

**ratio:**

**Prepared for:**  
Maddocks Lawyers on behalf of  
Eastern Ash Pty Ltd

**Prepared by:**  
Brett Young  
15 November 2021

**Traffic Expert Evidence**

**Greater Geelong Planning Scheme  
Amendment C391**  
73-155 Ash Road, Leopold

and

**Planning Permit Application  
39/2019**  
87-127 Ash Road, Leopold

**ratio:transport**

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Maddocks Lawyers on behalf of  
Eastern Ash Pty Ltd

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## **Appendix A: Traffic Surveys**

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## 1.1 Planning Panels Reference

- 1.1.1 Amendment C391 to the Greater Geelong Planning Scheme.

## 1.2 Name and Address

- 1.2.1 My name is Brett James Young. I am a Director at Ratio Consultants Pty Ltd and I practice as a Consulting Traffic Engineer. Ratio Consultants Pty Ltd is located at 8 Gwynne Street, Cremorne.

## 1.3 Qualifications and Expertise

- 1.3.1 My educational qualifications are as follows:
- Bachelor of Engineering (with Honours), University of Canterbury.
  - Member, Victorian Planning and Environmental Law Association.
  - Member, Institute of Transportation Engineers – Australian and New Zealand Section.
- 1.3.2 I have approximately 14 years of experience in Traffic Engineering, including:
- Two and a half years with Traffic Design Group Ltd (Auckland, New Zealand);
  - 11 and a half years with Ratio Consultants Pty Ltd.

## 1.4 Relevant Experience

- 1.4.1 I have experience and expertise in traffic engineering, road safety planning and development impact assessments of a wide range of land-use developments.

## 1.5 Instructions which defined the scope of this report

- 1.5.1 I have been instructed by Maddocks on behalf of Eastern Ash Pty Ltd to undertake a review of all relevant background material and prepare an expert witness statement for submission and presentation at Planning Panels Victoria, in regards to Amendment C391 of the Greater Geelong Planning Scheme and the concurrent Permit Application 39/2019 lodged by Eastern Ash Pty Ltd.
- 1.5.2 Specifically, I was instructed to prepare an evidence witness statement, in accordance with the *Guide to Expert Evidence* and to express my opinion on the Amendment in consideration of the following:
- Proposed Schedule 46 to Clause 43.02 - Design and Development Overlay (DDO46) that will apply to all the Amendment Land.
  - The exhibited draft Planning Permit.
  - The Traffic and Transport Assessment Report prepared by Cardno (December 2018) including all appendices and accompanying roadworks plans;
  - Eastern Ash's submission on the Amendment and the revised concept plan; and
  - Issues raised in submissions to the Amendment, including local submitter concerns regarding traffic volumes and the Department of Transport submission regarding the works at Bellarine Highway and Ash Road.

## 1.6 Facts, Matters and Assumption Relied Upon

1.6.1 In the course of preparing this report I have had access to and relied upon:

- Greater Geelong Planning Scheme.
- Planning Scheme Maps.
- Traffic & Transport Assessment for the Ash Road Leopold Development Plan, prepared by Cardno (dated 13 September 2012).
- Leopold Structure Plan 2011, prepared by the City of Greater Geelong (Amended in January 2013).
- South East Leopold Framework Plan, prepared by Tract Consultants (Dated January 2016).
- Traffic Impact Assessment for Planning Scheme Amendment C367, prepared by ESR (dated 23 January 2018).
- Traffic Engineering Evidence Statement for Planning Scheme Amendment C367, prepared by Traffix Group (dated 23 November 2018).
- Ash Road Final Shared Infrastructure Funding Plan, prepared by Urban Enterprise (Dated 30 November 2018).
- Proposed roundabout design at Walkers Road and Ash Road, Leopold, prepared by Cardno (drawing number: V171945-CI-SK01, dated 30 July 2019).
- Ash Road road upgrade plan, prepared by Cardno (drawing number: V171945-CI-SK02, dated 30 April 2020).
- Traffic and Transport Assessment for the Ash Road East subdivision application and Amendment C391, prepared by Cardno (dated 4 December 2018).
- Bellarine Highway / Ash Road turning lane design plan, prepared by Cardno (drawing number: V171945-CI-SK03, dated 30 July 2019).
- Proposed Schedule 46 to Clause 43.02 Design Development Overlay (DDO46).
- Draft Section 173 Agreement between City of Greater Geelong and landowners within the Amendment Land, prepared by Maddocks (dated 4 February 2021).
- Draft Planning Permit PP-39-2019 prepared by City of Greater Geelong.
- Combined Planning Scheme Amendment and Planning Permit Application report, prepared by Tract (issued 22 December 2020).
- Subdivision Plan for the Permit Land, prepared by Tract (dated 28 October 2020).
- Landscape Masterplan report for 73-155 Ash Road, Leopold, prepared by Tract (dated 22 October 2020).
- Alternative Subdivision Concept Plan attached to Eastern Ash submission, prepared by Tract (dated 24 June 2021).
- Submission from Eastern Ash for Amendment C391 Ash Road (East), Leopold, prepared by Tract (dated 28 June 2021).
- Meeting minutes from the Community Focus Council Meeting held on 8 September 2020, prepared by City of Greater Geelong.
- Combined redacted submissions document for Amendment C391.
- Referral responses and comments from Regional Roads Victoria (dated 2 May 2019), and further from Department of Transport (FOL/19/15511, dated 9 April 2021).
- Traffic surveys undertaken by Trans Traffic Surveys during October / November 2021.

- Historic SCATS data obtained for the intersection of Bellarine Highway, Ash Road and Simons Road.
- My relevant experience.

### **1.7 Identity of Persons Undertaking the Work**

- Brett Young of Ratio Consultants.
- Ben Krastins, Associate Transport Engineer at Ratio Consultants and Katie Harker, Transport Engineer at Ratio Consultants assisted in the preparation of the evidence statement and traffic analysis under my direction.
- All views expressed in this statement are my own, for the purposes of this evidence statement.

### **1.8 Declaration**

- 1.8.1 I confirm that I have read and that I understand the Planning Panels Victoria's 'Guide to Expert Evidence' and that I comply with the provisions of that guide.
- 1.8.2 I have no relationship with the client other than a business engagement to comment on this matter.
- 1.8.3 I also declare that I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel

## 2 Amendment Background:

- 2.1.1 Eastern Ash Pty Ltd, the proponent, submitted a combined Planning Scheme Amendment request and Planning Permit Application to Greater Geelong City Council.
- 2.1.2 The Planning Scheme Amendment is to rezone the land at 73-155 Ash Road, Leopold (Amendment Land) from Farming Zone (FZ) to General Residential Zone 1 (GRZ1) and apply the Design and Development Overlay Schedule 46 (DDO46).
- 2.1.3 The Planning Permit Application proposes residential subdivision of part of the Amendment Land at 87-127 Ash Road, Leopold (Permit Land).
- 2.1.4 The Permit Land is a more confined area within the Amendment Land, as illustrated in Figure 2-1.

**Figure 2-1: Amendment Area and Planning Permit Area**



- 2.1.5 On 8 September 2020, Greater Geelong City Council (Council) resolved to request authorisation from the Minister for Planning to prepare and exhibit the Amendment. The exhibited material included a Traffic and Transport Assessment Report prepared by Cardno (December 2020).
- 2.1.6 The exhibited material showed the Amendment Land yielding approximately 330 residential lots and the Permit Land containing approximately 196 residential lots.
- 2.1.7 The Amendment was exhibited between 27 May 2021 and 8 June 2021. In response to exhibition, Council received 29 submissions, including a submission lodged by Eastern Ash.
- 2.1.8 On 28 September 2021, Council considered the submissions and resolved to write to the Minister for Planning to request and Independent Panel be appointed to consider the matter. As part of the Agenda for this meeting, Council sought a number of road alignment adjustments to the revised subdivision Concept.
- 2.1.9 A number of submissions were received in relation to traffic and transport related matters. The Department of Transport seek an extension of the Bellarine Highway right turn lane on the west approach to the intersection with Ash Road so that the total length is 195m including a 25m taper. Consideration was also sought to be given to the parallel north-south routes at Melaluka Road and Mollers Lane. Further submissions were made by residents relating to traffic impact concerns to Ash Road and its intersection with Bellarine Highway. Submissions were also made in support for the proposed upgrade of Ash Road and at the intersection.

### 3 The Proposal:

- 3.1.1 The proposal involves a combined Planning Scheme Amendment and Planning Permit application for a subdivision of land.
- 3.1.2 The Planning Scheme Amendment is to rezone the land at 73-155 Ash Road, Leopold (Amendment Land) from Farming Zone (FZ) to General Residential Zone 1 (GRZ1) and apply the Design and Development Overlay Schedule 46 (DDO46).
- 3.1.3 The Planning Permit Application proposes residential subdivision of part of the Amendment Land at 87-127 Ash Road, Leopold (Permit Land).
- 3.1.4 According to the Traffic and Transport Assessment Report prepared by Cardno (dated December 2018) for the proposed rezoning, the Amendment Land will yield approximately 330 residential lots, whilst the Permit Land will yield approximately 196 lots.
- 3.1.5 Vehicle access to the Amendment Land is to be via several connections with Ash Road which abuts the land's western boundary. Ash Road is to be upgraded to a connector street consistent with the existing northern section of Ash Road. East-west road connections also provide connectivity through to the Mollers Lane subdivision area to the east of the Amendment Land.
- 3.1.6 The existing Ash Road intersection with Bellarine Highway is proposed to have the right turn lane on the west approach lengthened as part of the development of the Amendment Land.

# 4 Existing Conditions:

## 4.1 Amendment Land

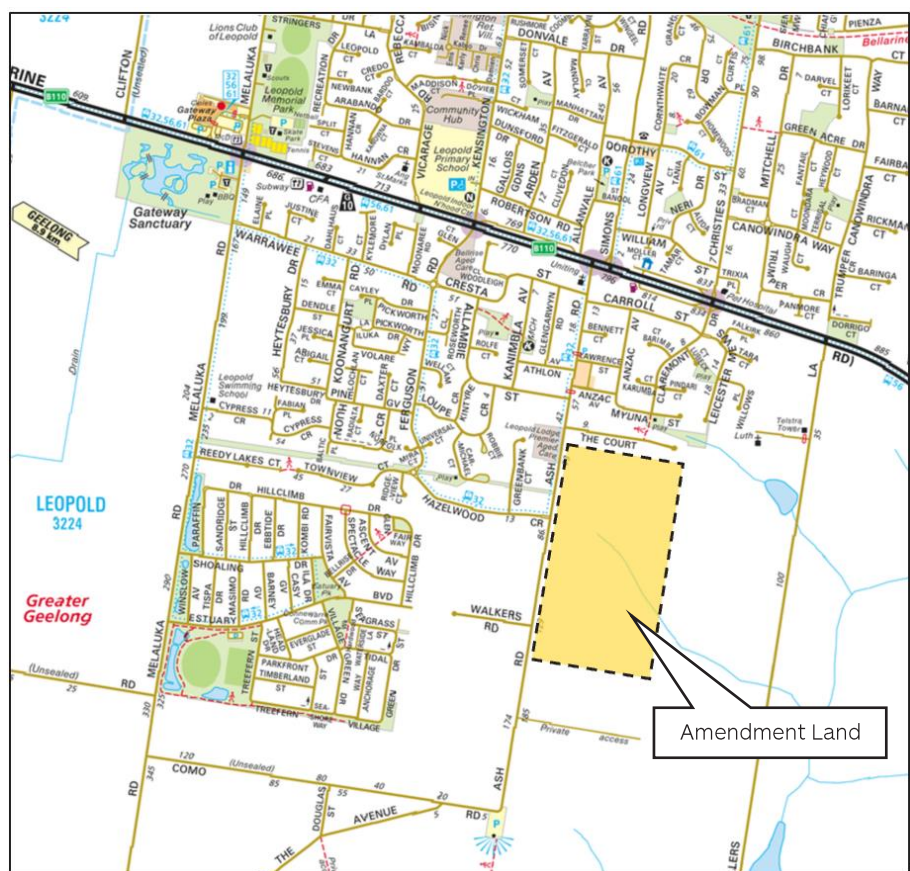
The Amendment Land is a rectangular area of 16.5 hectares, whilst the permit land which sits inside the Amendment Land is almost square in shape. The land is located on the eastern side of Ash Road, as shown in the locality plan in Figure 4-1 below. An aerial photograph of the site and surrounds is shown at Figure 4-2 below.

The site is currently undeveloped and is currently used for farming purposes with some existing dwellings and buildings.

The land is zoned Farming Zone (FZ) as shown in the Land Zoning Map at Figure 4-3.

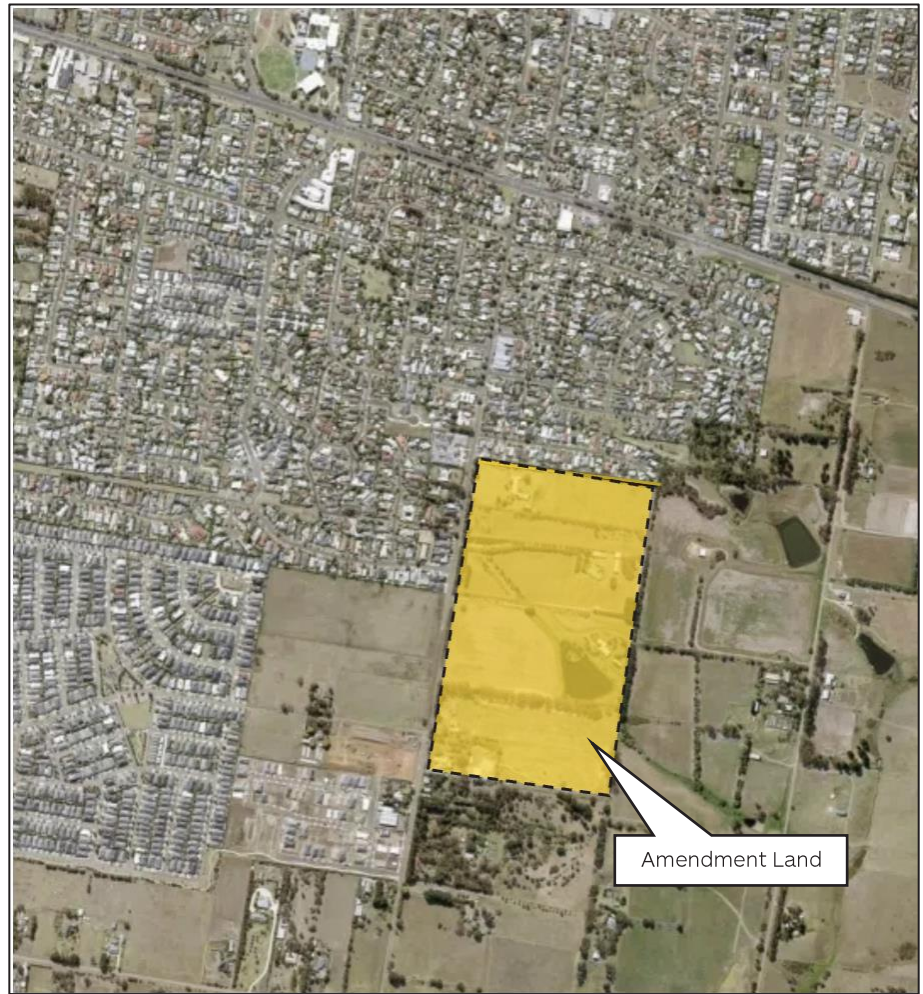
Land to the south and east is currently used for farming, with residential uses to the north and west.

