Lindum Vale Precinct Structure Plan

Traffic and Transport Assessment

CG140493

Prepared for
Metropolitan Planning Authority

11 November 2014

Cardno
Shaping the Future

Document Information

Prepared for	Metropolitan Planning Authority
Project Name	Traffic and Transport Assessment
File Reference	CG140493REP001F01.docx
Job Reference	CG140493
Date	11 November 2014

Contact Information

Cardno Victoria Pty Ltd
Trading as Cardno
ABN 47 106 610 913

150 Oxford Street, Collingwood
Victoria 3066 Australia

Telephone: (03) 8415 7777
Facsimile: (03) 8415 7788
International: +61 3 8415 7777

victoria@cardno.com.au
www.cardno.com

Document Control

Version	Date	Author	Author Initials	Reviewer	Reviewer Initials
F01	11/11/14	John-Paul Maina	JPM		
D01	13/08/14	David Fice	-	John-Paul Maina	-

Table of Contents

1 Introduction 1
1.1 Background 1
1.2 Referenced Documents 1
1.3 The Melbourne North Growth Corridor Plan 1
2 Existing Conditions 1
2.1 Location and Land Use 1
3 Road Network 2
3.1 Mickleham Road 2
3.2 Mt Ridley Road 3
4 Adjacent Precinct Structure Plans (PSPs) 4
4.2 Proposed Land Uses 4
4.2.1 Employment 4
4.2.2 Recreation 4
4.2.3 Education 4
5 Proposed Development 6
5.1 General 6
5.2 Access Arrangements 7
5.2.1 Mickleham Road 7
5.2.2 Mt Ridley Road 7
5.3 Internal Road Layout 7
5.4 External Road Layout 10
5.4.1 Mickleham Road 10
5.4.2 Mt Ridley Road 10
5.5 Anticipated Interim and Ultimate Intersection Layouts (Lindum Vale) 12
5.6 Bicycle and Pedestrian Links 13
5.7 Public Transport 14
6 Traffic Considerations 15
6.1 Merrifield West PSP and Associated Traffic Model 15
6.1.2 Interim Design Year, 2031 16
6.1.3 Ultimate Design Year, 2046 18
6.2 Lindum Vale PSP 20
6.2.1 Traffic Generation 20
6.2.2 Traffic Distribution 20
6.3 Anticipated Interim and Ultimate Intersection Layouts (Merrifield West) 23
6.4 Traffic Impact- Intersection Operation 24
6.5 SIDRA Results and Intersection Configurations 28
6.5.1 Interim Intersection Assessment (2031) 28
6.5.2 Ultimate Intersection Assessment (2046) 46
6.6 Other Considerations 64
7 Conclusions 68

Tables

Table 5-1 Internal Road Cross sections 7

Table 5-2 Interim Vs Ultimate Intersection Layouts (Lindum Vale – Proposed Intersections) 12
Table 6-1 Anticipated Traffic Generation 20
Table 6-2 Traffic Distribution Matrix 20
Table 6-3 Interim Vs Ultimate Intersection Layouts (Merrifield DCP Intersections) 23

Figures

Figure 1-1 The Melbourne Growth Corridor Plan 1
Figure 2-1 Site Location 1
Figure 3-1 Mickleham Road looking north adjacent the subject site 2
Figure 3-2 Mickleham Road looking south adjacent the subject site at the Mt Ridley Road/Mickleham Road intersection 2
Figure 3-3 Mt Ridley Road facing east adjacent the subject site 3
Figure 4-1 Subject Site in Context of Surrounding PSPs 4
Figure 4-2 Location of Key Land Uses to the North 5
Figure 5-1 Proposed Residential Subdivision Layout (yet to be finalised) 6
Figure 5-2 Connector Boulevard: 28.5 – 31.5m (Typically 7,000-12,000vpd) 8
Figure 5-3 Connector Street: 25m (Typically 3,000-7,000vpd) 8
Figure 5-4 Access Street Level 2: 20m (Typically 2,000-3,000vpd) 9
Figure 5-5 Access Place/Access Street Level 1: 16m (Typically <2,000vpd) 9
Figure 5-6 Mickleham Road: 6 Lane Primary Arterial - 50m (Typically >40,000vpd) 10
Figure 5-7 Mt Ridley Road: Interim Road Cross Section 10
Figure 5-8 Mt Ridley Road: Ultimate Road Cross Section 11
Figure 5-9 Major Pedestrian and Bicycle Links 13
Figure 5-10 Public Transport Routes - Ultimate Scenario 14
Figure 6-1 Merrifield PSP- Road Network 15
Figure 6-2 2031 Interim Traffic Model - Daily Volumes 16
Figure 6-3 2031 Interim AM & PM Peak Traffic Flows 17
Figure 6-4 Merrifield West PSP 2046 Ultimate Traffic Model- AM Peak Hour Volumes 18
Figure 6-5 Merrifield West PSP 2046 Ultimate Traffic Model – Daily Volumes 18
Figure 6-6 2046 Ultimate AM & PM Peak Traffic Flows 19
Figure 6-7 Anticipated Development Traffic (AM Peak Period) 21
Figure 6-8 Anticipated Development Traffic (PM Peak Period) 22
Figure 6-9 2031 Interim Base Traffic Flows + Development Traffic - AM & PM Peak 26
Figure 6-10 2046 Ultimate Base Flows + Development Traffic - AM & PM Peak 27
Figure 6-11 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT06)- AM Period 28
Figure 6-12 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT06)- PM Period 29
Figure 6-13 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT05)- AM Period 31
Figure 6-14 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT05)- PM Period 32
Figure 6-15 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT04)- AM Period 34

Figure 6-16 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT04)- PM Period 35
Figure 6-17 Interim (2031) Intersection Assessment - Mt Ridley Road / Mickleham Road - AM Period 37
Figure 6-18 Interim (2031) Intersection Assessment - Mt Ridley Road / Mickleham Road - PM Period 38
Figure 6-19 Interim (2031) Intersection Assessment - Mt Ridley Road / Connector Boulevard (Site Access) - AM Period 40
Figure 6-20 Interim (2031) Intersection Assessment - Mt Ridley Road / Connector Boulevard (Site Access) - PM Period 41
Figure 6-21 Interim (2031) Intersection Assessment - Mickleham Road / Connector Road (Site Access) - AM Period 43
Figure 6-22 Interim (2031) Intersection Assessment - Mickleham Road / Connector Road (Site Access) - PM Period 44
Figure 6-23 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT06)- AM Period 46
Figure 6-24 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT06)- PM Period 47
Figure 6-25 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT05)- AM Period 49
Figure 6-26 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT05)- PM Period 50
Figure 6-27 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT04)- AM Period 52
Figure 6-28 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT04)- PM Period 53
Figure 6-29 Ultimate (2046) Intersection Assessment - Mt Ridley Road / Mickleham Road - AM Period 55
Figure 6-30 Ultimate (2046) Intersection Assessment - Mt Ridley Road / Mickleham Road - PM Period 56
Figure 6-31 Ultimate (2046) Intersection Assessment - Mt Ridley Road / Connector Boulevard (Site Access) - AM Period 58
Figure 6-32 Ultimate (2046) Intersection Assessment - Mt Ridley Road / Connector Boulevard (Site Access) - PM Period 59
Figure 6-33 Ultimate (2046) Intersection Assessment - Mickleham Road / Connector Road (Site Access) - AM Period 61
Figure 6-34 Ultimate (2046) Intersection Assessment - Mickleham Road / Connector Road (Site Access) - PM Period 62
Figure 6-35 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Boulevard (IT06)- AM Period 65
Figure 6-36 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Boulevard (IT06)- PM Period 66

1 Introduction

1.1 Background

Cardno has been engaged by the Metropolitan Planning Authority (MPA) to provide traffic and transport advice for the Lindum Vale Precinct Structure Plan (PSP 1202).

The subject land forms part of the Northern Growth Corridor, with the land gazetted under Amendment C166 of the Hume Planning Scheme. The amendment aims to expand Melbourne's Urban Growth Boundary (UGB) with a strategic plan to guide the delivery of a quality urban environment.

This report provides an assessment of the expected traffic and transport implications of the proposal having consideration of the existing and proposed road, bicycle and pedestrian provisions in the area and the traffic growth and resultant impacts from the development of the subject site in the context of adjacent Precinct Structure Plan areas.

1.2 Referenced Documents

Lindum Vale is located immediately south of the Merrifield West PSP area. SMEC Australia Pty Ltd prepared a Traffic and Transport Impact Assessment for the Merrifield West PSP (dated 2 July 2012) which included traffic modelling for ultimate intersection arrangements (2046) and an outline of suitable road reservations and intersection requirements within that precinct. Modelling of the road network was undertaken using the MITM model.

It is noted the SMEC report forms the most recent traffic assessment of any area surrounding the site, with it considering traffic associated with all other relevant approved PSPs in the City of Hume.

Given the site's abuttal to Merrifield, and in consideration of the traffic modelling undertaken by SMEC, it is deemed appropriate to use the Merrifield PSP as a basis of assessment for the subject land.

In addition to the foregoing, reference has been made to relevant documents sourced from the MPA and the City of Hume, including traffic modelling data for the 2031 interim design period.

1.3 The Melbourne North Growth Corridor Plan

Melbourne's north is undergoing substantial transformation, with a widening socio-economic mix, and a diversifying economy.

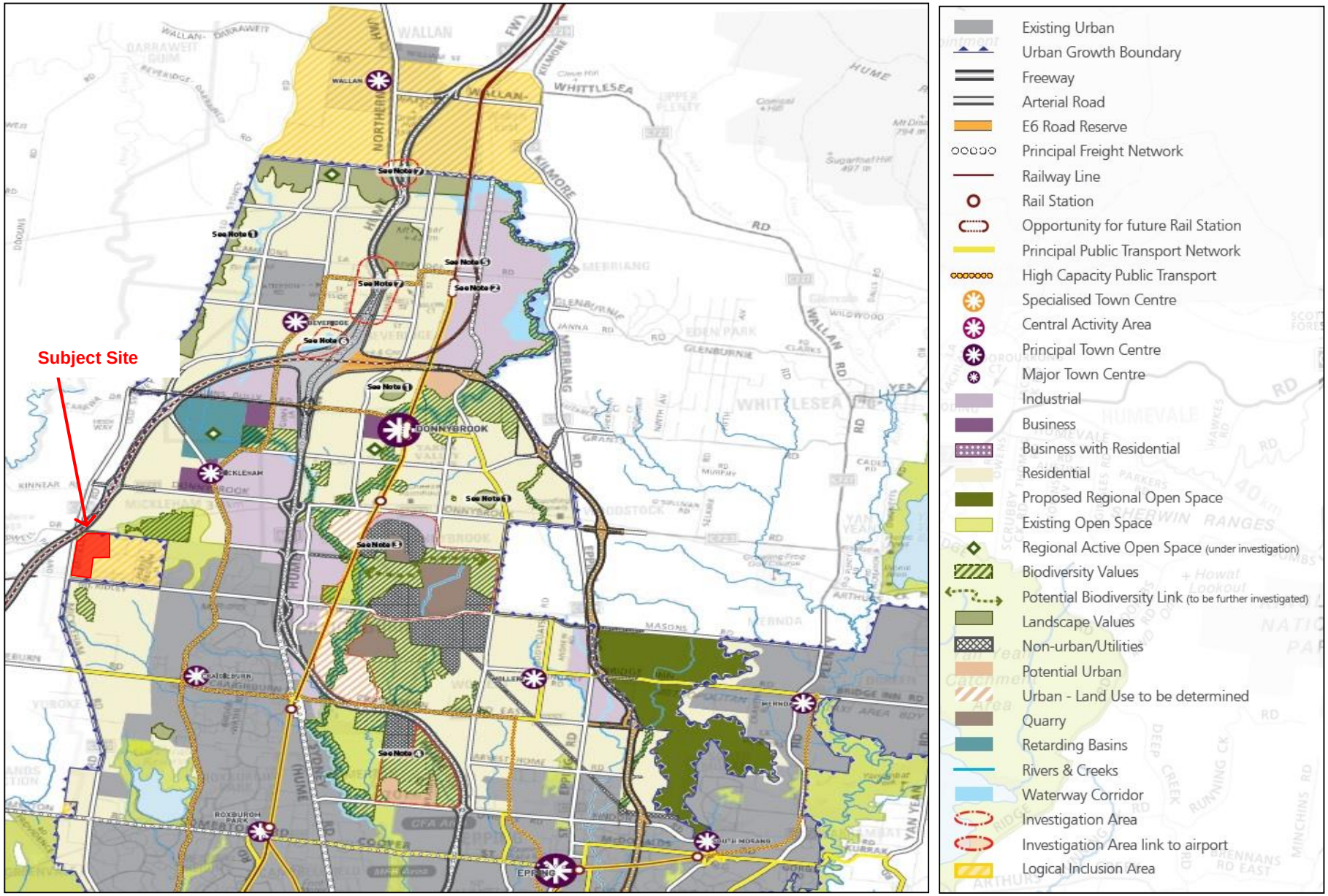
The area covered by the Corridor plans will eventually accommodate a population of 220,000 or more people and has the capacity to provide for at least 68,000 jobs. The majority of new industrial land for the northern metropolitan region will be located within the Northern Growth Corridor.

The Northern Growth corridor has good accessibility to the CBD and other major employment precincts. It features excellent road, rail, freight and public transport infrastructure, most notably Melbourne airport and other significant logistics hubs.

In the longer term, the outer Metropolitan Ring / E6 Road reservation (OMR/E6) and the Beveridge Interstate Freight Terminal (BIFT) will reinforce the economic functioning of this corridor.

Lindum Vale is strategically located in the western portion of the Corridor Plan as illustrated in Figure 1-1 overleaf.

Figure 1-1 The Melbourne Growth Corridor Plan

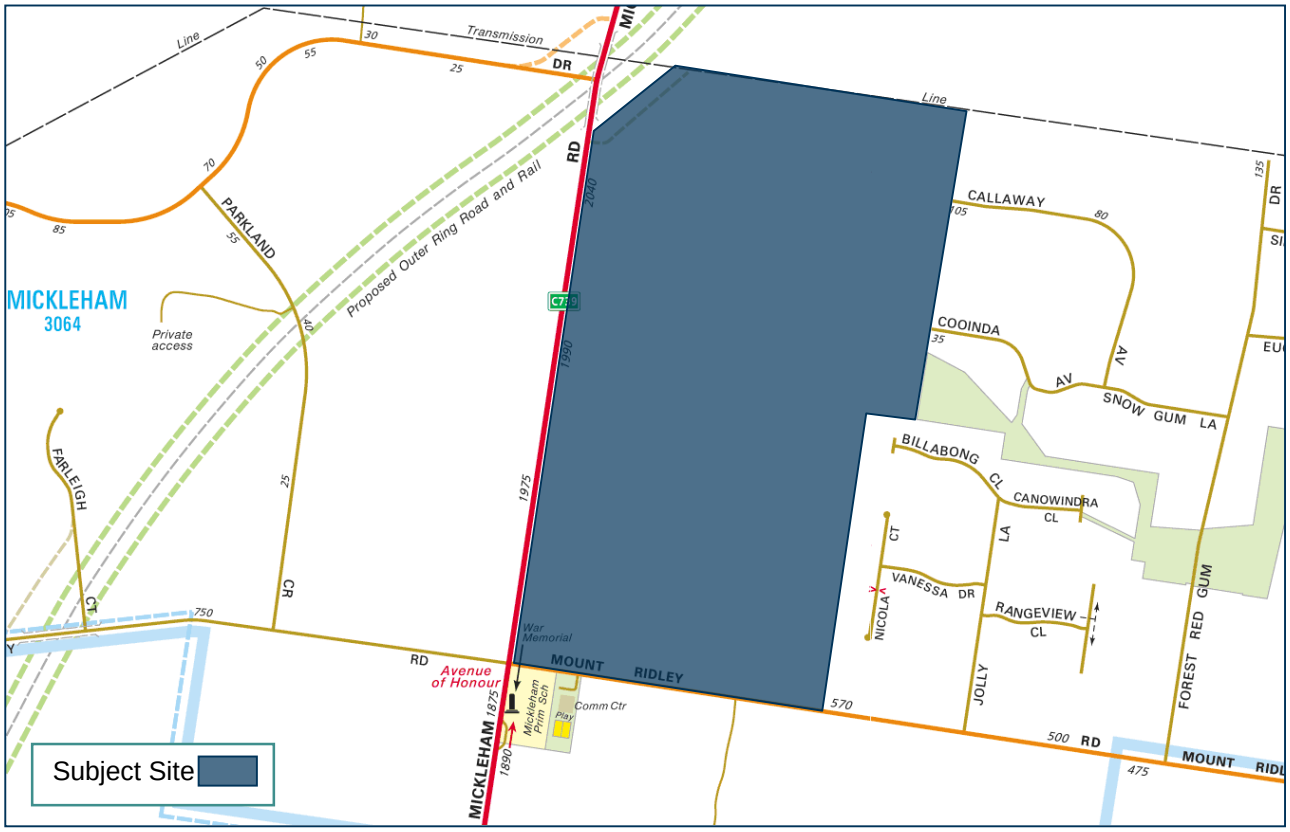


2 Existing Conditions

2.1 Location and Land Use

Lindum Vale is located at the corner of Mickleham Road and Mt Ridley Road, Mickleham, as shown in Figure 2-1. The subject site is irregular in shape, with a total area of approximately 140 hectares (1.4 square km's) comprising a frontage of approximately 1,648 metres to Mickleham Road and 793 metres to Mt Ridley Road.

Figure 2-1 Site Location



Copyright © Melway Publishing Pty Ltd

To the east and west of the site are rural residencies, whilst the Mickleham Primary School is located to the south of the site on the south east corner of the Mickleham Road/Mt Ridley Road intersection.

The Outer Metropolitan Ring Road (OMR) is proposed to the north west of the site, running parallel to Old Sydney Road. It is anticipated that the OMR will be constructed as a freeway with a small section of land within the site (at the northwest corner) to be set aside for the future road.

3 Road Network

3.1 Mickleham Road

Mickleham Road comprises a 2-lane road, carrying around 3,200 vehicles per day based on data collected by VicRoads.

Mickleham Road, in the vicinity of the site is a declared Arterial Road and services a number of rural properties.

Mickleham Road has a general speed limit of 100km/h, reducing to 80km on the approach to Mt Ridley Road. In consideration of the Mickleham Primary School located on the south east corner of the Mickleham Road/Mt Ridley Road intersection, the speed limit is further reduced to 60km/h during school days.

A view of Mickleham Road looking north past the site is provided in Figure 3-1.

Figure 3-1 Mickleham Road looking north adjacent the subject site

At its intersection with Mt Ridley Road, Mickleham Road widens to provide for short right turn lanes for northbound and southbound traffic whilst also providing a short left turn for southbound traffic as shown in Figure 3-2.

Figure 3-2 Mickleham Road looking south adjacent the subject site at the Mt Ridley Road/Mickleham Road intersection

3.2 Mt Ridley Road

Mt Ridley Road is generally aligned in an east to west direction between Konagaderra Road and just to the west of Hume Freeway before turning to the south to connect with Grand Boulevard. It is classified as a local road between Konagaderra Road and Mickleham Road and a major road from Mickleham Road to its terminus at its intersection with Grand Boulevard.

In the vicinity of the site, Mt Ridley Road operates with a single lane of traffic in each direction with a speed limit of 80km/h. Extending west of Mickleham Road, the pavement width narrows to accommodate two way traffic movements.

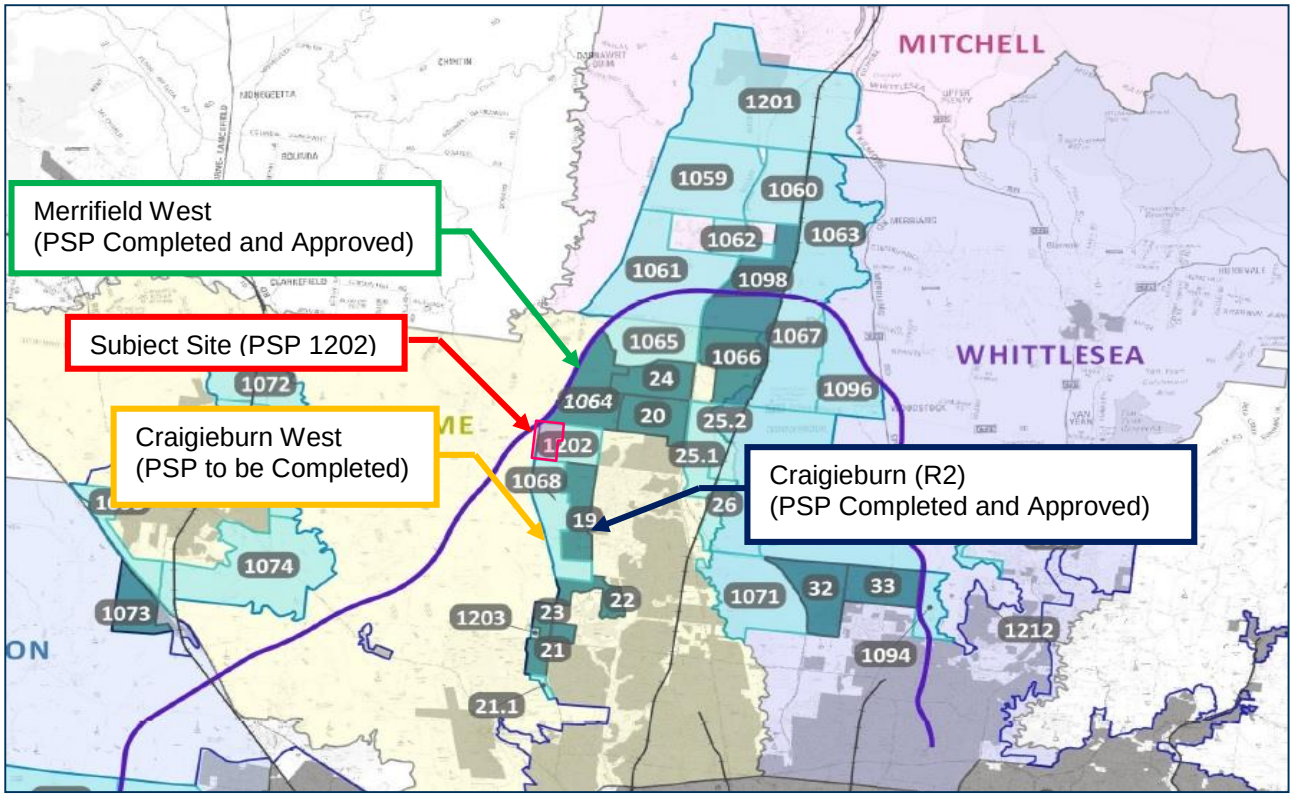
Figure 3-3 shows Mt Ridley Road looking to the east adjacent the subject site.

Figure 3-3 Mt Ridley Road facing east adjacent the subject site

4 Adjacent Precinct Structure Plans (PSPs)

The Lindum Vale Precinct is gazetted as PSP 1202, with the Merrifield West PSP (approved by GAA in March 2012) abutting the site to the north, and the Craigieburn R2 PSP (approved by GAA in September 2010) positioned to the southeast of the site. The Craigieburn West PSP (PSP 1068), which has yet to be approved, abuts the site to the south. Figure 4-1 shows the site in context of the relevant PSPs surrounding the subject site.

Figure 4-1 Subject Site in Context of Surrounding PSPs



4.2 Proposed Land Uses

Aside from residential, the following key land uses are contemplated proximate to the subject site.

4.2.1 Employment

A wide range of diverse employment opportunities are contemplated in neighbouring PSP areas. Notably the Merrifield / Mickleham Major Town Centre, Merrifield and AMP business parks located to the north, in addition to the Craigieburn Major Town Centre positioned south of Lindum Vale.

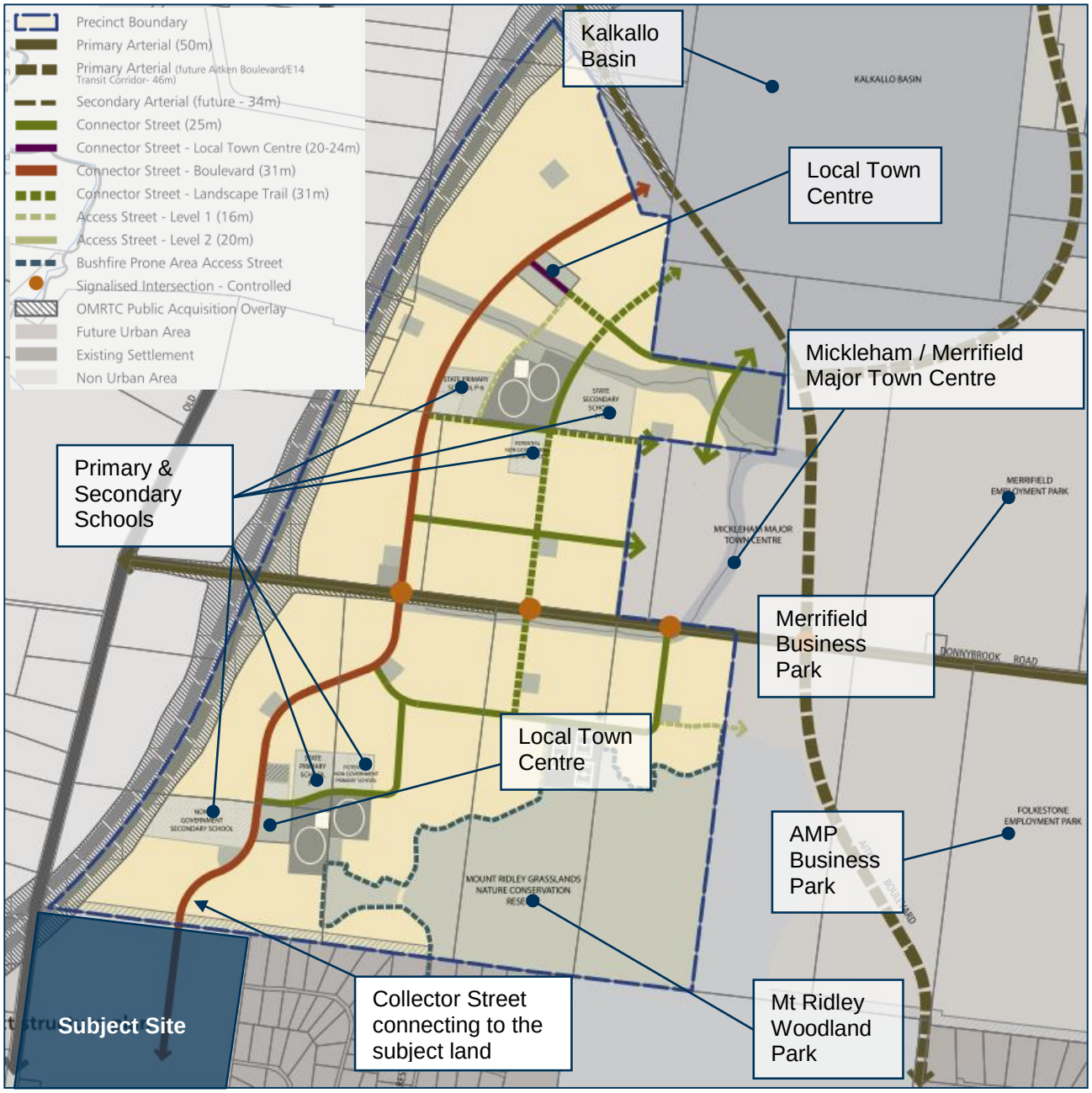
4.2.2 Recreation

Melbourne Water Kalkallo Retarding Basin and Mt. Ridley Woodland Park will offer future residents passive and active recreational opportunities and will encourage residents to walk and cycle to these key recreation locations. The Merrifield / Mickleham Major Town Centre, Craigieburn Major Town Centre and Craigieburn West PSP will also be expected to offer community infrastructure presenting recreational opportunities for residents.

