APPENDIX H TRANSPORT IMPACT ASSESSMENT

GTAconsultants

19 Neerabup Road, Clarkson
Structure Plan
Transport Impact Assessment

Client //	BWP Trust
Office //	WA
Reference //	W122330
Date //	16/04/18

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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1. Introduction

1.1 Background

GTA Consultants has been commissioned by BWP Trust (through DMG Property) to undertake a Transport Impact Assessment (TIA) of a proposed structure plan for a retail development site at 19 Neerabup Road, Clarkson in the City of Wanneroo.

The site is located north of Neerabup Road, east of Marmion Avenue, west of Key Largo Drive and south of Oceans Key Shopping Centre.

The structure plan area is proposed to include the following land uses:

- Supermarket: 2,500sqm
- Food & Beverage: 1,000sqm
- Retail Showrooms: 5,000sqm
- Service Commercial: 1,500sqm
- **Total** **10,000sqm**

This report is prepared in accordance with Western Australian Planning Commission Transport Impact Assessment Guidelines, August 2016 (WAPC Guidelines).

1.2 Report Purpose

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

i existing transport conditions surrounding the site
ii the proposed transport network internal to the site
iii the proposed access arrangements from the site to the external road network
iv the traffic generating characteristics of the proposed development, with respect to:
    - The amount of traffic likely to be generated and the potential distribution of this to the external road network
    - Potential access arrangements and circulation
    - Potential future road reserve requirements
    - Potential traffic impacts and external road network capacity.
v the transport impact of the development proposal on the surrounding road network.

The findings of this TIA have been presented as per the WAPC Guidelines.

1.3 References and Consultation

In preparing this report, reference has been made to the following:

- City of Wanneroo District Planning Scheme No. 2 (DPS 2)
- the Western Australian Planning Commission (WAPC) *Liveable Neighbourhoods*, dated January 2009 (noting the 2015 update is still in draft for comment)
- WAPC *Transport Impact Assessment Guidelines*, dated August 2016
- Perth Metropolitan Region Scheme
- Australian Standard/ New Zealand Standard 2890, Parking Facilities

- Revision 1 of concept plans for the proposed development prepared by Urbis, drawing number CP-01 dated 15 March 2018
- various technical data as referenced in this report
- an inspection of the site and its surrounds
- other documents as nominated.

2. Existing Conditions

2.1 Subject Site

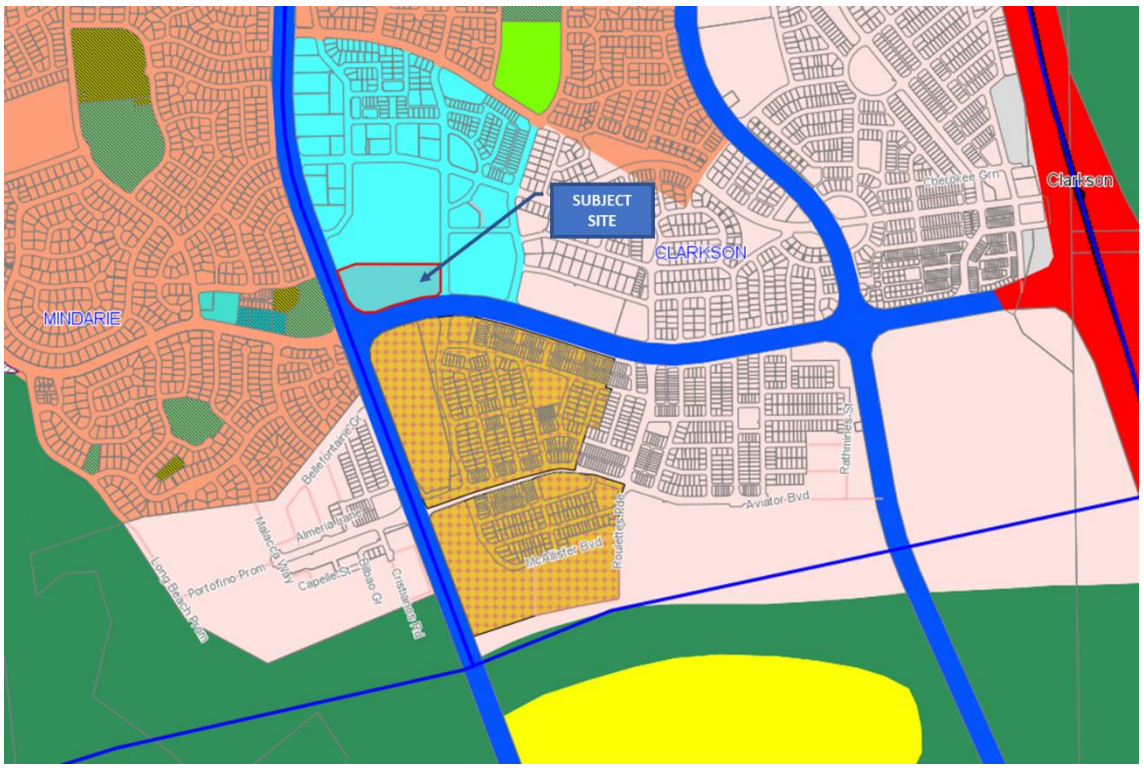
The subject site is located at 19 Neerabup Road, Clarkson, a suburb within the City of Wanneroo. The site is located 35km north of Perth CBD and approximately 7.5km north of Joondalup CBD. The site lies north of Neerabup Road frontages to Marmion Avenue and Key Largo Drive. Marmion Avenue is a 'Other Regional Road' within the Perth Metropolitan Region Scheme (MRS), a 'blue' road.

The site forms part of the Clarkson Activity Structure Plan Area and is zoned as *Centre* in the City of Wanneroo District Planning Scheme No. 2 (DPS 2); it is also located within an Urban zone in the MRS. The site is currently occupied by a large retail building (approximately 9,200sqm) and surfaced car park which formally operated as a Bunnings Warehouse hardware store.

The surrounding properties include a mix of residential land uses together with the retail land uses at Ocean Keys Shopping Centre, which is located to the north of the site. The notable exceptions include the Public Park and Recreation land uses (Anchorage Park) located on the opposite (west) side of Marmion Avenue.

The location of the subject site and the land zonings are shown in Figure 2.1, and the subject site and its surrounding environs are shown in Figure 2.2.

Figure 2.1: Subject Site Land Zoning Map



(Reproduced from City of Wanneroo DSP 2 Maps)

Figure 2.2: Subject Site and its Environs

(Reproduced with Permission from Nearmap)

2.2 Existing Movement Networks

2.2.1 Vehicular Access[1]

The subject site has three vehicle access points, as shown in Figure 2.2. Direct car access is primarily gained at the south boundary of the site at Neerabup Road, via a left-in/left-out access, and another general vehicle access to the north, via a right of way (ROW) easement between the site and Ocean Keys Shopping Centre. A service vehicle access is also located along the easement, at the northwest corner of the site.

Neerabup Road

Neerabup Road borders the site to the south and runs in an east-west direction with a posted speed limit of 70km/hr. It is classified as a District Distributor A in the Main Roads WA functional road hierarchy It is currently configured as a four-lane two-way divided road with two 7.0m wide vehicle carriageways set within a 60m wide carriageway. Neerabup Road carries approximately 17,000 vehicles per day[2] east of Key Largo Drive.

1 All dimensions in this section are approximate
2 2018 SCATS data provided by Main Roads WA

Marmion Avenue

Marmion Avenue runs in a general north-south direction, west of the site and is a District Distributor A in the Main Roads WA functional road hierarchy. It is currently configured as a four-lane two-way divided road with two 7.5m wide vehicle carriageways set within a 60m wide road reserve. It forms a four-way roundabout with Neerabup Road on the southwest corner of the site. Marmion Avenue carries approximately 41,000 vehicles per day[3] north of Neerabup Road.

Key Largo Drive and Pensacola Terrace

Key Largo Drive and Pensacola Terrace are both Local Distributors under the Main Roads WA functional road hierarchy, which are intended to "*Carry traffic within a cell and link District Distributors at the boundary to access roads*".

Key Largo Drive is a dual carriageway road to the east of the site running in a north-south direction with a posted speed limit of 50km/hr along its full length. The carriageway is around 15m wide, with a 2m shared use path on its western side between Ocean Keys Boulevard to Neerabup Road. Key Largo Drive carries an average of 9,800 vehicles per day[4].

Pensacola Terrace connects with Marmion Avenue via a left-in/left-out access and extends to the north of the site forming a two-lane undivided road with a posted speed limit of 50km/hr.

Right of Way Easement

The ROW easement, forming the north boundary of the site, is a two-lane single carriageway road serving as a driveway access road for both the subject site and Ocean Keys Shopping Centre. The road runs east-west in the immediate vicinity of the subject site and connects to Pensacola Terrace via a roundabout intersection to the north.

Traffic calming devices (road humps/cushions) are located along this road to manage vehicle speeds. It is noted that the two road humps located closest to the roof car park ramp for the Shopping Centre cover only half the width of the road and therefore may be ineffective at managing speeds as drivers may simply drive on the other side of the road to avoid them.

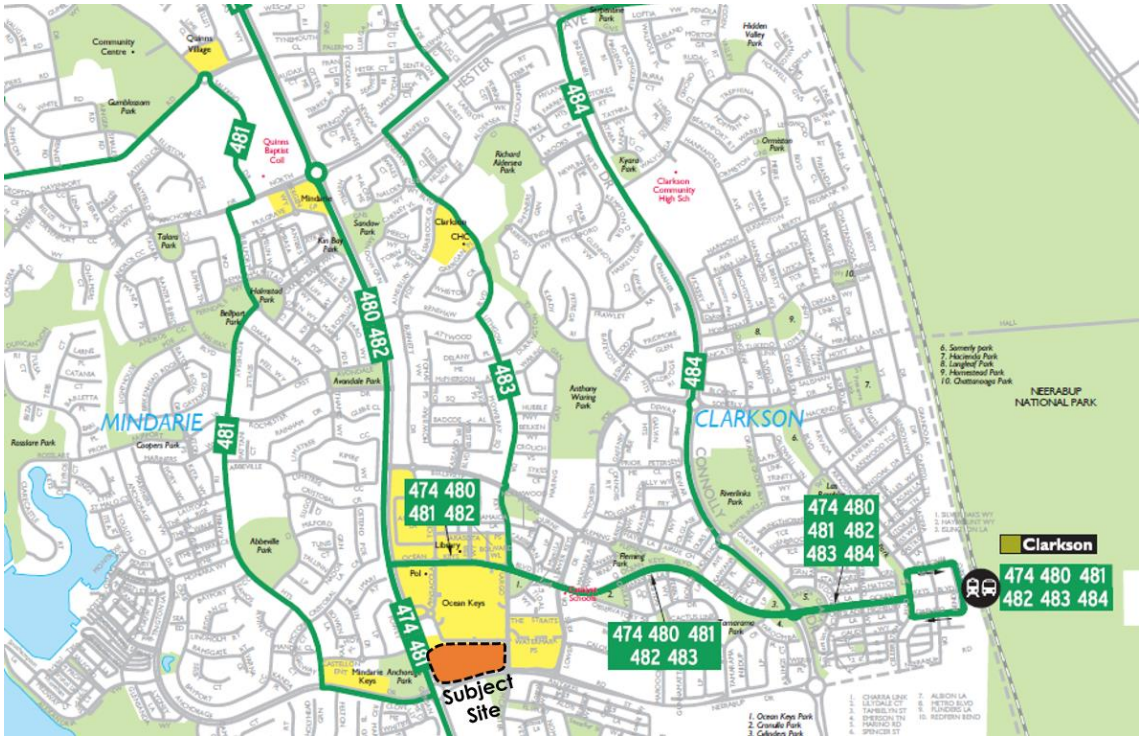
2.2.2 Public Transport

Figure 2.1 below presents an extract from the Transperth timetable information for the area surrounding the site. As can be seen, the site is located in close proximity to Clarkson train station on the Joondalup rail line with existing Park 'n' Ride facilities located north and south of the station. The closest bus services to the site are summarised in Table 2.1 below.

[3] Based on Main Roads WA traffic count data for December 2014.

