Traffic and Transport Assessment

Forest Road South Residential Subdivision

CG130500

Prepared for
TGM Group

8 October 2013

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Shaping the Future

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1 Introduction

Cardno have been retained by TGM Group to undertake a traffic and transport assessment of the proposed residential subdivision at 130-150 Forest Road South, Lara.

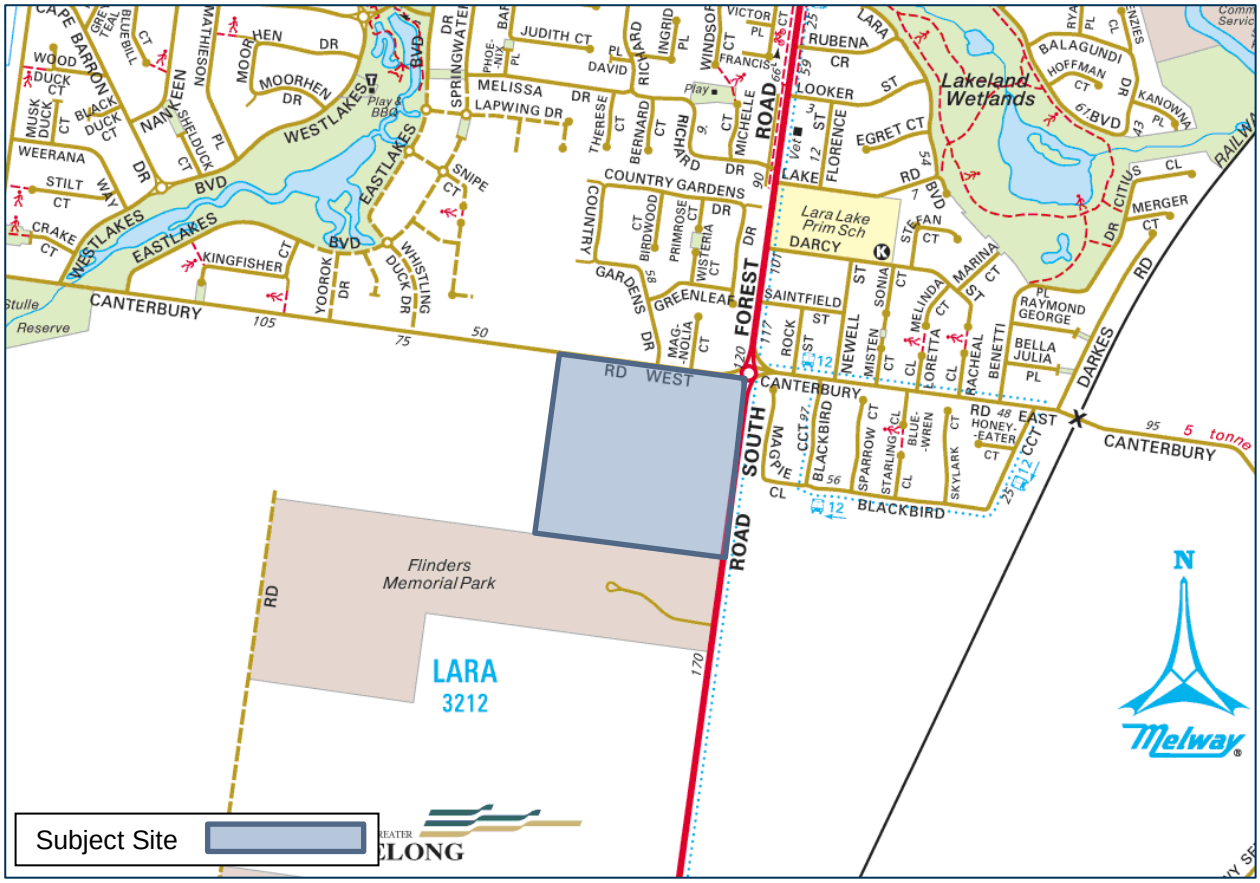
In the course of preparing this assessment, the subject site and its environs have been inspected, plans of the development examined, relevant background material from the City of Greater Geelong reviewed and all relevant traffic and parking data collected and analysed.

2 Background and Existing Conditions

2.1 Location and Land Use

The subject site, addressed as 130-150 Forest Road South, is located on the south-west corner of the intersection of Forest Road South and Canterbury Road West as shown in Figure 2-1 below. The site is rectangular in shape with frontages of approximately 400 metres to Canterbury Road West and Forest Road South for a site area of approximately 16 Hectares.

Figure 2-1 Site Location



The subject site and land generally to the south and west is currently rural/farming land whilst land use to the north and east is largely residential. Land uses of note in the area include Flinders Memorial Park to the south, Lara Lakes Primary School approximately 800 metres to the north and Lara Town Centre approximately 1.5 kilometres to the north.