4.2.3 Education

Aside from the existing Mickleham primary school located to the south of the site, four primary and two secondary schools are proposed within the Merrifield PSP area. Figure 4-2, illustrates the location of the above land uses within the context of the subject site.

Figure 4-2 Location of Key Land Uses to the North



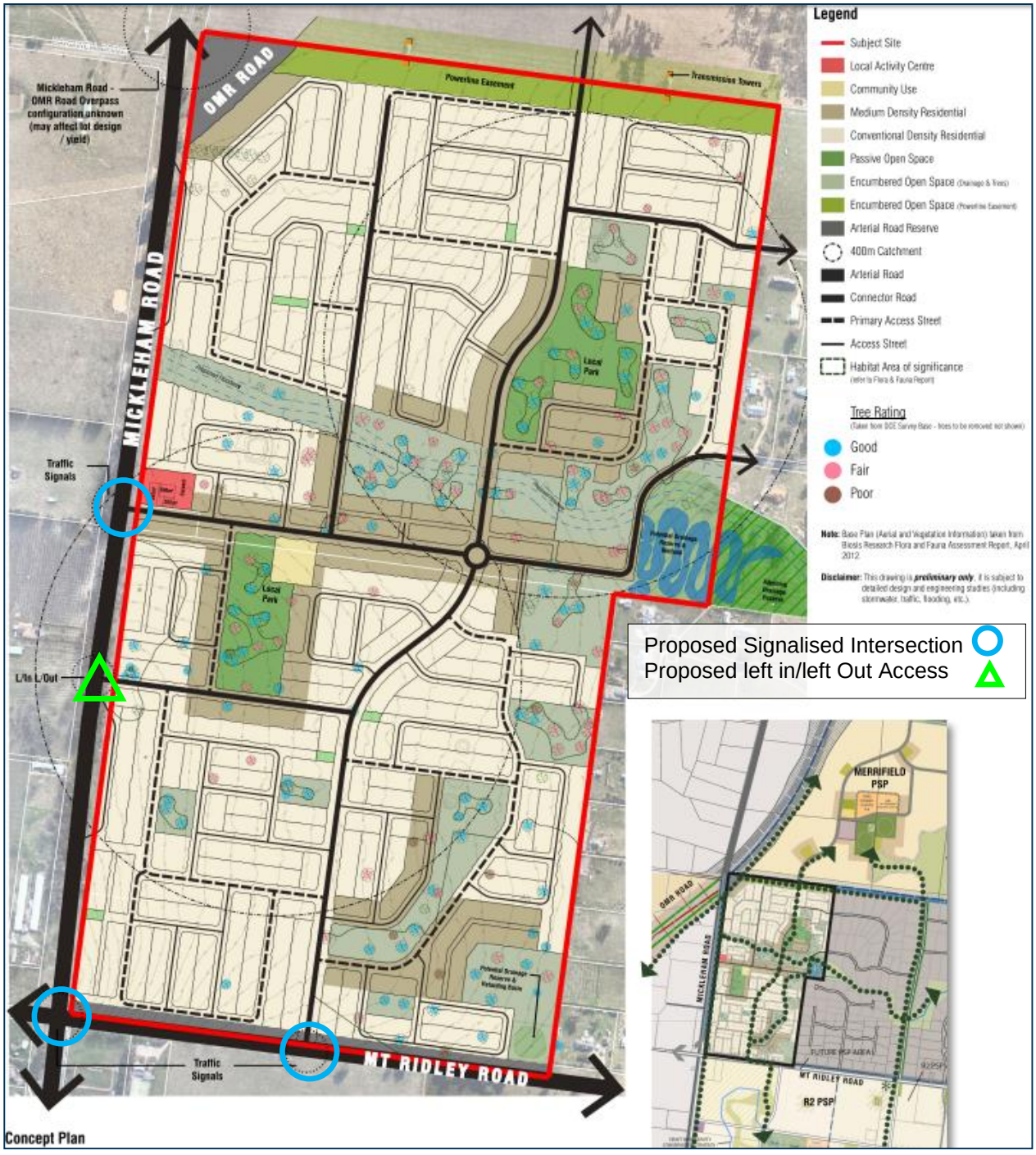
5 Proposed Development

5.1 General

The subject land is proposed to be developed for the purpose of residential use with approximately 1,600 residential lots, comprising a mixture of low, and medium density lots. The site is also anticipated to incorporate a small local activity centre along the western frontage of the site.

Figure 5-1 illustrates the proposed concept development plan. It is noted that this urban structure plan is a work in progress and as such is yet to be finalised.

Figure 5-1 Proposed Residential Subdivision Layout (yet to be finalised)



Concept Urban Structure Plan – Subject to Change

5.2 Access Arrangements

Access to the site will be provided via a number of external access points as described below:

5.2.1 Mickleham Road

> Signalised T – Intersection: Main East – West Link Road

> Left In / Left Out: Secondary East West Road

> Service Roads: Along the northern and southern parcels of the subject site

5.2.2 Mt Ridley Road

> Signalised Cross Intersection: Main North - South Link Road (Internal Boulevard Connector)

In addition to the foregoing:

> The main north – south link road (Internal Boulevard Connector) will extend northwards to the Merrifield West PSP area and will form a continuation of the north – south collector road contemplated by the Merrifield West PSP. This road will also extend south and link into the Craigieburn West PSP.

> Two (2) road connections are contemplated to the land east of the subject site.

> The proposal also contemplates the signalisation of the Mt Ridley Road/Mickleham Road intersection.

5.3 Internal Road Layout

The internal road network will comprise a mixture of road cross-sections that are generally in accordance with GAA Guidelines.

The only exception will be the Boulevard Connector (North – South Link Road), that will connect Mt Ridley Road to the Merrifield West PSP land. This road will be provided with a road reservation of 31 metres in accordance with VicRoads “Growth Areas: Typical Intersection Drawings”

A summary of the road classifications and proposed cross sections are detailed in Table 5-1 and shown in the Figures overleaf.

Table 5-1 Internal Road Cross sections

Classification	Road Reservation	Road Width	Parking Lane	Bicycle Lane	Median
Boulevard Connector	31	2 x 3.5 m	Yes- indented	Yes	Yes
Connector Street	25	2 x 3.5 m	Yes- indented	Yes	-
Access Street- Level 2	20	6 m	Yes	Yes	-
Access Street Level 1	16	7.3 m	On-road	No	-

Notwithstanding the above, it is noted that the cross-sections shown within this report re considered at this stage as ideal starting points. It is likely that the cross-sections may vary to either accommodate existing trees or further planting in the road reserve given the landscape character of the site and the urban design outcome that the future subdivision seeks to achieve.

Figure 5-2 Connector Boulevard: 28.5 – 31.5m (Typically 7,000-12,000vpd)

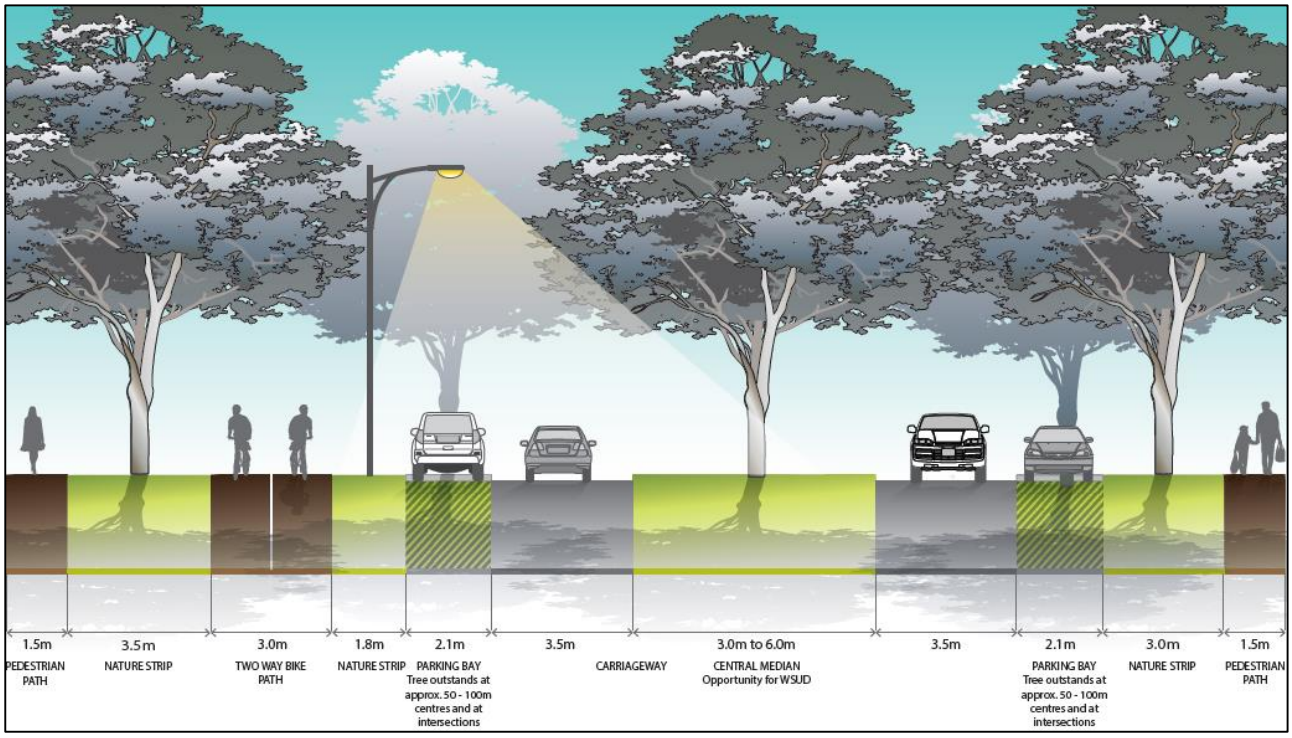


Figure 5-3 Connector Street: 25m (Typically 3,000-7,000vpd)

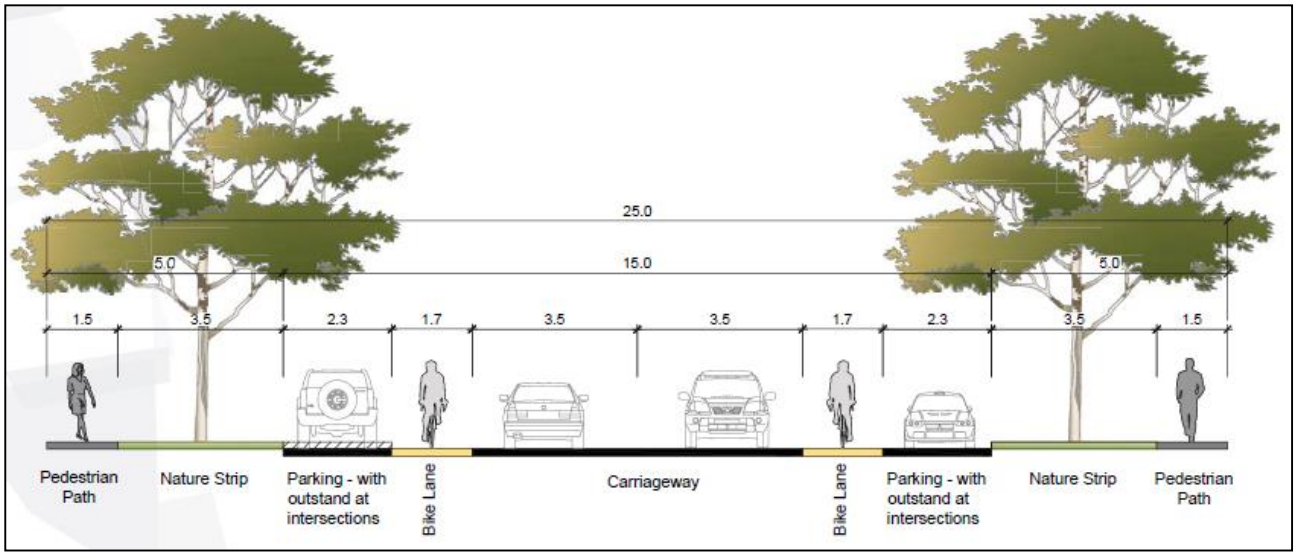


Figure 5-4 Access Street Level 2: 20m (Typically 2,000-3,000vpd)

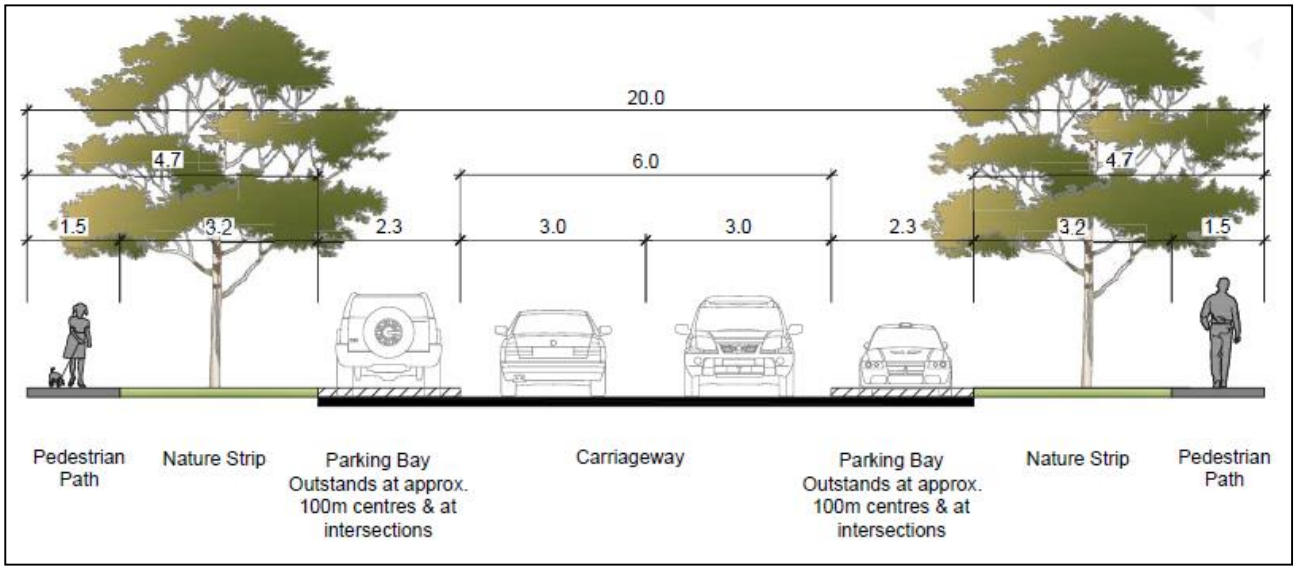
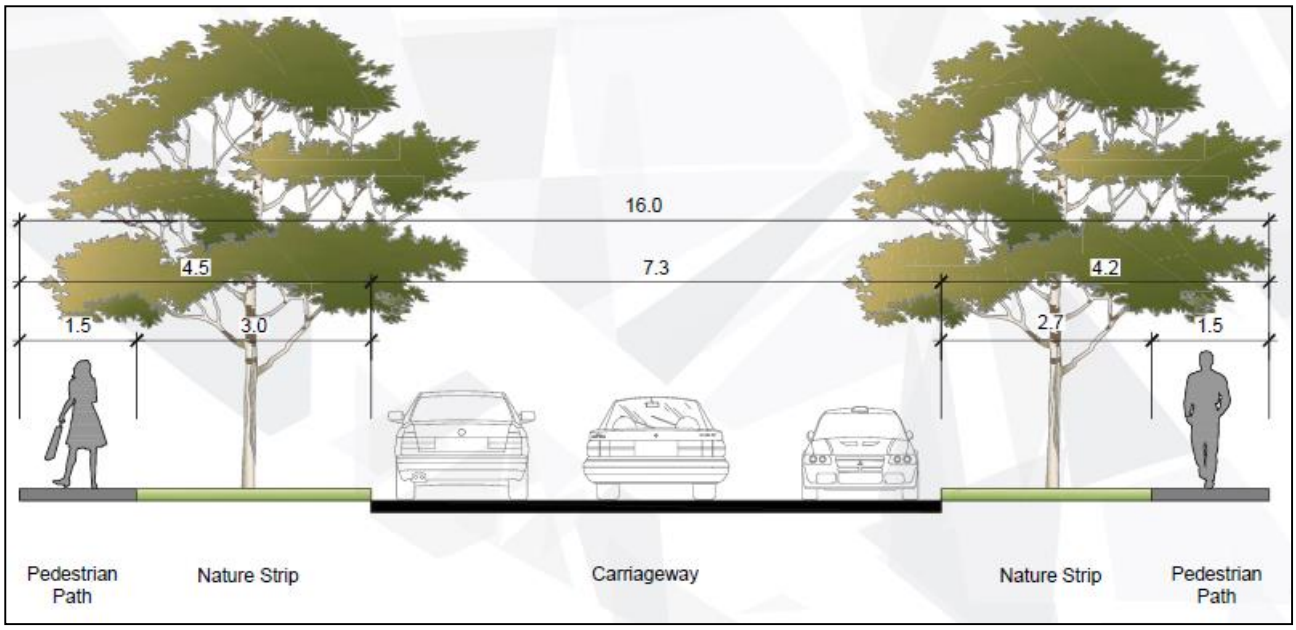


Figure 5-5 Access Place/Access Street Level 1: 16m (Typically <2,000vpd)



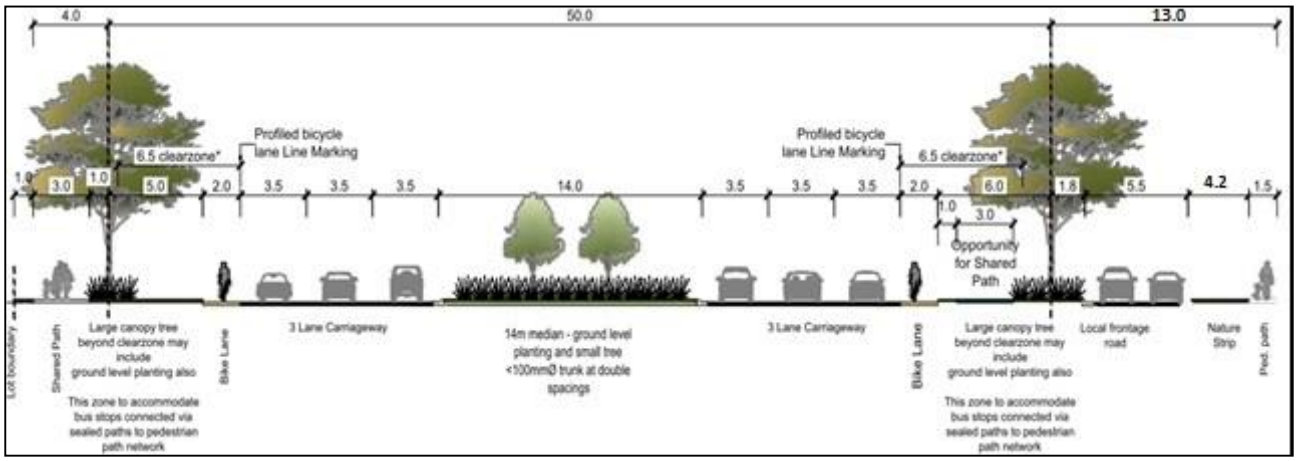
5.4 External Road Layout

5.4.1 Mickleham Road

Mickleham Road currently provides for a 2 lane carriageway with one lane in each direction, within a road reserve of approximately 50 metres

In the future it is anticipated that Mickleham Road will be duplicated to form a 6 lane Primary Arterial Road. It is noted the ultimate design of Mickleham Road accords with the cross section contemplated within the Merrifield PSP as illustrated in Figure 5-6.

Figure 5-6 Mickleham Road: 6 Lane Primary Arterial - 50m (Typically >40,000vpd)



5.4.2 Mt Ridley Road

In the future Mt Ridley Road will be duplicated to cater for a 6 lane Primary Arterial with a road reserve of 41 metres.

We understand that there is a setback requirement of about 20 metres that applies to the Lindum Vale land to allow for the future road widening.

Mt Ridley will be constructed in two (2) stages with an interim and ultimate design response. The interim and ultimate road cross sections are illustrated in Figure 5-7 and Figure 5-8.

Figure 5-7 Mt Ridley Road: Interim Road Cross Section

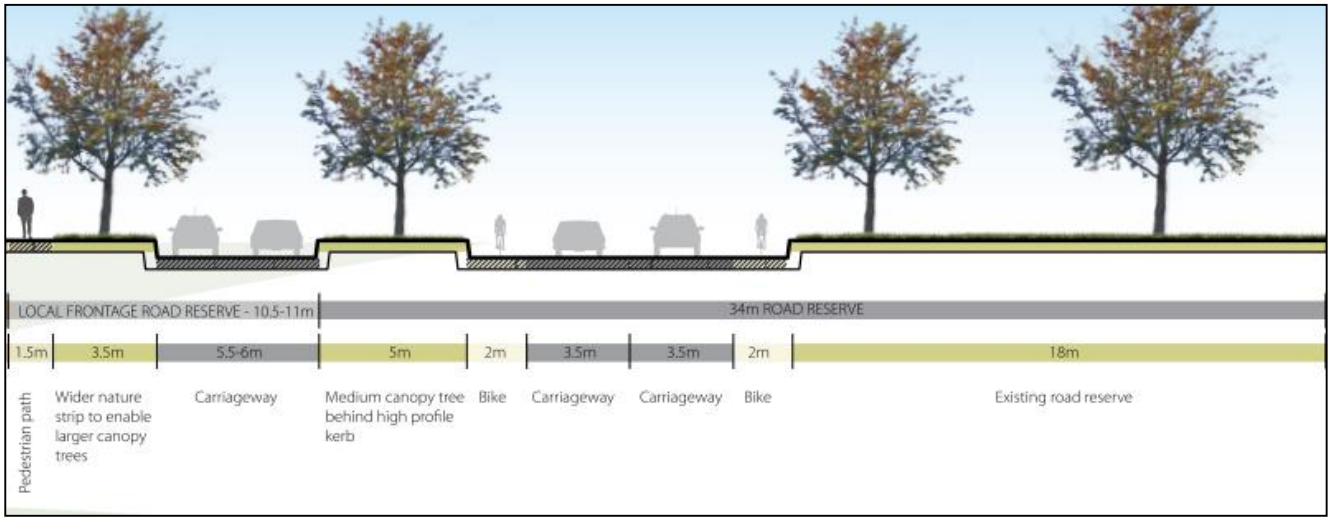
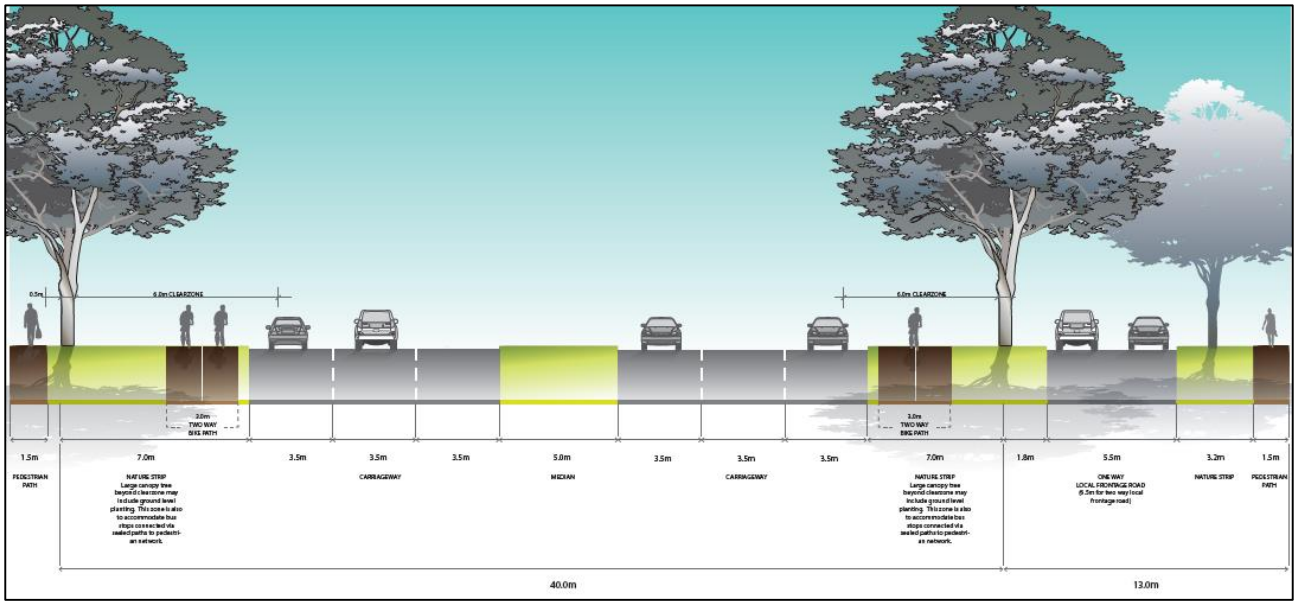


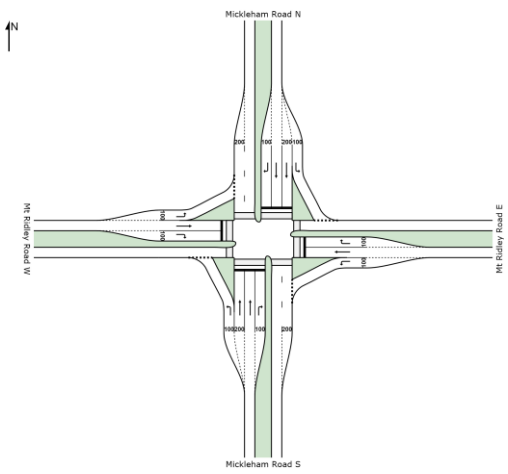
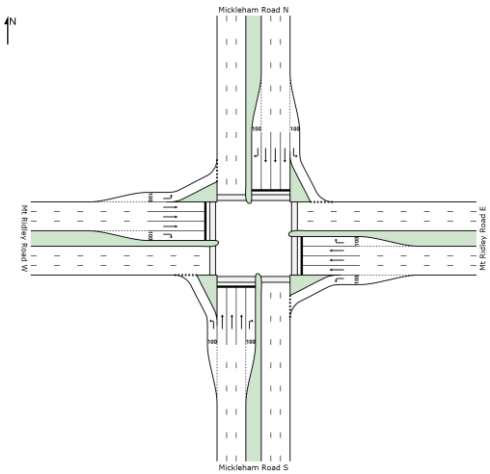
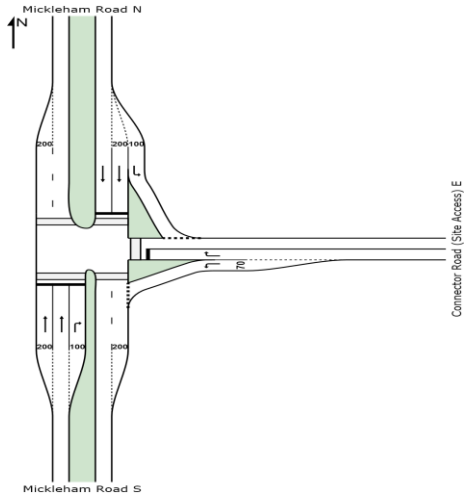
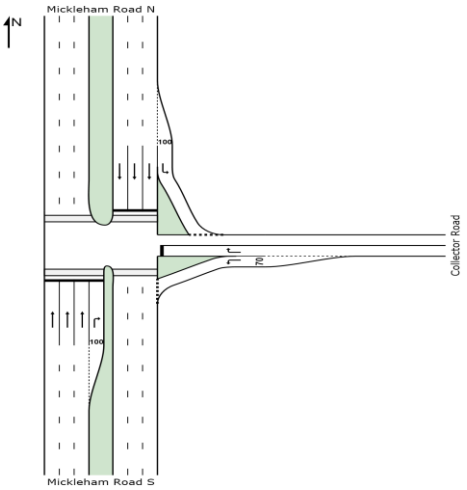
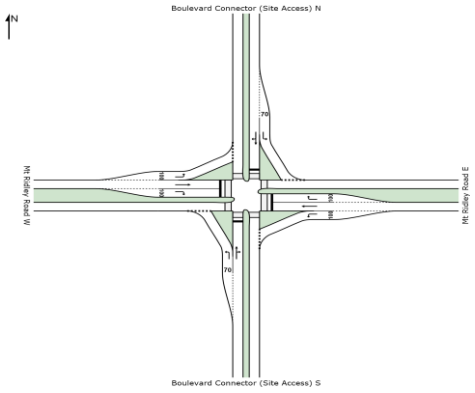
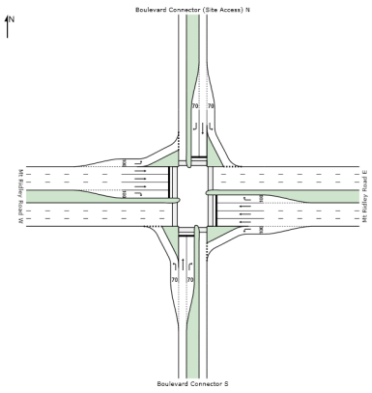
Figure 5-8 Mt Ridley Road: Ultimate Road Cross Section



5.5 Anticipated Interim and Ultimate Intersection Layouts (Lindum Vale)

Table 6-3 illustrates the anticipated interim and ultimate intersection layouts as part of the proposed Lindum Vale development.