[4] 2018 SCATS data provided by Main Roads WA

Figure 2.3: Existing public transport networks



Source: Transperth

Table 2.1: Existing Public Transport Provision

Route	Route Description	Location of Nearest Stop	Approximate Frequency On/Off Peak	
471A*	Joondalup - Burns Beach via Currambine	Marmion Avenue, north of Neerabup Road	to Clarkson Station 10 minutes (AM peak only)	
474*	Joondalup - Clarkson via Kinross	Marmion Avenue, north of Neerabup Road	to Clarkson Station 10 minutes peak	
480	Clarkson Station - Butler Station via Marmion Ave	Ocean Keys Boulevard, east of Pensacola Terrace	To Butler Station	10 minutes peak 60 minutes off peak
			To Clarkson Station	10 minutes peak 60 minutes off peak
481	Clarkson Station - Quinns Rocks via Mindarie	Marmion Avenue, north of Neerabup Road	To Quinns Rocks	30 minutes peak 60 minutes off peak
			To Clarkson Station	10 minutes peak 60 minutes off peak
482	Clarkson Station - Butler Station via Marmion Ave & Santa Barbara Parade	Ocean Keys Boulevard, east of Pensacola Terrace	To Butler Station	10 minutes peak 60 minutes off peak
			To Clarkson Station	15 minutes peak 60 minutes off peak
483	Clarkson Station - Alkimos via Merriwa & Butler Station	Key Largo Drive, north of Ocean Keys Boulevard	To Clarkson Station	10 minutes peak 60 minutes off peak
			To Alkimos	30 minutes peak 60 minutes off peak

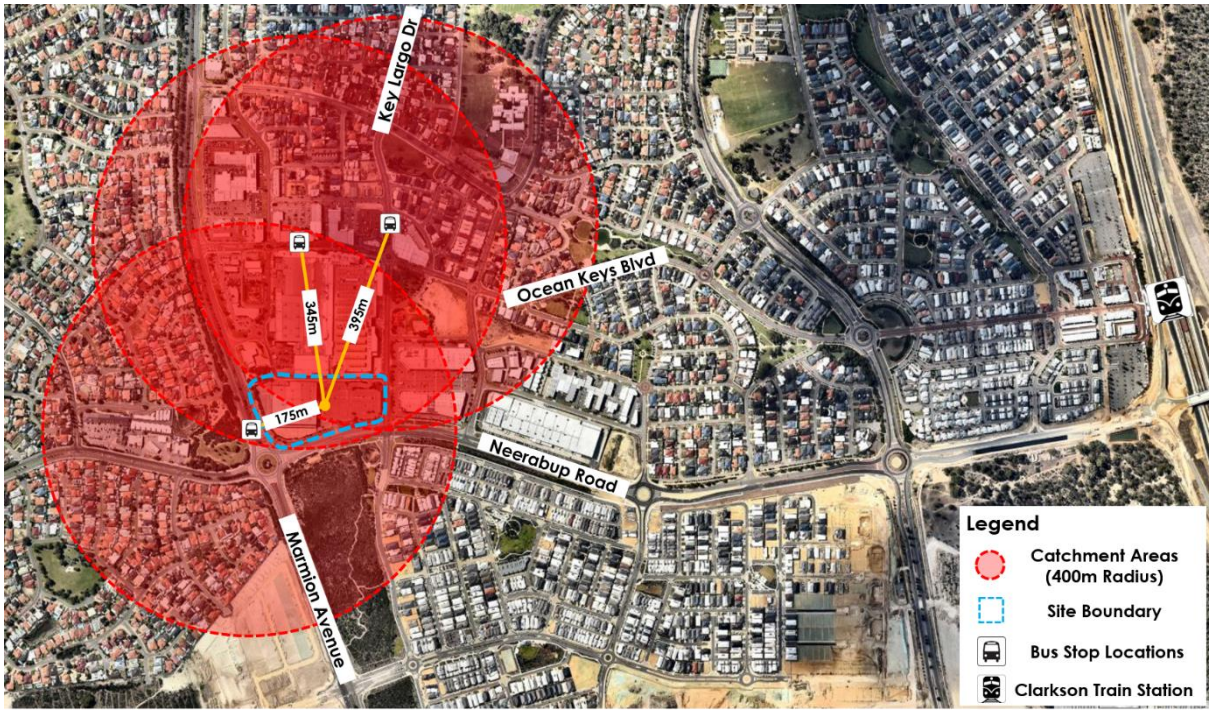
* Operates on school days only and extends to Clarkson Station

Considering a general 400m catchment for public transport, as shown in Figure 2.4, the site benefits from direct access to bus services immediately adjacent to its north and west boundaries. Bus stops within the 400m walking catchment to the site are as follows:

- Two stops on both sides of Marmion Avenue (about 120m North of Marmion Avenue/Neerabup Road roundabout) for northbound and southbound trips, and about 175m from the centre of the LSP area.
- Two stops along Ocean Keys Boulevard (about 140m east of Pensacola Terrace) for both directions of travel, and about 345m from the centre of the site.
- 60m north of Key Largo Drive/Ocean Keys Boulevard intersection for northbound and southbound, and about 395m from the centre of the LSP area.

The availability and accessibility of these bus services and the interchange opportunities it provides are of benefit to the site and presents an opportunity to replace private vehicle use with more sustainable modes of travel.

Figure 2.4: Existing Public Transport 400m Catchment



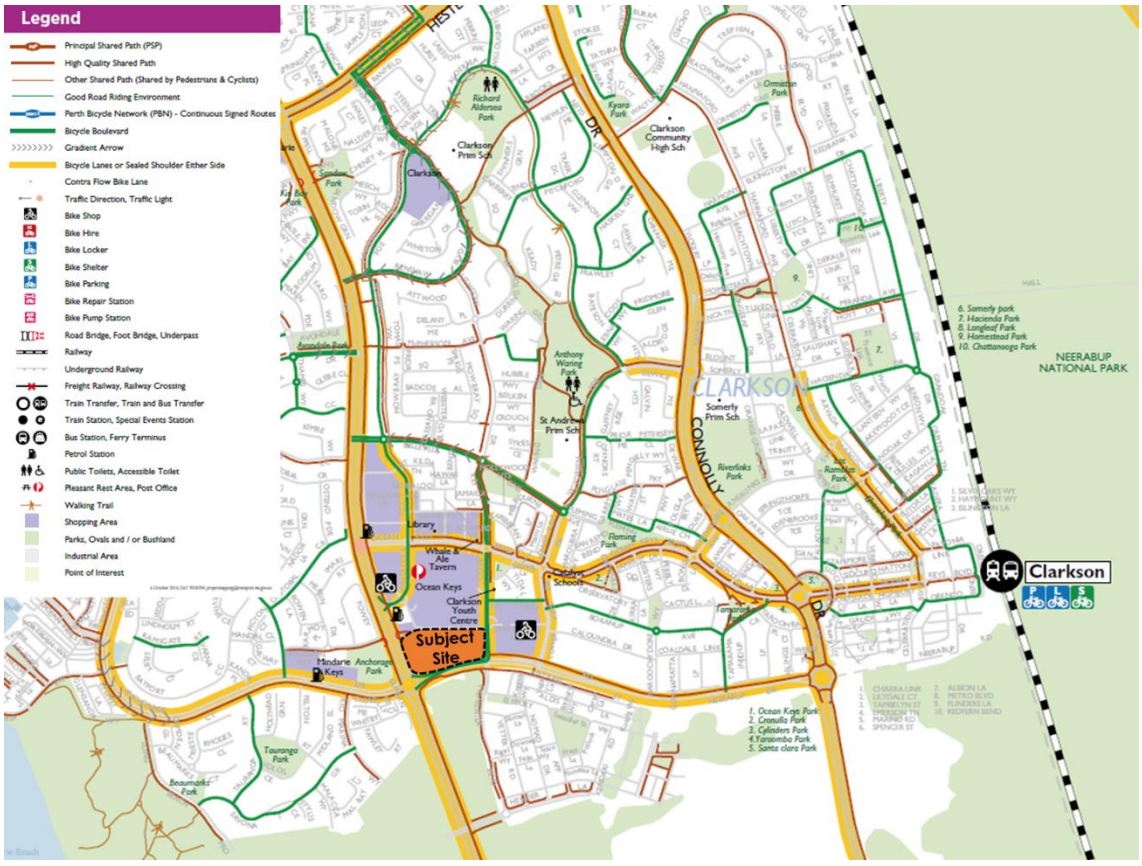
Source: Nearmap

2.2.3 Walking and Cycling

Walking and cycling infrastructure is well developed in the vicinity of the subject site. Bicycle lanes are provided on both sides of Marmion Avenue, Neerabup Road, Key Largo Drive, and Pensacola Terrace. The cycling facilities adjacent to the site, as shown in the Department of Transport's *Cycle and Walk Map*, reproduced at Figure 2.5.

In addition to the facilities shown on this map, a shared path is provided along both sides of Neerabup Road as well as other shared paths on one side of other roads near the site. These paths connect the site to Clarkson train station to the east and the existing shared path network to the north within Clarkson, in addition to a similar established network to the west at Mindarie.

Figure 2.5: Existing Key Walking and Cycling Links



Source: Department of Transport

3. Proposed Transport Network

3.1 External Road Network Changes

In early 2017, Neerabup Drive was upgraded to a four-lane dual carriageway road connecting through to Mitchell Freeway, approximately 2km east of the site. The freeway connections at Neerabup Road and Hester Avenue were both opened in mid-2017.

Future additional connections to Mitchell Freeway are planned to take place in the medium to long term, which may have an effect on traffic using Neerabup Road and Marmion Avenue. The effect of these future changes, in terms of likely future traffic volumes is taken into account in the Traffic Impact Assessment in Section 4 of this report.

3.2 Access Strategy

The following sections provide detail on the approach to establishing the access strategy for the site.

3.2.1 Walking and Cycling

For a development of this type, it is critical that walking and cycling infrastructure is provided internally, including adequate connections to/from key external destinations.

Access for pedestrians and cyclists can be provided via existing shared paths and cycle lanes along the three roads adjacent to the site including, Neerabup Road, Marmion Avenue, and Key Largo Drive. There is also a footway located along the northern site boundary in the ROW easement.

In view of this, the access strategy proposed for the redevelopment of the site should support movement by all relevant modes of transport, and should be designed to be functional, efficient and safe. It is also recognised that walking and cycling are main modes of transport and are also secondary modes of travel for public transport users, given the proximity of the Clarkson train station to the site, particularly for employees.

3.2.2 Public Transport

Broadly, it is expected that as the population of the Perth metropolitan area increases, public transport coverage and frequency will in turn increase; however, it is not known if any improvements to public transport are planned that will specifically affect the subject site.

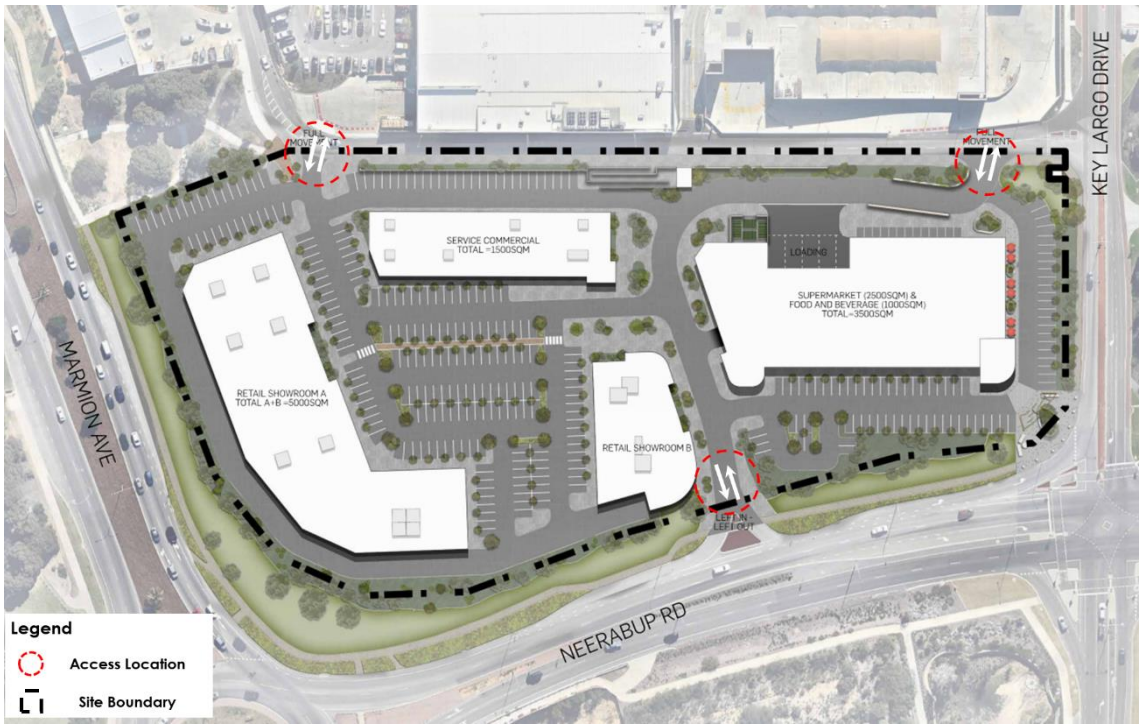
3.2.3 Vehicle Access

General Vehicles

The vehicle access arrangements are shown in Figure 3.1 below, and broadly similar to the existing arrangements on site:

- left-in/left-out access along Neerabup Road to the south of the site
- full movements access along the ROW easement, immediately west of Key Largo Drive
- full movements access along the ROW easement, approximately 100m south of Pensacola Terrace.

Figure 3.1: Proposed Site Access Arrangements



Source: reproduced from plans provided by Urbis

Servicing and Deliveries

Given the proposed layout access points and intersections, service vehicles can use all three access points to reach service areas within the subject site. Dedicated service areas are proposed for the supermarket and retail showrooms, while it is expected that deliveries and servicing tasks for the smaller service commercial units can take place from within the car park outside of opening hours.

Access to each of the service areas should be managed to ensure that heavy vehicles use external roads and internal circulation roads were possible, to minimise operational conflict with light vehicles and pedestrian areas and also minimise interaction with activity in parking areas.

It is recommended that a servicing and delivery management plan is prepared and adopted for the overall subject site at a future stage of planning.

4. Parking Provision

4.1 Bicycle Parking

4.1.1 Bicycle Parking Spaces

Guidance on the level of bicycle parking appropriate for a development of this type has been sought from the City of Wanneroo publication *Cycle Wanneroo*[5] (Wanneroo Bike Plan). Table 4.1 sets out the recommended bicycle parking requirements for adoption in the structure plan.

