Appendix 3 - Transport Impact Assessment (Transcore)

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North Eglinton Local Structure Plan

Transport Impact Assessment

PREPARED FOR:
Satterley Property Group

December 2023

Document history and status

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1 Introduction

This Transport Impact Assessment has been prepared by Transcore on behalf of Satterley Property Group. The subject of this report is a proposed amendment to the approved North Eglinton Local Structure Plan (LSP) at Lot 2 Pipidinny Road, Eglinton, in the City of Wanneroo.

The location of the LSP area is shown in **Figure 1** in relation to the various zones and reservations of the Metropolitan Region Scheme (MRS). It is bounded by Marmion Avenue on the western side, Pipidinny Road to the south, the future Mitchell Freeway alignment to the east and Parks and Recreation reservation to the north.

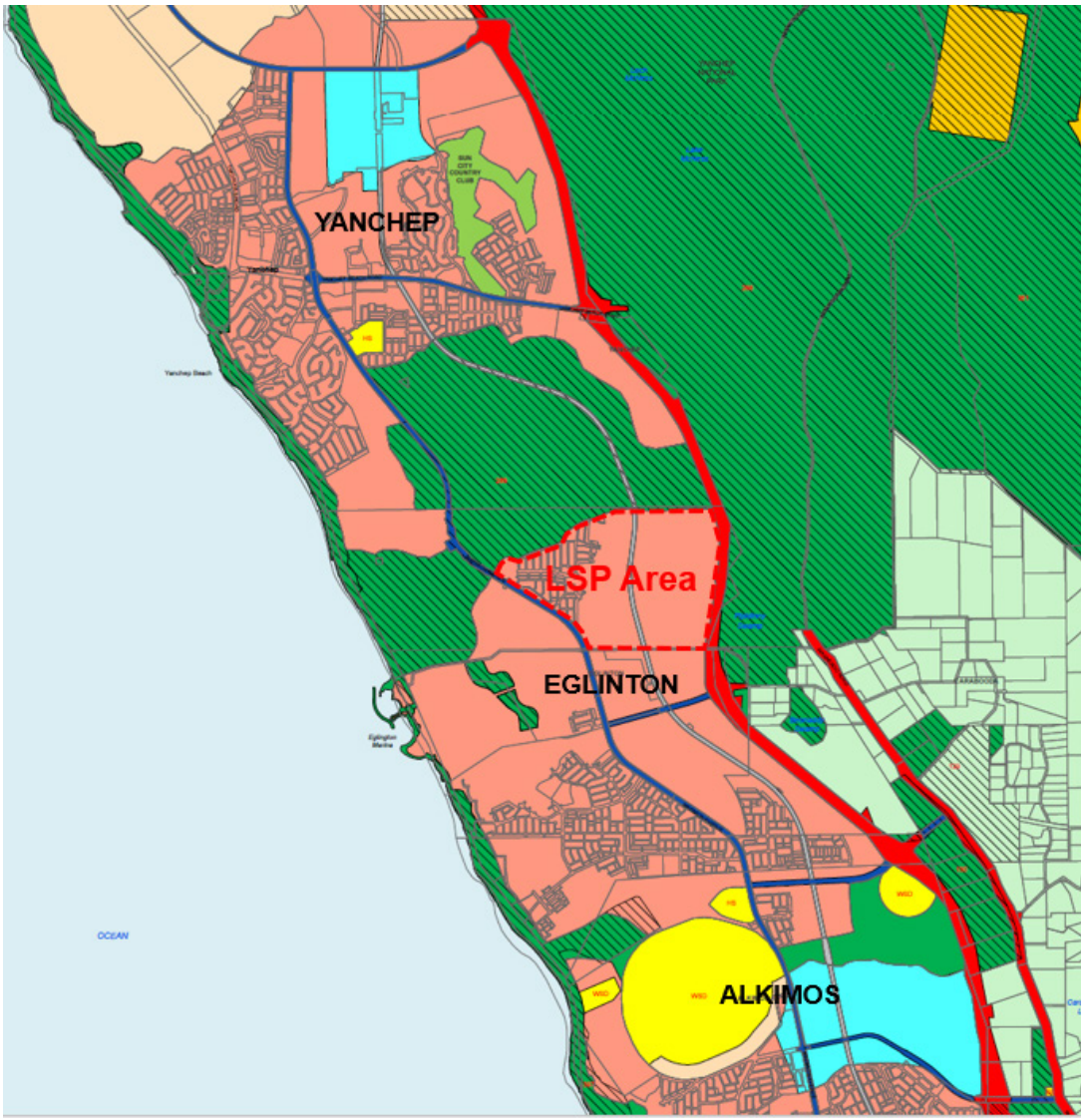


Figure 1: Site Location

This updated Transport Impact Assessment report is intended to replace the previous *North Eglinton Local Structure Plan Transport Assessment* (December 2013).

2 Local Structure Plan Amendment

The proposed amended North Eglinton Local Structure Plan (LSP) is shown in **Figure 2.** Plans showing the current approved LSP and proposed amendment, as well as a larger copy of this overall proposed Amended LSP plan with legend is included at **Appendix A**.

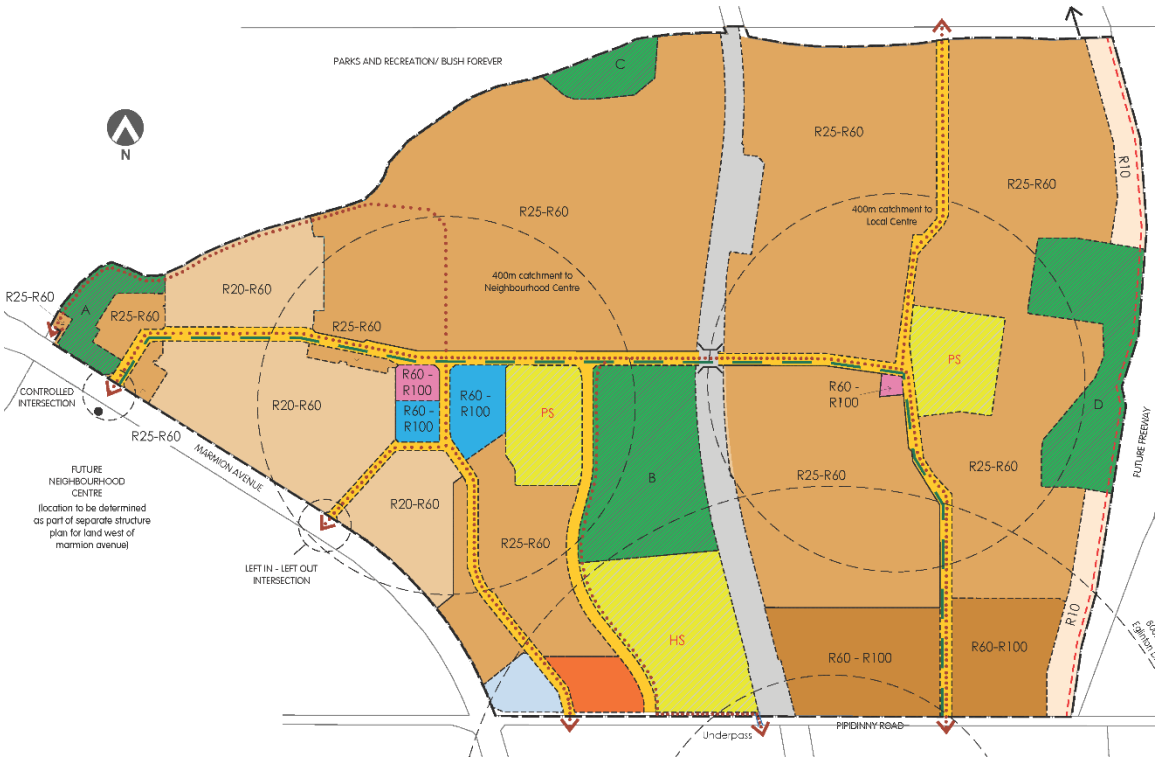


Figure 2: Proposed Amended Local Structure Plan

As shown on **Figure 2** the site is bisected by the future alignment of the Northern Suburbs Railway Line and one east west road link (Impressions Drive) across the railway line is proposed within the LSP area.

The LSP proposes residential land ranging from R20 to R100 density anticipated to yield approximately 3400 dwellings.

The LSP also features a neighbourhood activity centre in the western part of the site with approximately 3000m^2 floor area and a mixed-use component (approximately 1000m^2 floor area) on a neighbouring site.

The LSP includes a primary school adjacent to the neighbourhood activity centre, a high school and district open space on the western side of the railway line and a second primary school serving the eastern half of the LSP area.

The prosed LSP Amendment only proposes changes in the southwest quadrant of the LSP area (south of Impressions Drive and west of the railway line, and additional railway land requirements on the eastern side of the railway line.

The proposed LSP Amendment relocates the proposed high school site to the southern edge of the LSP area adjacent to Pipidinny Road, west of the railway line.

The proposed LSP Amendment also relocates a proposed indoor recreation centre site to the southern edge of the LSP area, close to Pipidinny Road.

The proposed LSP Amendment also includes a proposed commercial development site at the southwest corner of the LSP area to accommodate a petrol station / convenience store and approximately 7000m^2 floor area of commercial development.

The proposed LSP Amendment results in two north-south neighbourhood connector roads between Pipidinny Road and Impressions Drive in the southwest quadrant of the LSP area for access to and connectivity between the two schools, neighbourhood activity centre, district open space, indoor recreation centre and commercial development site.

3 Existing Situation

3.1 Existing Land Use

Residential subdivision has progressed in the western portion of the LSP area as can be seen in **Figure 3**.

Figure 3: Existing Land Use

Urban development has also been progressing at Yanchep, approximately 2 kilometres northwest of the site and at the Eglinton / Alkimos boundary approximately 1 to 2km south of Pipidinny Road.

The Northern Suburbs Railway Line to Yanchep is currently under construction through the middle of the LSP area, as can be seen in **Figure 3**.

3.2 Existing Road Network

Marmion Avenue is covered by an Other Regional Roads reservation in the Metropolitan Region Scheme. It is currently classified as a Primary Distributor road in the Main Roads WA Functional Road Hierarchy and is a State road under the care and control of Main Roads WA.

It is currently constructed as a dual carriageway road, two-lanes in each direction. It has a posted speed limit of 80km/h in this area.

Traffic count data obtained from the Main Roads WA website indicates that Marmion Avenue (south of Pipidinny Road) carried average weekday traffic flows of 14,143 vehicles per day (vpd) in 2021/22. The morning and afternoon peaks were recorded between 7:45 AM to 8:45 AM and 2:45 PM to 3:45 PM with a total of 1,290vph and 1,365vph respectively.

Pipidinny Road is classified as a Local Distributor road in the Main Roads WA Functional Road Hierarchy. It is constructed as a single carriageway, two-lane divided road. It has a posted speed limit of 80km/h in this area.

Traffic count data obtained from the Main Roads WA website indicates that Pipidinny Road (west of Wanneroo Road) carried average weekday traffic of 4,323 vehicles per day (vpd) in 2020/21. The morning and afternoon peaks were recorded between 6:00 AM to 7:00 AM and 3:15 PM to 4:15 PM with a total of 358vph and 372vph respectively.

The Marmion Avenue / Pipidinny Road intersection has been constructed as a 4-way roundabout with a central island diameter of 34m.

A new four-way roundabout has been constructed on Marmion Avenue at Impressions Drive, although approximately 120m of Impressions Drive northeast of this roundabout is not yet constructed (it is currently under construction at the time of writing this report) and the future subdivision road southwest of Marmion Avenue is not yet constructed.

Access into the LSP area is currently provided by Revolution Avenue, which connects as a full-movement T-intersection on Marmion Avenue. This T-intersection is currently constructed with a right turn deceleration lane and a left turn deceleration lane on Marmion Avenue.

The Wanneroo Road / Pipidinny Road intersection is a priority-controlled (i.e. give way) T-intersection with a left turn deceleration lane on the southern approach on Wanneroo Road.

3.3 Public Transport

Bus Route No. 490/491 runs on Marmion Avenue from Butler Train Station to Yanchep and Two Rocks, as shown in **Figure 4**.

This route provides an hourly service Monday to Friday with more frequent service (2 or 3 per hour) in the peak direction in AM and PM peak periods, hourly on Saturday and Sunday.

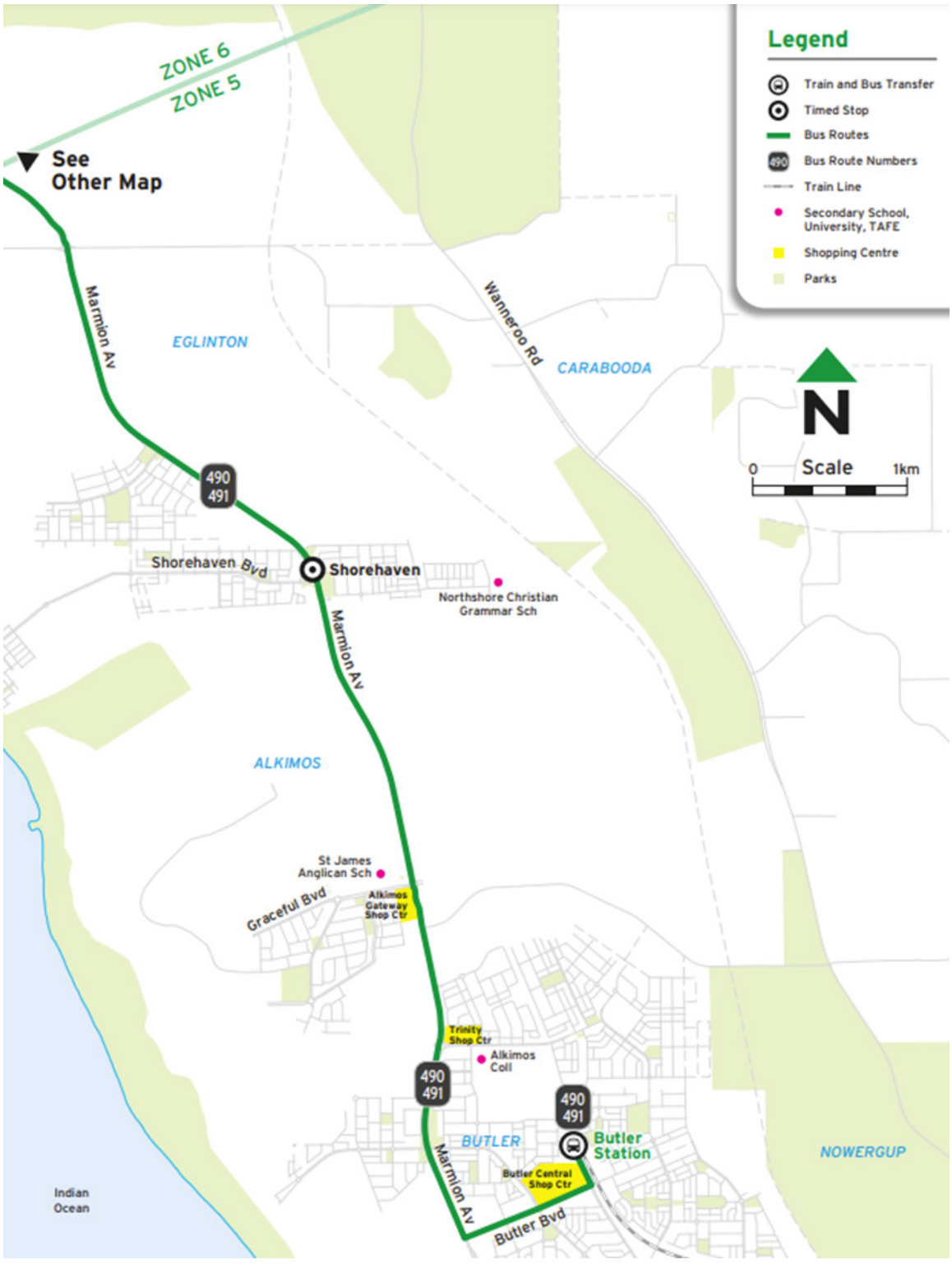


Figure 4: Existing bus routes

3.4 Pedestrian and Cyclist Facilities

There is an existing 3m wide shared path within the eastern verge of Marmion Avenue and 2m wide sealed shoulders on Marmion Avenue accommodate on-road cycling along Marmion Avenue.