Figure 4.1: Locality Plan



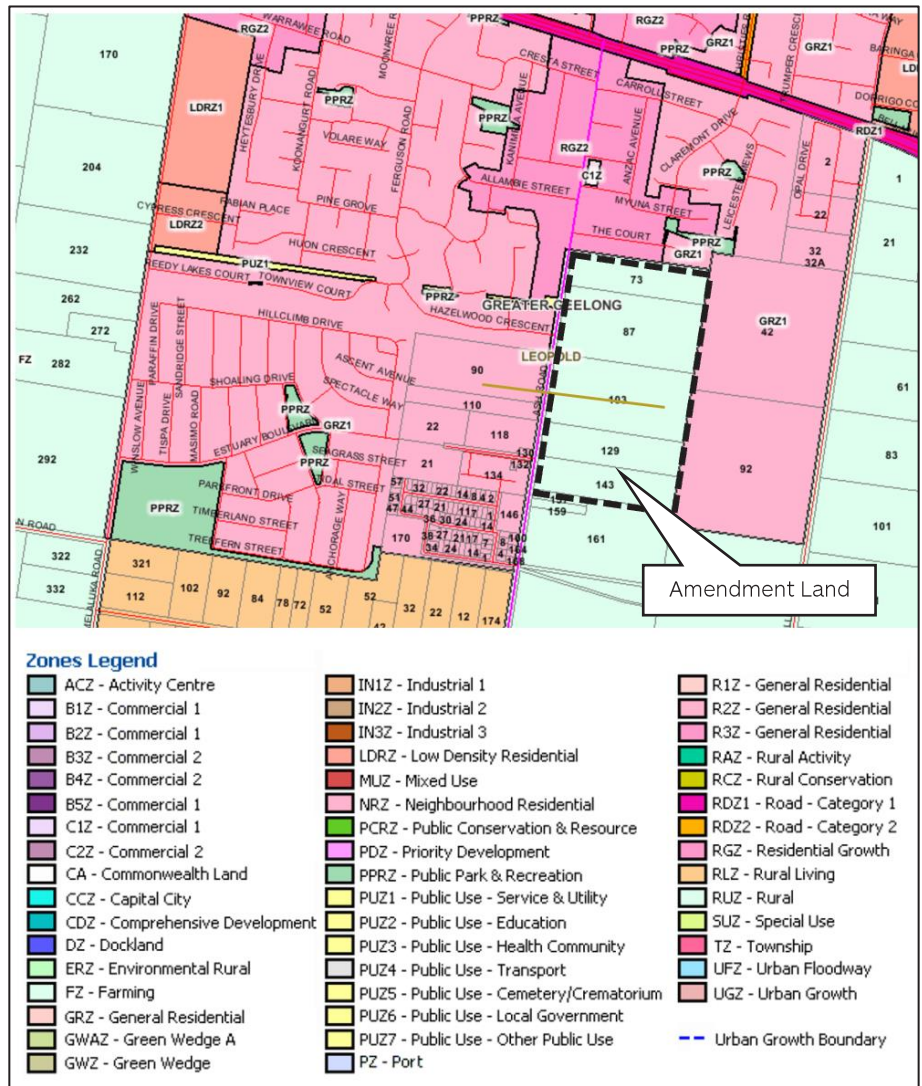
Source: Melways Online

Figure 4-2: Aerial Photograph



Source: [www.landchecker.com.au](http://www.landchecker.com.au)

Figure 4-3: Land Zoning Map



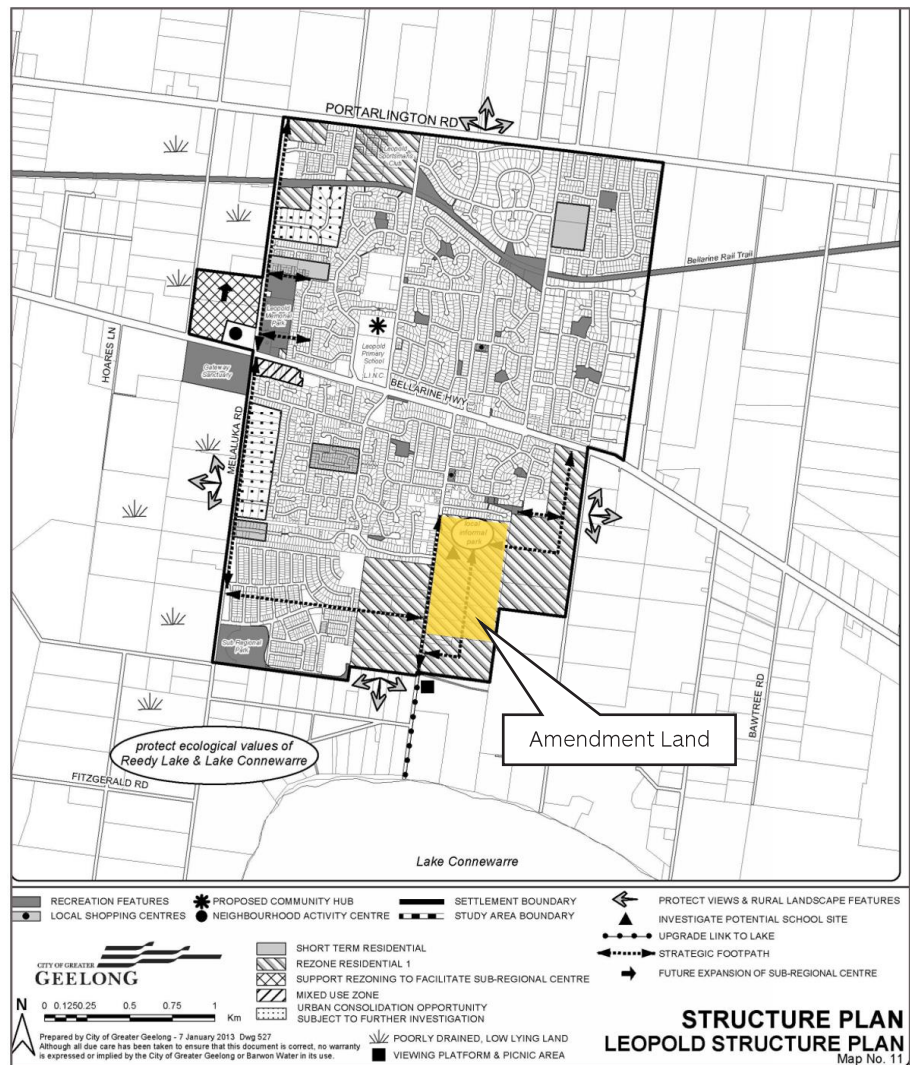
Source: [services.land.vic.gov.au](http://services.land.vic.gov.au)

## 4.2 Background Documents

### Leopold Structure Plan

- 4.2.1 The Amendment Land is located within the Leopold Structure Plan area, prepared by the City of Greater Geelong in September 2011 and updated in January 2013.
- 4.2.2 Figure 4-4 below depicts the Amendment Land in relation to the broader structure plan area.

**Figure 4-4: Leopold Structure Plan Area**



## South East Leopold Framework Plan

4.2.3 The South East Leopold Framework Plan (SELFP) was prepared by Tract Consultants (January 2016) and covers the Amendment Land as per Figure 4-5 below.

**Figure 4-5: South East Leopold Framework Plan**



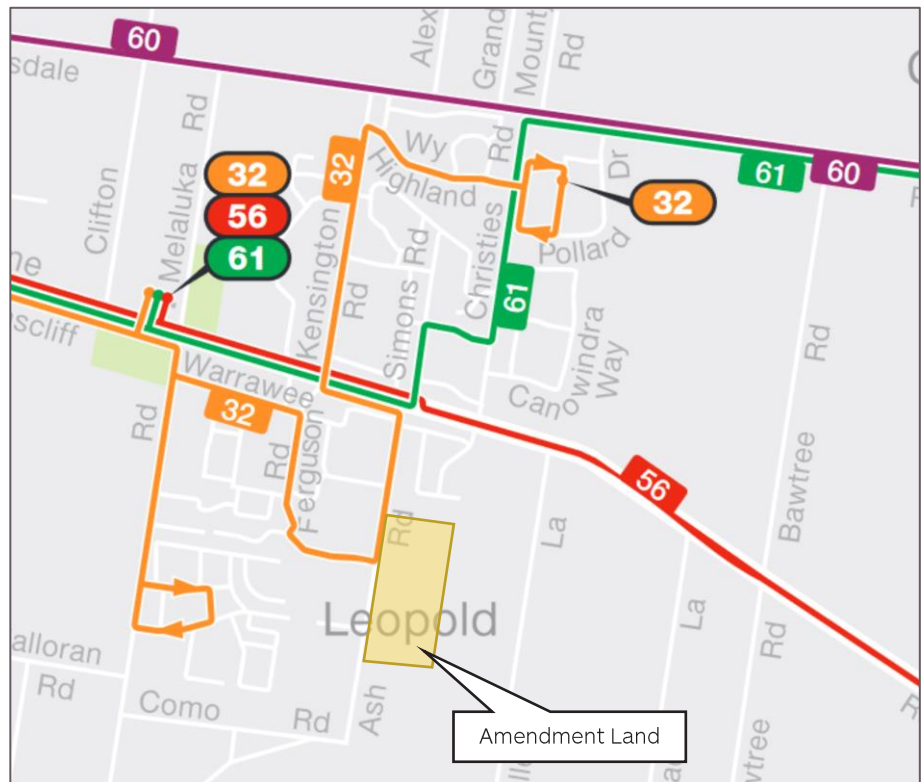
4.2.4 The SELFP nominates Ash Road as a Connector Road, as well as the two east-west roads through the Amendment Land. They are nominated with a road reservation width of 22 metres. The northern east-west connector is shown to form a T-intersection with Ash Road at its western end, whilst the southern east-west connector is shown to align with Walkers Road in the adjacent Ash Road west development area.

4.2.5 Shared paths are nominated along the linear open space areas, the southern edge and the western side of Mollers Lane to the east of the Amendment Land.

### 4.3 Public Transport

- 4.3.1 **Bus Route 32** operates along Ash Road past the Amendment Land, providing a service between Leopold and Geelong Railway Station. As the area develops it is likely that the bus services will be extended to service the subdivision.
- 4.3.2 Figure 4-6 below illustrates the nearby and surrounding public transport routes.

**Figure 4-6: Public Transport Routes Operating Nearby – Geelong bus network**



Source: [ptv.vic.gov.au](http://ptv.vic.gov.au)

## 5.1 Road Network

### Ash Road

- 5.1.1 Ash Road is a local road under the control of Council and is aligned in a north south direction between Bellarine Highway to the north and Lake Connewarre to the south where it connects to Como Road. It forms a signalised intersection with Bellarine Highway, which provides for dedicated controlled turning lanes. Near Bellarine Highway, Ash Road has a carriageway width of 10.5m, accommodating dedicated left and right turning lanes on the south approach.
- 5.1.2 Further south, Ash Road provides for a single traffic lane in each direction, with a kerbside parallel parking lane on the western side of the road. This extends to kerbside parking on both sides of the road between Cresta Street and The Court.
- 5.1.3 South of The Court, Ash Road provides a single width carriageway approx. 3.0 metres wide, with wide gravel shoulders on both sides to allow for passing vehicles.
- 5.1.4 In the section of the Ash Road having frontage to the recently subdivided land at the southern portion of the Ash Road West development area, the road has been widened to incorporate indented car parking, kerbing and a shared path on the western side of the road.
- 5.1.5 Elsewhere within built up areas of Ash Road towards Bellarine Highway, constructed footpaths are generally provided on both sides of the road with the exception of some sections fronting larger lot frontages.
- 5.1.6 There is a posted speed limit in place of 60 km/hr, which reduces to 40km/hr in the vicinity of the strip shopping area.
- 5.1.7 Photos of Ash Road in vicinity of the Amendment Land near Walkers Road and also towards the shopping strip near The Court are shown in Figures 5-1 and 5-2 respectively.

**Figure 5-1: Ash Road – looking north towards Walkers Road**



**Figure 5-2: Ash Road – looking north towards the Court**



### **Bellarine Highway**

- 5.1.8 Bellarine Highway is a primary arterial road under the control of the Department of Transport and is aligned in an east-west direction between Ormond Road in the west where it continues towards the Geelong CBD, and Queenscliff in the east.
- 5.1.9 Near Ash Road, the Bellarine Highway is provided as a dual carriageway with a planted median separating east and west bound traffic. The total carriageway width including median strip varies however is approximately 26.0 metres wide.
- 5.1.10 Constructed footpaths are provided on both sides of Bellarine Highway through the built-up section of Leopold. There is a posted speed limit in place of 70 km/hr which reduces to 40 km/hr towards the west of Ash Road past Kensington Road during school times.
- 5.1.11 A photo of the Bellarine Highway, looking west towards the intersection of Simons Road and Ash Road is shown in Figure 5-3.

**Figure 5-3: Bellarine Highway – looking west towards Simons Road / Ash Road**



### **Hazelwood Crescent / Ferguson Road**

- 5.1.12 Hazelwood Crescent is a local road under the control of Council and is aligned generally in north-west to south-easterly direction, connecting Ash Road in the east to the roundabout in the north where it continues as Ferguson Road. Ferguson Road is a local road under the control of Council and is aligned in a north-south direction, connecting Hazelwood Crescent in the south to Bellarine Highway in the north where it continues at Kensington Road towards Portarlington Road.
- 5.1.13 Both Hazelwood Crescent and Ferguson Road have a road carriageway width of approx. 10 metres, providing for a lane of traffic in each direction, with a kerbside parking lane in both directions.
- 5.1.14 Constructed footpaths are provided on both sides of Hazelwood Crescent and Ferguson Road and there is a posted speed limit in place of 50 km/hr.
- 5.1.15 Photos of Hazelwood Crescent near Greenbank Court, and Ferguson Road near Roseworth Close are shown in Figure 5-4 and 5-5 respectively.

**Figure 5-4: Hazelwood Crescent – looking west towards Ferguson Road**



**Figure 5-5: Ferguson Road – looking south towards Hazelwood Crescent**



### **Walkers Road**

- 5.1.16 Walkers Road is a local road under the control of Council and is aligned in an east-west direction between Ash Road in the east and terminates approximately 250 metres west of Ash Road.
- 5.1.17 Near Ash Road, Walkers Road is an unsealed gravel road with an approximately carriageway width of 3.0 metres.
- 5.1.18 There are no footpaths provided within Walkers Road and a 50 km/hr default speed limit applies to the length of the road.
- 5.1.19 A photo of Walkers Road looking west from Ash Road is shown in Figure 5-6.

**Figure 5-6: Walkers Road – looking west from Ash Road**



### **Estuary Boulevard**

- 5.1.20 Estuary Boulevard is a local road under the control of Council and is aligned in an east-west direction between Melaluka Road in the west and terminates at the border with adjacent land, aligning with the Walkers Road road reserve in the east.
- 5.1.21 Estuary Boulevard has a carriageway width of approx. 11.5 metres and provides a single lane of traffic in each direction with indented car parking throughout.
- 5.1.22 Footpaths are provided on both sides of the road, including a shared path on the southern side of the road. A 50 km/hr default speed limit applies to the length of the road.
- 5.1.23 A photo of Estuary Boulevard looking west towards Melaluka Road is shown in Figure 5-7.

**Figure 5-7: Estuary Boulevard – looking west towards Melaluka Road**



### **Melaluka Road**

- 5.1.24 Melaluka Road is a local road under the control of Council and is aligned in a north-south direction between Portarlington Highway in the north and terminates in the south near Lake Connemara, approx. 800 metres south of Fitzgerald Road.
- 5.1.25 Between Bellarine Highway and O'Halloran Road approx. 250 metres south of Estuary Boulevard, Melaluka Road has a road carriageway width of approx. 7.2 metres with gravel shoulders abutting semi-rural properties, and kerbing along the frontage of built up residential dwellings. A single lane of traffic is provided in each direction along this section and the road has a posted speed limit of 60 km/hr. A footpath is provided along the eastern side of Melaluka Road only, terminating at the southern boundary of the Estuary Estate.
- 5.1.26 At both Bellarine Highway and Portarlington Road, the intersections with Melaluka Road are fully controlled with signalisation, including turning lanes.

- 5.1.27 South of O'Halloran Road, Melaluka Road narrows to a single width pavement approx. 3.0 metres wide, with a posted speed limit of 100 km/hr south of Como Road.
- 5.1.28 A photo of Melaluka Road between Cypress Crescent and Warrawee Road is shown in Figure 5-8.