Table 4.1: Statutory Car Parking Requirements

Description	Use [1]	Size	Bicycle Parking Rate	Bicycle Parking Requirement
Supermarket	District Centre	2,500sqm	1 space per 750sqm NLA (minimum 16 spaces)	16 spaces
Food & Beverage	District Centre	1,000sqm		
Showrooms	Showrooms	5,000sqm	1 space per 1,000sqm NLA	7 spaces
Service Commercial	Showrooms	1,500sqm		
			Total	**23 spaces**

NLA denotes net lettable area

[1] Use as defined in the Wanneroo Bike Plan

It is therefore recommended that the proposed structure plan land uses are provided with a minimum of 23 bicycle parking spaces. These should be split approximately equally between staff and visitor parking.

Staff parking should be provided within buildings, in a communal storage area in a convenient location next to any showers or change room. Each tenancy should be provided with at least one shower unit and change room, with lockers for staff.

Visitor parking should be located in a convenient location close to entrance doors and would ideally be sheltered.

4.2 Bicycle Parking Layout

Bicycle parking should be designed in accordance with AS 2890.3:

- At least 20% of bicycle spaces should be provided as horizontal parking
- Bicycle parking rails should be spaced at least 500mm apart (assuming a staggered vertical arrangement or a front to back horizontal arrangement).
- The access aisle to the bicycle parking area should be 1.5m wide.
- 700mm should also be provided between any wall and horizontal bicycle rack/hoop. This can be reduced to 500mm in a staggered arrangement.
- General dimensions to be adopted when specifying bicycle parking spaces are shown on Figure 4.1 and Figure 4.2.

[5] Cycle Wanneroo, Wanneroo Bike Plan, City of Wanneroo/Jacobs, July 2015

Figure 4.1: General Dimensions for Horizontal Bicycle Parking

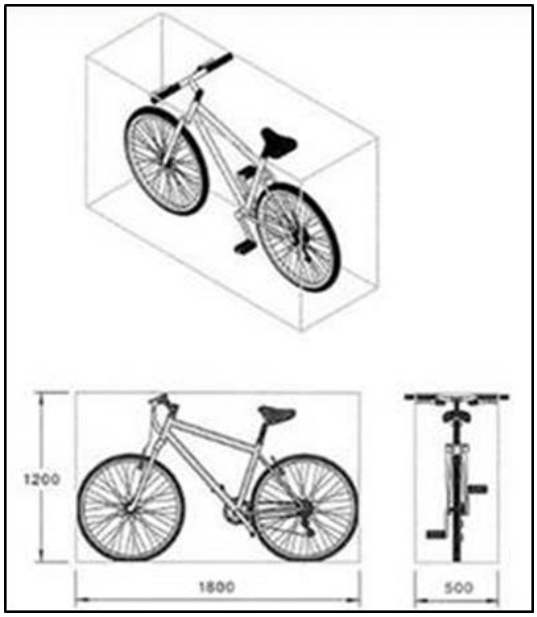
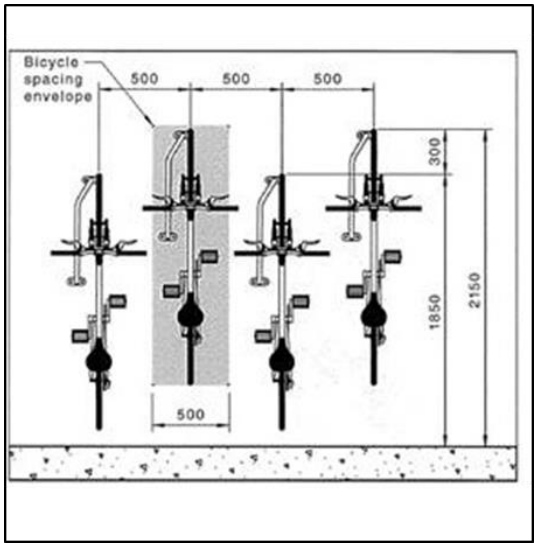


Figure 4.2: General Dimensions for Vertical Bicycle Parking



4.3 Car Parking

4.3.1 Car Parking Spaces

The parking requirements of a development within the Clarkson Activity Structure Plan Area are set out the Activity Centre Structure Plan documentation, which provides the following recommendations:

- *"Unless a lesser car parking rate is already provided by the Scheme, the car parking within the Structure Plan should be provided within a range of 4.5 – 6 bays per 100m2 of floorspace."*
- *"The Structure Plan provides for reduced rates of provision within the Commercial Zone. This is in accordance with the provisions of SPP4.2."*

State Planning Policy 4.2 (SPP4.2) then recommends:

- *"As a guide, two bays per 100m2 for showrooms and offices and 4-5 bays per 100m2 for shops. Minimums may be required, however, there should be flexibility for developers to provide less or no parking on-site…"*

In this regard Table 4.2 sets out the recommended car parking requirements for adoption in the structure plan.

Table 4.2: Statutory Car Parking Requirements

Description	Size	Car Parking Rate	Car Parking Requirement
Supermarket	2,500sqm	5 spaces per 100sqm	175 spaces
Food & Beverage	1,000sqm		
Showrooms	5,000sqm	2 spaces per 100sqm	130 spaces
Service Commercial	1,500sqm		
		Total	**305 spaces**

Accessible Parking

In addition to the statutory car parking requirements in the Planning Scheme, the Building Code of Australia (BCA) outlines requirements for the provision of car parking for people with disabilities. An assessment of the BCA disabled car parking requirements for the development proposal is set out in Table 4.3.

Table 4.3: BCA Car Parking Requirements for People with Disabilities

Description	BCA Class	BCA Disabled Parking Requirement
Retail	Class 6	1 space for every 50 car parking spaces or part thereof

In this instance, 7 accessible parking spaces are required for a car park containing 305 car spaces. Parking spaces for people with disabilities can be included in the total number of spaces provided.

4.3.2 Car Park Layout

The car park layout should be designed in accordance with the relevant parts of Australian Standard 2890.1 *Off-street car parking* and 2890.6 Off-street p*arking for people with disabilities*.

The following general principles should act as a guide to designing the parking layout

- Class 3A parking facility
- 2.6m wide by 5.4m long spaces (general parking)
- 2.4m wide by 5.4m long spaces (accessible parking) with 2.4m wide by 5.4m long shared area alongside, located close to building entrances
- 6.6m wide aisles (assuming 90-degree parking)
- Undercroft parking height clearance should be a minimum 2.2m in aisle and spaces from the entry point
- 2.5m height required immediately above accessible car spaces for roof loading.
- Minimum of 5.5m trafficable road width on all two-way roads that do not directly access a parking spaces
- Minimum of 0.3m clearance between the edge of a roadway or parking space that is next to any structure that exceeds 0.15m height
- Pedestrian crossings located along desire lines within the car park and at key locations across circulation roads.

It is noted that while the general parking layout should be in accordance with AS2890.1 Class 3A, flexibility should be retained to adopt a reduced, but still convenient standard of parking, particularly in undercroft parking areas where there is often a trade-off between column grid efficiency and car parking space numbers.

5. Traffic Assessment

5.1 Overview

The process for identifying, assessing and quantifying the potential traffic related implications of the proposed structure plan is described in this section of the TIA.

The assessment methodology is as follows:

- Ascertain the required performance objectives
- Establish the appropriate future design year
- Determine the base volumes (existing background traffic growth, including any extant planning approvals)
- Estimate the quantum of traffic generated by the development proposal
- Assign the traffic to the future transport network
- Assess the performance of key intersection(s)
- Comment on potentially required transport mitigation measures

5.2 Performance Objectives

WAPC guidelines for the preparation of a Structure Plan TIA call for a broad-brush approach to be adopted with regard to intersection assessment in the likely worst case peak hour.

TIA guidelines also indicate a traffic analysis is required when a proposed development adds 100 vehicles to a particular lane mid-block, based on this increase approximating 10% capacity of an urban road lane.

Once established that a TIA is required, the guidance notes that the extent of road network coverage should include intersections that would experience:

- an increase on 10% traffic on any leg, or
- an increase in traffic by 20% on any movement

5.3 Assessment Context

GTA has undertaken an analysis of the operational capacity of the signalised intersection at Neerabup Road/Key Largo Drive/McAllister Boulevard under its current form during the base year 2017 scenario. This would then act as a guide on how much development yield can be proposed within the site area contingent on meeting intersection performance targets. The following sections set out the approach adopted, the findings and any recommendations.

5.4 Traffic Data and Assessed Peak Periods

5.4.1 Existing Traffic

GTA Consultants obtained SCATS detector turning movements data at the Neerabup Road/Key Largo Drive/McAllister Boulevard signalised intersection for the period between 19 and 25 March 2018. The data identified the following peak hours for assessment:

- Weekday PM Peak: 4:15pm to 5:15pm
- Saturday Peak: 11:00am to 12:00pm

It is noted that the SCATS detector counts were increased by a factor of 5% to account for any vehicle volumes that have been potentially under-counted/undetected by the SCATS detectors. The AM and PM peak hour traffic volumes are shown in Figure 5.1 and Figure 5.2, respectively.

Figure 5.1: Existing PM Peak Hour Traffic Volumes

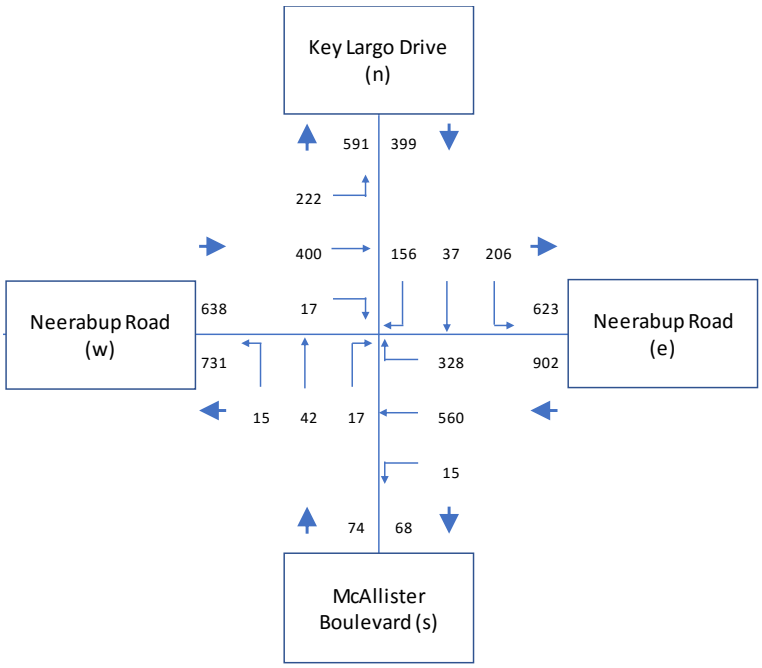
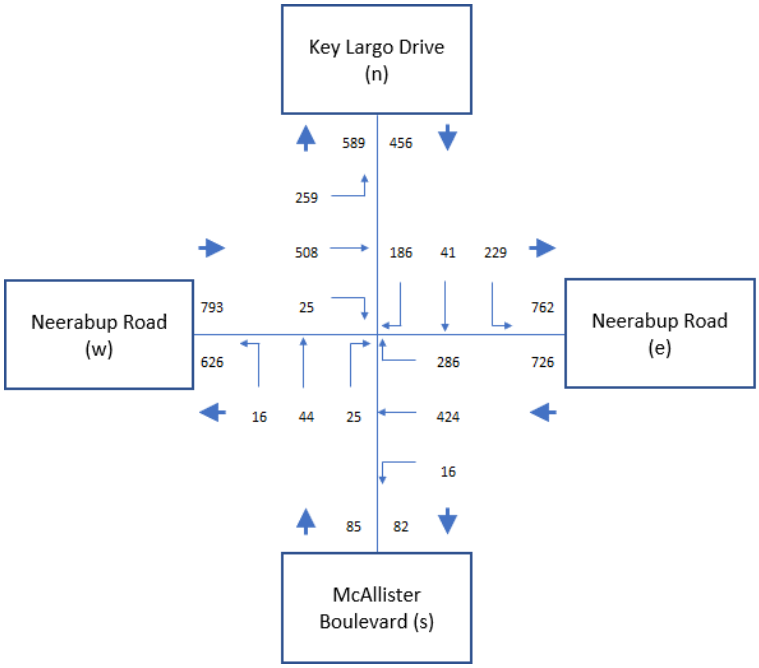


Figure 5.2: Existing Saturday Peak Hour Traffic Volumes



5.4.2 Future Years and Traffic Growth

WAPC TIA guidelines for structure plans indicate that a traffic assessment of a suitable future year should be carried out; this is normally around 10 years following opening of the development and should ideally align with future years considered in regional strategic transport modelling. In this

instance, allowing a lead-in time for further planning and development of 2-3 years, and a further 10 years for road network assessment purposes, 2031 is an appropriate year to design to which aligns with the Main Roads WA Regional Operations Model (ROM).

There is no publicly available traffic growth rate information for Neerabup Road. The level of background growth to be applied to existing through traffic movements along Neerabup Road is therefore estimated using a nominal growth factor of 2.5% per annum compounded (exponential) over the 13-years from 2018 to 2031. This results in an overall growth factor of nearly 40% in the assessment period.

5.5 Committed Development Traffic

5.5.1 Committed Traffic Generation

It is a standard practice in traffic to assess the net effect of replacing a current land use with a proposed land use. In this instance, the current land use (a Bunnings Warehouse hardware store) is no longer operating, although the building and car parking remains on-site. The estimated gross floor area (GFA) of this building is approximately 9,900sqm, not including the previously used outdoor garden centre area, or entrance atrium.

While it is not possible to survey the level of traffic the hardware store previously generated, it is possible to estimate the level of traffic likely to have been generated using industry standard techniques.

