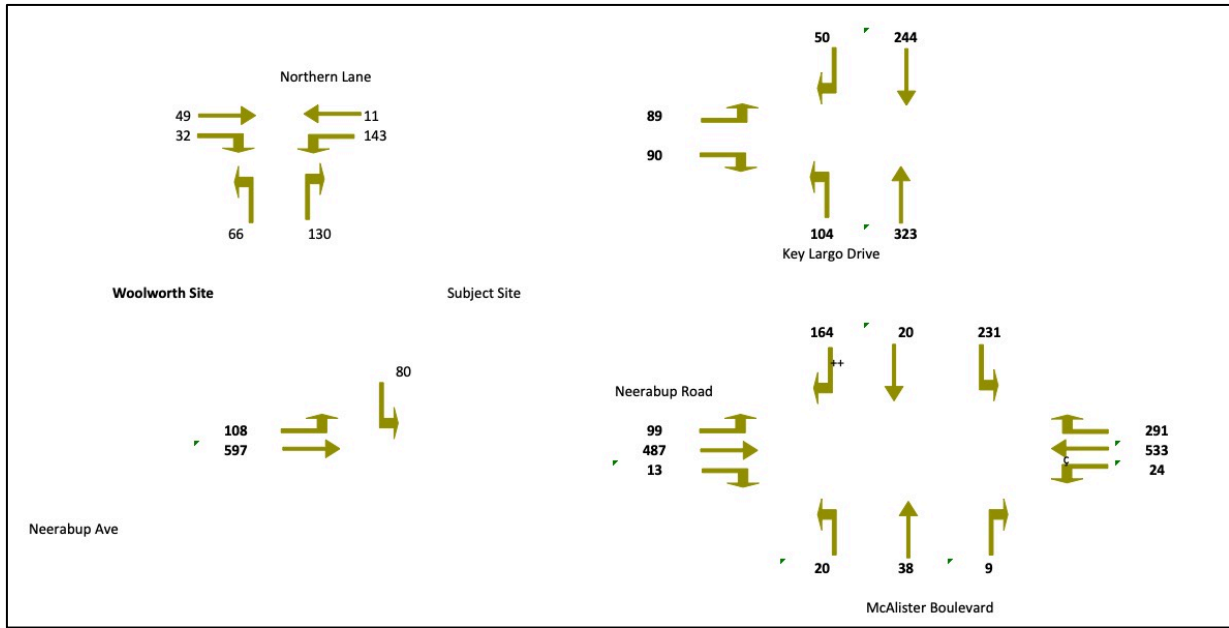
**APPENDIX C FORECAST DAILY DEMANDS**



**APPENDIX D CHANGES TO PEAK HOUR FLOWS**



**APPENDIX E SIDRA ANALYSIS TRAFFIC FLOWS**



### SIDRA ASSESSMENT OF EXISTING OPERATION

## LEVEL OF SERVICE

Lane Level of Service

■ ■ Network: N101 [Network1 (Network Folder: General)]

New Network

Network Category: (None)



Colour code based on Level of Service



Delay Model: SIDRA Standard (Geometric Delay is included).

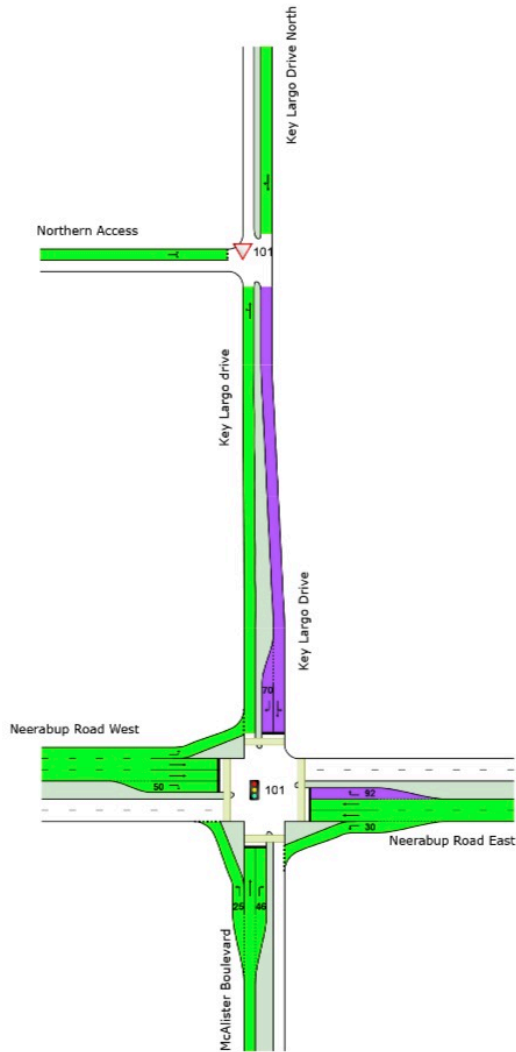


### DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

■ ■ Network: N101 [Thursday PM Base (Network Folder: General)]

New Network  
Network Category: (None)




Colour code based on Degree of Saturation



## Existing Operation

## MOVEMENT SUMMARY

 Site: 101 [NeerPM1 (Site Folder: General)]

 Network: N101 [Thursday  
PM Base (Network Folder:  
General)]

Neerabup Road / Key Largo

Existing PM Peak

Site Category: Base Year

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	AVERAGE 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: McAlister Boulevard														
1	L2	21	0.0	21	0.0	0.017	7.0	LOS A	0.1	0.6	0.25	0.59	0.25	51.0
2	T1	36	0.0	36	0.0	0.113	31.5	LOS C	0.7	5.2	0.89	0.65	0.89	30.0
3	R2	9	0.0	9	0.0	0.051	41.9	LOS D	0.2	1.5	0.93	0.67	0.93	35.2
Approach		66	0.0	66	0.0	0.113	25.2	LOS C	0.7	5.2	0.69	0.63	0.69	36.6
East: Neerabup Road East														
4	L2	25	0.0	25	0.0	0.017	6.2	LOS A	0.1	0.4	0.17	0.58	0.17	53.7
5	T1	561	3.0	561	3.0	* 0.510	15.5	LOS B	4.1	29.4	0.88	0.73	0.88	44.6
6	R2	282	1.0	282	1.0	* 0.874	50.2	LOS D	7.9	55.6	1.00	0.99	1.39	22.9
Approach		868	2.3	868	2.3	0.874	26.5	LOS C	7.9	55.6	0.90	0.81	1.03	36.4
North: Key Largo Drive														
7	L2	237	1.0	237	1.0	0.857	49.1	LOS D	7.0	49.6	1.00	0.99	1.35	25.5
8	T1	21	0.0	21	0.0	* 0.857	43.8	LOS D	7.0	49.6	1.00	0.99	1.35	26.0
9	R2	161	1.0	161	1.0	* 0.873	53.5	LOS D	4.5	31.8	1.00	1.01	1.50	16.7
Approach		419	0.9	419	0.9	0.873	50.5	LOS D	7.0	49.6	1.00	1.00	1.41	22.4
West: Neerabup Road West														
10	L2	186	1.0	186	1.0	0.151	8.6	LOS A	1.2	8.4	0.37	0.65	0.37	27.1
11	T1	428	3.0	428	3.0	0.427	26.9	LOS C	4.3	31.1	0.88	0.73	0.88	34.7
12	R2	14	0.0	14	0.0	* 0.098	44.8	LOS D	0.3	2.3	0.96	0.68	0.96	26.6
Approach		628	2.3	628	2.3	0.427	21.8	LOS C	4.3	31.1	0.73	0.70	0.73	33.7
All Vehicles		1982	1.9	1982	1.9	0.874	30.1	LOS C	7.9	55.6	0.86	0.81	1.00	31.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

