Strategic Transport Network Assessment

Sorell, Tasmania

November 2021

ratio:traffic

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Prepared for:

Sorell Council
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1 Introduction

1.1 Overview

Ratio Consultants have been engaged by Sorell Council to undertake a strategic transport review of Sorell that considers future growth projections, State Government transport projects (namely the Sorell Southern Bypass), and the function of the Sorell township as a key hub for the wider Tasman Peninsula East Coast area.

Amongst other things this study focuses on the proposed growth area to the south-east of the existing Sorell township.

1.2 Purpose of this Assessment

The purpose of the strategic transport network assessment was to:

— Determine the likely future growth-driven traffic generation and distribution for the study area;
— Review the expected changes in traffic volumes and distributions resulting from the soon to be constructed Sorell Southern Bypass; and
— Review the theoretical capacity of the future road network and confirm the suitability of the future transport network.

1.3 Referenced Documents

In preparing the assessment, the following documents were reviewed:

— Sorell Land Supply Strategy Stage 1 – Land Supply and Demand Analysis Report 2019 Update report, prepared by Echelon Planning, dated 21 June 2019;
— Sorell Land Supply Strategy Stage 2 – Assessment of Expansion Options Report 2019 Update report, prepared by Echelon Planning, dated 21 June 2019;
— Sorell Land Supply Strategy Stage 3 – Masterplans Report 2019 Update report, prepared by Echelon Planning, dated 21 June 2019;
— Tasman Highway – Sorell to Hobart Corridor Plan, Department of State Growth (DSG), dated November 2020;
— SETS – Southern Sorell Bypass Traffic Impact Assessment report, prepared by Pitt & Sherry, dated 7 April 2020;
— Sorell to Hobart Planning Study Land Use Planning Analysis report, prepared by ERA Planning & Environment, dated 20 February 2019;
— Land Supply and Demand memo prepared by ERA Planning & Environment, dated 20 July 2020;
— Community Travel Patterns on the Tasman Highway between Sorell and Hobart and Domain Highway, prepared by Data and Analysis Team, State Roads Division, DSG, dated August 2017; and
— Other documents as referenced throughout this report.

2 Background Document Review

2.1 Preamble

A number of background documents were sourced or provided by Council and reviewed accordingly. A summary of the key documents is provided as follows:

2.2 Southern Tasmania Regional Land Use Strategy 2010-2035 (STRLUS)

The STRLUS (dated 19 February 2020) is a broad State Government policy document aimed at facilitating and managing change, growth, and development within Southern Tasmania up until 2035.

The Strategy Vision is:

"a vibrant, growing, livable and attractive region, providing a sustainable lifestyle and development opportunities that build upon our unique natural and heritage assets and our advantages as Australia's southern most region."

Sorell is identified as a Rural Services Centre in the Activity Centre Network in the STRLUS, providing non-urban communities with a range of goods and services to meet daily and weekly needs. Under the STRLUS, a Rural Services Centre is intended to have a mix of retail and office-based employment with at least one supermarket and a range of specialty shops; there would also be basic services such as district health, Service Tasmania and community centres, and local bus facilities with a low-frequency service.

It is however noted that since the STRLUS was first declared in 2011, the role of the Sorell Activity Centre has changed. It not now only supports a town with surrounding non-urban community, but a growing residential suburban area around Sorell, Midway Point and the Southern Beaches. It has multiple supermarkets and shops, with a number of health services and community services.

2.3 Sorell Land Supply Strategy (2019 Update)

Council's Sorell Land Supply Strategy (2019 Update) was prepared by Echelon Planning. It outlines the Land Supply Strategy for the municipality. The original Strategy was prepared in 2017 and the 2019 update was prepared to account for changes that occurred between 2017-2019. These changes include the 2019 Department of Finance release of their population projections for Tasmania and its Local Government Areas (LGA), and updated development data. The Department of Finance's data confirmed that Sorell was one of the fastest growing LGAs, experiencing 3.0% growth in the period June 2017 to June 2018. This forecast growth is more than seven times the State average.

Council endorsed the updated Sorell Land Supply Strategy on the 25 June 2019 and the outcomes of the Strategy have been used by Council in its development of the Local Provisions Schedule ("LPS") for inclusion in the Tasmanian Planning Scheme ("TPS"). The Strategy outlines the quantum of land that should be set aside for development, assessments for expansion options, and masterplans which conceptually demonstrate how the identified development sites can be developed in a way that will integrate with the surrounding areas. The updated Strategy is a major supporting document to the LPS.

The Strategy comprises the following three reports:

— Stage 1: Land Supply and Demand Analysis;
— Stage 2: Assessment of Expansion Options; and
— Stage 3: Masterplans.

The Stage 1 Land Supply and Demand Analysis report adopts a 20-year timeframe (to 2038) and considers the entire municipality in terms of residential, commercial and industrial land uses.

The Stage 2: Assessment of Expansion Options report then goes on to identify development options for the Sorell township and Southern Beaches area and provides outline masterplans for the identified options.

The Stage 3: Masterplans report then goes on to detail masterplans for the recommended options which include an expansion of the Sorell township to the south-east. The location of this growth corridor and the associated indicative masterplan is discussed further in Section 3 of this report.

2.4 Sorell to Hobart Planning Study

The Sorell to Hobart Planning Study Land Use Planning Analysis Report (dated 20 February 2019) was prepared by ERA Planning (ERA) to highlight land use specific planning issues that may influence the successful implementation of an efficient transport solution for the Sorell and Clarence Local Government Areas (LGAs).

The report notes that the relatively compact Sorell township is experiencing the strongest growth of all the councils across Tasmania and that it is well positioned on the transport route from Hobart down to the Tasman and up to the East Coast.

The report notes that the current travel patterns of residents of the Sorell LGA strongly indicate reliance on Clarence and Hobart to meet their employment and social infrastructure needs. The report further notes that in Sorell there are 5,735 employed residents but only 2,378 jobs, the data relied upon in the report further suggests that a high proportion of residents work in Hobart.

In terms of Sorell, the report generally recommends that the DSG should support the ongoing recognition of Sorell and Midway Point as part of Greater Hobart area to enable the infrastructure challenges and patterns in Sorell to be responded to and considered at a Greater Hobart regional level. This should be reflected in any subsequent Regional Land Use Strategy as well as within any other planning opportunities such as the City Deal.

The report specifically recommends that Sorell Council should be supported to implement their strategic plan for the township of Sorell, recognizing that the LGA is not providing adequate residential land to accommodate future growth. If the land identified by Council is not considered appropriate for expansion (for example because it is split in two by the Sorell Bypass), then work with Council to identify alternative sites or attempt to accommodate good links between residential areas despite the location of a major trunk route.

2.5 ERA Land Supply and Demand Memo

The ERA Land Supply and Demand Memo (dated 20 July 2020) sets out a summary of current growth rates and the available supply of land that could meet the expected demand.

The memo includes a summary of the available land zoned General Residential Zone within the municipality that could potentially be developed to meet the short-term residential demand as follows:

Table 2.1: Development Potential of Existing General Residential Zoned Land

Property Address	Approved Lots	Potential Lots	Total Lots
37 Pawleena Road	254	69	323
20 Arthur Highway	55	0	55
2582 Tasman Highway	0	50	50
56-62 Forcett Street	0	59	59
18 Parsonage Place	0	40	40
Wolstenholme Drive	0	36	36
195-227 Penna Road	0	198 (current application)	198
310 Penna Road	0	70	70
Lot 200 Penna Road	0	20	20
Total	**309**	**522**	**831**

The bulk of the potentially developable land is located on Penna Road, Midway Point (288 lots), and on Pawleena Road, Sorell (323 lots).

In addition, the ERA memo notes that there are a number of potential Low Density Residential Lots that could be developed in the Southern Beaches area, the locations of these lots and their development potential is summarised in Table 2.2:

Table 2.2: Development Potential of Existing Low Density Residential Lots

Property Address	Location	Approved Lots	Potential Lots	Total Lots
Nicholas Avenue	Dodges Ferry	0	9	9
1 Tenth Avenue	Dodges Ferry	0	9	9
7 Neagarra Street	Dodges Ferry	0	8	8
14 Signal Hill Road	Dodges Ferry	24	0	24
17 Cootamundra Court	Dodges Ferry	0	3	3
116a Bally Park Road	Dodges Ferry	0	6	6
223 Carlton River Road	Carlton	0	14	14
26 Gate Five Road	Carlton River	0	13	13
2d Doges Hill Road	Dodges Hill	0	6	6
Ridge Road	Dodges Ferry	0	3	3
204 Carlton River Road	Carlton	0	9	9
176 Carlton River Road	Carlton	0	9	9
40 Erle Street	Carlton	0	3	3
Total		**24**	**92**	**116**

As outlined in Table 2.2, a total of 116 lots could potentially be provided within the Southern Beaches area with 68 lots in the Dodges Ferry area and 48 lots in Carlton. Table 2.1 and Table 2.2 indicate that there is a total supply of 947 residential lots within the LGA that could be readily developed.

The memo goes on to note that given the current population growth rate of 3% per annum that there would be enough land supply to meet demand up until 2023, subject to the majority of the 947 lots being developed. The memo goes on to conclude that:

"There is no other Future Urban Zoned land and there is not any other land which is within the Urban Growth Boundary under the Southern Tasmania Regional Land Use Strategy that can be rezoned. To that end, it is not only becoming increasingly critical to see a review of the Regional Land Use Strategy, but in the short term ensuring all Future Urban zoned land is development ready to maximise the land supply available given the development pressure".

2.6 Other Documents Provided By Council

Council also provided other documents pertaining to development within the study area. These documents are briefly described in Table 2.3:

Table 2.3: Documents Review Summary

Title	Author	Comments
Traffic Impact Assessment – Proposed Land Use Rezoning for Residential Development: 5 Arthur Highway, Sorell	Milan Prodanovic Traffic Engineering and Road Safety (dated February 2020)	• For the development of the Stage 1 area shown on the Sorell – Eastern Corridor Masterplan (refer to Figure 4.2). • The report adopts a development yield of 250 dwellings (verses, the 434 allowed for in the Indicative Sorell – Eastern Corridor Masterplan).
Traffic Engineering Response to Grounds of Refusal – 9 Pelham Street, Sorell	GHD, dated 19 May 2021	• The site location is outside of the Indicative Sorell – Eastern Corridor Masterplan area (refer to Figure 4.2) in an already established residential area. • The Planning Application was the construction of multiple dwellings on one allotment.

3 Existing Conditions

3.1 Existing Transport Network

Existing Roads and Traffic Volumes

The existing road network in the vicinity of the core study area is outlined in Figure 3.1 and Figure 3.2:

Figure 3.1: Existing Road Network

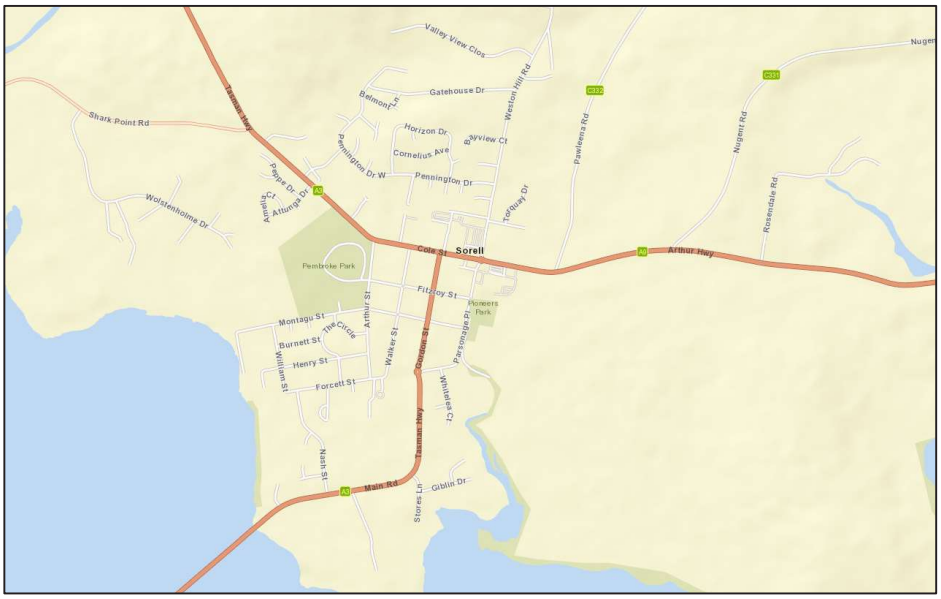


Figure 3.2: Existing Road Network in the Vicinity of the Proposed Growth Area

Base map source: https://maps.thelist.tas.gov.au/listmap/app/list/map

As outlined in Figure 3.1:, the key proposed growth area sits to the south of the existing Arthur Highway alignment.

Arthur Highway is owned by the DSG and is classified as a Category 3 road. It provides the only connection for townships on the Tasman Peninsula to the wider road network. In the vicinity of the Sorell township it has one 3.5m wide lane in each direction, with 0.5m sealed shoulders. It has a posted speed limit of 80km/hr and carries some 13,800 vehicles per day (vpd) with an 8.9% heavy vehicle mix[1].

To the west of the proposed growth area **Main Road / Gordon Street (Tasman Highway)** is a DSG owned Category 2 classified road. Main Road operates as a main highway connecting Sorell and the various townships on the Tasman Peninsula and the Greater Hobart region. Main Road becomes Gordon Street between Forcett Street and Cole Street. At the end of Gordon Street vehicles either turn left to the Tasman Highway (Cole Street) or right to the Arthur Highway at a signalised intersection. Main Road carries approximately 17,130 vpd with an 8.4% heavy vehicle mix[1].

Forcett Street (including Parsonage Place and Pelham Street) is a sealed two-way Council owned road with a marked 3.2m lane in each direction and a kerb and gutter on each side. Forcett Street has a posted speed limit of 50km/h and provides the primary light vehicle route between Main Road and the Arthur Highway in Sorell. Forcett Street carries approximately 7,700 vpd with 0.5% classified heavy vehicles[1].

Cole Street connects the Arthur Highway and Tasman Highway within the township. It consists of a 3.5m wide traffic lane in each direction and 3m wide marked on-street parking bays on either side of the street. Cole Street has a posted speed limit of 50km/hr and forms part of the designated heavy vehicle route through Sorell. Cole Street carries approximately 5,700 vpd with an 8.7% heavy vehicle mix[1].

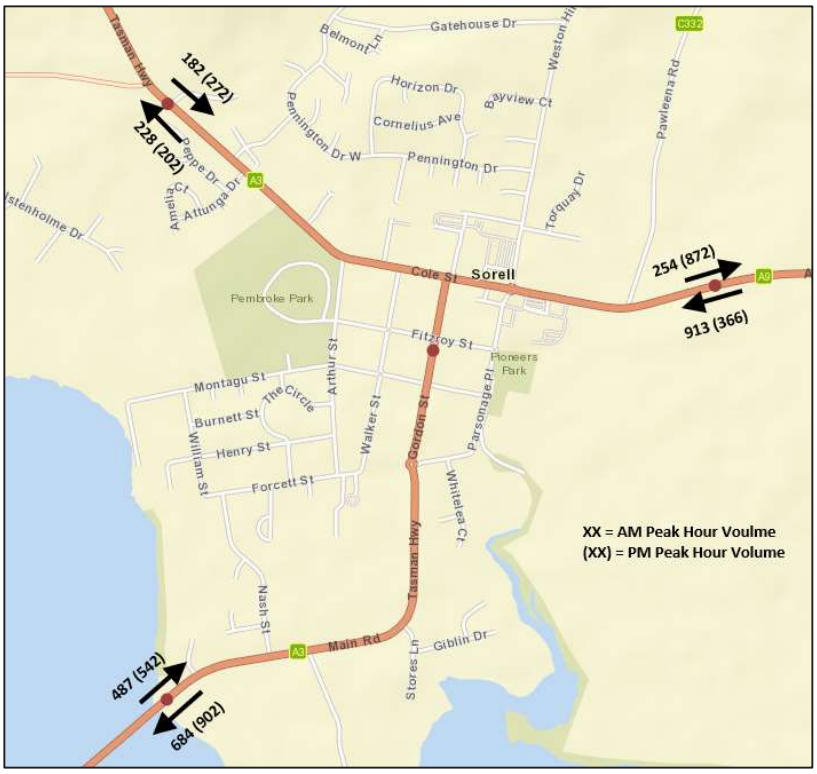
Nugent Road is a sealed two-way Council owned Collector Road that connects to the Arthur Highway just east of Sorell. Nugent Road has a sealed carriageway width of approximately 6m with unsealed shoulders on either side and no centre dividing line. In the vicinity of the Arthur Highway, Nugent Road has a posted speed limit of 60km/h. Nugent Road can also be utilised as an alternative route to the east coast, connecting to the Tasman Highway at Buckland. Nugent Road currently carries approximately 400 vpd[2].

Existing (2019) daily traffic volumes for key routes in/out of the Sorell township have also been sourced from the DSG's traffic Statistics database[3].

These volumes are summarised in Figure 3.3:

[1] Source: –SETS – Southern Sorell Bypass Traffic Impact Assessment report, prepared by Pitt & Sherry, dated 7 April 2020.
[2] Source: –SETS – Southern Sorell Bypass Traffic Impact Assessment report, prepared by Pitt & Sherry, dated 7 April 2020.
[3] http://geocounts.com/traffic/au/stategrowth

Figure 3.3: 2019 Peak Hour Traffic Volumes



Existing Intersections

There are a number of existing intersections proximate to the study area. A description of each of these intersections is provided in Table 3.1 with their locations shown in Figure 3.4.

Table 3.1: Existing Intersection Typologies

No.	Intersection	Type
1	Arthur Highway / Pawleena Road	Unsignalised
2	Arthur Highway / Nugent Road	Unsignalised
3	Main Street (Tasman Highway) / Forcett Street	Roundabout
4	Gordon Street / Somerville Street	Unsignalised
5	Fitzroy Street / Pelham Street / Pawleena Road	Roundabout
6	Gordon Street / Fitzroy Street	Roundabout
7	Pelham Street / Cole Street (Arthur Highway)/ Weston Hill Road	Roundabout
8	Gordon Street / Cole Street	Signalised

Figure 3.4: Existing Intersection Locations

Public Transport

Sorell has a dedicated Park and Ride facility located on Station Lane within the existing Sorell township area. Improved bus services commenced for Sorell on Saturday 1 February 2020 as part of ongoing statewide bus network enhancements by the State Government. The township is now serviced by bus routes 731 (Sorell to Hobart), X31 (Sorell to Hobart EXPRESS), and X33 (Hobart to Sorell EXPRESS). A total of 17 services run on weekdays with nine daily services on the weekend.