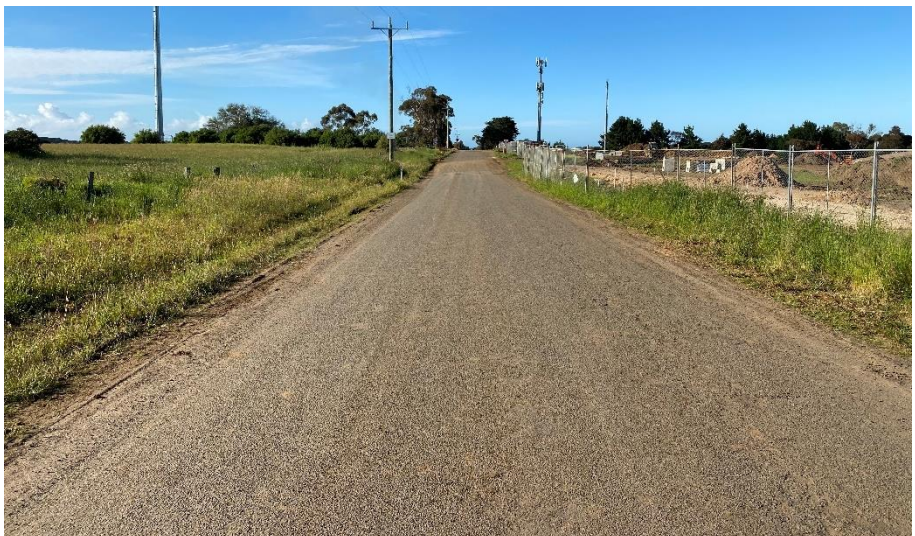
**Figure 5-8: Melaluka Road – looking north towards Warrawee Road**



#### **Mollers Lane**

- 5.1.29 Mollers Lane is a local road under the control of Council and is aligned in a north-south direction between Portarlinton Road in the north where it forms an unsignalised T-intersection, and terminating at the south near Lake Connewarre, approx. 120 metres south of Maloneys Road.
- 5.1.30 Mollers Lane is sealed with an approximate width of 5.5 metres for the first 110 metres south of Portarlinton Road. After this point it becomes an unsealed gravel road with the same width.
- 5.1.31 No footpath provision is made within Mollers Lane.
- 5.1.32 A photo of Mollers Lane looking south from Bellarine Highway is shown in Figure 5-9.

**Figure 5-9: Mollers Lane - looking south from Bellarine Highway**





- 5.3.6 Video footage used to undertake the October 2021 surveys was reviewed to observe the general performance and queuing on each of the east and west Bellarine Highway approaches including within turn lanes.
- 5.3.7 I observed that all through vehicle movements during the peak periods were accommodated within the allotted green time in each cycle, with all vehicles clearing storage lanes through a single phase.
- 5.3.8 A maximum of 5 (five) cars in the survey period were observed to queue within the right turn lane on the Bellarine Highway west approach at any one time, which occurred during the PM peak on one occasion.
- 5.3.9 I determined appropriate cycle and phase timings of the Ash Road / Bellarine Highway intersection through video footage observations and Controller Operation Specification documents obtained for the site. I determined an average Cycle time of 90 seconds in the AM Peak, and 100 seconds in the PM Peak.
- 5.3.10 The proportion of heavy vehicles within the area (in particular along Bellarine Highway) were recorded to be 5% in the AM Peak and 2% in the PM Peak. During the PM peak, many of the heavy vehicle trips were attributed to bus vehicles.
- 5.3.11 The survey indicated that both pedestrian and cyclist movements were very low, with a total of 6 and 1 pedestrians and 4 and 3 cyclists recorded during the morning and afternoon peak hour periods respectively.

## **5.4 Traffic Generation**

### **Residential Traffic Generation**

- 5.4.1 Traffic generation behaviour of residential subdivisions varies considerably based on a number of factors influencing mode choice and travel demand, such as housing density, proximity to retail facilities and services, and alternative modes of transport.
- 5.4.2 Between 26 October 2021 and 2 November 2021, I commissioned tube count surveys at the existing residential subdivision known as the Estuary Estate, located at the southern end of Melaluka Road. Estuary Estate has only two access roads in Shoaling Drive and Estuary Boulevard, and the traffic volume data was collected at these locations near Melaluka Road.
- 5.4.3 The study area used to calculate the daily generation rate, including the locations of Shoaling Drive and Estuary Boulevard is shown below in Figure 5-11.

**Figure 5-11: Survey Study Area – Estuary Estate**



- 5.4.4 The surveys showed that the 666 dwellings recorded in the survey area generated an average weekday volume of 4,486 vehicles per day, resulting in a daily traffic generation rate of 6.75 vehicles per day / dwelling. Given the purely residential nature the Estuary Estate, it can be reasonably assumed that no internal resident trips were undertaken by motor vehicle.
- 5.4.5 Further analysis and breakdown of the surveyed volumes indicated that approximately 9-10% of vehicles were generated during the respective AM and PM peak periods.
- 5.4.6 The calculated rate of 6.75 vehicles per day / dwelling is consistent and comparable with case studies that my firm has undertaken in recent years between 2016 and 2019 in outer suburban areas of Melbourne. The case studies have been chosen due to their limited access to facilities within walking distance and limited public transport opportunities to provide a conservative estimation of a residential community heavily dependent on car-based travel.
- 5.4.7 The case study data indicated that a daily residential traffic generation rate for between 7.4 and 7.9 vehicles per day / dwelling, with an average of 7.7 vehicles per day / dwelling. The case study data reviewed, including surveyed data for Estuary Estate in Leopold, is presented in Table 5-1.

**Table 5-1: Case Study Daily Traffic Summary**

Area / Location	No. of Lots	Daily Generation Rate
Epping	284 lots	7.9 vpd / lot
Altona Meadows	456 lots	7.7 vpd / lot
Greenvale	848 lots	7.4 vpd / lot
<b>Average</b>		<b>7.7 vpd / lot</b>
Estuary Estate, Leopold	666 lots	6.75 vpd / lot

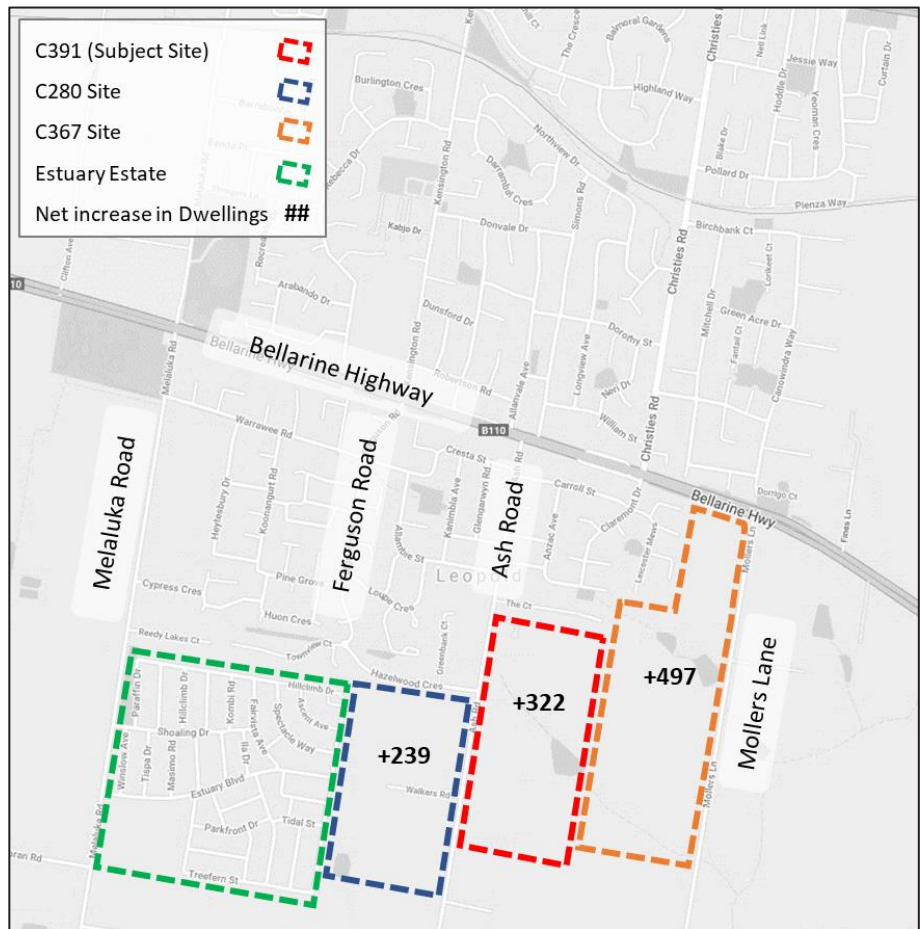
5.4.8 On the basis of the above, I have conservatively adopted a traffic generation rate of **8 vehicle movements per day / dwelling**, with 10% of traffic generated during the respective AM and PM peak periods.

**Development Generated Traffic**

5.4.9 For the purposes of my assessment, I have assessed the development plan traffic associated with this Planning Scheme Amendment (C391), as well as Mollers Lane (C367) and Ash Road West (C280) development plan areas.

5.4.10 The net increase in dwellings based on existing dwellings present in these areas in November 2021, are shown in Figure 5-12. The estimated daily traffic generated by each development area as an increase on existing dwellings is shown in Table 5-2.

**Figure 5-12: Leopold Development Areas Net Dwelling Increase**



**Table 5-2: Leopold Development Areas Estimated Traffic Increase**

Development Area Name	Net Change in Dwellings	Net Increase in daily traffic
C391 – Ash Road East	+322	+2,576 vpd
C367 - Mollers Lane	+497	+3,976 vpd
C280 – Ash Road West	+239*	+1,912 vpd
<i>Total Net Increases</i>	<i>+1,058</i>	<i>+8,464 vpd</i>

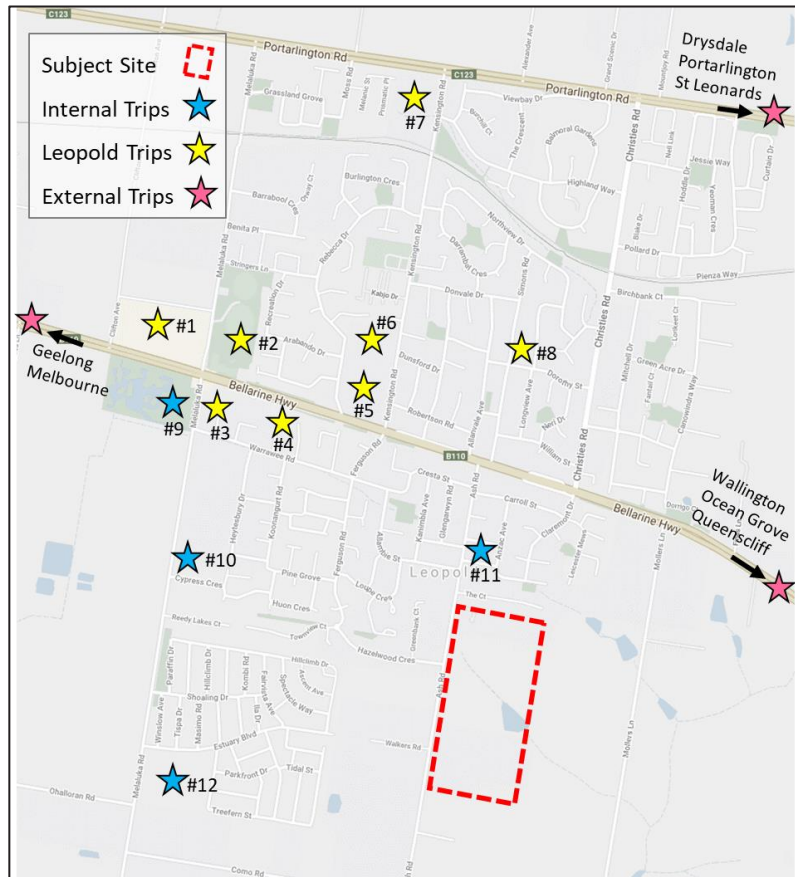
\* a total of 81 dwellings had been constructed as of 6<sup>th</sup> October 2021 in Ash Road West, as confirmed using timestamped aerial imagery

- 5.4.11 Based on the estimated net increase in dwellings, the Amendment Land is estimated to generate an additional 2,576 vehicles per day onto the surrounding road network. The total daily increase in traffic volumes generated by all three development plan areas considered in my analysis is 8,464 vehicles per day.

## 5.5 Traffic Distribution

- 5.5.1 Trip distribution to and from the site during the peak hours will relate to a mixture of trip purposes including work, education, shopping, and recreation. During the peak periods, the proportion of trips associated with commuting to and from work are typically greater.
- 5.5.2 Bellarine Highway provides a major east-west link through Leopold, connecting residents south of Bellarine Highway to the majority of traffic generating destinations in Leopold, including Geelong, the Gateway Shopping Centre, and a range of educational, convenience and recreational uses.
- 5.5.3 For the purposes of the analysis, Internal Trips are classified as trips which do not require access to Bellarine Highway. Leopold Trips are classified as the balance of all trips made within Leopold on the northern side of Bellarine Highway.
- 5.5.4 I have reviewed the location and direction of key trip destinations in context of the study area, and these are marked below in Figure 5-13 and further described in Table 5-3.

**Figure 5-13: Location of Key Trip Generating Developments**



**Table 5-3: Leopold Key Trip Destinations**

Site ID	Name	Key Land Use Type
1	Leopold Sub-Regional Activity Centre / Gateway Shopping Centre	Commercial / Retail
2	Leopold Recreation Reserve / Sporting Ovals	Recreational
3	Adami Plaza- Various take-away and dine-in	Food & Drink
4	Bellarine Highway – includes a Service Station, Childcare, Fruit & Vegetable shop	Commercial / Retail
5	Leopold Primary School	Education
6	Leopold Community Hub and Library	Community Facilities
7	Leopold Sportsmans Club	Food & Drink / Recreation
8	Dorothy Street Shopping Strip	Commercial / Retail
9	Gateway Sanctuary	Recreational
10	Leopold Swim School	Education
11	Ash Road Shopping Strip	Commercial / Retail
12	Estuary Estate Recreation Reserve / Sporting Ovals	Recreational

5.5.5 In consideration of the above key trip generators, their locations and peak hour trip generation characteristics, I have estimated the following internal and external distributions as shown in Table 5-4.

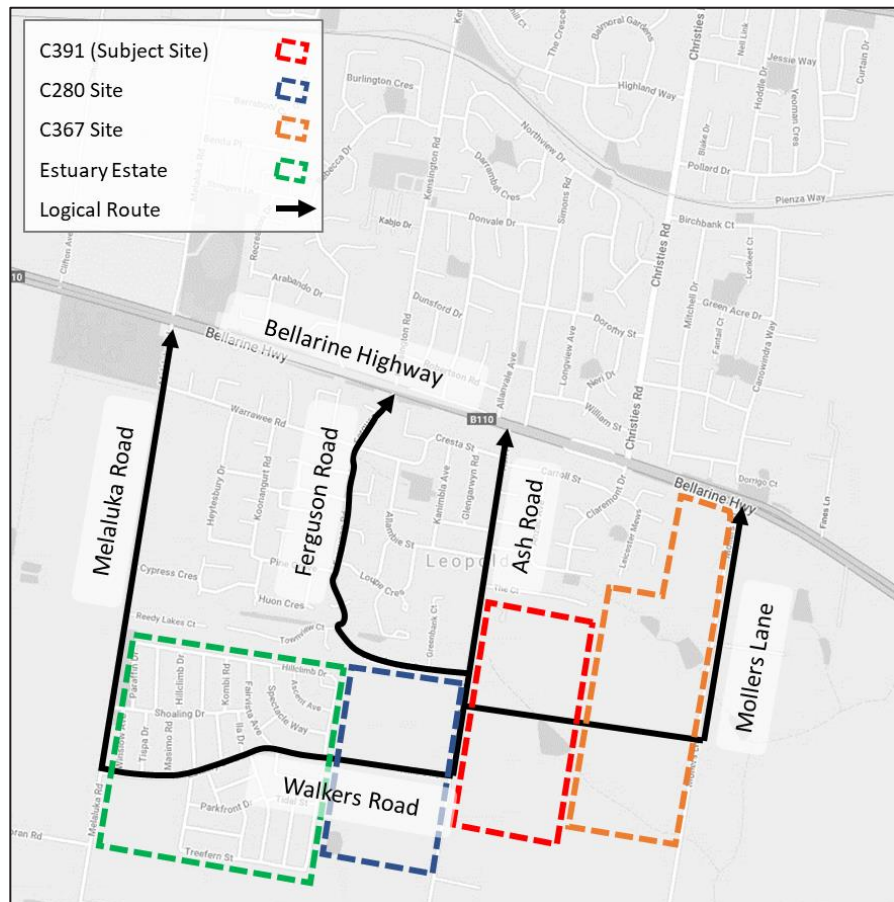
**Table 5-4: Adopted Trip Distribution**

Trip Distribution	Percentage Distribution
Internal Trips (i.e. Leopold trips south of Bellarine Highway)	4%
Leopold Trips (i.e. Leopold trips north of Bellarine Highway)	34%
Towards Geelong / Melbourne	52%
Towards Bellarine Peninsula	10%
<i>Total</i>	<i>100%</i>

5.5.6 The routes to and from the future development areas will follow the higher order connector road system which exists through Leopold south of Bellarine Highway, including Melaluka Road (via Estuary Boulevard/Walkers Road), Ash Road, Ferguson Road (via Hazelwood Drive) and Mollers Lane.