Table 5-2 Interim Vs Ultimate Intersection Layouts (Lindum Vale – Proposed Intersections)

Intersection	Interim Layout (2031)	Ultimate Layout (2046)
Lindum Vale – Proposed Intersections		
Mickleham Road / Mt Ridley Road		
	Change- Duplication of Mickleham Road and Mt Ridley Road Auxiliary left turn lane (eastern approach)	
Mickleham Road / Connector Road.		
	Change- Duplication of Mickleham Road	
Mt Ridley Road / Blvd Connector		
	Change- Duplication of Mt Ridley Road Auxilliary right turn lane (northern and southern approach)	

5.6 Bicycle and Pedestrian Links

In addition to footpaths being provided on either side of all internal roads and bicycle lanes along the collector roads, a network of passive open space linkages along parks and drainage corridors within the site will provide strategic connections to adjacent PSP areas including active recreational areas such as the Mt. Ridley Woodland Park and the Kalkallo Retarding Basin.

Figure 5-9 illustrates the proposed network of passive open space linkages. These links will encourage residents to walk and cycle to key destination locations in the area.

Figure 5-9 Major Pedestrian and Bicycle Links

Concept Urban Structure Plan – Subject to Change

5.7 Public Transport

As noted in the SMEC report, principal public transport infrastructure has been planned along the E14 / Aitken Boulevard from the south, turning eastwards through the MTC and then north to the Beveridge Major Town Centre.

These routes will be serviced by a high frequency bus services along clearly demarcated bus routes. Bus drop-off and pick-up points will be located near the MTC retail area. There is also potential for buses to loop further west into the Merrifield PSP and the Lindum Vale land to ensure that the maximum desirable 400 metre walking distance to bus stops is achieved. Figure 5-10 illustrates the potential bus routes within the Merrifield PSP and the Lindum Vale land.

Figure 5-10 Public Transport Routes - Ultimate Scenario

Concept Urban Structure Plan – Subject to Change

6 Traffic Considerations

6.1 Merrifield West PSP and Associated Traffic Model

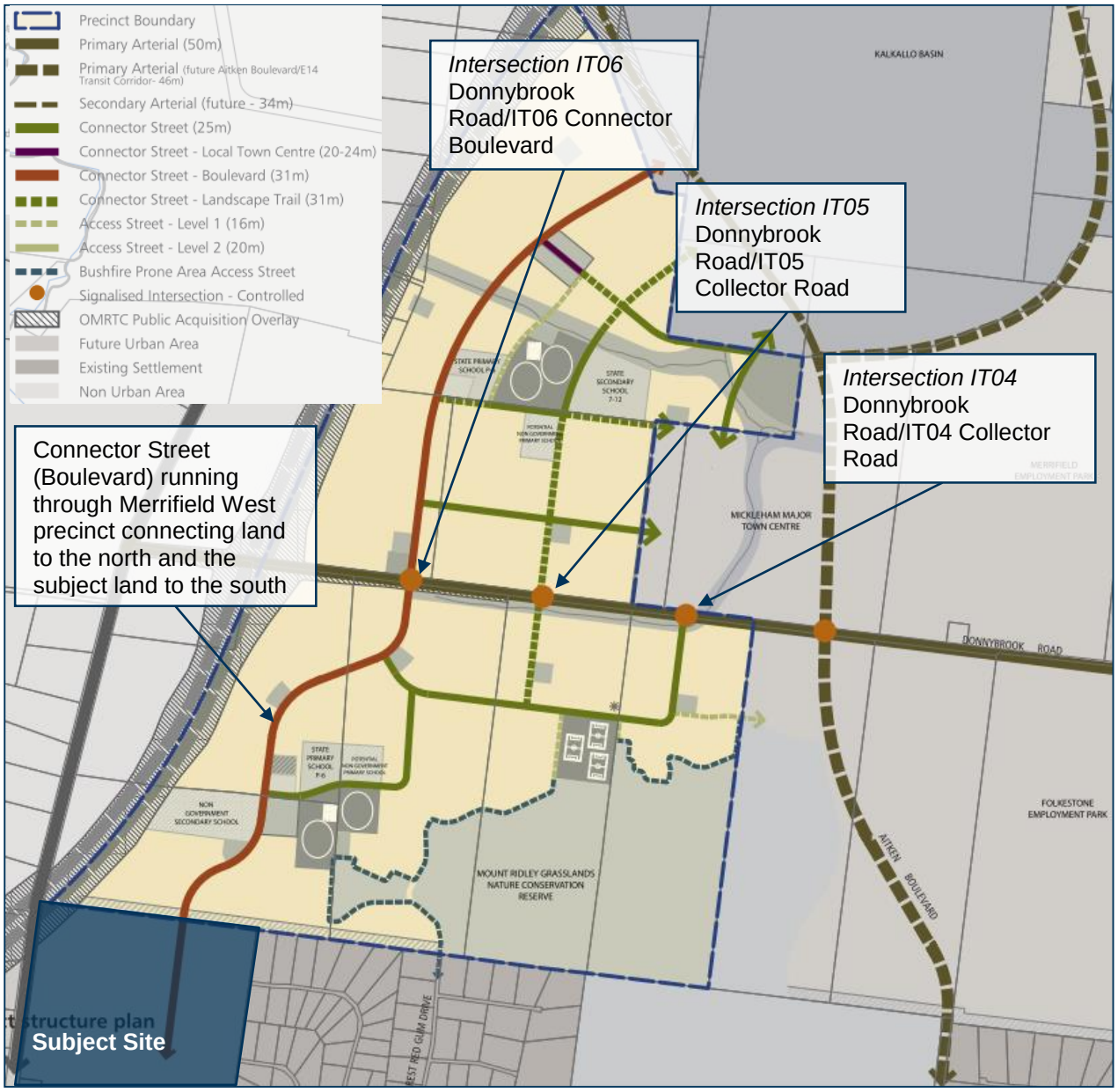
The Merrifield West PSP is located to the north of the subject site and will yield approximately 6,877 lots.

The precinct will be accessed via the Hume Freeway and OMR (to be constructed in the future). Regional arterial roads servicing the precinct include Donnybrook Road, which will provide a link between OMR, Aitken Boulevard and Hume Highway.

A connector street (requiring a 31 metre road reserve) will run the length of the Merrifield precinct connecting land to the north and the subject site to the south. Potential bus services may operate via this road with on-road bicycle paths on both sides. Additionally three controlled signalised intersections are proposed along Donnybrook Road as part of the Merrifield West PSP, all to the north of the subject site.

The Merrifield PSP road network is outlined in Figure 6-1.

Figure 6-1 Merrifield PSP- Road Network



6.1.2 Interim Design Year, 2031

An interim traffic model prepared by the City of Hume for the development of the land within Merrifield West considers a 2031 design period. The model provides daily traffic volumes, with the AM and PM peak period volumes extrapolated as 10% of the daily volumes.

As agreed with the MPA, the distribution of traffic throughout the road network replicates analysis previously conducted by SMEC, with the following distributions adopted for the AM peak period.

> Mt Ridley Road: 70% of movements to the west and 30% to the east,

> Donnybrook Road: 70% of movements to the east and 30% to the west,

> Mickleham Road, Collector Roads and Boulevards: 70% of traffic movements to the south and 30% to the north.

For the PM peak period, traffic distributions are transposed accordingly.

The Merrifield West 2031 interim traffic model is outlined in Figure 6-2, with the AM and PM peak traffic flows at the critical intersections illustrated in Figure 6-3.

Figure 6-2 2031 Interim Traffic Model - Daily Volumes

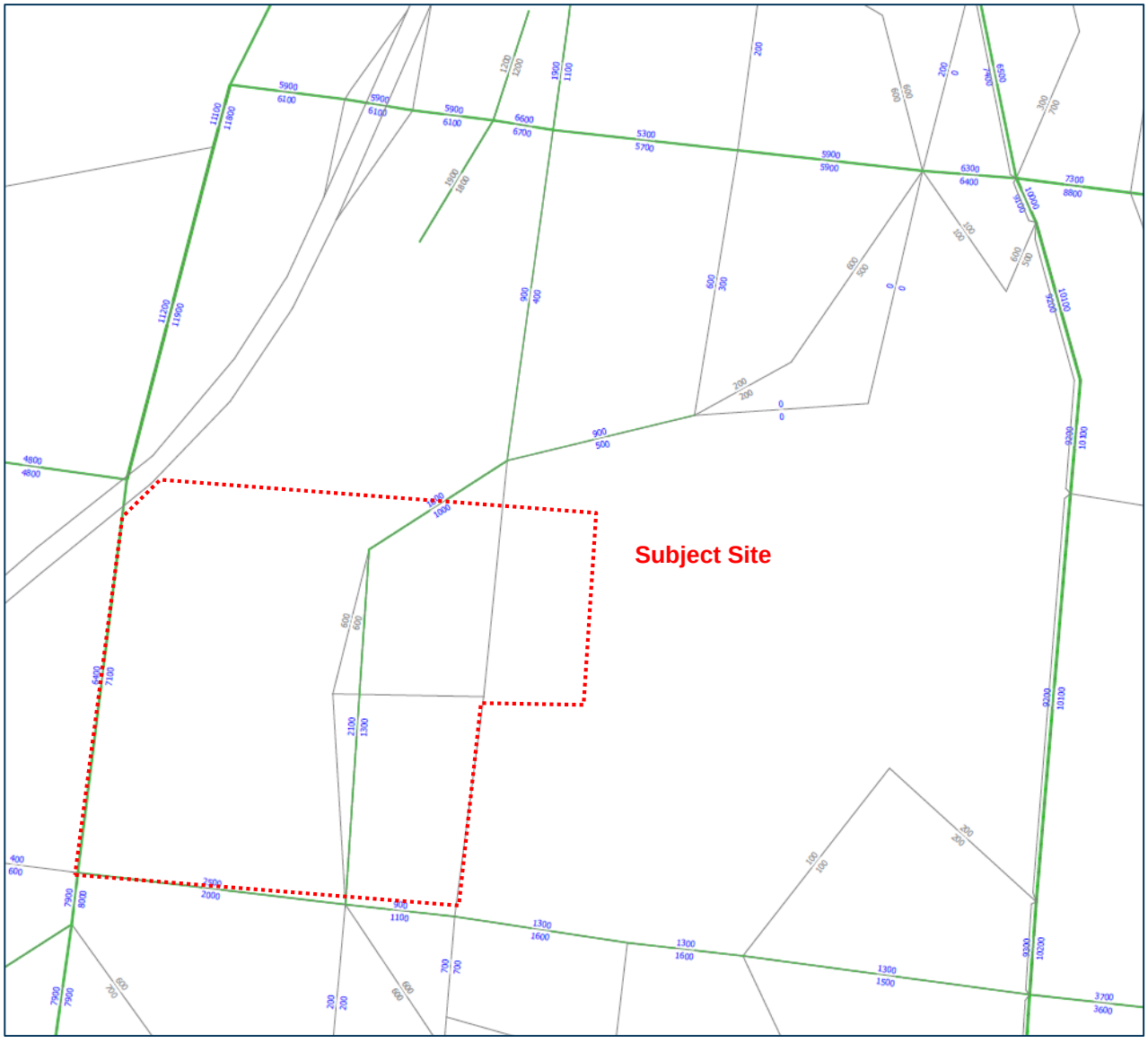
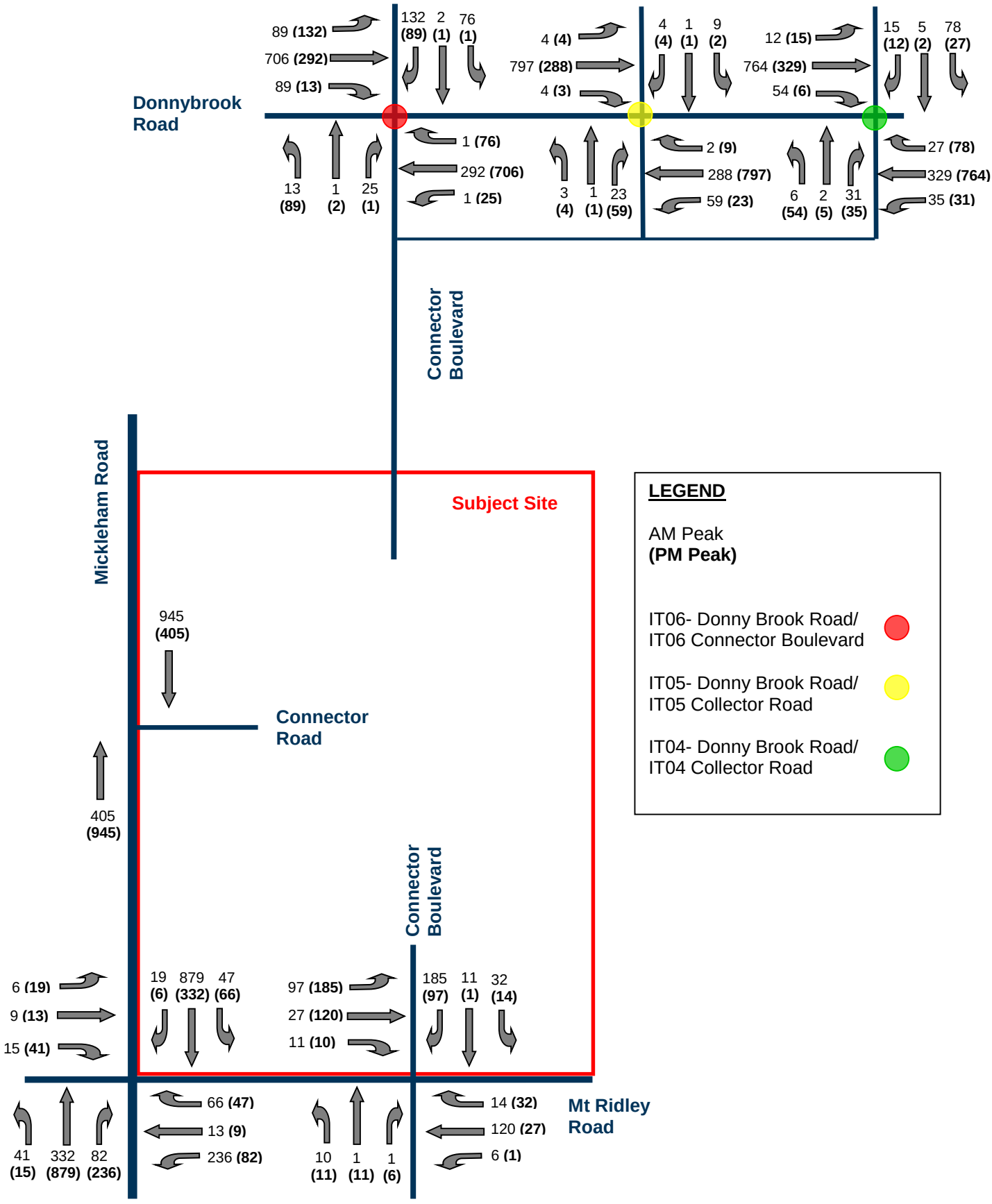


Figure 6-3 2031 Interim AM & PM Peak Traffic Flows



6.1.3 Ultimate Design Year, 2046

An ultimate traffic model prepared by SMEC for the development of the land within Merrifield West considers a 2046 design period, with the ultimate model accounting for the construction of the OMR.

Within the traffic modelling, the potential land uses within the Merrifield PSP area were developed in conjunction with the GAA, Council and Vic Roads.

The Merrifield West PSP 2046 traffic model is outlined in Figure 6-4 and Figure 6-5 with the AM and PM peak traffic flows at the critical intersections illustrated in Figure 6-6.

Figure 6-4 Merrifield West PSP 2046 Ultimate Traffic Model- AM Peak Hour Volumes

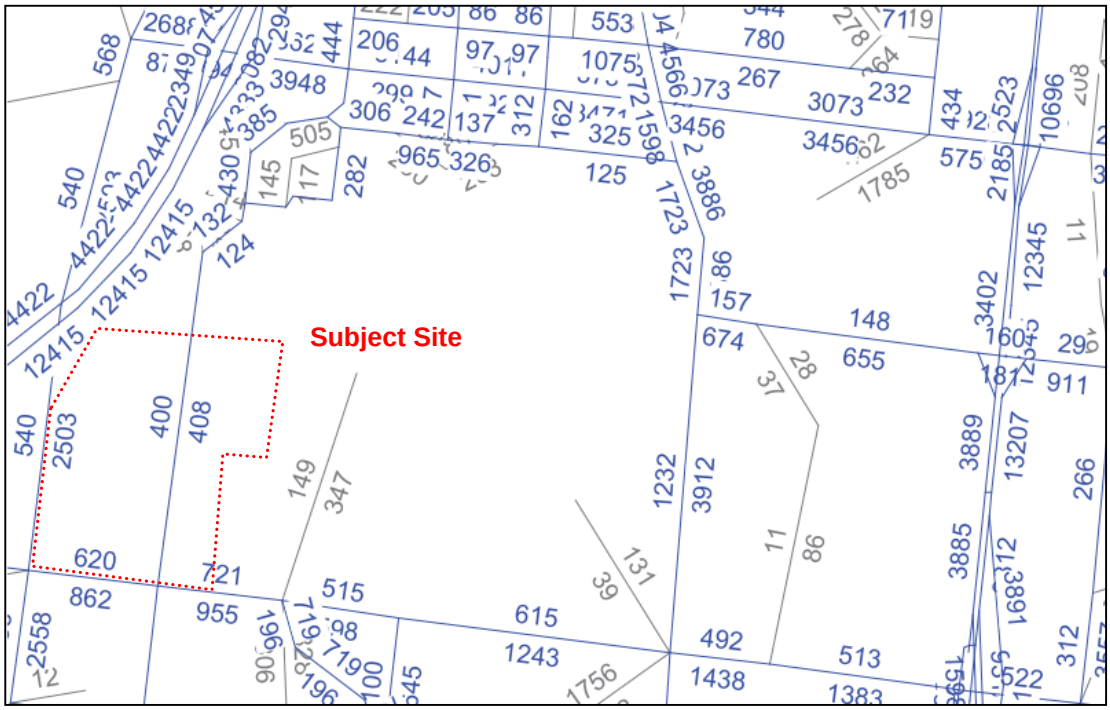


Figure 6-5 Merrifield West PSP 2046 Ultimate Traffic Model – Daily Volumes

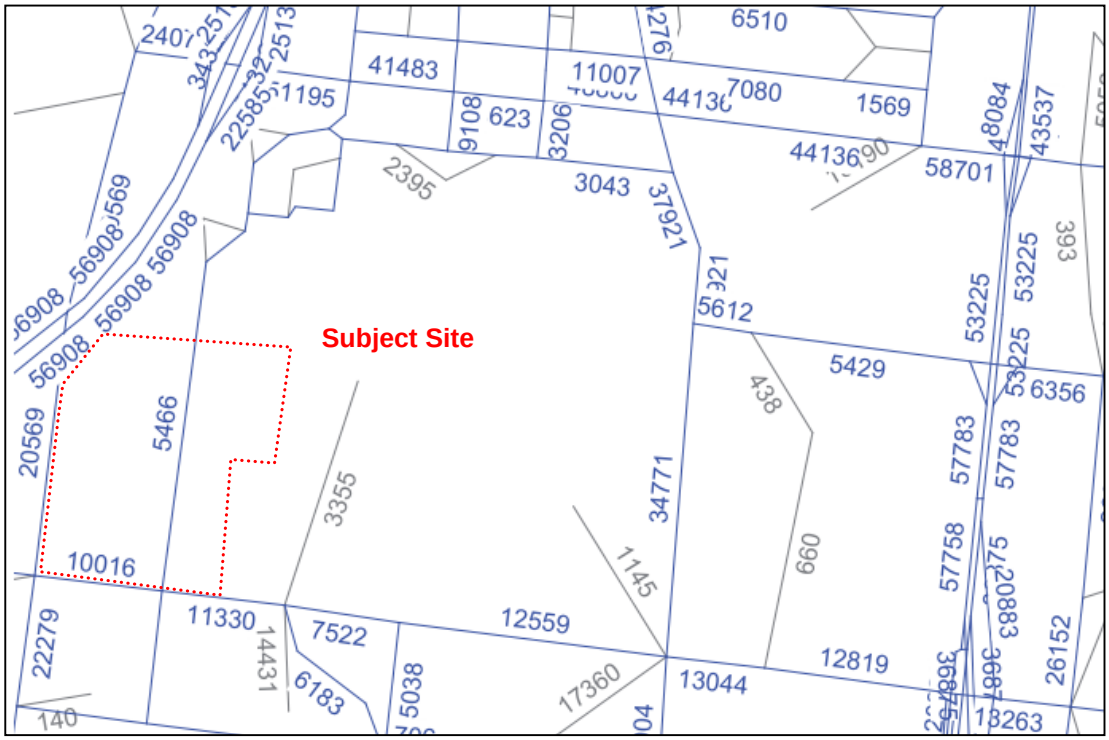
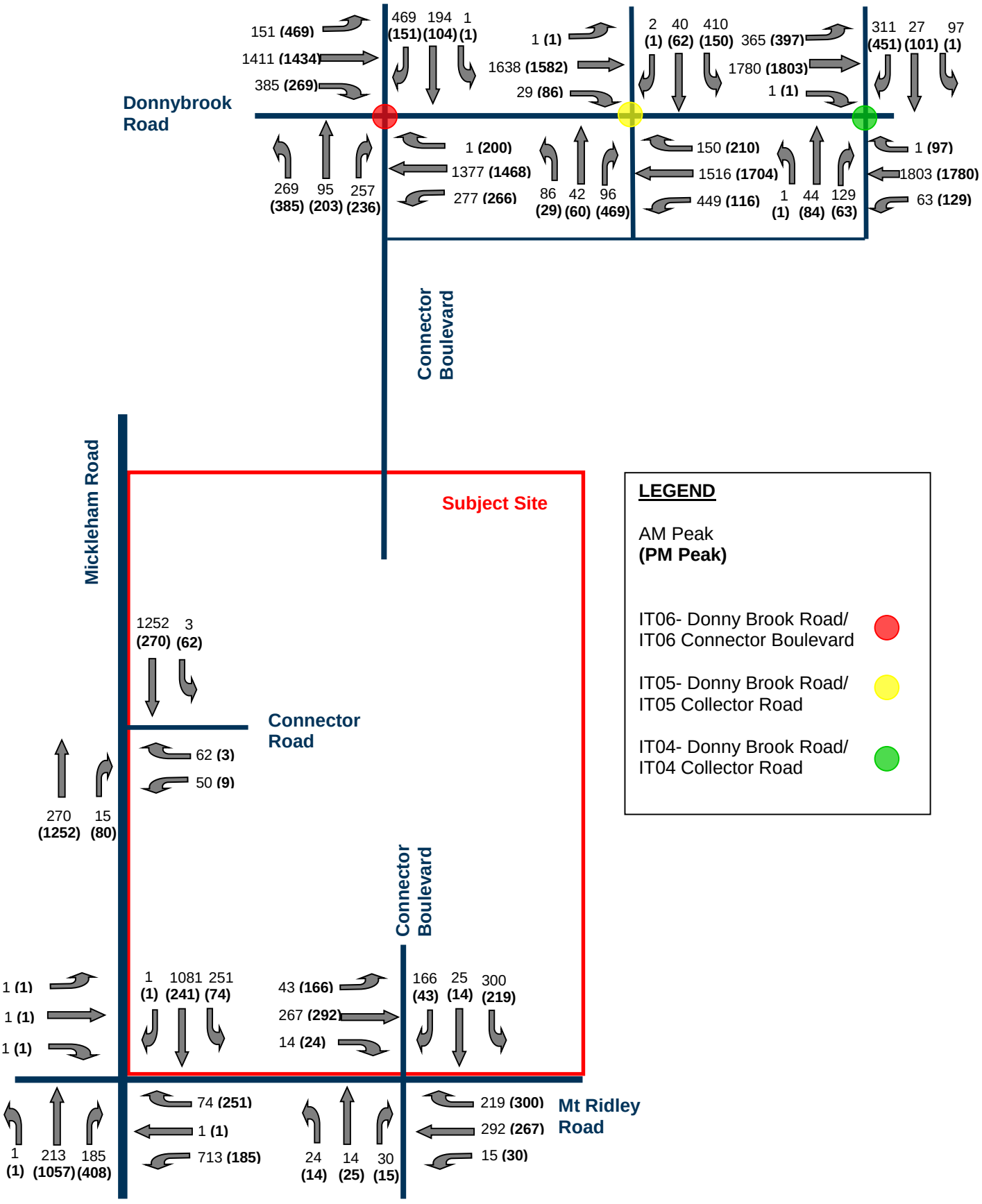


Figure 6-6 2046 Ultimate AM & PM Peak Traffic Flows



6.2 Lindum Vale PSP

6.2.1 Traffic Generation

The 'Merrifield West Precinct Structure Plan Traffic and Transport Impact Assessment' dated 2 July 2012, prepared by SMEC, adopted a peak hour traffic generation rate of 0.85 vehicle movement per hour for standard residential lots, or approximately 8.5 vehicle movements per day per lot.

Based on the above and assuming the subject land is developed with a yield of about 1,600 dwellings, it is projected that such a development would generate 13,600 vehicle movements per day, inclusive of 1,360 vehicle movements in each peak hour.

It has been assumed in the AM peak hour approximately 20% of movements are arrivals and 80% departures. For the PM peak hour, the volumes have been transposed to reflect 80% of movements as arrivals and 20% departures.

Based on the above, the following directional splits during the AM and PM peak hours have been adopted for the subject site.

Table 6-1 Anticipated Traffic Generation

Period	Arrivals	Departures	Total
AM Peak Hour	272	1,088	1,360
PM Peak Hour	1,088	272	1,360

6.2.2 Traffic Distribution

Vehicle trip purpose has been sourced from the Department of Transport VISTA 2007 (Victorian Integrated Survey of Travel and Activity), with the following trip purposes adopted.

