TRAFFIC IMPACT ASSESSMENT

SUBDIVISION, 471 CAMBRIDGE ROAD, MORNINGTON

Hubble Traffic

November 2024 Updated

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Version	Date	Reason for Issue
Draft	August 2023	Draft issued for client feedback
Final	August 2023	Final issued
Updated	January 2024	Removal of Pass Rd connection, traffic assessment of future Pass Rd junction
Updated	November 2024	Updated subdivision layout

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1. Introduction

JMG Engineers & Planners have engaged Hubble Traffic on behalf of the developers, to prepare an independent Traffic Impact Assessment, to consider the traffic impacts from the provision of a 60 lot residential subdivision at 471 Cambridge Road, Mornington and, 528 and 540 Pass Road, Cambridge.

This assessment has considered the amount of traffic this subdivision is likely to generate and how the additional traffic movements will enter and leave the development site, via a new junction at Cambridge Road.

This report has been prepared to satisfy the requirements of Austroads, Guide to Traffic Management Part 12: Traffic Impacts of Developments, 2019, and referred to the following information and resources:

- Tasmanian Planning Scheme (Clarence City Council)
- Road Traffic Authority NSW (RTA) Guide to Traffic Generating Developments
- Australian Standards AS2890 parts 1, 2 and 6
- Austroads series of Traffic Management and Road Design
  - Part 4: Intersection and crossings, General
  - Part 4a: Unsignalised and Signalised Intersections
  - Part 12: Traffic Impacts of Development
- Department of State Growth crash database
- LIST – Land Information System Tasmania

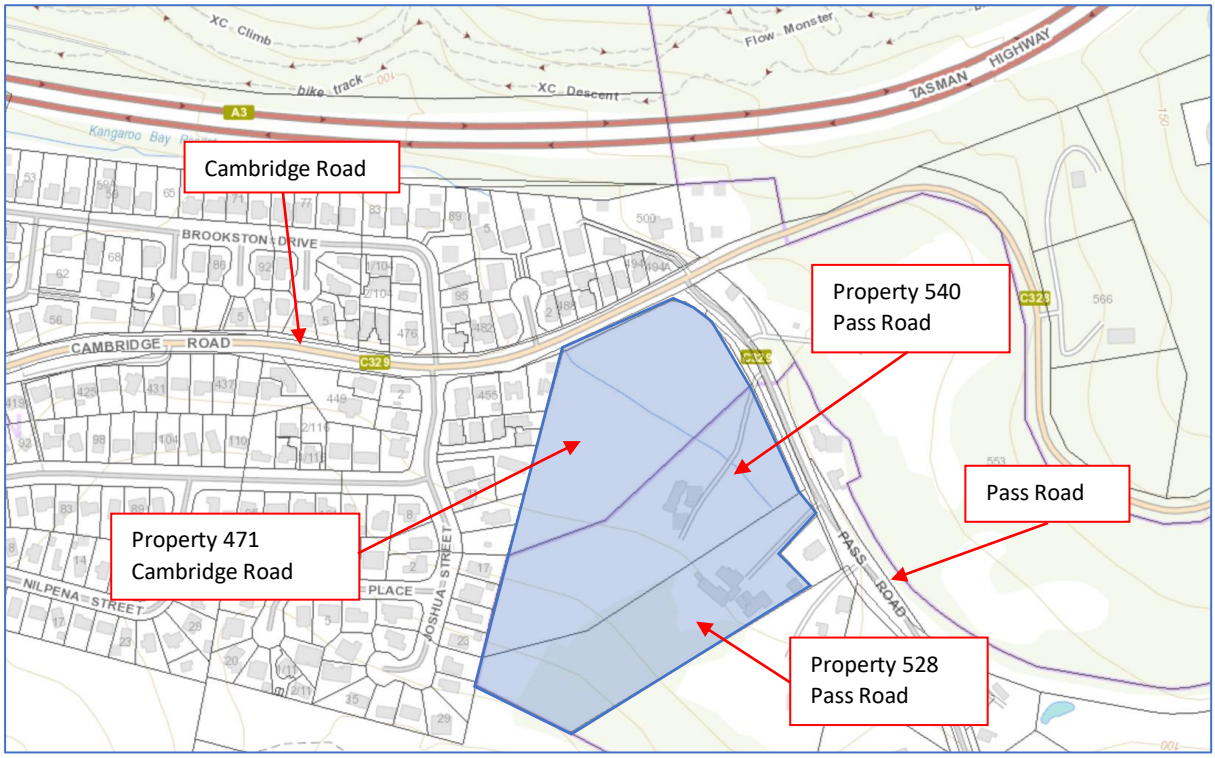
2. Site Description

The three parcels of land at 471 Cambridge Road, Mornington and, 528 and 540 Pass Road, Cambridge, will be combined into one parcel of land to form the development site. The land at Cambridge Road is undeveloped, and the existing buildings on the parcels of land at Pass Road will be demolished as part of the development. The parcels of land are situated on the southwest corner of the junction of Cambridge Road and Pass Road.

Along the western boundary and northern side separated by Cambridge Road, are established general residential dwellings. On the southern boundary there are rural residential properties, with the RSPCA Animal Centre occupying the land on the eastern side separated by Pass Road.

According to the LIST (Land Information Database) the parcels of land (development site) are zoned as rural living, and the developer has advised an application will be submitted to rezone the land to general residential. All parcels of land have an existing vehicular access to either Cambridge Road or Pass Road, which will be relocated to form the new junctions.

Diagram 2.0 – Extract from LIST Land Information Database



3. Development proposal

The development site will be general residential and contain 54 residential lots, plus five multiple unit lots that are likely to contain 58 units and one lot to contain six rooftop units located above commercial shops. In total the development site is expected to accommodate 118 residential dwellings/units, with a portion of these dwellings to be townhouses operating with a rear access lane.

The residential lots have been broken down into the following:

- 12 x 450 square metre lots which are suitable for single residential dwellings only, due to the natural topography of the land within this section,
- 17 x Type B lots which are suitable for single residential dwellings only,
- 25 x Type A lots which are suitable for single residential dwellings only,
- Two multiple unit lots to operate with a rear access lane consisting of small and medium townhouses,
- Three multiple unit lots, and
- Six two-bedroom rooftop units above commercial shops.

The residential development will be supported with a large open recreational area, with one future road connection to the adjacent property to the south. Two pedestrian links will be provided, with two lots reserved to form one link between roads 4 and 5, with one larger lot reserved at the cul-de-sac of road 1.

A 2,430 square metre lot is allocated for future commercial development, predicting traffic generation from this commercial lot is difficult without knowing the use, for the purpose of this traffic assessment this commercial lot has not been included, as a separate traffic impact assessment will be required to evaluate the traffic impact. On top of this future commercial building, residential units are expected to be built, at this stage the type and number is unknown, this assessment will assume there will be six two-bedroom units, for the purpose of estimating traffic movements.

The development site will be connected to the surrounding local road network, via a two-way junction onto Cambridge Road. A future road corridor to Pass Road will be preserved for a future two-way road connection, which is not required until the land south of the development site is developed.

Diagram 3.0 – Development proposal

4. Trip generation by this development

A trip in this report is defined as a one-way vehicular movement from one point to another, excluding the return journey. Therefore, a return trip to and from a land use is counted as two trips.

To determine the number of trips likely to be generated by this development, reference has been taken from the RTA Guide to Traffic Generating Developments (RTA Guide), section 3.3 residential housing. This Guide contains trip generation based on the type of dwelling, the number of bedrooms, with the following trip generation rates used for the three different types of residential dwelling:

Low density residential dwellings in regional areas (RTA update 4a - August 2013):

- Daily vehicle trips of 7.4 per dwelling and
- Weekday peak trips of 0.78 per dwelling

Medium density residential units, smaller units (up to two bedrooms):

- Daily vehicle trips of 5 per unit
- Weekday peak trips of 0.5 per unit

Large units or townhouses (three or more bedrooms):

- Daily vehicle trips of 6.5 per unit
- Weekday peak trips of 0.65 per unit

From the RTA Guide the 118 residential dwellings/units are estimated to generate 807 daily trips during a normal weekday, with 83 of these trips expected to occur during the morning and evening peak hour periods.