RMS NSW[6] has published weekday PM and Saturday peak hour traffic generation rates for hardware stores; these are as follows:

- Weekday PM peak hour 4.2 vehicle movements per 100sqm GFA
- Weekday Daily 33 vehicle movements per 100sqm GFA
- Saturday peak hour 5.6 vehicle movements per 100sqm GFA

On this basis, the existing 9,900sqm hardware store land use is estimated to generate the following levels of traffic:

- Weekday PM peak hour 416 vehicle movements
- Saturday peak hour 554 vehicle movements
- Weekday Daily 3,270 vehicle movements

5.5.2 Committed Traffic Distribution and Assignment

The directional distribution and assignment of traffic generated by the proposed development will be influenced by a number of factors, including the:

i configuration of the arterial road network in the immediate vicinity of the site
ii existing operation of intersections providing access between the local and arterial road network
iii distribution of households in the vicinity of the site
iv surrounding development in relation to the site
v configuration of access points to the site.

Having consideration to the above, for the purposes of estimating vehicle movements, the following directional distributions have been assumed:

[6] Guide to Traffic Generating Developments - Updated traffic surveys (TDT 2013/04a), Roads & Maritime Services, Government of New South Wales, August 2013.

- Marmion Avenue (north) 25%
- Marmion Avenue (south) 25%
- Neerabup Road (east) 25%
- Anchorage Drive (west) 10%
- Key Largo Drive (north) 10%
- McAllister Boulevard (south) 5%

This results in a conservative assessment of development impact as it is assumed that a significant amount of traffic leaving the subject site adds to the key right-turn movement at Key Largo Drive approach to the signals at Neerabup Road.

The above traffic distribution should be re-visited once a detailed retail impact study is conducted at a later stage of planning.

In addition, the directional split of traffic (i.e. the ratio between the inbound and outbound traffic movements) are considered to be 50% inbound and 50% outbound for retail-related traffic during the weekday PM and Saturday peak hours and over the course of the day.

Based on the above, Figure 5.3 and Figure 5.4 have been prepared to show the estimated turning movements attributable to the existing on-site land use.

Figure 5.3: Weekday PM Peak Hour Existing Land Use Traffic Volumes (Committed Traffic)

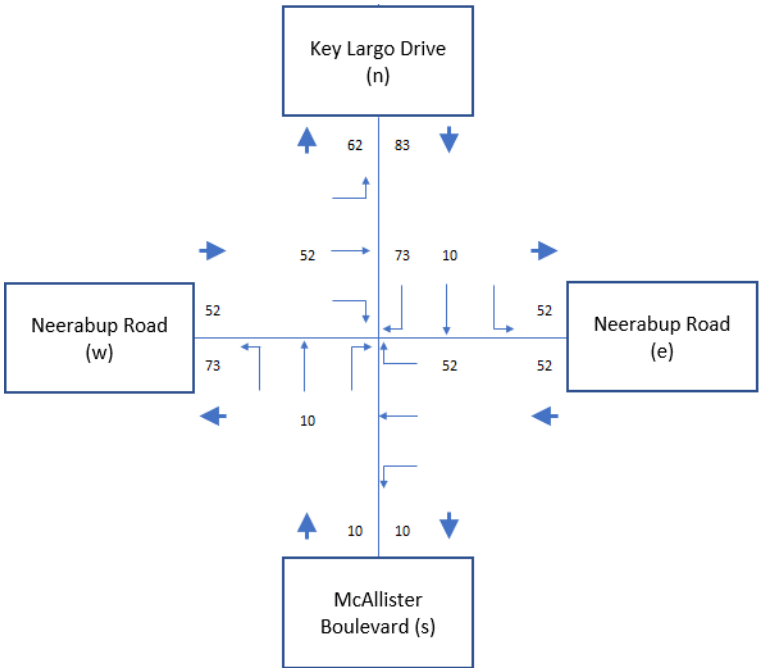
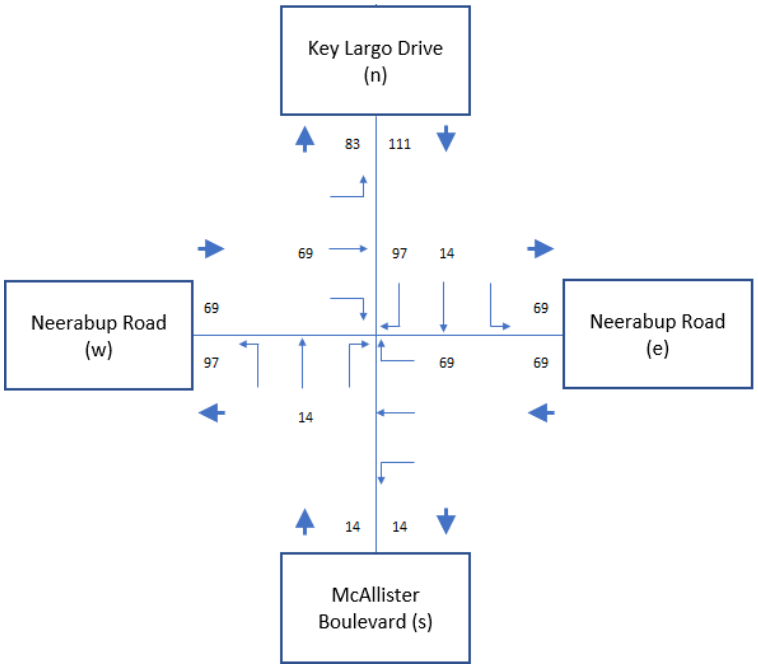


Figure 5.4: Saturday Peak Hour Existing Land Use Traffic Volumes (Committed Traffic)



5.6 Future Year Baseline Traffic

On the basis of the above, the 2021 year of opening and 2031 design year baseline traffic volumes during the weekday PM and Saturday peak hours are as shown in Figure 5.5 to Figure 5.8.

Figure 5.5: Opening Year (2021) Baseline PM Peak Hour Traffic Volumes

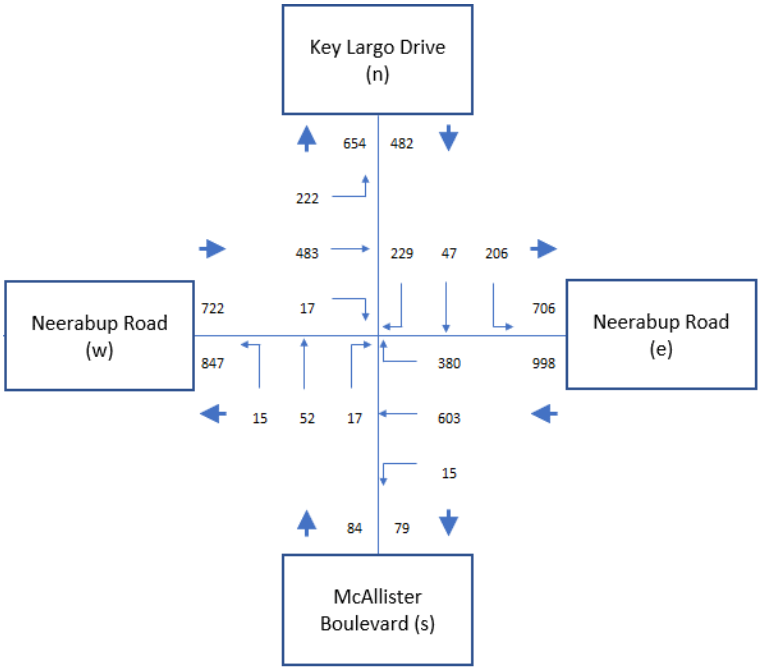


Figure 5.6: Opening Year (2021) Baseline Saturday Peak Hour Traffic Volumes

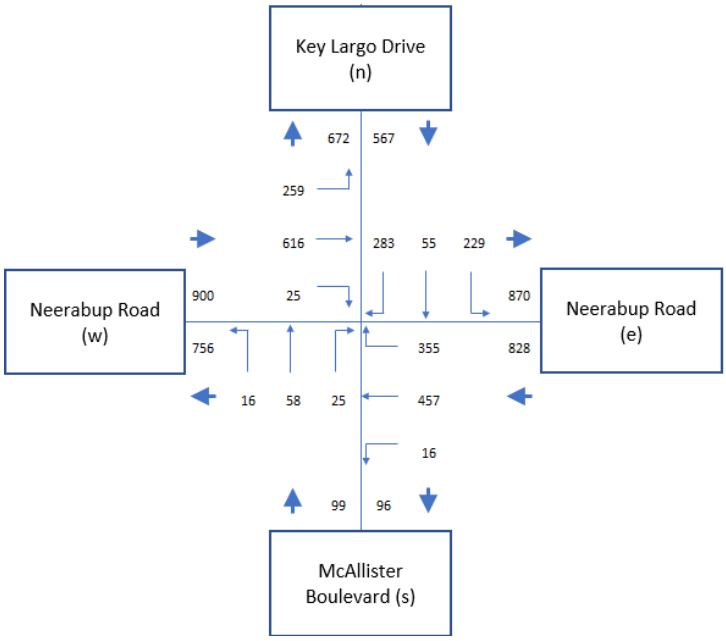


Figure 5.7: Design Year (2031) Baseline PM Peak Hour Traffic Volumes

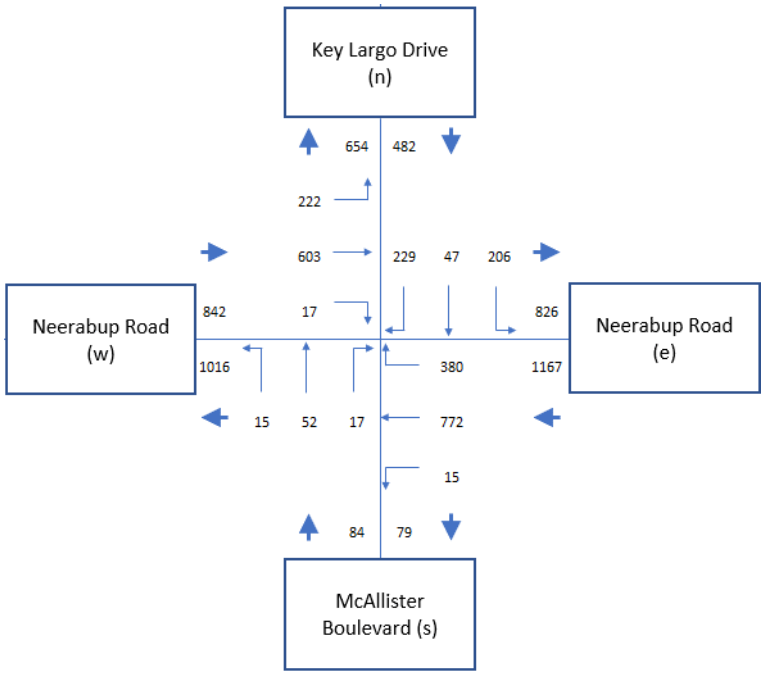
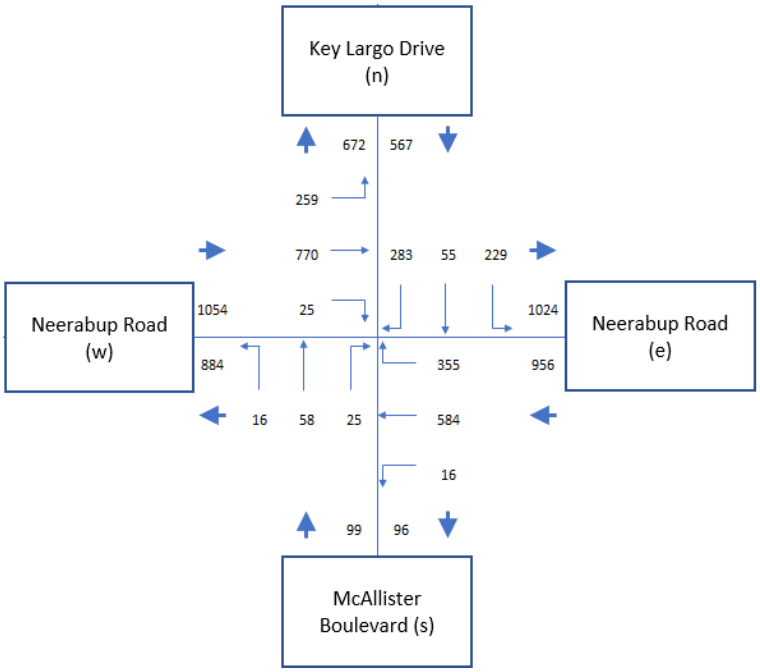


Figure 5.8: Design Year (2031) Baseline Saturday Peak Hour Traffic Volumes



5.7 Structure Plan Traffic

5.7.1 Structure Plan Traffic Generation

Retail Trip Characteristics

An important characteristic of the traffic generation of the above uses is the different types of trips which may occur. These different trip types correspond to:

- 'Primary Trips'
- 'Link-diverted Trips'
- 'Non-link-diverted Trips'.

It is normal to apply a form of reduction to account for these trip types; however, in accordance with the level of detail to be applied at this stage of planning, and the principles of adopting a broad-brush approach for structure plan traffic assessment, no reductions in trip generation levels is applied in this is assessment.

This ensures a level of robustness for current planning purposes and allows for further detail to be considered once more information becomes available at the subdivision or development application stage.

Adopted Structure Plan Traffic Generation

Traffic generation rates for the proposed land uses within the structure plan have been sourced from various industry publications and applied as follows:

- Supermarket
  - PM peak hour extracted from WAPC TIA guidelines for "food retail".
  - Weekday daily and Saturday peak hour extracted from RMS NSW Guide to Traffic Generating Developments, shopping centre traffic generation formula *supermarket* component, A(SM).