- Work 40 percent
- Shopping 20 percent
- Education 9 percent
- Recreation 6 percent
- Other 25 percent

Vehicle trips have then been distributed considering internal and external destinations (such as employment centres, local and major shopping destinations, recreational destinations and schools and other education centres), with the resultant distribution matrix shown in Table 6-2.

Table 6-2 Traffic Distribution Matrix

Trip Purpose	External			Internal	Total
	North	East	South		
Work	24%	12%	4%	0%	**40%**
Shopping	10%	0%	9%	1%	**20%**
Education	6.3%	0.9%	1.8%	0%	**9%**
Recreation	3%	0%	2.4%	0.6%	**6%**
Other	6.7%	6.7%	6.7%	4.9%	**25%**
Total	**50.00%**	**19.60%**	**23.90%**	**6.50%**	**100%**

Based on the above, Figure 6-7 and Figure 6-8 have been prepared to show the anticipated peak hour volumes at the proposed site connections to Mickleham Road and Mt Ridley Road. Additionally and given that about 50% of the development traffic is anticipated to have destinations to the north, consideration has also been given to the likely impact of the development traffic to the intersections been Donnybrook Road / Connector Boulevard (IT06), Donnybrook Road / Collector Road (IT05) and Donnybrook Road / Collector Road (IT04)

Figure 6-7 Anticipated Development Traffic (AM Peak Period)

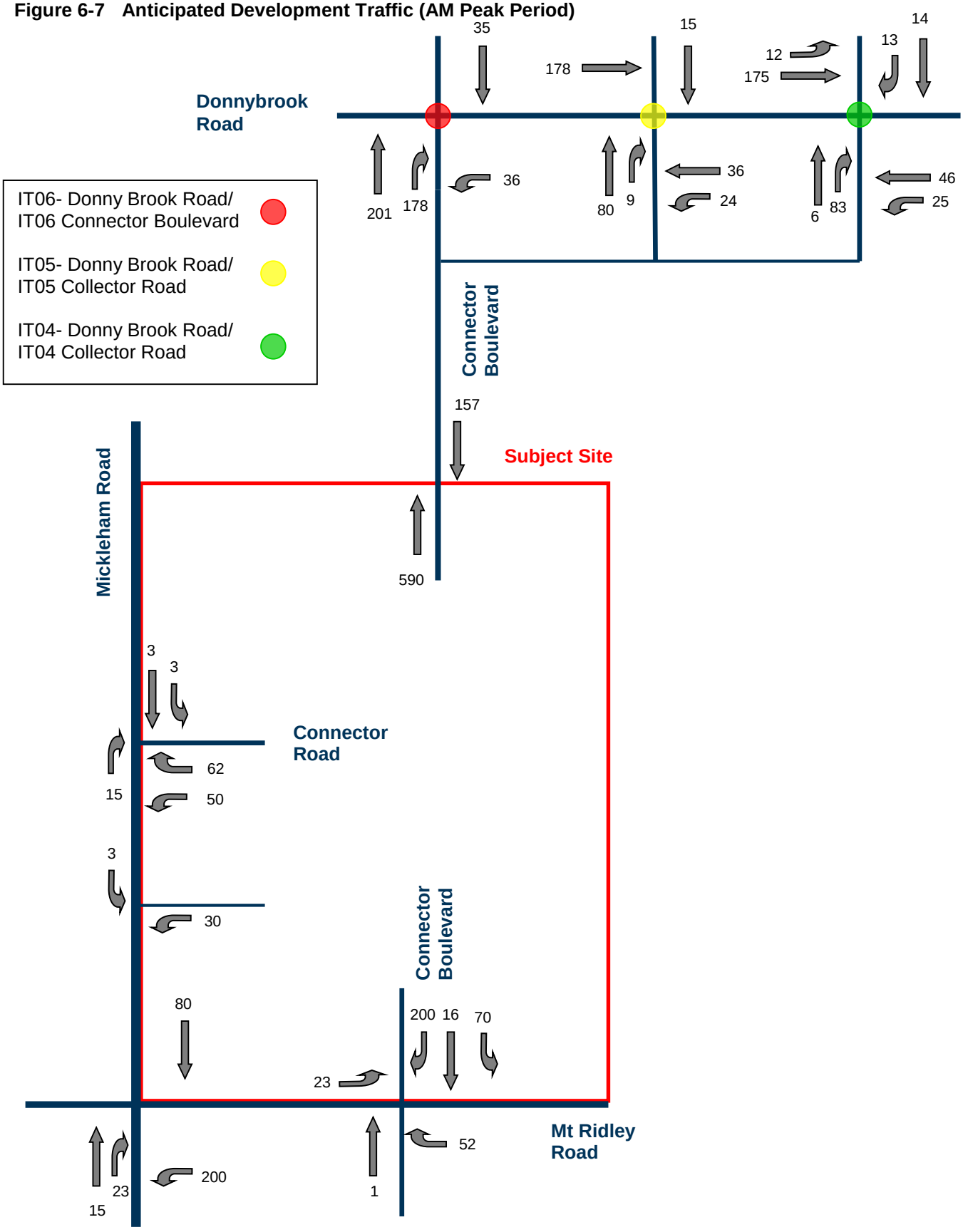
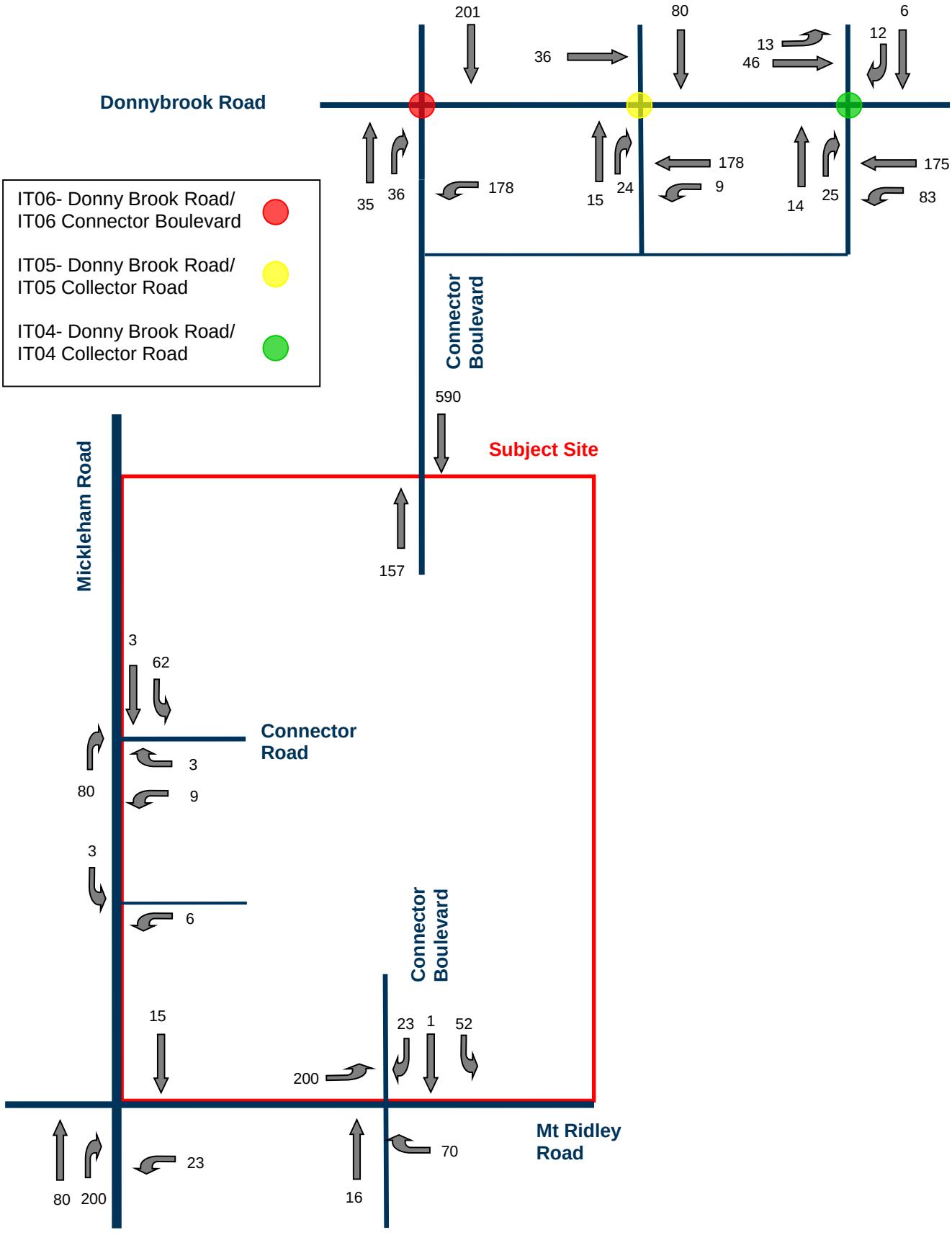


Figure 6-8 Anticipated Development Traffic (PM Peak Period)

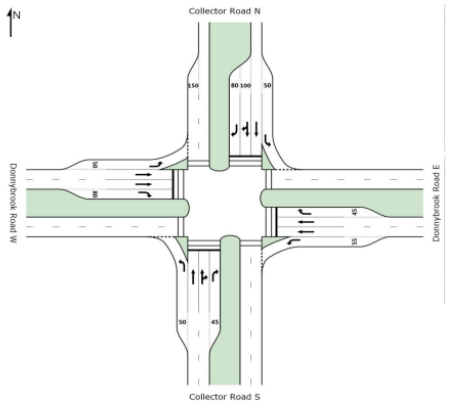
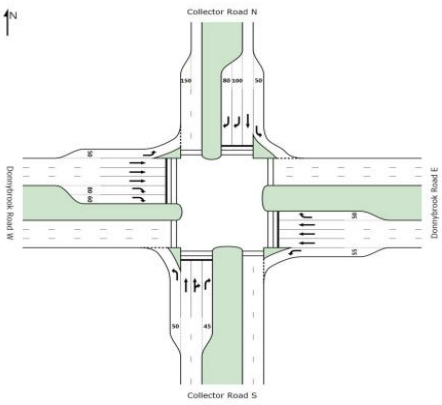
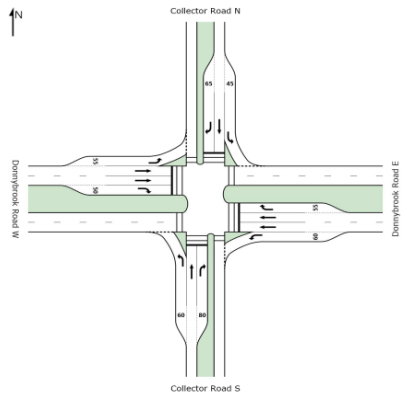
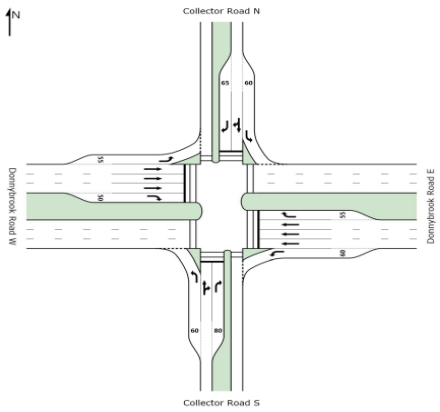
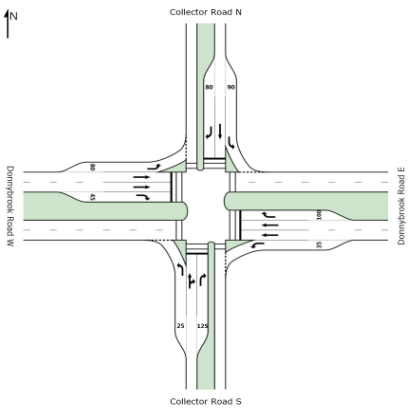
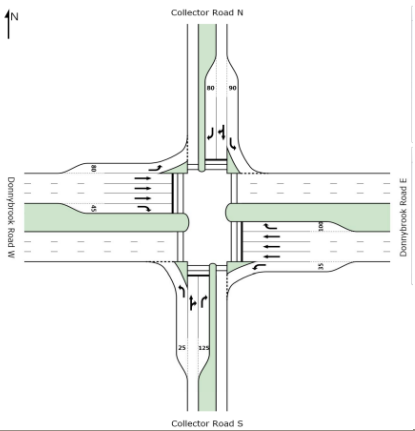


6.3 Anticipated Interim and Ultimate Intersection Layouts (Merrifield West)

As outlined above, given that about half of the traffic associated with the Lindum Vale development is anticipated to have destinations to the north, consideration has been given to the likely impacts of the additional traffic to the intersections been Donnybrook Road / Connector Boulevard (IT06), Donnybrook Road / Collector Road (IT05) and Donnybrook Road / Collector Road (IT04)

Table 6-3 outlines the differences between the three DCP intersections along Donnybrook Road (within the Merrifield PSP) in the interim and ultimate as contemplated in the SMEC Report.

Table 6-3 Interim Vs Ultimate Intersection Layouts (Merrifield DCP Intersections)

Intersection	Interim Layout (2031)	Ultimate Layout (2046)
Merrifield DCP Intersections – Donnybrook Road		
Donnybrook Road / IT06		
	Change-Duplication of Donnybrook Road, Lane designation on north approach.	
Donnybrook Road / IT05		
	Change-Duplication of Donnybrook Road, Lane designation on north and south approaches.	
Donnybrook Road / IT04		
	Change- Duplication of Donnybrook Road, Lane designation on north approach.	

6.4 Traffic Impact- Intersection Operation

To determine the impacts the additional traffic associated with the site will have to the surrounding road network the external signalised intersections have been assessed using the SIDRA intersection modelling software package.

SIDRA Intersection is a computer package, originally developed by the Australian Road Research Board that provides 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 outlined below:

- DoS < 0.6 Excellent operating conditions
- 0.6 < DoS < 0.7 Very good operating conditions
- 0.7 < DoS < 0.8 Good operating conditions
- 0.8 < DoS < 0.9 Fair operating conditions
- 0.9 < DoS ≤ 1.0 Poor operating conditions
- DoS > 1.0 Very poor operating conditions

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 high peak periods, reflecting the 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.

The Average Delay represents the average time, in seconds, taken for each vehicle passing through the intersection to approach and enter the intersection.

A SIDRA assessment was undertaken of the following future proposed intersections for the interim (2031) and ultimate (2046) design periods:

- Mt Ridley Road / Mickleham Road
- Mt Ridley Road / Connector Boulevard (Site Access)
- Mickleham Road / Connector Road (Site Access)

Additionally, a SIDRA assessment was undertaken for the Merrifield West intersections for the interim (2031) and ultimate (2046) design periods:

- Donnybrook Road / Connector Boulevard (IT06)
- Donnybrook Road / Collector Road (IT05)
- Donnybrook Road / Collector Road (IT04)

Notably:

> The 2031 interim traffic flows for analysis have been developed by superimposing the 2031 base traffic flows summarised in Figure 6-3 to the projected development traffic summarised in Figure 6-7 and Figure 6-8. The combination of these traffic flows for the 2031 interim design period is demonstrated in Figure 6-9.

> The 2046 ultimate traffic flows for analysis have been developed by superimposing the 2046 base traffic flows summarised in Figure 6-6 to the projected development traffic summarised in Figure 6-7 and Figure 6-8. The combination of these traffic flows for the 2046 ultimate design period is demonstrated Figure 6-10.

  - This is considered a conservative approach because it is our understanding that the 2046 base flows developed by SMEC and summarised in Figure 6-6 considered traffic generated by the Lindum Vale land. However, for the purpose of providing a conservative assessment, the projected development

traffic as illustrated in Figure 6-7 and Figure 6-8 will be superimposed over these volumes and an assessment undertaken of the expected operating conditions.

It is noted that no geometrical changes were made to the intersection layouts contemplated as part of the Merrifield West PSP.

The resultant SIDRA outcomes and adopted intersection configurations are presented in Section Figure 6-10.

Figure 6-9 2031 Interim Base Traffic Flows + Development Traffic - AM & PM Peak

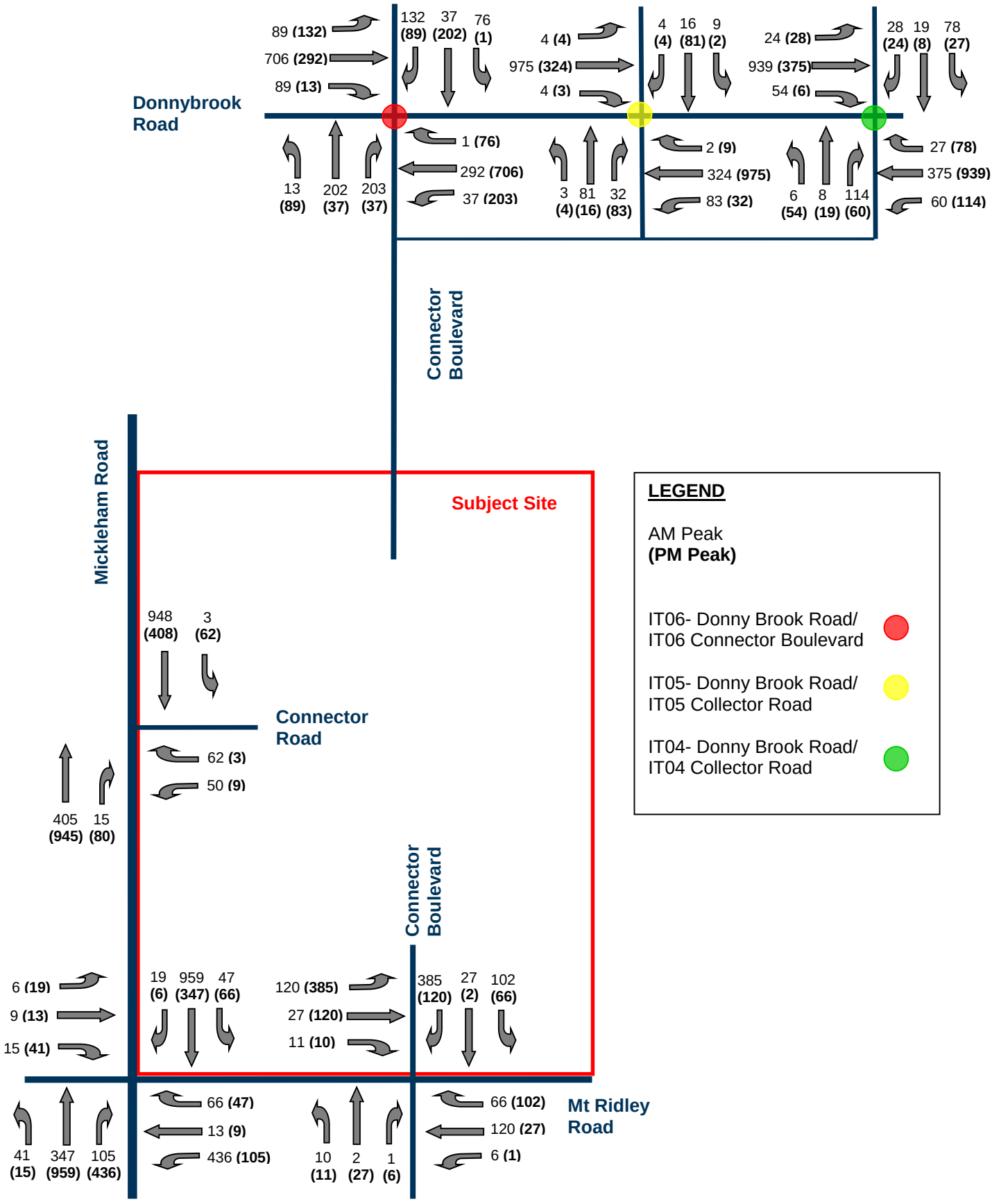
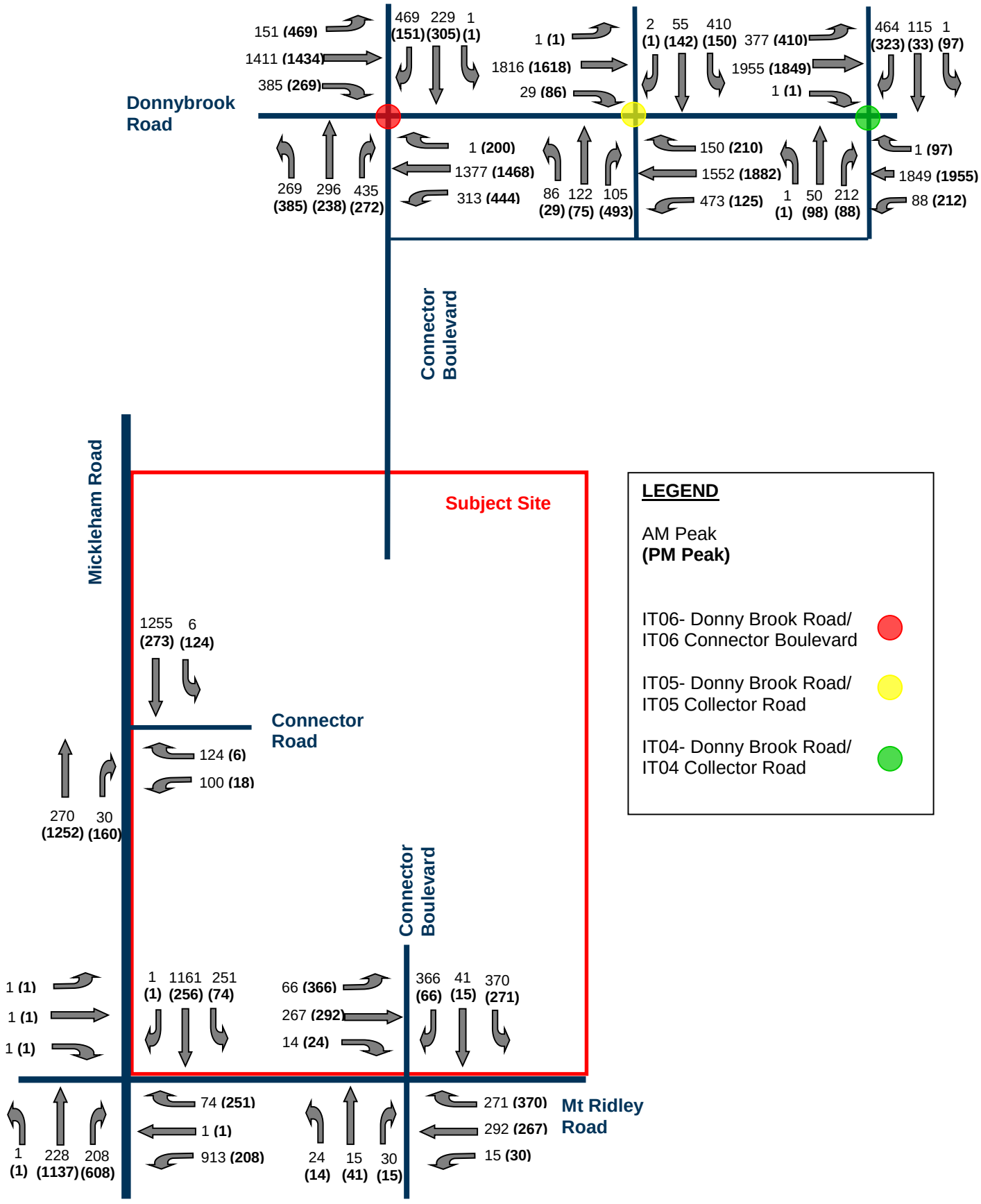


Figure 6-10 2046 Ultimate Base Flows + Development Traffic - AM & PM Peak



6.5 SIDRA Results and Intersection Configurations

6.5.1 Interim Intersection Assessment (2031)

6.5.1.1 Donnybrook Road / Collector Road (IT06)

Figure 6-11 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT06)- AM Period

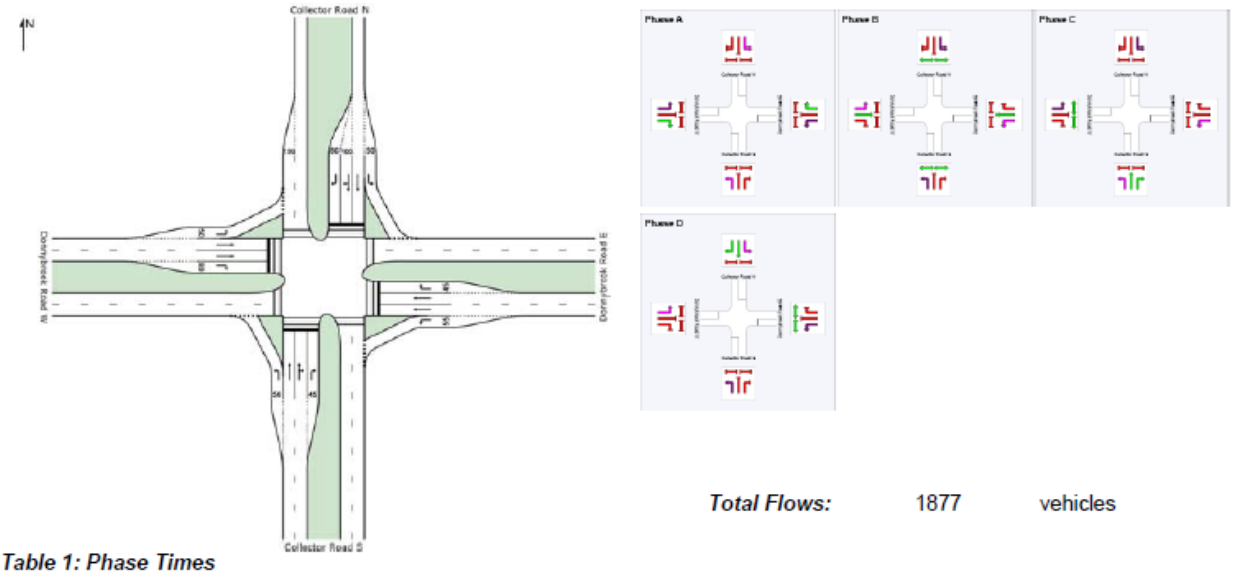


Table 1: Phase Times

Phs	Grn	Tot	%
A	13	19	16%
B	49	55	46%
C	21	27	23%
D	13	19	16%
	CL:	120	

Figure 3: Summary Results

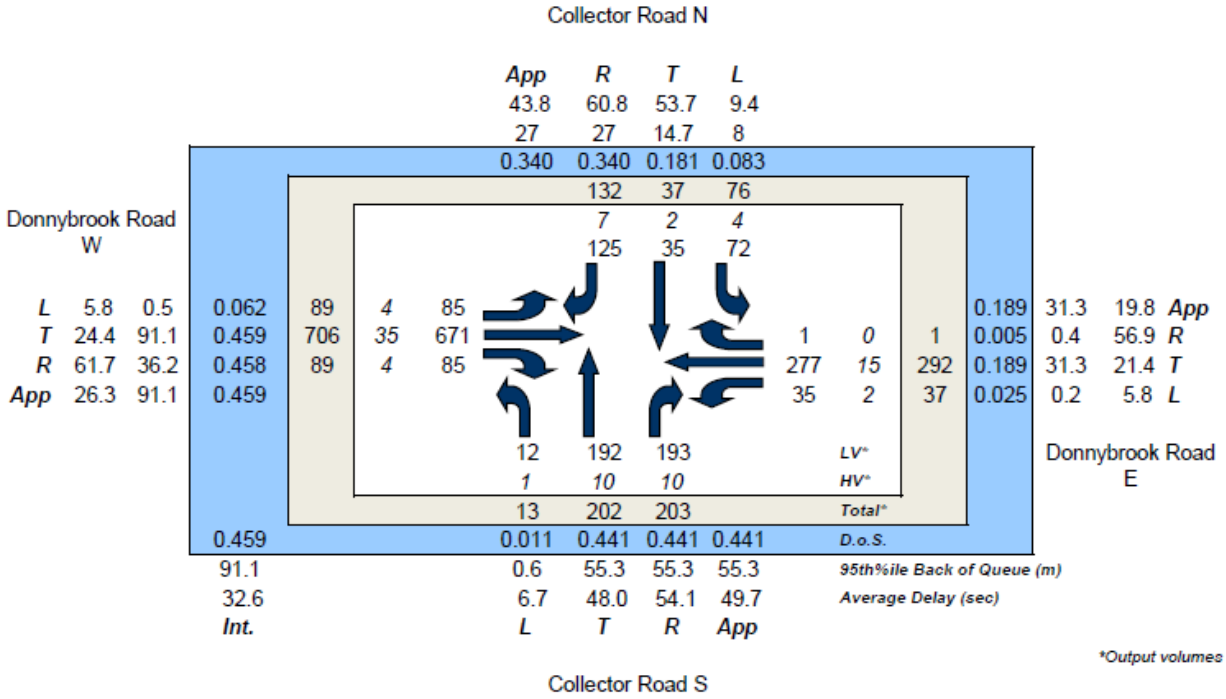
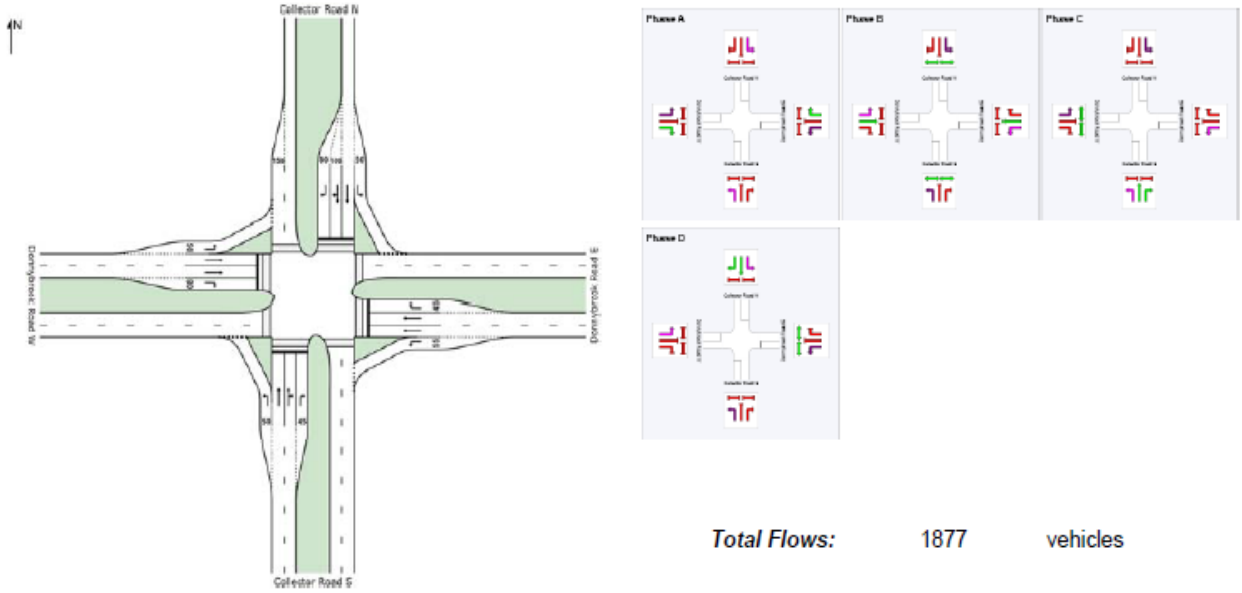