Table 4.0 – Predicted number of trips to be generated from the development

Dwelling Type	RTA Generation rate	Number of dwellings	Daily trips	Peak trips
Three-bedroom Townhouses	6.5 per day 0.65 per peak	58	377	38
Standalone dwelling	7.4 per day 0.78 per peak	54	400	42
Roof top two-bedroom units above commercial building	5 per day 0.5 per peak	6	30	3
Total		**118**	**807**	**83**

This trip assessment predicts a worst case scenario, with every townhouse considered to be a three bedroom townhouse. The smaller lots are designed for social housing, or small units, it is common for these types of properties to operate a single vehicle, so the actual trip generation is expected to be lower.

5. Existing traffic Conditions

Pass Road and Cambridge Road are managed by the Clarence City Council and within the surrounding road network both roads would operate as collector roads, connecting traffic flow between South Arm and Tasman Highways, which are part of the State Road Network.

5.1 Cambridge Road characteristics

Cambridge Road runs in a west to east direction, and the section west of Pass Road is constructed to a typical urban road standard, with sealed carriageway, concrete kerb and channel, formed footpath along the northern side, and street lighting. This urban road standard is consistent for the general residential development operating along the road.

Adjacent to the development site, the road has one traffic lane operating in each direction (3.2 metres wide) delineated by a separation centreline and edge lines. The space between the edge line is 1.6 metres wide and appears to be a protected space for cyclists, however there are no markings or signs to signify bicycle use along the southern lane, while there is a faded bicycle symbol at the start of the northern lane.

Site inspections found vehicles parking off-road, with vehicle parking along the road verge adjacent to the development site.

The road alignment west of Pass Road is reasonably straight on a gentle vertical rise towards Pass Road. There are posted 60 km/h speed limits signs operating along the road.

East of Pass Road, Cambridge Road continues for several kilometres, with roadside development either rural residential or undeveloped. The road standard changes to a rural road, with six metre wide sealed pavement. Traffic generated from this development is not expected to increase the traffic flows on this section of Cambridge Road and therefore has not been assessed.

Photograph 5.1 – Typical Cambridge Road standard

5.2 Pass Road characteristics

Pass Road has a rural road standard which is appropriate for the rural residential roadside development. The road has one traffic lane operating in each direction, six metre wide sealed pavement, gravel shoulders, painted centreline, and guideposts to provide delineation of alignment

Adjacent to the development site the road alignment is reasonably straight, while south of the existing access to 540 Pass Road there is a slight vertical crest. The severity of the vertical crest is moderate, as an approaching vehicle does not completely disappear, with the top half of the vehicle always visible.

Vehicular speeds pass the development site are moderated by 60 km/h speed limit signs.

Photograph 5.2 – Typical Pass Road standard

5.3 Junction of Cambridge and Pass Roads

The development site is bounded by Cambridge and Pass Roads, and it would be appropriate to consider the junction of these two roads. Pass Road intersects Cambridge Road at ninety degrees forming a standard T-junction, and the T-junction rule is reinforced with a give way sign and painted holding line.

The junction has an asphalt surface that is in good condition, with a traffic island within Pass Road separating the traffic lanes and moderating the speed of turning vehicles. There is no formal right turn lane on Cambridge Road which is considered appropriate, as most vehicles turn right into Pass Road, and the volume of vehicles traveling through the junction is relatively low.

The vertical grades through the junction are relatively gentle and the road alignment of Cambridge Road through the junction is straight.

Photograph 5.3 – Junction of Pass and Cambridge Roads

5.4 Available sight distance at the junction of Cambridge and Pass Roads

Austroads Guide to Road Design provides guidance on Safe Intersection Sight Distance (SISD), based on the speed environment, which specifies for a 60 km/h speed environment the recommended SISD is 114 metres. This is based on a driver reaction time of 1.5 seconds, and three seconds observation time, which is appropriate for an urban location.

Available sight distance was measured at the junction, based on the driver being 1.05 metres above the road surface, with approaching vehicles being 1.2 metres high. In both directions the available sight distance exceeds 125 metres, as shown in the following two photographs.

With the available sight distance exceeding 125 metres in both directions, there is sufficient sight distance for vehicles to turn at the junction in a safe and efficient manner, without causing adverse impact to other users.

Photograph 5.4A – Available sight distance to the left

Photograph 5.4B – Available sight distance to the right

5.5 Traffic activity on the surrounding road network

To evaluate the traffic impact from the development, it is important to understand the current traffic flow on Cambridge and Pass Roads. A recent manual traffic survey was undertaken at the junction during the two peak periods. From the survey data, peak hour for both the morning and evening periods has been extracted, with the peak hour flows shown in the diagrams below.

Diagram 5.5A – Morning peak hour traffic movements

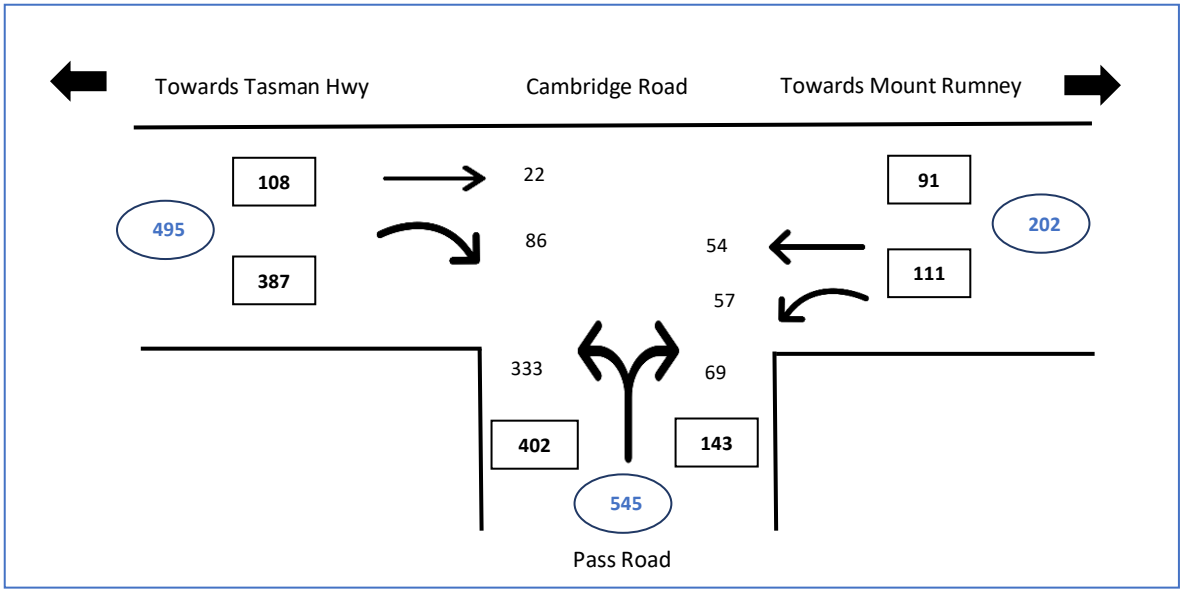
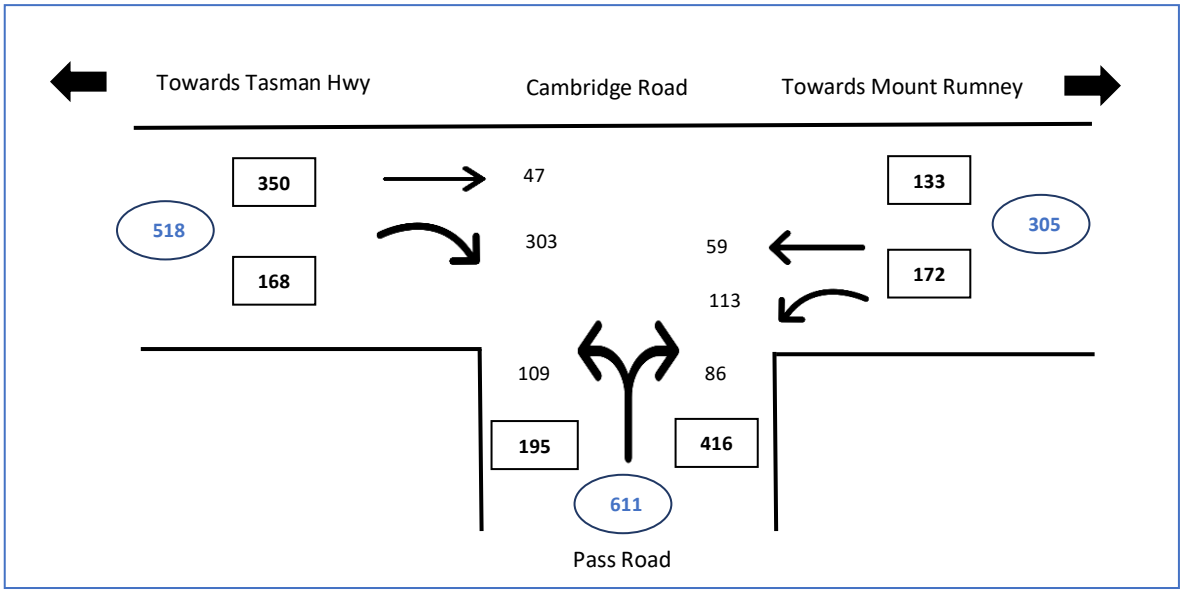