2.2 Road Network

2.2.1 Forest Road South

Forest Road South is a VicRoads Declared Main Road that runs north-south from the Princes Highway to Lara Town Centre where it continues north as Forest Road North. In the vicinity of the site it operates with a 6.5 metre pavement and unsealed shoulders accommodating a single lane of travel in either direction as shown in Figure 2-2.

Figure 2-2 Forest Road looking north beyond the subject site

The intersection with Canterbury Road is controlled by a roundabout, a view of which is provided in Figure 2-3

Figure 2-3 Forest Road / Canterbury Road intersection

The subject site adjacent to Forest Road South is subject to a Public Acquisition Overlay allowing VicRoads to create and construct a Road Zone. The Lara Structure Plan, published in 2011, outlines proposed road upgrades that include widening of Forest Road South to accommodate on-street parking, pedestrian refuges, on-road bike lanes, two traffic lanes in both directions and truck turning lanes.

2.2.2 Canterbury Road West

Canterbury Road West is a local connector street running east-west between O'Hallorans Road and Forest Road South. East of Forest Road it continues as Canterbury Road East over the Geelong-Melbourne Railway. Adjacent to the subject site it operates with an approximately 6.5 metre pavement and unsealed southern shoulder accommodating one lane of traffic in either direction as shown in Figure 2-4.

Figure 2-4 Canterbury Road West facing east adjacent to the subject site

Approximately midway through the site's boundary, the road surface becomes unsealed as indicated in Figure 2-5

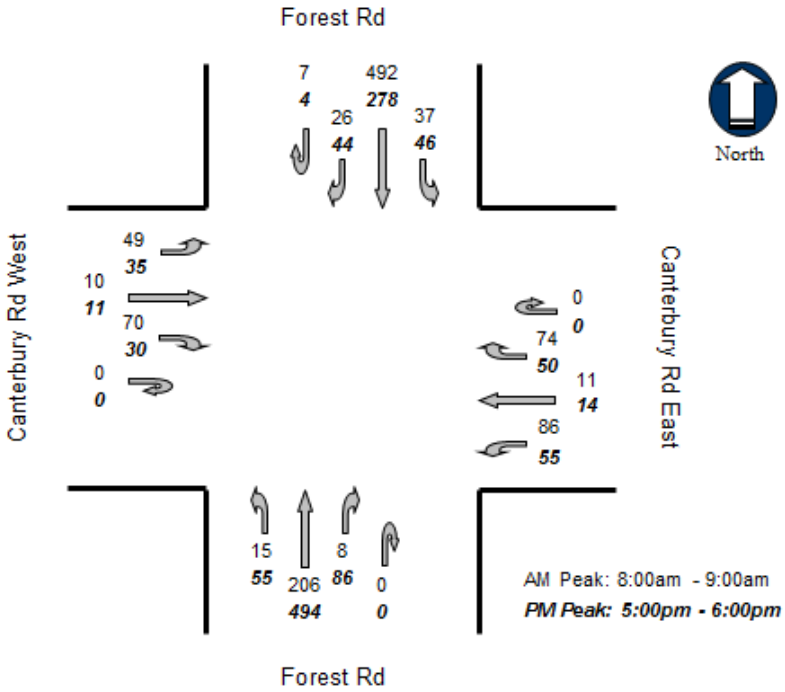
Figure 2-5 Canterbury Road West facing west adjacent to the subject site

2.3 Traffic Volumes

Cardno commissioned peak hour traffic movement surveys at the intersections of Forest Road South / Canterbury Road West on Wednesday 31st July from 7:00AM-10:00AM and 4:00PM-7:00PM coincident with peak traffic periods in the area.

Peak hours were determined to be between 8:00AM-9:00AM and 5:00PM-6:00PM, with volumes as indicated in Figure 2-6.

Figure 2-6 Peak Hour Traffic Volumes – Canterbury Road / Forest Road Intersection



The survey demonstrates a strong southbound bias during the AM peak and northbound bias during the PM peak consistent with expectations that a large proportion of traffic will have destinations to the south to Geelong or to utilise the Princes Freeway.

The traffic counts indicate Forest Road south of the roundabout is carrying in the order of 9,400 vehicles per day and Canterbury Road west of the roundabout is carrying in the order of 1,900 vehicles per day. Both roads are carrying appropriate levels of traffic for their given function and cross section.

2.4 Existing Intersection Operation

To assess the operation of the existing intersection of Forest Road South / Canterbury Road West the surveyed traffic volumes have been analysed using SIDRA.

