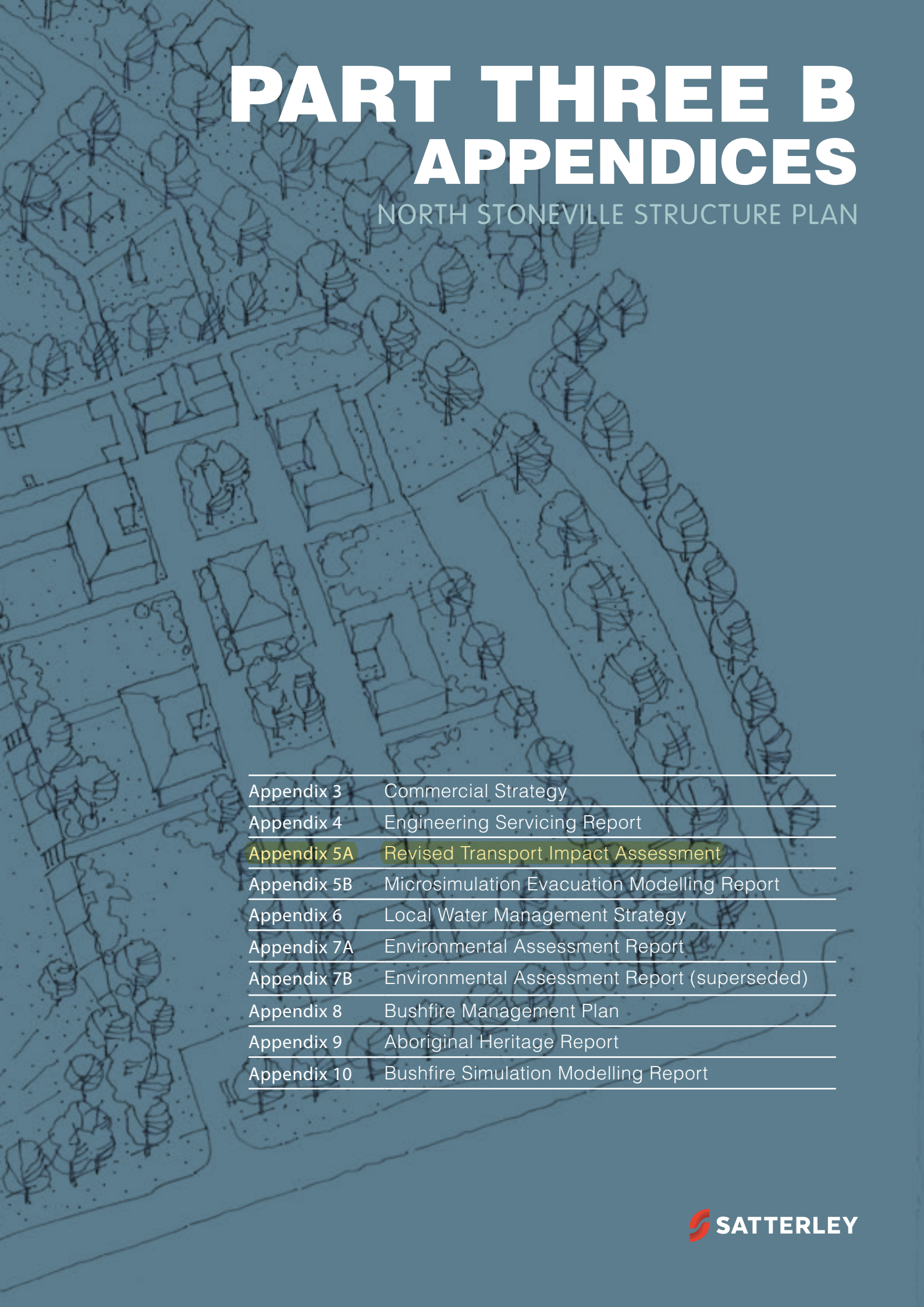
PART THREE B
APPENDICES

NORTH STONEVILLE STRUCTURE PLAN



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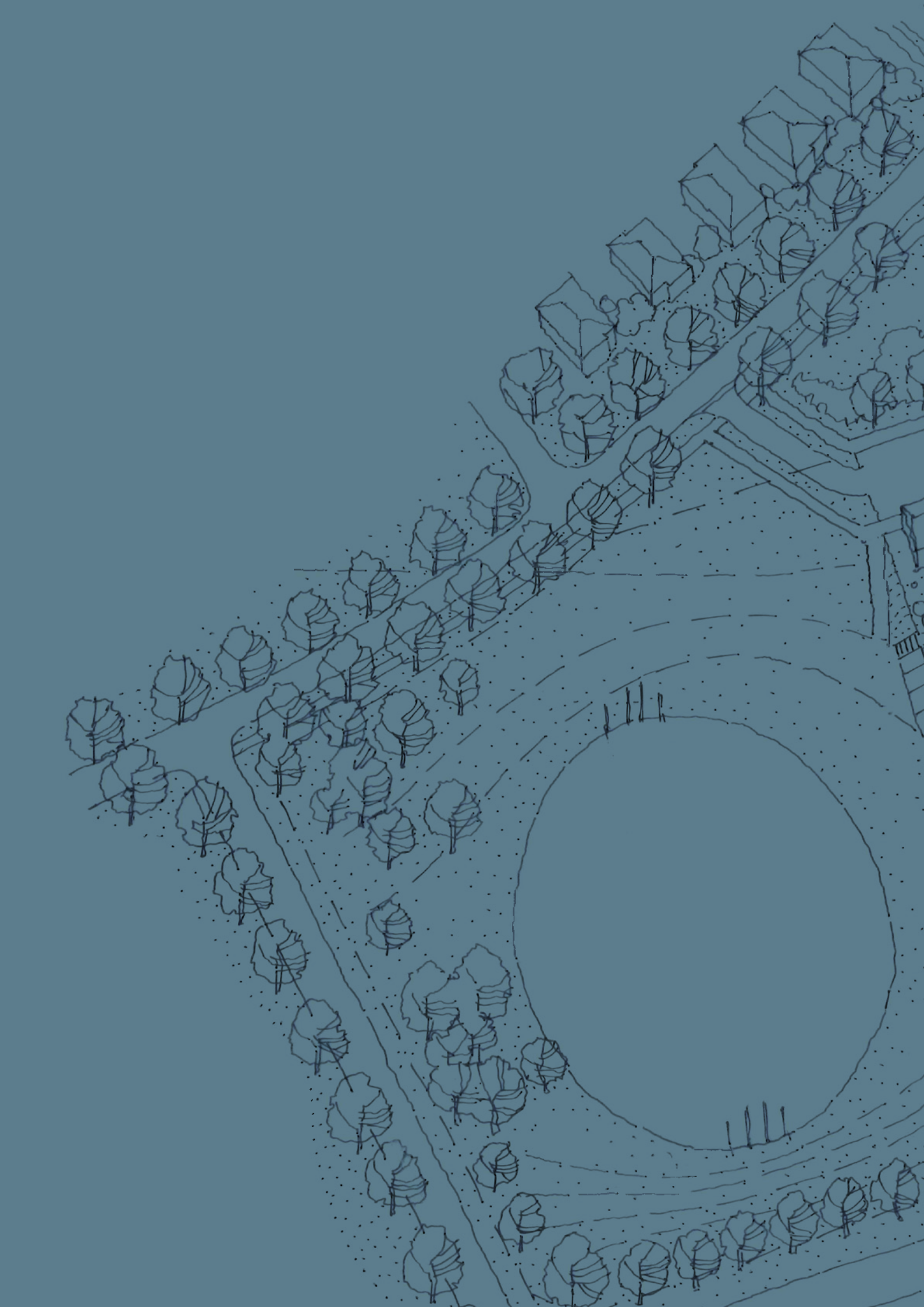
SATTERLEY

APPENDIX 5A

REVISED TRAFFIC IMPACT ASSESSMENT

SATTERLEY



transcore
20 years anniversary

transport planning
traffic engineering
modelling

North Stoneville Local Structure Plan

Lot 48 Stoneville Road, Stoneville

Revised Transport Impact Assessment

PREPARED FOR:
Satterley Property Group

January 2023

Document history and status

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1 Introduction

This 2022 Revised Transport Impact Assessment (2022 RTIA) has been prepared by Transcore on behalf of Satterley Property Group with regard to the proposed North Stoneville revised Local Structure Plan (LSP). Refer **Appendix A** for more details. The LSP extends over Lot 48 Stoneville Road with an area of approximately 533ha (refer **Figure 1**).

The project has undergone an extensive SAT Mediation process and as a result of the agreement during mediation for reconsideration of the LSP and supporting documents by State Planning Commission, a revised LSP has been prepared and this 2022 RTIA has been prepared with respect to the revised LSP.

The LSP area is broadly situated between Toodyay Road and Great Eastern Highway, approximately 4.5km north of Mundaring town site and 12.5km northeast of Midland. More specifically, the LSP occupies an area located immediately south of Hawkstone Road (formerly Cameron Road), east of Roland Road and west of Stoneville Road in Stoneville, as shown in **Figure 1**.

Figure 1: Local Structure Plan Location

The proposed LSP is anticipated to yield approximately 1,000 residential lots including a public primary school, Anglican K-12 school and a small commercial precinct with a local neighbourhood centre to support this community.

This 2022 RTIA estimates the traffic volumes that will be generated by the LSP area and assesses the impact of the proposed scheme on surrounding road network. Further, the 2022 RTIA assesses the proposed internal LSP road network, identifies the hierarchy of these roads, recommends intersection treatments, proposes network of shared paths and footpaths, and investigates the potential for future public transport services.

2 Proposed Local Structure Plan

The location of the LSP area in its regional context within the Metropolitan Region Scheme (MRS) is illustrated in **Figure 2**.

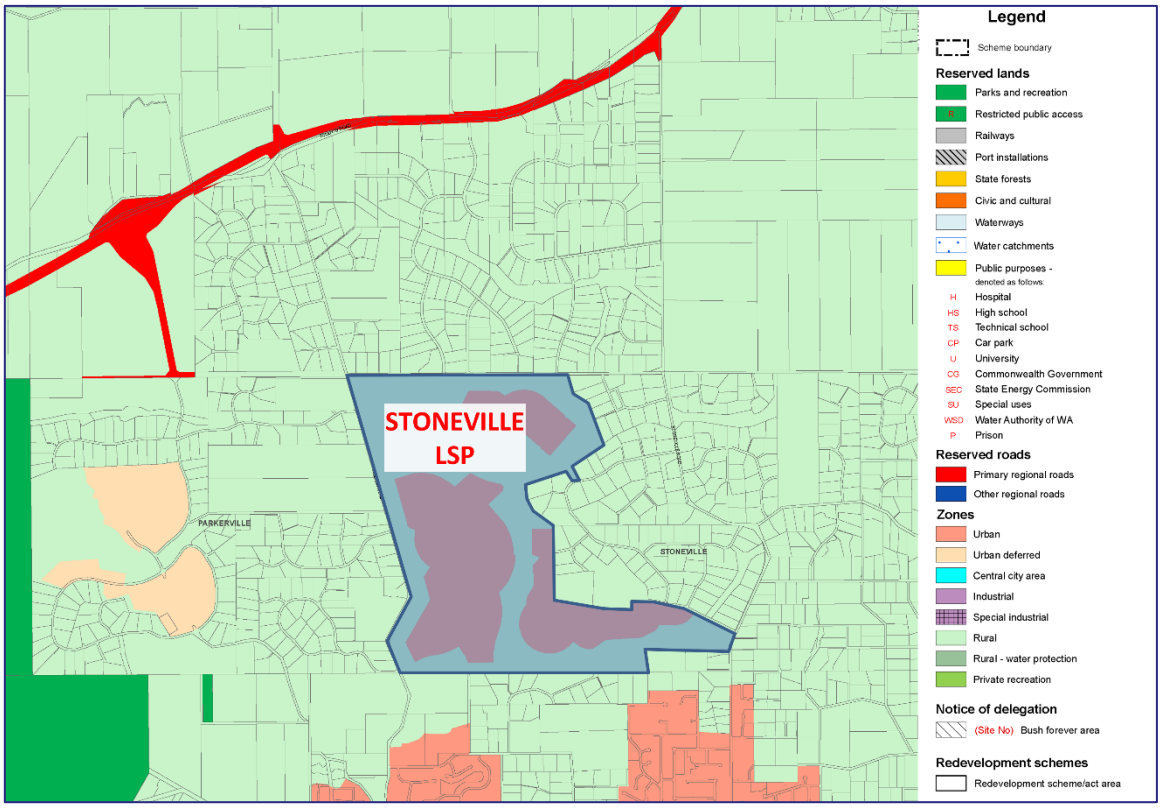


Figure 2: Local Structure Plan location within MRS context

The MRS plan shows subject site comprising "Rural" and "Urban Deferred" zones; however, as recently as November 2016 WAPC has resolved to transfer parts of LSP area zoned "Urban Deferred" to "Urban" in the MRS (MRS Amendment 1318/27).

The MRS plan identifies Toodyay Road and Great Eastern Highway as Primary Regional Roads (i.e. Red Roads) which are under care and control of Main Roads WA.

The LSP provides for a total of approximately 1,000 residential lots supporting a range of densities including a public primary school, private Anglican K-12 school and a retail/commercial node of approximately 1,500m^2 GFA. Refer concept North Stoneville Local Structure Plan provided in **Appendix A** for more details.

The proposed LSP is divided into three discrete "village" areas with a total residential yield of about 1,001 lots promoting three different types of dwellings:

- Natural Living: total of 42 lots (average lot size of 10,075m^2);
- Sub-Urban: total of 647 lots (average lot size of 1,700m^2); and,
- Village Urban: total of 312 lots (average lot size of 1,200m^2).

Refer the following map showing distribution and quantum of each type of lot across three village areas (refer to **Figure 3**).

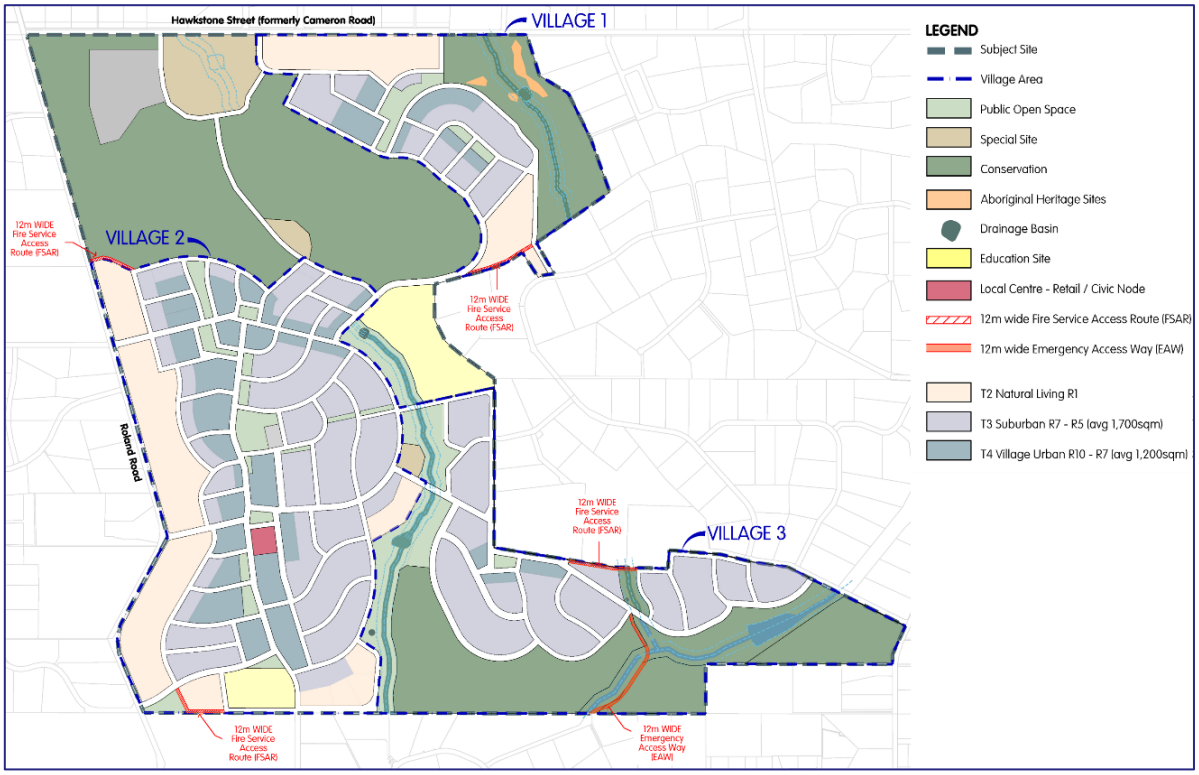


Figure 3: Lot types and distribution within LSP

As part of the LSP a private Anglican K-12 school site of approximately 12ha is proposed at the central-east location with estimated capacity of about 500 students. Additionally, a public primary school site of approximately 4.3ha is also proposed at the southwest corner of the LSP area with a total capacity of about 300 students.

An approximate of 1,500m^2 GFA of retail/commercial floorspace for a local centre, is proposed centrally within the LSP area. This small-scale retail/commercial node is intended to predominantly serve the local LSP residents and is not expected to attract many patrons/visitors/customers outside the LSP area.

The LSP integrates with the surrounding road network via a system of eleven access intersections on all four frontages as described below:

- **Western Hawkstone Street Access Intersection** is proposed as a new T-intersection with Hawkstone Street (formerly Cameron Road) at the northern side;
- **Central Hawkstone Street Access Intersection** is proposed as a new T-intersection with Hawkstone Street (formerly Cameron Road) approximately 35m west of Braidwood Pass and approximately 130m east of Centenary Drive,

- **Eastern Hawkstone Street Access Intersection** is proposed as a new T-intersection with Hawkstone Street (formerly Cameron Road) at the northern side;
- **NE La Grange Road Access Intersection** is proposed as a new T-intersection with La Grange Road at the eastern side;
- **Central Woodlands Road Access** is proposed as a westbound branch off existing Woodland Road into the LSP site to connect to the internal LSP road system from the eastern side;
- **SE Woodlands Road Access Intersection** is proposed as a new T-intersection with Woodlands Road approximately 70m east of Wildberry Drive;
- **Brindle Road Extension** is proposed to be a northbound extension of Brindle Road into the LSP site adjacent to the public primary school site at the southwest corner of the LSP;
- **Northern Roland Road Intersection** is proposed to connect to Roland Road at the location where the future Fringeleaf Drive eastbound extension would connect to Roland Road to form a four-way intersection a short distance north of the existing Boyamyne Road intersection;
- **Central Roland Road Intersection** is proposed as a new T-intersection with Roland Road approximately 700m north of McDowell Loop intersection; and,
- **Southern Roland Road Intersection** is proposed at the existing McDowell Loop/Roland Road intersection as a new eastbound extension of McDowell Loop into the LSP area.

All intersections are proposed in the form of full-movement intersections.

The proposed LSP access strategy was developed to achieve the following key outcomes:

- Provide balanced internal traffic distribution within the LSP area;
- Distribute the traffic from the LSP area onto Roland Road and Stoneville Road through several connection points thus dispersing the traffic load;
- Integrate with the existing road network within the locality; and,
- Provide multiple alternative access/egress and escape/evacuation options to achieve permeability, efficiency and maximise safety.

For the purpose of establishing appropriate form and standard of LSP's access intersections on local road network, the internal LSP road traffic projections and hierarchy and capacity of existing regional Toodyay Road intersections with Roland Road and Stoneville Road to accommodate full LSP traffic load, it was assumed all of the Stoneville area will be fully developed.

It should be noted however, that another model was developed for the pre-construction stage of the Perth to Adelaide National Highway or "EastLink" (refer to **Section 5**) with only 400 lots developed. More details regarding this assessment scenario are provided in **Section 7.1** of this report.

The latest version of a concept LSP plan is included in **Appendix A** of this report. Transcore has developed a transport model specifically for this project to encompass a fully developed North Stoneville LSP area.

The road network developed for the model has been updated following extensive discussions with the Shire of Mundaring to include the future road network modifications planned by the Shire which include Brooking Road extension/ realignment and Fringeleaf Drive eastbound extension. More details on these new road links and modifications are provided in **Section 5** of this report.

3 Existing Situation

The North Stoneville LSP area is located approximately 4.5km north of Mundaring town site and 12.5km northeast of Midland.

3.1 Existing Land Use

The subject site is rural in nature and generally undeveloped. The areas surrounding the subject site are also predominantly of rural character with rural residential estates, small scale farms, market gardens and limited horticulture operations. The small-scale retail developments (general stores, restaurants/taverns and markets) are located within the Parkerville and Stoneville village centres to the south of LSP area off Roland Road and Stoneville Road, respectively.

The major district retail node is situated in Mundaring town centre (Mundaring Mall) which is located next to the existing Great Eastern Highway/Stoneville Road intersection some 4.2km southeast of the LSP.

3.2 Existing Road Network

The existing road network in this area is expectedly rural in nature. The existing road network and its classification in the *Metropolitan Functional Road Hierarchy* is illustrated in **Figure 4**. The LSP area is located between two major state roads: Toodyay Road and Great Eastern Highway.

Great Eastern Highway at this locality is a four-lane divided road with a wide median. It generally operates under an 80km/h speed limit regime; however, through Mundaring town site the speed limit is reduced to 60km/h as shown in **Figure 5**.

Wide pedestrian footpaths are in place intermittently on either side of Great Eastern Highway only through the Mundaring town site. There are several formal pedestrian crossing points at the intersections and mid-block; however, these are generally found only within Mundaring town site.

Great Eastern Highway is classified as *Primary Distributor* road in Main Roads WA *Metropolitan Functional Road Hierarchy*. It is covered by a *Primary Regional Roads* reservation (i.e. *Red Roads*) in the Metropolitan Region Scheme (MRS). Great Eastern Highway is a State Road under the care and control of Main Road WA.