## MOVEMENT SUMMARY

Site: 101 [KeyPM1 (Site Folder: General)]

Network: N101 [Thursday  
PM Base (Network Folder:  
General)]

Key Largo Drive / Northern Lane  
Existing PM Peak

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

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE 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 drive														
1	L2	164	0.0	164	0.0	0.266	5.5	LOS A	0.0	0.0	0.00	0.19	0.00	16.3
2	T1	340	3.0	340	3.0	0.266	0.0	LOS A	0.0	0.0	0.00	0.19	0.00	57.0
Approach		504	2.0	504	2.0	0.266	1.8	NA	0.0	0.0	0.00	0.19	0.00	41.9
North: Key Largo Drive North														
8	T1	257	3.0	257	3.0	0.171	0.6	LOS A	0.2	1.5	0.20	0.09	0.20	56.9
9	R2	41	0.0	41	0.0	0.171	7.8	LOS A	0.2	1.5	0.20	0.09	0.20	46.3
Approach		298	2.6	298	2.6	0.171	1.6	NA	0.2	1.5	0.20	0.09	0.20	54.9
West: Northern Access														
10	L2	76	0.0	76	0.0	0.273	7.1	LOS A	0.5	3.2	0.50	0.75	0.52	46.8
12	R2	141	0.0	141	0.0	0.273	9.5	LOS A	0.5	3.2	0.50	0.75	0.52	26.2
Approach		217	0.0	217	0.0	0.273	8.7	LOS A	0.5	3.2	0.50	0.75	0.52	39.0
All Vehicles		1019	1.8	1019	1.8	0.273	3.2	NA	0.5	3.2	0.17	0.28	0.17	45.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

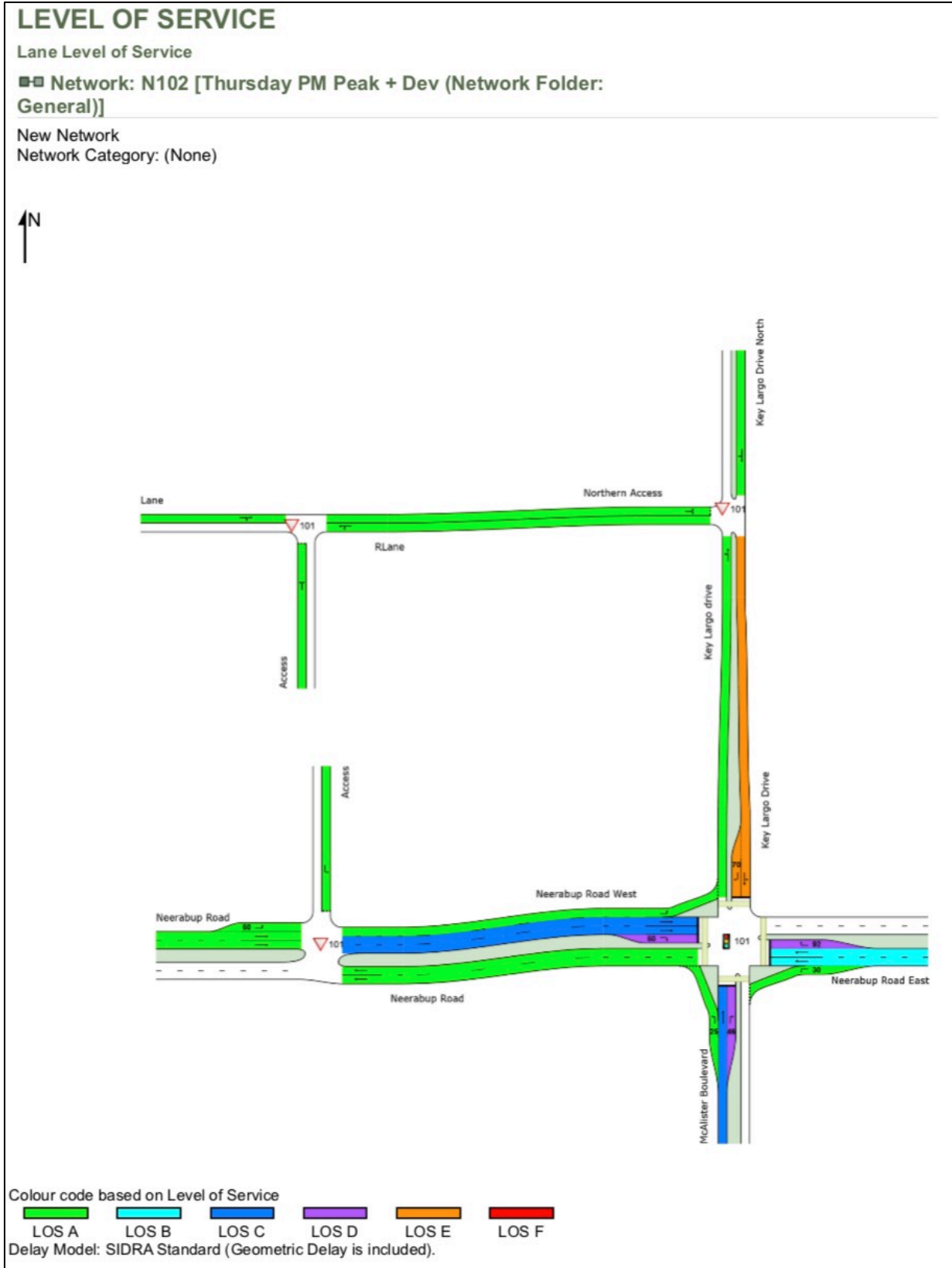
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

### SIDRA ASSESSMENT OF OPERATION WITH DEVELOPMENT



## DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

■ Network: N102 [Thursday PM Peak + Dev (Network Folder: General)]

New Network  
Network Category: (None)



Colour code based on Degree of Saturation



## OPERATION WITH PROPOSED NEW STORE

### MOVEMENT SUMMARY

Site: 101 [NeerPM2 (Site Folder: General)]

Network: N102 [Thursday  
PM Peak + Dev (Network  
Folder: General)]