- Food and Beverage
  - Assumed to be part of what would be considered "specialty retail" if assessed as part of an overall shopping centre.
  - Vehicle trip rates extracted from the RMS NSW Guide to Traffic Generating Developments, shopping centre traffic generation formula *specialty shops* component, A(SS).
- Retail Showrooms
  - Vehicle trip rates extracted from RMS NSW TDT 2013/04a "Bulky Goods".
- Service Commercial
  - This could cover a wide range of land uses; however, for the purposes of this assessment it is considered to have a similar trip profile to a showroom.
  - Vehicle trip rates extracted from RMS NSW TDT 2013/04a "Bulky Goods".

Based on the above, the adopted traffic generation rates for the proposed development are shown in Table 5.1 below.

Table 5.1: Adopted Structure Plan Land Use Traffic Generation

Retail Type	GLA	PM		Saturday		Weekday Daily	
Supermarket	2,500sqm	10.0/100sqm	250vph	15.0/100sqm	375vph	150/100sqm	3,750vpd
Food & Beverage	1,000sqm	5.0/100sqm	50vph	11.0/100sqm	110vph	55.5/100sqm	555vpd
Service Commercial	1,500sqm	2.7/100sqm	41vph	3.9/100sqm	59vph	19/100sqm	255vpd
Retail Showroom	5,000sqm	2.7/100sqm	135vph	3.9/100sqm	195vph	19/100sqm	850vpd
Total	10,000sqm	-	476vph	-	739vph	-	5,410vpd

Source: Various, as noted in supporting preamble text.

5.7.2 Structure Plan Traffic Distribution and Assignment

In accordance with the same principles and conservative assumptions adopted for the distribution and assignment of committed development traffic in Section 5.5, Figure 5.9 and Figure 5.10 have been prepared to show the estimated turning movements associated with the proposed structure plan land uses.

Figure 5.9: Weekday PM Peak Hour Structure Plan Land Use Traffic Volumes

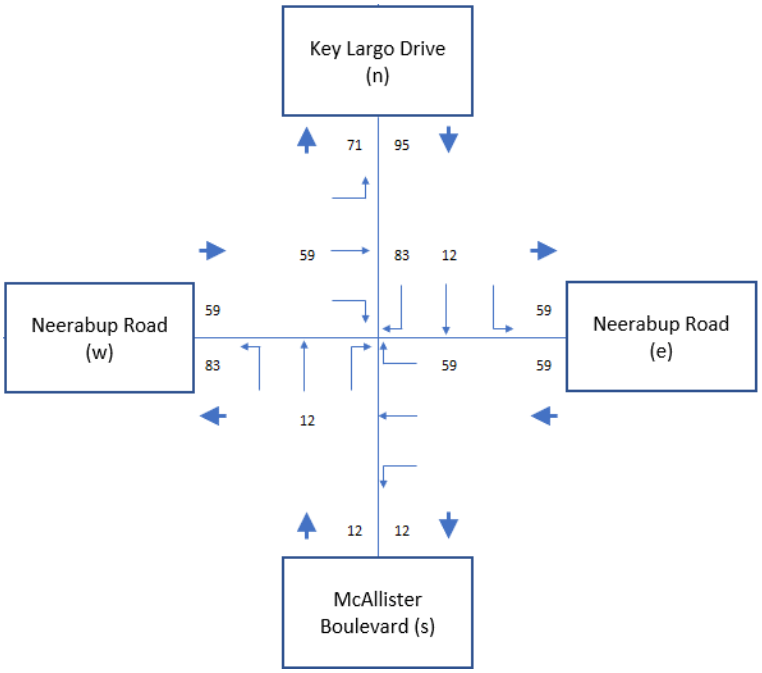
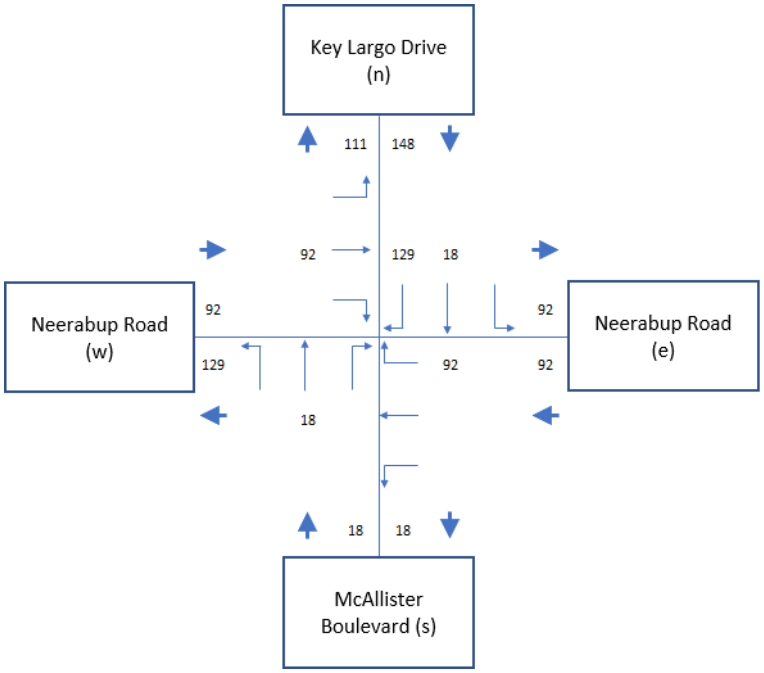


Figure 5.10: Saturday Peak Hour Structure Plan Land Use Traffic Volumes



5.8 Future Year Post-Development Traffic

On the basis of the above, the 2021 opening year and 2031 design year post-development traffic volumes during the weekday PM and Saturday peak hours are as shown in Figure 5.11 to Figure 5.14.

Figure 5.11: Opening Year (2021) Post-Development PM Peak Hour Traffic Volumes

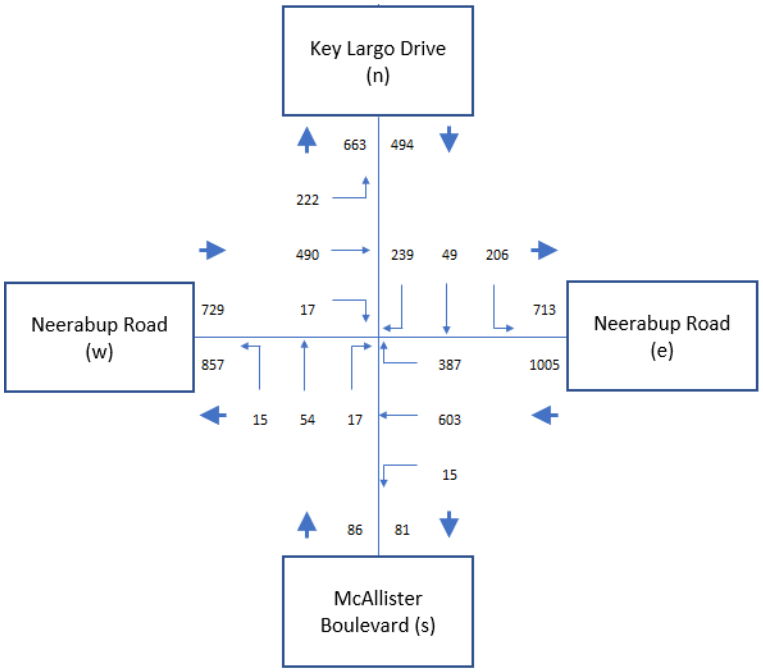


Figure 5.12: Opening Year (2021) Post-Development Saturday Peak Hour Traffic Volumes

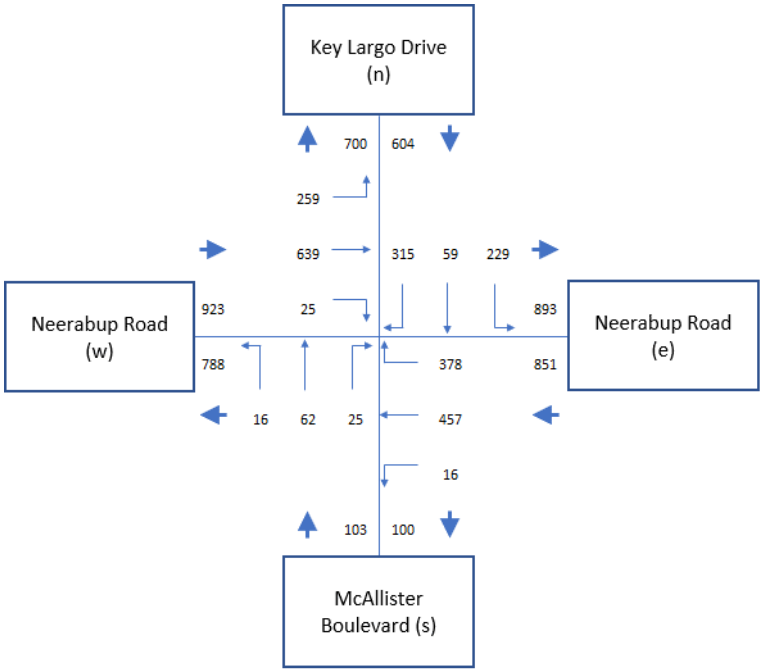


Figure 5.13: Design Year (2031) Post-Development PM Peak Hour Traffic Volumes

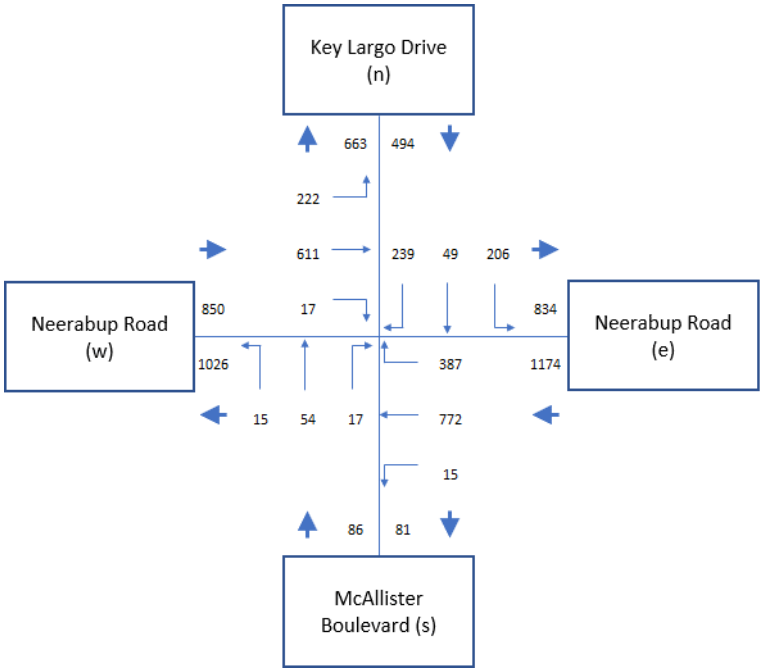
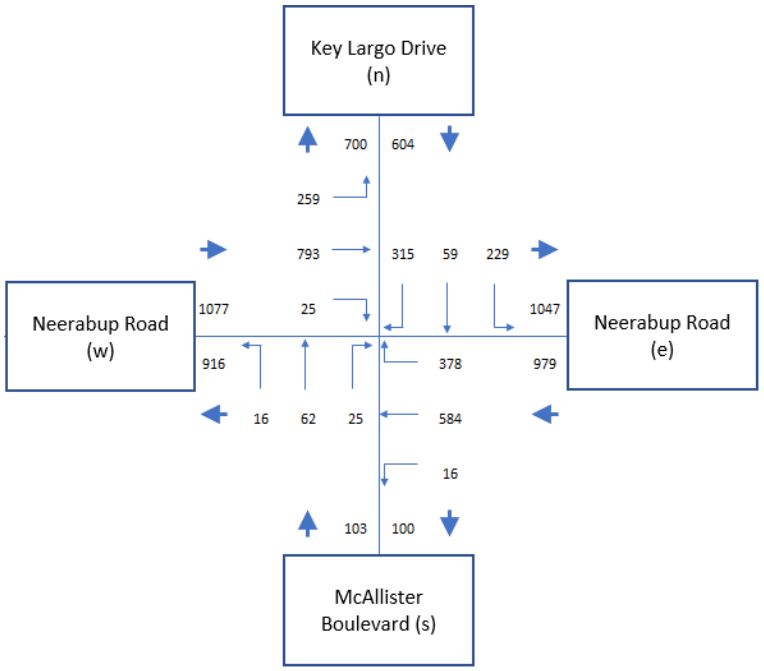


Figure 5.14: Design Year (2031) Post-Development Saturday Peak Hour Traffic Volumes



5.9 Intersection Performance

The operation of the Neerabup Road/Key Largo Drive/McAllister Boulevard intersection has been assessed using SIDRA Intersection (SIDRA), a computer-based modelling package which calculates intersection performance. As detailed in the WAPC Guidelines, the critical measure of intersection performance is average delay per vehicle and associated level of service (LOS).

The intersection has been assessed for the following scenarios:

- Current year existing traffic (2018)
- Opening year traffic baseline (2021)
- Design year traffic baseline (2031)
- Opening year traffic post-structure plan development (2021)
- Design year traffic post-structure plan development (2031)

5.9.1 Performance Objectives

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. For signalised intersections, a DOS of around 0.95 has been typically considered the 'ideal' limit, beyond which queues and delays increase disproportionately.
- **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 Length**; is the queue length below which 95% of all observed queue lengths fall.