SIDRA (Signalised and Unsignalised Intersection Design and Research Aid) is a computer package, originally developed to assist in the design of signalised and unsignalised intersection by providing information about the capacity of an intersection in terms of a range of parameters, as described below:

- *Degree of Saturation* (DoS) is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement. Various values of degree of saturation and their rating are shown in Table 2-1.

Table 2-1 Rating of Degrees of Saturation

Degree of Saturation	Rating
Up to 0.6	Excellent
0.6 to 0.7	Very Good
0.7 to 0.8	Good
0.8 to 0.9	Acceptable
0.9 to 1.0	Poor
Above 1.0	Very Poor

- *95th Percentile* (95%ile) Queue represents the maximum queue length, in metres, that can be expected in 95% of observed queue lengths in the peak hour.
- *Average Delay* represents the average delay that motorists will experience when undertaking a particular manoeuvre.

The current peak hour operating conditions of the Forest Road / Canterbury Road intersection is summarised in Table 2-2 below.

Table 2-2 Existing Intersection Operation

Approach		Degree of Saturation	95th%ile Queue	Average Delay
AM Peak	Forest Road North	0.37	1	7
	Canterbury Road East	0.24	10	13
	Forest Road South	0.20	8	8
	Canterbury Road West	0.14	5	11
PM Peak	Forest Road North	0.24	10	7
	Canterbury Road East	0.13	5	13
	Forest Road South	0.52	30	8
	Canterbury Road West	0.11	5	11

As indicated in the table above, all legs of the intersection are operating under 'excellent' conditions with motorists experiencing minimal queues and delays.

2.5 Public Transport

2.5.1 Existing Infrastructure

Lara has good access to existing rail infrastructure, with V/Line services provided between Geelong and Melbourne. Travel times between Lara and Geelong (Railway Terrace) are typically between 13 and 20 minutes depending on the time of day and travel times from Lara to Melbourne (Southern Cross Station) are between 42 and 55 minutes.

Upgrades to the Lara Station were completed in 2008 providing improved facilities and a new coach / train interchange. The railway station improvements complement the Lara Parkway (park and ride) facility, which was completed in 2007 and provides over 350 car parking spaces.

The 2011 Lara Structure Plan identifies that Lara is currently poorly served by buses, with only one (1) service between Lara and Geelong.

2.5.2 Proposed Improvements

The 2011 Lara Structure Plan recognises the State Government is currently delivering new regional rail projects for Geelong, which are intended to provide the communities along the line such as Lara with more frequent, reliable, and comfortable rail services via upgraded tracks and signals, and faster trains.

The Regional Rail Link is a major new rail line currently under construction running from west of Werribee to Deer Park and then through to Southern Cross Station. The project will free up capacity for more trains and

services, and provide better reliability. The new tracks will allow trains from Geelong to run express to Melbourne on dedicated tracks, removing the need for V/Line services to use metropolitan tracks and resulting in significantly improved travel times.

In order to address the shortfalls associated with buses in Lara, the City of Geelong has recommended implementation of the following:

1. A bus route travelling directly between Lara Station, The Centreway and Corio Village Shopping Centre, and will involve an efficient bus interchange at the Lara Station; and
2. One or two demand responsive mini-buses that pick passengers up at or close to their homes. This proposal would also service the rural residential areas of Lara and connect to the Lara Railway Station and the Centreway Shopping Centre, where interchanges with other services (bus and rail) can be made.

The 2011 Lara Structure Plan also identifies the need to improve and formalise school bus services around the Lara Primary School and Lara Secondary College, with the prepared outcome being the inclusion of a bus interchange within a future expansion of the Lara Recreation Reserve from Alkara Avenue.