Existing subdivision development within the LSP area includes a comprehensive path network on all streets in accordance with the WAPC *Liveable Neighbourhoods* policy.

High-level future planning for cycling facilities is now set out in Western Australia's Long Term Cycle Network (LTCN), which identifies an aspirational blueprint to ensure State and local governments continue to work together towards the delivery of a continuous cycling network providing additional transport options, recreational opportunities and support for tourism and commercial activity. The LTCN identifies the function of a route - primary, secondary or local - rather than the form it should take. Function considers the type of activities that take place along a route, and the level of demand (existing and potential). A route's built form is based on the characteristics of the environment, including space availability, topography, traffic conditions (speed, volumes), primary users, and so on.

The LTCN in this area is illustrated in **Figure 5**, which shows future primary routes (red) alongside Mitchell Freeway and the railway line, secondary routes (blue) along Marmion Avenue and Pipidinny Road, and a local route (green) along Impressions Drive within the LSP area.

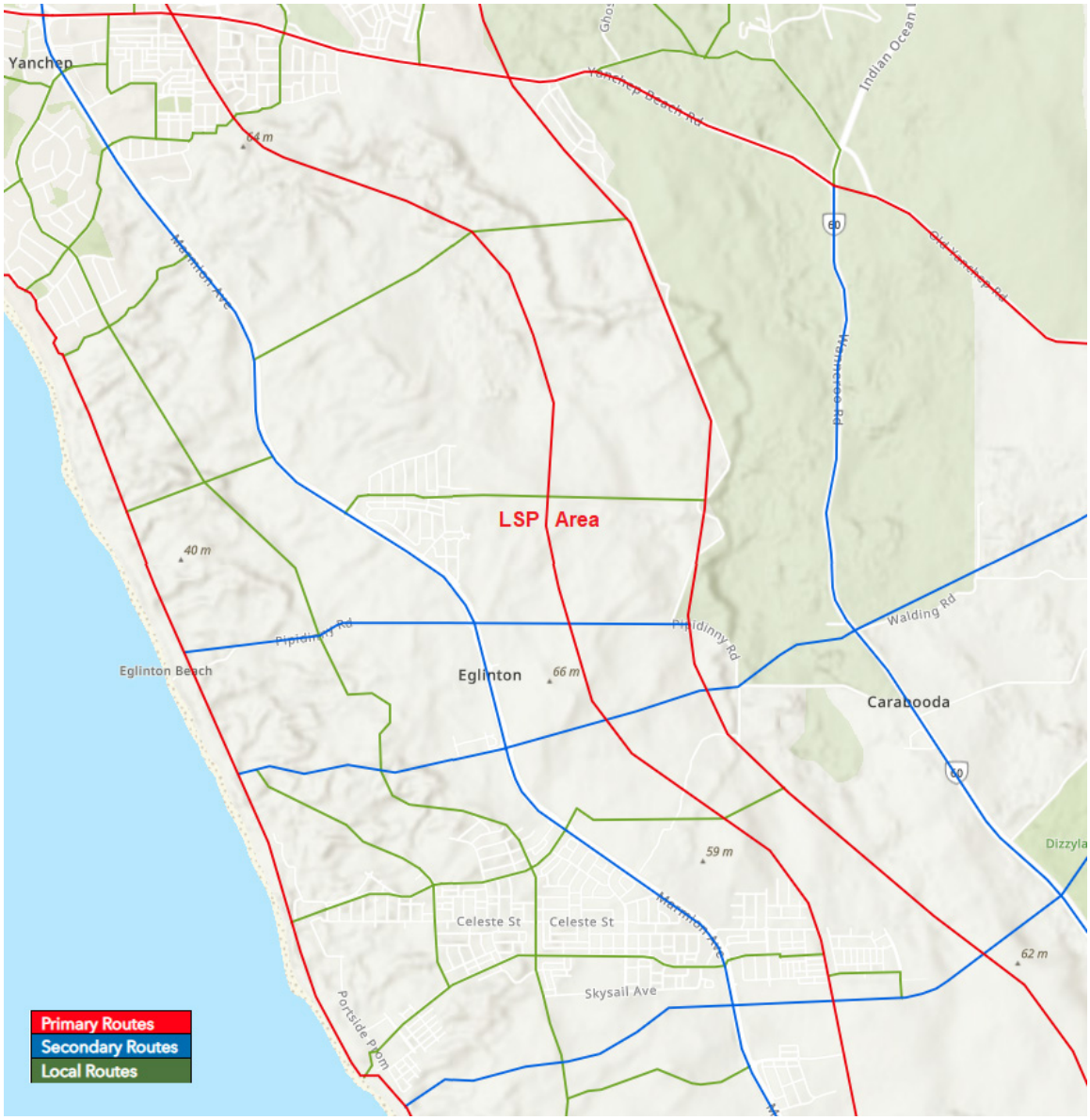


Figure 5: Long Term Cycle Network

3.5 Changes to Surrounding Road Network

Long-term road network planning for this part of the Metropolitan Region sees the Mitchell Freeway as the Primary Distributor road and Marmion Avenue as an Integrator Arterial (A) road. Eglinton Avenue (south of the Eglinton District Centre) will provide the closest freeway junction and the main east west road link in the Eglinton area. Pipidinny Road will not connect to the freeway.

The hierarchy of roads envisaged in this part of the *Alkimos Eglinton District Structure Plan* (December 2010) is illustrated in the extract from the DSP's Transport Assessment report (Appendix 4 of the DSP) shown in **Figure 6**. Note that Marmion Avenue is now under the care and control of Main Roads WA and is classified as a Primary Distributor.

Figure 6: Alkimos-Eglinton DSP Road Hierarchy

That plan shows two Neighbourhood Connector (A) roads within the North Eglinton LSP area; a northern east west connector (i.e. Impressions Drive) crossing the railway line and an Eglinton District Centre north south connector east of the railway line.

Pipidinny Road was indicated as an Integrator Arterial (B) road from this north south connector to Marmion Avenue although the traffic modelling for the DSP only indicated 1000vpd on this section.

The City of Wanneroo *Local Planning Policy 3.8: Marmion Avenue Arterial Road Access* (adopted 16 October 2018) specifies the road standard required and intersection treatments that will be allowed on Marmion Avenue. The section of Marmion Avenue adjacent to the LSP area is identified as an 80km/h speed zone although the speed limit will be reduced to 60km/h south of Pipidinny Road through the Eglinton District Centre. The Marmion Avenue / Impressions Drive intersection and the Marmion Avenue / Pipidinny Road intersection are both identified as future signalised intersections (although they have actually been constructed as roundabouts instead). The policy also specifies one other road connection into the LSP area midway between these two signalised intersections (i.e. Revolution Avenue); this is to be a left in / left out unsignalised intersection.

3.6 Public Transport Network Planning

Extension of the Northern Suburbs Railway Line to Yanchep is currently under construction as a Metronet project by the State government. This includes a station at Eglinton south of Pipidinny Road, with a Park & Ride car park for 433 cars.

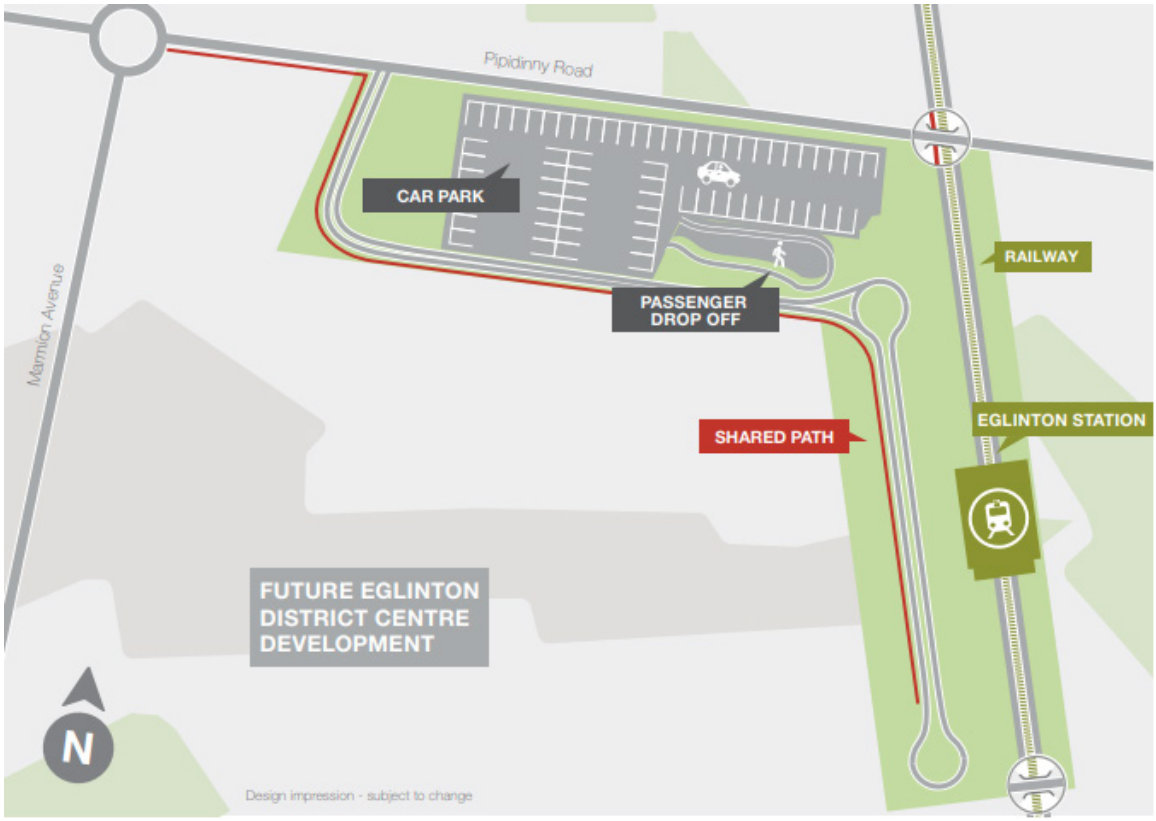


Figure 7: Planned Eglinton Station

Department of Transport's plan, *Public Transport for Perth in 2031,* envisages a bus rapid transit route from Alkimos station to Eglinton station west of the railway.

The *Alkimos Eglinton District Structure Plan* indicates that this bus rapid transit route (referred to as the Alkimos Eglinton CAT or AE-CAT route) will run on a neighbourhood connector road south of Pipidinny Road, so does not directly relate to the LSP area. However, it does indicate that a future Transperth bus route would run through the LSP area on the northern east west connector (Impressions Drive) and the Eglinton District Centre north south connector shown in **Figure 6**.

4 Proposed Transport Network

4.1 Road Hierarchy

The hierarchy of roads within the LSP area is illustrated in **Figure 8** using the road hierarchy defined in the WAPC *Liveable Neighbourhoods* policy.

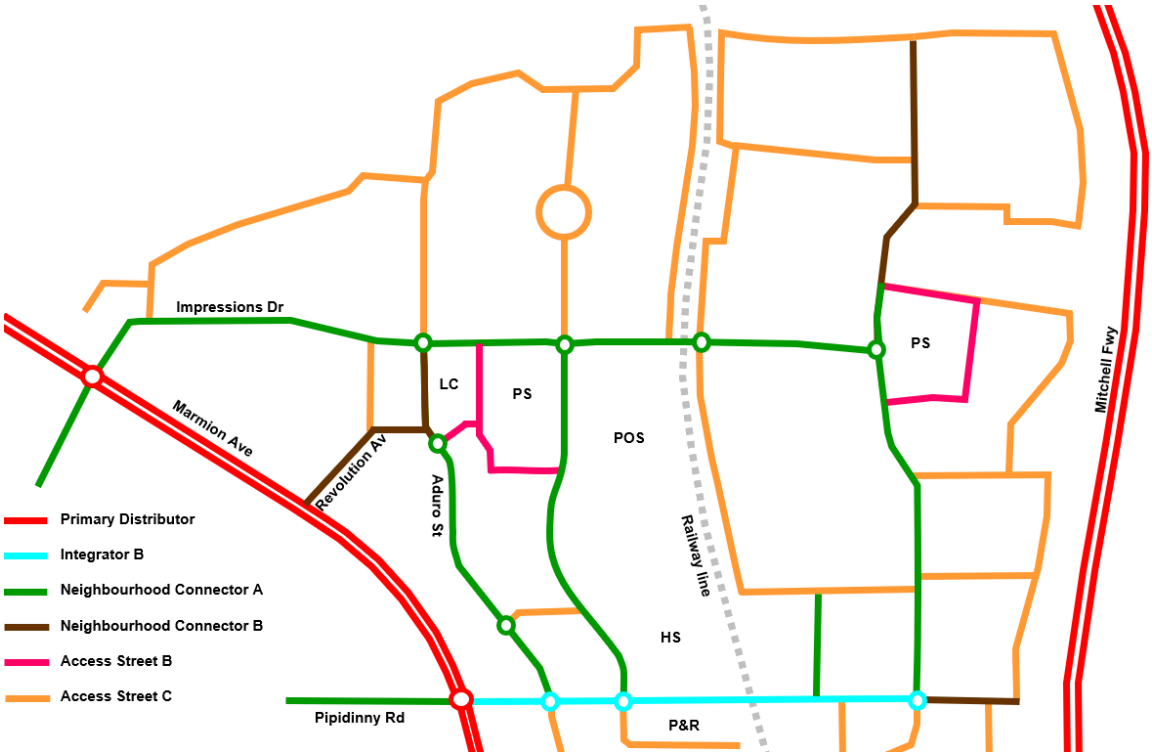


Figure 8: Road Hierarchy

Some key characteristics of the relevant road classifications have been summarised in **Table 1** below generally based on Liveable Neighbourhoods guidelines although the proposed widths do vary slightly from the standard Liveable Neighbourhoods cross-section diagrams.

