

# Rockingham Precinct Structure Plan

Transport Impact Assessment



Stantec Australia Pty Ltd

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City of Rockingham

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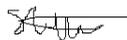
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- Appendix C ROM 24 Zonal Distribution**
- Appendix D Council Link Counts**
- Appendix E SIDRA Results**
- Appendix F SIDRA with Mitigation Results**



# 1 Introduction

## 1.1 Background

Stantec has been commissioned by Hames Sharley on behalf of the City of Rockingham to prepare a Traffic Impact Assessment report for the proposed amendment to the Rockingham Strategic Centre (RSC) Precinct Plan and Town Planning Scheme (TPS), focusing on transport requirements, opportunities, constraints, and assessment of potential future transport scenarios.

This Transport Impact Assessment (TIA) is provided as an update to the previous report prepared by Cardno dated March 2022 (CW1181500) and aims to address comments received by Main Roads WA. These comments are as follows:

- *The Transport Impact Assessment (TIA) is uncertain and requires amendment, in accordance with Transport Impact Assessment Guidelines (August 2016) and electronic SIDRA Intersection files (.sip) in Version 9, as appropriate.*
- *The TIA does not provide a development yield or forecast of land-use to projected trips generated by the Structure Plan. This is required to understand future intersection upgrades to Ennis Avenue and impacts to the State Road Network.*
- *Section 2.2 – It is unclear whether the ROM24 forecasts provided can be used without including the impacts of Westport or the Fremantle Rockingham Controlled Access Highway projects.*

This TIA also includes a comparison of the development yields associated with the 2025 Rockingham Strategic Centre (RSC) Precinct Plan and the previous 2009 City of Rockingham Precinct Structure Plan (CoRPSP). This report has been prepared in reference to the WAPC State Planning Policy 7.2, Precinct Design Guidelines.

## 1.2 Study Area Context

The RSC Precinct Plan Study Area is illustrated in **Figure 1-1** and comprises of eight precincts as listed below:

- P1 – City Centre
- P2 – Waterfront Village
- P3 – Coastal Lots
- P4 – TOD village
- P5 - City Park
- P6 - Southern Residential
- P7 – Education
- P8 – Dixon Road

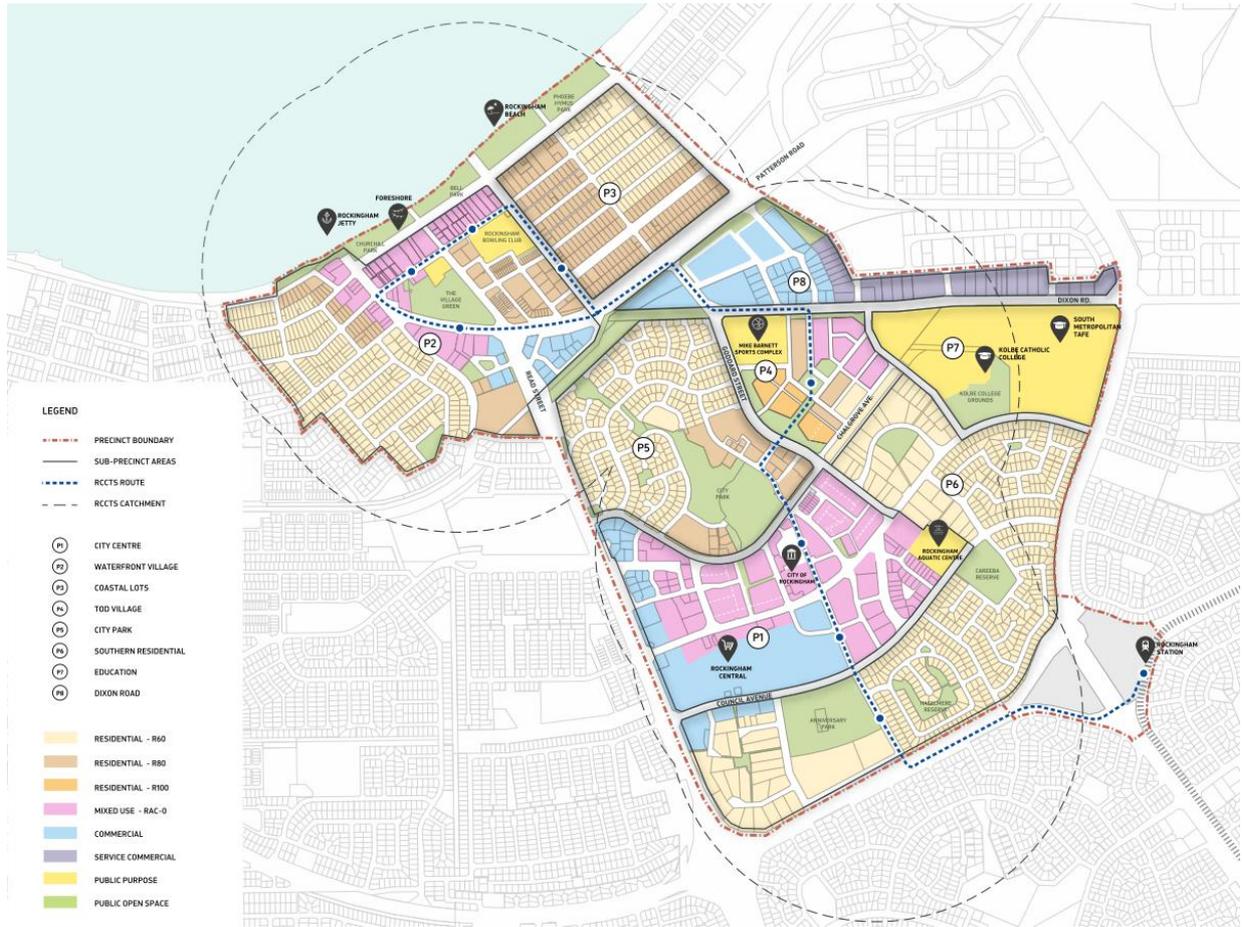
Existing intersection controls (traffic signal and roundabouts) within the RSC Precinct Plan Study Area are shown in **Figure 1-2**.



# Rockingham Precinct Structure Plan

## 1 Introduction

Figure 1-1. Study area



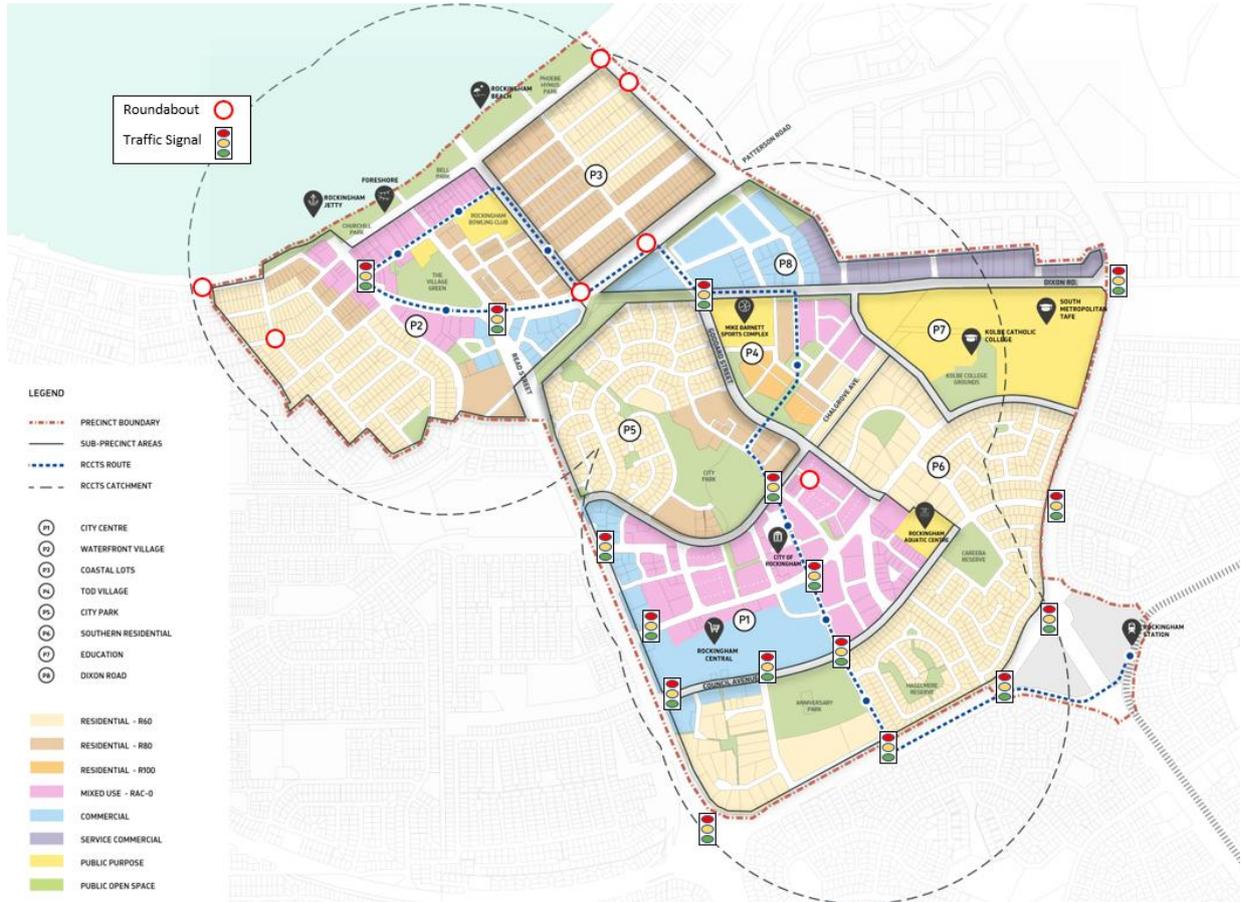
Source: Hames Sharley



# Rockingham Precinct Structure Plan

## 1 Introduction

Figure 1-2. Existing intersection controls within the study area (traffic signal and roundabout)



Source: Hames Sharley



## 2 Road Network Review

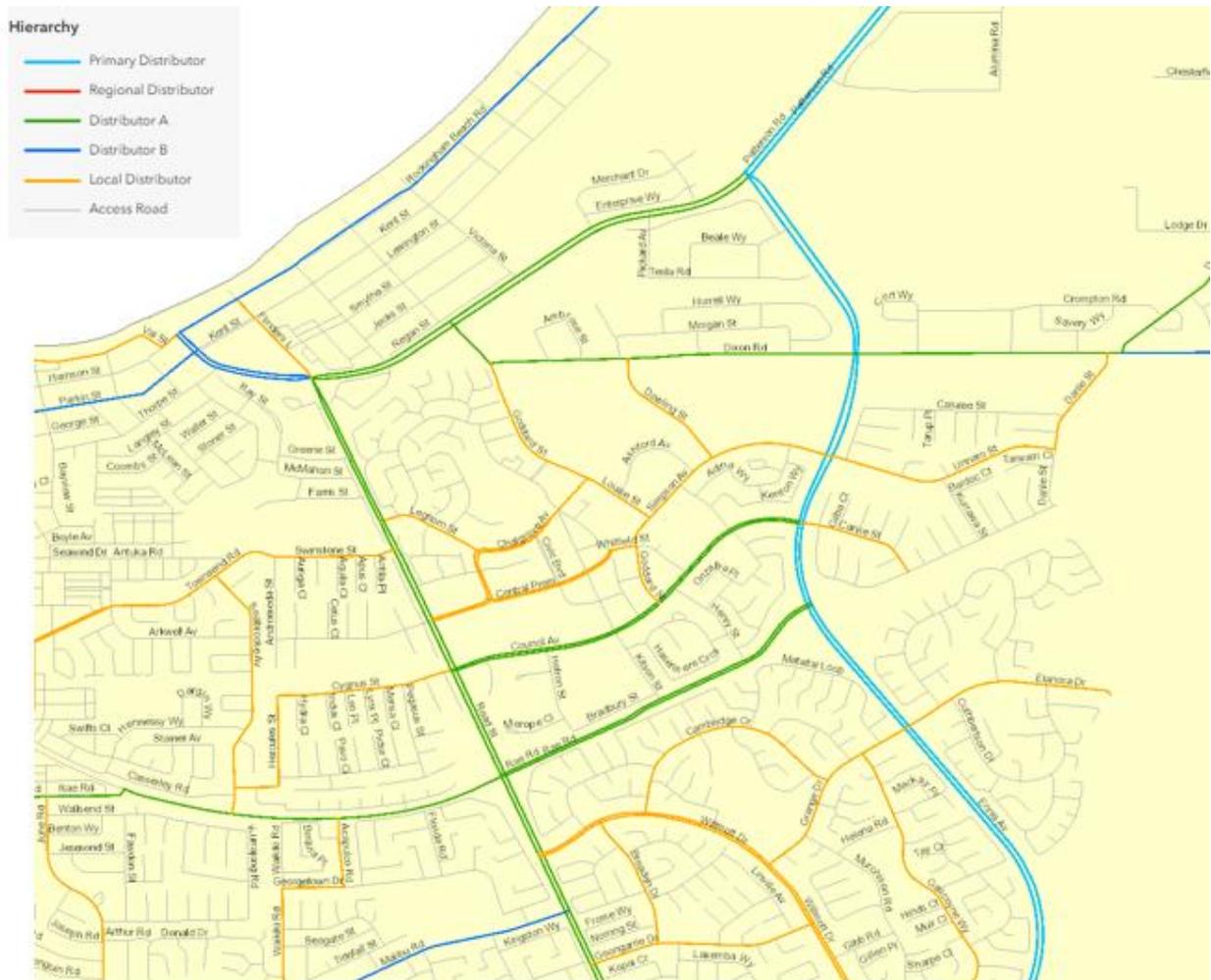
The Main Roads WA Metropolitan Functional Road Hierarchy (MFRH) of the road network in the vicinity of the Rockingham City Centre is presented in **Figure 2-1**.

These classifications are defined in the MFRH as follows:

- **Primary Distributors (light blue):** Form the regional and inter-regional grid of Main Roads WA traffic routes and carry large volumes of fast-moving traffic. Some are strategic freight routes, and all are National or State Roads WA.
- **Regional Distributors (red):** Roads that are not Primary Distributors, but which link significant destinations and are designed for efficient movement of people and goods within and beyond regional areas. They are managed by Local Government.
- **District Distributor A (green):** These carry traffic between industrial, commercial and residential areas and connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining properties. They are managed by Local Government.
- **Distributor B (dark blue):** Perform a similar function to District Distributor A but with reduced capacity due to flow restrictions from access to and roadside parking alongside adjoining property. These are often older roads with traffic demand in excess of that originally intended. District Distributor A and B roads run between land-use cells and not through them, forming a grid that would ideally be around 1.5 kilometres apart. They are managed by Local Government.
- **Local Distributors (orange):** Carry traffic within a cell and link District Distributors at the boundary to access roads. The route of the Local Distributor discourages through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to or serving the area. These roads should accommodate buses but discourage trucks. They are managed by Local Government.
- **Access Roads (grey):** Provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. These roads are bicycle and pedestrian friendly. They are managed by Local Government.



Figure 2-1. Main Roads WA functional road hierarchy



Source: MRWA Road Information Mapping System

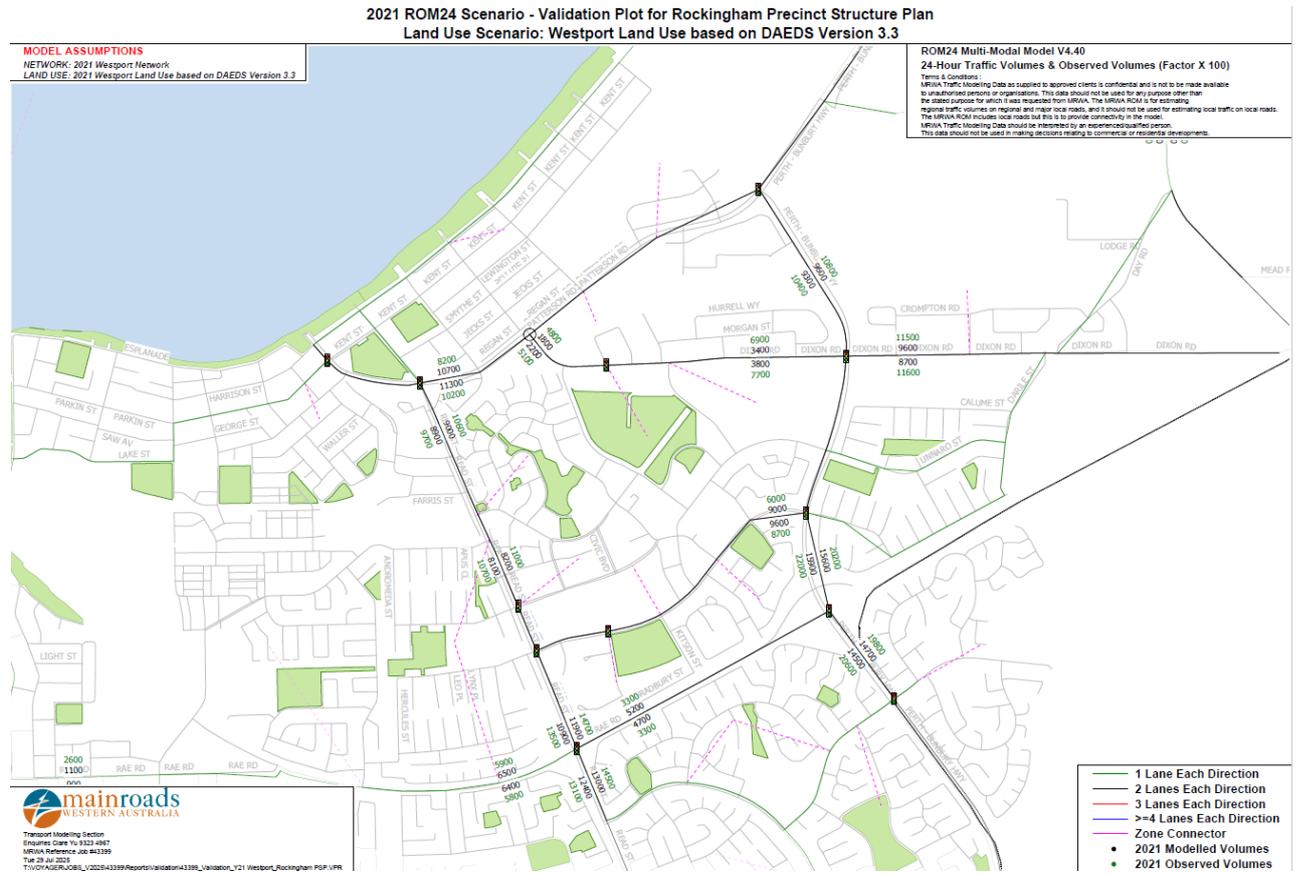
## 2.1 Traffic Volumes

Updated ROM 24 Link Volume Plots for 2021 and 2041 were provided by Main Roads WA (MRWA) in July 2025, as shown in **Figure 2-2**, **Figure 2-3** and included in **Appendix A**. It is noted that the modelling presented is based on plots with the Westport project case land use assumptions. The future traffic and the existing traffic volumes were compared to identify road sections which may be congested due to the anticipated increase in traffic.

In consultation with Main Roads WA and the City of Rockingham, detailed traffic modelling has been undertaken at key intersections identified along specific roads which may potentially be impacted due to the traffic associated with the proposed RSC Precinct Plan, as discussed further in Section 8.

# Rockingham Precinct Structure Plan 2 Road Network Review

Figure 2-2. ROM 24 plot link 2021



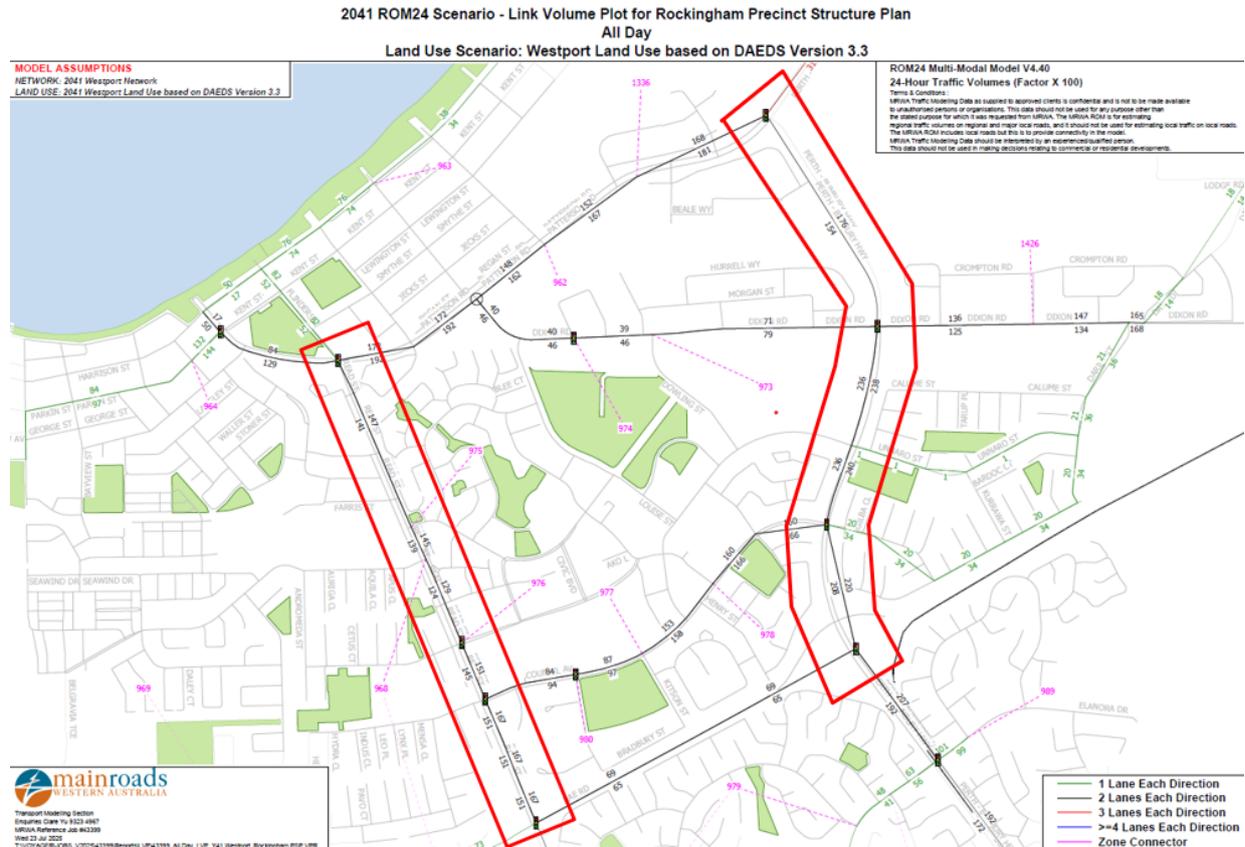
Source: MRWA



# Rockingham Precinct Structure Plan

## 2 Road Network Review

Figure 2-3. ROM 24 plot link - 2041



Source: MRWA

Comparison of the two ROM link plots indicates transport corridors with expected significant traffic volume increase (indicated in **Figure 2-3**) are:

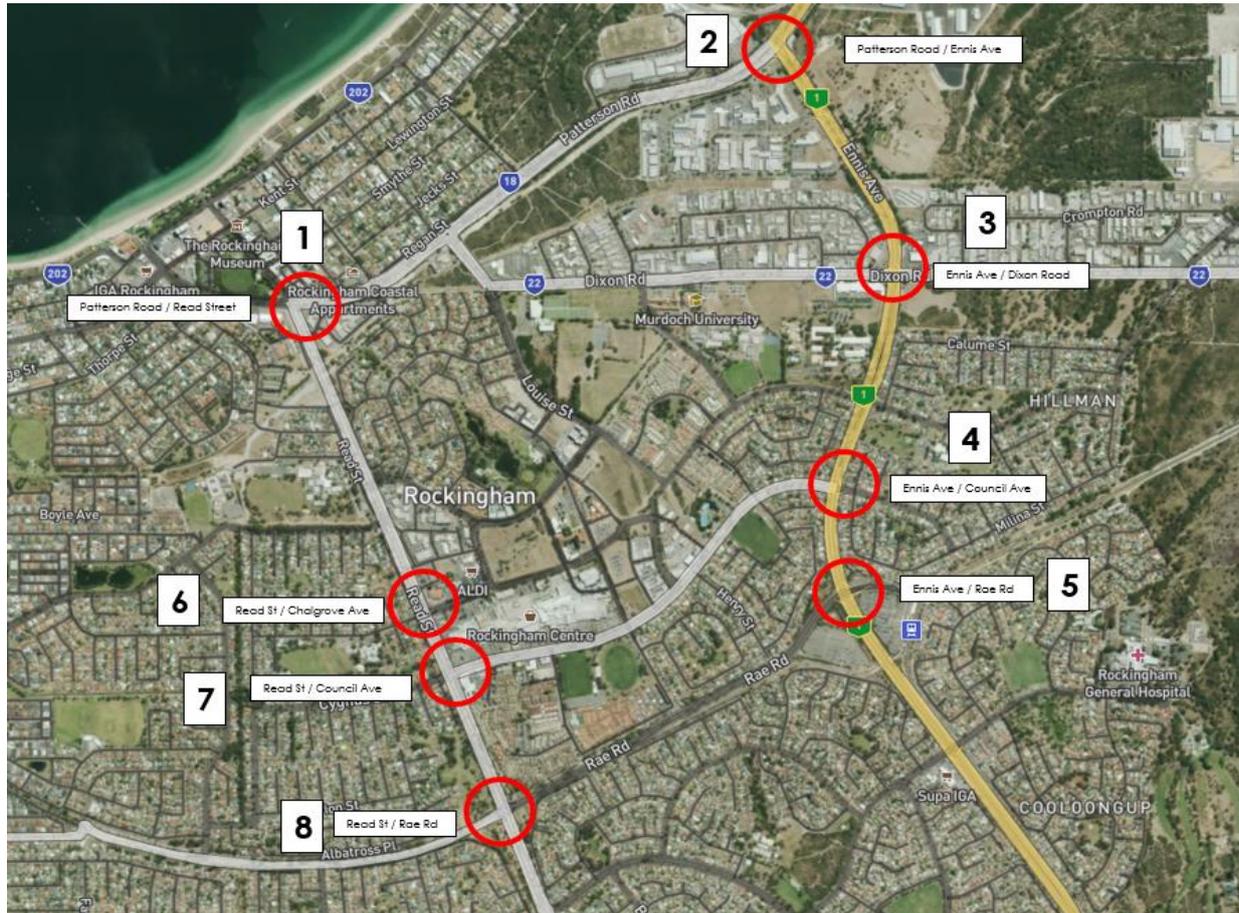
- Read Street Corridor
- Ennis Avenue Corridor

Following consultation between Main Roads WA and City of Rockingham, eight existing signalised intersections along these aforementioned corridors within the RSC Precinct Plan Study Area were identified to be assessed further. The identified intersections are listed below and shown in **Figure 2-4**.

- Patterson Road & Read Street
- Patterson Road & Ennis Avenue
- Ennis Avenue & Dixon Road
- Ennis Avenue & Council Avenue
- Ennis Avenue & Rae Road
- Read Street & Chalgrove Avenue
- Read Street & Council Avenue
- Read Street & Rae Road



Figure 2-4. Main roads identified intersections for further assessment



## 2.2 High Level Road Network Safety Review

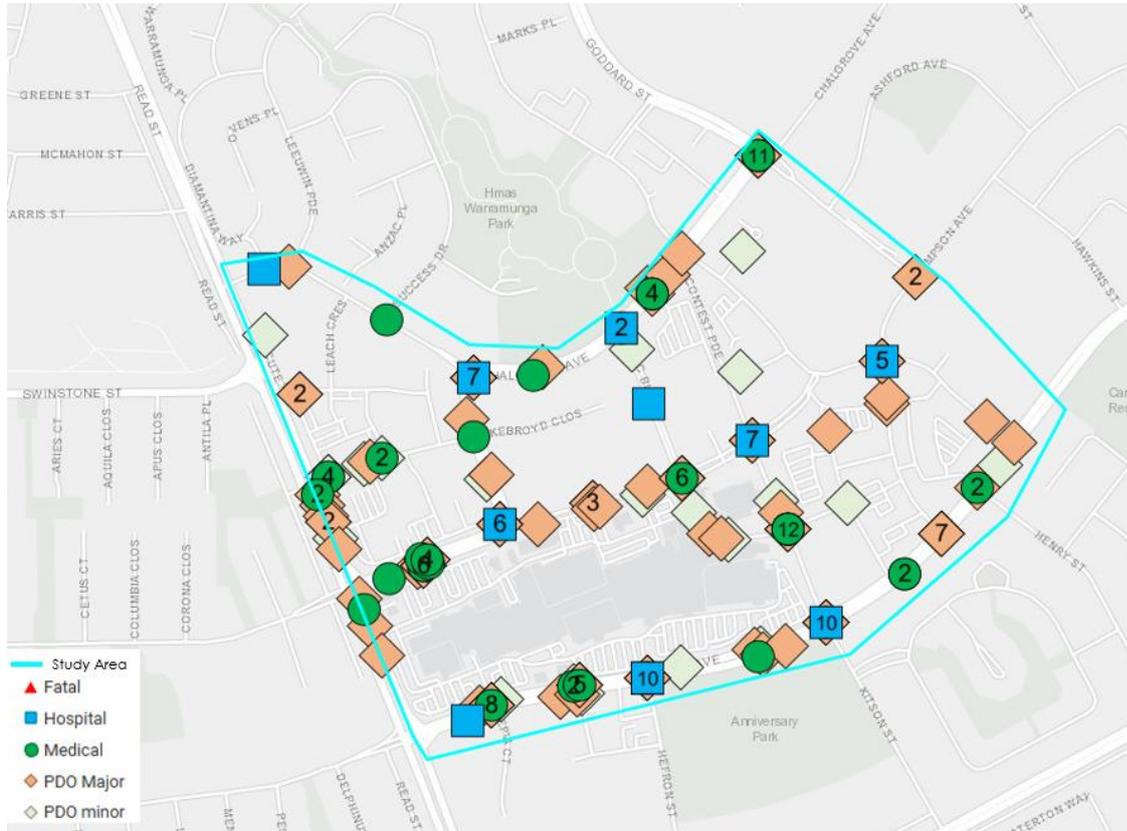
Stantec has reviewed the crash data of the study area for the recent 5-year period (2020 - 2024) obtained from the MRWA Crash report. **Figure 2-5** to **Figure 2-7** summarises the crashes within Precinct 1, Precinct 2 and Precinct 8 of the RSC Precinct Plan Study Area which are representative of the Central City Zone, Mixed-Use Zone and Industrial Zone.

Due to high level nature of this assessment, the crash review undertaken focuses on 5 key unsignalised intersections identified for improvements. Detailed road safety assessment was not conducted for all major roads and intersections along Read Street, Ennis Ave and Dixon Road as the majority of these intersections are developed close to the ultimate form already.

In conjunction with the crash assessment, the review identified crashes occurring at intersections and road sections within the RSC Precinct Plan Study Area which could be considered for upgrading or modified to improve the traffic safety or performance in the future and discussed further in Section 2.4.

# Rockingham Precinct Structure Plan 2 Road Network Review

Figure 2-5. Rockingham City Centre precinct 1

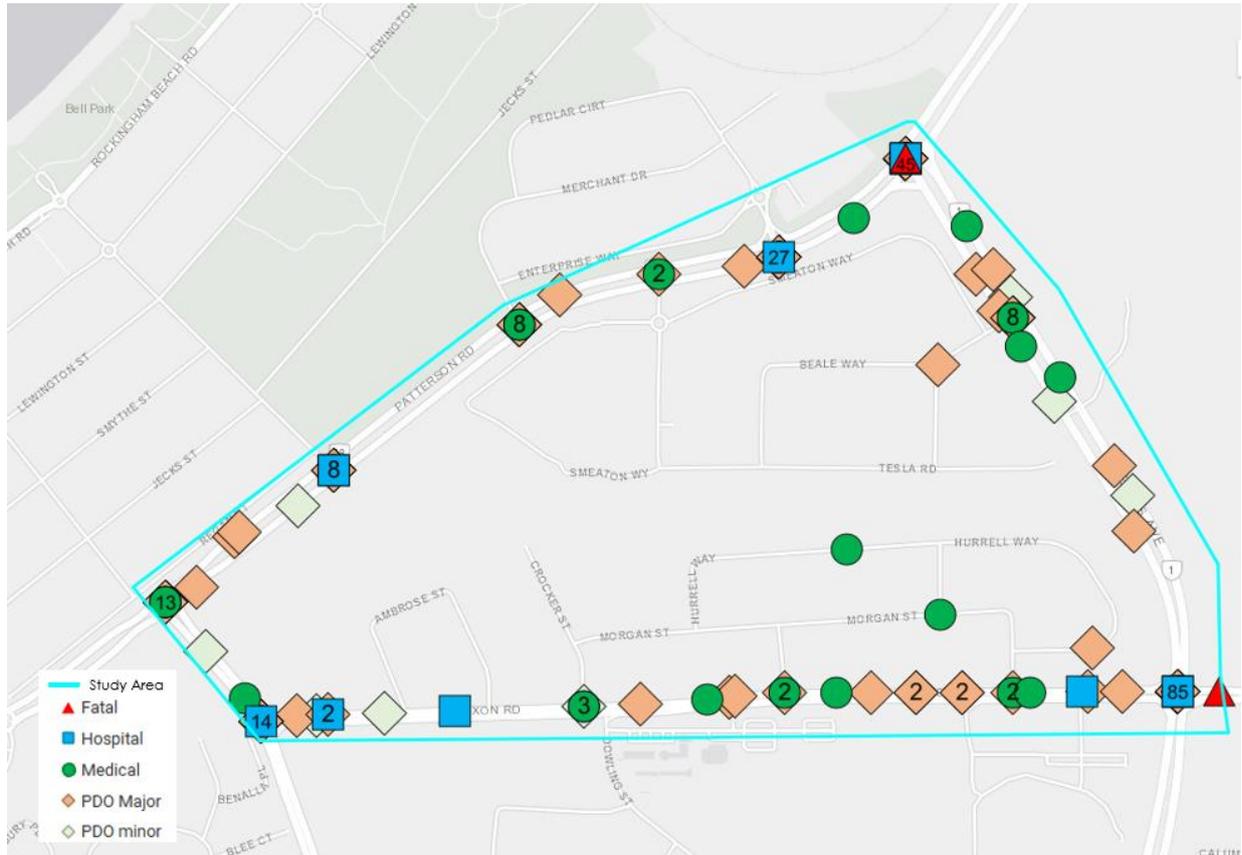


**Rockingham Precinct Structure Plan**  
2 Road Network Review

Figure 2-6. Rockingham waterfront precinct 2



Figure 2-7. Rockingham light industrial area precinct 8



The crash data summary of the intersections identified are presented in **Table 2-1 to Table 2-5**.

Table 2-1. Chalgrove Avenue – Central Promenade intersection

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Right Angle	-	-	-	1	-	1
Right Turn Thru	-	-	-	2	-	2
Hit Object	-	1	-	1	-	2
Rear End	-	-	-	1	-	1
<b>Total</b>	-	<b>1</b>	-	<b>5</b>	-	<b>6</b>

Table 2-2. Central Promenade – Syren & Civic Boulevard intersection

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Right Angle	-	-	1	2	3	6
<b>Total</b>	-	-	<b>1</b>	<b>2</b>	<b>3</b>	<b>6</b>



Table 2-3. Kent Street – Wanliss Street intersection

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Rear End	-	-	-	1	-	1
Right Angle	-	1	2	4	1	8
Not Specified	-	1	-	-	-	1
<b>Total</b>	<b>-</b>	<b>2</b>	<b>2</b>	<b>5</b>	<b>1</b>	<b>10</b>

Table 2-4. Flinders Lane – Kent Street intersection

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Right Turn Thru	-	-	-	1	-	1
Right Angle	-	-	1	2	-	3
Rear End	-	-	-	-	1	1
Not Specified	-	-	1	-	-	1
<b>Total</b>	<b>-</b>	<b>-</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>6</b>

Table 2-5. Patterson Road – Thorpe Street intersection

Type of Crash (RUM Code)	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Right Angle	-	1	-	2	-	3
Sideswipe Same Direction	-	-	-	1	-	1
Right Turn Thru	-	-	1	-	-	1
<b>Total</b>	<b>-</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>-</b>	<b>5</b>

## 2.3 Key Issues and Potential Treatments of Road Network

Table 2-6 summarises the key issues and potential treatments for intersections identified through the initial road network and crash assessment. Figure 2-8 illustrates the location of these intersections including potential treatment options of each intersection.

The intersection upgrade options considered in this assessment include:

- Standard roundabout
- Mini roundabout
- Signalised intersection
- 4-way raised intersection treatment

Additionally, minor upgrades such as intersection layout improvements and local area traffic management were also considered in this assessment.

Suggested treatments were considered for suitability at each site, with regard to available space and traffic requirements, however no detailed review (such as underground service locations) was undertaken.



Table 2-6. Key issues and potential treatments of intersections identified

Precinct	Intersection	Key issues / drivers	Urban design considerations	Potential treatment option*
P1 City Centre	Central Promenade / Syren Street	Safety issues – driven by crash data. On street parking restricting available sightlines – contributing to crashes.	Prime city centre location, main street retail and strong building interface proposed. Human scale and pedestrian / cyclist priority over cars essential.	Removal of some on street parking / Raised intersection treatment to slow traffic speeds. Closing parking bays and/or right turn pocket as a trial to gauge crash reduction improvement could be considered prior to major intersection works.
	Central Promenade / Chalgrove Avenue	High level of sight line available can contribute to drivers turning through intersection at speed without proper assessment of pedestrian movements across carriageways. Some confusion as to right of way also observed.	Located on periphery of high activity area. Land use focus more commercial in nature	Roundabout to slow traffic movements through intersection and provide clear intersection priority. Sufficient room for a suitable roundabout design appears to be available.
	Central Promenade / Whitfield Street / Goodard Street	Legibility of movement network into City Centre. Some confusion as to right of way also observed.	The legibility of the urban structure in this part of the City Centre requires improvements. Opportunities to simply entrance points, enhance pedestrian permeability and modify the existing block configuration possible.	Roundabout to slow traffic movements through intersection and provide clear intersection priority. Sufficient room for a suitable roundabout design appears to be available.
P2 Waterfront	Wanliss / Kent Street	Providing a priority route along Wanliss Street for cyclists travelling to / from beach front and help reduce speeds of traffic along Kent Street as they transition from the residential to Beach front village.	Tie in points for RCCTS, intersection design to ensure safe movement for public transport. Pedestrian and cyclist priority desired too with extension of cycling infrastructure down Wanliss Street.	Priority change at intersection to provide a cycle route to foreshore without the need to give way to traffic at Kent Street. Tighten intersection geometry to slow turning traffic movements within intersection.
	Flinders Lane / Kent Street	Safety issues – driven by crash data.	Prime waterfront location, strong building interface proposed. Human scale and pedestrian / cyclist	Raised intersection treatment as less impact on available verge area, tighten up intersection geometry to further



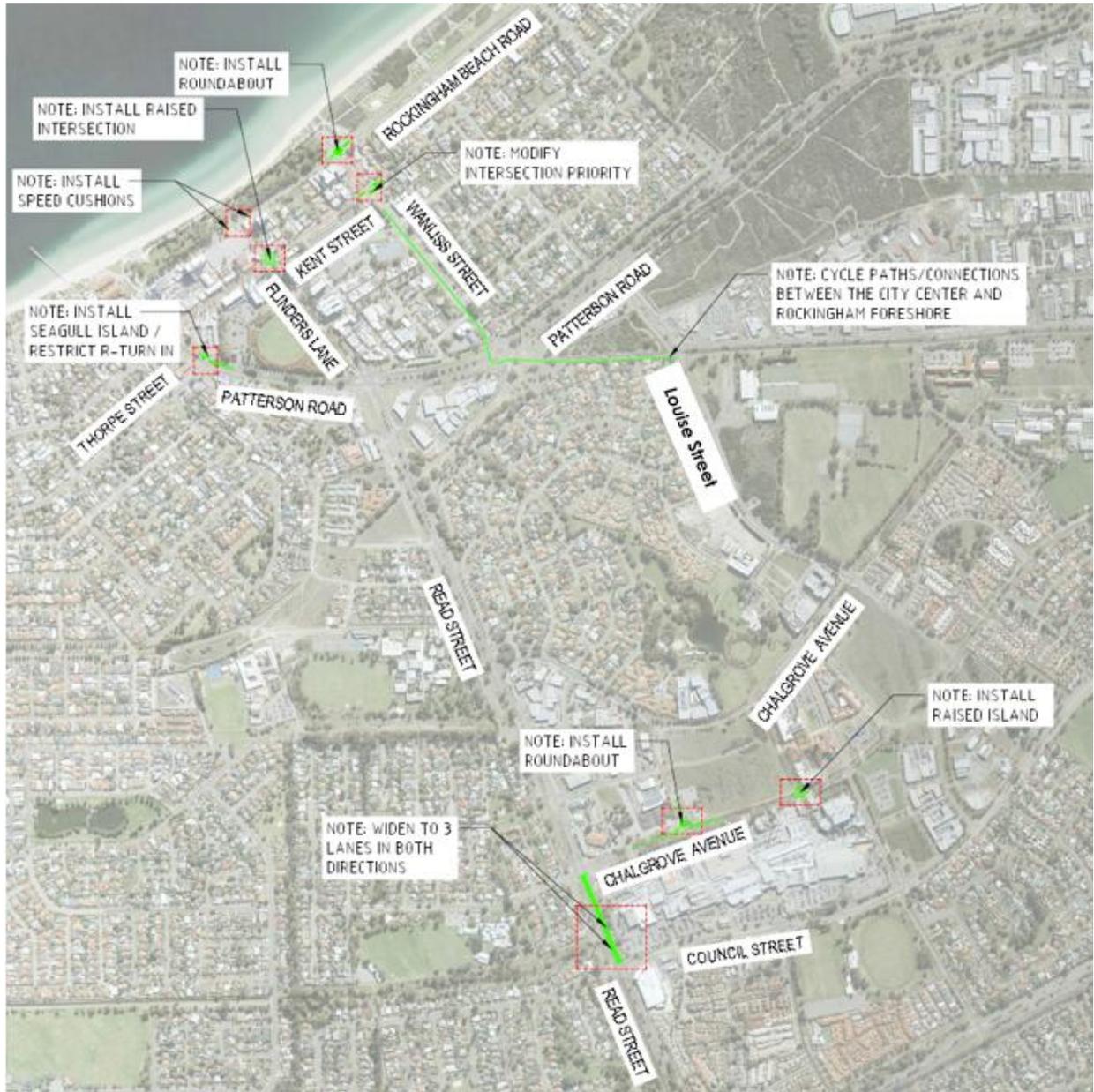
**Rockingham Precinct Structure Plan**  
2 Road Network Review

Precinct	Intersection	Key issues / drivers	Urban design considerations	Potential treatment option*
			priority over cars essential. RCCTS alignment also a consideration.	slow turning movements.
	Flinders Lane / Rockingham Beach Road	Safety issues – driven by crash data and observed vehicle speeds late evening and early morning (while pedestrian activity is still significant)	Scale of built form to increase substantially on southern side of Rockingham Beach Road. Pedestrian safety across Rockingham Beach Road is essential in this high activity area.	Traffic calming devices such as speed cushions on the approach to intersection to slow vehicles prior to reaching pedestrian facilities. Speed cushions could be considered further within the 40km/h section of Rockingham Beach Road if speed monitoring warrant, and the devices are removable if required.
	Rockingham Beach Road / Wanliss Street	Safety issues – driven by crash data. Also provide entry treatment to reinforce low speed environment within precinct.	Change in urban scale either side of Wanliss Street. Change in intersection treatment to signify entry into pedestrian priority zone (south west of Wanliss Street). Detailed assessment required to identify feasibility.	Roundabout intersection treatment. Should proposed marina proceed in the future, a roundabout would be key in assisting traffic control at the intersection due to increase traffic using Wanliss Street likely.
	Patterson Road / Thorpe Street	Safety issues – driven by crash data.	Primary vehicle entry point into Waterfront and higher order road. Vehicular priority (until Kent Street).	Seagull Island / Restricted right turn movements into commercial site from Patterson Road West Bound and restrict direct movements into site from Thorpe Street.

\*Detailed assessment with sufficient and accurate traffic data and future projection should be conducted to ensure the feasibility of suggested treatments.



Figure 2-8. Initial review outcome - potential treatments and intersection location



## 2.4 Future Intersection Upgrades

In consultation with the City of Rockingham, several of the intersections within the study area have been previously upgraded or are scheduled to be upgraded.

### 2.4.1.1 Patterson Road & Read Street

The City has confirmed a project is anticipated for 2025-2026 for upgrading the signals as shown in Figure 2-9.

Figure 2-9. Patterson Road & Read Street proposed upgrades



Source: City of Rockingham

### 2.4.1.2 Patterson Road and Ennis Avenue

The City of Rockingham is also aware of the Department of Transport's preferred alignment for the completion of the Kwinana Rail Loop. If reserved within the Metropolitan Region Scheme (MRS), grade separated interchanges will be required at Mandurah Road, Day Road and at Patterson and Ennis Avenue. As the reservation has yet to be formally adopted within the MRS, this alignment is not certain. Should this proceed, there will be significant implications to this intersection, likely requiring the entire intersection being grade separated above the freight rail line.

### 2.4.1.3 Ennis Avenue and Dixon Road

The City of Rockingham have confirmed that Main Roads WA have completed this upgrade. There are no further upgrades currently planned.

### 2.4.1.4 Read Street and Council Avenue

The City of Rockingham confirmed this intersection has been upgraded within the last few years

### 2.4.1.5 Read Street & Rae Road

The City of Rockingham confirmed this intersection has been upgraded within the last few years



## 2.5 Potential Upgrades to Other Intersections

Previous discussions between Hames Sharley and City of Rockingham identified the following three intersections requiring further assessment:

- Central Promenade / Syren Street / Civic Boulevard Intersection
- Kent Street / Flinders Lane Intersection
- Rockingham Beach Road / Flinders Lane

Four treatment options including standard roundabout, mini roundabout, signalised intersection and give way/stop controlled raised safety platform (raised intersection) were assessed taking due regard of the safe movement and priority for pedestrians (of all abilities), cyclists and vehicles (in that order).to identify the most suitable intersection treatments.

Based on previous meetings held with the City of Rockingham, discussions on these intersections are included below:

### 2.5.1 Central Promenade / Syren Street / Civic Boulevard Intersection

In the short-term (0-5 years), it is suggested that the parking bays adjacent to the intersection along Central Promenade be restricted to avoid vehicle sightline being obstructed by parked vehicles. It was previously identified through sightline assessment that 5 bays on the westbound approach and 1 bay on the eastbound approach of the intersection should be restricted to ensure sufficient sightline is provided.

For longer term (>5years), raised intersection treatment is suggested to encourage vehicles to slow down further and yield to others. Combined with the improved sightline through parking removal or restriction, the traffic safety at the intersection could be significantly improved. This could be implemented along a wider pedestrian/cyclist network improvement in the future to encourage active transport mode shift within the Town Centre area.

### 2.5.2 Kent Street / Flinders Lane

Based on the available data, a raised intersection treatment outscored other treatments at this location and resulted in a better overall transport safety outcome. However, it is noted that further detailed assessment of the intersection geometry and wider area is required.

### 2.5.3 Rockingham Beach Road / Flinders Lane

The vehicle speed along Rockingham Beach Road is a concern, particularly when traffic activity drops while the pedestrian activity remains. Assessment of the overall speed behaviour and crash history of this area suggested traffic calming devices such as speed cushions could reduce the risk of pedestrian related crashes at the pedestrian crossing facilities generally located at the intersections along Rockingham Beach Road.

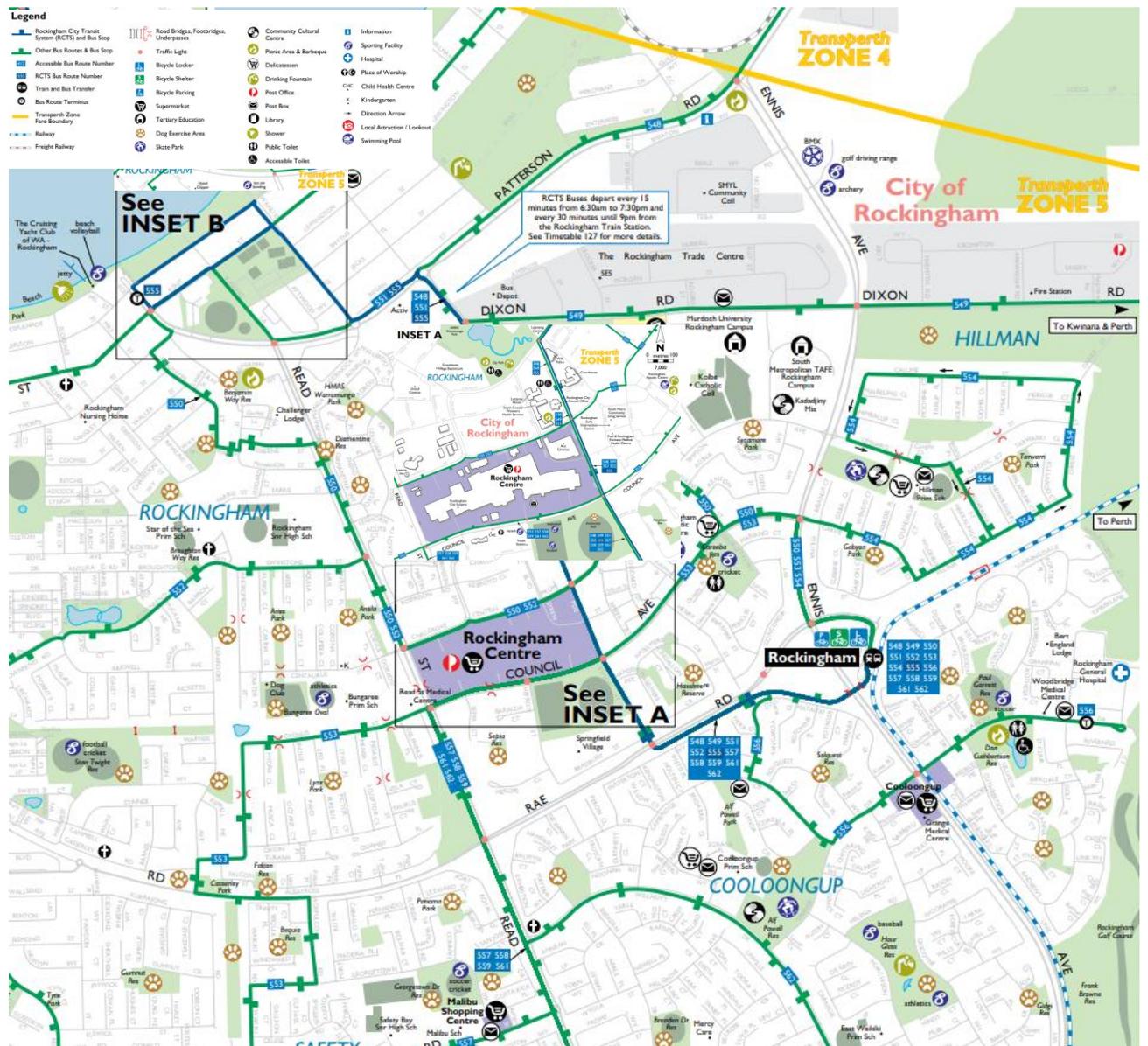


### 3 Public Transport

#### 3.1 Existing Public Transport

The existing public transport facilities in the vicinity of the Rockingham Precinct Structure Plan are shown in **Figure 3-1**. The precinct currently benefits from good public transport connection, especially on distributor roads.