2.6 Lara Transport Management Plan

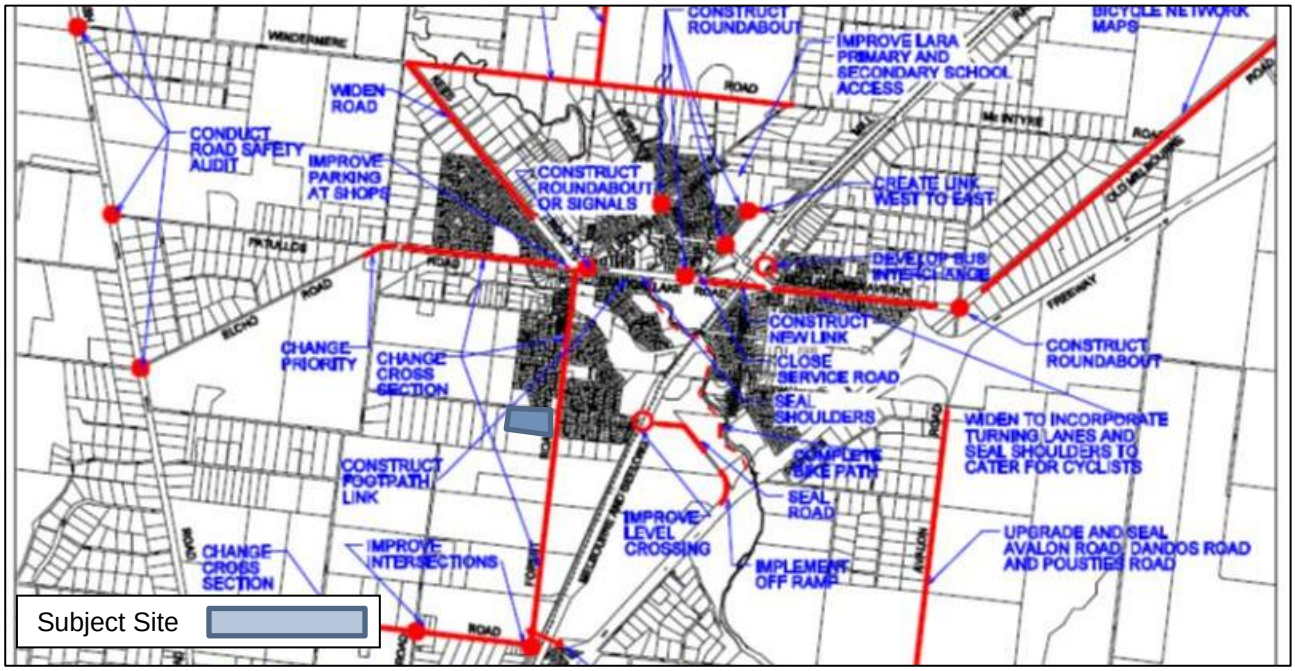
The Lara Transport Management Plan (2003) was prepared in 2003/2004 as a result of a recommendation within the draft Geelong Transport Strategy 2001 to investigate traffic issues in Lara.

The purpose of the study was to:

- Determine existing issues relating to the transportation of people and product.
- Determine the impacts of future residential and industrial development on the transport system, and
- Identify improvement options and preferred solutions for the subject study area to enable Council to cost effectively manage the safe and orderly movement of people and product and reduce adverse impacts of travel on the community.

The identified road network improvements, taken from the 2011 Lara Structure Plan, are shown in Figure 2-7.

Figure 2-7 Lara Transport Management Plan



As previously indicated, the Lara Structure Plan outlines proposed road upgrades that include widening of Forest Road South to accommodate on-street parking, pedestrian refuges, on-road bike lanes, two traffic lanes in both directions and truck turning lanes.