Table 1: Road Hierarchy

Road Classification	Indicative upper volume (vpd)	Indicative road reserve width (m)	Indicative road pavement width (m)
Integrator A	35,000	50m	2 x 8.5m (incl. cycle lanes), 6m median
Integrator B	15,000	27m	2 x 5m (incl. cycle lanes), 6m median and embayed parking
Neighbourhood Connector A	7,000	25m* (23m min) *30m with swale	2 x 5m (incl. cycle lanes), 2m median and embayed parking
Neighbourhood Connector A – without median	5,000	22.4m	2 x 5m (incl. cycle lanes), embayed parking (no median)
Neighbourhood Connector B	3,000	20m (18m min)	7.4m (plus embayed parking)
Access Street B	3,000	18m	7.2m (plus embayed parking)
Access Street C	3,000	16m	7.2m
Access Street D	1,000	15m	6m

It should be noted that these reserve widths are indicative and may be subject to further adjustment in consultation with the Department of Planning, Lands & Heritage and City of Wanneroo during detailed subdivision design.

Marmion Avenue

Marmion Avenue will be a Primary Distributor road in the Liveable Neighbourhoods road hierarchy as it is a State road under the care and control of Main Roads WA. The road standard is anticipated to remain similar to an Integrator A (i.e. 4-lanes divided) but some sections could potentially be upgraded to 6-lanes divided in future if required by the ultimate traffic volumes using Marmion Avenue in the longer term. The Other Regional Roads reservation in the MRS is approximately 50m wide and the proposed LSP takes this reservation into account.

Pipidinny Road

Pipidinny Road is proposed as an Integrator B between Marmion Avenue and the eastern 'north south connector' based on forecast future traffic volumes. The existing 20m road reserve would require widening to approximately 27m From Marmion

Avenue to the eastern 'north south connector', as indicated in **Table 1**, with embayed parking adjacent to the high school site and the higher density residential development proposed along the southern boundary of the LSP area east of the railway line.

The eastern portion of Pipidinny Road (west of the freeway) will have much lower traffic flows and accordingly is proposed as a Neighbourhood Connector B road, as shown in **Figure 8**. This will not require widening of the existing road reserve in that section.

Neighbourhood Connectors

There will be four Neighbourhood Connector A roads within the LSP area as shown in **Figure 8**. The 'east west connector' (i.e. Impressions Drive) and the eastern 'north south connector' correspond to those shown on the DSP road hierarchy plan (see **Figure 6** above).

The two western 'north south connectors' in the LSP are included in this category based on forecast traffic volumes. Sections of all four of these roads will carry traffic volumes in the 3,000 to 7,000 vpd range.

On the westernmost 'north south connector' (Aduro Street), only the southernmost section would exceed 3,000vpd, so only that southernmost section (just north of Pipidinny Road) would be planned to Neighbourhood Connector A standard with a central median.

The central section of Aduro Street (through the residential precinct) will have traffic volumes ranging from slightly above 3,000vpd to slightly below 3,000vpd. Rather than planning this as Neighbourhood Connector A (with cycle lanes) in the south and Neighbourhood Connector B (without cycle lanes in the north), with an awkward transition halfway along, it is considered that this would be a suitable special circumstance to apply a variant Neighbourhood Connector A cross-section with no central median, as allowed for in Liveable Neighbourhoods (refer LN Element 2, Figure 17, Footnote 7). The road reserve without a central median is reduced to 22.4m.

Impressions Drive will be the only crossing of the railway line within the LSP area and will form the main spine road in the LSP, with the neighbourhood activity centre, primary schools and playing fields located along its length. It is proposed to include a landscaped drainage swale about 6m wide on the northern side (west of the railway line), which increases the road reserve width to 30m in this section.

On several other sections of Neighbourhood Connector A roads in the LSP area a 25m road reserve width is proposed. Liveable Neighbourhoods indicates a typical width of 24.4m for this category of road (minimum 23m). The proposed 25m width provides a little more flexibility, for example to accommodate the 2.4m median width understood to be preferred by the City of Wanneroo (instead of the 2m median standard in Liveable Neighbourhoods cross sections). The section of Neighbourhood Connector A on the western side of the district open space is proposed to be reduced to 23m adjacent to that POS where there is substantially less space required for utility services in the verge, but is proposed to be 25m wide adjacent to the High School site.

The northern section of the westernmost 'north south connector' (Aduro Street) through the neighbourhood activity centre is planned as a low-speed environment (40km/h). Traffic volumes will be less than 3,000vpd, so cycle lanes are not required and cyclists will safely be able to share the traffic lanes with cars in this low speed environment and the proposed road reserve width of this specific section is reduced to 22m. (This is unchanged from the current approved LSP).

The central section of the westernmost 'north south connector' (Aduro Street) will carry lower traffic volumes (not exceeding 3,000vpd), so that section is proposed to be constructed as a Neighbourhood Connector B.

The northern section of the eastern 'north south connector' will have lower traffic volumes north of the eastern primary school, so this section is classified as a Neighbourhood Connector B.

Similarly, the road connection (Revolution Avenue) from south of the neighbourhood activity centre to Marmion Avenue will have lower traffic flows because ultimately it will only have left in / left out traffic movements at the Marmion Avenue intersection, so this link is also classified as a Neighbourhood Connector B.

On the eastern side of the railway line, the increased rail reserve requirements have encroached over a previously planned road reserve parallel to the railway line north of Pipidinny Road. At this stage the planning for the road network east of the railway line has not been revised, so a single north-south road connection has been modelled into the residential cell east of the railway line, north of Pipidinny Road. If this remains as the only road connection into that residential cell, it would potentially carry traffic volumes high enough to warrant a Neighbourhood Connector A standard road, as indicatively shown on **Figure 8**. This may be more appropriately treated as two (or more) lower-order road connections instead. This is to be determined as part of the future subdivision design process for future development stages east of the railway line.

Access Streets

The basic standard of access street proposed within the LSP area is a 6m wide carriageway in a 15m road reserve. This *Access Street D* results in 4.5m verges on both sides, with embayed parking accommodated in the verges where required, such as to provide visitor parking for lots serviced by rear laneways. This road standard is proposed where the future total traffic volumes are less than 1,000 vpd. It is anticipated that almost all access streets not shown in the LSP would be of this category.

However, most of the access streets actually shown on the LSP plan are longer or provide important local connections, so it is considered appropriate to classify these as a slightly higher category of access street. They are nominally indicated as *Access Street C* in **Figure 8**. The *Access Street C* in this LSP is based on a 16m road reserve width. A 7.2m road carriageway width is proposed in accordance with the standard approach recommended by Liveable Neighbourhoods for this category of access street.

Access streets adjacent to the Bush Forever land have been planned with an even wider road reserve width (typically 20m) in the LSP where required as a bushfire protection buffer zone.

Access streets adjacent to the two primary school sites are indicated as Access Street B to accommodate embayed parking in the road verge adjacent to the schools.

Laneways

The proposed road reserve width of the laneways is 6.0 metres. These would typically be designed with flush kerbing (i.e. at the same level as the laneway pavement) and central drainage, and can accommodate two-way vehicle movement and rubbish collection. Details relating to the design of these laneways will be addressed in more detail during the subdivision planning stages.

Visitor car parking is to be constructed in the road reserve adjacent to proposed lots serviced by laneways at a minimum rate of one bay per every two dwellings.

4.2 Public Transport

As noted in section 3.6 the primary public transport service in the Eglinton area will be the Northern Suburbs railway line with a station at Eglinton District Centre south of the LSP area.

Current planning anticipates a future Transperth bus route would run through the LSP area on the 'east west connector' (Impressions Drive) and the eastern 'north south connector' as well as a bus route on Marmion Avenue.

4.3 Pedestrian and Cyclist Facilities

A highly permeable road network within the LSP area creates excellent opportunities for the provision of good pedestrian and cyclist facilities that maximise use of non-motorised transport modes.

Figure 9 outlines the proposed pedestrian and cyclist network for the LSP area.

The north south 'Principal Shared Path' (PSP) shown on **Figure 9** within the LSP area is realigned away from the railway line around the High School and district open space for improved surveillance of this pathway. There is currently no indication that the PSP would be constructed (by others) in future through the Parks & Recreation / Bush Forever site north of the LSP area, parallel to the future Mitchell Freeway PSP, so it is anticipated that the district open space within the LSP area would effectively become the northern end of this railway PSP. The proposed Amended LSP plan indicates an underpass is to be provided for this PSP at Pipidinny Road, which will also facilitate pedestrian and cyclist access across Pipidinny Road for access to the high school, railway station and district centre.

In accordance with Liveable Neighbourhoods guidelines, paths will be provided on at least one side of all roads and both sides around schools and the neighbourhood activity centre. There would be paths on both sides on Integrator Arterial and Neighbourhood Connector roads, with a shared path at least 2m wide on one side of the road.

Laneway lots are to have footpath access to visitor parking bays provided in a nearby road reserve.

On-street cycle lanes are normally included on Integrator A, Integrator B and Neighbourhood Connector A roads, as indicated in the details of the road hierarchy listed in **Table 1**. Therefore, Pipidinny Road and the Neighbourhood Connector A roads within the LSP area will include on-road cycle lanes and they have already been constructed on Marmion Avenue as well.

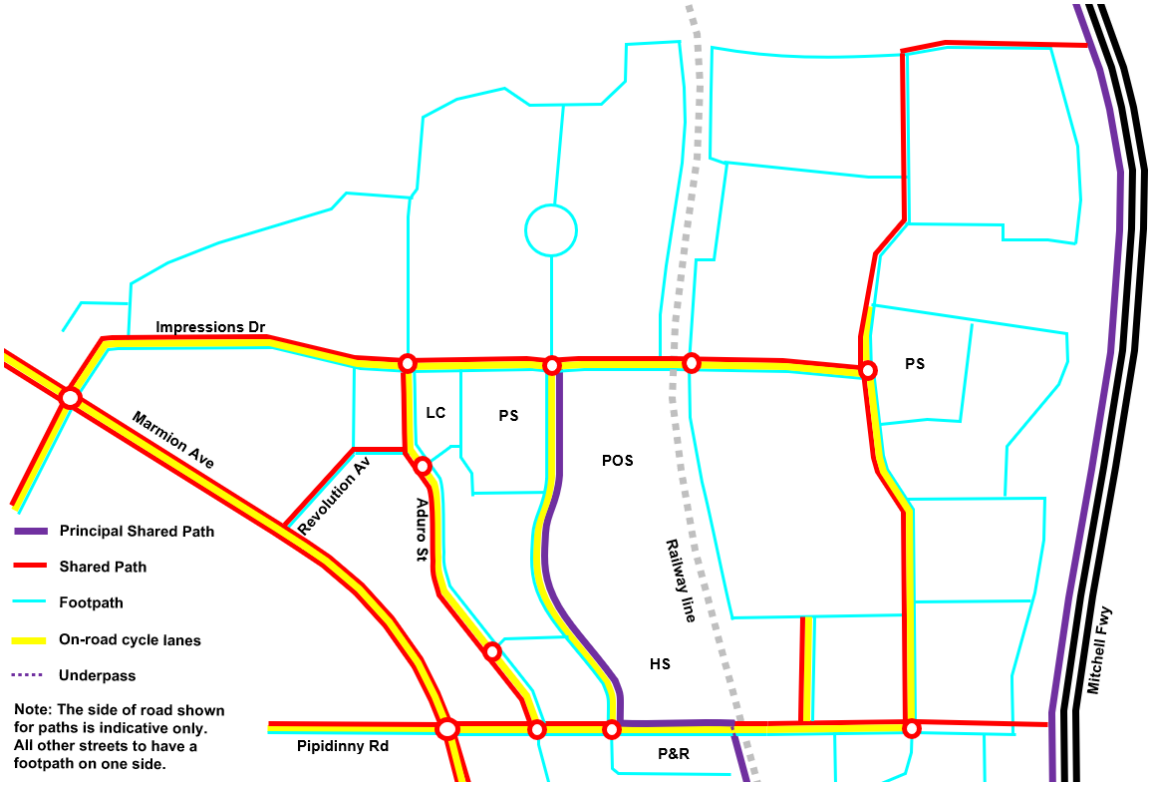


Figure 9: Pedestrian and cyclist facilities

5 Integration with Surrounding Area

The road network of the LSP area will connect to Marmion Avenue at two locations and Pipidinny Road at five locations. One intersection on Marmion Avenue will be a full movement 4-way intersection in accordance with the Alkimos Eglinton District Structure Plan and the other is proposed to be a left in / left out T-intersection.

Planning for the Eglinton District Centre south of Pipidinny Road has been taken into consideration in this Transport Impact Assessment to ensure satisfactory integration with the neighbouring areas is achieved.

The LSP path network will also provide opportunities for connection with future development in these areas.

6 Analysis of the Transport Network

6.1 Assessment Period

No specific assessment year has been adopted for this transport impact assessment. Instead, it is based on future full development of the North Eglinton LSP area and the adjacent Eglinton District Centre Activity Centre Structure Plan (EDCACSP) south of Pipidinny Road.

The EDCACSP Transport Assessment (including Addenda 1 and 2) indicated full build out of the EDCACSP area west of the railway line by 2040. The land east of the railway line was still shown as subject to future planning. That Transport Assessment utilised 2031 ROM traffic modelling run by Main Roads WA in 2018 but in the Addenda MRWA further advised in 2021 that updated ROM modelling "indicated the volume on Marmion Avenue plateauing at around 40,000vpd and the freeway increasing to a daily volume of around 80,000vpd".

Accordingly, the assessment undertaken in this TIA is intended to be consistent with that long-term regional traffic scenario.

As noted in section 3.2, the existing peak periods of traffic flows on this section of Marmion Avenue are around 8-9AM and 3-4PM, which coincides with before and after school peak periods. Accordingly, 8-9AM and 3-4PM have been utilised as the AM and PM peak hours for analysis in this TIA.

6.2 Traffic generation and distribution

Daily traffic generation rates used in this assessment for standard residential development and schools have been derived from peak hour trip generation rates recommended in the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines* (2016). The trip rates used are 8 vehicle trips per day (vpd) per dwelling and 2 vpd per student for schools. A lower trip generation rate of 6 vpd per dwelling has been applied for the higher density development along the southern edge of the LSP area based on rates from the NSW *Guide to Traffic Generating Developments*.

The anticipated 3,400 dwellings of the LSP area will generate approximately 26,400 vpd.

The proposed high school has been modelled as 1,450 students and will therefore generate approximately 2,900 vpd.

The proposed primary schools have been modelled as 540 students each, based on catchment areas east and west of the railway line, respectively. They will generate approximately 1,080 vpd each.

The traffic generation of the neighbourhood activity centre has been based on the Thursday shopping centre traffic generation rates from the NSW *Guide to Traffic Generating Developments*. The shopping centre is proposed to have a retail component of 3,000m^2 net lettable floor area. Thursday traffic attraction by this shopping centre is estimated at approximately 3,630 vpd.

The mixed-use component of 1,000m^2 floor area adjacent to the neighbourhood centre and approximately 7,000m^2 commercial floor area in the southwest corner of the LSP area are treated as office/commercial with trip rates of 10vpd/100m^2 GFA (peak hour 2vph/100m^2) based on the NSW and WAPC guides. Therefore, these generate 100vpd and 700vpd respectively.