Diagram 5.5B – Evening peak hour traffic movements



5.6 Traffic safety on the roads near development site

The Department of State Growth maintains a database of reported road crashes, a check of this database found five crashes reported at the junction of Cambridge and Pass Roads. Four of these crashes involve rear-end collisions, resulting in one minor injury, with the other crashes resulting in property damage.

The other crash involved a single vehicle losing control and leaving the roadway, with the occupant receiving minor injury.

The number of crashes is not as important as the crash severity, with no person being seriously injured or killed, the crash performance is acceptable.

There have been no crashes reported on Cambridge Road or Pass Road adjacent to the development site, where the new junctions will be created.

6. Impact from traffic generated by this development

As determined by section 4 of this report, the development is estimated to generate up to 807 additional traffic movements per normal weekday, with 83 of these movements expected to occur during the morning and evening peak hour periods.

It is common with residential properties, that 90 percent of the trips leave the site during the morning peak, with the opposite occurring in the evening peak.

6.1 New two-way junction onto Cambridge Road

Most of the peak hour traffic flow generated by the development site is expected to travel to and from the Tasman Highway along Cambridge Road. Based on this assumption, it is appropriate for the development to create a new two-way junction onto Cambridge Road, replacing an unused driveway crossover, as shown in the photograph below. This new junction will be located as near as practicable to the western boundary, to generate separation from the Pass Road junction. The junction will be located between two existing property driveways on the opposite side of Cambridge Road, to minimise impact of turning vehicles.

The new junction will have sufficient road pavement to facilitate two-way turning, with kerb and channel to connect into the existing Cambridge Road infrastructure.

The new junction will intersect Cambridge Road at approximately ninety degrees, forming a T-Junction, and under the Australian Road Rules, vehicles must give-way when travelling on the terminating leg of the junction. However, it would be appropriate, given the significance of Cambridge Road, that a Give Way sign, supplemented by a holding line be provided.

Photograph 6.1 – Existing unused vehicular crossover to Cambridge Road

6.2 Need for turning treatments on Cambridge Road

The need for a dedicated turning treatment into the development site off Cambridge Road is considered unwarranted. While it is expected that the majority of traffic movements will be left-out and right-in, the number of traffic movements generated by the development is considered minor, with the traffic flows along Cambridge Road considered moderate.

Dedicated right turn lanes in urban areas are generally provided at side roads generating high traffic flows. There are many existing junctions along Cambridge Road that operate successfully and efficiently without dedicated right turn treatments, and this junction will be consistent with this level of treatment.

Opposite the development site are established residential dwellings, which limits the ability to provide for a dedicated turning facility at the Pass Road junction, with these same traffic conditions applying to the location of the proposed junction.

6.3 Sight distance at the new junction with Cambridge Road

With the development requiring the creation of a new junction with Cambridge Road, it is important that drivers leaving the development site have suitable sight distance to undertake turning manoeuvres in a safe manner, without impacting motorists travelling along Cambridge Road.

The available sight distance at the new junction was measured on-site, based on the driver being 1.05 metres above the road surface and the approaching vehicle being 1.2 metres high. In both directions available sight distance exceeds 150 metres as shown in the following two photographs. This means vehicles will be able to enter and leave the development site in a safe and efficient manner.

Photograph 6.3A – Available sight distance to the left (150 metres)

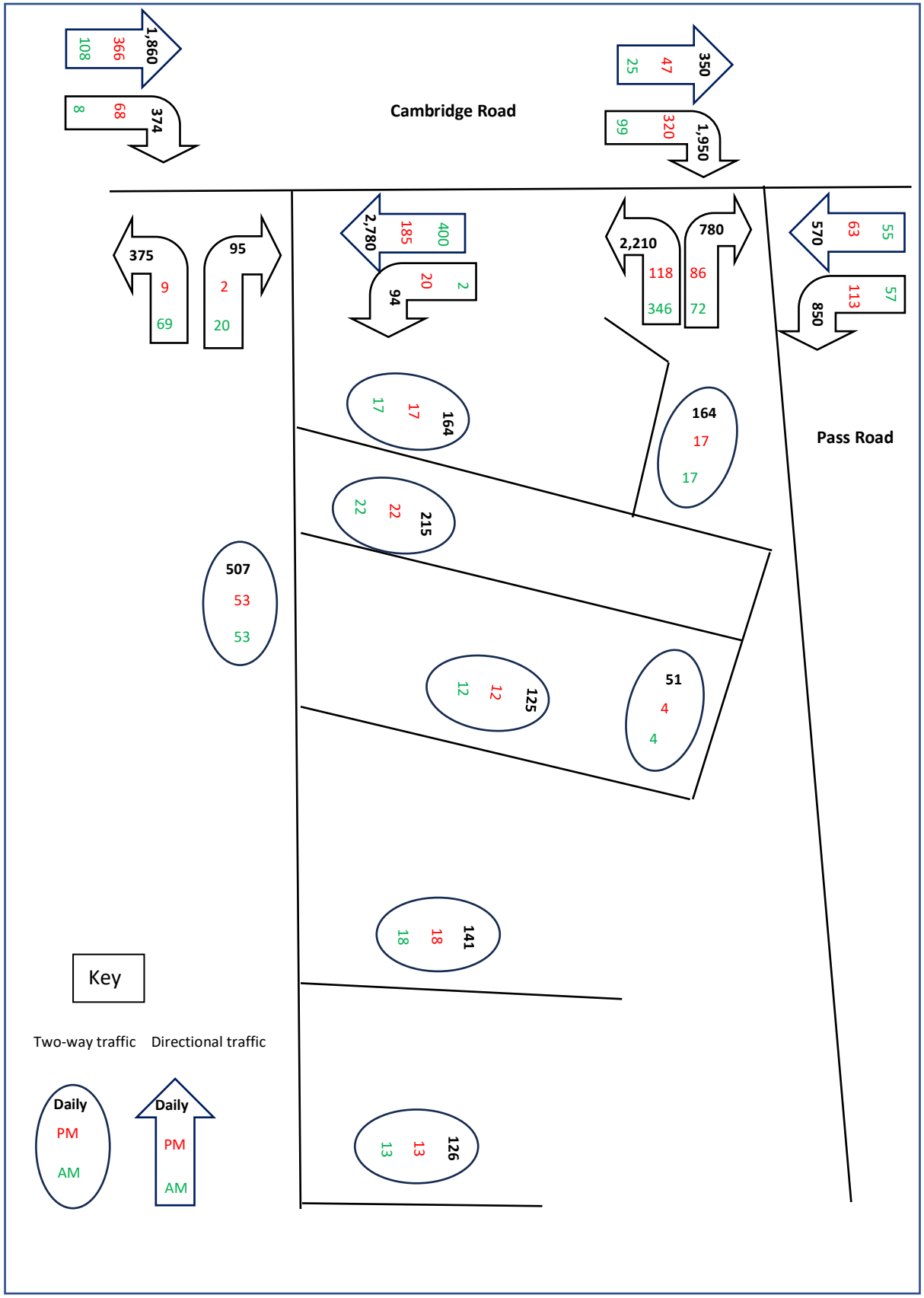
Photograph 6.3B – Available sight distance to the right (150 metres)

6.4 Assignment of trips generated by the development site

Trips from each of the lots have been assigned to the new internal roads, based on the location of the lot and the most direct route to the surrounding road network.