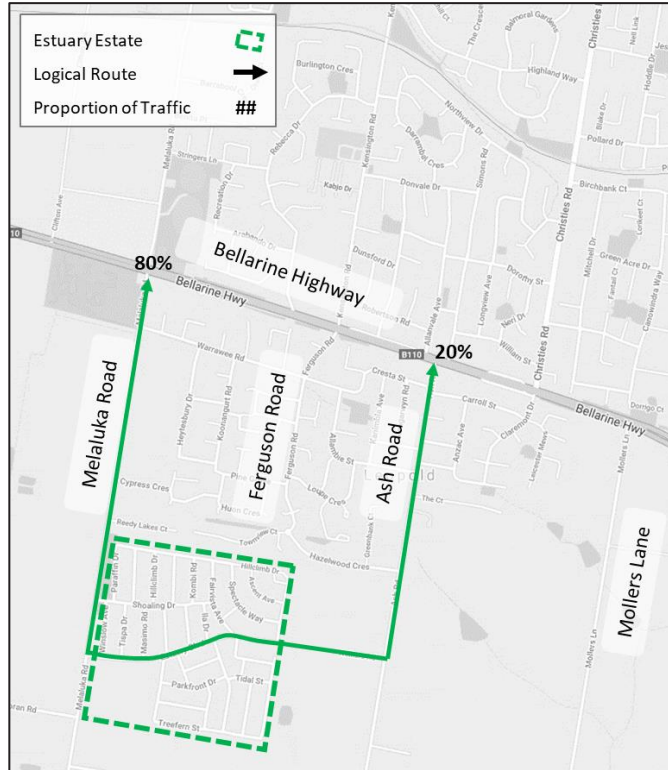
5.5.7 The logical routes from each of the three development areas, shown schematically, including Estuary Estate which will be connected to Ash Road via Estuary Boulevard and the Walkers Road extension, is shown in Figure 5-14.

**Figure 5-14: Logical Routes to / from the Development Plan Areas**

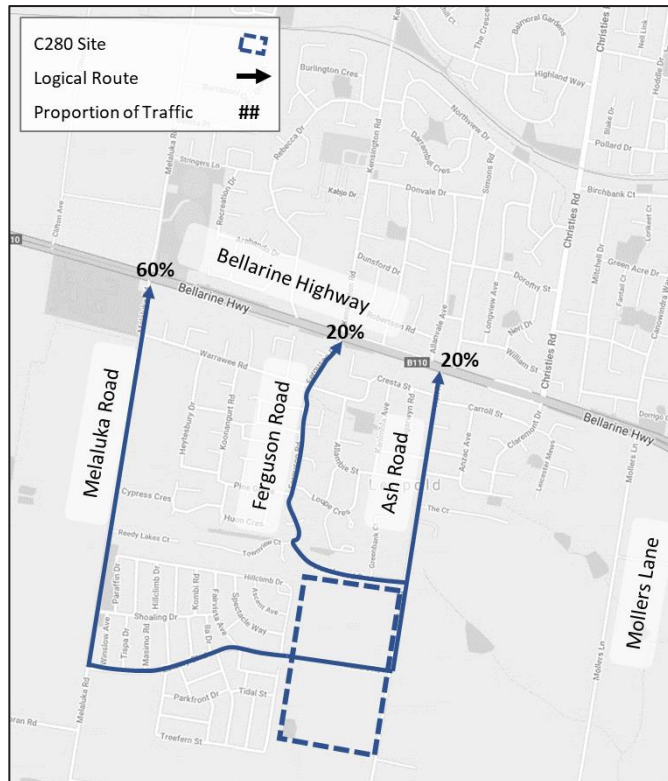


5.5.8 On the basis of the information presented above, I have estimated the percentage distribution of traffic using the internal connector roads for each development area, including the existing Estuary Estate, Ash Road West (C280), Ash Road East (C391), and Mollers Lane (C367). The assumed distributions are presented in Figures 5-15 to 5-18 respectively.

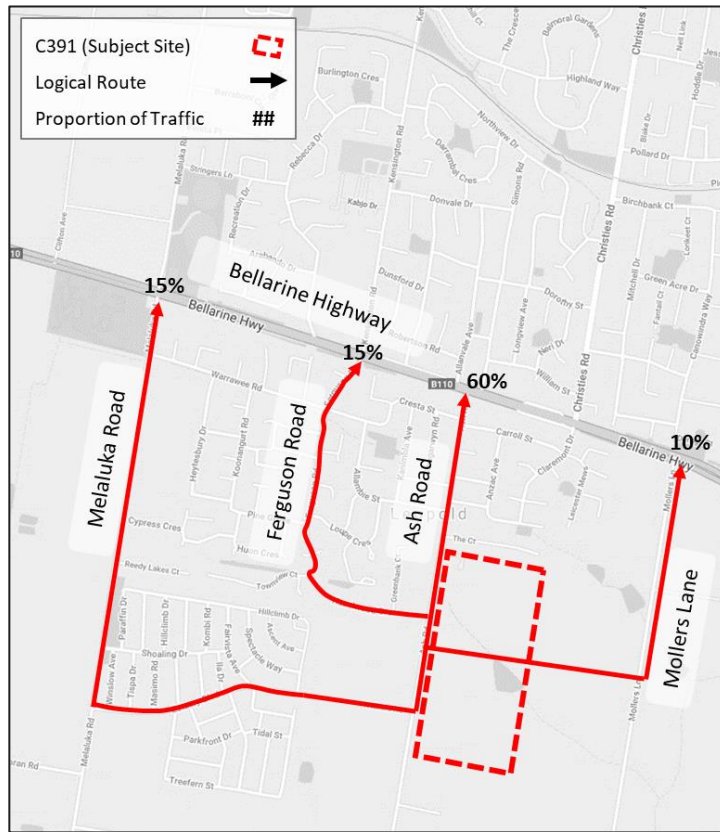
**Figure 5-15: Distribution Percentages – Estuary Estate**



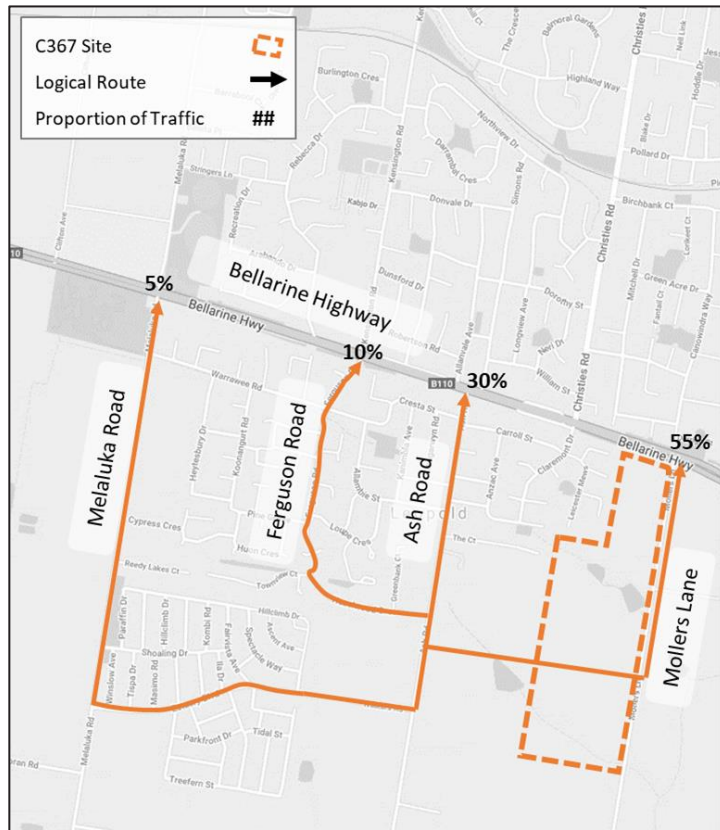
**Figure 5-16: Distribution Percentages – Ash Road West (C280)**



**Figure 5-17: Distribution Percentages – Ash Road East (C391)**



**Figure 5-18: Distribution Percentages – Mollers Lane (C367)**



5.5.9 The traffic estimated to use Ash Road (from Bellarine Highway), from residential development areas was further analysed as the critical intersection being considered under this rezoning application. I estimate an additional 804 vehicles will use Ash Road at the intersection of Bellarine Highway on a daily basis, including 229 vehicles associated with the Amendment Land.

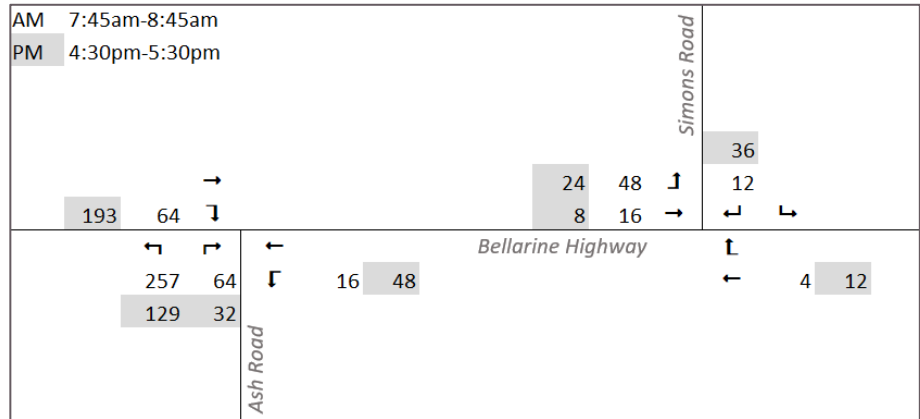
5.5.10 Based on studies of traffic generation of residential uses, I estimate traffic travelling to and from the site will be distributed as outlined in Table 5-5.

**Table 5-5: Peak Hour Traffic Direction**

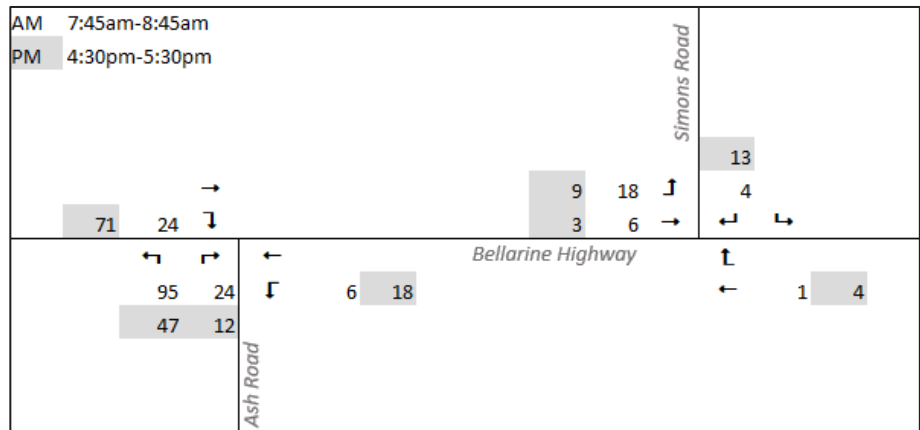
Peak Hour	Inbound	Outbound
AM Peak	20%	80%
PM Peak	60%	40%

5.5.11 The additional traffic estimated to be generated by all of the development plan areas through the intersection of Ash Road and Bellarine Highway during the AM and PM peak hours respectively is shown in Figure 5-19. The traffic generated by the Amendment Land alone is shown in Figure 5-20.

**Figure 5-19: Development Generated Peak Hour Traffic (Including adjacent developments)**



**Figure 5-20: Development Generated Peak Hour Traffic (Amendment Land only)**



## **5.6 Traffic Assessment**

### **Yearly Growth Assumptions**

- 5.6.1 Analysis of historic traffic growth between 2001 and 2015 on Bellarine Highway towards Moolap Station Road, was undertaken using Department of Transport (DOT) traffic volumes data. The analysis indicated a long term compounded growth rate of approximately 3%.
- 5.6.2 I consider this rate to be excessive for the purpose of my analysis given it will have incorporated growth occurring within Leopold, including Estuary Estate, and thus is not representative of external growth for through movements travelling beyond Leopold.
- 5.6.3 I have adopted a traffic growth rate of 1.5% per year, noting that the development of Ash Road West, Mollers Lane and the Amendment Land (C391) will form a significant proportion of future residential traffic growth on the Bellarine Peninsula and has already been accounted for in my analysis.

### **Existing Conditions SIDRA Assessment**

- 5.6.4 A SIDRA analysis was undertaken of the volumes presented in Figure 5-5, in order to model the existing conditions of the Ash Road / Bellarine Highway intersection.
- 5.6.5 The intersection encapsulates Bellarine Highway, Ash Road, Simons Road and provides a 30-meter storage area between Ash Road and Simons Road.
- 5.6.6 To model this intersection, ideally modelling the intersection in SIDRA in a network model would be used. The short offset of Simons Road and the early cut off for through movements along Bellarine Highway adds complexity to the SIDRA model that did not allow the model to be adequately calibrated to observed conditions when attempted.
- 5.6.7 Given that the central storage lanes of the intersection are observed to clear each cycle, for the purposes of assessing the impact on the critical right turn lane on the west approach, it is appropriate to model the intersection as a stand-alone T-intersection, removing Simons Road from the SIDRA model. It should be noted that volumes on the eastern approach incorporate both those from the through movement along Bellarine Highway and right turning from Simons Road.
- 5.6.8 The Key parameters used to determine the operational capacity of an intersection are queue length, average delay and degree of saturation (or volume to capacity ratio).
- 5.6.9 Degree of saturation is a ratio of arrival (or demand) flow to capacity. Degree of saturation above 1.0 represents oversaturated conditions and a degree of saturation below 1.0 represents undersaturated conditions. The operation rating associated with the degree of saturation is summarised in Table 5-6.

**Table 5-6: Ratings of Degree of Saturation**

Degree of Saturation (DOS)	Rating
Up to 0.6 Excellent	Up to 0.6 Excellent
0.61 – 0.70 Very Good	0.61 – 0.70 Very Good
0.71 – 0.80 Good	0.71 – 0.80 Good
0.81 – 0.90 Fair	0.81 – 0.90 Fair
0.91 – 1.00 Poor	0.91 – 1.00 Poor
Greater than 1.00 Very Poor	Greater than 1.00 Very Poor

5.6.10 The results of the existing conditions SIDRA analysis, using the adjusted 2021 survey traffic volumes, are summarised below in Table 5-7, with detailed results provided in Appendix B.

**Table 5-7: Existing Conditions SIDRA Results – Bellarine Highway / Ash Road / Simons Road**

Approach	Movement	AM PEAK			PM Peak		
		D.O.S.	95%ile Queue (m)	Average Delay (s)	D.O.S.	95%ile Queue (m)	Average Delay (s)
Ash Road (South)	Left	0.211	19.3	34.1	0.148	15.4	36.4
	Right	0.177	14.1	42.1	0.195	16.7	46.6
Bellarine Highway (East)	Left	0.032	2.9	5.7	0.044	4.7	6.4
	Through	0.662	157.4	13.7	0.384	79.3	12
Bellarine Highway (West)	Through	0.233	34.1	4.8	0.555	120.8	6.3
	Right	0.291	11.4	51.8	0.390	22.2	54.2
Site		<b>0.662</b>	<b>157.4</b>	<b>13.0</b>	<b>0.555</b>	<b>120.8</b>	<b>10.9</b>

5.6.11 Review of the above results shows that the intersection of Bellarine Highway / Ash Road is operating under “Very Good” and “Excellent” conditions during the AM and PM peak periods respectively. The performance can be attributed to the relatively low demand into and out of Ash Road, which results in majority of the green time allocated to through movements along Bellarine Highway.