Figure 3-1. Public transport network



Source: City of Rockingham Make your Move



## 3.2 Future Public Transport Proposals

### 3.2.1 Endorsed RCCTS

To cater for future population growth and support the City's transit-oriented development (TOD) strategy, the City has supported a Rockingham City Centre Transit System (RCCTS), a fixed route transit streetcar (BUS) system that is designed to link major activity nodes starting at the Rockingham Train Station and traversing through the Rockingham City Centre, Smart Village Sector and the Rockingham Foreshore.

The implementation of the RCCTS is expected to result in the following:

- Increase connectivity between major activity nodes;
- Support growth of existing and new business opportunities
- Increase public transport access from the Rockingham Train Station; and
- Unlock potential for TOD development at route stops.

The existing endorsed RCCTS route and network is shown in **Figure 3-2**.

Figure 3-2. Currently endorsed RCCTS route and network



A high-level assessment has identified several concerns regarding the currently endorsed RCCTS route. These concerns pose a potential risk to the existing road and public transport network which will require further investigation.

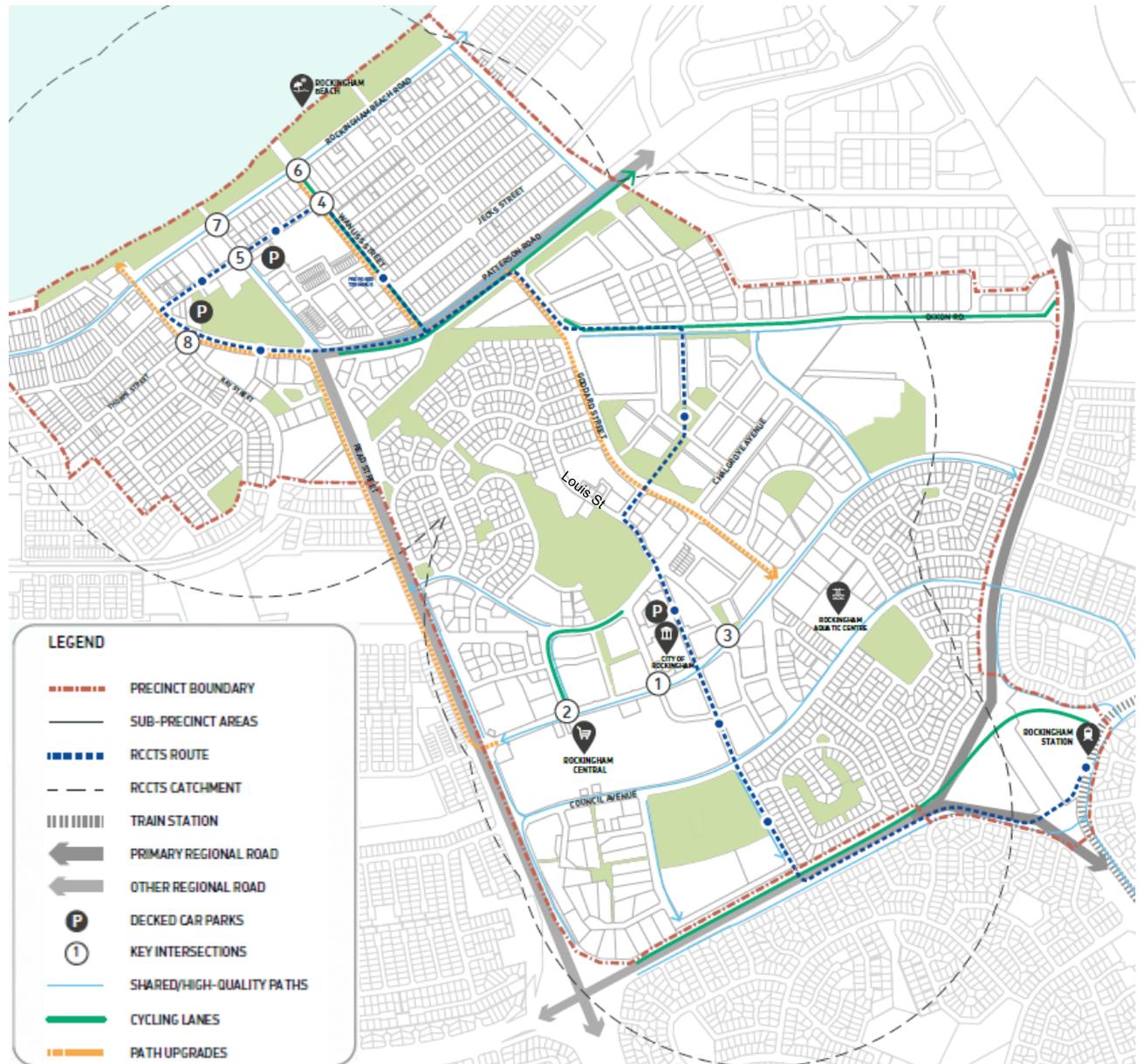
The potential risks include:

- Multiple bus stops and locations along the route that increase the risk of pedestrians being required to crossroads with high traffic volume.
- Multiple bus stops will increase the time of total journey related to the route.
- High pedestrian traffic along the waterfront increasing the risk of conflict with the route required.
- Traffic controls would be required at the new four-way intersections in the form of signals or roundabouts at the identified locations, listed below which will require further investigation. These new intersections are also likely to present a potential crash risk due to additional conflict points:
  - » Route over Patterson Road.
  - » Route over Dixon Road.
  - » Route over Council Avenue.

### **3.2.2 Proposed RCCTS**

As part of this assessment, a new RCCTS route has been proposed as illustrated in **Figure 3-3**. The proposed RCCTS route intend to improve the function of the existing RCCTS in meeting the City's vision, while not compromising on the accessibility and safety of the RCCTS route.

Figure 3-3. Proposed RCCTS route



Source: Hames Sharley

The following summarise the review findings of the proposed RCCTS:

- The proposed RCCTS route aims to consolidate the number of transits stops along the route, especially along major distributor routes to potentially reduce the journey time while maintaining the accessibility within the PSP.
- The proposed RCCTS route is relocated away from the foreshore (Rockingham Beach Road) to minimise the conflict with pedestrian traffic and provides increased opportunity to create a pedestrian only environment along Rockingham Beach Road in the future.
- Extends the coverage along Patterson Road to further activate the commercial developments between the Waterfront Village and City Centre.

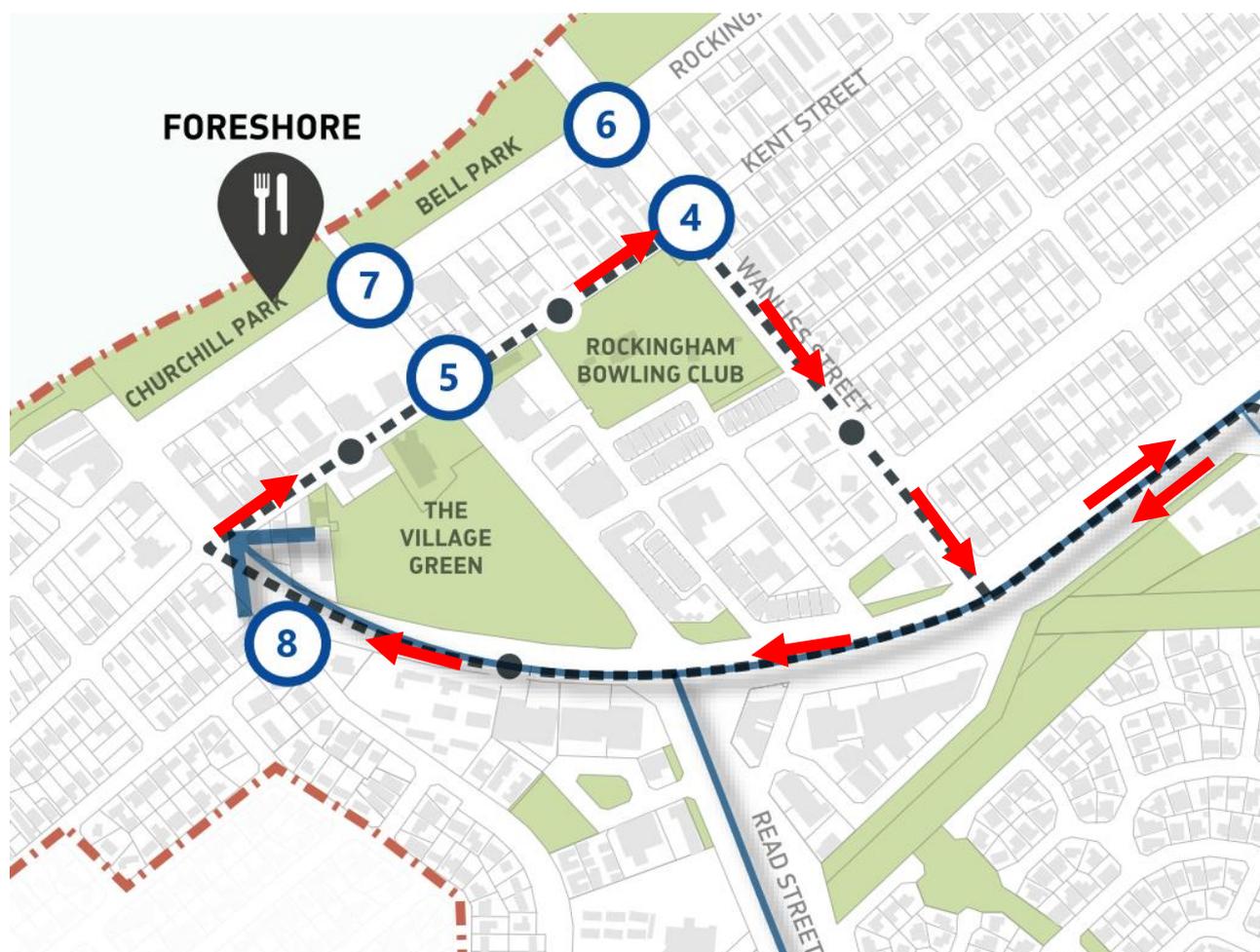


- Temporarily route the RCCTS route away from the residential development to the north of Patterson Road, with the opportunity to reintroduce an extended route when the need arises in the future.

### 3.2.3 Potential Implementation of the Proposed RCCTS

For RCCTS route within the Waterfront Village, it is proposed that the RCCTS services would circulate in a clockwise manner, along Patterson Road and turn right into Kent Street before going back on Patterson Road via Wanliss Street as illustrated in **Figure 3-4**.

Figure 3-4. Suggested route to waterfront village



This arrangement is expected to reduce the need for pedestrians accessing the commercial developments to the south of Patterson Road to cross Patterson Road in order to access the transit stop, minimising the risk of pedestrian related crashes along Patterson Road. This also provide future opportunity to extend the RCCTS route further east along Kent Street to cater for future developments to the east.

The proposed route would potentially require traffic controls at a new four-way intersection at Market Street and Louise Street (with new eastern leg ideally a “bus only” link) in the form of signals or roundabout. The proposed route also eliminates the need for new controlled intersections over Patterson Road, Dixon Road, reducing the potential crash risk due to additional conflict points.

### **3.2.4 Transition to Trackless Tram**

The transition to trackless tram along the RCCTS route is expected to be largely warranted by the overall route patronage. When the popularity of the route dictates a higher frequency or larger capacity buses to accommodate the passenger demand, trackless tram should be considered financially viable. Additionally, the residential density of the catchment surrounding the RCCTS route would need to increase noticeably over the current level of development to justify the implementation of future trackless tram infrastructure.

It is noted that the running of trackless trams would require wider turning paths at intersections that that of a typical bus, which makes roundabouts less desirable for intersection treatments. As such, consideration of intersection treatments on the future trackless tram route should also be noted.

## **3.3 Future Planned Public Transport Upgrades**

The Public Transport Authority (PTA) has advised that there is no medium to long term changes proposed to the existing bus services that currently operate in the vicinity of the Study Area.

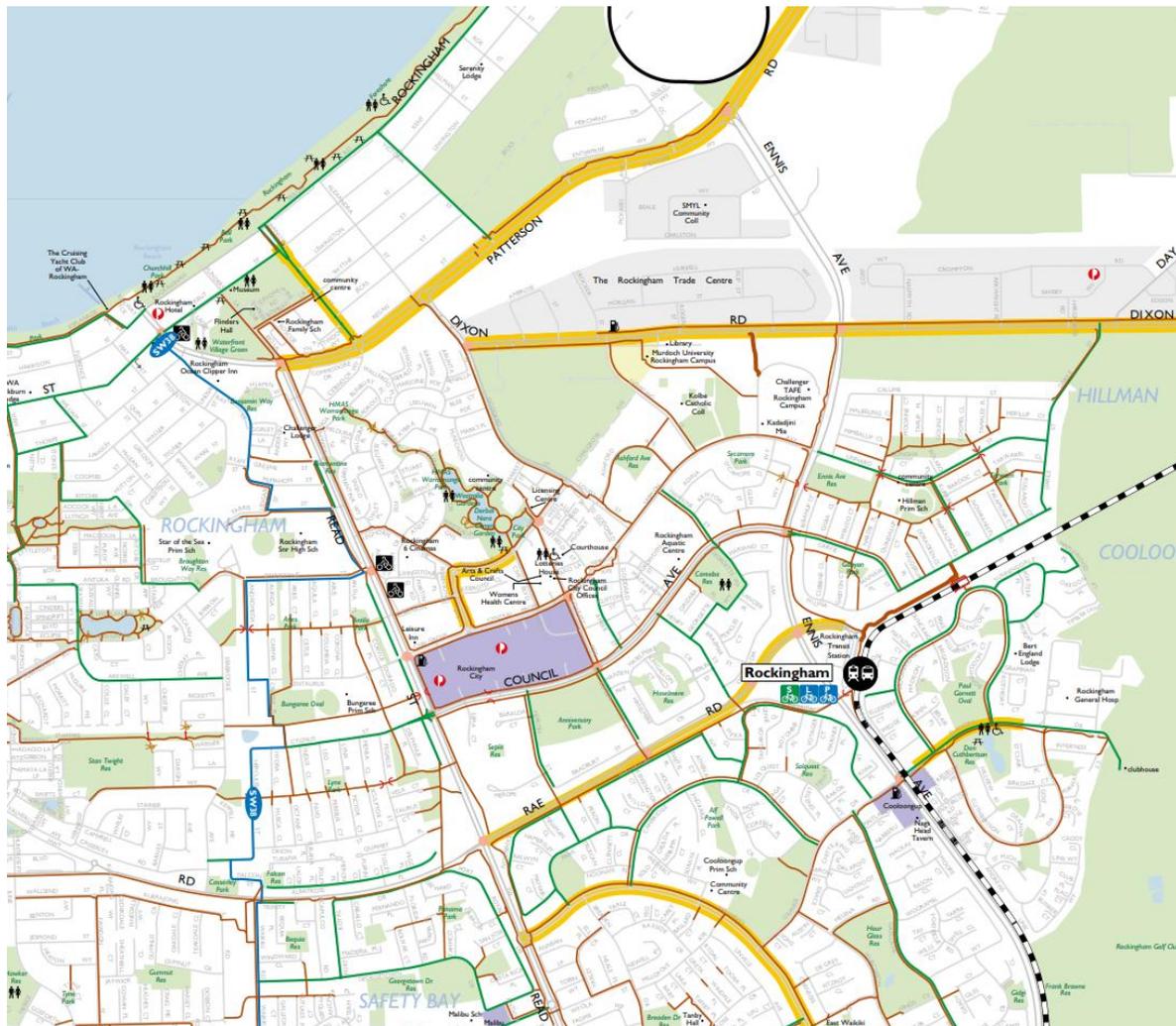


## 4 Active Transportation

### 4.1 Existing Pedestrian and Cycling Network

The existing pedestrian and cyclist network in the City Centre are in general, excellent condition and provides direct, continuous links to key destinations. Extensive shared path and good road riding infrastructure have been identified in strategic mapping (**Figure 4-1**).

Figure 4-1. Existing cycling and pedestrian facilities



However, there are some routes that have been incorrectly identified and require amendment. Additionally, there is an opportunity to recognize and strategically represent existing good quality walking and cycling environments that are currently not identified.

For example, extending existing shared path infrastructure will improve connectivity and continuity throughout the City, especially to direct people from the Rockingham Train Station and Rockingham Shopping Centre and Retail Precinct to the Rockingham Foreshore and the Waterfront and Mixed-Use Lifestyle Village. Sites where infrastructure is currently poor but has the potential to be upgraded to aid in creating a better walking and cycling environment will be identified.



## 4.2 New Shared Path

### 4.2.1 Goddard / Louise Street to Council Avenue

Many of the shared paths that have been provided run east-west. An issue that has been identified is a lack of high-quality and safe routes facilitating north-south movement. The most significant high-quality north-south route is on Goddard St. from Patterson Road to Chalgrove Avenue. There is an opportunity to extend this shared path south to Council Avenue.

The following benefits of developing a shared path along this route have been identified:

- Remove through traffic demand from the current Goddard St / Simpson Ave / Whitfield Street area and create potential for a more pedestrian activated commercial precinct; and
- Create continuity from the existing shared path on Goddard Street.

### 4.2.2 Flinders Lane

Flinders Lane from Patterson Road to Kent Street has been recognised as containing a shared path on the western side of the road. This route has a wide, comfortable path that many pedestrians and cyclists may opt to use to access the Foreshore from Patterson Road. However, the path beyond Kent Street to the foreshore also contains a shared path, albeit of different form, that should be recognised.

### 4.2.3 Anzac Park

Patterson Road is recognised as having a shared path up until Flinders Lane which ends before Anzac Park. However, it has been identified that this path continues through Anzac Park to Kent Street. This route is shaded by extensive tree coverage that makes for a pleasant, scenic cycle or walk. Plans should be amended to reflect this high-quality route.

### 4.2.4 Victoria Street

Victoria Street is currently not recognised as being a significant route of any kind, however, possesses many qualities of a high-quality shared path. Victoria Street could be recognised for its existing shared path. There is also an opportunity to promote cycling along this path with the addition of an on-road bicycle lane or creation of a bicycle boulevard, which Victoria Street can comfortably accommodate.

## 4.3 Shared Path Upgrade – Wanliss Street

Wanliss Street is recognised as containing a shared path. The existing path infrastructure is not in the greatest condition and requires an upgrade in path quality and width, especially as it is a significant route that provides access to the Foreshore. Wanliss Street has a large road reserve which provides ample opportunity to create a high-quality shared path infrastructure.

Wanliss Street is also recognised as having on road cycle lanes which is noted as being currently incorrect and should be amended. Opportunities to develop a cycle lane along Wanliss Street are limited as the road is too narrow to comfortably accommodate this use. A greater alternative would be to upgrade the existing shared path capitalising on the potential of the large road reserve.



#### 4.4 Good Road Riding Environment (Contest Parade / Central Promenade / Whitfield Street from Council Avenue to Chalgrove Avenue)

There is a route that has potential to be recognised as a good road riding environment. From Council Avenue, cyclists can ride north along Contest Parade then on to Central Promenade followed by Whitfield Street to Chalgrove Avenue. This route provides a key link from the Rockingham Shopping Centre to the Commercial Precinct.

#### 4.5 E-rideable

It is noted that E-rideable usage are becoming more prevalent in urban area. New e-rideable rules were endorsed in Western Australia in 2021, extracted and shown in **Figure 4-2**.

Figure 4-2. E-rideable rules



For future planning purposes, current and future e-ridable usage should be considered when designing and approving hardscape verge upgrades within the RSC Precinct Plan Study Area to ensure environment is appropriate for the mixing of e-riders and other path users. The verge environment should also be designed to make it easier for the e-riders to accurately differentiate path and road environment. For example, shared paths should be clearly marked to allow e-riders to identify the path environment and their allowable speed limit.

## 5 Transport Mode Share

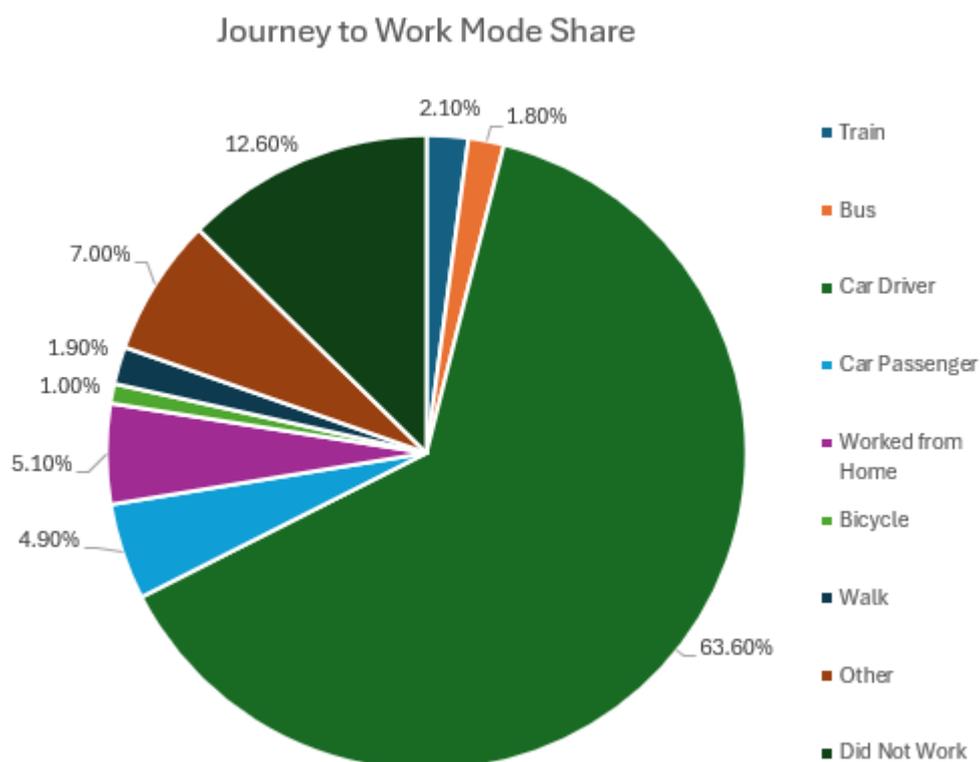
### 5.1.1 Employees

The existing journey to work transport mode share pattern for the Rockingham Precinct Structure Plan according to the Australian Bureau of Statistics (ABS) is shown in **Figure 5-1**.

Based on the census data, approximately 70% of the existing journey to work are by private vehicle, either as a driver or passenger, and only approximately 6.8% by public transport along with small percentage of active transport mode share.

It should be noted that this data represents the “employee” as residents of City of Rockingham, who do not necessarily work within City of Rockingham.

Figure 5-1. Journey to work mode split (City of Rockingham)



### 5.1.2 Residential Journey to Work

The transport mode share for existing residents in Rockingham has been extracted from ABS Census data (2021). While journey-to-work does not represent the entirety of travel, it is the dominant trip purpose both during the peak period and across the day.

Based on the data from Victorian Integrated Survey of Travel and Activity 2007 (VISTA 07) and NSW 2008/09 Household Travel Survey Summary Report 2010 Release, both of the documents have the similar distribution of trips purpose. The studies also reported that work related trips has the highest



proportion of 33% in between peak hours compare to other mode shares. These distribution percentage are being implemented in this case to illustrate the mode of transportation in Rockingham (refer **Table 5-1** below).

*Table 5-1. Mode of transportation (Rockingham)*

<b>Car as Driver Trips by Purpose (approximate)*</b>	<b>Work</b>	<b>Education</b>	<b>Other</b>
Daily	20%	15%	65%
Peak Hours	33%	14%	53%

Although there is great opportunity for journey to work mode shift during peak hours, journey to work would generally only make up to approximately 20% of the total destination trip. However, with the existing high car-as driver and passenger mode share, it represents a considerable capacity for mode shift among employees if sufficient alternatives are available.

## **5.2 Future Mode Share**

### **5.2.1 Peripheral Activity Centre**

The Rockingham Strategic Centre Precinct Structure Plan intends to develop and activate Rockingham Central as a peripheral Activity Centre of Perth Metropolitan area, similar to Midland and Joondalup Activity Centre. Similar to these activity centres, the private vehicle trips are relatively higher compared to other mode shares.

### **5.2.2 Public Transport Improvements**

Improvement of public transport links and frequency within the centre is likely to result in a step change of public transport usage within the centre. In dense urban locations supported by high-frequency public transport service, a reduced driving mode share for employees and residents is reasonable.

The RCCTS allow the PSP to be well connected by public transport via the Perth-Mandurah train line and by car, via the strategic road corridors of the Kwinana Freeway. Future incentive such as reduced public transport fares could see an increased usage of public transport and encourage mode shift from private vehicles to public transport.

### **5.2.3 Bike Shares**

Emerging technology also provides the opportunity for bike and scooter sharing platform to thrive. These platforms allow for one-way travel, and particularly when e-bikes are provided, can support much lower car-as-driver mode shares for short distance travel.

It is acknowledged that a number of bike-share start-ups have been trialled in Perth, with inconsistent results. However, the success of bike share schemes internationally suggests that the benefits of such as system can be extensive.



## 5.2.4 Car Sharing and Autonomous Vehicles

The rise of autonomous vehicles (AV) is occurring in tandem with a shift away from traditional ownership models, towards sharing and on-demand services. Before AV is fully integrated across the transportation system at all levels, car-sharing supports behaviour change in car-as-driver mode.

# 6 Parking

The City of Rockingham has advised that they are in the process of preparing a review of the existing Strategic Metropolitan Centre Parking Strategy.

## 6.1 Existing Key Parking Concerns

A mix of perceived and actual lack of parking supply and restricted public access to parking facilities have been identified as a key parking issue in the City of Rockingham Waterfront Village and Rockingham City Centre. This section of report has been prepared in reference to the adopted RSMC Strategic Metropolitan Centre Public Parking Strategy. The City of Rockingham have confirmed there will be a review undertaken of the SMC.

### 6.1.1 Waterfront Village Sector

It is noted that the Waterfront Village Sector does not generally have a shortage of available parking. However, it has been demonstrated that parking in close proximity to the popular destinations can reach capacity at certain times. It is also noted that the Waterfront Village is a very dynamic area and the underlying influences of parking can change quickly.

### 6.1.2 City Centre Sector

The City conducted parking surveys and determined that the public parking provision within the City Centre is currently sufficient for the existing parking demand. However, this could change as more developments occur within the City Centre area.

### 6.1.3 Reciprocal Parking Easement – Along Dixon Road

An accessibility issue that has been identified in the industrial area adjacent to the Smart Village precinct is that there is poor connectivity between businesses of similar function along Dixon Road. There are partial easements across some of the site's along Dixon Street, however, some sites can only be accessed via Dixon Road, leading to traffic movements in and out of access driveways, increasing congestion and crash risk.

In the future it is likely that many of these buildings in the light industrial area may be redeveloped and there will be an opportunity to create a parking / access easement along the northern frontage of most of the developments, which will improve access and connectivity between businesses and reduce the need for short trips between sites using Dixon Road.



## **6.2 Future Parking Improvements**

### **6.2.1 Decker Car Park – City Centre**

The City has previously identified two decked car park location within the City Centre which could accommodate the future parking demand increase. The multi-decked station located adjacent to the bus transit lane is expected to provide a significant public parking resource for the City Centre with the proposed 500 bay public parking station.

### **6.2.2 Foreshore Parking Provision**

The Rockingham Beach Foreshore Master Plan intend to provide public parking within the foreshore reserve and street parking within Railway Terrace and Rockingham Beach Road. The parking rationalisation was associated with a desire to create more pedestrian orientated public spaces and remove public parking from areas of high social value.

Significant parking reduction within the foreshore area is expected to encourage visitors to take public transport or active transport, reduce the carbon footprint of private vehicle usage and provide more capacity for street-side activities.

### **6.2.3 Overflow Parking**

It was discussed within the RSMC Public Parking Strategy that the City should develop guidelines that facilitate the use of suitable City controlled land to be made available for overflow parking which include prioritising the use of parking, information for motorists to locate the overflow parking and implementation of suitable traffic management.

## **6.3 Loading Bays within Town Centre**

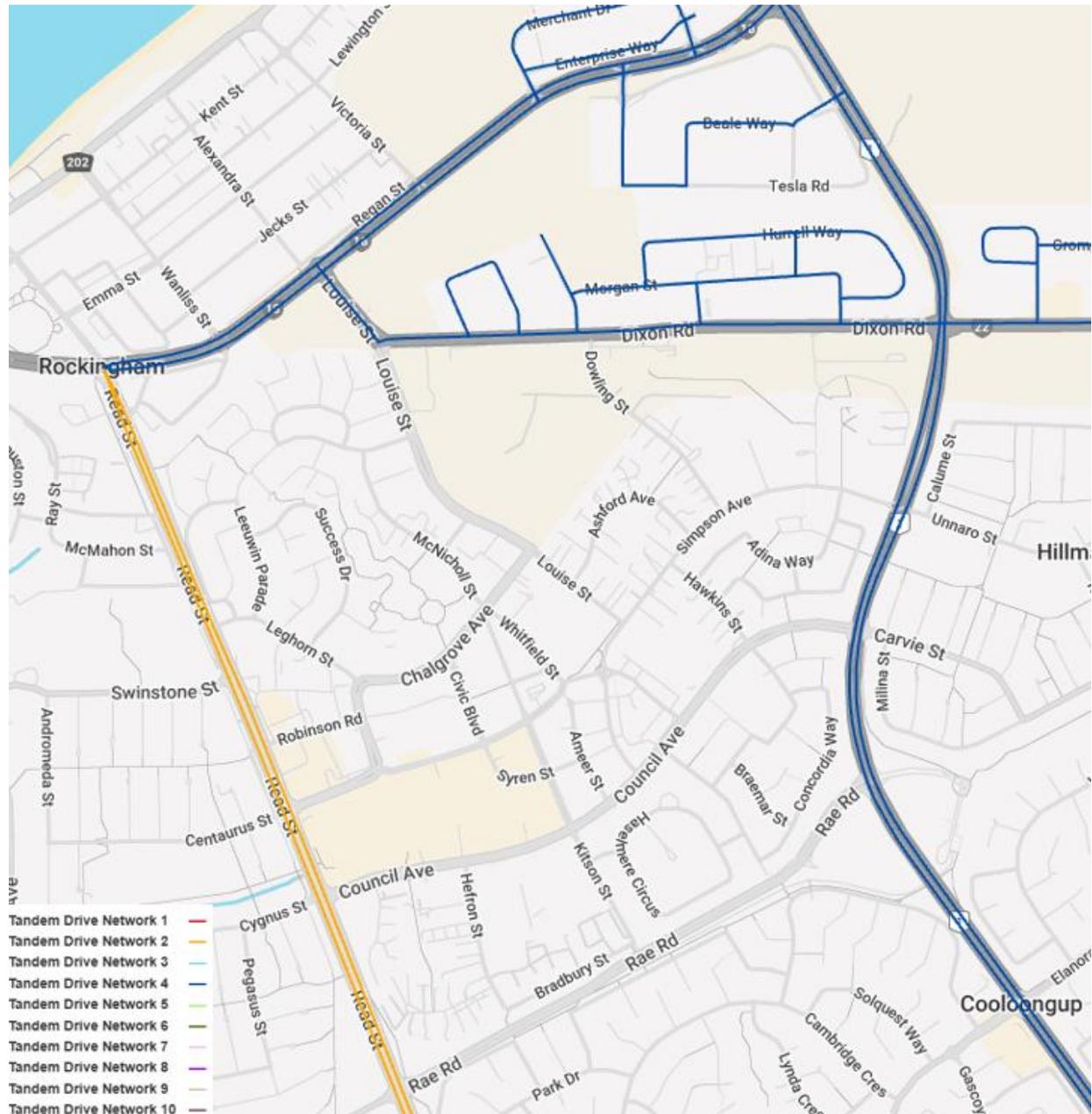
Given that much of the City Centre is still undeveloped, it is likely that future demand for on street loading facilities to facilitate smaller street frontage developments would be required. It is suggested that shared loading bays be considered at strategic locations within the City Centre area as development progresses. The loss of the existing on street parking capacity when these bays are installed should be factored into development parking calculations to ensure that appropriate bays are provided on site to balance the loss of bays required for servicing the sites.

The shared loading bays between developments not only reduces the footprint of redundant space, and it could also improve the overall traffic safety by reducing the potential need for additional crossovers for delivery vehicles entering sites.

## 7 RAV Network

The existing RAV network within the Study Area is currently suitable. RAV 4 network obtained from MRWA HVS Network Map shown in **Figure 7-1** shows that Ennis Avenue, Patterson Road (east of Read Street), Dixon Road and Read Street is currently covered within the RAV Network in the proximity of the Study Area.

Figure 7-1. MRWA HVS network map (RAV 4)



Source: MRWA HVS Network Map



## 8 Proposed Development Yields

The development yields associated with the 2025 Rockingham Strategic Centre (RSC) Precinct Plan and the previous 2009 City of Rockingham Precinct Structure Plan are outlined in the following sub-sections.

The 2009 City of Rockingham Precinct Structure Plan development yields were provided by the City of Rockingham.

The 2025 updated development yields have been provided by Hames Sharley in a form of a Technical Memorandum, dated 12/02/2025, which is included in **Appendix B** for reference purposes.

The land uses associated with the 2025 Rockingham Strategic Centre (RSC) Precinct Plan are categorised as follows:

- **Retail (RET)**
- **Health/Welfare/Community (HEL)**
- **Manufacturing (MAN)**
- **Office (OFF)**
- **Service (SER)**
- **Storage (STO)**

The 2009 Precinct Plan covers an area of approximately 600 hectares with the current 2025 Precinct Plan covering approximately 533 hectares, a reduction of approximately 67 hectares. This decrease primarily relates to the industrial land adjoining Patterson Road and Ennis Avenue near the proposed Precinct 8 (Dixon Rd) as shown in **Figure 8-1**. This area is largely developed for industrial purposes, which contains no residential dwellings and offers limited potential for further growth. For the purposes of the traffic assessment, this 2009 land use area has been accounted for within the Precinct 8 yields, as outlined in Section 8.1.1. Although this industrial area was technically part of the 2009 Precinct plan, no policy position was established to quantify or expand the existing floor space. Therefore, removal from the current 2025 Precinct plan does not alter the overall planning approach.

Conversely, it should be noted that the additional residential area to the west, adjacent to the Waterfront Precinct 2 area accommodates 449 dwellings in the 2025 precinct plan.

The SIDRA analysis presented in the following sections reflects the abovementioned changes within the PSP area.

The additional and removed land area when comparing the 2009 precinct plan and the 2025 precinct plan is illustrated in Figure 8-1.



**Rockingham Precinct Structure Plan**  
 8 Proposed Development Yields

Figure 8-1 Difference in Land Area 2009 PSP vs 2025 PSP



Source: City of Rockingham

To quantify the difference in lots between the 2009 precinct plan and the 2025 precinct plan, the City of Rockingham have provided information summarised in Table 8-1 to Table 8-5 which outline the changes within the 963, 964, 974, 975, and 977 Main Roads WA traffic modelling catchments.

Table 8-1 Difference in Lots - Catchment 963

MRWA Catchment	Coastal Lots Sub Precinct	Waterfront Village Sub Precinct	Outside the Strategic Centre	Development Yield for Northern Waterfront
963	433	52 Mixed Use	271 Residential	
			41 Special Residential	



**Rockingham Precinct Structure Plan**  
8 Proposed Development Yields

*Table 8-2 Difference in Lots - Catchment 964*

<b>MRWA Catchment</b>	<b>Sub Precinct</b>	<b>Waterfront Village Sub Precinct</b>	Outside the Strategic Centre	Number of Dwelling Subtracted from the Development Yield
964		27 Mixed Use 449 Residential	449	

*Table 8-3 Difference in Lots - Catchment 974*

<b>MRWA Catchment</b>	<b>Southern Residential Sub Precinct</b>	<b>TOD Village Sub Precinct</b>	Outside the Strategic Centre	Number of Dwelling Subtracted from the Development Yield
974	96	1 Mixed Use		

*Table 8-4 Difference in Lots - Catchment 975*

<b>MRWA Catchment</b>	<b>City Park Sub Precinct</b>	<b>Waterfront Village Sub Precinct</b>	Outside the Strategic Centre	Number of Dwelling Subtracted from the Development Yield
975	9 Mixed Use 372 Residential	6 Commercial		

*Table 8-5 Difference in Lots - Catchment 977*

<b>MRWA Catchment</b>	<b>City Centre Sub Precinct</b>	<b>Southern Residential Sub Precinct</b>	Outside the Strategic Centre	Number of Dwelling Subtracted from the Development Yield
977	13 Commercial 21 Mixed Use	2 Mixed Use 35 Residential		

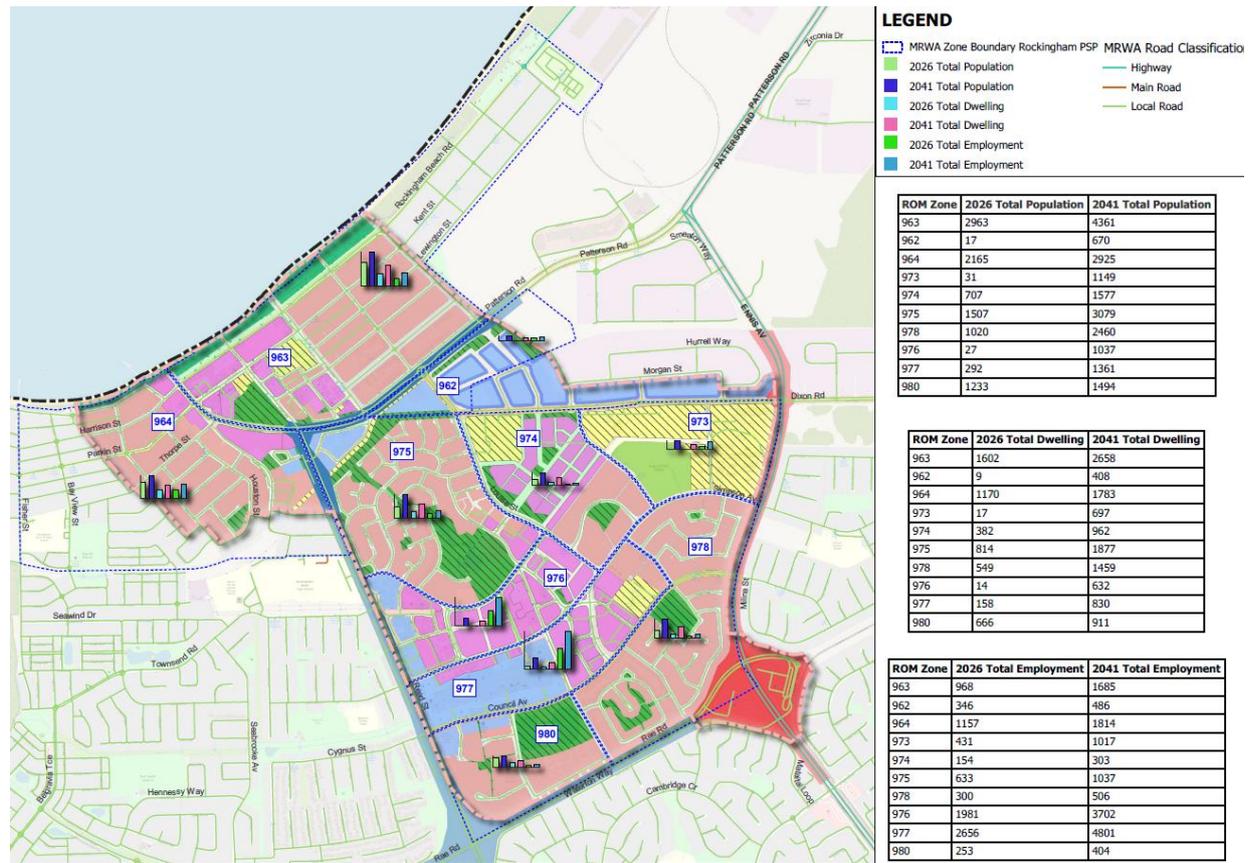
In addition, the City of Rockingham have also distributed the estimated residential development yields and employment for the proposed 2025 Precinct Structure Plan in accordance with the ROM24 Zonal System as requested by Main Roads WA and illustrated in **Figure 8-2** and included in **Appendix C**.



# Rockingham Precinct Structure Plan

## 8 Proposed Development Yields

Figure 8-2. 2025 Development yields distributed across ROM24 zonal system



Source: City of Rockingham

The removal of the area associated with the 2025 precinct plan correlates to the reduction in development yield floorspace for Precinct 8 which is outlined in Table 8-6 and also presented in Table 8-12. The table illustrates a total reduction of 17,950sqm.

Table 8-6 Difference in Floorspace/ Land Area between the 2009 PSP and the 2025 PSP for Precinct 8

PSP	Retail	ENT	HEL	Manu	Office	Service	Storage	Total
2009 Precinct 8	2,000			9,182	12,000	16,771	11,328	<b>51,281</b>
2025 Precinct 8				6,000	10,200	10481	6,650	<b>33,331</b>
Difference in Floor Area	-2000			-3182	-1800	-6290	-4678	<b>-17,950</b>

### 8.1.1 2009 City of Rockingham Precinct Structure Plan Development Yields

The 2009 City of Rockingham Precinct Structure Plan development yields were provided by the City of Rockingham and are presented in Table 8-7 (residential yields) and Table 8-8 (non-residential yields).



### 8.1.1.1 Residential

Table 8-7. 2009 residential yield (dwellings)

Residential	Existing Dwellings (number)	Interim Target	Proposed Dwellings (number)
P1-City Centre	432	-	4,894
P2 Waterfront Village	912	-	3,557
P3 Coastal Lots	536	-	2,448
P4 TOD Village	0	-	1,852
P5 City Park	347	-	382
P6 Southern Residential	1,555	-	3,660
P7 Education	0	-	0
P8 Dixon Road	0	-	0
<b>Total</b>	<b>3,787</b>	-	<b>16,793</b>

### 8.1.1.2 Non-Residential Floorspace

Table 8-8. 2009 non-residential development yield (sqm)

Non-Residential	Retail	ENT	HEL	Manu	Office	Service	Storage	Total
P1-City Centre	111,403	30,000	56,124	3,000	55,000	4,000		<b>259,527</b>
P2 Waterfront Village	22,751	23,893	10,000		8,000			<b>64,644</b>
P3 Coastal Lots								
P4 TOD Village	10,000	5,000	5,000		20,000			<b>40,000</b>
P5 City Park								
P6 Southern Residential								
P7 Education			96,200		5,000			<b>101,200</b>
P8 Dixon Road	2,000			9,182	12,000	16,771	11,328	<b>51,281</b>
<b>Total</b>	<b>146,154</b>	<b>58,893</b>	<b>167,324</b>	<b>12,182</b>	<b>100,000</b>	<b>20,771</b>	<b>11,328</b>	<b>516,652</b>

## 8.1.2 2025 Rockingham Strategic Centre (RSC) Precinct Plan Development Yields

The 2025 updated development yields was provided by Hames Sharley and presented in **Table 8-9** and **Table 8-10**.



**Rockingham Precinct Structure Plan**  
8 Proposed Development Yields

**8.1.2.1 Residential**

Table 8-9. 2025 residential development yield (dwellings)

Residential	Existing Dwellings	Interim Target	Proposed Dwellings
P1-City Centre	432	3,005	4,248
P2 Waterfront Village	1,097	2,522	3,634
P3 Coastal Lots	536	1,379	1,762
P4 TOD Village	0	805	1,205
P5 City Park	347	347	1,326
P6 Southern Residential	1,555	1,855	2,917
P7 Education	0	0	0
P8 Dixon Road	0	0	0
<b>Total</b>	<b>3,967</b>	<b>9,913</b>	<b>15,092</b>

**8.1.2.2 Non-Residential Floorspace**

Table 8-10. 2025 non-residential development yield (sqm)

Non-Residential	Retail	ENT	HEL	Manu	Office	Service	Storage	Total
P1-City Centre	85,173	30,000	54,070	2,730	40,000	4,000		<b>215,973</b>
P2 Waterfront Village	16,000	15,588	10,000		5,000			<b>46,588</b>
P3 Coastal Lots								<b>0</b>
P4 TOD Village	5,000				10,000			<b>15,000</b>
P5 City Park			5,000		8,000			<b>13,000</b>
P6 Southern Residential								<b>0</b>
P7 Education			80,000		5,000			<b>85,000</b>
P8 Dixon Road				6,000	10,200	10481	6,650	<b>33,331</b>
<b>Total</b>	<b>106,173</b>	<b>45,588</b>	<b>149,070</b>	<b>8,730</b>	<b>78,200</b>	<b>14,481</b>	<b>6,650</b>	<b>408,892</b>

**8.2 'NET' Yield**

An exercise has been undertaken to determine the estimated reduction in the residential dwellings and non-residential floorspace when comparing the proposed 2025 Rockingham Strategic Centre (RSC) Precinct Plan and the 2009 City of Rockingham Precinct Structure Plan development yields.

The net yield difference is presented in **Table 8-11** and **Table 8-12** below.



**Rockingham Precinct Structure Plan**  
8 Proposed Development Yields

**8.2.1.1 Residential**

Table 8-11. Residential NET yield (dwellings)

Residential	2009 Yield	2025 Yield	NET difference of proposed Dwellings
P1 City Centre	4,894	4,248	-646
P2 Waterfront Village	3,557	3,634	77
P3 Coastal Lots	2,448	1,762	-686
P4 TOD Village	1,852	1,205	-647
P5 City Park	382	1,326	944
P6 Southern Residential	3,660	2,917	-743
P7 Education	0	0	0
P8 Dixon Road	0	0	0
<b>Total</b>	<b>16,793</b>	<b>15,092</b>	<b>-1,701</b>

**8.2.1.2 Non-Residential Floorspace**

Table 8-12. Non-residential NET yield (sqm)

Non-Residential	Retail	ENT	HEL	Manu	Office	Service	Storage	Total
P1-City Centre	-26,230	-	-2,054	-270	-15,000	-	-	-43,554
P2 Waterfront Village	-6,751	-8,305	-	-	-3,000	-	-	-18,056
P3 Coastal Lots	0	-	-	-	-	-	-	0
P4 TOD Village	-5,000	-5,000	-5,000	-	-10,000	-	-	-25,000
P5 City Park	0	-	5,000	-	8,000	-	-	13,000
P6 Southern Residential	0	-	-	-	-	-	-	0
P7 Education	0	-	-16,200	-	-	-	-	-16,200
P8 Dixon Road	-2,000	-	-	-3,182	-1,800	-6,290	-4,678	-17,950
<b>Total</b>	<b>-39,981</b>	<b>-13,305</b>	<b>-18,254</b>	<b>-3452</b>	<b>-21,800</b>	<b>-6,290</b>	<b>-4,678</b>	<b>-107,760</b>

A comparison between the proposed 2025 Rockingham Strategic Centre (RSC) Precinct Plan and the 2009 City of Rockingham Precinct Structure Plan (PSP) indicates a reduction in both residential and non-residential development yields within the study area. The observed reduction in development intensity would result in a reduction in estimated traffic generated on the surrounding road network when compared to the previous PSP.



## 9 Analysis of Transport Network

### 9.1 Analysis Overview

In consultation with Main Roads WA and the City of Rockingham, eight existing signalised intersections along Ennis Avenue and Read Street within the RSC Precinct Plan Study Area were identified to be strategically assessed in further detail. These identified intersections are as follows:

- Patterson Rd and Read St intersection
- Patterson Rd and Ennis Ave intersection
- Ennis Ave and Dixon Rd intersection
- Ennis Ave and Council Ave intersection
- Ennis Ave and Rae Rd intersection
- Read St and Chalgrove Ave intersection
- Read St and Council Ave intersection
- Read St and Rae Rd intersection

#### 9.1.1 Data Sources

The following datasets and information sources were utilised in the preparation of this traffic analysis:

- ROM24 Data
- 2023 SCATS Traffic Signal Vehicle Counts
- City of Rockingham Average Daily Volumes 2024
- MRWA Traffic Counts
- City of Rockingham Observations

Where other sources of data have been relied upon, specific references are provided in the relevant sections of this report.

### 9.2 Analysis Scenarios

Two analysis scenarios have been determined based on the existing and ultimate proposed growth scenario for the RSC Precinct Plan:

- Scenario 1: 2025 Baseline Scenario (Weekday AM and PM)
- Scenario 2: 2041 Future Traffic with ultimate development (Weekday AM and PM)

### 9.3 Key Assumptions

The following assumptions were made for the analysis:

- Peak hours were identified using SCATS 2023 data as 08:00 AM to 09:00 AM and 15:00 PM to 16:00 PM on weekdays.



- The previous 2009 Activity Centre Plan vehicular trips have been removed from the traffic analysis. The previous 2009 Activity Centre Plan proposed significantly higher development yield potential than the current 2025 proposal.