Active Transport

Footpaths are generally provided on at least one side of the road on key roads within the existing Sorell township.

In addition, a 2.5m wide concrete shared path is located on the north side of the Tasman Highway between the Causeway and Stores Lane where a staged crossing is provided for crossing the Highway. After this point, the path on the north side of the road is a pedestrian footpath. The concrete shared path continues on the southern side of the Highway where it crosses Stores Lane and is unsealed to the Sorell Rivulet where a bridge is provided, this path then follows the alignment of the Sorell Rivulet where further north it is again sealed with connections provided to Pioneer Park and Parsonage Place.

3.2 Sorell Southern Bypass

The construction of the Sorell Southern Bypass, for which a transport corridor has been identified and protected, commenced in mid-2021. The alignment of the Bypass is outlined in Figure 3.5:

Figure 3.5: Sorell Southern Bypass

Source: https://www.transport.tas.gov.au/__data/assets/pdf_file/0006/226329/Tasman_Highway_-_Sorell_Southern_Bypass_Drawing.pdf

The Sorell Southern Bypass will provide for one traffic lane in each direction and include roundabout intersections at Tasman Highway/Main Road in the south-west and at the Arthur Highway (near Nugent Road) in the north-east. These intersections are spaced approximately 1.2km apart. The two-lane bypass will have a speed limit of 80km/hr.

It is understood through discussions with Council that no further connections will be permitted by the State Government to the Bypass other than those already shown in Figure 3.5 at this time.

The Traffic Impact Assessment for the Sorell Southern Bypass was included as Appendix F of the DSG's "South East Traffic Solution: Sorell Southern Bypass Report Supporting a Planning Permit Application" (dated September 2020).

The Traffic Impact Assessment, prepared by Pitt & Sherry (Rev 01, dated 7 April 2020), notes that origin-destination surveys were undertaken on Wednesday 29 August 2018 and found that approximately 60% of vehicles during the AM peak hour and 40% of vehicles in the PM peak hour were travelling unnecessarily through the Sorell township without stopping.

4 Eastern Corridor Concept Masterplan

4.1 Preamble

The municipality of Sorell is experiencing one of the highest growth rates in Tasmania. The Department of Treasury and Finance's 2019 population projections show that Sorell grew at 3% in the growth period June 2017 – June 2018, taking the total population in June 2018 to 15,218[4]. This level of growth is expected to continue, and it is therefore important that enough land is available to cater for these additional residents.

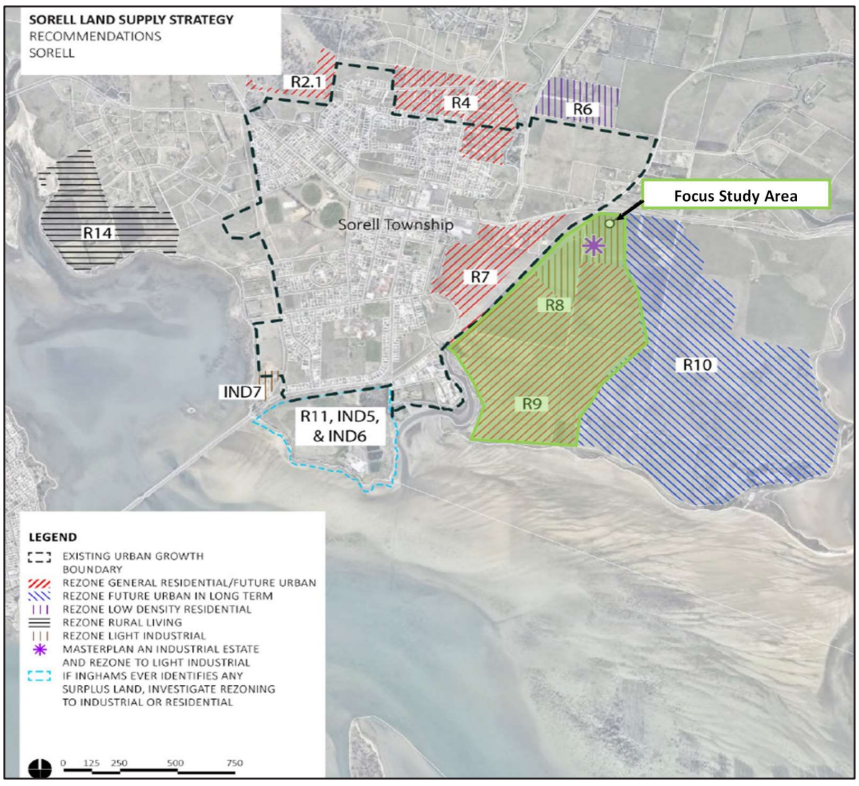
4.2 Sorell Land Supply Strategy

The updated Sorell Land Supply Strategy (previously discussed in Section 2.3) was endorsed by Council on 25 June 2019. The outcomes of this Strategy will be used by Council in its development of LPPs for inclusion in the Tasmanian Planning Scheme.

The Strategy identified locations and masterplans for the recommended growth options within the identified growth areas.

The key identified growth area for the Sorell Township is to the south-east of the existing township as outlined in Figure 4.1:

Figure 4.1: Focus Study Area



Base plan source: Sorell Land Supply Strategy Stage 3 – Masterplans 2019 Update report (Echelon Planning, dated 21 June 2019)

As outlined above, the majority of the growth in the Sorell township area is envisaged to occur to the south-east of the existing township, to the south of the south of Arthur Highway and the east of the Sorell Rivulet.

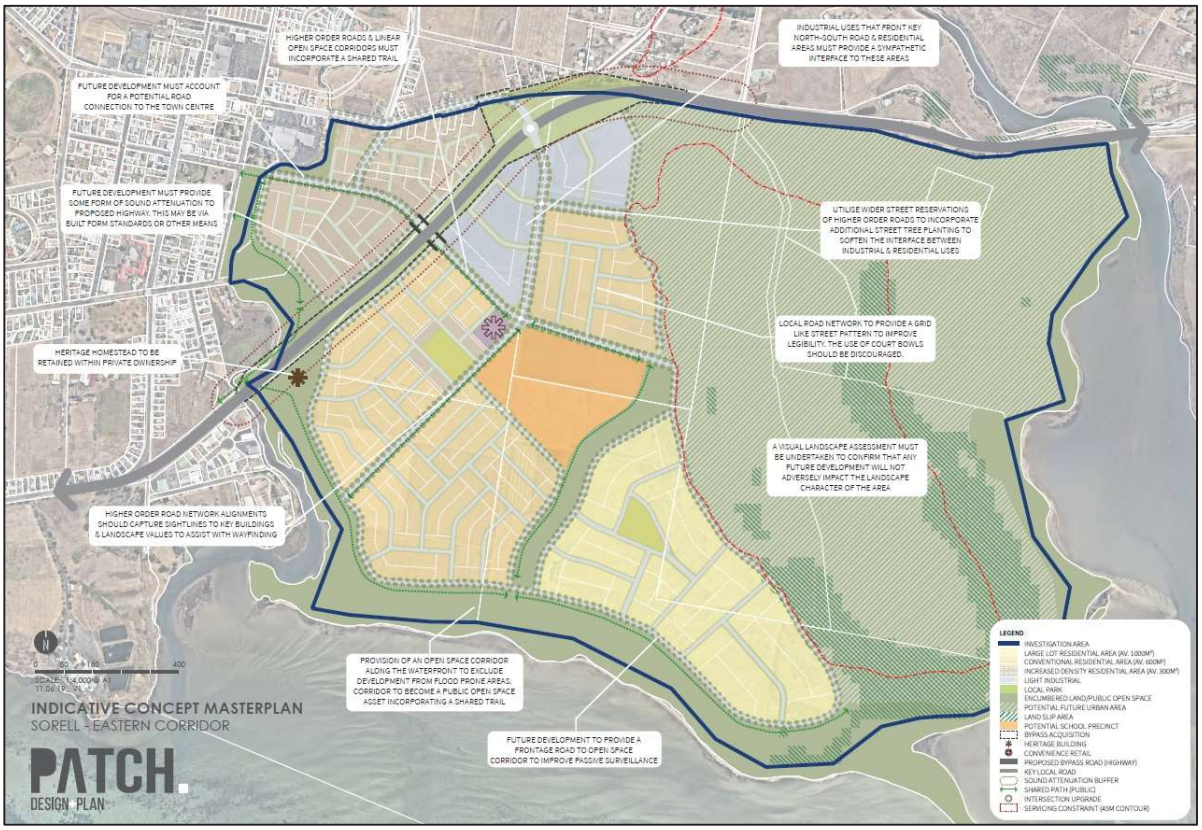
[4] Source: Land Supply and Demand memo prepared by ERA Planning & Environment, dated 20 July 2020;

4.3 Eastern Corridor Concept Masterplan

The Sorell Land Supply Strategy identified the most suitable sites for additional growth, masterplans were also developed to conceptually demonstrate that the selected sites can be developed in a way that will integrate with the surrounding area.

The masterplan developed for the core study area is referred to as the Indicative Eastern Corridor Concept Masterplan and is shown below in Figure 4.2.

Figure 4.2: Eastern Corridor Indicative Concept Masterplan



Base plan source: Sorell Land Supply Strategy Stage 3 – Masterplans 2019 Update report (Echelon Planning, dated 21 June 2019)

The Indicative Concept Masterplan for the Sorell Eastern Corridor is based on an expansion of the Sorell township to the south-east. It accommodates the land that was identified in Stage 2 of the Sorell Land Supply Strategy as the most suitable for urban development given its proximity to the town centre and the presence of fewer constraints compared to other sites.

The Sorell Southern Bypass (currently under construction) will traverse the area, providing access to the growth area via a roundabout at its northern end. The Indicative Masterplan envisages a road connection via a grade separated crossing of the Sorell Southern Bypass that allows local traffic to travel within the growth area and connect to the existing Sorell township. The Indicative Masterplan shows this road potentially connecting to Fitzroy Street via a new bridge across the Sorell Rivulet, in the long-term, with a new roundabout at the Arthur Road/Pawleena Road intersection in the short-term to provide access to the Sorell township.

It is however noted that the envisaged grade separated crossing of the Bypass will not be constructed as part Sorell Southern Bypass construction which is currently in progress.

The Sorell Land Supply Strategy Stage 3 report further notes that the growth area local road network has been designed to provide an east-west road that connects the site to the Sorell township, and north-south roads that follow drainage lines and provide view lines down to the coast and up to Mount Garret with frontage roads also provided adjacent to the coast and waterways.

The Indicative Masterplan also includes an 11ha light industrial estate located in the north-east corner where the land is flatter and where the existing and proposed roads can be used to assist with providing a buffer between houses and light industrial uses. An option for a non-government school site is depicted should an opportunity arise to develop another school in Sorell.

4.4 Land Use Forecasts

Sorell Land Supply Strategy Stage 3 report notes that the development of the Eastern Corridor is expected to take place over four stages as outlined in Figure 4.3 and Table 4.1.

Figure 4.3: Eastern Corridor Development Staging

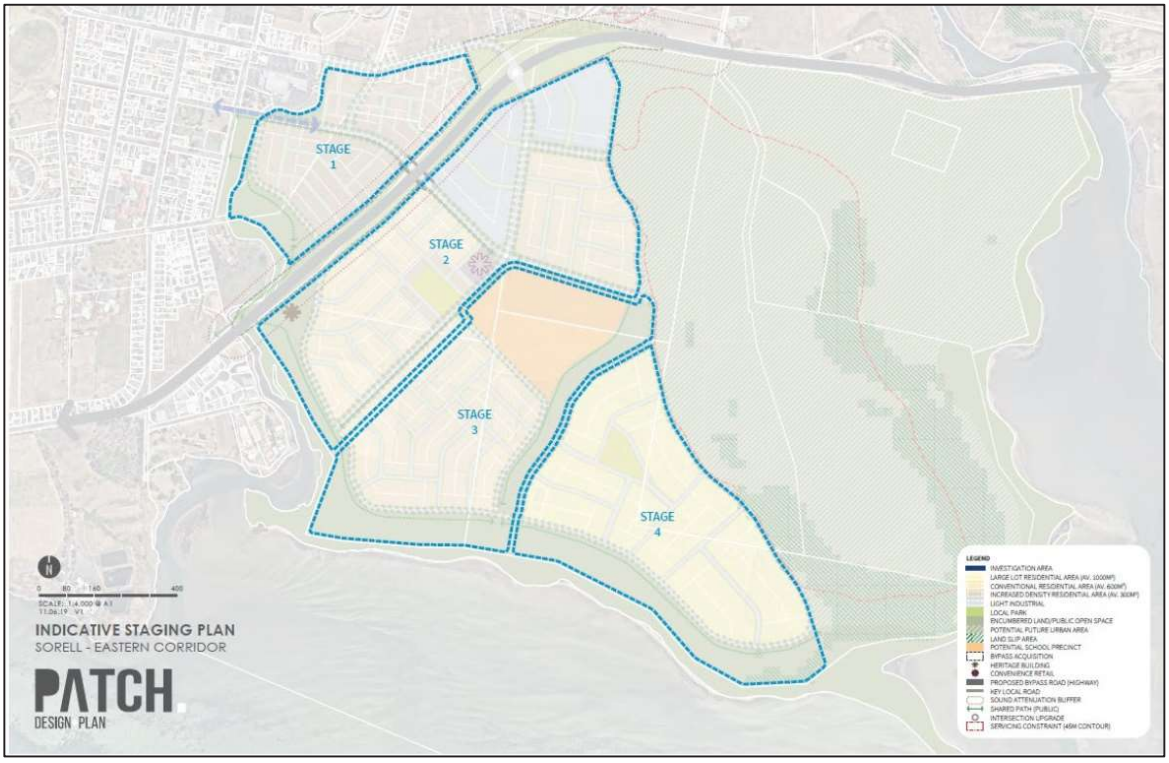


Table 4.1: Eastern Corridor Growth Area Land Budget

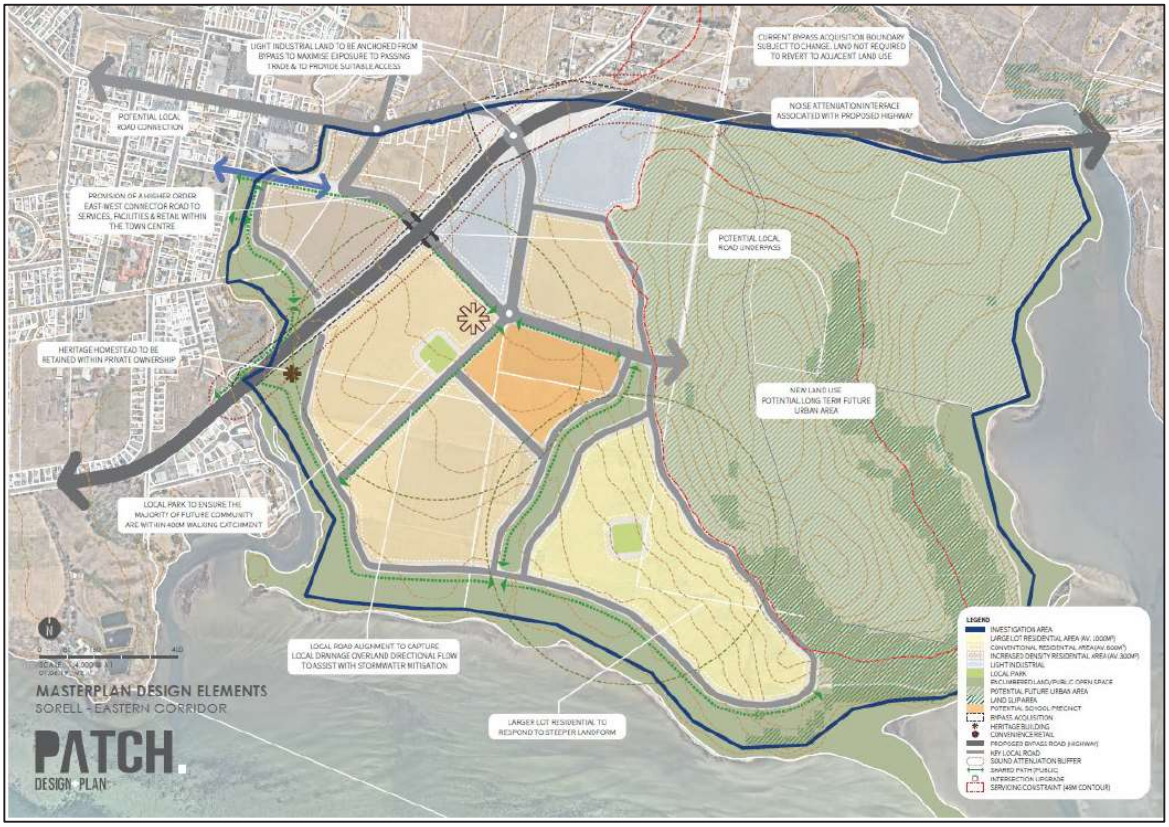
Land Use	Estimated Yield			
	Stage 1	Stage 2	Stage 3	Stage 4
Residential	434	355	225	225
Industrial		10 Ha		
School			10 Ha	
Local Convenience Centre		0.61 Ha		

As outlined in Table 4.1, the Masterplan area is envisaged to cater for 1,269 residential dwellings, industrial uses, a non-government school and a Local Convenience Centre (LCC).

4.5 Proposed Transport Network

The key elements of the indicative transport network for the growth area are outlined in Figure 4.4. It is highlighted that the transport network is indicative only and subject to refinement.

Figure 4.4: Indicative Key Transport Network Elements



The key transport features are summarised as follows:

- The Sorell Southern Bypass, which includes roundabout intersections at Tasman Highway/Main Road in the south-west and at the Arthur Highway (near Nugent Road) in the north-east. These intersections are spaced approximately 1.2km apart.
- A grade separated crossing of the Bypass aimed at providing for local traffic.
- An indictive connection to Fitzroy Street in the west which would require a new bridge across the Sorell Rivulet.
- A number of key local roads (Collector Roads).
- A number of shared paths throughout the growth corridor.

