

Traffic Impact Assessment – Proposed Planning Scheme Amendment

Manzeene Village, Lara

CG120293

Prepared for
Manzeene Avenue Development Project Trust
Pty Ltd

4 December 2012



Document Information

Prepared for Manzeene Avenue Development Project Trust Pty Ltd
Project Name Manzeene Village, Lara
File Reference CG120293REP001D03.docx
Job Reference CG120293
Date 4 December 2012

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Document Control

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1 Introduction

Cardno has been engaged by Manzeene Avenue Development Project Trust Pty Ltd to undertake a traffic engineering assessment of the proposed rezoning of a parcel of land on the east side of O'Hallorans Road in Lara, from Rural Living to Residential 1 and Business 1 zone. A Development Plan Overlay is proposed for the site, which will provide planning guidelines for its future development.

In the course of preparing this report, the subject site and its environs have been inspected, and plans of the proposal and relevant background information has been examined.

Figure 2-2 Lara Structure Plan

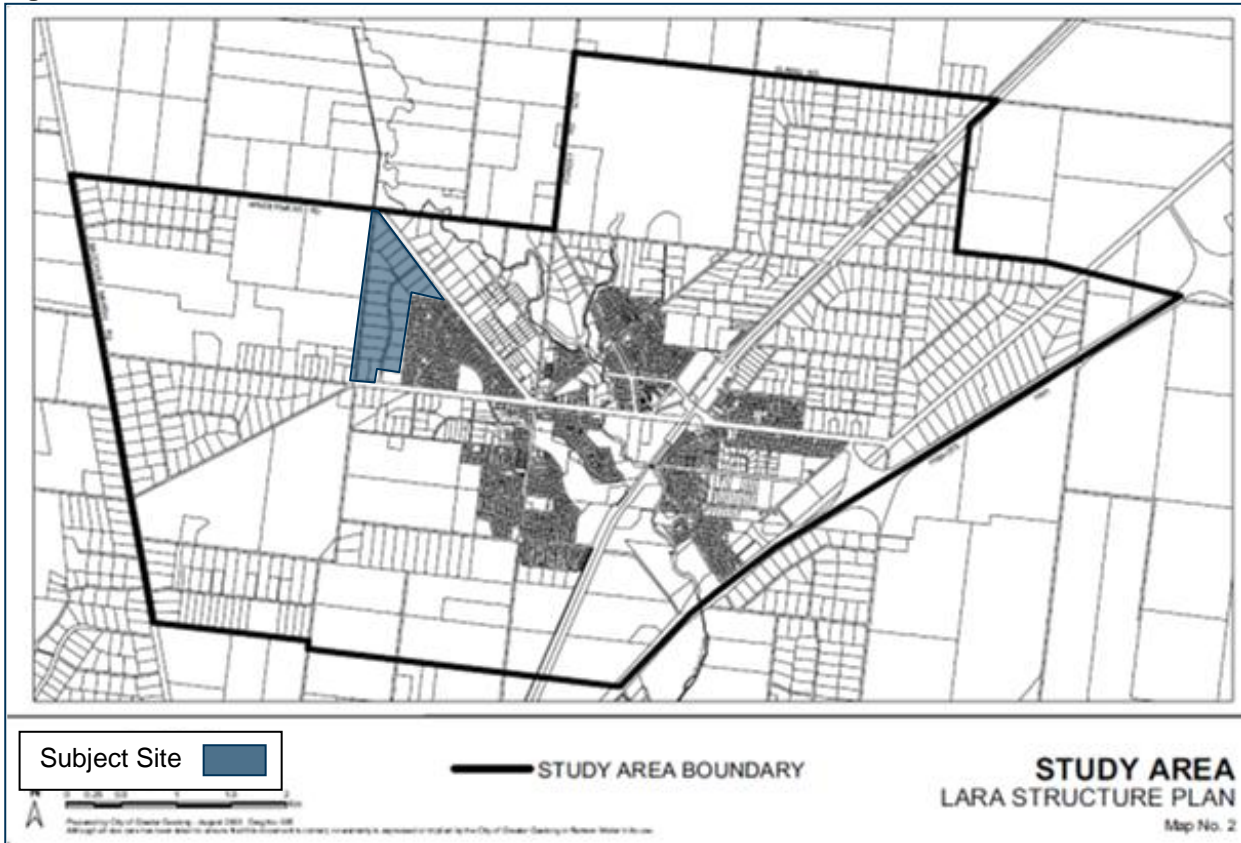
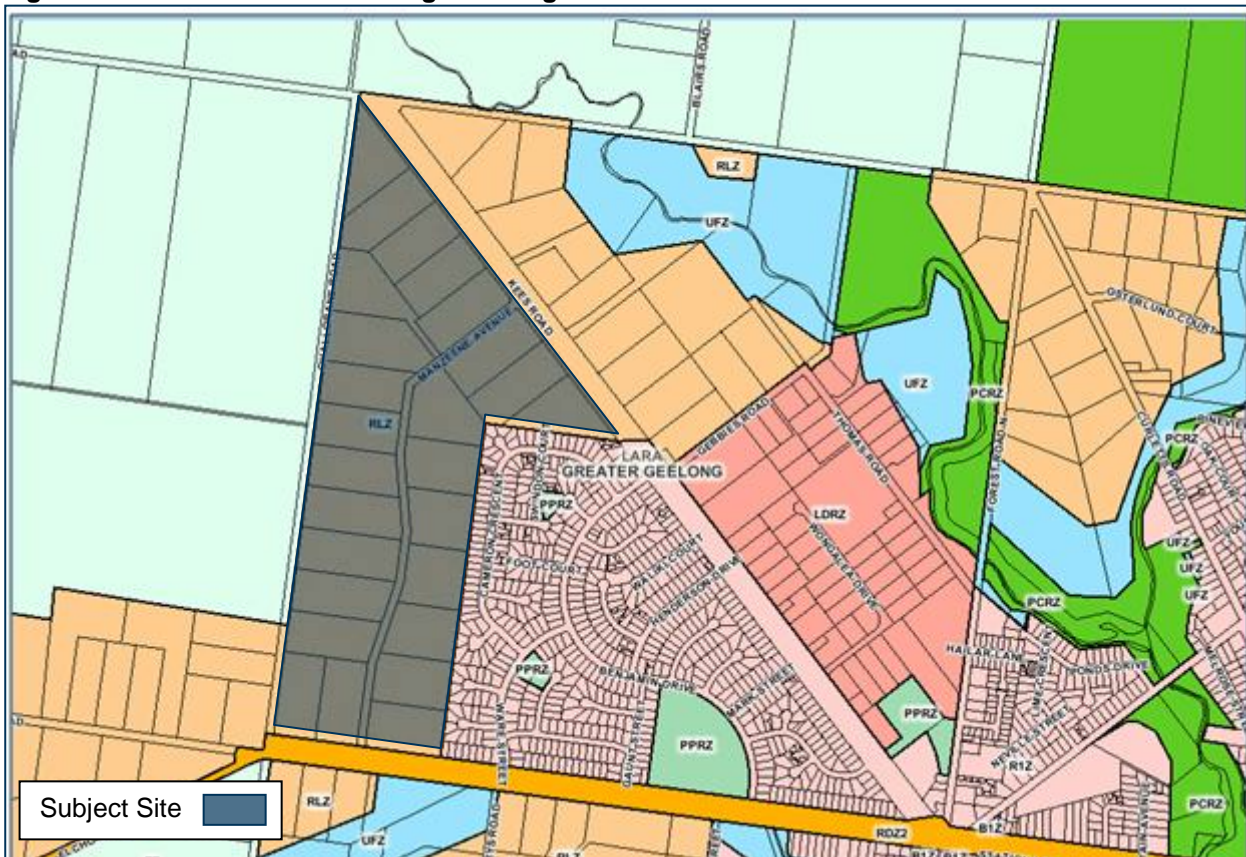


Figure 2-3 shows the location of the site and the current Greater Geelong Planning Scheme Zones.

Figure 2-3 Greater Geelong Planning Scheme Zones



2.2 Road Network

2.2.1 Manzeene Avenue

Manzeene Avenue is generally aligned in a north-south direction, and provides a connection between Kees Road in the north and Patullos Road in the south. Manzeene Avenue splits the subject site and has a pavement width of approximately 6 metres and operates as a single carriageway providing for one traffic lane in each direction, within a 20 metre road reserve.

Manzeene Avenue looking north from Patullos Road is shown in Figure 2-4.

Figure 2-4 Manzeene Avenue looking north from Patullos Road



2.2.2 Patullos Road

Patullos Road is a local road between Bacchus Marsh Road and Elcho Road. To the east of Elcho Road along the frontage of the site, Patullos Road is classified as a major road and provides for a single lane of traffic in each direction within a wide road reserve.

In the vicinity of the subject land, Patullos Road comprises a sealed pavement of approximately 7.5 metres, within a large road reserve of approximately 62 metres. A speed limit of 80km/h applies on Patullos Road at the frontage of the subject site.

Patullos Road looking east from Manzeene Avenue and O'Hallorans Road is shown in Figure 2-5 and Figure 2-6.

Figure 2-5 Patullos Road looking east from Manzeene Avenue



Figure 2-6 Patullos Road looking east from O'Hallorans Road



2.2.3 Kees Road

Kees Road is a local road connecting Windermere Road in the north and Patullos Road in the south. In the vicinity of the subject land, Kees Road comprises a sealed pavement of approximately 3.4 metres, within a large road reserve of approximately 64 metres.

Discussion with Council indicates that this section of Kees Road is proposed to be widened in the near future to provide 1 traffic lane in each direction.

Towards the southern end of Patullos Road, Kees Road widens to provide 1 traffic lane in each direction and a service road which provides direct access to adjoining lots. This leaves a significant verge between the service road and the main carriageway.

Kees Road along the frontage of the site is shown in Figure 2-7.

Figure 2-7 Kees Road looking east from the subject site



2.2.4 Windermere Road

Windermere Road is a collector road providing access from Bacchus Marsh Road in the west through to Mill Road in the east.

In the vicinity of the subject land, Windermere Road has a sealed pavement of approximately 7 metres providing 1 trafficable lane in each direction within a 20 metre road reserve.

Windermere Road along the frontage of the site is shown in Figure 2-8.