As previously stated, 90 percent of the trips are predicted to leave the site during the morning peak, with the opposite occurring in the evening peak. Assignment of trips is shown in the diagram below, with the diagram demonstrating the predicted two-way daily and peak hour flows, likely to be operating on the internal roads, and using the new junction onto Cambridge Road. This trip assignment will be used to evaluate and quantify the traffic impact on the surrounding road network.

Diagram 6.4 – Assignment of development trips



6.5 Traffic efficiency and impact from development

The simplest method to determine the traffic performance at a junction is to use SIDRA Intersection traffic modelling software, which uses gap acceptance theory to determine the average delay, queue lengths and degree of saturation, which are all measures of traffic congestion and level of service.

Level of Service (LOS) is a quantifiable assessment of the factors that contribute to the traffic performance, which includes traffic density, gaps in traffic streams, expected delays, and queues. For junctions, there are five levels from A to E, with A providing the highest level for give-way controlled junctions, meaning motorists are not incurring delays, with ample gaps in the traffic stream for vehicles to turn freely and safely without disrupting other users. The following table provides a reference to the level of service for the various traffic controls.

Diagram 6.5 Level of service for intersections based on RTA Guide

Table 4.2
Level of service criteria for intersections

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode

A traffic model has been developed within the SIDRA software to replicate the proposed new two-way junction with Cambridge Road. The model is based on the recent peak hour traffic flows and predicted trips generated by the development.

Traffic modelling predicts the junction will perform at LOS A during the morning and evening peak periods. This is the highest level of service possible for give way controls, with the modelling predicting virtually no traffic queues or delays. With the junction operating with DOS (degree of saturation) less than 0.24, it signifies there will be spare traffic capacity to accommodate future traffic growth.

The table below provides a summary of the modelling outcomes, demonstrating additional traffic generated by the development can access the surrounding road network, without adversely impacting the traffic performance.

Table 6.5 – Summary of traffic modelling

Period	Scenario	Total vehicles	DOS	Worst average delay	LOS	Max queue
Morning	Cambridge Rd	639	0.217	8 secs	A	2.4m
Evening	Cambridge Rd	649	0.238	8.3 secs	A	4.0m

6.6 Incremental traffic growth along the surrounding road network

This section evaluates the traffic performance of the new junctions, with incremental traffic growth occurring on the surrounding road network, at the rate of an additional two percent increase per year for ten years. SIDRA traffic modelling was used and predicts the two junctions to the development site will continue to provide an appropriate level of service for motorists. This demonstrates that the surrounding road network will not be adversely impacted with additional traffic generated from the development site.

Table 6.6 – Traffic modelling for incremental growth (2% per year for 10 years)

Period	Scenario	Total vehicles	DOS	Worst average delay	LOS	Max queue
Morning	Cambridge Rd	757	0.265	8.9 secs	A	2.7m
Evening	Cambridge Rd	789	0.281	9.2 secs	A	4.4m

6.7 Level of service for Cambridge

In evaluating the impact of additional vehicle movements on Cambridge and Pass Roads users, it is important to understand the Level of Service (LOS) motorists are currently receiving. The RTA Guide provides guidance for urban roads, based on peak hour directional traffic flows, as shown in the extract below.

Extract 6.7 – RTA Guide for level of service for urban roads

Urban road peak hour flows per direction

Level of Service	One Lane (veh/hr)	Two Lanes (veh/hr)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Based on the directional traffic flows obtained from the manual survey, the level of service of the traffic lanes can be determined by comparing the flows to the above RTA table. During the morning peak hour, the Cambridge Road eastbound traffic lane is currently operating at LOS A, while the westbound lane is operating at LOS B. During the evening peak hour, the eastbound lane is operating at LOS B, with the westbound operating at LOS A.

For Pass Road during the morning peak hour the southbound lane is operating at LOS A, and the northbound lane is operating at LOS C. In the evening peak hour, the southbound lane is operating at LOS C, and the northbound lane is operating at LOS A.

These levels of service are acceptable for collector roads during peak periods. The lowest level of service LOS C means the traffic flow is stable, while most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. Overall, the general level of comfort and convenience remains good.

Additional traffic generated by the development has been assigned to Cambridge and Pass Roads, with the table below comparing the level of service once the additional traffic is operating and demonstrating the level of service will not deteriorate.

Table 6.7 – Comparing level of service when the development is operating

	Cambridge Road				Pass Road			
	Morning		Afternoon		Morning		Afternoon	
	WB	EB	WB	EB	NB	SB	NB	SB
Directional flows	400	108	185	366	402	143	195	416
Level of service	C	A	A	B	C	A	A	C
Development traffic	477	130	262	388	404	163	205	418
Level of service	C	A	A	C	C	A	B	C

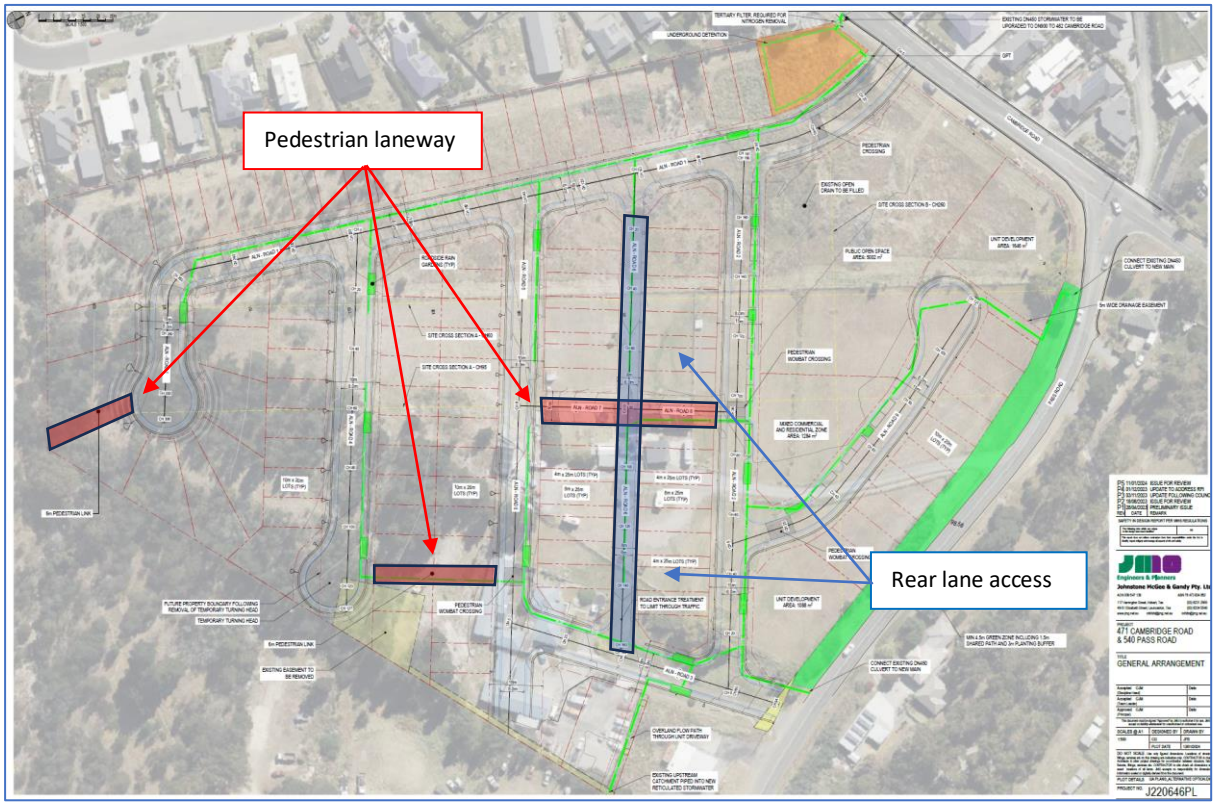
7. Subdivision layout and internal road arrangements

The principal access to the development site will be from Cambridge Road, with a new two-way junction created. The internal road layout will provide suitable connection between the residential properties and this new junction.

Townhouses will be incorporated into the design, with these dwellings operating with a rear laneway access that is highlighted in blue in the diagram below.

