

# **Transport Impact Assessment**

## Planning Proposal

No.'s 4, 12 and 14 Cowan Road, St Ives (Pymble Golf Club)

02/06/2022

P0407

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## Document Control

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<b>Project</b>	No.'s 4, 12 and 14 Cowan Road, St Ives (Pymble Golf Club)
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# contents

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## Glossary

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<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	The Planning Proposal	1
1.2	Transport Impact Assessment	1
<b>2</b>	<b>Strategic Context</b>	<b>4</b>
2.2	Ku-ring-gai Traffic and Transport Plan 2011-2020	5
2.3	Town Centre Traffic Studies	5
2.4	Ku-ring-gai Local Development Control Plans	7
<b>3</b>	<b>Existing Conditions</b>	<b>8</b>
3.2	Road Hierarchy	9
3.3	Public Transport	10
3.4	Bicycle Network	11
3.5	Pedestrian Connectivity	12
3.6	Journey to Work Data Analysis	12
3.7	Existing Intersection Operations	14
3.8	Future Base Intersection Operations	19
<b>4</b>	<b>Planning Proposal Traffic Assessment</b>	<b>24</b>
4.1	Proposed Development	24
4.2	Proposed Traffic Calming	24
4.3	Vehicle Access	25
4.4	Trip Generation	26
4.5	Trip Distribution	26
4.6	Trip Assignment	27
4.7	Future (2027) + Proposal Intersection Operations	31
<b>5</b>	<b>Conclusions</b>	<b>33</b>

## contents continued

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### Figures

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Figure 1: St Ives Community Infrastructure Plan	6
Figure 2: Existing Zoning Controls	8
Figure 3: Site Location and Surrounding Road Hierarchy	9
Figure 4: Public Transport Services	10
Figure 5: Regional Cycle and Pedestrian Connectivity	12
Figure 6: Traffic Volumes – Existing (2017) AM Peak Hour	15
Figure 7: Traffic Volumes – Existing (2017) PM Peak Hour	16
Figure 8: Traffic Volumes – Existing (2017) Saturday (Noon) Peak Hour	17
Figure 9: Traffic Volumes – Future (2027) AM Peak Hour	20
Figure 10: Traffic Volumes – Future (2027) PM Peak Hour	21
Figure 11: Traffic Volumes – Future (2027) Saturday (Noon) Peak Hour	22
Figure 12: Indicative Design – Ground Floor Plan	25
Figure 13: Traffic Volumes – Future (2027) AM Peak Hour + Proposal	28
Figure 14: Traffic Volumes – Future (2027) PM Peak Hour + Proposal	29
Figure 15: Traffic Volumes – Future (2027) Saturday (Noon) Peak Hour + Proposal	30

### Tables

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Table 1 Affected Land	8
Table 2 Bus Services	11
Table 3 St Ives JTW Data 2011 and 2016 – Method of Travel to Work	13
Table 4 Top 20 Employment Locations of Ku-ring-gai Residents by LGA	14
Table 5 Intersection Assessment Criteria	18
Table 6 Existing (2017) Intersection Performance	19
Table 7 Future (2027) Intersection Performance	23
Table 8 Land Use Assumptions	24
Table 9 Intersection Performance Comparison	31

### APPENDICES

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#### Appendix A. SIDRA Modelling Outputs

#### Appendix B. Green Travel Plan

#### Appendix C. Consultation Emails



# 1 Introduction

## 1.1 The Planning Proposal

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This Transport Impact Assessment (TIA) has been prepared on behalf of Pymble Golf Club to support a Planning Proposal to amend the Ku-ring-gai Local Environmental Plan 2015 (LEP 2015). The proposed amendment would provide for the medium density residential dwelling of a higher density than currently provided for in LEP 2015 at the Site, being Pymble Golf Club at 4, 12 and 14 Cowan Road, St Ives. It is estimated that the Proposal would provide for the development of between 80 and 100 residential units while retaining the existing golf course.

The Proposal offers the opportunity to provide a significant urban infill opportunity within the Ku-ring-gai Local Government Area (LGA), which aligns with broader State Government strategies to increase and accelerate housing supply.

It should be noted that any future renovations to the existing clubhouse will not effectively constitute an expansion or intensification resulting from an increased trip generation as the quantum of members will not exceed what is existing.

## 1.2 Transport Impact Assessment

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This TIA has been prepared to examine the broader traffic and transport characteristics of the Proposal. The structure and scope of the TIA is based on the assessment requirements detailed in the Transport for NSW (TfNSW) Guide to Traffic Generating Developments and TfNSW Integrated Public Transport Service Planning Guidelines.

It is noted from the outset that a further detailed assessment of the Proposal will be required as part of a future Development Application should the Planning Proposal be approved, particularly in regard to the detailed design of access and basement parking levels. As is appropriate to a Planning Proposal, this assessment (and the broader submission it accompanies) is designed to provide a more holistic overview of the Proposal to ensure that any potential issues can/could be resolved as part of a future formal Development Application.

### 1.2.1 TfNSW Consultation

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Ason Group has consulted with the TfNSW regarding the following:

#### 1. Recent and future proposals for the Mona Vale Road corridor

In an email dated 11 September 2018 (see Appendix D), TfNSW advised that no projects were identified in the St Ives area as part of the Pinch Point Program and that the only projects along Mona Vale Road were:

- Pacific Highway at Mona Vale and Ryde Road, Pymble/Gordon (completed 2019)
- Mona Vale Road, Forest Way and Garigal Road, Terrey Hills (completed 2018)

At Council's request given the elapsed time since that engagement, TfNSW were again contacted in August 2022 to ascertain the status of any proposed road and transport improvements along the Mona Vale Road corridor. A copy of the relevant correspondence is included in Appendix C. It is evident that there are no proposed road and transport improvements planned by TfNSW in the St Ives town centre area.

## 2. Future strategic traffic growth

Information was obtained (EMME model outputs) to inform development of a future baseline (i.e. without the Proposal) conditions. The modelling in 4.7.1 accounts for the redistribution of trips advised and provides for the forecast annual increase.

## 3. Traffic Signal Data

Preliminary discussions have been held with TfNSW Transport Management Centre (TMC) officers in relation to the current operation of traffic signals along the Mona Vale Road corridor, noting that signal cycle and phase times along Mona Vale Road are largely governed by the performance of the Mona Vale Road / Pentecost Avenue intersection. This data and advice has been incorporated into the analysis and modelling.

## 4. Bus Priority Infrastructure Program (BPIP)

The BPIP team advised that they are not currently proposing any changes in the St Ives area.