## **9.4 Estimated Growth Rates**

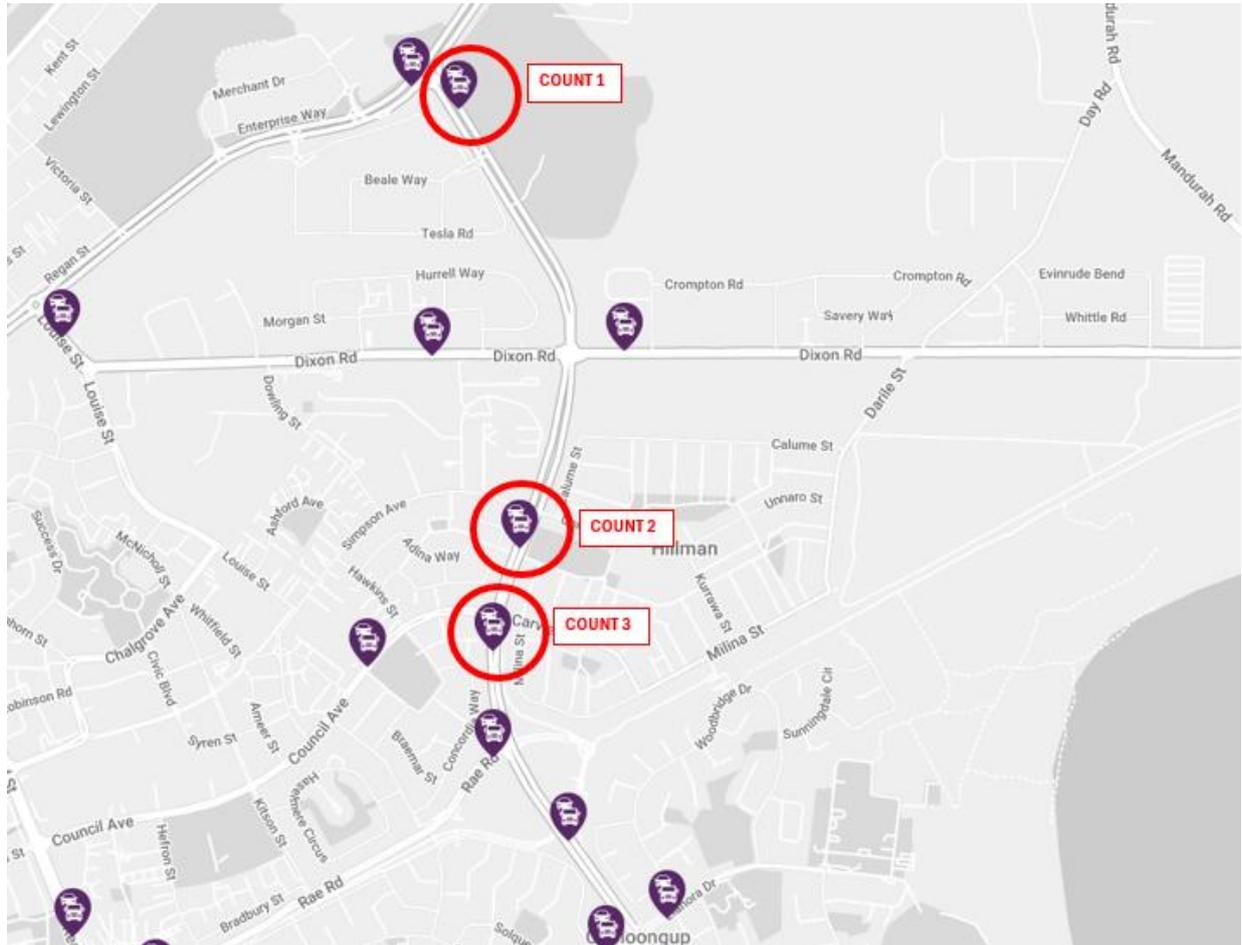
Future forecast growth rates were generated to forecast population growth across the RSC Precinct Plan Study Area.

Different growth rates were generated for each of the key traffic corridors on Ennis Ave and Read Street for the future years as indicated in **Table 9-1**.

For Read Street, the traffic growth rate for 2023 to 2025 has been determined from the Council Link Counts provided by the City of Rockingham for the Read Street traffic corridor. These Council Link Counts are included in **Appendix D**.

For Ennis Avenue, the traffic growth rate for 2023 to 2025 has been derived from the MRWA Traffic Counts obtained from the Main Roads WA Traffic Map. Bi-direction traffic volumes for three traffic counts located along Ennis Avenue were obtained for 2021 and 2023 and the traffic growth factor was calculated by averaging these three counts. It should be noted Count 2 and 3 showed a reduction in traffic growth between 2021 and 2023, hence the growth rate for Count 1 was considered to be the most appropriate. The count locations are illustrated in Figure 9-1 below.

Figure 9-1 Traffic Count Locations to obtain 2023-2025 growth rate along Ennis Ave



The future year growth rate for both traffic corridors (Ennis Ave and Read Street) 2025 to 2041 has been derived from the ROM24 data.

Table 9-1. Estimated growth rates

Analysis Period	Traffic Corridor	Growth Rate per Annum
2023-2025 Base year future growth rate	Ennis Ave	0.81%
	Read Street	5.67%
2025-2041 Future year growth rate	Ennis Ave	3.01%
	Read Street	3.01%

## 9.5 Comparison of Traffic Generation

In consultation with the City of Rockingham, it has been concluded that current ROM24 land-use models utilise data which contains the development yields associated with the 2009 City of Rockingham Precinct Structure Plan.

## Rockingham Precinct Structure Plan

### 9 Analysis of Transport Network

To assess future traffic growth under the 2041 scenario, forecasted traffic flows have been derived by using this ROM24 data to assess the impact of the 2025 Rockingham Strategic Centre (RSC) Precinct Plan yields on the identified intersections to be assessed.

On this basis, a comparative exercise has been undertaken by using the development yields associated with the 2025 Rockingham Strategic Centre (RSC) Precinct Plan and the previous 2009 City of Rockingham Precinct Structure Plan, to determine an estimation of the vehicular trips to be reduced from the future forecasted traffic flows.

To appropriately distribute this estimated reduction in trips, a comparison was undertaken for the different sub-precincts broken down by different land use.

Trip generation rates were sourced from the *Western Australian Planning Commission Transport Impact Assessment Guidelines (WAPC) Volume 5*, based on the land uses proposed for the RSC Precinct Plan Study Area.

The accompanying directional distribution has been based on both the WAPC Guidelines where applicable, as well as the Institute of Transportation Engineers (ITE) "Trip Generation" 10th Ed.

**Table 9-2** shows the trip rates for the proposed land uses,



**Rockingham Precinct Structure Plan**  
9 Analysis of Transport Network

Table 9-3 shows the directional distribution. **Table 9-4** indicates the estimated trip generation associated with the 2009 City of Rockingham Precinct Structure Plan (PSP) and



**Rockingham Precinct Structure Plan**  
 9 Analysis of Transport Network

Table 9-5 indicates the estimated trip generation associated with the 2025 Rockingham Strategic Centre (RSC) Precinct Plan. **Table 9-6** indicates the reduction for each precinct located within the Study Area.

*Table 9-2. Trip generation rate*

Land Use	Source of Trip Rate	Weekday	
		AM Peak Rate	PM Peak Rate
Residential	WAPC Vol 5 Residential	0.8	0.8
Retail	WAPC Retail (non-food)	1.25	4.00
Entertainment	RTA Guide in accordance with WAPC Vol 5 Page 20	5.00	5.00
Health, Welfare and Community	WAPC Vol 5 Commercial	2.00	2.00
Manufacturing	WAPC Vol 5 Industrial	1.00	1.00
Office	WAPC Vol 5 Commercial	2.00	2.00
Service	WAPC Vol 5 Industrial	1.00	1.00
Storage	WAPC Vol 5 Industrial	1.00	1.00



**Rockingham Precinct Structure Plan**  
 9 Analysis of Transport Network

Table 9-3. Directional distribution

Land Use	Source of Directional Distribution	AM Peak		PM Peak	
		In	Out	In	Out
Residential	WAPC Vol 5 Page 20 Residential Distribution	25%	75%	67%	33%
Retail	ITE Code 820 directional split for retail	54%	46%	50%	50%
Entertainment	ITE Code 820 directional split for retail	54%	46%	52%	48%
Health, Welfare and Community	ITE Code 820 directional split for retail	54%	46%	50%	50%
Manufacturing	WAPC Vol 5 Page 21 Industrial Distribution	80%	20%	20%	80%
Office	ITE Code 710 directional split for commercial	54%	46%	50%	50%
Service	WAPC Vol 5 Page 21 Industrial Distribution	80%	20%	20%	80%
Storage	WAPC Vol 5 Page 21 Industrial Distribution	80%	20%	20%	80%

Table 9-4 2009 PSP trip generation

Land Use	AM Peak		PM Peak	
	In	Out	In	Out
P1-City Centre	3797	5333	6756	5407
P2 Waterfront Village	1704	3004	3163	2148
P3 Coastal Lots	490	1469	1312	646
P4 TOD Village	843	1519	1573	1059
P5 City Park	76	229	205	101
P6 Southern Residential	732	2196	1962	966
P7 Education	1093	931	1012	1012
P8 Dixon Road	441	196	235	458
Total	9177	14878	16217	11797



**Rockingham Precinct Structure Plan**  
9 Analysis of Transport Network

*Table 9-5 2025 PSP trip generation*

Land Use	AM Peak		PM Peak	
	In	Out	In	Out
P1-City Centre	3304	4637	5715	4539
P2 Waterfront Village	1418	2785	2823	1803
P3 Coastal Lots	352	1057	944	465
P4 TOD Village	383	844	846	518
P5 City Park	406	915	841	480
P6 Southern Residential	583	1750	1564	770
P7 Education	918	782	850	850
P8 Dixon Road	295	140	148	287
Total	7659	12910	13730	9713

*Table 9-6. Estimated NET reduction in trip generation*

Land Use	AM Peak		PM Peak	
	In	Out	In	Out
P1-City Centre	-493	-696	-1,042	-868
P2 Waterfront Village	-287	-220	-340	-344
P3 Coastal Lots	-137	-412	-368	-181
P4 TOD Village	-460	-675	-727	-541
P5 City Park	329	686	636	379
P6 Southern Residential	-149	-446	-398	-196
P7 Education	-175	-149	-162	-162
P8 Dixon Road	-146	-56	-86	-171
Total	-1,517	-1,967	-2,487	-2,084

As previously stated, in consultation with the City of Rockingham, it has been concluded that current ROM24 land-use models incorporate the development yields associated with the 2009 City of Rockingham Precinct Structure Plan.

Given the future traffic forecasting is based on ROM 24 traffic growth for the 2041 scenario, it was imperative that the NET reduction of trips associated with the 2025 Rockingham Strategic Centre (RSC) Precinct Plan be calculated.

Therefore, on this basis, the net reduction in vehicular trips in **Table 9.6** above has been removed from the Scenario 2: 2041 Future Traffic with ultimate development (Weekday AM and PM) through proportionally distributing the reduction in traffic across the intersections being assessed.



## **9.6 Trip Distribution**

Vehicular trips were assigned across the network using both Video Surveys (where available) and existing SCATS turning movement data obtained from the Main Roads WA Traffic Map. In instances where specific turning movement data was unavailable, proportional assumptions were applied based on corresponding peak hour opposing movements. For example, it was assumed that the proportion of left-turning vehicles during the AM peak was used to estimate the proportion of right-turning vehicles during the PM peak.

The available Video Survey Data was utilised to obtain turning movements for the following intersections with the other intersections in the PSP study area utilising SCATS.

- Ennis Avenue / Dixon Avenue
- Ennis Avenue / Council Avenue
- Ennis Avenue / Rae Road

## **9.7 Background and Development Traffic**

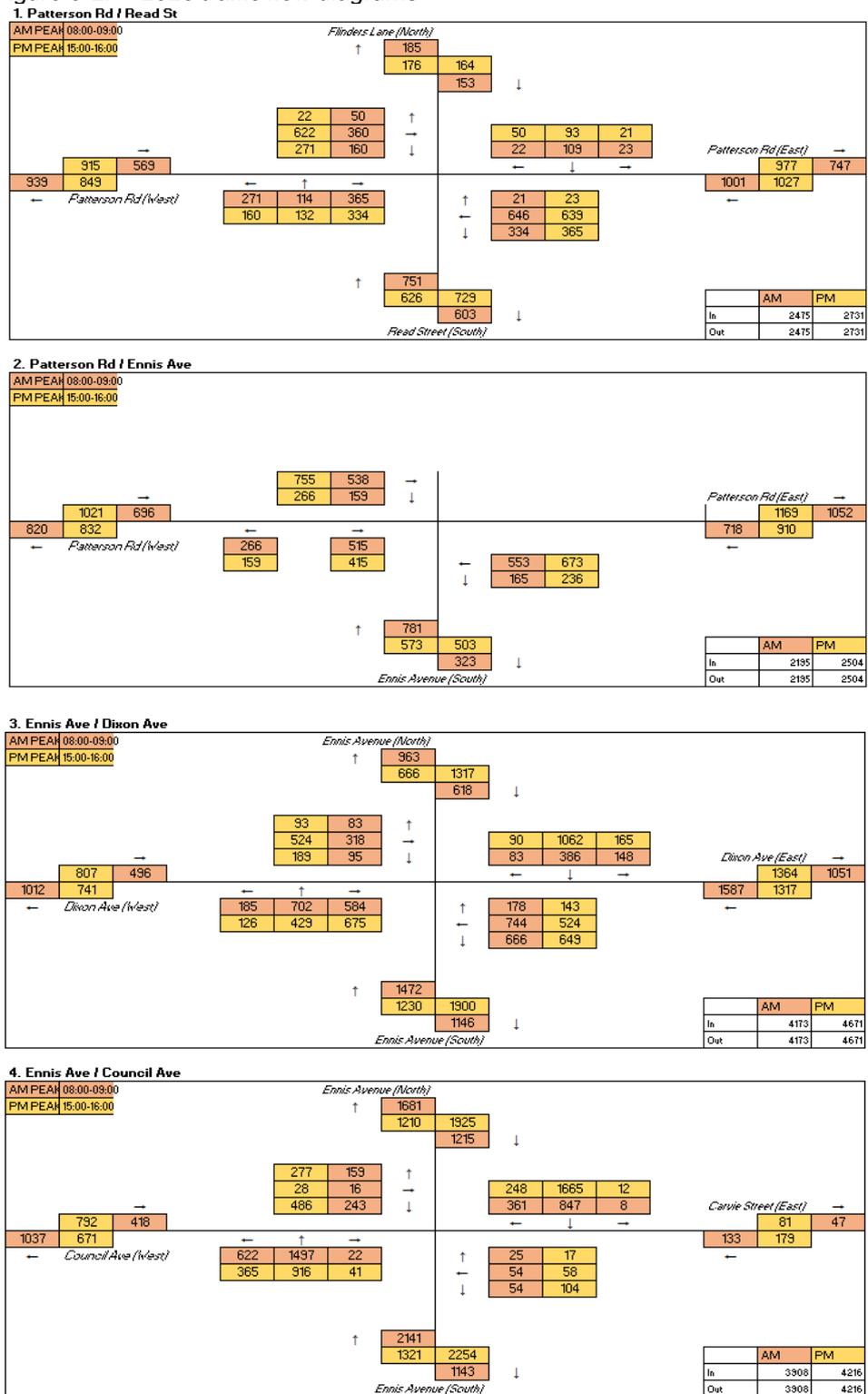
**Figure 9-2** shows the 2025 background traffic volumes for the assessment intersections, and **Figure 9-3** shows the 2041 scenario peak hour traffic flow of the ultimate development scenario.



# Rockingham Precinct Structure Plan

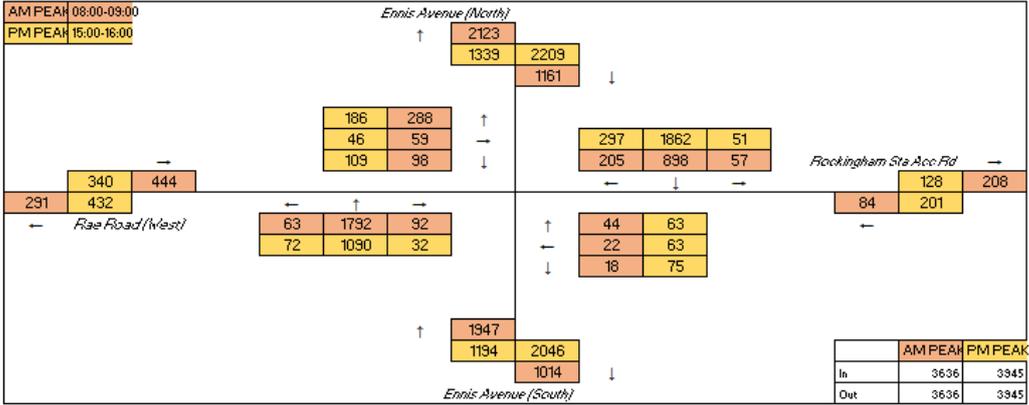
## 9 Analysis of Transport Network

Figure 9-2. 2025 traffic flow diagrams

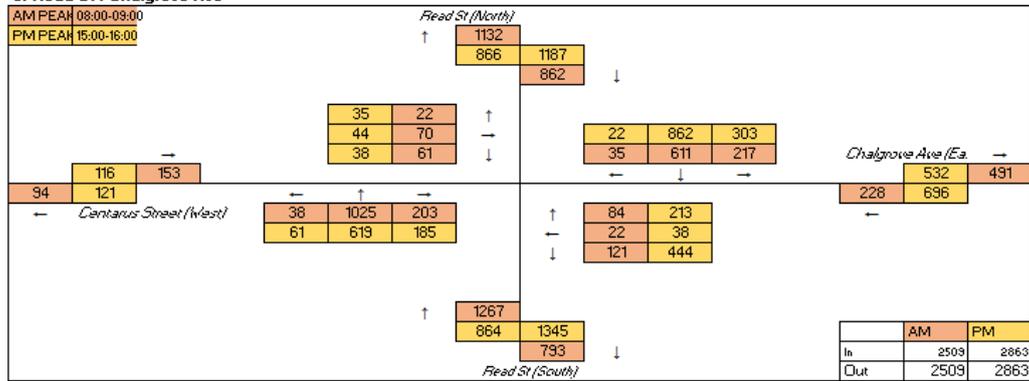


**Rockingham Precinct Structure Plan**  
**9 Analysis of Transport Network**

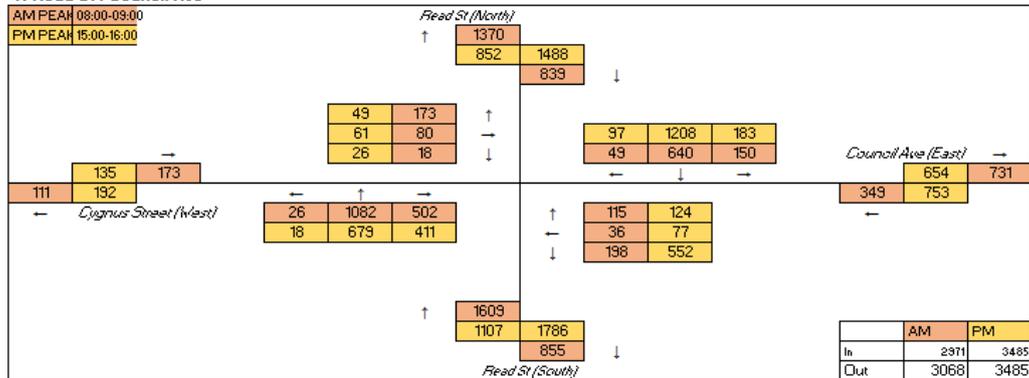
**5. Ennis Ave / Rae Road**



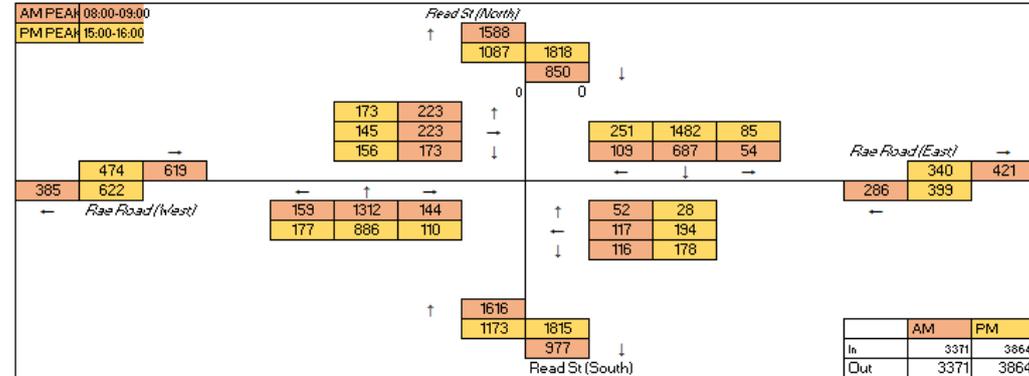
**6. Read St / Chalgrove Ave**



**7. Read St / Council Ave**



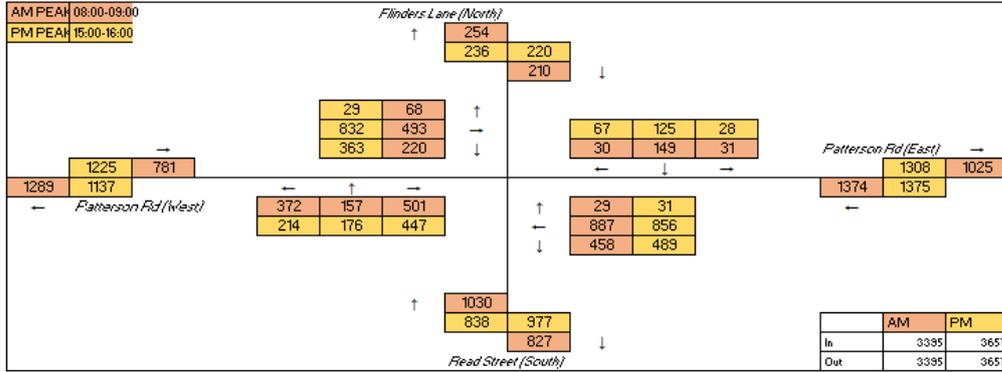
**8. Read St / Rae Road**



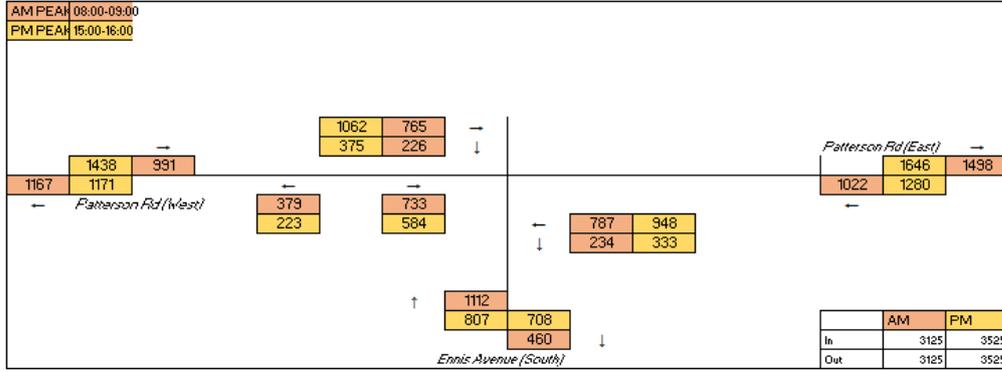
**Rockingham Precinct Structure Plan**  
**9 Analysis of Transport Network**

Figure 9-3. 2041 traffic flow figures

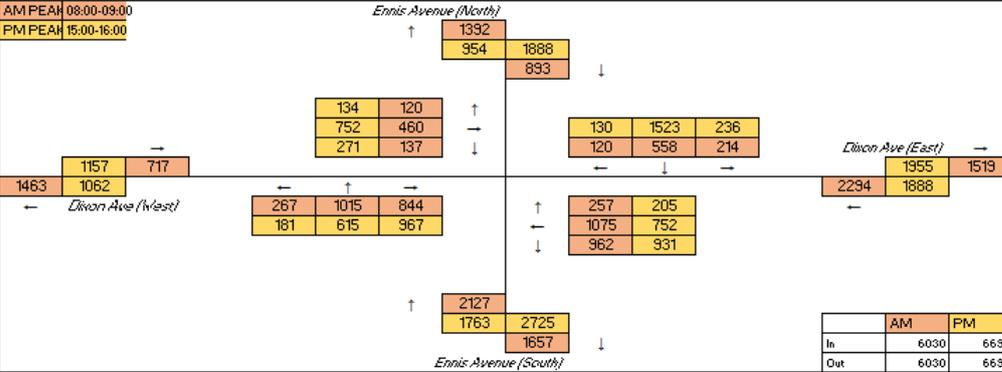
**1. Patterson Rd / Read St**



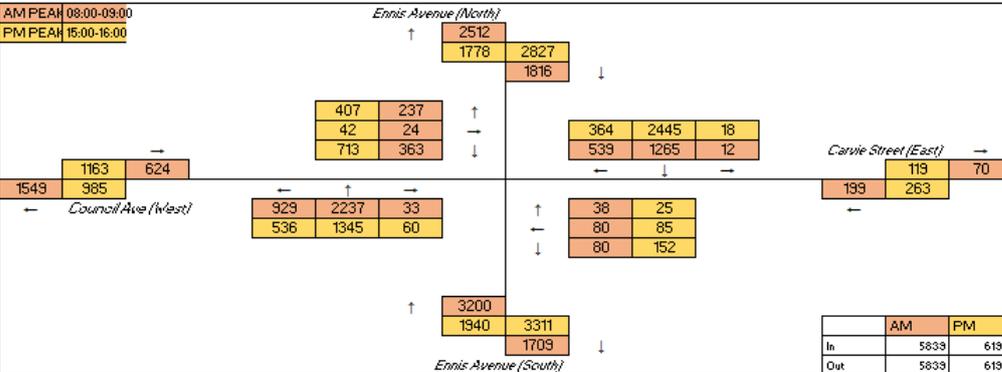
**2. Patterson Rd / Ennis Ave**



**3. Ennis Ave / Dixon Ave**



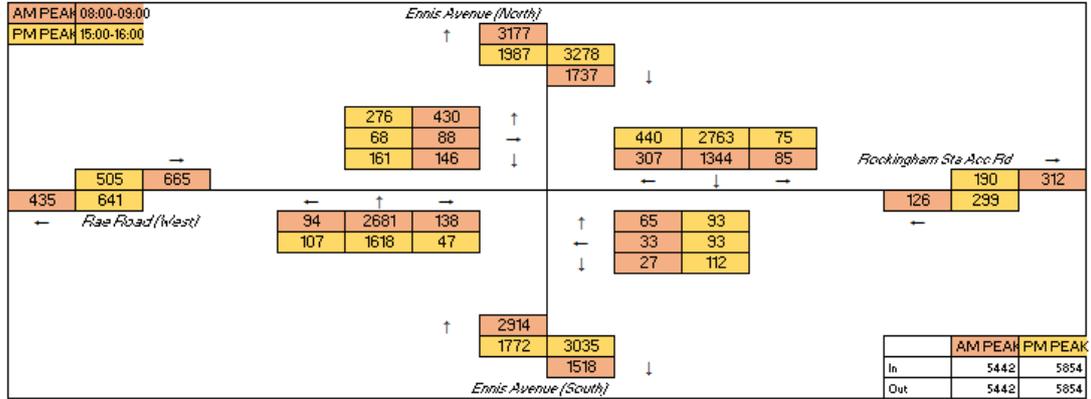
**4. Ennis Ave / Council Ave**



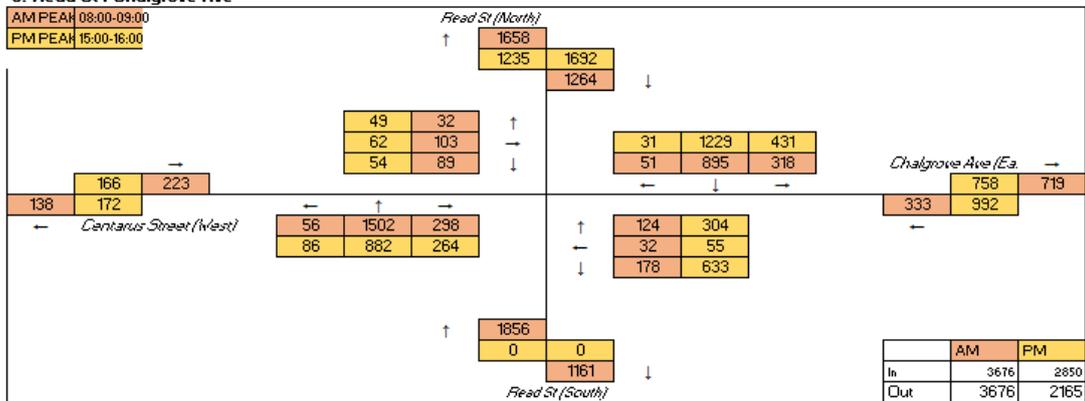
# Rockingham Precinct Structure Plan

## 9 Analysis of Transport Network

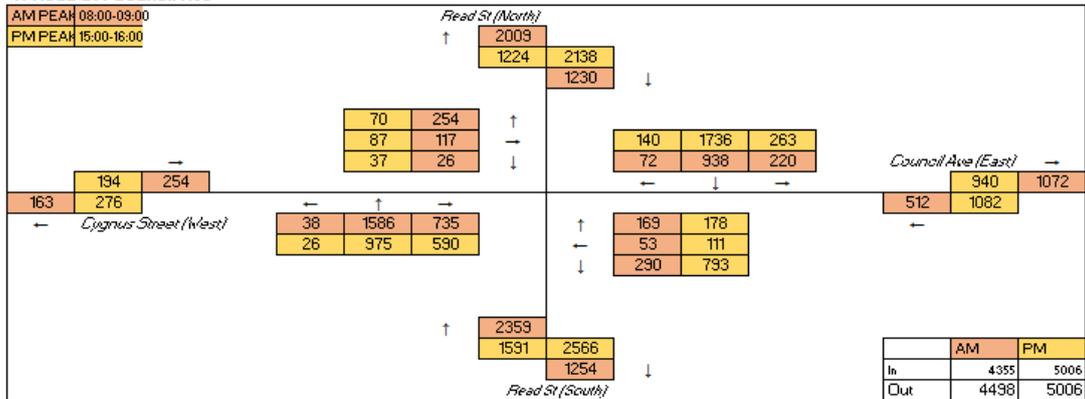
### 5. Ennis Ave / Rae Road



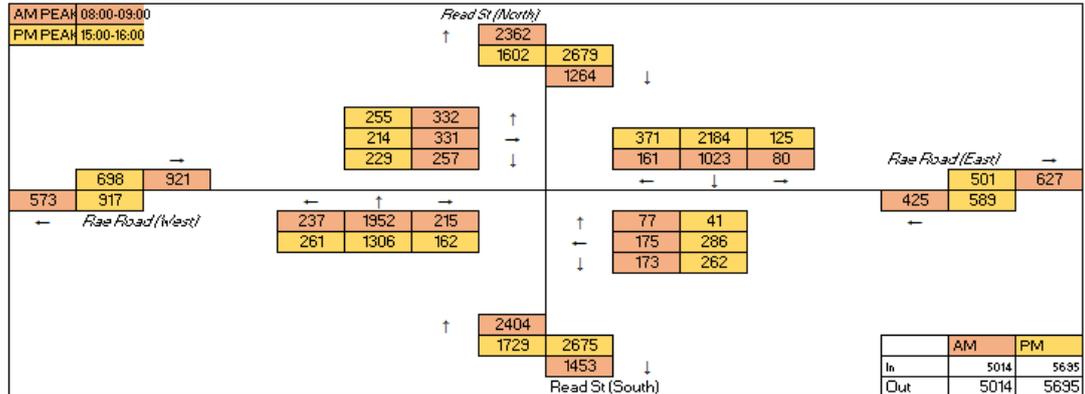
### 6. Read St / Chalgrove Ave



### 7. Read St / Council Ave



### 8. Read St / Rae Road



## 10 Key Intersection Analysis

### 10.1.1 SIDRA Results Definition

The key intersections were analysed using the SIDRA analysis software tool. This software calculates the performance of intersections based on input parameters, including geometry and traffic volumes. As an output SIDRA provides values for the Degree of Saturation (DOS), queue lengths, delays, level of service, and 95th Percentile Queue. These parameters 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 theoretical intersection capacity is exceeded for an unsignalised intersection where  $DOS > 0.80$ ;
- **95% Queue** is the statistical estimate of the queue length up to or below which 95% of all observed queues would be expected;
- **Average Delay** is the average of all travel time delays for vehicles through the intersection. An unsignalised intersection can be considered to be operating at capacity where the average delay exceeds 55 seconds for any movement; and
- **Level of Service (LOS)** is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. The different levels of service can generally be described as shown in **Table 10-1**.

Table 10-1. Level of Service (LoS) performance criteria

LOS	Description	Signalised Intersection	Unsignalised Intersection
A	Free-flow operations (best condition)	≤10 sec	≤10 sec
B	Reasonable free-flow operations	10-20 sec	10-15 sec
C	At or near free-flow operations	20-35 sec	15-25 sec
D	Decreasing free-flow levels	35-55 sec	25-35 sec
E	Operations at capacity	55-80 sec	35-50 sec
F	A breakdown in vehicular flow (worst condition)	≥80 sec	≥50 sec

A LOS exceeding these values indicates that the road section is exceeding its practical capacity. Above these values, users of the intersection are likely to experience unsatisfactory queueing and delays during the peak hour periods.

The SIDRA models have been developed in accordance with the Main Roads WA operational modelling guidelines (version 2.0 January 2021). The SIDRA outputs are provided in **Appendix E**.

### 10.1.2 Modelling Limitations

It should be noted that there are limitations to the use of traffic modelling tools as they have simplified assumptions about driver behaviour and do not account for demand elasticity and how road users might alter their travel patterns in response to congestion or delays. The modelling does not account for behavioural adaptations, such as route choice changes, departure time shifts, or mode shifts, leading to potentially overestimated delays and queues.



## 10.2 SIDRA Analysis Results

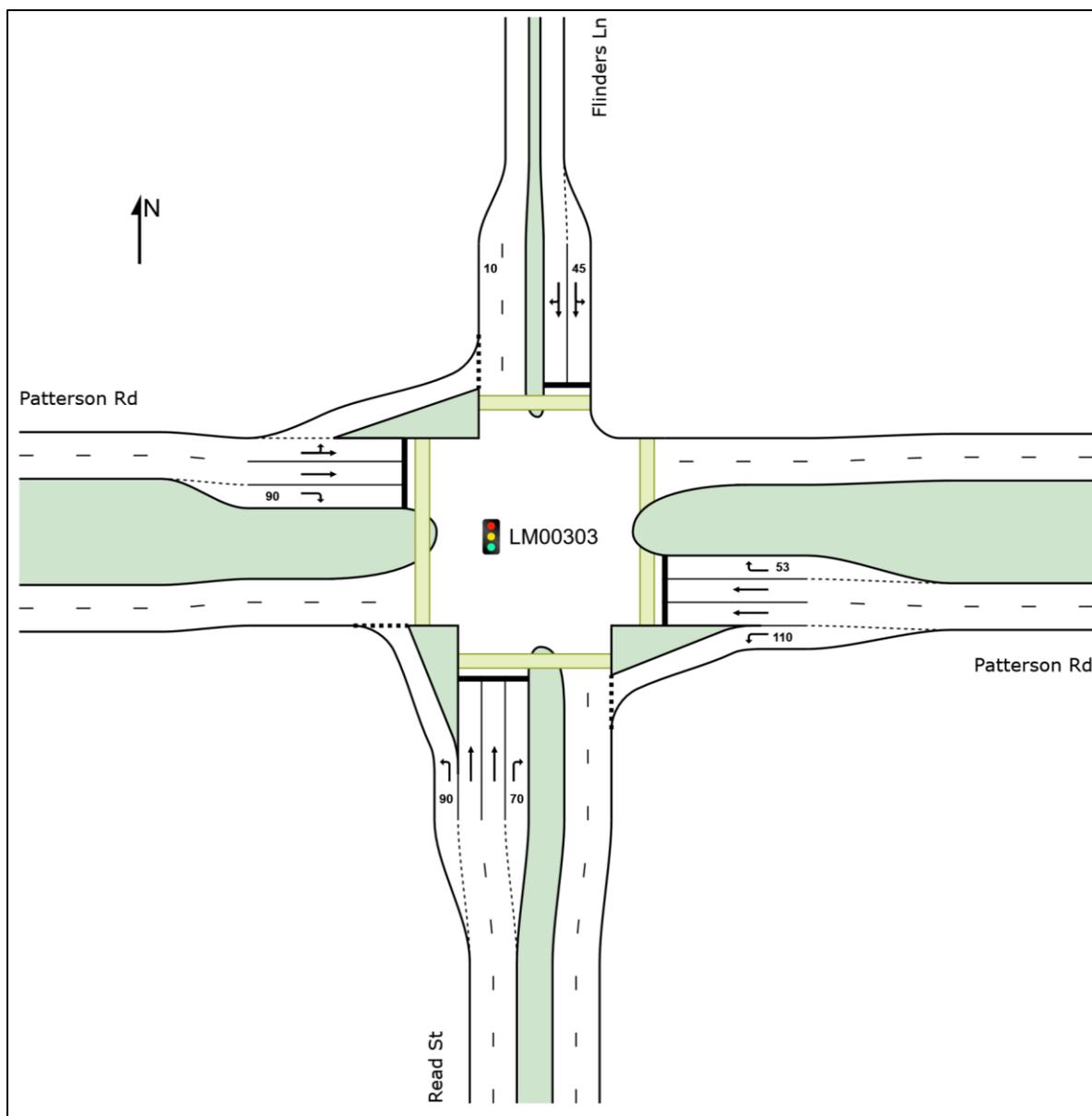
The analysis was undertaken for the following scenarios:

- Scenario 1: 2025 baseline scenario (weekday AM and PM)
- Scenario 2: 2041 future traffic with ultimate development (weekday AM and PM)

### 10.2.1 Patterson Road and Read Street Intersection

The SIDRA layout for this intersection is illustrated in **Figure 10-1** and the analysis results for this intersection are summarised in **Table 10-2** and **Table 10-3**.

Figure 10-1. Patterson Road and Read Street intersection



**Rockingham Precinct Structure Plan**  
10 Key Intersection Analysis

Table 10-2. SIDRA results: Patterson Road / Read Street intersection – scenario 1 - 2025 baseline

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Read Street	L	0.246	11.5	B	36.4	0.150	11.5	B	21.5
	T	0.131	24.6	C	24.5	0.180	36.4	D	37.5
	R	0.636	31.4	C	111.8	0.726	45.1	D	134.5
<b>Approach</b>		<b>0.636</b>	<b>23.2</b>	<b>C</b>	<b>111.8</b>	<b>0.726</b>	<b>34.7</b>	<b>C</b>	<b>134.5</b>
East: Patterson Road	L	0.267	8.5	A	33.4	0.315	11.3	B	57.2
	T	0.787	51.4	D	138.6	0.859	70.6	E	173.6
	R	0.099	62.9	E	8.1	0.120	81.2	F	10.6
<b>Approach</b>		<b>0.787</b>	<b>37.3</b>	<b>D</b>	<b>138.6</b>	<b>0.859</b>	<b>49.8</b>	<b>D</b>	<b>173.6</b>
North: Flinders Lane	L	0.731	64.8	E	36.8	0.819	77.7	E	48.0
	T	0.731	60.3	E	36.8	0.819	73.3	E	48.0
	R	0.731	65.1	E	34.0	0.819	78.4	E	42.8
<b>Approach</b>		<b>0.731</b>	<b>61.7</b>	<b>E</b>	<b>36.8</b>	<b>0.819</b>	<b>75.5</b>	<b>E</b>	<b>48.0</b>
West: Patterson Road	L	0.492	6.9	A	72.0	0.531	7.1	A	127.8
	T	0.492	42.6	D	75.8	0.531	37.8	D	129.0
	R	0.757	60.2	E	71.0	0.849	42.7	D	93.8
<b>Approach</b>		<b>0.757</b>	<b>44.4</b>	<b>D</b>	<b>75.8</b>	<b>0.849</b>	<b>38.5</b>	<b>D</b>	<b>129.0</b>
<b>All vehicles</b>		<b>0.787</b>	<b>36.2</b>	<b>D</b>	<b>138.6</b>	<b>0.859</b>	<b>44.1</b>	<b>D</b>	<b>173.6</b>

The result indicates that the Patterson Road / Read Street intersection is operating at deteriorating operational performance during the AM and PM peak hours for the 2025 base scenario with an overall LOS D and some approaches operating at LOS E with queues of approximately 175 m.



**Rockingham Precinct Structure Plan**  
10 Key Intersection Analysis

Table 10-3. SIDRA results: Patterson Road / Read Street intersection – scenario 2 - 2041 future traffic with ultimate development

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Read Street	L	0.357	18.9	B	77.6	0.210	14.6	B	40.7
	T	0.170	44.4	D	44.5	0.226	53.4	D	56.6
	R	0.917	78.0	E	283.6	1.028	132.2	F	326.8
<b>Approach</b>		<b>0.917</b>	<b>51.5</b>	<b>D</b>	<b>283.6</b>	<b>1.028</b>	<b>85.5</b>	<b>F</b>	<b>326.8</b>
East: Patterson Road	L	0.369	19.3	B	79.5	0.437	27.5	C	113.0
	T	1.031	146.8	F	389.1	1.153	243.0	F	443.6
	R	0.138	105.0	F	15.1	0.127	103.4	F	15.7
<b>Approach</b>		<b>1.031</b>	<b>103.5</b>	<b>F</b>	<b>389.1</b>	<b>1.153</b>	<b>163.3</b>	<b>F</b>	<b>443.6</b>
North: Flinders Lane	L	1.069	165.3	F	94.8	1.039	143.7	F	97.0
	T	1.069	161.3	F	94.8	1.039	139.7	F	97.0
	R	1.069	166.5	F	85.6	1.039	146.0	F	82.1
<b>Approach</b>		<b>1.069</b>	<b>162.6</b>	<b>F</b>	<b>94.8</b>	<b>1.039</b>	<b>142.1</b>	<b>F</b>	<b>97.0</b>
West: Patterson Road	L	0.585	7.4	A	135.8	0.821	10.7	B	254.0
	T	0.585	55.9	E	140.1	0.821	61.3	E	254.0
	R	1.046	147.8	F	183.2	1.131	190.2	F	309.7
<b>Approach</b>		<b>1.046</b>	<b>77.6</b>	<b>E</b>	<b>183.2</b>	<b>1.131</b>	<b>98.3</b>	<b>F</b>	<b>309.7</b>
<b>All vehicles</b>		<b>1.069</b>	<b>85.4</b>	<b>F</b>	<b>389.1</b>	<b>1.153</b>	<b>122.5</b>	<b>F</b>	<b>443.6</b>

The result indicates that the Patterson Road / Read Street intersection is expected to reach capacity and poor level of service during the AM and PM peak hour periods for the 2041 future traffic with ultimate development scenario with an overall LOS F and queues exceeding 400 m.

### 10.2.2 Patterson Road and Ennis Avenue Intersection

The SIDRA layout for this intersection is illustrated in **Figure 10-2** and the analysis results for this intersection are summarised in **Table 10-4** and **Table 10-5**.



Figure 10-2. Patterson Road and Ennis Avenue intersection

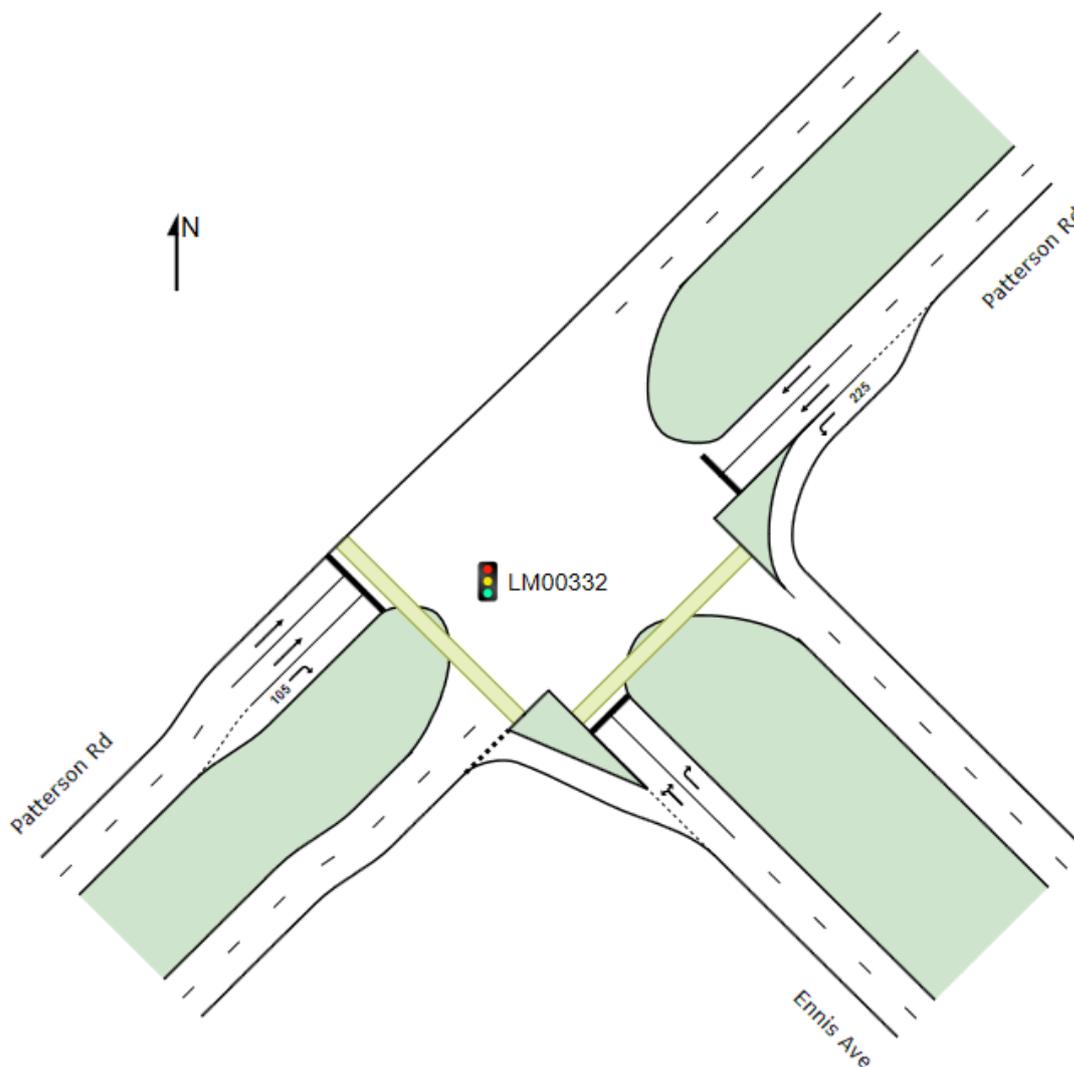


Table 10-4. SIDRA results: Patterson Road / Ennis Avenue intersection – scenario 1 - 2025 baseline

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Southeast: Ennis Avenue	L	0.760	14.7	B	109.5	0.714	14.3	B	90.5
	R	0.760	44.7	D	109.599.5	0.714	51.3	D	90.5
<b>Approach</b>		<b>0.760</b>	<b>34.5</b>	<b>C</b>	<b>109.599.5</b>	<b>0.714</b>	<b>41.0</b>	<b>D</b>	<b>90.5</b>
Northeast: Patterson Road	L	0.101	6.7	A	0.0	0.144	6.7	A	0.0
	T	0.754	35.2	D	87.7	0.798	39.0	D	121.4
<b>Approach</b>		<b>0.753</b>	<b>28.7</b>	<b>C</b>	<b>87.7</b>	<b>0.798</b>	<b>30.6</b>	<b>C</b>	<b>121.4</b>
Southwest: Patterson Road	T	0.290	10.9	B	45.7	0.358	9.4	A	65.2
	R	0.648	26.5	C	28.7	0.770	29.0	C	53.0
<b>Approach</b>		<b>0.648</b>	<b>14.5</b>	<b>B</b>	<b>45.7</b>	<b>0.770</b>	<b>14.5</b>	<b>B</b>	<b>65.2</b>
<b>All vehicles</b>		<b>0.760</b>	<b>26.3</b>	<b>C</b>	<b>109.5</b>	<b>0.798</b>	<b>26.4</b>	<b>C</b>	<b>121.4</b>



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The result indicates that the Patterson Road / Ennis Avenue intersection operates at acceptable levels with LOS C during peak AM and PM peak hours for the 2025 base scenario with average delays of around 26 seconds.

*Table 10-5. SIDRA results: Patterson Road / Ennis Avenue intersection – scenario 2 - 2041 future traffic with ultimate development*

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
Southeast: Ennis Ave	L	1.021	70.5	E	363.8	1.013	63.6	E	248.0
	R	1.021	96.7	F	363.8	1.013	90.7	F	248.0
<b>Approach</b>		<b>1.021</b>	<b>87.7</b>	<b>F</b>	<b>363.8</b>	<b>1.013</b>	<b>83.2</b>	<b>F</b>	<b>248.0</b>
Northeast: Patterson Rd	L	0.143	6.7	A	0.0	0.204	6.7	A	0.0
	T	1.044	122.5	F	260.8	1.223	265.3	F	454.4
<b>Approach</b>		<b>1.044</b>	<b>95.9</b>	<b>F</b>	<b>260.8</b>	<b>1.223</b>	<b>198.1</b>	<b>F</b>	<b>454.4</b>
Southwest: Patterson Rd	T	0.403	13.9	B	85.3	0.495	10.6	B	106.4
	R	1.063	110.9	F	112.6	1.210	229.2	F	310.2
<b>Approach</b>		<b>1.063</b>	<b>36.1</b>	<b>D</b>	<b>112.6</b>	<b>1.210</b>	<b>67.6</b>	<b>E</b>	<b>310.2</b>
<b>All vehicles</b>		<b>1.063</b>	<b>74.0</b>	<b>E</b>	<b>363.9</b>	<b>1.223</b>	<b>118.6</b>	<b>F</b>	<b>454.4</b>

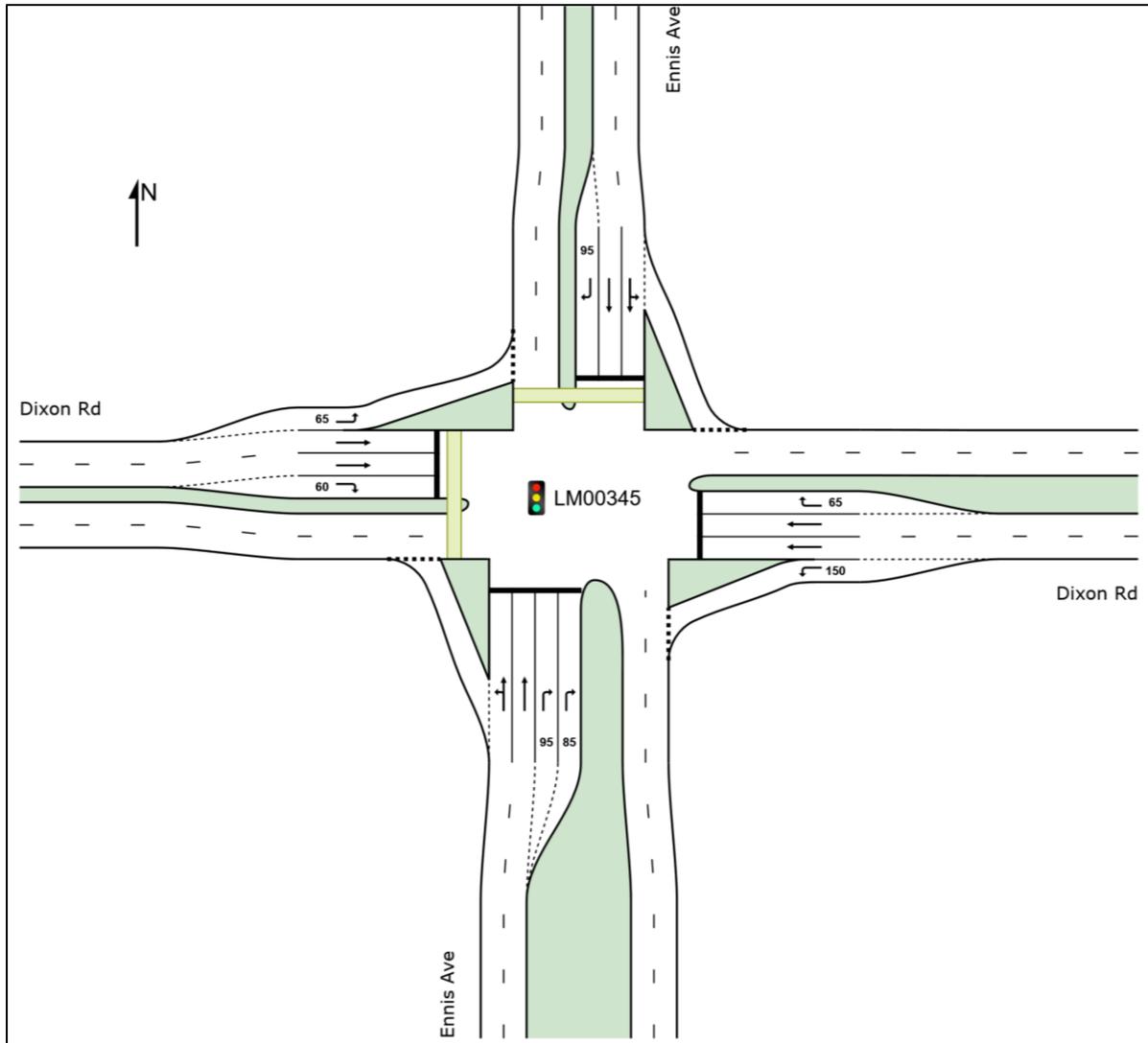
The result indicates that the Patterson Road / Ennis Avenue intersection is expected to operate at capacity during the AM and PM peak hours for the 2041 future traffic with ultimate development scenario with an overall LOS E or F.