Table 5.2 sets out the WAPC guideline thresholds for intersection delays considered to provide an adequate level of service for signal-controlled intersections.

Table 5.2: WAPC Guideline Thresholds for Intersection Adequate Operations

Delay Component	Signalised Intersection Threshold
Average delay for all vehicles passing through the intersection	<55 seconds (LOS D)
Average delay for any individual vehicle, pedestrian or cyclist movement	<65 seconds (LOS E)

* Only applicable to non-priority legs of intersection due to zero delays associated with priority movements

The above criteria, however, relates to the level of service experienced rather than the point at which operational failure of the intersection occurs. Moreover, Perth's continuing development and resultant traffic growth have meant that such desirable levels of services are no longer realistic, particularly for intersections within fully developed urban areas during peak periods. In this regard, it is the physical characteristics of the intersection, capacity (DoS) and queuing that become important.

5.9.2 Existing Intersection Performance

The operation of the intersection has been assessed in its current form and in accordance with the phasing arrangements obtained from the SCATS data in March 2018.

Analysis results indicate that the intersection is currently operating at LOS C during the weekday PM peak with recorded average delay of 28 seconds. The intersection has a DOS of 0.83 during the PM peak hour at present.

Analysis results for the Saturday peak indicate that the intersection is currently operating at LOS C with a recorded average delay of 30 seconds. The intersection has a DOS of 0.85 during the Saturday peak hour at present.

There are no queue related concerns in either peak period under existing conditions.

The complete set of SIDRA outputs is provided in Appendix B

5.9.3 2021 Opening Year Baseline Intersection Performance

The operation of the intersection has been assessed in its current form using the same assumptions on the availability of signal phasing and on the basis of the traffic volumes noted in Figure 5.5 and Figure 5.6.

Analysis results indicate that the intersection will potentially operate at LOS C during the weekday PM peak with recorded average delay of 28 seconds. The intersection will potentially have a DOS of 0.90 during the PM peak hour in the 2021 future year baseline scenario.

Analysis results for the Saturday peak indicate that the intersection will potentially operate at LOS D with a recorded average delay of 44 seconds. Two individual movements are noted to reach LOS E. The intersection will potentially have a DOS of 0.80 during the Saturday peak hour in the 2021 future year baseline scenario.

There are no queue related concerns in either peak period under 2021 baseline conditions.

The complete set of SIDRA outputs is provided in Appendix C.

5.9.4 2031 Opening Year Baseline Intersection Performance

The operation of the intersection has been assessed in its current form using the same assumptions on the availability of signal phasing and on the basis of the traffic volumes noted in Figure 5.7 and Figure 5.8.

Analysis results indicate that the intersection will potentially operate at LOS C during the weekday PM peak with recorded average delay of 32 seconds. The intersection will potentially have a DOS of 0.88 during the PM peak hour in the 2031 future year baseline scenario.

Analysis results for the Saturday peak indicate that the intersection will potentially operate at LOS E with a recorded average delay of 60 seconds. Three individual movements are noted to reach LOS F. The intersection will potentially have a DOS of 0.98 during the Saturday peak hour in the 2031 future year baseline scenario.

There are no particular queue related concerns in the PM peak hour; however, the 95th percentile queue on the Neerabup Road eastbound approach exceeds the available lane length between Key Largo Drive and Marmion Avenue, indicating that some queue spillback into the roundabout at Marmion Avenue may occur from time to time. It is noted that the average queue remains within the available lane length.

The potential queue spillback issue indicates that mitigation measures may be required in the 2031 future year baseline scenario i.e. without further development of the subject beyond its extant use as a hardware store.

The complete set of SIDRA outputs is provided in Appendix C.

5.9.5 2021 Post-Development Intersection Performance

The operation of the intersection has been assessed in its current form using the same assumptions on the availability of signal phasing and on the basis of the traffic volumes noted in Figure 5.11 and Figure 5.12.

Analysis results indicate that the intersection will potentially operate at LOS D during the weekday PM peak with recorded average delay of 39 seconds. The intersection will potentially have a DOS of 0.84 during the PM peak hour in the 2021 future year post-development scenario.

Analysis results for the Saturday peak indicate that the intersection will potentially operate at LOS E with a recorded average delay of 39 seconds. Three individual movements are noted to reach LOS F. The intersection will potentially have a DOS of 0.95 during the Saturday peak hour in the 2021 future year post-development scenario, indicating that practical capacity is reached, and mitigation measures would be required to accommodate further traffic growth.

There are no particular queue related concerns in the PM peak hour. During the Saturday peak hour, the 95th percentile queue on the Neerabup Road eastbound approach is contained within the available lane length between Key Largo Drive and Marmion Avenue, as is the 100th percentile queue. It is noted that the average queue is well within the available lane length.

The complete set of SIDRA outputs is provided in Appendix D.

5.9.6 2031 Post-Development Intersection Performance

The operation of the intersection has been assessed in its current form using the same assumptions on the availability of signal phasing and on the basis of the traffic volumes noted in Figure 5.13 and Figure 5.14.

Analysis results indicate that the intersection will potentially operate at LOS C during the weekday PM peak with recorded average delay of 33 seconds. The intersection will potentially have a DOS of 0.89 during the PM peak hour in the 2031 future year post-development scenario.

Analysis results for the Saturday peak indicate that the intersection will potentially operate at LOS E with a recorded average delay of 68 seconds. Three individual movements are noted to reach LOS F, with additional delay compared to the baseline scenario. The intersection will potentially have a DOS of 1.02 during the Saturday peak hour in the 2031 future year post-development scenario; therefore, capacity will have been exceeded by this point.

There remains no particular queue related concerns in the PM peak hour; however, the 95th percentile queue on the Neerabup Road eastbound approach greatly exceeds the available lane length between Key Largo Drive and Marmion Avenue, indicating a high probability of queue spillback into the roundabout at Marmion Avenue during the peak hour. It is noted that the average queue closely matches the available lane length, confirming that queue spillback and potential blockage of the roundabout during a significant proportion of the peak hour is expected.

The complete set of SIDRA outputs is provided in Appendix D.

5.9.7 Post-Development Mitigation Measures

There are broadly three tests that must be satisfied to determine if potential mitigation measures are required and are appropriate:

- Need there must be an identifiable need for improvement
- Nexus the need must be connected to the demand created by the development

- Equity the cost of improvement should be at the same scale as the impact of the development

The foregoing analysis demonstrated while an improvement to this intersection may be required in the future year due increase in background traffic by 2031, the proposed development would exacerbate this potential problem at the design year. It is also noted that the proposed structure plan uses would potentially cause the intersection to reach capacity at the opening year, 2021.

Therefore, there is a need for improvement that is tied to increase in traffic brought about by the proposed development land uses; however, while there is available land in the road reserve along Neerabup Road, there is limited opportunity for physical works at this intersection that would pass the equity test.

Notwithstanding, there is a possibility for a minor change through implementation of a left-turn slip lane on the north approach at Key Largo Drive. This would have the benefit of enabling the dominant left-turn movement to exit the intersection throughout the signal cycle and would have minimal interaction with the relatively minor amount of through traffic movements that currently sharing the same inside lane.

The existing intersection layout is shown alongside the suggested intersection treatment measures (high-angle left-turn slip lane) on Figure 5.15 and Figure 5.16 respectively.

Figure 5.15: Existing Intersection Layout

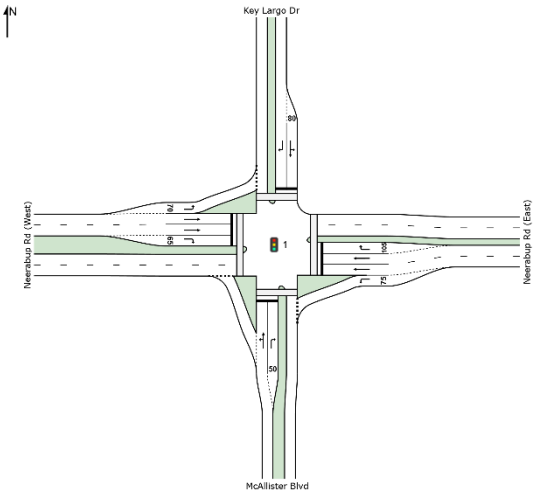
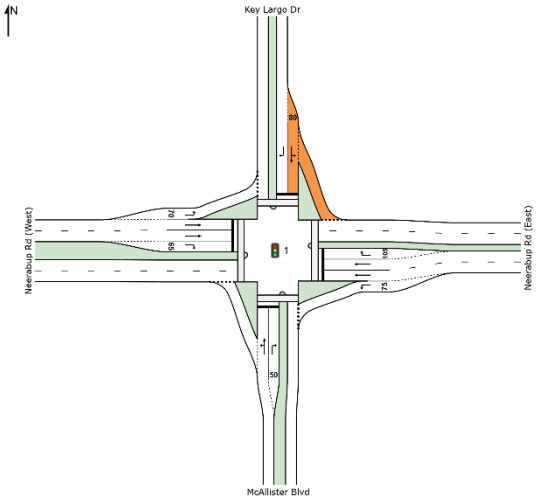


Figure 5.16: Potential Future Mitigated Intersection Layout



Source: SIDRA Intersection

Analysis results for the 2031 future year post-development scenario indicate that the intersection will potentially operate at LOS C during the weekday PM peak with recorded average delay of 27 seconds. The intersection will potentially have a DOS of 0.87 during the PM peak hour at 2031 when improved as suggested.

Analysis results for the Saturday peak indicate that the intersection will potentially operate at LOS D with a recorded average delay of 38 seconds. The intersection will potentially have a DOS of 0.87 during the Saturday peak hour in the 2031 future year post-development scenario when improved as suggested.

There are no particular queue related concerns in the PM peak hour and in this instance the 95th percentile queue on the Neerabup Road eastbound approach is contained within the available

lane length between Key Largo Drive and Marmion Avenue, as is the 100th percentile queue. It is noted that the average queue is well within the available lane length.

The above suggested improvements would therefore mitigate the traffic impacts of the development at the key intersection, noting the improvement is potentially required without further development of the site beyond its extant use as a hardware store

The complete set of SIDRA outputs is provided in Appendix E.

5.10 Daily Traffic Impact

Compared the to the current permitted use as a hardware store, the proposed structure plan land uses are anticipated to generate approximately an additional 2,150 vehicle movements per day.

Considering that this increase in traffic will be split 50/50 between in/out trips and further diluted over several approach routes, it is not expected that the proposed structure plan will notably affect the functional characteristics of roads within the activity centre precinct.

6. Safety Assessment

6.1 Existing Conditions

A review of the reported casualty crash history for the roads and intersections adjoining the subject site has been sourced from the Main Roads WA crash database. This database records all reported road crashes that have occurred in Western Australia over the most recent available five-year period (2013 to 2017).

It is noted that there have been no recorded incidents at the intersection of Key Largo Drive with the ROW easement north of the site. A summary of the accidents for the nearby Neerabup Road/Key Largo Drive signalised intersection is presented in Table 6.1.

Table 6.1: Crash Record for Roads and Intersections in the vicinity of the Subject Site

Location	State Ranking		Crash Severity				Total Crashes
	Cost	Frequency	PDO	Medical	Hospital	Fatal	
Neerabup Road/ Key Largo Drive	1,204	1,322	14	7	0	0	21

PDO – property damage only, Medical – roadside medical assistance, Hospital – hospitalisation required

The 21 crashes reported at the above intersection consisted of the following:

- Rear End 3
- Right-angle 5
- Thru-right 13

6.2 Post-Development Conditions

The number and severity of crashes is not of particular concern; however, the signal phasing plan that incorporates priority-controlled right-turn movements, is likely causing the instances of right-angle and thru-right crashes. It is likely that fully-controlled right turns would mitigate this issue.

Compared to the extant use as a hardware store, the additional traffic generated by the proposed structure plan land uses during peak hours and over the course of a day are considered to be moderate at approximately 185 vehicles in any one hour. This traffic is split between in/out vehicle movements and is further is dispersed over a number of turning movements at the site access points.

The potential intersection improvements create a capacity benefit compared to the existing situation, which notionally reduces driver frustration and associated risk-taking behaviour. This is an improvement over the baseline situation.

Full signal control of all right turns would change the signal timings of the intersection and detrimentally affect capacity (DOS would likely exceed 1.00). To implement this type of control would therefore require physical improvements to increase the number of lanes or to decrease the influence pedestrian walk times have on the intersection (through introduction of staged crossings).

In this regard, and in consideration of the need, nexus and equity tests, the best way the proposed development can address potential future road safety concerns is to mitigate the impact the development has on intersection performance.

Elsewhere, the moderate increase in traffic volumes could not be expected to adversely affect pedestrians crossing the road, or any cyclists that travel on-road.

Accordingly, the road safety characteristics of the mitigated post-development are considered acceptable.

7. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

i The proposed structure plan land uses have a car parking requirement of 305 spaces.

ii The proposed development has a requirement for 23 bicycle parking spaces

iii The site is expected to generate 476 vehicle movements per hour in the weekday PM peak and 739 vehicle movements per hour in the Saturday peak.

iv The development is expected to generate approximately 5,410 vehicle movements over the course of a typical weekday.

v The extant use of the site as a hardware store has been assessed in terms of the net difference between this approved use and those land uses in the proposed structure plan.

vi Detailed traffic modelling has been undertaken for at the key intersection in the study area, the Neerabup Road/Key Largo Drive/McAllister Boulevard signal-controlled intersection.

vii Traffic growth is expected to increase vehicle volumes to a point where, when combined with the structure plan generated traffic, the above key intersection area may reach practical capacity at the opening year (2021) and may exceed capacity at the design year (2031).

viii The following mitigating works are suggested to ameliorate the potential off-site traffic impacts of the proposed development:

- Construction of a high-angle left-turn slip lane at the Key Largo Drive approach to the above intersection

ix Compared to the baseline situation, following these mitigation works, the key intersection is considered to operate safely and efficiently at least 10yrs after full development.