### 1.2.2 Ku-ring-gai Council Consultation

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Ason Group has consulted with Ku-ring-gai Council (Council), regarding:

- General scope of the TIA.
- Key local traffic issues.
- Key local roads and intersections. In this regard, Council has identified the following intersections for detailed assessment:
  - Mona Vale Road / Cowan Road / Shinfield Avenue
  - Cowan Road / Killeaton Street
  - Cowan Road / Village Green Parade
- Appropriate design peak periods. In this regard, Council has identified the following periods for detailed assessment:
  - Weekday AM and PM peak hours
  - Saturday (PM) peak hour
- Further, Council advised that surveys should be undertaken inside the March–September winter sports season as surveys taken outside this period would likely record lower Saturday peak period traffic volumes.
- Development of future base traffic network scenarios i.e. without the Proposal, specifically considering Council's plans for the St Ives Town Centre and the redevelopment of the St Ives Shopping Village.
- Integrated land use and transport strategies.

### 1.2.3 Reference Documents

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In the preparation of this report, reference is made to the following documents:

- NSW Government, Ku-ring-gai Local Environmental Plan (Local Centres) 2012 (Local Centres LEP 2012),
- NSW Government, Ku-ring-gai Local Environmental Plan 2015 (LEP 2015);
- Ku-ring-gai Council, Local Centres Development Control Plan 2022, effective 23 May 2022 (DCP 2022)
- Ku-ring-gai Council, Traffic and Transport Plan 2011-2021, September 2011;
- Ku-ring-gai Council, Ku-ring-gai Contributions Plan, 2010;
- Ku-ring-gai Council, Ku-ring-gai Public Domain Plan 2010; and
- TfNSW Integrated Public Transport Service Planning Guidelines (TfNSW Guideline).

This TIA also references general access, traffic and parking guidelines, including:

- TfNSW Guide to Traffic Generating Developments (TfNSW Guide);
- TfNSW Technical Direction TDT 2013/04a, Guide to Traffic Generating Developments – Updated Traffic Surveys (TfNSW TDT/04a);
- Traffic Signal Design Section 2 – Warrants (TfNSW Traffic Signal Warrants); and
- Australian Standards 2980 (AS2890).

## 2 Strategic Context

The North District Plan requires the integration of land use and transport planning to create walkable and 30-minute cities. To achieve this, Future Transport 2056 and A Metropolis of Three Cities propose the concept of a 30-minute city. The 30 minute city is an aspiration of the NSW Government that will guide decision-making on locations for new transport, housing, jobs, tertiary education, hospitals and other amenities. It is intended that more housing, jobs, health and education facilities be planned in metropolitan and strategic centres, increasing access for people to public transport to their closest metropolitan or strategic centre.

The Site is located within 30 minutes of two health and education precincts, easily accessible via public transport. Macquarie Park (28 minutes from site) has a baseline target of 73,000 employees by 2036, and St Leonards (30 minutes from site) a baseline target of 54,000 employees.

The site is also located within 30 minutes of two strategic centres. Chatswood (25 minutes from site) has a baseline target of 31,000 employees by 2026, and Hornsby (29 minutes from site) a baseline target of 18,000 employees.

Local centres are a focal point of neighbourhoods and are an important part of a 30-minute city. While local centres are diverse and vary in size, they provide essential access to day-to-day goods and services close to where people live. Future Transport 2056 identifies the importance of local centres as transport interchanges, as places which will have a high level of accessibility which will be enhanced as service frequencies and travel times are improved. Local centres also have an important role in providing local employment. Approximately 200 local centres include a supermarket with floorspace greater than 1,000m<sup>2</sup>, accounting for close to 18% of all Greater Sydney's jobs.

St Ives is identified by the North District Plan as an emerging destination for eateries and cafes offering unique neighbourhood qualities and cultural facilities. Turramurra, Gordon and Lindfield are also identified as local centres and are located within 30 minutes of the site.

The North District Plan acknowledges the management of local centres is predominantly led by Councils. The resolution of which local centres are important to each Council is assessed as part of their preparation of local strategic planning statements and local environmental plans. The Plan desires that Councils consider which centres will be appropriate to accommodate additional housing as part of their housing strategy, will need to grow to provide for the required goods and services of the community, or may also need to grow to deliver other roles for the community, such as recreational, cultural and community hubs.

The Ku-ring-gai Local Strategic Planning Statement identifies St Ives as a 'primary local centre' within its discussion of centres with potential suitability for additional housing, and subsequently identifies part of the Pymble Golf Club within the 'priority investigation area for future housing (2021-2026)'. The principles for identification of suitability for future housing include:

Locate high density housing types within a 10 minute walk (800 metre radius) of Primary and Secondary Local Centres: Gordon, Lindfield, Turramurra, St Ives, Roseville, Killara, Pymble and Wahroonga.

### 2.1 Northern Beaches Transport Action Plan

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As part of the planning for future growth in the area, the NSW Government is investing \$633 over the next five years to connect the new Northern Beaches Hospital to the community and to start delivery of bus rapid transit. This will be supported by traffic and road improvements, commuter car parks, modern bus stops and more frequent public transport services. Major road improvements to reduce congestion and improve travel times include:

- A four-lane upgrade to Mona Vale Road,

- Modern bus stops providing convenient, safe and attractive shelters, and
- New and more frequent bus services from Mona Vale to Macquarie Park.

\$125 million is being invested to get on with the job of delivering kerbside Bus Rapid Transit (BRT) on the Northern Beaches. This will be supported by new bus lanes and 800 new commuter car parking spaces, making public transport more attractive.

## 2.2 Ku-ring-gai Traffic and Transport Plan 2011-2020

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This plan provides a 10-year strategy for traffic and transport in the Ku-ring-gai LGA. The document links policies, data, as well as outcomes of studies and town centre proposals. It is therefore, useful to many sections of the Ku-ring-gai community and includes the rationale for proposing and prioritising traffic management works for the 10-year period 2011-2020.

It should be noted that while the Plan shows Council's priorities and the basis for those priorities, actual projects undertaken will depend in some cases on funding from external sources, and Council exercising discretion where there has been previous commitment. Some priorities may also change, as traffic data changes over time. Notwithstanding, the Plan is consistent with other Council documents, including Council's Traffic and Transport Policy and other studies undertaken internally.