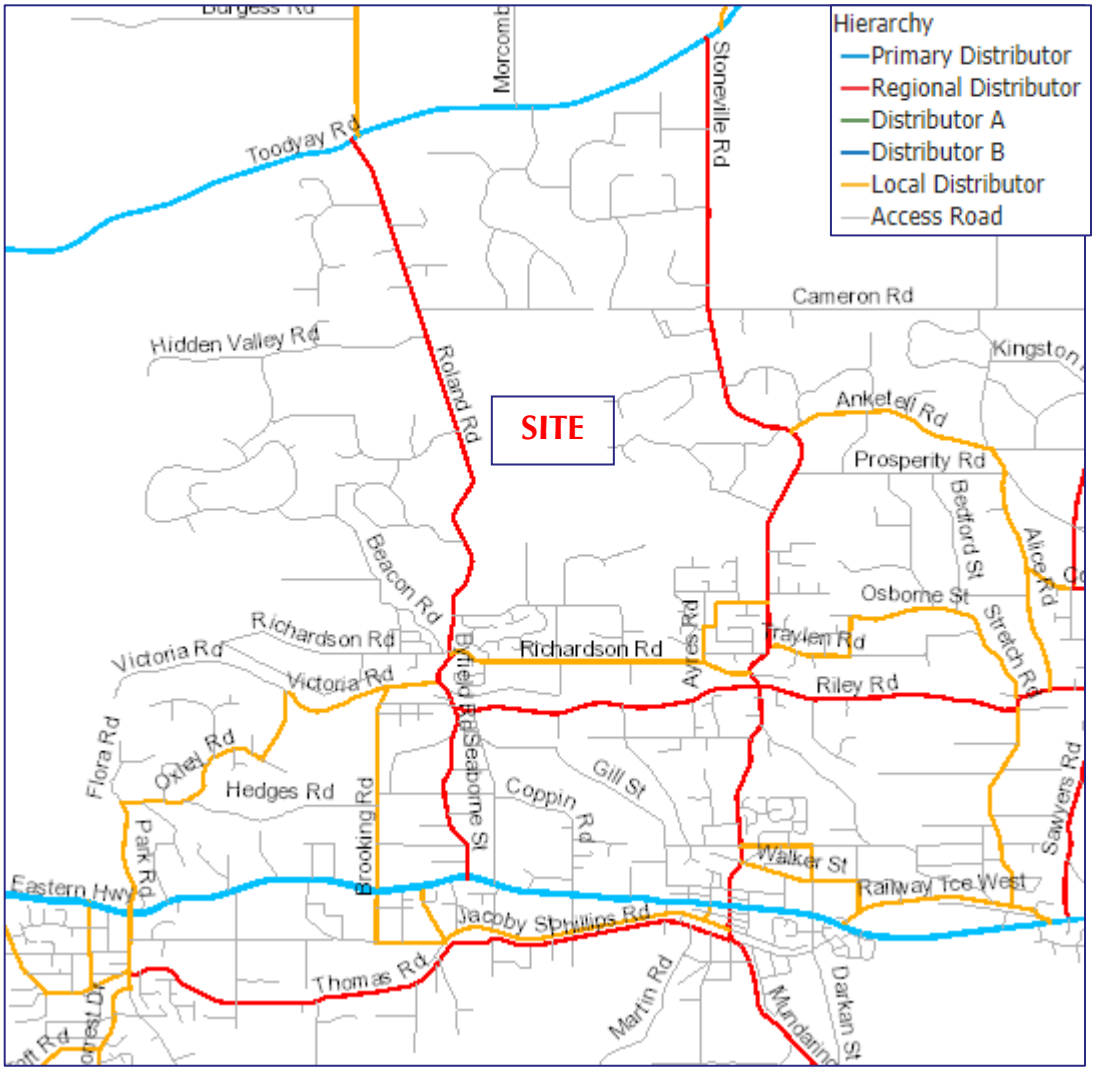


Figure 4: Existing Road Hierarchy

Toodyay Road is currently constructed as a single carriageway (one lane in each direction) with occasional passing lanes. At this locality it generally operates under a 100km/h speed limit regime; however, approaching the Gidgegannup townsite the speed is reduced to 80km/h and through the town site the speed is reduced 60km/h (40km/h adjacent to school).

Toodyay Road is classified as a *Primary Distributor* road in the Main Roads *Metropolitan Functional Road Hierarchy*. It is covered by a *Primary Regional Roads* reservation (i.e. *Red Road*) in the Metropolitan Region Scheme (MRS) and is a declared State Road under the care and control of Main Roads WA.

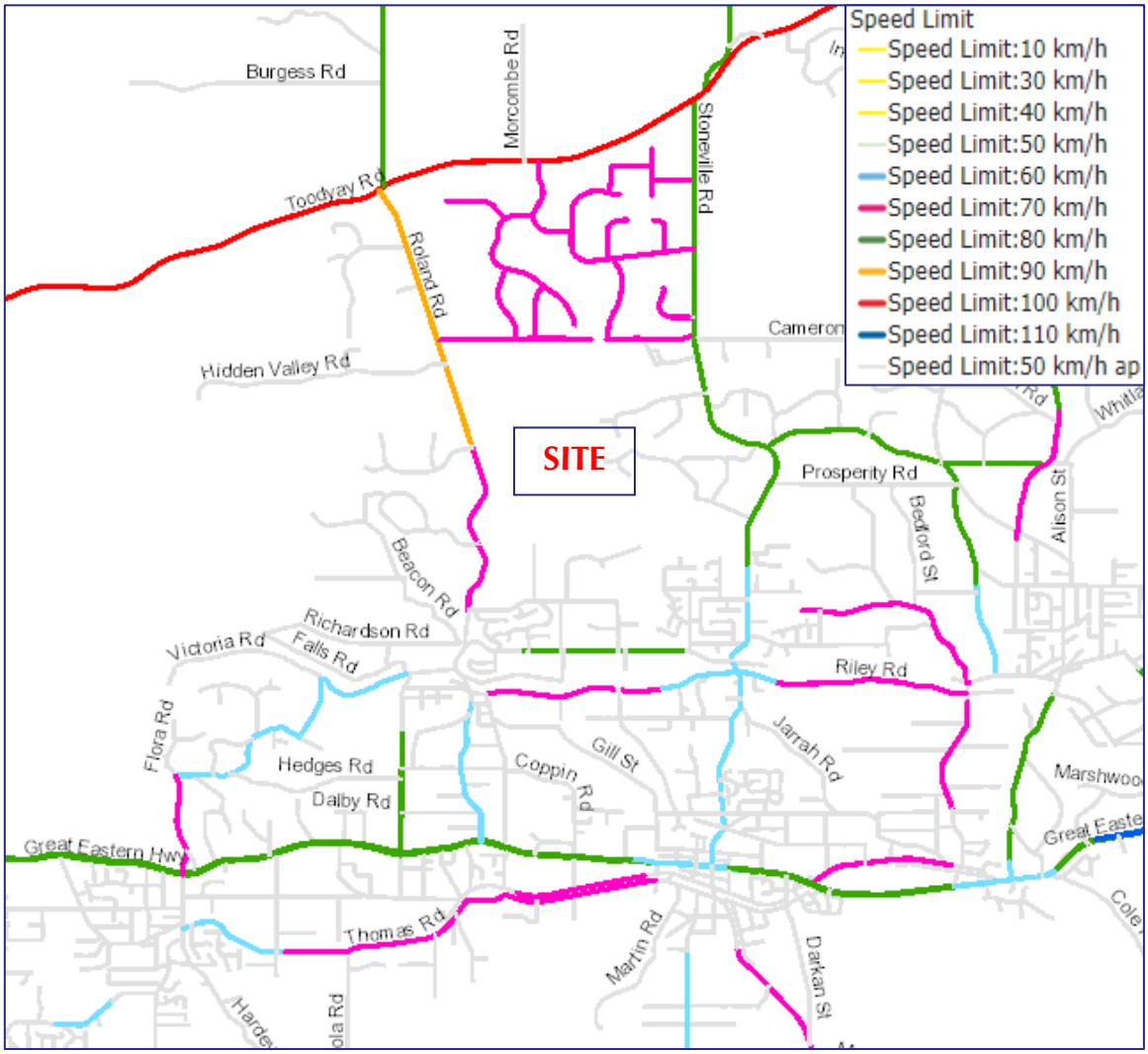


Figure 5: Existing Speed Limits

Roland Road, a north-south road link between the Toodyay Road and Parkerville town site, is a recently upgraded 7.2m wide, mostly unkerbed, single-carriageway rural road with wide gravel shoulders.

Roland Road is classified as a *Regional Distributor* in the Main Roads *Metropolitan Functional Road Hierarchy* and is under the care and control of the relevant local authorities (City of Swan and Shire of Mundaring). The posted speed limit on Roland Road in the vicinity of the LSP area is 70km/h on the section south of Boyamyne Road and 90km/h on the section between Boyamyne Road and Toodyay Road as shown in **Figure 5**.

Stoneville Road, a north-south road link between Toodyay Road and Great Eastern Highway passing through Stoneville town site, is about 7m wide, mostly unkerbed, single-carriageway rural road with wide gravel shoulders.

Stoneville Road is classified as a *Regional Distributor* in the Main Roads *Metropolitan Functional Road Hierarchy* and is under the care and control of the relevant local authorities (City of Swan and Shire of Mundaring). The posted speed limit on

Stoneville Road is generally 80km/h but reduces to 60km/h for the section between northern approach to Stoneville town site and Great Eastern Highway as shown in **Figure 5**.

Hawkstone Street (formerly Cameron Road) currently borders the LSP area on the along the northern side. It is connected to Roland Road with approximate 200m of unsealed section as it approaches Stoneville Road. Adjacent to Hawkstone Street, located in the west of Stoneville Road is Cameron Road.

Hawkstone Street is classified as an *Access Road* in the Main Roads *Metropolitan Functional Road Hierarchy* and is under the care and control of City of Swan. Hawkstone Street operates under a 70km/h speed limit regime between Roland Road and Stoneville Road.

There are no traffic counts available for this road; however, based on the number of properties it serves, it is anticipated that Hawkstone Street carries a very low level of traffic.

Roland Road forms a priority-controlled, T-intersection with Toodyay Road at its northern end. This intersection has been upgraded in late 2018 to include a left-turn slip lane and a right-turn pocket on Toodyay Road and a separate left and right-turn lanes on Roland Road approach.

Seaborne Street, southbound extension of Roland Road, forms a priority-controlled, T-intersection with Great Eastern Highway as shown in **Figure 6**. A left-turn slip lane and a right-turn pocket are in place on Great Eastern Highway. Wide median on Great Eastern Highway facilitates staged right-turn movements in and out of Seaborne Street. The intersection has been upgraded in 2020 with extended slip lane and turn pocket on Great Eastern Highway and a widened lane with a new splitter island on Seaborne Street approach. Street lighting has also been installed at the intersection. These works formed part of the Great Eastern Highway intersections upgrade programme by Main Roads WA.

At its northern end Stoneville Road also forms a priority-controlled, T-intersection with Toodyay Road as shown in **Figure 8**. Similarly, this intersection has also been upgraded in late 2018 to incorporate a left-turn slip lane and a right-turn pocket on Toodyay Road and a separate left and right-turn lanes on Stoneville Road approach.

At the southern end, adjacent to Mundaring town site, Stoneville Road forms a four-way signal-controlled intersection with Great Eastern Highway and Mundaring Weir Road as shown in **Figure 7**.

Hawkstone Street forms a simple T-intersection with Roland Road.

Figure 6: Great Eastern Highway/Seaborne Street Intersection

Figure 7: Great Eastern Highway/Stoneville Road/Mundaring Weir Road Intersection

Figure 8: Toodyay Road/Stoneville Road Intersection

3.3 Existing Traffic Volumes

Existing average weekday traffic (AWT) volumes on the study area road network have been obtained from Main Roads WA and Shire of Mundaring (indicated by *) and are summarised in Table 1.

Table 1: Existing Traffic Volumes

Road Name	Location	AWT (HV)	AM Peak	PM Peak	Date
Great Eastern Hwy	East of Seaborne St	24,723vpd (13.2%)	1,830vph 0800-0900	2,037vph 1600-1700	2021/22
Great Eastern Hwy	West of Mundaring Weir Rd	18,723vpd (19.2%)	1,411vph 0800-0900	1,489vph 1600-1700	2021/22
Toodyay Rd	West of Roland Rd	8,530vpd (13.5%)	597vph 0800-0900	784vph 1600-1700	2022/23
Toodyay Rd	East of Stoneville Rd	6,334vpd (15.3%)	491vph 0700-0800	552vph 1600-1700	2021/22
Toodyay Rd	West of Stoneville Rd	6,760vpd (14.5%)	558vph 0700-0800	615vph 1600-1700	2021/22
Roland Rd	South of Toodyay Rd	1,812vpd (15.7%)	187vph 0800-0900	187vph 1500-1600	2021/22

Stoneville Rd	South of Toodyay Rd	1,740vpd (14.2%)	157vph 0800-0900	175vph 1500-1600	2021/22
Stoneville Rd	170m South of Hawkstone Street	1,506vpd* (21.3%)	112vph* 0800-1900	143vph* 1600-1700	June 2018*

3.4 Crash History

Crash histories have been obtained from the Main Roads WA website for the relevant intersections where any road crashes were recorded during the five-year period from 2017-2021 (refer **Table 2** for more details).

Table 2: Crash Statistics – Intersections

Intersection	Hospital	Medical	PDO	Critical	Total
Great Eastern Hwy / Seaborne St	3	6	7	Right Angle	16
Great Eastern Hwy / Stoneville Rd / Mundaring Weir Rd	1	4	18	Rear End	23
Toodyay Rd / Roland Rd	0	0	4	Unknown	4
Toodyay Rd / Stoneville Rd	0	0	2	Unknown	2
Roland Rd / Richardson Rd / Byfield Rd	1	0	0	Non-Collision	1

The crash statistics for the relevant roads (mid-block crashes) during the five-year period between 2017-2021 were also obtained from Main Roads WA and presented in **Table 3** for more details.

Table 3: Crash Statistics – Midblock

Road	Hospital	Medical	PDO	Critical	Total
Roland Rd	2	1	7	Hit Object	10
Stoneville Rd	2	1	10	Rear End	13
Byfield Rd	1	0	4	Hit Object	5
Seaborne St	0	0	2	Unknown	2

3.5 Heavy Vehicle Routes

Restricted Access Vehicle (RAV) Network routes are designated for access by large heavy vehicle combinations that require special permits for each trip. Main Roads WA manages the RAV Networks and the permits for trucks to use them. **Figure 9** shows that Toodyay Road and Great Eastern Highway are permitted for use by RAV Network 4 (dark blue) vehicles. RAV Networks 2, 3, and 4 permit access by a number of heavy vehicle combinations up to 27.5m long.

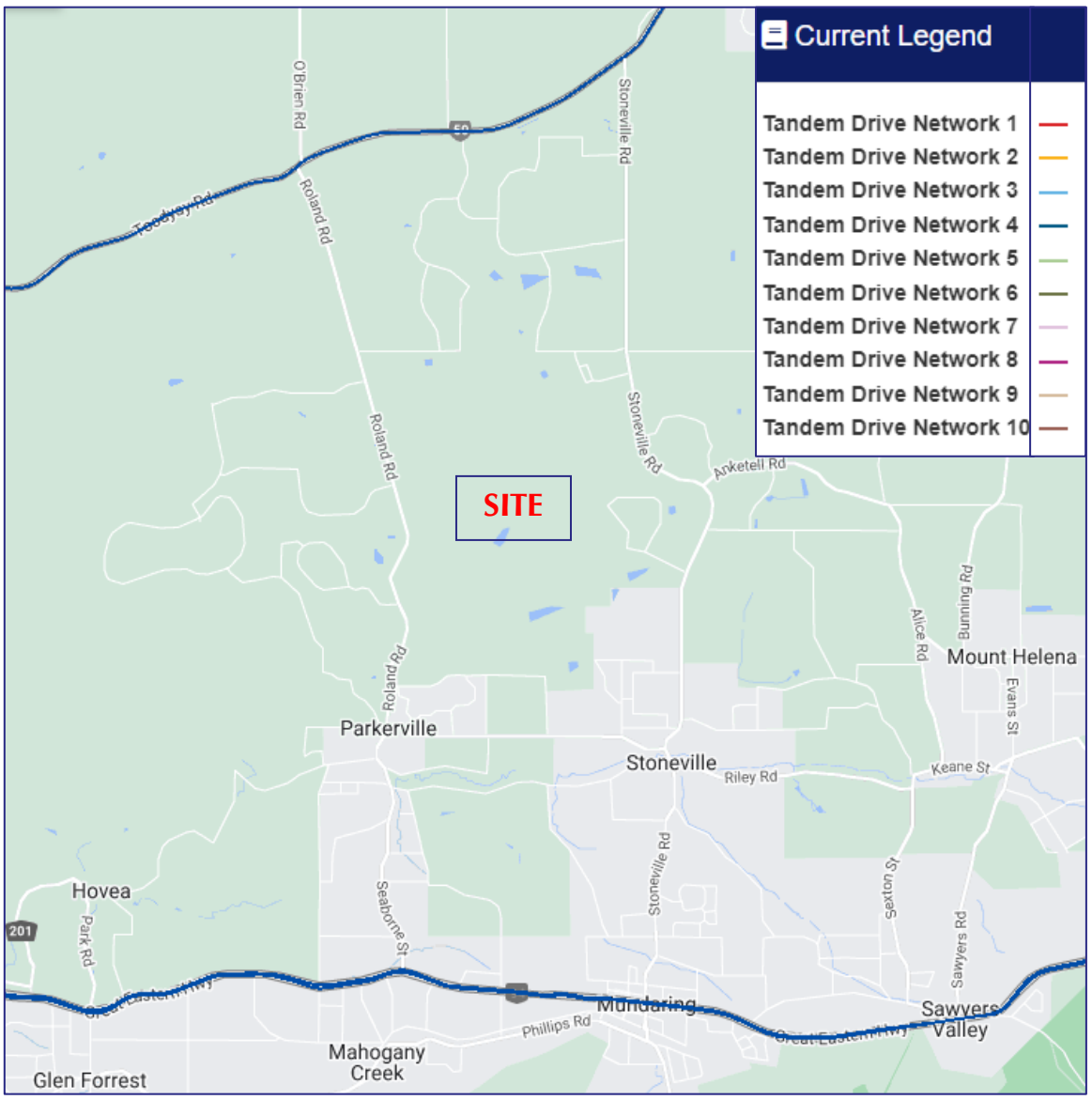


Figure 9: Restricted Access Vehicles Network Map

3.6 Public Transport

The Parkerville and Stoneville localities are presently served by bus services No. 328 and 331 which operate along Seaborne Street/Byfield Road/Richardson Road and Stoneville Road/Richardson Road routes providing connections to a bus/rail transfer facility at Midland Station and to Mundaring, Chidlow, and Wundowie town sites.

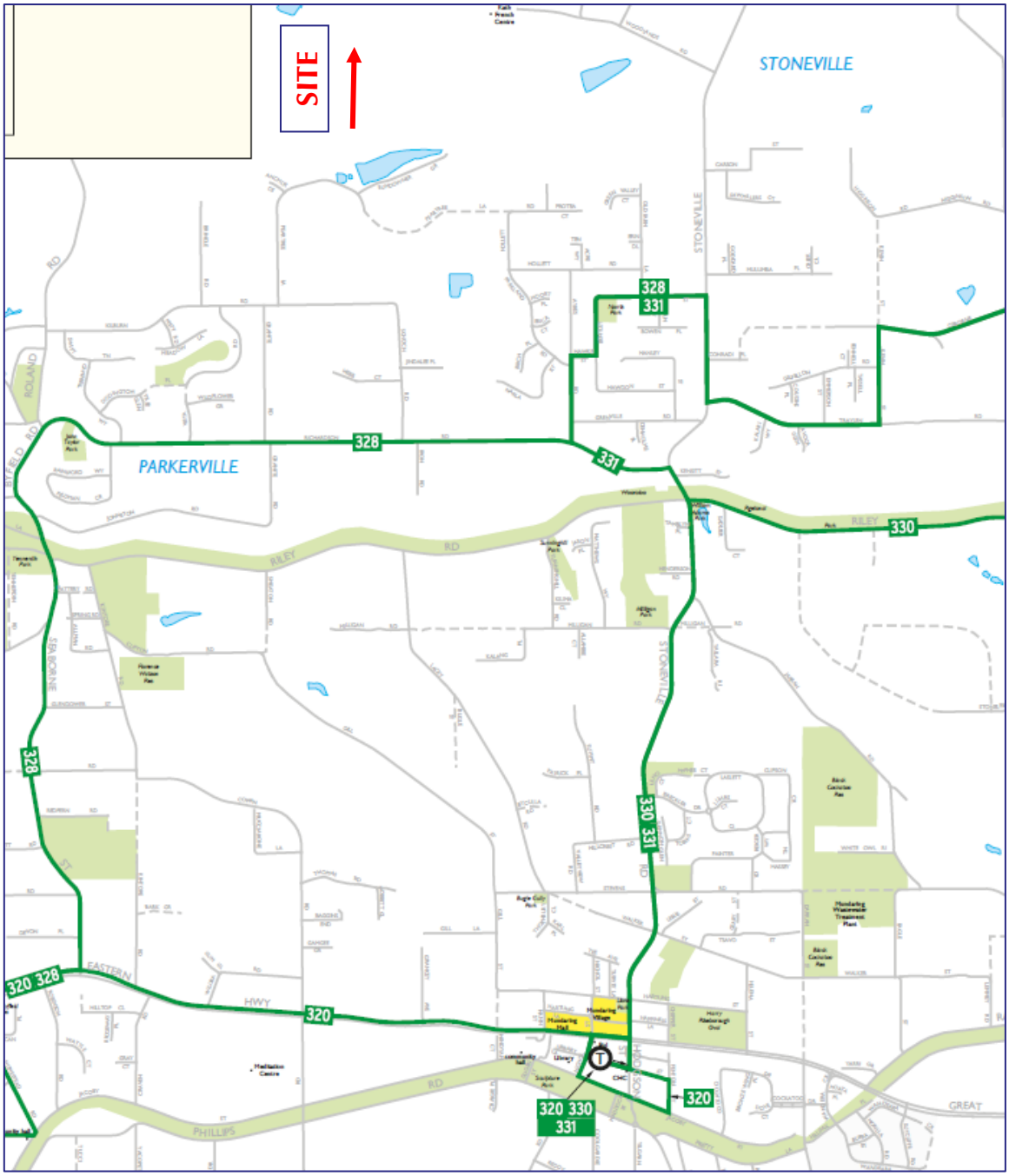


Figure 10: Existing Bus Routes

3.7 Pedestrian and Cyclist Facilities

The subject locality (area surrounding LSP) does not have a network of footpaths or shared paths with the only limited and isolated path network being located adjacent to Parkerville and Stoneville town sites.