The petrol station with convenience store proposed in the southwest corner of the LSP area is anticipated to attract 265vpd per car refuelling position based on trip rates from the ITE *Trip Generation Manual* (11th Edition, land use #945), so a typical 8 refuelling position facility would generate approximately 2,120vpd, although many of those trips would be pass-by trips from traffic already passing the site on Marmion Avenue.

The 6,000m^2 indoor recreation centre is anticipated to attract approximately 31vpd/100m^2 GFA based on trip rates from the ITE *Trip Generation Manual* (11th Edition, land use #495), which results in daily traffic generation of 1,860vpd.

It should be noted that some of these traffic generation figures represent two ends of the same trips. Overall, the land uses in the LSP are anticipated to generate daily traffic flows of approximately 28,220 vpd (14,110 in / 14,110 out) across the LSP boundary (i.e. to and from Marmion Avenue and Pipidinny Road).

The traffic modelling for this project also includes the EDCACSP south of Pipidinny Road to allow future traffic flows on Pipidinny Road to be modelled. Based on information in the EDCACSP and its Transport Assessment report, this includes 55,100m^2 of district centre retail and non-retail floor space, 514 dwellings west of the railway line, 290 retirement village units, park'n'ride (433 bays) at Eglinton station, a 1220 student private school east of the railway line and another 700 dwellings estimated potential east of the railway line. Trip rates quoted in the EDCACSP Transport Assessment report have been used for the non-residential land uses in the EDCACSP area.

It should be noted that some of the trips generated by the land uses in the LSP area may also have the other end of that trip within the EDCACSP area. For example, trips from dwellings in the LSP area to the district centre or park'n'ride car park, or trips from dwellings in the EDCACSP area to the high school, indoor recreation centre, etc. Overall, this accounts for approximately 6,760vpd out of the 28,220vpd generated to and from Marmion Avenue and Pipidinny Road by the land uses in the LSP area.

The distribution of the remaining external trips has been determined from comparison of the external trip distributions used in the EDCACSP Transport Assessment report and the previous 2013 *North Eglinton Local Structure Plan Transport Assessment* report, which were both based on information derived from previous 2031 ROM traffic

model information obtained from Main Roads WA. The resulting distribution of external trips to and from the LSP area and EDCACSP is summarised in **Table 2**.

Table 2:Trip Distribution

External node	Percentage of trips
Mitchell Freeway (north)	5%
Mitchell Freeway (south)	16%
Eglinton Ave (east of Freeway) (east)	1%
Road south of Eglinton Ave, east of railway (south)	2%
Road south of Eglinton Ave, west of railway (south)	8%
Marmion Ave south of Eglinton Ave (south)	24%
Eglinton Ave west of Marmion Ave (west)	14%
Neighbourhood connector west of Eglinton District Centre (west)	7%
Pipidinny Road west of Marmion Ave (west)	7%
Neighbourhood connector west of LSP area (west)	1%
Marmion Ave (north)	15%

6.3 Traffic Flow Forecasts

The future total daily traffic flows on the road network in and around the LSP area has been modelled for the future scenario of full development of this area as discussed above.

External through traffic is based on information sourced from the EDCACSP Transport Assessment, which included analysis of 2031 ROM traffic projections from Main Roads WA.

As noted in section 6.1, the modelled traffic flows do not represent a particular year but are based on future full development of the North Eglinton LSP area and the adjacent Eglinton District Centre Activity Centre Structure Plan, which is anticipated to be beyond 2040.

Figure 10 illustrates future total daily traffic flows anticipated on the road network of the LSP area. There are no through routes within the LSP area that will be attractive to through traffic, so all of the traffic flows within the LSP area are generated by the land uses proposed in the LSP area.

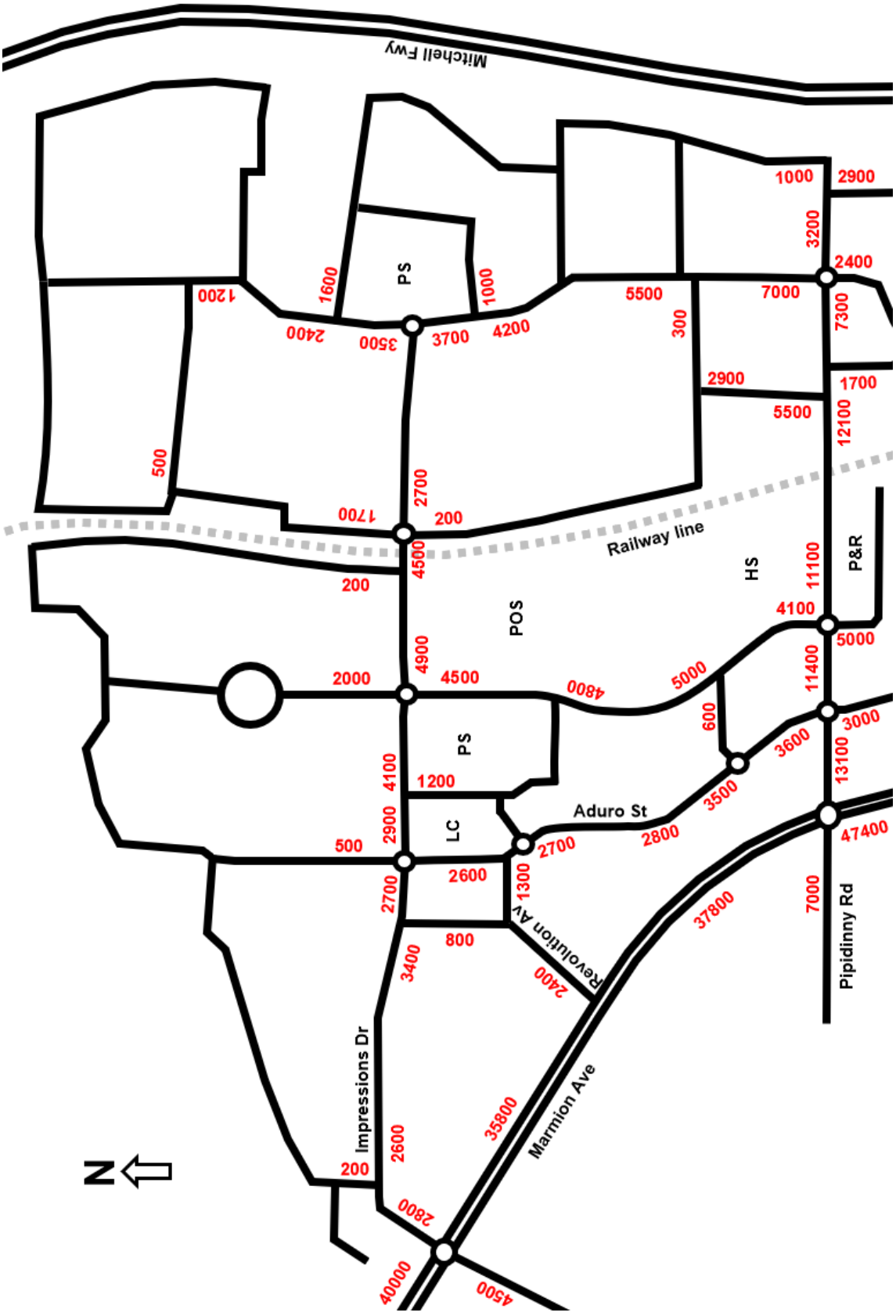


Figure 10: Future Daily Traffic Volumes

6.4 Roads and Intersections

The proposed road network to accommodate these traffic volumes has been detailed in section 4 of this transport assessment, including the details of the proposed road hierarchy in section 4.1.

Figure 11 details the proposed intersection controls for intersections within the LSP area. Also shown are the two locations where neighbourhood connector roads (Pipidinny Road and Impressions Drive) will bridge across the future railway line through this LSP area.

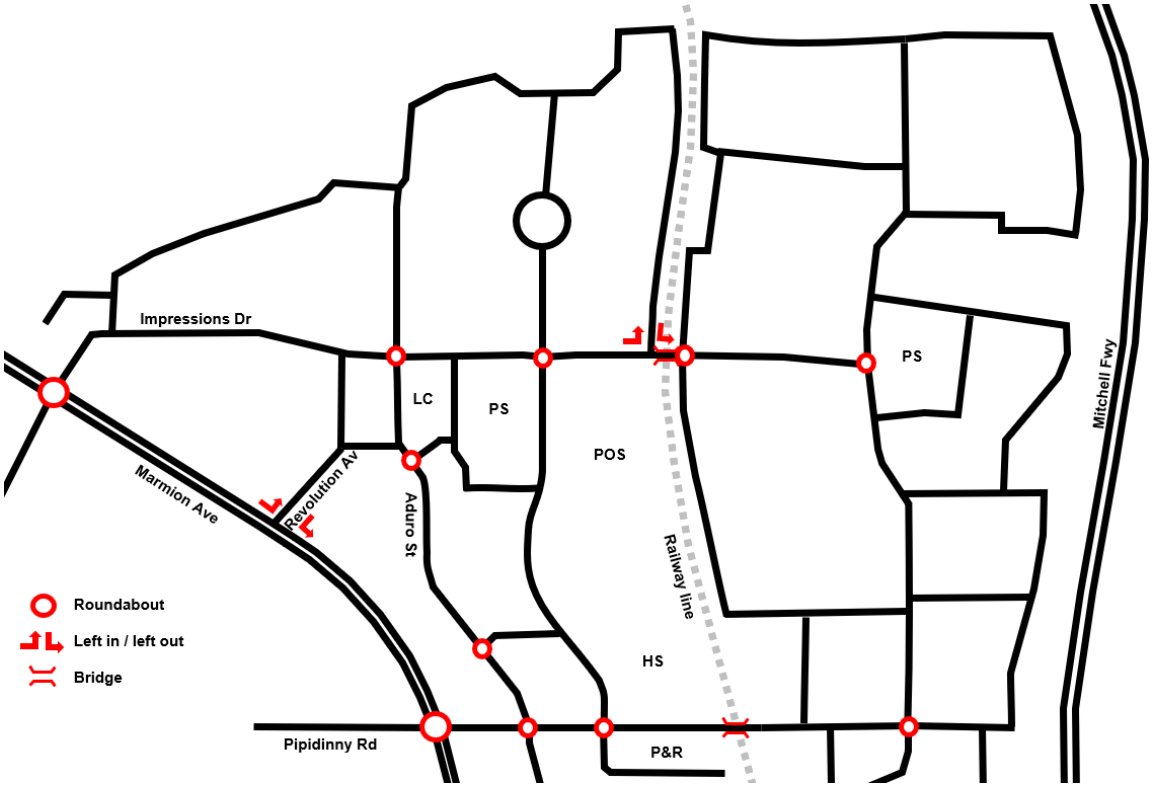


Figure 11: Intersection treatments

Marmion Avenue Intersections

Marmion Avenue is anticipated to remain as currently constructed (i.e. 4-lanes divided) but some sections could potentially be upgraded to 6-lanes divided in future if required by the ultimate traffic volumes using Marmion Avenue in the longer term.

Marmion Avenue / Pipidinny Road intersection and Marmion Avenue / Impressions Drive intersection have been constructed as dual-lane roundabouts. The City of Wanneroo's *Marmion Avenue Arterial Road Access* policy shows them as future signalised intersections but Main Roads WA policy currently favours roundabouts in preference to signalised intersections, so they are shown as roundabouts in **Figure 11**.

The Revolution Avenue intersection on Marmion Avenue midway between these two roundabouts will ultimately be restricted to left in / left out movements to and from Revolution Avenue.

Pipidinny Road Intersections

Pipidinny Road will have a bridge across the railway line.

The western 'north south connector' (Aduro Street) and an access street in the EDCACSP to the south will form a 4-way intersection on Pipidinny Road, which is recommended as a single-lane roundabout.

The 'north south connector' on the western side of the district open space will also form a 4-way intersection on Pipidinny Road with the access road leading to the Eglinton Station car parks, and is also recommended as a single-lane roundabout.

The Pipidinny Road intersection with the eastern 'north south connector' is anticipated to become a 4-way intersection, depending on the future planning in that part of the Eglinton District Centre, and another roundabout is expected to be appropriate there as shown on **Figure 11**. However, this recommendation should be reviewed depending on future planning east of the railway line in the Eglinton District Centre.

East West Connector (Impressions Drive) Intersections

The east west connector road (Impressions Drive) will be approximately 1.7km long within the LSP area and is relatively straight for most of this length. Traffic speeds may become an issue on this road in future so at least one roundabout is recommended to slow traffic in the middle of this length. The western 'north south connector' (Aduro Street) intersection at the neighbourhood activity centre has therefore been constructed as a roundabout.

The proposed 'north south connector' on the western side of the district open space will also form a 4-way intersection on Impressions Drive at the northeast corner of the western primary school site, and is also proposed to be constructed as a roundabout.

At the eastern end of Impressions Drive, the intersection with the eastern 'north south connector' is also recommended as a roundabout to help to control traffic speeds on that road, as well as providing a landmark to identify this key intersection and assisting right turning vehicles (including Transperth buses on this route).

The requirement of a frontage road along the railway reserve results in another 4-way intersection on this east west connector road immediately east of the railway reserve. It is recommended that this should also be constructed as a roundabout. It is understood that the railway line will be in cutting through this site and that the road bridge across it will be at or close to the finished ground level, so there are not expected to be vertical sight line issues resulting from having the bridge and roundabout in close proximity. Sight line requirements will be taken into consideration in the detailed design of bridges and nearby intersections.

The proposed access street alongside the western boundary of the railway reserve (north of Impressions Drive) should be restricted to left in / left out, due to close proximity to the proposed roundabout on the eastern side of the railway line. This road will carry significantly less traffic than on the eastern side of the railway and other

road links to Impressions Drive further west will provide satisfactory alternative routes for the potential right turn movements displaced from this western intersection.

Other access street intersections along Impressions Drive would generally only be full-movement T-intersections if the 40m intersection separation required in the WAPC *Liveable Neighbourhoods* policy is satisfied; otherwise, they would generally be restricted to left in / left out only.

Two other roundabouts are indicated along Aduro Street at future 4-way intersections (note that minor access streets are not shown on Figure 11, so the fourth leg of those 4-way intersections are not apparent on that diagram).

Internal Intersections

There are no other four-way intersections shown on the LSP plan but within the future local access road network it is likely there will be a number of future four-way intersections on low-traffic-volume access streets These are recommended to be constructed as priority-controlled intersections with give way signs on the minor road approaches as suggested in *Liveable Neighbourhoods* (LN Element 2 pages 31-33). Appropriate entry treatments should be provided on the side roads to help to alert drivers to the presence of those intersections and that traffic on the major road has priority.

6.5 Intersection Analysis

Intersection capacity analysis has been undertaken for the three intersections on Marmion Avenue and three roundabouts proposed on Pipidinny Road for the AM and PM peak hour flows that correspond to the future daily traffic flows in **Figure 10**.