## 2.3 Town Centre Traffic Studies

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During the planning of the six Ku-ring-gai town centres, which culminated in the gazettal of the Ku-ring-gai Local Environmental Plan (Local Centres) 2012 (Local Centres LEP 2012), Council undertook numerous traffic and other studies. These studies examined existing traffic conditions and considered the cumulative traffic generating impacts of all redevelopments under the LEP 2012, including retail, commercial and residential land uses. Ku-ring-gai Council has since consolidated the Local Centres LEP 2012 with LEP 2015 to form a single LEP for the whole of Ku-ring-gai

The studies considered various traffic flow and intersection improvement options around each of the six the town centres, which are; Roseville, Lindfield, Gordon, Pymble, Turramurra and St Ives. Ku-ring-gai Council has planned to provide a practical and sustainable basis for future transport initiatives, activities and operations.

The increased residential densities in and around St Ives Town Centre have realised a corresponding increase in pedestrian and cyclist numbers and ultimately user facilities. Overall, the additional residential densities and commercial floor area in and around St Ives Town Centre that were proposed by these studies have been manageable with the addition of recommended intersection controls and improvements.

Council's vision for the area is set out in the Town Centres Public Domain Plan, 2010; the Ku-ring-gai Contributions Plan, 2010; the Ku-ring-gai Local Environmental Plan 2015 and the Ku-ring-gai Local Centres Development Control Plan (DCP 2022). The key elements of the public domain plan for the St Ives town centre are:

- a new town square;
- a new free-standing, Council-owned, multi-purpose community facility;
- a new one-way Village Green Parade;

- a pedestrian promenade;
- partial closure of Denley Lane;
- streetscape improvements;
- closure of Durham Lane for a new civic space; and
- traffic and parking improvements.

These measures are indicated in Figure 1: St Ives Community Infrastructure Plan **Figure 1** from the Ku-ring-gai Local Centres DCP 2022.

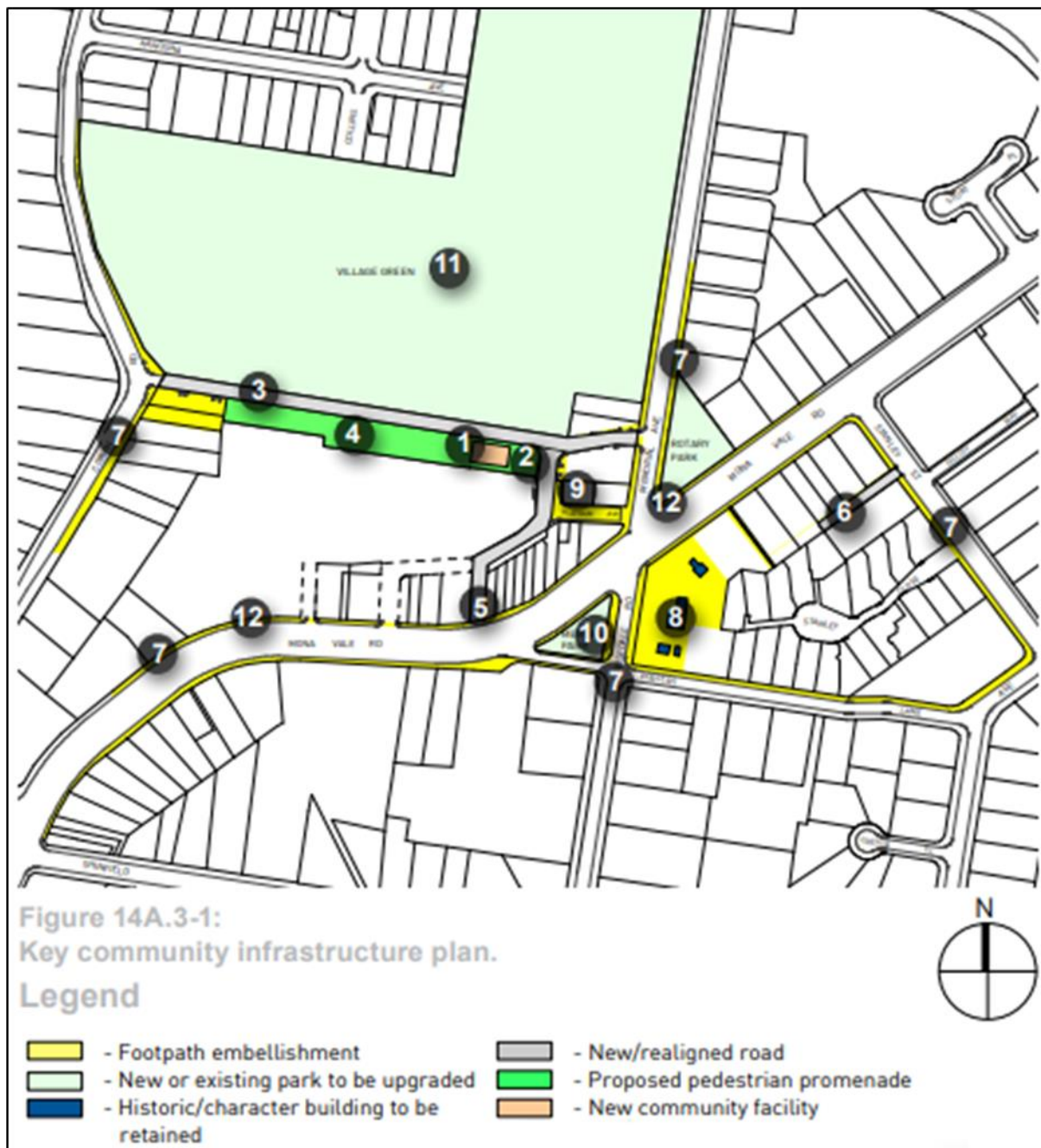


Figure 1: St Ives Community Infrastructure Plan



Key to Figure 1:

5. A new town square between the shopping centre and the Village Green. The town square will be generously proportioned (a minimum dimension of 30m x 30m or 900m<sup>2</sup>) located so as to be level, with a northern aspect and views across, and direct access to, the Village Green.
6. A new freestanding Council owned multi-purpose facility incorporating a branch library, neighbourhood centre, youth facility and childcare centre and located at the north-eastern corner of the St Ives Shopping Village adjoining Denley Lane/ Village Green Parade intersection but on land additional to the 900sqm town square.
7. Reconstruction of Village Green Parade as a one way street with on street parking and avenue tree planting.
8. A broad pedestrian promenade (minimum width 8 metres) and tree lined along the northern edge of shopping centre. Public carparking relocated to basement parking under the promenade.
9. A modified Denley Lane to connect with Mona Vale Road (in a new location) as a two way lane with footpaths.
10. Reconstruction of Stanley Lane as a two way lane with footpaths.
11. Embellishment of the footpath areas on Mona Vale Road, Cowan Road, Memorial Avenue, Stanley Street, Rosedale Road and Porters Lane including underground power lines, new lighting, high quality paving, furniture and street tree planting.
12. Improvement works to the old school area including the creation of a new public square, parking modifications, and upgrading of the community buildings.
13. Closure of Durham Lane and creation of a new civic space.
14. Upgrade works to Memorial Park and Rotary Park on Mona Vale Road.
15. Upgrade works to St Ives Village Green in accordance with Village Green Master plan.
16. A range of traffic and transport improvements including new traffic signals on Mona Vale Road; new bus facilities; and modifications to existing streets and lanes. These have all been modelled and will support improved traffic access and circulation around the centre.