Figure 2-8 Windermere Road looking east from the subject site



2.2.5 O'Hallorans Road

O'Hallorans Road is an unsealed rural road, connecting Windermere Road in the north and Canterbury Road west in the south, from where it continues as Minyip Road to Bacchus Marsh Road. In the vicinity of the subject land, O'Hallorans Road has a gravel road of approximately 6 metres providing 1 lane in each direction, within a 20 metre road reserve.

It is understood that as part of the Lara West Growth Area, it is proposed to upgrade O'Hallorans Road, and the intersection of Patullos Road and O'Hallorans Road is to be controlled by a traffic signals.

Figure 2-9 O'Hallorans Road looking south from Windermere Road



2.3 Public Transport

The site has reasonable access to public transport with a bus route operating on Patullos Road within walking distance from the site. This bus service is listed in Table 2-1 and the bus routes are illustrated in Figure 2-10.

Table 2-1 Available Public Transport Services

Service	Route No	Nearest Stop	Route
Bus	12	Patullos Road	Geelong City - Lara

It is also noted that the subject site is located within the study area of the G21 Integrated Public Transport Strategy, which has identified improvements to the Route 12 bus service. These improvements include providing morning and afternoon peak service to Lara, and expand services to cater for residential growth areas.

Figure 2-10 Geelong Bus Routes



In addition to the bus service detailed above, the site is located approximately 3km to the west of the Lara Railway Station which provides access to a number of V/Line railway services. Travel times between Lara and Geelong generally is less than 18 minutes, whilst travel times between Lara and Melbourne is approximately 1 hour.

3 Lara West Growth Area

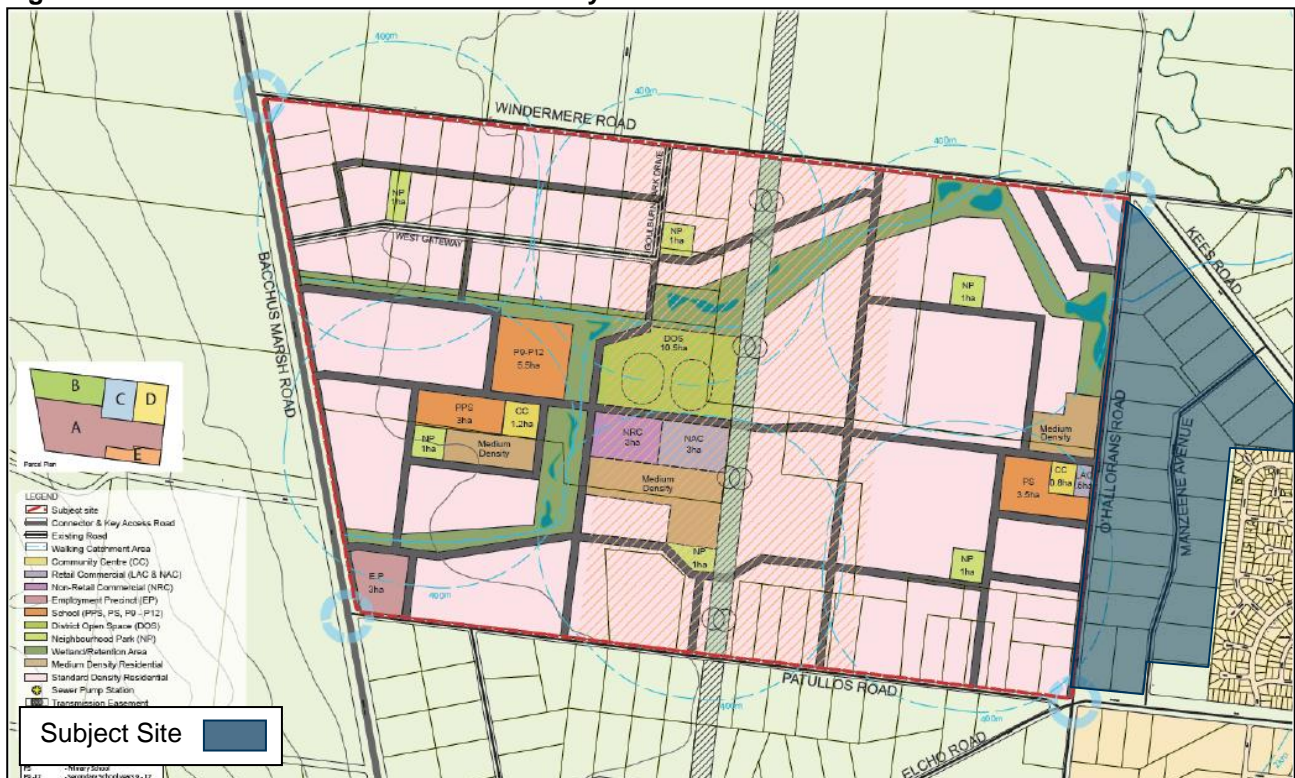
3.1 General

Land to the west of the subject site opposite O'Hallorans Road is also known as the Lara West Growth Area, which covers approximately 380 hectares. The preliminary urban structure plan prepared for this land indicates that it would include up to 4,000 residential lots, with a range of community and commercial facilities including local neighbourhood activity centres, employment precincts, primary and private schools and recreational areas.

On 28 August 2012, Greater Geelong City resolved to support the preparation and exhibition of Amendment C246 to the Greater Geelong Planning Scheme for the rezoning of the Lara West Growth Area.

Access to the Lara West Growth Area is proposed via the site frontages along O'Hallorans Road, Windermere Road, Patullos Road and Bacchus Marsh Road, as shown in Figure 3-1.

Figure 3-1 Lara West Growth Area Preliminary Urban Structure Plan



3.2 Lara West Growth Area Traffic Volumes

A traffic report was prepared by O'Brien Traffic (dated 12 June 2012) for the development of the Lara West Growth Area, and included detailed survey results of peak hour turning movement counts in the vicinity of the subject site on Wednesday 4 May 2011 between 7am-9:30am and 4:30pm-7pm.

The location of the traffic surveys is illustrated in Figure 3-2, with the detailed survey results on Windermere Road and Elcho Road shown in Figure 3-3 to Figure 3-6.

Figure 3-2 Locations of Turning Movement Counts

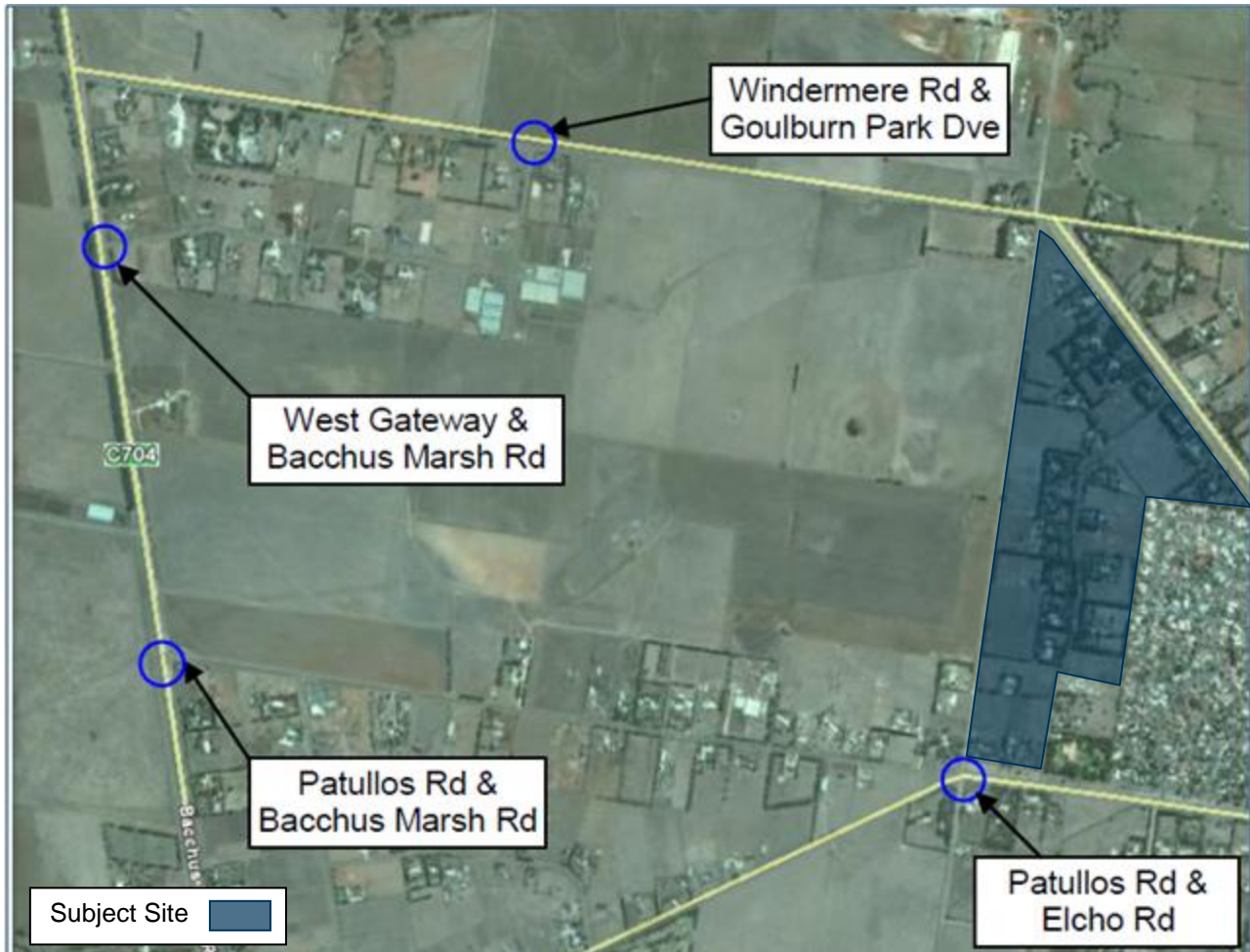


Figure 3-3 Windermere Road and Goulburn Park Drive (AM Peak hour: 7:15am-8:15am)