Accordingly, the transport characteristics of the proposed structure plan are considered acceptable.

Appendix A

Proposed Structure Plan

URBIS

19 NEERABUP ROAD, CLARKSON
RETAIL CONCEPT MASTERPLAN

1:2000 @ A1

0 20 40 60 80 100

DATE: 15.03.18
JOB NO: PA1313
DWG NO: CP-01
REV: 1

URBIS

19 NEERABUP ROAD, CLARKSON
RETAIL CONCEPT MASTERPLAN

1:2000 @ A1

0 20 40 60 80 100

DATE: 15.03.18
JOB NO: PA1313
DWG NO: CP-01
REV: 1

LEGEND:

- SUBJECT SITE
- MAIN STREET INTERFACE
- GATEWAY / LANDMARK BUILDING
- MOVEMENT
- PEDESTRIAN MOVEMENT
- VIEW LINES
- ACTIVATED EDGES
- LANDSCAPE SCREENED EDGES

MARMION AVE

KEY LARGO DRIVE

NEERABUP RD

URBIS

19 NEERABUP ROAD, CLARKSON
DESIGN PRINCIPLES

1:2000 @ A1

0 20 40 60 80 100

DATE: 15.03.18
JOB NO: PA1313
DWG NO: CP-01
REV: 1

URBIS

19 NEERABUP ROAD, CLARKSON

RESIDENTIAL CONCEPT MASTERPLAN

1:2000 @ A1

0 20 40 60 80 100

DATE: 15.03.18
JOB NO: PA1313
DWG NO: CP-02
REV:

URBIS

19 NEERABUP ROAD, CLARKSON
RESIDENTIAL CONCEPT MASTERPLAN

1:2000 @ A1

0 20 40 60 80 100

DATE: 15.03.18
JOB NO: PA1313
DWG NO: CP-02
REV:

URBIS

19 NEERABUP ROAD, CLARKSON

RESIDENTIAL DESIGN PRINCIPLES

1:2000 @ A1

DATE: 15.03.18
JOB NO: PA1313
DWG NO: CP-02
REV:

Appendix B

Current Year SIDRA Output

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2018 PM EX]

Signals - Fixed Time Isolated Cycle Time = 80 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	60	2.0	337	0.178	100	21.4	LOS C	1.4	9.7	Full	500	0.0	0.0
Lane 2	18	2.0	245	0.073	100	26.6	LOS C	0.5	3.3	Short	50	0.0	NA
Approach	78	2.0		0.178		22.6	LOS C	1.4	9.7				
East: Neerabup Rd (East)													
Lane 1	16	2.0	1390	0.011	100	6.5	LOS A	0.1	0.5	Short	75	0.0	NA
Lane 2	295	8.0	626	0.471	100	22.7	LOS C	9.2	68.6	Full	500	0.0	0.0
Lane 3	295	8.0	626	0.471	100	22.7	LOS C	9.2	68.6	Full	500	0.0	0.0
Lane 4	345	5.0	492	0.702	100	25.2	LOS C	9.8	71.3	Short	105	0.0	NA
Approach	951	6.8		0.702		23.4	LOS C	9.8	71.3				
North: Key Largo Dr													
Lane 1	256	4.5	325	0.788	100	43.1	LOS D	10.6	77.3	Short	80	0.0	NA
Lane 2	164	5.0	460	0.357	100	25.9	LOS C	4.7	34.4	Full	500	0.0	0.0
Approach	420	4.7		0.788		36.4	LOS D	10.6	77.3				
West: Neerabup Rd (West)													
Lane 1	234	5.0	1133	0.206	100	8.8	LOS A	2.4	17.4	Short	70	0.0	NA
Lane 2	211	8.0	255	0.826	100	42.8	LOS D	9.1	68.3	Full	500	0.0	0.0
Lane 3	211	8.0	255	0.826	100	42.8	LOS D	9.1	68.3	Full	500	0.0	0.0
Lane 4	18	2.0	216	0.083	100	24.6	LOS C	0.5	3.2	Short	65	0.0	NA
Approach	673	6.8		0.826		30.5	LOS C	9.1	68.3				
Intersection	2121	6.2		0.826		28.2	LOS C	10.6	77.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2018 SAT EX]

Signals - Fixed Time Isolated Cycle Time = 85 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	63	1.0	339	0.186	100	22.3	LOS C	1.6	11.2	Full	500	0.0	0.0
Lane 2	26	1.0	221	0.119	100	28.2	LOS C	0.7	5.1	Short	50	0.0	NA
Approach	89	1.0		0.186		24.0	LOS C	1.6	11.2				
East: Neerabup Rd (East)													
Lane 1	17	1.0	1385	0.012	100	6.4	LOS A	0.1	0.5	Short	75	0.0	NA
Lane 2	223	5.0	622	0.359	100	23.5	LOS C	7.1	51.8	Full	500	0.0	0.0
Lane 3	223	5.0	622	0.359	100	23.5	LOS C	7.1	51.8	Full	500	0.0	0.0
Lane 4	301	2.0	441	0.682	100	26.2	LOS C	8.7	62.2	Short	105	0.0	NA
Approach	764	3.7		0.682		24.2	LOS C	8.7	62.2				
North: Key Largo Dr													
Lane 1	284	1.8	333	0.853	100	49.2	LOS D	13.3	94.5	Short	80	0.0	NA
Lane 2	196	2.0	496	0.395	100	26.3	LOS C	5.9	41.8	Full	500	0.0	0.0
Approach	480	1.9		0.853		39.9	LOS D	13.3	94.5				
West: Neerabup Rd (West)													
Lane 1	273	2.0	1207	0.226	100	8.6	LOS A	2.7	19.1	Short	70	0.0	NA
Lane 2	267	5.0	333	0.802	100	41.4	LOS D	11.8	86.4	Full	500	0.0	0.0
Lane 3	267	5.0	333	0.802	100	41.4	LOS D	11.8	86.4	Full	500	0.0	0.0
Lane 4	26	1.0	281	0.094	100	24.2	LOS C	0.7	4.9	Short	65	0.0	NA
Approach	834	3.9		0.802		30.1	LOS C	11.8	86.4				
Intersection	2167	3.3		0.853		29.9	LOS C	13.3	94.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix C

Future Year Baseline SIDRA Output

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2021 PM BL]

Signals - Fixed Time Isolated Cycle Time = 80 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	71	2.0	276	0.255	100	24.6	LOS C	2.0	14.2	Full	500	0.0	0.0
Lane 2	18	2.0	216	0.083	100	29.1	LOS C	0.5	3.6	Short	50	0.0	NA
Approach	88	2.0		0.255		25.5	LOS C	2.0	14.2				
East: Neerabup Rd (East)													
Lane 1	16	2.0	1381	0.011	100	6.5	LOS A	0.1	0.5	Short	75	0.0	NA
Lane 2	317	8.0	741	0.428	100	18.8	LOS B	9.0	67.5	Full	500	0.0	0.0
Lane 3	317	8.0	741	0.428	100	18.8	LOS B	9.0	67.5	Full	500	0.0	0.0
Lane 4	400	5.0	528	0.757	100	25.2	LOS C	11.3	82.3	Short	105	0.0	NA
Approach	1051	6.8		0.757		21.1	LOS C	11.3	82.3				
North: Key Largo Dr													
Lane 1	266	4.4	295	0.902	100	53.3	LOS D	12.7	92.3	Short	80	0.0	NA
Lane 2	241	5.0	372	0.649	100	33.7	LOS C	7.9	57.6	Full	500	0.0	0.0
Approach	507	4.7		0.902		44.0	LOS D	12.7	92.3				
West: Neerabup Rd (West)													
Lane 1	234	5.0	1089	0.215	100	9.5	LOS A	2.5	18.5	Short	70	0.0	NA
Lane 2	254	8.0	324	0.784	100	38.6	LOS D	10.5	78.7	Full	500	0.0	0.0
Lane 3	254	8.0	324	0.784	100	38.6	LOS D	10.5	78.7	Full	500	0.0	0.0
Lane 4	18	2.0	214	0.084	100	23.7	LOS C	0.4	3.2	Short	65	0.0	NA
Approach	760	6.9		0.784		29.3	LOS C	10.5	78.7				
Intersection	2406	6.2		0.902		28.7	LOS C	12.7	92.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2021 SAT BL]

Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	78	1.0	353	0.221	100	55.3	LOS E	4.2	29.3	Full	500	0.0	0.0
Lane 2	26	1.0	175	0.151	100	41.7	LOS D	1.2	8.1	Short	50	0.0	NA
Approach	104	1.0		0.221		51.9	LOS D	4.2	29.3				
East: Neerabup Rd (East)													
Lane 1	17	1.0	1404	0.012	100	6.3	LOS A	0.1	0.6	Short	75	0.0	NA
Lane 2	241	5.0	436	0.552	100	47.7	LOS D	13.5	98.7	Full	500	0.0	0.0
Lane 3	241	5.0	436	0.552	100	47.7	LOS D	13.5	98.7	Full	500	0.0	0.0
Lane 4	374	2.0	540	0.692	100	33.8	LOS C	15.4	109.8	Short	105	0.0	NA
Approach	872	3.6		0.692		40.9	LOS D	15.4	109.8				
North: Key Largo Dr													
Lane 1	299	1.8	377	0.793	100	61.2	LOS E	19.1	135.7	Short	80	0.0	NA
Lane 2	298	2.0	459	0.648	100	42.9	LOS D	14.7	104.9	Full	500	0.0	0.0
Approach	597	1.9		0.793		52.1	LOS D	19.1	135.7				
West: Neerabup Rd (West)													
Lane 1	273	2.0	1141	0.239	100	10.3	LOS B	4.3	30.4	Short	70	0.0	NA
Lane 2	314	5.0	392[1]	0.802	100	54.2	LOS D	19.6	143.2	Full	500	0.0	0.0
Lane 3	334	5.0	416[1]	0.802	100	54.5	LOS D	21.0	153.5	Full	500	0.0	0.0
Lane 4	26	1.0	594	0.044	100	23.0	LOS C	0.8	5.5	Short	65	0.0	NA
Approach	947	4.0		0.802		40.8	LOS D	21.0	153.5				
Intersection	2520	3.3		0.802		44.0	LOS D	21.0	153.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2031 PM BL]

Signals - Fixed Time Isolated Cycle Time = 90 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	71	2.0	271	0.261	100	29.3	LOS C	2.3	16.2	Full	500	0.0	0.0
Lane 2	18	2.0	199	0.090	100	32.7	LOS C	0.6	4.1	Short	50	0.0	NA
Approach	88	2.0		0.261		30.0	LOS C	2.3	16.2				
East: Neerabup Rd (East)													
Lane 1	16	2.0	1397	0.011	100	6.4	LOS A	0.1	0.5	Short	75	0.0	NA
Lane 2	406	8.0	803	0.506	100	19.9	LOS B	13.0	96.9	Full	500	0.0	0.0
Lane 3	406	8.0	803	0.506	100	19.9	LOS B	13.0	96.9	Full	500	0.0	0.0
Lane 4	400	5.0	546	0.733	100	28.0	LOS C	12.6	92.1	Short	105	0.0	NA
Approach	1228	6.9		0.733		22.4	LOS C	13.0	96.9				
North: Key Largo Dr													
Lane 1	266	4.4	303	0.880	100	55.0	LOS D	13.6	98.7	Short	80	0.0	NA
Lane 2	241	5.0	355	0.679	100	39.2	LOS D	9.0	65.8	Full	500	0.0	0.0
Approach	507	4.7		0.880		47.5	LOS D	13.6	98.7				
West: Neerabup Rd (West)													
Lane 1	234	5.0	1083	0.216	100	9.9	LOS A	2.9	21.4	Short	70	0.0	NA
Lane 2	317	8.0	371	0.856	100	46.0	LOS D	15.6	116.5	Full	500	0.0	0.0
Lane 3	317	8.0	371	0.856	100	46.0	LOS D	15.6	116.5	Full	500	0.0	0.0
Lane 4	18	2.0	216	0.083	100	23.0	LOS C	0.4	3.1	Short	65	0.0	NA
Approach	886	7.1		0.856		36.0	LOS D	15.6	116.5				
Intersection	2711	6.4		0.880		31.8	LOS C	15.6	116.5				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2031 SAT BL]

Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	78	1.0	299	0.261	100	44.6	LOS D	3.8	27.1	Full	500	0.0	0.0
Lane 2	26	1.0	359	0.073	100	35.2	LOS D	1.0	7.3	Short	50	0.0	NA
Approach	104	1.0		0.261		42.2	LOS D	3.8	27.1				
East: Neerabup Rd (East)													
Lane 1	17	1.0	1398	0.012	100	6.3	LOS A	0.1	0.6	Short	75	0.0	NA
Lane 2	307	5.0	465	0.661	100	47.7	LOS D	17.6	128.8	Full	500	0.0	0.0
Lane 3	307	5.0	465	0.661	100	47.7	LOS D	17.6	128.8	Full	500	0.0	0.0
Lane 4	374	2.0	425	0.879	100	57.9	LOS E	22.2	158.3	Short	105	0.0	NA
Approach	1005	3.8		0.879		50.8	LOS D	22.2	158.3				
North: Key Largo Dr													
Lane 1	299	1.8	313	0.954	100	89.2	LOS F	23.9	170.1	Short	80	0.0	NA
Lane 2	298	2.0	528	0.564	100	37.7	LOS D	14.0	99.8	Full	500	0.0	0.0
Approach	597	1.9		0.954		63.5	LOS E	23.9	170.1				
West: Neerabup Rd (West)													
Lane 1	273	2.0	1234	0.221	100	10.5	LOS B	4.7	33.4	Short	70	0.0	NA
Lane 2	375	5.0	384[1]	0.978	100	90.0	LOS F	31.3	228.8	Full	500	0.0	0.0
Lane 3	435	5.0	445[1]	0.978	100	89.6	LOS F	37.0	269.8	Full	500	0.0	0.0
Lane 4	26	1.0	484	0.054	100	26.2	LOS C	0.8	6.0	Short	65	0.0	NA
Approach	1109	4.2		0.978		68.8	LOS E	37.0	269.8				
Intersection	2816	3.4		0.978		60.3	LOS E	37.0	269.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Appendix D

Future Year Post-Development SIDRA Output

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2021 PM PD]

Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	73	2.0	309	0.235	100	38.8	LOS D	3.2	22.8	Full	500	0.0	0.0
Lane 2	18	2.0	378	0.047	100	31.9	LOS C	0.6	4.5	Short	50	0.0	NA
Approach	91	2.0		0.235		37.4	LOS D	3.2	22.8				
East: Neerabup Rd (East)													
Lane 1	16	2.0	1426	0.011	100	6.3	LOS A	0.1	0.6	Short	75	0.0	NA
Lane 2	320	8.0	741	0.432	100	27.9	LOS C	13.5	100.8	Full	500	0.0	0.0
Lane 3	320	8.0	741	0.432	100	27.9	LOS C	13.5	100.8	Full	500	0.0	0.0
Lane 4	407	5.0	533	0.764	100	37.6	LOS D	18.3	133.9	Short	105	0.0	NA
Approach	1063	6.8		0.764		31.3	LOS C	18.3	133.9				
North: Key Largo Dr													
Lane 1	268	4.4	318	0.844	100	64.0	LOS E	16.9	122.9	Short	80	0.0	NA
Lane 2	252	5.0	528	0.477	100	33.8	LOS C	10.5	77.0	Full	500	0.0	0.0
Approach	520	4.7		0.844		49.4	LOS D	16.9	122.9				
West: Neerabup Rd (West)													
Lane 1	234	5.0	1137	0.206	100	10.4	LOS B	3.7	26.9	Short	70	0.0	NA
Lane 2	258	8.0	309	0.835	100	59.2	LOS E	16.1	120.6	Full	500	0.0	0.0
Lane 3	258	8.0	309	0.835	100	59.2	LOS E	16.1	120.6	Full	500	0.0	0.0
Lane 4	18	2.0	207	0.087	100	30.8	LOS C	0.6	4.4	Short	65	0.0	NA
Approach	767	6.9		0.835		43.7	LOS D	16.1	120.6				
Intersection	2441	6.2		0.844		39.3	LOS D	18.3	133.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2021 SAT PD]

Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	82	1.0	313	0.262	100	58.6	LOS E	4.4	31.0	Full	500	0.0	0.0
Lane 2	26	1.0	134	0.196	100	41.2	LOS D	1.1	7.5	Short	50	0.0	NA
Approach	108	1.0		0.262		54.3	LOS D	4.4	31.0				
East: Neerabup Rd (East)													
Lane 1	17	1.0	1464	0.012	100	6.4	LOS A	0.1	0.7	Short	75	0.0	NA
Lane 2	241	5.0	392	0.613	100	50.8	LOS D	14.0	102.1	Full	500	0.0	0.0
Lane 3	241	5.0	392	0.613	100	50.8	LOS D	14.0	102.1	Full	500	0.0	0.0
Lane 4	398	2.0	454	0.876	100	56.1	LOS E	23.7	168.6	Short	105	0.0	NA
Approach	896	3.6		0.876		52.3	LOS D	23.7	168.6				
North: Key Largo Dr													
Lane 1	303	1.8	321	0.946	100	86.1	LOS F	23.9	169.9	Short	80	0.0	NA
Lane 2	332	2.0	566	0.585	100	35.9	LOS D	15.3	108.7	Full	500	0.0	0.0
Approach	635	1.9		0.946		59.9	LOS E	23.9	169.9				
West: Neerabup Rd (West)													
Lane 1	273	2.0	1128	0.242	100	11.6	LOS B	5.4	38.1	Short	70	0.0	NA
Lane 2	314	5.0	331[1]	0.949	100	80.6	LOS F	24.5	178.6	Full	500	0.0	0.0
Lane 3	359	5.0	378[1]	0.949	100	80.4	LOS F	28.3	206.8	Full	500	0.0	0.0
Lane 4	26	1.0	515	0.051	100	27.0	LOS C	0.9	6.2	Short	65	0.0	NA
Approach	972	4.0		0.949		59.7	LOS E	28.3	206.8				
Intersection	2611	3.2		0.949		57.0	LOS E	28.3	206.8				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2031 PM PD]

Signals - Fixed Time Isolated Cycle Time = 90 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	73	2.0	264	0.275	100	30.8	LOS C	2.4	17.3	Full	500	0.0	0.0
Lane 2	18	2.0	198	0.090	100	32.7	LOS C	0.6	4.1	Short	50	0.0	NA
Approach	91	2.0		0.275		31.2	LOS C	2.4	17.3				
East: Neerabup Rd (East)													
Lane 1	16	2.0	1395	0.011	100	6.4	LOS A	0.1	0.5	Short	75	0.0	NA
Lane 2	406	8.0	803	0.506	100	19.9	LOS B	13.0	96.9	Full	500	0.0	0.0
Lane 3	406	8.0	803	0.506	100	19.9	LOS B	13.0	96.9	Full	500	0.0	0.0
Lane 4	407	5.0	544	0.749	100	29.2	LOS C	13.3	96.8	Short	105	0.0	NA
Approach	1236	6.9		0.749		22.8	LOS C	13.3	96.9				
North: Key Largo Dr													
Lane 1	268	4.4	303	0.886	100	55.7	LOS E	13.8	100.4	Short	80	0.0	NA
Lane 2	252	5.0	358	0.702	100	40.1	LOS D	9.5	69.4	Full	500	0.0	0.0
Approach	520	4.7		0.886		48.1	LOS D	13.8	100.4				
West: Neerabup Rd (West)													
Lane 1	234	5.0	1105	0.212	100	9.7	LOS A	2.9	21.4	Short	70	0.0	NA
Lane 2	322	8.0	371	0.867	100	47.1	LOS D	16.0	119.9	Full	500	0.0	0.0
Lane 3	322	8.0	371	0.867	100	47.1	LOS D	16.0	119.9	Full	500	0.0	0.0
Lane 4	18	2.0	216	0.083	100	23.0	LOS C	0.4	3.1	Short	65	0.0	NA
Approach	895	7.1		0.867		36.9	LOS D	16.0	119.9				
Intersection	2741	6.4		0.886		32.5	LOS C	16.0	119.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2031 SAT PD]

Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	82	1.0	284	0.290	100	45.8	LOS D	4.2	29.5	Full	500	0.0	0.0
Lane 2	26	1.0	387	0.068	100	34.6	LOS C	1.0	7.3	Short	50	0.0	NA
Approach	108	1.0		0.290		43.1	LOS D	4.2	29.5				
East: Neerabup Rd (East)													
Lane 1	17	1.0	1475	0.011	100	6.4	LOS A	0.1	0.7	Short	75	0.0	NA
Lane 2	307	5.0	770	0.399	100	29.0	LOS C	13.6	99.5	Full	500	0.0	0.0
Lane 3	307	5.0	770	0.399	100	29.0	LOS C	13.6	99.5	Full	500	0.0	0.0
Lane 4	398	2.0	427	0.932	100	69.2	LOS E	26.6	189.5	Short	105	0.0	NA
Approach	1029	3.8		0.932		44.1	LOS D	26.6	189.5				
North: Key Largo Dr													
Lane 1	303	1.8	299	1.013	100	116.4	LOS F	28.1	199.4	Short	80	0.0	NA
Lane 2	332	2.0	528	0.627	100	38.4	LOS D	15.9	113.4	Full	500	0.0	0.0
Approach	635	1.9		1.013		75.6	LOS E	28.1	199.4				
West: Neerabup Rd (West)													
Lane 1	273	2.0	1144	0.238	100	11.3	LOS B	5.2	37.0	Short	70	0.0	NA
Lane 2	385	5.0	378[1]	1.020	100	115.5	LOS F	37.4	273.3	Full	500	0.0	0.0
Lane 3	449	5.0	441[1]	1.020	100	112.9	LOS F	43.2	315.3	Full	500	0.0	0.0
Lane 4	26	1.0	290	0.091	100	28.1	LOS C	0.9	6.5	Short	65	0.0	NA
Approach	1134	4.2		1.020		87.4	LOS F	43.2	315.3				
Intersection	2906	3.4		1.020		67.8	LOS E	43.2	315.3				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

Appendix E

Mitigated Future Year Post-Development SIDRA Output

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2031 PM PD Mtg]

Signals - Fixed Time Isolated Cycle Time = 85 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	73	2.0	247	0.294	100	29.1	LOS C	2.3	16.3	Full	500	0.0	0.0
Lane 2	18	2.0	376	0.048	100	29.6	LOS C	0.6	3.9	Short	50	0.0	NA
Approach	91	2.0		0.294		29.2	LOS C	2.3	16.3				
East: Neerabup Rd (East)													
Lane 1	16	2.0	781	0.020	100	13.4	LOS B	0.2	1.6	Short	75	0.0	NA
Lane 2	406	8.0	785	0.518	100	19.5	LOS B	12.5	93.4	Full	500	0.0	0.0
Lane 3	406	8.0	785	0.518	100	19.5	LOS B	12.5	93.4	Full	500	0.0	0.0
Lane 4	407	5.0	533	0.765	100	28.8	LOS C	12.8	93.4	Short	105	0.0	NA
Approach	1236	6.9		0.765		22.5	LOS C	12.8	93.4				
North: Key Largo Dr													
Lane 1	268	4.4	958	0.280	100	10.3	LOS B	4.3	31.0	Short	80	0.0	NA
Lane 2	252	5.0	345	0.729	100	39.3	LOS D	9.2	67.4	Full	500	0.0	0.0
Approach	520	4.7		0.729		24.4	LOS C	9.2	67.4				
West: Neerabup Rd (West)													
Lane 1	234	5.0	1099	0.213	100	9.7	LOS A	2.8	20.5	Short	70	0.0	NA
Lane 2	322	8.0	371	0.867	100	45.0	LOS D	15.2	114.0	Full	500	0.0	0.0
Lane 3	322	8.0	371	0.867	100	45.0	LOS D	15.2	114.0	Full	500	0.0	0.0
Lane 4	18	2.0	223	0.080	100	22.0	LOS C	0.4	2.9	Short	65	0.0	NA
Approach	895	7.1		0.867		35.3	LOS D	15.2	114.0				
Intersection	2741	6.4		0.867		27.2	LOS C	15.2	114.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

LANE SUMMARY

Site: 1 [Neerabup/McAllister/Key Largo 2031 SAT PD Mtg]

Signals - Fixed Time Isolated Cycle Time = 130 seconds (User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: McAllister Blvd													
Lane 1	82	1.0	206	0.398	100	53.8	LOS D	4.5	31.8	Full	500	0.0	0.0
Lane 2	26	1.0	286	0.092	100	43.8	LOS D	1.3	8.9	Short	50	0.0	NA
Approach	108	1.0		0.398		51.4	LOS D	4.5	31.8				
East: Neerabup Rd (East)													
Lane 1	17	1.0	1274	0.013	100	7.4	LOS A	0.2	1.1	Short	75	0.0	NA
Lane 2	307	5.0	930	0.331	100	21.2	LOS C	11.6	84.8	Full	500	0.0	0.0
Lane 3	307	5.0	930	0.331	100	21.2	LOS C	11.6	84.8	Full	500	0.0	0.0
Lane 4	398	2.0	536	0.742	100	39.2	LOS D	17.8	126.4	Short	105	0.0	NA
Approach	1029	3.8		0.742		27.9	LOS C	17.8	126.4				
North: Key Largo Dr													
Lane 1	303	1.8	697	0.435	100	19.0	LOS B	7.3	51.8	Short	80	0.0	NA
Lane 2	332	2.0	383	0.867	100	62.0	LOS E	20.2	144.1	Full	500	0.0	0.0
Approach	635	1.9		0.867		41.5	LOS D	20.2	144.1				
West: Neerabup Rd (West)													
Lane 1	273	2.0	1021	0.267	100	13.3	LOS B	5.7	40.7	Short	70	0.0	NA
Lane 2	385	5.0	449[1]	0.858	100	53.4	LOS D	24.5	179.1	Full	500	0.0	0.0
Lane 3	449	5.0	524[1]	0.858	100	53.9	LOS D	29.3	214.0	Full	500	0.0	0.0
Lane 4	26	1.0	337	0.078	100	22.9	LOS C	0.7	5.2	Short	65	0.0	NA
Approach	1134	4.2		0.858		43.2	LOS D	29.3	214.0				
Intersection	2906	3.4		0.867		37.7	LOS D	29.3	214.0				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

1 Reduced capacity due to a short lane effect. Short lane queues may extend into the full-length lanes. Some upstream delays at entry to short lanes are not included.

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