## 2.4 Ku-ring-gai Local Development Control Plans

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All development within the St Ives local centre is to be designed to support the planned future character of the centre through the provision of Key Community Infrastructure as stated in the Ku-ring-gai Contributions Plan 2010. The proposal will increase housing density along a route and within an identified local precinct that is alleviated through the Proposed Community Infrastructure requirements for each as stipulated in DCP 2022, including:

- The installation of new traffic signals at the intersection of Killeaton Street with Cowan Road and removal of existing pedestrian operated signals near Collins Road, and
- A range of traffic and transport improvements on Mona Vale Road; new bus facilities; and modifications to existing streets and lanes.

As discussed, the modelling of future conditions provided in this TIA considers these proposals, which as stated will support improved traffic access and circulation around the centre.

## 3 Existing Conditions

### 3.1 The Site

The Site comprises 5 adjoining land parcels as shown in the table below.

TABLE 1 AFFECTED LAND			
Lot Number	DP Number	Address	Zoning
(Part of) Lot 1	511821	4 Cowan Road	RE2
Lot B	368565	4 Cowan Road	R3
Lot 1	531533	12 Cowan Road	R3
Lot 2	531533	4 Cowan Road	R3
Lot 3	531533	14 Cowan Road	R3

The Site is bordered by the balance of Pymble Golf Course to the north, south and west, while Cowan Road forms the eastern Site frontage. The Site is located on the western edge of the St Ives Shopping Village/St Ives Town Centre, and is shown in its local context in Figure 2 and Figure 3.

The Site is currently zoned for RE2 Private Recreation (Pymble Golf Club) and R3 Medium Density Residential (4, 12 and 14 Cowan Road), as show in Figure 2.



Figure 2: Existing Zoning Controls



## 3.2 Road Hierarchy

The road hierarchy in the vicinity of the Site is shown in Figure 3, with the following roads considered noteworthy:

- Monavale Road – an TfNSW classified Main Road (MR162) that generally runs in a north-easterly direction. Monavale Road provides 3 lanes in each direction during peak periods, noting the recent introduction of peak period clearways; and has a speed limit of 60km/h.
- Cowan Road – a collector road that runs in a north-south direction along the eastern border of the Site. Cowan Road generally provides a single lane in each direction with additional approach lanes at key intersections, and has a speed limit of 50km/h.
- Killeaton Street – a sub-arterial road that runs in an east-west direction to the north of the Site. Killeaton Street provides 2 lanes in each direction, and has a speed limit of 60km/h.
- Memorial Avenue – a collector road that runs in an east-west direction to the east of the St Ives Shopping Village. Memorial Avenue provides a single lane in each direction, and has a speed limit of 50km/h.
- Village Green Parade – a local access road running between Cowan Road and Memorial Avenue that services St Ives Shopping Village and St Ives Village Green car parks access points. Village Green Parade provides a single lane in each direction and has a speed limit of 50km/h.



Figure 3: Site Location and Surrounding Road Hierarchy

As such, the Site is conveniently located with respect to the arterial and local road network serving the region, with a number of routes available to the north, south, east and west. With reference to Section 4.2, the availability of this level of accessibility means that the proposed left/left out access restrictions at the future Site access driveways would not result in a significant increase in vehicle kilometres travelled (VKT)

### 3.3 Public Transport

The Site lies in close proximity to public transport services, as shown in Figure 4. A summary of the existing public transport services is discussed further below.