5 Expected Eastern Growth Corridor Traffic Generation

5.1 Methodology for Assessing Future Traffic Volumes

The methodology adopted for assessing the future traffic volumes for the Sorell Eastern Growth Corridor involved using the analysis undertaken for the Sorell Southern Bypass to assess the background traffic volumes on the arterial road network and a first principles-based approach to assess the traffic generated by the full development of the Sorell Eastern Growth Corridor area.

The background traffic volumes were then added to the traffic volumes calculated for the Sorell Eastern Growth Corridor area to provide post-development or "Ultimate" traffic volumes for the area.

5.2 Background Traffic Volumes

The Traffic Impact Assessment for the Sorell Southern Bypass (Bypass TIA report) is included the Appendix F of the DSG's "South East Traffic Solution: Sorell Southern Bypass Report Supporting a Planning Permit Application" (dated September 2020).

This report includes existing 2019 and future 2042 with Bypass traffic volumes. The 2042 with Bypass traffic volumes as outlined in the Bypass TIA are outlined in Figure 5.1 and Figure 5.2 for the morning and evening weekday commuter peak hours respectively.

Figure 5.1: 2042 Weekday Background Volumes (AM Peak)

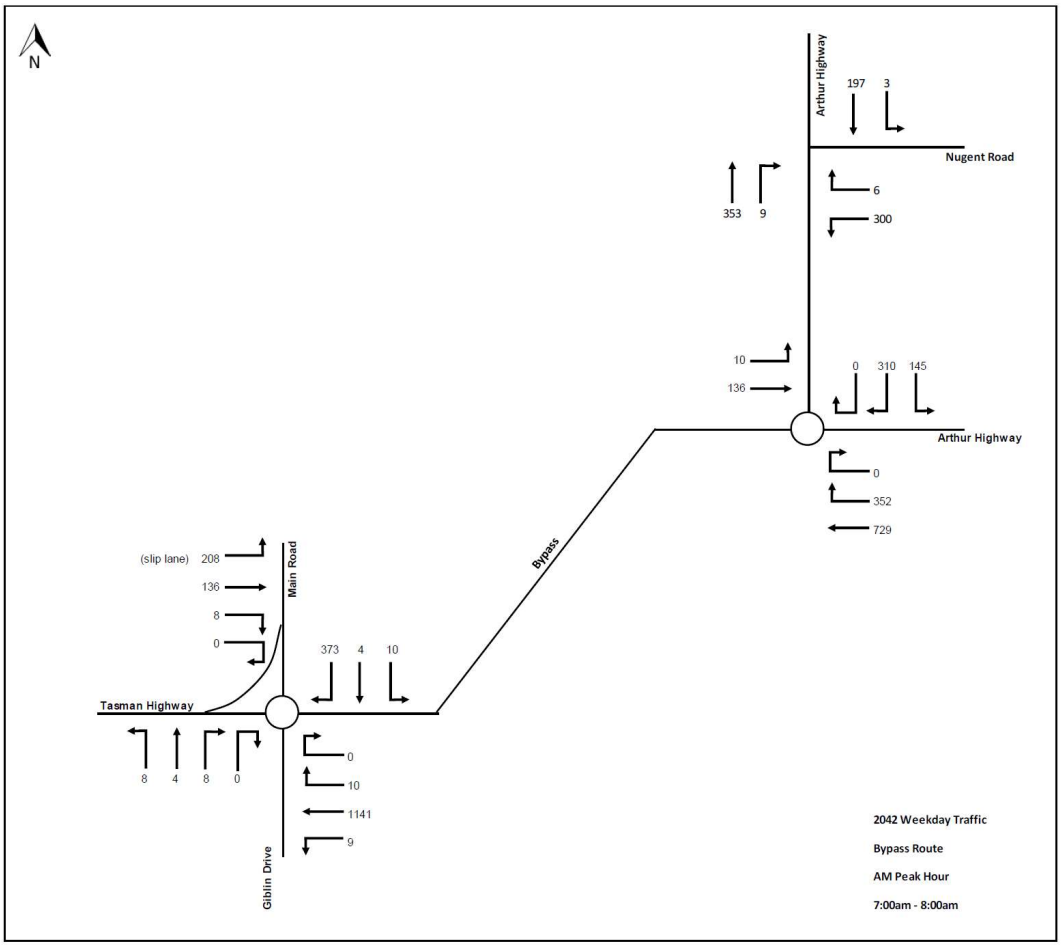
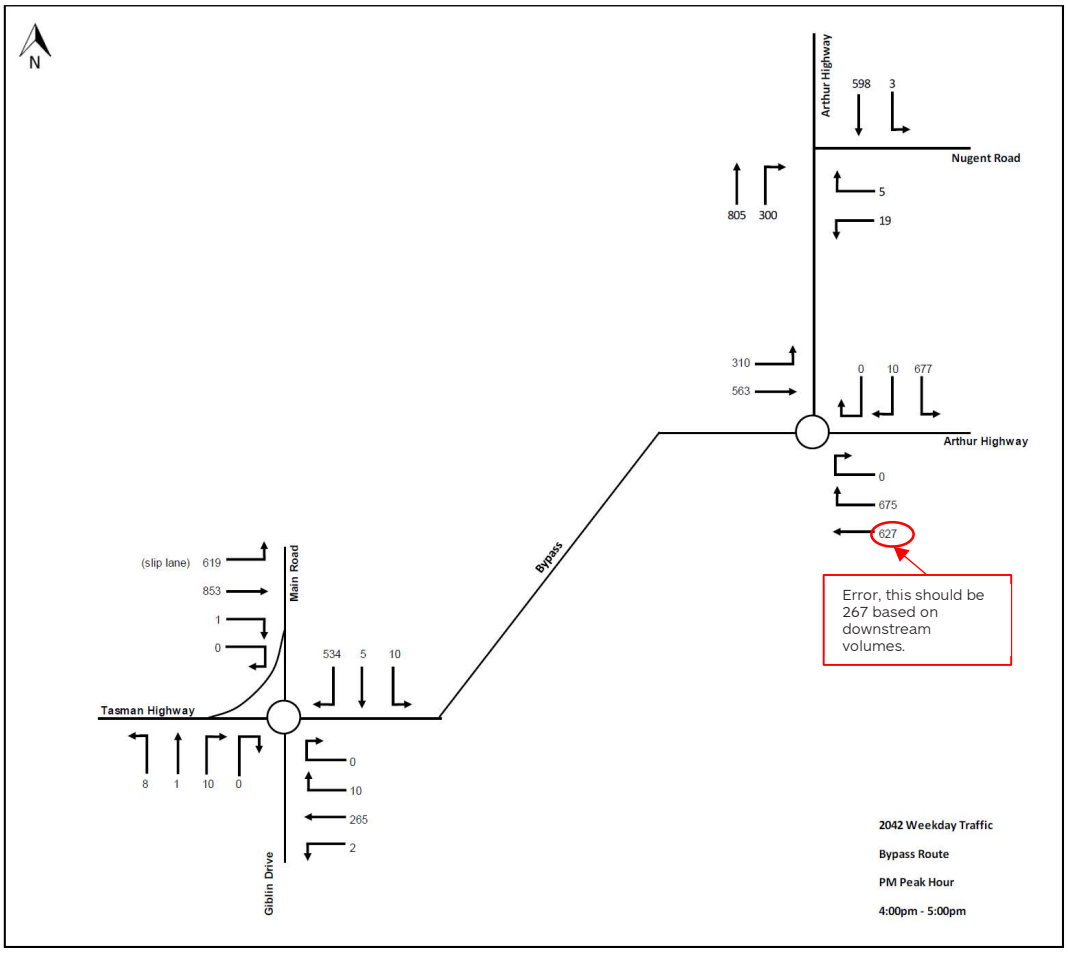


Figure 5.2: 2042 Weekday Background Volumes (PM Peak)



Based on the volumes outlined in Figure 5.1 and Figure 5.2, the 2042 peak hour traffic volumes expected to be carried by the Bypass are outlined in Table 5.1:

Table 5.1: 2042 Background Bypass Traffic Volumes

Peak Hour	Peak Hour Traffic Volume		
	Southbound	Northbound	Total
AM	1,160	154	1,314
PM	227	873	1,100

5.3 Adopted Traffic Generation Rates

The first principles-based assessment of the growth area involved applying empirical traffic generation rates to the proposed land uses and distributing the trips onto the wider road network. The following subsections discuss the adopted traffic generation rates.

Residential dwellings

Residential traffic generation data collected by Ratio Consultants for subdivisions in growth areas suggests a residential traffic generation rate of 8.0 trips/household/day.

This rate is consistent with the rate adopted in the *"Traffic Impart Assessment Proposed Land Use Rezoning For Residential Development – 5 Arthur Highway Sorell"* report (prepared by Milan

Prodanovic Traffic Engineering and Road Safety, dated February 2020). This report notes that the adopted rate is consistent with surveys of built-up areas of Tasmania.

A daily residential traffic generation rate of 8.0 trips/dwelling has therefore been adopted for the purposes of this assessment. Typically, 10% of daily trips occur within the commuter peak hours, a commuter peak hour traffic generation rate of 0.8 trips/dwelling has therefore been adopted for the purposes of this assessment.

In addition, an internal trip reduction factor of 25% has been applied to the residential trips to account for trips fully contained with the growth area (to/from the school, LCC, recreational areas and the industrial area). This internal trip reduction factor is based on Section 3.3 of the New South Wales Road and Traffic Authority (RTA) "Guide to Traffic Generating Development" document (RTA Guide), a commonly adopted data source throughout Australia.

Furthermore, a directional distribution of 20% inbound/80%outbound trips has been adopted for the AM commuter peak hour, and a 60% inbound / 40% outbound split has been adopted for the PM peak hour based on surveys for subdivisions in growth areas.

School

The traffic generation rates for the school use have been sourced from the New South Wales (NSW) Roads and Maritime Services (RMS) 2014 trip generation surveys of schools in the Greater Sydney area. The surveys resulted in an average daily trip rate of 1.59 trips per student for schools in both metropolitan and regional areas, and an average AM peak hour rate of 0.88 trips per student, and an average school PM peak hour rate of 0.71 trips per student.

For the purposes of this assessment an AM peak hour traffic generation rate of 0.44 trips per student has been adopted, this rate is half the average RMS surveyed rate of 0.88 trips per student to account for the school AM peak hour not overlapping fully with the AM commuter peak hour of 7:00-8:00am.

Furthermore, a PM commuter peak hour rate of 0.1 trips per student has been adopted to allow for staff movements given that the school PM peak hour does not coincide with the PM commuter peak hour.

The envisaged school is expected to be a non-government school. The school has been assumed to cater for 554 students based on the national average student enrollments at non-government schools[5].

Furthermore, the NSW RMS surveys also suggest a directional distribution of 51% inbound / 49% outbound in the AM Peak. A commuter PM peak hour distribution of 90% outbound/10% inbound is proposed to account for staff movements.

Local Convenience Centre

In order to assess the likely traffic generation of the Local Convenience Centre (LCC), reference is made to the RTA Guide. It is anticipated that the LCC will essentially operate as small shopping centre servicing the needs of the local community.

For shopping centres up to 10,000sqm in floor space, the RTA Guide suggests a daily traffic generation rate of 121 trips per 100sqm and 12.5 trips per 100sqm during the evening commuter peak hour.

In regard to the AM commuter peak, the RTA Guide does not suggest a trip rate, similarly limited case study data is available for the AM peak period. For the purposes of this assessment, it has been assumed that the AM peak hour trip rate will be 10% of the PM peak hour trip rate (i.e. 1.25 trips per 100 sqm) to account for staff and servicing activities.

Furthermore, it has been assumed that 50% of the total area will translate to developable floor area.

In addition, a directional distribution of 50% inbound/50%outbound trips has been adopted for both the commuter peak hours as the duration of visits to the LCC is generally expected to be less than one hour.

[5] Source: https://isa.edu.au/about-independent-schools/about-independent-schools/independent-schools-overview/

Industrial Use

An 10ha light industrial estate has been identified for the relatively flat area of land south of the Arthur Highway within the Indicative Concept Masterplan for the Sorell-Eastern Corridor.

Guidance on the traffic generating potential of the industrial use has been sought from the NSW Transport Roads and Maritime Services Technical Direction – Guide to Traffic Generating Developments – Updated Traffic Surveys, August 2013, (the RMS Guide). The RMS Guide includes a traffic generation rates for business parks and industrial estates in regional areas.

The RMS Guide reports an average AM peak hour rate of 0.7 trips per 100 sqm gross floor area (GFA), an average PM peak hour rate of 0.78 trips per 100 sqm GFA, and an average daily trip rate of 7.83 trips per 100 sqm GFA for light industrial areas. These rates have been adopted for the purposes of this assessment.

Furthermore, it has been assumed that 50% of the total area will translate to developable GFA, and a directional distribution of 90% inbound/10%outbound trips has been adopted for the AM commuter peak hour and a 10% inbound / 90% outbound split has been adopted for the PM peak hour to account for staff movements.

5.4 Growth Area Traffic Generation

Based on the above outlined traffic generation rates, the traffic volumes expected to be generated by the full development of the Sorell Eastern Growth Corridor area are summarised in Table 5.2 to Table 5.4:

Table 5.2: Growth Area Traffic Generation (Full Development) – AM Peak Hour

Land Use	Estimated Traffic Generation					Trip Apportionment	
	Stage 1	Stage 2	Stage 3	Stage 4	Total	Internal	External
Residential	347	284	180	180	991	248	743
Industrial		390			390		390
School			244		244		244
Local Convenience Centre		38			38		38
Total	**347**	**712**	**424**	**180**	**1,663**	**248**	**1,415**

Note: refer to Figure 4.3 for development staging.

Table 5.3: Growth Area Traffic Generation (Full Development) – PM Peak Hour

Land Use	Estimated Traffic Generation					Trip Apportionment	
	Stage 1	Stage 2	Stage 3	Stage 4	Total	Internal	External
Residential	347	284	180	180	991	248	743
Industrial		350			350		350
School			55		55		55
Local Convenience Centre		381			381		381
Total	**347**	**1,015**	**235**	**180**	**1,778**	**248**	**1,530**

Note: refer to Figure 4.3 for development staging.

Table 5.4: Growth Area Traffic Generation (Full Development) – Daily Peak Hour

Land Use	Estimated Traffic Generation					Trip Apportionment	
	Stage 1	Stage 2	Stage 3	Stage 4	Total	Internal	External
Residential	3,472	2,840	1,800	1,800	9,912	2,478	7,434
Industrial		3,915			3,915		3,915
School			881		881		881
Local Convenience Centre		3,691			3,691		3,691
Total	**3,472**	**10,446**	**2,681**	**1,800**	**18,398**	**2,478**	**15,920**

Note: refer to Figure 4.3 for development staging.

5.5 Traffic Distribution

The distribution of the traffic generated by the growth area onto the surrounding road network has been based on the distribution of surveyed 2019 traffic volumes and the assumption that 25% of all trips generated by the growth area will be to/from the Sorell township[6] for daily needs. The resulting distributions adopted for the growth area are outlined as follows:

Table 5.5: Distribution of External Trips Generated by the Growth Area

Origin/Destination	AM Peak Hour		PM Peak Hour	
	To	From	To	From
West (towards Hobart)	68%	68%	70%	70%
Sorell Township	25%	25%	25%	25%
East (towards Forectt)	7%	7%	5%	5%

The above outlined distributions indicate that the majority of the trips generated by the growth area will be to/from the west (towards Hobart).

[6] This factor is based on the internal trip reduction factor outlined in Section 3.3 of the New South Wales Road and Traffic Authority (RTA) "Guide to Traffic Generating Development" document (RTA Guide).

5.6 Growth Area Generated Traffic Volumes

Based on the traffic volumes and distributions outlined above, the expected 2042 peak hour volumes with the full development of the growth area were derived. In doing so the following assumptions were made in relation to how the traffic generated by growth area would access the surrounding road network:

Table 5.6: Growth Area Traffic Route Distribution

Development Stage	Land Use	Trips via the Sorell Township			Trips via the Bypass Access		
		West	Sorell	East	West	Sorell	East
Stage 1	Residential	100%	100%				100%
Stage 2	Residential	50%	50%		50%	50%	100%
	Industrial		100%		100%		100%
	Local Convenience Centre	100%	100%				100%
Stage 3	Residential		50%		100%	50%	10%
	School		100%		100%		100%
Stage 4	Residential		50%		100%	50%	100%

Note: refer to Figure 4.3 for development staging.