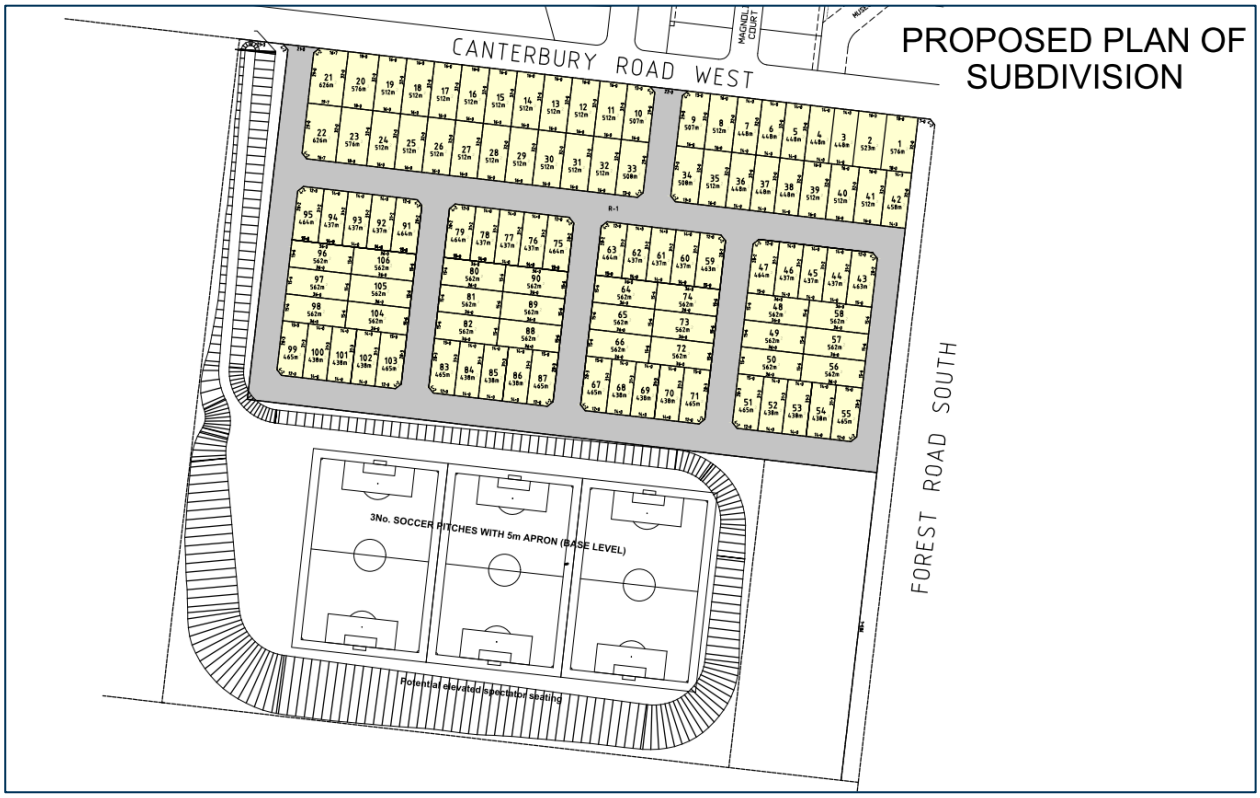
3 Proposed Development

3.1 General

The rezoning and permit application contemplates development of the site for a residential subdivision. The development plans illustrate a total of 106 lots. Figure 3-1 below illustrates the proposed residential subdivision lot layout and site access points.

Immediately to the south of the residential development component, a number of sports fields are proposed, functioning as a large drainage basin. It is understood an associated car parking area is will be ultimately provided to the east of the sporting fields adjacent to Forest Road South.

Figure 3-1 Proposed Residential Subdivision Layout



3.2 External Access

Two access roads to the internal lots are proposed from Canterbury Road West that will provide for fully direction movements into and out of the site. Regular lots fronting Canterbury Road and the balance-lot dwellings on Forest Road will be provided with crossovers directly to their respective streets.

Whilst opportunity exists to provide access to the sporting grounds and associated car park through the site's internal road network, it is anticipated that the most effective means of access to the sporting facilities will be utilisation of Forest Road South.

3.3 Internal Road Layout

Internal roads are specified with road reservations between 14 and 16 metres, sufficient to accommodate typical access street pavement widths of 7.3 metres and verge widths of between 4.35 and 2.35 metres along lot frontages, with smaller verges provided where no footpath is required.

3.4 Canterbury Road West

Canterbury Road West along the frontage of the site is partially constructed between Forest Road and Gardens Drive. West of Gardens Drive, Canterbury Road is currently a gravel road.

As part of the proposed subdivision, the existing sealed section of Canterbury Road West will be fully constructed as an approximately 9.0 metre carriageway, equivalent to that constructed across the frontage of the Grand Lakes estate to the west.

The balance of the Canterbury Road West along the site frontage will be constricted at a two thirds sealed pavement.

4 Traffic Considerations

4.1 Traffic Generation

It is generally accepted that residential lots in outer-suburban areas generate traffic at a rate of up to 10 vehicles per day per lot with 10% of trips undertaken during each peak hour. In areas of good public transport accessibility, and for multi-unit and higher density dwelling lots, lower traffic generation rates are often observed.

Conservatively adopting a traffic generation rate of 10 movements per dwelling suggests the subdivision will generate in the order of 1,060 daily traffic movements, inclusive of 106 movements during each peak hour.

It is generally accepted that for residential developments approximately 80% of trips are outbound and 20% inbound in the AM peak. Conversely in the PM peak, 60% are inbound and 40% are outbound.

Adopting these rates to the proposed 181 lots, gives the estimated traffic volumes outlined in Table 4-1.