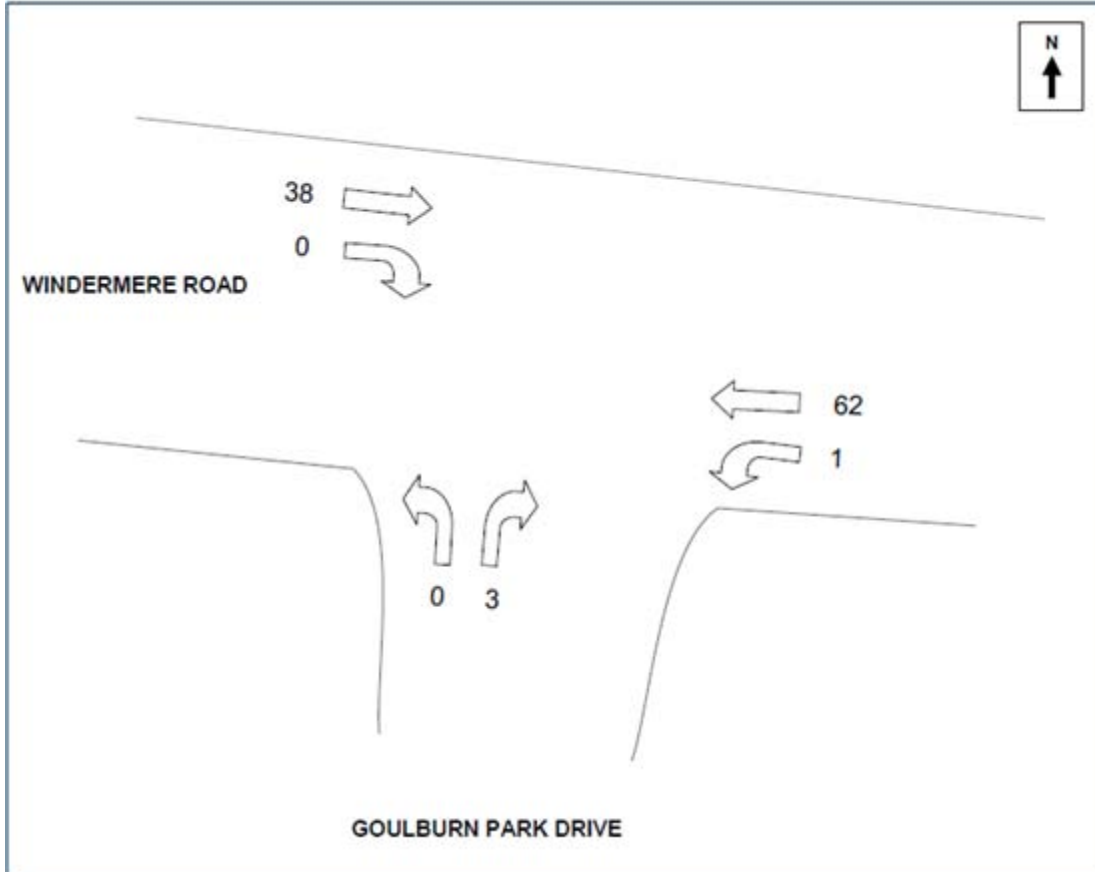


Figure 3-4 Windermere Road and Goulburn Park Drive (PM Peak hour: 4:30am-5:30am)

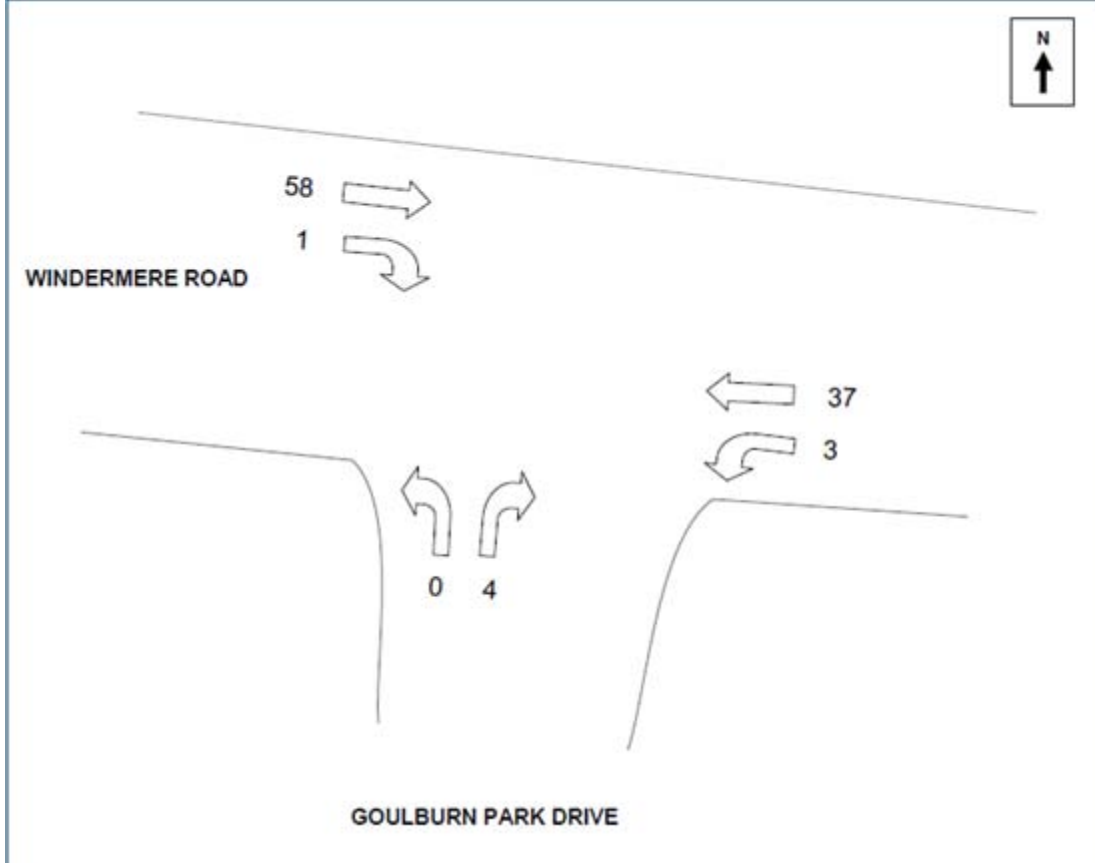


Figure 3-5 Patullos Road and Elcho Road (AM Peak hour: 8am-9am)

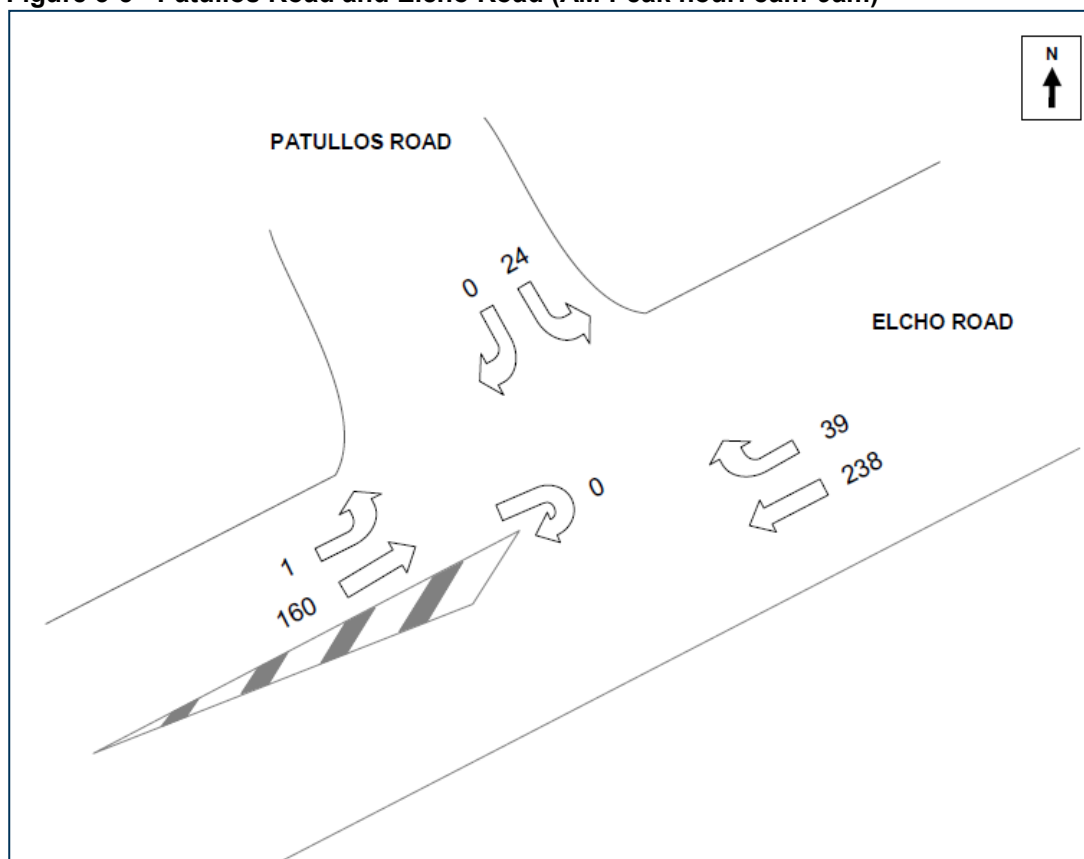
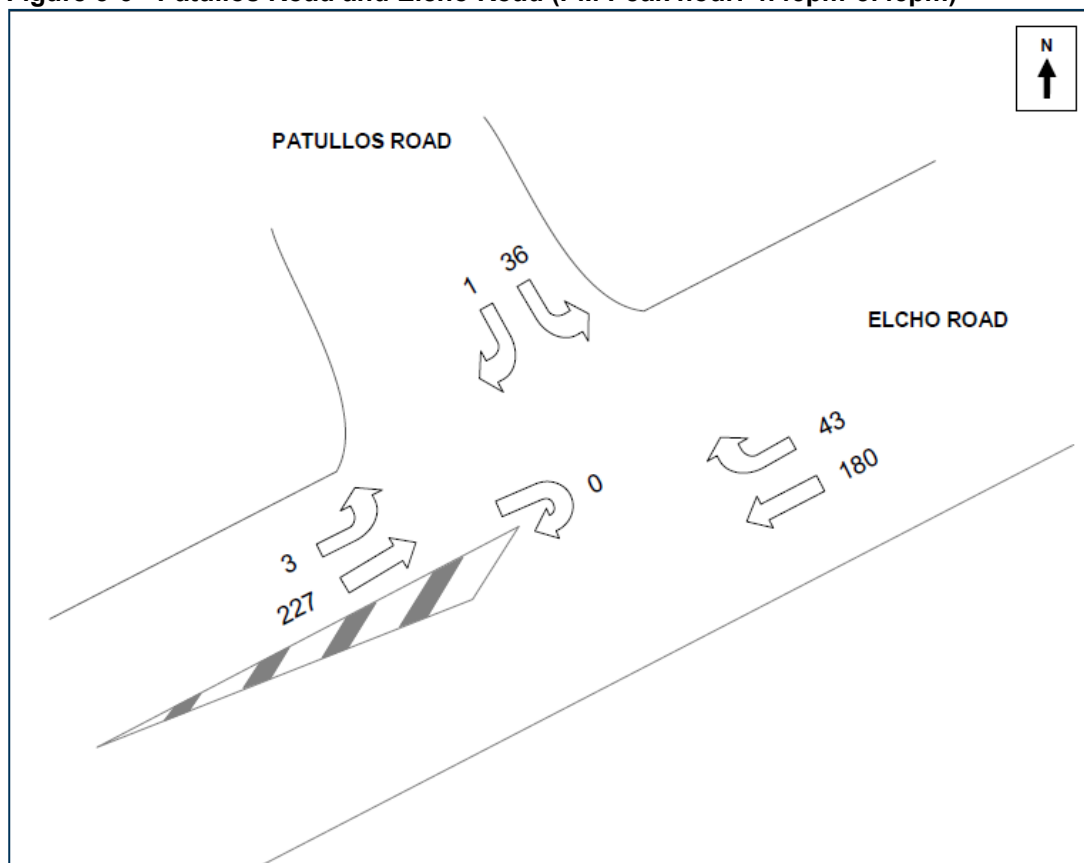