Figure 6-12 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT06)- PM Period



Total Flows: 1877 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	12	18	15%
B	56	62	52%
C	13	19	16%
D	15	21	18%
	CL:	120	

Figure 3: Summary Results

Collector Road N

				App	*R*	*T*	*L*						
				55.2	59.2	53.7	6.3						
				41	36.1	41.0	-						
				0.428	0.397	0.428	0.001						
					89	202	1						
Donnybrook Road W					*4*	*10*	*0*						
					85	192	1						
L	5.8	0.8	0.089	132	*7*	125					0.424	75.0	19.0 *App*
T	15.9	25.8	0.166	292	*15*	277		72	*4*	76	0.424	31	62.5 *R*
R	59.5	5	0.072	13	*1*	12		671	35	706	0.401	75	18.2 *T*
App	14.2	25.8	0.166					193	*10*	203	0.138	1.4	5.8 *L*
					85	35	35		*LV**			Donnybrook Road E	
					4	*2*	*2*		*HV**				
					89	37	37		*Total**				
			0.428		0.095	0.130	0.130	0.130	*D.o.S.*				
			75		7.5	10.3	10.3	10.3	*95th%ile Back of Queue (m)*				
			24.5		8.2	53.1	59.0	29.9	*Average Delay (sec)*				
			Int.		*L*	*T*	*R*	*App*					

**Output volumes*

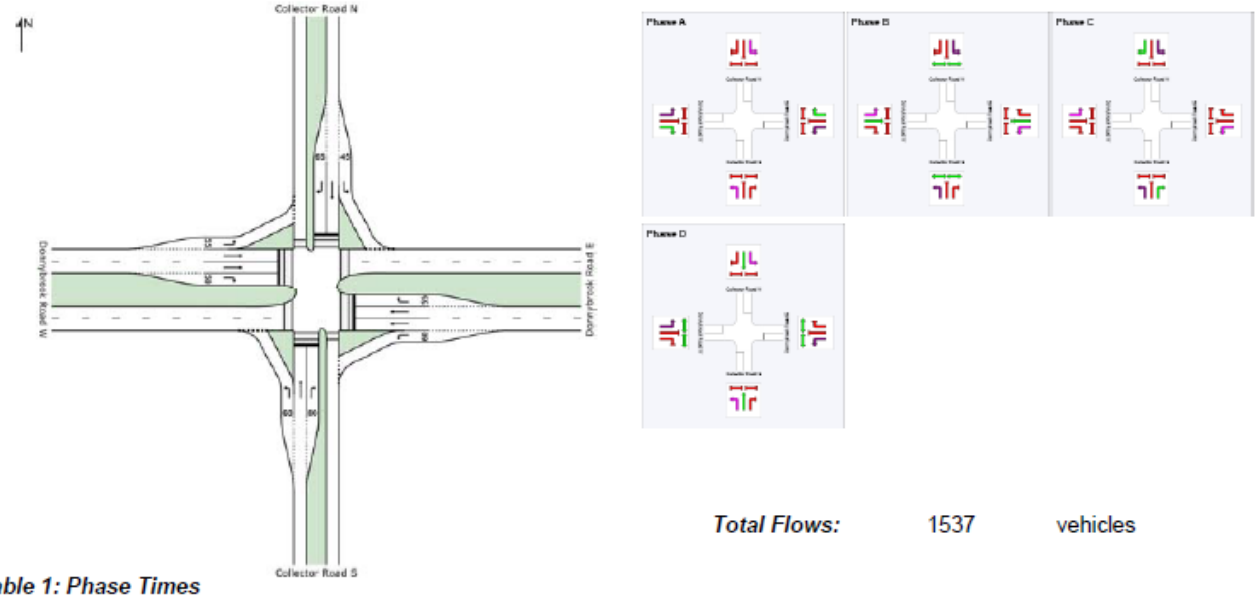
Collector Road S

The analysis shows that during both the AM and PM peak period, the intersection will operate satisfactorily with motorists experiencing manageable queues and delays. No material change to the operation of the intersection both during the AM and PM peak periods is expected.

Given the above, the intersection as contemplated by SMEC will not require any design changes.

6.5.1.2 Donnybrook Road / Collector Road (IT05)

Figure 6-13 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT05)- AM Period



Total Flows: 1537 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	6	12	10%
B	71	77	64%
C	6	12	10%
D	13	19	16%
	CL:	120	

Figure 3: Summary Results

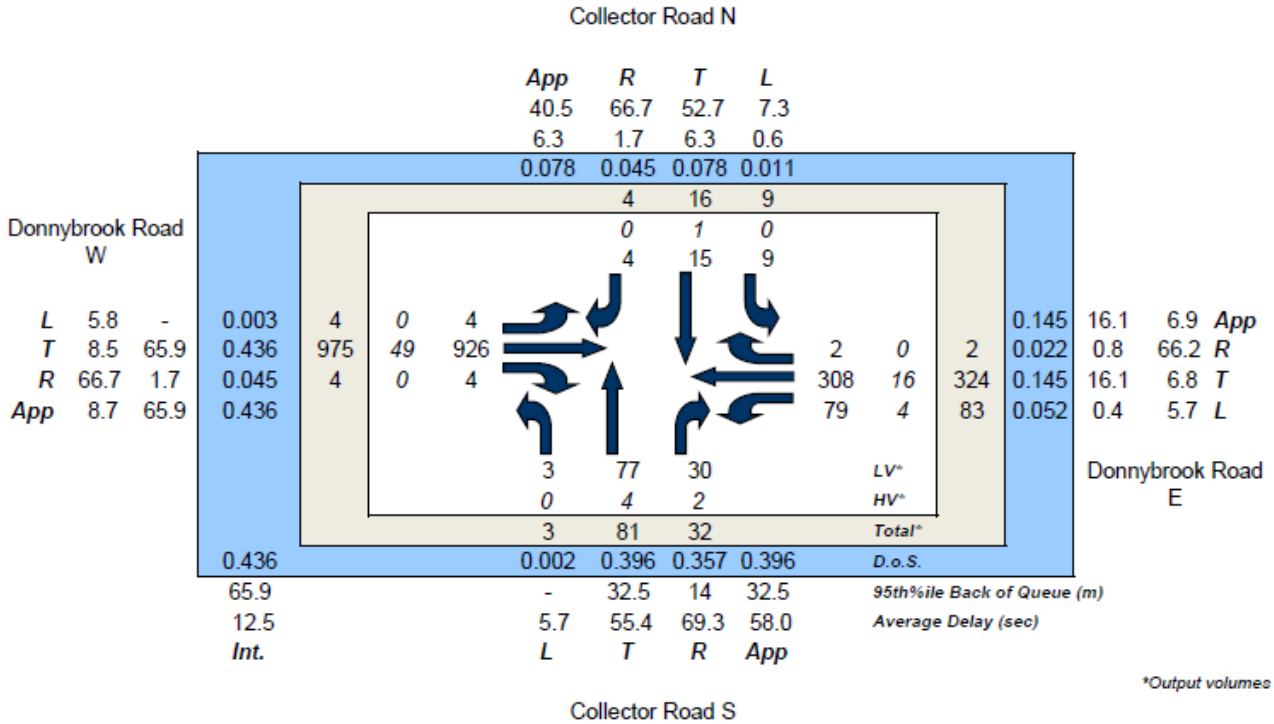
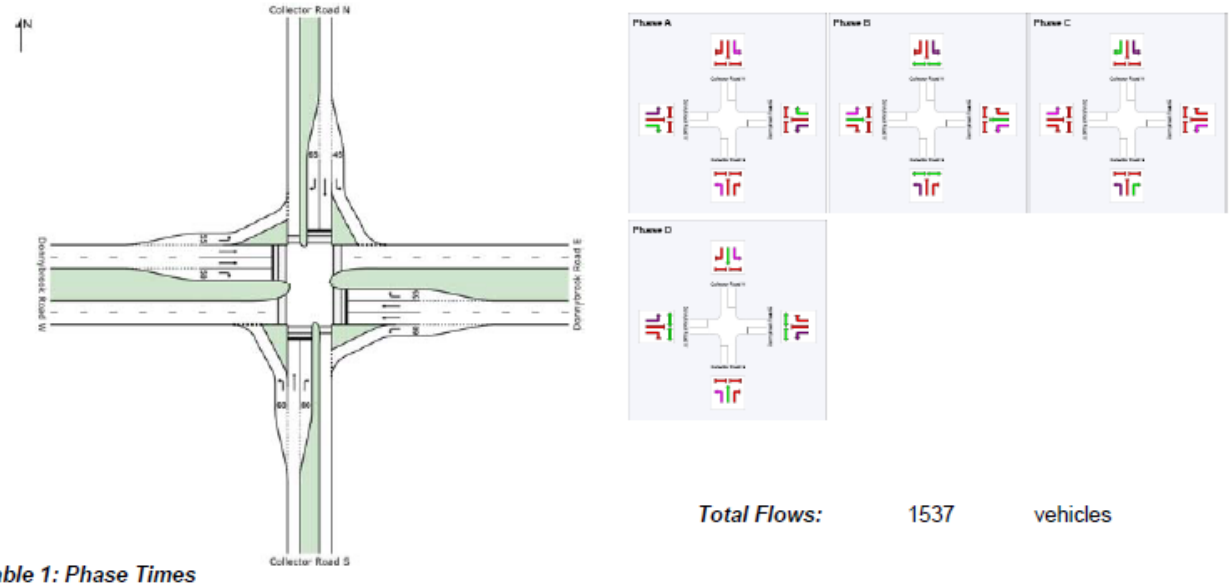


Figure 6-14 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT05)- PM Period



Total Flows: 1537 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	6	12	10%
B	65	71	59%
C	12	18	15%
D	13	19	16%
	CL:	120	

Figure 3: Summary Results

Collector Road N

	App	*R*	*T*	*L*									
	54.4	58.7	55.4	6.9									
	33.3	1.6	33.3	0.1									
	0.396	0.022	0.396	0.002									
		4	81	2									
		0	*4*	*0*									
		4	77	2									
L	6.0	0.1	0.003	4	*0*	4					0.483	126.9	18.1	*App*
T	14.5	34	0.158	324	*16*	308	9	*0*	9		0.100	3.9	67.5	*R*
R	66.5	1.3	0.033	3	*0*	3	926	*49*	975		0.483	127	18.0	*T*
App	14.9	34	0.158				30	*2*	32		0.021	1.2	6.3	*L*
					4	15	79			*LV**				
					0	*1*	*4*			*HV**				
					4	16	83			*Total**				
			0.483		0.005	0.078	0.463	0.463		*D.o.S.*				
			126.9		0.4	6.3	34.8	34.8		*95th%ile Back of Queue (m)*				
			22.2		8.6	52.7	62.7	59.1		*Average Delay (sec)*				
			Int.		*L*	*T*	*R*	*App*						

*Output volumes

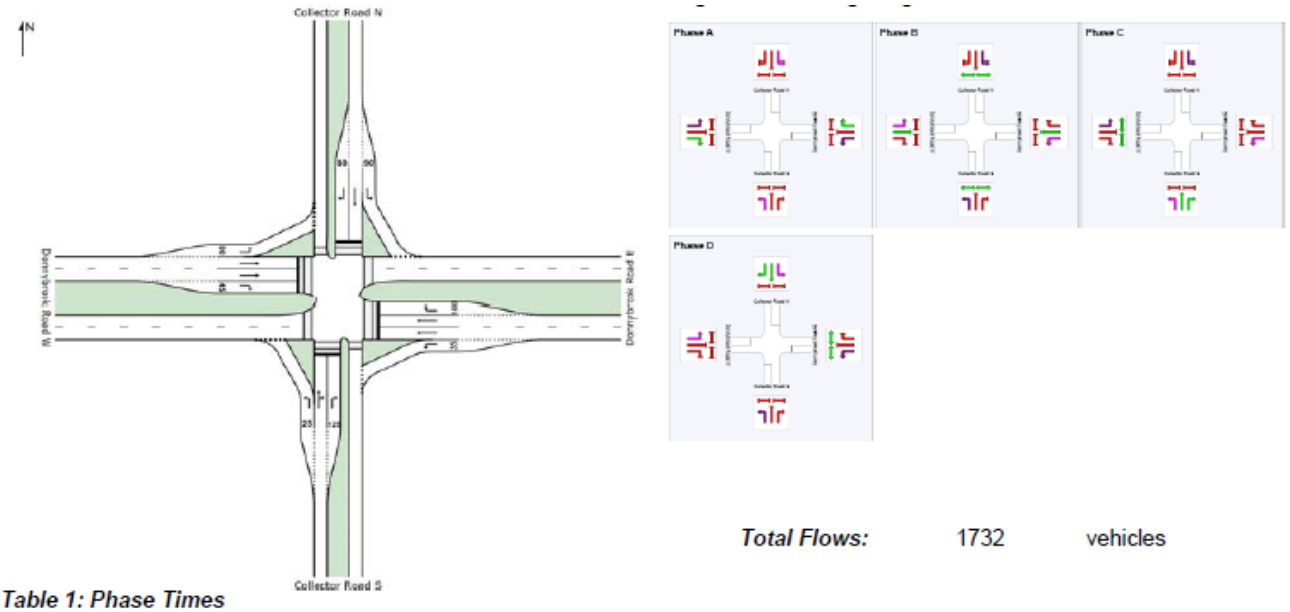
Collector Road S

The analysis shows that during both the AM and PM peak period, the intersection will operate satisfactorily with motorists experiencing manageable queues and delays. No material change to the operation of the intersection both during the AM and PM peak periods is expected.

Given the above, the intersection as contemplated by SMEC will not require any design changes.

6.5.1.3 Donnybrook Road / Collector Road (IT04)

Figure 6-15 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT04)- AM Period



Total Flows: 1732 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	8	14	12%
B	62	68	57%
C	13	19	16%
D	13	19	16%
	CL:	120	

Figure 3: Summary Results

Collector Road N

	App	*R*	*T*	*L*									
	27.5	59.1	52.8	10.0									
	11.1	11.1	7.5	8.9									
	0.144	0.144	0.093	0.096									
		28	19	78									
		1	*1*	*4*									
		27	18	74									
L 6.1 0.7	0.015	24	*1*	23							0.226	42.2	18.0 *App*
T 19.8 136	0.504	939	*47*	892			26	*1*	27		0.226	11.5	65.7 *R*
R 67.1 23.5	0.452	54	*3*	51			356	*19*	375		0.192	42.2	16.4 *T*
App 22.0 136	0.504						57	*3*	60		0.039	2.2	6.3 *L*
		6	8	108	*LV**								
		0	*0*	*6*	*HV**								
		6	8	114	*Total**								
0.504		0.005	0.313	0.313	0.313	*D.o.S.*							
135.5		0.3	24.9	24.9	24.9	*95th%ile Back of Queue (m)*							
24.0		6.7	54.9	60.5	57.7	*Average Delay (sec)*							
Int.		*L*	*T*	*R*	*App*								

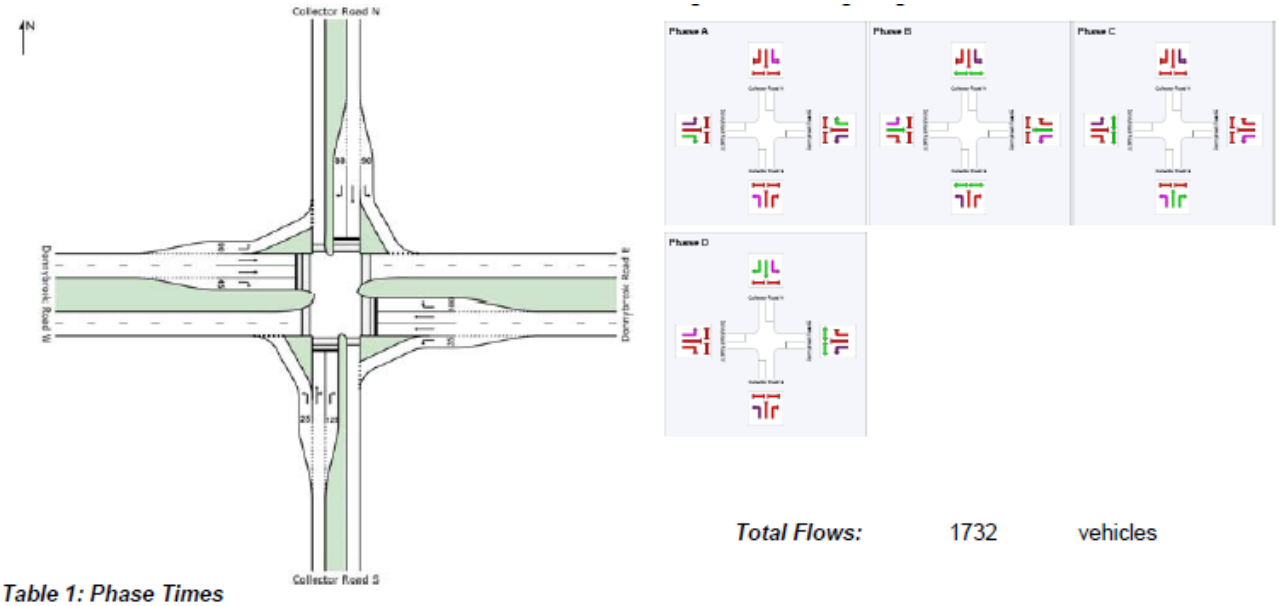
Donnybrook Road W

Donnybrook Road E

**Output volumes*

Collector Road S

Figure 6-16 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Road (IT04)- PM Period

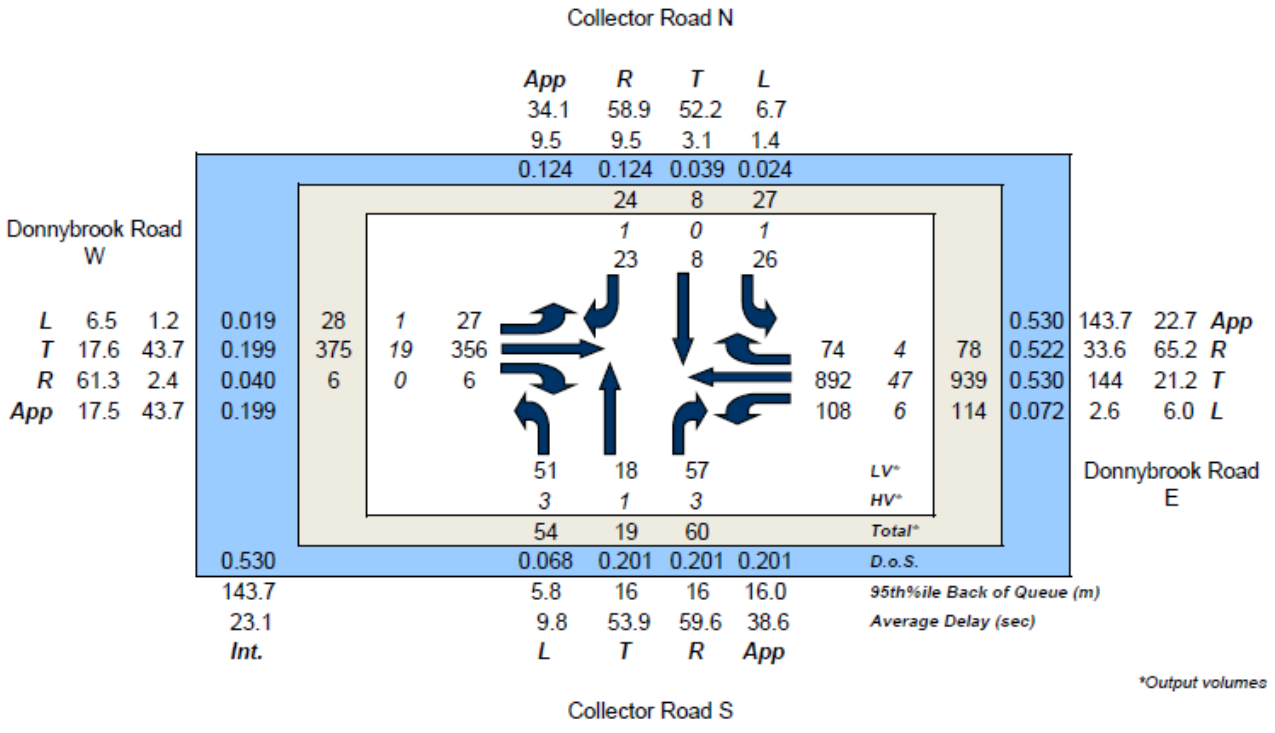


Total Flows: 1732 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	10	16	13%
B	60	66	55%
C	13	19	16%
D	13	19	16%
	CL:	120	

Figure 3: Summary Results

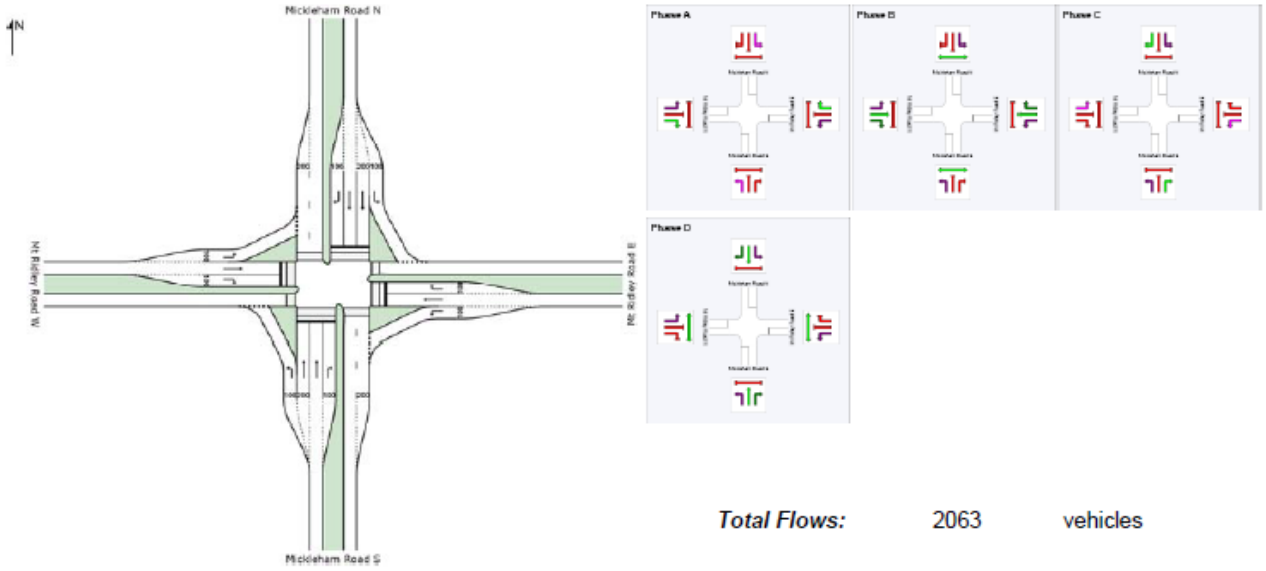


The analysis shows that during both the AM and PM peak period, the intersection will operate satisfactorily with motorists experiencing manageable queues and delays. No material change to the operation of the intersection both during the AM and PM peak periods is expected.

Given the above, the intersection as contemplated by SMEC will not require any design changes.