The development will incorporate an open recreational area, servicing both the development and the local community, and will be supported with dedicated car parking spaces. This recreational area is situated in close proximity to the townhouses and will be connected to all dwellings by appropriate footpaths. A dedicated pedestrian laneway (highlighted in red) will be providing connection to established walking trails at the rear of the property.

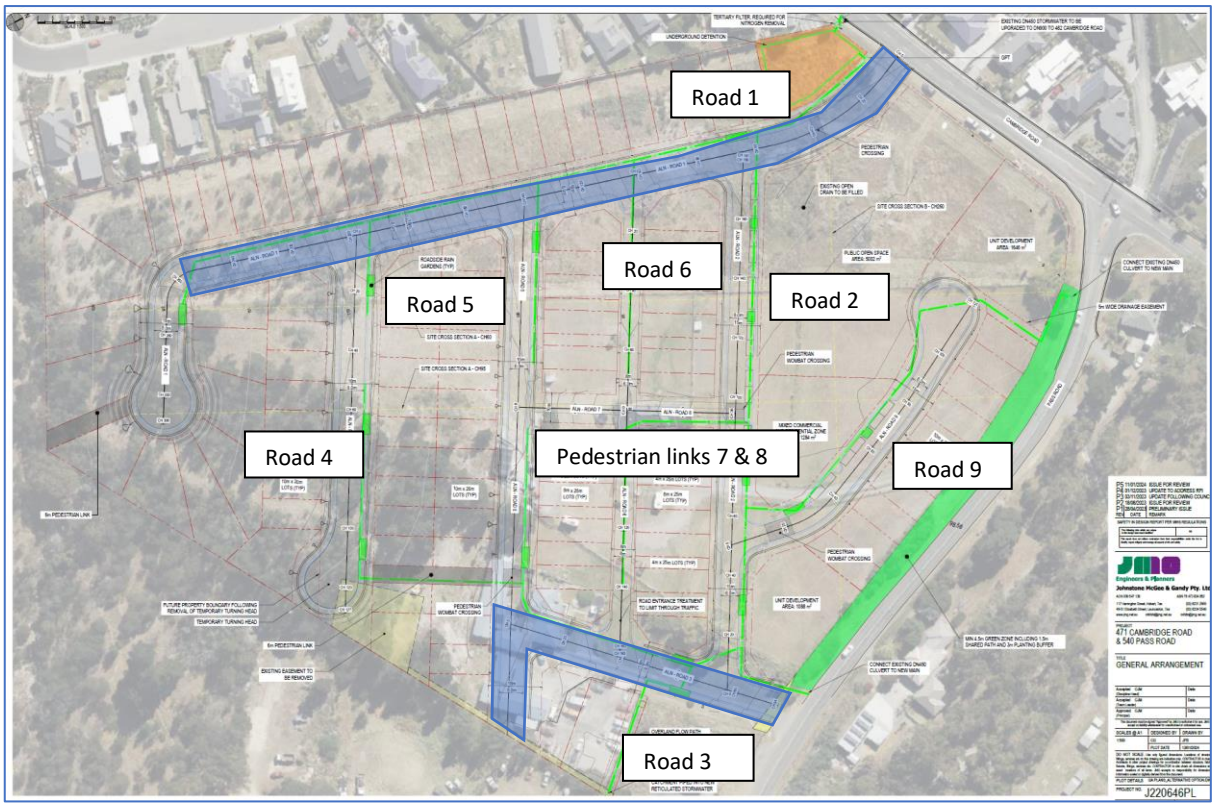
Diagram 7.0 – Development proposal



7.1 Subdivisional roads standard

The internal roads will be designed as urban roads complying with LGAT (Local Government Association of Tasmania) standard drawing TSD-R06-v1. The internal roads are labelled in the diagram below, with the roads highlighted in blue predicted to carry traffic from connecting roads, with these roads having a slightly higher standard in respect to road reservation and pavement width. Based on the predicted two-way traffic flows, the internal roads will be lightly trafficked.

Diagram 7.1 – Road layout based on the civil design



Roads labelled 1, 3, and the section of road 5 connecting to the neighbouring property, have the potential to carry traffic from a connecting road. These roads will have an 18 metre wide road corridor, with eight metre road pavement (lip to lip) to cater for slightly higher traffic flows.

The remaining roads will have a 15 metre wide road corridor, with six metre wide pavement (lip to lip). These roads will service the abutting properties and will be lightly trafficked, with the narrower road pavement minimising the risk of through traffic.

Road 6 will operate with a six metre wide road pavement, within an eight metre road reserve, to operate as a rear lane access only to the surrounding townhouses.

The table below is a summary of the proposed road standard, based on predicted traffic flow and road function for this development, and consideration to the connection with the neighbouring property.

Table 7.1 – Proposed standard of internal roads

Road	Predicted traffic flows		Function	Reservation width	Pavement width
	Daily	Peak hour			
Road 1	507	53	Traffic and access	18.0 m	8.0 m
Road 2	164	17	Property access	15.0 m	6.0 m
Road 3	51	4	Traffic and access	18.0 m	8.0 m
Road 4	146	18	Property access	18.0 m	8.0 m
Road 5	125	12	Property access	15.0 m	6.0 m
Road 5 (connection)			Traffic and Access	18.0 m	8.0 m
Road 6 (rear access lane)	125	22	Property access	8.0 m	6.0 m
Roads 7 and 8	Pedestrian link – no traffic				
Roads 9	164	17	Property access	15.0 m	6.0 m

7.2 Rear lane access to the townhouses

The design will include two rows of townhouses located on long narrow lots, with a single rear access lane to service the townhouses. At the front of the townhouses is the main entrance and front door, while the garage is located out of sight at the rear of the property and accessed from the rear access lane. This type of design can enhance the visual appearance of the street frontage, while maximising land yield.

The rear lane will be a minimum of six metres wide to accommodate two-way traffic, with sufficient width to accommodate manoeuvring behind the enclosed garages and to allow for waste collection to occur within the lane. The rear access lane is not a standard urban street and will be constructed as a shared zone, which will incorporate a range of traffic calming measures, including cobbled pavement and vertical displacement traffic humps to eliminate through traffic. Traffic signs signifying local traffic only will be provided at the beginning of the street and supplemented with 10 km/h shared speed zone signs.

From a traffic perspective a rear access lane can be designed to deliver suitable outcomes for the occupants of the townhouses, while meeting the road authority's functional requirements, without causing adverse traffic efficiency impacts. The rear laneway will only provide access to the surrounding townhouses and not provide any on-street parking.

A dedicated pedestrian link will be incorporated midway along the row of townhouses, to provide a suitable pedestrian connection between the townhouses and the recreation area.

7.3 Pedestrian pathways

All the urban streets will be provided with a concrete footpath along both sides of the streets, complying with LGAT standard drawings.

The pedestrian link (roads 7 and 8) will provide suitable connection between road 5 and the public open space. Due to the natural topography of the land, the pedestrian link will require relatively steep grades, not meeting accessible access grades and may require steps. Pedestrians requiring accessible grades will need to use the footpaths along the roads. A pedestrian wombat crossing will be provided between the pedestrian link and road 2, ensuring safe pedestrian movements between the link and public open space.

Two six metre wide pedestrian links will be provided between roads 4 and 5 and from the cul-de-sac on road 1 to improve pedestrian connectivity within the network, and connection to the established walking tracks.

7.4 Turning facilities

The road layout has been designed to allow for vehicles to circulate in a forward direction, and the three cul-de-sacs within the road layout will be provided with a circular turning head. Overall, all vehicles can enter, circulate, and leave the development site in a forward-driving direction.

7.5 On-site parking provisions

The residential lots will have direct access to the new internal roads, and expected to have suitable area to accommodate on-site parking. Many of the smaller lots are expected to accommodate social housing or small units, these tenants generally operate a single vehicle and only requires one on-site parking space. The surrounding roads will have sufficient width to accommodate on-street parking that will be available for visitors. Overall, there will be sufficient supply of on-street parking to meet the expected demand, eliminating overflow parking.

Around the edge of the open space area, indented parking bays will provide for visitor parking, minimising parking impact to the residential properties.

The units with access to the rear laneway will have enclosed garages with access to the laneway, with no parking expected within the laneway.

7.6 Junction layout with Cambridge Road

The new junction will intersect Cambridge Road at ninety degrees and form a T-Junction, where vehicles must give-way when travelling on the terminating leg of the junction under the Australian Road Rules. However, given the significance of Cambridge Road it would be appropriate to provide a Give Way sign supplemented by a holding line.