5.6.12 Similarly, the observation that all through vehicles along Bellarine Highway clear the intersection within the available green time is supported by minimal delays modelled on the east and west approach along Bellarine Highway. The modelled queues on the Bellarine Highway west approach reflect observed conditions and so I am satisfied that the existing model is adequate for use as a base conditions model.

### Future Transport Network Conditions

5.6.13 The future traffic generation attributed to the Amendment Land and nearby development areas has been detailed in Section 5.4. To understand the total traffic using Ash Road, development from all nearby sites was assessed and distributed across the network. This includes

traffic from Mollers Lane (C367), Ash Road West (C280), and the Amendment Land (C391).

- 5.6.14 It is proposed to provide an east-west connection between Ash Road and Melaluka Road through the extension and connection of Walkers Road. This will provide access for residents in Estuary Estate to use Ash Road, and residents in the Amendment Land and nearby to use Melaluka Road.
- 5.6.15 To model the future through traffic along Bellarine Highway, a compounding growth rate of 1.5% was applied for 10 years, this being the typical period tested for developments of this magnitude.
- 5.6.16 The overall peak hour turning movements under ultimate conditions are shown in Figure 5-21, with the detailed results presented in Appendix B.

**Figure 5-21: Ultimate Traffic Volumes – 10-year Future Development**

AM 7:45am-8:45am		PM 4:30pm-5:30pm					
				Simons Road			
1653 689 →		99 63 ↓		92 13			
254 97 ↓		1637 737 →		54 14			
				Bellarine Highway			
← 329 111 →		← 1561 921 →		↑ 12 17			
182 83		↓ 55 101		← 1562 930			
				Ash Road			

**Post Development Intersection Performance**

- 5.6.17 A SIDRA analysis was undertaken of the volumes displayed in Figure 5-21 to test the adequacy of the intersection to cater for all development traffic in 10 years’ time. The results of the analysis are shown in Table 5-8, with full results presented in Appendix B.

**Table 5-8: Ultimate SIDRA Results – Bellarine Highway / Ash Road / Simons Road**

Approach	Movement	AM PEAK			PM Peak		
		D.O.S.	95%ile Queue (m)	Average Delay (s)	D.O.S.	95%ile Queue (m)	Average Delay (s)
Ash Road (South)	Left	0.805	119.6	44.0	0.291	45.2	27.0
	Right	0.326	36.3	43.1	0.318	27.9	47.6
Bellarine Highway (East)	Left	0.045	4.6	5.9	0.106	15.2	11.9
	Through	0.814	253.5	21.2	0.626	140.0	23.3
Bellarine Highway (West)	Through	0.384	79.2	16.5	0.619	146.5	7.0
	Right	0.813	40.5	62.4	0.608	84.1	42.6
Site		<b>0.814</b>	<b>253.5</b>	<b>24.6</b>	<b>0.626</b>	<b>146.5</b>	<b>16.9</b>

- 5.6.18 The above results show that the intersection of Bellarine Highway / Ash Road / Simons Road operates under “fair” conditions in the future AM Peak periods, and “Very Good” conditions in the future PM Peak periods.



- 5.6.19 In the future AM Peak, the overall reduction in performance can be attributed to the increase in through traffic along Bellarine Highway as a result of growth over the 10-year period as opposed to development traffic impacts.
- 5.6.20 The reduced performance observed in the PM Peak can be attributed to the increase in through traffic eastbound along Bellarine Highway, and the increase in right turning vehicles into Ash Road from the development traffic.
- 5.6.21 Currently, a 30-metre, short right turn lane is provided on the western approach, accommodating right turning vehicles into Ash Road. An extension to this lane to increase the storage length to 70 metres is funded through the Ash Road West Shared Infrastructure Funding Plan. The intersection improvements are linked to the 100<sup>th</sup> lot being subdivided, which I understand from construction activity on aerial imagery could occur within the next 6-12 months.
- 5.6.22 I gradually increased the lane length in the traffic model until the 95th percentile queue was able to be stored clear of through traffic on Bellarine Highway. From this iterative process, a right turn lane with a storage length of 100-metres was determined as being sufficient.
- 5.6.23 Based on this analysis, the right turn lane on the west approach should be extended to accommodate 100m of storage, representing an additional 30m in length to the 70m determined in the Ash Road West Infrastructure Funding Plan. A total lane length of 120m (i.e. including 25m taper) would be adequate in meeting this requirement, noting that part of the storage (assumed 5m) can be accommodated within the taper. In this regard, the total lane length of 195m sought by the Department of Transport in their submission is excessive and is not supported by the modelling I have undertaken.

## **5.7 Mid-block capacities**

- 5.7.1 Based on the above analysis and assuming that 10% of daily traffic volumes occur during the peak hours, traffic volumes on Ash Road at the threshold of Bellarine Highway are estimated to be between 6,200 and 6,500 vehicles per day.
- 5.7.2 Ash Road is classified as a Connector Road, and therefore has an environmental capacity of between 3,000 and 7,000 vehicles per day, and the ultimate traffic volumes are within the upper limit of the range.
- 5.7.3 It is noted that the environmental capacity is not representative of theoretical traffic capacity, which is significantly higher. Furthermore, traffic volumes are expected to gradually decrease further south where the catchment gradually decreases.

## **5.8 Adjacent Intersections**

- 5.8.1 A number of adjacent intersections exist which will experience additional traffic growth associated with the relevant development plan areas. The majority of traffic generated from development of the Amendment Land will use Ash Road via the intersection of Ash Road and Bellarine Highway.

### **Melaluka Road / Bellarine Highway**

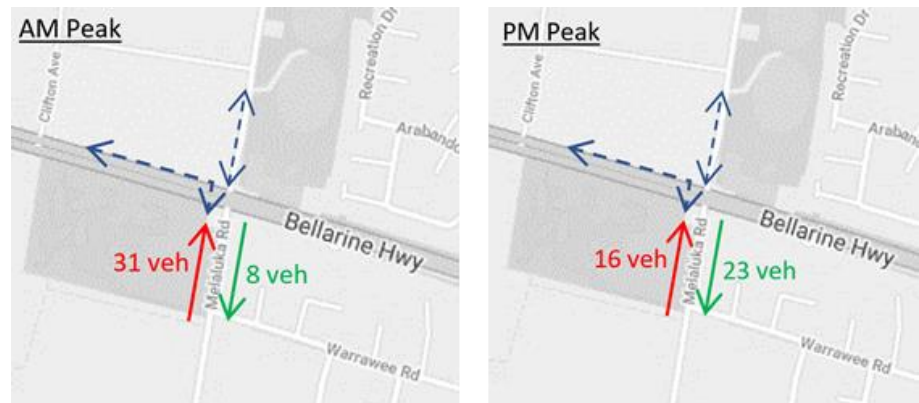
- 5.8.2 Melaluka Road is an alternative, albeit less direct means of accessing Bellarine Highway to Ash Road, and provides access to destinations such as Gateway Plaza Shopping Centre and Leopold Recreation Reserve. I have estimated 15% of traffic movements generated will opt for this route.

5.8.3 As per Table 5-9 and Figure 5-22 below, the number of movements added by the development of the Amendment Land to the intersection of Melaluka Road / Bellarine Highway will be barely discernible to its operation. The number of added movements via Melaluka Road (39 movements per peak hour in and out combined) is less than one movement per traffic signal cycle on average, noting that there are approximately 40 traffic signal cycles per hour at this intersection (based on cycle time of 90 obtained from the Signal Operations sheet). The traffic impacts of the proposed rezoning to Melaluka Road and its intersection with Bellarine Highway are acceptable on this basis.

**Table 5-9: Peak Hour Site Generated Traffic Through Melaluka Road / Bellarine Highway Intersection**

Development Generated Movements (Melaluka Road)	AM Peak Hour	PM Peak Hour
In	8 veh	23 veh
Out	31 veh	16 veh
<b>Total</b>	<b>39 veh</b>	<b>39 veh</b>

**Figure 5-22: Peak Hour Site Generated Traffic Using Melaluka Road**



**Ferguson Road / Bellarine Highway**

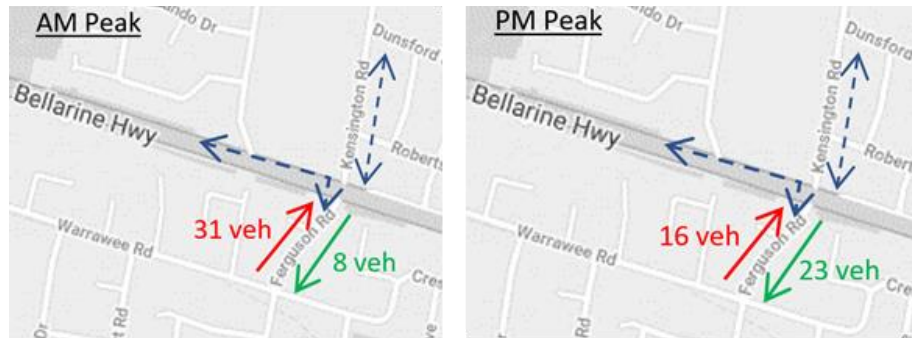
5.8.4 Ferguson Road provides a convenient through movement connection for these vehicle trips from the Amendment Land wanting to access areas to the north of Bellarine Highway, including Leopold Primary School, Leopold Community Hub and Library, the Leopold Sportsmans Club, and Portarlington Road.

5.8.5 Similar to the Melaluka Road discussion above, based on my trip distribution assumptions, I have estimated 15% of movements generated by the development of the Amendment Land will opt for this route. This equates to a combined 39 vehicle movements on the through southern approach during the AM and PM peaks, which again equates to one additional traffic movement per signal cycle on average and will not impact on its operation. The Amendment Land generated traffic on Ferguson Road at Bellarine Highway during the respective AM and PM peaks is shown in Table 5-10 and Figure 5-23.

**Table 5-10: Peak Hour Site Generated Traffic Through Ferguson Road at Bellarine Highway**

Development Generated Movements (Ferguson Road)	AM Peak Hour	PM Peak Hour
In	8 veh	23 veh
Out	31 veh	16 veh
Total	39 veh	39 veh

**Figure 5-23: Peak Hour Site Generated Traffic Using Melaluka Road**



**Mollers Lane / Bellarine Highway**

- 5.8.1 The assessment of this intersection at the Panel Hearing for C367 considered a worst-case scenario where all of the Mollers Lane development plan traffic would be reliant on it for access to the Bellarine Highway, i.e. with no connection available through to Ash Road.
- 5.8.2 Figure 5-24 below demonstrates a comparison of ultimate turning volumes through the intersection of Mollers Lane and Bellarine Highway between the evidence prepared by Mr Walsh (Traffix Group) as part of the C367 Panel Hearing and the analysis presented in this report for the Amendment Land.

**Figure 5-24: Peak Hour Site Generated Traffic Using Melaluka Road**

AM Peak				PM Peak			
Traffix Group Ratio				Traffix Group Ratio			
	43	103	↓		127	310	↓
	←	→	↕	12		5	
	406	45		←	→	↕	36
	168	19		204	23		15
				84	9		

- 5.8.3 Following the development of the Amendment Land and east west road connections are established through both parcels, the net level of traffic using this intersection will be less than what has already been assessed, as noted in the comparison diagrams above. Accordingly, no further

upgrades are necessary to this intersection beyond what has already been identified as part of C367.

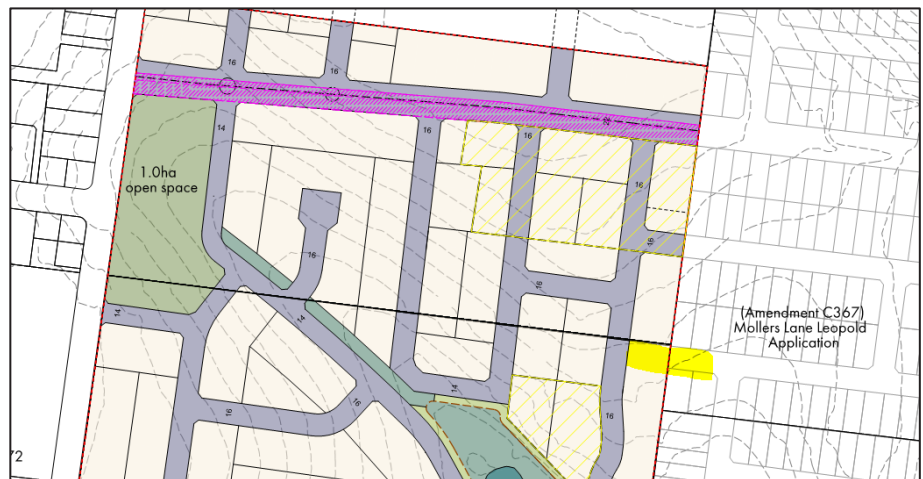
## 6.1 Road Hierarchy

- 6.1.1 The Concept Plan for the subdivision prepared by Tract incorporates the key aspects of the South East Leopold Framework Plan, including the following road types:
- Ash Road is to be upgraded along the site frontage to collector road standard, inclusive of 2 x 3.0m traffic lanes and kerbside parking lanes, consistent with the northern section of Ash Road.
  - Two east-west connector streets, with the northern road within the Permit Land (forming a T-intersection with Ash Road and the southern road sitting outside the Permit Land at the southern end of the Amendment Land and which will connect through to Walkers Road.
  - Local access streets adjacent to the encumbered open space areas.
  - All other roads will function as local access streets.
- 6.1.2 The proposed road hierarchy is appropriate in my view and is consistent with the South East Leopold Framework Plan and will adequately cater for the likely traffic volumes generated.

## 6.2 Road Network Connectivity

- 6.2.1 The revised concept plan does not continue one of the local roads proposed in the adjoining Mollers Lane subdivision to the east (see below). I agree with Council's comment at Page 278 of the agenda document for the 28 September meeting that this road should be continued into the Permit Land. With this exception, the roads proposed in the advertised and revised concept subdivision plans provide for an integrated road network, as sought by the draft Schedule 46 to the Clause 43.02 (i.e. DDO46).

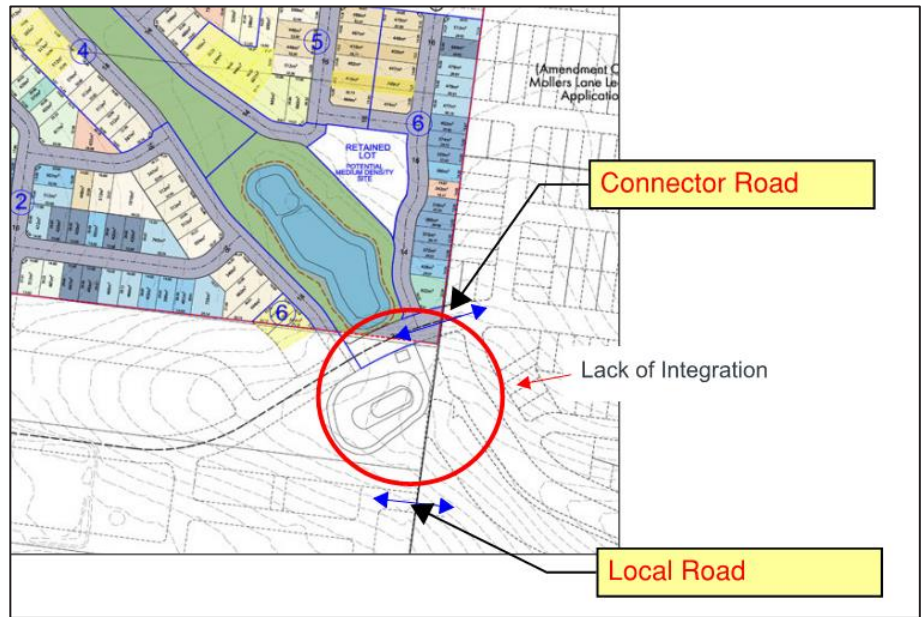
**Figure 6-1: Lack of Connectivity to Local Road in Mollers Lane**



Council note at Page 278 of the 28 September meeting agenda document that the eastern-most north-south road should be moved eastward to avoid a potential long court bowl in the northern section of the Amendment Land. I agree with the desire to avoid the long court bowl and understand that the subdivision plan can be amended accordingly.