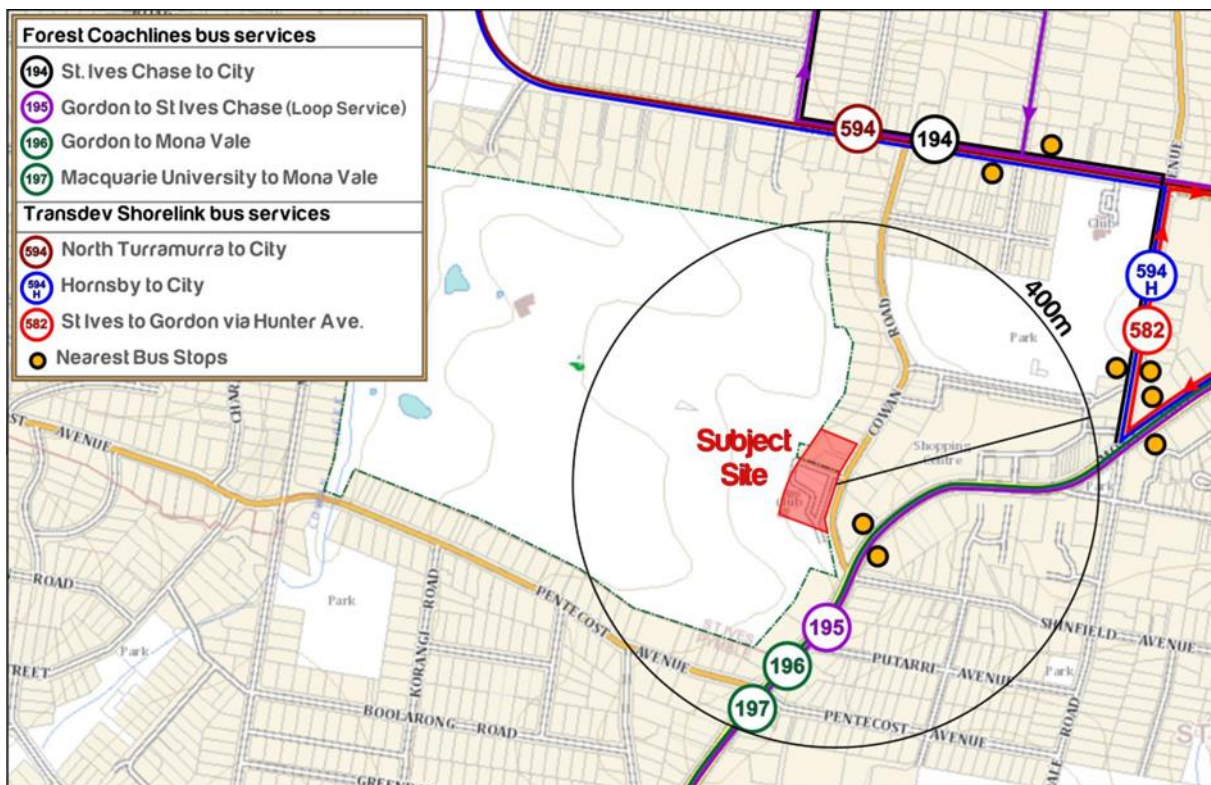


Figure 4: Public Transport Services

#### 3.3.1 Bus services

As shown in Figure 4, bus stops are located within 400m of the Site in Monavale Road (immediately east of Cowan Road) for bus services operating along Monavale Road. It is noted that TfNSW Guidelines state that bus services within 400m of a site can have a significant influence on travel mode choice, with that level of influence in turn depending on the frequency and destinations of those services.

The details of each bus service that use the Monavale Road bus stops are presented in **Table 2**.

TABLE 2 BUS SERVICES		
Route No.	Route Description	Peak Hour Frequency
195	Gordon to St Ives Chase (Loop Service – Northbound)	3
	Gordon to St Ives Chase (Loop Service – Southbound )	3
196	Gordon to Mona Vale	3
	Mona Vale to Gordon	1
197	Mona Vale to Macquarie University via Gordon	5
	Macquarie University to Mona Vale via Gordon	5

Importantly, and with reference to the TfNSW Trip Planner application, during the AM and PM peak periods, a bus service to (or from) Gordon Railway Station is available every 5 – 10 minutes, while outside of the commuter peaks a bus service is available every 10 – 15 minutes. This means that there is a frequent and direct service available connecting the Site to the Sydney rail network.

Additional bus services connecting to Turramurra, Hornsby and Sydney City operate along Memorial Avenue and Killeaton Road, with bus stops located approximately 500m from the Site in Memorial Avenue, and approximately 600m from the Site in Killeaton Road.

### 3.3.2 Rail services

The Site is not located within walking distance of any railway stations, but as described above regular bus services are available to Gordon Railway Station, which in turn provides access to the metropolitan rail network.

## 3.4 Bicycle Network

The bicycle network in the vicinity of the Site is shown in **Figure 5**. A “useful unmarked route” (as designated by Council for a known cycle route that does not provide a formal cycle path) runs along Cowan Road past the Site, connecting to Mona Vale Road and the off-road cycle route along Killeaton Street. These routes in turn provide access to the wider walking and cycling network, including links to Gordon, Pymble and Turramurra Railway Stations.



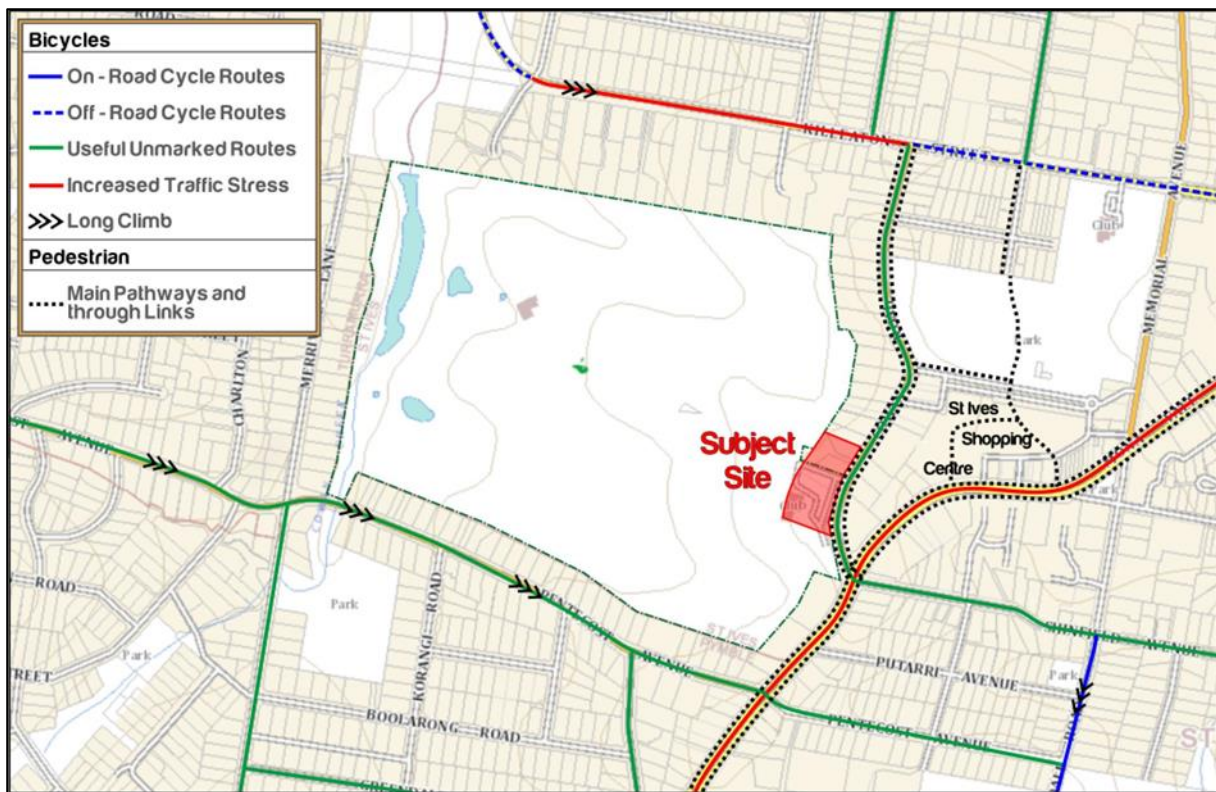


Figure 5: Regional Cycle and Pedestrian Connectivity

### 3.5 Pedestrian Connectivity

Key pedestrian desire lines in the vicinity of the Site primarily relate to connections to existing public transport infrastructure (i.e. bus stops); the St Ives Shopping Village; and nearby recreational spaces. In this regard, formal footpaths are provided in all local roads, while signalised and pedestrian (zebra) crossings are provided at the intersections of Monar Vale Road / Cowan Road and Memorial Avenue / Pentecost Avenue. Other pedestrian connections are provided by way of footpaths in and around the St Ives Shopping Village and broader St Ives Town Centre.