The resulting growth area traffic volumes are outlined in Figure 5.3 and Figure 5.4:

Figure 5.3: 2042 Growth Area Generated AM Peak Hour Traffic Volumes (Full Development)

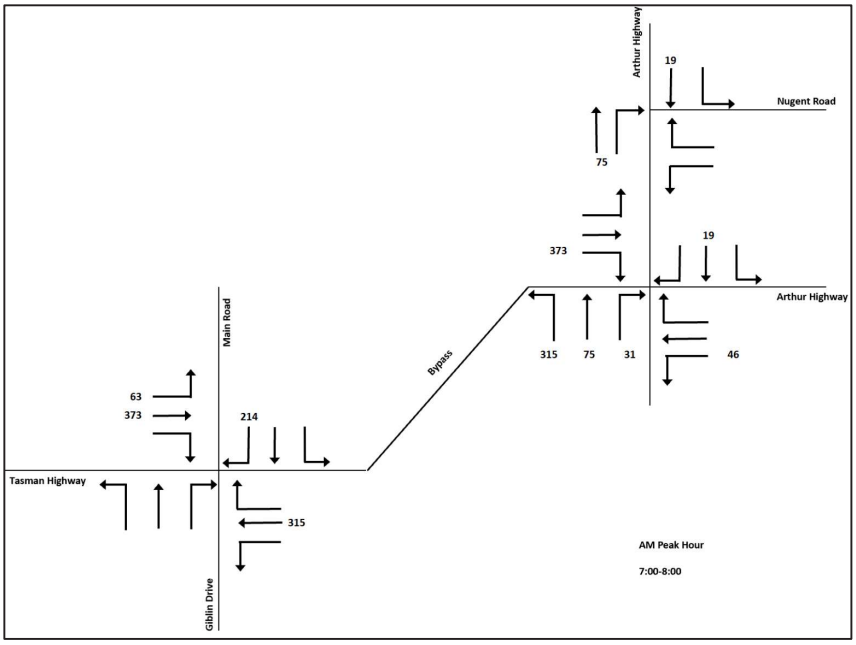
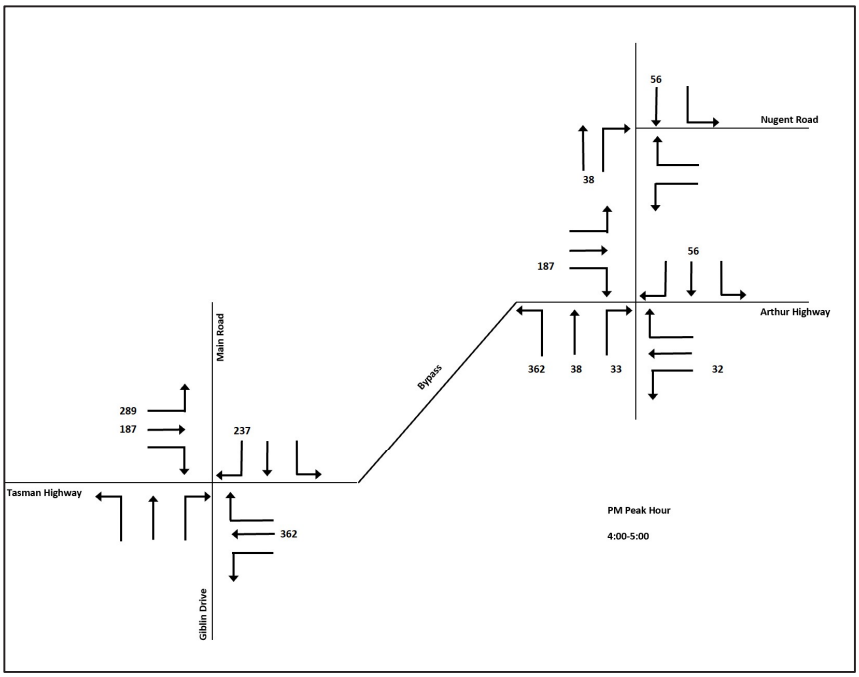


Figure 5.4: 2042 Growth Area Generated PM Peak Hour Traffic Volumes (Full Development)



5.7 Ultimate 2042 Traffic Volumes

The 2042 background volumes were then added to the 2042 growth area generated traffic volumes to determine the Ultimate 2042 traffic volumes which account for the completion of the Southern Sorell Bypass and the full development of the growth area. The Ultimate traffic volumes during the commuter peak hours are outlined as follows:

Figure 5.5: 2042 Ultimate AM Peak Hour Traffic Volumes

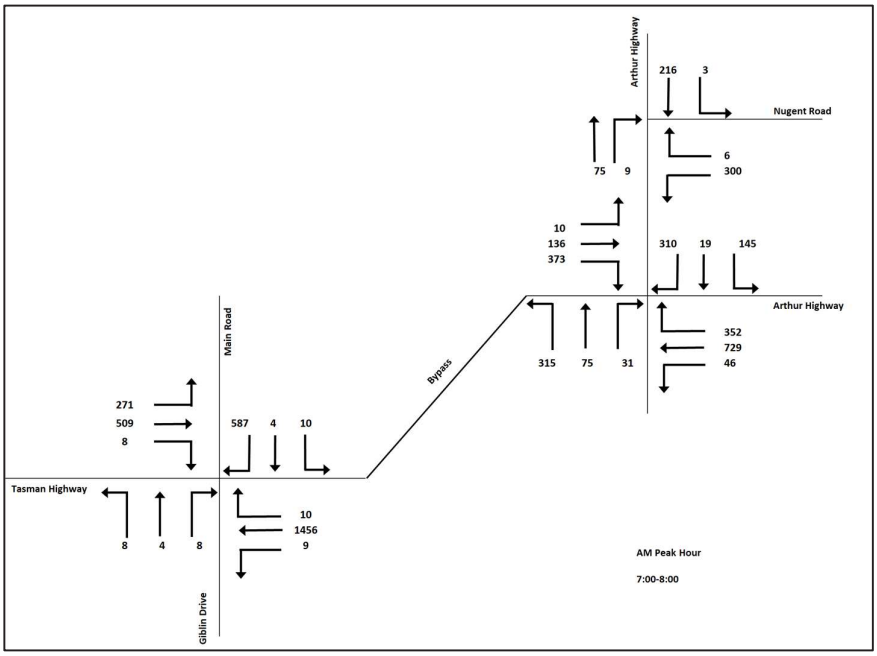
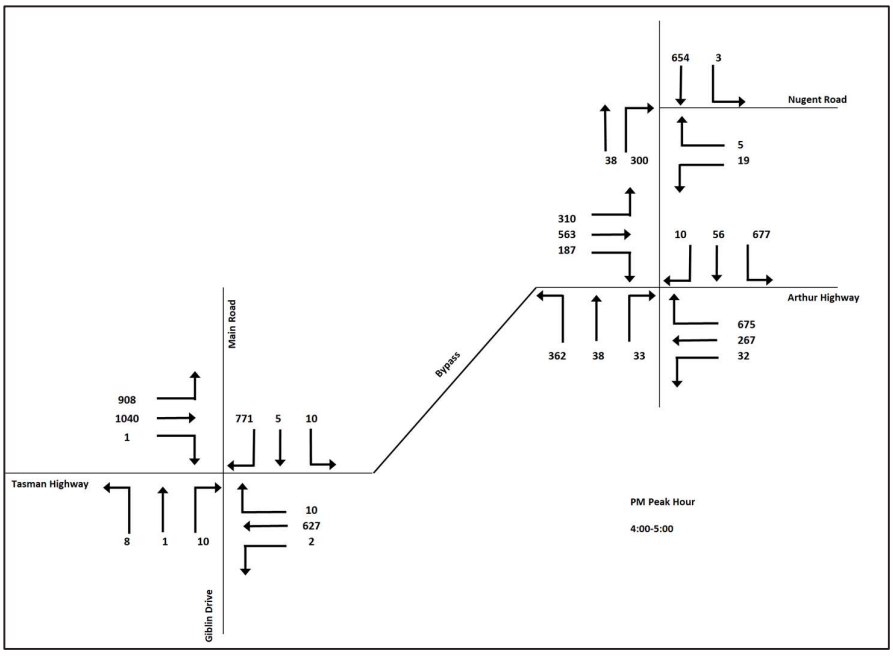


Figure 5.6: 2042 Ultimate PM Peak Hour Traffic Volumes



6 Assessment of Future Eastern Growth Corridor Traffic Volumes

6.1 Growth Area Access/Arthur Highway/Southern Sorell Bypass Roundabout

Given that most of the trips generated by the growth area will be to/from the west (towards Hobart), there will be a strong reliance on access to the Sorell Southern Bypass/Tasman Highway. In this regard access to the Bypass via the Growth Area Access/Arthur Highway/Bypass was tested using SIDRA Intersection 9.0, a computer based modelling package that calculates intersection performance.

The parameters used to assess the modelled intersections are summarised as follows:

Degree of Saturation (D.O.S.) is a ratio of arrival (or demand) flow to capacity. Degrees of saturation above 1.00 represent oversaturated conditions and degrees of saturation below 1.00 represent under saturated conditions. The D.O.S. ratings are detailed in Table 6.1 below.

Although operating conditions with a D.O.S. of close to 1.00 are undesirable, it is acknowledged that this level of congestion is typical of many urban intersections during the AM and PM peak hours.

Table 6.1: Degree of Saturation Ratings

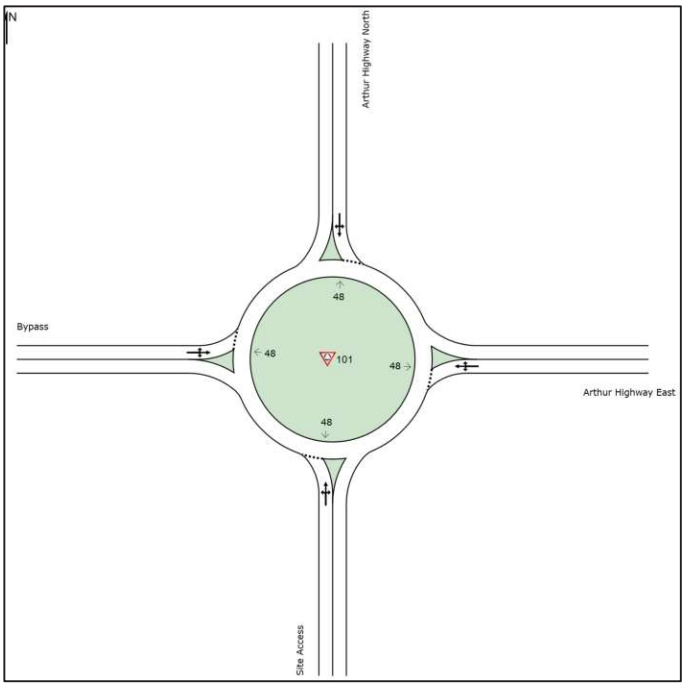
Level of Service	Rating	Intersection Degree of Saturation (D.O.S)		
		Roundabout	Unsignalised Intersection	Signalised Intersection
A	Excellent	Up to 0.6	Up to 0.6	Up to 0.6
B	Very Good	0.60 to 0.70	0.60 to 0.70	0.60 to 0.70
C	Good	0.7 to 0.85	0.7 to 0.80	0.7 to 0.9.0
D	Fair	0.85 to 0.95	0.80 to 0.90	0.9 to 0.95
E	Poor	0.95 to 1.0	0.90 to 1.0	0.95 to 1.0
F	Very poor	Greater than 1.00	Greater than 1.00	Greater than 1.00

The 95th percentile queue length (95%ile queue) is the value below which 95 percent of all expected queue lengths fall, or 5 percent of all observed queue lengths exceed.

Average Delay is the average time, in seconds, that vehicles can be expected to wait at an intersection.

Base case SIDRA models were firstly developed and calibrated to accord with the SIDRA models included in the SETS – Southern Sorell Bypass Traffic Impact Assessment report (prepared by Pitt & Sherry, dated 7 April 2020). A southern leg was then added to the roundabout as outlined below:

Figure 6.1: Growth Area Access/Arthur Highway/Sorell Southern Bypass Roundabout Layout



The above intersection layout was firstly tested using the AM and PM peak hour traffic volumes previously outlined in Figure 5.5 and Figure 5.6. The results of the SIDRA modelling are outlined in Table 6.2 with the full results included in Appendix A:

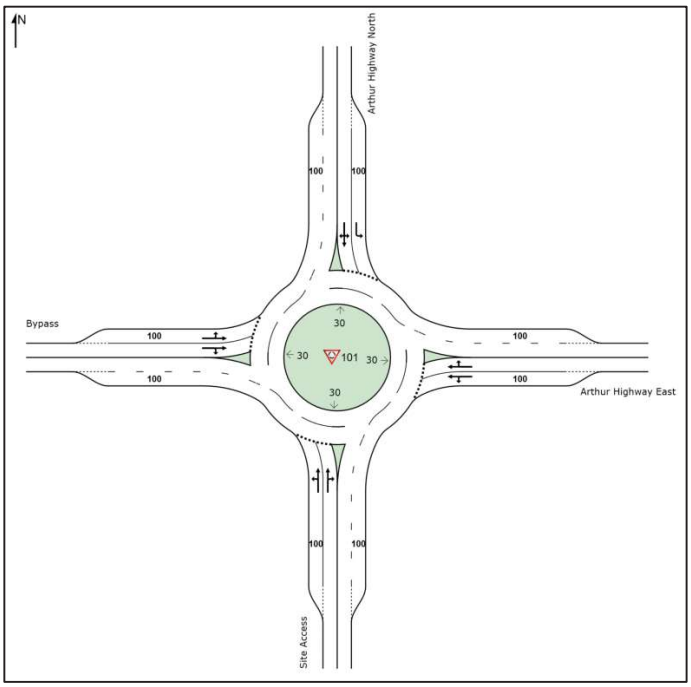
Table 6.2: 2042 SIDRA Outputs - Growth Area Access/Arthur Highway/Sorell Southern Bypass Roundabout

Peak Hour	Approach	No Growth Area Traffic (Base Case)			With Growth Area Traffic		
		D.O.S	Average Delay (seconds)	95th Percentile Queue (metres)	D.O.S	Average Delay (seconds)	95th Percentile Queue (metres)
AM	Site Access	n/a	n/a	n/a	1.03	124	274
	Arthur Highway East	0.83	14	113	1.27	265	1,249
	Arthur Highway North	0.32	11	16	0.49	14	30
	Sorell Southern Bypass	0.13	7	6	0.48	11	29
PM	Site Access	n/a	n/a	n/a	0.79	27	89
	Arthur Highway East	0.53	11	45	0.73	13	65
	Arthur Highway North	0.74	13	75	0.89	24	143
	Sorell Southern Bypass	0.87	24	139	1.38	366	1,520

As outlined above if a single lane roundabout was maintained, the subject intersection would operate under oversaturated conditions resulting in unacceptable delays and queuing during both peak periods.

A duplicated layout for the roundabout was then tested, with the tested layout outlined in Figure 6.2:

Figure 6.2: Growth Area Access/Arthur Highway/Sorell Southern Bypass Duplicated Roundabout Layout



The SIDRA results for the duplicated layout of the roundabout are summarised in Table 6.3, with the full results included in Appendix A.

Table 6.3: 2042 SIDRA Outputs - Growth Area Access/Arthur Highway/Sorell Southern Bypass Roundabout-Duplicated Layout

Peak Hour	Approach	With Growth Area Traffic		
		D.O.S	Average Delay (seconds)	95th Percentile Queue (metres)
AM	Site Access	0.56	15	32
	Arthur Highway East	0.82	20	94
	Arthur Highway North	0.33	12	12
	Sorell Southern Bypass	0.37	11	18
PM	Site Access	0.43	8	19
	Arthur Highway East	0.55	11	33
	Arthur Highway North	0.68	14	49
	Sorell Southern Bypass	0.86	23	115

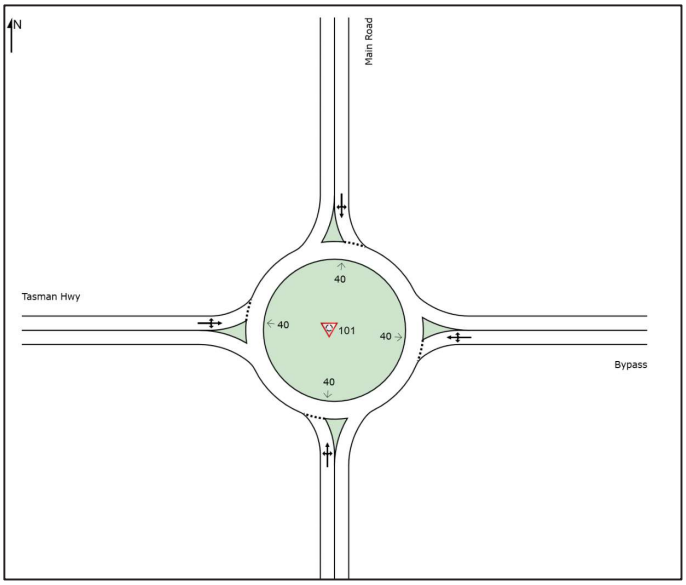
As outlined above, the duplicated roundabout is expected to operate at acceptable levels during both the morning and evening peak hours with acceptable level of average dely and queuing on all approaches.

6.2 Tasman Highway/Southern Sorell Bypass/ Main Road / Giblin Drive Roundabout

The impact of the Growth Area traffic on the operation of the Tasman Highway/Southern Sorell Bypass/ Main Road / Giblin Drive Roundabout was also tested using SIDRA Intersection 9.0.

Again, base case SIDRA models were firstly developed and calibrated to accord with the SIDRA models included in Pitt & Sherry Bypass TIA report. The layout of the modelled intersection is outlined in Figure 6.3:

Figure 6.3: Tasman Highway/Southern Sorell Bypass/ Main Road / Giblin Drive Roundabout Layout



The above intersection layout was firstly tested using the AM and PM peak hour traffic volumes previously outlined in Figure 5.5 and Figure 5.6. The results of the SIDRA modelling are outlined in Table 6.4, with the full results included in Appendix A.

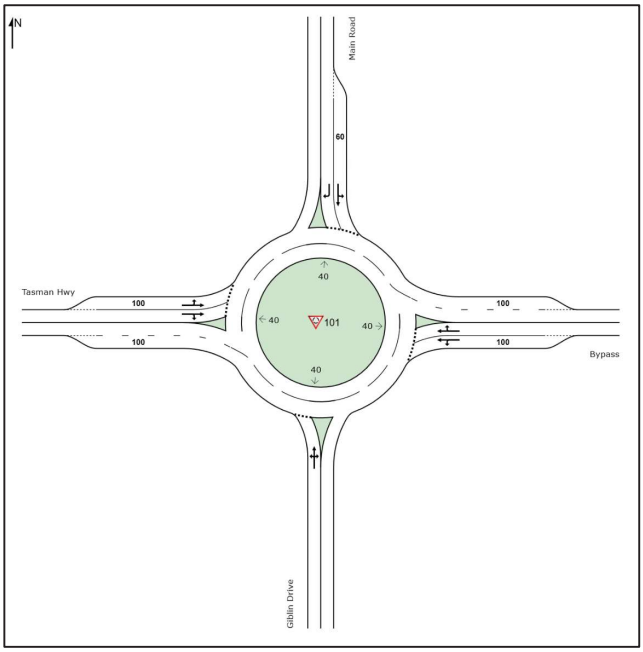
Table 6.4: 2042 SIDRA Outputs - Tasman Highway/ Bypass/ Main Road / Giblin Drive Roundabout

Peak Hour	Approach	No Growth Area Traffic (Base Case)			With Growth Area Traffic		
		D.O.S	Average Delay (seconds)	95th Percentile Queue (metres)	D.O.S	Average Delay (seconds)	95th Percentile Queue (metres)
AM	Giblin Drive	0.13	32	7	0.19	38	7
	Sorell Southern Bypass	0.88	15	142	1.44	413	2,189
	Main Road	0.28	10	12	0.58	15	40
	Tasman Highway	0.09	3	4	0.32	3	18
PM	Giblin Drive	0.03	11	2	0.05	19	3
	Sorell Southern Bypass	0.30	8	16	0.66	12	60
	Main Road	0.67	23	60	1.28	300	962
	Tasman Highway	0.50	3	35	0.63	3	56

As outlined above if a single lane roundabout was maintained, the subject intersection it would operate under oversaturated conditions resulting in unacceptable delays and queuing during both peak periods.