4 Proposed Transport Network

4.1 Road Hierarchy

The North Stoneville LSP is based on the principles contained within the WAPC *Liveable Neighbourhoods* publication (2009) including the stated principles for road hierarchy. All internal LSP roads can be classified as *Neighbourhood Connectors B, Access Streets A and Access Streets D.*

The application of this road hierarchy to the proposed road network in the LSP is shown in **Figure 11.**

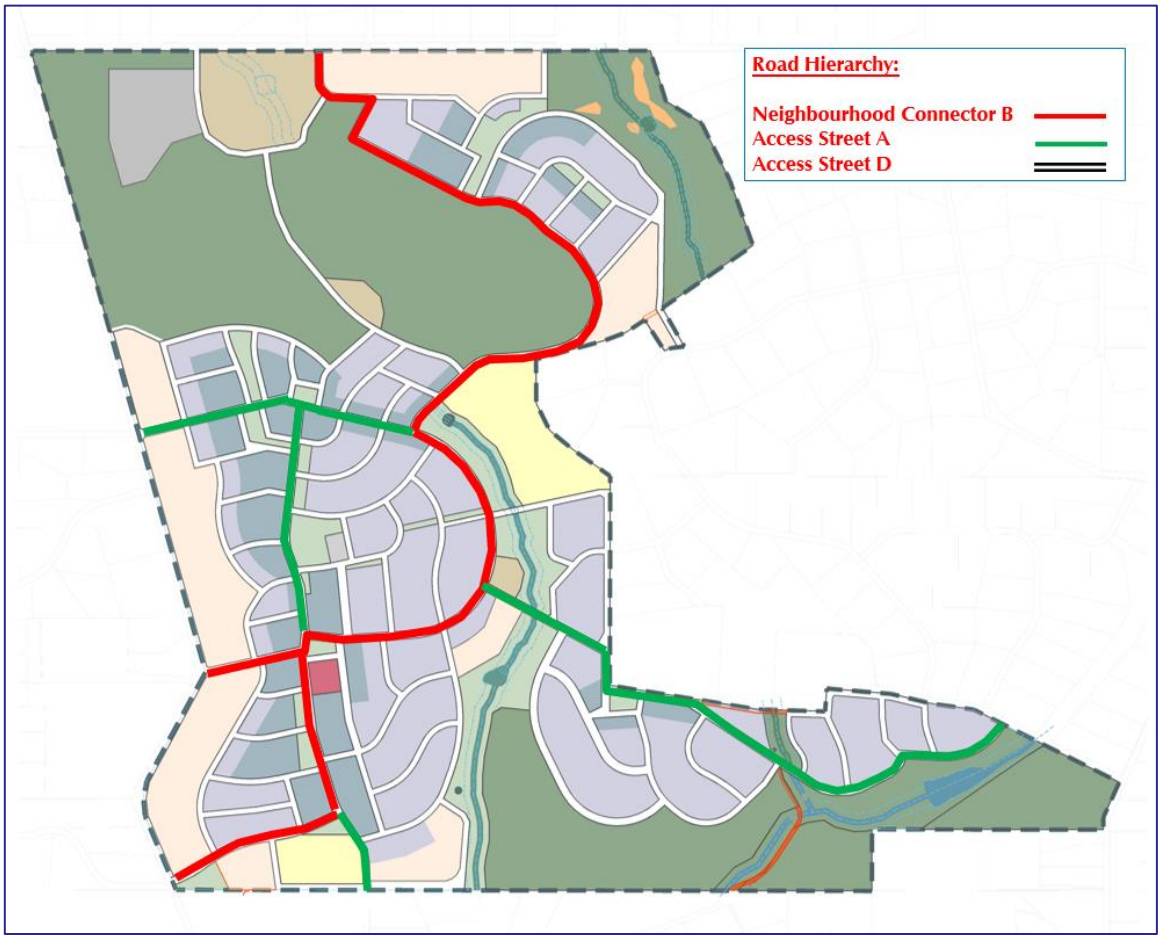


Figure 11: Proposed Road Hierarchy – North Stoneville LSP

4.2 Public Transport

The Public Transport Authority (PTA) supports the proposed structure plan. Whilst it is reasonable to assume there will be limited potential for a public transport service to directly serve the proposed townsite in the near future, it is expected that, once the population has reached an appropriate level the PTA may be receptive to the idea of

introducing a bus service (most likely in the form of a spur form one of the existing bus services) from Parkerville town centre pass through the LSP area and continue towards Stoneville town centre.

In the interim, the proponent could engage with the community and relevant agencies to provide a privately sponsored community service (e.g. a private shuttle bus) that could provide access to existing PTA services at Mundaring. The details of this service could be worked out as the LSP is progressed through the consultation and approvals process.

4.3 Pedestrian and Cyclist Facilities

The proposed principles for provision of pedestrian and cyclist facilities in the North Stoneville LSP are based on the guidance provided in WAPC *Liveable Neighbourhood* publication.

All Neighbourhood Connector roads and Access Street A, including sections of Roland Road and Hawkstone Street fronting the LSP, will have a 2.0-2.5m shared path on one side and a 1.5m footpath on the other side. This defines the network of shared paths shown in **Figure 12**.

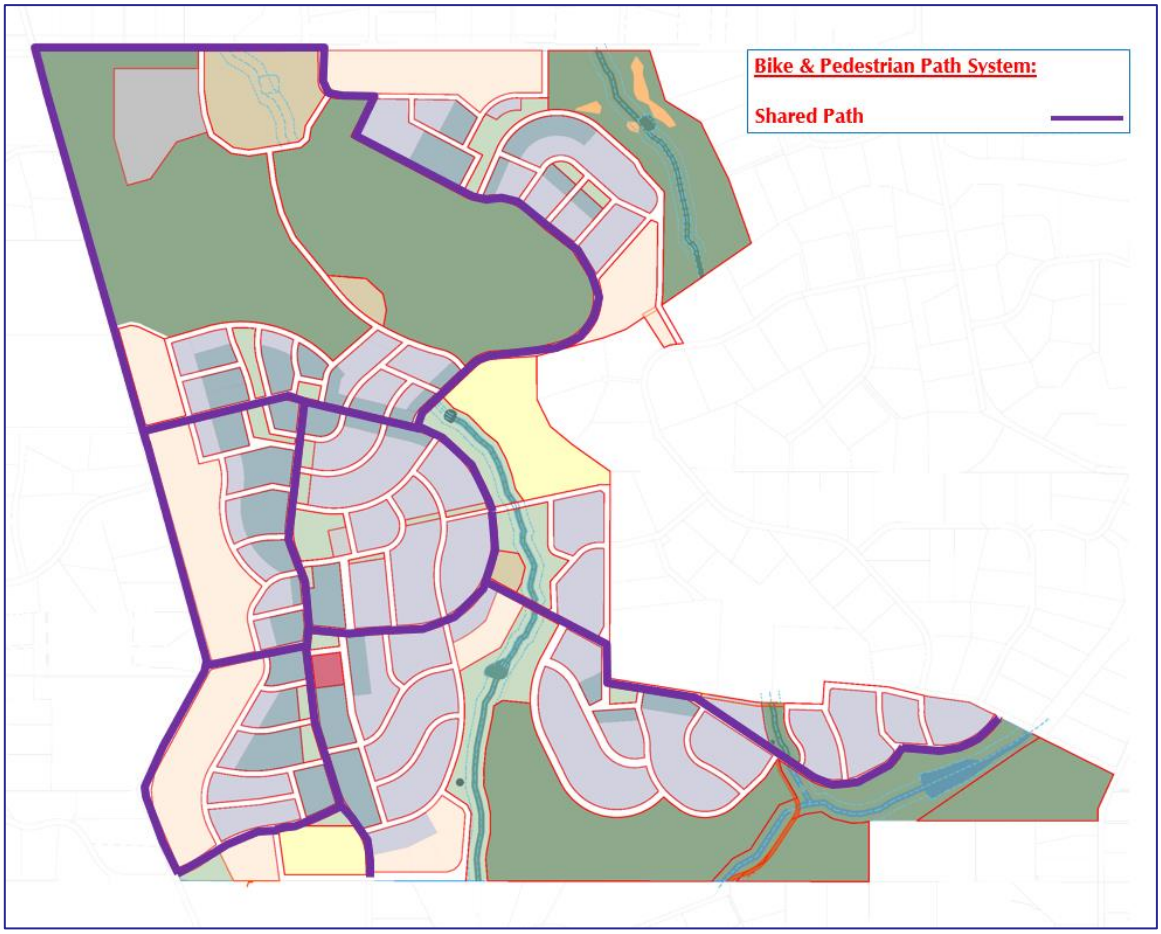


Figure 12: Proposed Shared Path Network – North Stoneville LSP

Most lower order access streets will have a 1.5m footpath on one side. However, footpaths will be provided on both sides or paired with shared paths on access streets abutting schools and retail/commercial nodes.

The proposed network of shared paths bisects the LSP area in both north-south and east-west directions allowing for connections to the recreational paths[1] which generally follow the existing terrain at this location, and which will also form part of the overall LSP area path network.

[1] *The network of recreational paths is not shown in Figure 5*

5 Changes to External Transport Network

5.1 Perth – Adelaide National Highway

The future Perth to Adelaide National Highway ("Orange Route" or "EastLink") will improve safety and amenity on the Northam to Perth section of the Great Eastern Highway and improve interstate access to metropolitan Perth. This longer-term planning concept, protected in the *Metropolitan Region Scheme*, will reduce gradients and provide significant productivity and safety benefits for freight vehicles[2].

The alignment is to the north of the existing route and generally follows the Toodyay Road corridor, deviating through the Red Hill section and connecting with the former rail reserve at Bakers Hill on Great Eastern Highway. Refer **Figure 13** for more details on route alignment of Eastlink.

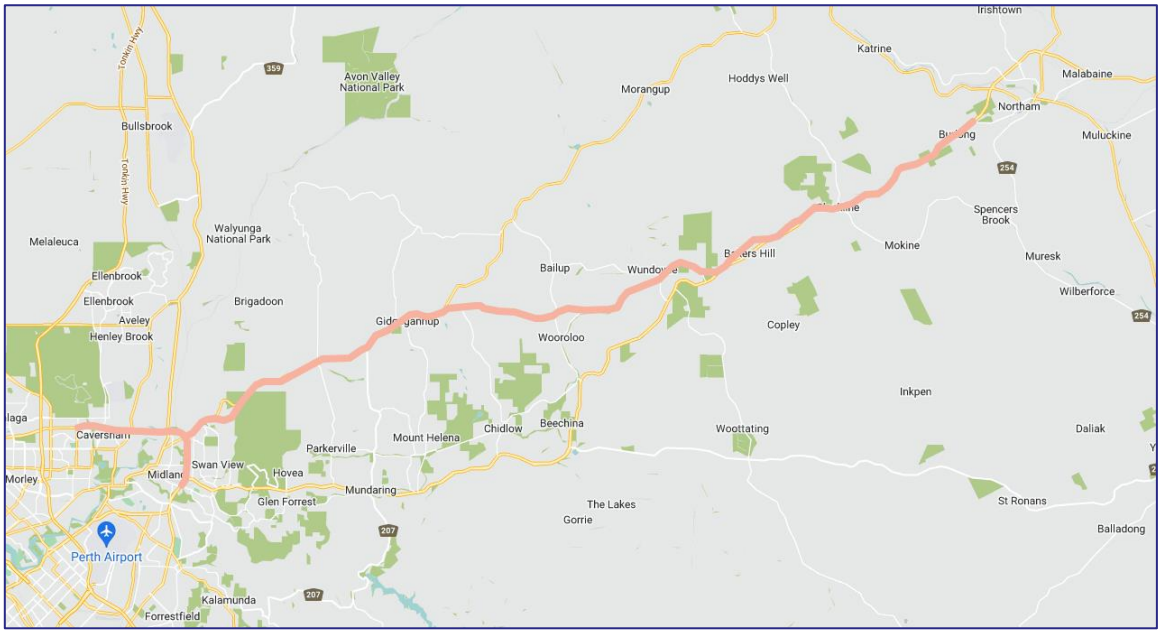


Figure 13: Perth – Adelaide National Highway – indicative alignment[3]

The realigned route will also address safety and amenity issues at the Greenmount Hill entrance to Perth on the Great Eastern Highway, which has steep grades and is in close proximity to residential areas. Refer **Figure 14** for more details on route alignment in the vicinity of subject site.

[2] *Perth Freight Transport Network Plan – Department of Transport*
[3] *EastLink WA Project Map – Building for Tomorrow*

Figure 14: Perth – Adelaide National Highway – alignment in the vicinity of the site[4]

The EastLink is ultimately planned as a dual carriageway with interchanges and overpasses to freeway standard, enabling access for RAV 7 heavy vehicles (36.5m combinations) between Perth and Northam.

Ultimately, the intersections linking the LSP to Toodyay Road is planned to be upgraded into an interchange format with the construction of EastLink as shown in **Figure 15.** This planned interchanges with Stoneville Road and Roland Road securing very good level of operation and ample capacity for these two connections to district-level roads. However, these two intersections with Toodyay Road (prior to EastLink implementation) are expected to continue to operate satisfactorily thanks to the recent intersection upgrades.

This project is currently in a three-year planning and development phase until 2024, however, construction of grade-separated interchanges along Reid Highway planned to start in 2023.[5] Construction of the EastLink is currently not funded and would require Federal funding. At this stage Main Roads WA has secured funding for the $10 million towards the $20 million commitment to the planning and development for EastLink WA, which involves planning studies, design refinement and scoping to produce preliminary designs for the route.

[4] *EastLink WA Project Map – Building for Tomorrow*
[5] *EastLink WA – Main Roads WA*

Main Roads WA has recently completed a series of intersection upgrades along Toodyay Road, between Red Hill and Noble Falls in the City of Swan. Among other intersections, the intersections of Toodyay Road/Roland Road and Toodyay Road/ Stoneville Road have been upgraded to improve the existing traffic operations and safety.

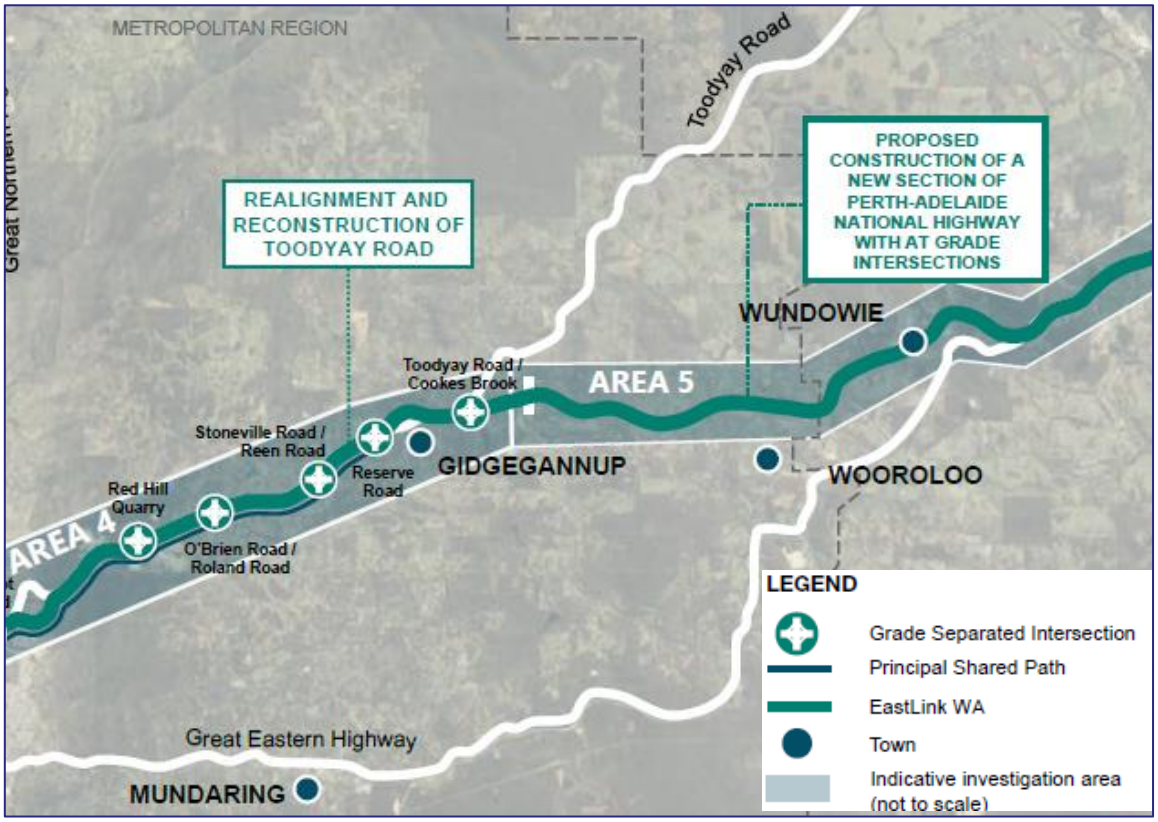


Figure 15: EastLink Map 2 – Proposed Perth – Adelaide National Highway[6]

5.2 Roland Road/Richardson Road/Byfield Road Roundabout Concept

The Shire has provided a concept plan for the Roland Road/Richardson Road/Byfield Road roundabout intersection upgrade which shows modifications on the existing Richardson Road alignment to form a four-way intersection with Roland Road and Byfield Road. The concept plan for the roundabout is shown in **Appendix C**.

[6] *EastLink Map 2 - Proposed Perth-Adelaide National Highway*

5.3 Brooking Road Realignment

Further, the Shire has provided early-stage concept plans for the Brooking Road/Beacon Road realignment which shows modifications of existing Beacon Road and Roland Road alignments to form a new intersection immediately north of Parkerville town centre with northbound extension of existing Brooking Road.

5.4 Proposed Great Eastern Highway/Seaborne Street Intersection Upgrade Concept

The existing intersection of Great Eastern Highway/Seaborne Street would require upgrades before 2031 assuming EastLink has not been constructed by this point.

The upgrade is required to improve the current capacity and operation of this intersection under normal traffic activities and in particular in case of bushfire emergencies prior to implementation of EastLink in 2031 and beyond and comprise the following elements:

- Conversion of existing free-flow left-turn slip lane on Great Eastern Highway to a give-way format (installation of a separation island);
- Upgrade of a Seaborne Street approach to include a separate left- and right-turn facility with approximately 50m-long right-turn pocket;
- Adjustment of the Great Eastern Highway median kerbing;
- Formalisation of the U-turn facility through signage and pavement marking at the existing Great Eastern Highway/Craven Road intersection (not shown on plan).

These upgrades will ensure satisfactory operation of this intersection with or without the Brooking Road realignment by the time EastLink project is completed.

The proposed concept plan for the intersection upgrade is shown in **Appendix D**.

5.5 Proposed Hawkstone Road and Cameron Road Connection

It is understood that the current disconnection between Hawkstone Road and Cameron Road will be addressed in the future and prior to 2031 so that two roads form a continuous east-west link providing convenient and legible connection between Roland Road and Stoneville Road along the norther LSP boundary.

6 Integration with Surrounding Area

The proposed North Stoneville LSP is consistent with the long-term planning for the subject locality.

The proposed LSP integrates with the existing local road network proposing three connections to Roland Road and four (indirect) connection to Stoneville Road as two key regional roads. Three links to Hawkstone Road provides for even distribution of the LSP traffic on surrounding road network. On district-level access to the subject site is available via two state roads: Toodyay Road and Great Eastern Highway.

The proposed LSP road system is designed to accommodate the anticipated future traffic from within the locality associated with the proposed two new LSP schools (public primary and private K-12 school). The LSP also proposes a small-scale retail/commercial node which will serve to reduce the demand for external trips to regional retail/commercial nodes for LSP residents to a certain degree.

7 Analysis of the Transport Network

7.1 Assessment Period

Transcore has developed two distinct models for the purpose of North Stoneville LSP project:

Model 1: Strategic transport model developed assumes release of 400 residential lots of the North Stoneville LSP by 2028 based on Satterley's indicative Projected Lot Delivery Programme. The model also assumes continued background traffic growth on local and district roads and pre-construction of EastLink. The purpose of this model was to establish traffic impact on internal North Stoneville LSP road network, external LSP access intersection format and operation, local road network impacts and adequacy of key district intersections to accommodate traffic load from the LSP and support fire evacuation prior to EastLink construction.

Model 2: Strategic transport model developed assuming ultimate development of the North Stoneville LSP and continued traffic growth on local and district roads and post-construction of EastLink in 2031. The purpose of this model was to establish traffic projections and road hierarchy on internal North Stoneville LSP road network, external LSP access intersections form and standard, local road network impacts, traffic impact assessment on key district intersections with the assumed implementation of EastLink with background volumes and traffic re-distribution between Great Eastern Highway and Toodyay Road in accordance with ROM24 projections provided by Main Roads WA (refer Table 4).

Table 4: ROM24 outputs provided by Main Roads WA

Traffic projections	From	To	2016 (ROM)	2019 (observed)	2026 (ROM)	2031(ROM)	2036 (ROM)	
Great Eastern Hwy	Stoneville	Sawyers	23700	16135	29000	21000	23000	
Toodyay Rd (PANH)	Stoneville	Reserve	12500	5329	14000	23000	24000	
Total			36200	21464	43000	44000	47000	
Distribution between GEH and PANH	From	To	2016 (ROM)	2019 (observed)	2026 (ROM)	2031(ROM)	2036 (ROM)	
Great Eastern Hwy	Stoneville	Sawyers	65%	75%	67%	48%	49%	
Toodyay Rd (PANH)	Stoneville	Reserve	35%	25%	33%	52%	51%	
Total			1	1	1	1	1	
Traffic growth rate per annum	From	To	2016 (ROM)	2019 (observed)	2026 (ROM)	2031(ROM)	2036 (ROM)	
Great Eastern Hwy	Stoneville	Sawyers			2.0%	-1%	-0.1%	
Toodyay Rd (PANH)	Stoneville	Reserve			1.1%	4%	3.3%	avg
Total			0	0	1.7%	1%	1.3%	1.5%

The ROM24 outputs provided by Main Roads WA indicate that:

- The average annual traffic growth on Great Eastern Highway and Toodyay is about 1.5%; and,
- Once EastLink is implemented, the directional split of traffic between Great Eastern Highway and EastLink (Toodyay Road) would be about 50/50.

Accordingly, the above assumptions were used to establish the projected traffic volumes for future scenarios.

7.2 Traffic Generation and Distribution

Transcore has developed a traffic model for typical weekday traffic flows for the North Stoneville area using transport modelling. As previously discussed, the model also makes allowance for the traffic impact of the surrounding road network but also the future road network modifications and development in accordance with the Shire of Mundaring strategic road network planning initiatives.

For the purpose of North Stoneville LSP modelling the following land use assumptions have been adopted:

- A total of approximately 1,000 dwellings will be assumed for the whole of the LSP area;
- One public primary school (assumed enrolment of 300 students);
- One private K-12 school (assumed enrolment of 500 students);
- Local retail/commercial centre located centrally within the Village 2 area totalling about 1,500m^2 GFA (50/50 split between retail and commercial floorspace); and,
- No public transport was modelled resulting in a more robust vehicular-based transport model.

The daily traffic generation rate used in traffic model was 8 vehicle trips per day (vpd) per dwelling, which corresponds to trip generation rates recommended in the WAPC *Transport Impact Assessment Guidelines*. This residential trip generation rate was assumed regardless of the specific type of dwellings (i.e., density) which results in a more robust modelling outcome.

Based on a guidance in the WAPC Transport Impact Assessment Guidelines a school trip generation rate of 2 vpd per student was adopted for this assessment. It was also assumed that the public primary school would primarily cater for the students residing within the area; however, some school trips originating from external sources have also been modelled.