The six locations analysed are:

- Marmion Avenue / Impressions Drive roundabout
- Marmion Avenue / Revolution Avenue left in / left out (LILO) intersection
- Marmion Avenue / Pipidinny Road roundabout
- Pipidinny Road / Aduro Street roundabout
- Pipidinny Road / DOS neighbourhood connector / Eglinton Station access road roundabout
- Pipidinny Road / eastern neighbourhood connector roundabout

Capacity analysis of these intersections has been 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 intersection analysis has been undertaken as SIDRA Network analysis using parameters specified in current Main Roads WA guidelines, including modelling of heavy vehicles in two separate categories (Austroads Classes 2-5 and 6-9). Note that larger vehicles (Austroads Classes 10 to 12) are not permitted on this section of Marmion Avenue and are not present in current traffic counts on this section of road.

The results of the SIDRA analysis are summarised in **Appendix B**.

The SIDRA analysis in Tables B1a and B1b indicates that the existing Marmion Avenue / Impressions Drive roundabout will operate satisfactorily in both peak periods with the forecast future traffic flows for full development of North Eglinton. The modelled degree of saturation is 60.2% in the AM peak and 73.6% in the PM peak period. It will operate at level of service A overall and no movement worse than level of service B, which indicates satisfactory performance.

The SIDRA analysis in Tables B2a and B2b indicates the Marmion Avenue / Revolution Avenue left in / left out intersection is also anticipated to operate satisfactorily with the left turn out to Marmion Avenue at level of service C in both the AM and PM peak periods. The modelled degree of saturation is 57.0% in the AM peak and 56.3% in the PM peak period.

SIDRA analysis indicates the Marmion Avenue / Pipidinny Road roundabout would need to be modified to accommodate the future traffic flows anticipated on Pipidinny Road. The modified layout is schematically illustrated in Figure B1, which includes addition of a left turn lane on the Marmion Avenue northern approach, two-lane entry and two-lane exit on Pipidinny Road east and two-lane entry on Pipidinny Road west. The SIDRA analysis in Tables B3a and B3b indicates that this upgraded Marmion Avenue / Pipidinny Road roundabout will operate satisfactorily in both peak periods with the forecast future traffic flows for full development of North Eglinton. The modelled degree of saturation is 73.6% in the AM peak and 87.5% in the PM peak period. It will operate at level of service A overall in the AM peak and B in the PM peak, with no movement worse than level of service B in the AM peak and C in the PM peak period.

The SIDRA analysis in Tables B4a and B4b indicates the proposed Pipidinny Road / Aduro Street roundabout is also anticipated to operate satisfactorily. The modelled degree of saturation is 58.2% in the AM peak and 84.5% in the PM peak period. It will operate at level of service A overall in the AM peak and B in the PM peak, with no movement worse than level of service B in the AM peak and C in the PM peak period.

The SIDRA analysis in Tables B5a and B5b indicates the Pipidinny Road / HS neighbourhood connector / Eglinton Station access road roundabout is also anticipated to operate satisfactorily. The modelled degree of saturation is 60.3% in the AM peak and 62.5% in the PM peak period. It will operate at overall level of service A in both peak periods and no movement worse than level of service B.

The SIDRA analysis in Tables B6a and B6b indicates the Pipidinny Road / eastern neighbourhood connector roundabout is also anticipated to operate satisfactorily. The modelled degree of saturation is 63.0% in the AM peak and 63.2% in the PM peak period. It will operate at overall level of service A in both peak periods and no movement worse than level of service B.

6.6 Access to Frontage Properties

The WAPC *Liveable Neighbourhoods* policy requires that *"Development along integrator B and neighbourhood connector streets with ultimate vehicle volumes over 5000 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 7000 vehicles per day."*

There will be no direct driveway access from abutting residential development to Marmion Avenue and traffic volumes on the Neighbourhood Connector A roads within the LSP area will generally be less than 5000 vpd, so generally no restriction on vehicular access is required on those roads.

The only significant exceptions are on Pipidinny Road, the southern section of the neighbourhood connector on the western side of the DOS, and the southern section of the eastern 'north south connector', which will have traffic flows above 5000 vpd on some sections. These sections will either have higher density residential development or medium density residential development accessed from side streets or rear laneways, so there will not need to be individual driveway access from Pipidinny Road or the southern sections of those 'north south connectors' for these dwellings.

The high school site would have driveway access to parking areas from Pipidinny Road and from the neighbourhood connector road abutting the school site. It is anticipated that right turn access would be able to be provided at school driveways on Pipidinny Road with appropriate median openings and right turn lanes on Pipidinny Road where required to accommodate this. Access details would be determined at detailed design stage for the high school development application.

The proposed petrol station / convenience store at the southwest corner of the LSP area is anticipated to have one midblock driveway crossover on Pipidinny Road (possibly restricted to left in / left out or right in / left in / left out movements only) and full-movement access on Aduro Street, to be determined at detailed design stage for the development application. Similarly, the proposed indoor recreation centre east of Aduro Street is also assumed to have a left in / left out midblock driveway crossover

on Pipidinny Road, as well as access from Aduro Street and/or the neighbourhood connector on its eastern side, to be determined at detailed design stage for the development application.

6.7 Pedestrian / Cycle Network

The proposed network of shared paths for pedestrians and cyclists is described in section 4.3 of this transport impact assessment. This network of paths will provide an excellent level of accessibility and permeability for pedestrians and cyclists within the LSP area, and connections to neighbouring precincts and the abutting Bush Forever land to the north at strategic locations.

The WAPC *Transport Impact Assessment Guidelines* (2016) provides guidance on the levels of traffic volumes that are likely to affect the ability for pedestrians to cross various types of road. Based on that guidance an undivided two-lane road should be acceptable for pedestrians crossing traffic volumes of up to approximately 11,000 vpd and this threshold can be increased to around 28,000 vpd by adding a central median or pedestrian refuge islands. On a four-lane road, because of its greater carriageway width, this threshold is lower; even with a median island the threshold is only around 16,000 vpd.

Future traffic volumes on Marmion Avenue could potentially be up to 38,000 vpd adjacent to the LSP area and may need to be crossed by high school students if the catchment area for the high school extends west of Marmion Avenue. If the Pipidinny Road and Impressions Drive intersections on Marmion Avenue remain as roundabouts (not signalised intersections) it would be appropriate to plan for a signalised pedestrian crossing on Marmion Avenue somewhere between Pipidinny Road and Revolution Avenue. This should be determined in conjunction with planning for future subdivision of the area west of Marmion Avenue / north of Pipidinny Road.

The proposed Amended LSP plan indicates an underpass is to be provided under Pipidinny Road on the western side of the railway line, which will facilitate pedestrian and cyclist access across Pipidinny Road for access to the high school, railway station and district centre, as well as for the planned Principal Shared Path at that location.

It is anticipated that guard-controlled school crossings would be appropriate at the high school site on the abutting neighbourhood connector, and at the two primary school sites, to assist students crossing the adjacent roads before and after school. Guard-controlled school crossings can easily be accommodated on the Neighbourhood Connector and Access Street B roads around those school sites at any location that suits the internal and external access routes of each school at detailed design stage.

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 to school while 26.7% of primary and 21.9% of high school students walk or cycle home from school. Therefore a 540-student primary school would typically have about 140 students walking or cycling and a 1450-student high school would typically have about 250-320 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 (eg. P&C or P&F). The anticipated numbers of students crossing the roads around the school sites would potentially meet these warrants in future, so it would be expected that the schools would apply for this type of facility when future student numbers and movements meet those warrants.

6.8 Access to Public Transport

At this stage of the structure planning process bus stop locations are not known. However, in these circumstances the WAPC *Transport Impact Assessment Guidelines* (2016) suggest that it is desirable for at least 90 per cent of dwellings to be within 400m straight line distance of a bus route.

The future bus route on the 'east west connector' (Impressions Drive) would be about 600m from the northern edge of the LSP area, so the northernmost lots in the LSP area would be more than 400m from this bus route. This would affect about 10% of the residential land in the LSP but as this is the proposed lowest density area the number of dwellings affected would be lower than this percentage. The LSP is therefore considered to satisfy the guideline of 90% of the dwellings in the LSP area to be within 400m straight line distance of a bus route.

7 Conclusions

The main findings of the transport impact assessment for the proposed amended North Eglinton Local Structure Plan are outlined below.

The LSP area is anticipated to accommodate approximately 3400 dwellings, a neighbourhood activity centre, a high school, two primary schools, playing fields, an indoor recreation centre and a commercial development site.

This LSP area is anticipated to generate traffic flows of approximately 28,220 vehicles per day across the LSP boundaries, with approximately 6,760vpd of those being trips to and from the adjacent Eglinton District Centre Activity Centre Structure Plan area south of Pipidinny Road.

The road network of the LSP area has been designed based on WAPC Liveable Neighbourhoods guidelines to accommodate the future traffic flows that will be generated in this area.

The future planning for Marmion Avenue assumes it will remain as currently constructed (i.e. 4-lanes divided) but some sections could potentially be upgraded to 6-lanes divided in future if required by the ultimate traffic volumes using Marmion Avenue in the longer term.

The Marmion Avenue / Pipidinny Road intersection and Marmion Avenue / Impressions Drive intersection have been constructed as dual-lane roundabouts. The City of Wanneroo's *Marmion Avenue Arterial Road Access* policy shows them as future signalised intersections but Main Roads WA policy currently favours roundabouts in preference to signalised intersections, so they are anticipated to remain as roundabouts in this report. The existing Marmion Avenue / Pipidinny Road roundabout would require some modifications (additional entry and exit lanes on some legs) to accommodate the modelled future traffic volumes with full development of the Eglinton area.

The Revolution Avenue intersection on Marmion Avenue midway between these two roundabouts will ultimately be restricted to left in / left out movements to and from Revolution Avenue.

These intersections have been analysed for future traffic flows when the Eglinton area is fully developed and the analysis indicates that all three intersections will operate satisfactorily during weekday AM and PM peak periods.

Roundabouts are also recommended at several other four-way intersections on Pipidinny Road and internal neighbourhood connector roads in the LSP area.

The proposed road network will accommodate a planned future bus route through the LSP area, which will provide satisfactory public transport access in future.

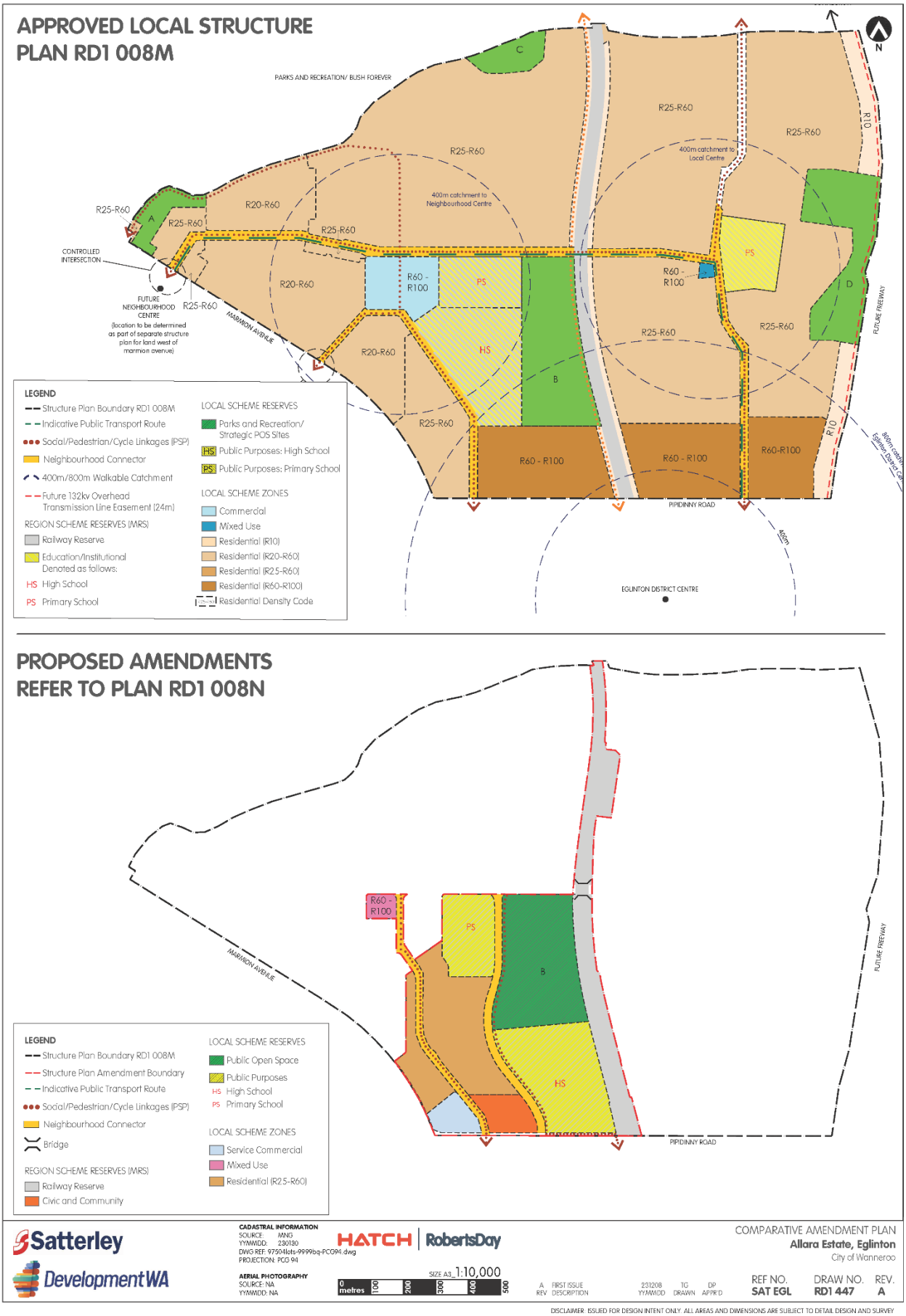
The proposed LSP also provides for a comprehensive network of shared paths and footpaths to encourage and facilitate non-motorised travel as well.