A duplicated layout for the roundabout was then tested, with the tested layout outlined in Figure 6.4:

Figure 6.4: Tasman Highway/Southern Sorell Bypass/ Main Road / Giblin Drive Duplicated Roundabout Layout



The SIDRA results for the duplicated layout of the roundabout are summarised in Table 6.5, with the full results included in Appendix A.

Table 6.5: 2042 SIDRA Outputs - Tasman Highway/ Bypass/ Main Road / Giblin Drive Roundabout-Duplicated Layout

Peak Hour	Approach	With Growth Area Traffic		
		D.O.S	Average Delay (seconds)	95th Percentile Queue (metres)
AM [1]	Giblin Drive	0.09	1,242 [1]	4
	Sorell Southern Bypass	0.83	451	104
	Main Road	0.62	13	33
	Tasman Highway	0.20	3	8
PM	Giblin Drive	0.04	16	2
	Sorell Southern Bypass	0.49	12	29
	Main Road	0.74	16	49
	Tasman Highway	0.38	4	18

[1]: Excessive delays modelled in SIDRA as a result of the low left turn volume on the Giblin Drive approach and opposing movements form the north and east.

As outlined above, the duplicated roundabout is expected to operate at an acceptable level during the evening peak hour.

In the case of the AM peak hour, it was found that the volume of right turning vehicles from the north (Main Road) approach limited opportunities for through movements from the east (Bypass approach)

indicting that by 2042 with full development of the growth area that the roundabout may need to be metered on the north approach or the intersection converted to a signalised intersection.

Alternatively, the volume of right turning traffic from the Main Road approach could also be reduced if an additional access to the growth area was provided from the Bypass. This would reduce the number of growth area generated trips accessing the Tasman Highway by first traversing the Sorell township. The potential location of such a roundabout is discussed further in Section 7.

6.3 Traffic Volumes within the Sorell Township

The Bypass TIA report notes that the construction of the Bypass is expected to reduce through traffic volumes within the Sorell township by 60% in the AM peak hour and 40% in the PM peak hour (due to commuters undertaking linked trips within the township on their way home).

The Bypass TIA further notes that the *"The operation of the existing intersections with the Bypass in place has not been modelled. It is considered that the volumes expected on the Bypass will reduce traffic volumes on the existing intersections by between 40% and 60%. This will cause the intersections to operate at an acceptable level for the foreseeable future."*

The up-take of the growth area generated traffic at full development on the capacity released by the construction of Bypass on key routes within the township is outlined in Table 6.6:

Table 6.6: Traffic Volume Changes within the Sorell Township

Attribute	Travel Direction Through Township	Traffic Volume (vehicles/hour)	
		AM Peak Hour	PM Peak Hour
Existing through traffic volume	Westbound	902	684
	Eastbound	254	872
Volume reduction due to Bypass construction	Westbound	-541	-274
	Eastbound	-152	-349
Expected growth area traffic through/within township	Westbound	+407	+213
	Eastbound	+223	+458
Expected volumes in township with the construction of the Bypass and full development of the Growth Area	Westbound	948	487
	Eastbound	376	807
Net change in traffic volumes	Westbound	+46	-197
	Eastbound	+122	-65

During the AM commuter peak hour local trips from the Sorell township to the growth area (eastbound direction) are expected to increase in comparison to existing volumes by some 122 vehicle per hour as a result of trips to the industrial area and school within the growth area. A small increase (46 vehicles per hour) is also expected in the westbound direction. The Bypass TIA notes that currently, existing key intersections within the township are operating efficiently, and therefore the impact of expected increase in traffic volumes is anticipated to be minimal.

It is further noted that during the PM peak hour, with the full development of the growth area, traffic volumes within the Sorell township are expected to be less than the existing volumes given the construction of the Sorell Southern Bypass.

There will accordingly be sufficient capacity within the Sorell township road network to cater for traffic generated by the full development of the growth area.

7 Eastern Growth Corridor Transport Network Assessment

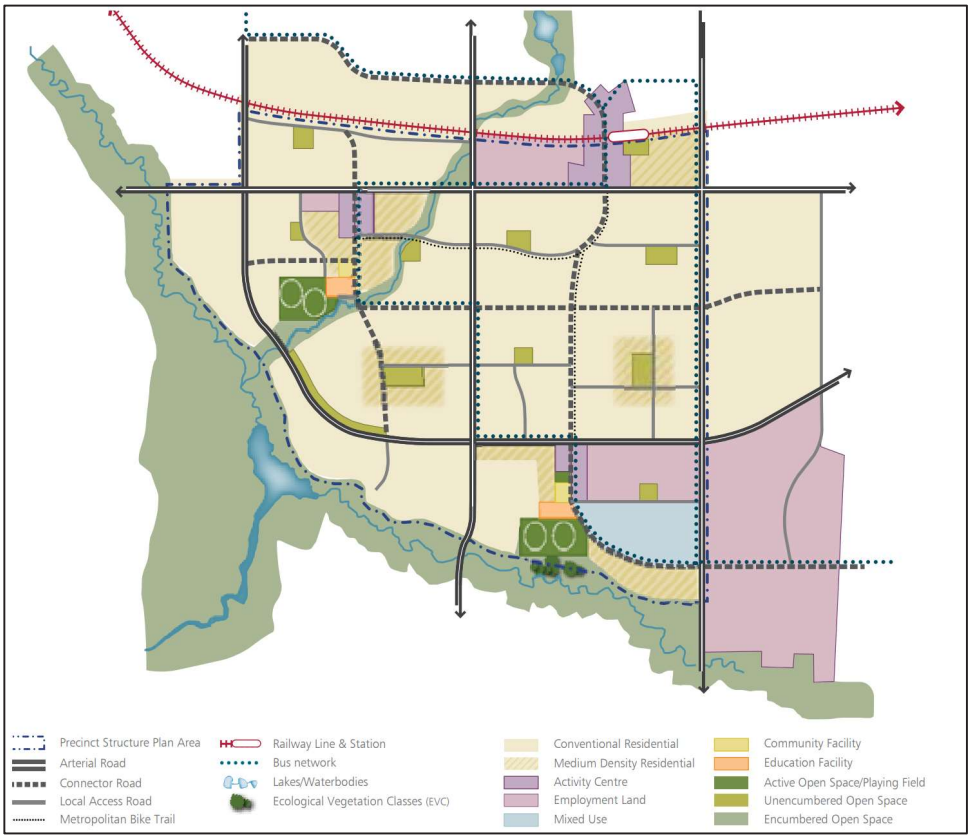
7.1 Preamble

In reviewing the indicative road network layout proposed for the growth area consideration was given to both the traditional 'one mile' grid network transport network planning principles and the Local Government Road Hierarchy which are discussed as follows:

One Mile Grid Transport Network Principles

The One Mile Grid transport network planning principles aims to provide a permeable and flexible transport network. The approach provides Arterial Roads at approximately 1.6 km (one mile) spacings in a grid layout. Collector Roads are then provided approximately halfway between the Arterial Roads and Local Access Roads are provided halfway between the Collector Roads. An example of the resulting road network layout is outlined in Figure 7.3:

Figure 7.1: One Mile Grid Road Network Layout Example



Source: https://vpa.vic.gov.au/wp-content/Assets/Files/PSP_Guidelines_Notes_Our_Roads_Connecting_People%5B2%5D.pdf

A permeable and resilient precinct is created by providing a road network grid that maximises the use of Arterial Roads for through traffic wishing to travel further than an adjacent grid block and maximises the use of Local and Collector Roads for travel within a grid block or between adjacent blocks. This form of grid system is adaptable in that there are multiple options (albeit with clear preferences) for each journey, allowing traffic flows to balance themselves across the network and for flexibility in times of unusual conditions (e.g. vehicular breakdown or crashes).

Local Government Road Hierarchy

The Local Government Road Hierarchy was developed by the Department of Premier and Cabinet's Local Government division in conjunction with other areas of government. In July 2015, the Minister for Planning and Local Government asked all Tasmanian Councils to adopt the hierarchy. The Road Hierarchy is outlined in Figure 7.2:

Figure 7.2: Tasmanian Local Government Road Hierarchy

Classification	1. Arterial	2. Collector	3. Link	4. Local Access	5. Minor Access	Unformed
Functional Criteria						
Function/ predominant purpose	Provide the principal links between urban centres and rural regions.	Connect arterial roads to local areas and supplement arterial roads in providing for traffic movements between urban areas, or in some cases rural population centres.	Provide a link between the arterial or collector roads and local access roads.	Provide access to residential properties and in some cases commercial properties and in some cases commercial properties, at a local level.	Provide access to residential properties and irregular access to community facilities such as parks and reserves.	Roads not maintained by the council or non constructed/ maintained road reserves or roads that have a very low level of services.
Connectivity description	High connectivity - connecting precincts, localities, suburbs, and rural population centres.	High connectivity - supplements arterial roads in connecting suburbs, business districts and localised facilities.	Medium connectivity - connects traffic at a neighbourhood level with collector and arterial roads.	Low - connects individual properties within a neighbourhood to link roads.	Low - provides access to properties.	Future roads or roads that have a very low level of service.
Guidance Metrics						
Average Annual Daily Traffic (AADT)	>10000 vehicles per day (vpd)	3000–10000 vpd	1000–3000vpd	50–1000vpd	<50vpd	N/A
Heavy vehicles permitted	Yes - thoroughfare	Yes - thoroughfare	Yes - some through traffic	No thoroughfare, local access only	No thoroughfare, local access only	N/A
Average Annual Daily Truck Traffic or Equivalent Heavy Vehicles (AADTT/ EHV)	>1000 AADTT or > 10% EHV	250–1000 AADTT or > 10% EHV	<250 AADTT or > 10% EHV	N/A	N/A	N/A
Public Transport Route	Yes	Yes	Yes	No	No	N/A
Carriageway form	2 or 4 lanes	2 lanes	2 lanes	1 or 2 lanes	Typically 1 lane	N/A
Running surface	Sealed	Sealed	Sealed	Sealed/ unsealed	Sealed/ unsealed	Unformed

Source: City of Hobart Transport Strategy 2018-30 Consultation Paper 4: Local Area Traffic Management 2017

7.2 Review of Growth Area Connections to the Surrounding Road Network

Indicative Masterplan Connections to the Surrounding Road Network

Connections to the surrounding road network to/from the growth area were shown previously in Figure 4.4 and are described as follows:

— A grade separated crossing of the Bypass linking the growth area to Fitzroy Street in the west via a bridge across the Sorell Rivulet.
— A roundabout connection to the Sorell Southern Bypass near Nugent Road.
— A roundabout connection with the Arthur Highway at Pawleena Road.

As noted previously, the Sorell Southern Bypass also includes roundabout intersections at Tasman Highway/Main Road in the south-west, the intersection spacing to the growth area access roundabout is approximately 1.2km.

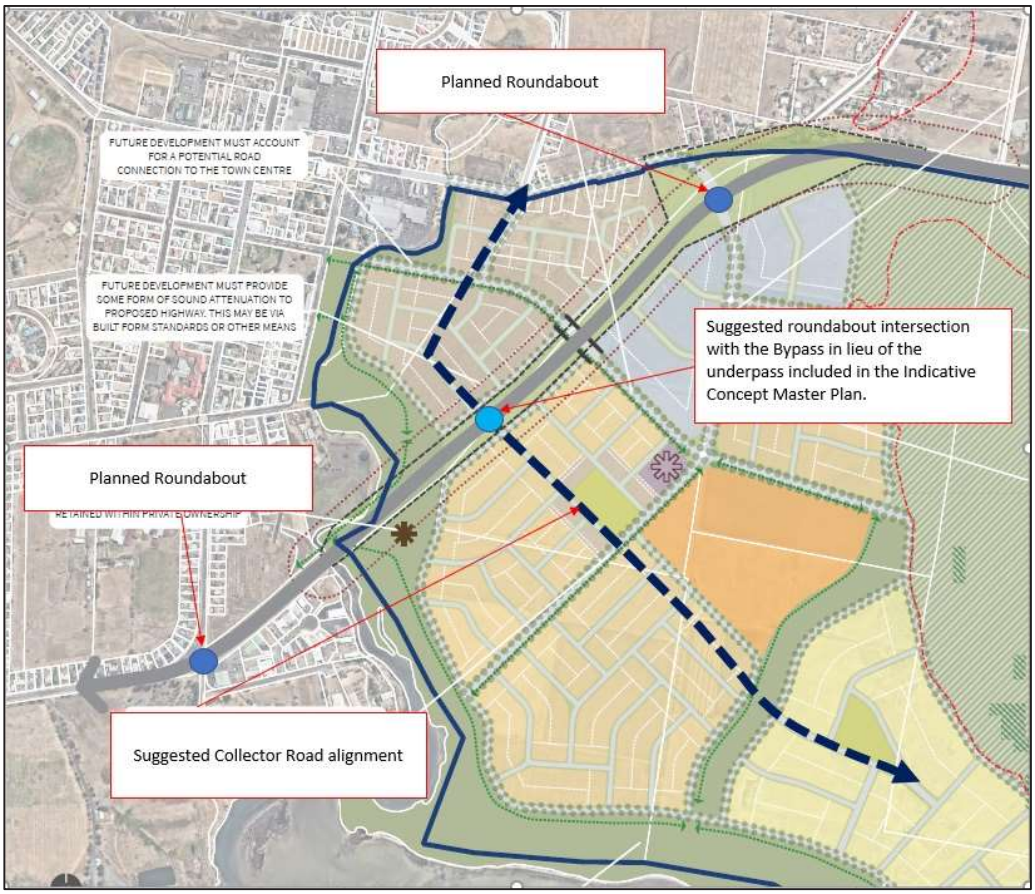
Nexus for an Additional Roundabout Connection to the Sorell Southern Bypass

It is understood that additional connections to the Sorell Southern Bypass are currently not permitted by the State Government at this time.

The spacing of the planned intersections along the Sorell Southern Bypass does however suggest that another intersection could be facilitated between the planned roundabouts (in accordance with growth area road network planning principles and the AUSTROADS Guide to Road Design Part 4). This intersection, most likely a roundabout, would remove the need for the grade separated crossing of the Bypass as shown on the Indicative Concept Masterplan and allow for increased connectivity and permeability to/from the growth area.

The potential location of this intersection is shown in below in Figure 7.3 along with the indicative Collector Road alignment required to facilitate the roundabout. The location of the suggested roundabout is approximately halfway between the planned roundabouts associated with the Sorell Southern Bypass.

Figure 7.3: Indicative Additional Intersection to Bypass Location



The benefits of the additional connection to the Bypass include:

- Negating the need for a costly grade separated crossing of the Bypass.
- Potentially negating the need for a bridge crossing of the Sorell Rivulet to provide a connection to Fitzroy Street.
- Increased connectivity to the Bypass and key destinations to the west (i.e. Hobart) of the township, noting that some 70% of the trips generated by the growth area are expected to be to/from the west.
- Enhanced distribution of the growth area generated traffic onto the surrounding road network.
- Improved AM peak hour operation of the Tasman Highway/ Bypass/ Main Road / Giblin Drive Roundabout (refer to Section 6.2).

Suggested Changes to the Indicative Mater Plan Transport Network

As outlined above, an additional roundabout connection to the Sorell Southern Bypass to/from the growth area is a preferable option given it would increase connectivity to key destinations to west (i.e. Hobart). It is however understood that no additional connections to the Sorell Southern Bypass are currently permitted by the State Government.

If no additional connection to the Bypass can be provided, a crossing of the Sorell Rivulet would be required to facilitate an additional access route to the west of the Sorell township. The potential alignment of this connection is outlined in Figure 7.4:

Figure 7.4: Preferred Sorell Rivulet Crossing Location

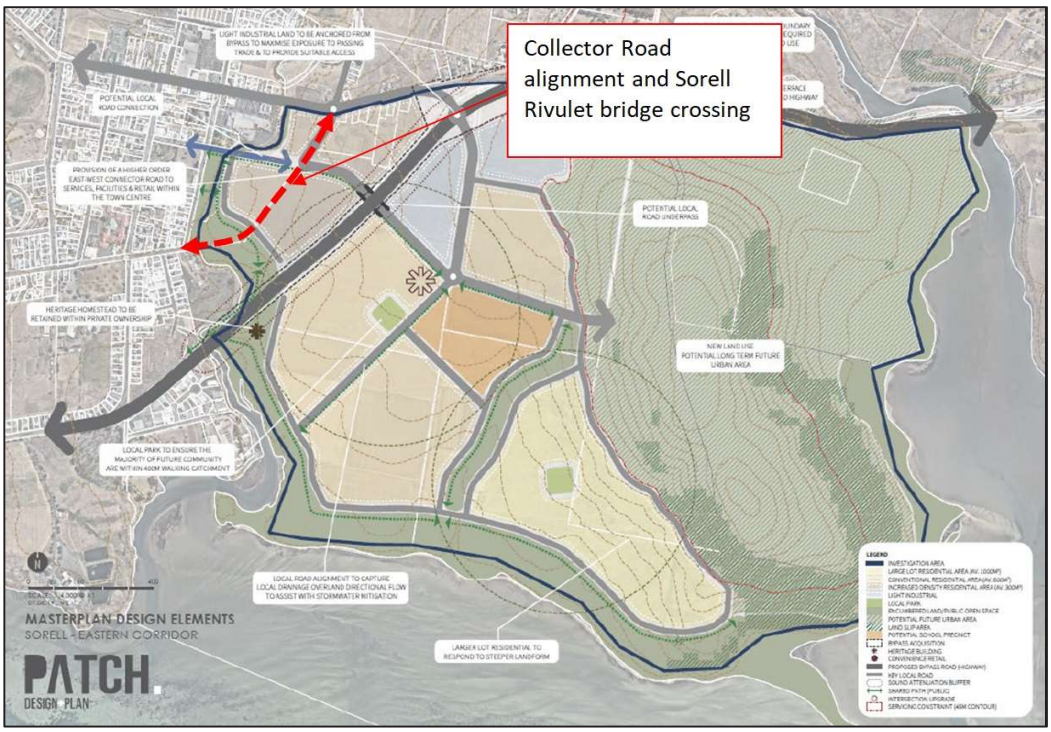


Figure 7.4 depicts a Collector Road connection between Cole Street (at the intersection Pawleena Road) in the north and Forcett St/Parsonage Place in the south. This road alignment would require a bridge crossing of the Sorell Rivulet near Forcett Street as opposed to near Fitzroy Street as shown on the Indicative Masterplan.