### 10.2.3 Ennis Avenue and Dixon Road Intersection

The SIDRA layout for this intersection is illustrated in **Figure 10-3** and the analysis results for this intersection are summarised in **Table 10-6** and Table 10-7.



Figure 10-3. Ennis Avenue and Dixon Road intersection



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Table 10-6. SIDRA results: Ennis Avenue / Dixon Road intersection – scenario 1 - 2025 baseline

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Ennis Avenue	L	0.908	32.3	C	201.5	0.382	14.8	B	97.4
	T	0.908	61.6	E	201.5	0.382	40.2	D	106.5
	R	1.024	86.3	F	135.1	1.117	164.7	F	277.2
<b>Approach</b>		<b>1.024</b>	<b>67.7</b>	<b>E</b>	<b>201.5</b>	<b>1.117</b>	<b>105.9</b>	<b>F</b>	<b>277.2</b>
East: Dixon Road	L	0.587	12.2	B	109.4	0.772	49.8	D	236.5
	T	1.080	141.1	F	261.8	1.097	185.1	F	242.8
	R	1.061	139.0	F	114.2	0.852	99.9	F	88.2
<b>Approach</b>		<b>1.080</b>	<b>86.8</b>	<b>F</b>	<b>261.8</b>	<b>1.097</b>	<b>109.1</b>	<b>F</b>	<b>242.8</b>
North: Ennis Avenue	L	1.029	71.6	E	166.3	1.134	154.4	F	609.0
	T	1.029	105.0	F	166.3	1.134	197.6	F	609.0
	R	0.450	53.6	D	30.9	0.383	97.0	F	47.2
<b>Approach</b>		<b>1.029</b>	<b>90.1</b>	<b>F</b>	<b>166.3</b>	<b>1.134</b>	<b>185.3</b>	<b>F</b>	<b>609.0</b>
West: Dixon Road	L	0.094	15.3	B	13.7	0.087	34.4	C	13.1
	T	0.450	38.6	D	54.0	1.122	205.5	F	259.2
	R	0.566	54.5	D	36.3	1.126	226.1	F	177.9
<b>Approach</b>		<b>0.566</b>	<b>37.7</b>	<b>D</b>	<b>54.0</b>	<b>1.126</b>	<b>190.6</b>	<b>F</b>	<b>259.2</b>
<b>All vehicles</b>		<b>1.080</b>	<b>74.7</b>	<b>E</b>	<b>261.8</b>	<b>1.134</b>	<b>143.8</b>	<b>F</b>	<b>609.0</b>

The result indicates that the Ennis Avenue / Dixon Road intersection is currently reaching capacity during the AM and PM peak hours for the 2025 base year with some approaches at LOS E or F with queues up to about 609 m on Ennis Avenue north approach in the PM peak.



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Table 10-7. SIDRA results: Ennis Ave / Dixon Rd intersection – scenario 2 - 2041 future traffic with ultimate development

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Ennis Avenue	L	1.325	312.4	F	747.8	0.552	17.3	B	160.2
	T	1.325	339.7	F	747.8	0.552	94.4	F	165.4
	R	1.479	482.6	F	516.3	1.601	663.2	F	722.4
<b>Approach</b>		<b>1.479</b>	<b>393.0</b>	<b>F</b>	<b>747.8</b>	<b>1.601</b>	<b>398.4</b>	<b>F</b>	<b>722.4</b>
East: Dixon Road	L	0.876	24.5	C	245.7	1.108	166.2	F	689.7
	T	1.560	563.7	F	775.6	1.575	609.6	F	602.2
	R	1.532	560.1	F	353.9	1.222	322.4	F	225.0
<b>Approach</b>		<b>1.560</b>	<b>337.2</b>	<b>F</b>	<b>775.6</b>	<b>1.575</b>	<b>359.8</b>	<b>F</b>	<b>689.7</b>
North: Ennis Avenue	L	1.488	459.8	F	554.0	1.626	585.1	F	1453.9
	T	1.488	491.7	F	554.0	1.626	634.2	F	1453.9
	R	0.650	55.6	E	46.4	0.553	110.2	F	70.2
<b>Approach</b>		<b>1.488</b>	<b>425.3</b>	<b>F</b>	<b>554.0</b>	<b>1.626</b>	<b>592.0</b>	<b>F</b>	<b>1453.9</b>
West: Dixon Road	L	0.142	17.6	B	22.3	0.140	75.6	E	26.6
	T	0.651	40.7	D	82.3	1.610	641.1	F	629.3
	R	0.817	60.2	E	57.1	1.615	673.0	F	430.4
<b>Approach</b>		<b>0.817</b>	<b>40.5</b>	<b>D</b>	<b>82.3</b>	<b>1.615</b>	<b>583.1</b>	<b>F</b>	<b>629.3</b>
<b>All vehicles</b>		<b>1.560</b>	<b>334.7</b>	<b>F</b>	<b>775.6</b>	<b>1.626</b>	<b>474.0</b>	<b>F</b>	<b>1453.9</b>

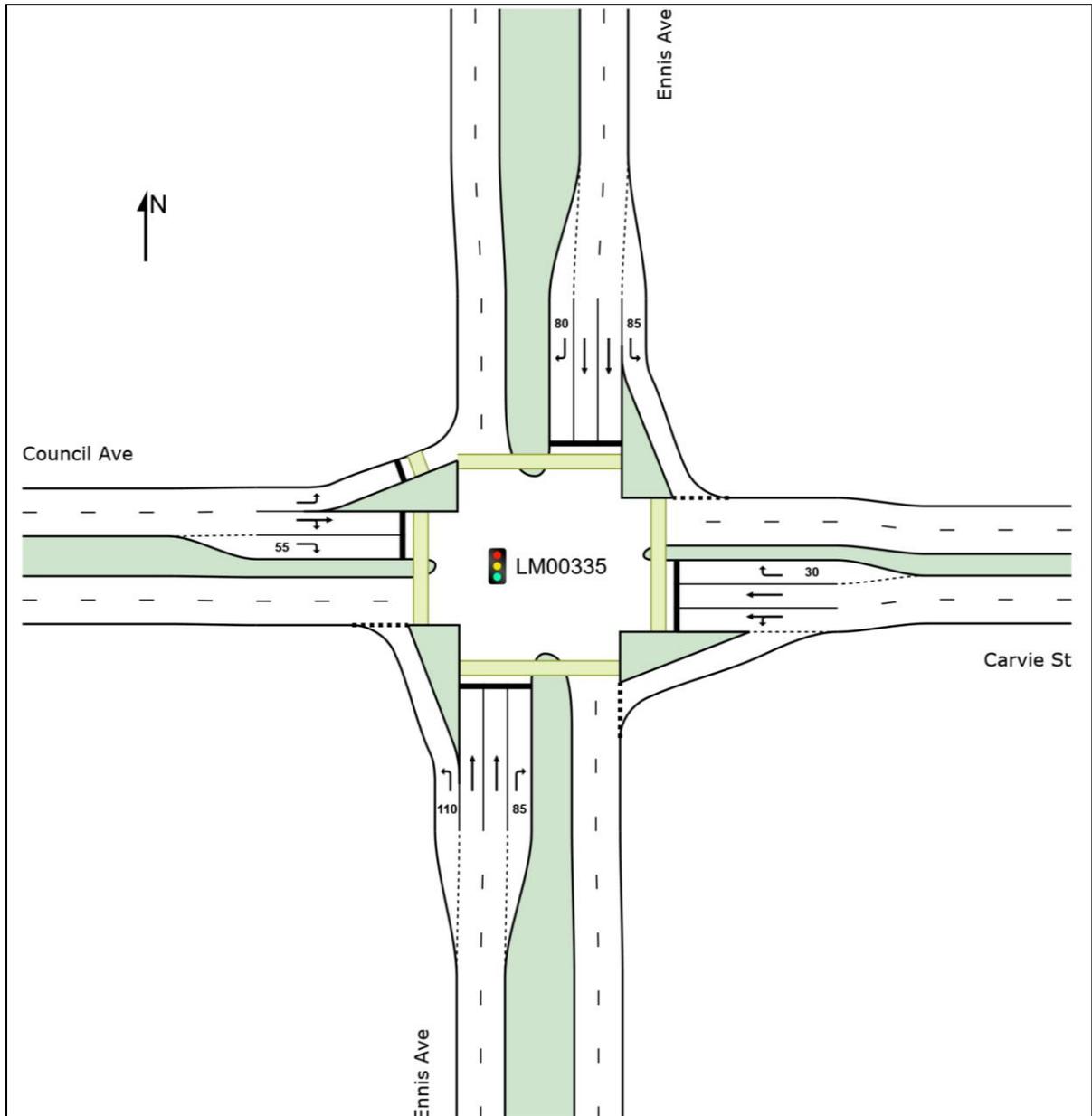
The result indicates that the Ennis Avenue / Dixon Road intersection is expected to operate over capacity and poor levels of service during the AM and PM peak hours for the 2041 future traffic with ultimate development scenario.

### 10.2.4 Ennis Avenue and Council Avenue Intersection

The SIDRA layout for this intersection is illustrated in **Figure 10-4** and the analysis results for this intersection are summarised in **Table 10-8** and **Table 10-9**.



Figure 10-4. Ennis Avenue and Council Avenue intersection



**Rockingham Precinct Structure Plan**  
10 Key Intersection Analysis

Table 10-8. SIDRA results: Ennis Avenue / Council Avenue intersection – scenario 1 - 2025 baseline

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Ennis Avenue	L	0.526	61.8	E	87.9	0.305	30.1	C	32.5
	T	2.010	990.8	F	1364.4	1.232	281.6	F	459.0
	R	0.213	94.4	F	9.6	0.463	80.4	F	18.5
<b>Approach</b>		<b>2.010</b>	<b>711.7</b>	<b>F</b>	<b>1364.4</b>	<b>1.232</b>	<b>206.0</b>	<b>F</b>	<b>459.0</b>
East: Carvie Street	L	0.131	13.3	B	13.4	0.175	27.7	C	30.5
	T	0.131	44.7	D	15.0	0.175	44.4	D	30.5
	R	0.085	47.2	D	9.1	0.058	46.8	D	6.1
<b>Approach</b>		<b>0.131</b>	<b>32.4</b>	<b>C</b>	<b>15.0</b>	<b>0.175</b>	<b>35.0</b>	<b>C</b>	<b>30.5</b>
North: Ennis Avenue	L	0.006	14.0	B	0.3	0.009	60.1	E	0.5
	T	0.738	39.9	D	167.1	1.463	491.1	F	1169.2
	R	1.883	841.8	F	587.5	1.294	356.4	F	233.1
<b>Approach</b>		<b>1.883</b>	<b>277.8</b>	<b>F</b>	<b>587.5</b>	<b>1.463</b>	<b>3471.1</b>	<b>F</b>	<b>1169.2</b>
West: Council Avenue	L	0.270	20.6	C	26.6	0.470	23.6	C	55.0
	T	0.461	48.4	D	51.8	1.018	112.2	F	165.5
	R	0.461	52.9	D	51.8	1.018	116.7	F	165.5
<b>Approach</b>		<b>0.461</b>	<b>40.4</b>	<b>D</b>	<b>51.8</b>	<b>1.018</b>	<b>83.9</b>	<b>F</b>	<b>165.5</b>
<b>All vehicles</b>		<b>2.010</b>	<b>481.8</b>	<b>F</b>	<b>1364.4</b>	<b>1.463</b>	<b>296.8</b>	<b>F</b>	<b>1169.2</b>

The result indicates that the Ennis Avenue / Council Avenue intersection currently operates over capacity with the through movements on Ennis Avenue southern approach and the through and right turn movements on Ennis Ave northern approach expected to operate at poor levels of service during the AM and PM peak hours for the 2025 base scenario.



**Rockingham Precinct Structure Plan**  
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Table 10-9. SIDRA results: Ennis Avenue / Council Avenue intersection – scenario 2 - 2041 future traffic with ultimate development

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Ennis Avenue	L	0.956	120.9	F	419.3	0.460	53.1	D	62.9
	T	3.003	1893.3	F	2533.4	1.809	807.1	F	1128.3
	R	0.320	103.8	F	14.5	0.678	96.2	F	27.9
<b>Approach</b>		<b>3.003</b>	<b>1360.1</b>	<b>F</b>	<b>2533.4</b>	<b>1.809</b>	<b>576.9</b>	<b>F</b>	<b>1128.3</b>
East: Carvie Street	L	0.200	23.7	C	28.7	0.257	28.5	C	46.1
	T	0.200	45.8	D	28.7	0.257	45.3	D	46.1
	R	0.129	47.6	D	14.0	0.085	47.2	D	9.1
<b>Approach</b>		<b>0.200</b>	<b>37.2</b>	<b>D</b>	<b>28.7</b>	<b>0.257</b>	<b>35.7</b>	<b>D</b>	<b>46.1</b>
North: Ennis Avenue	L	0.009	50.3	D	0.5	0.013	74.6	E	0.9
	T	1.213	282.7	F	691.1	2.148	1112.0	F	2464.7
	R	2.811	1736.4	F	1194.4	1.899	912.0	F	596.6
<b>Approach</b>		<b>2.811</b>	<b>712.6</b>	<b>F</b>	<b>1194.4</b>	<b>2.148</b>	<b>1079.7</b>	<b>F</b>	<b>2464.7</b>
West: Council Avenue	L	0.402	21.5	C	42.0	0.690	31.4	C	113.1
	T	0.688	51.5	D	82.0	1.495	527.7	F	516.7
	R	0.688	55.9	E	82.0	1.495	532.1	F	516.7
<b>Approach</b>		<b>0.688</b>	<b>42.7</b>	<b>D</b>	<b>82.0</b>	<b>1.495</b>	<b>356.5</b>	<b>F</b>	<b>516.7</b>
<b>All vehicles</b>		<b>3.003</b>	<b>973.0</b>	<b>F</b>	<b>2533.4</b>	<b>2.148</b>	<b>742.2</b>	<b>F</b>	<b>2464.7</b>

The result indicates that the Ennis Avenue / Council Avenue intersection is expected to operate over capacity and at poor levels of service during the AM and PM peak hours for the 2041 future traffic with ultimate development scenario.

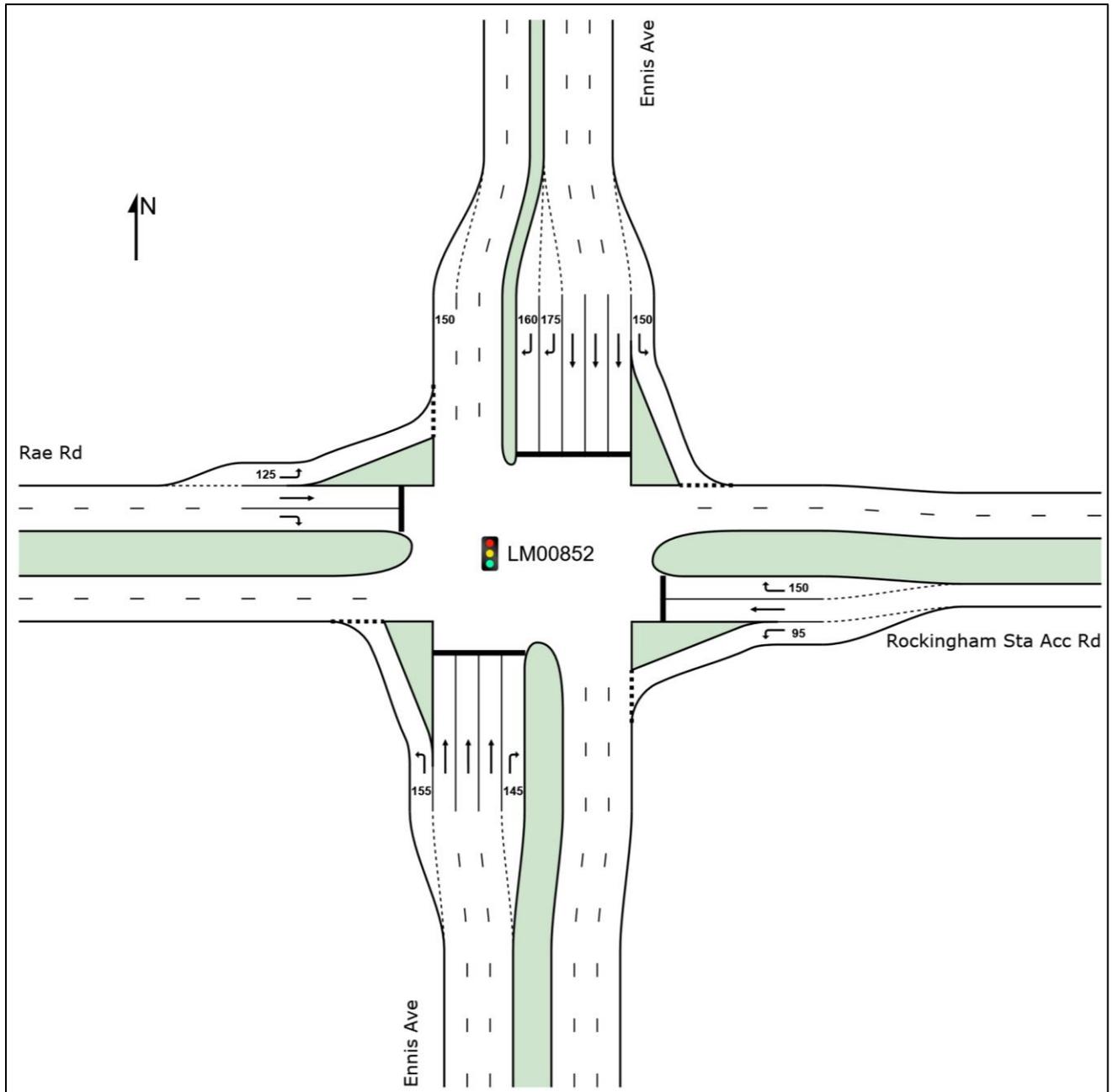
### 10.2.5 Ennis Avenue and Rae Road Intersection

The SIDRA layout for this intersection is illustrated in **Figure 10-5** and the analysis results for this intersection are summarised in **Table 10-10** and **Table 10-11**.



**Rockingham Precinct Structure Plan**  
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Figure 10-5. Ennis Avenue and Rae Road intersection



**Rockingham Precinct Structure Plan**  
10 Key Intersection Analysis

Table 10-10. SIDRA results: Ennis Avenue / Rae Road intersection – scenario 1- 2025 baseline

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Ennis Avenue	L	0.048	7.9	A	3.0	0.059	8.8	A	4.7
	T	0.822	26.3	C	183.7	0.531	20.1	C	87.3
	R	0.721	50.5	D	30.1	0.188	44.2	D	9.3
<b>Approach</b>		<b>0.822</b>	<b>26.8</b>	<b>C</b>	<b>183.7</b>	<b>0.531</b>	<b>20.0</b>	<b>C</b>	<b>87.3</b>
East: Rockingham Sta Acc Road	L	0.020	7.6	A	1.4	0.107	15.1	B	11.5
	T	0.164	39.7	D	6.6	0.470	41.8	D	19.5
	R	0.345	45.2	D	13.5	0.495	45.9	D	19.6
<b>Approach</b>		<b>0.345</b>	<b>35.7</b>	<b>D</b>	<b>13.5</b>	<b>0.495</b>	<b>33.1</b>	<b>C</b>	<b>19.6</b>
North: Ennis Avenue	L	0.044	8.1	A	3.0	0.038	7.6	A	2.0
	T	0.394	17.1	B	62.1	0.868	32.4	C	202.5
	R	0.803	52.4	D	34.5	0.874	54.7	D	52.1
<b>Approach</b>		<b>0.803</b>	<b>22.9</b>	<b>C</b>	<b>62.1</b>	<b>0.874</b>	<b>34.8</b>	<b>C</b>	<b>202.5</b>
West: Rae Road	L	0.395	22.2	C	48.5	0.212	12.3	B	18.8
	T	0.440	43.6	D	18.2	0.343	43.2	D	14.1
	R	0.768	51.5	D	32.6	0.856	54.8	D	37.9
<b>Approach</b>		<b>0.768</b>	<b>31.5</b>	<b>C</b>	<b>48.5</b>	<b>0.856</b>	<b>30.1</b>	<b>C</b>	<b>37.9</b>
<b>All vehicles</b>		<b>0.822</b>	<b>26.4</b>	<b>C</b>	<b>183.7</b>	<b>0.874</b>	<b>29.8</b>	<b>C</b>	<b>202.5</b>

The result indicates that the Ennis Avenue / Rae Road intersection is operating at LOS C with some movements at LOS D during the AM and PM peak hours for the 2025 base scenario with queues around 200 m.



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Table 10-11. SIDRA results: Ennis Avenue / Rae Road intersection – scenario 2 - 2041 future traffic with ultimate development

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Ennis Avenue	L	0.072	22.4	C	6.6	0.089	10.3	B	10.7
	T	1.084	284.0	F	652.1	0.701	24.6	C	169.1
	R	0.903	75.9	E	61.0	0.231	51.1	D	16.5
<b>Approach</b>		<b>1.084</b>	<b>265.7</b>	<b>F</b>	<b>652.1</b>	<b>0.701</b>	<b>24.4</b>	<b>C</b>	<b>169.1</b>
East: Rockingham Sta Acc Road	L	0.037	10.6	B	3.4	0.194	27.2	C	28.6
	T	0.308	52.3	D	12.7	0.867	60.5	E	39.9
	R	0.478	54.8	D	24.8	0.608	54.8	D	35.8
<b>Approach</b>		<b>0.478</b>	<b>44.6</b>	<b>D</b>	<b>24.8</b>	<b>0.867</b>	<b>46.2</b>	<b>D</b>	<b>39.9</b>
North: Ennis Avenue	L	0.067	9.0	A	6.6	0.055	25.3	C	3.9
	T	0.511	18.6	B	113.3	1.148	185.8	F	746.6
	R	1.004	96.8	F	83.4	1.079	149.6	F	147.1
<b>Approach</b>		<b>1.004</b>	<b>32.0</b>	<b>C</b>	<b>113.3</b>	<b>1.148</b>	<b>177.2</b>	<b>F</b>	<b>746.6</b>
West: Rae Road	L	0.772	611.1	F	128.7	0.377	21.5	C	54.9
	T	0.820	60.2	E	36.8	0.634	56.5	E	27.1
	R	1.074	143.2	F	95.4	1.053	127.4	F	99.4
<b>Approach</b>		<b>1.074</b>	<b>435.2</b>	<b>F</b>	<b>128.7</b>	<b>1.053</b>	<b>60.0</b>	<b>E</b>	<b>99.4</b>
<b>All vehicles</b>		<b>1.084</b>	<b>206.7</b>	<b>F</b>	<b>652.1</b>	<b>1.148</b>	<b>114.2</b>	<b>F</b>	<b>746.6</b>

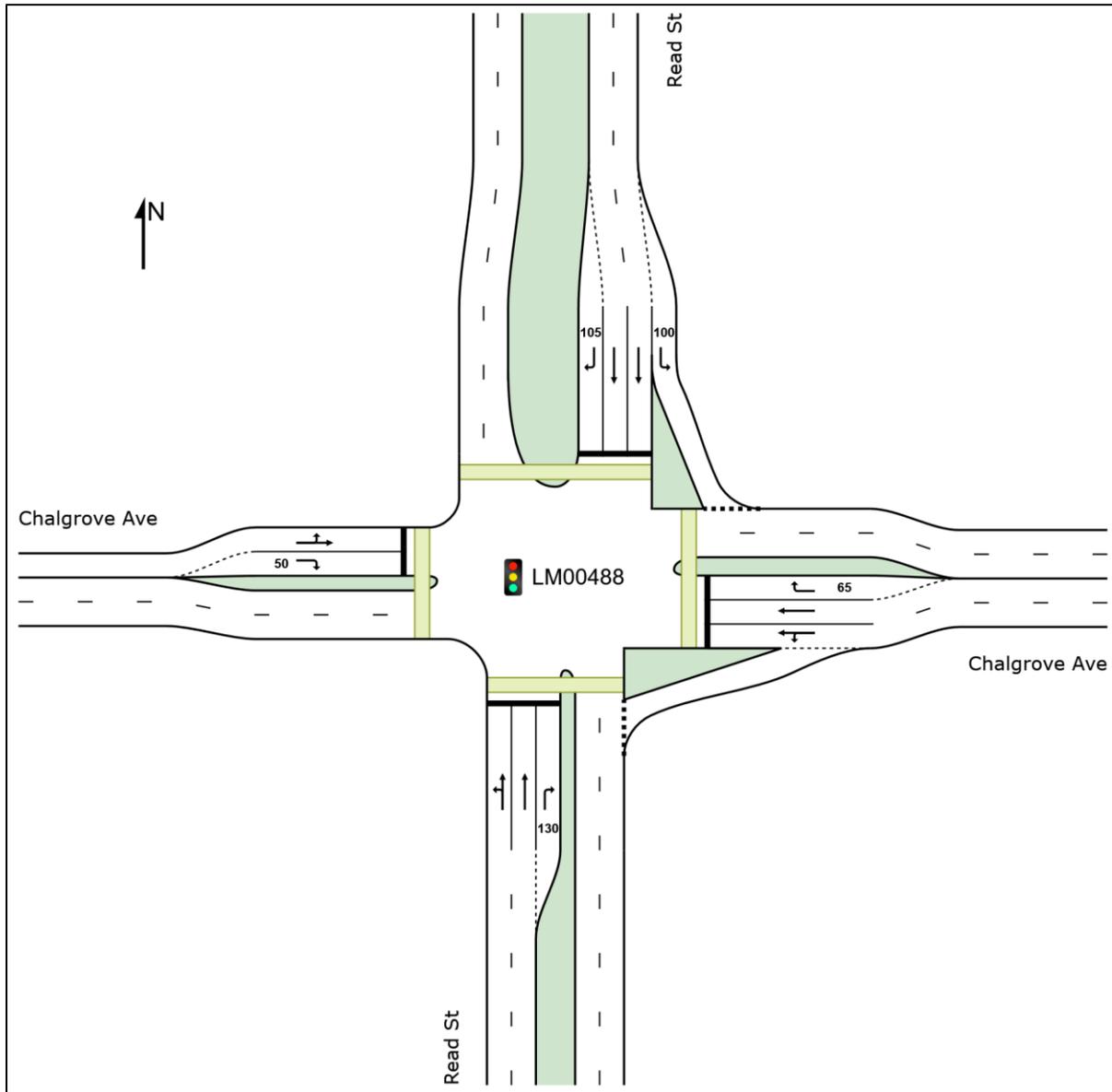
The result indicates that the Ennis Avenue / Rae Road intersection is expected to operate at capacity and poor levels of service during the AM and PM peak hours for the 2041 future traffic with ultimate development scenario with an overall LOS F.

### 10.2.6 Read Street and Chalgrove Avenue Intersection

The SIDRA layout for this intersection is illustrated in **Figure 10-6** and the analysis results for this intersection are summarised in **Table 10-12** and **Table 10-13**.



Figure 10-6. Read Street and Chalgrove Avenue intersection



**Rockingham Precinct Structure Plan**  
10 Key Intersection Analysis

Table 10-12. SIDRA results: Read Street / Chalgrove Avenue intersection – scenario 1 - 2025 baseline

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Read Street	L	0.883	53.6	D	237.7	0.723	47.2	D	130.1
	T	0.883	47.2	D	238.5	0.723	40.7	D	131.2
	R	0.874	67.3	E	94.5	0.854	66.1	E	84.6
<b>Approach</b>		<b>0.883</b>	<b>50.6</b>	<b>D</b>	<b>238.5</b>	<b>0.854</b>	<b>46.6</b>	<b>D</b>	<b>131.2</b>
East: Chalgrove Avenue	L	0.111	9.3	A	12.6	0.433	14.2	B	82.4
	T	0.059	38.8	D	7.3	0.101	39.3	D	12.7
	R	0.775	66.9	E	37.9	0.860	64.3	E	97.5
<b>Approach</b>		<b>0.775</b>	<b>33.5</b>	<b>C</b>	<b>37.9</b>	<b>0.860</b>	<b>30.9</b>	<b>C</b>	<b>97.5</b>
North: Read Street	L	0.182	10	A	22.2	0.247	9.4	A	28.9
	T	0.507	31.4	C	100.8	0.912	57.3	E	207.5
	R	0.151	52.7	D	13	0.102	53.3	D	8.2
<b>Approach</b>		<b>0.507</b>	<b>26.9</b>	<b>C</b>	<b>100.8</b>	<b>0.912</b>	<b>45.0</b>	<b>D</b>	<b>207.5</b>
West: Chalgrove Avenue	L	0.249	44	D	32	0.216	43.7	D	27.2
	T	0.249	39.4	D	32	0.216	39.1	D	27.2
	R	0.563	62.4	E	26.3	0.153	49.6	D	14
<b>Approach</b>		<b>0.563</b>	<b>49.3</b>	<b>D</b>	<b>32.0</b>	<b>0.216</b>	<b>43.9</b>	<b>D</b>	<b>27.2</b>
<b>All vehicles</b>		<b>0.883</b>	<b>40.8</b>	<b>D</b>	<b>238.5</b>	<b>0.912</b>	<b>42</b>	<b>D</b>	<b>207.5</b>

The result indicates that the Read Street / Chalgrove Avenue intersection is nearing capacity and operating at LOS D during the AM and PM peak hour periods for the 2025 base scenario.

On-site traffic observations provided by the City of Rockingham would indicate that actual queue lengths on Read Street / Chalgrove Avenue intersection are generally shorter than those predicted by the SIDRA model and hence the modelled results are considered to be conservative. The traffic signal coordination appears to be working reasonably well on Read Street between the Chalgrove Ave and Council Ave intersections.



**Rockingham Precinct Structure Plan**  
10 Key Intersection Analysis

Table 10-13. SIDRA results: Read Street / Chalgrove Avenue intersection – scenario 2 - 2041 future traffic with ultimate development

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Read Street	L	1.114	175.9	F	764.9	0.810	56.5	E	255.2
	T	1.114	179.6	F	764.9	0.810	51.6	D	255.2
	R	1.094	199.8	F	263.2	1.108	196	F	238.5
<b>Approach</b>		<b>1.114</b>	<b>182.7</b>	<b>F</b>	<b>764.9</b>	<b>1.108</b>	<b>82.9</b>	<b>F</b>	<b>255.2</b>
East: Chalgrove Avenue	L	0.185	14.5	B	35.9	0.793	39	D	224.3
	T	0.107	58.3	E	15.2	0.184	80.7	F	26.7
	R	1.093	184.3	F	108	1.118	220.9	F	280.8
<b>Approach</b>		<b>1.093</b>	<b>81.8</b>	<b>F</b>	<b>108</b>	<b>1.118</b>	<b>97.0</b>	<b>F</b>	<b>280.8</b>
North: Read Street	L	0.274	15.5	B	58.7	0.351	31.6	C	73.5
	T	0.618	38.7	D	200.4	1.147	228.9	F	664.9
	R	0.187	68.8	E	25	0.130	95.2	F	15.4
<b>Approach</b>		<b>0.618</b>	<b>34.1</b>	<b>C</b>	<b>200.4</b>	<b>1.147</b>	<b>176.2</b>	<b>F</b>	<b>91.0</b>
West: Chalgrove Avenue	L	0.457	65.8	E	69.2	0.380	64.9	E	56
	T	0.457	61.2	E	69.2	0.380	60.3	E	56
	R	0.784	85.7	F	53.5	0.19	62.7	E	26.3
<b>Approach</b>		<b>0.784</b>	<b>71.6</b>	<b>E</b>	<b>69.2</b>	<b>0.380</b>	<b>62.5</b>	<b>E</b>	<b>56.0</b>
<b>All vehicles</b>		<b>1.114</b>	<b>115.7</b>	<b>F</b>	<b>764.9</b>	<b>1.147</b>	<b>124.2</b>	<b>F</b>	<b>664.9</b>

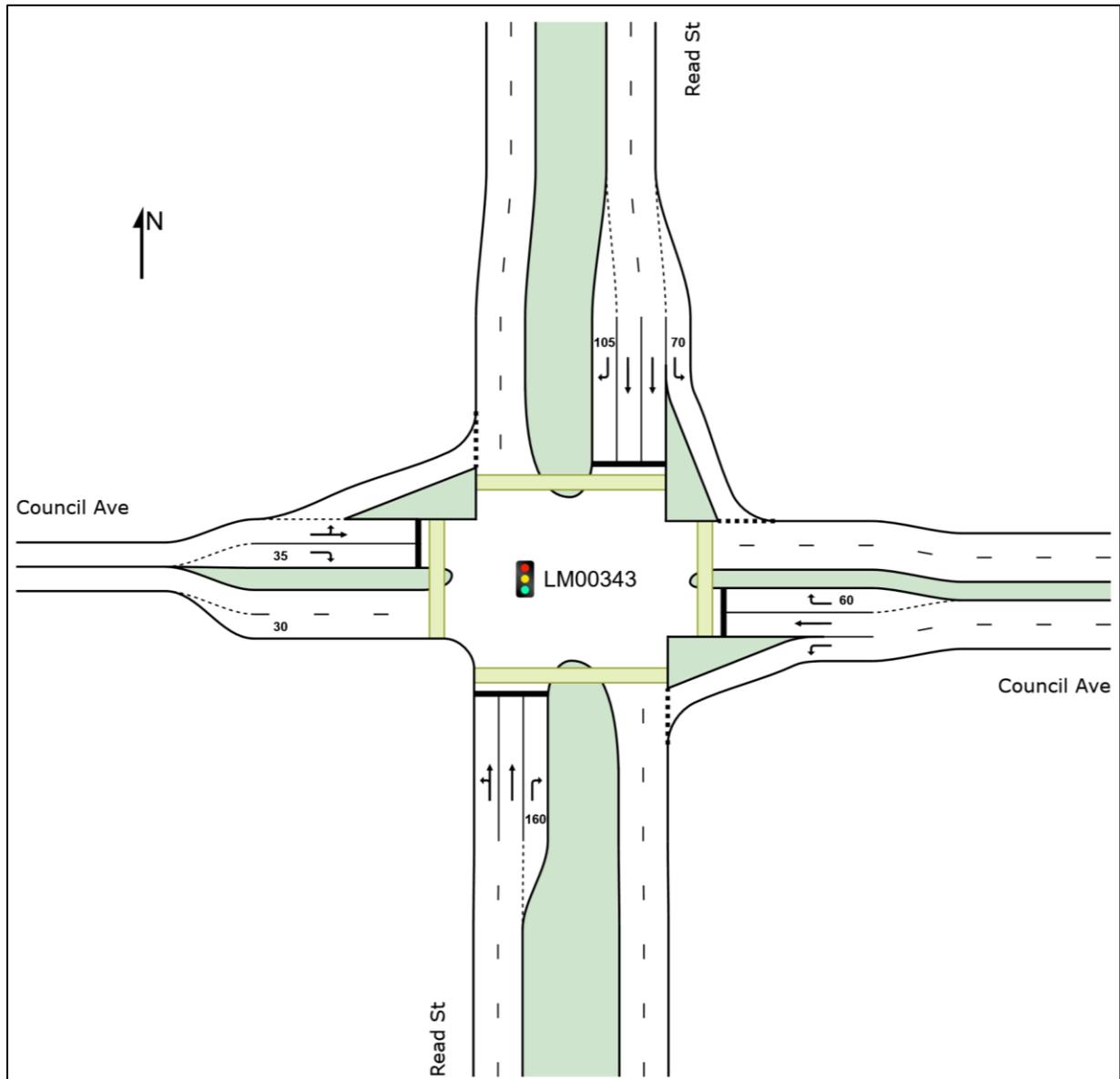
The result indicates that the Read Street / Chalgrove Avenue intersection is expected to operate at over capacity levels during the AM and PM peak hours for the 2041 future traffic with ultimate development scenario.



### 10.2.7 Read Street and Council Avenue Intersection

The Sidra layout for this intersection is illustrated in **Figure 10-7** and the analysis results for this intersection are summarised in **Table 10-14** and **Table 10-15**.

Figure 10-7. Read Street and Council Avenue intersection



**Rockingham Precinct Structure Plan**  
10 Key Intersection Analysis

Table 10-14. SIDRA results: Read Street / Council Avenue intersection – scenario 1 - 2025 baseline

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Read Street	L	1.015	114.9	F	438.6	0.541	47.2	D	153.9
	T	1.015	110.3	F	438.6	0.541	40.6	D	154.3
	R	1.029	129.3	F	398	1.035	134.3	F	328.7
<b>Approach</b>		<b>1.029</b>	<b>116.3</b>	<b>F</b>	<b>438.6</b>	<b>1.035</b>	<b>75.4</b>	<b>E</b>	<b>328.7</b>
East: Council Avenue	L	0.168	10.1	B	28.1	0.621	31.9	C	173.5
	T	0.125	59.6	E	17.4	0.268	61.4	E	38.3
	R	1.013	128.9	F	86.5	0.993	118.6	F	90.4
<b>Approach</b>		<b>1.013</b>	<b>54.4</b>	<b>D</b>	<b>86.5</b>	<b>0.993</b>	<b>49.2</b>	<b>D</b>	<b>173.5</b>
North: Read Street	L	0.155	24.7	C	34.5	0.168	43.3	D	35
	T	0.594	49.3	D	157.3	1.06	161.7	F	534
	R	0.1	48.3	D	20	0.244	80	E	44.2
<b>Approach</b>		<b>0.594</b>	<b>44.8</b>	<b>D</b>	<b>157.3</b>	<b>1.060</b>	<b>141.8</b>	<b>F</b>	<b>534.0</b>
West: Council Avenue	L	0.718	66	E	124.6	0.347	14.7	B	44
	T	0.718	157.6	F	124.6	0.347	93.9	F	44
	R	0.159	105	F	9.9	0.208	77.2	E	14.2
<b>Approach</b>		<b>0.718</b>	<b>95.6</b>	<b>F</b>	<b>124.6</b>	<b>0.347</b>	<b>62.2</b>	<b>E</b>	<b>44.0</b>
<b>All vehicles</b>		<b>1.029</b>	<b>87.9</b>	<b>F</b>	<b>438.6</b>	<b>1.060</b>	<b>97.6</b>	<b>F</b>	<b>534</b>

The result indicates that the Read Street / Council Avenue intersection is operating at LOS F, indicating critical congestion, delays around 90 s and queues exceeding 430 m during the 2025 baseline scenario.

On-site traffic observations provided by the City of Rockingham would indicate that actual queue lengths on Read Street / Council Avenue intersection are generally shorter than those predicted by the SIDRA model and hence the modelled results are considered to be conservative. The traffic signal coordination appears to be working reasonably well on Read Street between the Chalgrove Ave and Council Ave intersections.



**Rockingham Precinct Structure Plan**  
10 Key Intersection Analysis

Table 10-15. SIDRA Results: Read St / Council Ave intersection – scenario 2 - 2041 future traffic with ultimate development

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Read Street	L	1.488	509.1	F	1197.1	0.776	52.2	D	247.6
	T	1.488	515.1	F	1197.1	0.776	53.7	D	248.2
	R	1.506	552.9	F	1070.9	1.485	529.8	F	846.4
<b>Approach</b>		<b>1.506</b>	<b>526.8</b>	<b>F</b>	<b>1197.1</b>	<b>1.485</b>	<b>230.2</b>	<b>F</b>	<b>846.4</b>
East: Council Avenue	L	0.284	18.5	B	72.8	0.909	52.2	D	376.3
	T	0.185	60.3	E	25.9	0.387	62.9	E	56.4
	R	0.1489	530.3	F	244.1	1.426	473.2	F	243.8
<b>Approach</b>		<b>1.489</b>	<b>191.8</b>	<b>F</b>	<b>244.1</b>	<b>1.426</b>	<b>122.6</b>	<b>F</b>	<b>376.3</b>
North: Read Street	L	0.235	42.8	D	57.3	0.247	53.4	D	56.5
	T	0.961	103.3	F	352.3	1.524	567.5	F	1352.1
	R	0.148	66.1	E	29.8	0.352	93.2	F	65.7
<b>Approach</b>		<b>0.961</b>	<b>90.3</b>	<b>F</b>	<b>352.3</b>	<b>1.524</b>	<b>473.3</b>	<b>F</b>	<b>1352.1</b>
West: Council Avenue	L	1.011	99.1	F	263.4	0.507	28	C	72.9
	T	1.011	111.9	F	263.4	0.507	105.7	F	72.9
	R	0.229	115.9	F	14.4	0.296	81.7	F	20.5
<b>Approach</b>		<b>1.011</b>	<b>103.9</b>	<b>F</b>	<b>263.4</b>	<b>0.507</b>	<b>73.1</b>	<b>E</b>	<b>72.9</b>
<b>All vehicles</b>		<b>1.506</b>	<b>332</b>	<b>F</b>	<b>1197.1</b>	<b>1.524</b>	<b>304.7</b>	<b>F</b>	<b>1352.1</b>

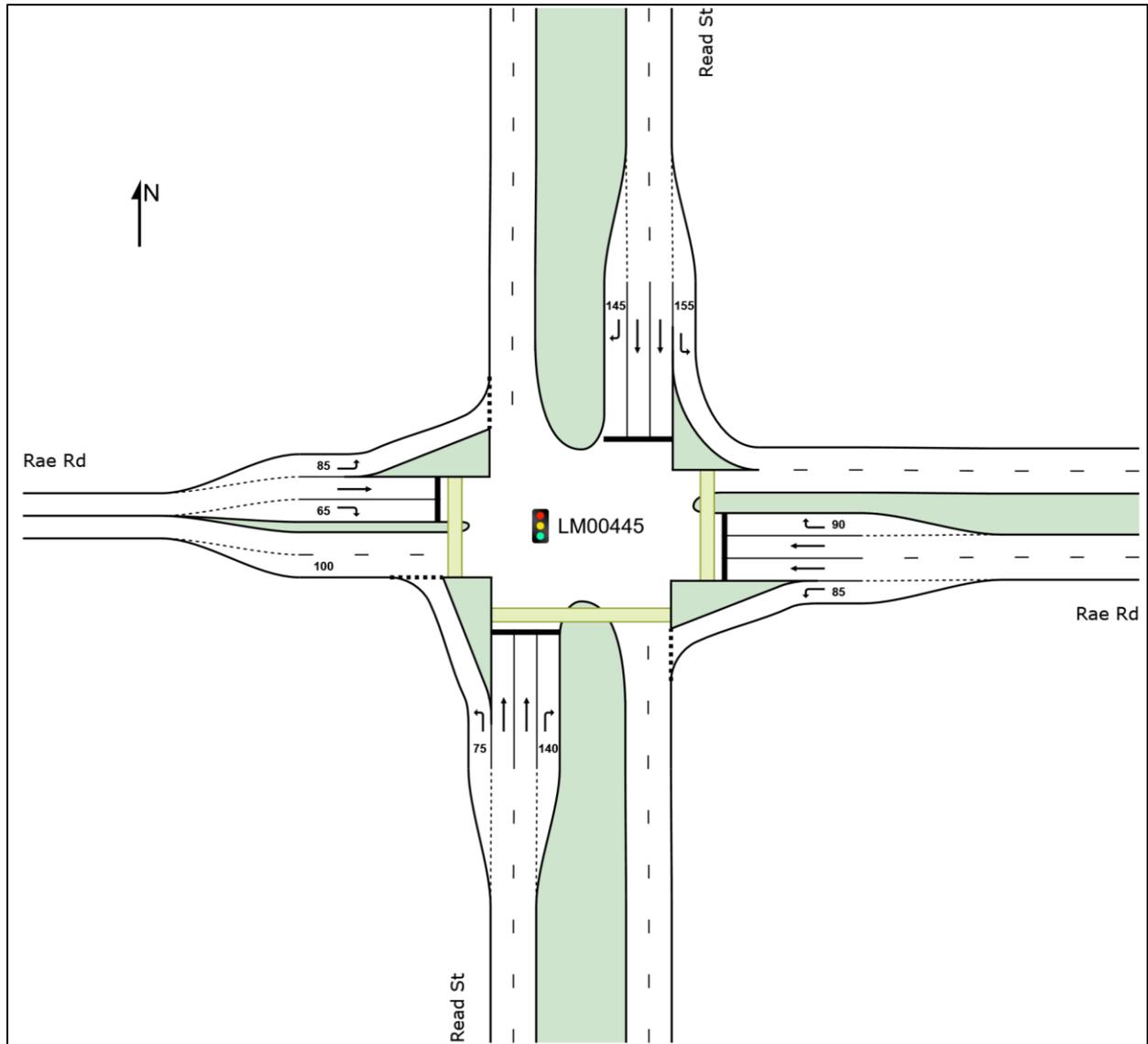
The result indicates that the Read Street / Council Avenue intersection is expected to operate with very high levels of congestion at peak hours during the 2041 future traffic with ultimate development scenario with an overall LOS F, delays >300 s and queues over 1.2 km.

### 10.2.8 Read Street and Rae Road Intersection

The Sidra layout for this intersection is illustrated in **Figure 10-8** and the analysis results for this intersection are summarised in **Table 10-16** and **Table 10-17**.



Figure 10-8. Read Street and Rae Road intersection



**Rockingham Precinct Structure Plan**  
10 Key Intersection Analysis

Table 10-16. SIDRA results: Read Street / Rae Road intersection – scenario 1 - 2025 baseline

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Read Street	L	0.119	28.3	C	13.5	0.149	21.5	C	29.1
	T	0.909	66.1	E	382.1	0.605	38.2	D	200.2
	R	0.846	91.2	F	82.1	0.421	69.4	E	56.7
<b>Approach</b>		<b>0.909</b>	<b>64.6</b>	<b>E</b>	<b>382.1</b>	<b>0.605</b>	<b>38.6</b>	<b>D</b>	<b>200.2</b>
East: Rae Road	L	0.123	13.3	B	18.8	0.265	37.6	D	66.2
	T	0.279	58.1	E	33.9	0.495	65.6	E	62.8
	R	0.267	69	E	25.5	0.176	75.7	E	14.9
<b>Approach</b>		<b>0.279</b>	<b>41.9</b>	<b>D</b>	<b>33.9</b>	<b>0.495</b>	<b>53.9</b>	<b>D</b>	<b>66.2</b>
North: Read Street	L	0.032	6.7	A	0	0.05	7.1	A	0
	T	0.433	28.5	C	122.4	1.003	106.2	F	583.2
	R	0.640	74.7	E	57.4	0.962	116.1	F	174.1
<b>Approach</b>		<b>0.640</b>	<b>33.0</b>	<b>C</b>	<b>122.4</b>	<b>1.003</b>	<b>103.7</b>	<b>F</b>	<b>583.2</b>
West: Rae Street	L	0.286	25.5	C	64.4	0.174	13.2	B	29.6
	T	0.874	73.7	E	128	0.607	67.2	E	78.4
	R	0.889	85.4	F	101.8	0.982	114	F	111.6
<b>Approach</b>		<b>0.889</b>	<b>59.6</b>	<b>E</b>	<b>128.0</b>	<b>0.982</b>	<b>62.9</b>	<b>E</b>	<b>111.6</b>
<b>All vehicles</b>		<b>0.909</b>	<b>53.8</b>	<b>D</b>	<b>382.1</b>	<b>1.003</b>	<b>73.4</b>	<b>E</b>	<b>583.2</b>

The result indicates that the Read Street / Rae Road intersection is operating at near or at capacity with overall LOS D or E during the 2025 base year scenario.

On-site traffic observations provided by the City of Rockingham would indicate that actual queue lengths on Read Street / Rae Road intersection are generally shorter than those predicted by the SIDRA model and hence the modelled results are considered to be conservative. Furthermore, the vehicles were observed to clear this intersection within one cycle.