Figure 3-6 Patullos Road and Elcho Road (PM Peak hour: 4:45pm-5:45pm)



3.3 Lara West Growth Area Traffic Model

A traffic model was prepared by O'Brien Traffic for the development of the land within Lara West Growth Area, which was developed in conjunction with Council and Vic Roads.

For the purposes of the traffic analysis, the interim traffic model in year 2022 was selected for future travel demand forecast. The peak hour volumes for the Lara West Growth Area in 2022 during the AM and PM peak are shown in Figure 3-7 and Figure 3-8 respectively.

In the Lara West Growth Area traffic model, the estimated peak hour traffic volumes were based on existing traffic volumes and an annual growth factor of 4 per cent per annum.

Figure 3-7 Future AM Peak Hour Traffic Volumes (2022)

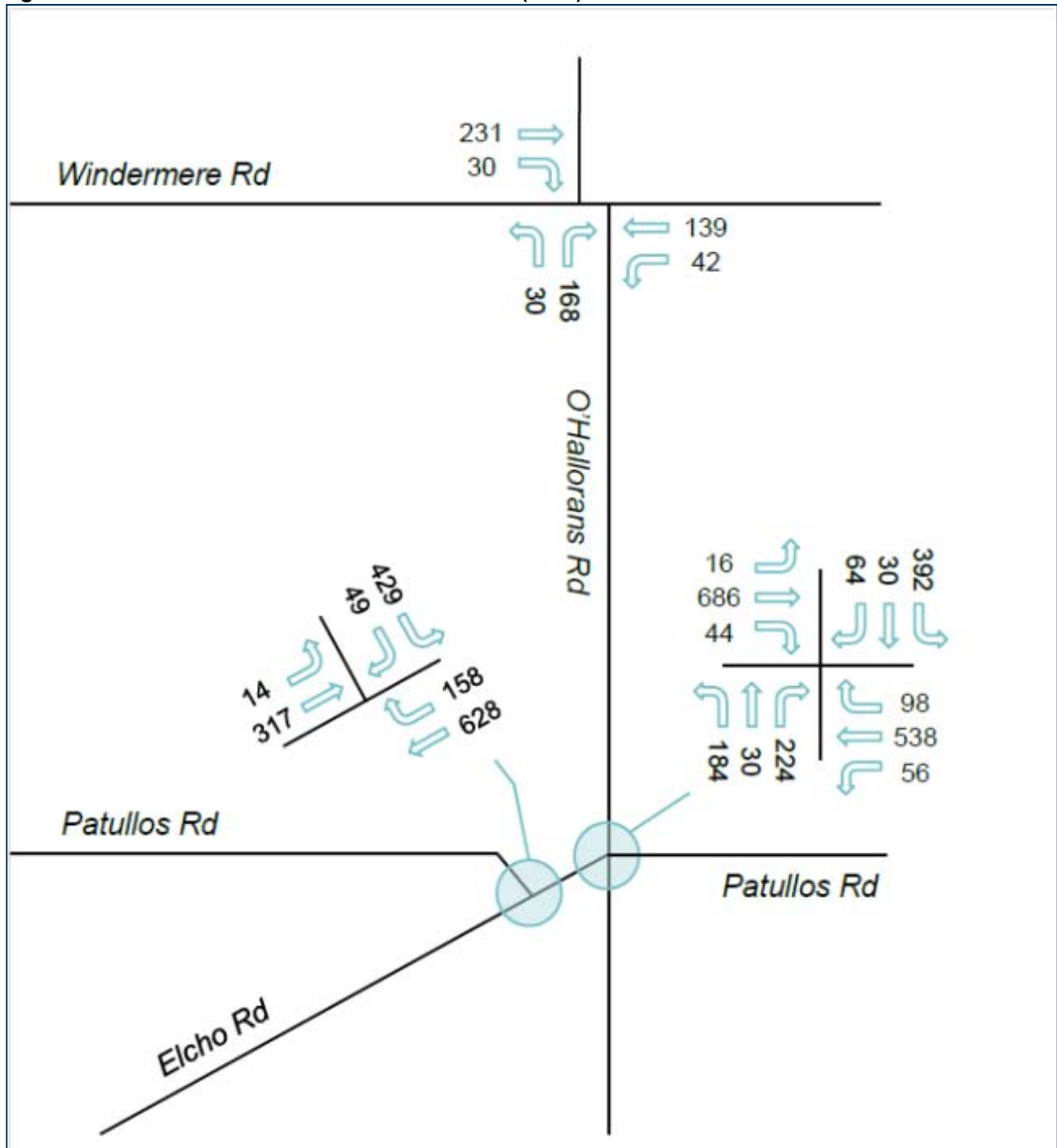
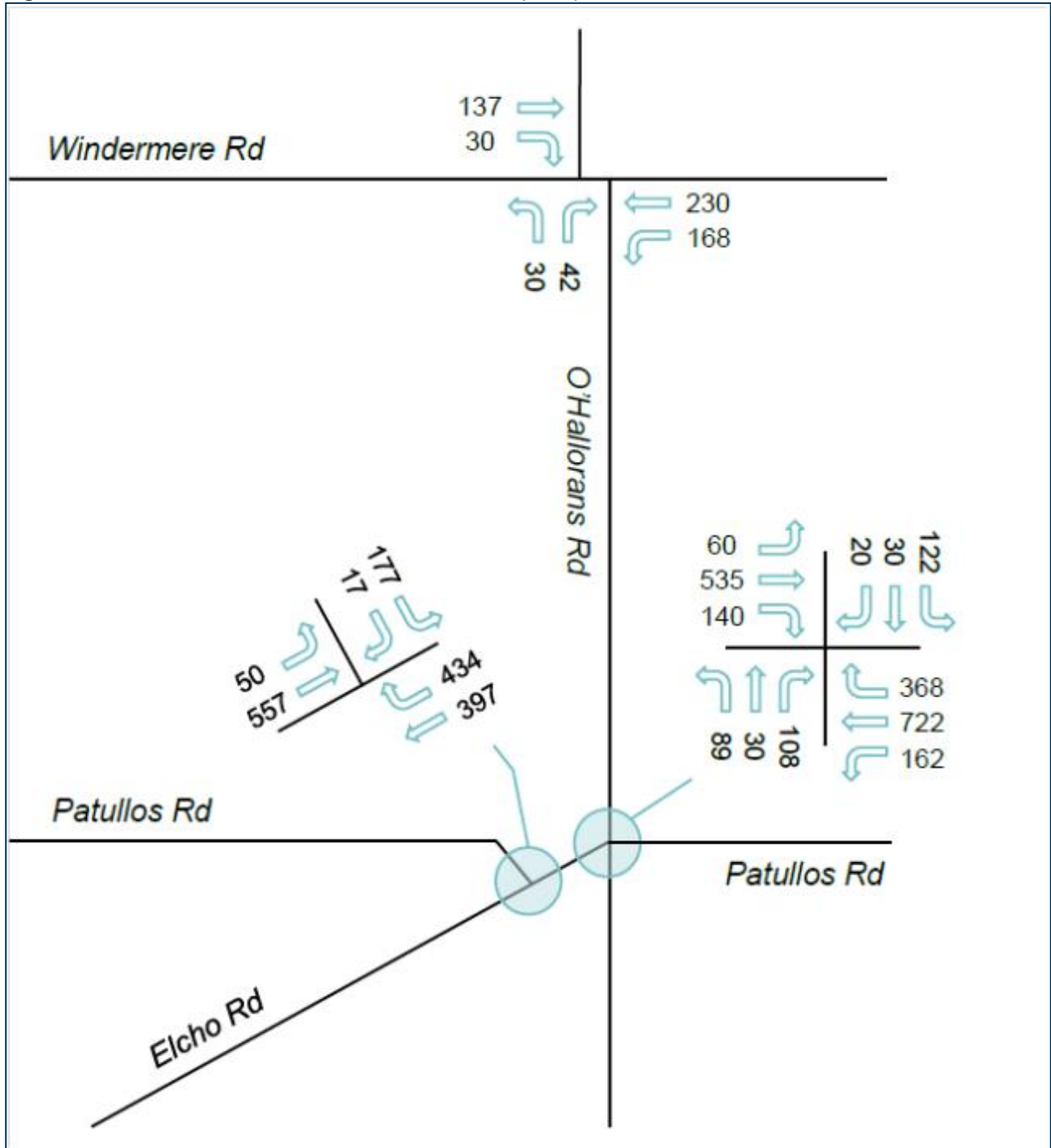


Figure 3-8 Future PM Peak Hour Traffic Volumes (2022)


4 Proposed Amendment

4.1 General

It is proposed to rezone the subject site along both sides of Manzeene Avenue from Rural Living to Residential 1 and Business 1 Zone. The development overlay plan envisages a mix of conventional and medium density residential dwellings.

Based on the land area of approximately 60 hectares, it is projected the subject site could potentially accommodate in the order of 600 lots assuming development of 10 lots per hectare. This estimation is considered conservative and provides an appropriate base for the purposes of this traffic assessment.