Appendix A

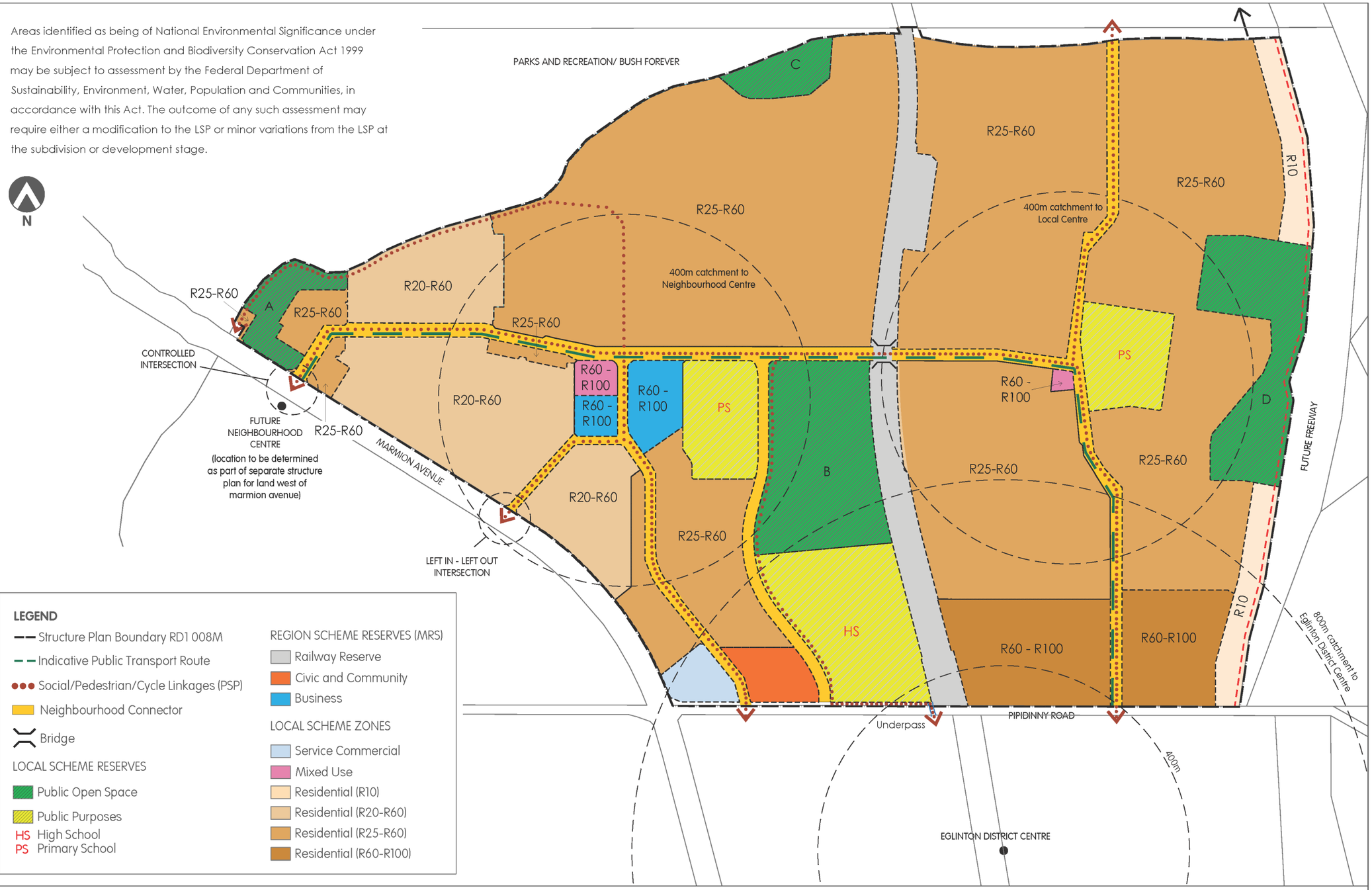
PROPOSED AMENDED LOCAL STRUCTURE PLAN

transcore

Engineering a better future for over 20 years!


APPROVED LOCAL STRUCTURE PLAN RD1 008M
PARKS AND RECREATION/ BUSH FOREVER
R25-R60
R20-R60
R60 - R100
R60-R100
400m catchment to Neighbourhood Centre
400m catchment to Local Centre
CONTROLLED INTERSECTION
FUTURE NEIGHBOURHOOD CENTRE
(location to be determined as part of separate structure plan for land west of marmion avenue)
MARMION AVENUE
FUTURE FREEWAY
PIPIDINNY ROAD
EGLINTON DISTRICT CENTRE
LEGEND
Structure Plan Boundary RD1 008M
Indicative Public Transport Route
Social/Pedestrian/Cycle Linkages (PSP)
Neighbourhood Connector
400m/800m Walkable Catchment
Future 132kv Overhead Transmission Line Easement (24m)
REGION SCHEME RESERVES (MRS)
Railway Reserve
Education/Institutional
Denoted as follows:
HS High School
PS Primary School
LOCAL SCHEME RESERVES
Parks and Recreation/ Strategic POS Sites
HS Public Purposes: High School
PS Public Purposes: Primary School
LOCAL SCHEME ZONES
Commercial
Mixed Use
Residential (R10)
Residential (R20-R60)
Residential (R25-R60)
Residential (R60-R100)
Residential Density Code
PROPOSED AMENDMENTS REFER TO PLAN RD1 008N
Structure Plan Amendment Boundary
Bridge
Public Open Space
Public Purposes
Service Commercial
Civic and Community
Satterley
DevelopmentWA
HATCH
RobertsDay
CADASTRAL INFORMATION
AERIAL PHOTOGRAPHY
COMPARATIVE AMENDMENT PLAN
Allara Estate, Eglinton
City of Wanneroo
REF NO. SAT EGL
DRAW NO. RD1 447
REV. A
DISCLAIMER: ISSUED FOR DESIGN INTENT ONLY. ALL AREAS AND DIMENSIONS ARE SUBJECT TO DETAIL DESIGN AND SURVEY

Areas identified as being of National Environmental Significance under the Environmental Protection and Biodiversity Conservation Act 1999 may be subject to assessment by the Federal Department of Sustainability, Environment, Water, Population and Communities, in accordance with this Act. The outcome of any such assessment may require either a modification to the LSP or minor variations from the LSP at the subdivision or development stage.



Satterley DevelopmentWA HATCH RobertsDay

CADASTRAL INFORMATION
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PROJECTION: PCG 94

AERIAL PHOTOGRAPHY
SOURCE: NA
YYMMDD: NA

SIZE A3
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0 metres 100 200 300 400

N REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
	UPDATE EDUCATION VILLAGE	231211	TG	DP

STRUCTURE PLAN MAP
Allara Estate, Eglinton
City of Wanneroo

REF NO. **SAT EGL** | DRAW NO. **RD1 008** | REV. **N**

Appendix B

SIDRA INTERSECTION ANALYSIS

transcore

Engineering a better future for over 20 years!

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

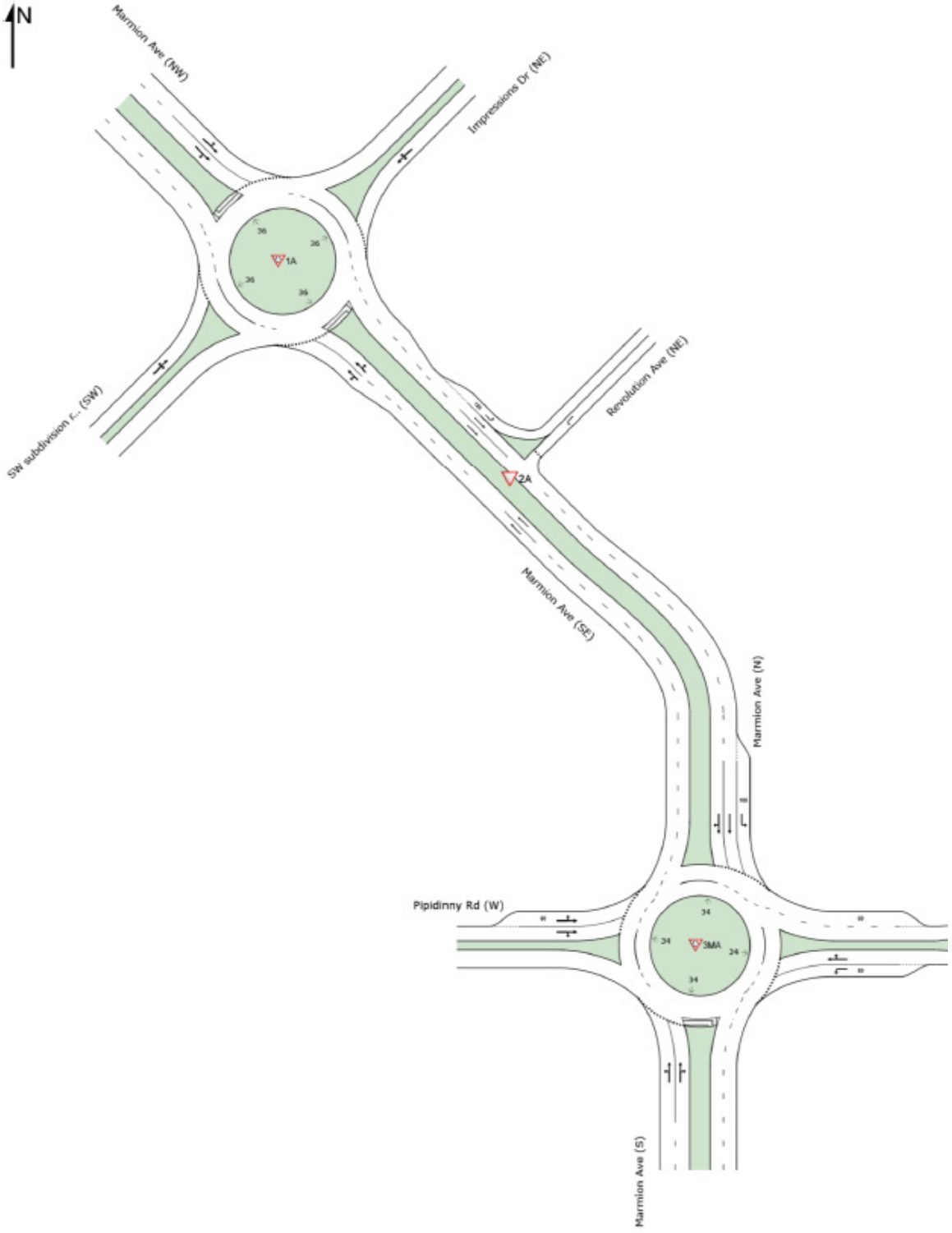

Figure B1: Marmion Avenue intersections modelled using SIDRA Network

Note: The modelled network also includes the Pipidinny Rd intersections shown in Figure B2.

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

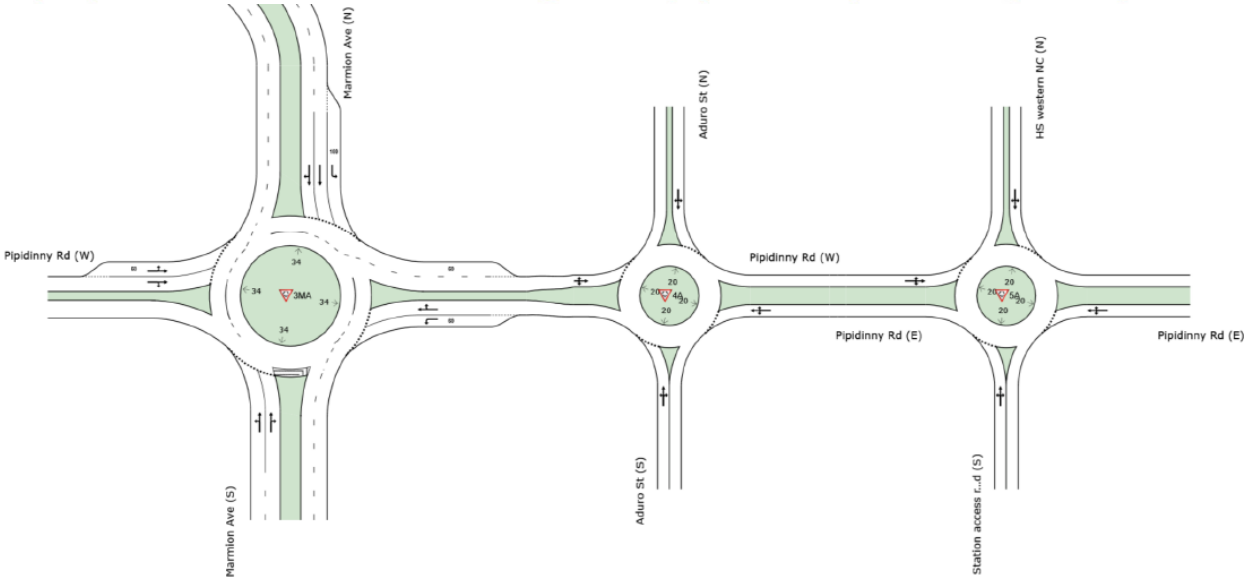

Figure B2: Pipidinny Road intersections modelled using SIDRA Network

Table B1a: SIDRA results – Marmion Ave / Impressions Dr roundabout – future weekday 8-9AM peak with full development

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Marmion Ave (SE)															
1	L2	All MCs	26	6.8	26	6.8	0.602	6.7	LOS A	4.7	37.5	0.54	0.54	0.54	53.4
2	T1	All MCs	1606	7.6	1606	7.6	0.602	7.1	LOS A	4.7	37.5	0.55	0.56	0.55	62.1
3	R2	All MCs	48	6.8	48	6.8	0.602	13.8	LOS B	4.5	36.0	0.58	0.57	0.58	54.7
Approach			1681	7.6	1681	7.6	0.602	7.3	LOS A	4.7	37.5	0.55	0.56	0.56	61.8
NorthEast: Impressions Dr (NE)															
4	L2	All MCs	11	6.8	11	6.8	0.229	5.8	LOS A	0.9	7.1	0.66	0.82	0.66	26.1
5	T1	All MCs	9	6.8	9	6.8	0.229	5.3	LOS A	0.9	7.1	0.66	0.82	0.66	40.8
6	R2	All MCs	143	6.8	143	6.8	0.229	11.2	LOS B	0.9	7.1	0.66	0.82	0.66	47.1
Approach			163	6.8	163	6.8	0.229	10.5	LOS B	0.9	7.1	0.66	0.82	0.66	46.1
NorthWest: Marmion Ave (NW)															
7	L2	All MCs	44	6.8	44	6.8	0.489	5.8	LOS A	3.4	26.8	0.25	0.44	0.25	58.6
8	T1	All MCs	1403	7.6	1403	7.6	0.489	6.1	LOS A	3.4	26.8	0.26	0.46	0.26	61.0
9	R2	All MCs	101	6.8	101	6.8	0.489	12.7	LOS B	3.3	26.3	0.28	0.48	0.28	53.7
Approach			1548	7.5	1548	7.5	0.489	6.5	LOS A	3.4	26.8	0.26	0.46	0.26	59.9
SouthWest: SW subdivision road (SW)															
10	L2	All MCs	304	6.8	304	6.8	0.591	9.9	LOS A	3.5	27.2	0.84	1.00	1.14	49.2
11	T1	All MCs	3	6.8	3	6.8	0.591	9.3	LOS A	3.5	27.2	0.84	1.00	1.14	40.2
12	R2	All MCs	23	6.8	23	6.8	0.591	15.3	LOS B	3.5	27.2	0.84	1.00	1.14	39.4
Approach			331	6.8	331	6.8	0.591	10.2	LOS B	3.5	27.2	0.84	1.00	1.14	48.6
All Vehicles			3723	7.4	3723	7.4	0.602	7.4	LOS A	4.7	37.5	0.46	0.57	0.49	58.9

Table B1b: SIDRA results – Marmion Ave / Impressions Dr roundabout – future weekday 3-4PM peak with full development