6.5.1.4 Mt Ridley Road / Mickleham Road

Figure 6-17 Interim (2031) Intersection Assessment - Mt Ridley Road / Mickleham Road - AM Period



Total Flows: 2063 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	6	12	10%
B	22	28	23%
C	8	14	12%
D	60	66	55%
	CL:	120	

Figure 3: Summary Results

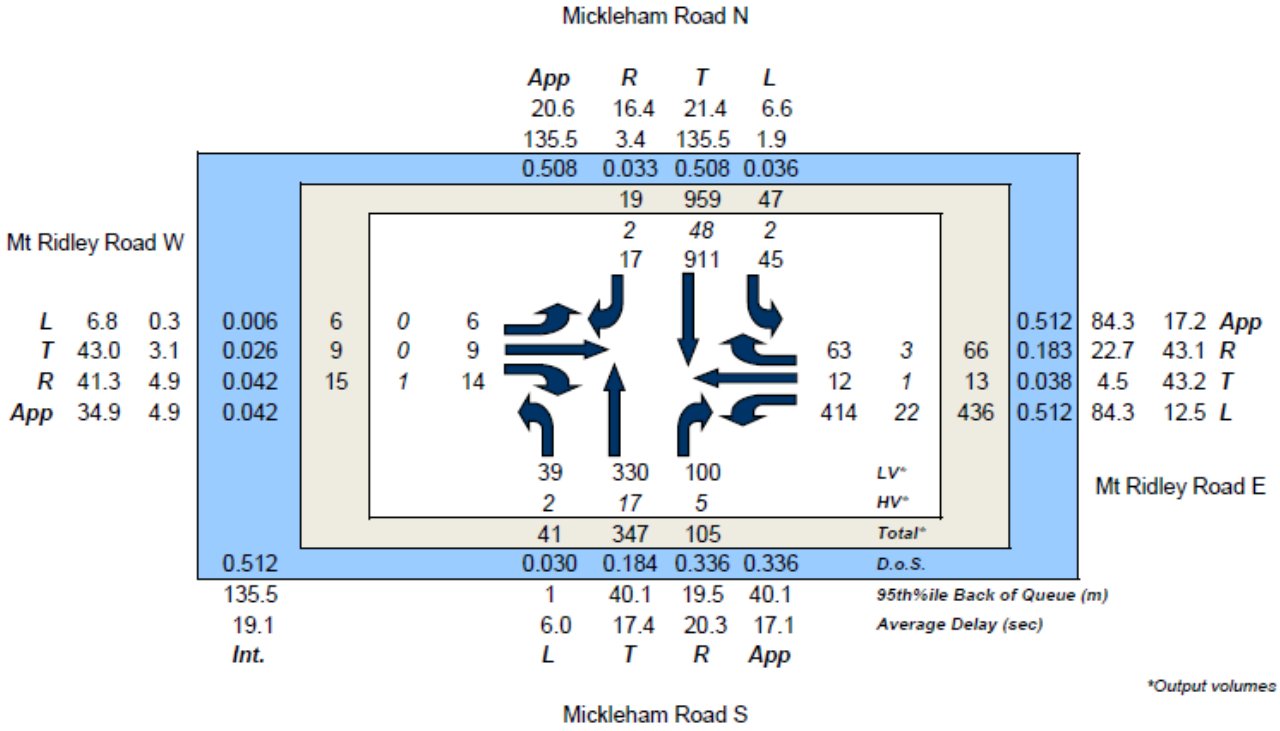
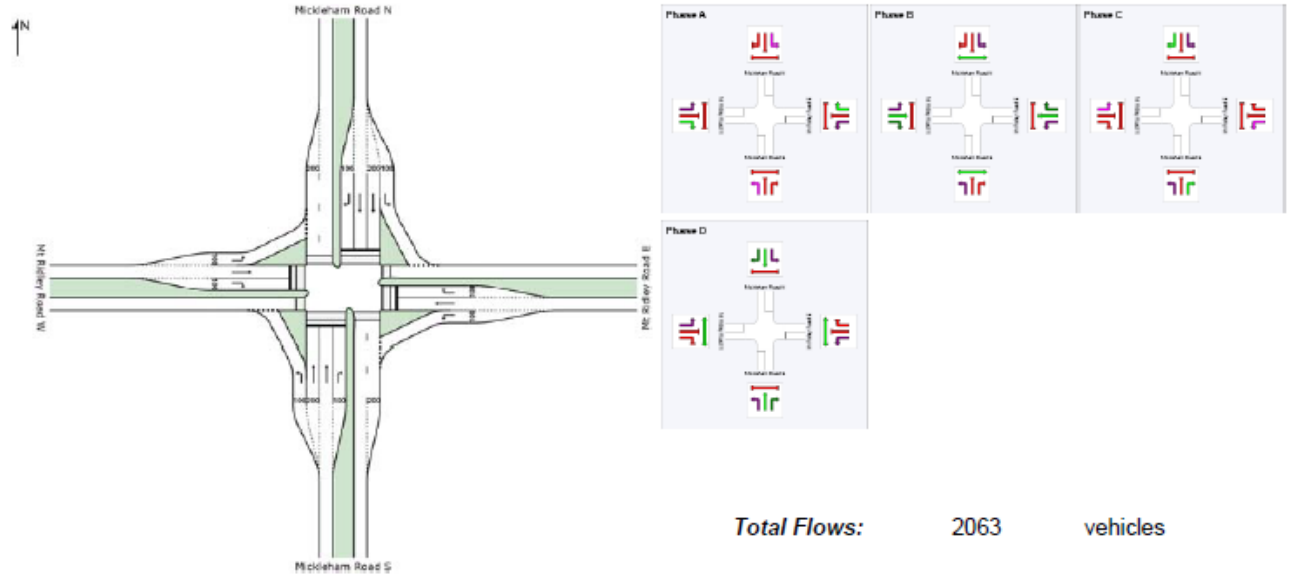


Figure 6-18 Interim (2031) Intersection Assessment - Mt Ridley Road / Mickleham Road - PM Period

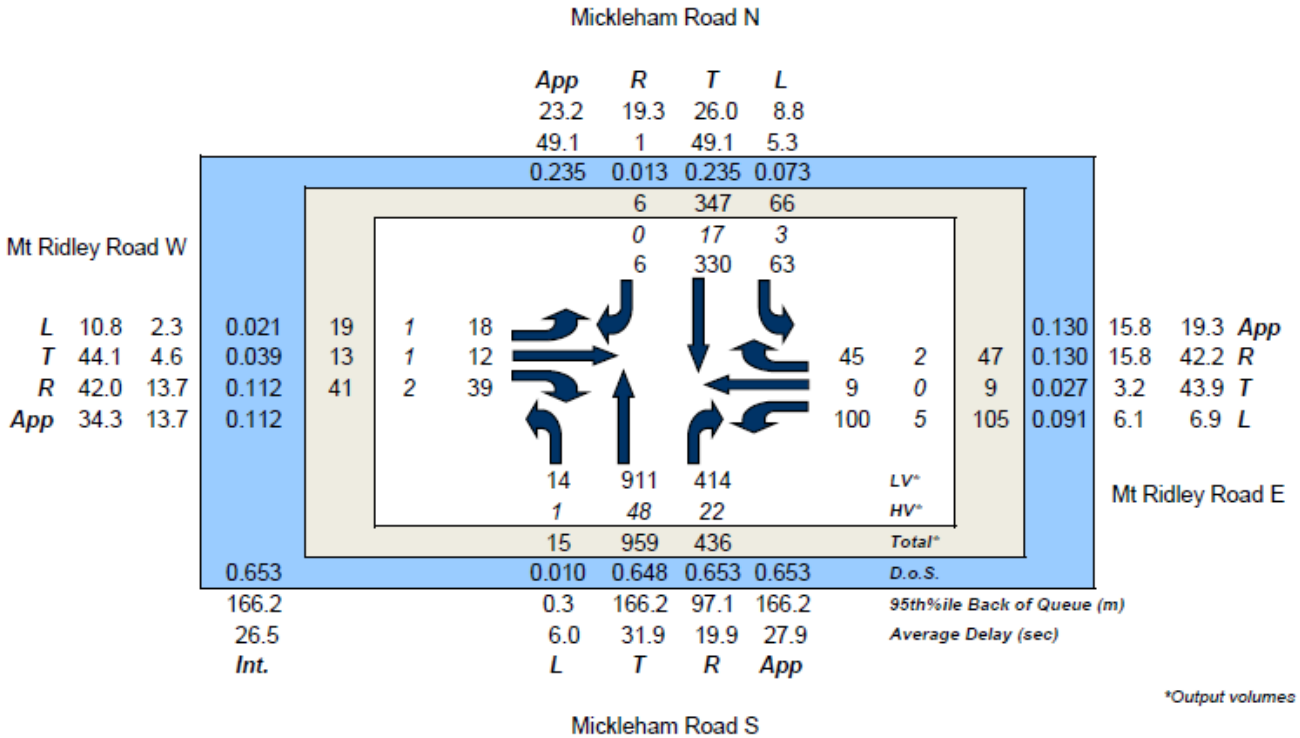


Total Flows: 2063 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	7	13	11%
B	21	27	23%
C	21	27	23%
D	47	53	44%
	CL:	120	

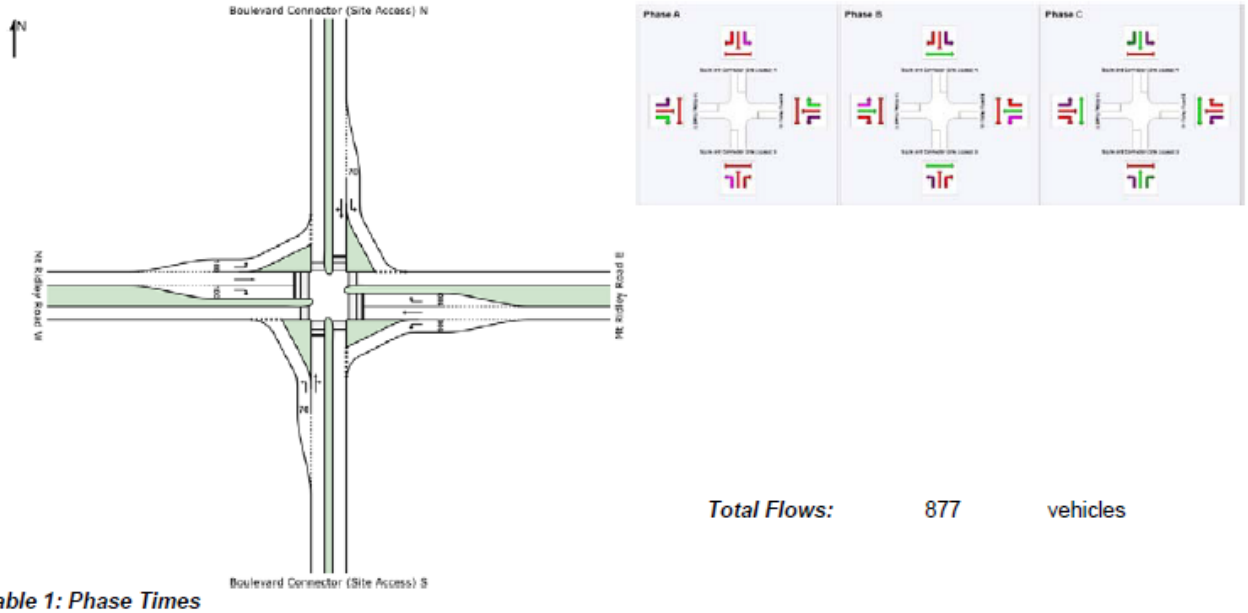
Figure 3: Summary Results



Based on the foregoing analysis, the proposed intersection layout is expected adequately accommodate the projected 2031 traffic demand, with motorists experiencing manageable queues and delays.

6.5.1.5 Mt Ridley Road / Connector Boulevard (Site Access)

Figure 6-19 Interim (2031) Intersection Assessment - Mt Ridley Road / Connector Boulevard (Site Access) - AM Period



Total Flows: 877 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	10	16	13%
B	17	23	19%
C	75	81	68%
	CL:	120	

Figure 3: Summary Results

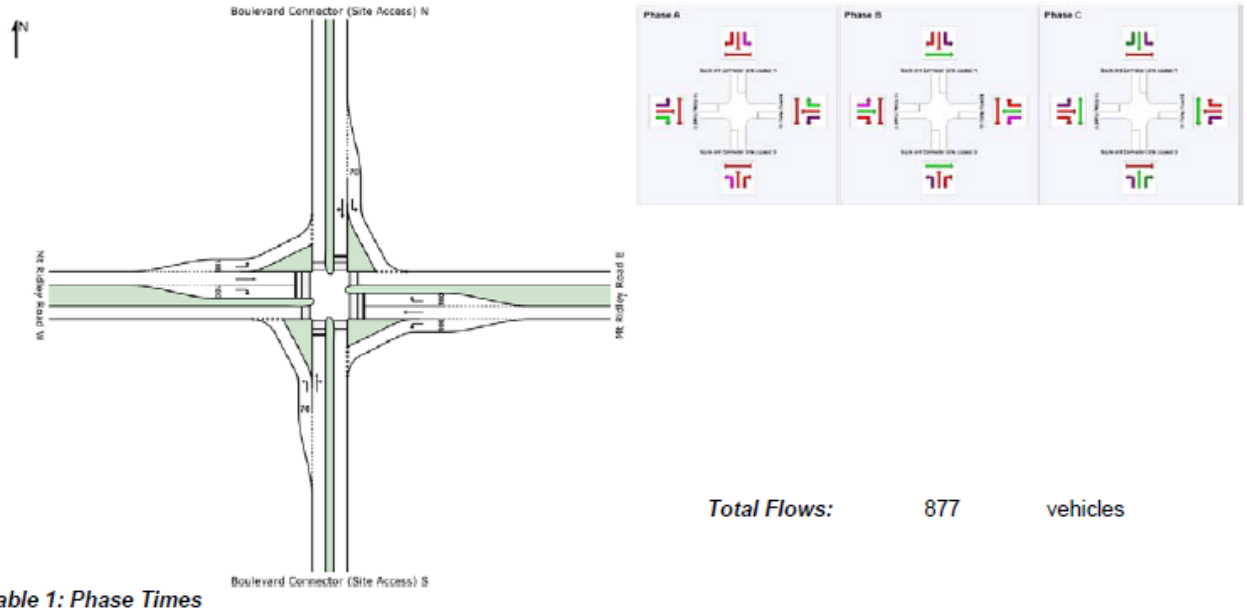
Boulevard Connector (Site Access) N

					App	*R*	*T*	*L*								
					15.6	18.3	12.7	6.1								
					92.1	92.1	92.1	2.8								
					0.465	0.465	0.465	0.075								
						385	27	102								
Mt Ridley Road W						*19*	*1*	*5*								
						366	26	97								
L	6.3	4.6	0.091	120	*6*	114							0.449	48.1	54.9	*App*
T	48.8	10.2	0.101	27	*1*	26			63	*3*	66		0.442	28.2	64.6	*R*
R	61.8	4.5	0.074	11	*1*	10			114	*6*	120		0.449	48.1	52.0	*T*
App	17.4	10.2	0.101						6	*0*	6		0.004	0.1	6.0	*L*
						10	2	1		*LV**						
						1	*0*	*0*		*HV**						Mt Ridley Road E
						10	2	1		*Total**						
			0.465			0.011	0.003	0.003	0.011	*D.o.S.*						
			92.1			0.8	0.5	0.5	0.8	*95th%ile Back of Queue (m)*						
			24.4			8.7	8.8	14.4	9.1	*Average Delay (sec)*						
			Int.			*L*	*T*	*R*	*App*							

**Output volumes*

Boulevard Connector (Site Access) S

Figure 6-20 Interim (2031) Intersection Assessment - Mt Ridley Road / Connector Boulevard (Site Access) - PM Period

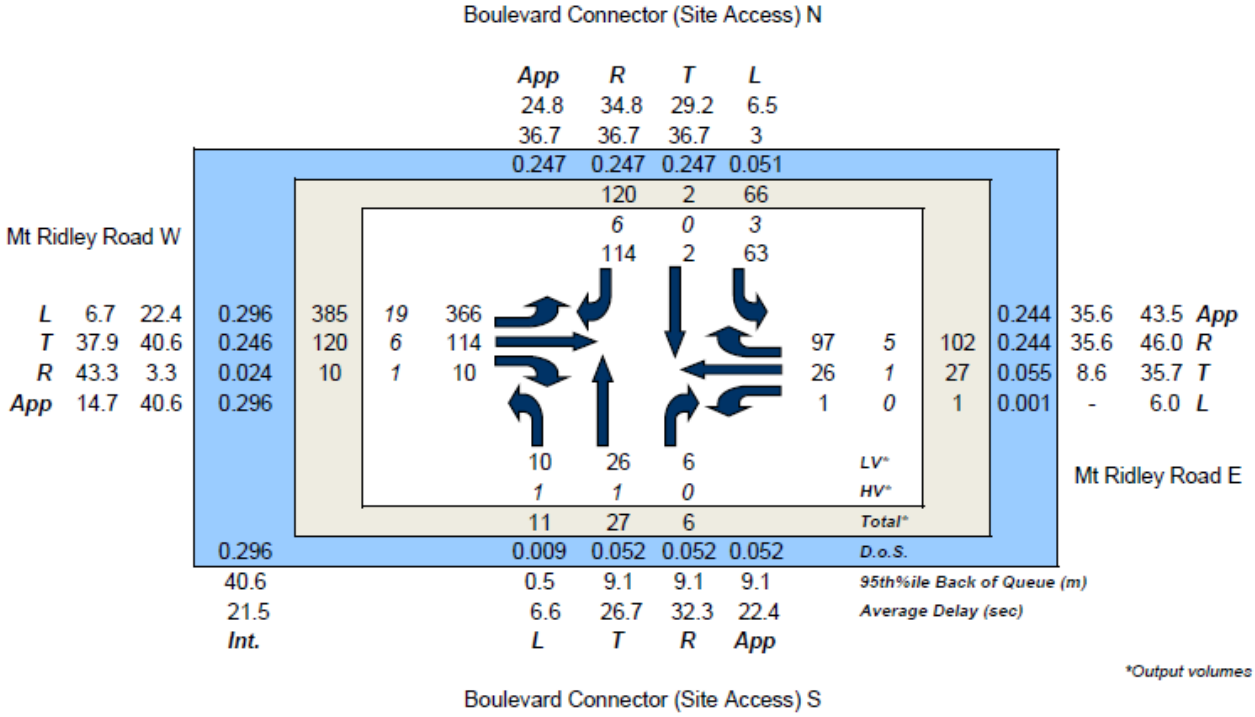


Total Flows: 877 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	28	34	28%
B	31	37	31%
C	43	49	41%
	CL:	120	

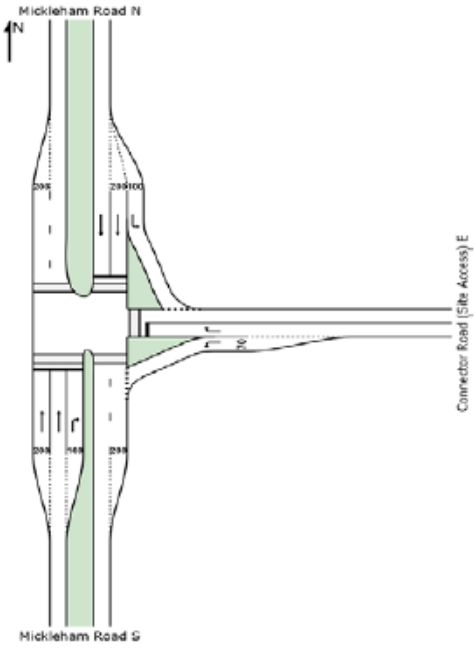
Figure 3: Summary Results

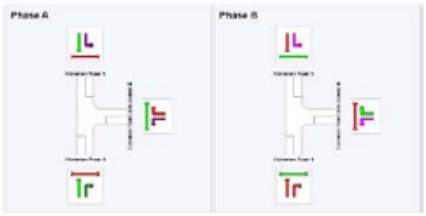


Based on the foregoing analysis, the proposed intersection layout is expected adequately accommodate the projected 2031 traffic demand, with motorists experiencing manageable queues and delays.

6.5.1.6 Mickleham Road / Connector Road (Site Access)

Figure 6-21 Interim (2031) Intersection Assessment - Mickleham Road / Connector Road (Site Access) - AM Period





Total Flows: 1483 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	67	73	73%
B	21	27	27%
	CL:	100	

Figure 3: Summary Results

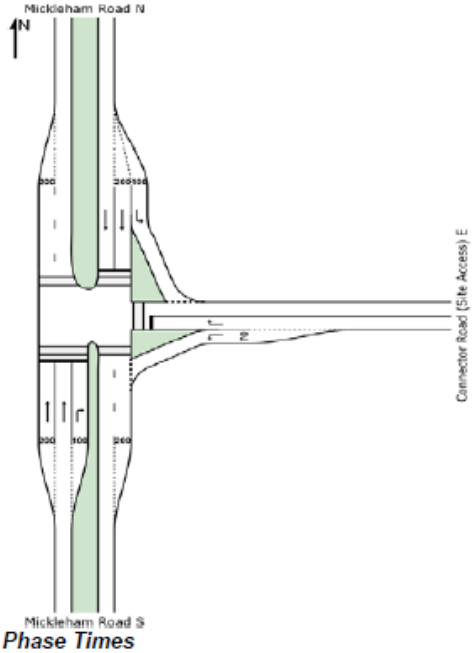
Mickleham Road N

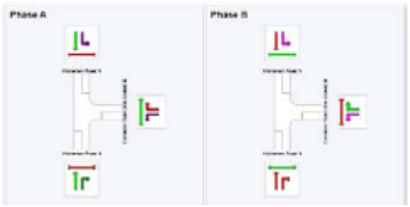
						App	*R*	*T*	*L*						
						7.7	-	7.7	6.1						
						73.2	-	73.2	0.1						
						0.375	-	0.375	0.002						
							-	948	3						
							-	*47*	*0*						
	-						-	901	3						
L	-	-	-	-	-	-							0.165	18.3	26.0 *App*
T	-	-	-	-	-	-				59	*3*	62	0.165	18.3	40.8 *R*
R	-	-	-	-	-	-				-	-	-	-	-	- *T*
App	-	-	-							48	*3*	50	0.067	18.3	7.6 *L*
							-	385	14		*LV**				Connector Road (Site Access) E
							-	*20*	*1*		*HV**				
							-	405	15		*Total**				
					0.375		-	0.160	0.049	0.160	*D.o.S.*				
					73.2		-	26.1	2.5	26.1	*95th%ile Back of Queue (m)*				
					8.8		-	6.4	16.5	6.8	*Average Delay (sec)*				
					Int.		*L*	*T*	*R*	*App*					

**Output volumes*

Mickleham Road S

Figure 6-22 Interim (2031) Intersection Assessment - Mickleham Road / Connector Road (Site Access) - PM Period





Total Flows: 1507 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	67	73	73%
B	21	27	27%
	CL:	100	

Figure 3: Summary Results

Mickleham Road N

							App	*R*	*T*	*L*							
							6.4	-	6.4	6.3							
							26.3	-	26.3	2							
							0.161	-	0.161	0.047							
								-	408	62							
								-	*20*	*3*							
	-							-	388	59							
L	-	-	-	-	-	-								0.008	0.8	14.4	*App*
T	-	-	-	-	-	-					3	*0*	3	0.008	0.8	38.9	*R*
R	-	-	-	-	-	-					-	-	-	-	-	-	*T*
App	-	-	-								9	*0*	9	0.008	0.8	6.3	*L*
								-	898	76		*LV**					
								-	*47*	*4*		*HV**					
								-	945	80		*Total**					
			0.373					-	0.373	0.132	0.373	*D.o.S.*					
			72.9					-	72.9	11.2	72.9	*95th%ile Back of Queue (m)*					
			7.6					-	7.7	13.2	8.1	*Average Delay (sec)*					
			Int.					*L*	*T*	*R*	*App*						

Connector Road (Site Access) E

**Output volumes*

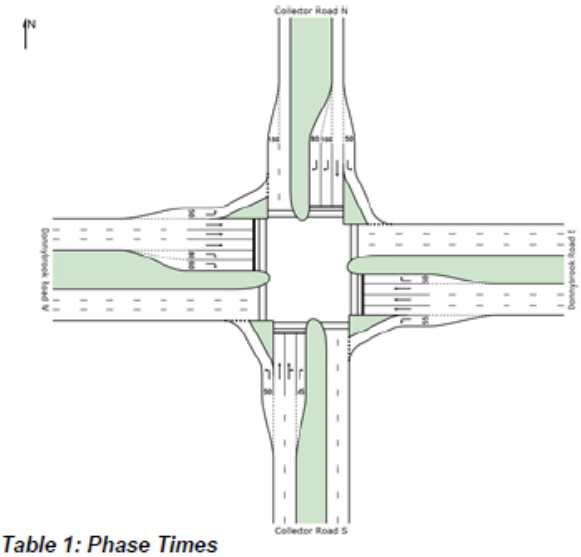
Mickleham Road S

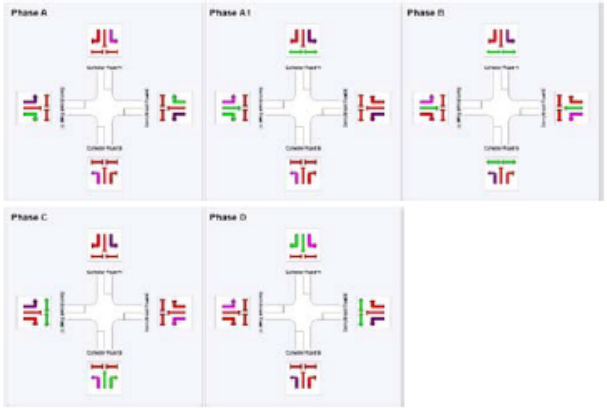
Based on the foregoing analysis, the proposed intersection layout is expected adequately accommodate the projected 2031 traffic demand, with motorists experiencing manageable queues and delays.