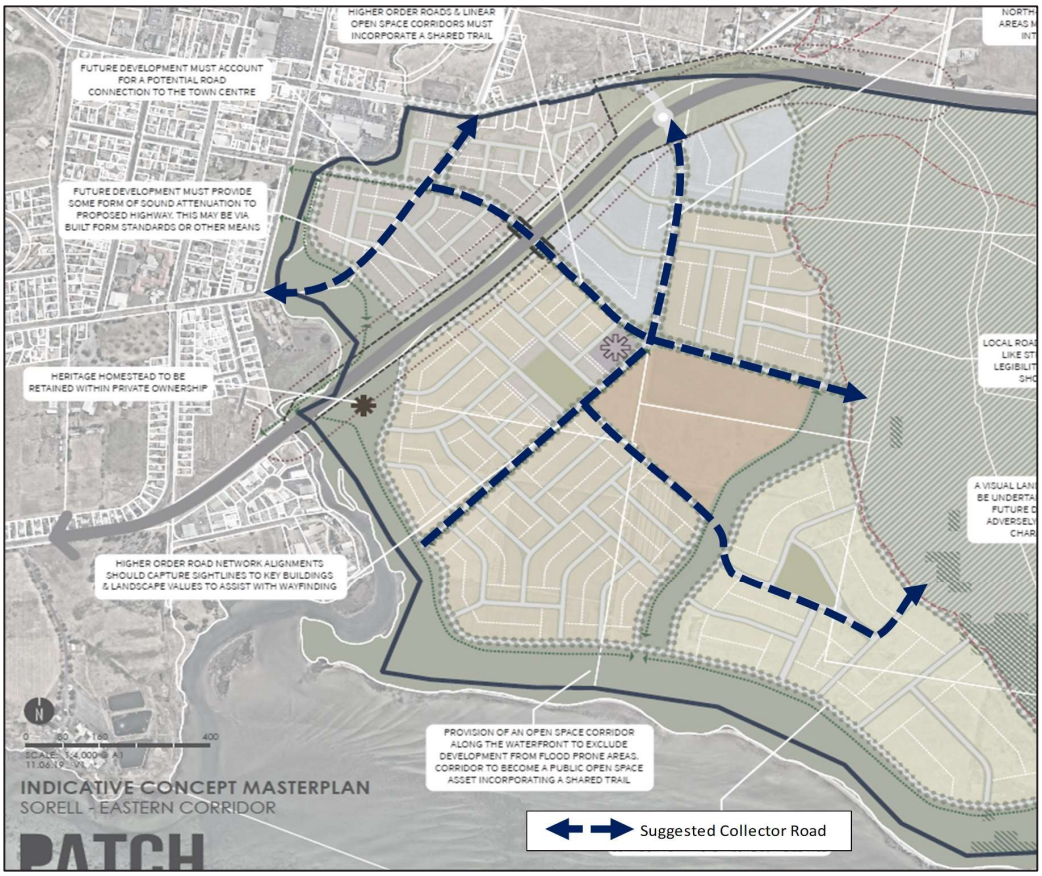
This alignment is preferable as it provides a more direct connection to/from the west (towards Hobart) via the Tasman Highway and allows for trips to the west to be separated from the main activity area in the existing Sorell township whilst still providing suitable connectivity to the existing township via Cole Street and Parsonage Place.

7.3 Future Collector Road and Local Road Provisions

Collector Roads

At full development the growth area is expected to generate in the order of 18,400vpd, approximately 16,000 vpd of which are expected to be external to the growth area. Based on the expected daily volumes, the classification characteristics of a Collector Road (as outlined in Figure 7.2), and the absence of an additional connection to the Sorell Southern Bypass being provided, the suggested Collector Road network layout for the growth area is outlined in Figure 7.5:

Figure 7.5:Suggested Collector Road Provisions



The Collector Road network layout outlined in Figure 7.5 facilitates a grid-stye road network that responds to envisaged land use and environmental constrains of the growth area. The alignment of the Collector Roads is based on a traditional grid layout commonly adopted in growth area planning to allow for reliable network performance and flexibility.

Local Roads

The Local Road layout included in the Indicative Masterplan allows for a permeable and flexible road network and avoids the use of cul-de-sacs allowing good access to properties whilst allowing traffic flows to balance themselves across the network and for flexibility in times of unusual conditions (eg. vehicular breakdown or crashes).

7.4 Pedestrian and Cyclists

The permeable grid road network that can been seen in Figure 7.5 allows for good pedestrian and cyclist connectivity and permeability. In addition, a number of shared paths are included in the Indicative Masterplan providing linkages throughout the growth area and to/from surrounding areas.

8 Transport Impacts of Potential Developments within the Town Centre

8.1 Overview

The Sorell Land Supply Strategy Stage 1 – Land Supply and Demand Analysis Report notes that there is 3.79Ha of commercial General Business Zone land supply within the Sorell township. If 50% of this area was to translate into gross commercial floor, there could potentially be an increase of 18,950 sqm commercial floor area in the Sorell township.

It is understood that this development potential within the township would be accommodated to the north of Cole Street in the vicinity of Dubs and Co Drive and potentially on the Gateway Shopping Centre site.

This potential development would essentially increase the size of the existing Sorell township activity centre and have the traffic and parking characteristics akin to a shopping centre.

8.2 Traffic Generation and Strategic Impact

Traffic volumes and car parking demands generated by shopping centres are a function of the size of the centre, the level of car parking provided, the quality, size and type of goods and services offered for sale, the population density, and road accessibility to the area. For the purposes of assessing the Sorell township activity centre it has been assumed to have the traffic generating characteristics of a large shopping centre.

Traffic activity at shopping centres varies throughout the year and during the week. Peak activity associated with shopping centres generally occurs prior to Christmas and other promotion days. It is recognized that these events are infrequent and therefore parking facilities, access points and the road network adjacent to the site are not designed to cater for such extreme situations.

Traffic generation rates for shopping centres also generally decrease as floor are increases. Therefore, subsequent stages of development of a shopping centre are anticipated to have a lower traffic generation rate per 100sqm. In this regard Table 8.1 outlines the traffic generation rates for varying sized shopping centres outlined in the RTA Guide:

Table 8.1: RTA Guide Traffic Generation Rates for Shopping Centres

Floor Area Range (sqm)	Traffic Generation Rate (vehicles per 100sqm floor area)	
	Friday Evening Peak Hour	Saturday Peak Hour
0 - 10,000	12.5	7.5
10,000 – 20,000	6.9	7.5
20,000 – 30,000	5.9	7.0
30,000 – 40,000	3.7	6.1

As can be seen in Table 8.1, the traffic generation rate for a shopping centre decreases as floor area increases indicating that additional stages of development within a shopping centre/activity centre result in more choice for consumers but do not necessarily result in a corresponding increase in traffic generation.

In this case it is further highlighted that the Sorell township activity centre is expected to cater for the same catchment area as opposed to attracting trips from further afield as the township activity centre grows given the proximity to Sorell to Hobart.

Given the above, coupled with the introduction of the Sorell Southern Bypass and the associated increased traffic capacity within the existing township, the future potential commercial/retail development within the Sorell township is not expected to result in the need for strategic road network changes (i.e. additional Collector Roads or increases in the number of traffic lanes on existing roads).

8.3 Development in the Vicinity of Dubs and Co Drive

It is understood that there are a number of development proposals within the Sorell township in the vicinity of Dubs and Co Drive. The location of this area in the context of the wider township is outlined in Figure 10.1:

Figure 8.1:Developable Area in the Vicinity of Dubs and Co Drive

As outlined in Figure 10.1, Dubs and Co Drive connects to Station Lane in the south, Weston Hill Road in the east and Pennington Drive in the north. There is also potential to connect the western north-south portion of Dubs and Co Drive to access road to the Sorell Council buildings in the future.

Dubs and Co Drive is well connected to the existing road network with enhanced accessibility provided via the Station Lane/Gordon Street / Cole Street signalised intersection. The multiple connections to the surrounding road network provides for good permeability and allows for trips generated by the development of the area to be disbursed over a number of adjoining roads.

The grid network of the immediate area also allows for multiple access routes for service and emergency vehicles to access Dubs and Co Drive, this is considered important should a portion of the road network be closed for roadworks or as a result of an accident.

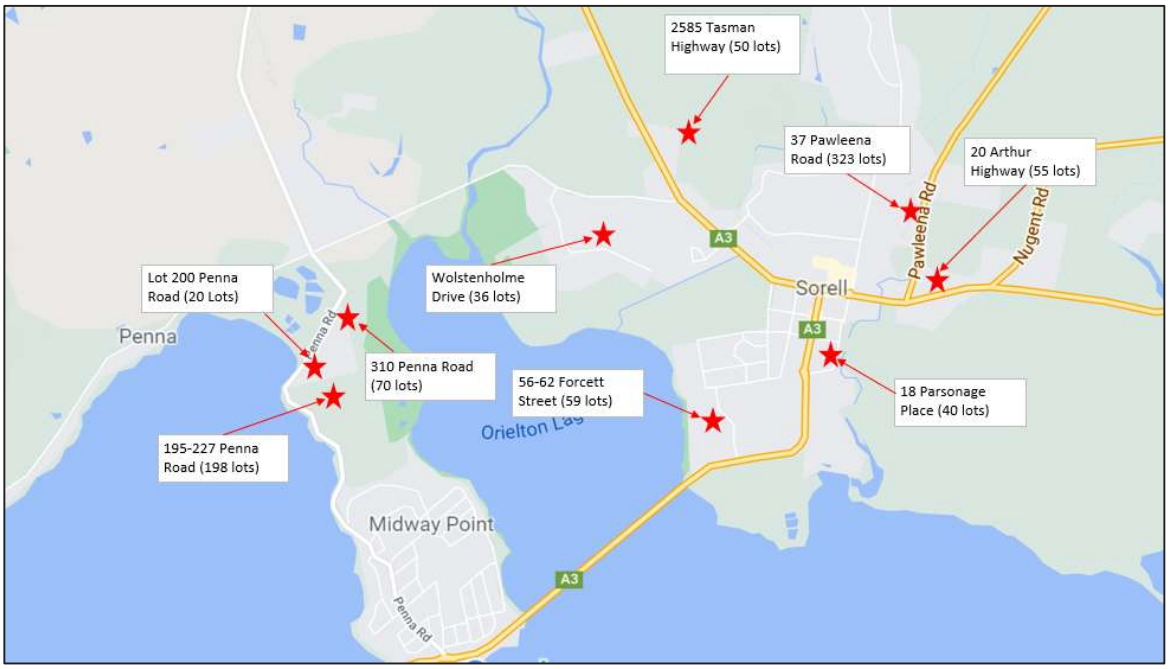
The existing road network is therefore considered suffice to cater for the traffic generated by the development sites abutting Dubs and Co Drive.

9 Transport Impacts Other Residential Development Areas

9.1 Potential Development Areas

As outlined in Section 2.5, potential residential development areas have been identified as follows:

Figure 9.1: Potential Residential Development Locations



As outlined in Figure 9.1 the bulk of the potentially developable land is located on Penna Road, Midway Point (288 lots) and on Pawleena Road, Sorell (323 lots).

In addition to the above, there are a total of 116 lots of that could be developed in the Southern Beaches area made up of 68 lots in the Dodges Ferry area and 48 lots in Carlton.

9.2 Traffic Impacts of Potential Developments to the East of the Sorell Township

As previously detailed in Table 2.1 and summarised in Figure 9.1, in addition to the potential development of the Eastern Corridor Growth Area, a 254 lot residential subdivision has been approved at 37 Pawleena Road with a further 55 lot subdivision approved at 20 Arthur Highway. In addition, there is potential for a further 40 residential lots to be provided at 18 Parsonage Place within the Sorell township.

18 Parsonage Place

Based on the traffic generation rates outlined in Section 5.3, the potential development of 18 Parsonage Place would result some 32 vehicle movements onto the wider road network during the commuter peak hours, and some 320 daily vehicle movements onto the wider road network. This level of traffic is expected to have a negligible to minimal impact on the operation of the surrounding road network which has the capacity to readily absorb this level of additional traffic.

20 Arthur Highway

The Traffic Impact Assessment[7] for the approved development at 20 Arthur Highway notes that four of the new lots will have direct access to the Arthur Highway whist the remaining lots will access the wider road network via Pawleena Road. At full development the Traffic Impact Assessment report notes that the site will generate 320 daily vehicle movements, and 32 vehicle movements during the commuter peak hours onto the surrounding road network. From a strategic viewpoint this level of traffic will have negligible impact on the operation of the wider road network.

37 Pawleena Road

In regard to the subdivision at 37 Pawleena Road, the Traffic Impact Assessment[8] for the development proposal notes that up to 323 residential lots are proposed and that the development will include an internal Collector Road that will link Nugent Road to Pawleena Road. The report further notes that the development will take up to 20 years to be fully completed with some 15-25 lots released every stage.

At full development the subdivision is therefore likely to generate in the order of 2,584 daily vehicle movements and 258 vehicle movements during the commuter peak hours onto the surrounding road network. The traffic analysis outlined in the report notes that consideration was given to the development site itself as well as the development of 20 Arthur Highway and goes on to conclude that a roundabout will eventually be required at the Pawleena Road / Arthur Road intersection to cater for the traffic generated by the proposed subdivisions.

Proposed Pawleena Road / Arthur Road Roundabout

It is understood that a southern leg to the proposed Pawleena Road / Arthur Road roundabout will be required as part of the development of proposed subdivision plan for No.5 & LOT 1 Arthur Highway (broadly the Stage 1 area of the Eastern Corridor previously outlined in Figure 4.3). The proposed subdivision includes some 283 lots, resulting in an expected daily traffic generation of some 2,260 vehicle per day and some 226 vehicle movements during the commuter peak hours.

The roundabout could therefore be expected to cater for 484 entry/exit movements on its north (Pawleena Road) and south approaches with the Arthur Highway. The Bypass is expected to reduce traffic volumes on the Arthur Highway by 60% in the AM commuter peak hour and by 40% in the PM commuter peak hour, resulting in traffic volumes on the Arthur Highway to the order of 725 vehicles per hour in the busier PM peak hour.

The level of peak hour traffic expected at the roundabout is within the capacity limits for a single lane roundabout as outlined in the Austroads Guide to Traffic Management Part 3: Transport Study and Analysis Method[9].

Overall Traffic Impact

Based on the above, the expected traffic generation resulting from the developments to the east of the Sorell township is therefore expected to be adequately catered for by the proposed Pawleena Road/Arthur Highway roundabout and not require any further changes to the road network at a strategic level given that additional capacity within the Sorell township will be available as a result of the completion of the Sorell Southern Bypass.

9.3 Traffic Impacts of Potential Developments in Midway Point

As outlined in Figure 9.1, there is potential for an additional 288 residential lots to be developed along Penna Road in Midway Point. Based on the traffic generation rates outlined in Section 5.3, these lots are expected to generate some 230 vehicle movements onto Penna Road during the commuter peak hours and some 2,304 daily vehicle movements onto Penna Road.

[7] Traffic Impact Assessment report tittle *"Proposed Residential Subdivision Development, 20 Arthur Highway, Sorell"* prepared by Milan Prodanovic Traffic Engineering and Road Safety, dated July 2019.
[8] Traffic Impact Assessment report tittle *"Proposed Residential Subdivision Development, Pawleena Road – Nugent Road, Sorell"* prepared by Milan Prodanovic Traffic Engineering and Road Safety, dated November 2020.
[9] As outlined in Figure 7.7: Upper and lower-bound capacity estimates for a single-lane roundabout of the Austroads Guide.

Penna Road is currently estimated to be carrying some 2,750[10] vehicles per day at the intersection with Tasman Highway and is classified as a Council owned Collector Road. As previously outlined in Figure 7.2, Collector Roads can carry in the order of 3,000 – 10,000 vehicles per day. The addition of the traffic generated by potential residential development along Penna Road would result in traffic volumes on Penna Road increasing to some 5,054 vehicles per day. The resultant daily traffic volume are therefore still be well within the capacity range for a Collector Road and no further changes to the road cross section would be required from a traffic carrying perspective.

It is further highlighted that the Penna Road/Tasman Highway intersection is currently being upgraded to a signalised intersection as part of the State Government's Midway Point Intersection Solution project, a key part of the South East Traffic Solution works.

The Midway Point Intersection Solution Traffic Impact Assessment Report (prepared by Pitt&Sherry, dated 24 March 2020) notes that the signalised intersection is expected to operate well with a signal timing of 60 -100 seconds during peak times in the future analysis years of 2022 and 2042.

This analysis also includes background traffic growth on Penna Road of 3.6% and 2.3% between 2022 and 2042 for the AM and PM peak hour respectively resulting in volume increases of 468 vehicles per hour in the AM peak hour and 801 vehicles per hour in the PM peak hour along Penna Road. This level of traffic growth comfortably allows for the envisaged future development along Penna Road.

The traffic generated by the above outlined potential residential development on Penna Road is therefore not expected to result in any physical changes to the signalised form of the Penna Road/Tasman Highway intersection, and if need be could be mitigated through programing changes to the signal phasing and timing data for the intersection to optimize traffic flow and reduce delay.

9.4 Traffic Impacts of Potential Developments in The Southern Beaches Area

As previously outlined in Table 2.2, a total of 116 lots could potentially be developed within the Southern Beaches area with 68 lots in the Dodges Ferry area and 48 lots in Carlton.