Neerabup Road / Key Largo

PM Peak With Development

Site Category: Future Conditions 1

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	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h ]	[ HV % ]	[ Total veh/h ]	[ HV % ]				[ Veh. ]	[ Dist ]				
South: McAlister Boulevard														
1	L2	21	0.0	21	0.0	0.014	6.7	LOS A	0.1	0.5	0.22	0.58	0.22	49.3
2	T1	40	0.0	40	0.0	0.137	32.6	LOS C	0.9	6.0	0.90	0.67	0.90	29.4
3	R2	9	0.0	9	0.0	0.051	41.9	LOS D	0.2	1.5	0.93	0.67	0.93	35.2
Approach		71	0.0	71	0.0	0.137	26.2	LOS C	0.9	6.0	0.70	0.64	0.70	34.4
East: Neerabup Road East														
4	L2	25	0.0	25	0.0	0.017	6.2	LOS A	0.1	0.4	0.17	0.58	0.17	53.7
5	T1	561	3.0	561	3.0	*0.489	14.8	LOS B	4.0	28.7	0.87	0.72	0.87	40.6
6	R2	306	1.0	306	1.0	*0.886	51.0	LOS D	8.7	61.4	1.00	1.01	1.41	22.7
Approach		893	2.2	893	2.2	0.886	27.0	LOS C	8.7	61.4	0.89	0.81	1.03	32.5
North: Key Largo Drive														
7	L2	243	0.0	243	0.0	0.935	60.3	LOS E	8.2	57.4	1.00	1.11	1.63	22.6
8	T1	21	0.0	21	0.0	*0.935	54.7	LOS D	8.2	57.4	1.00	1.11	1.63	23.0
9	R2	173	0.0	173	0.0	*0.920	58.6	LOS E	5.1	35.9	1.00	1.08	1.66	6.7
Approach		437	0.0	437	0.0	0.935	59.3	LOS E	8.2	57.4	1.00	1.10	1.64	17.8
West: Neerabup Road West														
10	L2	104	0.0	104	0.0	0.085	8.7	LOS A	0.7	4.6	0.36	0.64	0.36	26.9
11	T1	513	3.0	513	3.0	0.511	27.6	LOS C	5.3	38.2	0.90	0.76	0.90	34.3
12	R2	14	0.0	14	0.0	*0.098	44.8	LOS D	0.3	2.3	0.96	0.68	0.96	26.6
Approach		631	2.4	631	2.4	0.511	24.8	LOS C	5.3	38.2	0.81	0.73	0.81	33.7
All Vehicles		2031	1.7	2031	1.7	0.935	33.3	LOS C	8.7	61.4	0.88	0.84	1.08	28.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

## MOVEMENT SUMMARY

▼ Site: 101 [KeyPM2 (Site Folder: General)]

■ Network: N102 [Thursday  
PM Peak + Dev (Network  
Folder: General)]

Key Largo Drive / Northern Lane  
PM Peak with 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	AVERAGE 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 drive														
1	L2	109	0.0	109	0.0	0.237	5.5	LOS A	0.0	0.0	0.00	0.14	0.00	49.9
2	T1	340	3.0	340	3.0	0.237	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	57.7
Approach		449	2.3	449	2.3	0.237	1.4	NA	0.0	0.0	0.00	0.14	0.00	57.2
North: Key Largo Drive North														
8	T1	257	3.0	257	3.0	0.178	0.6	LOS A	0.3	1.8	0.23	0.11	0.23	56.4
9	R2	53	0.0	53	0.0	0.178	7.5	LOS A	0.3	1.8	0.23	0.11	0.23	56.4
Approach		309	2.5	309	2.5	0.178	1.8	NA	0.3	1.8	0.23	0.11	0.23	56.4
West: Northern Access														
10	L2	94	0.0	94	0.0	0.214	4.5	LOS A	0.4	2.5	0.46	0.68	0.46	49.1
12	R2	95	0.0	95	0.0	0.214	6.5	LOS A	0.4	2.5	0.46	0.68	0.46	19.1
Approach		188	0.0	188	0.0	0.214	5.5	LOS A	0.4	2.5	0.46	0.68	0.46	44.0
All Vehicles		947	1.9	947	1.9	0.237	2.3	NA	0.4	2.5	0.17	0.24	0.17	54.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

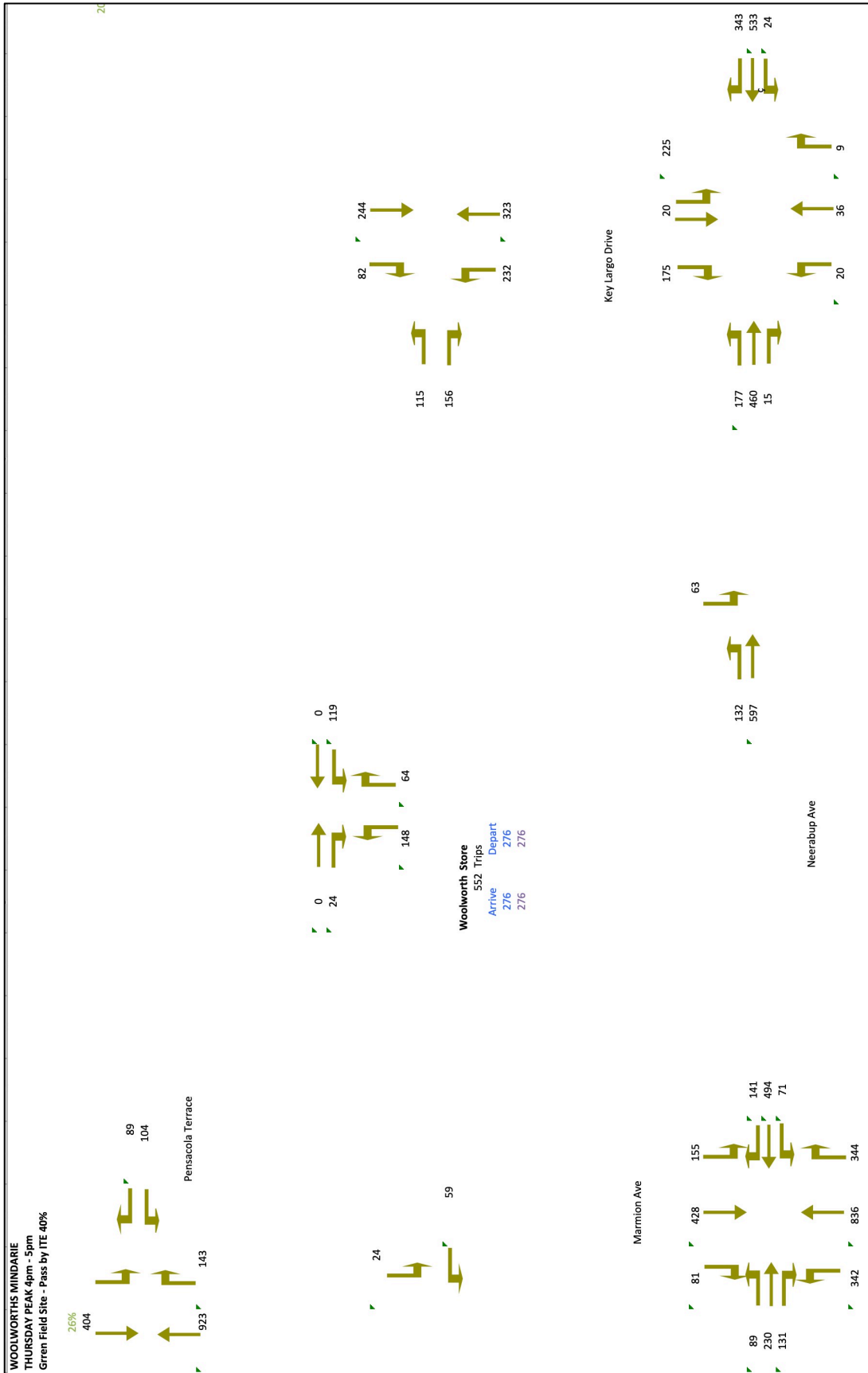
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