A submission made on behalf of the owners of the land at 92-120 Mollers Lane (page 5 of the letter prepared by Cardno TGM dated 23 June 2021) notes a lack of road connectivity between the two parcels of land. As per the arrows added to their figure in my diagram below, the area in question does show adequate road connectivity between the two parcels in my view via the southern east-west connector as well as a local road connection.

**Figure 6-2 Road connectivity between Amendment Land and subdivision to the east**



Base figure extracted from Page 5 of Cardno TGM letter dated 23 June 2021

### **6.3 Cross Sections**

- 6.3.1 The road reservation widths and cross sections are generally in accordance with the requirements of the Greater Geelong Planning Scheme and Infrastructure Design Manual (IDM).

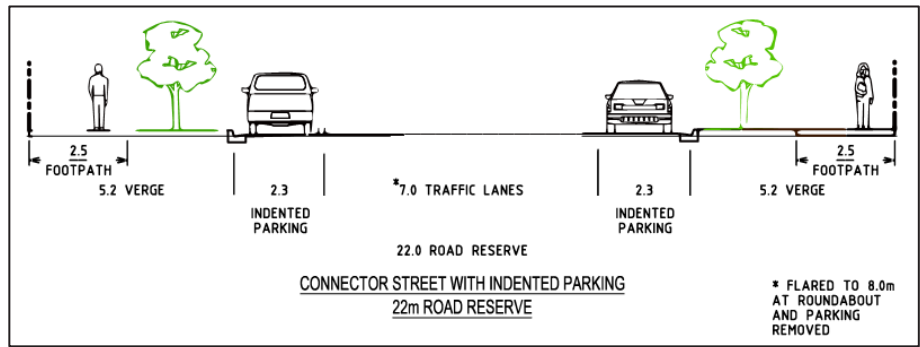
#### **Ash Road**

- 6.3.2 Ash Road is to be upgraded within the current road reserve width along the site frontage and will be brought into consistency with the existing Ash Road to the north. As per the Ash Road upgrade plan prepared by Cardno (Drawing No. V171945-CI-SK02 Rev 3) this will involve the construction of kerbside parking lanes, kerb and channel on the eastern side of Ash Road along the site frontage.

#### **Connector Streets**

- 6.3.3 As per the cross sections provided in the Cardno Traffic Report (2018) submitted with the application and shown in Figure 6-3, the two east-west connector streets are proposed within a 22m road reserve with indented parking and 2.5m wide shared paths within the verge. I support the view expressed by the Department of Transport in their letter dated 9 April 2019 that only one of these paths should be 2.5m wide to match the road cross sections in the Mollers Lane development land to the east, with the other reduced to 1.5m in width.

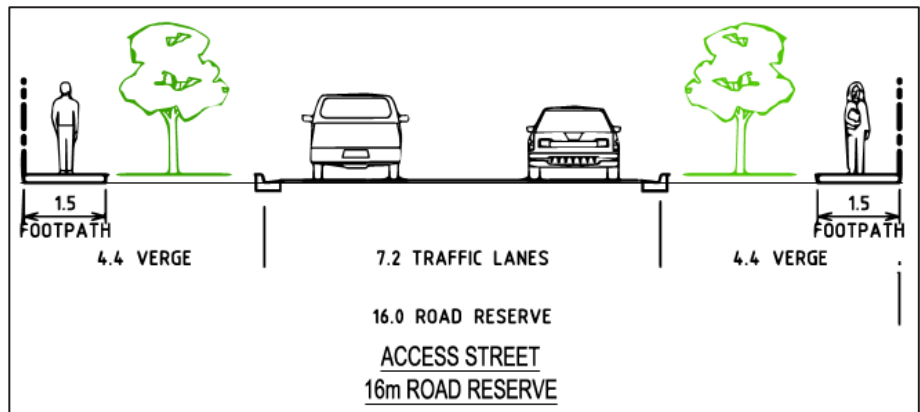
**Figure 6-3: Connector Street Cross Section – 22m (Cardno Traffic Report 2018)**



**Local Access Streets**

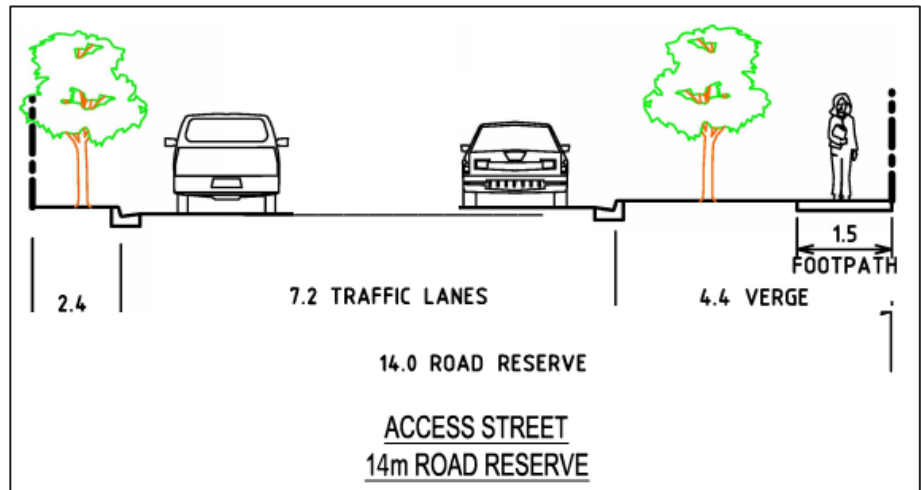
6.3.4 Most of the streets in the subdivision are local access streets with a 16m wide road reserve, including a 7.2m wide carriageway as shown in Figure 6-4. Footpaths are provided on both sides of the roads, 1.5m in width. I recommend that the road carriageway is extended to 7.3m wide to align with adopted cross sections for the development area for Mollers Lane (C367) and the IDM.

**Figure 6-4: Local Street – 16m (Cardno Traffic Report 2018)**



6.3.5 Adjacent to open space reserves, the local streets are proposed to be constructed within 14m wide reserves, with a 7.2m wide carriageway with a single 1.5m wide footpath constructed on the opposite of the road to the open space reserve, as shown in Figure 6-5. With the exception of the 7.2m wide carriageway discussed above, I consider this cross section to be appropriate given a footpath can be accommodated within the open space reserve.

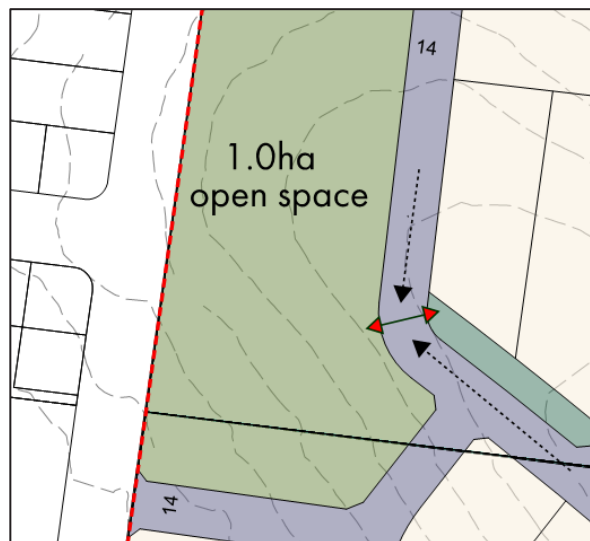
Figure 6-5: Local Street – 14m (Cardno Traffic Report 2018)



## 6.4 Shared Path Provision

- 6.4.1 In addition to the 2.5m wide shared path provided on one side of the two connector streets discussed previously (above) a further shared path is contemplated in a south-east to north-west alignment. In consideration of the relatively low levels of pedestrian and cyclist volumes using the path, I would be satisfied that this path also be provided with a width of 2.5m.
- 6.4.2 In this regard, I do not think it is necessary to adopt the width of 3.5m submitted by the Department of Transport in their letter dated 9 April 2019.
- 6.4.3 Council note at page 278 of the 28 September agenda document that the apex of the road adjacent to the one hectare park raised sight line concerns. I do not share these concerns, noting a shared path crossing could be provided at this location with clear sight lines from both approaches as illustrated in the below. I do not consider it necessary or desirable to 'smooth' the bend in the road, which could instead result in poorer sightlines due to the curvature.

Figure 6-6: Clear sightlines to crossing point at bend in the road



## **6.5 Car Parking Provision**

- 6.5.1 Designated parking provided on-street along both sides of the proposed connector streets are in accordance with the Planning Scheme and IDM objectives. On-street parking is also provided along the western side of Ash Road adjacent to the proposed lots.
- 6.5.2 Notwithstanding my recommendation to widen the carriageway on the Access Streets to 7.3m, the 7.2m wide traffic lanes on the local streets provide for on-street parking to occur on both sides of the carriageway whilst maintaining a through lane for traffic. Simultaneous two-way traffic is possible when parking occurs on one side of these roads.

## **6.6 Emergency and Service Vehicle Access**

- 6.6.1 The proposed road network will facilitate access by the relevant service vehicles and emergency vehicles and accords with typical fire authority requirements.
- 6.6.2 A court bowl treatment is proposed in the revised Concept Plan and will be designed to accommodate the turning movements of the relevant service and emergency vehicles.
- 6.6.3 Where required, temporary end treatments will be installed at road discontinuations between stages, consisting of a gravel turn around area beyond the end of the road with road closure signage installed. There will be of a sufficient size to accommodate a 3 point turn of a medium rigid vehicle (i.e. garbage truck / CFA tanker) (Cardno Traffic Report – 2018).

## **6.7 Public Transport**

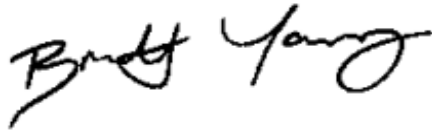
- 6.7.1 Ash Road and the two east-west connector roads are designed to accommodate future bus routes. Bus routes along either of these roads would provide residents of the rezoned land with a bus route within 400m of their homes.

## **6.8 Traffic Management**

- 6.8.1 Clause 56.06-7 of the Planning Scheme suggests that street blocks should be desirably no longer than 240m to facilitate pedestrian movement and control traffic speed.
- 6.8.2 A small proportion of the local roads in each of the advertised and revised Concept Plans have a length exceeding 240m, namely the roads abutting the open space areas.
- 6.8.3 I consider that the Local Area Traffic Management Plan (LATM) proposed under Condition 9a of the Draft Permit will adequately address the need for any traffic management devices to control traffic speeds.

## 7 Conclusions:

- 7.1.1 Having undertaken a detailed traffic engineering assessment of Greater Geelong Planning Scheme Amendment C391 and Planning Permit Application 39-2019 for the proposed residential subdivision at 87-127 Ash Road, Leopold, I am of the opinion that:
- Development of up to 330 dwellings can be accommodated by Ash Road and the broader road network, subject to extended the right turn lane on the Bellarine Highway west approach to 120m total (including a 25m taper).
  - The proposed layout of the subdivision provides for a network that connects to development to the east through to Mollers Lane.
  - The proposed road reservations and cross sections are appropriate to accommodate traffic, footpaths, and car parking in accordance with the Planning Scheme and IDM, with the exception of Local Access Streets which I have recommend are increased from 7.2m wide to 7.3m wide.
  - All relevant vehicles will be able to adequately access the proposed road network, including service vehicles and emergency vehicles.
  - Shared paths should only be provided on one side of the connector streets, consistent with the proposed development to the east.
  - There are no traffic engineering reasons why the rezoning and permit application should not proceed, subject to conditions.
- 7.1.2 I have made all enquiries I believe are desirable and appropriate and there are no matters of significance I regard as relevant, which to the best of my knowledge, have been withheld from the Panel.



**Brett Young**  
**Director: Traffic**  
**Ratio Consultants**

## Appendix A: Traffic Surveys

# TRANS TRAFFIC SURVEY

## TURNING MOVEMENT SURVEY

trafficsurvey.com.au



### Intersection of Bellarine Hwy and Ash Rd, Leopold

GPS -38.190207, 144.468818

Date:	Tue 26/10/21
Weather:	Fine
Suburban:	Leopold
Customer:	Ratio

North:	N/A
East:	Bellarine Hwy
South:	Ash Rd
West:	Bellarine Hwy

Survey Period	AM:	7:30 AM-9:30 AM
	PM:	4:00 PM-6:00 PM
Traffic Peak	AM:	7:45 AM-8:45 AM
	PM:	4:30 PM-5:30 PM

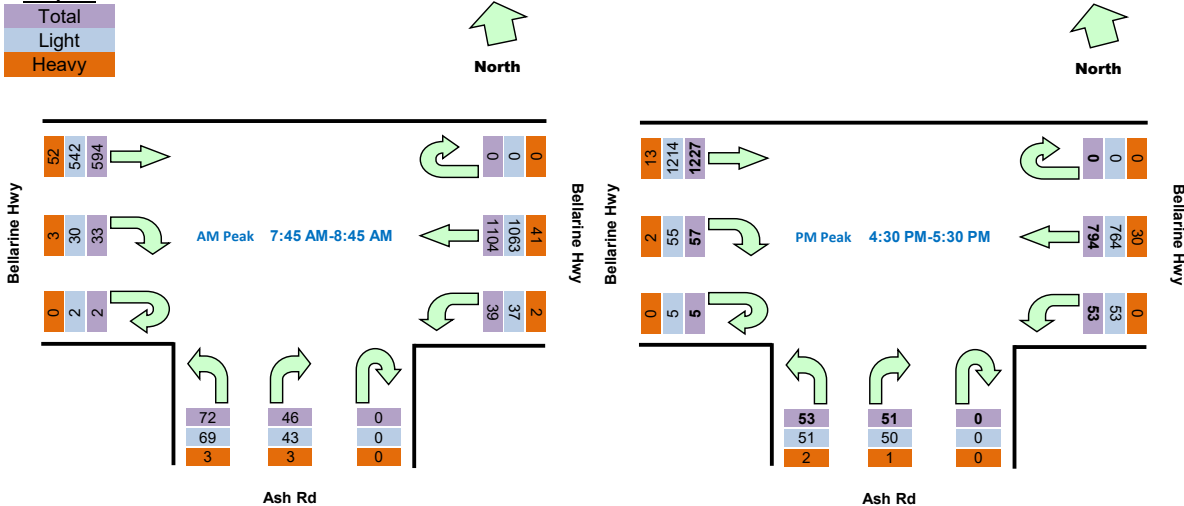
#### All Vehicles

Time		East Approach Bellarine Hw			South Approach Ash Rd			West Approach Bellarine Hw			Hourly Total	
Period Start	Period End	U	WB	L	U	R	L	U	R	EB	Hour	Peak
7:30	7:45	0	241	3	0	5	18	0	2	127	1800	
7:45	8:00	0	271	4	0	9	23	1	7	147	1890	Peak
8:00	8:15	0	296	7	0	9	21	0	4	140	1883	
8:15	8:30	0	280	12	0	16	9	0	9	139	1836	
8:30	8:45	0	257	16	0	12	19	1	13	168	1738	
8:45	9:00	0	225	15	0	18	15	1	15	166		
9:00	9:15	0	232	8	0	11	15	2	18	144		
9:15	9:30	0	155	8	0	17	12	1	11	163		
16:00	16:15	0	207	11	0	9	19	0	18	297	2191	
16:15	16:30	0	195	15	0	11	10	1	19	281	2189	
16:30	16:45	0	191	13	0	12	19	0	16	292	2240	Peak
16:45	17:00	0	192	10	0	14	13	2	18	306	2211	
17:00	17:15	0	206	13	0	17	12	2	16	293	2095	
17:15	17:30	0	205	17	0	8	9	1	7	336		
17:30	17:45	0	165	7	0	11	11	0	17	303		
17:45	18:00	0	145	11	0	5	12	1	18	247		

Peak Time		East Approach Bellarine Hw			South Approach Ash Rd			West Approach Bellarine Hw			Peak total
Period Start	Period End	U	WB	L	U	R	L	U	R	EB	
7:45	8:45	0	1104	39	0	46	72	2	33	594	1890
16:30	17:30	0	794	53	0	51	53	5	57	1227	2240

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

#### Graphic



#### Light Vehicles

Time		East Approach Bellarine Hw			South Approach Ash Rd			West Approach Bellarine Hw		
Period Start	Period End	U	WB	L	U	R	L	U	R	EB
7:30	7:45	0	238	3	0	5	18	0	1	117
7:45	8:00	0	265	3	0	8	22	1	6	135