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Marmion Ave (SE)															
1	L2	All MCs	29	6.5	29	6.5	0.736	8.4	LOS A	8.4	67.1	0.72	0.68	0.81	52.5
2	T1	All MCs	1800	8.4	1800	8.4	0.736	9.2	LOS A	8.4	67.1	0.74	0.70	0.85	60.5
3	R2	All MCs	109	6.5	109	6.5	0.736	16.3	LOS B	8.3	66.6	0.77	0.73	0.91	52.6
Approach			1939	8.3	1939	8.3	0.736	9.6	LOS A	8.4	67.1	0.74	0.70	0.85	60.1
NorthEast: Impressions Dr (NE)															
4	L2	All MCs	7	6.5	7	6.5	0.184	7.5	LOS A	0.8	6.6	0.78	0.89	0.78	24.3
5	T1	All MCs	5	6.5	5	6.5	0.184	7.0	LOS A	0.8	6.6	0.78	0.89	0.78	39.7
6	R2	All MCs	79	6.5	79	6.5	0.184	13.0	LOS B	0.8	6.6	0.78	0.89	0.78	45.8
Approach			92	6.5	92	6.5	0.184	12.2	LOS B	0.8	6.6	0.78	0.89	0.78	44.5
NorthWest: Marmion Ave (NW)															
7	L2	All MCs	109	6.5	109	6.5	0.693	6.3	LOS A	6.8	54.3	0.51	0.51	0.51	56.1
8	T1	All MCs	1693	8.4	1693	8.4	0.693	6.7	LOS A	6.8	54.3	0.53	0.53	0.53	57.6
9	R2	All MCs	254	6.5	254	6.5	0.693	13.4	LOS B	6.6	52.8	0.56	0.56	0.56	52.1
Approach			2056	8.1	2056	8.1	0.693	7.5	LOS A	6.8	54.3	0.53	0.53	0.53	56.3
SouthWest: SW subdivision road (SW)															
10	L2	All MCs	152	6.5	152	6.5	0.454	10.3	LOS B	2.5	19.6	0.87	0.97	1.04	48.6
11	T1	All MCs	7	6.5	7	6.5	0.454	9.7	LOS A	2.5	19.6	0.87	0.97	1.04	39.6
12	R2	All MCs	33	6.5	33	6.5	0.454	15.7	LOS B	2.5	19.6	0.87	0.97	1.04	38.8
Approach			192	6.5	192	6.5	0.454	11.2	LOS B	2.5	19.6	0.87	0.97	1.04	47.2
All Vehicles			4278	8.1	4278	8.1	0.736	8.7	LOS A	8.4	67.1	0.65	0.64	0.70	57.5

Table B2a: SIDRA results – Marmion Ave / Revolution Ave LILO intersection – future weekday 8-9AM peak with full development

Vehicle Movement Performance

Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Marmion Ave (SE)															
2	T1	All MCs	1682	7.6	1682	7.6	0.461	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach			1682	7.6	1682	7.6	0.461	0.2	NA	0.0	0.0	0.00	0.00	0.00	59.6
NorthEast: Revolution Ave (NE)															
4	L2	All MCs	280	6.8	280	6.8	0.570	15.8	LOS C	3.1	24.4	0.78	1.07	1.31	39.8
Approach			280	6.8	280	6.8	0.570	15.8	LOS C	3.1	24.4	0.78	1.07	1.31	39.8
NorthWest: Marmion Ave (NW)															
7	L2	All MCs	8	6.8	8	6.8	0.005	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	51.6
8	T1	All MCs	1428	7.6	1428	7.6	0.391	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
Approach			1437	7.6	1437	7.6	0.391	0.2	NA	0.0	0.0	0.00	0.00	0.00	59.6
All Vehicles			3399	7.5	3399	7.5	0.570	1.5	NA	3.1	24.4	0.06	0.09	0.11	57.3

Table B2b: SIDRA results – Marmion Ave / Revolution Ave LILO intersection – future weekday 3-4PM peak with full development

Vehicle Movement Performance

Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
SouthEast: Marmion Ave (SE)															
2	T1	All MCs	1940	8.4	1940	8.4	0.536	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	59.5
Approach			1940	8.4	1940	8.4	0.536	0.3	NA	0.0	0.0	0.00	0.00	0.00	59.5
NorthEast: Revolution Ave (NE)															
4	L2	All MCs	205	6.5	205	6.5	0.563	19.6	LOS C	2.6	20.5	0.84	1.08	1.36	36.8
Approach			205	6.5	205	6.5	0.563	19.6	LOS C	2.6	20.5	0.84	1.08	1.36	36.8
NorthWest: Marmion Ave (NW)															
7	L2	All MCs	21	6.5	21	6.5	0.012	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	51.7
8	T1	All MCs	1712	8.4	1712	8.4	0.473	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach			1733	8.4	1733	8.4	0.473	0.3	NA	0.0	0.0	0.00	0.01	0.00	59.4
All Vehicles			3878	8.3	3878	8.3	0.563	1.3	NA	2.6	20.5	0.04	0.06	0.07	57.6

Table B3a: SIDRA results – Marmion Ave / Pipidinny Rd upgraded roundabout – future weekday 8-9AM peak with full development

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Marmion Ave (S)															
1	L2	All MCs	199	6.8	199	6.8	0.736	8.0	LOS A	8.7	69.0	0.75	0.67	0.81	47.2
2	T1	All MCs	1469	7.6	1469	7.6	0.736	8.8	LOS A	8.7	69.0	0.77	0.69	0.85	43.6
3	R2	All MCs	274	6.8	274	6.8	0.736	15.7	LOS B	8.6	68.4	0.79	0.72	0.90	42.1
Approach			1942	7.4	1942	7.4	0.736	9.7	LOS A	8.7	69.0	0.77	0.69	0.85	44.2
East: Pipidinny Rd (E)															
4	L2	All MCs	408	6.8	408	6.8	0.655	10.7	LOS B	4.6	36.3	0.90	1.05	1.28	40.4
5	T1	All MCs	113	6.8	113	6.8	0.608	11.3	LOS B	3.5	27.5	0.87	1.05	1.19	39.1
6	R2	All MCs	158	6.8	158	6.8	0.608	17.1	LOS B	3.5	27.5	0.87	1.05	1.19	27.1
Approach			679	6.8	679	6.8	0.655	12.3	LOS B	4.6	36.3	0.89	1.05	1.24	37.7
North: Marmion Ave (N)															
7	L2	All MCs	91	6.8	91	6.8	0.084	7.8	LOS A	0.4	2.8	0.46	0.62	0.46	59.8
8	T1	All MCs	1580	7.6	1580	7.6	0.637	8.8	LOS A	5.5	43.5	0.69	0.71	0.79	58.3
9	R2	All MCs	38	6.8	38	6.8	0.637	15.6	LOS B	5.2	41.3	0.71	0.74	0.84	51.7
Approach			1708	7.5	1708	7.5	0.637	8.9	LOS A	5.5	43.5	0.68	0.71	0.78	58.1
West: Pipidinny Rd (W)															
10	L2	All MCs	55	6.8	55	6.8	0.207	8.2	LOS A	1.0	7.5	0.81	0.85	0.81	41.5
11	T1	All MCs	55	6.8	55	6.8	0.390	7.9	LOS A	2.3	18.0	0.84	0.89	0.89	39.8
12	R2	All MCs	184	6.8	184	6.8	0.390	13.6	LOS B	2.3	18.0	0.89	0.93	0.99	42.4
Approach			294	6.8	294	6.8	0.390	11.5	LOS B	2.3	18.0	0.86	0.91	0.94	41.9
All Vehicles			4623	7.3	4623	7.3	0.736	9.9	LOS A	8.7	69.0	0.76	0.76	0.89	49.2

Table B3b: SIDRA results – Marmion Ave / Pipidinny Rd upgraded roundabout – future weekday 3-4PM peak with full development

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Marmion Ave (S)															
1	L2	All MCs	233	6.5	233	6.5	0.875	9.3	LOS A	16.3	130.7	0.85	0.72	0.97	46.7
2	T1	All MCs	1791	8.4	1791	8.4	0.875	10.4	LOS B	16.3	130.7	0.89	0.74	1.04	41.9
3	R2	All MCs	403	6.5	403	6.5	0.875	17.7	LOS B	16.0	127.5	0.95	0.78	1.14	39.7
Approach			2426	7.9	2426	7.9	0.875	11.5	LOS B	16.3	130.7	0.89	0.75	1.05	42.5
East: Pipidinny Rd (E)															
4	L2	All MCs	320	6.5	320	6.5	0.675	14.3	LOS B	4.9	38.9	0.96	1.09	1.37	37.1
5	T1	All MCs	71	6.5	71	6.5	0.538	12.2	LOS B	2.9	23.2	0.90	1.03	1.13	38.5
6	R2	All MCs	113	6.5	113	6.5	0.538	18.0	LOS B	2.9	23.2	0.90	1.03	1.13	26.2
Approach			503	6.5	503	6.5	0.675	14.8	LOS B	4.9	38.9	0.94	1.07	1.28	35.6
North: Marmion Ave (N)															
7	L2	All MCs	148	6.5	148	6.5	0.150	8.9	LOS A	0.7	5.9	0.60	0.68	0.60	58.6
8	T1	All MCs	1714	8.4	1714	8.4	0.811	13.3	LOS B	10.9	87.9	0.91	0.99	1.37	55.0
9	R2	All MCs	56	6.5	56	6.5	0.811	20.7	LOS C	9.6	77.3	0.92	1.01	1.43	49.1
Approach			1918	8.2	1918	8.2	0.811	13.2	LOS B	10.9	87.9	0.89	0.97	1.31	55.0
West: Pipidinny Rd (W)															
10	L2	All MCs	36	6.5	36	6.5	0.401	13.6	LOS B	2.1	16.8	0.90	0.97	1.04	37.5
11	T1	All MCs	111	6.5	111	6.5	0.757	17.3	LOS B	6.4	50.2	0.93	1.04	1.21	34.4
12	R2	All MCs	244	6.5	244	6.5	0.757	31.9	LOS C	6.4	50.2	1.00	1.23	1.67	33.7
Approach			391	6.5	391	6.5	0.757	26.1	LOS C	6.4	50.2	0.97	1.15	1.48	34.1
All Vehicles			5238	7.8	5238	7.8	0.875	13.5	LOS B	16.3	130.7	0.90	0.89	1.20	46.2

Table B4a: SIDRA results – Pipidinny Rd / Aduro St roundabout – future weekday 8-9AM peak with full development

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Aduro St (S)															
1	L2	All MCs	14	6.8	14	6.8	0.314	8.5	LOS A	2.0	15.9	0.80	0.74	0.80	39.1
2	T1	All MCs	76	6.8	76	6.8	0.314	8.4	LOS A	2.0	15.9	0.80	0.74	0.80	43.3
3	R2	All MCs	115	6.8	115	6.8	0.314	12.9	LOS B	2.0	15.9	0.80	0.74	0.80	39.1
Approach			204	6.8	204	6.8	0.314	10.9	LOS B	2.0	15.9	0.80	0.74	0.80	41.2
East: Pipidinny Rd (E)															
4	L2	All MCs	103	6.8	103	6.8	0.582	4.1	LOS A	5.2	41.0	0.50	0.43	0.50	43.7
5	T1	All MCs	586	6.8	586	6.8	0.582	4.0	LOS A	5.2	41.0	0.50	0.43	0.50	34.7
6	R2	All MCs	41	6.8	41	6.8	0.582	8.5	LOS A	5.2	41.0	0.50	0.43	0.50	43.1
Approach			731	6.8	731	6.8	0.582	4.2	LOS A	5.2	41.0	0.50	0.43	0.50	38.5
North: Aduro St (N)															
7	L2	All MCs	4	6.8	4	6.8	0.075	5.6	LOS A	0.4	3.2	0.58	0.65	0.58	41.0
8	T1	All MCs	17	6.8	17	6.8	0.075	5.5	LOS A	0.4	3.2	0.58	0.65	0.58	44.4
9	R2	All MCs	41	6.8	41	6.8	0.075	10.0	LOS B	0.4	3.2	0.58	0.65	0.58	41.0
Approach			62	6.8	62	6.8	0.075	8.5	LOS A	0.4	3.2	0.58	0.65	0.58	42.3
West: Pipidinny Rd (W)															
10	L2	All MCs	43	6.8	43	6.8	0.379	4.6	LOS A	2.6	20.8	0.56	0.52	0.56	43.3
11	T1	All MCs	282	6.8	282	6.8	0.379	4.5	LOS A	2.6	20.8	0.56	0.52	0.56	34.6
12	R2	All MCs	26	6.8	26	6.8	0.379	9.1	LOS A	2.6	20.8	0.56	0.52	0.56	42.7
12u	U	All MCs	39	6.8	39	6.8	0.379	10.9	LOS B	2.6	20.8	0.56	0.52	0.56	34.6
Approach			391	6.8	391	6.8	0.379	5.5	LOS A	2.6	20.8	0.56	0.52	0.56	37.7
All Vehicles			1387	6.8	1387	6.8	0.582	5.8	LOS A	5.2	41.0	0.56	0.51	0.56	39.4

Table B4b: SIDRA results – Pipidinny Rd / Aduro St roundabout – future weekday 3-4PM peak with full development

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Aduro St (S)															
1	L2	All MCs	6	6.5	6	6.5	0.455	7.7	LOS A	3.3	25.7	0.78	0.73	0.82	40.1
2	T1	All MCs	180	6.5	180	6.5	0.455	7.6	LOS A	3.3	25.7	0.78	0.73	0.82	43.9
3	R2	All MCs	165	6.5	165	6.5	0.455	12.1	LOS B	3.3	25.7	0.78	0.73	0.82	40.1
Approach			352	6.5	352	6.5	0.455	9.7	LOS A	3.3	25.7	0.78	0.73	0.82	42.5
East: Pipidinny Rd (E)															
4	L2	All MCs	103	6.5	103	6.5	0.477	4.6	LOS A	3.7	29.5	0.58	0.50	0.58	43.4
5	T1	All MCs	376	6.5	376	6.5	0.477	4.5	LOS A	3.7	29.5	0.58	0.50	0.58	33.8
6	R2	All MCs	38	6.5	38	6.5	0.477	9.0	LOS A	3.7	29.5	0.58	0.50	0.58	42.8
Approach			517	6.5	517	6.5	0.477	4.8	LOS A	3.7	29.5	0.58	0.50	0.58	38.8
North: Aduro St (N)															
7	L2	All MCs	24	6.5	24	6.5	0.183	9.4	LOS A	1.2	9.6	0.87	0.77	0.87	38.6
8	T1	All MCs	25	6.5	25	6.5	0.183	9.3	LOS A	1.2	9.6	0.87	0.77	0.87	43.0
9	R2	All MCs	40	6.5	40	6.5	0.183	13.9	LOS B	1.2	9.6	0.87	0.77	0.87	38.6
Approach			89	6.5	89	6.5	0.183	11.4	LOS B	1.2	9.6	0.87	0.77	0.87	40.4
West: Pipidinny Rd (W)															
10	L2	All MCs	86	6.5	86	6.5	0.845	14.6	LOS B	15.0	118.1	1.00	1.06	1.50	37.6
11	T1	All MCs	529	6.5	529	6.5	0.845	14.5	LOS B	15.0	118.1	1.00	1.06	1.50	24.4
12	R2	All MCs	60	6.5	60	6.5	0.845	19.0	LOS B	15.0	118.1	1.00	1.06	1.50	37.1
12u	U	All MCs	80	6.5	80	6.5	0.845	20.9	LOS C	15.0	118.1	1.00	1.06	1.50	24.4
Approach			756	6.5	756	6.5	0.845	15.5	LOS B	15.0	118.1	1.00	1.06	1.50	29.0
All Vehicles			1714	6.5	1714	6.5	0.845	10.9	LOS B	15.0	118.1	0.82	0.81	1.05	36.3