The traffic generation for the retail/commercial zone was based on relevant traffic generation rates derived from the *Roads and Traffic Authority NSW, "Guide to Traffic Generating Developments" (2002)* document.

Accordingly, once fully developed, the LSP area is estimated to generate approximately **8,000** total daily vehicular trips for a typical weekday (both inbound and outbound). The total daily vehicular traffic includes both internal LSP trips and external trips distributed across local and district road network.

For the purpose of this project the typical weekday morning and afternoon peak hour flows were determined using the typical 10% daily traffic principle. Although the school-related traffic will be missing from the afternoon peak hour traffic as school activity terminates prior to the afternoon commuter peak hour, for the purpose of robust assessment the 10% afternoon peak hour traffic volume is still applied in this case.

The directional LSP traffic flows were established by using the 20/80 and 65%/35% inbound/outbound morning and afternoon peak hour traffic split principle is applied, respectively. This directional split is deemed appropriate considering the bulk of the LSP land uses is residential.

The traffic split on major roads (Roland Road and Stoneville Road) was assumed as 40/60 inbound/outbound for the morning and reverse for the afternoon peak traffic flows.

This traffic split is reflective only of the external LSP traffic component (i.e., traffic leaving from and arriving to the LSP area to and from external sources). The adopted traffic split also enables investigation of impacts of extreme/unbalanced traffic flow scenarios at intersections ensuring the proposed intersection standard and geometry is able to comfortably accommodate more balanced flows.

7.3 Trip Distribution

The distribution of LSP internal trips is automatically determined by the modelling software in proportion to the location of trip producers and trip attractors for work trips, education trips and other trips (shopping, social, recreational, etc.) between all the land uses within the transport model. The external distribution of trips to and from the LSP is summarised in **Table 5**.

Table 5: Trip Distribution – North Stoneville LSP

Approach Road	Proportion (%)
Toodyay Road (west)	43.96%
Areas to north of Toodyay Road	2.03%
Toodyay Road (east)	2.57%
Great Eastern Highway (west)	43.96%
Great Eastern Highway (east)	5.11%
Areas to the east of Stoneville Road	0.34%
Mundaring Weir Road	2.03%
Total	**100%**

7.4 Daily Traffic Flow Forecasts

The forecast daily traffic volumes for the key internal LSP road network have been derived from the transport model developed and are illustrated in **Figure 16**. It should be noted however that the forecast daily traffic volumes shown in this figure represent only the traffic generated by the North Stoneville LSP development.

The forecast traffic volumes on the internal North Stoneville LSP roads and roads surrounding as a result of the LSP is shown in **Figure 16**.

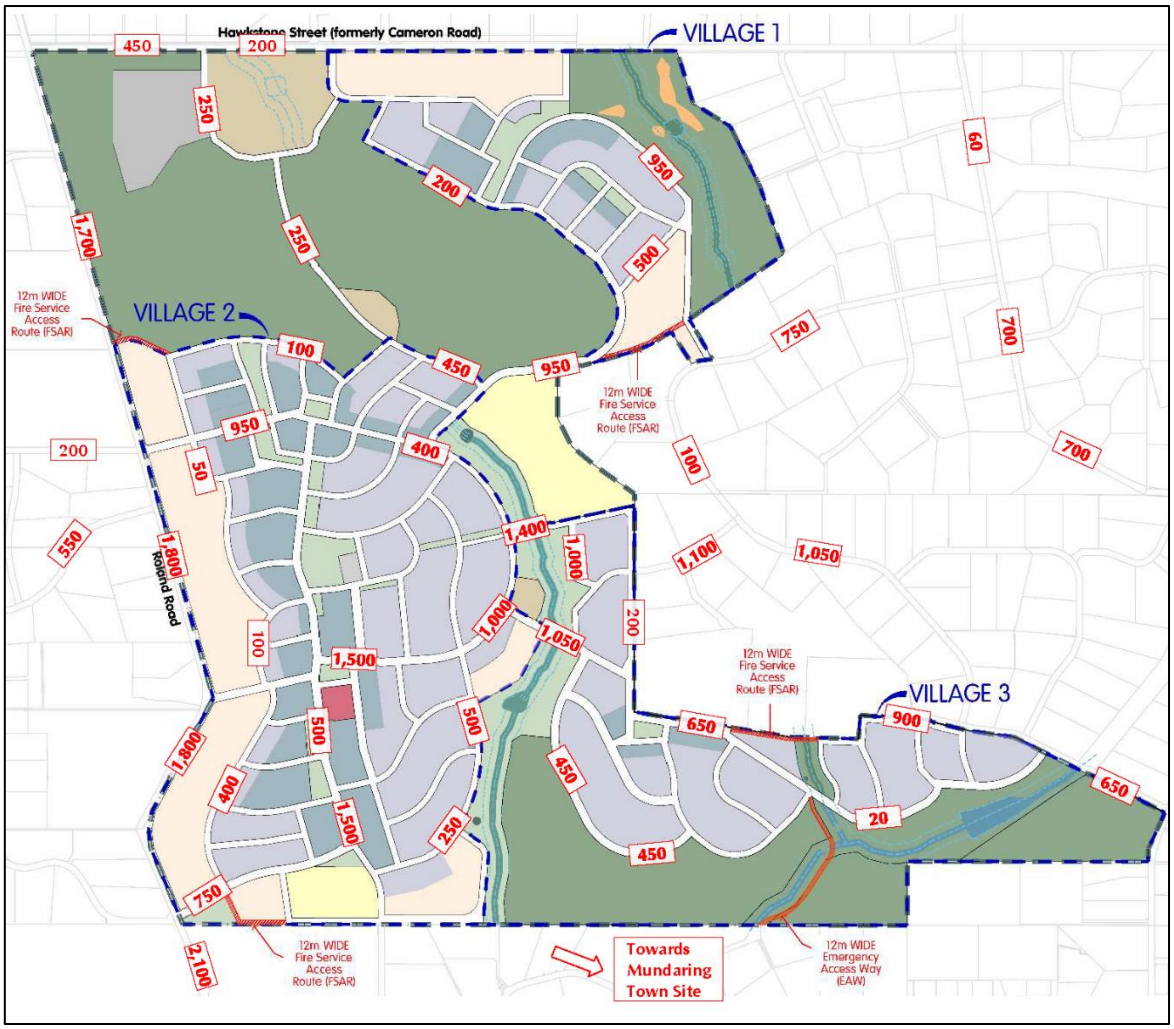


Figure 16: Daily Traffic Flow Forecast for North Stoneville LSP

7.5 Roads and Intersections

7.5.1 Roads Assessment

The North Stoneville LSP road network proposed to accommodate the projected traffic volumes is detailed in **Section 7.4** of this Revised Transport Impact Assessment while the details of the proposed road hierarchy are discussed in **Section 4.1**.

The projected traffic volumes for LSP road network were established using the transport model for North Stoneville LSP developed for this project. The outputs were also used to determine the road hierarchy and the typical road reservations and cross-sections for the internal LSP road network.

A review of North Stoneville LSP traffic projections shows that, in accordance with the WAPC *"Liveable Neighbourhoods"* document, all internal LSP roads can be classified as *Neighbourhood Connector B, Access Street A, and Access Street D* roads.

Some key characteristics of the relevant road classifications have been summarised in **Table 6** and discussed in the following paragraphs.

Table 6: Proposed LSP internal road hierarchy – Indicative cross-sections

Road Classification	Indicative upper volume (vpd)	Indicative road reserve width (m)	Indicative road pavement width (m)
Neighbourhood Connector B	3,000	19.4m	2 x 3.5m lanes with 2.1m embayed parking
Access Street A	3,000	24.0m	2 x 3.5m lanes with 2.1m embayed parking
Access Street D	1,000	14.2m	6.0m

The north-south internal LSP spine road is proposed to be classified as a *Neighbourhood Connector B* road based on its function, location and projected traffic volumes of up to 1,500vpd. This road passes the internal LSP retail/commercial node, public primary school, K-12 private school, and connect to regional distributor roads such as Roland Road to the west and (indirectly via Hawkstone Road) at the north of the LSP. Certain sections of these roads may potentially become part of a future bus route through the LSP subject to positive feasibility assessment outcome and PTA's approval.

The typical *Neighbourhood Connector B* road reserve of 19.4m includes 3.5m wide traffic lanes and indented 2.1m wide parking lanes (where required) one both sides. This road is a potential bus route. A shared path is proposed on one side of the road with a footpath on the other. Refer **Figure 17** for indicative cross section.

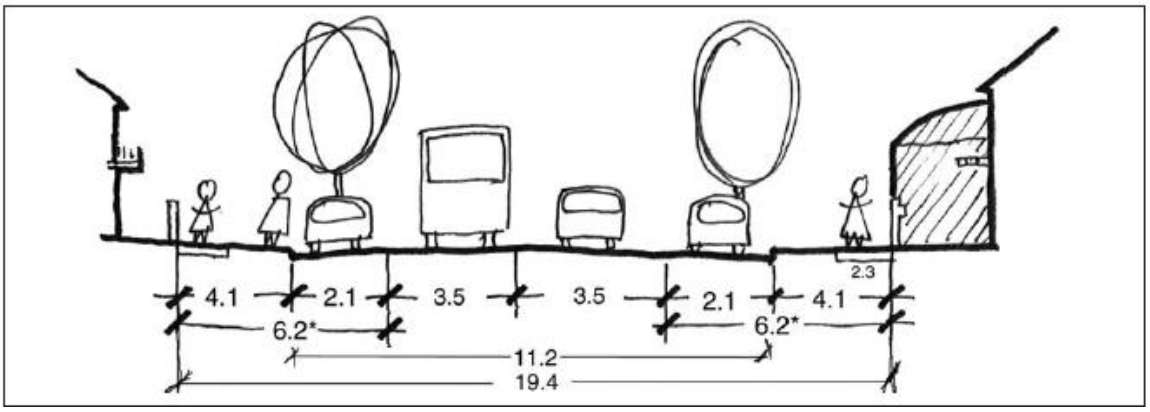


Figure 17: Neighborhood Connector B – with target speed of 50 km/h (<3,000vpd)

A total of four internal LSP roads (two east-west and two north-south roads) are classified as *Access Street A* roads. These roads, along with Neighbourhood Connectors, form the skeleton of the internal LSP road system. One of these roads passes the public primary school site at the southwest corner of the LSP area as such are anticipated to carry a significant proportion of school-related traffic. These roads are to connect to the regional distributor roads such as Roland Road to the west and Stoneville Road to the east. Extensive school-related parking activity is also expected on these roads especially adjacent to the school site and during drop-off/pick-up hours. The typical *Access Street A* road reserve of 24.0m includes 3.5m wide traffic lanes and indented 2.1m wide parking lanes (where required) one both sides. Shared paths are proposed on one side of these roads coupled with footpaths on the other. Refer **Figure 18** for indicative cross section.

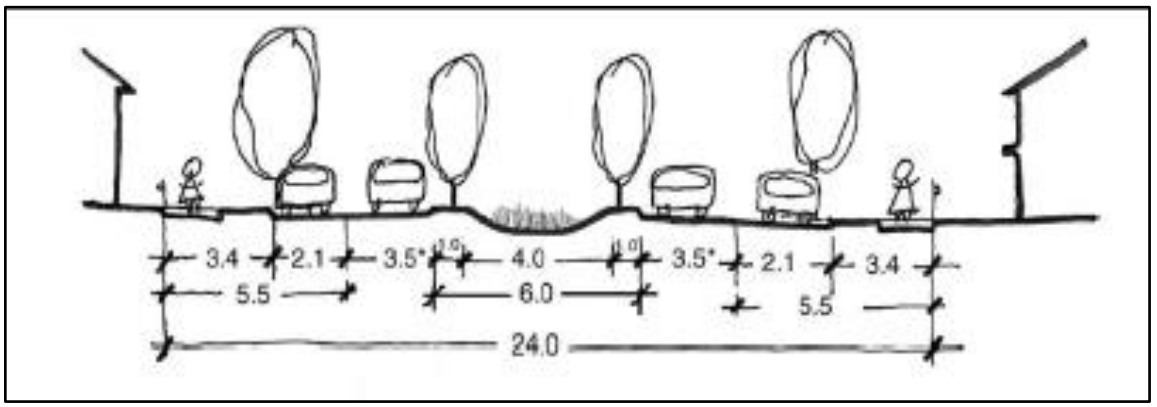


Figure 18: Access Street A - Avenue – with target speed of 40 km/h (<3,000vpd)

The balance of internal LSP roads is proposed as *Access Street D* roads. The typical road reserve for *Access Street D* entails a 6m wide trafficable carriageway pavement with 4.1m wide verges on both sides. If fronting P.O.S., access street verge adjacent to P.O.S. may be reduced to 1.0m. Maximum desirable traffic volume for this type of road is 1,000vpd. The indicative cross-section of the *Access Street D* is illustrated in **Figure 19**.

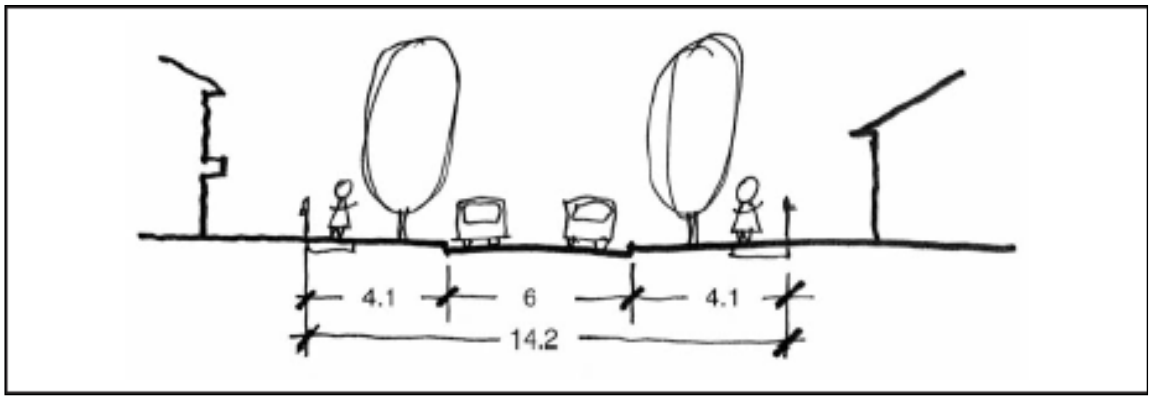


Figure 19: Access Street D – narrow yield (give way) street with target speed of 30 km/h (<1,000vpd)

The projected additional daily traffic volumes for year 2031 which include the natural growth of regional traffic, traffic with the ultimate development of North Stoneville LSP area is shown in **Figure 20**.

It should be noted that the projected traffic volumes for this assessment are not based on or derived from Main Roads WA ROM24 model.

Figure 20: Projected additional daily traffic volumes from the LSP on regional roads with full North Stoneville LSP build-out

As a result of the full buildout of LSP area Toodyay Road, west of Roland Road, is estimated to accommodate about 2,000vpd of LSP-generated traffic, post-construction of EastLink. The section of Toodyay Road east of Stoneville Road is anticipated accommodate about 120vpd of the LSP traffic at the same time. These levels of additional traffic can be accommodated on a single carriageway road with characteristics similar to the current Toodyay Road without the need for major upgarde.

Based on Main Roads WA advice, passing lanes may be contemplated to increase capacity of Toodyay Road west of Stoneville in the interim stage before Perth to Adelaide National Highway is implemented (i.e., EastLink). However, as EastLink is expected to be constructed by 2031, it may not be practical to undertake any major and costly road upgrades prior to EastLink project.

Great Eastern Highway west of Seaborne Street, under this conservative scenario, is estimated to accommodate additional 2,050vpd of LSP-generated traffic with sections west and east of Mundaring town centre carrying about 750vpd and 250vpd of the LSP traffic, respectively. The current dual carriageway standard of Great Eastern Highway is sufficient to accommodate the project daily traffic volumes with no need for upgrade. The construction of EastLink is expected to have significant and beneficial impact on existing traffic patterns within the locality and is anticipated to attract significant portion of traffic presently carried by Great Eastern Highway. Accordingly, the construction of EastLink will also serve to alleviate the traffic load on Great Eastern Highway and consequently improve its operation.

According to the *Austroads' Guide to Road Design Part 3: Geometric Design* document rural roads carrying daily traffic volumes excess of 3,000vpd would warrant total carriageway width of 12.0m comprising of 2 x 3.5m wide trafficable lanes and 2.5m wide shoulders with sealed width of 1.5m.

Based on latest Transcore's traffic surveys Roland Road presently carries about 1,800vpd just south of Toodyay Road. Similarly, based on latest Transcore's traffic surveys Seaborne Street is estimated to carry just over 3,000vpd north of Great Eastern Highway

Roland Road under full traffic load from the LSP is estimated to carry a maximum additional 2,200vpd of the LSP traffic at the northern end and up to about 1,800vpd of the LSP traffic adjacent to the Parkerville town centre. Accordingly, a cross-section comprising 2 x 3.5m wide trafficable lanes and 2.5m wide shoulders with sealed width of 1.5m would be sufficient for Roland Road to accommodate this level of traffic.

Seaborne Road, benefitting from new Brooking Road realignment route, estimated carry up to a maximum of 1,980vpd additional LSP traffic at the southernmost end. Similarly, to Roland Road, a road profile comprising 2 x 3.5m wide trafficable lanes and 2.5m wide shoulders with sealed width of 1.5m would also be sufficient for Seaborne Street to accommodate this level of traffic.

Additionally, appropriate intersection treatments would be required to control traffic flows at major new and existing intersections once this level of daily traffic is

experienced. More details on intersection treatments will be provided in the following paragraphs.

Based on latest Transcore's traffic surveys Stoneville Road presently carries about 2,450vpd just south of Woodlands Road.

With full development of North Stoneville LSP area, Stoneville Road could be expected to experience an increase in traffic activity with total daily traffic volumes increasing by 2,600vpd from the LSP traffic along the section adjacent to the LSP area and about 3,500vpd of the LSP traffic in the vicinity of Mundaring town centre.

As such, single carriageway road with a total width of 12.0m comprising of 2 x 3.5m wide trafficable lanes and 2.5m wide shoulders with sealed width of 1.5m standard would provide sufficient capacity for the anticipated traffic volumes on Stoneville Road. However, the section of Stoneville Road adjacent to Mundaring town centre may require localised widening to provide for sheltered turning facilities at key intersections.

The internal north-south LSP Access Street abutting the public primary school site which further south connects to Brindle Road forming a LSP road/Brindle Road/Kilburn Road/Granite Road/Richardson Road corridor to Stoneville Road could be expected to attract about 1,000vpd additional traffic from the LSP as an attractive proposition to access the eastern part of Mundaring town centre zone. All roads forming this corridor are classified as Access Streets. Brindle Road is presently only partially sealed and as such this missing link would need to be constructed.

Hawkstone Street could ultimately carry about 450vpd of the LSP traffic. With its current standard Hawkstone Street should be able to accommodate this level of daily traffic without the need for upgrade.

The ultimate road standards and cross-sections to be implemented will be determined during the detail design stages of the project through liaison with the local government technical departments and/or relevant state agencies. The contribution towards road network upgrades should be made on fair and equitable basis through appropriate development contribution schemes where funding its typically determined on impact basis.

7.5.2 Internal LSP Intersection Analysis

The LSP road network proposed to accommodate the projected traffic volumes is detailed in **Section 7.2** of this transport assessment, including the details of the proposed road hierarchy in **Section 4.1**.

Table 2.4 from AUSTROADS *"Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings"* illustrates the traffic volume thresholds above which a detailed intersection capacity assessment is required.

Assuming that typical peak hour traffic represents approximately 10% of the daily traffic volume, it is confirmed that uninterrupted traffic flow conditions can be expected at all key internal subdivision intersections. As hourly traffic volumes through

intersections are well below the indicative thresholds indicated in **Table 7**, sufficient capacity would be available and detailed assessment or capacity analysis is not warranted in this instance. Refer **Figure 16** for LSP daily traffic projections.

Table 7: Traffic volume thresholds for detailed intersection analysis

Major Road type	Major Road Flow (vph[7])	Minor Road Flow (vph)
Two-lane	400 500 650	250 200 100
Four-lane	1,000 1,500 2,000	100 50 25

Accordingly, it is confirmed that the proposed internal LSP road network layout provides for satisfactory permeability and efficient traffic distribution throughout the LSP area with no bottlenecks or traffic congestion anticipated during typical operating conditions.

However, in order to ensure efficient and safe traffic movements within and adjacent to the LSP area a number of intersection treatments are proposed as detailed in **Figure 21.** The design details of the intersection treatments and other speed-control measures are typically determined at the subdivision design stage.

There are a number of four-way intersections within the LSP that will require special consideration. Most of these are located along proposed *Neighbourhood Connector B* and *Access Street A* roads, including two along Roland Road. It is suggested that these be constructed as roundabouts to improve the safety of these crossroads as well as help control traffic speeds on these relatively long roads.