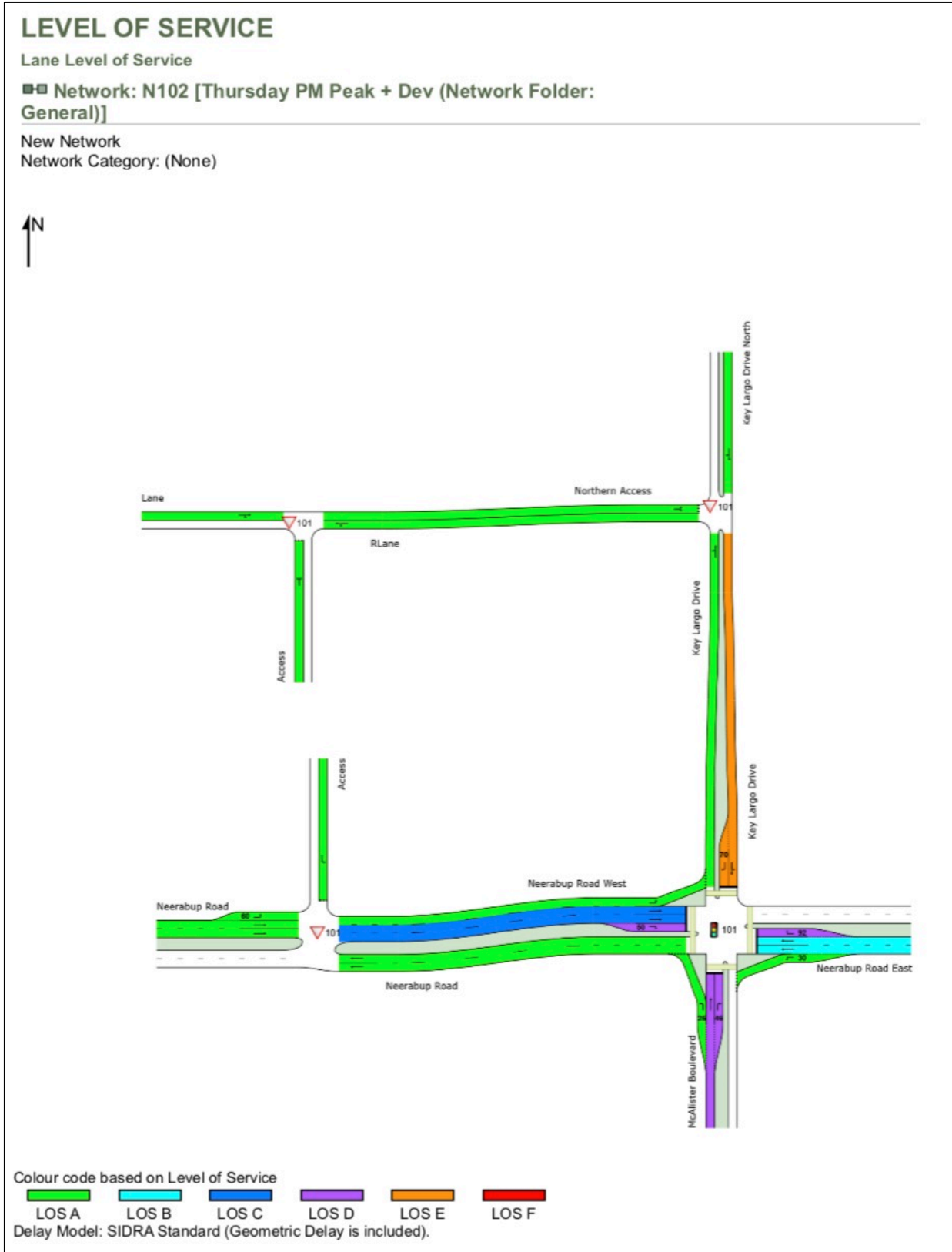
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

### APPENDIX F SIDRA ANALYSIS TRAFFIC FLOWS FOR GREEN FIELD SITE ASSESSMENT





**Sidra Network Diagrams And Movement Summaries.**

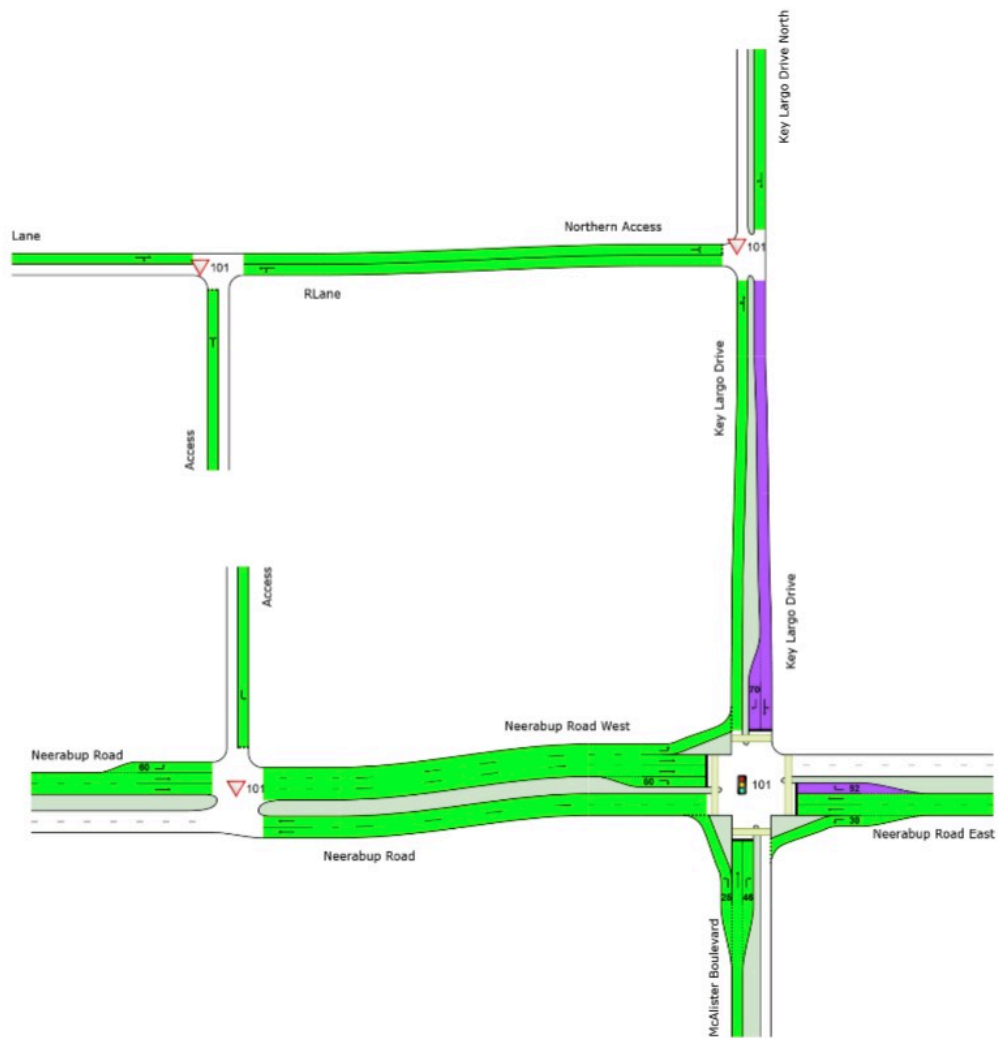


### DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

Network: N102 [Thursday PM Peak + Dev New (Network Folder: General)]

New Network  
Network Category: (None)



## MOVEMENT SUMMARY

Site: 101 [NearPM2 (Site Folder: General)]

Network: N102 [Thursday  
PM Peak + Dev (Network  
Folder: General)]