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10 Key Intersection Analysis

Table 10-17. SIDRA results: Read Street / Rae Road intersection – scenario 2 - 2041 future traffic with ultimate development

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Read Street	L	0.185	43.2	D	30.9	0.228	38	D	51.5
	T	1.360	407.7	F	1296.8	0.97	94	F	490.1
	R	1.353	434.7	F	274.3	0.649	86.7	F	87.6
<b>Approach</b>		<b>1.360</b>	<b>374.2</b>	<b>F</b>	<b>1296.8</b>	<b>0.970</b>	<b>84.9</b>	<b>F</b>	<b>490.1</b>
East: Rae Road	L	0.215	20.5	C	44	0.398	42.2	D	99
	T	0.388	61.8	E	54.6	0.73	68.8	E	97.9
	R	0.399	74.7	E	41.2	0.258	76.5	E	22
<b>Approach</b>		<b>0.399</b>	<b>47.3</b>	<b>D</b>	<b>54.6</b>	<b>0.730</b>	<b>57.5</b>	<b>E</b>	<b>99.0</b>
North: Read Street	L	0.047	6.7	A	0	0.073	7.2	A	0
	T	0.629	33.2	C	216.7	1.471	506.5	F	1640.4
	R	1.013	129.3	F	122	1.486	549.1	F	532.8
<b>Approach</b>		<b>1.013</b>	<b>43.8</b>	<b>D</b>	<b>216.7</b>	<b>1.486</b>	<b>490.5</b>	<b>F</b>	<b>1640.4</b>
West: Rae Street	L	0.522	58	E	131.1	0.328	29.9	C	85.4
	T	1.365	432.8	F	426.9	0.951	104.4	F	145.1
	R	1.332	413.5	F	320.4	1.441	496.4	F	317.5
<b>Approach</b>		<b>1.365</b>	<b>292.2</b>	<b>F</b>	<b>426.9</b>	<b>1.441</b>	<b>205.8</b>	<b>F</b>	<b>317.5</b>
<b>All vehicles</b>		<b>1.365</b>	<b>248.1</b>	<b>F</b>	<b>1296.8</b>	<b>1.486</b>	<b>287</b>	<b>F</b>	<b>1640.4</b>

The result indicates that the Read Street / Rae Road intersection is expected to operate over capacity with poor levels of service during The AM and PM peak hours for the 2041 future traffic with ultimate development scenario.



## 10.3 SIDRA Results Summary

The SIDRA 'All Vehicles' results for each scenario and each intersection are summarised in **Table 10-18**.

Table 10-18. SIDRA results summary

Patterson Rd and Read St intersection									
Scenario		AM Peak				PM Peak			
		DOS	Delay (s)	LOS	95% Back of Queue	DOS	Delay (s)	LOS	95% Back of Queue
1	2025 Base Scenario	0.787	36.2	D	138.6	0.859	44.1	D	173.6
2	2041 Assessment Year	1.069	85.4	F	389.1	1.153	122.5	F	443.6
Patterson Rd and Ennis Ave intersection									
Scenario		AM Peak				PM Peak			
		DOS	Delay (s)	LOS	95% Back of Queue	DOS	Delay (s)	LOS	95% Back of Queue
1	2025 Base Scenario	0.760	26.3	C	109.5	0.798	26.4	C	121.4
2	2041 Assessment Year	1.064	74.0	E	363.9	1.223	118.6	F	454.4
Ennis Ave and Dixon Rd intersection									
Scenario		AM Peak				PM Peak			
		DOS	Delay (s)	LOS	95% Back of Queue	DOS	Delay (s)	LOS	95% Back of Queue
1	2025 Base Scenario	1.080	74.7	E	261.8	1.134	143.8	F	609.0
2	2041 Assessment Year	1.560	334.7	F	775.6.5	1.626	474.0	F	1453.9
Ennis Ave and Council Ave intersection									
Scenario		AM Peak				PM Peak			
		DOS	Delay (s)	LOS	95% Back of Queue	DOS	Delay (s)	LOS	95% Back of Queue
1	2025 Base Scenario	2.0100	481.8	F	1364.4	1.4630	296.8	F	1169.2
2	2041 Assessment Year	3.003	973.0	F	2533.4	2.1480	742.24	F	2464.7
Ennis Ave and Rae Rd intersection									
Scenario		AM Peak				PM Peak			
		DOS	Delay (s)	LOS	95% Back of Queue	DOS	Delay (s)	LOS	95% Back of Queue
1	2025 Base Scenario	0.822	26.44	C	183.7	0.874	29.8	C	202.5
2	2041 Assessment Year	1.084	206.7	F	652.14	1.148	114.23	F	746.6
Read St and Chalgrove Ave intersection									
Scenario		AM Peak				PM Peak			
		DOS	Delay (s)	LOS	95% Back of Queue	DOS	Delay (s)	LOS	95% Back of Queue
1	2025 Base Scenario	0.883	40.8	D	238.5	0.912	42	D	207.5
2	2041 Assessment Year	1.114	115.7	F	764.9	1.147	124.2	F	664.9
Read St and Council Ave intersection									
Scenario		AM Peak				PM Peak			
		DOS	Delay (s)	LOS	95% Back of Queue	DOS	Delay (s)	LOS	95% Back of Queue
1	2025 Base Scenario	1.029	87.9	F	438.6	1.060	97.6	F	534
2	2041 Assessment Year	1.506	332	F	1197.1	1.524	304.7	F	1352.1
Read St and Rae Rd intersection									
Scenario		AM Peak				PM Peak			
		DOS	Delay (s)	LOS	95% Back of Queue	DOS	Delay (s)	LOS	95% Back of Queue
1	2025 Base Scenario	0.909	53.8	D	382.1	1.003	73.4	E	583.2
2	2041 Assessment Year	1.365	248.1	F	1296.8	1.486	287	F	1640.4



## **Rockingham Precinct Structure Plan**

### 10 Key Intersection Analysis

It is acknowledged that several intersections within the RSC Precinct Plan Study Area is expected to perform at unsatisfactory capacity levels during the 2041 design year, even with the proposed significantly reduced development yields when compared to the 2009 PSP.

The SIDRA analysis undertaken highlights the need for a wider regional transport assessment particularly in relation to the role of the Patterson Road, Ennis Ave and Read Street which appear to struggle due to amount of traffic travelling through the Rockingham CBD. In addition, it is highly unlikely that the full build-out of the RSC Precinct Plan will be realised by 2041 and that the RSC precinct-generated traffic on its own would trigger the need for any mitigation measures, hence a comprehensive regional transport strategy for this area should be considered.



## 11 Potential Intersection Mitigation Measures

Mitigation measures were assessed at selected intersections along the Read Street traffic corridor, specifically between Chalgrove Avenue and Council Avenue. This targeted approach was adopted because many other intersections along Read Street and Ennis Avenue have already undergone significant upgrades, as outlined in Section 2.4. With several intersections now operating at their ultimate design form, opportunities for further major infrastructure improvements are limited. Hence, this assessment focused on identifying locations where additional mitigation measures could still potentially be incorporated for the wider betterment of the road network.

### 11.1 Future Lane Widening

To address the capacity and operational deficiencies identified along Read Street, a mitigation measures involving the provision of an additional lane in each direction (resulting in a six-lane cross-section) between Chalgrove Avenue and Council Avenue was considered.

The specific intersection mitigation treatments analysed are summarised below:

- **Southbound entry (Chalgrove Intersection):** Added a through lane (Short Lane with 105m length) towards the median.
- **Northbound entry (Council Ave):** Added a through lane and kept the curbside lane as a short lane (60m length) with shared through and left movement.
- **Exit lanes:** Set as short lanes of 60m for both intersections.

It should be noted that there is an existing underpass located on Read Street between Chalgrove Avenue and Council Avenue which could be a potential factor for restricting future widening as shown in **Figure 11-1**. However, it should be noted that an existing disused bus embayment exists in the vicinity of this underpass, demonstrating that 3 lanes could potentially be accommodated at this location.



Figure 11-1. Existing underpass Read Street



Source: Metromap

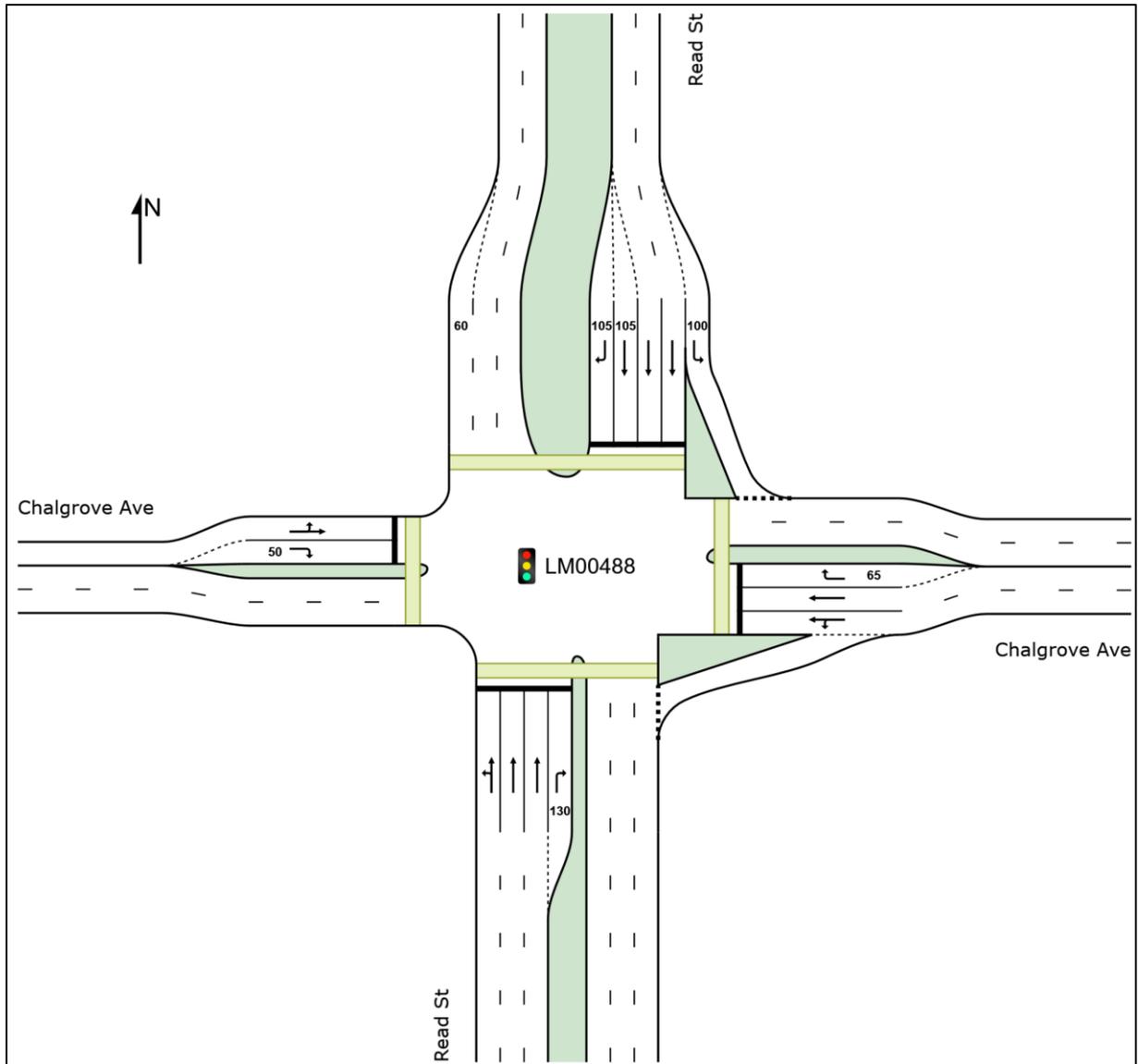
The SIDRA results for the assessment of the above-mentioned mitigation option are discussed below with full outputs available in **Appendix F**.

### 11.1.1 Read Street / Chalgrove Avenue with Mitigation Measure

The SIDRA layout for the proposed mitigation measure provided at this intersection is illustrated in **Figure 11-2** and the analysis results for this intersection are summarised in **Table 11-1**.

**Rockingham Precinct Structure Plan**  
11 Potential Intersection Mitigation Measures

Figure 11-2. Proposed mitigation to intersection layout Read Street / Chalgrove Avenue



**Rockingham Precinct Structure Plan**  
11 Potential Intersection Mitigation Measures

Table 11-1. SIDRA results: Read Street / Chalgrove Avenue intersection – 2041 future traffic with ultimate development – mitigated scenario

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Read Street	L	0.390	41.7	D	107.2	0.305	50.3	D	67.3
	T	0.990	86.9	F	499.7	0.772	52.1	D	210.4
	R	0.972	117.6	F	211.6	0.969	105.3	F	185.9
<b>Approach</b>		<b>0.990</b>	<b>90.4</b>	<b>F</b>	<b>499.7</b>	<b>0.969</b>	<b>63.4</b>	<b>E</b>	<b>210.4</b>
East: Chalgrove Avenue	L	0.174	10.3	B	26.1	0.648	23.8	C	210.3
	T	0.107	58.4	E	15.2	0.184	78.6	E	26.7
	R	0.910	94.9	F	79.7	0.975	124.4	F	218.1
<b>Approach</b>		<b>0.910</b>	<b>46.3</b>	<b>D</b>	<b>79.7</b>	<b>0.975</b>	<b>57.7</b>	<b>E</b>	<b>218.1</b>
North: Read Street	L	0.280	14.3	B	62	0.359	19.1	B	78.4
	T	0.430	35.9	D	121.7	0.955	92.3	F	287.8
	R	0.166	62.7	E	24.3	0.114	72.1	E	14.9
<b>Approach</b>		<b>0.430</b>	<b>31.5</b>	<b>C</b>	<b>121.7</b>	<b>0.955</b>	<b>73.3</b>	<b>E</b>	<b>287.8</b>
West: Chalgrove Avenue	L	0.457	68.2	E	69.2	0.380	65.9	E	56
	T	0.457	61.2	E	69.2	0.380	60.3	E	56
	R	0.653	80.3	F	51.1	0.164	58.7	E	25.3
<b>Approach</b>		<b>0.653</b>	<b>69.8</b>	<b>E</b>	<b>69.2</b>	<b>0.380</b>	<b>61.4</b>	<b>E</b>	<b>56.0</b>
<b>All vehicles</b>		<b>0.990</b>	<b>64.9</b>	<b>E</b>	<b>499.7</b>	<b>0.975</b>	<b>66.0</b>	<b>E</b>	<b>287.8</b>

The results indicate that the Read Street / Chalgrove Avenue intersection with the proposed mitigation measure in the 2041 design year is expected to operate near capacity with a LOS E and long queue lengths on critical approaches. Despite some improvement in delay and DoS values, the intersection is expected to experience congestion during both peak hour periods.

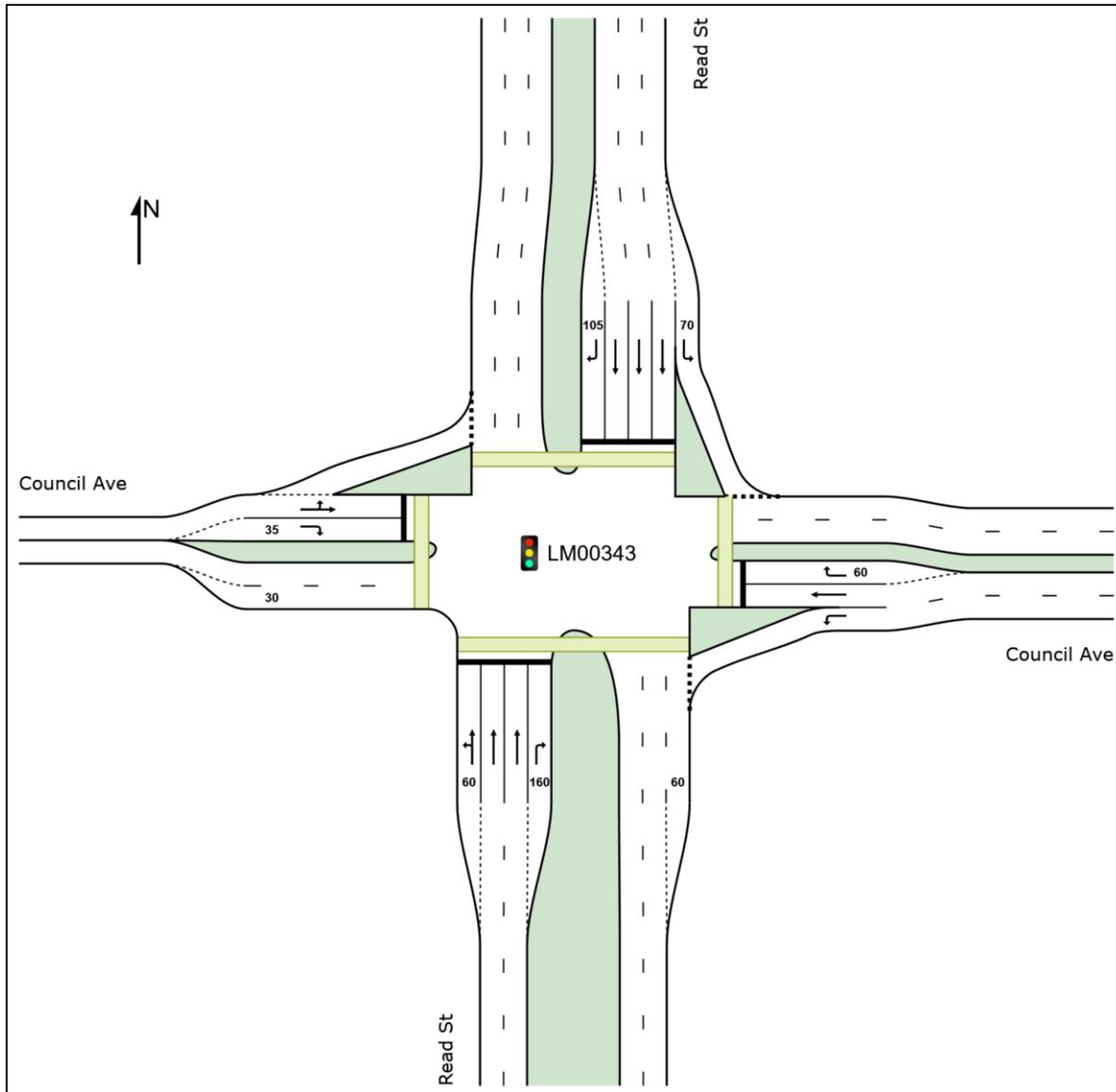
### 11.1.2 Read Street / Council Avenue with Mitigation Measure

The SIDRA layout for the proposed mitigation measure at this intersection is illustrated in **Figure 11-3** and the results for this intersection are summarised in **Table 11-2**.



**Rockingham Precinct Structure Plan**  
11 Potential Intersection Mitigation Measures

Figure 11-3. Proposed mitigation to intersection layout Read Street / Council Avenue



**Rockingham Precinct Structure Plan**  
11 Potential Intersection Mitigation Measures

Table 11-2. SIDRA results: Read Street / Council Avenue intersection – 2041 future traffic with ultimate development – mitigated scenario

Intersection Approach		AM peak				PM Peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Read Street	L	1.392	462.6	F	625.6	0.686	65.1	E	147.5
	T	1.392	450.3	F	902.8	0.686	59.5	E	191.6
	R	1.404	457.0	F	984.9	1.300	360.5	F	709.6
<b>Approach</b>		<b>1.404</b>	<b>452.6</b>	<b>F</b>	<b>984.9</b>	<b>1.300</b>	<b>171.2</b>	<b>F</b>	<b>709.6</b>
East: Council Avenue	L	0.257	14.3	B	55.3	0.842	74.3	E	286.3
	T	0.185	60.4	E	25.9	0.387	62.9	E	56.4
	R	1.354	409.0	F	216.0	1.307	367.1	F	216.0
<b>Approach</b>		<b>1.354</b>	<b>149.3</b>	<b>F</b>	<b>216.0</b>	<b>1.307</b>	<b>121.3</b>	<b>F</b>	<b>286.3</b>
North: Read Street	L	0.250	23.6	C	62.3	0.261	19.2	B	62.7
	T	0.805	57.6	E	213.7	1.316	318.4	F	922.7
	R	0.132	49.5	D	28.3	0.308	83.3	F	62.6
<b>Approach</b>		<b>0.805</b>	<b>51.0</b>	<b>D</b>	<b>213.7</b>	<b>1.316</b>	<b>266.2</b>	<b>F</b>	<b>922.7</b>
West: Council Avenue	L	1.011	98.4	F	263.4	0.507	22.7	C	70.7
	T	1.011	113.2	F	263.4	0.507	107.7	F	70.7
	R	0.208	114.4	F	14.2	0.272	80	E	20.2
<b>Approach</b>		<b>1.011</b>	<b>103.8</b>	<b>F</b>	<b>263.4</b>	<b>0.507</b>	<b>71.8</b>	<b>E</b>	<b>70.7</b>
<b>All vehicles</b>		<b>1.404</b>	<b>277.5</b>	<b>F</b>	<b>984.9</b>	<b>1.316</b>	<b>197.1</b>	<b>F</b>	<b>922.7</b>

The results indicate that the Read Street / Council Avenue intersection with the proposed mitigation measure for the 2041 future year would continue to operate at capacity and poor levels of service with multiple approaches performing at LOS E or F and excessive queues indicating persistent capacity constraints and operational inefficiency.

### 11.1.2.1 Results of the proposed mitigation

Overall, the results indicate that even with the proposed mitigation measures along Read Street between Chalgrove Avenue and Council Avenue, key intersections are expected to operate at or near capacity, with poor levels of service during peak periods if the full development potential of the Precinct Structure Plan (PSP) is to be realised by 2041. The network is expected to experience severe delays, excessive queuing, and overall operational breakdown under future 2041 traffic conditions even with the reduction in development intensity when compared to the current WAPC-approved Precinct Plan.

This suggests that the proposed mitigation measure alone is inadequate to accommodate the forecasted traffic volumes for 2041 and as such, the emphasis of the Precinct Structure Plan and broader Local Planning Strategy to shifting mode share away from private vehicle dependency is essential and in order to support sustainable movement within and to the Rockingham Strategic Centre in the future.

In the short-term, the City of Rockingham and Main Roads WA could consider optimising the traffic signals along Read Street between the Chalgrove Avenue and Council Avenue intersections and determine the most efficient and practicable phasing for these intersections as demand increases over time.



## **Rockingham Precinct Structure Plan**

### 11 Potential Intersection Mitigation Measures

As previously stated in Section 10.1.2, there are limitations to the use of traffic modelling tools as they have simplified assumptions about driver behaviour and do not account for demand elasticity and how road users might alter their travel patterns in response to congestion or delays

The transport movement network within the RSC Precinct Plan Study Area requires a holistic regional approach that considers broader connectivity, encourage public transport and increase active travel mode shares and integrated strategies for managing internal and external vehicular traffic, cycling and pedestrian movements on a wider scale rather than being confined to upgrading specific intersections. It is also highly unlikely that the full build-out of the RSC Precinct Plan will be realised by 2041 and that the RSC precinct-generated traffic on its own would trigger the need for any mitigation measures, hence a comprehensive regional transport strategy for this area should be considered.

It is recommended that the broader transport network requirements should be addressed by Main Roads WA in collaboration with the City of Rockingham, as the identified transport issues extend beyond the precinct study area and the scope of this study.



## 11.2 Modal Shift and Public Transport Investment

The current operational performance of 4 out of the 8 key intersections assessed within the RSC Precinct Plan Study Area are expected to operate at unacceptable levels, resulting in delays, congestion, and reduced network efficiency in the 2025 base scenario. These issues are symptomatic of a transport system that is heavily reliant on private vehicle use, which has led to excessive demand on intersection capacity and compromised overall movement through the precinct.

Major upgrades to intersection geometry or signal infrastructure are not considered viable due to the risk of pedestrian severance and the negative impact on urban connectivity. Such interventions would likely widen carriageways, increase crossing distances, and reduce pedestrian safety and amenity.

Given these constraints, a strategic modal shift away from car dependency is essential. Encouraging and enabling a transition to public transport will reduce vehicular volumes at intersections, improve operational performance, and support broader sustainability and accessibility goals. This shift aligns with contemporary transport planning principles, including:

- **Reducing intersection pressure** by lowering private vehicle volumes.
- **Improving pedestrian safety and connectivity** by avoiding physical expansion of intersections.
- **Supporting land use and urban development goals** through better access and reduced severance.
- **Enhancing equity and accessibility** by providing viable alternatives to car travel.

Investment in public transport infrastructure, service frequency, and network integration is critical to achieving this modal shift. This includes improving bus priority measures (such as the endorsed RCCTS), enhancing stop accessibility, and ensuring seamless multimodal connections. Without such a shift, the precinct risks continued operational decline, increased emissions, and reduced livability and safety.

The SIDRA analysis indicates the existing network has moderate congestion with the future year scenario reflecting widespread operational breakdown with several intersections facing severe delays, excessive queuing, and overall network failure.

Overall, the current operational inefficiencies across multiple intersections within the precinct highlight the need to reduce car dependency and shift towards more sustainable transport modes.

Given that major intersection upgrades are not feasible due to the risk of pedestrian severance, a strategic investment in public transport is essential. Enhancing public transport accessibility and reliability will alleviate pressure on the road network and improve intersection performance.

### 11.2.1 Future Mode Share Targets For the Rockingham Strategic Centre (RSC) Precinct Plan

The proposed Rockingham Strategic Centre (RSC) Precinct Plan sets out the following future mode share aspirational targets:

- Reduce private vehicle trips by 10–15%.
- Increase public transport usage by 15% for local trips.



**Rockingham Precinct Structure Plan**  
11 Potential Intersection Mitigation Measures

- Increase cycling by 8%.
- Increase walking by 17%.

Based on the SIDRA summary results in Section 10.3, it is estimated at a high level that a 10–15% reduction in private vehicle demand, could potentially alleviate pressure on the key intersections assessed within the RSC Precinct Plan Study Area, except for the Read Street/Council Ave, Read Street/Rae Road, Ennis Ave/Council Ave and Ennis Ave/Dixon Road. These results demonstrates that mode share shift alone will not fully resolve the broader traffic challenges and would require a holistic and regional approach that considers broader connectivity and the development of a sustainable transport solution which should be addressed by Main Roads WA in collaboration with the City of Rockingham.

### 11.2.2 Implementation Plan

To ensure that the intended mode share targets are to be achieved, an established monitoring framework can be considered by the City to be implemented to collate baseline data on travel behaviour around the PSP. Monitoring measures such as conducting travel surveys, traffic counts and emerging sources such as mobile or GPS data to measure the shift in mode share are possible considerations

Developers within the PSP should also consider mode share reduction initiatives. Table 11-3 outlines a number of actions that if considered, will assist the City achieve future aspirational mode shift targets.

**Table 11-3** provides detail on the actions that could be considered, specifically:

- What is the type of action;
- What mode it facilitates;
- Whether its implementation should be in the short, medium, or long term.

*Table 11-3 Measures to Facilitate Alternative Transport*

Strategy	Action	Timeframe (S/M/L Term)	
Information	Public Transport	Provide public transport information to prospective developers on RCCTS	S
		Provide directional signage to bus stops, train station, bike racks, taxi ranks on on-site totems	S
	Active Transport	Developers / Tenants consider providing local maps (including walking and cycling routes and time) at info points	S
	Public and Active Transport	Update and distribute the public transport guides to encourage public and active modes further	M
		Seek out opportunities to promote alternative transport modes	S
		Have transport as a standing agenda item in tenant meetings	S
Engagement	Active transport	Identify and engage with local community that may be interested in walking or cycling to work	S
	Public and Active Transport	Promote transport and community events e.g bike month	M
	All	Undertake annual travel surveys to understand performance against mode share targets	S



**Rockingham Precinct Structure Plan**  
 11 Potential Intersection Mitigation Measures

Enablers and Facilitators	Active Transport	Provide secure public bike racks in highly visible areas (including electric bicycle and scooter charging stations)	M
		Provide legible and safe access for pedestrians and cyclists supported by wayfinding initiatives	M
		Look for opportunities to trial car share schemes with developers	L
		Undertake regular monitoring activities of car parking	S

Monitoring across the PSP should be considered in the form of annual reporting. Examples of regular monitoring activities that could be undertaken is as follows:

- Car park usage surveys
- Bike counts (usage of bike racks)
- Participation in events
- Developer uptake of Travel Planning Initiatives

**Table 11-4** shows an indicative monitoring schedule for activities.

*Table 11-4 Monitoring Frequency*

Activity	Frequency
Car park occupancy	Annually
Bike counts	Annually
Travel Survey	Within 6 months of tenant occupations
Event participation	Ongoing
Review travel information	Semi-annually



## 12 Summary and Conclusions

This Transport Impact Assessment (TIA) outlines the transport aspects of the proposed Rockingham Strategic Centre (RSC) Precinct Plan and adopted Town Planning Scheme (TPS) amendment. This assessment has been prepared in accordance with the *Western Australian Planning Commission Transport Impact Assessment Guidelines Volume 2: Planning Schemes, Structure Plans & Activity Centre Plans* (2016).

### 12.1.1 Existing Situation

- Recorded crash data highlights safety concerns at key intersections and road sections, which may warrant future upgrades or modifications.
- Census data shows approximately 70% of journeys to work are currently made by private vehicle, with only 6.8% by public transport and a small proportion by active transport modes. The precinct currently benefits from good public transport connection. The existing pedestrian and cyclist network in the City Centre are in general, excellent condition and provides direct, continuous links to key destinations. Extensive shared path and good road riding infrastructure have been identified in strategic mapping
- The City has previously identified two decked car park location within the City Centre which could accommodate the future parking demand increase. The multi-decked station located adjacent to the bus transit lane is expected to provide a significant public parking resource for the City Centre with the proposed 500 bay public parking station.
- Several intersections within the RSC Precinct Plan Study Area are currently modelled to operate at or near capacity, with poor levels of service during the peak hour periods resulting in delays, congestion, and reduced network efficiency with LOS D and below. On-site observations would indicate that vehicles are able to clear intersections on Read Street within one traffic signal cycle. The poor levels of traffic operations are symptomatic of a transport system heavily reliant on private vehicle use, which has led to excessive demand on intersection capacity and compromised overall movement.

### 12.1.2 Planned Approach

- The RSC Precinct Plan proposes a reduction in land use intensity compared to the 2009 Activity Centre Plan and is expected to generate lower vehicular trips. The proposed housing in the RSC Precinct Plan is well located to employment which reduces the broader demand on the regional movement network.
- There is limited North-South regional access (especially with the removal of the FRACH) to access employment in the Western Trade Coast. Currently Ennis Ave and Patterson Road provide an alternative regional route from Mandurah towards Perth CBD.



## Rockingham Precinct Structure Plan

### 12 Summary and Conclusions

- The transport impact assessment undertaken provides a conservative approach for vehicle traffic scenarios and is based on the premise that the full build-out of the RSC Precinct Plan would occur by 2041. The likelihood of achieving what is capable in this Precinct Plan area within this timeframe, even considering optimal economic conditions for development, is very remote, due to:
  - the size and scope of the PSP area in question.
  - redevelopment of established areas does not occur in a uniform manner.
  - the development potential of the PSP may not be realised in all future proposals

- The assessment of the proposed mitigation measure on Read Street between Chalgrove Avenue and Council Avenue show that the intersections are expected to continue operating at capacity and poor Levels of Service (LOS) during both the AM and PM peak periods. The network is expected to experience severe delays, excessive queuing, and overall operational breakdown for the future 2041 traffic conditions.

This suggests that the proposed mitigation alone is inadequate to accommodate the forecasted traffic volumes for 2041 and as such, the emphasis of the Precinct Structure Plan and broader Local Planning Strategy to shifting mode share away from private vehicle dependency is essential and in order to support sustainable movement within and to the Rockingham Strategic Centre in the future.

- Major upgrades to intersection geometry or signal infrastructure are not considered viable due to the risk of pedestrian severance and the negative impact on urban connectivity. Such interventions would likely widen carriageways, increase crossing distances, and reduce pedestrian amenities. Given these constraints, a strategic modal shift away from car dependency is essential. Encouraging and enabling a transition to public transport will reduce vehicular volumes at intersections, improve operational performance, and support broader sustainability and accessibility goals.
- Based on the SIDRA summary results, it is estimated at a high level that a 10–15% reduction in private vehicle demand, could potentially alleviate pressure on the key intersections assessed within the RSC Precinct Plan Study Area, except for the Read Street/Council Ave, Read Street/Rae Road and Ennis Ave/Dixon Road and Ennis Ave/ Council Ave. These results demonstrates that mode share shift alone will not fully resolve the broader traffic challenges and would require a holistic and regional approach that considers broader connectivity and the development of a sustainable transport solution in the future which should be addressed by Main Roads WA in collaboration with the City of Rockingham.
- Enhancing public transport accessibility should be prioritised by the City of Rockingham in collaboration with the Public Transport Authority to support the RSC Precinct Plan objectives and reduce private vehicle demand on the surrounding road network.

Overall, a strategic investment in public transport is essential to accommodate the potential traffic demands of the proposed Rockingham Strategic Centre (RSC) Precinct Plan and encouraging a modal shift in travel behaviours is recommended. Enhancing public transport accessibility should be considered by the City of Rockingham in collaboration with the Public Transport Authority to reduce



**Rockingham Precinct Structure Plan**  
12 Summary and Conclusions

private vehicle demand on the surrounding road network and improve intersection performance in the future.





# Appendices



# Appendix A

ROM 24 Plots



# 2021 ROM24 Scenario - Validation Plot for Rockingham Precinct Structure Plan

## Land Use Scenario: Westport Land Use based on DAEDS Version 3.3

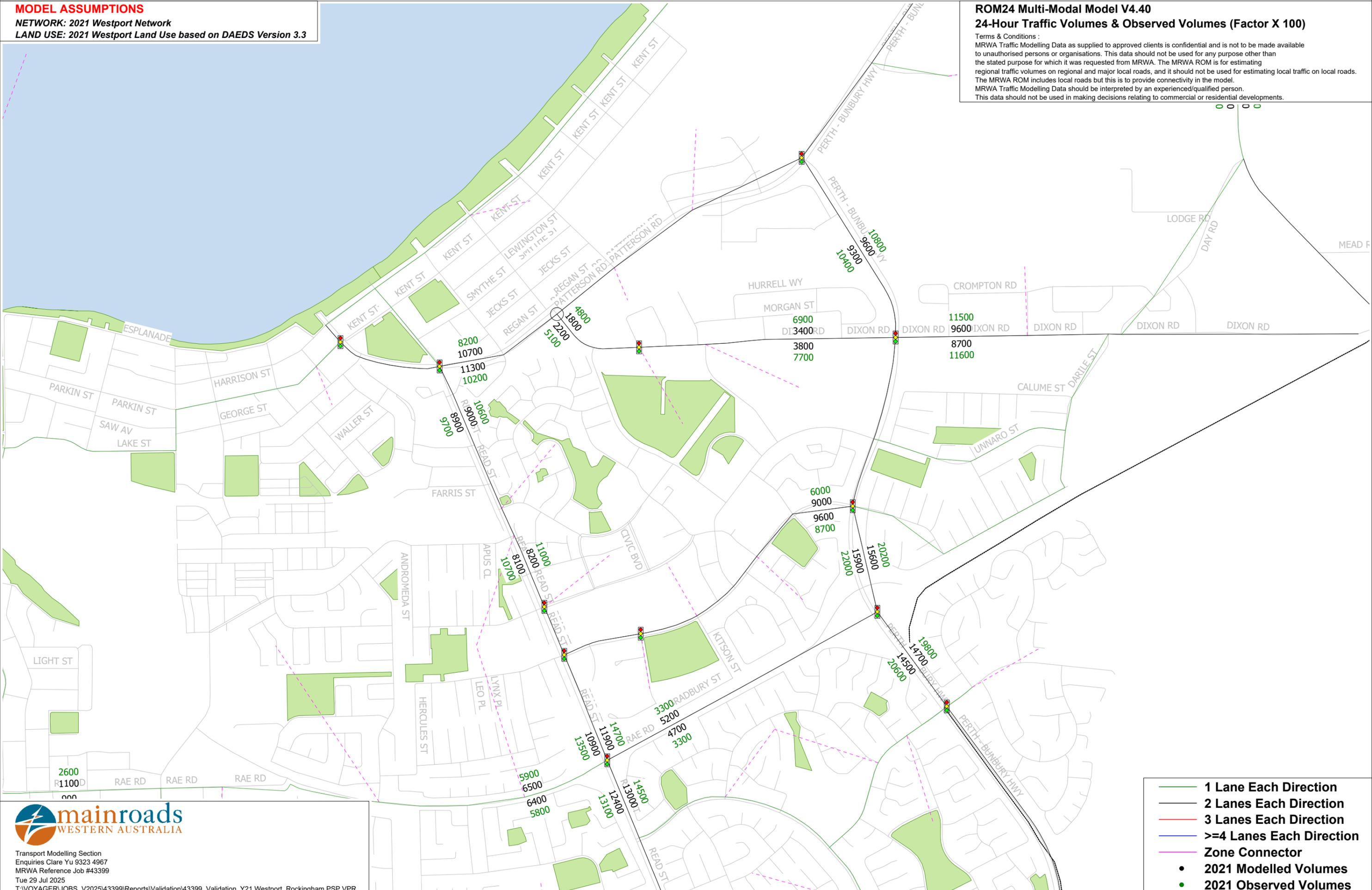
### MODEL ASSUMPTIONS

**NETWORK:** 2021 Westport Network  
**LAND USE:** 2021 Westport Land Use based on DAEDS Version 3.3

### ROM24 Multi-Modal Model V4.40

#### 24-Hour Traffic Volumes & Observed Volumes (Factor X 100)

**Terms & Conditions:**  
 MRWA Traffic Modelling Data as supplied to approved clients is confidential and is not to be made available to unauthorised persons or organisations. This data should not be used for any purpose other than the stated purpose for which it was requested from MRWA. The MRWA ROM is for estimating regional traffic volumes on regional and major local roads, and it should not be used for estimating local traffic on local roads. The MRWA ROM includes local roads but this is to provide connectivity in the model. MRWA Traffic Modelling Data should be interpreted by an experienced/qualified person. This data should not be used in making decisions relating to commercial or residential developments.



- 1 Lane Each Direction
- 2 Lanes Each Direction
- 3 Lanes Each Direction
- $\geq 4$  Lanes Each Direction
- - - Zone Connector
- 2021 Modelled Volumes
- 2021 Observed Volumes



Transport Modelling Section  
 Enquiries Clare Yu 9323 4967  
 MRWA Reference Job #43399  
 Tue 29 Jul 2025  
 T:\VOYAGER\JOBS\_V2025\43399\Reports\Validation\43399\_Validation\_Y21 Westport\_Rockingham PSP.VPR

MRWA ROM24 Base Network - Version 2014  
 MRWA Transport Modelling Data as supplied to approved clients is confidential and is not to be made available to unauthorised persons or organisations







# Appendix B

Hames Sharley Technical Memo



# memo

FROM : **Hames Sharley** DATE : **12-02-2025**

PROJECT: **Rockingham Strategic Centre Precinct Structure Plan** PROJECT NUMBER: **44322**

## MEMO PURPOSE

This memorandum has been prepared for Main Roads Western Australia (MRWA) on behalf of the City of Rockingham. Its purpose is to assist MRWA in understanding the changes in development yield proposed in the **Rockingham Strategic Centre Precinct Structure Plan (RPSP)**, compared to the previous Centre Plan (prepared in 2009).

This comparison will assist MRWA in understanding what changes will be needed to the Traffic Impact Assessment (TIA).

## RESIDENTIAL GROWTH

### DEVELOPMENT YIELD FORECAST COMPARISON

- Table 1 provides a comparison of the estimated dwellings possible under the 2009 Centre Plan and the RPSP.
- Due to density reductions proposed as part of the RPSP, there is a possible net reduction of 1,700 dwellings under the different frameworks.

**Table 1: Estimated Dwellings Comparison**

	2009 CENTRE PLAN	RPSP	DIFFERENCE
<b>Estimated Dwellings</b>	16,793	15,093	-1,700 dwellings

### RPSP DWELING TARGETS

- Table 2 provides the interim and ultimate dwelling yield estimates based on the RPSP framework, including a breakdown for each of the 8 sub-precincts.

**Table 2: RPSP Dwelling Yield Estimates**

PRECINCT	EXISTING DWELLINGS	INTERIM TARGET	ULTIMATE TARGET
P1 - City Centre	432	3,005	4,248
P2 - Waterfront Village	1,097	2,522	3,634
P3 - Coastal Lots	536	1,379	1,762
P4 - TOD Village	0	805	1,205
P5 - City Park	347	347	1,326
P6 - Southern Residential	1,555	1,855	2,917
P7 - Education	0	0	0
P8 - Dixon Road	0	0	0
<b>TOTAL</b>	<b>3,967</b>	<b>9,914</b>	<b>15,093</b>

Source: Draft RPSP, 2023, City of Rockingham / Hames Sharley

## NON-RESIDENTIAL GROWTH

### FLOORSPACE PROJECTIONS

- In order to meet the 15,000 job target set for the Rockingham Strategic Centre (RSC), major floorspace increases are proposed across all major sectors. Floorspace modelling undertaken for the RSC as part of the City's Needs Assessment is summarised in Table 3.
- The provision of floorspace across the RSC was compared to the identified benchmarks to determine and quantify current gaps by Planning Land Use Categories (PLUC) floorspace use.

**Table 3: RPSP Floorspace Projections**

SCENARIO		ENT	HEL	MAN	OFF	SER	STO	TOTAL
Scenario 1 WA Tomorrow	2021 (existing)	29,500	54,559	1,135	48,662	4,533	1,890	140,279
	2041 (ultimate)	16,088	94,511	7,595	29,538	9,948	4,760	162,441
	<b>Total</b>	<b>45,588</b>	<b>149,070</b>	<b>8,730</b>	<b>78,200</b>	<b>14,481</b>	<b>6,650</b>	<b>302,720</b>
Scenario 2 COR	2021 (existing)	29,500	54,559	1,135	48,662	4,533	1,890	140,279
	2041 (ultimate)	29,393	112,765	11,047	51,513	16,238	9,438	230,395
	<b>Total</b>	<b>58,893</b>	<b>167,324</b>	<b>12,182</b>	<b>100,175</b>	<b>20,771</b>	<b>11,328</b>	<b>370,674</b>

Source: City of Rockingham Needs Assessment, 2021, Pracsys

### FLOORSPACE PROJECTIONS

- Per Table 3, the City's preferred growth scenario is Scenario 2. Based on Scenario 2, the following floorspace gaps are identified to 2041:
  - **Retail (RET)** +15,500 m<sup>2</sup>
  - **Health/Welfare/Community (HEL):** +58,206 m<sup>2</sup>
  - **Manufacturing (MAN):** +9,912 m<sup>2</sup>
  - **Office (OFF):** +2,851 m<sup>2</sup>
  - **Service (SER):** +11,705 m<sup>2</sup>
  - **Storage (STO):** +7,548 m<sup>2</sup>
- Table 4 provides an estimated distribution of the floor space gap, based on land use permissibility across the RPSP area. This will assist with trip generation projections.

**Table 4: Estimated Floorspace Gap Distribution**

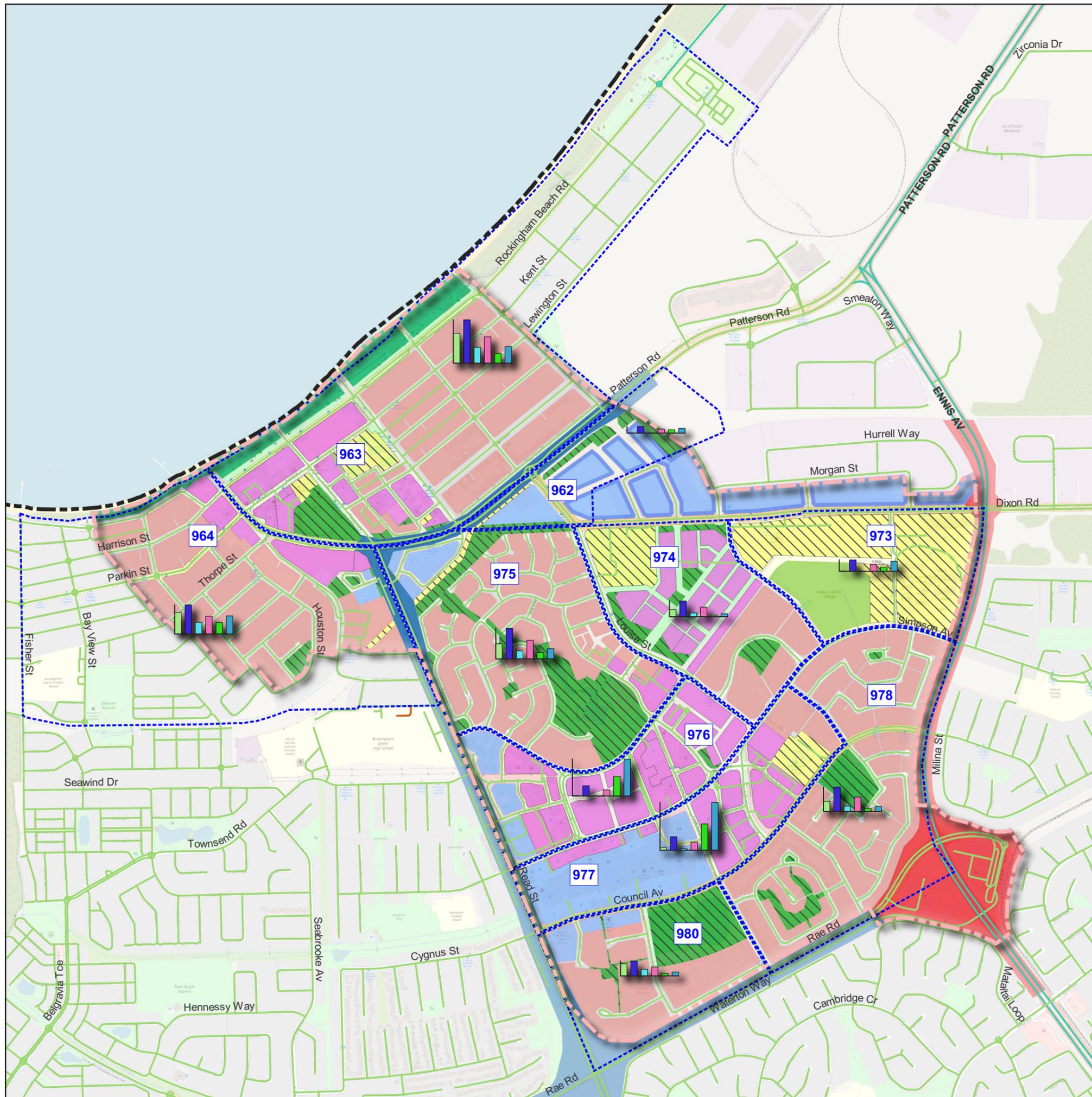
RPSP SUB-PRECINCT	RET	HEL	MAN	OFF	SER	STO
<b>P1 - City Centre</b>	10,000 m <sup>2</sup>	15,000 m <sup>2</sup>		2,000 m <sup>2</sup>		3,000 m <sup>2</sup>
<b>P2 - Waterfront Village</b>	1,500 m <sup>2</sup>					548 m <sup>2</sup>
<b>P3 - Coastal Lots</b>						
<b>P4 - TOD Village</b>	4,000 m <sup>2</sup>	5,000 m <sup>2</sup>		851 m <sup>2</sup>		
<b>P5 - City Park</b>						
<b>P6 - Southern Residential</b>						
<b>P7 - Education</b>		38,206 m <sup>2</sup>				
<b>P8 - Dixon Road</b>			9,912 m <sup>2</sup>		11,705 m <sup>2</sup>	4,000 m <sup>2</sup>
<b>Total</b>	15,500 m <sup>2</sup>	58,206 m <sup>2</sup>	9,912 m <sup>2</sup>	2,851 m <sup>2</sup>	11,705 m <sup>2</sup>	7,548 m <sup>2</sup>

Note: Figures provided are a high-level estimate only, to assist with trip generation assessment.