### 3.6 Journey to Work Data Analysis

The existing travel mode(s) for the journey to work for residents of St Ives was surveyed in the 2011 and 2016 Census and collated in Journey to Work (JTW) data provided by the Bureau of Transport Statistics. A summary of travel modes from the Australian Bureau of Statistics, Census of Population (ABS Census Data) and Housing 2016 comparing the 2016 JTW data with the 2011 JTW data has been compiled and is presented in **Table 3**.

Further, the ABS Census Data in **Table 4** shows that 24% of residents in the LGA live and work in the area and 76% live in but work outside the area.

**TABLE 3 ST IVES JTW DATA 2011 AND 2016 – METHOD OF TRAVEL TO WORK**

St Ives – Employed Persons (Enumerated)	2016			2011			Change
Main Method of Travel	Number	%	Ku-ring-gai %	Number	%	Ku-ring-gai %	2011 - 2016
Car – as driver	4,315	54.4	47.4	4,120	57.9	50.8	195
Train	1,502	18.9	26	1,112	15.6	21.4	389
Bus	402	5	2.3	209	2.9	1.8	+192
Car – as passenger	239	3	2.9	240	3.4	3.2	-1
Walked only	144	1.8	2.1	92	1.3	2.1	53
Other Mode	59	0.8	0.9	21	0.3	0.8	39
Motorbike/Scooter	31	0.4	0.5	37	0.5	0.4	-5
Truck	9	0.1	0.2	10	0.1	0.3	-1
Bicycle	6	0.1	0.6	10	0.1	0.6	-5
Worked at home	658	8.3	8.4	592	8.3	8	66
Did not go to work	556	7	8	620	8.7	9.4	-64
Not stated	19	0.2	0.5	53	0.7	1	-33
Total employed persons aged 15+	7,936	100	100	7,112	100	100	824

Source: Australian Bureau of Statistics, Census of Population

With reference to **Table 3**, while the travel mode by private car is still quite high, it is certainly encouraging that there have been increases in the number of people using public transport rather than private vehicles for the key trip to work.

**TABLE 4 TOP 20 EMPLOYMENT LOCATIONS OF KU-RING-GAI RESIDENTS BY LGA**

LGA	Number	%
Sydney (C)	14,083	25.7
Ku-ring-gai (A)	13,394	24.4
Willoughby (C)	5,064	9.2
North Sydney (A)	3,689	6.7
Ryde (C)	3,643	6.6
Northern Beaches (A)	2,476	4.5
Hornsby (A)	2,356	4.3
Parramatta (C)	1,483	2.7
No Fixed Address (NSW)	1,410	2.6
Lane Cove (A)	802	1.5
The Hills Shire (A)	688	1.3
Canada Bay (A)	508	0.9
Blacktown (C)	474	0.9
Inner West (A)	461	0.8
Cumberland (A)	420	0.8
Botany Bay (C)	394	0.7
Randwick (C)	383	0.7
Canterbury-Bankstown (A)	348	0.6
Central Coast (C) (NSW)	265	0.5
Woollahra (A)	228	0.4

Source: Australian Bureau of Statistics, Census of Population

## 3.7 Existing Intersection Operations

### 3.7.1 Traffic Surveys

Traffic surveys were undertaken at the key intersections identified by Council (per Section 1.2.2) during the AM, PM and Saturday (noon) peak periods. Council advised that surveys should be undertaken inside the March–September winter sports season as surveys taken outside this period would likely record lower Saturday peak period traffic volumes. Therefore, they were conducted on the following dates and times:

- Wednesday 17 May 2017 (7:00am–9:00am)
- Saturday 20 May 2017 (11:00am–1:00pm)\

It is noted that additional surveys at adjacent intersections were also undertaken so as to better model the coordination of (signalised) intersections, as well as potential upstream queuing issues.

The peak hourly volumes surveyed are summarised in the figures below.