Neerabup Road / Key Largo

PM Peak With Green Field Site Development

Site Category: Future Conditions 2

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	AVERAGE 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: McAlister Boulevard														
1	L2	21	0.0	21	0.0	0.014	7.1	LOS A	0.1	0.7	0.23	0.58	0.23	48.8
2	T1	39	0.0	39	0.0	0.128	36.0	LOS D	0.9	6.4	0.90	0.66	0.90	28.0
3	R2	9	0.0	9	0.0	0.046	45.0	LOS D	0.2	1.6	0.92	0.67	0.92	34.2
Approach		69	0.0	69	0.0	0.128	28.5	LOS C	0.9	6.4	0.70	0.64	0.70	33.2
East: Neerabup Road East														
4	L2	25	0.0	25	0.0	0.016	6.1	LOS A	0.1	0.4	0.15	0.58	0.15	53.7
5	T1	561	3.0	561	3.0	* 0.440	15.5	LOS B	4.4	31.5	0.83	0.69	0.83	40.0
6	R2	361	1.0	361	1.0	* 0.881	53.2	LOS D	11.2	79.4	1.00	0.99	1.32	22.1
Approach		947	2.2	947	2.2	0.881	29.6	LOS C	11.2	79.4	0.87	0.80	1.00	31.1
North: Key Largo Drive														
7	L2	237	0.0	237	0.0	0.880	56.2	LOS E	8.0	56.3	1.00	1.00	1.38	23.6
8	T1	21	0.0	21	0.0	* 0.880	50.7	LOS D	8.0	56.3	1.00	1.00	1.38	24.0
9	R2	184	0.0	184	0.0	* 0.884	58.8	LOS E	5.8	40.4	1.00	1.01	1.46	6.7
Approach		442	0.0	442	0.0	0.884	57.1	LOS E	8.0	56.3	1.00	1.00	1.41	17.9
West: Neerabup Road West														
10	L2	186	0.0	186	0.0	0.157	9.7	LOS A	1.5	10.5	0.39	0.66	0.39	25.3
11	T1	484	3.0	484	3.0	0.518	32.2	LOS C	5.7	41.2	0.92	0.77	0.92	32.0
12	R2	16	0.0	16	0.0	* 0.128	50.7	LOS D	0.4	3.0	0.97	0.69	0.97	24.9
Approach		686	2.1	686	2.1	0.518	26.5	LOS C	5.7	41.2	0.78	0.74	0.78	31.2
All Vehicles		2145	1.6	2145	1.6	0.884	34.2	LOS C	11.2	79.4	0.86	0.82	1.00	27.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

## MOVEMENT SUMMARY

▼ Site: 101 [KeyPM2 (Site Folder: General)]

■ Network: N102 [Thursday  
PM Peak + Dev (Network  
Folder: General)]

Key Largo Drive / Northern Lane  
PM Peak with Green Field Site Assessment/Development

Site Category: Future Conditions 2  
Give-Way (Two-Way)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS		ARRIVAL FLOWS		Deg. Satn	Aver. Delay	Level of Service	AVERAGE 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 Drive														
1	L2	244	0.0	244	0.0	0.309	5.5	LOS A	0.0	0.0	0.00	0.25	0.00	44.7
2	T1	340	3.0	340	3.0	0.309	0.0	LOS A	0.0	0.0	0.00	0.25	0.00	56.2
Approach		584	1.7	584	1.7	0.309	2.3	NA	0.0	0.0	0.00	0.25	0.00	54.6
North: Key Largo Drive North														
8	T1	257	3.0	257	3.0	0.218	1.5	LOS A	0.4	3.2	0.38	0.18	0.38	54.2
9	R2	86	0.0	86	0.0	0.218	8.5	LOS A	0.4	3.2	0.38	0.18	0.38	54.2
Approach		343	2.2	343	2.2	0.218	3.2	NA	0.4	3.2	0.38	0.18	0.38	54.2
West: Northern Access														
10	L2	121	0.0	121	0.0	0.367	5.2	LOS A	0.8	5.3	0.52	0.76	0.65	47.2
12	R2	164	0.0	164	0.0	0.367	8.5	LOS A	0.8	5.3	0.52	0.76	0.65	15.9
Approach		285	0.0	285	0.0	0.367	7.1	LOS A	0.8	5.3	0.52	0.76	0.65	39.7
All Vehicles		1213	1.5	1213	1.5	0.367	3.7	NA	0.8	5.3	0.23	0.35	0.26	51.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

## APPENDIX G ASSESSMENT OF PAD SITES POTENTIAL

As has been discussed, the development of the remaining pad sites on the subject land does not form part of this development application. Development options are purely speculative and are provided at the request of the City of Wanneroo.

Based on the close proximity of the Ocean Keys shopping centre and other commercial sites, showroom land uses are perhaps the most likely future development option. With a total land area of 5,470m<sup>2</sup> and a plot ratio of 50%, 2,735m<sup>2</sup> gross floor area of showroom could mature. No calculations in regard to the land area required for car parking have been undertaken, which may result in a lower floor area.

Reference to the GTA structure plan traffic report suggests a trip rate of 19/100m<sup>2</sup> per day with 2.7 /100m<sup>2</sup> during the evening peak and 3.9/100m<sup>2</sup> on Saturday.

### Pad Site Traffic Generation

Land Use	Daily trips	PM Peak	Saturday Peak
Showroom	520	74	107

Assuming the showroom traffic is considered new to the network (highly improbable) the traffic demands shown below could arise. The traffic distribution is the same as the supermarket home based trips.

The forecast traffic demands include the proposed supermarket traffic as new (green field site assessment demand). The forecast demands are input to the Sidra Network Model.

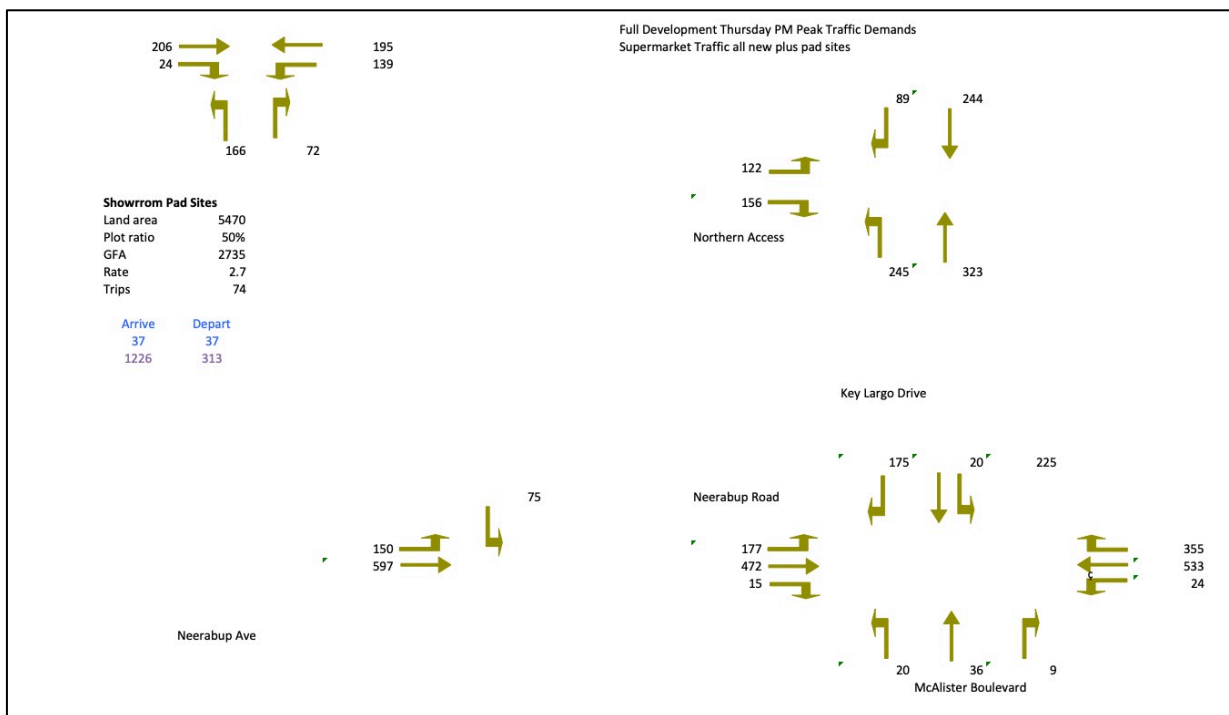
Further analysis is also provided to assess the traffic signal upgrade identified in the GTA structure plan traffic report. The upgrade suggested the provision of an additional left turn lane on Key Largo Drive. Sidra analysis has included the suggested lane as a 60 metre slip with yield conditions at Neerabup Road.