Table 4-1 Anticipated Traffic Generation

Period	In	Out	Total
AM Peak	21	85	106
PM Peak	64	42	106
Daily	530	530	1,060 vpd

4.2 Traffic Distribution

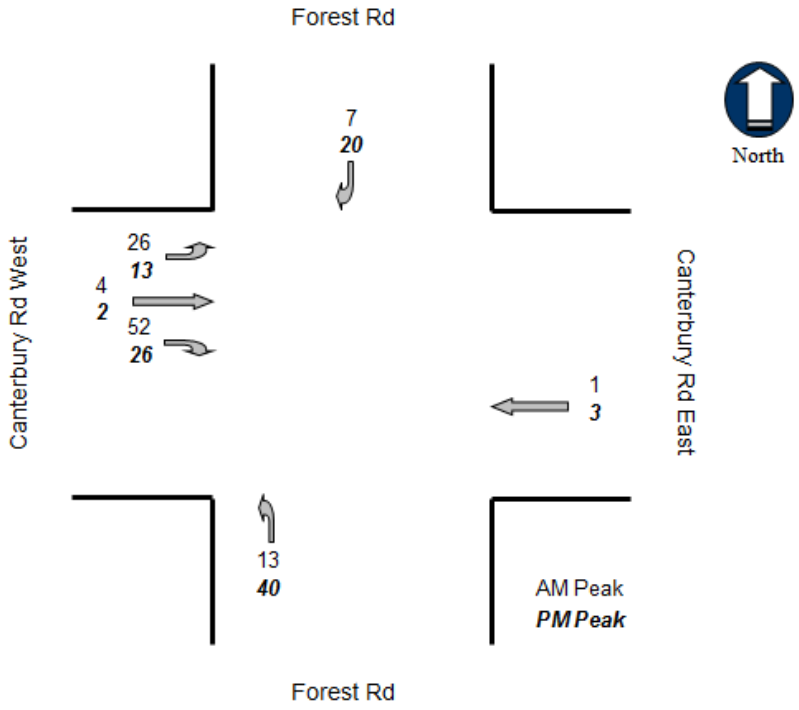
An analysis of the likely shopping, education and work destinations in the surrounding areas has aided in developing a traffic distribution model for the proposed development. It is anticipated that traffic movements will be split to each direction as indicated in Table 4-2.

Table 4-2 Traffic Distribution

Direction	Proportion
North	30%
East	5%
South	60%
West	5%

Based on the above, the projected traffic generated by the development at the intersection of Forest Road and Canterbury Road is as indicated in Figure 4-1.

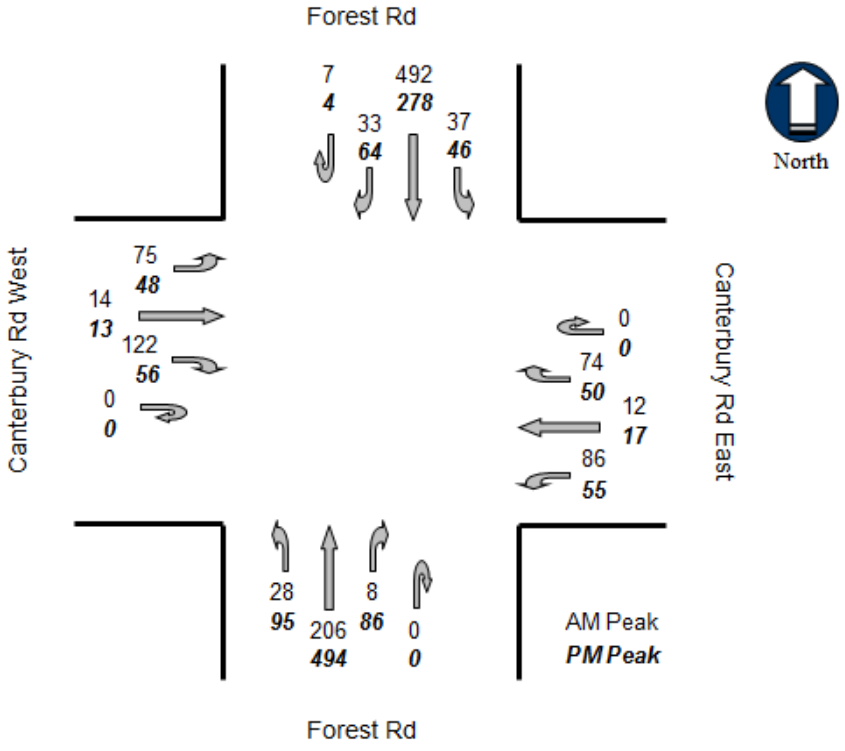
Figure 4-1 Projected Traffic Volumes



4.3 Traffic Impact

Based on the forgoing, the post-development traffic volumes at the intersection of Forest Road and Canterbury Road are as outlined in Figure 4-2.

Figure 4-2 Post-Development Traffic Volumes



4.3.2 Intersection Analysis

The aforementioned traffic volumes were input into SIDRA, with the results of the intersection analysis presented below in Table 4-3.

Table 4-3 Future Intersection Operation

Approach		Degree of Saturation		95th%ile Queue		Average Delay	
		Existing	Future	Existing	Future	Existing	Future
AM Peak	Forest Road North	0.37	0.40	1	21	7	8
	Canterbury Road East	0.24	0.24	10	11	13	14
	Forest Road South	0.20	0.22	8	9	8	8
	Canterbury Road West	0.14	0.22	5	9	11	11
PM Peak	Forest Road North	0.24	0.27	10	12	7	8
	Canterbury Road East	0.13	0.14	5	5	13	11
	Forest Road South	0.52	0.57	30	34	8	8
	Canterbury Road West	0.11	0.17	5	7	11	13

As indicated above, all legs of the intersection continue to operate under excellent conditions with minimal increases to queues and delays. It is evident that the intersection possesses significant capacity for any increases in traffic flows in the future.