With regard to vehicle access, Manzeene Avenue will serve as the main road thorough the site with connections to Kees Road in the north and Patullos Road in the south.

With respect to O'Hallorans Road, there is the opportunity to provide access to O'Hallorans Road with lots fronting O'Hallorans Road gaining direct access.

Figure 4-1 illustrates the proposed residential subdivision lot layout and site access points to the wider area.

Figure 4-1 Proposed Residential Subdivision Layout



4.2 Neighbourhood Activity Centre

Within the subject site, a Neighbourhood Activity Centre of approximately 6,000 square metres is also proposed. It will contain a supermarket, specialty shops, medical facilities and other community uses.

It is anticipated that primary vehicle access to the Neighbourhood Activity Centre will be provided via O'Hallorans Road with secondary access from Patullos Road.

4.3 External Access

4.3.1 Interim Site Access

The development plan illustrates 2 primary access points to the subject land from Patullos Road. In the interim, these primary site access points will allow fully directional access with the provision of localised widening to facilitate turning movements.

To the north, the intersection of Kees Road and Manzeene Avenue will also be upgraded to include localised widening to accommodate separate turning lanes. In addition, road connections to the west via O'Hallorans Road are also available.

4.3.2 Ultimate Site Access

The Lara West Growth Area contemplates the upgrade of the key intersections in the vicinity of the subject site, with localised widening to provide separate turning lanes.

In particular, it is proposed to construct traffic signals at the Patullos Road/ O'Hallorans Road intersection, and realign the existing T-intersection of Patullos Road/ Elcho Road. In the future, it is expected that Patullos Road/ O'Hallorans Road intersection will operate with 2 traffic lanes in each direction.

To the north, the O'Hallorans Road and Windermere Road intersection will also be upgraded to include localised widening to provide a turning lane and an eastbound overtaking lane.

Conceptual functional layout plans illustrating the above intersection treatments are attached in Appendix A, which were prepared by Smec Urban.

In O'Hallorans Road, it is understood that a 9 metres wide single carriageway will be constructed to accommodate a traffic lane in each direction. At key intersections, O'Hallorans will be widened to provide auxiliary right and left turning lanes to access the subject site.

4.4 Internal Road Network

The internal road network proposes a main access road (Manzeene Avenue) aligned in a north – south direction within a 20 metres wide road reserve, with access streets branching off in an east-west direction.

All roads within the subdivision will be designed to provide for convenient access to individual allotments, with road reservations typically 16 metres wide which is sufficient to provide for standard residential 7.3 metre wide road pavements.

5 Traffic Considerations

5.1 Traffic Generation

5.1.1 Residential

The 'Lara West Growth Area Traffic and Transport Impact Assessment' dated 21 June 2012, prepared by O'Brien Traffic, adopted a peak hour traffic generation rate of 0.8 vehicle movement per hour for standard residential lots, or approximately 8 vehicle movements per day per lot.

Based on the above and assuming the subject land is developed for in the order of 600 dwellings, it is projected that such a development would generate 4,800 vehicle movements per day, inclusive of 480 vehicle movements in each peak hour.

Studies of residential developments indicate that during the morning peak hour approximately 20% of movements are arrivals and 80% departures, whilst during the evening peak hour 60% of movements are arrivals and 40% departures.

Based on the above, a total of 480 vehicle movements are expected to be generated to and from the land during each peak hour, as shown in Table 5-1.

Table 5-1 Site Access Peak Hour Traffic Movements

Time	Peak Hour Traffic Movements		
	Arrival	Departures	Total
AM Peak Hour	96	384	480
PM Peak Hour	288	192	480

For residential subdivisions, not all trips are external trips. As a guide, about 25% of these trips will be internal to any subdivision associated with local shopping, schools and local social visits, or equivalent to approximately 3,600 vehicles per day and 1,200 vehicles within the local road network.

5.1.2 Neighbourhood Activity Centre

The critical time for traffic generation will be in the afternoon PM peak hour when it is expected that the proposed Neighbourhood Activity Centre will generate traffic that will need to integrate with the existing commuter peak.

Commensurate with the rates adopted in the Lara West Growth Area, it is estimated that the proposed Neighbourhood Activity Centre will generate traffic at an average rate of 90 movements per 100 square metres per day, and 9 movements per 100 square metres in the PM peak hour.

Application of the above rate results in a projected daily traffic generation of 5,400 movements for the floor area of 6,000 square metres, and 540 movements in the PM peak hour. Of this traffic, it is estimated that approximately 50% of the traffic generation is external to the residential subdivision with the remaining internal trips.

Therefore, it is projected that Neighbourhood Activity Centre as proposed would generate a daily volume of 2,700 vehicle movements to the external road network, inclusive of 270 vehicle movements in the PM peak hour.

5.2 Traffic Distribution

In consideration of the recorded traffic volumes, the following will be assumed with regard to distribution of traffic.

- Approximately 25% of residential trips will be internal to the proposed subdivision.
- Neighbourhood Activity Centre traffic will be evenly split between IN and OUT movements.
- 60% of Neighbourhood Activity Centre traffic will use the Patullos Road/ O'Hallorans Road intersection, 20% will use Kees Road/ Manzeene Avenue intersection, 20% will use O'Hallorans Road / Windermere Road intersection, and 20% will use Patullos Road/ Manzeene Avenue intersection.
- 15% of external traffic will be to / from the north along O'Hallorans Road.
- 15% of external traffic will be to / from the south along O'Hallorans Road.
- 20% of external traffic will be to / from the north along Manzeene Avenue.
- 50% of external traffic will be to / from the south along Manzeene Avenue.
- To the wider road network, approximately 30% of the traffic will have origins/destinations to the west and 70% of the traffic will have origins/destinations to the east.

Based on the foregoing, Figure 5-1 has been prepared to illustrate the anticipated development traffic distribution to Patulous Road, O'Hallorans Road and Kees Road, whilst Figure 5-2 illustrates the expected development daily volumes in the vicinity of the subject site.

Figure 5-1 Development Traffic Distribution



Figure 5-2 Projected Development Daily Volumes



Figure 5-3 Anticipated Development Peak Hour Traffic Volumes

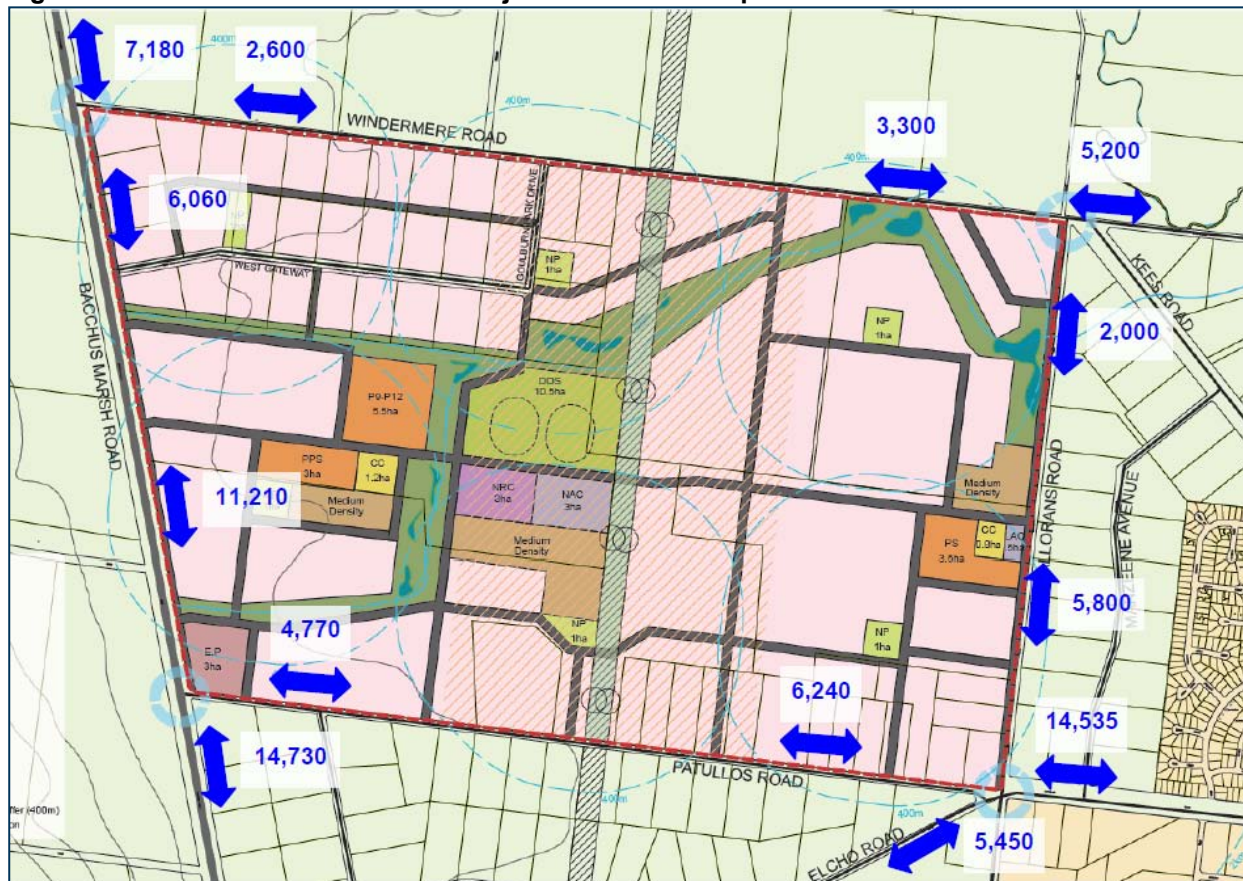


5.1 Other Developments

Review of the Development Plan for the Lara West Growth Area and associated traffic report indicates that the development to the west of the site is projected to generate in the order of 28,000 movements per day, assuming that a proportion of external trips will be multi-purpose trips.

Figure 5-4 illustrates the projected daily post development traffic volumes associated with the Lara West Growth Area development, and the surrounding road network.

Figure 5-4 Lara West Growth Area Projected Post Development Traffic Volumes



The Lara West Growth Area traffic analysis indicates that O'Hallorans Road north of Patullos Road would be expected to carry between 2,000 and 5,800 vehicles per day. To the south, Patullos Road is estimated to carry 14,500 vehicles per day, whilst to the north Windermere Road is projected to carry 5,200 vehicles per day.