### Conclusions

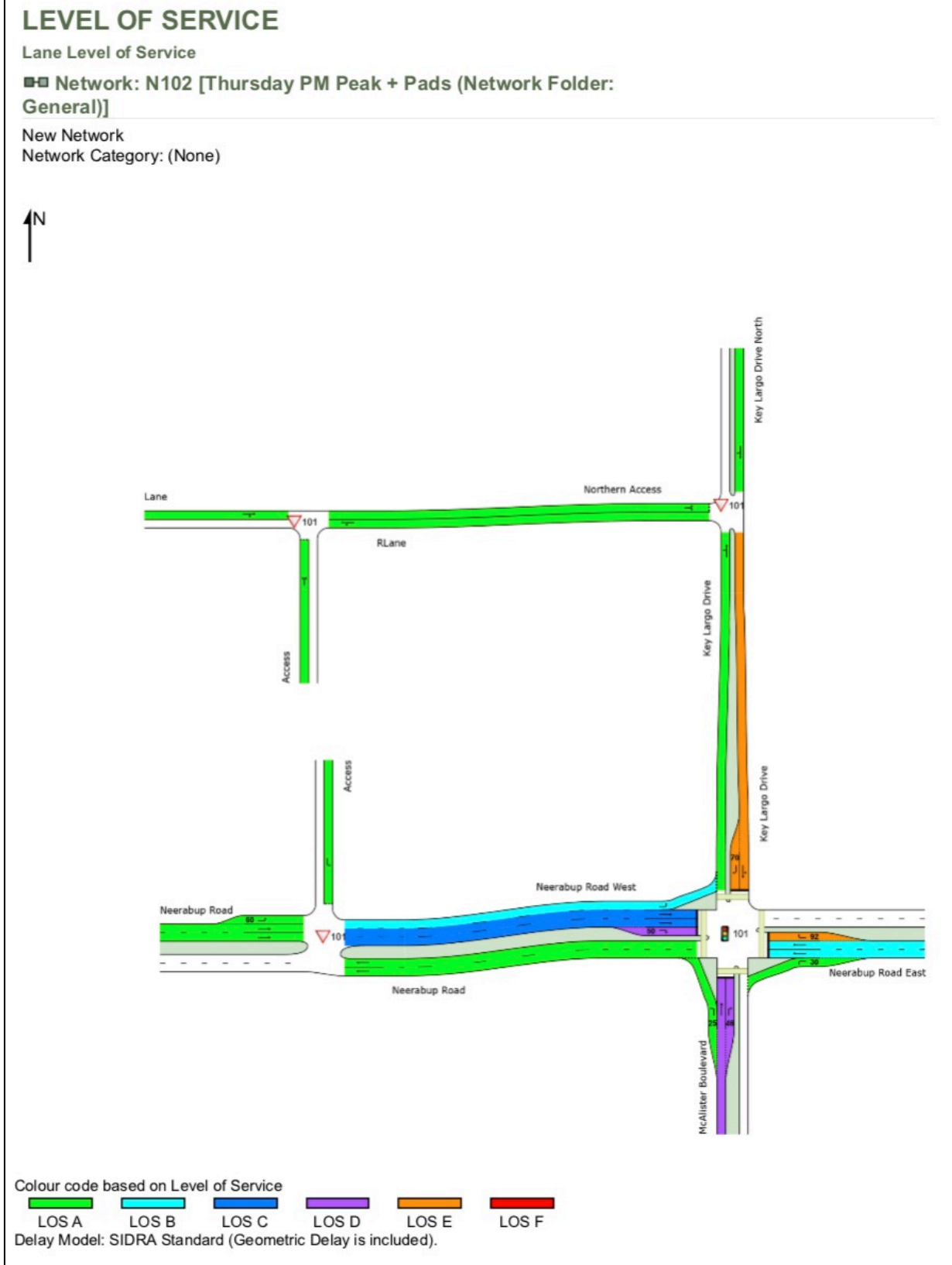
The Sidra assessment of the local road network with the pad sites developed as showrooms shows that acceptable peak hour operation can be expected. Level of Service E is shown on Key Largo Drive approaching Neerabup Road. The right turn from Neerabup Road to Key Largo Drive is also shown to operate at Level of Service E and approaching capacity.

Assessment of the additional traffic lane to Key Largo Drive shows that all approaches operate within capacity and with acceptable Levels of Service (LoS D). It can be seen that the left slip lane will maintain current Levels of Service.

The provision of a left turn slip lane to Key Largo Drive is shown to maintain the status quo, based on the proposed supermarket and pad site being assessed as all-new traffic to the network. However, there are other developments in the locality that may need to be assessed in regard to the long term operation of the traffic signals (future residential development south of Neerabup Road).