[7] *vph – vehicles per hour, typically represent 10% of total daily traffic volume*

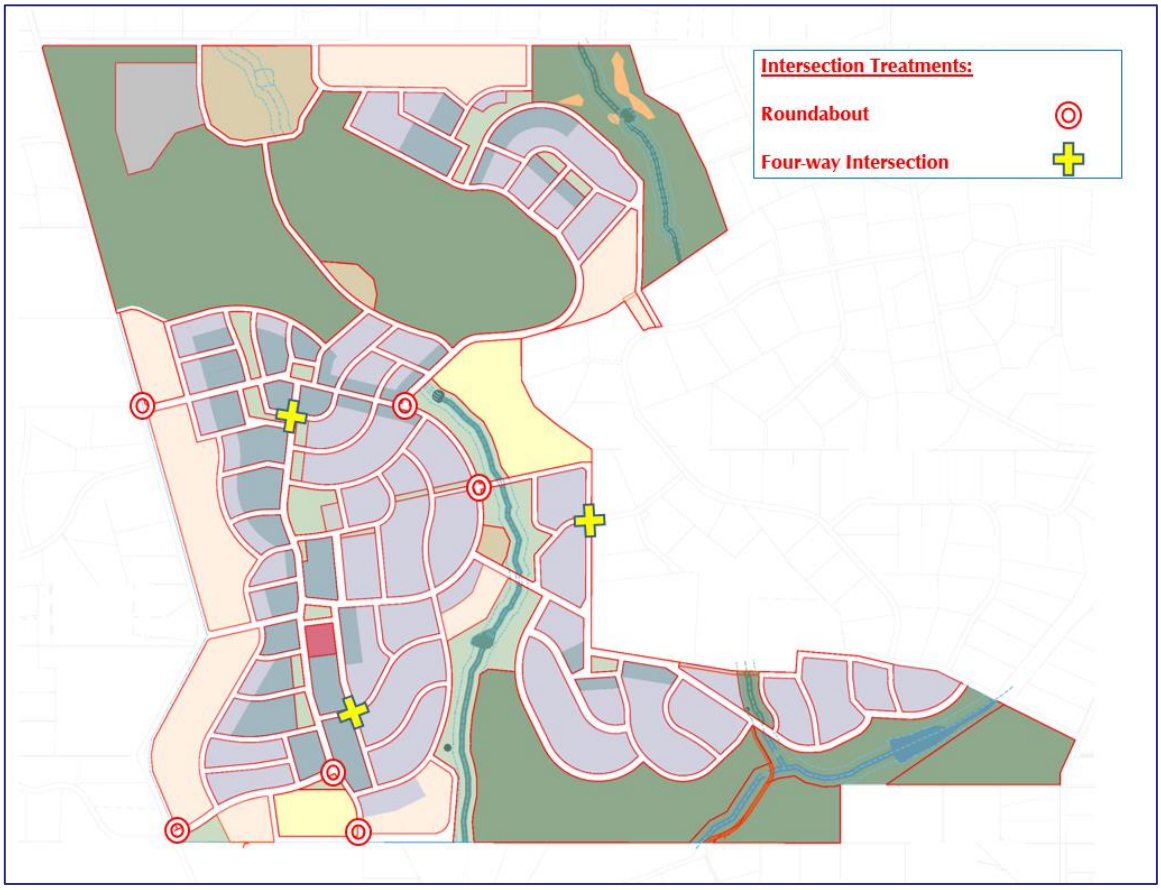


Figure 21: Proposed Intersection Treatments

A number of other four-way intersections are indicated on **Figure 21**. Each of these may require appropriate traffic management treatments to ensure low traffic speeds on the side road approaches, clearly indicating priority at the intersection and alerting drivers to the presence of the crossroads (i.e. threshold treatments, raised plateaus, etc.). However, it is not appropriate to prescribe specific intersection treatments or traffic calming measures at all these locations at the structure planning stage. This level of detail can more appropriately be addressed as part of the subsequent subdivision design and approval processes. A number of staggers are also shown in the proposed LSP. Each of these staggered intersections need to be addressed at the detailed subdivision design stage in accordance with *Liveable Neighbourhoods (2009) Table 5 Junction Spacing*.

There is a total of three access intersections on Roland Road, three on Hawkstone Street, one on La Grange Road, two on Woodlands Road and one on Brindle Road northbound extension into the LSP is proposed to serve the North Stoneville LSP area.

All but four access intersections are proposed in the form of T-intersection. The two Roland Road access intersections (Northern and Southern) are proposed to form 4-way roundabout intersections with Fringeleaf Drive (eastbound extension) and McDowell Loop, respectively. Due to the anticipated low level of traffic flows the future four-way access intersection on Woodlands Road is proposed to be designed as priority-controlled four-way intersection with priority on Woodlands Road.

7.5.3 External Intersection Analysis

The capacity assessment of key district intersections on Toodyay Road, Great Eastern Highway, Roland Road and Stoneville Road during typical weekday morning and afternoon peak hour was undertaken using the SIDRA intersection-modelling software to determine the expected operational characteristics of these intersections for the following two discrete scenarios:

Scenario 1: Partial development of LSP area (400 residential lots are released) at the western end of the area with two access intersections on Roland Road. The previously indicated local road and intersection upgrades are carried out as discussed in **Section 5** the report. To ensure additional level of robustness for given scenario it was further assumed that EastLink is not yet developed by this stage thereby providing no attractive alternative to Great Eastern Highway. An indicative timeframe of 2028 is assumed for the purpose of this assessment;

Scenario 2: Full LSP build-out scenario with all external access intersections completed. The Roland Road and Stoneville Road intersections on Toodyay Road are now upgraded to a grade-separated free-flow standard in line with the planning for the EastLink project. As previously discussed, the EastLink project will result in re-balancing of traffic between Toodyay Road and Great Eastern Highway which is at this stage estimated to be at approximately 50/50 split. The Brooking Road realignment provides additional connection between the LSP and Great Eastern Highway.

Intersections where increase in traffic flows for any intersection approach is under the 100vph threshold or intersections with minor road are not considered in this instance.

Capacity analysis of these intersections was undertaken using the SIDRA computer software package. SIDRA is an intersection modelling tool commonly used by traffic engineers for all types of intersections. SIDRA outputs are presented in the form of Degree of Saturation, Level of Service, Average Delay and 95% Queue. These characteristics are defined as follows:

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

The results of the relevant intersection SIDRA analysis are summarised in **Appendix B** and discussed in the following paragraphs.

Toodyay Road/Roland Road Intersection

This intersection was modelled in its current, recently upgraded form for the existing situation scenario. A continuous left-turn lane on Roland Road approach to the intersection is proposed for this intersection as a next incremental upgrade in order to secure free-flow conditions during the bushfire evacuation events. This upgrade is a specific requirement of DFES resulting from the previous bushfire evacuation modelling and assessment undertaken for this project. Accordingly, this intersection was modelled to allow for the proposed subsequent upgrade for the Scenario 1 stage.

The results of the SIDRA analysis demonstrate very good overall intersection LoS during both peak periods and in both existing and Scenario 1 models. The analysis for infers that the intersection will operate with significant spare capacity (approximately 70%) in the Scenario 1.

Ultimately, this intersection is planned to be upgraded to an interchange format with the construction of EastLink. Clearly at this stage (i.e., Scenario 2) no capacity issues would be expected.

Great Eastern Highway/Seaborne Street Intersection

This intersection is modelled for the existing situation with the allowance for the proposed intersection upgrades as discussed previously in Section 5.4 of the report. The SIDRA analysis shows that the proposed upgrades will provide benefits in securing sufficient capacity and good operation conditions during both peak weekday assessment periods.

The addition of the North Stoneville LSP traffic will have some impact on the operation of this intersection; however, the proposed intersection upgrades will secure that the intersection does not exceed 88% capacity in Scenario 1 (during AM peak only). The capacity assessment of this intersection suggests that, as expected, the most pronounced delays and queueing will be experienced for the right-turn out movement from Seaborne Street. It should be noted that a portion of LSP outbound traffic heading west towards Perth will take a left-turn from Seaborne Street first and then perform a U-turn at Craven Road intersection to continue travelling westbound towards Perth. Accordingly, the proposed U-turn facility at the Great Eastern Highway/Craven Road intersection plays an important role in alleviating the traffic load and improving the overall intersection operation at Great Eastern Highway/Seaborne Street intersection.
In order to secure a conservative intersection analysis no LSP traffic was re-assigned to the alternative Brooking Road (realigned) route and all traffic was assigned to Great Eastern Highway/Seaborne Street intersection in Stage 1.

Expectedly, the Stage 2 intersection analysis renders much improved operational characteristics at Great Eastern Highway/Seaborne Street intersection due to the anticipated re-assignment of regional traffic onto EastLink.

Great Eastern Highway/Stoneville Road/Mundaring Weir Road Intersection

The SIDRA analysis indicates that the combination of North Stoneville LSP traffic and the cumulative growth in background traffic along the highway will result in change in overall intersection LoS C to D in both morning and afternoon weekday peak periods (Scenario 1). The analysis indicates that the existing intersection capacity of

86% and 83% will increase moderately to 89% and 87% during the AM and PM peak hour periods, respectively.

However, due to the implementation of EastLink and re-distribution of district-level traffic this signalised intersection will maintain its overall LoS D going into the future (Stage 2).

Roland Road/Richardson Road Intersection

This intersection was modelled in its current format and without any additional turning facilities to provide for a conservative assessment. The result of SIDRA analysis confirms that an overall LoS A/B with minor queues and delays can be expected at this intersection for both peak weekday periods in Stage 1 scenario.

With the future creation of Roland Road/Richardson Road/Byfield Road roundabout intersection the new intersection format will secure significant additional capacity and improvement in operational characteristics that no detailed analysis of this intersection for Stage 2 was deemed necessary.

Roland Road/Fingerleaf Drive/Northern LSP Access Road Intersection

This future 4-way intersection was modelled as a 4-way roundabout intersection in line with the DEFS requirements in order to secure seamless discharge of LSP traffic onto Roland Road in bushfire emergency situations. For this porose priority additional lane was included in the road bout design to secure free-flow right-turns out of LSP.

As expected, the result of SIDRA analysis for Stage 2 confirms that an overall LoS A/B with minor queues and delays and no practical impact on Roland Road operation can be expected at this intersection for both peak weekday periods under this format.

Roland Road/Central LSP Access Road Intersection

The SIDRA assessment of this future T-intersection renders overall intersection LoS A for both weekday peak periods with moderate queues and delays. The intersection operates with significant level of spare capacity, but it is anticipated that left and right turn lanes on Roland Road may be warranted on safety grounds due to the volume of through traffic along Roland Road.

Roland Road/McDowell Loop/Southern LSP Access Road Intersection

Similar operating conditions as with Northern LSP Access Road intersection are expected at this future 4-way intersection which was initially modelled as a simple four-way stop-controlled intersection for Scenario 1 and single-lane roundabout for Scenario 2.

Stoneville Road/Woodlands Road Intersection

The capacity assessment of the existing T-intersection on Stoneville Road confirms that excellent overall intersection LoS A can be expected during both weekday peak periods under full North Stoneville LSP build-out scenario (Scenario 2). Localised road widening on Stoneville Road should be considered at this intersection to mitigate any potential impact on operation of through traffic along Stoneville Road. Any intersection treatment at this intersection should consider the proximity of existing local road intersection located some 80m to the north including the proximity of the horizontal curve on Stoneville Road to the south.

7.6 Access to Frontage Properties

The WAPC Liveable Neighbourhoods policy requires that *"Development along Integrator B and Neighbourhood Connector streets with ultimate vehicle volumes over 5,000 vehicles per day should be designed either so vehicles entering the street can do so travelling forward or are provided with alternative forms of vehicle access. Wider lots with paired driveways and protected reversing areas in the parking lane may be used on streets with up to 7,000 vehicles per day."*

No internal LSP roads are expected to experience these levels of daily traffic and as such this is not an issue.

7.7 Pedestrian and Cycle Networks

The proposed network of shared paths for pedestrians and cyclists in the LSP area is described in **Section 4.3** of this Revised Transport Impact Assessment. This network of paths will provide for a very good level of accessibility and permeability for pedestrians and cyclists within the LSP area, and connections to key internal retail/commercial and education nodes.

The subject site is relatively isolated and removed from the nearest developed areas. As such, the proposed network of LSP cycle and pedestrian paths is generally limited to internal routes with limited potential for external connectivity; however, in addition to the internal path system a shared path link along the eastern (LSP) side of Roland Road and southern side of Hawkstone Street (west of LSP access intersection) is proposed to form a comprehensive system of paths.

The main locations where there may be increased demand for pedestrian and cyclist movements crossing the road network are likely to be adjacent to the retail/commercial node and schools. The anticipated traffic volumes adjacent to these nodes is relatively low so pedestrian movements across these streets will be generally safe. Appropriate pedestrian crossing facilities with refuge island and drop ramps should be incorporated in the road design at subdivision stages of the development.

The WAPC *Transport Impact Assessment Guidelines Vol 2* (2016) provides guidance on the levels of traffic volumes that are likely to affect the ability for pedestrians to cross various types of roads. Based on that guidance an undivided two-lane road should be acceptable for pedestrians crossing traffic volumes of up to approximately 1,100vph and this threshold can be increased to around 2,800vph by adding a central median or pedestrian refuge islands.

None of the roads within the LSP area are expected to carry traffic flows anywhere near these levels.

7.8 Access to Schools

The proposed LSP will be the primary catchment area for the future primary and K-12 schools. Hence all primary and high school students residing in the proximity would need to cross either the *Neighbourhood Connector B* or *Access Street A* or *D* roads separating the schools from the immediately adjacent residential areas on their way to and from school.

Pedestrian paths on one side and shared paths on the other are proposed on the perimeter roads. It is recommended that pedestrian crossing facilities in the vicinity of schools be further investigated during the subdivision design stage of the project.

Information from the 2002 – 2006 *Perth & Regions Travel Survey* (PARTS) indicated that 25.4% of primary school students and 17.1% of high school students walk or cycle home from school while 26.7% of primary and 21.9% of high school students walk or cycle home from school. Therefore, a 300-student primary school would typically have about 80-students walking or cycling, and a 500-student high school would typically have about 85-105 students walking or cycling.

Warrant criteria provided on the WA Police website indicate that a *Type A Children's Crossing* may be provided where a minimum of 20 students and 200 vehicle movements occur within the hour immediately before and immediately after school for a primary school, or 20 students and 700vph for high schools.

The warrants are lower for a *Type B Children's Crossing* at 10 students and 100vph for a primary school or 10 students and 350vph for a high school. Such facilities can only be applied for by a School Principal or the President/Secretary of the relevant school/parent organisation (e.g., P&C, or P&F). The anticipated numbers of students crossing roads around school perimeters around the school sites may potentially meet these warrants in future so it would be expected that the schools would apply for this facility if/when future student numbers and movements meet those warrants.

7.9 Access to Public Transport

The WAPC *Transport Impact Assessment Guidelines Vol 2* (2016) suggests that it is desirable that at least 90 per cent of dwellings within the structure plan area should be within 500m straight line distance of a bus route.

Current planning by the Public Transport Authority (PTA) does not propose any future bus routes adjacent to or through the LSP area. However, a route combining sections of *Neighbourhood Connector B* and *Access A* roads lends itself to a potential future bus route through the LSP area. With this proposed bus route, it is estimated that some 75-80% of the LSP area would be covered with the suggested 500m distance. Importantly, the proposed route would pass all two school sites including the LSP town centre. If this route is selected, the constituent roads and intersections would need to be designed in accordance with PTA requirements.

The indicative bus route through the LSP areas is at best envisaged as a deviation of the existing bus route number 328 that currently operates along Richardson Road. Refer **Figure 22** for more details.

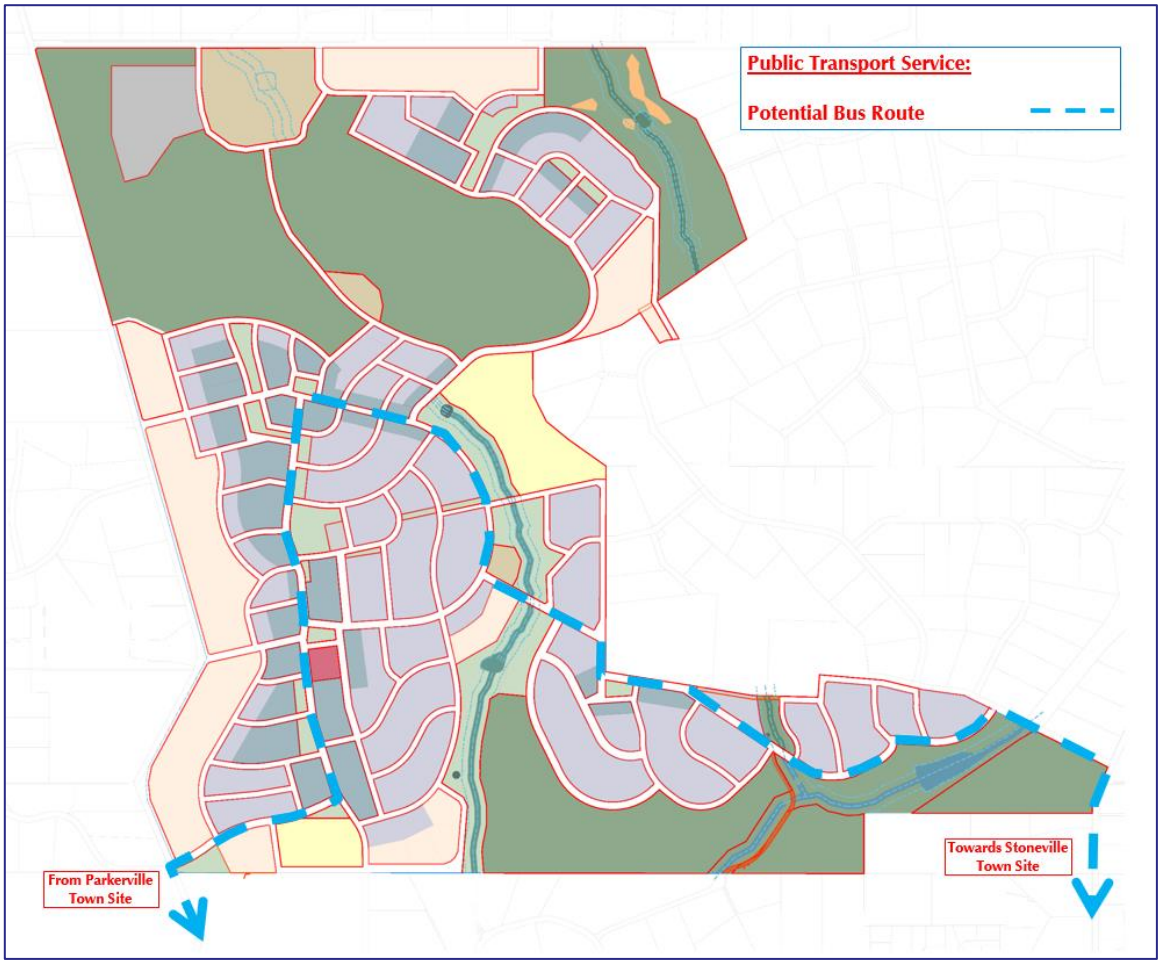


Figure 22: Potential Bus Route through the LSP area

8 Conclusions

This Revised Transport Impact Assessment was necessitated by a request from the WAPC to prepare an updated transport impact assessment based on the revised and reduced original North Stoneville LSP project scope.

The main findings of the Revised Transport Impact Assessment prepared for the proposed North Stoneville LSP are outlined below.

The LSP area is anticipated to accommodate approximately 1,000 dwellings including a public primary school, private K-12 school and a retail/commercial node of approximately 1,500m^2 GFA.

This structure plan area is anticipated to generate traffic volume of approximately 8,000 vehicles per day (both inbound and outbound trips).

The internal road network of the LSP area has been designed in accordance with WAPC *Liveable Neighbourhoods* principles. The cross-sections and reservations for these roads will be finalised during the detailed subdivision design stage.

Toodyay Road would retain its two-lane standard albeit some upgrades are proposed for its intersection with Roland Road.

As part of the early road upgrade works requested by WAPC, several existing intersections within the locality will be upgraded prior to commencement of LSP. This is particularly important in case of Great Eastern Highway/Seaborne Street intersection as it would start experiencing capacity issues before 2031 and EastLink project under current Great Eastern Highway traffic growth trend, regardless of the North Stoneville LSP development. Similarly, the existing Toodyay Road/Roland Road intersection will also undergo upgrade works to improve its operation and safety particularly during bushfire evacuation events.

The existing road network at the subject locality is generally of good standard and would require only limited upgrades to support the anticipated increase in traffic activity as a result of the proposed North Stoneville LSP.

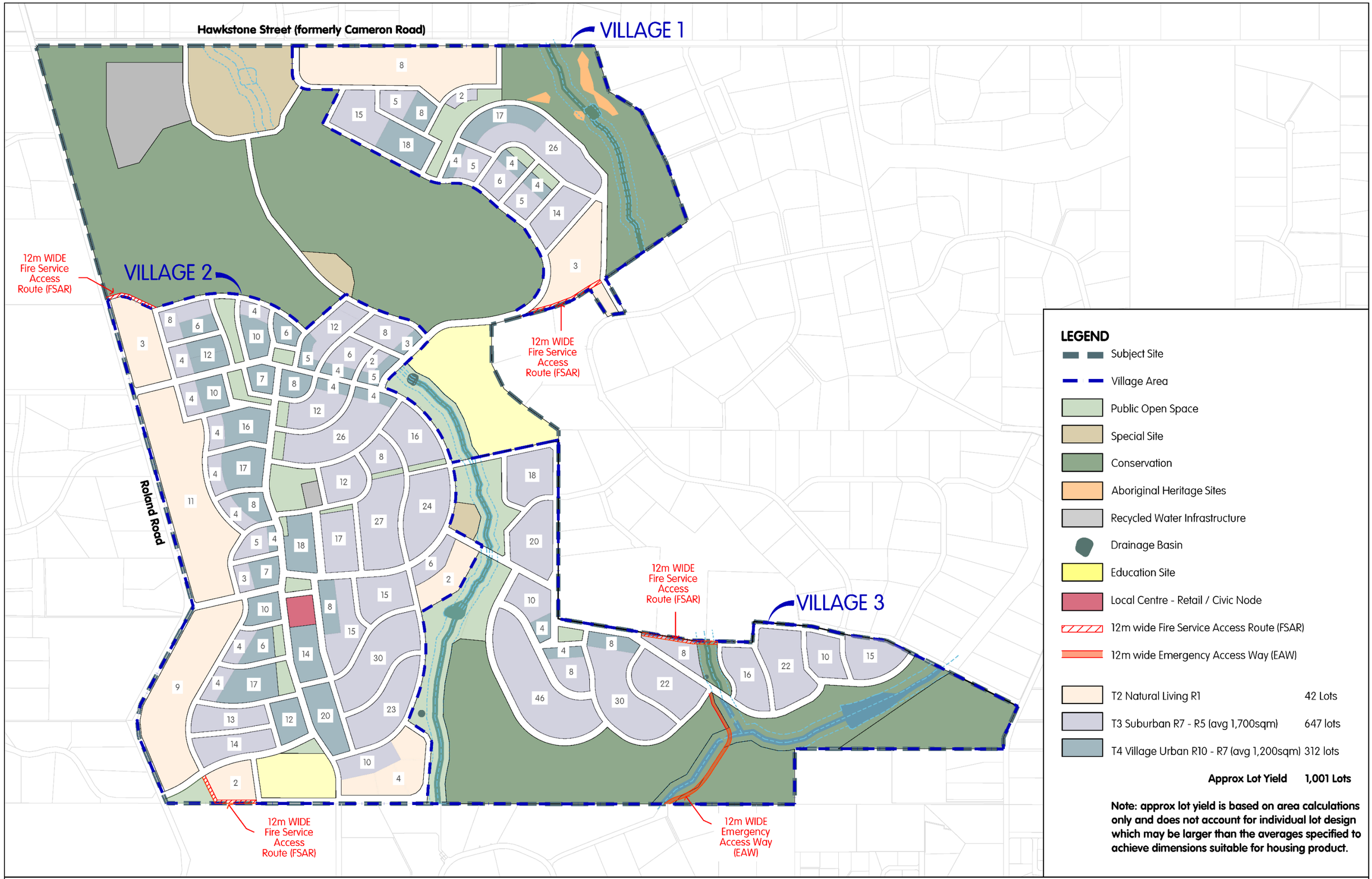
Access to the LSP area is proposed to be facilitated through a system of access intersections along Roland Road, Hawkstone Road and (indirectly) Stoneville Road, including few lower order local roads comprising either roundabouts or T-intersections with appropriate treatments.