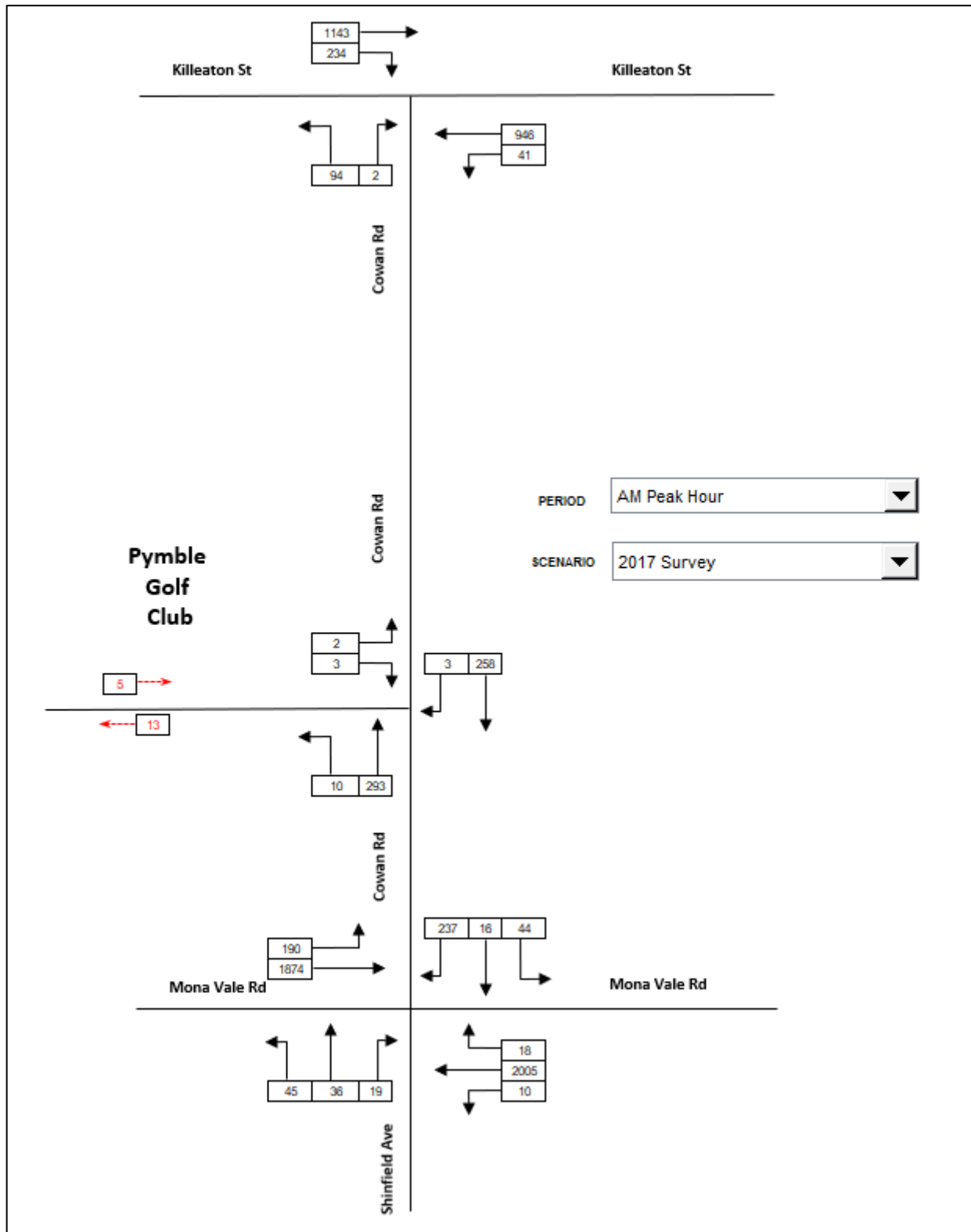


Figure 6: Traffic Volumes – Existing (2017) AM Peak Hour

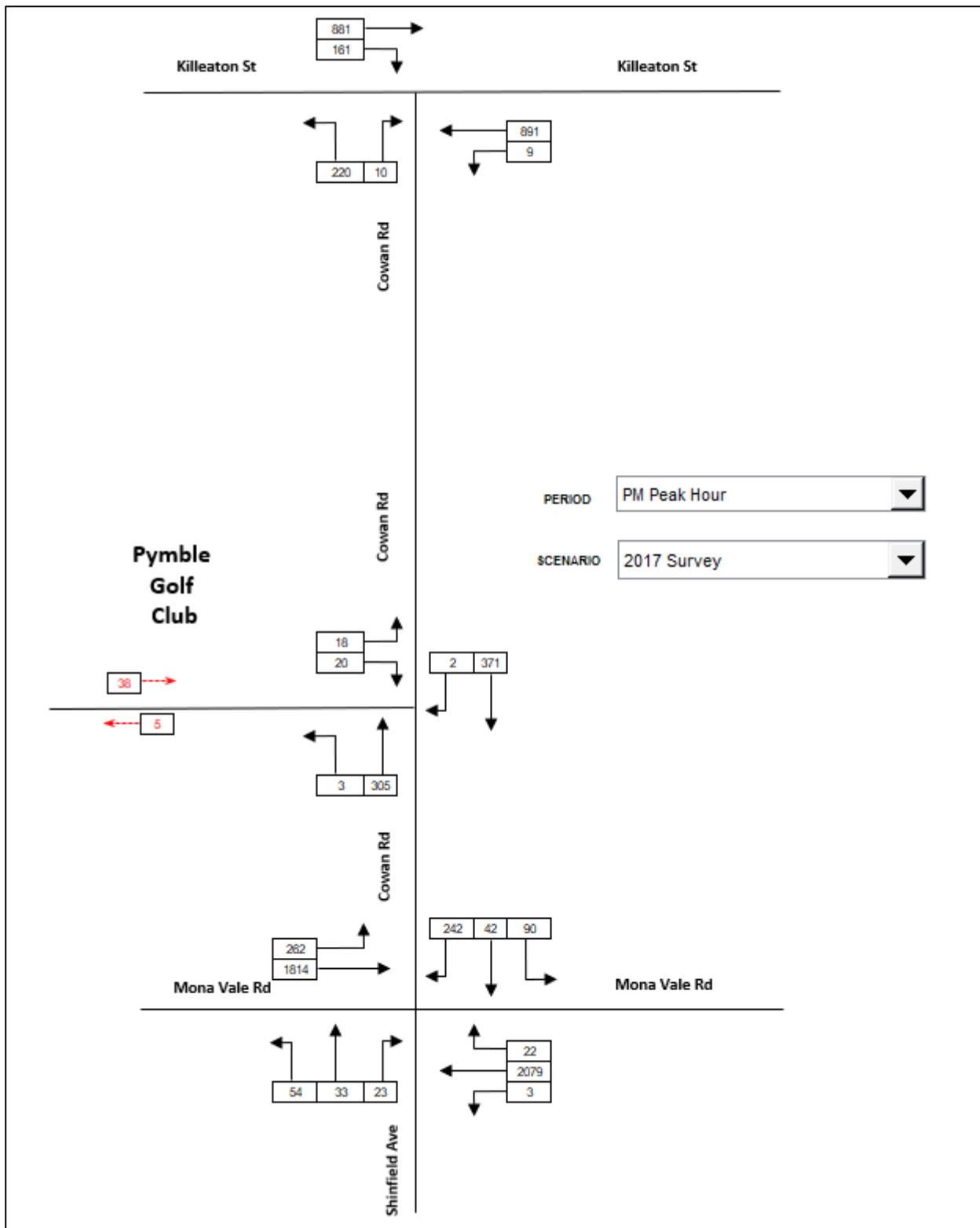


Figure 7: Traffic Volumes – Existing (2017) PM Peak Hour



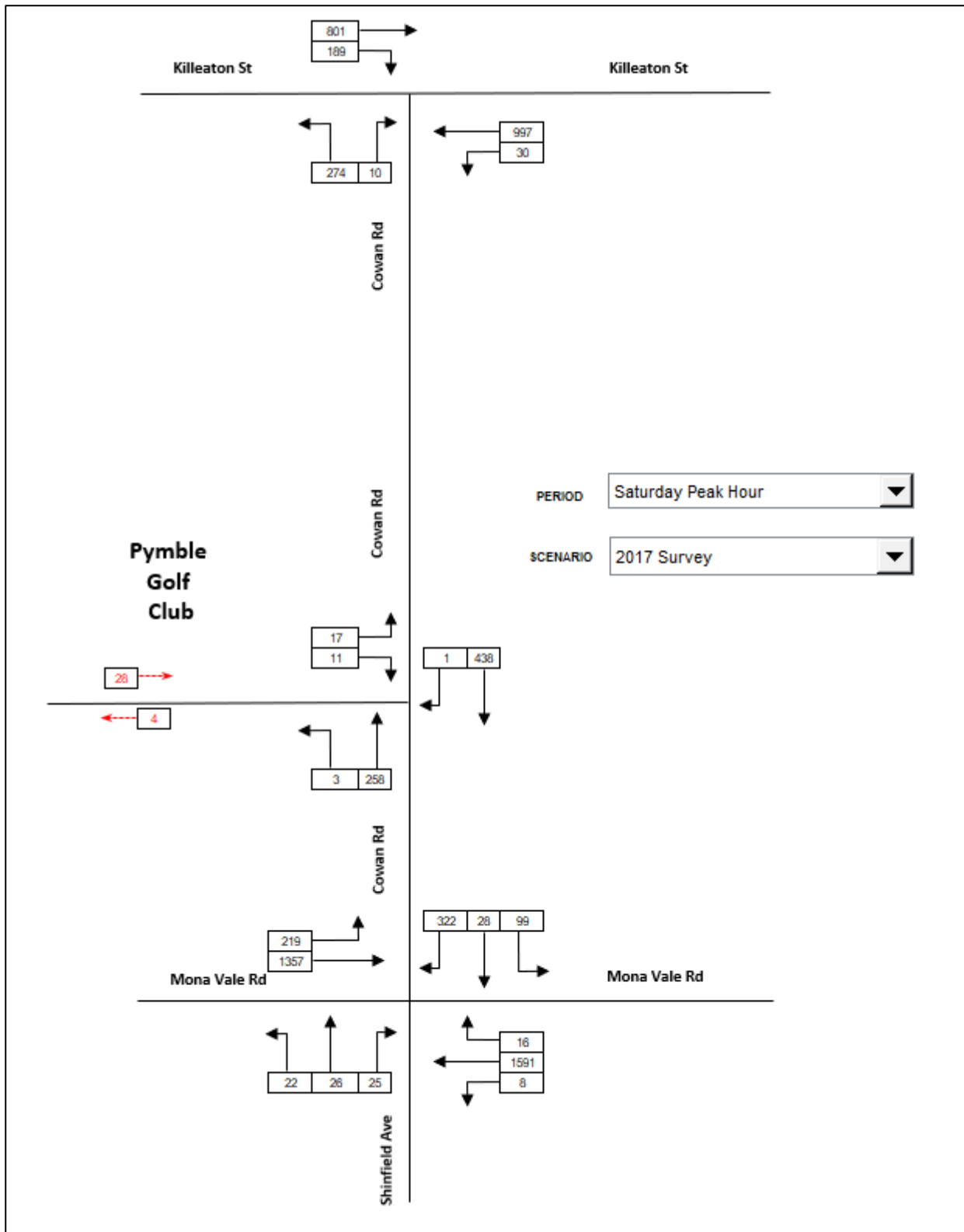


Figure 8: Traffic Volumes – Existing (2017) Saturday (Noon) Peak Hour

### 3.7.2 Road Network Performance

The performance of the key intersections has been analysed using the SIDRA Network modelling software. SIDRA modelling outputs a range of performance measures, in particular:

- **Degree of Saturation (DOS)** – The DOS is defined as the ratio of demand (arrival) flow to capacity. The DOS is used to measure the performance of intersections where a value of 1.0 represents an intersection at theoretical capacity, above 1.0 represent over-saturated conditions (demand flows exceed capacity) and degrees of saturation below 1.0 represent under-saturated conditions (demand flows are below capacity). As the performance of an intersection approaches DOS of 1.0, queue lengths and delays increase rapidly. It is usual to attempt to keep DOS to less than 0.9, with satisfactory intersection operation generally achieved with a DOS below 0.8.
- **Average Vehicle Delay (AVD)** – Delay represents the difference between interrupted and uninterrupted travel times through an intersection and is measured in seconds per vehicle. Delays include queued vehicles accelerating and decelerating from/to the intersection stop lines, as well as general delays to all vehicles travelling through the intersection. The AVD (or average delay per vehicle in seconds) for intersections also provides a measure of the operational performance of an intersection and is used to determine an intersection's Level of Service (see below). For signalised intersections, the AVD reported relates to the average of all vehicle movements through the intersection. For priority (Give Way, Stop and Roundabout controlled) intersections, the AVD reported is that for the movement with the highest AVD.
- **Level of Service (LOS)** – Measure that provides an indication of operating performance, based on AVD. For signalised and roundabout intersections, LOS is based on average delay to all vehicles, while at priority controlled intersections LOS is based on worst approach delay.