Table B5a: SIDRA results – Pipidinny Rd / HS neighbourhood connector / Eglinton station access roundabout – future weekday 8-9AM peak with full development

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Station access road (S)															
1	L2	All MCs	14	6.8	14	6.8	0.155	8.2	LOS A	1.0	7.6	0.78	0.70	0.78	30.2
2	T1	All MCs	71	6.8	71	6.8	0.155	8.1	LOS A	1.0	7.6	0.78	0.70	0.78	42.0
3	R2	All MCs	9	6.8	9	6.8	0.155	12.7	LOS B	1.0	7.6	0.78	0.70	0.78	41.1
Approach			94	6.8	94	6.8	0.155	8.6	LOS A	1.0	7.6	0.78	0.70	0.78	41.2
East: Pipidinny Rd (E)															
4	L2	All MCs	13	6.8	13	6.8	0.603	6.5	LOS A	5.6	44.2	0.75	0.63	0.81	42.3
5	T1	All MCs	558	6.8	558	6.8	0.603	6.4	LOS A	5.6	44.2	0.75	0.63	0.81	42.1
6	R2	All MCs	19	6.8	19	6.8	0.603	11.0	LOS B	5.6	44.2	0.75	0.63	0.81	44.4
Approach			589	6.8	589	6.8	0.603	6.6	LOS A	5.6	44.2	0.75	0.63	0.81	42.2
North: HS western NC (N)															
7	L2	All MCs	1	6.8	1	6.8	0.300	5.3	LOS A	1.8	14.2	0.58	0.61	0.58	44.4
8	T1	All MCs	119	6.8	119	6.8	0.300	5.2	LOS A	1.8	14.2	0.58	0.61	0.58	42.0
9	R2	All MCs	159	6.8	159	6.8	0.300	9.7	LOS A	1.8	14.2	0.58	0.61	0.58	41.4
Approach			279	6.8	279	6.8	0.300	7.8	LOS A	1.8	14.2	0.58	0.61	0.58	41.7
West: Pipidinny Rd (W)															
10	L2	All MCs	43	6.8	43	6.8	0.304	3.5	LOS A	2.1	16.5	0.35	0.39	0.35	44.3
11	T1	All MCs	306	6.8	306	6.8	0.304	3.4	LOS A	2.1	16.5	0.35	0.39	0.35	44.7
12	R2	All MCs	27	6.8	27	6.8	0.304	8.0	LOS A	2.1	16.5	0.35	0.39	0.35	38.1
Approach			377	6.8	377	6.8	0.304	3.8	LOS A	2.1	16.5	0.35	0.39	0.35	44.4
All Vehicles			1339	6.8	1339	6.8	0.603	6.2	LOS A	5.6	44.2	0.60	0.57	0.63	42.7

Table B5b: SIDRA results – Pipidinny Rd / DOS neighbourhood connector / Eglinton station access roundabout – future weekday 3-4PM peak with full development

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Station access road (S)															
1	L2	All MCs	14	6.8	14	6.8	0.155	8.2	LOS A	1.0	7.6	0.78	0.70	0.78	30.2
2	T1	All MCs	71	6.8	71	6.8	0.155	8.1	LOS A	1.0	7.6	0.78	0.70	0.78	42.0
3	R2	All MCs	9	6.8	9	6.8	0.155	12.7	LOS B	1.0	7.6	0.78	0.70	0.78	41.1
Approach			94	6.8	94	6.8	0.155	8.6	LOS A	1.0	7.6	0.78	0.70	0.78	41.2
East: Pipidinny Rd (E)															
4	L2	All MCs	13	6.8	13	6.8	0.603	6.5	LOS A	5.6	44.2	0.75	0.63	0.81	42.3
5	T1	All MCs	558	6.8	558	6.8	0.603	6.4	LOS A	5.6	44.2	0.75	0.63	0.81	42.1
6	R2	All MCs	19	6.8	19	6.8	0.603	11.0	LOS B	5.6	44.2	0.75	0.63	0.81	44.4
Approach			589	6.8	589	6.8	0.603	6.6	LOS A	5.6	44.2	0.75	0.63	0.81	42.2
North: HS western NC (N)															
7	L2	All MCs	1	6.8	1	6.8	0.300	5.3	LOS A	1.8	14.2	0.58	0.61	0.58	44.4
8	T1	All MCs	119	6.8	119	6.8	0.300	5.2	LOS A	1.8	14.2	0.58	0.61	0.58	42.0
9	R2	All MCs	159	6.8	159	6.8	0.300	9.7	LOS A	1.8	14.2	0.58	0.61	0.58	41.4
Approach			279	6.8	279	6.8	0.300	7.8	LOS A	1.8	14.2	0.58	0.61	0.58	41.7
West: Pipidinny Rd (W)															
10	L2	All MCs	43	6.8	43	6.8	0.304	3.5	LOS A	2.1	16.5	0.35	0.39	0.35	44.3
11	T1	All MCs	306	6.8	306	6.8	0.304	3.4	LOS A	2.1	16.5	0.35	0.39	0.35	44.7
12	R2	All MCs	27	6.8	27	6.8	0.304	8.0	LOS A	2.1	16.5	0.35	0.39	0.35	38.1
Approach			377	6.8	377	6.8	0.304	3.8	LOS A	2.1	16.5	0.35	0.39	0.35	44.4
All Vehicles			1339	6.8	1339	6.8	0.603	6.2	LOS A	5.6	44.2	0.60	0.57	0.63	42.7

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

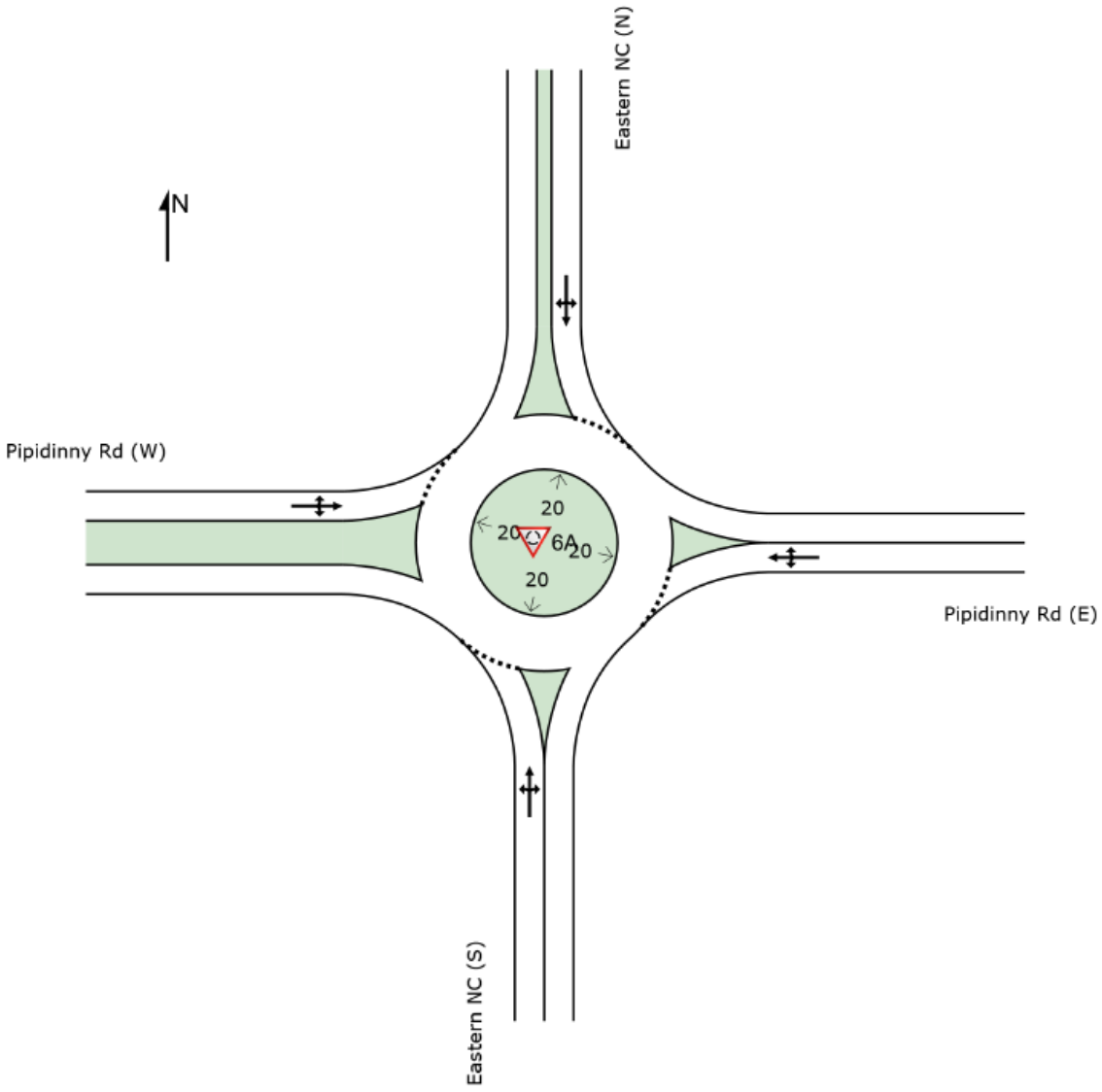

Figure B3: Pipidinny Rd / eastern neighbourhood connector roundabout layout modelled in SIDRA

Table B6a: SIDRA results – Pipidinny Rd / eastern neighbourhood connector roundabout – future weekday 8-9AM peak with full development

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Eastern NC (S)															
1	L2	All MCs	123	6.8	123	6.8	0.286	6.2	LOS A	1.7	13.7	0.66	0.61	0.66	45.3
2	T1	All MCs	113	6.8	113	6.8	0.286	6.1	LOS A	1.7	13.7	0.66	0.61	0.66	45.5
3	R2	All MCs	1	6.8	1	6.8	0.286	10.6	LOS B	1.7	13.7	0.66	0.61	0.66	42.5
Approach			237	6.8	237	6.8	0.286	6.2	LOS A	1.7	13.7	0.66	0.61	0.66	45.4
East: Pipidinny Rd (E)															
4	L2	All MCs	28	6.8	28	6.8	0.299	7.5	LOS A	1.9	15.1	0.77	0.70	0.77	42.2
5	T1	All MCs	132	6.8	132	6.8	0.299	7.4	LOS A	1.9	15.1	0.77	0.70	0.77	42.6
6	R2	All MCs	47	6.8	47	6.8	0.299	12.0	LOS B	1.9	15.1	0.77	0.70	0.77	41.7
Approach			207	6.8	207	6.8	0.299	8.5	LOS A	1.9	15.1	0.77	0.70	0.77	42.3
North: Eastern NC (N)															
7	L2	All MCs	197	6.8	197	6.8	0.630	4.7	LOS A	6.0	47.0	0.64	0.55	0.64	42.5
8	T1	All MCs	245	6.8	245	6.8	0.630	4.6	LOS A	6.0	47.0	0.64	0.55	0.64	45.1
9	R2	All MCs	291	6.8	291	6.8	0.630	9.1	LOS A	6.0	47.0	0.64	0.55	0.64	44.4
Approach			733	6.8	733	6.8	0.630	6.4	LOS A	6.0	47.0	0.64	0.55	0.64	44.2
West: Pipidinny Rd (W)															
10	L2	All MCs	253	6.8	253	6.8	0.373	4.1	LOS A	2.6	20.3	0.46	0.49	0.46	45.7
11	T1	All MCs	86	6.8	86	6.8	0.373	4.0	LOS A	2.6	20.3	0.46	0.49	0.46	43.9
12	R2	All MCs	88	6.8	88	6.8	0.373	8.5	LOS A	2.6	20.3	0.46	0.49	0.46	45.2
Approach			427	6.8	427	6.8	0.373	5.0	LOS A	2.6	20.3	0.46	0.49	0.46	45.3
All Vehicles			1604	6.8	1604	6.8	0.630	6.3	LOS A	6.0	47.0	0.61	0.56	0.61	44.5

Table B6b: SIDRA results – Pipidinny Rd / eastern neighbourhood connector roundabout – future weekday 3-4PM peak with full development

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Eastern NC (S)															
1	L2	All MCs	99	6.5	99	6.5	0.489	7.0	LOS A	3.7	29.1	0.76	0.67	0.80	44.8
2	T1	All MCs	301	6.5	301	6.5	0.489	6.9	LOS A	3.7	29.1	0.76	0.67	0.80	45.1
3	R2	All MCs	9	6.5	9	6.5	0.489	11.5	LOS B	3.7	29.1	0.76	0.67	0.80	42.0
Approach			409	6.5	409	6.5	0.489	7.1	LOS A	3.7	29.1	0.76	0.67	0.80	45.0
East: Pipidinny Rd (E)															
4	L2	All MCs	2	6.5	2	6.5	0.187	7.0	LOS A	1.1	8.9	0.72	0.68	0.72	42.2
5	T1	All MCs	83	6.5	83	6.5	0.187	6.9	LOS A	1.1	8.9	0.72	0.68	0.72	42.5
6	R2	All MCs	47	6.5	47	6.5	0.187	11.4	LOS B	1.1	8.9	0.72	0.68	0.72	41.7
Approach			133	6.5	133	6.5	0.187	8.5	LOS A	1.1	8.9	0.72	0.68	0.72	42.2
North: Eastern NC (N)															
7	L2	All MCs	123	6.5	123	6.5	0.586	5.3	LOS A	5.3	41.4	0.71	0.61	0.72	42.0
8	T1	All MCs	167	6.5	167	6.5	0.586	5.2	LOS A	5.3	41.4	0.71	0.61	0.72	44.7
9	R2	All MCs	316	6.5	316	6.5	0.586	9.7	LOS A	5.3	41.4	0.71	0.61	0.72	44.0
Approach			606	6.5	606	6.5	0.586	7.5	LOS A	5.3	41.4	0.71	0.61	0.72	43.9
West: Pipidinny Rd (W)															
10	L2	All MCs	339	6.5	339	6.5	0.632	7.7	LOS A	6.4	50.4	0.82	0.74	0.94	44.1
11	T1	All MCs	118	6.5	118	6.5	0.632	7.6	LOS A	6.4	50.4	0.82	0.74	0.94	41.9
12	R2	All MCs	120	6.5	120	6.5	0.632	12.2	LOS B	6.4	50.4	0.82	0.74	0.94	43.7
Approach			577	6.5	577	6.5	0.632	8.6	LOS A	6.4	50.4	0.82	0.74	0.94	43.6
All Vehicles			1725	6.5	1725	6.5	0.632	7.9	LOS A	6.4	50.4	0.76	0.67	0.81	44.0