### Sidra Network Assessment – Existing Road Layout

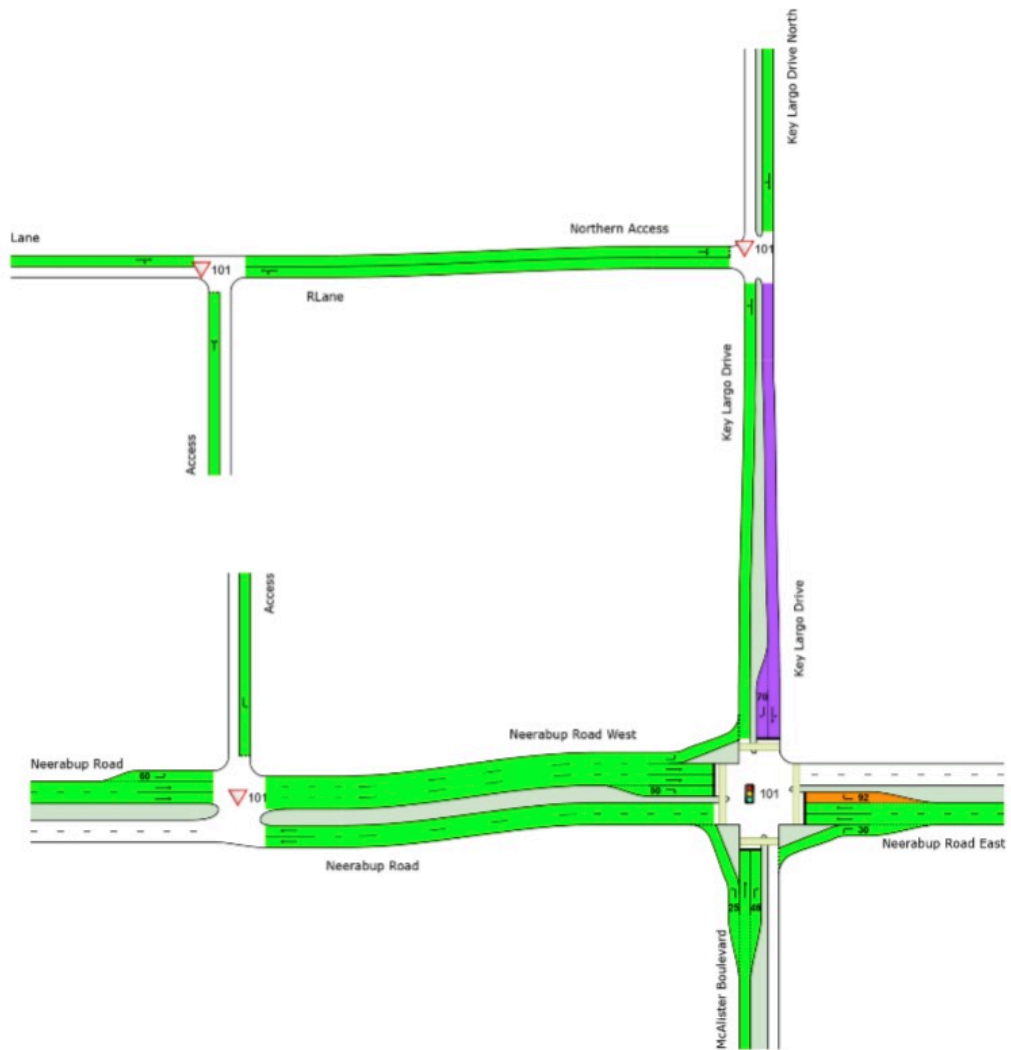


### DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

■ Network: N102 [Thursday PM Peak + Pads (Network Folder: General)]

New Network  
Network Category: (None)



Colour code based on Degree of Saturation





## MOVEMENT SUMMARY

Site: 101 [NeerPM2 (Site Folder: General)]

Network: N102 [Thursday  
PM Peak + Pads (Network  
Folder: General)]

Neerabup Road / Key Largo

PM Peak With Green Field Site Development and Pad Sites

Site Category: Future Conditions 3

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	AVERAGE 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: McAlister Boulevard														
1	L2	21	0.0	21	0.0	0.014	7.1	LOS A	0.1	0.7	0.23	0.58	0.23	48.8
2	T1	39	0.0	39	0.0	0.128	36.0	LOS D	0.9	6.4	0.90	0.66	0.90	28.0
3	R2	9	0.0	9	0.0	0.046	45.0	LOS D	0.2	1.6	0.92	0.67	0.92	34.2
Approach		69	0.0	69	0.0	0.128	28.5	LOS C	0.9	6.4	0.70	0.64	0.70	33.2
East: Neerabup Road East														
4	L2	25	0.0	25	0.0	0.016	6.1	LOS A	0.1	0.4	0.15	0.58	0.15	53.7
5	T1	561	3.0	561	3.0	* 0.440	15.5	LOS B	4.4	31.5	0.83	0.69	0.83	40.0
6	R2	374	1.0	374	1.0	* 0.912	58.1	LOS E	12.3	87.1	1.00	1.03	1.41	20.9
Approach		960	2.1	960	2.1	0.912	31.8	LOS C	12.3	87.1	0.88	0.82	1.04	30.0
North: Key Largo Drive														
7	L2	237	0.0	237	0.0	0.880	56.2	LOS E	8.0	56.3	1.00	1.00	1.38	23.6
8	T1	21	0.0	21	0.0	* 0.880	50.7	LOS D	8.0	56.3	1.00	1.00	1.38	24.0
9	R2	184	0.0	184	0.0	* 0.884	58.8	LOS E	5.8	40.4	1.00	1.01	1.46	6.7
Approach		442	0.0	442	0.0	0.884	57.1	LOS E	8.0	56.3	1.00	1.00	1.41	17.9
West: Neerabup Road West														
10	L2	186	0.0	186	0.0	0.158	10.0	LOS B	1.6	10.9	0.41	0.66	0.41	24.9
11	T1	497	3.0	497	3.0	0.531	32.3	LOS C	5.9	42.4	0.92	0.77	0.92	31.9
12	R2	16	0.0	16	0.0	* 0.128	50.7	LOS D	0.4	3.0	0.97	0.69	0.97	24.9
Approach		699	2.1	699	2.1	0.531	26.8	LOS C	5.9	42.4	0.78	0.74	0.78	31.1
All Vehicles		2171	1.6	2171	1.6	0.912	35.2	LOS D	12.3	87.1	0.87	0.82	1.02	27.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

## Sidra Network Assessment – Left Turn Lane at Neerabup Road (GTA report)

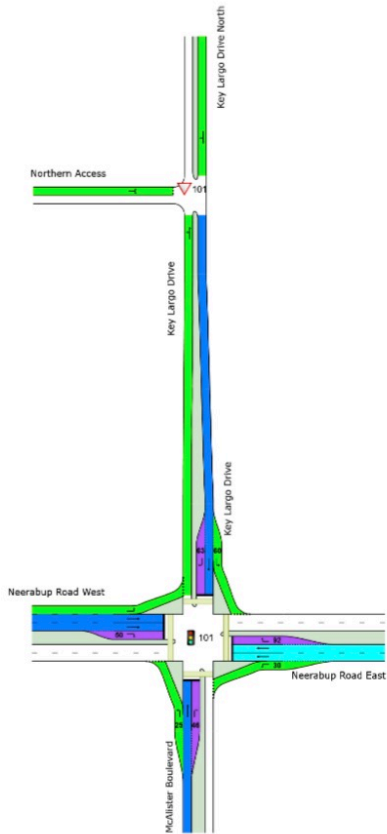
### LEVEL OF SERVICE

Lane Level of Service

■ Network: N103 [Thurs PM with left slip (Network Folder: General)]

New Network

Network Category: (None)



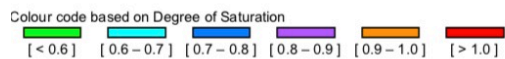
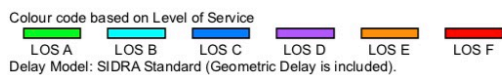
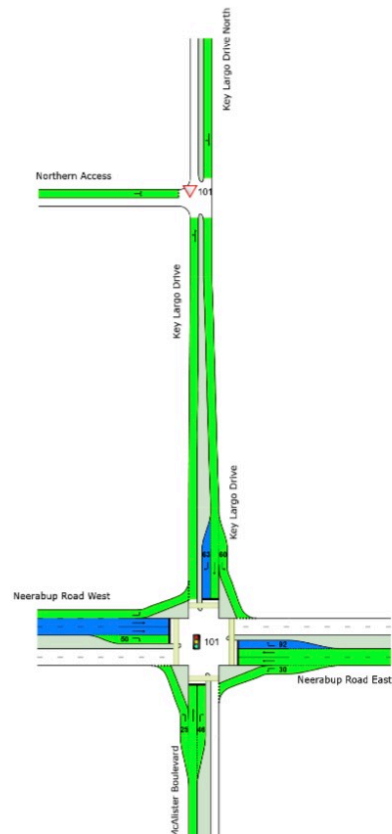
### DEGREE OF SATURATION