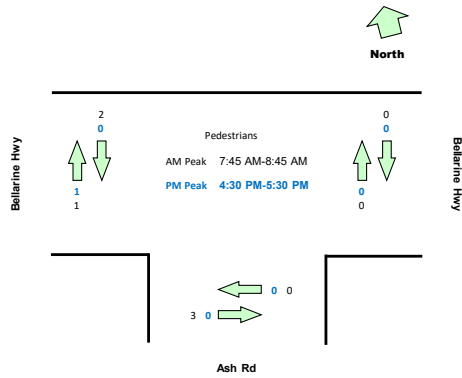




**Pedestrians Crossing**

Time		East Approach Bellarine Hwy		South Approach Ash Rd		West Approach Bellarine Hwy		Hourly Total
Period Start	Period End	Northbound	Southbound	Eastbound	Westbound	Northbound	Southbound	
7:30	7:45	0	0	0	0	0	2	8
7:45	8:00	0	0	0	1	2	0	6
8:00	8:15	0	0	0	1	0	0	4
8:15	8:30	0	0	0	1	0	1	6
8:30	8:45	0	0	0	0	0	0	6
8:45	9:00	0	0	0	0	0	1	
9:00	9:15	0	0	2	0	0	1	
9:15	9:30	0	0	1	0	1	0	
16:00	16:15	0	0	0	0	0	0	2
16:15	16:30	0	0	0	0	0	1	2
16:30	16:45	0	0	0	0	0	0	1
16:45	17:00	0	0	0	0	0	1	3
17:00	17:15	0	0	0	0	0	0	3
17:15	17:30	0	0	0	0	0	0	
17:30	17:45	0	0	1	1	0	0	
17:45	18:00	0	0	1	0	0	0	

Peak Time		East Approach Bellarine Hwy		South Approach Ash Rd		West Approach Bellarine Hwy		Peak total
Period Start	Period End	Northbound	Southbound	Eastbound	Westbound	Northbound	Southbound	
7:45	8:45	0	0	0	3	2	1	6
16:30	17:30	0	0	0	0	0	1	1



**Queue**

Time		Right Turn
Period Start	Period End	
7:30	7:35	0
		0
7:35	7:40	0
		0
7:40	7:45	0
		0
7:45	7:50	0
		0
7:50	7:55	0
		0
7:55	8:00	0
		0
8:00	8:05	0
		0
8:05	8:10	0
		0
8:10	8:15	2
		0
8:15	8:20	2
		0
8:20	8:25	5
		0
8:25	8:30	0
		0
8:30	8:35	2
		0
8:35	8:40	2
		0
8:40	8:45	3
		3
8:45	8:50	2
		3
8:50	8:55	4
		0
8:55	9:00	2
		2
9:00	9:05	3
		3
9:05	9:10	2
		5
9:10	9:15	2
		0
9:15	9:20	2
		2
9:20	9:25	0
		0
9:25	9:30	0
		0
16:00	16:05	3
		0
16:05	16:10	4
		2
16:10	16:15	2
		2
16:15	16:20	2
		3
16:20	16:25	4
		2
16:25	16:30	2
		2
16:30	16:35	3
		2
16:35	16:40	3
		3
16:40	16:45	3
		4
16:45	16:50	3
		2
16:50	16:55	2
		2
16:55	17:00	4
		3
17:00	17:05	5
		0

17:05	17:10	2
		2
17:10	17:15	2
		2
17:15	17:20	2
		0
17:20	17:25	0
		0
17:25	17:30	3
		2
17:30	17:35	2
		0
17:35	17:40	3
		0
17:40	17:45	7
		2
17:45	17:50	0
		0
17:50	17:55	0
		0
17:55	18:00	5

# TRANS TRAFFIC SURVEY

## TURNING MOVEMENT SURVEY

trafficsurvey.com.au



### Intersection of Bellarine Hwy and Simons Rd, Leopold

GPS -38.190354, 144.469442

Date:	Tue 26/10/21
Weather:	Fine
Suburban:	Leopold
Customer:	Ratio

North:	Simons Rd
East:	Bellarine Hwy
South:	N/A
West:	Bellarine Hwy

Survey Period	AM:	7:30 AM-9:30 AM
	PM:	4:00 PM-6:00 PM
Traffic Peak	AM:	7:45 AM-8:45 AM
	PM:	4:30 PM-5:30 PM

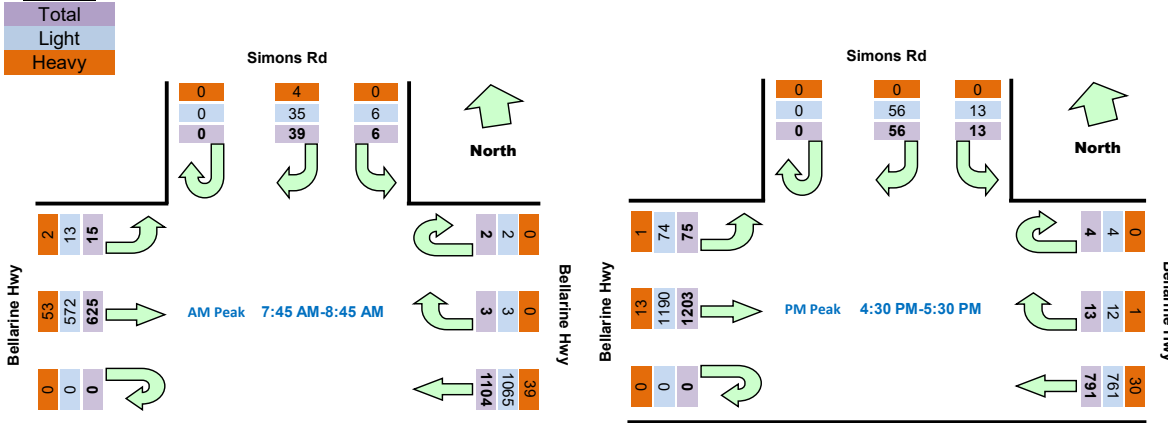
#### All Vehicles

Time		North Approach Simons Rd			East Approach Bellarine Hw			West Approach Bellarine Hw			Hourly Total	
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	Hour	Peak
7:30	7:45	0	13	2	0	0	231	0	129	3	1716	
7:45	8:00	0	8	2	0	1	267	0	153	3	1794	Peak
8:00	8:15	0	13	0	1	0	290	0	146	3	1791	
8:15	8:30	0	5	2	1	1	287	0	154	1	1737	
8:30	8:45	0	13	2	0	1	260	0	172	8	1641	
8:45	9:00	0	7	2	2	3	233	0	172	12		
9:00	9:15	0	13	4	0	0	227	0	141	14		
9:15	9:30	0	6	7	3	2	157	0	167	13		
16:00	16:15	0	9	3	2	3	209	0	288	18	2083	
16:15	16:30	0	21	0	2	2	189	0	273	19	2085	
16:30	16:45	0	10	4	1	2	194	0	291	13	2155	Peak
16:45	17:00	0	12	3	1	4	190	0	295	25	2133	
17:00	17:15	0	15	2	1	2	204	0	288	22	2017	
17:15	17:30	0	19	4	1	5	203	0	329	15		
17:30	17:45	0	15	4	1	2	157	0	287	27		
17:45	18:00	0	11	2	1	3	145	0	234	18		

Peak Time		North Approach Simons Rd			East Approach Bellarine Hw			West Approach Bellarine Hw			Peak total
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	
7:45	8:45	0	39	6	2	3	1104	0	625	15	1794
16:30	17:30	0	56	13	4	13	791	0	1203	75	2155

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

#### Graphic



#### Light Vehicles

Time		North Approach Simons Rd			East Approach Bellarine Hw			West Approach Bellarine Hw		
Period Start	Period End	U	R	L	U	R	WB	U	EB	L
7:30	7:45	0	12	2	0	0	229	0	119	3
7:45	8:00	0	6	2	0	1	262	0	141	2

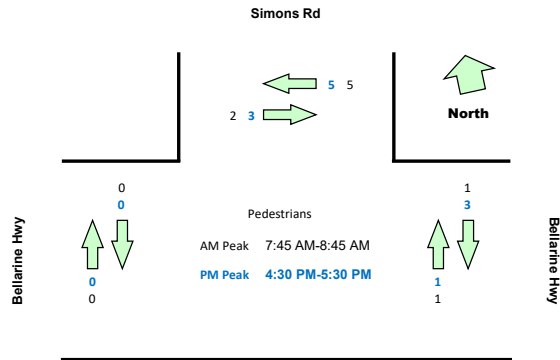




**Pedestrians Crossing**

Time		North Approach Simons Rd		East Approach Bellarine Hwy		West Approach Bellarine Hwy		Hourly Total
Period Start	Period End	Westbound	Eastbound	Southbound	Northbound	Southbound	Northbound	
7:30	7:45	0	0	1	0	0	0	7
7:45	8:00	2	0	1	0	0	0	9
8:00	8:15	0	2	0	1	0	0	6
8:15	8:30	0	0	0	0	0	0	7
8:30	8:45	3	0	0	0	0	0	12
8:45	9:00	0	0	0	0	0	0	
9:00	9:15	0	0	1	3	0	0	
9:15	9:30	1	1	1	2	0	0	
16:00	16:15	2	0	2	0	0	0	11
16:15	16:30	2	0	0	0	0	0	12
16:30	16:45	0	0	1	1	0	0	12
16:45	17:00	2	1	0	0	0	0	13
17:00	17:15	2	2	1	0	0	0	12
17:15	17:30	1	0	1	0	0	0	
17:30	17:45	0	1	2	0	0	0	
17:45	18:00	1	1	0	0	0	0	

Peak Time		North Approach Simons Rd		East Approach Bellarine Hwy		West Approach Bellarine Hwy		Peak total
Period Start	Period End	Westbound	Eastbound	Southbound	Northbound	Southbound	Northbound	
7:45	8:45	5	2	1	1	0	0	9
16:30	17:30	5	3	3	1	0	0	12



## Appendix B : SIDRA Results

# SITE LAYOUT

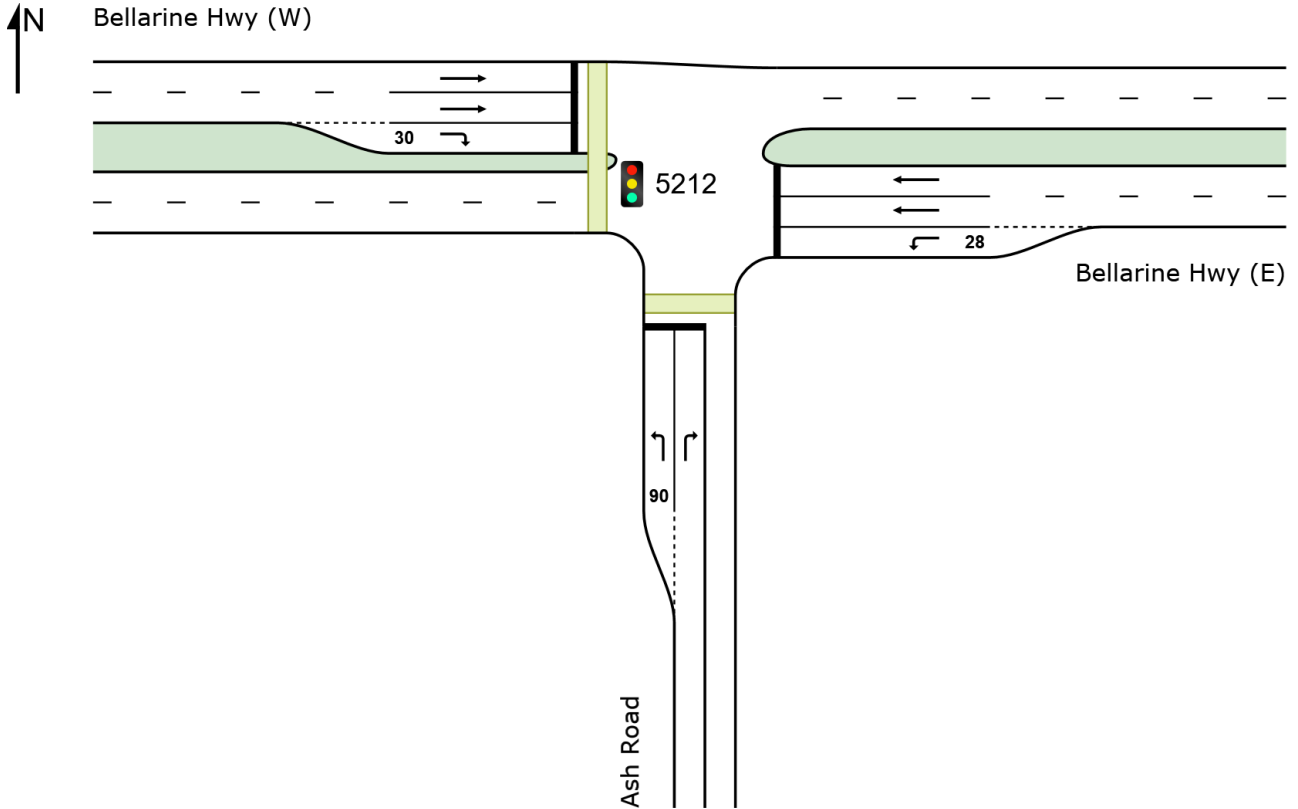
 Site: 5212 [AM - Bellarine Hwy / Ash Road (Site Folder: AM)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



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Project: Y:\18501-19000\18566T - Amendment C391 To the Greater Geelong Planning Scheme\Work\Analysis\SIDRA\18566T\_Bellarine Hwy-Ash Rd-Simons Rd.sip9

# MOVEMENT SUMMARY

**Site: 5212 [AM - Bellarine Hwy / Ash Road (Site Folder: AM)]**

New Site

Site Category: (None)

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

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist ] m				
South: Ash Road														
1	L2	72	5.0	76	5.0	* 0.211	34.1	LOS C	2.6	19.3	0.87	0.75	0.87	37.7
3	R2	47	5.0	49	5.0	0.177	42.1	LOS D	1.9	14.1	0.90	0.74	0.90	25.6
Approach		119	5.0	125	5.0	0.211	37.3	LOS D	2.6	19.3	0.88	0.74	0.88	33.6
East: Bellarine Hwy (E)														
4	L2	39	5.0	41	5.0	0.032	5.7	LOS A	0.4	2.9	0.31	0.60	0.31	48.6
5	T1	1345	5.0	1416	5.0	* 0.662	13.7	LOS B	21.6	157.4	0.73	0.66	0.73	42.2
Approach		1384	5.0	1457	5.0	0.662	13.5	LOS B	21.6	157.4	0.72	0.66	0.72	42.4
West: Bellarine Hwy (W)														
11	T1	594	5.0	625	5.0	0.233	4.8	LOS A	4.7	34.1	0.37	0.32	0.37	52.4
12	R2	33	5.0	35	5.0	* 0.291	51.8	LOS D	1.6	11.4	0.99	0.72	0.99	31.9
Approach		627	5.0	660	5.0	0.291	7.2	LOS A	4.7	34.1	0.40	0.34	0.40	49.4
All Vehicles		2130	5.0	2242	5.0	0.662	13.0	LOS B	21.6	157.4	0.63	0.57	0.63	43.3

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

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

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

Delay Model: SIDRA Standard (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.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[ Ped ped	Dist ] m					
South: Ash Road												
P1	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	202.3	211.9	1.05
West: Bellarine Hwy (W)												
P4	Full	50	53	39.3	LOS D	0.1	0.1	0.94	0.94	208.9	220.5	1.06
All Pedestrians		100	105	39.3	LOS D	0.1	0.1	0.94	0.94	205.6	216.2	1.05