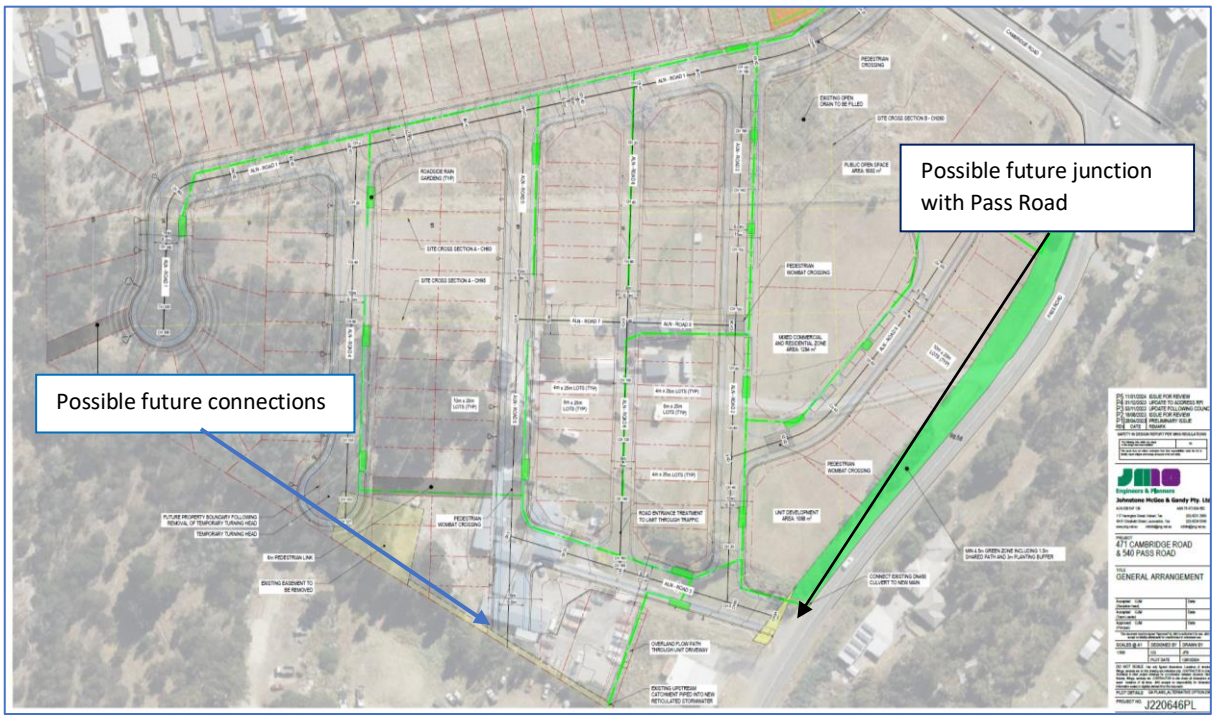
The junction will be design with sufficient road pavement to accommodate two-way traffic movements, with sufficient kerb radius to accommodate a medium rigid vehicle to turn into and out, without encroaching the centreline of Cambridge Road.

7.7 Future road connections

The road network incorporates one road connection to the neighbouring property to the south, to provide future road connection when the property is rezoned and developed. The design also preserves a future road connection to Pass Road, located near the southern boundary of the development site. From a traffic engineering perspective, this future road connection to Pass Road is only required once the neighbouring property generates additional traffic movements.

The road layout and pavement widths have been designed to encourage motorists from the future development to access Pass Road via Road 3, without travelling through the established residential network.

Diagram 7.7 – Future road connections

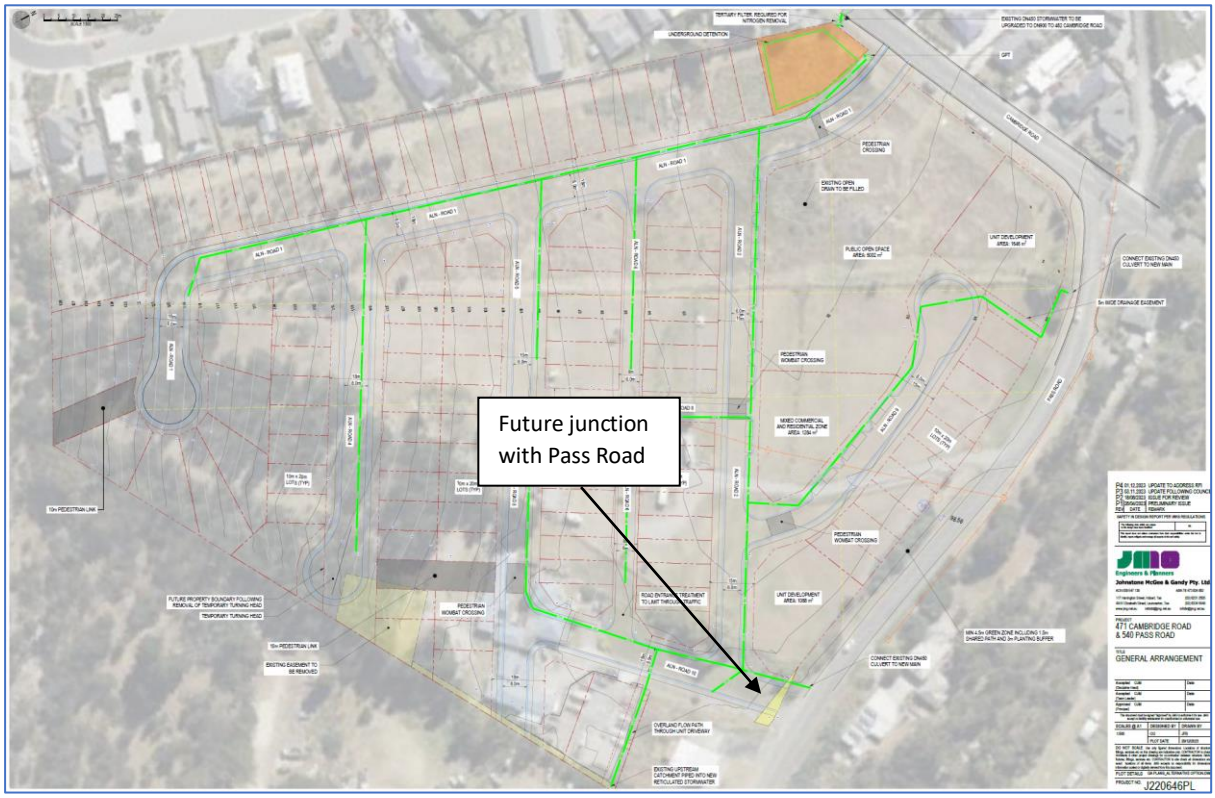


8. Future connection with Pass Road

As previously discussed, a future road corridor to Pass Road will be preserved for a future two-way road connection, which is not required until the land south of the development site is developed. The future two-way road connection will be an upgrade of the existing vehicular access for the property located at 528 Pass Road to a new junction.

This section will assess the suitability of the proposed new road connection onto Pass Road.

Diagram 8.0 – Future connection with Pass Road



8.1 Sight distance at the future junction with Pass Road

Once the adjacent property to the south is developed, a new junction onto Pass Road will be required, at a similar location where the current vehicular access to 528 Pass Road is located. It will be necessary that drivers using the new junction have suitable sight distance to undertake turning manoeuvres in a safe manner, without impacting motorists travelling along Pass Road.

The available sight distance at the new junction was measured on-site, based on the driver being 1.05 metres above the road surface and the approaching vehicle being 1.2 metres high. The available sight distance to the left is 136 metres and exceeding 150 metres to the right, with both distances exceeding the recommended required SISD of 114 metres. This means vehicles will be able to enter and leave the development site in a safe and efficient manner.

Photograph 8.1A – Available sight distance to the left (136 metres)

Photograph 8.1B – Available sight distance to the right (exceeding 150 metres)

8.2 Traffic impact and efficiency from future residential development

With the number of future residential dwellings unknown, it is important to consider a range of potential residential dwellings. This section will consider the impact on the future junction with Pass Road based on the potential of 50, 100 and 150 new residential dwellings. As this is a future connection, the existing traffic flows along Pass Road will be used with an incremental growth of two percent for 10 years.