5 Internal Road Layout

All roads within the subdivision have been designed to provide for convenient access to individual allotments and have generally been designed in accordance with Clause 56 of the Greater Geelong Planning Scheme.

The western internal road providing access from Canterbury Road West is identified as having a 15 metre road reservation. Whilst this is less than a 16 metre reservation typically specified for an Access Street – Level 2, it provides sufficient width for a 7.3 metre pavement and a 4.35 metre verge on the eastern side, with the balance of width (3.35 metres) provided within the verge on the western side.

It is not considered necessary to provide the entire 4.35 metre verge on the western side given that it runs adjacent to a drainage reserve and does not provide direct lot access.

Similarly, the internal road running adjacent to Forest Road South on the sites eastern boundary is specified with a reduced reservation of 14 metres, sufficient to provide a 2.35 metre verge on the eastern side. Given that no properties gain access form the eastern edge, it is also considered appropriate to provide a reduced verge width.

All remaining internal roads are provided with a 16 metre reservation, sufficient to provide 7.3 metre pavements and 4.35 metre verges across each side.

Indicative road cross sections are included in Appendix A.

6 Planning Scheme Assessment

6.1 Clause 56

Clause 56 of the Greater Geelong Planning Scheme relates to 'Residential Subdivision' and specifies 'Objectives' and 'Standards' to meet specified design element criteria.

With regard to traffic and car parking issues, the most relevant is *Clause 56.06; Access and Mobility Management,* consisting of the following key objectives:

56.06-1: Integrated Mobility Objectives
56.06-2: Walking and Cycling Network Objectives
56.06-3: Public Transport Network Objectives
56.06-4: Neighbourhood Street Network Objectives
56.06-5: Walking and Cycling Network Detail Objectives
56.06-6: Public Transport Network Detail Objectives
56.06-7: Neighbourhood Street Network Detail Objectives
56.06-8: Lot Access Objective

The assessment of the effectiveness of the road network in meeting the above objectives will be determined by its ability to provide;

> A safe and accessible road network;
> No incentive for through traffic intrusion;
> Suitable access for emergency and service vehicle access;
> A low speed traffic environment;
> A safe and convenient pedestrian and bicycle network;
> An attractive streetscape with a high level of residential amenity;
> Safe intersection design, with a preference for T-intersections; and
> Sufficient room for drainage systems, public utility services and street lighting.

An assessment of each of the relevant objectives is presented below:

Objective Clause 56.06-1: Integrated Mobility

The intent is to achieve an urban design that is permeable and compact that encourages walking, cycling and public transport modes, with accessibility to larger activity centres.

The proposed subdivisional road network has been designed for substantial integrated mobility networks to be created with strong linkages to the north, east and west. Linkages to the south are not considered required as this site is the Flinders Memorial Park.

Objective Clause 56.06-2 & 56.06-5: Walking and Cycling

The intent is to create subdivisions that encourage walking and cycling within the residential development, and between surrounding neighbourhoods.

The road network within the proposed subdivision is suitably designed to cater for and encourage both pedestrian and cyclist trips within and through the area. The internal road network is proposed to have footpaths across all residential frontages.

Objective Clause 56.06-3 & 56.06-6: Public Transport Network

The intent is to encourage the use of existing public transport infrastructure, and to create new services that provide links to surrounding activity nodes.

Dwellings will be within 400 metres of the No.12 bus route running along Forest Road South.

Objective Clause 56.06-4 & 56.06-7: Neighbourhood Street Network

The intent is for direct, safe and easy movement through and between neighbourhoods for pedestrians, cyclists, public transport and other motor vehicles.

The proposed internal subdivision roads consist of individual roads, which fall under the classification of Access Street – Level 2 within Clause 56. It is considered that the layout proposed and the cross section of those roads is appropriate to promote safe and easy movement through the subdivision for all road users.

Furthermore, the proposed road network will provide adequate clearances to cater for the access requirements of service and emergency vehicles (e.g. typically up to an 8.8m truck).

The forecast daily traffic volumes for the internal subdivision roads are well within the recommended volume limits specified in Table C1 of Clause 56.06 for an Access Place.

Objective Clause 56.06-8: Lot Access

The intent is to provide for safe vehicle access between roads and subdivision lots.

All internal single dwelling lots will have direct access onto the proposed internal road network via conventional crossovers.