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

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

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

# SITE LAYOUT

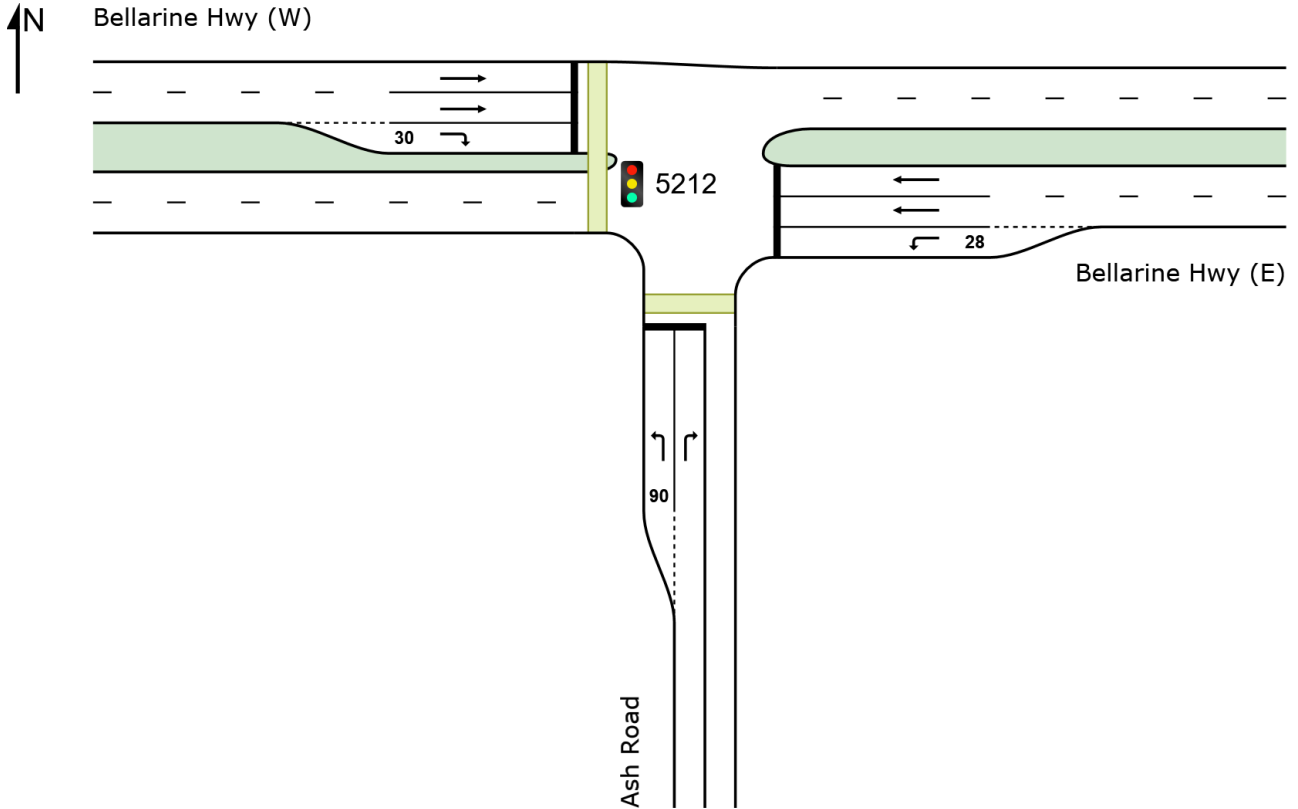
 Site: 5212 [PM - Bellarine Hwy / Ash Road (Site Folder: PM)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



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Project: Y:\18501-19000\18566T - Amendment C391 To the Greater Geelong Planning Scheme\Work\Analysis\SIDRA\18566T\_Bellarine Hwy-Ash Rd-Simons Rd.sip9

# MOVEMENT SUMMARY

**Site: 5212 [PM - Bellarine Hwy / Ash Road (Site Folder: PM)]**

New Site

Site Category: (None)

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

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist ] m				
South: Ash Road														
1	L2	54	2.0	57	2.0	0.148	36.4	LOS D	2.2	15.4	0.85	0.73	0.85	36.9
3	R2	51	2.0	54	2.0	*0.195	46.6	LOS D	2.3	16.7	0.91	0.74	0.91	24.2
Approach		105	2.0	111	2.0	0.195	41.4	LOS D	2.3	16.7	0.88	0.74	0.88	31.4
East: Bellarine Hwy (E)														
4	L2	53	2.0	56	2.0	0.044	6.4	LOS A	0.7	4.7	0.32	0.61	0.32	47.9
5	T1	794	2.0	836	2.0	0.384	12.0	LOS B	11.1	79.3	0.58	0.51	0.58	43.9
Approach		847	2.0	892	2.0	0.384	11.6	LOS B	11.1	79.3	0.56	0.51	0.56	44.1
West: Bellarine Hwy (W)														
11	T1	1424	2.0	1499	2.0	*0.555	6.3	LOS A	17.0	120.8	0.48	0.44	0.48	50.2
12	R2	61	2.0	64	2.0	0.390	54.2	LOS D	3.1	22.2	0.98	0.76	0.98	31.3
Approach		1485	2.0	1563	2.0	0.555	8.3	LOS A	17.0	120.8	0.50	0.45	0.50	48.1
All Vehicles		2437	2.0	2565	2.0	0.555	10.9	LOS B	17.0	120.8	0.54	0.49	0.54	45.3

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

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

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

Delay Model: SIDRA Standard (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.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
						[ Ped ped	Dist ] m					
South: Ash Road												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
West: Bellarine Hwy (W)												
P4	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	213.9	220.5	1.03
All Pedestrians		100	105	44.3	LOS E	0.1	0.1	0.94	0.94	210.6	216.2	1.03

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

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

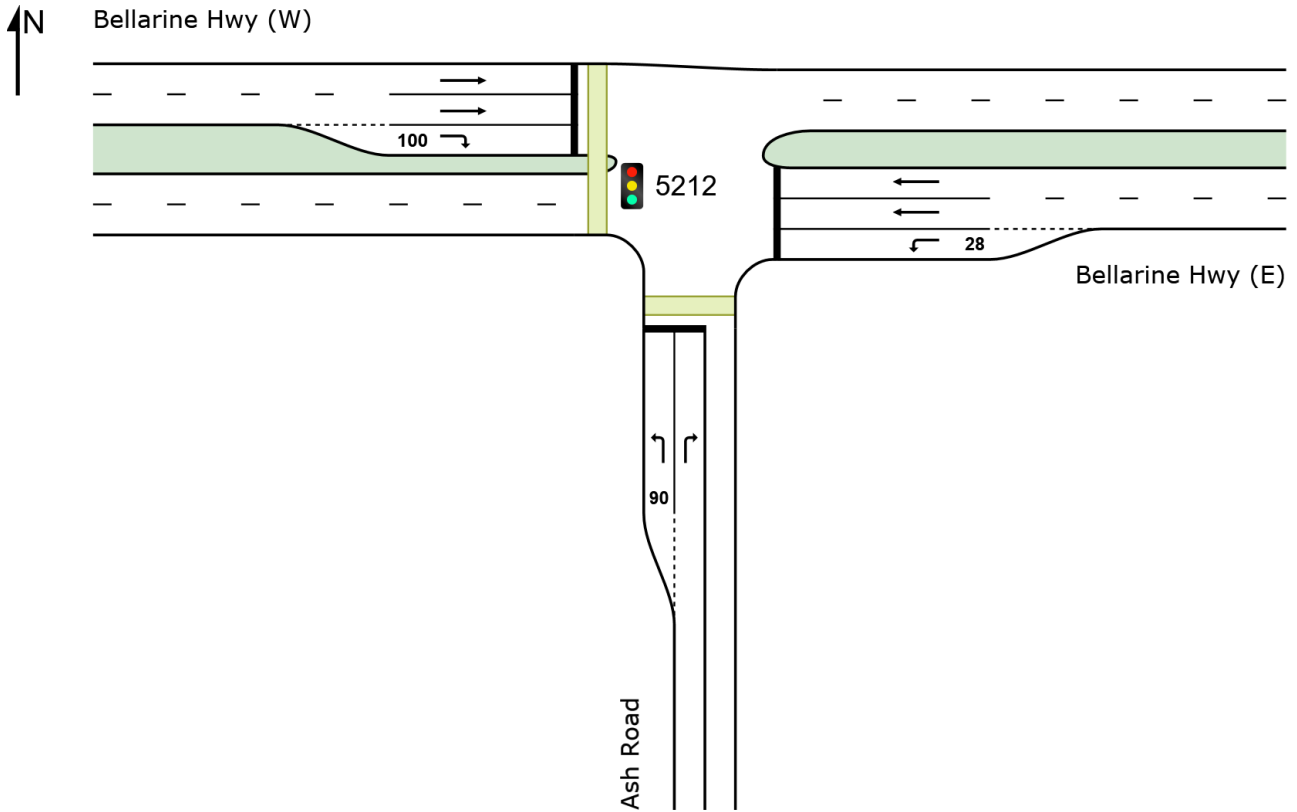
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# SITE LAYOUT

Site: 5212 [AM - Bellarine Hwy / Ash Road - Ultimate (Site Folder: AM - Ultimate)]

New Site  
Site Category: (None)  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



# MOVEMENT SUMMARY

**Site: 5212 [AM - Bellarine Hwy / Ash Road - Ultimate (Site Folder: AM - Ultimate)]**

New Site

Site Category: (None)

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

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist ] m				
South: Ash Road														
1	L2	329	5.0	346	5.0	* 0.805	44.0	LOS D	16.4	119.6	1.00	0.91	1.14	34.2
3	R2	111	5.0	117	5.0	0.326	43.1	LOS D	5.0	36.3	0.90	0.78	0.90	25.3
Approach		440	5.0	463	5.0	0.805	43.8	LOS D	16.4	119.6	0.97	0.87	1.08	32.5
East: Bellarine Hwy (E)														
4	L2	55	5.0	58	5.0	0.045	5.9	LOS A	0.6	4.6	0.30	0.60	0.30	48.3
5	T1	1561	5.0	1643	5.0	* 0.814	21.2	LOS C	34.7	253.5	0.86	0.81	0.89	36.4
Approach		1616	5.0	1701	5.0	0.814	20.6	LOS C	34.7	253.5	0.84	0.81	0.87	36.7
West: Bellarine Hwy (W)														
11	T1	689	5.0	725	5.0	0.384	16.5	LOS B	10.8	79.2	0.66	0.58	0.66	39.8
12	R2	97	5.0	102	5.0	* 0.813	62.4	LOS E	5.5	40.5	1.00	0.91	1.35	29.2
Approach		786	5.0	827	5.0	0.813	22.2	LOS C	10.8	79.2	0.70	0.62	0.75	37.0
All Vehicles		2842	5.0	2992	5.0	0.814	24.6	LOS C	34.7	253.5	0.83	0.77	0.87	35.7

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

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

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

Delay Model: SIDRA Standard (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.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec	[ Ped ped	Dist ] m						
South: Ash Road												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
West: Bellarine Hwy (W)												
P4	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	213.9	220.5	1.03
All Pedestrians		100	105	44.3	LOS E	0.1	0.1	0.94	0.94	210.6	216.2	1.03

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

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

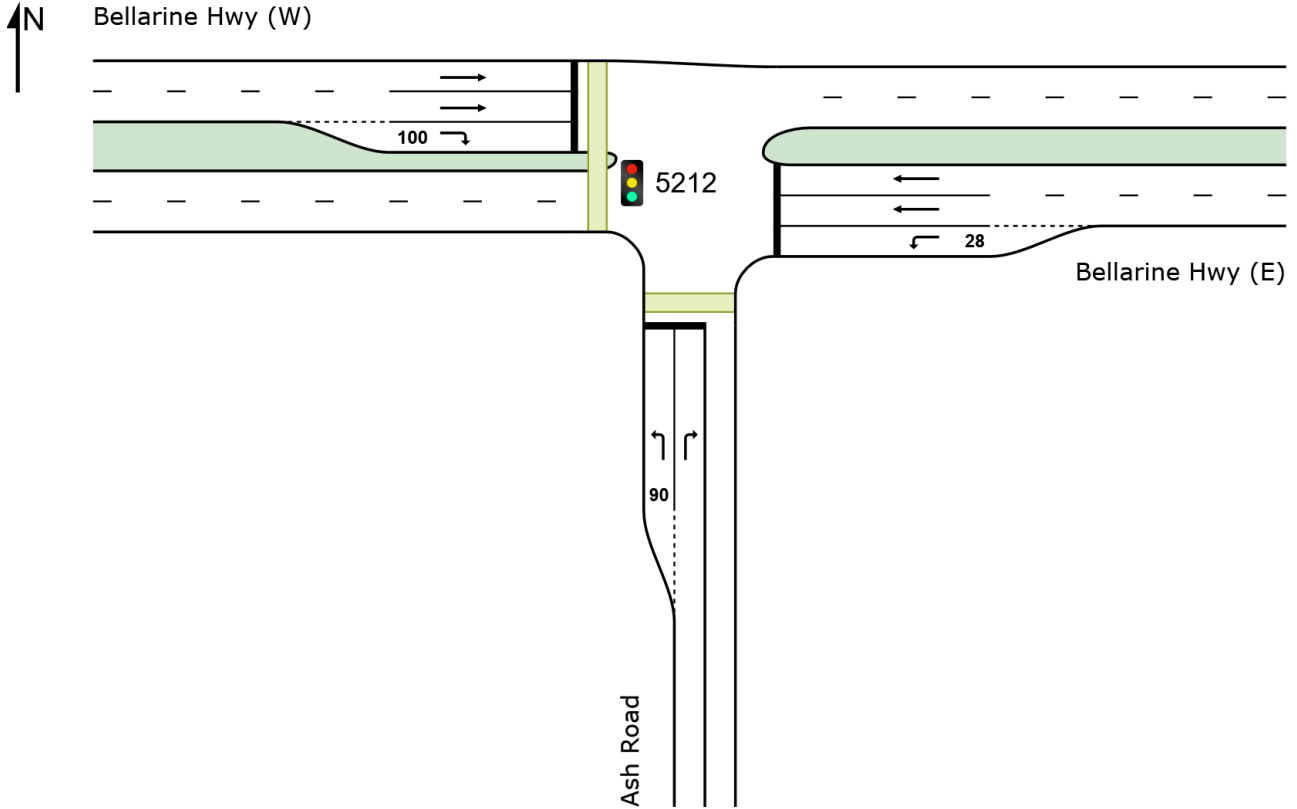
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

# SITE LAYOUT

Site: 5212 [PM - Bellarine Hwy / Ash Road - Ultimate (Site Folder: PM - Ultimate)]

New Site  
Site Category: (None)  
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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



# MOVEMENT SUMMARY

**Site: 5212 [PM - Bellarine Hwy / Ash Road - Ultimate (Site Folder: PM - Ultimate)]**

New Site

Site Category: (None)

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

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[ Total veh/h	HV %	[ Total veh/h	HV %				[ Veh. veh	Dist ] m				
South: Ash Road														
1	L2	182	2.0	192	2.0	* 0.291	27.0	LOS C	6.4	45.2	0.75	0.76	0.75	40.7
3	R2	83	2.0	87	2.0	0.318	47.6	LOS D	3.9	27.9	0.93	0.77	0.93	23.9
Approach		265	2.0	279	2.0	0.318	33.4	LOS C	6.4	45.2	0.81	0.76	0.81	35.8
East: Bellarine Hwy (E)														
4	L2	101	2.0	106	2.0	0.106	11.9	LOS B	2.1	15.2	0.50	0.67	0.50	42.3
5	T1	921	2.0	969	2.0	* 0.626	23.3	LOS C	19.7	140.0	0.82	0.72	0.82	35.0
Approach		1022	2.0	1076	2.0	0.626	22.2	LOS C	19.7	140.0	0.79	0.72	0.79	35.6
West: Bellarine Hwy (W)														
11	T1	1653	2.0	1740	2.0	0.619	7.0	LOS A	20.6	146.5	0.54	0.49	0.54	49.3
12	R2	254	2.0	267	2.0	* 0.608	42.6	LOS D	11.8	84.1	0.94	0.83	0.94	34.7
Approach		1907	2.0	2007	2.0	0.619	11.8	LOS B	20.6	146.5	0.59	0.54	0.59	45.1
All Vehicles		3194	2.0	3362	2.0	0.626	16.9	LOS B	20.6	146.5	0.67	0.61	0.67	40.7

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

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

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

Delay Model: SIDRA Standard (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.

\* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Effective Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[ Ped ped	Dist ] m			sec	m	m/sec
South: Ash Road												
P1	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	207.3	211.9	1.02
West: Bellarine Hwy (W)												
P4	Full	50	53	44.3	LOS E	0.1	0.1	0.94	0.94	213.9	220.5	1.03
All Pedestrians		100	105	44.3	LOS E	0.1	0.1	0.94	0.94	210.6	216.2	1.03

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

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

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