The proposed North Stoneville LSP provides for a comprehensive network of shared paths and footpaths to encourage and facilitate non-motorised modes of traffic throughout the LSP area.

At present, there are no plans to provide a public transport service for the proposed LSP; however, if such service becomes feasible in the future the proposed LSP road network allows for such service.

Appendix A

NORTH STONEVILLE LOCAL STRUCTURE PLAN – CONCEPT



REVISED DESIGN OF PROPOSED STRUCTURE PLAN (SP34)

REVISION OF PROPOSED STRUCTURE PLAN (SP34)

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP SERVICE
YYMMDD: VARIES
DWG REF: VARIES
PROJECTION: HUG94

AERIAL PHOTOGRAPHY
SOURCE: NEARMAPS
YYMMDD: 201010

N

SIZE A3_1:12500

0 metres 125 250 375 500 625

DR 189 of 2020 - Satterley Property Group Pty Ltd v WAPC (confidential and subject to legal professional privilege)

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
F	UPDATED AREAS AND YIELD CALCS	221101	SB	PC
E	UPDATED AREAS AND YIELD CALCS	221026	SJ	PC
D	FIRE EMERGENCY ACCESS WAYS INCREASED TO 12M	221019	SB	PC
C	ROAD NAMES	220519	SJ	PC
B	FIRE EMERGENCY ACCESS WAY	220518	SJ	PC

North Stoneville
Shire of Mundaring

JOB CODE	DRAW NO.	REV.
SAT STO	**RD1 500**	**F**

Appendix B

SIDRA INTERSECTION ASSESSMENT RESULTS

Table 8: SIDRA Results: Roland Road/Toodyay Road intersection – AM Peak (Existing)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
10	L2	94	5	99	5.3	0.059	9.8	LOS A	0.4	3.3	0.45	0.71	0.45	87.6
6	R2	18	1	19	5.6	0.025	15.5	LOS C	0.2	1.4	0.66	0.82	0.66	60.1
Approach		112	6	118	5.4	0.059	10.7	LOS B	0.4	3.3	0.49	0.73	0.49	85.7
East: Toodyay Rd (E)														
7	L2	33	4	35	12.1	0.021	8.2	LOS A	0.0	0.0	0.00	0.66	0.00	67.8
2	T1	356	36	375	10.1	0.219	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach		389	40	409	10.3	0.219	0.7	NA	0.0	0.0	0.00	0.06	0.00	98.8
West: Toodyay Rd (W)														
8	T1	193	37	203	19.2	0.130	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
9	R2	66	10	69	15.2	0.087	10.8	LOS B	0.3	2.9	0.49	0.74	0.49	85.9
Approach		259	47	273	18.1	0.130	2.8	NA	0.3	2.9	0.13	0.19	0.13	95.9
All Vehicles		760	93	800	12.2	0.219	2.9	NA	0.4	3.3	0.11	0.20	0.11	95.7

Table 9: SIDRA Results: Roland Road/Toodyay Road intersection – PM Peak (Existing)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
10	L2	48	6	51	12.5	0.027	9.2	LOS A	0.2	1.6	0.37	0.65	0.37	85.6
6	R2	12	2	13	16.7	0.028	22.3	LOS C	0.2	1.7	0.77	0.92	0.77	51.0
Approach		60	8	63	13.3	0.028	11.8	LOS B	0.2	1.7	0.45	0.70	0.45	82.2
East: Toodyay Rd (E)														
7	L2	11	0	12	0.0	0.006	7.8	LOS A	0.0	0.0	0.00	0.66	0.00	75.3
2	T1	255	37	268	14.5	0.162	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach		266	37	280	13.9	0.162	0.3	NA	0.0	0.0	0.00	0.03	0.00	99.5
West: Toodyay Rd (W)														
8	T1	442	22	465	5.0	0.255	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
9	R2	93	4	98	4.3	0.095	9.3	LOS A	0.4	2.9	0.40	0.68	0.40	89.0
Approach		535	26	563	4.9	0.255	1.8	NA	0.4	2.9	0.07	0.12	0.07	97.8
All Vehicles		861	71	906	8.2	0.255	2.0	NA	0.4	2.9	0.07	0.13	0.07	97.2

Table 10: SIDRA Results: Roland Road/Toodyay Road intersection – AM Peak (Stage 1)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
10	L2	182	5.3	192	5.3	0.054	8.3	LOS A	0.0	0.0	0.00	0.62	0.00	82.8
6	R2	25	5.6	26	5.6	0.043	18.1	LOS C	0.3	2.3	0.73	0.90	0.73	57.6
Approach		207	5.3	218	5.3	0.054	9.5	LOS A	0.3	2.3	0.09	0.65	0.09	81.6
East: Toodyay Rd (E)														
7	L2	39	12.1	41	12.1	0.024	8.2	LOS A	0.0	0.0	0.00	0.66	0.00	67.8
2	T1	399	10.1	420	10.1	0.246	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach		438	10.3	461	10.3	0.246	0.8	NA	0.0	0.0	0.00	0.06	0.00	98.7
West: Toodyay Rd (W)														
8	T1	217	19.2	228	19.2	0.145	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
9	R2	99	15.2	104	15.2	0.141	11.6	LOS B	0.6	4.7	0.53	0.79	0.53	85.6
Approach		316	17.9	333	17.9	0.145	3.7	NA	0.6	4.7	0.17	0.25	0.17	95.0
All Vehicles		961	11.7	1012	11.7	0.246	3.6	NA	0.6	4.7	0.07	0.25	0.07	93.4

Table 11: SIDRA Results: Roland Road/Toodyay Road intersection – PM Peak (Stage 1)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
10	L2	89	5.3	94	5.3	0.027	8.3	LOS A	0.0	0.0	0.00	0.62	0.00	82.8
6	R2	16	5.6	17	5.6	0.045	26.2	LOS D	0.3	2.3	0.84	0.94	0.84	51.1
Approach		105	5.4	111	5.4	0.045	11.1	LOS B	0.3	2.3	0.13	0.67	0.13	80.6
East: Toodyay Rd (E)														
7	L2	17	12.1	18	12.1	0.011	8.2	LOS A	0.0	0.0	0.00	0.66	0.00	67.8
2	T1	286	10.1	301	10.1	0.176	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	99.9
Approach		303	10.2	319	10.2	0.176	0.5	NA	0.0	0.0	0.00	0.04	0.00	99.2
West: Toodyay Rd (W)														
8	T1	496	19.2	522	19.2	0.333	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	99.8
9	R2	167	15.2	176	15.2	0.194	10.4	LOS B	0.8	7.1	0.47	0.73	0.47	86.2
Approach		663	18.2	698	18.2	0.333	2.8	NA	0.8	7.1	0.12	0.18	0.12	96.0
All Vehicles		1071	14.7	1127	14.7	0.333	3.0	NA	0.8	7.1	0.09	0.19	0.09	95.2

Table 12: SIDRA Results: Freat Eastern Highway/Seaborne Street intersection – AM Peak (Existing)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median (S)														
5	T1	35	3.0	35	3.0	0.059	4.6	LOS A	0.2	1.5	0.61	0.60	0.61	44.9
Approach		35	3.0	35	3.0	0.059	4.6	LOS A	0.2	1.5	0.61	0.60	0.61	44.9
North: Seaborne St (N)														
1	L2	55	3.8	55	3.8	0.053	7.3	LOS A	0.2	1.5	0.45	0.65	0.45	51.4
2	T1	194	6.0	194	6.0	0.439	13.7	LOS B	1.8	13.7	0.73	0.97	1.02	41.6
Approach		248	5.5	248	5.5	0.439	12.3	LOS B	1.8	13.7	0.67	0.90	0.89	44.1
West: GEH (W)														
3	L2	100	10.5	100	10.5	0.066	7.6	LOS A	0.3	2.2	0.11	0.57	0.11	54.8
4	T1	794	15.0	794	15.0	0.255	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		894	14.5	894	14.5	0.255	0.9	LOS A	0.3	2.2	0.01	0.06	0.01	74.8
All Vehicles		1177	12.3	1177	12.3	0.439	3.4	NA	1.8	13.7	0.17	0.26	0.22	65.9
East: GEH (E)														
2	T1	1064	13.0	1064	13.0	0.333	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
3	R2	35	9.1	35	9.1	0.021	6.9	LOS A	0.0	0.0	0.00	0.65	0.00	51.0
Approach		1099	12.8	1099	12.8	0.333	0.3	NA	0.0	0.0	0.00	0.02	0.00	79.2
North: Median (N)														
1	R2	194	6.0	194	6.0	0.506	14.8	LOS B	2.5	19.6	0.86	1.18	1.29	37.7
Approach		194	6.0	194	6.0	0.506	14.8	LOS B	2.5	19.6	0.86	1.18	1.29	37.7
All Vehicles		1293	11.8	1293	11.8	0.506	2.4	NA	2.5	19.6	0.13	0.19	0.19	70.9

Table 13: SIDRA Results: Freat Eastern Highway/Seaborne Street intersection – PM Peak (Existing)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median (S)														
5	T1	35	9.1	35	9.1	0.094	8.5	LOS A	0.3	2.5	0.76	0.76	0.76	38.9
Approach		35	9.1	35	9.1	0.094	8.5	LOS A	0.3	2.5	0.76	0.76	0.76	38.9
North: Seaborne St (N)														
1	L2	34	0.0	34	0.0	0.037	7.9	LOS A	0.1	1.0	0.51	0.69	0.51	51.6
2	T1	81	3.9	81	3.9	0.216	15.6	LOS C	0.8	6.2	0.81	0.93	0.86	39.9
Approach		115	2.8	115	2.8	0.216	13.4	LOS B	0.8	6.2	0.72	0.86	0.76	43.7
West: GEH (W)														
3	L2	165	3.2	165	3.2	0.106	7.5	LOS A	0.5	3.5	0.11	0.58	0.11	57.3
4	T1	1116	6.3	1116	6.3	0.316	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		1281	5.9	1281	5.9	0.316	1.0	LOS A	0.5	3.5	0.01	0.07	0.01	74.8
All Vehicles		1431	5.7	1431	5.7	0.316	2.2	NA	0.8	6.2	0.09	0.15	0.09	70.4
East: GEH (E)														
2	T1	904	10.6	904	10.6	0.276	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
3	R2	35	9.1	35	9.1	0.021	6.9	LOS A	0.0	0.0	0.00	0.65	0.00	51.0
Approach		939	10.5	939	10.5	0.276	0.3	NA	0.0	0.0	0.00	0.02	0.00	79.2
North: Median (N)														
1	R2	81	3.9	81	3.9	0.156	7.0	LOS A	0.6	4.5	0.71	0.74	0.71	46.5
Approach		81	3.9	81	3.9	0.156	7.0	LOS A	0.6	4.5	0.71	0.74	0.71	46.5
All Vehicles		1020	10.0	1020	10.0	0.276	0.8	NA	0.6	4.5	0.06	0.08	0.06	76.2

Table 14: SIDRA Results: Freat Eastern Highway/Seaborne Street intersection – AM Peak (Stage 1)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median (S)														
5	T1	48	3.0	48	3.0	0.095	5.8	LOS A	0.3	2.5	0.67	0.67	0.67	43.7
Approach		48	3.0	48	3.0	0.095	5.8	LOS A	0.3	2.5	0.67	0.67	0.67	43.7
North: Seaborne St (N)														
1	L2	187	3.8	187	3.8	0.192	7.9	LOS A	0.8	6.0	0.52	0.74	0.52	51.0
2	T1	211	6.0	211	6.0	0.882	36.6	LOS E	4.3	33.5	0.81	1.46	2.62	27.5
Approach		398	5.0	398	5.0	0.882	23.1	LOS C	4.3	33.5	0.67	1.12	1.63	37.3
West: GEH (W)														
3	L2	142	10.5	142	10.5	0.095	7.7	LOS A	0.4	3.3	0.14	0.57	0.14	54.7
4	T1	889	15.0	889	15.0	0.286	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		1032	14.4	1032	14.4	0.286	1.1	LOS A	0.4	3.3	0.02	0.08	0.02	73.7
All Vehicles		1478	11.5	1478	11.5	0.882	7.2	NA	4.3	33.5	0.22	0.38	0.47	58.9
East: GEH (E)														
2	T1	1288	13.0	1288	13.0	0.403	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.6
3	R2	48	9.1	48	9.1	0.029	6.9	LOS A	0.0	0.0	0.00	0.65	0.00	51.0
Approach		1337	12.8	1337	12.8	0.403	0.3	NA	0.0	0.0	0.00	0.02	0.00	79.0
North: Median (N)														
1	R2	211	3.8	211	3.8	0.813	38.3	LOS E	3.9	29.8	0.97	1.86	2.31	25.1
Approach		211	3.8	211	3.8	0.813	38.3	LOS E	3.9	29.8	0.97	1.86	2.31	25.1
All Vehicles		1547	11.6	1547	11.6	0.813	5.5	NA	3.9	29.8	0.13	0.27	0.31	65.4

Table 15: SIDRA Results: Freat Eastern Highway/Seaborne Street intersection – PM Peak (Stage 1)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median (S)														
5	T1	63	3.0	63	3.0	0.231	13.6	LOS B	0.8	5.9	0.85	0.90	0.93	37.0
Approach		63	3.0	63	3.0	0.231	13.6	LOS B	0.8	5.9	0.85	0.90	0.93	37.0
North: Seaborne St (N)														
1	L2	52	3.8	52	3.8	0.069	9.1	LOS A	0.3	1.9	0.57	0.77	0.57	49.9
2	T1	133	6.0	133	6.0	0.576	31.6	LOS D	2.5	19.8	0.93	1.10	1.41	29.7
Approach		184	5.4	184	5.4	0.576	25.3	LOS D	2.5	19.8	0.83	1.01	1.18	34.9
West: GEH (W)														
3	L2	260	10.5	260	10.5	0.177	7.8	LOS A	0.8	6.6	0.17	0.57	0.17	54.5
4	T1	1251	15.0	1251	15.0	0.401	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.6
Approach		1511	14.2	1511	14.2	0.401	1.4	LOS A	0.8	6.6	0.03	0.10	0.03	72.3
All Vehicles		1758	12.9	1758	12.9	0.576	4.4	NA	2.5	19.8	0.14	0.22	0.18	64.8
East: GEH (E)														
2	T1	1014	13.0	1014	13.0	0.317	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
3	R2	63	9.1	63	9.1	0.038	6.9	LOS A	0.0	0.0	0.00	0.65	0.00	51.0
Approach		1077	12.7	1077	12.7	0.317	0.4	NA	0.0	0.0	0.00	0.04	0.00	78.7
North: Median (N)														
1	R2	133	3.8	133	3.8	0.321	11.0	LOS B	1.4	10.5	0.81	0.95	0.98	42.0
Approach		133	3.8	133	3.8	0.321	11.0	LOS B	1.4	10.5	0.81	0.95	0.98	42.0
All Vehicles		1209	11.7	1209	11.7	0.321	1.6	NA	1.4	10.5	0.09	0.14	0.11	73.7

Table 16: SIDRA Results: Freat Eastern Highway/Seaborne Street intersection – AM Peak (Stage 2)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median (S)														
5	T1	60	3.0	60	3.0	0.087	3.6	LOS A	0.3	2.4	0.55	0.53	0.55	45.9
Approach		60	3.0	60	3.0	0.087	3.6	LOS A	0.3	2.4	0.55	0.53	0.55	45.9
North: Seaborne St (N)														
1	L2	211	3.8	211	3.8	0.189	7.2	LOS A	0.8	6.1	0.45	0.67	0.45	51.4
2	T1	282	6.0	282	6.0	0.871	27.3	LOS D	5.0	39.2	0.72	1.44	2.42	31.9
Approach		493	5.1	493	5.1	0.871	18.7	LOS C	5.0	39.2	0.61	1.11	1.58	39.8
West: GEH (W)														
3	L2	156	10.5	156	10.5	0.106	7.7	LOS A	0.5	3.7	0.16	0.57	0.16	54.6
4	T1	681	15.0	681	15.0	0.219	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
Approach		837	14.2	837	14.2	0.219	1.5	LOS A	0.5	3.7	0.03	0.11	0.03	71.9
All Vehicles		1389	10.5	1389	10.5	0.871	7.7	NA	5.0	39.2	0.26	0.48	0.60	56.6
East: GEH (E)														
2	T1	989	13.0	989	13.0	0.310	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
3	R2	60	9.1	60	9.1	0.036	6.9	LOS A	0.0	0.0	0.00	0.65	0.00	51.0
Approach		1049	12.7	1049	12.7	0.310	0.4	NA	0.0	0.0	0.00	0.04	0.00	78.8
North: Median (N)														
1	R2	282	3.8	282	3.8	0.655	16.3	LOS C	3.9	29.8	0.89	1.46	1.67	37.1
Approach		282	3.8	282	3.8	0.655	16.3	LOS C	3.9	29.8	0.89	1.46	1.67	37.1
All Vehicles		1332	10.8	1332	10.8	0.655	3.8	NA	3.9	29.8	0.19	0.34	0.35	67.0

Table 17: SIDRA Results: Freat Eastern Highway/Seaborne Street intersection – PM Peak (Stage 2)

Vehicle Movement Performance														
Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median (S)														
5	T1	95	3.0	95	3.0	0.206	7.2	LOS A	0.7	5.6	0.73	0.76	0.77	42.3
Approach		95	3.0	95	3.0	0.206	7.2	LOS A	0.7	5.6	0.73	0.76	0.77	42.3
North: Seaborne St (N)														
1	L2	71	3.8	71	3.8	0.076	7.9	LOS A	0.3	2.2	0.50	0.70	0.50	51.0
2	T1	154	6.0	154	6.0	0.398	17.8	LOS C	1.8	14.0	0.84	1.01	1.11	38.1
Approach		224	5.3	224	5.3	0.398	14.7	LOS B	1.8	14.0	0.73	0.91	0.92	42.5
West: GEH (W)														
3	L2	303	10.5	303	10.5	0.213	7.9	LOS A	1.0	8.1	0.22	0.58	0.22	54.3
4	T1	955	15.0	955	15.0	0.306	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	79.7
Approach		1258	13.9	1258	13.9	0.306	2.0	LOS A	1.0	8.1	0.05	0.14	0.05	69.8
All Vehicles		1577	12.0	1577	12.0	0.398	4.1	NA	1.8	14.0	0.19	0.29	0.22	63.4
East: GEH (E)														
2	T1	776	13.0	776	13.0	0.243	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	79.8
3	R2	95	9.1	95	9.1	0.058	6.9	LOS A	0.0	0.0	0.00	0.65	0.00	51.0
Approach		871	12.5	871	12.5	0.243	0.8	NA	0.0	0.0	0.00	0.07	0.00	77.9
North: Median (N)														
1	R2	154	3.8	154	3.8	0.268	7.0	LOS A	1.2	8.9	0.71	0.81	0.80	46.6
Approach		154	3.8	154	3.8	0.268	7.0	LOS A	1.2	8.9	0.71	0.81	0.80	46.6
All Vehicles		1024	11.2	1024	11.2	0.268	1.7	NA	1.2	8.9	0.11	0.18	0.12	72.5

Table 18: SIDRA Results: Freat Eastern Highway/Stoneville Road/Mundaring Weir Road intersection – AM Peak (Existing)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mundaring Weir Rd (S)														
1	L2	46	5	48	10.9	0.069	16.1	LOS B	0.9	7.4	0.63	0.67	0.63	44.7
2	T1	120	12	126	10.0	*0.844	41.9	LOS D	5.0	41.4	1.00	0.98	1.51	35.7
3	R2	74	5	78	6.8	0.525	41.7	LOS D	2.8	21.9	1.00	0.77	1.02	34.3
Approach		240	22	253	9.2	0.844	36.9	LOS D	5.0	41.4	0.93	0.86	1.19	36.7
East: GEH (E)														
4	L2	98	6	103	6.1	0.880	43.8	LOS D	16.0	156.1	1.00	1.12	1.40	34.9
5	T1	615	115	647	18.7	*0.880	38.4	LOS D	16.0	156.1	1.00	1.13	1.41	36.6
6	R2	38	2	40	5.3	*0.266	40.4	LOS D	1.4	10.7	0.97	0.73	0.97	34.8
Approach		751	123	791	16.4	0.880	39.2	LOS D	16.0	161.1	1.00	1.11	1.38	36.3
North: Stoneville Rd (N)														
7	L2	30	0	32	0.0	0.509	33.4	LOS C	6.1	45.7	0.94	0.77	0.94	40.1
8	T1	153	4	161	2.6	0.509	27.9	LOS C	6.1	45.7	0.94	0.77	0.94	40.8
9	R2	307	9	323	2.9	*0.903	48.7	LOS D	13.8	105.6	1.00	1.08	1.51	32.8
Approach		490	13	516	2.7	0.903	41.2	LOS D	13.8	105.6	0.98	0.96	1.30	35.4
West: GEH (W)														
10	L2	51	4	54	7.8	0.112	25.9	LOS C	1.4	11.1	0.77	0.72	0.77	40.0
11	T1	416	99	438	23.8	0.556	23.8	LOS C	6.6	72.8	0.90	0.76	0.90	43.2
12	R2	29	2	31	6.9	0.206	40.1	LOS D	1.0	8.2	0.96	0.72	0.96	34.8
Approach		496	105	522	21.2	0.556	25.0	LOS C	6.6	72.8	0.89	0.75	0.89	42.3
All Vehicles		1977	263	2081	13.3	0.903	35.8	LOS D	16.0	161.1	0.96	0.95	1.21	37.4

Table 19: SIDRA Results: Freat Eastern Highway/Stoneville Road/Mundaring Weir Road intersection – PM Peak (Existing)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mundaring Weir Rd (S)														
1	L2	71	3	75	4.2	0.086	12.1	LOS B	1.0	7.6	0.56	0.67	0.56	48.4
2	T1	154	5	162	3.2	*0.858	36.5	LOS D	5.6	42.7	1.00	1.01	1.55	37.7
3	R2	100	6	105	6.0	0.609	36.6	LOS D	3.3	25.8	1.00	0.82	1.11	36.2
Approach		325	14	342	4.3	0.858	31.2	LOS C	5.6	42.7	0.90	0.88	1.20	39.1
East: GEH (E)														
4	L2	56	2	59	3.6	0.835	36.1	LOS D	11.1	104.9	1.00	1.05	1.34	38.3
5	T1	562	80	592	14.2	*0.835	30.5	LOS C	11.1	104.9	1.00	1.05	1.34	39.8
6	R2	46	1	48	2.2	*0.273	34.6	LOS C	1.4	10.9	0.96	0.73	0.96	37.3
Approach		664	83	699	12.5	0.835	31.3	LOS C	11.1	106.9	1.00	1.03	1.31	39.5
North: Stoneville Rd (N)														
7	L2	78	1	82	1.3	0.763	36.0	LOS D	6.9	51.0	1.00	0.92	1.24	38.3
8	T1	128	1	135	0.8	0.763	30.4	LOS C	6.9	51.0	1.00	0.92	1.24	39.2
9	R2	223	6	235	2.7	*0.871	41.6	LOS D	8.3	62.9	1.00	1.06	1.52	35.1
Approach		429	8	452	1.9	0.871	37.2	LOS D	8.3	62.9	1.00	0.99	1.39	36.8
West: GEH (W)														
10	L2	77	1	81	1.3	0.177	25.2	LOS C	1.9	14.3	0.82	0.74	0.82	41.4
11	T1	553	55	582	9.9	0.704	24.5	LOS C	8.5	76.5	0.96	0.87	1.07	42.8
12	R2	31	0	33	0.0	0.176	34.1	LOS C	0.9	6.9	0.95	0.71	0.95	38.0
Approach		661	56	696	8.5	0.704	25.0	LOS C	8.5	76.5	0.95	0.85	1.04	42.4
All Vehicles		2079	161	2188	7.7	0.871	30.5	LOS C	11.1	106.9	0.97	0.94	1.22	39.7