Ratio of Demand Volume to Capacity, v/c ratio per lane

■ Network: N103 [Thurs PM with left slip (Network Folder: General)]

New Network

Network Category: (None)

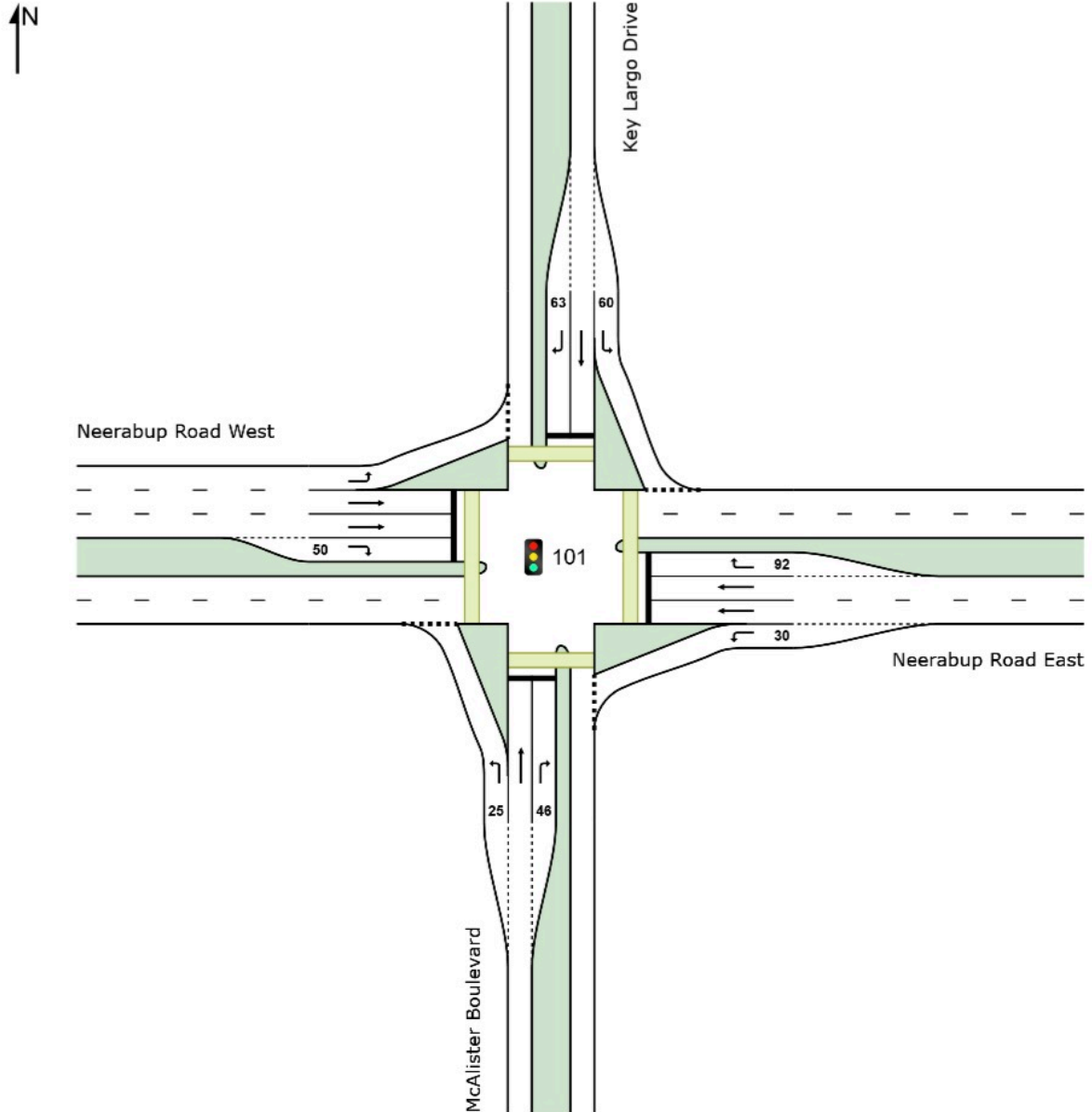


## SITE LAYOUT

### Site: 101 [NeerPM3 (Site Folder: General)]

Neerabup Road / Key Largo  
PM Peak With Development and pad sites  
Site Category: Future Conditions 3  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



## MOVEMENT SUMMARY

Site: 101 [NeerPM3 (Site Folder: General)]

Network: N103 [Thurs PM  
with left slip (Network Folder:  
General)]

Neerabup Road / Key Largo

PM Peak With Development and pad sites

Site Category: Future Conditions 3

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	AVERAGE 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: McAlister Boulevard														
1	L2	21	0.0	21	0.0	0.020	9.3	LOS A	0.1	0.9	0.40	0.62	0.40	48.9
2	T1	39	0.0	39	0.0	*0.233	34.3	LOS C	0.8	5.7	0.97	0.70	0.97	28.7
3	R2	9	0.0	9	0.0	0.060	38.9	LOS D	0.2	1.3	0.94	0.66	0.94	36.2
Approach		69	0.0	69	0.0	0.233	27.4	LOS C	0.8	5.7	0.79	0.67	0.79	35.3
East: Neerabup Road East														
4	L2	25	0.0	25	0.0	0.018	6.3	LOS A	0.1	0.4	0.20	0.59	0.20	53.6
5	T1	561	3.0	561	3.0	*0.570	14.2	LOS B	3.5	25.2	0.92	0.76	0.92	45.6
6	R2	374	3.0	374	3.0	0.799	36.6	LOS D	8.3	59.4	0.99	0.93	1.18	27.6
Approach		960	2.9	960	2.9	0.799	22.7	LOS C	8.3	59.4	0.93	0.82	1.00	38.2
North: Key Largo Drive														
7	L2	242	3.0	242	3.0	0.210	7.7	LOS A	1.2	8.6	0.36	0.65	0.36	48.6
8	T1	21	0.0	21	0.0	0.076	28.8	LOS C	0.4	2.8	0.90	0.64	0.90	33.9
9	R2	184	3.0	184	3.0	*0.709	39.6	LOS D	4.0	28.9	1.00	0.87	1.15	20.3
Approach		447	2.9	447	2.9	0.709	21.9	LOS C	4.0	28.9	0.65	0.74	0.71	34.3
West: Neerabup Road West														
10	L2	186	3.0	186	3.0	0.169	9.4	LOS A	1.3	9.0	0.44	0.67	0.44	25.8
11	T1	507	3.0	507	3.0	*0.774	34.0	LOS C	5.6	40.6	1.00	0.93	1.20	31.2
12	R2	16	0.0	16	0.0	*0.099	39.2	LOS D	0.3	2.3	0.95	0.69	0.95	28.5
Approach		709	2.9	709	2.9	0.774	27.7	LOS C	5.6	40.6	0.85	0.86	1.00	30.7
All Vehicles		2186	2.8	2186	2.8	0.799	24.3	LOS C	8.3	59.4	0.84	0.81	0.93	35.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Geometric Delay is included).

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.