6.5.2 Ultimate Intersection Assessment (2046)

6.5.2.1 Donnybrook Road / Collector Road (IT06)

Figure 6-23 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT06)- AM Period





Total Flows: 5337 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	6	12	10%
A1	3	9	8%
B	39	45	38%
C	23	29	24%
D	19	25	21%
	CL:	120	

Figure 3: Summary Results

Collector Road N

					App	***R***	***T***	***L***						
					62.1	65.3	55.9	14.5						
					107	107	99.6	0.2						
					0.826	0.826	0.766	0.001						
						469	229	1						
						23	*11*	*0*						
						446	218	1						
L	5.9	1.1	0.109	151	*8*	143						0.841	210.9	36.6 ***App***
T	27.6	161	0.684	1411	*71*	1340			1	*0*	1	0.011	0.4	65.8 ***R***
R	68.9	88.8	0.859	385	*19*	366			1308	*69*	1377	0.841	211	43.1 ***T***
App	34.1	161	0.859						297	*16*	313	0.262	14.4	7.7 ***L***
						256	281	413		*LV**				
						13	*15*	*22*		*HV**				
						269	296	435		*Total**				
			0.859			0.342	0.762	0.842	0.842	*D.o.S.*				
			210.9			61.2	117.5	102	117.5	*95th%ile Back of Queue (m)*				
			41.3			20.2	52.9	63.2	48.6	*Average Delay (sec)*				
			Int.			***L***	***T***	***R***	***App***					

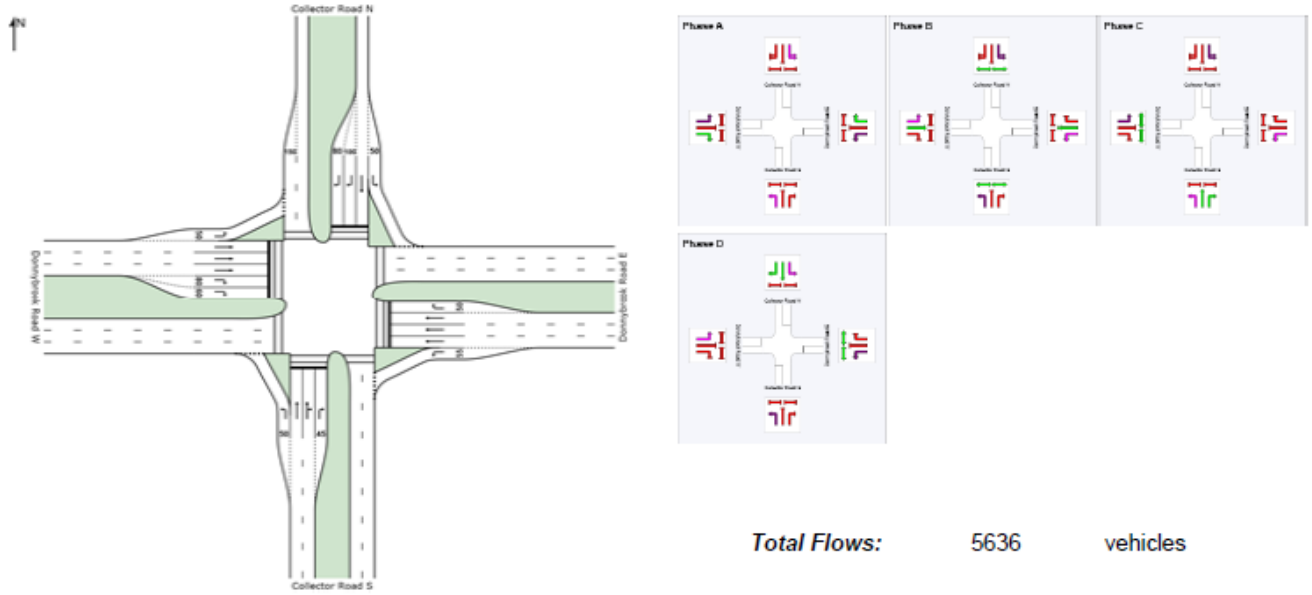
Donnybrook Road W

Donnybrook Road E

**Output volumes*

Collector Road S

Figure 6-24 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT06)- PM Period



Total Flows: 5636 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	15	21	18%
B	42	48	40%
C	18	24	20%
D	21	27	23%
	CL:	120	

Figure 3: Summary Results

Collector Road N

	App	*R*	*T*	*L*							
	65.7	52.1	72.5	16.1							
	159.5	28.1	159.5	0.2							
	0.924	0.241	0.924	0.001							
		151	305	1							
		8	*15*	*0*							
		143	290	1							

Donnybrook Road W

L	6.6	11.7	0.377	469	*23*	446				0.919	290.8	45.3	*App*
T	41.7	234	0.858	1434	*72*	1362	190	*10*	200	0.892	95.5	72.2	*R*
R	60.9	55.1	0.600	269	*13*	256	1395	*73*	1468	0.919	291	52.8	*T*
App	36.5	234	0.858				422	*22*	444	0.371	25.9	8.2	*L*
							366	226	258	*LV**			
							19	*12*	*14*	*HV**			
							385	238	272	*Total**			

Donnybrook Road E

0.924	0.500	0.637	0.637	0.637	*D.o.S.*	
290.8	93.8	72.4	72.4	93.8	*95th%ile Back of Queue (m)*	
42.8	20.0	52.5	58.8	40.4	*Average Delay (sec)*	
Int.	*L*	*T*	*R*	*App*		

**Output volumes*

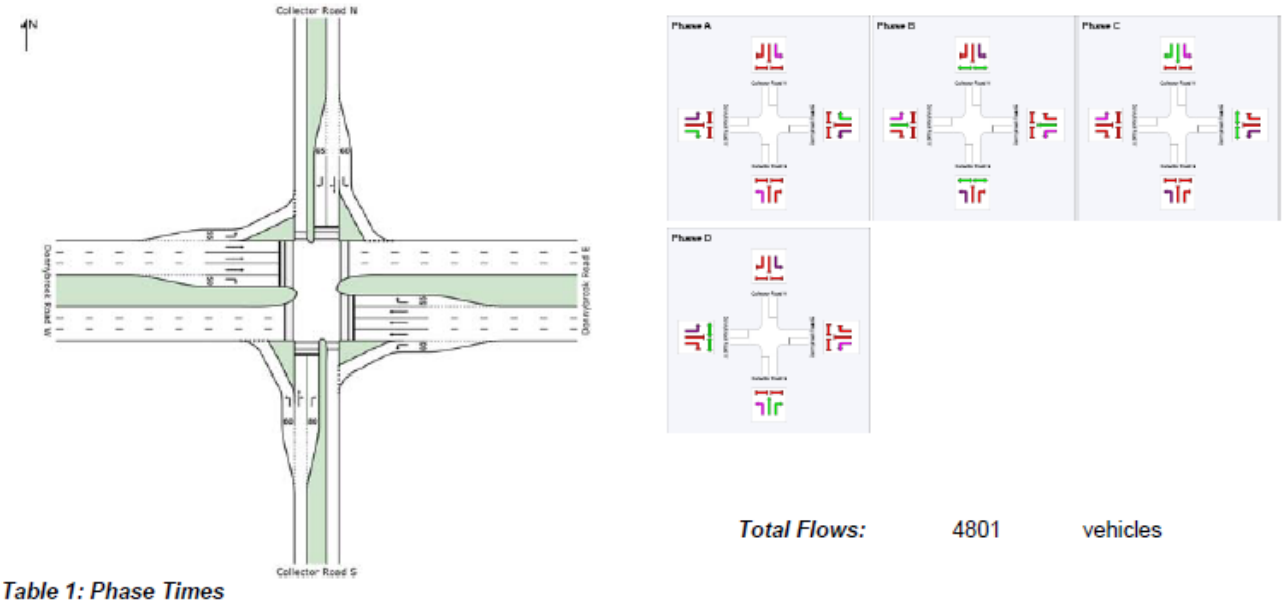
Collector Road S

Given the conservative nature of our assessment, the analysis shows that during AM and PM peak periods, motorists are anticipated to experience congestion on all approaches. That being said, the intersection has the capacity to accommodate projected traffic demands up to the 2046 design period.

Given the above, the intersection design as contemplated by SMEC will not require any design changes.

6.5.2.2 Donnybrook Road / Collector Road (IT05)

Figure 6-25 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT05)- AM Period



Total Flows: 4801 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	14	20	17%
B	52	58	48%
C	15	21	18%
D	15	21	18%
	CL:	120	

Figure 3: Summary Results

Collector Road N

	App	*R*	*T*	*L*								
	21.2	55.1	52.1	16.9								
	87.8	0.7	21.7	87.8								
	0.483	0.009	0.233	0.483								
		2	55	410								
		0	*3*	*21*								
		2	52	390								
L 5.9 -	0.001	1	*0*	1						0.734	186.7	23.1 *App*
T 26.0 194	0.749	1816	*91*	1725	143	*8*	150			0.717	64.4	63.9 *R*
R 58.0 10.9	0.139	29	*1*	28	1474	*78*	1552			0.734	187	24.5 *T*
App 26.5 194	0.749				449	*24*	473			0.316	3.7	5.8 *L*
		82	116	100		*LV**						
		4	*6*	*5*		*HV**						
		86	122	105		*Total**						
	0.749	0.096	0.517	0.468	0.517	*D.o.S.*						
	193.7	3.9	49	41.8	49.0	*95th%ile Back of Queue (m)*						
	25.5	7.9	54.4	59.8	43.5	*Average Delay (sec)*						
	Int.	*L*	*T*	*R*	*App*							

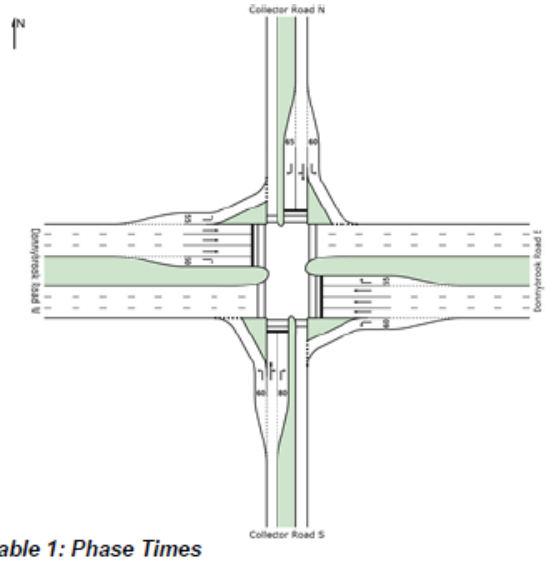
Donnybrook Road W

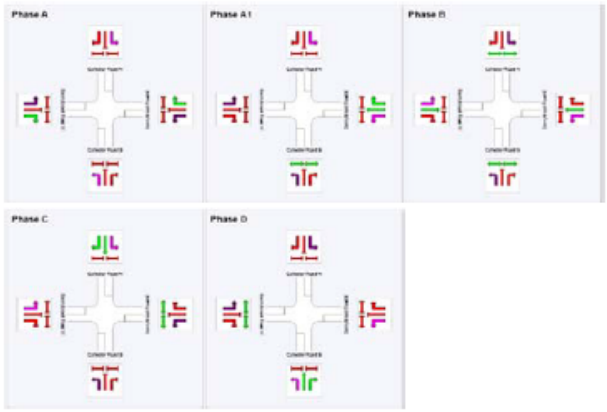
Donnybrook Road E

**Output volumes*

Collector Road S

Figure 6-26 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT05)- PM Period





Total Flows: 4812 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	7	13	11%
A1	4	10	8%
B	42	48	40%
C	15	21	18%
D	22	28	23%
	CL:	120	

Figure 3: Summary Results

Collector Road N

	App	*R*	*T*	*L*								
	38.3	54.8	55.1	22.3								
	59.2	0.4	59.2	34.4								
	0.601	0.004	0.601	0.214								
		1	142	150								
		0	*7*	*8*								
		1	135	143								
L	8.4	0.1	0.001	1	*0*	1				0.854	292.0	39.0 *App*
T	44.5	241	0.846	1618	*81*	1537	200	*11*	210	0.827	96.4	66.7 *R*
R	74.3	40.8	0.822	86	*4*	82	1788	*94*	1882	0.854	292	38.0 *T*
App	46.0	241	0.846				119	*6*	125	0.089	9.5	7.7 *L*
							28	71	468		*LV**	
							1	*4*	*25*		*HV**	
							29	75	493		*Total**	
			0.866				0.034	0.866	0.866	0.866	*D.o.S.*	
			292				4.9	133.7	135	134.7	*95th%ile Back of Queue (m)*	
			44.5				15.6	61.3	67.0	63.8	*Average Delay (sec)*	
			Int.				*L*	*T*	*R*	*App*		

Donnybrook Road W

Donnybrook Road E

**Output volumes*

Collector Road S

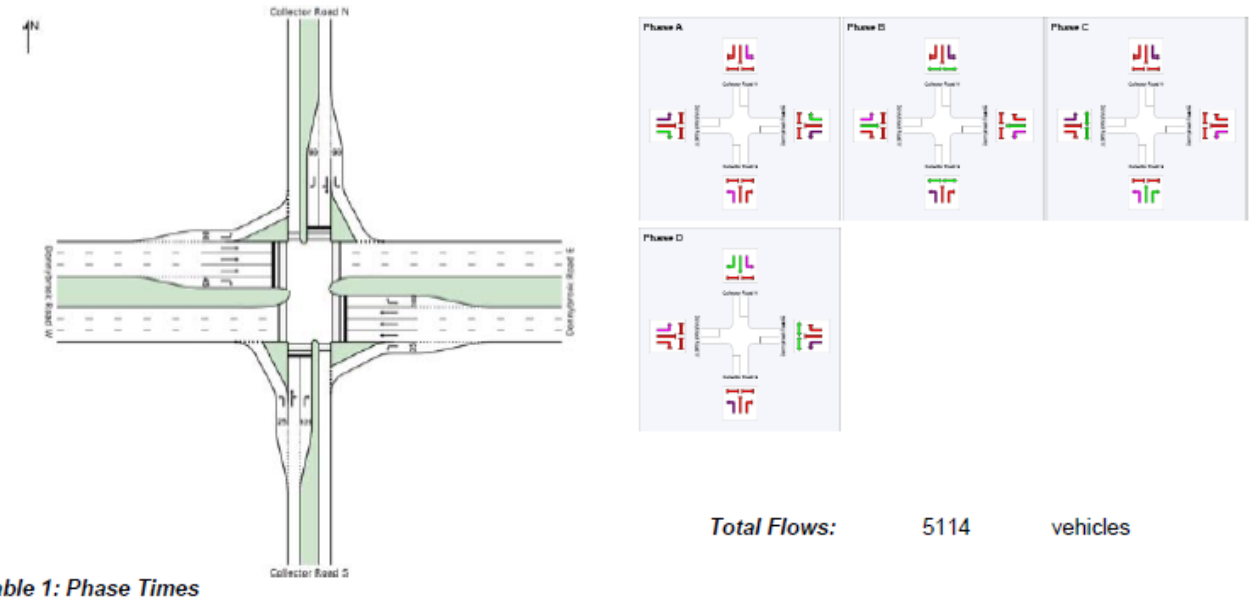
The proposed intersection layout is expected to adequately accommodate the projected 2046 traffic demand during the AM peak period, with motorists experiencing manageable queues and delays.

Given the conservative nature of our assessment, the analysis shows that during the PM peak period, motorists are anticipated to experience congestion on the southbound, westbound and eastbound approaches. That being said, the intersection has the capacity to accommodate projected traffic demands up to the 2046 design period.

Given the above, the intersection design as contemplated by SMEC will not require any design changes.

6.5.2.3 Donnybrook Road / Collector Road (IT04)

Figure 6-27 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT04)- AM Period



Total Flows: 5114 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	6	12	10%
B	52	58	48%
C	15	21	18%
D	23	29	24%
	CL:	120	

Figure 3: Summary Results

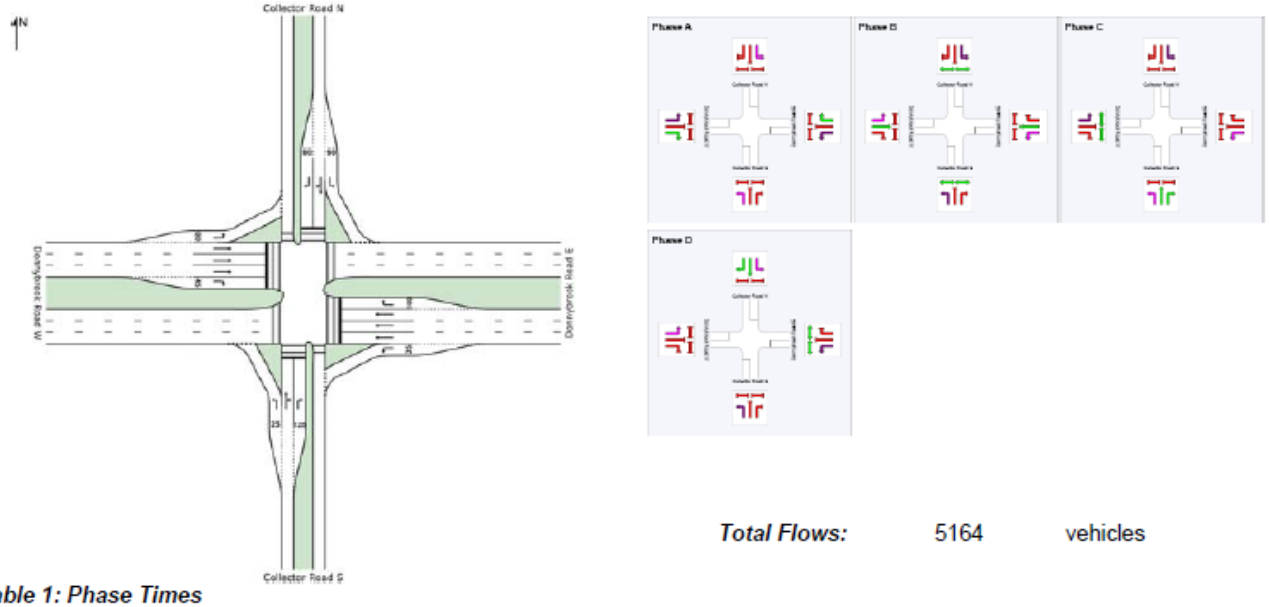
Collector Road N

			App	R	T	L							
			61.8	63.0	57.3	17.0							
			132.7	132.7	132.7	0.2							
			0.834	0.834	0.834	0.001							
				464	115	1							
				23	*6*	*0*							
				441	109	1							
L	5.8	2.5	0.244	377	*19*	358				0.779	208.3	25.6	*App*
T	30.7	254	0.840	1955	*98*	1857	1	*0*	1	0.011	0.4	65.8	*R*
R	65.8	0.4	0.011	1	*0*	1	1757	*92*	1849	0.779	208	26.5	*T*
App	26.7	254	0.840				84	*4*	88	0.060	0.6	5.8	*L*
				1	48	201		*LV**					
				0	*3*	*11*		*HV**					
				1	50	212		*Total**					
			0.840	0.002	0.580	0.580	0.580	*D.o.S.*					
			253.7	0.2	55	55	55.0	*95th%ile Back of Queue (m)*					
			31.9	19.2	55.0	60.7	59.5	*Average Delay (sec)*					
			Int.	*L*	*T*	*R*	*App*						

*Output volumes

Collector Road S

Figure 6-28 Ultimate (2046) Intersection Assessment - Donnybrook Road / Collector Road (IT04)- PM Period



Total Flows: 5164 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	9	15	13%
B	57	63	52%
C	15	21	18%
D	15	21	18%
	CL:	120	

Figure 3: Summary Results

Collector Road N

					App	*R*	*T*	*L*							
					54.5	66.1	60.4	13.8							
					80.5	80.5	80.5	15.8							
					0.790	0.790	0.790	0.131							
						323	33	97							
Donnybrook Road W						*16*	*2*	*5*							Donnybrook Road E
						307	31	92							
L	5.9	3.7	0.290	410	*21*	390							0.801	229.1	23.3 *App*
T	21.0	169	0.687	1849	92	1757			92	*5*	97		0.721	43.3	68.8 *R*
R	61.6	0.4	0.007	1	*0*	1			1857	*98*	1955		0.801	229	22.9 *T*
App	18.3	169	0.687						201	*11*	212		0.136	1.2	5.8 *L*
						1	93	84		*LV**					
						0	*5*	*4*		*HV**					
						1	98	88		*Total**					
			0.801			0.002	0.415	0.393	0.415	*D.o.S.*					
			229.1			0.2	39.7	35.6	39.7	*95th%ile Back of Queue (m)*					
			25.0			17.3	53.6	59.2	56.0	*Average Delay (sec)*					
			Int.			*L*	*T*	*R*	*App*						

**Output volumes*

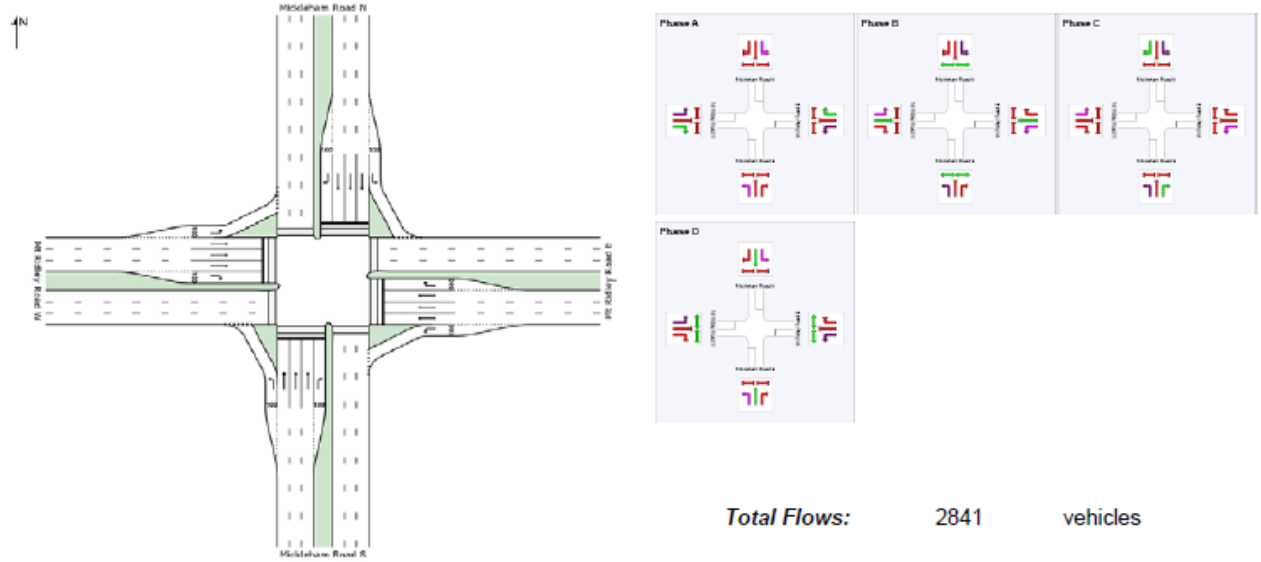
Collector Road S

Despite the conservative nature of our assessment, the analysis shows that during both the AM and PM peak period, the intersection will operate satisfactorily with motorists experiencing manageable queues and delays. No material change to the operation of the intersection both during the AM and PM peak periods is expected.

Given the above, the intersection design as contemplated by SMEC will not require any design changes.

6.5.2.4 Mt Ridley Road / Mickleham Road

Figure 6-29 Ultimate (2046) Intersection Assessment - Mt Ridley Road / Mickleham Road - AM Period



Total Flows: 2841 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	7	13	11%
B	17	23	19%
C	39	45	38%
D	33	39	33%
	CL:	120	

Figure 3: Summary Results

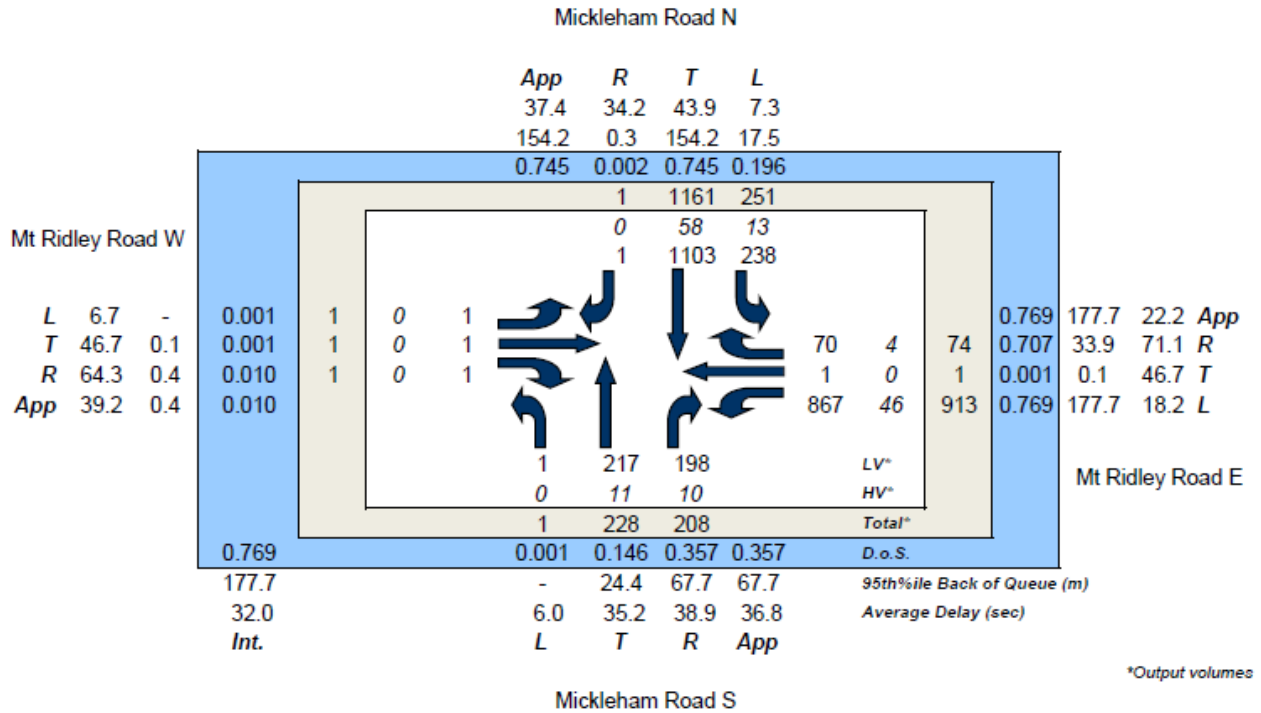
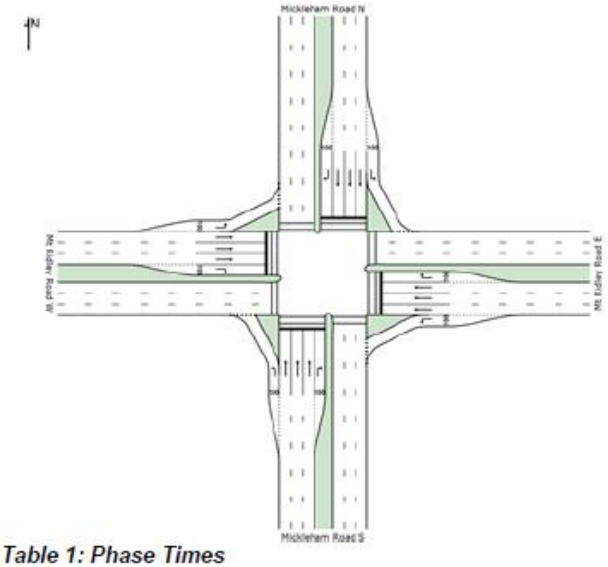
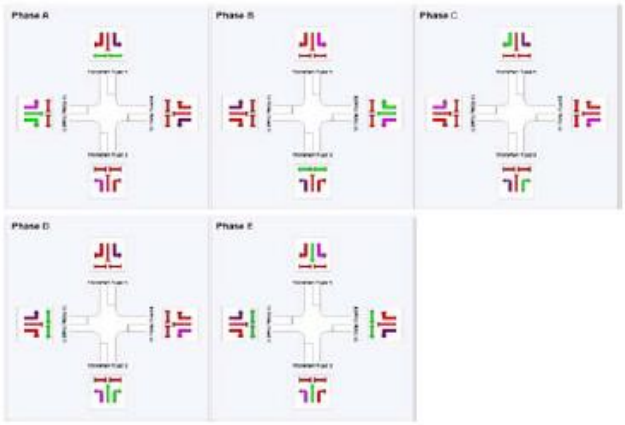


Figure 6-30 Ultimate (2046) Intersection Assessment - Mt Ridley Road / Mickleham Road - PM Period





Total Flows: 2540 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	15	21	18%
B	17	23	19%
C	6	12	10%
D	37	43	36%
E	15	21	18%
	CL:	120	

Figure 3: Summary Results

Mickleham Road N

	App	*R*	*T*	*L*								
	44.5	65.8	53.1	14.1								
	34.3	0.4	34.3	11.6								
	0.361	0.011	0.361	0.084								
		1	256	74								
		0	*13*	*4*								
		1	243	70								
L	12.1	0.1	0.001	1	*0*	1					0.988	162.0	65.0	*App*
T	48.7	0.1	0.001	1	*0*	1	238	*13*	251		0.988	162	113.5	*R*
R	54.8	0.4	0.004	1	*0*	1	1	*0*	1		0.001	0.1	46.7	*T*
App	38.6	0.4	0.004				198	*10*	208		0.140	9.5	6.5	*L*
						1	1080	578		*LV**				
						0	*57*	*30*		*HV**				
						1	1137	608		*Total**				
			0.992			0.001	0.415	0.992	0.992	*D.o.S.*				
			413.5			-	103.3	414	413.5	*95th%ile Back of Queue (m)*				
			53.4			6.0	21.3	109.9	52.1	*Average Delay (sec)*				
			Int.			*L*	*T*	*R*	*App*					

Mt Ridley Road W

Mt Ridley Road E

**Output volumes*

Mickleham Road S

The proposed intersection layout is expected to adequately accommodate the projected 2046 traffic demand during the AM peak period, with motorists experiencing manageable queues and delays.