7 Conclusion

Based on the forgoing analysis, it can be concluded that:

> It is proposed to redevelop the subject site, located at the intersection of Forest Road and Canterbury Road, Lara for a residential subdivision contemplating 106 lots;

> The proposal is expected to generate in the order of 1,060 daily vehicle trips, inclusive of 106 during each commuter peak hour;

> The traffic generated by the proposal is not expected to have any impact on the operation of the Forest Road / Canterbury Road intersection, with SIDRA analysis indicating the intersection will continue to operate under excellent conditions post-development;

> The internal roads are proposed to provide between 14 and 16 metre reservations accommodating 7.3 metre pavements and reduced verge widths at abuttals to the drainage reserve to the west of the site and Forest Road South; and

> The subdivision plan satisfies the requirements of Clause 56 of the Planning Scheme.

Forest Road South Residential Subdivision

APPENDIX A

INTERNAL ROAD CROSS SECTIONS

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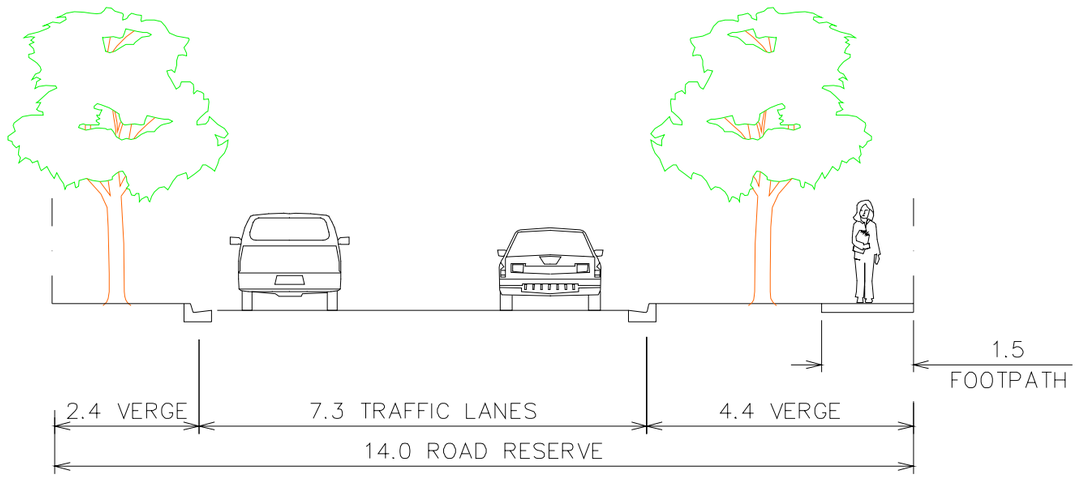
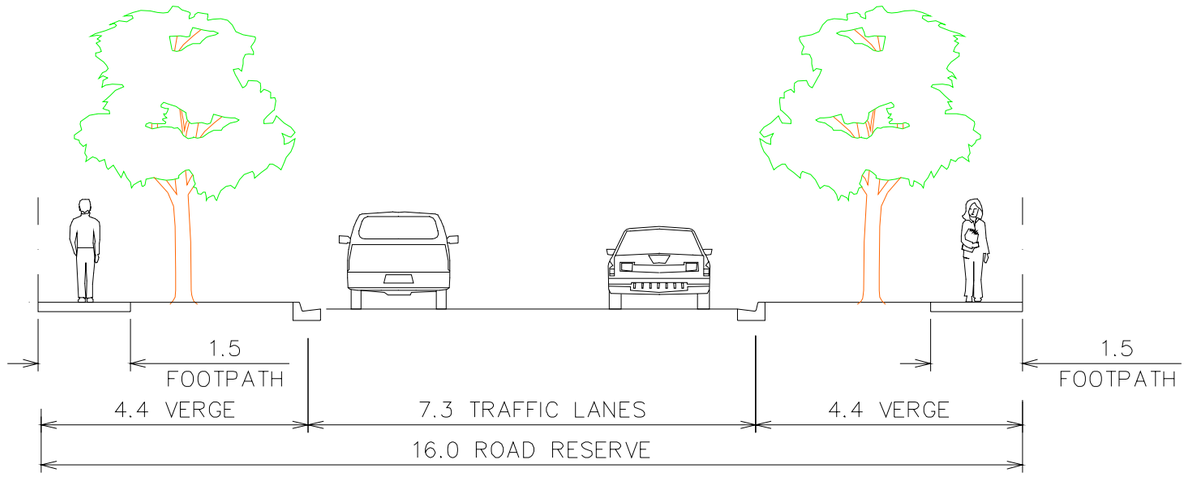


INTERNAL ROAD
14.0m ROAD RESERVE
SCALE 1:100



INTERNAL ROAD
16.0m ROAD RESERVE
SCALE 1:100