5.2 Resultant Post Development Daily Traffic Volumes

The resultant external traffic and the development generated traffic equates to approximately 6,500 vehicle movements per day at the intersection of Patullos Road and O'Hallorans Road, and 2,700 vehicles per day at the intersection of O'Hallorans Road and Windermere Road.

Figure 5-5 illustrates the external and resultant daily traffic volumes on O'Hallorans Road and Manzeene Avenue, and Figure 5-3 illustrates the resultant peak hour volumes.

Figure 5-5 Resultant Daily Traffic Volumes



5.3 Traffic Impact

5.3.1 Manzeene Avenue

Manzeene Avenue can be defined within the Greater Geelong Planning Scheme as a Level 2 Access Street, which as a guide has an indicative maximum daily volume of 3,000 vehicles per day.

The proposed development is anticipated to generate a daily volume of 2,400 vehicle movements in Manzeene Avenue. Based on this, Manzeene Avenue has more than sufficient capacity to accommodate the traffic generated from the development of approximately 600 dwellings.

5.3.2 O'Hallorans Road

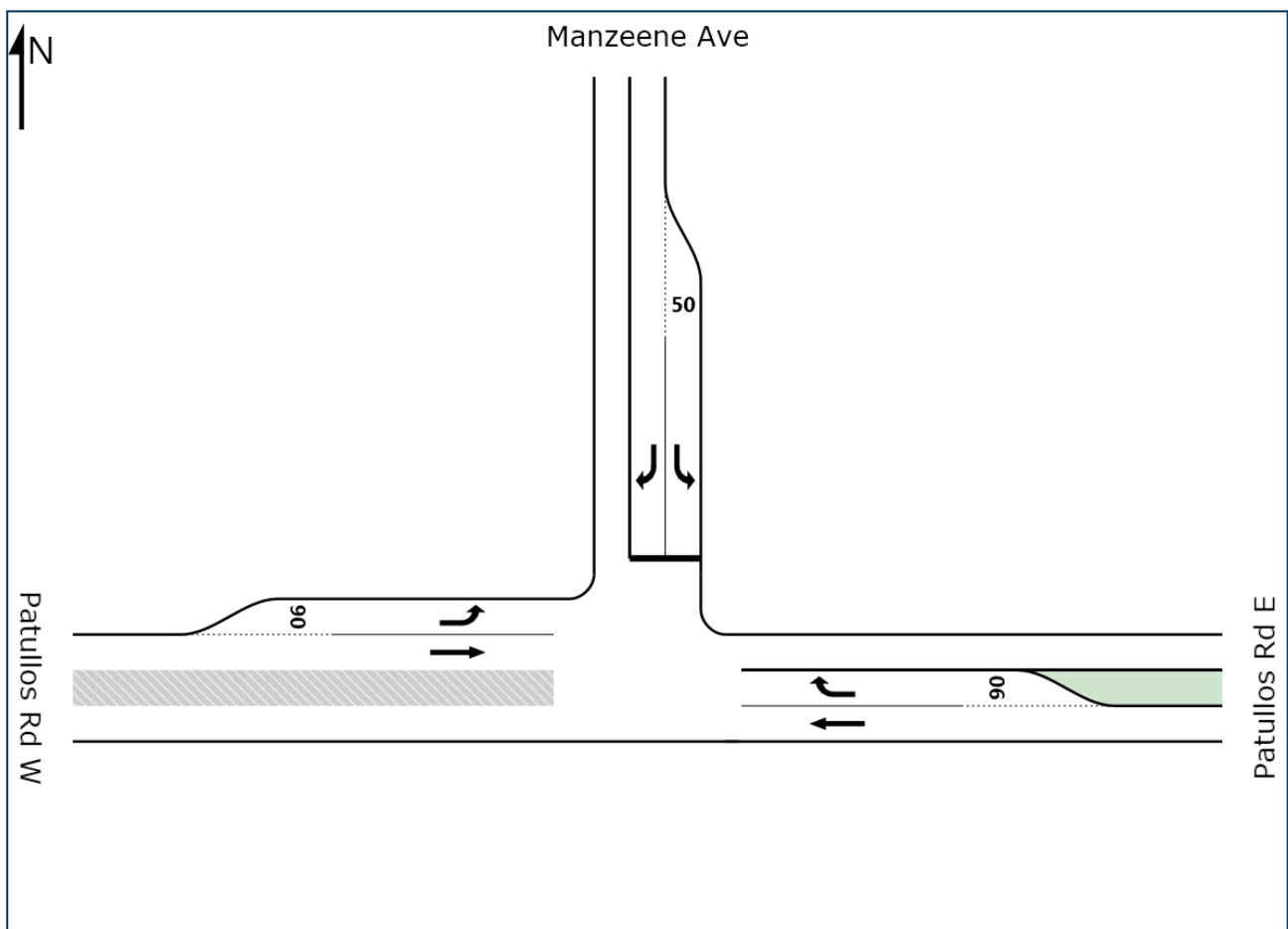
Traffic volumes in O'Hallorans Road will increase significantly as development occurs at the Lara West Growth Area and to a lesser extent within the subject site. At the completion of these developments, it is projected that O'Hallorans Road will carry up to 6,500 vehicles per day. Therefore, the proposed upgrade of O'Hallorans Road will have more than the sufficient capacity to accommodate the projected traffic volumes.

5.3.3 Patullos Road and Manzeene Avenue Intersection

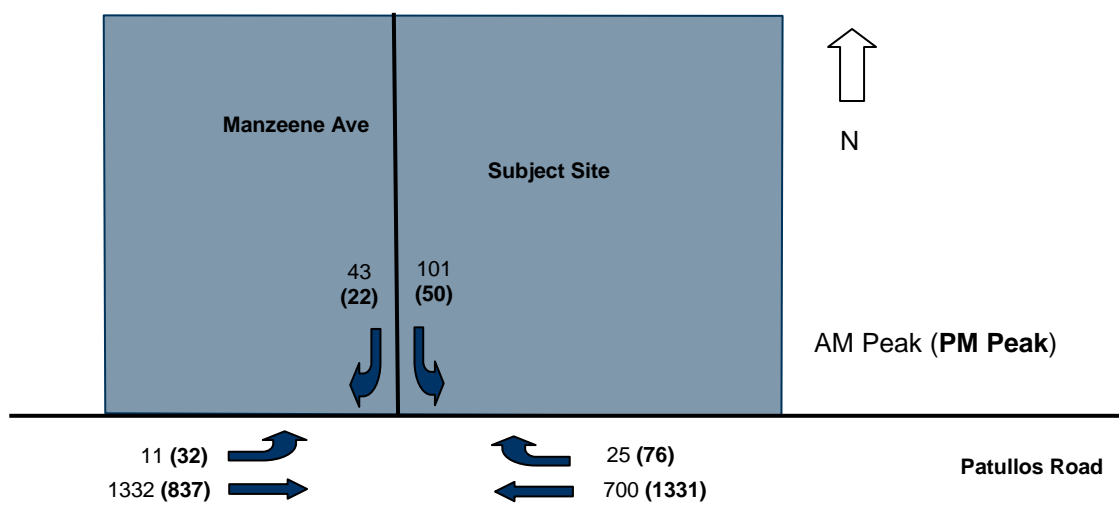
For the purposes of this assessment, it will be presumed that the interim access strategy will incorporate localised widening at the Patullos Road and Manzeene Avenue intersection to provide auxiliary right and left turning lanes to access the site.

A concept functional layout illustrating the proposed interim access arrangements is provided in Figure 5-6.

Figure 5-6 Patullos Road and Manzeene Avenue Intersection Concept Layout



Review of the Lara West Growth Area traffic model indicates that Patullos Road in 2022 will carry in the order of 15,000 vehicles per day east of Elcho Road. Based on this, Figure 5-7 has been prepared to illustrate the resultant 2022 peak hour volumes.

Figure 5-7 Patullos Road and Manzeene Avenue Intersection Peak Hour Volumes (2022)


To determine the impact of the proposed development, the traffic volumes detailed in Figure 5-7 and the proposed Patullos Road and Manzeene Avenue intersection have been input into SIDRA and analysed.

SIDRA, a computer package originally developed by the Australian Road Research Board, as a guide for intersection design has been used to assess the operation of the proposed intersections. The package provides information about the capacity, average delay and 95th percentile back of queue of an intersection, 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 5-2.

Table 5-2 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	Fair
0.9 to 1.0	Poor
Above 1.0	Very Poor

Whilst rated as 'poor', it is considered acceptable for some critical movements in an intersection to operate in the range of 0.9 to 1.0 during the high peak periods, reflecting actual conditions in a significant proportion of suburban signalised intersections.

The **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 (seconds) is the delay time that can be expected for all vehicles making a particular movement in the peak hour.

The results of the SIDRA analysis are summarised in Table 5-3, and they highlight that the Patullos Road and Manzeene Avenue intersection is expected to operate under 'fair' conditions after the completion of the proposed development.

As shown in Figure 5-7, there is a significant level of through traffic carried during the peak periods on Patullos Road in 2022 due to the development of the Lara West Growth Area. Accordingly, the SIDRA output indicates delays in excess of 100 seconds will be experienced by motorists turning right out of Manzeene Avenue in the afternoon peak hour.

Table 5-3 SIDRA Analysis (2022) – Patullos Road/Manzeene Avenue

Movement	AM Peak Hour			PM Peak Hour		
	DOS	Average Delay (s)	95th'ile Back of Queue (m)	DOS	Average Delay (s)	95th'ile Back of Queue (m)
Patullos Rd E (T)	0.39	0	0	0.73	0	0
Patullos Rd E (R)	0.08	20	2	0.13	13	4
Manzeene Ave N (L)	0.48	33	14	0.11	17	3
Manzeene Ave N (R)	0.60	85	14	0.56	140	12
Patullos Rd W (L)	0.01	8	0	0.02	8	0
Patullos Rd W (T)	0.72	0	0	0.46	0	0

Notwithstanding the above, it is anticipated that Patullos Road will experience a high level of platooning when the proposed traffic signals are constructed at the Patullos Road and O'Hallorans Road intersection.

As such, it is considered that the projected delay for the right turn movements exiting out of Manzeene Avenue is overstated. This is highlighted by the degree of saturation and the modest queue distance. Based on this it is considered that the intersection will operate satisfactorily.