# Appendix C

ROM 24 Zonal Distribution





## LEGEND

- MRWA Zone Boundary
- 2026 Total Population
- 2041 Total Population
- 2026 Total Dwelling
- 2041 Total Dwelling
- 2026 Total Employment
- 2041 Total Employment
- Highway
- Main Road
- Local Road

ROM Zone	2026 Total Population	2041 Total Population
963	2963	4361
962	17	670
964	2165	2925
973	31	1149
974	707	1577
975	1507	3079
978	1020	2460
976	27	1037
977	292	1361
980	1233	1494

ROM Zone	2026 Total Dwelling	2041 Total Dwelling
963	1602	2658
962	9	408
964	1170	1783
973	17	697
974	382	962
975	814	1877
978	549	1459
976	14	632
977	158	830
980	666	911

ROM Zone	2026 Total Employment	2041 Total Employment
963	968	1685
962	346	486
964	1157	1814
973	431	1017
974	154	303
975	633	1037
978	300	506
976	1981	3702
977	2656	4801
980	253	404



# Appendix D

Council Link Counts





## Traffic Survey

**Location:** Read Street - south of Patterson Road

**Site name:** Read-01 Location: [-32.279312 +115.735570]

**Survey duration:** 0:00 Wednesday, 8 June 2022 to 0:00 Wednesday, 15 June 2022 (7 days, 1 weeks)

**Profile:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16),

**Speed limit:** 70 km/h

**Sensor Balance:** %

**Class scheme =** AustRoads94

### Summary

<b>AWDT (VPD)</b>	<b>17599</b>
<b>Commercial</b>	<b>4.6%</b>
<b>Mean Speed</b>	<b>49.5kp/h</b>
<b>Speed 85%</b>	<b>59.8kp/h</b>
<b>30kp/h Above</b>	<b>0.997%</b>
<b>Direction</b>	<b>North, South (bound)</b>

### Average Daily Volume

Hours	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
0000-0100	32	34	22	37	49	101	121	35	111	57
0100-0200	18	29	25	29	25	52	62	25	57	34
0200-0300	15	20	23	22	30	37	45	22	41	27
0300-0400	35	47	30	40	27	36	37	36	37	36
0400-0500	134	130	150	129	146	79	47	138	63	116
0500-0600	477	503	530	484	463	143	87	491	115	384
0600-0700	581	597	619	584	576	206	151	591	179	473
0700-0800	701	743	712	755	705	386	233	723	310	605
0800-0900	1215	1198	1287	1305	1240	753	556	1249	655	1079
0900-1000	1048	1044	1094	1069	1143	1113	818	1080	966	1047
1000-1100	1105	1082	1164	1211	1246	1349	988	1162	1169	1164
1100-1200	1255	1244	1270	1217	1345	1565	1232	1266	1399	1304
1200-1300	1263	1219	1307	1289	1425	1601	1303	1301	1452	1344
1300-1400	1176	1171	1170	1165	1361	1395	1172	1209	1284	1230
1400-1500	1321	1343	1360	1450	1625	1260	1158	1420	1209	1360
1500-1600	1517	1604	1521	1565	1568	1196	975	1555	1086	1421
1600-1700	1559	1629	1468	1550	1562	1115	971	1554	1043	1408
1700-1800	1293	1306	1349	1386	1455	1023	859	1358	941	1239
1800-1900	779	879	857	968	898	895	623	876	759	843
1900-2000	456	503	538	609	589	643	410	539	527	535
2000-2100	331	404	397	436	499	515	259	413	387	406
2100-2200	199	266	256	287	391	359	205	280	282	280
2200-2300	116	148	170	174	302	295	143	182	219	193
2300-2400	81	91	79	76	149	194	55	95	125	104
<b>Total</b>	<b>16707</b>	<b>17234</b>	<b>17398</b>	<b>17837</b>	<b>18819</b>	<b>16311</b>	<b>12510</b>	<b>17599</b>	<b>14411</b>	<b>16688</b>

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>AM peak</b>	255 (1100)	244 (1100)	287 (0800)	305 (0800)	345 (1100)	565 (1100)	232 (1100)	1266 (1100)	399 (1100)	304 (1100)
<b>PM peak</b>	559 (1600)	629 (1600)	521 (1500)	565 (1500)	625 (1400)	601 (1200)	303 (1200)	1555 (1500)	452 (1200)	421 (1500)
<b>Day peak</b>	559 (1600)	629 (1600)	521 (1500)	565 (1500)	625 (1400)	601 (1200)	303 (1200)	1555 (1500)	452 (1200)	421 (1500)

### Speed Data kp/h

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>Mean kp/h</b>	49.4	49.2	49.1	49.4	48.7	50.2	50.9	49.2	50.5	49.5
<b>Speed 85% kp/h</b>	59.9	59.4	59.2	59.6	59.0	59.9	60.8	59.4	60.3	59.8
<b>Mean Exceeding kp/h</b>	73.6	73.5	74.2	73.8	73.7	73.1	73.5	73.8	73.3	73.6
<b>Vol Exceeding %</b>	180	162	172	159	165	155	172	168	164	166
<b>Exceeding</b>	1.077	0.940	0.989	0.891	0.877	0.950	1.375	0.952	1.135	0.997
<b>Vehicles 30kph Above</b>		1165								0.997%

### Class Data

**Commercial 4.60%**

Class (AustRoads94)	Number of Vehicles	%
1 - SV	110690	94.76%
2 - SVT	743	0.636%
3 - TB2	4869	4.168%
4 - TB3	281	0.241%
5 - T4	69	0.059%
6 - ART3	47	0.040%
7 - ART4	68	0.058%
8 - ART5	20	0.017%
9 - ART6	26	0.022%
10 - BD	2	0.002%
11 - DRT	1	0.001%
12 - TRT	0	0.000%

Class (AustRoads94)	%
Light Vehicle	95.40%
Medium Vehicle	4.47%
Heavy Vehicle	0.14%



## Traffic Survey

**Location:** Read St north of Council Ave (#) <70>

**Site name:** Read St north of Council Ave Location: [-32.291390 +115.741552]

**Survey duration:** 0:00 Friday, 23 May 2025 to 0:00 Monday, 2 June 2025 (10 days, 1.42857 weeks)

**Profile:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16),

**Speed limit:** 70 km/h

**Sensor Balance:** %

**Class scheme =** AustRoads94

### Summary

<b>AWDT (VPD)</b>	<b>19650</b>
<b>Commercial</b>	<b>5.1%</b>
<b>Mean Speed</b>	<b>40.1kp/h</b>
<b>Speed 85%</b>	<b>52.4kp/h</b>
<b>30kp/h Above</b>	<b>0.846%</b>
<b>Direction</b>	<b>North, South (bound)</b>

### Average Daily Volume

Hours	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
0000-0100	48	31	56	72	61	113	132	55	122	82
0100-0200	26	34	27	36	40	67	96	34	81	53
0200-0300	15	21	15	21	34	60	91	23	75	44
0300-0400	29	37	49	34	45	50	54	40	52	45
0400-0500	91	109	115	135	113	64	49	113	57	90
0500-0600	209	287	311	335	213	122	99	261	111	201
0600-0700	438	476	514	509	344	214	212	438	213	348
0700-0800	714	820	863	891	684	450	343	776	396	624
0800-0900	1586	1655	1651	1689	1131	778	587	1474	682	1157
0900-1000	1147	1239	1164	1208	1186	1140	833	1188	987	1108
1000-1100	1272	1162	1263	1239	1417	1335	1078	1295	1206	1259
1100-1200	1304	1407	1400	1407	1586	1528	1251	1448	1389	1425
1200-1300	1288	1360	1413	1365	1534	1489	1341	1416	1415	1415
1300-1400	1350	1408	1426	1329	1474	1306	1208	1410	1257	1349
1400-1500	1748	1770	1818	1836	1727	1273	1111	1771	1192	1539
1500-1600	1593	1797	1875	1617	1660	1217	1042	1700	1129	1472
1600-1700	1565	1702	1697	1728	1697	1142	1018	1681	1080	1440
1700-1800	1490	1475	1653	1545	1586	1030	869	1556	949	1313
1800-1900	937	887	1034	1027	1124	733	598	1022	665	879
1900-2000	602	627	753	787	747	549	489	711	519	634
2000-2100	384	441	622	536	622	473	164	538	318	450
2100-2200	244	295	350	387	449	395	95	362	245	315
2200-2300	134	167	180	184	303	298	58	212	178	198
2300-2400	72	108	108	115	185	219	37	129	128	128
<b>Total</b>	<b>18286</b>	<b>19315</b>	<b>20357</b>	<b>20032</b>	<b>19954</b>	<b>16038</b>	<b>12850</b>	<b>19650</b>	<b>14444</b>	<b>17567</b>

<b>AM peak</b>	586 (0800)	655 (0800)	651 (0800)	689 (0800)	586 (1100)	528 (1100)	251 (1100)	1474 (0800)	389 (1100)	425 (1100)
<b>PM peak</b>	748 (1400)	797 (1500)	875 (1500)	836 (1400)	727 (1400)	489 (1200)	341 (1200)	1771 (1400)	415 (1200)	539 (1400)
<b>Day peak</b>	748 (1400)	797 (1500)	875 (1500)	836 (1400)	727 (1400)	528 (1100)	341 (1200)	1771 (1400)	415 (1200)	539 (1400)

### Speed Data kp/h

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>Mean kp/h</b>	39.4	38.2	37.9	37.4	41.0	41.5	42.4	39.2	41.9	40.1
<b>Speed 85% kp/h</b>	51.7	50.9	51.7	49.9	52.9	52.9	54.0	51.7	53.5	52.4
<b>Mean Exceeding kp/h</b>	74.5	74.5	73.7	74.7	97.7	74.4	75.0	92.7	74.7	89.5
<b>Vol Exceeding %</b>	65	55	82	61	480	65	67	204	66	149
<b>Exceeding</b>	0.355	0.285	0.403	0.305	2.406	0.405	0.521	1.037	0.457	0.846
<b>Vehicles 30kph Above</b>		1487	0.846%							

### Class Data

**Commercial** 5.14%

Class (AustRoads94)	Number of Vehicles	%
1 - SV	164539	93.66%
2 - SVT	2111	1.202%
3 - TB2	4035	2.297%
4 - TB3	1296	0.738%
5 - T4	952	0.542%
6 - ART3	194	0.110%
7 - ART4	1866	1.062%
8 - ART5	143	0.081%
9 - ART6	337	0.192%
10 - BD	51	0.029%
11 - DRT	107	0.061%
12 - TRT	41	0.023%

Class (AustRoads94)	%
Light Vehicle	94.86%
Medium Vehicle	3.58%
Heavy Vehicle	1.56%



## Traffic Survey

**Location:** Victoria St - btw Smythe St & Jecks St Rockingham (#21)

**Site name:** Victoria-01 Location: [-32.272165 +115.743055]

**Survey duration:** 0:00 Thursday, 8 June 2023 to 0:00 Thursday, 15 June 2023 (7 days, 1 weeks)

**Profile:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16),

**Speed limit:** 50 km/h

**Sensor Balance:** %

**Class scheme =** AustRoads94

### Summary

<b>AWDT (VPD)</b>	<b>3498</b>
<b>Commercial</b>	<b>7.7%</b>
<b>Mean Speed</b>	<b>55.5kp/h</b>
<b>Speed 85%</b>	<b>63.0kp/h</b>
<b>30kp/h Above</b>	<b>78.75%</b>
<b>Direction</b>	<b>East, West (bound)</b>

### Average Daily Volume

Hours	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
0000-0100	7	10	11	5	10	20	21	9	21	12
0100-0200	9	10	9	6	3	11	17	7	14	9
0200-0300	1	10	4	4	5	8	7	5	8	6
0300-0400	12	7	8	14	10	12	5	10	9	10
0400-0500	30	31	28	18	19	10	9	25	10	21
0500-0600	112	97	90	109	107	39	23	103	31	82
0600-0700	146	145	153	149	129	75	56	144	66	122
0700-0800	188	238	201	216	205	94	87	210	91	176
0800-0900	218	224	223	208	227	185	153	220	169	205
0900-1000	238	241	233	223	194	257	196	226	227	226
1000-1100	211	240	242	206	237	320	256	227	288	245
1100-1200	262	224	281	222	253	380	313	248	347	276
1200-1300	255	242	270	218	259	270	267	249	269	254
1300-1400	229	243	252	250	267	287	253	248	270	254
1400-1500	252	260	272	286	303	272	223	275	248	267
1500-1600	326	272	288	317	297	241	220	300	231	280
1600-1700	337	302	323	268	328	234	227	312	231	288
1700-1800	263	269	287	261	261	183	182	268	183	244
1800-1900	163	159	166	190	191	129	103	174	116	157
1900-2000	67	73	81	90	109	71	68	84	70	80
2000-2100	64	51	53	74	64	69	66	61	68	63
2100-2200	32	45	40	61	53	54	40	46	47	46
2200-2300	18	28	36	35	42	56	17	32	37	33
2300-2400	11	13	8	17	24	40	15	15	28	18
<b>Total</b>	<b>3451</b>	<b>3434</b>	<b>3559</b>	<b>3447</b>	<b>3597</b>	<b>3317</b>	<b>2824</b>	<b>3498</b>	<b>3071</b>	<b>3376</b>

<b>AM peak</b>	262 (1100)	241 (0900)	281 (1100)	223 (0900)	253 (1100)	380 (1100)	313 (1100)	<b>248 (1100)</b>	347 (1100)	<b>276 (1100)</b>
<b>PM peak</b>	337 (1600)	302 (1600)	323 (1600)	317 (1500)	328 (1600)	287 (1300)	267 (1200)	<b>312 (1600)</b>	270 (1300)	<b>288 (1600)</b>
<b>Day peak</b>	337 (1600)	302 (1600)	323 (1600)	317 (1500)	328 (1600)	380 (1100)	313 (1100)	<b>312 (1600)</b>	347 (1100)	<b>288 (1600)</b>

### Speed Data kp/h

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>Mean kp/h</b>	55.1	55.3	55.6	55.6	55.8	55.4	55.8	55.5	55.6	<b>55.5</b>
<b>Speed 85% kp/h</b>	62.3	62.8	63.0	63.4	63.2	62.5	63.4	63.0	62.8	<b>63.0</b>
<b>Mean Exceeding kp/h</b>	58.1	58.2	58.4	58.4	58.6	58.1	58.6	58.3	58.3	<b>58.3</b>
<b>Vol Exceeding %</b>	2656	2689	2814	2733	2847	2625	2243	2748	2434	<b>2658</b>
<b>Exceeding %</b>	76.96	78.31	79.07	79.29	79.15	79.14	79.43	78.56	79.27	<b>78.75</b>
<b>Vehicles 30kph Above</b>	18607		<b>78.75%</b>							

### Class Data

**Commercial 7.66%**

Class (AustRoads94)	Number of Vehicles	%
1 - SV	21581	91.33%
2 - SVT	239	1.011%
3 - TB2	1639	6.936%
4 - TB3	57	0.241%
5 - T4	31	0.131%
6 - ART3	27	0.114%
7 - ART4	46	0.195%
8 - ART5	5	0.021%
9 - ART6	3	0.013%
10 - BD	0	0.000%
11 - DRT	1	0.004%
12 - TRT	0	0.000%

Class (AustRoads94)	%
Light Vehicle	92.34%
Medium Vehicle	7.31%
Heavy Vehicle	0.35%



## Traffic Survey

**Location:** Wanliss Street - btw Kent St & Lewington St

**Site name:** Wanliss-01 Location: [-32.274310 +115.735465]

**Survey duration:** 0:00 Friday, 22 July 2022 to 0:00 Tuesday, 2 August 2022 (11 days, 1.57143 weeks)

**Profile:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16),

**Speed limit:** 50 km/h

**Sensor Balance:** %

**Class scheme =** AustRoads94

### Summary

<b>AWDT (VPD)</b>	<b>2487</b>
<b>Commercial</b>	<b>9.1%</b>
<b>Mean Speed</b>	<b>44.1kp/h</b>
<b>Speed 85%</b>	<b>50.4kp/h</b>
<b>30kp/h Above</b>	<b>16.93%</b>
<b>Direction</b>	<b>East, West (bound)</b>

### Average Daily Volume

Hours	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
0000-0100	5	4	4	10	6	15	21	5	18	10
0100-0200	4	0	2	4	3	10	9	3	9	5
0200-0300	2	3	3	2	5	4	4	3	4	3
0300-0400	3	5	8	1	4	3	5	4	4	4
0400-0500	8	14	8	10	7	9	6	9	7	8
0500-0600	31	36	46	41	39	16	10	38	13	29
0600-0700	67	59	51	73	61	26	21	63	23	48
0700-0800	111	128	102	107	113	73	52	112	62	94
0800-0900	163	163	225	182	181	135	101	180	118	157
0900-1000	153	151	185	175	155	152	148	161	150	157
1000-1100	144	138	176	183	182	180	200	164	190	173
1100-1200	195	161	202	225	207	186	249	199	217	206
1200-1300	185	198	202	228	224	200	236	206	218	211
1300-1400	160	165	199	199	204	181	216	184	198	189
1400-1500	192	188	247	210	258	156	221	220	188	209
1500-1600	209	191	231	216	226	159	196	215	177	201
1600-1700	179	192	216	196	194	156	171	193	163	182
1700-1800	154	180	203	199	212	152	153	188	152	175
1800-1900	87	113	146	137	130	127	114	118	120	119
1900-2000	49	46	95	90	108	104	80	78	92	83
2000-2100	44	53	67	78	79	64	59	63	61	63
2100-2200	24	34	57	62	71	59	36	49	47	48
2200-2300	10	20	15	14	35	37	12	20	24	21
2300-2400	6	10	13	10	23	19	9	13	14	13
<b>Total</b>	<b>2179</b>	<b>2252</b>	<b>2703</b>	<b>2652</b>	<b>2722</b>	<b>2219</b>	<b>2322</b>	<b>2487</b>	<b>2270</b>	<b>2408</b>

<b>AM peak</b>	195 (1100)	163 (0800)	225 (0800)	225 (1100)	207 (1100)	186 (1100)	249 (1100)	<b>199 (1100)</b>	217 (1100)	<b>206 (1100)</b>
<b>PM peak</b>	209 (1500)	198 (1200)	247 (1400)	228 (1200)	258 (1400)	200 (1200)	236 (1200)	<b>220 (1400)</b>	218 (1200)	<b>211 (1200)</b>
<b>Day peak</b>	209 (1500)	198 (1200)	247 (1400)	228 (1200)	258 (1400)	200 (1200)	249 (1100)	<b>220 (1400)</b>	218 (1200)	<b>211 (1200)</b>

### Speed Data kp/h

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>Mean kp/h</b>	43.8	43.9	44.0	44.4	44.2	44.2	43.9	44.1	44.1	<b>44.1</b>
<b>Speed 85% kp/h</b>	50.6	50.6	50.4	50.8	50.6	50.6	50.0	50.6	50.2	<b>50.4</b>
<b>Mean Exceeding kp/h</b>	53.3	53.4	53.7	53.9	53.6	53.5	53.7	53.6	53.6	<b>53.6</b>
<b>Vol Exceeding %</b>	375	399	443	459	477	381	359	429	370	<b>408</b>
<b>Exceeding %</b>	17.21	17.72	16.39	17.31	17.51	17.17	15.46	17.26	16.30	<b>16.93</b>
<b>Vehicles 30kph Above</b>	4484		<b>16.93%</b>							

### Class Data

**Commercial 9.12%**

Class (AustRoads94)	Number of Vehicles	%
1 - SV	23921	90.31%
2 - SVT	151	0.570%
3 - TB2	2242	8.464%
4 - TB3	121	0.457%
5 - T4	29	0.109%
6 - ART3	4	0.015%
7 - ART4	16	0.060%
8 - ART5	0	0.000%
9 - ART6	4	0.015%
10 - BD	0	0.000%
11 - DRT	1	0.004%
12 - TRT	0	0.000%

Class (AustRoads94)	%
Light Vehicle	90.88%
Medium Vehicle	9.03%
Heavy Vehicle	0.09%



### Traffic Survey

**Location:** 51 Thorpe St, Rockingham 03(#51) <50>  
**Site name:** 51 Thorpe St, Rockingham 03 Location: [-32.278691 +115.729368]  
**Survey duration:** 0:00 Friday, 22 March 2024 to 0:00 Saturday, 30 March 2024 (8 days, 1.14286 weeks)  
**Profile:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16),  
**Speed limit:** 50 km/h      **Sensor Balance:** %      **Class scheme =** AustRoads94

#### Summary

<b>AWDT (VPD)</b>	<b>2692</b>
<b>Commercial</b>	<b>8.2%</b>
<b>Mean Speed</b>	<b>50.7kp/h</b>
<b>Speed 85%</b>	<b>59.8kp/h</b>
<b>30kp/h Above</b>	<b>56.53%</b>
<b>Direction</b>	<b>East, West (bound)</b>

#### Average Daily Volume

Hours	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
0000-0100	0	2	5	4	10	16	16	5	16	8
0100-0200	1	3	2	3	11	15	8	5	12	7
0200-0300	3	3	4	12	6	10	3	6	7	6
0300-0400	4	2	5	3	6	3	2	4	3	4
0400-0500	25	38	34	29	17	6	12	27	9	22
0500-0600	78	74	80	81	43	31	14	66	23	55
0600-0700	117	118	121	121	56	39	29	98	34	82
0700-0800	190	217	186	157	113	52	55	163	54	135
0800-0900	296	312	316	305	191	114	92	269	103	227
0900-1000	161	164	138	179	130	148	108	150	128	145
1000-1100	169	156	157	173	129	151	139	152	145	150
1100-1200	163	145	154	191	155	174	180	160	177	165
1200-1300	163	171	176	187	144	172	162	164	167	165
1300-1400	152	151	157	210	139	170	135	158	153	157
1400-1500	291	267	300	328	222	156	138	272	147	240
1500-1600	232	252	245	282	179	149	121	228	135	205
1600-1700	259	240	196	225	173	127	105	211	116	187
1700-1800	201	208	237	187	157	133	113	191	123	174
1800-1900	123	133	148	181	116	100	86	136	93	125
1900-2000	75	78	92	95	77	87	87	82	87	83
2000-2100	37	48	71	65	59	43	61	57	52	55
2100-2200	27	37	44	88	45	50	24	48	37	45
2200-2300	16	20	31	29	33	33	29	27	31	28
2300-2400	10	12	12	17	21	33	6	15	20	16
<b>Total</b>	<b>2793</b>	<b>2851</b>	<b>2911</b>	<b>3152</b>	<b>2224</b>	<b>2012</b>	<b>1725</b>	<b>2692</b>	<b>1869</b>	<b>2486</b>

<b>AM peak</b>	296 (0800)	312 (0800)	316 (0800)	305 (0800)	191 (0800)	174 (1100)	180 (1100)	<b>269 (0800)</b>	177 (1100)	<b>227 (0800)</b>
<b>PM peak</b>	291 (1400)	267 (1400)	300 (1400)	328 (1400)	222 (1400)	172 (1200)	162 (1200)	<b>272 (1400)</b>	167 (1200)	<b>240 (1400)</b>
<b>Day peak</b>	296 (0800)	312 (0800)	316 (0800)	328 (1400)	222 (1400)	174 (1100)	180 (1100)	<b>272 (1400)</b>	177 (1100)	<b>240 (1400)</b>

#### Speed Data kp/h

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT	
<b>Mean kp/h</b>	50.1	50.5	51.2	50.8	50.8	50.7	50.1	50.7	50.4	<b>50.7</b>	
<b>Speed 85% kp/h</b>	59.2	59.8	60.1	59.6	59.9	60.3	59.6	59.8	59.9	<b>59.8</b>	
<b>Mean Exceeding kp/h</b>	56.9	57.2	57.5	57.1	57.3	57.4	57.4	57.2	57.4	<b>57.2</b>	
<b>Vol Exceeding %</b>	1503	1589	1673	1804	1279	1184	934	1521	1059	<b>1406</b>	
<b>Exceeding %</b>	53.81	55.73	57.47	57.23	57.50	58.85	54.14	56.49	56.68	<b>56.53</b>	
<b>Vehicles 30kph Above</b>	11244		<b>56.53%</b>								

#### Class Data

**Commercial 8.16%**

Class (AustRoads94)	Number of Vehicles	%
1 - SV	18034	90.66%
2 - SVT	234	1.176%
3 - TB2	1482	7.451%
4 - TB3	36	0.181%
5 - T4	23	0.116%
6 - ART3	30	0.151%
7 - ART4	47	0.236%
8 - ART5	0	0.000%
9 - ART6	4	0.020%
10 - BD	1	0.005%
11 - DRT	0	0.000%
12 - TRT	0	0.000%

Class (AustRoads94)	%
Light Vehicle	91.84%
Medium Vehicle	7.75%
Heavy Vehicle	0.41%



## Traffic Survey

**Location:** 53 Rockingham Beach Rd (#53) <40>

**Site name:** 53 Rockingham Beach Rd Location: [-32.273351 +115.733397]

**Survey duration:** 0:00 Tuesday, 24 December 2024 to 0:00 Tuesday, 7 January 2025 (14 days, 2 weeks)

**Profile:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16),

**Speed limit:** 40 km/h      **Sensor Balance:** %      **Class scheme =** AustRoads94

### Summary

<b>AWDT (VPD)</b>	<b>5362</b>
<b>Commercial</b>	<b>8.3%</b>
<b>Mean Speed</b>	<b>26.7kp/h</b>
<b>Speed 85%</b>	<b>34.0kp/h</b>
<b>30kp/h Above</b>	<b>4.469%</b>
<b>Direction</b>	<b>North, South (bound)</b>

### Average Daily Volume

Hours	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
0000-0100	13	22	35	22	16	21	19	22	20	21
0100-0200	10	8	44	11	13	10	11	17	11	15
0200-0300	4	7	25	6	8	9	11	10	10	10
0300-0400	7	7	14	5	11	11	6	9	8	8
0400-0500	18	17	19	13	12	15	13	16	14	15
0500-0600	86	70	53	57	78	54	47	69	51	64
0600-0700	139	136	97	114	115	117	107	120	112	118
0700-0800	196	207	185	181	202	237	180	194	208	198
0800-0900	246	292	314	259	269	332	299	276	315	287
0900-1000	388	179	422	366	389	456	489	349	472	384
1000-1100	497	221	579	500	496	573	626	458	599	499
1100-1200	539	237	589	561	554	612	616	496	614	530
1200-1300	476	230	515	546	524	645	610	458	628	507
1300-1400	447	202	515	487	509	509	548	432	528	459
1400-1500	445	178	501	464	433	519	529	404	524	438
1500-1600	399	149	455	414	405	483	472	364	478	397
1600-1700	410	137	448	384	368	493	462	349	477	386
1700-1800	399	146	462	391	389	468	409	357	439	380
1800-1900	341	125	400	345	366	440	358	315	399	339
1900-2000	311	153	360	295	287	357	286	281	321	292
2000-2100	193	109	243	179	204	232	180	185	206	191
2100-2200	107	77	124	97	95	126	99	100	113	103
2200-2300	51	52	52	50	80	72	40	57	56	56
2300-2400	32	23	26	21	33	40	17	27	28	27
<b>Total</b>	<b>5747</b>	<b>2979</b>	<b>6474</b>	<b>5761</b>	<b>5852</b>	<b>6826</b>	<b>6428</b>	<b>5362</b>	<b>6627</b>	<b>5724</b>

<b>AM peak</b>	539 (1100)	292 (0800)	589 (1100)	561 (1100)	554 (1100)	612 (1100)	626 (1000)	<b>496 (1100)</b>	614 (1100)	<b>530 (1100)</b>
<b>PM peak</b>	476 (1200)	230 (1200)	515 (1200)	546 (1200)	524 (1200)	645 (1200)	610 (1200)	<b>458 (1200)</b>	628 (1200)	<b>507 (1200)</b>
<b>Day peak</b>	539 (1100)	292 (0800)	589 (1100)	561 (1100)	554 (1100)	645 (1200)	626 (1000)	<b>496 (1100)</b>	628 (1200)	<b>530 (1100)</b>

### Speed Data kp/h

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>Mean kp/h</b>	28.4	30.8	23.9	27.5	28.1	25.7	25.3	27.3	25.5	26.7
<b>Speed 85% kp/h</b>	35.6	37.4	31.3	34.6	34.9	32.2	32.0	34.7	32.2	<b>34.0</b>
<b>Mean Exceeding kp/h</b>	44.7	44.5	45.3	44.8	44.5	45.8	45.1	44.7	45.4	44.9
<b>Vol Exceeding %</b>	338	251	187	295	292	217	212	272	214	256
<b>Exceeding</b>	5.873	8.427	2.889	5.112	4.990	3.179	3.291	5.080	3.233	4.469
<b>Vehicles 30kph Above</b>		3581								<b>4.469%</b>

### Class Data

**Commercial**      **8.34%**

Class (AustRoads94)	Number of Vehicles	%
1 - SV	73090	91.22%
2 - SVT	354	0.442%
3 - TB2	6154	7.680%
4 - TB3	144	0.180%
5 - T4	219	0.273%
6 - ART3	37	0.046%
7 - ART4	70	0.087%
8 - ART5	12	0.015%
9 - ART6	40	0.050%
10 - BD	3	0.004%
11 - DRT	4	0.005%
12 - TRT	2	0.002%

Class (AustRoads94)	%
Light Vehicle	91.66%
Medium Vehicle	8.13%
Heavy Vehicle	0.21%



## Traffic Survey

**Location:** 73 Rockingham Beach Rd (#73) <50>

**Site name:** 73 Rockingham Beach Rd Location: [-32.271550 +115.736025]

**Survey duration:** 0:00 Tuesday, 24 December 2024 to 0:00 Tuesday, 7 January 2025 (14 days, 2 weeks)

**Profile:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16),

**Speed limit:** 50 km/h      **Sensor Balance:** %      **Class scheme =** AustRoads94

### Summary

<b>AWDT (VPD)</b>	<b>4603</b>
<b>Commercial</b>	<b>7.6%</b>
<b>Mean Speed</b>	<b>43.4kp/h</b>
<b>Speed 85%</b>	<b>52.0kp/h</b>
<b>30kp/h Above</b>	<b>22.92%</b>
<b>Direction</b>	<b>North, South (bound)</b>

### Average Daily Volume

Hours	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
0000-0100	10	21	116	15	13	16	19	35	17	30
0100-0200	6	8	27	8	9	10	8	11	9	11
0200-0300	3	6	20	5	8	8	9	8	8	8
0300-0400	3	5	12	4	6	9	6	6	7	6
0400-0500	17	15	14	9	11	11	10	13	10	12
0500-0600	78	70	44	49	66	51	44	61	47	57
0600-0700	107	109	77	87	90	83	86	94	84	91
0700-0800	158	161	135	141	142	164	132	147	148	147
0800-0900	189	227	259	206	193	240	224	215	232	220
0900-1000	286	238	361	262	285	334	482	286	408	321
1000-1100	333	331	469	345	361	422	441	368	431	386
1100-1200	389	349	532	376	411	502	508	411	505	438
1200-1300	343	305	468	380	366	505	474	372	489	406
1300-1400	322	304	479	362	357	396	426	364	411	378
1400-1500	346	264	442	383	335	412	411	354	411	370
1500-1600	315	247	400	323	304	365	367	317	366	331
1600-1700	303	283	399	308	261	402	350	310	376	329
1700-1800	287	280	369	294	258	343	303	297	323	305
1800-1900	250	326	343	256	262	295	258	287	276	284
1900-2000	224	354	291	225	208	287	212	260	249	257
2000-2100	149	291	195	121	147	170	134	180	152	172
2100-2200	69	152	83	79	69	88	70	90	79	87
2200-2300	41	121	43	40	56	47	37	60	42	55
2300-2400	29	183	23	17	25	31	15	55	23	46
<b>Total</b>	<b>4251</b>	<b>4645</b>	<b>5594</b>	<b>4288</b>	<b>4238</b>	<b>5185</b>	<b>5020</b>	<b>4603</b>	<b>5103</b>	<b>4746</b>

<b>AM peak</b>	389 (1100)	349 (1100)	532 (1100)	376 (1100)	411 (1100)	502 (1100)	508 (1100)	<b>411 (1100)</b>	505 (1100)	<b>438 (1100)</b>
<b>PM peak</b>	346 (1400)	354 (1900)	479 (1300)	383 (1400)	366 (1200)	505 (1200)	474 (1200)	<b>372 (1200)</b>	489 (1200)	<b>406 (1200)</b>
<b>Day peak</b>	389 (1100)	354 (1900)	532 (1100)	383 (1400)	411 (1100)	505 (1200)	508 (1100)	<b>411 (1100)</b>	505 (1100)	<b>438 (1100)</b>

### Speed Data kp/h

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>Mean kp/h</b>	48.1	39.4	39.1	46.7	47.4	43.4	41.6	43.8	42.5	<b>43.4</b>
<b>Speed 85% kp/h</b>	54.7	52.0	48.2	53.3	53.6	51.1	50.0	52.7	50.6	<b>52.0</b>
<b>Mean Exceeding kp/h</b>	55.2	55.1	54.7	54.6	54.8	54.5	54.5	54.9	54.5	<b>54.8</b>
<b>Vol Exceeding %</b>	1604	1036	573	1285	1402	967	750	1180	859	<b>1088</b>
<b>Exceeding %</b>	37.72	22.30	10.23	29.96	33.07	18.65	14.94	25.62	16.83	<b>22.92</b>
<b>Vehicles 30kph Above</b>		15229	<b>22.92%</b>							

### Class Data

**Commercial**      **7.64%**

Class (AustRoads94)	Number of Vehicles	%
1 - SV	60951	91.74%
2 - SVT	414	0.623%
3 - TB2	4643	6.988%
4 - TB3	85	0.128%
5 - T4	220	0.331%
6 - ART3	51	0.077%
7 - ART4	40	0.060%
8 - ART5	7	0.011%
9 - ART6	21	0.032%
10 - BD	6	0.009%
11 - DRT	2	0.003%
12 - TRT	0	0.000%

Class (AustRoads94)	%
Light Vehicle	92.36%
Medium Vehicle	7.45%
Heavy Vehicle	0.19%



## Traffic Survey

**Location:** Patterson Rd, Rockingham(#) <80>

**Site name:** Patterson Rd, Rockingham Location: [-32.270333 +115.752224]

**Survey duration:** 0:00 Friday, 22 March 2024 to 0:00 Saturday, 30 March 2024 (8 days, 1.14286 weeks)

**Profile:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16),

**Speed limit:** 80 km/h

**Sensor Balance:** %

**Class scheme =** AustRoads94

### Summary

<b>AWDT (VPD)</b>	<b>19560</b>
<b>Commercial</b>	<b>10.4%</b>
<b>Mean Speed</b>	<b>71.8kp/h</b>
<b>Speed 85%</b>	<b>79.6kp/h</b>
<b>30kp/h Above</b>	<b>13.29%</b>
<b>Direction</b>	<b>East, West (bound)</b>

### Average Daily Volume

Hours	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
0000-0100	39	67	68	79	92	115	126	73	121	85
0100-0200	40	20	33	36	55	67	83	40	75	49
0200-0300	27	36	34	34	54	52	53	40	53	43
0300-0400	84	78	79	84	64	62	75	75	69	74
0400-0500	265	269	307	253	190	124	101	246	113	212
0500-0600	852	908	889	844	521	348	203	756	276	636
0600-0700	1108	1181	1154	1085	684	400	278	983	339	822
0700-0800	1268	1382	1308	1296	853	602	440	1160	521	1000
0800-0900	1412	1382	1455	1409	939	901	744	1256	823	1148
0900-1000	1167	1216	1280	1204	1053	1158	1045	1162	1102	1147
1000-1100	1186	1171	1165	1286	1158	1361	1203	1187	1282	1211
1100-1200	1216	1212	1286	1400	1313	1342	1322	1290	1332	1300
1200-1300	1192	1196	1273	1512	1276	1350	1270	1287	1310	1293
1300-1400	1217	1206	1232	1528	1357	1219	1188	1316	1204	1288
1400-1500	1512	1455	1525	1667	1400	1264	1248	1493	1256	1434
1500-1600	1798	1797	1791	1825	1394	1163	1090	1666	1127	1531
1600-1700	1801	1863	1836	1806	1351	1081	1004	1668	1043	1512
1700-1800	1382	1507	1574	1390	1091	1048	935	1339	992	1252
1800-1900	791	862	996	956	782	767	671	861	719	826
1900-2000	518	518	621	699	563	581	557	580	569	578
2000-2100	331	334	462	464	450	452	403	415	428	418
2100-2200	221	262	339	435	375	493	284	334	389	348
2200-2300	130	167	220	282	250	304	169	216	237	221
2300-2400	76	81	121	147	137	198	87	117	143	123
<b>Total</b>	<b>19633</b>	<b>20170</b>	<b>21048</b>	<b>21721</b>	<b>17394</b>	<b>16452</b>	<b>14579</b>	<b>19560</b>	<b>15516</b>	<b>18549</b>

<b>AM peak</b>	412 (0800)	382 (0700)	455 (0800)	409 (0800)	313 (1100)	361 (1000)	322 (1100)	1290 (1100)	332 (1100)	300 (1100)
<b>PM peak</b>	801 (1600)	863 (1600)	836 (1600)	825 (1500)	400 (1400)	350 (1200)	270 (1200)	1668 (1600)	310 (1200)	531 (1500)
<b>Day peak</b>	801 (1600)	863 (1600)	836 (1600)	825 (1500)	400 (1400)	361 (1000)	322 (1100)	1668 (1600)	332 (1100)	531 (1500)

### Speed Data kp/h

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>Mean kp/h</b>	71.6	71.9	71.9	71.3	71.9	71.8	72.1	71.8	71.9	71.8
<b>Speed 85% kp/h</b>	79.7	79.9	79.7	79.4	79.4	79.4	79.4	79.6	79.4	79.6
<b>Mean Exceeding kp/h</b>	83.6	83.6	83.8	83.6	83.5	83.7	83.6	83.6	83.7	83.6

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>Vol Exceeding %</b>	2762	2977	2912	2702	2207	2105	1845	2628	1975	2465
<b>Exceeding %</b>	14.07	14.76	13.84	12.44	12.69	12.79	12.66	13.43	12.73	13.29

Vehicles 30kph Above 19716 13.29%

### Class Data

**Commercial 10.36%**

Class (AustRoads94)	Number of Vehicles	%
1 - SV	129722	87.42%
2 - SVT	3296	2.221%
3 - TB2	10824	7.294%
4 - TB3	835	0.563%
5 - T4	491	0.331%
6 - ART3	275	0.185%
7 - ART4	1840	1.240%
8 - ART5	154	0.104%
9 - ART6	707	0.476%
10 - BD	52	0.035%
11 - DRT	111	0.075%
12 - TRT	84	0.057%

Class (AustRoads94)	%
Light Vehicle	89.64%
Medium Vehicle	8.19%
Heavy Vehicle	2.17%



## Traffic Survey

**Location:** Patterson Road - east of Parkin Street

**Site name:** Patterson-07 Location: [-32.277438 +115.730408]

**Survey duration:** 0:00 Wednesday, 8 June 2022 to 0:00 Wednesday, 15 June 2022 (7 days, 1 weeks)

**Profile:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16),

**Speed limit:** 60 km/h

**Sensor Balance:** %

**Class scheme =** AustRoads94

### Summary

<b>AWDT (VPD)</b>	<b>11903</b>
<b>Commercial</b>	<b>7.3%</b>
<b>Mean Speed</b>	<b>46.7kp/h</b>
<b>Speed 85%</b>	<b>53.1kp/h</b>
<b>30kp/h Above</b>	<b>2.070%</b>
<b>Direction</b>	<b>East, West (bound)</b>

### Average Daily Volume

Hours	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
0000-0100	18	28	20	20	21	60	67	21	64	33
0100-0200	14	19	13	29	19	33	34	19	34	23
0200-0300	14	20	12	9	24	21	16	16	19	17
0300-0400	15	26	32	20	16	11	24	22	18	21
0400-0500	62	65	66	54	53	50	24	60	37	53
0500-0600	308	314	358	333	314	92	54	325	73	253
0600-0700	605	577	652	588	593	134	105	603	120	465
0700-0800	656	676	705	727	606	332	207	674	270	558
0800-0900	710	750	734	752	763	519	429	742	474	665
0900-1000	745	735	678	728	832	693	574	744	634	712
1000-1100	730	761	769	826	899	891	616	797	754	785
1100-1200	813	857	882	887	964	1027	722	881	875	879
1200-1300	773	881	908	841	1154	1022	814	911	918	913
1300-1400	830	852	852	811	994	936	794	868	865	867
1400-1500	860	914	935	908	1081	837	735	940	786	896
1500-1600	956	1120	1270	1118	903	743	631	1073	687	963
1600-1700	992	1096	934	1033	851	747	608	981	678	894
1700-1800	747	864	758	794	835	710	591	800	651	757
1800-1900	415	503	491	561	537	586	414	501	500	501
1900-2000	307	305	306	337	391	420	253	329	337	331
2000-2100	186	241	225	282	316	350	181	250	266	254
2100-2200	135	156	145	198	304	255	152	188	204	192
2200-2300	66	78	104	95	192	196	69	107	133	114
2300-2400	23	47	47	51	89	125	29	51	77	59
<b>Total</b>	<b>10980</b>	<b>11885</b>	<b>11896</b>	<b>12002</b>	<b>12751</b>	<b>10790</b>	<b>8143</b>	<b>11903</b>	<b>9467</b>	<b>11207</b>

<b>AM peak</b>	813 (1100)	857 (1100)	882 (1100)	887 (1100)	964 (1100)	1027 (1100)	722 (1100)	<b>881 (1100)</b>	875 (1100)	<b>879 (1100)</b>
<b>PM peak</b>	992 (1600)	1120 (1500)	270 (1500)	118 (1500)	154 (1200)	1022 (1200)	814 (1200)	<b>1073 (1500)</b>	918 (1200)	<b>963 (1500)</b>
<b>Day peak</b>	992 (1600)	1120 (1500)	270 (1500)	118 (1500)	154 (1200)	1027 (1100)	814 (1200)	<b>1073 (1500)</b>	918 (1200)	<b>963 (1500)</b>

### Speed Data kp/h

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>Mean kp/h</b>	46.9	46.6	46.8	47.0	46.1	46.3	47.1	46.7	46.7	46.7
<b>Speed 85% kp/h</b>	53.3	52.9	53.3	53.5	52.7	52.7	53.1	53.1	52.9	<b>53.1</b>
<b>Mean Exceeding kp/h</b>	63.9	63.5	63.5	63.6	63.4	63.3	63.8	63.6	63.5	63.6
<b>Vol Exceeding %</b>	232	225	268	271	241	204	183	247	194	232
<b>Exceeding</b>	2.113	1.893	2.253	2.258	1.890	1.891	2.247	2.079	2.044	2.070
<b>Vehicles 30kph Above</b>	1624	2.070%								

### Class Data

**Commercial 7.34%**

Class (AustRoads94)	Number of Vehicles	%
1 - SV	72066	91.87%
2 - SVT	622	0.793%
3 - TB2	4523	5.766%
4 - TB3	582	0.742%
5 - T4	197	0.251%
6 - ART3	34	0.043%
7 - ART4	72	0.092%
8 - ART5	28	0.036%
9 - ART6	319	0.407%
10 - BD	2	0.003%
11 - DRT	1	0.001%
12 - TRT	1	0.001%

Class (AustRoads94)	%
Light Vehicle	92.66%
Medium Vehicle	6.76%
Heavy Vehicle	0.58%



## Traffic Survey

**Location:** Pedlar Crt Rockingham (#) <>

**Site name:** Pedlar Crt Rockingham Location: [-32.269413 +115.752962]

**Survey duration:** 0:00 Friday, 22 March 2024 to 0:00 Saturday, 30 March 2024 (8 days, 1.14286 weeks)

**Profile:** Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16),

**Speed limit:** 50 km/h      **Sensor Balance:** %      **Class scheme =** AustRoads94

### Summary

<b>AWDT (VPD)</b>	<b>6067</b>
<b>Commercial</b>	<b>11.1%</b>
<b>Mean Speed</b>	<b>31.4kp/h</b>
<b>Speed 85%</b>	<b>36.5kp/h</b>
<b>30kp/h Above</b>	<b>0.095%</b>
<b>Direction</b>	<b>North, South (bound)</b>

### Average Daily Volume

Hours	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
0000-0100	0	2	2	0	4	0	2	2	1	2
0100-0200	2	2	2	2	2	3	0	2	2	2
0200-0300	1	2	0	3	2	8	2	2	5	3
0300-0400	3	2	2	9	2	4	1	3	3	3
0400-0500	19	8	13	20	10	3	1	13	2	10
0500-0600	43	49	40	46	23	15	9	37	12	31
0600-0700	118	118	124	126	70	41	20	104	31	86
0700-0800	247	262	263	296	164	242	169	233	206	226
0800-0900	451	446	485	508	267	527	320	404	424	409
0900-1000	663	632	636	752	379	767	582	574	675	599
1000-1100	805	749	660	795	411	891	803	639	847	691
1100-1200	744	713	721	830	455	902	878	653	890	712
1200-1300	701	686	619	800	409	809	778	604	794	651
1300-1400	639	595	610	796	382	724	629	567	677	595
1400-1500	615	605	582	717	359	764	586	540	675	573
1500-1600	616	615	613	683	339	595	443	534	519	530
1600-1700	560	541	519	595	246	401	358	451	380	433
1700-1800	377	372	403	483	165	283	241	328	262	311
1800-1900	231	225	253	305	91	149	106	199	128	181
1900-2000	88	105	104	176	50	30	27	96	29	79
2000-2100	53	31	57	83	31	3	9	48	6	37
2100-2200	24	17	11	40	14	11	6	20	9	17
2200-2300	16	14	11	21	13	5	1	15	3	12
2300-2400	3	0	2	0	2	1	0	2	1	1
<b>Total</b>	<b>7019</b>	<b>6791</b>	<b>6732</b>	<b>8086</b>	<b>3887</b>	<b>7178</b>	<b>5971</b>	<b>6067</b>	<b>6575</b>	<b>6194</b>

<b>AM peak</b>	805 (1000)	749 (1000)	721 (1100)	830 (1100)	455 (1100)	902 (1100)	878 (1100)	<b>653 (1100)</b>	890 (1100)	<b>712 (1100)</b>
<b>PM peak</b>	701 (1200)	686 (1200)	619 (1200)	800 (1200)	409 (1200)	809 (1200)	778 (1200)	<b>604 (1200)</b>	794 (1200)	<b>651 (1200)</b>
<b>Day peak</b>	805 (1000)	749 (1000)	721 (1100)	830 (1100)	455 (1100)	902 (1100)	878 (1100)	<b>653 (1100)</b>	890 (1100)	<b>712 (1100)</b>

### Speed Data kp/h

	MON	TUES	WED	THURS	FRI	SAT	SUN	AWDT	AWET	ADT
<b>Mean kp/h</b>	31.6	31.6	31.9	31.2	31.7	31.1	31.0	31.6	31.1	31.4
<b>Speed 85% kp/h</b>	36.5	36.7	36.9	36.5	36.9	36.2	36.2	36.7	36.2	<b>36.5</b>
<b>Mean Exceeding kp/h</b>	51.3	54.0	54.3	53.4	52.6	52.7	52.1	53.1	52.5	53.0
<b>Vol Exceeding %</b>	6	1	11	7	7	5	3	7	4	6
<b>Exceeding %</b>	0.085	0.015	0.163	0.087	0.180	0.070	0.050	0.107	0.061	<b>0.095</b>
<b>Vehicles 30kph Above</b>	47									<b>0.095%</b>

### Class Data

**Commercial 11.07%**

Class (AustRoads94)	Number of Vehicles	%
1 - SV	43441	87.67%
2 - SVT	626	1.263%
3 - TB2	4990	10.07%
4 - TB3	226	0.456%
5 - T4	109	0.220%
6 - ART3	49	0.099%
7 - ART4	81	0.163%
8 - ART5	8	0.016%
9 - ART6	20	0.040%
10 - BD	0	0.000%
11 - DRT	1	0.002%
12 - TRT	0	0.000%

Class (AustRoads94)	%
Light Vehicle	88.93%
Medium Vehicle	10.75%
Heavy Vehicle	0.32%

# Appendix E

SIDRA Results



# MOVEMENT SUMMARY

**Site: LM00303 [01\_PattersonRd\_ReadSt\_AM\_2025 (Site Folder: Base 2025 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. veh	Dist ] m				km/h
South: Read St															
1	L2	All MCs	285	8.8	285	8.8	0.246	11.5	LOS B	4.8	36.4	0.40	0.69	0.40	51.9
2	T1	All MCs	120	8.8	120	8.8	0.131	24.6	LOS C	3.3	24.5	0.66	0.63	0.66	42.3
3	R2	All MCs	384	8.8	384	8.8	*0.636	31.4	LOS C	14.8	111.8	0.90	0.83	0.90	40.9
Approach			789	8.8	789	8.8	0.636	23.2	LOS C	14.8	111.8	0.68	0.75	0.68	44.5
East: Patterson Rd															
4	L2	All MCs	352	8.8	352	8.8	0.267	8.5	LOS A	4.4	33.4	0.33	0.65	0.33	51.7
5	T1	All MCs	680	8.8	680	8.8	*0.787	51.4	LOS D	18.4	138.6	1.00	0.92	1.09	34.3
6	R2	All MCs	22	8.8	22	8.8	0.099	62.9	LOS E	1.1	8.1	0.92	0.70	0.92	30.4
Approach			1054	8.8	1054	8.8	0.787	37.3	LOS D	18.4	138.6	0.77	0.83	0.83	37.1
North: Flinders Ln															
7	L2	All MCs	24	8.8	24	8.8	0.731	64.8	LOS E	4.9	36.8	1.00	0.87	1.19	27.9
8	T1	All MCs	115	8.8	115	8.8	*0.731	60.3	LOS E	4.9	36.8	1.00	0.87	1.19	29.3
9	R2	All MCs	23	8.8	23	8.8	0.731	65.1	LOS E	4.5	34.0	1.00	0.88	1.20	28.0
Approach			162	8.8	162	8.8	0.731	61.7	LOS E	4.9	36.8	1.00	0.87	1.19	28.9
West: Patterson Rd															
10	L2	All MCs	53	8.8	53	8.8	0.492	6.9	LOS A	9.6	72.0	0.91	0.78	0.91	34.8
11	T1	All MCs	379	8.8	379	8.8	0.492	42.6	LOS D	10.1	75.8	0.91	0.77	0.91	37.0
12	R2	All MCs	168	8.8	168	8.8	*0.757	60.2	LOS E	9.4	71.0	1.00	0.90	1.14	30.2
Approach			600	8.8	600	8.8	0.757	44.4	LOS D	10.1	75.8	0.94	0.81	0.98	34.6
All Vehicles			2605	8.8	2605	8.8	0.787	36.2	LOS D	18.4	138.6	0.80	0.80	0.84	37.7

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec	
South: Read St												
P2	Full	50	53	46.5	LOS E	0.2	0.2	0.92	0.92	200.3	200.0	1.00
East: Patterson Rd												

P5	Stage 1	25	26	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00
P4	Stage 2	25	26	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00
North: Flinders Ln												
P1	Full	50	53	46.5	LOS E	0.2	0.2	0.92	0.92	200.3	200.0	1.00
West: Patterson Rd												
P3	Full	50	53	46.5	LOS E	0.2	0.2	0.92	0.92	200.3	200.0	1.00
All	Pedestrians	200	211	46.5	LOS E	0.2	0.2	0.92	0.92	200.3	200.0	1.00

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: K:\Infrastructure Pune Team\Project Folder\AP\Traffic\300204265 - Rockingham PSP\40 Technical\Sidra\Rockingham\_09232025.sip9

# MOVEMENT SUMMARY

**Site: LM00332 [02\_Patterson Rd Ennis Ave\_AM\_2025 (Site Folder: Base 2025 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: Base Year

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec			m				km/h
SouthEast: Ennis Ave															
21	L2	All MCs	280	6.8	280	6.8	0.760	14.7	LOS B	14.4	109.5	0.94	0.95	1.01	42.5
23	R2	All MCs	542	6.8	542	6.8	*0.760	44.7	LOS D	14.4	109.5	0.96	0.92	1.06	40.8
Approach			822	6.8	822	6.8	0.760	34.5	LOS C	14.4	109.5	0.95	0.93	1.04	41.4
NorthEast: Patterson Rd															
24	L2	All MCs	174	6.8	174	6.8	0.101	6.7	LOS A	0.0	0.0	0.00	0.56	0.00	56.7
25	T1	All MCs	582	6.8	582	6.8	*0.754	35.2	LOS D	11.6	87.7	0.99	0.90	1.11	43.3
Approach			756	6.8	756	6.8	0.754	28.7	LOS C	11.6	87.7	0.77	0.82	0.86	45.8
SouthWest: Patterson Rd															
31	T1	All MCs	566	6.8	566	6.8	0.290	10.9	LOS B	6.0	45.7	0.58	0.51	0.58	60.3
32	R2	All MCs	167	6.8	167	6.8	*0.648	26.5	LOS C	3.8	28.7	0.99	0.82	1.05	44.2
Approach			734	6.8	734	6.8	0.648	14.5	LOS B	6.0	45.7	0.68	0.58	0.69	55.7
All Vehicles			2312	6.8	2312	6.8	0.760	26.3	LOS C	14.4	109.5	0.80	0.78	0.87	46.6

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	ped/h	sec		ped	m			sec	m	m/sec	
SouthEast: Ennis Ave												
P1	Full	30	32	26.4	LOS C	0.1	0.1	0.81	0.81	180.3	200.0	1.11
SouthWest: Patterson Rd												
P2	Full	30	32	24.8	LOS C	0.1	0.1	0.79	0.79	178.7	200.0	1.12
All Pedestrians		60	63	25.6	LOS C	0.1	0.1	0.80	0.80	179.5	200.0	1.11