Table 20: SIDRA Results: Freat Eastern Highway/Stoneville Road/Mundaring Weir Road intersection – AM Peak (Stage 1)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mundaring weir Rd (S)														
10	L2	52	9.6	55	9.6	0.041	22.4	LOS C	1.7	14.3	0.59	0.65	0.59	39.0
2	T1	135	8.9	142	8.9	*0.323	55.8	LOS E	8.2	66.8	0.96	0.75	0.96	30.1
6	R2	83	6.0	87	6.0	0.207	59.5	LOS E	5.0	38.8	0.94	0.75	0.94	28.1
Approach		270	8.1	284	8.1	0.323	50.5	LOS D	8.2	66.8	0.88	0.73	0.88	30.8
East: GEH (E)														
7	L2	110	6.1	116	6.1	0.894	68.2	LOS E	31.5	307.4	1.00	1.03	1.22	28.5
2	T1	689	18.7	725	18.7	*0.894	61.0	LOS E	31.5	307.4	1.00	1.05	1.24	30.1
6	R2	43	5.3	45	5.3	0.556	76.3	LOS E	3.0	23.6	1.00	0.76	1.04	26.0
Approach		842	16.4	886	16.4	0.894	62.7	LOS E	31.5	307.4	1.00	1.04	1.22	29.6
North: Sroneville Rd (N)														
7	L2	34	0.0	36	0.0	*0.184	33.5	LOS C	4.0	29.6	0.77	0.71	0.77	39.3
8	T1	172	2.6	181	2.6	*0.884	48.0	LOS D	32.8	249.7	0.91	0.88	1.03	31.2
9	R2	344	2.9	362	2.9	0.884	63.7	LOS E	32.8	249.7	1.00	0.98	1.18	29.2
Approach		550	2.7	579	2.7	0.884	56.9	LOS E	32.8	249.7	0.96	0.93	1.11	30.3
West: GEH (W)														
10	L2	58	6.9	61	6.9	0.053	13.4	LOS B	1.3	10.3	0.36	0.65	0.36	46.5
8	T1	466	23.8	491	23.8	0.594	40.2	LOS D	13.3	146.0	0.89	0.76	0.89	36.2
9	R2	33	6.9	35	6.9	0.433	77.2	LOS E	2.3	18.2	1.00	0.73	1.00	26.7
Approach		557	21.0	586	21.0	0.594	39.6	LOS D	13.3	146.0	0.84	0.75	0.84	36.3
All Vehicles		2219	13.1	2336	13.1	0.894	54.0	LOS D	32.8	307.4	0.93	0.90	1.06	31.4

Table 21: SIDRA Results: Freat Eastern Highway/Stoneville Road/Mundaring Weir Road intersection – PM Peak (Stage 1)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mundaring weir Rd (S)														
10	L2	80	9.6	84	9.6	0.053	15.4	LOS B	1.9	15.8	0.52	0.64	0.52	42.1
2	T1	173	8.9	182	8.9	*0.374	46.6	LOS D	8.9	72.5	0.96	0.76	0.96	32.6
6	R2	112	6.0	118	6.0	0.252	50.3	LOS D	5.7	44.2	0.94	0.76	0.94	30.2
Approach		365	8.2	384	8.2	0.374	40.9	LOS D	8.9	72.5	0.85	0.73	0.85	33.4
East: GEH (E)														
7	L2	63	6.1	66	6.1	0.847	55.8	LOS E	21.8	217.6	1.00	1.00	1.19	31.5
2	T1	630	18.7	663	18.7	0.847	48.4	LOS D	21.8	217.6	1.00	1.01	1.19	33.5
6	R2	52	5.3	55	5.3	*0.569	65.0	LOS E	3.1	24.1	1.00	0.77	1.06	28.3
Approach		745	16.7	784	16.7	0.847	50.2	LOS D	21.8	217.6	1.00	0.99	1.18	32.9
North: Sroneville Rd (N)														
7	L2	88	0.0	93	0.0	0.177	21.3	LOS C	2.4	17.9	0.76	0.73	0.76	43.8
8	T1	144	2.6	152	2.6	*0.854	48.8	LOS D	23.4	177.5	0.98	0.96	1.16	30.9
9	R2	250	2.9	263	2.9	0.854	55.3	LOS E	23.4	177.5	1.00	0.98	1.19	31.4
Approach		482	2.3	507	2.3	0.854	47.2	LOS D	23.4	177.5	0.95	0.93	1.10	32.9
West: GEH (W)														
10	L2	87	6.9	92	6.9	0.087	14.6	LOS B	1.9	15.5	0.43	0.67	0.43	45.8
8	T1	620	23.8	653	23.8	*0.865	51.7	LOS D	19.9	219.4	0.99	1.06	1.25	32.5
9	R2	35	6.9	37	6.9	0.389	65.5	LOS E	2.1	16.2	1.00	0.73	1.00	29.2
Approach		742	21.0	781	21.0	0.865	48.0	LOS D	19.9	219.4	0.93	1.00	1.14	33.5
All Vehicles		2334	13.8	2457	13.8	0.865	47.4	LOS D	23.4	219.4	0.94	0.94	1.10	33.2

Table 22: SIDRA Results: Freat Eastern Highway/Stoneville Road/Mundaring Weir Road intersection – AM Peak (Stage 2)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mundaring weir Rd (S)														
10	L2	59	9.6	62	9.6	0.044	20.3	LOS C	1.9	15.3	0.56	0.64	0.56	39.9
2	T1	154	8.9	162	8.9	*0.369	56.2	LOS E	9.4	76.7	0.96	0.76	0.96	30.0
6	R2	93	6.0	98	6.0	0.232	59.8	LOS E	5.6	43.6	0.94	0.75	0.94	28.1
Approach		306	8.2	322	8.2	0.369	50.4	LOS D	9.4	76.7	0.88	0.74	0.88	30.8
East: GEH (E)														
7	L2	124	6.1	131	6.1	0.871	68.3	LOS E	25.1	238.2	1.00	1.00	1.21	28.5
2	T1	525	18.7	553	18.7	*0.871	61.1	LOS E	25.1	238.2	1.00	1.03	1.22	30.0
6	R2	53	5.3	56	5.3	0.685	77.8	LOS E	3.8	29.6	1.00	0.81	1.16	25.7
Approach		702	15.5	739	15.5	0.871	63.7	LOS E	25.1	238.2	1.00	1.00	1.21	29.4
North: Sroneville Rd (N)														
7	L2	57	0.0	60	0.0	*0.183	25.5	LOS C	3.8	28.1	0.71	0.70	0.71	42.6
8	T1	199	2.6	209	2.6	*0.881	44.1	LOS D	37.7	286.8	0.91	0.89	1.02	32.2
9	R2	392	2.9	413	2.9	0.881	58.4	LOS E	37.7	286.8	1.00	0.98	1.15	30.5
Approach		648	2.6	682	2.6	0.881	51.1	LOS D	37.7	286.8	0.95	0.92	1.07	31.8
West: GEH (W)														
10	L2	67	6.9	71	6.9	0.062	13.4	LOS B	1.5	12.0	0.36	0.66	0.36	46.5
8	T1	356	23.8	375	23.8	0.520	44.8	LOS D	10.3	113.4	0.91	0.76	0.91	34.7
9	R2	39	6.9	41	6.9	0.512	77.7	LOS E	2.7	21.6	1.00	0.74	1.01	26.6
Approach		462	19.9	486	19.9	0.520	43.0	LOS D	10.3	113.4	0.84	0.74	0.84	35.1
All Vehicles		2118	11.4	2229	11.4	0.881	53.4	LOS D	37.7	286.8	0.93	0.88	1.04	31.4

Table 23: SIDRA Results: Freat Eastern Highway/Stoneville Road/Mundaring Weir Road intersection – PM Peak (Stage 2)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mundaring weir Rd (S)														
10	L2	91	9.6	96	9.6	0.059	13.7	LOS B	1.9	15.7	0.51	0.64	0.51	42.9
2	T1	199	8.9	209	8.9	*0.419	42.5	LOS D	9.4	76.3	0.96	0.77	0.96	33.8
6	R2	126	6.0	133	6.0	0.276	46.1	LOS D	5.8	45.3	0.94	0.76	0.94	31.3
Approach		416	8.2	438	8.2	0.419	37.3	LOS D	9.4	76.3	0.85	0.74	0.85	34.6
East: GEH (E)														
7	L2	71	6.1	75	6.1	0.867	59.1	LOS E	16.4	161.0	1.00	1.04	1.30	30.6
2	T1	480	18.7	505	18.7	*0.867	51.8	LOS D	16.4	161.0	1.00	1.06	1.30	32.5
6	R2	73	5.3	77	5.3	*0.726	61.2	LOS E	4.1	31.7	1.00	0.85	1.23	29.1
Approach		624	15.7	657	15.7	0.867	53.8	LOS D	16.4	165.7	1.00	1.03	1.29	31.8
North: Sroneville Rd (N)														
7	L2	107	0.0	113	0.0	0.179	17.6	LOS B	2.2	16.0	0.71	0.73	0.71	45.7
8	T1	165	2.6	174	2.6	*0.862	44.7	LOS D	24.8	188.2	0.99	0.98	1.18	32.0
9	R2	283	2.9	298	2.9	0.862	50.2	LOS D	24.8	188.2	1.00	0.99	1.20	32.9
Approach		555	2.3	584	2.3	0.862	42.3	LOS D	24.8	188.2	0.94	0.94	1.10	34.5
West: GEH (W)														
10	L2	103	6.9	108	6.9	0.108	15.1	LOS B	2.3	18.2	0.46	0.69	0.46	45.5
8	T1	472	23.8	497	23.8	0.840	49.7	LOS D	13.5	148.3	1.00	1.03	1.27	33.1
9	R2	41	6.9	43	6.9	0.414	59.9	LOS E	2.2	17.3	1.00	0.74	1.00	30.6
Approach		616	19.8	648	19.8	0.840	44.6	LOS D	13.5	148.3	0.91	0.95	1.12	34.5
All Vehicles		2211	12.1	2327	12.1	0.867	45.2	LOS D	24.8	188.2	0.93	0.93	1.11	33.7

Table 24: SIDRA Results: Roland Road/Richardson Road intersection – AM Peak (Existing)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Richardson Rd (E)														
8	T1	116	4	122	3.4	0.133	0.6	LOS A	0.6	4.6	0.30	0.24	0.30	58.6
9	R2	84	8	88	9.5	0.133	5.6	LOS A	0.6	4.6	0.30	0.24	0.30	53.4
Approach		200	12	211	6.0	0.133	2.7	NA	0.6	4.6	0.30	0.24	0.30	56.3
North: Roland Rd (N)														
10	L2	53	5	56	9.4	0.145	7.9	LOS A	1.2	9.1	0.24	0.67	0.24	54.6
6	R2	215	12	226	5.6	0.145	9.2	LOS A	1.2	9.1	0.24	0.67	0.24	65.3
Approach		268	17	282	6.3	0.145	8.9	LOS A	1.2	9.1	0.24	0.67	0.24	62.9
West: Byfield Rd (W)														
7	L2	184	11	194	6.0	0.134	7.6	LOS A	0.0	0.0	0.00	0.62	0.00	68.1
2	T1	42	0	44	0.0	0.134	4.0	LOS A	0.0	0.0	0.00	0.62	0.00	74.8
Approach		226	11	238	4.9	0.134	6.9	NA	0.0	0.0	0.00	0.62	0.00	69.3
All Vehicles		694	40	731	5.8	0.145	6.5	NA	1.2	9.1	0.18	0.53	0.18	62.7

Table 25: SIDRA Results: Roland Road/Richardson Road intersection – PM Peak (Existing)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Richardson Rd (E)														
8	T1	45	2	47	4.4	0.050	0.4	LOS A	0.2	1.5	0.24	0.24	0.24	58.5
9	R2	34	1	36	2.9	0.050	5.2	LOS A	0.2	1.5	0.24	0.24	0.24	55.9
Approach		79	3	83	3.8	0.050	2.5	NA	0.2	1.5	0.24	0.24	0.24	57.3
North: Roland Rd (N)														
10	L2	27	0	28	0.0	0.061	7.8	LOS A	0.4	3.2	0.27	0.64	0.27	55.7
6	R2	101	0	106	0.0	0.061	8.0	LOS A	0.4	3.2	0.27	0.64	0.27	69.1
Approach		128	0	135	0.0	0.061	8.0	LOS A	0.4	3.2	0.27	0.64	0.27	65.8
West: Byfield Rd (W)														
7	L2	70	3	74	4.3	0.103	7.6	LOS A	0.0	0.0	0.00	0.55	0.00	71.0
2	T1	110	4	116	3.6	0.103	4.0	LOS A	0.0	0.0	0.00	0.55	0.00	75.7
Approach		180	7	189	3.9	0.103	5.4	NA	0.0	0.0	0.00	0.55	0.00	73.8
All Vehicles		387	10	407	2.6	0.103	5.6	NA	0.4	3.2	0.14	0.52	0.14	67.1

Table 26: SIDRA Results: Roland Road/Richardson Road intersection – AM Peak (Stage 1)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Richardson Rd (E)														
8	T1	130	3.4	137	3.4	0.169	1.0	LOS A	0.8	6.5	0.38	0.28	0.38	58.1
9	R2	111	9.5	117	9.5	0.169	6.0	LOS A	0.8	6.5	0.38	0.28	0.38	53.0
Approach		241	6.2	254	6.2	0.169	3.3	NA	0.8	6.5	0.38	0.28	0.38	55.7
North: Roland Rd (N)														
10	L2	108	9.4	114	9.4	0.265	8.0	LOS A	2.6	20.3	0.30	0.70	0.30	53.9
6	R2	353	5.6	372	5.6	0.265	10.5	LOS B	2.6	20.3	0.30	0.70	0.30	64.2
Approach		461	6.5	485	6.5	0.265	9.9	LOS A	2.6	20.3	0.30	0.70	0.30	61.5
West: Byfield Rd (W)														
7	L2	244	6.0	257	6.0	0.174	7.6	LOS A	0.0	0.0	0.00	0.62	0.00	68.0
2	T1	48	0.0	51	0.0	0.174	4.0	LOS A	0.0	0.0	0.00	0.62	0.00	74.6
Approach		292	5.0	307	5.0	0.174	7.0	NA	0.0	0.0	0.00	0.62	0.00	69.0
All Vehicles		994	6.0	1046	6.0	0.265	7.4	NA	2.6	20.3	0.23	0.58	0.23	61.9

Table 27: SIDRA Results: Roland Road/Richardson Road intersection – PM Peak (Stage 1)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Richardson Rd (E)														
8	T1	51	3.4	54	3.4	0.097	1.1	LOS A	0.5	3.7	0.40	0.37	0.40	57.5
9	R2	79	9.5	83	9.5	0.097	5.9	LOS A	0.5	3.7	0.40	0.37	0.40	52.5
Approach		130	7.1	137	7.1	0.097	4.0	NA	0.5	3.7	0.40	0.37	0.40	54.3
North: Roland Rd (N)														
10	L2	59	9.4	62	9.4	0.121	8.2	LOS A	0.9	7.4	0.34	0.68	0.34	54.7
6	R2	166	5.6	175	5.6	0.121	9.1	LOS A	0.9	7.4	0.34	0.68	0.34	65.4
Approach		225	6.6	237	6.6	0.121	8.9	LOS A	0.9	7.4	0.34	0.68	0.34	62.2
West: Byfield Rd (W)														
7	L2	173	6.0	182	6.0	0.172	7.6	LOS A	0.0	0.0	0.00	0.58	0.00	69.2
2	T1	124	0.0	131	0.0	0.172	4.0	LOS A	0.0	0.0	0.00	0.58	0.00	76.0
Approach		297	3.5	313	3.5	0.172	6.1	NA	0.0	0.0	0.00	0.58	0.00	71.9
All Vehicles		652	5.3	686	5.3	0.172	6.6	NA	0.9	7.4	0.20	0.57	0.20	64.3

Table 28: SIDRA Results: Roland Road/Fingerleaf Road/Northern LSP Access intersection – AM Peak (Stage 2)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
10	L2	1	2.0	1	2.0	0.056	6.2	LOS A	0.0	0.0	0.00	0.56	0.00	70.4
2	T1	192	7.0	202	7.0	0.056	7.4	LOS A	0.0	0.0	0.00	0.56	0.00	70.0
6	R2	5	2.0	5	2.0	0.056	11.3	LOS B	0.0	0.0	0.00	0.56	0.00	71.8
Approach		198	6.8	208	6.8	0.056	7.5	LOS A	0.0	0.0	0.00	0.56	0.00	70.1
East: Access 3 (E)														
7	L2	19	2.0	20	2.0	0.069	3.7	LOS A	0.4	2.9	0.39	0.56	0.39	53.5
2	T1	5	2.0	5	2.0	0.069	3.7	LOS A	0.4	2.9	0.39	0.56	0.39	46.5
6	R2	51	2.0	54	2.0	0.069	8.4	LOS A	0.4	2.9	0.39	0.56	0.39	54.1
Approach		75	2.0	79	2.0	0.069	6.9	LOS A	0.4	2.9	0.39	0.56	0.39	53.4
North: Roland Rd (N)														
7	L2	13	2.0	14	2.0	0.129	6.3	LOS A	0.7	5.2	0.05	0.53	0.05	57.4
8	T1	174	7.0	183	7.0	0.129	7.0	LOS A	0.7	5.2	0.05	0.53	0.05	70.6
9	R2	3	2.0	3	2.0	0.129	11.5	LOS B	0.7	5.2	0.05	0.53	0.05	59.4
Approach		190	6.6	200	6.6	0.129	7.0	LOS A	0.7	5.2	0.05	0.53	0.05	69.3
West: New Road (W)														
10	L2	13	2.0	14	2.0	0.017	4.6	LOS A	0.1	0.6	0.40	0.48	0.40	55.2
8	T1	1	2.0	1	2.0	0.017	4.4	LOS A	0.1	0.6	0.40	0.48	0.40	47.7
9	R2	1	2.0	1	2.0	0.017	8.7	LOS A	0.1	0.6	0.40	0.48	0.40	56.1
Approach		15	2.0	16	2.0	0.017	4.8	LOS A	0.1	0.6	0.40	0.48	0.40	54.7
All Vehicles		478	5.8	503	5.8	0.129	7.2	LOS A	0.7	5.2	0.09	0.54	0.09	65.9

Table 29: SIDRA Results: Roland Road/Fingerleaf Road/Northern LSP Access intersection – PM Peak (Stage 2)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
10	L2	1	2.0	1	2.0	0.039	6.2	LOS A	0.0	0.0	0.00	0.58	0.00	70.0
2	T1	123	7.0	129	7.0	0.039	7.4	LOS A	0.0	0.0	0.00	0.58	0.00	69.5
6	R2	16	2.0	17	2.0	0.039	11.3	LOS B	0.0	0.0	0.00	0.58	0.00	71.3
Approach		140	6.4	147	6.4	0.039	7.8	LOS A	0.0	0.0	0.00	0.58	0.00	69.7
East: Access 3 (E)														
7	L2	8	2.0	8	2.0	0.030	3.7	LOS A	0.2	1.2	0.39	0.55	0.39	53.4
2	T1	2	2.0	2	2.0	0.030	3.7	LOS A	0.2	1.2	0.39	0.55	0.39	46.5
6	R2	22	2.0	23	2.0	0.030	8.4	LOS A	0.2	1.2	0.39	0.55	0.39	54.0
Approach		32	2.0	34	2.0	0.030	7.0	LOS A	0.2	1.2	0.39	0.55	0.39	53.3
North: Roland Rd (N)														
7	L2	42	2.0	44	2.0	0.169	6.3	LOS A	0.9	6.9	0.11	0.53	0.11	57.1
8	T1	182	7.0	192	7.0	0.169	7.1	LOS A	0.9	6.9	0.11	0.53	0.11	70.2
9	R2	10	2.0	11	2.0	0.169	11.6	LOS B	0.9	6.9	0.11	0.53	0.11	59.1
Approach		234	5.9	246	5.9	0.169	7.2	LOS A	0.9	6.9	0.11	0.53	0.11	66.9
West: New Road (W)														
10	L2	6	2.0	6	2.0	0.011	4.0	LOS A	0.0	0.4	0.32	0.43	0.32	55.2
8	T1	4	2.0	4	2.0	0.011	3.9	LOS A	0.0	0.4	0.32	0.43	0.32	47.8
9	R2	1	2.0	1	2.0	0.011	8.2	LOS A	0.0	0.4	0.32	0.43	0.32	56.2
Approach		11	2.0	12	2.0	0.011	4.3	LOS A	0.0	0.4	0.32	0.43	0.32	52.4
All Vehicles		417	5.7	439	5.7	0.169	7.3	LOS A	0.9	6.9	0.10	0.55	0.10	66.0

Table 30: SIDRA Results: Roland Road/Central LSP Access intersection – AM Peak (Stage 1)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
2	T1	167	7.0	176	7.0	0.056	0.1	LOS A	0.2	1.6	0.09	0.09	0.09	86.9
6	R2	27	2.0	28	2.0	0.056	7.7	LOS A	0.2	1.6	0.09	0.09	0.09	61.3
Approach		194	6.3	204	6.3	0.056	1.2	NA	0.2	1.6	0.09	0.09	0.09	82.1
East: Access 2 (E)														
7	L2	80	2.0	84	2.0	0.105	5.0	LOS A	0.4	3.0	0.25	0.55	0.25	54.4
6	R2	40	2.0	42	2.0	0.105	6.1	LOS A	0.4	3.0	0.25	0.55	0.25	54.1
Approach		120	2.0	126	2.0	0.105	5.4	LOS A	0.4	3.0	0.25	0.55	0.25	54.3
North: Roland Rd (N)														
7	L2	14	2.0	15	2.0	0.078	7.5	LOS A	0.0	0.0	0.00	0.07	0.00	79.4
8	T1	124	7.0	131	7.0	0.078	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	88.2
Approach		138	6.5	145	6.5	0.078	0.8	NA	0.0	0.0	0.00	0.07	0.00	87.3
All Vehicles		452	5.2	476	5.2	0.105	2.2	NA	0.4	3.0	0.10	0.21	0.10	73.4