5.3.4 Patullos Road and O'Hallorans Road Intersection

It is proposed to construct traffic signals at the Patullos Road and O'Hallorans Road intersection, prior to the development of the Lara West Growth Area. A concept functional layout illustrating the ultimate access arrangement is provided in Figure 5-8.

Figure 5-8 Patullos Road and O'Hallorans Road Intersection Concept Layout

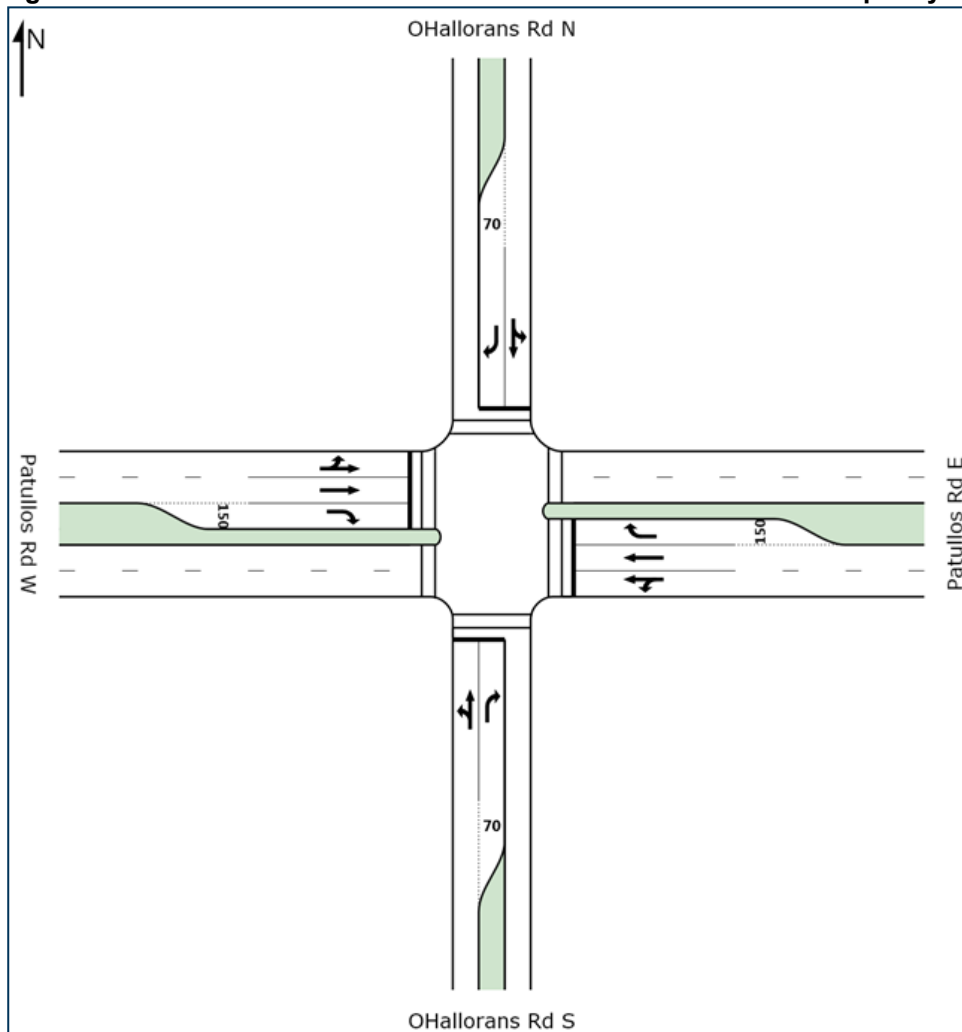


Figure 5-9 has also been prepared to illustrate the resultant 2022 peak hour volumes at the Patullos Road and O'Hallorans Road intersection, and Table 5-4 shows the results of the SIDRA intersection analysis.

Figure 5-9 Patullos Road and O'Hallorans Road Intersection Peak Hour Volumes (2022)

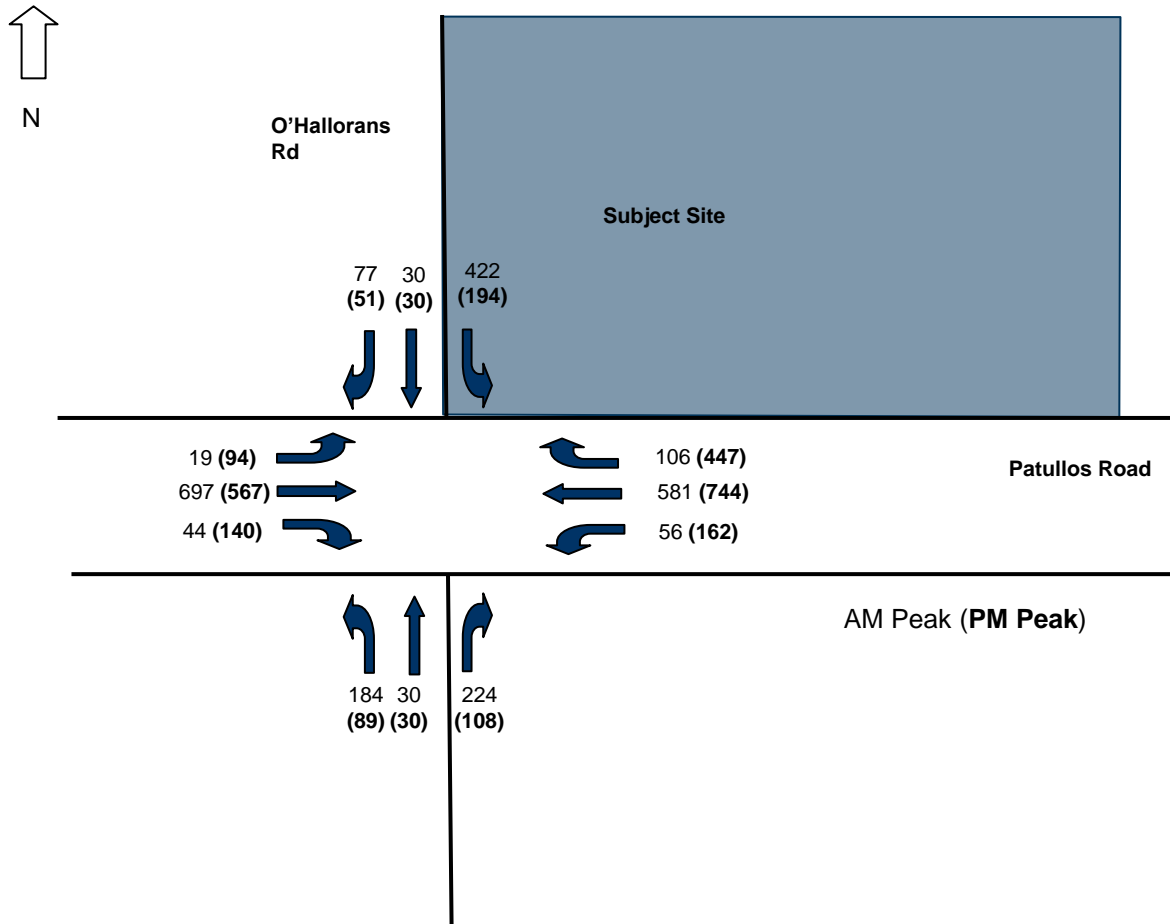


Table 5-4 SIDRA Analysis (2022) – Patullos Road/ O'Hallorans Road

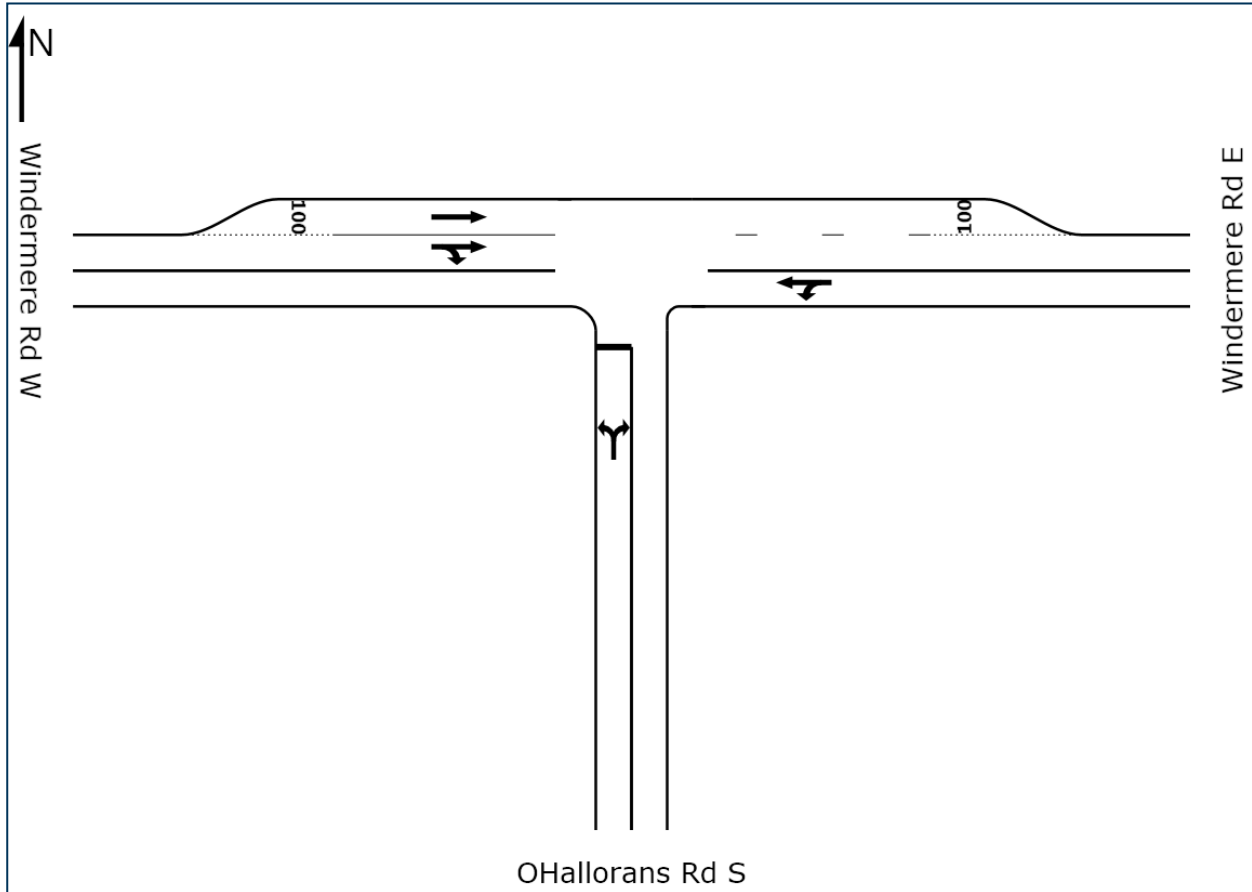
Movement	AM Peak Hour			PM Peak Hour		
	DOS	Average Delay (s)	95th'ile Back of Queue (m)	DOS	Average Delay (s)	95th'ile Back of Queue (m)
O'Hallorans Rd S (L)	0.32	35	65	0.31	50	44
O'Hallorans Rd S (T)	0.32	27	65	0.31	42	44
O'Hallorans Rd S (R)	0.65	33	59	0.56	49	40
Patullos Rd E (L)	0.58	46	119	0.76	47	183
Patullos Rd E (T)	0.58	38	120	0.76	40	183
Patullos Rd E (R)	0.51	39	33	0.76	29	113
O'Hallorans Rd S (L)	0.65	39	160	0.47	47	83
O'Hallorans Rd S (T)	0.65	31	160	0.47	39	83
O'Hallorans Rd S (R)	0.17	27	18	0.20	47	18
Patullos Rd W (L)	0.66	47	138	0.56	44	120
Patullos Rd W (T)	0.66	39	138	0.56	36	120
Patullos Rd W (R)	0.19	37	13	0.27	25	26