Based on the traffic generation rates outlined in Section 5.3 these lots are expected to generate some 128 vehicle movements onto the wider road network during the commuter peak hours and some 1,280 daily vehicle movements onto wider road network. This level of traffic generation will have a negligible impact on the operation of the wider strategic road network given the relatively low peak hour volumes and dispersed nature of the potential residential lots.

[10] Daily traffic volume estimate sourced from the Department of State Growth's SETS – Midway Point Intersection Solution Traffic Impact Assessment Report (prepared by Pitt&Sherry, dated 24 March 2020).

10 Summary

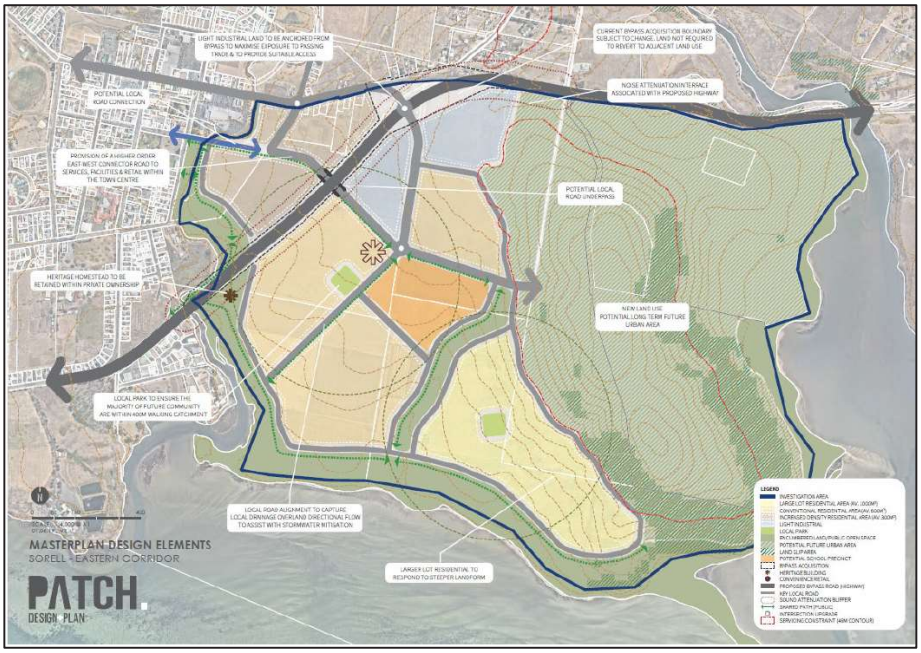
The municipality of Sorell is experiencing one of the highest growth rates in Tasmania. The Department of Treasury and Finance's 2019 population projections show that Sorell grew at 3% in the growth period June 2017 – June 2018, taking the total population in June 2018 to 15,218[11]. This level of growth is expected to continue, and it is therefore important that enough land is available to cater for these additional residents.

In response the Sorell Land Supply Strategy was prepared by Echelon Planning and the updated Strategy was endorsed by Council on 25 June 2019. The outcomes of the Strategy will be used by Council in its development of LPPs for inclusion in the Tasmanian Planning Scheme.

The Strategy identified locations and masterplans for the recommended growth options within the identified growth areas. The key identified growth area for the Sorell Township is to the south-east of the existing township.

The Indicative Concept Masterplan for the Sorell Eastern Corridor included in the Strategy is hence based on an expansion of the Sorell township to the south-east south of Arthur Highway and the east of the Sorell Rivulet with the soon to be constructed Sorell Southern Bypass traversing the area. The Indicative Concept Masterplan is shown in Figure 10.1:

Figure 10.1: Concept Masterplan for the Sorell Eastern Corridor



The key transport features of the Masterplan are outlined as follows:

— The Sorell Southern Bypass, which includes roundabout intersections at Tasman Highway/Main Road in the south-west and at the Arthur Highway (near Nugent Road) in the north-east. These intersections are spaced approximately 1.2km apart.
— A grade separated crossing of the Bypass aimed at providing for local traffic.
— An indictive connection to Fitzroy Street in the west which would require a new bridge across the Sorell Rivulet.

Ratio Consultants was engaged by Sorell Council to undertake a strategic transport review that considered the transport implications of the land use development envisaged by Indicative Concept

[11] Source: Land Supply and Demand memo prepared by ERA Planning & Environment, dated 20 July 2020;

Masterplan in conjunction with the construction of the Sorell Southern Bypass and other known key developments.

The key findings of the assessment are summarised as follows:

— The full development of the growth area is expected to generate some 16,000vpd onto the external road network with approximately 70% of the trips having an origin/destination to the west of the Sorell township (i.e. towards Hobart).

— Additional capacity will be required at both the soon to be constructed Growth Area Access/Arthur Highway/Southern Sorell Bypass Roundabout and the Tasman Highway/Southern Sorell Bypass/ Main Road / Giblin Drive Roundabout in 2042 with full development of the growth area.

— The level of development within the growth area warrants an additional connection to the Sorell Southern Bypass given the high proportion of trips generated by the area having an origin or destination to the west of the Sorell township (i.e. towards Hobart). This intersection could be located approximately midway between the Bypass Roundabouts shown in Figure 10.1.

— If an additional connection to the Bypass cannot be provided, consideration should be given to moving the indictive connection to Fitzroy Street in the west (which would require a new bridge across the Sorell Rivulet) further south to align with Forcett St/Parsonage Place. This realignment would provide a more direct connection to/from the west (towards Hobart) via the Tasman Highway and allow for trips to/from the west to be separated from the main activity area in the existing Sorell township whilst still providing suitable connectivity from the growth area to/from the existing township via Cole Street and Parsonage Place.

— The road network outlined in the Figure 10.1 generally, accords with the One Mile Grid transport network planning principles and allows for good connectivity and permeability for all road users, including pedestrians and cyclists within the growth area.

— The potential for commercial/retail development within the existing Sorell township to north of Cole Street is envisaged to essentially increase the size of the existing Sorell township activity centre. The introduction of the Sorell Southern Bypass and the associated increased traffic capacity within the existing township is expected to fully cater for the traffic generated by commercial/retail development envisaged within the township at a strategic level. The envisaged development is not expected to result in the need for strategic road network changes (i.e. additional Collector Roads or increases in the number of traffic lanes on existing roads).

— In addition to the potential development of the Eastern Corridor Growth Area, a 254 lot residential subdivision has been approved at 37 Pawleena Road with a further 55 lot subdivision approved at 20 Arthur Highway to the east of the existing Sorell township. The traffic generation resulting from these developments is expected to be adequately cater for by the roundabout proposed at Pawleena Road/Arthur Highway and not warrant any further changes to the road network at a strategic level.

— There is potential for an additional 288 residential lots to be developed along Penna Road in Midway Point, furthermore the Penna Road/Tasman Highway intersection is currently being upgraded to a signalised intersection as part of the State Government's Midway Point Intersection. These lots are expected to generate some 230 vehicle movements onto the wider road network during the commuter peak hours and some 2,034 daily vehicle movements onto wider road network There is sufficient capacity on Penna Road and at the signalised Penna Road/Tasman Highway intersection to cater for this level of traffic generation.

— A total of 116 lots could potentially be developed within the Southern Beaches area with 68 lots in the Dodges Ferry area and 48 lots in Carlton. These lots are expected to generate some 128 vehicle movements onto the wider road network during the commuter peak hours and some 1,280 daily vehicle movements onto wider road network. This level of traffic generation will have a negligible impact on the operation of the wider strategic road network given the relatively low peak hour volumes and dispersed nature of the potential residential lots.

Appendix A **SIDRA Modelling Outputs**

MOVEMENT SUMMARY

Site: 101 [2042 Bypass Replication - AM Peak (Site Folder: Bypass/Site/Access/Arthur Hwy roundabout)]

New Site
Site Category: (None)
Roundabout

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: Arthur Highway East														
5	T1	729	2.4	729	2.4	0.843	11.6	LOS B	15.6	112.9	0.94	0.87	1.20	62.8
6	R2	352	7.4	352	7.4	0.843	19.6	LOS B	15.6	112.9	0.94	0.87	1.20	61.7
Approach		1081	4.0	1081	4.0	0.843	14.2	LOS B	15.6	112.9	0.94	0.87	1.20	62.4
North: Arthur Highway North														
7	L2	145	11.7	145	11.7	0.316	5.6	LOS A	2.2	16.0	0.38	0.62	0.38	60.3
9	R2	310	0.0	310	0.0	0.316	13.3	LOS B	2.2	16.0	0.38	0.62	0.38	65.8
Approach		455	3.7	455	3.7	0.316	10.9	LOS B	2.2	16.0	0.38	0.62	0.38	64.0
West: Bypass														
10	L2	10	0.0	10	0.0	0.132	6.2	LOS A	0.9	6.4	0.57	0.53	0.57	66.2
11	T1	136	9.1	136	9.1	0.132	6.5	LOS A	0.9	6.4	0.57	0.53	0.57	66.7
Approach		146	8.5	146	8.5	0.132	6.5	LOS A	0.9	6.4	0.57	0.53	0.57	66.6
All Vehicles		1682	4.3	1682	4.3	0.843	12.6	LOS B	15.6	112.9	0.76	0.77	0.93	63.2

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

MOVEMENT SUMMARY

Site: 101 [2042 Bypass Replication - PM Peak (Site Folder: Bypass/Site/Access/Arthur Hwy roundabout)]

New Site
Site Category: (None)
Roundabout

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: Arthur Highway East														
5	T1	267	2.9	267	2.9	0.531	5.0	LOS A	6.2	44.9	0.13	0.60	0.13	66.1
6	R2	675	3.9	675	3.9	0.531	12.8	LOS B	6.2	44.9	0.13	0.60	0.13	66.0
Approach		942	3.6	942	3.6	0.531	10.6	LOS B	6.2	44.9	0.13	0.60	0.13	66.0
North: Arthur Highway North														
7	L2	677	2.7	677	2.7	0.741	13.1	LOS B	10.5	75.4	1.00	1.02	1.34	60.5
9	R2	10	0.0	10	0.0	0.741	20.9	LOS C	10.5	75.4	1.00	1.02	1.34	64.0
Approach		687	2.7	687	2.7	0.741	13.2	LOS B	10.5	75.4	1.00	1.02	1.34	60.6
West: Bypass														
10	L2	310	0.0	310	0.0	0.871	23.5	LOS C	19.5	138.6	1.00	1.32	2.09	52.5
11	T1	563	3.0	563	3.0	0.871	23.8	LOS C	19.5	138.6	1.00	1.32	2.09	53.8
Approach		873	1.9	873	1.9	0.871	23.7	LOS C	19.5	138.6	1.00	1.32	2.09	53.3
All Vehicles		2502	2.8	2502	2.8	0.871	15.9	LOS B	19.5	138.6	0.67	0.96	1.14	59.7

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

MOVEMENT SUMMARY

Site: 101 [2042 Bypass/Site Access - AM Peak (Site Folder: Bypass/Site/Access/Arthur Hwy roundabout)]

New Site
Site Category: (None)
Roundabout

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: Site Access														
1	L2	315	5.0	332	5.0	1.034	124.4	LOS F	37.8	276.0	1.00	2.40	4.53	20.0
2	T1	75	5.0	79	5.0	1.034	123.9	LOS F	37.8	276.0	1.00	2.40	4.53	20.3
3	R2	31	5.0	33	5.0	1.034	131.3	LOS F	37.8	276.0	1.00	2.40	4.53	20.4
Approach		421	5.0	443	5.0	1.034	124.8	LOS F	37.8	276.0	1.00	2.40	4.53	20.1
East: Arthur Highway East														
4	L2	46	5.0	48	5.0	1.268	260.1	LOS F	172.3	1248.0	1.00	5.13	13.03	12.0
5	T1	729	2.4	729	2.4	1.268	262.2	LOS F	172.3	1248.0	1.00	5.13	13.03	12.3
6	R2	352	7.4	352	7.4	1.268	270.2	LOS F	172.3	1248.0	1.00	5.13	13.03	12.3
Approach		1127	4.1	1129	4.1	1.268	264.6	LOS F	172.3	1248.0	1.00	5.13	13.03	12.3
North: Arthur Highway North														
7	L2	145	11.7	145	11.7	0.490	8.9	LOS A	4.2	30.1	0.83	0.83	0.87	58.3
8	T1	19	5.0	20	5.0	0.490	6.0	LOS A	4.2	30.1	0.83	0.83	0.87	58.0
9	R2	310	0.0	310	0.0	0.490	16.4	LOS B	4.2	30.1	0.83	0.83	0.87	63.5
Approach		474	3.8	475	3.8	0.490	13.6	LOS B	4.2	30.1	0.83	0.83	0.87	61.6
West: Bypass														
10	L2	10	0.0	10	0.0	0.483	7.0	LOS A	3.9	28.6	0.72	0.72	0.72	57.3
11	T1	136	9.1	136	9.1	0.483	7.4	LOS A	3.9	28.6	0.72	0.72	0.72	57.6
12	R2	373	5.0	393	5.0	0.483	11.9	LOS B	3.9	28.6	0.72	0.72	0.72	55.7
Approach		519	6.0	539	5.9	0.483	10.6	LOS B	3.9	28.6	0.72	0.72	0.72	56.2
All Vehicles		2541	4.6	2586	4.6	1.268	141.7	LOS F	172.3	1248.0	0.91	2.95	6.77	19.8

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

MOVEMENT SUMMARY

Site: 101 [2042 Bypass/Site Access - PM Peak (Site Folder: Bypass/Site/Access/Arthur Hwy roundabout)]

New Site
Site Category: (None)
Roundabout

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: Site Access														
1	L2	362	5.0	381	5.0	0.783	26.7	LOS C	12.1	88.5	1.00	1.33	1.82	42.0
2	T1	38	5.0	40	5.0	0.783	26.1	LOS C	12.1	88.5	1.00	1.33	1.82	43.4
3	R2	33	5.0	35	5.0	0.783	33.5	LOS C	12.1	88.5	1.00	1.33	1.82	44.0
Approach		433	5.0	456	5.0	0.783	27.1	LOS C	12.1	88.5	1.00	1.33	1.82	42.3
East: Arthur Highway East														
4	L2	32	5.0	34	5.0	0.728	4.9	LOS A	8.8	64.9	0.76	0.68	0.78	56.0
5	T1	267	2.4	267	2.4	0.728	7.0	LOS A	8.8	64.9	0.76	0.68	0.78	63.0
6	R2	675	7.4	675	7.4	0.728	15.0	LOS B	8.8	64.9	0.76	0.68	0.78	61.9
Approach		974	6.0	976	5.9	0.728	12.5	LOS B	8.8	64.9	0.76	0.68	0.78	62.0
North: Arthur Highway North														
7	L2	677	11.7	677	11.7	0.887	23.9	LOS C	18.9	144.5	1.00	1.28	1.94	49.8
8	T1	56	5.0	59	5.0	0.887	20.9	LOS C	18.9	144.5	1.00	1.28	1.94	49.5
9	R2	10	0.0	10	0.0	0.887	31.2	LOS C	18.9	144.5	1.00	1.28	1.94	53.7
Approach		743	11.0	746	11.0	0.887	23.8	LOS C	18.9	144.5	1.00	1.28	1.94	49.8
West: Bypass														
10	L2	310	0.0	310	0.0	1.381	362.8	LOS F	206.4	1515.2	1.00	5.88	14.83	9.2
11	T1	563	9.1	563	9.1	1.381	363.3	LOS F	206.4	1515.2	1.00	5.88	14.83	9.2
12	R2	187	5.0	197	5.0	1.381	367.7	LOS F	206.4	1515.2	1.00	5.88	14.83	9.1
Approach		1060	5.7	1070	5.7	1.381	364.0	LOS F	206.4	1515.2	1.00	5.88	14.83	9.2
All Vehicles		3210	6.9	3247	6.9	1.381	132.9	LOS F	206.4	1515.2	0.93	2.62	5.82	20.5

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

MOVEMENT SUMMARY

Site: 101 [2042 Bypass/Site Access Duplication-AM Peak (Site Folder: Bypass/Site/Access/Arthur Hwy roundabout)]

New Site
Site Category: (None)
Roundabout

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: Site Access														
1	L2	315	5.0	315	5.0	0.564	16.1	LOS B	4.3	31.5	0.94	1.06	1.20	49.5
2	T1	75	5.0	75	5.0	0.278	10.5	LOS B	1.4	10.5	0.84	0.91	0.84	51.4
3	R2	31	5.0	31	5.0	0.278	16.3	LOS B	1.4	10.5	0.84	0.91	0.84	51.7
Approach		421	5.0	421	5.0	0.564	15.2	LOS B	4.3	31.5	0.91	1.02	1.11	50.0
East: Arthur Highway East														
4	L2	48	5.0	48	5.0	0.568	11.9	LOS B	4.7	33.5	0.83	0.98	1.05	54.5
5	T1	729	2.4	729	2.4	0.819	18.1	LOS B	12.9	94.2	0.92	1.10	1.39	57.2
6	R2	352	7.4	352	7.4	0.819	25.4	LOS C	12.9	94.2	1.00	1.21	1.71	52.8
Approach		1129	4.1	1129	4.1	0.819	20.1	LOS C	12.9	94.2	0.94	1.13	1.47	55.6
North: Arthur Highway North														
7	L2	145	11.7	145	11.7	0.327	8.4	LOS A	1.7	12.3	0.57	0.76	0.57	61.5
8	T1	19	5.0	19	5.0	0.327	6.0	LOS A	1.7	12.3	0.59	0.79	0.59	56.5
9	R2	310	0.0	310	0.0	0.327	13.4	LOS B	1.7	12.3	0.59	0.79	0.59	61.5
Approach		474	3.8	474	3.8	0.327	11.6	LOS B	1.7	12.3	0.58	0.78	0.58	61.2
West: Bypass														
10	L2	10	0.0	10	0.0	0.203	8.9	LOS A	1.1	8.0	0.61	0.70	0.61	64.0
11	T1	136	9.1	136	9.1	0.203	8.8	LOS A	1.1	8.0	0.61	0.70	0.61	63.7
12	R2	373	5.0	373	5.0	0.372	11.4	LOS B	2.5	18.0	0.67	0.77	0.67	51.7
Approach		519	6.0	519	6.0	0.372	10.7	LOS B	2.5	18.0	0.65	0.75	0.65	54.5
All Vehicles		2543	4.6	2543	4.6	0.819	15.8	LOS B	12.9	94.2	0.81	0.97	1.08	55.3