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: U:\300204265\Traffic\working\Sidra\Rockingham\_update\_09122025.sip9

# MOVEMENT SUMMARY

**Site: LM00345 [03\_Ennis Ave\_Dixon Rd\_AM\_2025 (Site Folder: Base 2025 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

Ennis Ave and Dixon Rd  
 Site Category: Base Year  
 Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. ]	[ Dist ]				km/h
			veh/h		veh/h					veh	m				
South: Ennis Ave															
1	L2	All MCs	195	4.4	195	4.4	0.908	32.3	LOS C	27.3	201.5	1.00	1.13	1.28	31.1
2	T1	All MCs	739	4.4	739	4.4	0.908	61.6	LOS E	27.3	201.5	1.00	1.10	1.29	34.2
3	R2	All MCs	615	4.4	615	4.4	* 1.024	86.3	LOS F	18.3	135.1	1.00	1.31	1.82	21.8
Approach			1548	4.4	1548	4.4	1.024	67.7	LOS E	27.3	201.5	1.00	1.19	1.50	27.6
East: Dixon Rd															
4	L2	All MCs	701	4.4	701	4.4	0.587	12.2	LOS B	14.8	109.4	0.58	0.75	0.58	49.8
5	T1	All MCs	783	4.4	783	4.4	* 1.080	141.1	LOS F	35.5	261.8	1.00	1.58	2.07	18.6
6	R2	All MCs	187	4.4	187	4.4	* 1.061	139.0	LOS F	15.5	114.2	1.00	1.35	2.09	19.0
Approach			1672	4.4	1672	4.4	1.080	86.8	LOS F	35.5	261.8	0.83	1.20	1.45	25.3
North: Ennis Ave															
7	L2	All MCs	156	4.4	156	4.4	1.029	71.6	LOS E	22.5	166.3	1.00	1.29	1.85	21.5
8	T1	All MCs	406	4.4	406	4.4	* 1.029	105.0	LOS F	22.5	166.3	1.00	1.29	1.87	23.0
9	R2	All MCs	87	4.4	87	4.4	0.450	53.6	LOS D	4.2	30.9	0.98	0.77	0.98	32.2
Approach			649	4.4	649	4.4	1.029	90.1	LOS F	22.5	166.3	1.00	1.22	1.74	23.5
West: Dixon Rd															
10	L2	All MCs	87	4.4	87	4.4	0.094	15.3	LOS B	1.9	13.7	0.52	0.67	0.52	47.9
11	T1	All MCs	335	4.4	335	4.4	0.450	38.6	LOS D	7.3	54.0	0.93	0.76	0.93	36.9
12	R2	All MCs	100	4.4	100	4.4	0.566	54.5	LOS D	4.9	36.3	1.00	0.79	1.01	31.9
Approach			522	4.4	522	4.4	0.566	37.7	LOS D	7.3	54.0	0.87	0.75	0.87	37.2
All Vehicles			4392	4.4	4392	4.4	1.080	74.7	LOS E	35.5	261.8	0.92	1.15	1.44	26.8

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

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ]	[ Dist ]			sec	m	m/sec
						ped	m					
North: Ennis Ave												
P2	Full	30	32	37.0	LOS D	0.1	0.1	0.86	0.86	190.9	200.0	1.05
West: Dixon Rd												

P1 Full	30	32	37.0	LOS D	0.1	0.1	0.86	0.86	190.9	200.0	1.05
All Pedestrians	60	63	37.0	LOS D	0.1	0.1	0.86	0.86	190.9	200.0	1.05

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: U:\300204265\Trafficworking\Sidra\Rockingham\_update\_09122025.sip9

# MOVEMENT SUMMARY

**Site: LM00335 [04\_Ennis Ave\_Council Ave\_AM\_2025 (Site Folder: Base 2025 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. veh	Dist ] m				km/h
South: Ennis Ave															
1	L2	All MCs	655	4.3	655	4.3	0.526	61.8	LOS E	11.9	87.9	0.48	0.74	0.48	51.1
2	T1	All MCs	1576	4.3	1576	4.3	*2.010	990.8	LOS F	185.2	1364.4	1.00	3.33	5.00	3.6
3	R2	All MCs	23	4.3	23	4.3	0.213	94.4	LOS F	1.3	9.6	0.98	0.71	0.98	28.2
Approach			2254	4.3	2254	4.3	2.010	711.7	LOS F	185.2	1364.4	0.85	2.55	3.64	5.0
East: Carvie St															
4	L2	All MCs	57	4.3	57	4.3	0.131	13.3	LOS B	1.8	13.4	0.74	0.69	0.74	42.1
5	T1	All MCs	57	4.3	57	4.3	*0.131	44.7	LOS D	2.0	15.0	0.85	0.68	0.85	35.1
6	R2	All MCs	26	4.3	26	4.3	0.085	47.2	LOS D	1.2	9.1	0.87	0.70	0.87	32.2
Approach			140	4.3	140	4.3	0.131	32.4	LOS C	2.0	15.0	0.81	0.69	0.81	37.0
North: Ennis Ave															
7	L2	All MCs	8	4.3	8	4.3	0.006	14.0	LOS B	0.0	0.3	0.16	0.60	0.16	50.0
8	T1	All MCs	892	4.3	892	4.3	0.738	39.9	LOS D	22.7	167.1	0.95	0.84	0.96	41.1
9	R2	All MCs	380	4.3	380	4.3	*1.883	841.8	LOS F	79.7	587.5	1.00	2.28	4.75	4.0
Approach			1280	4.3	1280	4.3	1.883	277.8	LOS F	79.7	587.5	0.96	1.27	2.08	10.9
West: Council Ave															
10	L2	All MCs	167	4.3	167	4.3	0.270	20.6	LOS C	3.6	26.6	0.76	0.75	0.76	44.8
11	T1	All MCs	17	4.3	17	4.3	*0.461	48.4	LOS D	7.0	51.8	0.95	0.79	0.95	30.9
12	R2	All MCs	256	4.3	256	4.3	0.461	52.9	LOS D	7.0	51.8	0.95	0.79	0.95	32.4
Approach			440	4.3	440	4.3	0.461	40.4	LOS D	7.0	51.8	0.88	0.78	0.88	36.1
All Vehicles			4114	4.3	4114	4.3	2.010	481.8	LOS F	185.2	1364.4	0.88	1.90	2.76	7.1

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: Ennis Ave												
P4	Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
East: Carvie St												

P2 Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
North: Ennis Ave											
P3 Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
West: Council Ave											
P1 Full	25	26	42.2	LOS E	0.1	0.1	0.86	0.86	196.0	200.0	1.02
P5 Slip/ Bypass	25	26	21.3	LOS C	0.0	0.0	0.84	0.84	175.1	200.0	1.14
All Pedestrians	200	211	39.6	LOS D	0.1	0.1	0.86	0.86	193.4	200.0	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00852 [05\_Ennis Ave\_Rae Rd\_AM\_2025 (Site Folder: Base 2025 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: Base Year

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. ]	[ Dist ]				km/h
			veh/h		veh/h					veh	m				
South: Ennis Ave															
1	L2	All MCs	66	0.3	66	0.3	0.048	7.9	LOS A	0.4	3.0	0.26	0.64	0.26	57.6
2	T1	All MCs	1886	0.3	1886	0.3	*0.822	26.3	LOS C	25.2	183.7	0.93	0.88	1.00	47.6
3	R2	All MCs	97	0.3	97	0.3	0.721	50.5	LOS D	4.1	30.1	1.00	0.86	1.21	32.2
Approach			2049	0.3	2049	0.3	0.822	26.8	LOS C	25.2	183.7	0.91	0.87	0.99	46.8
East: Rockingham Sta Acc Rd															
4	L2	All MCs	19	0.3	19	0.3	0.020	7.6	LOS A	0.2	1.4	0.36	0.58	0.36	49.7
5	T1	All MCs	23	0.3	23	0.3	0.164	39.7	LOS D	0.9	6.6	0.97	0.68	0.97	35.7
6	R2	All MCs	46	0.3	46	0.3	0.345	45.2	LOS D	1.9	13.5	0.99	0.73	0.99	33.3
Approach			88	0.3	88	0.3	0.345	35.7	LOS D	1.9	13.5	0.85	0.69	0.85	36.5
North: Ennis Ave															
7	L2	All MCs	60	0.3	60	0.3	0.044	8.1	LOS A	0.4	3.0	0.27	0.64	0.27	50.7
8	T1	All MCs	945	0.3	945	0.3	0.394	17.1	LOS B	8.5	62.1	0.74	0.63	0.74	52.6
9	R2	All MCs	216	0.3	216	0.3	*0.803	52.4	LOS D	4.7	34.5	1.00	0.91	1.35	34.1
Approach			1221	0.3	1221	0.3	0.803	22.9	LOS C	8.5	62.1	0.76	0.68	0.82	48.0
West: Rae Rd															
10	L2	All MCs	303	0.3	303	0.3	0.395	22.2	LOS C	6.7	48.5	0.68	0.77	0.68	50.5
11	T1	All MCs	62	0.3	62	0.3	*0.440	43.6	LOS D	2.5	18.2	0.99	0.75	0.99	34.8
12	R2	All MCs	103	0.3	103	0.3	*0.768	51.5	LOS D	4.5	32.6	1.00	0.89	1.28	34.6
Approach			468	0.3	468	0.3	0.768	31.5	LOS C	6.7	48.5	0.79	0.79	0.86	43.4
All Vehicles			3827	0.3	3827	0.3	0.822	26.4	LOS C	25.2	183.7	0.85	0.80	0.92	46.4

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

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# MOVEMENT SUMMARY

**Site: LM00488 [06\_Read St\_Chalgrove Ave\_AM\_2025 (Site Folder: Base 2025 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: Base Year

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Read St															
1	L2	All MCs	40	5.1	40	5.1	0.883	53.6	LOS D	32.5	237.7	1.00	1.02	1.17	27.7
2	T1	All MCs	1079	5.1	1079	5.1	*0.883	47.2	LOS D	32.6	238.5	1.00	1.02	1.17	31.7
3	R2	All MCs	214	5.1	214	5.1	*0.874	67.3	LOS E	12.9	94.5	1.00	0.98	1.31	24.2
Approach			1333	5.1	1333	5.1	0.883	50.6	LOS D	32.6	238.5	1.00	1.01	1.19	30.1
East: Chalgrove Ave															
4	L2	All MCs	127	5.1	127	5.1	0.111	9.3	LOS A	1.7	12.6	0.34	0.64	0.34	48.4
5	T1	All MCs	23	5.1	23	5.1	0.059	38.8	LOS D	1.0	7.3	0.83	0.64	0.83	34.8
6	R2	All MCs	88	5.1	88	5.1	*0.775	66.9	LOS E	5.2	37.9	1.00	0.89	1.25	28.9
Approach			239	5.1	239	5.1	0.775	33.5	LOS C	5.2	37.9	0.63	0.73	0.72	36.3
North: Read St															
7	L2	All MCs	228	5.1	228	5.1	0.182	10.0	LOS A	3.0	22.2	0.34	0.67	0.34	53.1
8	T1	All MCs	643	5.1	643	5.1	0.507	31.4	LOS C	13.8	100.8	0.85	0.73	0.85	38.9
9	R2	All MCs	37	5.1	37	5.1	0.151	52.7	LOS D	1.8	13.0	0.92	0.73	0.92	31.5
Approach			908	5.1	908	5.1	0.507	26.9	LOS C	13.8	100.8	0.73	0.72	0.73	41.8
West: Chalgrove Ave															
10	L2	All MCs	23	5.1	23	5.1	0.249	44.0	LOS D	4.4	32.0	0.88	0.71	0.88	33.9
11	T1	All MCs	74	5.1	74	5.1	*0.249	39.4	LOS D	4.4	32.0	0.88	0.71	0.88	34.0
12	R2	All MCs	64	5.1	64	5.1	0.563	62.4	LOS E	3.6	26.3	1.00	0.78	1.04	23.6
Approach			161	5.1	161	5.1	0.563	49.3	LOS D	4.4	32.0	0.93	0.74	0.94	29.7
All Vehicles			2641	5.1	2641	5.1	0.883	40.8	LOS D	32.6	238.5	0.87	0.87	0.97	34.0

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P4	Full	30	32	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00
East: Chalgrove Ave												

P1 Full	30	32	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00
North: Read St											
P3 Full	30	32	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00
West: Chalgrove Ave											
P2 Full	30	32	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00
All Pedestrians	120	126	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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1:00:15 PM

Project: K:\Infrastructure Pune Team\Project Folder\AP\Traffic\300204265 - Rockingham PSP\40 Technical\Sidra\Rockingham\_09232025.sip9

# MOVEMENT SUMMARY

**Site: LM00343 [07 Read St\_Council Ave\_AM\_2025 (Site Folder: Base 2025 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
			veh/h	%	veh/h	%	v/c	sec							
South: Read St															
1	L2	All MCs	27	5.1	27	5.1	1.015	114.9	LOS F	60.0	438.6	1.00	1.29	1.43	22.1
2	T1	All MCs	1139	5.1	1139	5.1	* 1.015	110.3	LOS F	60.0	438.6	1.00	1.30	1.43	19.6
3	R2	All MCs	528	5.1	528	5.1	* 1.029	129.3	LOS F	54.5	398.0	1.00	1.17	1.49	20.7
Approach			1695	5.1	1695	5.1	1.029	116.3	LOS F	60.0	438.6	1.00	1.26	1.45	19.8
East: Council Ave															
4	L2	All MCs	208	5.1	208	5.1	0.168	10.1	LOS B	3.8	28.1	0.31	0.64	0.31	52.8
5	T1	All MCs	38	5.1	38	5.1	0.125	59.6	LOS E	2.4	17.4	0.89	0.69	0.89	29.2
6	R2	All MCs	121	5.1	121	5.1	* 1.013	128.9	LOS F	11.8	86.5	1.00	1.13	1.66	15.7
Approach			367	5.1	367	5.1	1.013	54.4	LOS D	11.8	86.5	0.60	0.81	0.82	31.0
North: Read St															
7	L2	All MCs	158	5.1	158	5.1	0.155	24.7	LOS C	4.7	34.5	0.48	0.70	0.48	42.4
8	T1	All MCs	674	5.1	674	5.1	0.594	49.3	LOS D	21.5	157.3	0.90	0.78	0.90	33.4
9	R2	All MCs	52	5.1	52	5.1	0.100	48.3	LOS D	2.7	20.0	0.77	0.73	0.77	27.7
Approach			883	5.1	883	5.1	0.594	44.8	LOS D	21.5	157.3	0.82	0.76	0.82	33.0
West: Council Ave															
10	L2	All MCs	182	5.1	182	5.1	0.718	66.0	LOS E	17.1	124.6	0.98	1.04	1.00	22.6
11	T1	All MCs	84	5.1	84	5.1	* 0.718	157.6	LOS F	17.1	124.6	0.98	1.04	1.00	27.2
12	R2	All MCs	19	5.1	19	5.1	0.159	105.0	LOS F	1.4	9.9	0.97	0.70	0.97	26.5
Approach			285	5.1	285	5.1	0.718	95.6	LOS F	17.1	124.6	0.98	1.02	1.00	20.1
All Vehicles			3231	5.1	3231	5.1	1.029	87.9	LOS F	60.0	438.6	0.90	1.05	1.17	23.2

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P4	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Council Ave												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Read St											
P3 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Council Ave											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	120	126	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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1:00:16 PM

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# MOVEMENT SUMMARY

**Site: LM00445 [08 Read St\_Rae Rd\_AM\_2025 (Site Folder: Base 2025 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 140 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec			m				km/h
South: Read St															
1	L2	All MCs	167	5.1	167	5.1	0.119	28.3	LOS C	1.8	13.5	0.23	0.64	0.23	56.0
2	T1	All MCs	1381	5.1	1381	5.1	*0.909	66.1	LOS E	52.3	382.1	1.00	1.02	1.13	36.2
3	R2	All MCs	152	5.1	152	5.1	*0.846	91.2	LOS F	11.2	82.1	1.00	0.94	1.24	26.6
Approach			1700	5.1	1700	5.1	0.909	64.6	LOS E	52.3	382.1	0.92	0.98	1.05	32.1
East: Rae Rd															
4	L2	All MCs	122	5.1	122	5.1	0.123	13.3	LOS B	2.6	18.8	0.38	0.68	0.38	52.3
5	T1	All MCs	123	5.1	123	5.1	0.279	58.1	LOS E	4.6	33.9	0.93	0.71	0.93	33.5
6	R2	All MCs	55	5.1	55	5.1	0.267	69.0	LOS E	3.5	25.5	0.95	0.75	0.95	30.7
Approach			300	5.1	300	5.1	0.279	41.9	LOS D	4.6	33.9	0.71	0.71	0.71	38.3
North: Read St															
7	L2	All MCs	57	5.1	57	5.1	0.032	6.7	LOS A	0.0	0.0	0.00	0.57	0.00	58.6
8	T1	All MCs	723	5.1	723	5.1	0.433	28.5	LOS C	16.8	122.4	0.74	0.65	0.74	46.4
9	R2	All MCs	115	5.1	115	5.1	0.640	74.7	LOS E	7.9	57.4	1.00	0.81	1.03	29.0
Approach			895	5.1	895	5.1	0.640	33.0	LOS C	16.8	122.4	0.72	0.66	0.73	43.6
West: Rae Rd															
10	L2	All MCs	235	5.1	235	5.1	0.286	25.5	LOS C	8.8	64.4	0.63	0.75	0.63	46.0
11	T1	All MCs	235	5.1	235	5.1	*0.874	73.7	LOS E	17.5	128.0	1.00	0.99	1.23	29.4
12	R2	All MCs	182	5.1	182	5.1	*0.889	85.4	LOS F	13.9	101.8	1.00	0.98	1.30	26.1
Approach			652	5.1	652	5.1	0.889	59.6	LOS E	17.5	128.0	0.87	0.90	1.03	32.6
All Vehicles			3546	5.1	3546	5.1	0.909	53.8	LOS D	52.3	382.1	0.85	0.86	0.94	35.0

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P3	Full	30	32	61.4	LOS F	0.1	0.1	0.94	0.94	215.2	200.0	0.93
East: Rae Rd												

P1 Full	30	32	61.4	LOS F	0.1	0.1	0.94	0.94	215.2	200.0	0.93
West: Rae Rd											
P2 Full	30	32	61.4	LOS F	0.1	0.1	0.94	0.94	215.2	200.0	0.93
All Pedestrians	90	95	61.4	LOS F	0.1	0.1	0.94	0.94	215.2	200.0	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: K:\Infrastructure Pune Team\Project Folder\AP\Traffic\300204265 - Rockingham PSP\40 Technical\Sidra\Rockingham\_09232025.sip9

# MOVEMENT SUMMARY

**Site: LM00303 [01\_PattersonRd\_ReadSt\_PM\_2025 (Site Folder: Base 2025 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
			veh/h	%	veh/h	%	v/c	sec							
South: Read St															
1	L2	All MCs	168	8.8	168	8.8	0.150	11.5	LOS B	2.9	21.5	0.37	0.68	0.37	51.9
2	T1	All MCs	139	8.8	139	8.8	0.180	36.4	LOS D	5.0	37.3	0.73	0.67	0.73	38.0
3	R2	All MCs	352	8.8	352	8.8	*0.726	45.1	LOS D	17.9	134.5	0.97	0.85	0.98	36.3
Approach			659	8.8	659	8.8	0.726	34.7	LOS C	17.9	134.5	0.77	0.77	0.77	39.1
East: Patterson Rd															
4	L2	All MCs	384	8.8	384	8.8	0.315	11.3	LOS B	7.6	57.2	0.41	0.68	0.41	49.7
5	T1	All MCs	673	8.8	673	8.8	*0.859	70.6	LOS E	23.1	173.6	1.00	1.00	1.17	30.1
6	R2	All MCs	24	8.8	24	8.8	0.120	81.2	LOS F	1.4	10.6	0.93	0.71	0.93	28.1
Approach			1081	8.8	1081	8.8	0.859	49.8	LOS D	23.1	173.6	0.79	0.88	0.89	33.0
North: Flinders Ln															
7	L2	All MCs	22	8.8	22	8.8	0.819	77.7	LOS E	6.4	48.0	1.00	0.94	1.28	25.5
8	T1	All MCs	98	8.8	98	8.8	*0.819	73.3	LOS E	6.4	48.0	1.00	0.94	1.28	26.5
9	R2	All MCs	53	8.8	53	8.8	0.819	78.4	LOS E	5.7	42.8	1.00	0.94	1.30	25.2
Approach			173	8.8	173	8.8	0.819	75.5	LOS E	6.4	48.0	1.00	0.94	1.29	26.0
West: Patterson Rd															
10	L2	All MCs	23	8.8	23	8.8	0.531	7.1	LOS A	17.0	127.8	0.85	0.75	0.85	34.8
11	T1	All MCs	655	8.8	655	8.8	0.531	37.8	LOS D	17.1	129.0	0.86	0.75	0.86	37.6
12	R2	All MCs	285	8.8	285	8.8	*0.849	42.7	LOS D	12.5	93.8	1.00	0.92	1.18	35.2
Approach			963	8.8	963	8.8	0.849	38.5	LOS D	17.1	129.0	0.90	0.80	0.95	36.8
All Vehicles			2876	8.8	2876	8.8	0.859	44.1	LOS D	23.1	173.6	0.83	0.83	0.91	34.9

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P2	Full	50	53	56.4	LOS E	0.2	0.2	0.93	0.93	210.3	200.0	0.95
East: Patterson Rd												

P5	Stage 1	25	26	56.4	LOS E	0.1	0.1	0.93	0.93	210.2	200.0	0.95
P4	Stage 2	25	26	56.4	LOS E	0.1	0.1	0.93	0.93	210.2	200.0	0.95
North: Flinders Ln												
P1	Full	50	53	56.4	LOS E	0.2	0.2	0.93	0.93	210.3	200.0	0.95
West: Patterson Rd												
P3	Full	50	53	56.4	LOS E	0.2	0.2	0.93	0.93	210.3	200.0	0.95
All	Pedestrians	200	211	56.4	LOS E	0.2	0.2	0.93	0.93	210.3	200.0	0.95

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: K:\Infrastructure Pune Team\Project Folder\AP\Traffic\300204265 - Rockingham PSP\40 Technical\Sidra\Rockingham\_09232025.sip9

# MOVEMENT SUMMARY

**Site: LM00332 [02\_Patterson Rd Ennis Ave\_PM\_2025 (Site Folder: Base 2025 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: Base Year

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. ]	[ Dist ]				km/h
			veh/h		veh/h					veh	m				
SouthEast: Ennis Ave															
21	L2	All MCs	167	6.8	167	6.8	0.714	14.3	LOS B	11.9	90.5	0.96	0.93	1.00	39.2
23	R2	All MCs	437	6.8	437	6.8	*0.714	51.3	LOS D	11.9	90.5	0.97	0.89	1.03	38.4
Approach			604	6.8	604	6.8	0.714	41.0	LOS D	11.9	90.5	0.97	0.90	1.02	38.7
NorthEast: Patterson Rd															
24	L2	All MCs	248	6.8	248	6.8	0.144	6.7	LOS A	0.0	0.0	0.00	0.56	0.00	56.7
25	T1	All MCs	708	6.8	708	6.8	*0.798	39.0	LOS D	16.0	121.4	1.00	0.93	1.13	41.5
Approach			957	6.8	957	6.8	0.798	30.6	LOS C	16.0	121.4	0.74	0.84	0.84	44.6
SouthWest: Patterson Rd															
31	T1	All MCs	795	6.8	795	6.8	0.358	9.4	LOS A	8.6	65.2	0.53	0.48	0.53	61.9
32	R2	All MCs	280	6.8	280	6.8	*0.770	29.0	LOS C	7.0	53.0	1.00	0.88	1.12	42.9
Approach			1075	6.8	1075	6.8	0.770	14.5	LOS B	8.6	65.2	0.65	0.58	0.69	55.5
All Vehicles			2636	6.8	2636	6.8	0.798	26.4	LOS C	16.0	121.4	0.76	0.75	0.82	46.7

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	ped/h	sec		[ Ped ]	[ Dist ]			sec	m	m/sec	
					ped	m						
SouthEast: Ennis Ave												
P1	Full	30	32	31.3	LOS D	0.1	0.1	0.83	0.83	185.1	200.0	1.08
SouthWest: Patterson Rd												
P2	Full	30	32	29.6	LOS C	0.1	0.1	0.81	0.81	183.5	200.0	1.09
All Pedestrians		60	63	30.5	LOS D	0.1	0.1	0.82	0.82	184.3	200.0	1.09

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: U:\300204265\Traffic\working\Sidra\Rockingham\_update\_09122025.sip9

# MOVEMENT SUMMARY

**Site: LM00345 [03\_Ennis Ave\_Dixon Rd\_PM\_2025 (Site Folder: Base 2025 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

Ennis Ave and Dixon Rd  
 Site Category: Base Year  
 Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. ]	[ Dist ]				km/h
			veh/h		veh/h					veh	m				
South: Ennis Ave															
1	L2	All MCs	133	4.4	133	4.4	0.382	14.8	LOS B	13.2	97.4	0.72	0.76	0.72	38.2
2	T1	All MCs	452	4.4	452	4.4	0.382	40.2	LOS D	14.4	106.5	0.74	0.69	0.74	42.4
3	R2	All MCs	711	4.4	711	4.4	* 1.117	164.7	LOS F	37.6	277.2	1.00	1.33	1.87	14.1
Approach			1295	4.4	1295	4.4	1.117	105.9	LOS F	37.6	277.2	0.88	1.05	1.36	20.0
East: Dixon Rd															
4	L2	All MCs	683	4.4	683	4.4	0.772	49.8	LOS D	32.0	236.5	0.88	0.94	0.88	37.7
5	T1	All MCs	552	4.4	552	4.4	1.097	185.1	LOS F	32.9	242.8	1.00	1.41	1.83	15.4
6	R2	All MCs	151	4.4	151	4.4	0.852	99.9	LOS F	12.0	88.2	1.00	0.94	1.24	24.8
Approach			1385	4.4	1385	4.4	1.097	109.1	LOS F	32.9	242.8	0.94	1.13	1.29	23.1
North: Ennis Ave															
7	L2	All MCs	174	4.4	174	4.4	1.134	154.4	LOS F	82.5	609.0	1.00	1.36	1.86	13.8
8	T1	All MCs	1118	4.4	1118	4.4	* 1.134	197.6	LOS F	82.5	609.0	1.00	1.52	1.87	14.6
9	R2	All MCs	95	4.4	95	4.4	0.383	97.0	LOS F	6.4	47.2	0.95	0.78	0.95	28.0
Approach			1386	4.4	1386	4.4	1.134	185.3	LOS F	82.5	609.0	1.00	1.45	1.81	15.0
West: Dixon Rd															
10	L2	All MCs	98	4.4	98	4.4	0.087	34.4	LOS C	1.8	13.1	0.32	0.63	0.32	51.0
11	T1	All MCs	552	4.4	552	4.4	* 1.122	205.5	LOS F	35.1	259.2	1.00	1.46	1.92	14.3
12	R2	All MCs	199	4.4	199	4.4	* 1.126	226.1	LOS F	24.1	177.9	1.00	1.34	1.97	13.6
Approach			848	4.4	848	4.4	1.126	190.6	LOS F	35.1	259.2	0.92	1.34	1.74	15.4
All Vehicles			4915	4.4	4915	4.4	1.134	143.8	LOS F	82.5	609.0	0.94	1.23	1.53	18.0

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

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ]	[ Dist ]			sec	m	m/sec
						ped	m					
North: Ennis Ave												
P2	Full	30	32	61.7	LOS F	0.1	0.1	0.91	0.91	215.6	200.0	0.93
West: Dixon Rd												

P1 Full	30	32	61.7	LOS F	0.1	0.1	0.91	0.91	215.6	200.0	0.93
All Pedestrians	60	63	61.7	LOS F	0.1	0.1	0.91	0.91	215.6	200.0	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: U:\300204265\Trafficworking\Sidra\Rockingham\_update\_09122025.sip9

# MOVEMENT SUMMARY

**Site: LM00335 [04\_Ennis Ave\_Council Ave\_PM\_2025 (Site Folder: Base 2025 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec			m				km/h
South: Ennis Ave															
1	L2	All MCs	384	4.3	384	4.3	0.305	30.1	LOS C	4.4	32.5	0.32	0.68	0.32	52.7
2	T1	All MCs	964	4.3	964	4.3	1.232	281.6	LOS F	62.3	459.0	1.00	1.92	2.65	11.4
3	R2	All MCs	43	4.3	43	4.3	0.463	80.4	LOS F	2.5	18.5	1.00	0.74	1.00	27.6
Approach			1392	4.3	1392	4.3	1.232	206.0	LOS F	62.3	459.0	0.81	1.54	1.96	14.9
East: Carvie St															
4	L2	All MCs	109	4.3	109	4.3	0.175	27.7	LOS C	4.1	30.5	0.71	0.70	0.71	38.4
5	T1	All MCs	61	4.3	61	4.3	*0.175	44.4	LOS D	4.1	30.5	0.88	0.70	0.88	33.5
6	R2	All MCs	18	4.3	18	4.3	0.058	46.8	LOS D	0.8	6.1	0.86	0.68	0.86	32.3
Approach			188	4.3	188	4.3	0.175	35.0	LOS C	4.1	30.5	0.78	0.70	0.78	36.0
North: Ennis Ave															
7	L2	All MCs	13	4.3	13	4.3	0.009	60.1	LOS E	0.1	0.5	0.18	0.61	0.18	49.9
8	T1	All MCs	1753	4.3	1753	4.3	*1.463	491.1	LOS F	158.7	1169.2	1.00	2.80	3.56	7.1
9	R2	All MCs	261	4.3	261	4.3	*1.294	356.4	LOS F	31.6	233.1	1.00	1.67	2.97	9.3
Approach			2026	4.3	2026	4.3	1.463	471.1	LOS F	158.7	1169.2	0.99	2.64	3.46	7.4
West: Council Ave															
10	L2	All MCs	292	4.3	292	4.3	0.470	23.6	LOS C	7.5	55.0	0.82	0.80	0.82	43.2
11	T1	All MCs	29	4.3	29	4.3	*1.018	112.2	LOS F	22.5	165.5	1.00	1.28	1.73	20.8
12	R2	All MCs	512	4.3	512	4.3	1.018	116.7	LOS F	22.5	165.5	1.00	1.27	1.73	21.4
Approach			833	4.3	833	4.3	1.018	83.9	LOS F	22.5	165.5	0.94	1.10	1.41	26.0
All Vehicles			4439	4.3	4439	4.3	1.463	296.8	LOS F	158.7	1169.2	0.92	1.93	2.49	10.9

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Ennis Ave												
P4	Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
East: Carvie St												

P2 Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
North: Ennis Ave											
P3 Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
West: Council Ave											
P1 Full	25	26	42.2	LOS E	0.1	0.1	0.86	0.86	196.0	200.0	1.02
P5 Slip/ Bypass	25	26	21.5	LOS C	0.0	0.0	0.84	0.84	175.3	200.0	1.14
All Pedestrians	200	211	39.6	LOS D	0.1	0.1	0.86	0.86	193.5	200.0	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: U:\300204265\Traffic\working\Sidra\Rockingham\_update\_09122025.sip9

# MOVEMENT SUMMARY

**Site: LM00852 [05\_Ennis Ave\_Rae Rd\_PM\_2025 (Site Folder: Base 2025 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: Base Year

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. ]	[ Dist ]				km/h
			veh/h		veh/h					veh	m				
South: Ennis Ave															
1	L2	All MCs	76	3.3	76	3.3	0.059	8.8	LOS A	0.6	4.7	0.31	0.65	0.31	56.0
2	T1	All MCs	1147	3.3	1147	3.3	0.531	20.1	LOS C	12.0	87.3	0.80	0.70	0.80	50.9
3	R2	All MCs	34	3.3	34	3.3	0.188	44.2	LOS D	1.3	9.3	0.95	0.72	0.95	33.7
Approach			1257	3.3	1257	3.3	0.531	20.0	LOS C	12.0	87.3	0.78	0.70	0.78	50.4
East: Rockingham Sta Acc Rd															
4	L2	All MCs	79	3.3	79	3.3	0.107	15.1	LOS B	1.6	11.5	0.61	0.67	0.61	44.6
5	T1	All MCs	66	3.3	66	3.3	*0.470	41.8	LOS D	2.7	19.5	1.00	0.75	1.00	35.1
6	R2	All MCs	66	3.3	66	3.3	0.495	45.9	LOS D	2.7	19.6	1.00	0.75	1.00	32.8
Approach			212	3.3	212	3.3	0.495	33.1	LOS C	2.7	19.6	0.85	0.72	0.85	37.2
North: Ennis Ave															
7	L2	All MCs	54	3.3	54	3.3	0.038	7.6	LOS A	0.3	2.0	0.23	0.63	0.23	50.1
8	T1	All MCs	1960	3.3	1960	3.3	*0.868	32.4	LOS C	27.8	202.5	0.99	1.01	1.17	43.3
9	R2	All MCs	313	3.3	313	3.3	*0.874	54.7	LOS D	7.1	52.1	1.00	1.00	1.47	33.1
Approach			2326	3.3	2326	3.3	0.874	34.8	LOS C	27.8	202.5	0.97	1.00	1.19	41.7
West: Rae Rd															
10	L2	All MCs	196	3.3	196	3.3	0.212	12.3	LOS B	2.6	18.8	0.45	0.70	0.45	54.2
11	T1	All MCs	48	3.3	48	3.3	0.343	43.2	LOS D	1.9	14.1	0.99	0.73	0.99	34.9
12	R2	All MCs	115	3.3	115	3.3	*0.856	54.8	LOS D	5.2	37.9	1.00	0.96	1.47	33.3
Approach			359	3.3	359	3.3	0.856	30.1	LOS C	5.2	37.9	0.70	0.79	0.85	42.4
All Vehicles			4154	3.3	4154	3.3	0.874	29.8	LOS C	27.8	202.5	0.88	0.88	1.02	43.8

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

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Project: U:\300204265\Traffic\working\Sidra\Rockingham\_update\_09122025.sip9

# MOVEMENT SUMMARY

**Site: LM00488 [06\_Read St\_Chalgrove Ave\_PM\_2025 (Site Folder: Base 2025 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: Base Year

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
			veh/h	%	veh/h	%	v/c	sec							
South: Read St															
1	L2	All MCs	64	5.1	64	5.1	0.723	47.2	LOS D	17.8	130.1	0.97	0.85	0.99	29.4
2	T1	All MCs	652	5.1	652	5.1	0.723	40.7	LOS D	18.0	131.2	0.97	0.85	0.99	34.1
3	R2	All MCs	195	5.1	195	5.1	*0.854	66.1	LOS E	11.6	84.6	1.00	0.96	1.28	24.5
Approach			911	5.1	911	5.1	0.854	46.6	LOS D	18.0	131.2	0.98	0.87	1.05	31.1
East: Chalgrove Ave															
4	L2	All MCs	467	5.1	467	5.1	0.433	14.2	LOS B	11.3	82.4	0.56	0.73	0.56	44.5
5	T1	All MCs	40	5.1	40	5.1	0.101	39.3	LOS D	1.7	12.7	0.84	0.66	0.84	34.7
6	R2	All MCs	224	5.1	224	5.1	*0.860	64.3	LOS E	13.4	97.5	1.00	0.99	1.27	29.5
Approach			732	5.1	732	5.1	0.860	30.9	LOS C	13.4	97.5	0.71	0.81	0.79	36.9
North: Read St															
7	L2	All MCs	319	5.1	319	5.1	0.247	9.4	LOS A	4.0	28.9	0.33	0.68	0.33	53.5
8	T1	All MCs	907	5.1	907	5.1	*0.912	57.3	LOS E	28.4	207.5	1.00	1.08	1.27	28.4
9	R2	All MCs	23	5.1	23	5.1	0.102	53.3	LOS D	1.1	8.2	0.92	0.71	0.92	31.4
Approach			1249	5.1	1249	5.1	0.912	45.0	LOS D	28.4	207.5	0.83	0.97	1.02	33.4
West: Chalgrove Ave															
10	L2	All MCs	37	5.1	37	5.1	0.216	43.7	LOS D	3.7	27.2	0.87	0.71	0.87	33.7
11	T1	All MCs	46	5.1	46	5.1	*0.216	39.1	LOS D	3.7	27.2	0.87	0.71	0.87	33.8
12	R2	All MCs	40	5.1	40	5.1	0.153	49.6	LOS D	1.9	14.0	0.91	0.72	0.91	26.5
Approach			123	5.1	123	5.1	0.216	43.9	LOS D	3.7	27.2	0.88	0.72	0.88	31.5
All Vehicles			3015	5.1	3015	5.1	0.912	42.0	LOS D	28.4	207.5	0.85	0.89	0.97	33.4

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P4	Full	30	32	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00
East: Chalgrove Ave												

P1 Full	30	32	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00
North: Read St											
P3 Full	30	32	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00
West: Chalgrove Ave											
P2 Full	30	32	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00
All Pedestrians	120	126	46.4	LOS E	0.1	0.1	0.92	0.92	200.3	200.0	1.00

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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1:00:27 PM

Project: K:\Infrastructure Pune Team\Project Folder\AP\Traffic\300204265 - Rockingham PSP\40 Technical\Sidra\Rockingham\_09232025.sip9

# MOVEMENT SUMMARY

**Site: LM00343 [07 Read St\_Council Ave\_PM\_2025 (Site Folder: Base 2025 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. ]	[ Dist ]				km/h
			veh/h		veh/h					veh	m				
South: Read St															
1	L2	All MCs	19	5.1	19	5.1	0.541	47.2	LOS D	21.1	153.9	0.85	0.75	0.85	35.8
2	T1	All MCs	715	5.1	715	5.1	0.541	40.6	LOS D	21.1	154.3	0.85	0.74	0.85	35.6
3	R2	All MCs	433	5.1	433	5.1	* 1.035	134.3	LOS F	45.0	328.7	1.00	1.17	1.54	19.9
Approach			1166	5.1	1166	5.1	1.035	75.4	LOS E	45.0	328.7	0.91	0.90	1.11	26.5
East: Council Ave															
4	L2	All MCs	581	5.1	581	5.1	0.621	31.9	LOS C	23.8	173.5	0.76	0.93	0.76	40.8
5	T1	All MCs	81	5.1	81	5.1	0.268	61.4	LOS E	5.2	38.3	0.92	0.74	0.92	28.8
6	R2	All MCs	131	5.1	131	5.1	* 0.993	118.6	LOS F	12.4	90.4	1.00	1.12	1.58	16.7
Approach			793	5.1	793	5.1	0.993	49.2	LOS D	23.8	173.5	0.82	0.94	0.91	33.4
North: Read St															
7	L2	All MCs	193	5.1	193	5.1	0.168	43.3	LOS D	4.8	35.0	0.41	0.69	0.41	45.1
8	T1	All MCs	1272	5.1	1272	5.1	* 1.060	161.7	LOS F	73.1	534.0	1.00	1.44	1.58	16.6
9	R2	All MCs	102	5.1	102	5.1	0.244	80.0	LOS E	6.1	44.2	0.86	0.77	0.86	25.5
Approach			1566	5.1	1566	5.1	1.060	141.8	LOS F	73.1	534.0	0.92	1.30	1.39	15.8
West: Council Ave															
10	L2	All MCs	52	5.1	52	5.1	0.347	14.7	LOS B	6.0	44.0	0.92	0.85	0.92	24.5
11	T1	All MCs	64	5.1	64	5.1	* 0.347	93.9	LOS F	6.0	44.0	0.92	0.85	0.92	29.2
12	R2	All MCs	27	5.1	27	5.1	0.208	77.2	LOS E	1.9	14.2	0.97	0.72	0.97	26.6
Approach			143	5.1	143	5.1	0.347	62.2	LOS E	6.0	44.0	0.93	0.82	0.93	27.1
All Vehicles			3668	5.1	3668	5.1	1.060	97.6	LOS F	73.1	534.0	0.89	1.08	1.18	21.9

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ]	[ Dist ]			sec	m	m/sec
						ped	m					
South: Read St												
P4	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Council Ave												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Read St											
P3 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Council Ave											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	120	126	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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1:00:28 PM

Project: K:\Infrastructure Pune Team\Project Folder\AP\Traffic\300204265 - Rockingham PSP\40 Technical\Sidra\Rockingham\_09232025.sip9

# MOVEMENT SUMMARY

**Site: LM00445 [08 Read St\_Rae Rd\_PM\_2025 (Site Folder: Base 2025 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. veh	Dist ] m				km/h
South: Read St															
1	L2	All MCs	186	5.1	186	5.1	0.149	21.5	LOS C	4.0	29.1	0.36	0.67	0.36	52.7
2	T1	All MCs	933	5.1	933	5.1	0.605	38.2	LOS D	27.4	200.2	0.83	0.73	0.83	43.2
3	R2	All MCs	116	5.1	116	5.1	0.421	69.4	LOS E	7.8	56.7	0.95	0.79	0.95	29.3
Approach			1235	5.1	1235	5.1	0.605	38.6	LOS D	27.4	200.2	0.77	0.73	0.77	40.8
East: Rae Rd															
4	L2	All MCs	187	5.1	187	5.1	0.265	37.6	LOS D	9.1	66.2	0.71	0.76	0.71	38.9
5	T1	All MCs	204	5.1	204	5.1	0.495	65.6	LOS E	8.6	62.8	0.96	0.77	0.96	31.4
6	R2	All MCs	29	5.1	29	5.1	0.176	75.7	LOS E	2.0	14.9	0.96	0.72	0.96	29.1
Approach			421	5.1	421	5.1	0.495	53.9	LOS D	9.1	66.2	0.85	0.76	0.85	34.1
North: Read St															
7	L2	All MCs	89	5.1	89	5.1	0.050	7.1	LOS A	0.0	0.0	0.00	0.57	0.00	58.6
8	T1	All MCs	1560	5.1	1560	5.1	* 1.003	106.2	LOS F	79.8	583.2	1.00	1.27	1.34	26.5
9	R2	All MCs	264	5.1	264	5.1	* 0.962	116.1	LOS F	23.8	174.1	1.00	1.06	1.39	24.0
Approach			1914	5.1	1914	5.1	1.003	103.7	LOS F	79.8	583.2	0.95	1.20	1.28	24.4
West: Rae Rd															
10	L2	All MCs	182	5.1	182	5.1	0.174	13.2	LOS B	4.1	29.6	0.38	0.69	0.38	53.8
11	T1	All MCs	153	5.1	153	5.1	* 0.607	67.2	LOS E	10.7	78.4	0.99	0.81	0.99	30.9
12	R2	All MCs	164	5.1	164	5.1	* 0.982	114.0	LOS F	15.3	111.6	1.00	1.09	1.52	21.7
Approach			499	5.1	499	5.1	0.982	62.9	LOS E	15.3	111.6	0.77	0.85	0.94	31.6
All Vehicles			4068	5.1	4068	5.1	1.003	73.4	LOS E	79.8	583.2	0.86	0.97	1.04	29.7

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: Read St												
P3	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Rae Rd												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Rae Rd											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	90	95	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: K:\Infrastructure Pune Team\Project Folder\AP\Traffic\300204265 - Rockingham PSP\40 Technical\Sidra\Rockingham\_09232025.sip9

# MOVEMENT SUMMARY

**Site: LM00303 [01\_PattersonRd\_ReadSt\_AM\_2041 (Site Folder: Year 2041 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. Dist ]				km/h	
			veh/h		veh/h					veh	m				
South: Read St															
1	L2	All MCs	392	8.8	392	8.8	0.357	18.9	LOS B	10.3	77.6	0.48	0.77	0.48	47.0
2	T1	All MCs	165	8.8	165	8.8	0.170	44.4	LOS D	5.9	44.5	0.65	0.64	0.65	39.7
3	R2	All MCs	527	8.8	527	8.8	*0.917	78.0	LOS E	37.7	283.6	1.00	0.96	1.18	31.0
Approach			1084	8.8	1084	8.8	0.917	51.5	LOS D	37.7	283.6	0.76	0.85	0.85	33.2
East: Patterson Rd															
4	L2	All MCs	482	8.8	482	8.8	0.369	19.3	LOS B	10.6	79.5	0.37	0.72	0.37	49.9
5	T1	All MCs	934	8.8	934	8.8	*1.031	146.8	LOS F	51.7	389.1	1.00	1.38	1.52	20.0
6	R2	All MCs	31	8.8	31	8.8	0.138	105.0	LOS F	2.0	15.1	0.92	0.72	0.92	26.8
Approach			1446	8.8	1446	8.8	1.031	103.5	LOS F	51.7	389.1	0.79	1.15	1.13	22.3
North: Flinders Ln															
7	L2	All MCs	33	8.8	33	8.8	1.069	165.3	LOS F	12.6	94.8	1.00	1.26	1.84	15.9
8	T1	All MCs	157	8.8	157	8.8	*1.069	161.3	LOS F	12.6	94.8	1.00	1.25	1.85	16.3
9	R2	All MCs	32	8.8	32	8.8	1.069	166.5	LOS F	11.4	85.6	1.00	1.24	1.86	15.9
Approach			221	8.8	221	8.8	1.069	162.6	LOS F	12.6	94.8	1.00	1.25	1.85	16.2
West: Patterson Rd															
10	L2	All MCs	72	8.8	72	8.8	0.585	7.4	LOS A	18.0	135.8	0.92	0.81	0.92	31.1
11	T1	All MCs	519	8.8	519	8.8	0.585	55.9	LOS E	18.6	140.1	0.92	0.80	0.92	33.1
12	R2	All MCs	232	8.8	232	8.8	*1.046	147.8	LOS F	24.3	183.2	1.00	1.23	1.67	17.7
Approach			822	8.8	822	8.8	1.046	77.6	LOS E	24.3	183.2	0.94	0.92	1.13	26.4
All Vehicles			3574	8.8	3574	8.8	1.069	85.4	LOS F	51.7	389.1	0.83	1.01	1.09	25.1

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ped	Dist ]			sec	m	m/sec
South: Read St												
P2	Full	50	53	66.4	LOS F	0.2	0.2	0.94	0.94	220.3	200.0	0.91
East: Patterson Rd												

P5	Stage 1	25	26	66.3	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
P4	Stage 2	25	26	66.3	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Flinders Ln												
P1	Full	50	53	66.4	LOS F	0.2	0.2	0.94	0.94	220.3	200.0	0.91
West: Patterson Rd												
P3	Full	50	53	66.4	LOS F	0.2	0.2	0.94	0.94	220.3	200.0	0.91
All	Pedestrians	200	211	66.4	LOS F	0.2	0.2	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00332 [02\_Patterson Rd Ennis Ave\_AM\_2041 (Site Folder: Year 2041 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: Base Year

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec			m				km/h
SouthEast: Ennis Ave															
21	L2	All MCs	399	6.8	399	6.8	1.021	70.5	LOS E	48.0	363.8	1.00	1.24	1.67	23.4
23	R2	All MCs	772	6.8	772	6.8	* 1.021	96.7	LOS F	48.0	363.8	1.00	1.29	1.70	23.8
Approach			1171	6.8	1171	6.8	1.021	87.7	LOS F	48.0	363.8	1.00	1.27	1.69	23.6
NorthEast: Patterson Rd															
24	L2	All MCs	246	6.8	246	6.8	0.143	6.7	LOS A	0.0	0.0	0.00	0.56	0.00	56.7
25	T1	All MCs	828	6.8	828	6.8	* 1.044	122.5	LOS F	34.4	260.8	1.00	1.45	1.88	22.8
Approach			1075	6.8	1075	6.8	1.044	95.9	LOS F	34.4	260.8	0.77	1.25	1.45	26.4
SouthWest: Patterson Rd															
31	T1	All MCs	805	6.8	805	6.8	0.403	13.9	LOS B	11.2	85.3	0.62	0.55	0.62	57.5
32	R2	All MCs	238	6.8	238	6.8	* 1.063	110.9	LOS F	14.8	112.6	1.00	1.36	2.06	19.3
Approach			1043	6.8	1043	6.8	1.063	36.1	LOS D	14.8	112.6	0.71	0.74	0.95	39.5
All Vehicles			3288	6.8	3288	6.8	1.063	74.0	LOS E	48.0	363.8	0.83	1.09	1.37	28.2

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	ped/h	sec		ped	m			sec	m	m/sec	
SouthEast: Ennis Ave												
P1	Full	30	32	36.2	LOS D	0.1	0.1	0.85	0.85	190.0	200.0	1.05
SouthWest: Patterson Rd												
P2	Full	30	32	34.5	LOS D	0.1	0.1	0.83	0.83	188.3	200.0	1.06
All Pedestrians		60	63	35.3	LOS D	0.1	0.1	0.84	0.84	189.2	200.0	1.06

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: U:\300204265\Traffic\working\Sidra\Rockingham\_update\_09122025.sip9

# MOVEMENT SUMMARY

**Site: LM00345 [03\_Ennis Ave\_Dixon Rd\_AM\_2041 (Site Folder: Year 2041 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

Ennis Ave and Dixon Rd  
 Site Category: Base Year  
 Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
			veh/h	%	veh/h	%	v/c	sec							
South: Ennis Ave															
1	L2	All MCs	281	4.4	281	4.4	1.325	312.4	LOS F	101.3	747.8	1.00	1.94	3.32	9.0
2	T1	All MCs	1068	4.4	1068	4.4	1.325	339.7	LOS F	101.3	747.8	1.00	2.20	3.32	9.3
3	R2	All MCs	888	4.4	888	4.4	* 1.479	482.6	LOS F	69.9	516.3	1.00	2.14	4.02	6.7
Approach			2238	4.4	2238	4.4	1.479	393.0	LOS F	101.3	747.8	1.00	2.15	3.60	8.0
East: Dixon Rd															
4	L2	All MCs	1013	4.4	1013	4.4	0.876	24.5	LOS C	33.3	245.7	0.88	0.94	0.96	42.7
5	T1	All MCs	1132	4.4	1132	4.4	* 1.560	563.7	LOS F	105.1	775.6	1.00	2.97	4.30	6.0
6	R2	All MCs	271	4.4	271	4.4	* 1.532	560.1	LOS F	47.9	353.9	1.00	2.32	4.24	6.1
Approach			2415	4.4	2415	4.4	1.560	337.2	LOS F	105.1	775.6	0.95	2.05	2.89	9.4
North: Ennis Ave															
7	L2	All MCs	225	4.4	225	4.4	1.488	459.8	LOS F	75.0	554.0	1.00	2.06	4.05	6.6
8	T1	All MCs	587	4.4	587	4.4	* 1.488	491.7	LOS F	75.0	554.0	1.00	2.22	4.06	6.7
9	R2	All MCs	126	4.4	126	4.4	0.650	55.6	LOS E	6.3	46.4	1.00	0.83	1.07	31.7
Approach			939	4.4	939	4.4	1.488	425.3	LOS F	75.0	554.0	1.00	1.99	3.65	7.5
West: Dixon Rd															
10	L2	All MCs	126	4.4	126	4.4	0.142	17.6	LOS B	3.0	22.3	0.57	0.69	0.57	46.4
11	T1	All MCs	484	4.4	484	4.4	0.651	40.7	LOS D	11.2	82.3	0.97	0.82	0.98	36.2
12	R2	All MCs	144	4.4	144	4.4	0.817	60.2	LOS E	7.7	57.1	1.00	0.95	1.27	30.4
Approach			755	4.4	755	4.4	0.817	40.5	LOS D	11.2	82.3	0.91	0.82	0.97	36.2
All Vehicles			6346	4.4	6346	4.4	1.560	334.7	LOS F	105.1	775.6	0.97	1.93	3.02	9.3