The table below shows the number of peak hour trips based on the number of residential dwellings and the distribution of peak hour trips during the morning and evening periods.

Table 8.2A – Number of peak trips and distribution per residential dwellings

Number of dwellings	Morning peak trips			Evening peak trips		
	Total	Leaving	Arriving	Total	Leaving	Arriving
50	39	35	4	39	4	35
100	78	70	8	78	8	70
150	117	105	12	117	12	105

A traffic model was developed within the SIDRA software to replicate the proposed new two-way junction with Pass Road. The model is based on the recent peak hour traffic flows with an incremental growth of two percent for 10 years, and predicted trips generated by 50, 100 and 150 residential dwellings.

Traffic modelling predicts the junction will perform at LOS A during the morning and evening peak periods. This is the highest level of service possible for give way controls, with the modelling predicting virtually no traffic queues or delays. With the junction operating with DOS (degree of saturation) less than 0.325, it signifies there will be spare traffic capacity to accommodate future traffic growth.

Table 8.2B – Traffic modelling for future junction with Pass Road

Period	Scenario	Total vehicles	DOS	Worst average delay	LOS	Max queue
Morning peak hour	50 dwellings	703	0.252	8.7 secs	A	0.9m
	100 dwellings	742	0.253	8.9 secs	A	1.9m
	150 dwellings	781	0.255	9.0 secs	A	2.9m
Evening peak hour	50 dwellings	784	0.282	9.4 secs	A	2.0m
	100 dwellings	823	0.303	9.8 secs	A	3.9m
	150 dwellings	862	0.325	10.2 secs	A	5.9m

9. Planning scheme

9.1 C3.5.1 Traffic generation at a vehicle crossing, level crossing or new junction

The development will replace the unused access, creating a new two-way junction with Cambridge Road. The amount of traffic generated from the site will require the development to be assessed under the performance criteria P1, demonstrating the junctions can operate safely and efficiently.

Performance criteria	Assessment
To ensure that the safety and efficiency of roads is not reduced by the creation of a new access and junctions.	
a) Any increase in the traffic caused by the use;	The development of 54 residential lots, five multiple unit lots and six rooftop units is estimated to generate 807 daily vehicle movements, with 83 of these movements expected to occur during the morning and evening peak hour periods.
b) The nature and frequency of the traffic generated by the use;	The development is for residential living, with most vehicle movements to be generated by the development to be less than 5.5 metres in length, these types of vehicles are associated with urban residential living, and compatible with the existing vehicles using the surrounding local road network.
c) The nature of the road;	Within the surrounding road network, Cambridge Road between the development site and the Tasman Highway operates as a local urban collector, within an urban environment. The standard of Cambridge Road is appropriate to accommodate the increase in traffic movements, without causing adverse impact to other users. The majority of traffic movements generated, are expected to commute to and from the Tasman Highway using Cambridge Road. Pass Road operates as a rural collector road, connecting to the South Arm Highway. The increase in traffic using Pass Road is expected to be low, with the road standard suitable to accommodate the small increase. There will be adequate available sight distance at the new junctions to ensure vehicles can enter and leave in a safe and efficient manner.
d) The speed limit and traffic flow of the road;	The speed limit along both Cambridge and Pass Roads adjacent to the development site are posted at 60 km/h. Recent manual traffic surveys found that Cambridge Road is moderately trafficked with 495 two-way traffic movements in the morning peak hour and 518 two-way traffic movements in the evening peak. This assessment found there is sufficient spare traffic capacity on the surrounding roads to easily accommodate the increase in traffic generated by the development, without causing any adverse impact to traffic safety, or efficiency. Traffic modelling determined the new junctions providing access to the development site can operate in a safe and efficient manner, and there is spare traffic capacity for future traffic growth.

e) Any alternative access;	The proposed access arrangement is considered appropriate for the site and surrounding road network.
f) The need for the access or junction;	This development is expected to assist with meeting the shortage in residential housing accommodation.
g) Any traffic impact assessment; and	An independent traffic assessment found there was no reason for this development not to proceed.
h) Any written advice received from the road authority.	Aware of none.

9.2 C2 Parking and Sustainable Transport Code

C2.5.1 Car parking numbers.	Each residential lot will be of sufficient size to accommodate on-site parking facilities to meet the reasonable demand generated. Many of the smaller lots are expected to accommodate social housing or small units, tenants of these properties generally only operate one vehicle and only require one parking space. The surrounding roads will have sufficient pavement width to accommodate on-street parking for visitors. Surrounding the public open space, indented parking spaces will be provided for visitors, minimising parking impact to residential properties. Overall, the supply of parking is expected to meet the reasonable demand, eliminating parking overflow.
C2.5.2 Bicycle parking numbers.	Not applicable for residential subdivision.
C2.5.3 Motorcycle parking numbers.	Not applicable for residential subdivision.
C2.5.4 Loading bays.	While loading bays are not applicable for a residential subdivision, the subdivisional road will have sufficient width to accommodate commercial vehicles, including waste collection and fire emergency vehicles.
C2.5.5 Number of car parking spaces within the General Residential Zone and Inner Residential Zone.	Not applicable for residential subdivision.

10. Conclusion

From a traffic engineering and road safety perspective, additional traffic generated from this development site is not expected to create any adverse safety, amenity, or traffic efficiency problems, as:

- the amount of traffic generated by the development is considered minor, and there is sufficient spare capacity within the current road network to absorb the extra traffic movements,
- the new junction with Cambridge Road and future Pass Road junction will have sufficient Safe Intersection Sight Distance complying with Austroads requirements, allowing vehicles to enter and leave in a safe and efficient manner,
- traffic modelling predicts that the new junction with Cambridge Road, and future Pass Road junction will operate at appropriate level of service for a give way control, and no deterioration in the level of traffic efficiency on the surrounding roads is expected.

This Traffic Impact Assessment found no reason for this development not to proceed.

11. Appendix A – Traffic modelling

Traffic modelling for Cambridge Road access – Morning peak hour

MOVEMENT SUMMARY

Site: 101 [Cambridge Road with development site - morning peak hour]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Deevelopment site								
1	L2	73	0.0	0.094	7.1	LOS A	0.3	2.4
3	R2	21	0.0	0.094	8.0	LOS A	0.3	2.4
Approach		94	0.0	0.094	7.3	LOS A	0.3	2.4
East: Cambridge Rd (Pass Rd)								
4	L2	2	0.0	0.217	5.6	LOS A	0.0	0.0
5	T1	421	0.0	0.217	0.0	LOS A	0.0	0.0
Approach		423	0.0	0.217	0.1	NA	0.0	0.0
West: Cambridge Rd (Morington)								
11	T1	114	0.0	0.066	0.2	LOS A	0.1	0.5
12	R2	8	0.0	0.066	7.1	LOS A	0.1	0.5
Approach		122	0.0	0.066	0.7	NA	0.1	0.5
All Vehicles		639	0.0	0.217	1.2	NA	0.3	2.4

Traffic modelling for morning peak with 2% incremental growth

MOVEMENT SUMMARY

Site: 101 [Cambridge Road morning peak hour - Incremental growth 2% pa 10 y

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	G
South: Deevelopment site									
1	L2	73	0.0	0.106	7.7	LOS A	0.4	2.7	
3	R2	21	0.0	0.106	8.9	LOS A	0.4	2.7	
Approach		94	0.0	0.106	7.9	LOS A	0.4	2.7	
East: Cambridge Rd (Pass Rd)									
4	L2	2	0.0	0.265	5.6	LOS A	0.0	0.0	
5	T1	514	0.0	0.265	0.0	LOS A	0.0	0.0	
Approach		516	0.0	0.265	0.1	NA	0.0	0.0	
West: Cambridge Rd (Morington)									
11	T1	139	0.0	0.079	0.2	LOS A	0.1	0.6	
12	R2	8	0.0	0.079	7.6	LOS A	0.1	0.6	
Approach		147	0.0	0.079	0.6	NA	0.1	0.6	
All Vehicles		757	0.0	0.265	1.1	NA	0.4	2.7	