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

MOVEMENT SUMMARY

Site: 101 [2042 Bypass/Site Access Duplication-PM Peak (Site Folder: Bypass/Site/Access/Arthur Hwy roundabout)]

New Site
Site Category: (None)
Roundabout

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: Site Access														
1	L2	362	5.0	362	5.0	0.436	7.6	LOS A	2.7	19.4	0.76	0.90	0.84	53.1
2	T1	38	5.0	38	5.0	0.140	8.2	LOS A	0.6	4.3	0.67	0.84	0.67	52.5
3	R2	33	5.0	33	5.0	0.140	13.9	LOS B	0.6	4.3	0.67	0.84	0.67	52.7
Approach		433	5.0	433	5.0	0.436	8.1	LOS A	2.7	19.4	0.74	0.89	0.81	53.0
East: Arthur Highway East														
4	L2	32	5.0	32	5.0	0.315	5.4	LOS A	1.8	13.0	0.49	0.59	0.49	58.3
5	T1	267	2.4	267	2.4	0.315	7.3	LOS A	1.8	13.0	0.49	0.59	0.49	65.7
6	R2	675	7.4	675	7.4	0.551	13.1	LOS B	4.4	32.5	0.59	0.71	0.59	59.2
Approach		974	6.0	974	6.0	0.551	11.3	LOS B	4.4	32.5	0.56	0.67	0.56	60.8
North: Arthur Highway North														
7	L2	677	11.7	677	11.7	0.678	13.6	LOS B	6.4	49.3	0.88	1.01	1.09	58.0
8	T1	42	5.0	42	5.0	0.678	10.7	LOS B	6.4	49.3	0.92	1.06	1.21	56.6
9	R2	10	0.0	10	0.0	0.678	18.4	LOS B	6.4	49.3	0.92	1.06	1.21	61.7
Approach		729	11.2	729	11.2	0.678	13.5	LOS B	6.4	49.3	0.88	1.02	1.10	58.0
West: Bypass														
10	L2	310	0.0	310	0.0	0.599	16.7	LOS B	5.3	37.7	0.90	1.04	1.17	58.8
11	T1	563	9.1	563	9.1	0.864	24.5	LOS C	15.6	116.8	0.99	1.31	1.89	49.6
12	R2	187	5.0	187	5.0	0.864	28.3	LOS C	15.6	116.8	1.00	1.35	2.00	46.6
Approach		1060	5.7	1060	5.7	0.864	22.9	LOS C	15.6	116.8	0.96	1.24	1.70	51.3
All Vehicles		3196	6.9	3196	6.9	0.864	15.2	LOS B	15.6	116.8	0.79	0.97	1.10	55.7

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

MOVEMENT SUMMARY

Site: 101 [2042 Bypass Replication - AM Peak (Site Folder: Bypass/Tasman Hwy/Main Rd/Giblin Dr roundabout)]

New Site
Site Category: (None)
Roundabout

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: Giblin Drive														
1	L2	8	11.1	8	11.1	0.133	29.6	LOS C	0.8	6.5	1.00	1.00	1.00	39.8
2	T1	4	20.0	4	20.0	0.133	30.6	LOS C	0.8	6.5	1.00	1.00	1.00	40.8
3	R2	8	11.1	8	11.1	0.133	36.0	LOS D	0.8	6.5	1.00	1.00	1.00	42.1
Approach		20	12.9	21	12.9	0.133	32.3	LOS C	0.8	6.5	1.00	1.00	1.00	40.9
East: Bypass														
4	L2	9	0.0	9	0.0	0.884	14.8	LOS B	19.9	142.0	1.00	1.01	1.49	54.3
5	T1	1141	2.5	1141	2.5	0.884	15.2	LOS B	19.9	142.0	1.00	1.01	1.49	56.3
6	R2	10	0.0	10	0.0	0.884	22.1	LOS C	19.9	142.0	1.00	1.01	1.49	57.1
Approach		1160	2.5	1160	2.5	0.884	15.2	LOS B	19.9	142.0	1.00	1.01	1.49	56.2
North: Main Road														
7	L2	10	0.0	10	0.0	0.281	3.7	LOS A	1.7	12.1	0.35	0.61	0.35	55.9
8	T1	4	0.0	4	0.0	0.281	3.5	LOS A	1.7	12.1	0.35	0.61	0.35	53.3
9	R2	373	4.6	373	4.6	0.281	10.2	LOS B	1.7	12.1	0.35	0.61	0.35	53.8
Approach		387	4.4	387	4.4	0.281	10.0	LOS A	1.7	12.1	0.35	0.61	0.35	53.9
West: Tasman Hwy														
10	L2	2	0.0	2	0.0	0.094	3.1	LOS A	0.5	4.1	0.12	0.31	0.12	56.8
11	T1	136	9.1	136	9.1	0.094	2.9	LOS A	0.5	4.1	0.12	0.31	0.12	62.2
12	R2	8	0.0	8	0.0	0.094	9.5	LOS A	0.5	4.1	0.12	0.31	0.12	59.7
Approach		146	8.5	146	8.5	0.094	3.2	LOS A	0.5	4.1	0.12	0.31	0.12	61.9
All Vehicles		1713	3.5	1715	3.5	0.884	13.2	LOS B	19.9	142.0	0.78	0.86	1.11	55.9

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

MOVEMENT SUMMARY

Site: 101 [2042 Bypass Replication - PM Peak (Site Folder: Bypass/Tasman Hwy/Main Rd/Giblin Dr roundabout)]

New Site
Site Category: (None)
Roundabout

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: Giblin Drive														
1	L2	8	11.1	8	11.1	0.029	7.4	LOS A	0.2	1.5	0.79	0.68	0.79	51.3
2	T1	1	50.0	1	50.0	0.029	8.4	LOS A	0.2	1.5	0.79	0.68	0.79	52.7
3	R2	10	9.1	11	9.1	0.029	13.8	LOS B	0.2	1.5	0.79	0.68	0.79	55.6
Approach		19	12.1	20	12.1	0.029	10.8	LOS B	0.2	1.5	0.79	0.68	0.79	53.5
East: Bypass														
4	L2	10	0.0	11	0.0	0.303	7.8	LOS A	2.3	16.4	0.77	0.67	0.77	58.2
5	T1	265	3.0	265	3.0	0.303	8.2	LOS A	2.3	16.4	0.77	0.67	0.77	60.4
6	R2	2	0.0	2	0.0	0.303	15.1	LOS B	2.3	16.4	0.77	0.67	0.77	61.3
Approach		277	2.9	278	2.9	0.303	8.2	LOS A	2.3	16.4	0.77	0.67	0.77	60.3
North: Main Road														
7	L2	10	0.0	10	0.0	0.672	16.2	LOS B	8.4	59.6	0.97	1.18	1.49	48.0
8	T1	5	0.0	5	0.0	0.672	15.9	LOS B	8.4	59.6	0.97	1.18	1.49	46.1
9	R2	534	1.1	534	1.1	0.672	22.7	LOS C	8.4	59.6	0.97	1.18	1.49	46.6
Approach		549	1.1	549	1.1	0.672	22.5	LOS C	8.4	59.6	0.97	1.18	1.49	46.6
West: Tasman Hwy														
10	L2	2	0.0	2	0.0	0.495	3.1	LOS A	4.9	35.1	0.14	0.28	0.14	57.0
11	T1	853	3.1	853	3.1	0.495	2.8	LOS A	4.9	35.1	0.14	0.28	0.14	63.8
12	R2	1	0.0	1	0.0	0.495	9.5	LOS A	4.9	35.1	0.14	0.28	0.14	60.0
Approach		856	3.1	856	3.1	0.495	2.8	LOS A	4.9	35.1	0.14	0.28	0.14	63.8
All Vehicles		1701	2.5	1703	2.5	0.672	10.1	LOS B	8.4	59.6	0.52	0.64	0.69	56.3

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

MOVEMENT SUMMARY

Site: 101 [2042 Bypass Replication - AM Peak - Growth Area (Site Folder: Bypass/Tasman Hwy/Main Rd/Giblin Dr roundabout)]

New Site
Site Category: (None)
Roundabout

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: Giblin Drive														
1	L2	8	11.1	8	11.1	0.189	35.3	LOS D	0.9	6.7	0.95	0.98	0.95	37.4
2	T1	4	20.0	4	20.0	0.189	37.2	LOS D	0.9	6.7	0.95	0.98	0.95	38.4
3	R2	8	11.1	8	11.1	0.189	41.7	LOS D	0.9	6.7	0.95	0.98	0.95	39.5
Approach		20	12.9	21	12.9	0.189	38.2	LOS D	0.9	6.7	0.95	0.98	0.95	38.4
East: Bypass														
4	L2	9	0.0	9	0.0	1.442	411.7	LOS F	306.0	2187.6	1.00	6.87	17.34	8.1
5	T1	1458	2.5	1458	2.5	1.442	412.1	LOS F	306.0	2187.6	1.00	6.87	17.34	8.1
6	R2	10	0.0	10	0.0	1.442	419.0	LOS F	306.0	2187.6	1.00	6.87	17.34	8.2
Approach		1477	2.5	1477	2.5	1.442	412.1	LOS F	306.0	2187.6	1.00	6.87	17.34	8.1
North: Main Road														
7	L2	10	0.0	10	0.0	0.584	8.1	LOS A	5.5	39.6	0.79	0.90	0.93	53.2
8	T1	4	0.0	4	0.0	0.584	7.8	LOS A	5.5	39.6	0.79	0.90	0.93	50.9
9	R2	587	4.6	587	4.6	0.584	14.7	LOS B	5.5	39.6	0.79	0.90	0.93	51.4
Approach		601	4.5	601	4.5	0.584	14.5	LOS B	5.5	39.6	0.79	0.90	0.93	51.4
West: Tasman Hwy														
10	L2	2	0.0	2	0.0	0.318	3.1	LOS A	2.4	18.1	0.14	0.29	0.14	56.9
11	T1	509	9.1	509	9.1	0.318	2.9	LOS A	2.4	18.1	0.14	0.29	0.14	62.3
12	R2	8	0.0	8	0.0	0.318	9.5	LOS A	2.4	18.1	0.14	0.29	0.14	59.9
Approach		519	8.9	519	8.9	0.318	3.0	LOS A	2.4	18.1	0.14	0.29	0.14	62.3
All Vehicles		2617	4.3	2619	4.3	1.442	236.7	LOS F	306.0	2187.6	0.78	4.15	10.03	13.0

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

MOVEMENT SUMMARY

Site: 101 [2042 Bypass Replication - PM Peak - Growth Area (Site Folder: Bypass/Tasman Hwy/Main Rd/Giblin Dr roundabout)]

New Site
Site Category: (None)
Roundabout

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: Giblin Drive														
1	L2	8	11.1	8	11.1	0.051	15.8	LOS B	0.4	3.0	0.98	0.80	0.98	46.2
2	T1	1	20.0	1	20.0	0.051	16.1	LOS B	0.4	3.0	0.98	0.80	0.98	47.5
3	R2	10	11.1	11	11.1	0.051	22.2	LOS C	0.4	3.0	0.98	0.80	0.98	49.3
Approach		19	11.6	20	11.6	0.051	19.2	LOS B	0.4	3.0	0.98	0.80	0.98	47.8
East: Bypass														
4	L2	2	0.0	2	0.0	0.663	11.3	LOS B	8.3	59.4	1.00	0.96	1.22	56.7
5	T1	627	2.5	627	2.5	0.663	11.7	LOS B	8.3	59.4	1.00	0.96	1.22	58.8
6	R2	10	0.0	10	0.0	0.663	18.6	LOS B	8.3	59.4	1.00	0.96	1.22	59.7
Approach		639	2.5	639	2.5	0.663	11.8	LOS B	8.3	59.4	1.00	0.96	1.22	58.8
North: Main Road														
7	L2	10	0.0	10	0.0	1.282	293.0	LOS F	132.0	959.9	1.00	5.35	12.07	10.8
8	T1	5	0.0	5	0.0	1.282	292.7	LOS F	132.0	959.9	1.00	5.35	12.07	10.7
9	R2	771	4.6	771	4.6	1.282	299.6	LOS F	132.0	959.9	1.00	5.35	12.07	10.8
Approach		786	4.5	786	4.5	1.282	299.5	LOS F	132.0	959.9	1.00	5.35	12.07	10.8
West: Tasman Hwy														
10	L2	2	0.0	2	0.0	0.628	3.2	LOS A	7.5	56.3	0.22	0.28	0.22	56.5
11	T1	1040	9.1	1040	9.1	0.628	2.9	LOS A	7.5	56.3	0.22	0.28	0.22	61.9
12	R2	1	0.0	1	0.0	0.628	9.6	LOS A	7.5	56.3	0.22	0.28	0.22	59.4
Approach		1043	9.1	1043	9.1	0.628	3.0	LOS A	7.5	56.3	0.22	0.28	0.22	61.8
All Vehicles		2487	6.0	2488	6.0	1.282	99.1	LOS F	132.0	959.9	0.67	2.06	4.23	24.3

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

MOVEMENT SUMMARY

Site: 101 [2042 Bypass Replication - AM Peak - Growth Area + Duplication (Site Folder: Bypass/Tasman Hwy/Main Rd/Giblin Dr roundabout)]

New Site
Site Category: (None)
Roundabout

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: Giblin Drive														
1	L2	8	11.1	8	11.1	0.094	1242.1	LOS F	0.5	4.2	0.94	0.97	0.94	44.4
2	T1	4	20.0	4	20.0	0.094	20.2	LOS C	0.5	4.2	0.94	0.97	0.94	45.7
3	R2	8	11.1	8	11.1	0.094	26.1	LOS C	0.5	4.2	0.94	0.97	0.94	47.3
Approach		20	12.9	21	12.9	0.094	511.3	LOS F	0.5	4.2	0.94	0.97	0.94	45.8
East: Bypass														
4	L2	9	0.0	9	0.0	0.619	10.9	LOS B	6.0	42.6	0.87	0.93	1.06	57.5
5	T1	1456	2.5	1456	2.5	0.829	456.5	LOS F	14.5	103.5	0.95	1.03	1.35	57.6
6	R2	10	0.0	10	0.0	0.829	21.8	LOS C	14.5	103.5	1.00	1.08	1.52	57.3
Approach		1475	2.5	1475	2.5	0.829	450.7	LOS F	14.5	103.5	0.95	1.03	1.35	57.6
North: Main Road														
7	L2	10	0.0	10	0.0	0.624	7.7	LOS A	4.5	32.5	0.68	0.93	0.84	54.0
8	T1	4	0.0	4	0.0	0.624	6.7	LOS A	4.5	32.5	0.68	0.93	0.84	51.6
9	R2	587	4.6	587	4.6	0.624	13.6	LOS B	4.5	32.5	0.68	0.93	0.84	52.1
Approach		601	4.5	601	4.5	0.624	13.4	LOS B	4.5	32.5	0.68	0.93	0.84	52.1
West: Tasman Hwy														
10	L2	2	0.0	2	0.0	0.148	3.3	LOS A	0.7	5.6	0.11	0.28	0.11	57.0
11	T1	509	9.1	509	9.1	0.199	3.1	LOS A	1.1	8.1	0.11	0.29	0.11	62.5
12	R2	8	0.0	8	0.0	0.199	9.5	LOS A	1.1	8.1	0.11	0.29	0.11	60.0
Approach		519	8.9	519	8.9	0.199	3.2	LOS A	1.1	8.1	0.11	0.29	0.11	62.5
All Vehicles		2615	4.3	2617	4.3	0.829	261.9	LOS F	14.5	103.5	0.72	0.86	0.98	56.9

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Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2042 Bypass Replication - PM Peak - Growth Area +Duplication (Site Folder: Bypass/Tasman Hwy/Main Rd/Giblin Dr roundabout)]

New Site
Site Category: (None)
Roundabout

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: Giblin Drive														
1	L2	8	11.1	8	11.1	0.043	16.3	LOS B	0.2	1.7	0.79	0.81	0.79	49.6
2	T1	1	50.0	1	50.0	0.043	11.5	LOS B	0.2	1.7	0.79	0.81	0.79	51.0
3	R2	10	9.1	11	9.1	0.043	16.2	LOS B	0.2	1.7	0.79	0.81	0.79	53.7
Approach		19	12.1	20	12.1	0.043	16.0	LOS B	0.2	1.7	0.79	0.81	0.79	51.7
East: Bypass														
4	L2	2	0.0	2	0.0	0.366	9.4	LOS A	2.4	17.1	0.82	0.79	0.82	57.7
5	T1	627	3.0	627	3.0	0.490	12.2	LOS B	4.1	29.6	0.86	0.82	0.92	59.6
6	R2	10	0.0	10	0.0	0.490	16.8	LOS B	4.1	29.6	0.89	0.84	0.97	60.4
Approach		639	2.9	639	2.9	0.490	12.2	LOS B	4.1	29.6	0.86	0.82	0.92	59.6
North: Main Road														
7	L2	10	0.0	10	0.0	0.022	8.9	LOS A	0.1	0.6	0.57	0.63	0.57	59.4
8	T1	5	0.0	5	0.0	0.022	6.2	LOS A	0.1	0.6	0.57	0.63	0.57	56.4
9	R2	771	1.1	771	1.1	0.740	16.4	LOS B	6.9	48.7	0.81	1.10	1.27	50.2
Approach		786	1.1	786	1.1	0.740	16.2	LOS B	6.9	48.7	0.81	1.09	1.26	50.4
West: Tasman Hwy														
10	L2	2	0.0	2	0.0	0.283	3.3	LOS A	1.6	11.4	0.12	0.28	0.12	57.0
11	T1	1040	3.1	1040	3.1	0.379	3.7	LOS A	2.4	17.6	0.12	0.28	0.12	64.0
12	R2	1	0.0	1	0.0	0.379	9.5	LOS A	2.4	17.6	0.12	0.28	0.12	60.1
Approach		1043	3.1	1043	3.1	0.379	3.7	LOS A	2.4	17.6	0.12	0.28	0.12	64.0
All Vehicles		2487	2.5	2488	2.5	0.740	9.9	LOS A	6.9	48.7	0.53	0.68	0.69	57.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.