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

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		Ped	Dist			sec	m	m/sec
North: Ennis Ave												
P2	Full	30	32	37.0	LOS D	0.1	0.1	0.86	0.86	190.9	200.0	1.05
West: Dixon Rd												

P1 Full	30	32	37.0	LOS D	0.1	0.1	0.86	0.86	190.9	200.0	1.05
All Pedestrians	60	63	37.0	LOS D	0.1	0.1	0.86	0.86	190.9	200.0	1.05

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00335 [04\_Ennis Ave\_Council Ave\_AM\_2041 (Site Folder: Year 2041 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec			m				km/h
South: Ennis Ave															
1	L2	All MCs	978	4.3	978	4.3	0.956	120.9	LOS F	56.9	419.3	1.00	1.07	1.24	33.7
2	T1	All MCs	2355	4.3	2355	4.3	* 3.003	1893.3	LOS F	343.9	2533.4	1.00	4.12	6.28	1.9
3	R2	All MCs	35	4.3	35	4.3	0.320	103.8	LOS F	2.0	14.5	0.99	0.73	0.99	28.0
Approach			3367	4.3	3367	4.3	3.003	1360.1	LOS F	343.9	2533.4	1.00	3.20	4.76	2.7
East: Carvie St															
4	L2	All MCs	84	4.3	84	4.3	0.200	23.7	LOS C	3.9	28.7	0.78	0.71	0.78	38.4
5	T1	All MCs	84	4.3	84	4.3	* 0.200	45.8	LOS D	3.9	28.7	0.87	0.71	0.87	34.2
6	R2	All MCs	40	4.3	40	4.3	0.129	47.6	LOS D	1.9	14.0	0.88	0.72	0.88	32.1
Approach			208	4.3	208	4.3	0.200	37.2	LOS D	3.9	28.7	0.83	0.71	0.83	35.3
North: Ennis Ave															
7	L2	All MCs	13	4.3	13	4.3	0.009	50.3	LOS D	0.1	0.5	0.17	0.61	0.17	50.0
8	T1	All MCs	1332	4.3	1332	4.3	1.213	282.7	LOS F	93.8	691.1	1.00	2.03	2.54	12.2
9	R2	All MCs	567	4.3	567	4.3	* 2.811	1736.4	LOS F	156.0	1149.4	1.00	2.74	6.11	2.1
Approach			1912	4.3	1912	4.3	2.811	712.6	LOS F	156.0	1149.4	0.99	2.23	3.58	5.0
West: Council Ave															
10	L2	All MCs	249	4.3	249	4.3	0.402	21.5	LOS C	5.7	42.0	0.80	0.78	0.80	44.3
11	T1	All MCs	25	4.3	25	4.3	* 0.688	51.5	LOS D	11.1	82.0	0.99	0.85	1.04	30.2
12	R2	All MCs	382	4.3	382	4.3	0.688	55.9	LOS E	11.1	82.0	0.99	0.85	1.04	31.5
Approach			657	4.3	657	4.3	0.688	42.7	LOS D	11.1	82.0	0.92	0.82	0.95	35.3
All Vehicles			6144	4.3	6144	4.3	3.003	973.0	LOS F	343.9	2533.4	0.98	2.56	3.85	3.7

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Ennis Ave												
P4	Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
East: Carvie St												

P2 Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
North: Ennis Ave											
P3 Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
West: Council Ave											
P1 Full	25	26	42.2	LOS E	0.1	0.1	0.86	0.86	196.0	200.0	1.02
P5 Slip/ Bypass	25	26	21.3	LOS C	0.0	0.0	0.84	0.84	175.1	200.0	1.14
All Pedestrians	200	211	39.6	LOS D	0.1	0.1	0.86	0.86	193.4	200.0	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00852 [05\_Ennis Ave\_Rae Rd\_AM\_2041 (Site Folder: Year 2041 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: Base Year

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. ]	[ Dist ]				km/h
			veh/h		veh/h					veh	m				
South: Ennis Ave															
1	L2	All MCs	99	3.3	99	3.3	0.072	22.4	LOS C	0.9	6.6	0.27	0.64	0.27	56.2
2	T1	All MCs	2822	3.3	2822	3.3	* 1.084	284.0	LOS F	89.5	652.1	1.00	1.56	1.74	23.7
3	R2	All MCs	145	3.3	145	3.3	0.903	75.9	LOS E	8.4	61.0	1.00	1.02	1.48	27.6
Approach			3066	3.3	3066	3.3	1.084	265.7	LOS F	89.5	652.1	0.98	1.51	1.68	24.3
East: Rockingham Sta Acc Rd															
4	L2	All MCs	28	3.3	28	3.3	0.037	10.6	LOS B	0.5	3.4	0.42	0.61	0.42	47.3
5	T1	All MCs	35	3.3	35	3.3	0.308	52.3	LOS D	1.7	12.7	0.99	0.72	0.99	31.9
6	R2	All MCs	68	3.3	68	3.3	0.478	54.8	LOS D	3.4	24.8	1.00	0.76	1.00	30.4
Approach			132	3.3	132	3.3	0.478	44.6	LOS D	3.4	24.8	0.87	0.72	0.87	33.4
North: Ennis Ave															
7	L2	All MCs	89	3.3	89	3.3	0.067	9.0	LOS A	0.9	6.6	0.29	0.64	0.29	49.2
8	T1	All MCs	1415	3.3	1415	3.3	0.511	18.6	LOS B	15.5	113.3	0.73	0.65	0.73	51.6
9	R2	All MCs	323	3.3	323	3.3	* 1.004	96.8	LOS F	11.4	83.4	1.00	1.17	1.84	24.1
Approach			1827	3.3	1827	3.3	1.004	32.0	LOS C	15.5	113.3	0.76	0.74	0.90	42.8
West: Rae Rd															
10	L2	All MCs	453	3.3	453	3.3	0.772	611.1	LOS F	17.7	128.7	0.96	1.00	1.02	38.1
11	T1	All MCs	93	3.3	93	3.3	* 0.820	60.2	LOS E	5.1	36.8	1.00	0.91	1.34	30.1
12	R2	All MCs	154	3.3	154	3.3	* 1.074	143.2	LOS F	13.1	95.4	1.00	1.28	2.19	18.6
Approach			699	3.3	699	3.3	1.074	435.2	LOS F	17.7	128.7	0.97	1.05	1.32	30.1
All Vehicles			5724	3.3	5724	3.3	1.084	206.7	LOS F	89.5	652.1	0.90	1.19	1.37	29.2

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

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Project: U:\300204265\Traffic\working\Sidra\Rockingham\_update\_09122025.sip9

# MOVEMENT SUMMARY

**Site: LM00488 [06\_Read St\_Chalgrove Ave\_AM\_2041 (Site Folder: Year 2041 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: Base Year

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. ]	[ Dist ]				km/h
			veh/h		veh/h					veh	m				
South: Read St															
1	L2	All MCs	59	5.1	59	5.1	1.114	175.9	LOS F	104.7	764.9	1.00	1.57	1.75	12.4
2	T1	All MCs	1581	5.1	1581	5.1	* 1.114	179.6	LOS F	104.7	764.9	1.00	1.59	1.76	13.1
3	R2	All MCs	314	5.1	314	5.1	* 1.094	199.8	LOS F	36.0	263.2	1.00	1.22	1.80	12.1
Approach			1954	5.1	1954	5.1	1.114	182.7	LOS F	104.7	764.9	1.00	1.53	1.77	12.3
East: Chalgrove Ave															
4	L2	All MCs	187	5.1	187	5.1	0.185	14.5	LOS B	4.9	35.9	0.43	0.68	0.43	44.3
5	T1	All MCs	34	5.1	34	5.1	0.107	58.3	LOS E	2.1	15.2	0.88	0.68	0.88	29.4
6	R2	All MCs	131	5.1	131	5.1	* 1.093	184.3	LOS F	14.8	108.0	1.00	1.24	1.90	15.1
Approach			352	5.1	352	5.1	1.093	81.8	LOS F	14.8	108.0	0.69	0.89	1.02	23.4
North: Read St															
7	L2	All MCs	335	5.1	335	5.1	0.274	15.5	LOS B	8.0	58.7	0.40	0.70	0.40	50.5
8	T1	All MCs	942	5.1	942	5.1	0.618	38.7	LOS D	27.4	200.4	0.84	0.75	0.84	36.4
9	R2	All MCs	54	5.1	54	5.1	0.187	68.8	LOS E	3.4	25.0	0.90	0.75	0.90	28.4
Approach			1331	5.1	1331	5.1	0.618	34.1	LOS C	27.4	200.4	0.73	0.74	0.73	38.0
West: Chalgrove Ave															
10	L2	All MCs	34	5.1	34	5.1	0.457	65.8	LOS E	9.5	69.2	0.95	0.78	0.95	28.2
11	T1	All MCs	108	5.1	108	5.1	* 0.457	61.2	LOS E	9.5	69.2	0.95	0.78	0.95	28.4
12	R2	All MCs	94	5.1	94	5.1	0.784	85.7	LOS F	7.3	53.5	1.00	0.90	1.19	19.7
Approach			236	5.1	236	5.1	0.784	71.6	LOS E	9.5	69.2	0.97	0.83	1.05	24.7
All Vehicles			3872	5.1	3872	5.1	1.114	115.7	LOS F	104.7	764.9	0.88	1.16	1.30	18.2

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ]	[ Dist ]			sec	m	m/sec
						ped	m					
South: Read St												
P4	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Chalgrove Ave												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Read St											
P3 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Chalgrove Ave											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	120	126	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00343 [07 Read St\_Council Ave\_AM\_2041 (Site Folder: Year 2041 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
			veh/h	%	veh/h	%	v/c	sec							
South: Read St															
1	L2	All MCs	40	5.1	40	5.1	1.488	509.1	LOS F	163.9	1197.1	1.00	2.53	3.01	6.8
2	T1	All MCs	1669	5.1	1669	5.1	* 1.488	515.1	LOS F	163.9	1197.1	1.00	2.52	3.01	5.4
3	R2	All MCs	774	5.1	774	5.1	* 1.506	552.9	LOS F	146.6	1070.9	1.00	1.85	3.06	6.6
Approach			2483	5.1	2483	5.1	1.506	526.8	LOS F	163.9	1197.1	1.00	2.31	3.03	5.7
East: Council Ave															
4	L2	All MCs	305	5.1	305	5.1	0.284	18.5	LOS B	10.0	72.8	0.51	0.70	0.51	47.4
5	T1	All MCs	56	5.1	56	5.1	0.185	60.3	LOS E	3.5	25.9	0.90	0.71	0.90	29.0
6	R2	All MCs	178	5.1	178	5.1	* 1.489	530.3	LOS F	33.4	244.1	1.00	1.79	3.08	4.8
Approach			539	5.1	539	5.1	1.489	191.8	LOS F	33.4	244.1	0.71	1.06	1.40	14.0
North: Read St															
7	L2	All MCs	232	5.1	232	5.1	0.235	42.8	LOS D	7.8	57.3	0.53	0.72	0.53	41.0
8	T1	All MCs	987	5.1	987	5.1	0.961	103.3	LOS F	48.2	352.3	1.00	1.15	1.29	23.4
9	R2	All MCs	76	5.1	76	5.1	0.148	66.1	LOS E	4.1	29.8	0.78	0.75	0.78	27.5
Approach			1295	5.1	1295	5.1	0.961	90.3	LOS F	48.2	352.3	0.90	1.05	1.13	21.8
West: Council Ave															
10	L2	All MCs	267	5.1	267	5.1	1.011	99.1	LOS F	36.1	263.4	1.00	1.23	1.48	15.5
11	T1	All MCs	123	5.1	123	5.1	* 1.011	111.9	LOS F	36.1	263.4	1.00	1.23	1.48	19.2
12	R2	All MCs	27	5.1	27	5.1	0.229	115.9	LOS F	2.0	14.4	0.98	0.72	0.98	26.4
Approach			418	5.1	418	5.1	1.011	103.9	LOS F	36.1	263.4	1.00	1.20	1.45	14.3
All Vehicles			4735	5.1	4735	5.1	1.506	332.0	LOS F	163.9	1197.1	0.94	1.73	2.18	8.2

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P4	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Council Ave												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Read St											
P3 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Council Ave											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	120	126	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00445 [08 Read St\_Rae Rd\_AM\_2041 (Site Folder: Year 2041 AM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. veh	Dist ] m				km/h
South: Read St															
1	L2	All MCs	249	5.1	249	5.1	0.185	43.2	LOS D	4.2	30.9	0.30	0.66	0.30	54.5
2	T1	All MCs	2055	5.1	2055	5.1	* 1.360	407.7	LOS F	177.5	1296.8	1.00	2.30	2.64	9.0
3	R2	All MCs	226	5.1	226	5.1	* 1.353	434.7	LOS F	37.5	274.3	1.00	1.61	2.70	8.0
Approach			2531	5.1	2531	5.1	1.360	374.2	LOS F	177.5	1296.8	0.93	2.08	2.41	9.0
East: Rae Rd															
4	L2	All MCs	182	5.1	182	5.1	0.215	20.5	LOS C	6.0	44.0	0.53	0.73	0.53	47.5
5	T1	All MCs	184	5.1	184	5.1	0.388	61.8	LOS E	7.5	54.6	0.94	0.74	0.94	32.4
6	R2	All MCs	81	5.1	81	5.1	0.399	74.7	LOS E	5.6	41.2	0.97	0.77	0.97	29.4
Approach			447	5.1	447	5.1	0.399	47.3	LOS D	7.5	54.6	0.78	0.74	0.78	36.3
North: Read St															
7	L2	All MCs	84	5.1	84	5.1	0.047	6.7	LOS A	0.0	0.0	0.00	0.57	0.00	58.6
8	T1	All MCs	1077	5.1	1077	5.1	0.629	33.2	LOS C	29.7	216.7	0.82	0.74	0.82	43.9
9	R2	All MCs	169	5.1	169	5.1	1.013	129.3	LOS F	16.7	122.0	1.00	1.12	1.61	20.7
Approach			1331	5.1	1331	5.1	1.013	43.8	LOS D	29.7	216.7	0.79	0.78	0.87	38.9
West: Rae Rd															
10	L2	All MCs	349	5.1	349	5.1	0.522	58.0	LOS E	17.9	131.1	0.83	0.92	0.83	38.0
11	T1	All MCs	348	5.1	348	5.1	* 1.365	432.8	LOS F	58.4	426.9	1.00	1.86	2.71	8.1
12	R2	All MCs	271	5.1	271	5.1	* 1.332	413.5	LOS F	43.9	320.4	1.00	1.60	2.63	8.4
Approach			968	5.1	968	5.1	1.365	292.2	LOS F	58.4	426.9	0.94	1.45	2.01	10.9
All Vehicles			5277	5.1	5277	5.1	1.365	248.1	LOS F	177.5	1296.8	0.88	1.52	1.81	12.7

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: Read St												
P3	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Rae Rd												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Rae Rd											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	90	95	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00303 [01\_PattersonRd\_ReadSt\_PM\_2041 (Site Folder: Year 2041 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
			veh/h	%	veh/h	%	v/c	sec							
South: Read St															
1	L2	All MCs	225	8.8	225	8.8	0.210	14.6	LOS B	5.4	40.7	0.44	0.69	0.44	49.7
2	T1	All MCs	185	8.8	185	8.8	0.226	53.4	LOS D	7.5	56.6	0.73	0.68	0.73	36.9
3	R2	All MCs	471	8.8	471	8.8	* 1.028	132.2	LOS F	43.4	326.8	1.00	1.20	1.51	19.7
Approach			881	8.8	881	8.8	1.028	85.5	LOS F	43.4	326.8	0.80	0.96	1.07	24.0
East: Patterson Rd															
4	L2	All MCs	515	8.8	515	8.8	0.437	27.5	LOS C	15.0	113.0	0.51	0.77	0.51	47.3
5	T1	All MCs	901	8.8	901	8.8	* 1.153	243.0	LOS F	58.9	443.6	1.00	1.70	1.98	13.2
6	R2	All MCs	33	8.8	33	8.8	0.127	103.4	LOS F	2.1	15.7	0.90	0.72	0.90	27.4
Approach			1448	8.8	1448	8.8	1.153	163.3	LOS F	58.9	443.6	0.82	1.35	1.43	16.4
North: Flinders Ln															
7	L2	All MCs	29	8.8	29	8.8	1.039	143.7	LOS F	12.9	97.0	1.00	1.23	1.73	17.5
8	T1	All MCs	132	8.8	132	8.8	* 1.039	139.7	LOS F	12.9	97.0	1.00	1.22	1.74	18.0
9	R2	All MCs	71	8.8	71	8.8	1.039	146.0	LOS F	10.9	82.1	1.00	1.21	1.76	17.2
Approach			232	8.8	232	8.8	1.039	142.1	LOS F	12.9	97.0	1.00	1.22	1.75	17.7
West: Patterson Rd															
10	L2	All MCs	31	8.8	31	8.8	0.821	10.7	LOS B	33.7	254.0	0.99	0.92	1.04	29.9
11	T1	All MCs	876	8.8	876	8.8	0.821	61.3	LOS E	33.7	254.0	0.99	0.92	1.05	31.8
12	R2	All MCs	382	8.8	382	8.8	* 1.131	190.2	LOS F	41.1	309.7	1.00	1.42	1.92	13.6
Approach			1288	8.8	1288	8.8	1.131	98.3	LOS F	41.1	309.7	0.99	1.07	1.30	21.8
All Vehicles			3849	8.8	3849	8.8	1.153	122.5	LOS F	58.9	443.6	0.88	1.16	1.33	19.5

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P2	Full	50	53	66.4	LOS F	0.2	0.2	0.94	0.94	220.3	200.0	0.91
East: Patterson Rd												

P5	Stage 1	25	26	66.3	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
P4	Stage 2	25	26	66.3	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Flinders Ln												
P1	Full	50	53	66.4	LOS F	0.2	0.2	0.94	0.94	220.3	200.0	0.91
West: Patterson Rd												
P3	Full	50	53	66.4	LOS F	0.2	0.2	0.94	0.94	220.3	200.0	0.91
All	Pedestrians	200	211	66.4	LOS F	0.2	0.2	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00332 [02\_Patterson Rd Ennis Ave\_PM\_2041 (Site Folder: Year 2041 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: Base Year

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec			m				km/h
SouthEast: Ennis Ave															
21	L2	All MCs	235	6.8	235	6.8	1.013	63.6	LOS E	32.7	248.0	1.00	1.25	1.73	23.6
23	R2	All MCs	615	6.8	615	6.8	* 1.013	90.7	LOS F	32.7	248.0	1.00	1.29	1.75	24.2
Approach			849	6.8	849	6.8	1.013	83.2	LOS F	32.7	248.0	1.00	1.28	1.74	24.0
NorthEast: Patterson Rd															
24	L2	All MCs	351	6.8	351	6.8	0.204	6.7	LOS A	0.0	0.0	0.00	0.56	0.00	56.6
25	T1	All MCs	998	6.8	998	6.8	* 1.223	265.3	LOS F	59.9	454.4	1.00	2.06	2.93	12.3
Approach			1348	6.8	1348	6.8	1.223	198.1	LOS F	59.9	454.4	0.74	1.67	2.17	15.5
SouthWest: Patterson Rd															
31	T1	All MCs	1118	6.8	1118	6.8	0.495	10.6	LOS B	14.0	106.4	0.59	0.54	0.59	60.7
32	R2	All MCs	395	6.8	395	6.8	* 1.210	229.2	LOS F	40.9	310.2	1.00	1.73	2.88	12.1
Approach			1513	6.8	1513	6.8	1.210	67.6	LOS E	40.9	310.2	0.70	0.85	1.19	29.5
All Vehicles			3711	6.8	3711	6.8	1.223	118.6	LOS F	59.9	454.4	0.78	1.24	1.67	21.4

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Input Crossing	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed	
	ped/h	ped/h	sec		ped	m			sec	m	m/sec	
SouthEast: Ennis Ave												
P1	Full	30	32	33.7	LOS D	0.1	0.1	0.84	0.84	187.6	200.0	1.07
SouthWest: Patterson Rd												
P2	Full	30	32	32.1	LOS D	0.1	0.1	0.82	0.82	185.9	200.0	1.08
All Pedestrians		60	63	32.9	LOS D	0.1	0.1	0.83	0.83	186.7	200.0	1.07

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00345 [03\_Ennis Ave\_Dixon Rd\_PM\_2041 (Site Folder: Year 2041 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

Ennis Ave and Dixon Rd  
 Site Category: Base Year  
 Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. ]	[ Dist ]				km/h
			veh/h		veh/h					veh	m				
South: Ennis Ave															
1	L2	All MCs	191	4.4	191	4.4	0.552	17.3	LOS B	21.7	160.2	0.80	0.83	0.80	36.5
2	T1	All MCs	647	4.4	647	4.4	0.552	94.4	LOS F	22.4	165.4	0.81	0.76	0.81	40.8
3	R2	All MCs	1018	4.4	1018	4.4	* 1.601	663.2	LOS F	97.9	722.4	1.00	1.88	3.31	5.4
Approach			1856	4.4	1856	4.4	1.601	398.4	LOS F	97.9	722.4	0.91	1.38	2.18	8.8
East: Dixon Rd															
4	L2	All MCs	980	4.4	980	4.4	1.108	166.2	LOS F	93.4	689.7	1.00	1.33	1.71	16.2
5	T1	All MCs	792	4.4	792	4.4	1.575	609.6	LOS F	81.6	602.2	1.00	2.32	3.25	5.6
6	R2	All MCs	216	4.4	216	4.4	1.222	322.4	LOS F	30.5	225.0	1.00	1.45	2.29	10.4
Approach			1987	4.4	1987	4.4	1.575	359.8	LOS F	93.4	689.7	1.00	1.74	2.39	9.0
North: Ennis Ave															
7	L2	All MCs	248	4.4	248	4.4	1.626	585.1	LOS F	196.9	1453.9	1.00	1.98	3.34	5.3
8	T1	All MCs	1603	4.4	1603	4.4	* 1.626	634.2	LOS F	196.9	1453.9	1.00	2.42	3.34	5.4
9	R2	All MCs	137	4.4	137	4.4	0.553	110.2	LOS F	9.5	70.2	0.98	0.80	0.98	27.6
Approach			1988	4.4	1988	4.4	1.626	592.0	LOS F	196.9	1453.9	1.00	2.25	3.18	5.7
West: Dixon Rd															
10	L2	All MCs	141	4.4	141	4.4	0.140	75.6	LOS E	3.6	26.6	0.42	0.67	0.42	48.2
11	T1	All MCs	792	4.4	792	4.4	* 1.610	641.1	LOS F	85.2	629.3	1.00	2.35	3.33	5.4
12	R2	All MCs	285	4.4	285	4.4	* 1.615	673.0	LOS F	58.3	430.4	1.00	2.02	3.36	5.3
Approach			1218	4.4	1218	4.4	1.615	583.1	LOS F	85.2	629.3	0.93	2.08	3.00	6.0
All Vehicles			7049	4.4	7049	4.4	1.626	474.0	LOS F	196.9	1453.9	0.97	1.85	2.66	7.2

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

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ]	[ Dist ]			sec	m	m/sec
						ped	m					
North: Ennis Ave												
P2	Full	30	32	61.7	LOS F	0.1	0.1	0.91	0.91	215.6	200.0	0.93
West: Dixon Rd												

P1 Full	30	32	61.7	LOS F	0.1	0.1	0.91	0.91	215.6	200.0	0.93
All Pedestrians	60	63	61.7	LOS F	0.1	0.1	0.91	0.91	215.6	200.0	0.93

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00335 [04\_Ennis Ave\_Council Ave\_PM\_2041 (Site Folder: Year 2041 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 114 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. Dist ]		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec			m				km/h
South: Ennis Ave															
1	L2	All MCs	564	4.3	564	4.3	0.460	53.1	LOS D	8.5	62.9	0.41	0.71	0.41	51.9
2	T1	All MCs	1416	4.3	1416	4.3	1.809	807.1	LOS F	153.2	1128.3	1.00	3.07	4.57	4.4
3	R2	All MCs	63	4.3	63	4.3	0.678	96.2	LOS F	3.8	27.9	1.00	0.82	1.15	27.2
Approach			2043	4.3	2043	4.3	1.809	576.9	LOS F	153.2	1128.3	0.84	2.35	3.32	6.1
East: Carvie St															
4	L2	All MCs	160	4.3	160	4.3	0.257	28.5	LOS C	6.3	46.1	0.74	0.72	0.74	38.0
5	T1	All MCs	89	4.3	89	4.3	*0.257	45.3	LOS D	6.3	46.1	0.89	0.72	0.89	33.3
6	R2	All MCs	26	4.3	26	4.3	0.085	47.2	LOS D	1.2	9.1	0.87	0.70	0.87	32.2
Approach			276	4.3	276	4.3	0.257	35.7	LOS D	6.3	46.1	0.80	0.72	0.80	35.7
North: Ennis Ave															
7	L2	All MCs	19	4.3	19	4.3	0.013	74.6	LOS E	0.1	0.9	0.20	0.61	0.20	49.7
8	T1	All MCs	2574	4.3	2574	4.3	*2.148	1112.0	LOS F	334.6	2464.7	1.00	4.01	5.24	3.3
9	R2	All MCs	383	4.3	383	4.3	*1.899	912.0	LOS F	81.0	596.6	1.00	2.29	4.79	3.9
Approach			2976	4.3	2976	4.3	2.148	1079.7	LOS F	334.6	2464.7	0.99	3.77	5.15	3.3
West: Council Ave															
10	L2	All MCs	428	4.3	428	4.3	0.690	31.4	LOS C	15.3	113.1	0.91	0.89	0.91	39.6
11	T1	All MCs	44	4.3	44	4.3	*1.495	527.7	LOS F	70.1	516.7	1.00	2.32	3.71	6.4
12	R2	All MCs	751	4.3	751	4.3	1.495	532.1	LOS F	70.1	516.7	1.00	2.27	3.71	6.5
Approach			1223	4.3	1223	4.3	1.495	356.5	LOS F	70.1	516.7	0.97	1.79	2.73	9.1
All Vehicles			6518	4.3	6518	4.3	2.148	742.2	LOS F	334.6	2464.7	0.93	2.82	3.94	4.8

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Ennis Ave												
P4	Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
East: Carvie St												

P2 Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
North: Ennis Ave											
P3 Full	50	53	42.2	LOS E	0.1	0.1	0.86	0.86	196.1	200.0	1.02
West: Council Ave											
P1 Full	25	26	42.2	LOS E	0.1	0.1	0.86	0.86	196.0	200.0	1.02
P5 Slip/ Bypass	25	26	21.5	LOS C	0.0	0.0	0.84	0.84	175.3	200.0	1.14
All Pedestrians	200	211	39.6	LOS D	0.1	0.1	0.86	0.86	193.5	200.0	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00852 [05\_Ennis Ave\_Rae Rd\_PM\_20241 (Site Folder: Year 2041 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.1.200**

New Site

Site Category: Base Year

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. ]	[ Dist ]			km/h	
			veh/h		veh/h					veh	m				
South: Ennis Ave															
1	L2	All MCs	113	3.3	113	3.3	0.089	10.3	LOS B	1.5	10.7	0.34	0.65	0.34	54.7
2	T1	All MCs	1703	3.3	1703	3.3	0.701	24.6	LOS C	23.2	169.1	0.85	0.76	0.85	48.4
3	R2	All MCs	49	3.3	49	3.3	0.231	51.1	LOS D	2.3	16.5	0.94	0.74	0.94	31.7
Approach			1865	3.3	1865	3.3	0.701	24.4	LOS C	23.2	169.1	0.82	0.75	0.82	48.1
East: Rockingham Sta Acc Rd															
4	L2	All MCs	118	3.3	118	3.3	0.194	27.2	LOS C	3.9	28.6	0.75	0.71	0.75	38.9
5	T1	All MCs	98	3.3	98	3.3	* 0.867	60.5	LOS E	5.5	39.9	1.00	0.99	1.44	29.9
6	R2	All MCs	98	3.3	98	3.3	0.608	54.8	LOS D	4.9	35.8	1.00	0.81	1.05	30.4
Approach			314	3.3	314	3.3	0.867	46.2	LOS D	5.5	39.9	0.91	0.83	1.06	32.9
North: Ennis Ave															
7	L2	All MCs	79	3.3	79	3.3	0.055	25.3	LOS C	0.5	3.9	0.22	0.63	0.22	50.0
8	T1	All MCs	2908	3.3	2908	3.3	* 1.148	185.8	LOS F	102.5	746.6	1.00	2.03	2.34	15.8
9	R2	All MCs	463	3.3	463	3.3	* 1.079	149.6	LOS F	20.2	147.1	1.00	1.36	2.15	18.2
Approach			3451	3.3	3451	3.3	1.148	177.2	LOS F	102.5	746.6	0.98	1.91	2.26	16.3
West: Rae Rd															
10	L2	All MCs	291	3.3	291	3.3	0.377	21.5	LOS C	7.5	54.9	0.64	0.77	0.64	49.4
11	T1	All MCs	72	3.3	72	3.3	0.634	56.5	LOS E	3.7	27.1	1.00	0.80	1.10	31.1
12	R2	All MCs	169	3.3	169	3.3	* 1.053	127.4	LOS F	13.6	99.4	1.00	1.26	2.06	20.2
Approach			532	3.3	532	3.3	1.053	60.0	LOS E	13.6	99.4	0.80	0.93	1.15	32.0
All Vehicles			6161	3.3	6161	3.3	1.148	114.2	LOS F	102.5	746.6	0.91	1.42	1.67	22.3

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

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Project: U:\300204265\Traffic\working\Sidra\Rockingham\_update\_09122025.sip9

# MOVEMENT SUMMARY

**Site: LM00488 [06\_Read St\_Chalgrove Ave\_PM\_2041 (Site Folder: Year 2041 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: Base Year

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
			veh/h	%	veh/h	%	v/c	sec							
South: Read St															
1	L2	All MCs	91	5.1	91	5.1	0.810	56.5	LOS E	34.9	255.2	0.98	0.89	1.01	26.7
2	T1	All MCs	928	5.1	928	5.1	0.810	51.6	LOS D	34.9	255.2	0.98	0.89	1.01	30.5
3	R2	All MCs	278	5.1	278	5.1	* 1.108	196.0	LOS F	32.6	238.5	1.00	1.24	1.87	11.5
Approach			1297	5.1	1297	5.1	1.108	82.9	LOS F	34.9	255.2	0.98	0.97	1.19	22.0
East: Chalgrove Ave															
4	L2	All MCs	666	5.1	666	5.1	0.793	39.0	LOS D	30.7	224.3	0.91	1.01	0.91	31.8
5	T1	All MCs	58	5.1	58	5.1	0.184	80.7	LOS F	3.6	26.7	0.90	0.71	0.90	29.2
6	R2	All MCs	320	5.1	320	5.1	* 1.118	220.9	LOS F	38.4	280.8	1.00	1.36	1.89	14.2
Approach			1044	5.1	1044	5.1	1.118	97.0	LOS F	38.4	280.8	0.94	1.10	1.21	20.7
North: Read St															
7	L2	All MCs	454	5.1	454	5.1	0.351	31.6	LOS C	10.1	73.5	0.38	0.70	0.38	51.5
8	T1	All MCs	1294	5.1	1294	5.1	* 1.147	228.9	LOS F	91.0	664.9	1.00	1.68	1.92	11.2
9	R2	All MCs	33	5.1	33	5.1	0.130	95.2	LOS F	2.1	15.4	0.91	0.73	0.91	27.9
Approach			1780	5.1	1780	5.1	1.147	176.2	LOS F	91.0	664.9	0.84	1.41	1.51	13.6
West: Chalgrove Ave															
10	L2	All MCs	52	5.1	52	5.1	0.380	64.9	LOS E	7.7	56.0	0.94	0.77	0.94	28.2
11	T1	All MCs	65	5.1	65	5.1	* 0.380	60.3	LOS E	7.7	56.0	0.94	0.77	0.94	28.3
12	R2	All MCs	57	5.1	57	5.1	0.190	62.7	LOS E	3.6	26.3	0.90	0.74	0.90	23.6
Approach			174	5.1	174	5.1	0.380	62.5	LOS E	7.7	56.0	0.92	0.76	0.92	26.8
All Vehicles			4295	5.1	4295	5.1	1.147	124.2	LOS F	91.0	664.9	0.91	1.18	1.32	17.4

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P4	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Chalgrove Ave												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Read St											
P3 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Chalgrove Ave											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	120	126	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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1:02:03 PM

Project: K:\Infrastructure Pune Team\Project Folder\AP\Traffic\300204265 - Rockingham PSP\40 Technical\Sidra\Rockingham\_09232025.sip9

# MOVEMENT SUMMARY

**Site: LM00343 [07 Read St\_Council Ave\_PM\_2041 (Site Folder: Year 2041 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
			veh/h	%	veh/h	%	v/c	sec							
South: Read St															
1	L2	All MCs	27	5.1	27	5.1	0.776	52.2	LOS D	33.9	247.6	0.96	0.85	0.96	34.3
2	T1	All MCs	1026	5.1	1026	5.1	0.776	53.7	LOS D	34.0	248.2	0.96	0.85	0.96	33.7
3	R2	All MCs	621	5.1	621	5.1	* 1.485	529.8	LOS F	115.9	846.4	1.00	1.81	3.02	6.8
Approach			1675	5.1	1675	5.1	1.485	230.2	LOS F	115.9	846.4	0.97	1.21	1.72	11.9
East: Council Ave															
4	L2	All MCs	835	5.1	835	5.1	0.909	52.2	LOS D	51.5	376.3	0.99	1.12	1.07	33.7
5	T1	All MCs	117	5.1	117	5.1	0.387	62.9	LOS E	7.7	56.4	0.94	0.77	0.94	28.5
6	R2	All MCs	187	5.1	187	5.1	* 1.426	473.2	LOS F	33.4	243.8	1.00	1.76	2.91	5.3
Approach			1139	5.1	1139	5.1	1.426	122.6	LOS F	51.5	376.3	0.99	1.19	1.36	20.1
North: Read St															
7	L2	All MCs	277	5.1	277	5.1	0.247	53.4	LOS D	7.7	56.5	0.46	0.71	0.46	44.1
8	T1	All MCs	1827	5.1	1827	5.1	* 1.524	567.5	LOS F	185.1	1352.1	1.00	2.63	3.10	5.2
9	R2	All MCs	147	5.1	147	5.1	0.352	93.2	LOS F	9.0	65.7	0.88	0.79	0.88	25.2
Approach			2252	5.1	2252	5.1	1.524	473.3	LOS F	185.1	1352.1	0.93	2.28	2.63	5.7
West: Council Ave															
10	L2	All MCs	74	5.1	74	5.1	0.507	28.0	LOS C	10.0	72.9	0.95	0.92	0.95	22.8
11	T1	All MCs	92	5.1	92	5.1	* 0.507	105.7	LOS F	10.0	72.9	0.95	0.92	0.95	27.3
12	R2	All MCs	39	5.1	39	5.1	0.296	81.7	LOS F	2.8	20.5	0.98	0.74	0.98	26.5
Approach			204	5.1	204	5.1	0.507	73.1	LOS E	10.0	72.9	0.96	0.88	0.96	24.9
All Vehicles			5269	5.1	5269	5.1	1.524	304.7	LOS F	185.1	1352.1	0.95	1.65	2.00	9.1

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P4	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Council Ave												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Read St											
P3 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Council Ave											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	120	126	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00445 [08 Read St\_Rae Rd\_PM\_2041 (Site Folder: Year 2041 PM Peak)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. veh	Dist ] m				km/h
South: Read St															
1	L2	All MCs	275	5.1	275	5.1	0.228	38.0	LOS D	7.1	51.5	0.41	0.69	0.41	51.1
2	T1	All MCs	1375	5.1	1375	5.1	0.970	94.0	LOS F	67.1	490.1	1.00	1.17	1.26	29.5
3	R2	All MCs	171	5.1	171	5.1	0.649	86.7	LOS F	12.0	87.6	1.00	0.82	1.00	28.5
Approach			1820	5.1	1820	5.1	0.970	84.9	LOS F	67.1	490.1	0.91	1.06	1.11	27.4
East: Rae Rd															
4	L2	All MCs	276	5.1	276	5.1	0.398	42.2	LOS D	13.6	99.0	0.77	0.87	0.77	37.1
5	T1	All MCs	301	5.1	301	5.1	0.730	68.8	LOS E	13.4	97.9	0.99	0.83	1.03	30.6
6	R2	All MCs	43	5.1	43	5.1	0.258	76.5	LOS E	3.0	22.0	0.97	0.74	0.97	29.0
Approach			620	5.1	620	5.1	0.730	57.5	LOS E	13.6	99.0	0.89	0.84	0.91	33.0
North: Read St															
7	L2	All MCs	132	5.1	132	5.1	0.073	7.2	LOS A	0.0	0.0	0.00	0.57	0.00	58.6
8	T1	All MCs	2299	5.1	2299	5.1	* 1.471	506.5	LOS F	224.5	1640.4	1.00	2.56	2.96	7.3
9	R2	All MCs	391	5.1	391	5.1	* 1.486	549.1	LOS F	72.9	532.8	1.00	1.77	3.04	6.7
Approach			2821	5.1	2821	5.1	1.486	490.5	LOS F	224.5	1640.4	0.95	2.35	2.83	7.1
West: Rae Rd															
10	L2	All MCs	268	5.1	268	5.1	0.328	29.9	LOS C	11.7	85.4	0.67	0.76	0.67	43.8
11	T1	All MCs	225	5.1	225	5.1	* 0.951	104.4	LOS F	19.9	145.1	1.00	1.09	1.39	25.3
12	R2	All MCs	241	5.1	241	5.1	* 1.441	496.4	LOS F	43.5	317.5	1.00	1.74	2.94	6.8
Approach			735	5.1	735	5.1	1.441	205.8	LOS F	43.5	317.5	0.88	1.18	1.64	14.4
All Vehicles			5996	5.1	5996	5.1	1.486	287.0	LOS F	224.5	1640.4	0.92	1.66	1.96	11.2

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: Read St												
P3	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Rae Rd												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Rae Rd											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	90	95	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# Appendix F

SIDRA with Mitigation Results



# MOVEMENT SUMMARY

**Site: LM00488 [06\_Read St\_Chalgrove Ave\_AM\_2041\_MT (Site Folder: Year 2041 AM Peak Mitigation)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: Base Year

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
			veh/h	%	veh/h	%	v/c	sec							
South: Read St															
1	L2	All MCs	59	5.1	59	5.1	0.390	41.7	LOS D	14.7	107.2	0.77	0.69	0.77	31.1
2	T1	All MCs	1581	5.1	1581	5.1	*0.990	86.9	LOS F	68.4	499.7	0.97	1.15	1.24	22.7
3	R2	All MCs	314	5.1	314	5.1	*0.972	117.6	LOS F	29.0	211.6	1.00	1.07	1.40	18.2
Approach			1954	5.1	1954	5.1	0.990	90.4	LOS F	68.4	499.7	0.97	1.13	1.25	21.0
East: Chalgrove Ave															
4	L2	All MCs	187	5.1	187	5.1	0.174	10.3	LOS B	3.6	26.1	0.33	0.65	0.33	47.5
5	T1	All MCs	34	5.1	34	5.1	0.107	58.4	LOS E	2.1	15.2	0.88	0.68	0.88	29.5
6	R2	All MCs	131	5.1	131	5.1	*0.910	94.9	LOS F	10.9	79.7	1.00	1.01	1.37	23.8
Approach			352	5.1	352	5.1	0.910	46.3	LOS D	10.9	79.7	0.63	0.79	0.77	31.7
North: Read St															
7	L2	All MCs	335	5.1	335	5.1	0.280	14.3	LOS B	8.5	62.0	0.42	0.70	0.42	50.0
8	T1	All MCs	942	5.1	942	5.1	0.430	35.9	LOS D	16.7	121.7	0.79	0.68	0.79	36.5
9	R2	All MCs	54	5.1	54	5.1	0.166	62.7	LOS E	3.3	24.3	0.88	0.75	0.88	29.1
Approach			1331	5.1	1331	5.1	0.430	31.5	LOS C	16.7	121.7	0.70	0.69	0.70	39.3
West: Chalgrove Ave															
10	L2	All MCs	34	5.1	34	5.1	0.457	68.2	LOS E	9.5	69.2	0.95	0.78	0.95	28.3
11	T1	All MCs	108	5.1	108	5.1	*0.457	61.2	LOS E	9.5	69.2	0.95	0.78	0.95	28.4
12	R2	All MCs	94	5.1	94	5.1	0.653	80.3	LOS F	7.0	51.1	1.00	0.82	1.05	20.5
Approach			236	5.1	236	5.1	0.653	69.8	LOS E	9.5	69.2	0.97	0.80	0.99	25.2
All Vehicles			3872	5.1	3872	5.1	0.990	64.9	LOS E	68.4	499.7	0.84	0.92	1.00	26.6

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P4	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Chalgrove Ave												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Read St											
P3 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Chalgrove Ave											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	120	126	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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 \Rockingham\_withMT\_03102025.sip9

# MOVEMENT SUMMARY

**Site: LM00343 [07 Read St\_Council Ave\_AM\_2041\_MT (Site Folder: Year 2041 AM Peak Mitigation)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
			veh/h	%	veh/h	%	v/c	sec							
South: Read St															
1	L2	All MCs	40	5.1	40	5.1	1.392	462.6	LOS F	85.6	625.6	1.00	2.09	2.78	7.9
2	T1	All MCs	1669	5.1	1669	5.1	* 1.392	450.3	LOS F	123.6	902.8	1.00	2.17	2.77	6.4
3	R2	All MCs	774	5.1	774	5.1	* 1.404	457.0	LOS F	134.8	984.9	1.00	1.76	2.79	7.9
Approach			2483	5.1	2483	5.1	1.404	452.6	LOS F	134.8	984.9	1.00	2.04	2.77	6.5
East: Council Ave															
4	L2	All MCs	305	5.1	305	5.1	0.257	14.3	LOS B	7.6	55.3	0.40	0.67	0.40	50.9
5	T1	All MCs	56	5.1	56	5.1	0.185	60.4	LOS E	3.5	25.9	0.90	0.71	0.90	29.0
6	R2	All MCs	178	5.1	178	5.1	* 1.354	409.0	LOS F	29.6	216.0	1.00	1.66	2.72	6.1
Approach			539	5.1	539	5.1	1.354	149.3	LOS F	29.6	216.0	0.65	1.00	1.22	16.9
North: Read St															
7	L2	All MCs	232	5.1	232	5.1	0.250	23.6	LOS C	8.5	62.3	0.57	0.73	0.57	39.4
8	T1	All MCs	987	5.1	987	5.1	0.805	57.6	LOS E	29.3	213.7	0.97	0.87	1.01	30.3
9	R2	All MCs	76	5.1	76	5.1	0.132	49.5	LOS D	3.9	28.3	0.75	0.74	0.75	28.7
Approach			1295	5.1	1295	5.1	0.805	51.0	LOS D	29.3	213.7	0.89	0.84	0.92	30.9
West: Council Ave															
10	L2	All MCs	267	5.1	267	5.1	1.011	98.4	LOS F	36.1	263.4	1.00	1.23	1.48	15.5
11	T1	All MCs	123	5.1	123	5.1	* 1.011	113.2	LOS F	36.1	263.4	1.00	1.23	1.48	19.2
12	R2	All MCs	27	5.1	27	5.1	0.208	114.4	LOS F	1.9	14.2	0.97	0.72	0.97	26.7
Approach			418	5.1	418	5.1	1.011	103.8	LOS F	36.1	263.4	1.00	1.20	1.45	14.3
All Vehicles			4735	5.1	4735	5.1	1.404	277.5	LOS F	134.8	984.9	0.93	1.52	1.97	9.6

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P4	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Council Ave												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Read St											
P3 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Council Ave											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	120	126	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00488 [06\_Read St\_Chalgrove Ave\_PM\_2041\_MT (Site Folder: Year 2041 PM Peak Mitigation)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: Base Year

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [ Total HV ]		Arrival Flows [ Total HV ]		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [ Veh. ]	Dist [ m ]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Read St															
1	L2	All MCs	91	5.1	91	5.1	0.305	50.3	LOS D	9.2	67.3	0.82	0.74	0.82	27.7
2	T1	All MCs	928	5.1	928	5.1	0.772	52.1	LOS D	28.8	210.4	0.97	0.86	0.98	30.0
3	R2	All MCs	278	5.1	278	5.1	*0.969	105.3	LOS F	25.4	185.9	1.00	1.06	1.41	18.2
Approach			1297	5.1	1297	5.1	0.969	63.4	LOS E	28.8	210.4	0.96	0.89	1.06	26.2
East: Chalgrove Ave															
4	L2	All MCs	666	5.1	666	5.1	0.648	23.8	LOS C	28.8	210.3	0.73	0.83	0.73	38.6
5	T1	All MCs	58	5.1	58	5.1	0.184	78.6	LOS E	3.6	26.7	0.90	0.71	0.90	29.3
6	R2	All MCs	320	5.1	320	5.1	*0.975	124.4	LOS F	29.8	218.1	1.00	1.12	1.40	22.3
Approach			1044	5.1	1044	5.1	0.975	57.7	LOS E	29.8	218.1	0.82	0.91	0.95	28.0
North: Read St															
7	L2	All MCs	454	5.1	454	5.1	0.359	19.1	LOS B	10.7	78.4	0.41	0.77	0.41	51.0
8	T1	All MCs	1294	5.1	1294	5.1	*0.955	92.3	LOS F	39.4	287.8	1.00	1.15	1.30	22.1
9	R2	All MCs	33	5.1	33	5.1	0.114	72.1	LOS E	2.0	14.9	0.89	0.73	0.89	28.6
Approach			1780	5.1	1780	5.1	0.955	73.3	LOS E	39.4	287.8	0.85	1.05	1.07	25.4
West: Chalgrove Ave															
10	L2	All MCs	52	5.1	52	5.1	0.380	65.9	LOS E	7.7	56.0	0.94	0.77	0.94	28.2
11	T1	All MCs	65	5.1	65	5.1	*0.380	60.3	LOS E	7.7	56.0	0.94	0.77	0.94	28.3
12	R2	All MCs	57	5.1	57	5.1	0.164	58.7	LOS E	3.5	25.3	0.87	0.74	0.87	24.5
Approach			174	5.1	174	5.1	0.380	61.4	LOS E	7.7	56.0	0.91	0.76	0.91	27.2
All Vehicles			4295	5.1	4295	5.1	0.975	66.0	LOS E	39.4	287.8	0.88	0.96	1.03	26.3

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE [ Ped Dist ]		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		ped	m			sec	m	m/sec
South: Read St												
P4	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Chalgrove Ave												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Read St											
P3 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Chalgrove Ave											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	120	126	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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# MOVEMENT SUMMARY

**Site: LM00343 [07 Read St\_Council Ave\_PM\_2041\_MT (Site Folder: Year 2041 PM Peak Mitigation)]**

**Output produced by SIDRA INTERSECTION Version: 9.1.6.228**

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 150 seconds (Site Practical Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[ Total HV ]	%	[ Total HV ]	%	v/c	sec		[ Veh. Dist ]				km/h	
			veh/h		veh/h					veh	m				
South: Read St															
1	L2	All MCs	27	5.1	27	5.1	0.686	65.1	LOS E	20.2	147.5	0.93	0.81	0.93	33.6
2	T1	All MCs	1026	5.1	1026	5.1	0.686	59.5	LOS E	26.2	191.6	0.93	0.81	0.93	32.9
3	R2	All MCs	621	5.1	621	5.1	* 1.300	360.5	LOS F	97.1	709.6	1.00	1.61	2.47	9.6
Approach			1675	5.1	1675	5.1	1.300	171.2	LOS F	97.1	709.6	0.96	1.10	1.50	15.1
East: Council Ave															
4	L2	All MCs	835	5.1	835	5.1	0.842	74.3	LOS E	39.2	286.3	0.91	1.02	0.91	39.4
5	T1	All MCs	117	5.1	117	5.1	0.387	62.9	LOS E	7.7	56.4	0.94	0.77	0.94	28.5
6	R2	All MCs	187	5.1	187	5.1	* 1.307	367.1	LOS F	29.6	216.0	1.00	1.63	2.57	6.7
Approach			1139	5.1	1139	5.1	1.307	121.3	LOS F	39.2	286.3	0.92	1.10	1.18	24.0
North: Read St															
7	L2	All MCs	277	5.1	277	5.1	0.261	19.2	LOS B	8.6	62.7	0.50	0.72	0.50	42.6
8	T1	All MCs	1827	5.1	1827	5.1	* 1.316	318.4	LOS F	126.3	922.7	0.98	1.92	2.24	8.6
9	R2	All MCs	147	5.1	147	5.1	0.308	83.3	LOS F	8.6	62.6	0.84	0.79	0.84	26.3
Approach			2252	5.1	2252	5.1	1.316	266.2	LOS F	126.3	922.7	0.91	1.70	1.94	9.6
West: Council Ave															
10	L2	All MCs	74	5.1	74	5.1	0.507	22.7	LOS C	9.7	70.7	0.95	0.91	0.95	23.0
11	T1	All MCs	92	5.1	92	5.1	* 0.507	107.7	LOS F	9.7	70.7	0.95	0.91	0.95	27.5
12	R2	All MCs	39	5.1	39	5.1	0.272	80.0	LOS E	2.8	20.2	0.98	0.73	0.98	26.8
Approach			204	5.1	204	5.1	0.507	71.8	LOS E	9.7	70.7	0.95	0.88	0.95	25.2
All Vehicles			5269	5.1	5269	5.1	1.316	197.1	LOS F	126.3	922.7	0.93	1.35	1.60	13.6

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

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

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

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

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

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

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

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ped	Dist ]			sec	m	m/sec
							m					
South: Read St												
P4	Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
East: Council Ave												

P1 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
North: Read St											
P3 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
West: Council Ave											
P2 Full	30	32	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91
All Pedestrians	120	126	66.4	LOS F	0.1	0.1	0.94	0.94	220.2	200.0	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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