Traffic modelling for Cambridge Road access – Evening peak hour

MOVEMENT SUMMARY

Site: 101 [Cambridge Road with development site - evening peak hour]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Deevelopment site								
1	L2	9	0.0	0.010	6.0	LOS A	0.0	0.2
3	R2	2	0.0	0.010	8.3	LOS A	0.0	0.2
Approach		12	0.0	0.010	6.4	LOS A	0.0	0.2
East: Cambridge Rd (Pass Rd)								
4	L2	21	0.0	0.102	5.6	LOS A	0.0	0.0
5	T1	177	0.0	0.102	0.0	LOS A	0.0	0.0
Approach		198	0.0	0.102	0.6	NA	0.0	0.0
West: Cambridge Rd (Morington)								
11	T1	368	0.0	0.238	0.2	LOS A	0.6	4.0
12	R2	72	0.0	0.238	6.2	LOS A	0.6	4.0
Approach		440	0.0	0.238	1.2	NA	0.6	4.0
All Vehicles		649	0.0	0.238	1.1	NA	0.6	4.0

Traffic modelling for evening peak with 2% incremental growth

MOVEMENT SUMMARY

Site: 101 [Cambridge Road- evening peak hour - Incremental growth 2% pa 10

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Deevelopment site								
1	L2	9	0.0	0.011	6.2	LOS A	0.0	0.3
3	R2	2	0.0	0.011	9.2	LOS A	0.0	0.3
Approach		12	0.0	0.011	6.7	LOS A	0.0	0.3
East: Cambridge Rd (Pass Rd)								
4	L2	21	0.0	0.122	5.6	LOS A	0.0	0.0
5	T1	216	0.0	0.122	0.0	LOS A	0.0	0.0
Approach		237	0.0	0.122	0.5	NA	0.0	0.0
West: Cambridge Rd (Morington)								
11	T1	449	0.0	0.281	0.2	LOS A	0.6	4.4
12	R2	72	0.0	0.281	6.5	LOS A	0.6	4.4
Approach		521	0.0	0.281	1.1	NA	0.6	4.4
All Vehicles		769	0.0	0.281	1.0	NA	0.6	4.4

Traffic modelling for Pass Road future connection with 50 dwellings – Morning peak hour

MOVEMENT SUMMARY

Site: 101 [Pass Road - future access - Morning peak with 50 dwellings]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Future road								
1	L2	32	0.0	0.036	7.4	LOS A	0.1	0.9
3	R2	3	0.0	0.036	8.7	LOS A	0.1	0.9
Approach		35	0.0	0.036	7.5	LOS A	0.1	0.9
East: Pass Road (Howrah)								
4	L2	2	0.0	0.252	5.6	LOS A	0.0	0.0
5	T1	490	0.0	0.252	0.0	LOS A	0.0	0.0
Approach		492	0.0	0.252	0.1	NA	0.0	0.0
West: Pass Road (Cambridge)								
11	T1	174	0.0	0.091	0.0	LOS A	0.0	0.2
12	R2	2	0.0	0.091	7.5	LOS A	0.0	0.2
Approach		176	0.0	0.091	0.1	NA	0.0	0.2
All Vehicles		703	0.0	0.252	0.4	NA	0.1	0.9

Traffic modelling for Pass Road future connection with 50 dwellings – Evening peak hour

MOVEMENT SUMMARY

Site: 101 [Pass Road - future access - Evening peak with 50 dwellings]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Future road								
1	L2	2	0.0	0.005	6.2	LOS A	0.0	0.1
3	R2	2	0.0	0.005	9.4	LOS A	0.0	0.1
Approach		4	0.0	0.005	7.8	LOS A	0.0	0.1
East: Pass Road (Howrah)								
4	L2	5	0.0	0.125	5.6	LOS A	0.0	0.0
5	T1	238	0.0	0.125	0.0	LOS A	0.0	0.0
Approach		243	0.0	0.125	0.1	NA	0.0	0.0
West: Pass Road (Cambridge)								
11	T1	507	0.0	0.282	0.1	LOS A	0.3	2.0
12	R2	30	0.0	0.282	6.5	LOS A	0.3	2.0
Approach		537	0.0	0.282	0.5	NA	0.3	2.0
All Vehicles		784	0.0	0.282	0.4	NA	0.3	2.0

Traffic modelling for Pass Road future connection with 100 dwellings – Morning peak hour

MOVEMENT SUMMARY

Site: 101 [Pass Road - future access - Morning peak with 100 dwellings]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Future road								
1	L2	64	0.0	0.073	7.5	LOS A	0.3	1.9
3	R2	6	0.0	0.073	8.9	LOS A	0.3	1.9
Approach		70	0.0	0.073	7.6	LOS A	0.3	1.9
East: Pass Road (Howrah)								
4	L2	4	0.0	0.253	5.6	LOS A	0.0	0.0
5	T1	490	0.0	0.253	0.0	LOS A	0.0	0.0
Approach		494	0.0	0.253	0.1	NA	0.0	0.0
West: Pass Road (Cambridge)								
11	T1	174	0.0	0.093	0.1	LOS A	0.0	0.3
12	R2	4	0.0	0.093	7.5	LOS A	0.0	0.3
Approach		178	0.0	0.093	0.2	NA	0.0	0.3
All Vehicles		742	0.0	0.253	0.8	NA	0.3	1.9

Traffic modelling for Pass Road future connection with 100 dwellings – Evening peak hour

MOVEMENT SUMMARY

Site: 101 [Pass Road - future access - Evening peak with 100 dwellings]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Future road								
1	L2	4	0.0	0.010	6.2	LOS A	0.0	0.2
3	R2	4	0.0	0.010	9.8	LOS A	0.0	0.2
Approach		8	0.0	0.010	8.0	LOS A	0.0	0.2
East: Pass Road (Howrah)								
4	L2	10	0.0	0.127	5.6	LOS A	0.0	0.0
5	T1	238	0.0	0.127	0.0	LOS A	0.0	0.0
Approach		248	0.0	0.127	0.2	NA	0.0	0.0
West: Pass Road (Cambridge)								
11	T1	507	0.0	0.303	0.2	LOS A	0.6	3.9
12	R2	60	0.0	0.303	6.6	LOS A	0.6	3.9
Approach		567	0.0	0.303	0.9	NA	0.6	3.9
All Vehicles		823	0.0	0.303	0.7	NA	0.6	3.9

Traffic modelling for Pass Road future connection with 150 dwellings – Morning peak hour

MOVEMENT SUMMARY

Site: 101 [Pass Road - future access - Morning peak with 150 dwellings]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Future road								
1	L2	96	0.0	0.109	7.5	LOS A	0.4	2.9
3	R2	9	0.0	0.109	9.0	LOS A	0.4	2.9
Approach		105	0.0	0.109	7.7	LOS A	0.4	2.9
East: Pass Road (Howrah)								
4	L2	6	0.0	0.255	5.6	LOS A	0.0	0.0
5	T1	490	0.0	0.255	0.0	LOS A	0.0	0.0
Approach		496	0.0	0.255	0.1	NA	0.0	0.0
West: Pass Road (Cambridge)								
11	T1	174	0.0	0.095	0.1	LOS A	0.1	0.5
12	R2	6	0.0	0.095	7.5	LOS A	0.1	0.5
Approach		180	0.0	0.095	0.4	NA	0.1	0.5
All Vehicles		781	0.0	0.255	1.2	NA	0.4	2.9

Traffic modelling for Pass Road future connection with 150 dwellings – Evening peak hour

MOVEMENT SUMMARY

Site: 101 [Pass Road - future access - Evening peak with 150 dwellings]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Future road								
1	L2	6	0.0	0.016	6.2	LOS A	0.1	0.4
3	R2	6	0.0	0.016	10.2	LOS B	0.1	0.4
Approach		12	0.0	0.016	8.2	LOS A	0.1	0.4
East: Pass Road (Howrah)								
4	L2	15	0.0	0.130	5.6	LOS A	0.0	0.0
5	T1	238	0.0	0.130	0.0	LOS A	0.0	0.0
Approach		253	0.0	0.130	0.3	NA	0.0	0.0
West: Pass Road (Cambridge)								
11	T1	507	0.0	0.325	0.3	LOS A	0.8	5.9
12	R2	90	0.0	0.325	6.6	LOS A	0.8	5.9
Approach		597	0.0	0.325	1.2	NA	0.8	5.9
All Vehicles		862	0.0	0.325	1.1	NA	0.8	5.9