The results of the SIDRA analysis highlight that the Patullos Road and O'Hallorans Road intersection is expected to operate under 'good' conditions after the completion of the proposed development in 2022.

5.3.5 O'Hallorans Road and Windermere Road Intersection

The O'Hallorans Road and Windermere Road intersection is proposed to be upgraded with localised road widening to accommodate right turning movements into O'Hallorans Road, and an eastbound overtaking lane. A concept functional layout illustrating the above ultimate access arrangement is provided in Figure 5-10.

Figure 5-10 O'Hallorans Road and Windermere Road Intersection Concept Layout



In Year 2022, O'Hallorans Road in 2022 is projected to carry in the order of 2,700 vehicles per day south of Windermere Road. Based on this, Figure 5-11 has been prepared to illustrate the resultant 2022 peak hour volumes, and the results of the SIDRA analysis are summarised in Table 5-5.

Figure 5-11 O'Hallorans Road and Windermere Road Intersection Peak Hour Volumes (2022)

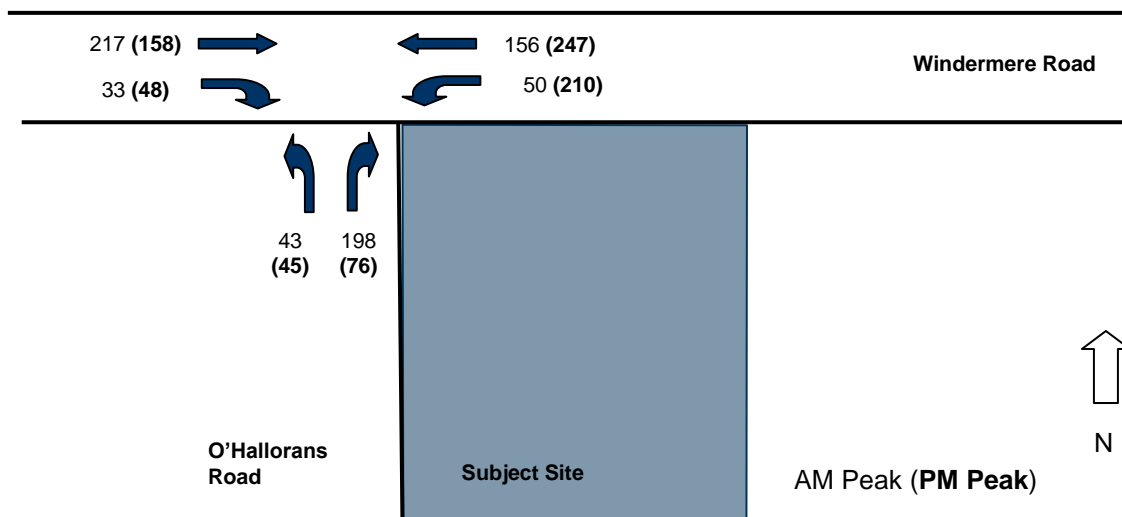


Table 5-5 SIDRA Analysis (2022) – O’Hallorans Road/ Windermere Road

Movement	AM Peak Hour			PM Peak Hour		
	DOS	Average Delay (s)	95th’ile Back of Queue (m)	DOS	Average Delay (s)	95th’ile Back of Queue (m)
O’Hallorans Rd S (L)	0.33	14	11	0.19	14	5
O’Hallorans Rd S (R)	0.33	14	11	0.19	14	5
Windermere Rd E (L)	0.12	8	0	0.26	8	0
Windermere Rd E (T)	0.12	0	0	0.26	0	0
Windermere Rd W (T)	0.10	1	4	0.10	1	4
Windermere Rd W (R)	0.10	10	4	0.10	11	4

The above analysis indicates that at the full development of the subject site in 2022, the O’Hallorans Road and Windermere Road intersection will operate within the ‘excellent’ category with negligible queues and delays to motorists departing the subject site, highlighting that the proposed improvement works would be an acceptable intersection treatment.

6 Internal Road Layout

At this stage a road layout for the subdivision has not been established. It is recommended that in general terms, all road cross sections be designed in accordance with Clause 56 of the Planning Scheme with due reference to the GAA guidelines.

7 Conclusions

Based on the preceding analysis, it is concluded that:

- Development of 600 dwellings within the subject site would generate in the order of 4,800 vehicle movements per day, and 480 vehicle movements occurring during the peak periods.
- The Neighbourhood Activity Centre is projected to generate approximately 5,400 vehicle movements per day, and 540 movements in the PM peak hour.
- Generated traffic will be distributed to both the surrounding local road network and directly to Manzeene Avenue and O'Hallorans Road.
- Daily traffic volumes in Manzeene Avenue would carry in the order of 2,400 vehicles per day, which is well within the targeted range for a street of this function and nature.
- At the completion of the proposed Manzeene Avenue subdivision and the Lara West Growth Area, Patullos Road east of Manzeene Avenue is projected to carry approximately 17,000 vehicles per day, and Windermere Road east of Kees Road will carry in the order of 6,000 vehicles per day. Kees Road will carry approximately 1,600 vehicles per day.
- The additional traffic volumes on Patullos Road, Kees Road and Windermere Road would be adequately accommodated within the existing carriageway.
- With regard to O'Hallorans Road, the proposed improvement works will adequately accommodate the projected traffic volumes.
- The proposed intersection treatments at Patullos Road/ Manzeene Avenue, Patullos Road/ O'Hallorans Road, and O'Hallorans Road/ Windermere Road will provide for safe and efficient site access.
- There are no traffic engineering grounds that should prohibit the rezoning of the land to Residential 1 and Business 1 zone.

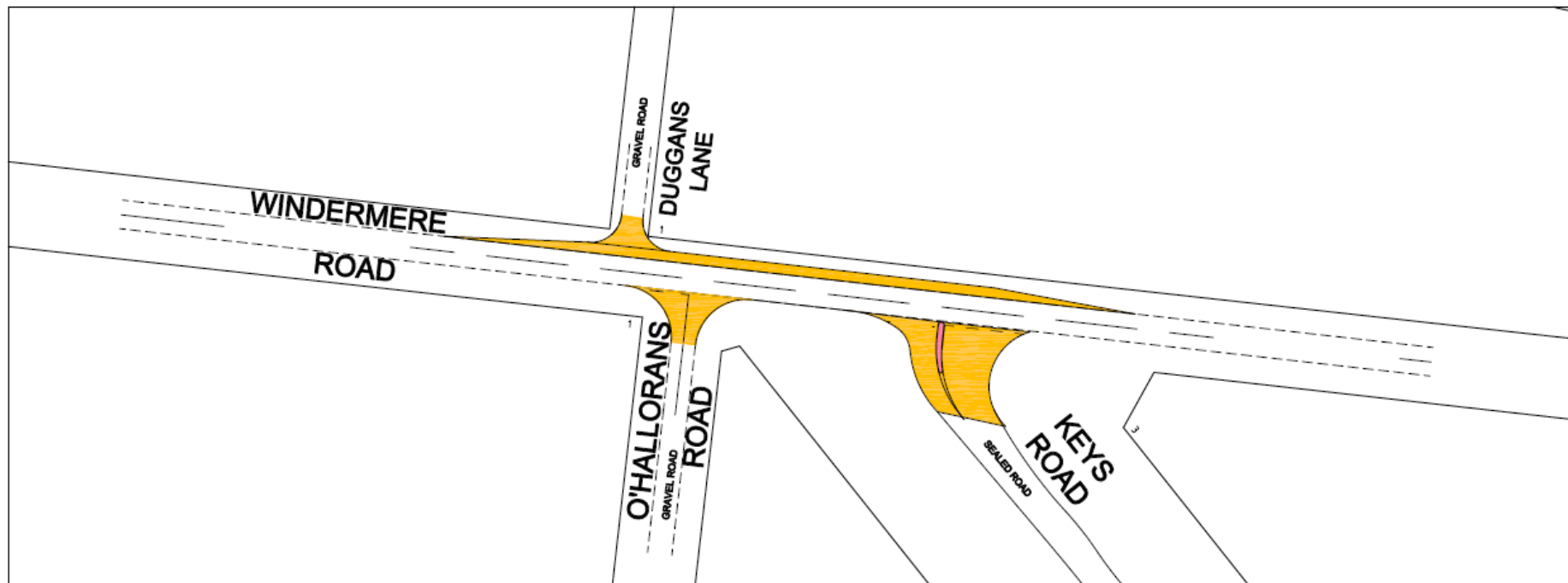
8 Appendix

Lara West Growth Area – Concept Intersection Designs



(Intersection of Windermere Road, Kees Road and O'Hallorans Road)

(Intersection of Patullos Road, Elcho Road and O'Hallorans Road)

Intersection of Windermere Road, Kees Road and O'Hallorans Road



LEGEND

-  FULL DEPTH PAVEMENT
-  CONCRETE ISLANDS

Intersection of Patullos Road, Elcho Road and O'Hallorans Road