Given the conservative nature of our assessment, the analysis shows that during PM peak period, motorists are anticipated to experience congestion on the southbound and eastbound approaches. That being said, the intersection has the capacity to accommodate projected traffic demands up to the 2046 design period.

Given the above, the intersection design as contemplated by SMEC will not require any design changes.

6.5.2.5 Mt Ridley Road / Connector Boulevard (Site Access)

Figure 6-31 Ultimate (2046) Intersection Assessment - Mt Ridley Road / Connector Boulevard (Site Access) - AM Period

Figure 1: Intersection Geometry

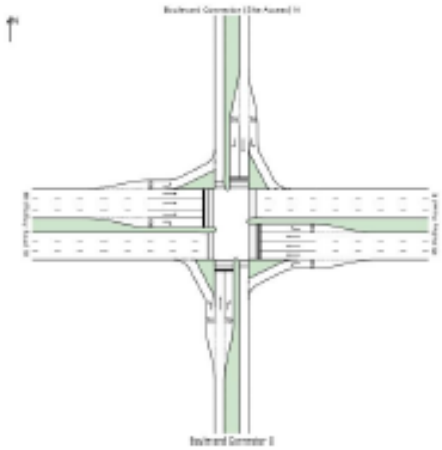
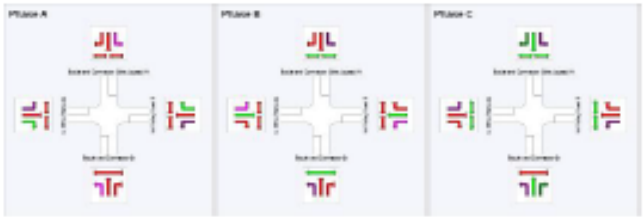


Figure 2: Phasing Diagram



Total Flows: 1771 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	25	31	31%
B	15	21	21%
C	42	48	48%
	CL:	100	

Figure 3: Summary Results

Boulevard Connector (Site Access) N

	App	*R*	*T*	*L*								
	18.5	30.4	18.2	6.8								
	103.1	103.1	8.5	18.3								
	0.619	0.619	0.052	0.293								
		366	41	370								
		18	*2*	*19*								
		348	39	352								
L	7.9	4.7	0.064	66	*3*	63				0.605	86.7	41.1 *App*
T	41.9	29	0.314	267	*13*	254	257	*14*	271	0.605	86.7	41.9 *R*
R	36.0	3.7	0.031	14	*1*	13	277	*15*	292	0.344	31.9	42.1 *T*
App	35.2	29	0.314				14	*1*	15	0.011	0.4	6.1 *L*
							23	14	29		*LV**	
							1	*1*	*2*		*HV**	
							24	15	30		*Total**	
	0.619						0.027	0.019	0.053	0.053	*D.o.S.*	
	103.1						2.2	3.1	6.4	6.4	*95th%ile Back of Queue (m)*	
	29.1						9.9	17.8	24.7	18.0	*Average Delay (sec)*	
	Int.						*L*	*T*	*R*	*App*		

Mt Ridley Road W

Mt Ridley Road E

*Output volumes

Boulevard Connector S

**Figure 6-32 Ultimate (2046) Intersection Assessment -
Mt Ridley Road / Connector Boulevard (Site Access) - PM Period**

Figure 1: Intersection Geometry

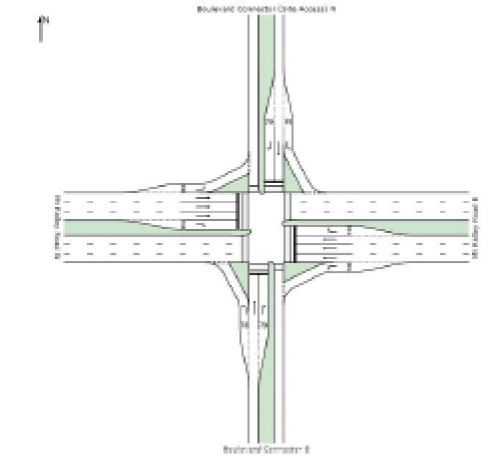
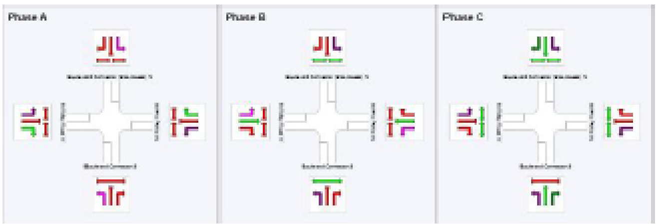


Figure 2: Phasing Diagram

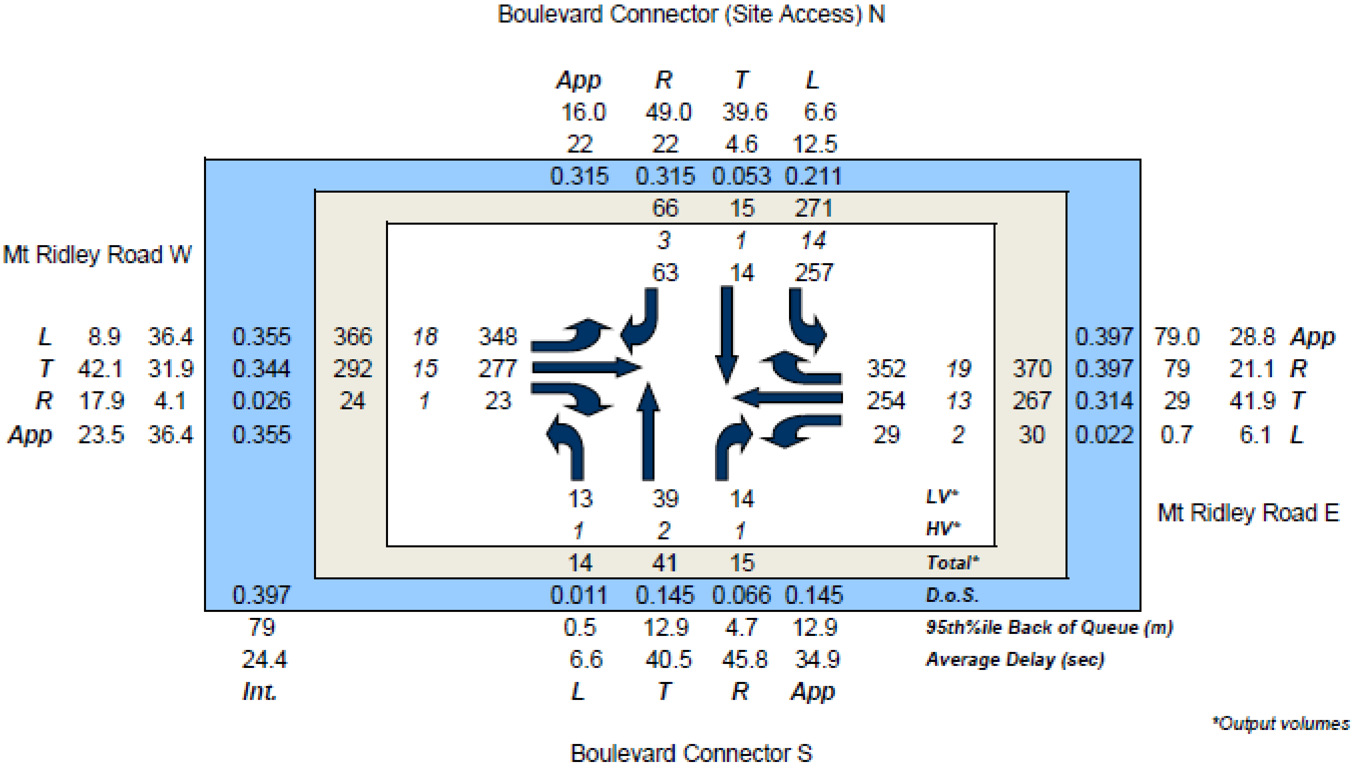


Total Flows: 1771 vehicles

Table 1: Phase Times

Phs	Grn	Tot	%
A	52	58	58%
B	15	21	21%
C	15	21	21%
	CL:	100	

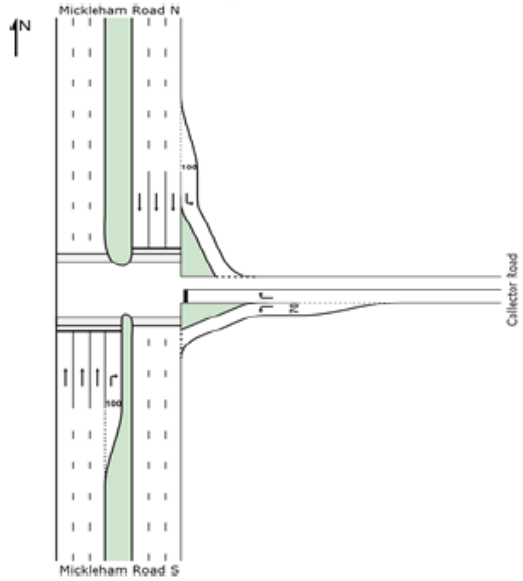
Figure 3: Summary Results

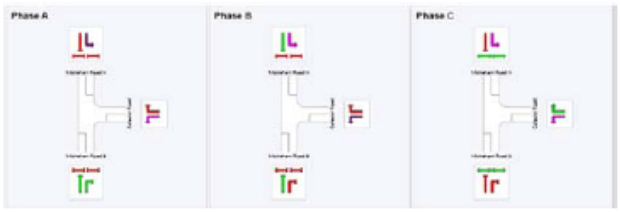


Based on the foregoing analysis, the proposed intersection layout is expected adequately accommodate the projected 2046 traffic demand, with motorists experiencing manageable queues and delays.

6.5.2.6 Mickleham Road / Connector Road (Site Access)

Figure 6-33 Ultimate (2046) Intersection Assessment - Mickleham Road / Connector Road (Site Access) - AM Period





Total Flows: 1785 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	6	12	12%
B	58	64	64%
C	18	24	24%
	CL:	100	

Figure 3: Summary Results

Mickleham Road N

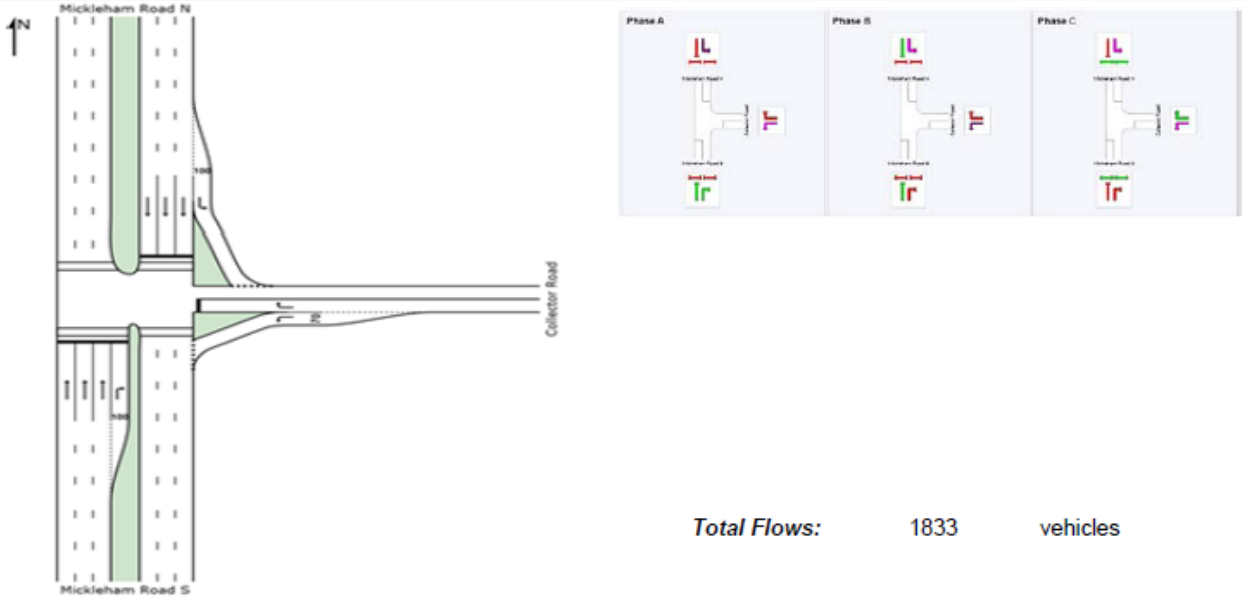
							App	*R*	*T*	*L*					
							12.0	-	12.0	6.1					
							79.3	-	79.3	0.2					
							0.382	-	0.382	0.004					
								-	1255	6					
								-	*63*	*0*					
	-							-	1192	6					
L	-	-	-	-	-	-							0.384	39.8	28.7	*App*
T	-	-	-	-	-	-					118	*6*	124	0.384	39.8	45.5	*R*
R	-	-	-	-	-	-					-	-	-	-	-	-	*T*
App	-	-	-								95	*5*	100	0.125	39.8	7.8	*L*
								-	257	29		*LV**					
								-	*14*	*2*		*HV**					
								-	270	30		*Total**					
			0.384					-	0.068	0.279	0.279	*D.o.S.*					
			79.3					-	9.8	10.9	10.9	*95th%ile Back of Queue (m)*					
			13.8					-	5.0	57.5	10.2	*Average Delay (sec)*					
			Int.					*L*	*T*	*R*	*App*						

Collector Road

**Output volumes*

Mickleham Road S

Figure 6-34 Ultimate (2046) Intersection Assessment - Mickleham Road / Connector Road (Site Access) - PM Period



Total Flows: 1833 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	44	50	50%
B	23	29	29%
C	15	21	21%
	CL:	100	

Figure 3: Summary Results

Mickleham Road N

							App	*R*	*T*	*L*					
							25.3	-	33.8	6.6					
							26.4	-	26.4	5.4					
							0.209	-	0.209	0.093					
								-	273	124					
		-						-	*14*	*6*					
								-	259	118					
L	-	-	-	-	-	-							0.022	1.8	15.9 *App*
T	-	-	-	-	-	-					6	*0*	6	0.022	1.8	44.9 *R*
R	-	-	-	-	-	-					-	-	-	-	-	- *T*
App	-	-	-								17	*1*	18	0.012	1.8	6.3 *L*
								-	1189	152		*LV**			
								-	*63*	*8*		*HV**			
								-	1252	160		*Total**			
			0.303					-	0.303	0.203	0.303	*D.o.S.*			
			50.5					-	50.5	34.7	50.5	*95th%ile Back of Queue (m)*			
			11.2					-	4.9	24.0	7.1	*Average Delay (sec)*			
			Int.					*L*	*T*	*R*	*App*				

Collector Road

**Output volumes*

Mickleham Road S

Based on the foregoing analysis, the proposed intersection layout is expected adequately accommodate the projected 2046 traffic demand, with motorists experiencing manageable queues and delays.

6.6 Other Considerations

In addition to the formerly mentioned intersection operations, consideration was given to an interim scenario contemplating the signalisation of a single intersection only along Donnybrook Road within Merrifield West.

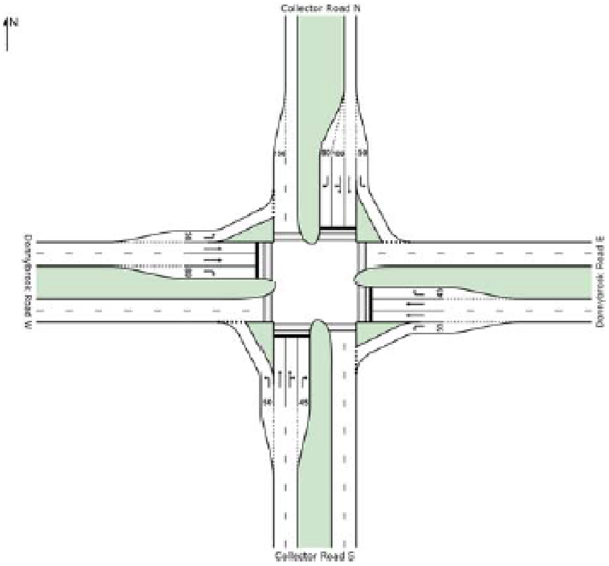
A SIDRA analysis was undertaken to assess the likely impacts of additional traffic for the signalisation of the Donnybrook Rd / Connector Boulevard intersection (IT06), with the assumption that the Donnybrook Road / Connector Road intersections (IT04 and IT05) were to be signalised at a later date.

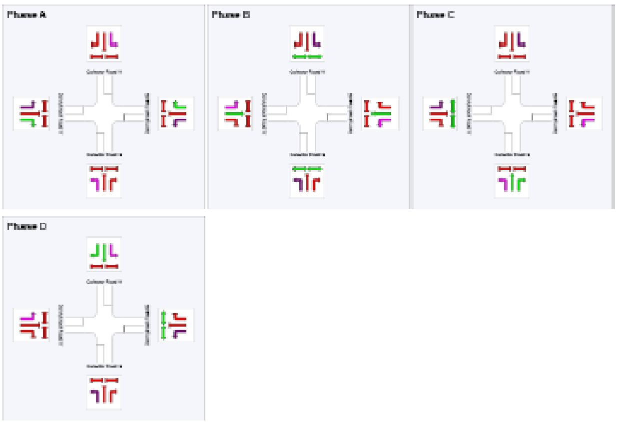
It is noted, no geometrical changes were made to the Donnybrook Rd / Connector Boulevard intersection for the analysis above.

The SIDRA results and adopted intersection configuration (based on the SIDRA analysis) for the scenario above are presented in Figure 6-35 and Figure 6-36.

6.6.1.1 *Donnybrook Road / Connector Boulevard (IT06 – Single intersection signalisation scenario for Donnybrook Road)*

Figure 6-35 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Boulevard (IT06)- AM Period





Total Flows: 2508 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	17	23	19%
B	40	46	38%
C	26	32	27%
D	13	19	16%
	CL:	120	

Figure 3: Summary Results

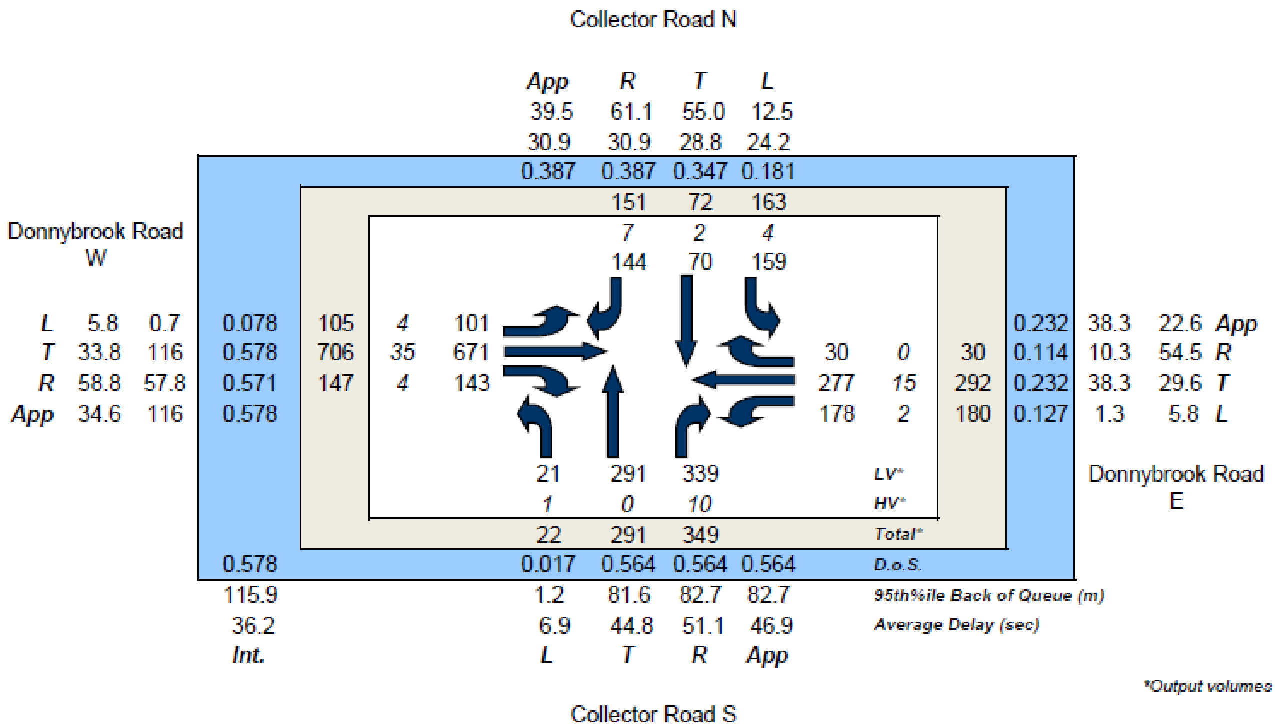
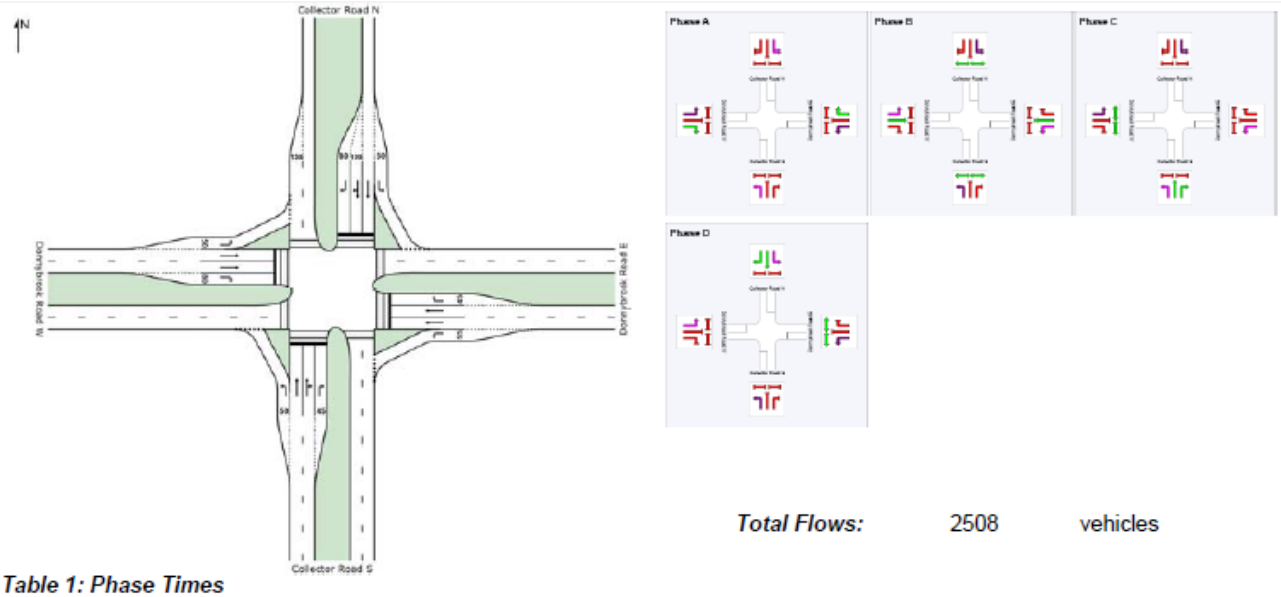


Figure 6-36 Interim (2031) Intersection Assessment - Donnybrook Road / Collector Boulevard (IT06)- PM Period



Total Flows: 2508 vehicles

Table 1: Phase Times

Phs	*Grn*	*Tot*	*%*
A	19	25	21%
B	48	54	45%
C	13	19	16%
D	16	22	18%
	CL:	120	

Figure 3: Summary Results

Collector Road N

	App	*R*	*T*	*L*								
	51.7	58.6	53.8	6.9								
	57.4	42.2	57.4	1.7								
	0.560	0.437	0.560	0.025								
		105	291	30								
		4	*0*	*0*								
		101	291	30								
L 5.9 1.1	0.111	151	*7*	144					0.564	99.4	24.0	*App*
T 22.2 32	0.193	292	*15*	277	159	*4*	163		0.564	62.4	57.0	*R*
R 52.2 7.5	0.076	22	*1*	21	671	*35*	706		0.559	99.4	25.4	*T*
App 18.3 32	0.193				339	*10*	349		0.244	2.9	5.8	*L*
		143	70	178		*LV**						
		4	*2*	*2*		*HV**						
		147	72	180		*Total**						
	0.564	0.148	0.347	0.451	0.451	*D.o.S.*						
	99.4	15.5	28.8	36.1	36.1	*95th%ile Back of Queue (m)*						
	30.4	9.5	55.0	61.5	41.2	*Average Delay (sec)*						
	Int.	*L*	*T*	*R*	*App*							

Donnybrook Road W

Donnybrook Road E

**Output volumes*

Collector Road S

Based on the forgoing analysis, the interim scenario considering only signalisation of the IT06 intersection along Donnybrook Road within Merrifield West is expected to adequately accommodate the projected 2031 traffic demand, with motorists experiencing manageable queues and delays.

The analysis shows the IT06 signalised intersection has the capacity to accommodate projected traffic demands in the interim (2031), with the Donnybrook Road / Connector Road intersections (IT04 and IT05) to be signalised at a later date.

7 Conclusions

Based on the preceding analysis and discussion, it is concluded that;

> The subject land, Lindum Vale, forms part of the Northern Growth Corridor and is located at the corner of Mickleham Road and Mt Ridley Road, Mickleham.

> It is proposed to develop the subject land for the purposes of approximately 1,600 residential lots, comprising a mixture of low, and medium density lots with the urban structure yet to be finalised. The subject site will also incorporate a small local activity centre along the western frontage of the site.

> The Merrifield West PSP abuts the site to the north. SMEC prepared a traffic assessment as part of the Merrifield West PSP dated July 2012. In preparing this report we have relied on the traffic considerations outlined within this PSP report for the Ultimate Scenario i.e. 2046, whilst for the Interim Scenario i.e. 2031 consideration has been given to an interim traffic model prepared by the City of Hume for the development of the land within Merrifield West.

> A peak hour traffic generation rate of 0.85 vehicle movements per hour for standard residential lots, or approximately 8.5 vehicle movements per day per lot has been adopted (in accordance with the SMEC Traffic Assessment undertaken as part of the Merrifield West PSP).

> It is projected that the proposed development would generate 13,600 vehicle movements per day, inclusive of 1,360 vehicle movements in each peak hour.

> It has been assumed in the AM peak hour 20% of movements are arrivals and 80% departures whilst the reverse has been adopted for the PM peak Traffic has been distributed taking into account vehicle trip purposes sourced from the Department of Transport VISTA 2007 and the MITM model.

> A SIDRA assessment for both the interim and ultimate post development scenarios was undertaken at the critical intersections within the vicinity of the subject site, including three critical intersections located within the Merrifield West PSP namely the IT04, IT05 and IT06 intersections along Donnybrook Road.

- No geometrical changes were made to the above noted Intersections.

> The assessment shows that

- The layout of the IT04, IT05 & IT06 intersections as proposed by SMEC will satisfactorily accommodate the additional traffic, with no design changes required; and
- The proposed access arrangements to the site will satisfactorily accommodate the development traffic with motorists experiencing manageable delays and queues.

> Consideration was also given to a 2031 interim scenario that envisages the construction and signalisation of only one of the three critical intersections along Donnybrook Road.

> Assuming that only the IT06 intersection along Donnybrook Road was constructed and signalised, the SIDRA analysis shows the IT06 signalised intersection has the capacity to accommodate the projected traffic demands, with motorists expected to experience manageable queues and delays.

> In consideration of the above, the proposed development will add a relatively low level of traffic to that already considered as part of the Merrifield West PSP and will not create adverse traffic effects on the surrounding roadwork, and already approved road infrastructure.