Table 31: SIDRA Results: Roland Road/Central LSP Access intersection – PM Peak (Stage 1)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
2	T1	85	7.0	89	7.0	0.048	0.5	LOS A	0.4	3.2	0.26	0.28	0.26	81.2
6	R2	67	2.0	71	2.0	0.048	7.9	LOS A	0.4	3.2	0.26	0.28	0.26	58.4
Approach		152	4.8	160	4.8	0.048	3.7	NA	0.4	3.2	0.26	0.28	0.26	69.3
East: Access 2 (E)														
7	L2	40	2.0	42	2.0	0.053	5.1	LOS A	0.2	1.5	0.27	0.54	0.27	54.3
6	R2	20	2.0	21	2.0	0.053	6.0	LOS A	0.2	1.5	0.27	0.54	0.27	54.0
Approach		60	2.0	63	2.0	0.053	5.4	LOS A	0.2	1.5	0.27	0.54	0.27	54.2
North: Roland Rd (N)														
7	L2	33	2.0	35	2.0	0.104	7.5	LOS A	0.0	0.0	0.00	0.12	0.00	78.4
8	T1	151	7.0	159	7.0	0.104	0.0	LOS A	0.0	0.0	0.00	0.12	0.00	87.0
Approach		184	6.1	194	6.1	0.104	1.4	NA	0.0	0.0	0.00	0.12	0.00	85.3
All Vehicles		396	5.0	417	5.0	0.104	2.9	NA	0.4	3.2	0.14	0.25	0.14	72.6

Table 32: SIDRA Results: Roland Road/Central LSP Access intersection – AM Peak (Stage 2)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
2	T1	188	7.0	198	7.0	0.060	0.1	LOS A	0.2	1.2	0.07	0.06	0.07	87.7
6	R2	19	2.0	20	2.0	0.060	7.9	LOS A	0.2	1.2	0.07	0.06	0.07	61.7
Approach		207	6.5	218	6.5	0.060	0.8	NA	0.2	1.2	0.07	0.06	0.07	84.5
East: Access 2 (E)														
7	L2	75	2.0	79	2.0	0.146	5.2	LOS A	0.5	4.2	0.33	0.60	0.33	54.1
6	R2	72	2.0	76	2.0	0.146	6.6	LOS A	0.5	4.2	0.33	0.60	0.33	53.8
Approach		147	2.0	155	2.0	0.146	5.9	LOS A	0.5	4.2	0.33	0.60	0.33	54.0
North: Roland Rd (N)														
7	L2	18	2.0	19	2.0	0.106	7.5	LOS A	0.0	0.0	0.00	0.06	0.00	79.5
8	T1	170	7.0	179	7.0	0.106	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	88.3
Approach		188	6.5	198	6.5	0.106	0.7	NA	0.0	0.0	0.00	0.06	0.00	87.4
All Vehicles		542	5.3	571	5.3	0.146	2.2	NA	0.5	4.2	0.12	0.21	0.12	74.0

Table 33: SIDRA Results: Roland Road/Central LSP Access intersection – PM Peak (Stage 2)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
2	T1	119	7.0	125	7.0	0.057	0.5	LOS A	0.4	3.4	0.26	0.22	0.26	82.5
6	R2	61	2.0	64	2.0	0.057	8.1	LOS A	0.4	3.4	0.26	0.22	0.26	59.1
Approach		180	5.3	189	5.3	0.057	3.1	NA	0.4	3.4	0.26	0.22	0.26	72.8
East: Access 2 (E)														
7	L2	33	2.0	35	2.0	0.065	5.2	LOS A	0.2	1.7	0.32	0.58	0.32	54.2
6	R2	32	2.0	34	2.0	0.065	6.4	LOS A	0.2	1.7	0.32	0.58	0.32	53.9
Approach		65	2.0	68	2.0	0.065	5.8	LOS A	0.2	1.7	0.32	0.58	0.32	54.0
North: Roland Rd (N)														
7	L2	59	2.0	62	2.0	0.133	7.5	LOS A	0.0	0.0	0.00	0.17	0.00	77.5
8	T1	178	7.0	187	7.0	0.133	0.0	LOS A	0.0	0.0	0.00	0.17	0.00	85.8
Approach		237	5.8	249	5.8	0.133	1.9	NA	0.0	0.0	0.00	0.17	0.00	83.6
All Vehicles		482	5.1	507	5.1	0.133	2.9	NA	0.4	3.4	0.14	0.24	0.14	74.0

Table 34: SIDRA Results: Roland Road/McDowell Loop/Southern LSP Access intersection – AM Peak (Stage 1)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
10	L2	1	2.0	1	2.0	0.042	8.0	LOS A	0.4	2.9	0.25	0.32	0.25	58.6
2	T1	65	7.0	68	7.0	0.042	0.4	LOS A	0.4	2.9	0.25	0.32	0.25	80.4
6	R2	67	2.0	71	2.0	0.042	7.7	LOS A	0.4	2.9	0.25	0.32	0.25	58.1
Approach		133	4.4	140	4.4	0.042	4.2	NA	0.4	2.9	0.25	0.32	0.25	67.2
East: Access 1 (E)														
7	L2	40	2.0	42	2.0	0.056	5.0	LOS A	0.2	1.6	0.25	0.54	0.25	54.4
2	T1	1	2.0	1	2.0	0.056	4.5	LOS A	0.2	1.6	0.25	0.54	0.25	46.1
6	R2	20	2.0	21	2.0	0.056	6.1	LOS A	0.2	1.6	0.25	0.54	0.25	54.1
Approach		61	2.0	64	2.0	0.056	5.4	LOS A	0.2	1.6	0.25	0.54	0.25	54.2
North: Roland Rd (N)														
7	L2	33	2.0	35	2.0	0.086	7.5	LOS A	0.0	0.1	0.00	0.15	0.00	61.6
8	T1	118	7.0	124	7.0	0.086	0.0	LOS A	0.0	0.1	0.00	0.15	0.00	86.3
9	R2	1	2.0	1	2.0	0.086	7.4	LOS A	0.0	0.1	0.00	0.15	0.00	61.0
Approach		152	5.9	160	5.9	0.086	1.7	NA	0.0	0.1	0.00	0.15	0.00	79.2
West: McDowell Loop (W)														
10	L2	1	2.0	1	2.0	0.003	4.8	LOS A	0.0	0.1	0.21	0.50	0.21	54.8
8	T1	1	2.0	1	2.0	0.003	4.5	LOS A	0.0	0.1	0.21	0.50	0.21	46.4
9	R2	1	2.0	1	2.0	0.003	6.1	LOS A	0.0	0.1	0.21	0.50	0.21	54.5
Approach		3	2.0	3	2.0	0.003	5.1	LOS A	0.0	0.1	0.21	0.50	0.21	51.6
All Vehicles		349	4.6	367	4.6	0.086	3.3	NA	0.4	2.9	0.14	0.28	0.14	68.6

Table 35: SIDRA Results: Roland Road/McDowell Loop/Southern LSP Access intersection – PM Peak (Stage 1)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
10	L2	1	2.0	1	2.0	0.045	7.9	LOS A	0.2	1.5	0.10	0.11	0.10	61.6
2	T1	127	7.0	134	7.0	0.045	0.1	LOS A	0.2	1.5	0.10	0.11	0.10	86.2
6	R2	26	2.0	27	2.0	0.045	7.6	LOS A	0.2	1.5	0.10	0.11	0.10	61.0
Approach		154	6.1	162	6.1	0.045	1.4	NA	0.2	1.5	0.10	0.11	0.10	80.4
East: Access 1 (E)														
7	L2	80	2.0	84	2.0	0.111	5.0	LOS A	0.4	3.2	0.25	0.54	0.25	54.4
2	T1	1	2.0	1	2.0	0.111	4.7	LOS A	0.4	3.2	0.25	0.54	0.25	46.1
6	R2	40	2.0	42	2.0	0.111	6.3	LOS A	0.4	3.2	0.25	0.54	0.25	54.1
Approach		121	2.0	127	2.0	0.111	5.4	LOS A	0.4	3.2	0.25	0.54	0.25	54.2
North: Roland Rd (N)														
7	L2	13	2.0	14	2.0	0.070	7.5	LOS A	0.0	0.1	0.01	0.07	0.01	62.5
8	T1	111	7.0	117	7.0	0.070	0.0	LOS A	0.0	0.1	0.01	0.07	0.01	88.0
9	R2	1	2.0	1	2.0	0.070	7.6	LOS A	0.0	0.1	0.01	0.07	0.01	61.9
Approach		125	6.4	132	6.4	0.070	0.8	NA	0.0	0.1	0.01	0.07	0.01	84.2
West: McDowell Loop (W)														
10	L2	1	2.0	1	2.0	0.003	5.0	LOS A	0.0	0.1	0.29	0.50	0.29	54.6
8	T1	1	2.0	1	2.0	0.003	4.5	LOS A	0.0	0.1	0.29	0.50	0.29	46.2
9	R2	1	2.0	1	2.0	0.003	6.5	LOS A	0.0	0.1	0.29	0.50	0.29	54.3
Approach		3	2.0	3	2.0	0.003	5.3	LOS A	0.0	0.1	0.29	0.50	0.29	51.4
All Vehicles		403	5.0	424	5.0	0.111	2.5	NA	0.4	3.2	0.11	0.23	0.11	70.8

Table 36: SIDRA Results: Roland Road/McDowell Loop/Southern LSP Access intersection – AM Peak (Stage 2)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
10	L2	1	2.0	1	2.0	0.081	6.3	LOS A	0.9	7.1	0.09	0.53	0.09	57.0
2	T1	217	7.0	228	7.0	0.081	7.1	LOS A	0.9	7.1	0.09	0.53	0.09	69.6
6	R2	13	2.0	14	2.0	0.081	11.4	LOS B	0.9	7.1	0.09	0.53	0.09	58.7
Approach		231	6.7	243	6.7	0.081	7.4	LOS A	0.9	7.1	0.09	0.53	0.09	68.8
East: Access 1 (E)														
7	L2	53	2.0	56	2.0	0.060	4.1	LOS A	0.3	2.4	0.42	0.48	0.42	55.4
2	T1	5	2.0	5	2.0	0.060	4.1	LOS A	0.3	2.4	0.42	0.48	0.42	47.9
6	R2	3	2.0	3	2.0	0.060	8.6	LOS A	0.3	2.4	0.42	0.48	0.42	56.3
Approach		61	2.0	64	2.0	0.060	4.4	LOS A	0.3	2.4	0.42	0.48	0.42	54.8
North: Roland Rd (N)														
7	L2	1	2.0	1	2.0	0.147	6.3	LOS A	0.7	5.9	0.09	0.53	0.09	57.1
8	T1	199	7.0	209	7.0	0.147	7.1	LOS A	0.7	5.9	0.09	0.53	0.09	69.8
9	R2	6	2.0	6	2.0	0.147	11.4	LOS B	0.7	5.9	0.09	0.53	0.09	58.8
Approach		206	6.8	217	6.8	0.147	7.3	LOS A	0.7	5.9	0.09	0.53	0.09	69.3
West: McDowell Loop (W)														
10	L2	24	2.0	25	2.0	0.026	4.3	LOS A	0.1	1.0	0.43	0.48	0.43	55.4
8	T1	1	2.0	1	2.0	0.026	4.2	LOS A	0.1	1.0	0.43	0.48	0.43	47.9
9	R2	1	2.0	1	2.0	0.026	8.7	LOS A	0.1	1.0	0.43	0.48	0.43	56.3
Approach		26	2.0	27	2.0	0.026	4.4	LOS A	0.1	1.0	0.43	0.48	0.43	55.1
All Vehicles		524	6.0	552	6.0	0.147	6.8	LOS A	0.9	7.1	0.14	0.52	0.14	66.3

Table 37: SIDRA Results: Roland Road/McDowell Loop/Southern LSP Access intersection – PM Peak (Stage 2)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Roland Rd (S)														
10	L2	1	2.0	1	2.0	0.071	6.3	LOS A	0.7	5.8	0.12	0.57	0.12	56.3
2	T1	148	7.0	156	7.0	0.071	7.2	LOS A	0.7	5.8	0.12	0.57	0.12	68.6
6	R2	43	2.0	45	2.0	0.071	11.5	LOS B	0.7	5.8	0.12	0.57	0.12	58.0
Approach		192	5.9	202	5.9	0.071	8.1	LOS A	0.7	5.8	0.12	0.57	0.12	65.8
East: Access 1 (E)														
7	L2	23	2.0	24	2.0	0.026	4.2	LOS A	0.1	1.1	0.44	0.47	0.44	55.4
2	T1	2	2.0	2	2.0	0.026	4.1	LOS A	0.1	1.1	0.44	0.47	0.44	47.9
6	R2	1	2.0	1	2.0	0.026	8.7	LOS A	0.1	1.1	0.44	0.47	0.44	56.3
Approach		26	2.0	27	2.0	0.026	4.4	LOS A	0.1	1.1	0.44	0.47	0.44	54.8
North: Roland Rd (N)														
7	L2	3	2.0	3	2.0	0.179	6.5	LOS A	0.9	7.5	0.18	0.54	0.18	56.4
8	T1	207	7.0	218	7.0	0.179	7.3	LOS A	0.9	7.5	0.18	0.54	0.18	68.8
9	R2	20	2.0	21	2.0	0.179	11.6	LOS B	0.9	7.5	0.18	0.54	0.18	58.2
Approach		230	6.5	242	6.5	0.179	7.7	LOS A	0.9	7.5	0.18	0.54	0.18	67.5
West: McDowell Loop (W)														
10	L2	11	2.0	12	2.0	0.015	4.0	LOS A	0.1	0.6	0.39	0.44	0.39	55.4
8	T1	4	2.0	4	2.0	0.015	3.9	LOS A	0.1	0.6	0.39	0.44	0.39	47.9
9	R2	1	2.0	1	2.0	0.015	8.4	LOS A	0.1	0.6	0.39	0.44	0.39	56.2
Approach		16	2.0	17	2.0	0.015	4.2	LOS A	0.1	0.6	0.39	0.44	0.39	53.3
All Vehicles		464	5.8	488	5.8	0.179	7.6	LOS A	0.9	7.5	0.18	0.54	0.18	65.4

Table 38: SIDRA Results: Stoneville Road/Woodlands Road intersection – AM Peak (Stage 2)

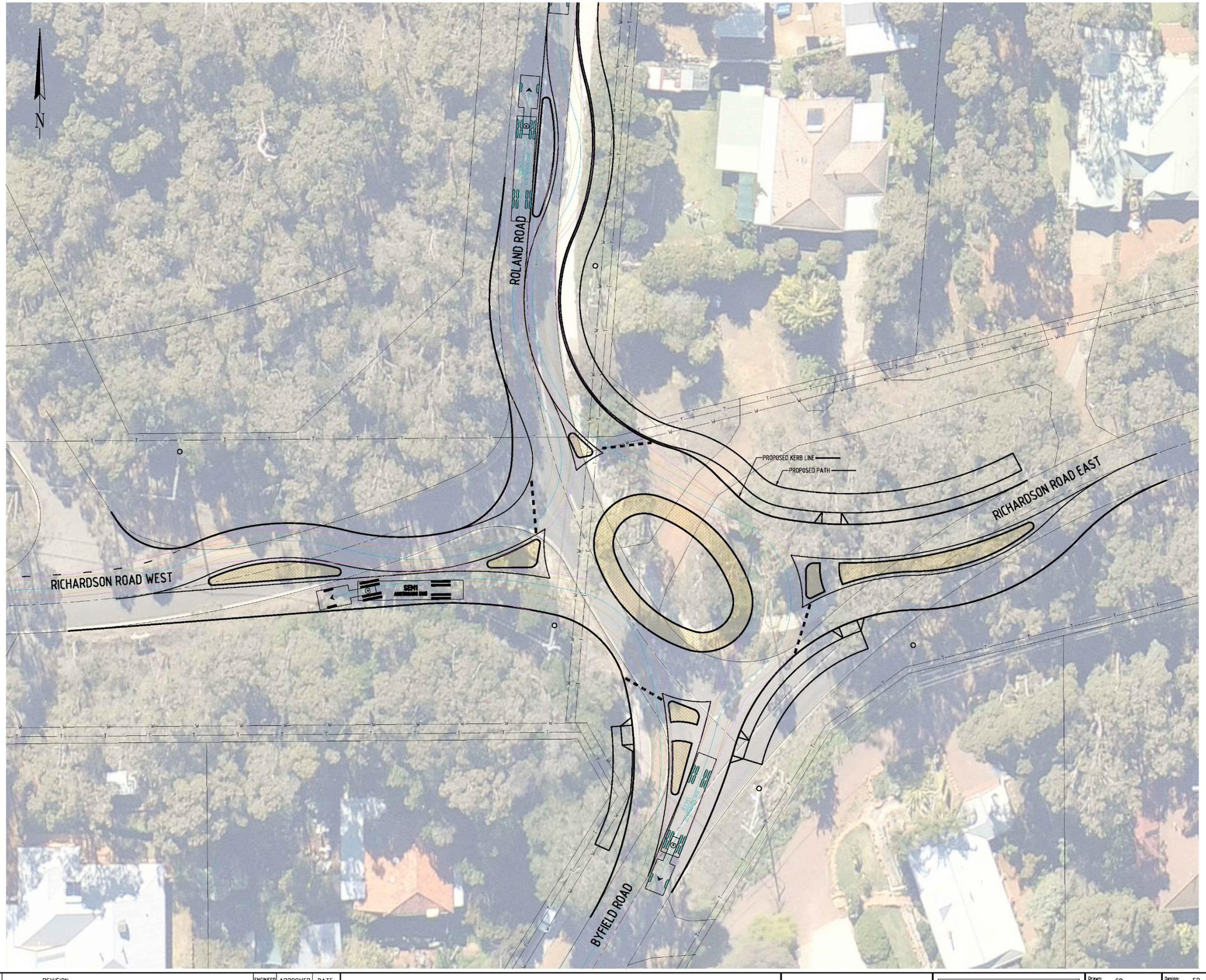
Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Stoneville Rd (S)														
7	L2	147	0.0	155	0.0	0.208	7.5	LOS A	0.0	0.0	0.00	0.55	0.00	73.5
2	T1	228	1.4	240	1.4	0.208	4.0	LOS A	0.0	0.0	0.00	0.55	0.00	76.4
Approach		375	0.8	395	0.8	0.208	5.3	NA	0.0	0.0	0.00	0.55	0.00	75.2
North: Stoneville Rd (N)														
8	T1	166	6.3	175	6.3	0.104	0.1	LOS A	0.1	0.6	0.05	0.02	0.05	60.6
9	R2	6	33.3	6	33.3	0.104	7.2	LOS A	0.1	0.6	0.05	0.02	0.05	47.8
Approach		172	7.2	181	7.2	0.104	0.4	NA	0.1	0.6	0.05	0.02	0.05	60.0
West: Woodlands Rd (W)														
10	L2	7	25.0	7	25.0	0.061	9.6	LOS A	0.4	3.1	0.44	0.73	0.44	53.4
6	R2	86	0.0	91	0.0	0.061	9.4	LOS A	0.4	3.1	0.44	0.73	0.44	67.5
Approach		93	1.9	98	1.9	0.061	9.4	LOS A	0.4	3.1	0.44	0.73	0.44	66.2
All Vehicles		640	2.7	674	2.7	0.208	4.6	NA	0.4	3.1	0.08	0.44	0.08	69.2

Table 39: SIDRA Results: Stoneville Road/Woodlands Road intersection – AM Peak (Stage 2)

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Stoneville Rd (S)														
7	L2	51	12.5	54	12.5	0.115	7.8	LOS A	0.0	0.0	0.00	0.53	0.00	67.1
2	T1	143	6.5	151	6.5	0.115	4.0	LOS A	0.0	0.0	0.00	0.53	0.00	75.4
Approach		194	8.1	204	8.1	0.115	5.0	NA	0.0	0.0	0.00	0.53	0.00	73.0
North: Stoneville Rd (N)														
8	T1	262	1.7	276	1.7	0.148	0.0	LOS A	0.0	0.3	0.02	0.01	0.02	61.8
9	R2	5	0.0	5	0.0	0.148	5.3	LOS A	0.0	0.3	0.02	0.01	0.02	59.6
Approach		267	1.7	281	1.7	0.148	0.1	NA	0.0	0.3	0.02	0.01	0.02	61.8
West: Woodlands Rd (W)														
10	L2	6	0.0	6	0.0	0.123	8.0	LOS A	0.9	7.0	0.47	0.76	0.47	54.6
6	R2	183	6.3	193	6.3	0.123	9.7	LOS A	0.9	7.0	0.47	0.76	0.47	64.0
Approach		189	6.1	199	6.1	0.123	9.7	LOS A	0.9	7.0	0.47	0.76	0.47	63.6
All Vehicles		650	4.9	684	4.9	0.148	4.4	NA	0.9	7.0	0.14	0.38	0.14	65.4

Appendix C

ROLAND ROAD/RICHARDSON ROAD/BYFIELD ROAD ROUNDABOUT CONCEPT



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WARNING

SERVICES AND CADASTRAL BOUNDARY LOCATIONS SHOWN ARE ONLY INDICATIVE AND MUST NOT BE USED FOR EXCAVATION.
THE "ONE CALL 1100" SYSTEM SHALL BE USED TO OBTAIN ACCURATE SERVICE LOCATIONS.

No.	REVISION	ENGINEER	APPROVED	DATE

SHIRE OF MUNDARING

GREAT EASTERN HIGHWAY
MUNDARING

Stace Rogers Assoc Dip Civ Eng (AMIEAust)
SJR Civil Consulting Pty Ltd
30 North Road
BASSENDEAN WA 6054
Ph : (08) 9379 9481 or 0447 112 481

Drawn: SR	Design: SR
Draft Check:	Engineer Check:
Approved:	
Scale: 1:250	Datum: MGA 94, AHD

In the absence of the APPROVED signature this drawing shall be treated as PRELIMINARY.

Project: BYFIELD, RICHARDSON & ROLAND ROADS
PROPOSED ROUNDABOUT

Title: INTERSECTION RECONFIGURATION CONCEPT PLAN

Size: A1 | Drg. No. | Rev

Cadfile: MWR Design\Dwg

Appendix D

GREAT EASTERN HIGHWAY/SEABORNE STREET INTERSECTION UPGRADE – CONCEPT

Intersection Great Eastern Hwy and Seabourne St

Proposed Intersection Modification -Option 3

t16.318.sk03

15/03/2020

Scale: 1:500 @ A3

transcore