**Table 5** outlines the relevant performance criteria in accordance with the TfNSW Guide.

TABLE 5 INTERSECTION ASSESSMENT CRITERIA			
Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
<b>A</b>	Less than 14	Good operation	Good operation
<b>B</b>	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
<b>C</b>	29 to 42	Satisfactory	Satisfactory, but accident study required
<b>D</b>	43 to 56	Operating near capacity	Near capacity and accident study required
<b>E</b>	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
<b>F</b>	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

**TABLE 6 EXISTING (2017) INTERSECTION PERFORMANCE**

Intersection	Period	Degree of Saturation (DOS)	Average Vehicle Delay (AVD)	Level of Service (LOS)
Killeaton Street / Cowan Road	AM	0.998	36.0 sec	C
	PM	0.784	13.1 sec	A
	Sat	0.860	17.6 sec	B
Pymble Golf Club Access / Cowan Road	AM	0.168	8.2 sec	A
	PM	0.167	8.2 sec	A
	Sat	0.141	8.2 sec	A
Mona Vale Road / Cowan Road	AM	1.070	12.5 sec	A
	PM	1.290	22.4 sec	B
	Sat	1.437	44.8 sec	D

Observations on site and from the SIDRA analysis show queue lengths in Cowan Road on the northern approach to Mona Vale Road can occasionally extend to the existing Site access.

## 3.8 Future Base Intersection Operations

### 3.8.1 2027 Baseline Year Traffic Volumes

A future baseline traffic scenario has been assessed to provide a 'benchmark' from which to appropriately assess the impacts of the Proposal compared to a long term 'do nothing' scenario, i.e. future conditions without the Proposal.

Future traffic volumes have been derived from a number of sources:

- With regard to flows along Mona Vale Road, the TfNSW strategic models forecast movements during the weekday peaks to experience a relatively lower annual growth of 0.4%, which would include growth associated with the future St Ives Town Centre and St Ives Shopping Village redevelopment.
- With regard to the redevelopment of the St Ives Town Centre, assessment reports indicate that further to redevelopment total traffic flows would be little changed from existing flows, though there would be a redistribution of trips accounting for localised upgrades and the inclusion of a new intersection to Mona Vale Road (between Memorial Avenue and Cowan Road).

The modelling accounts for this redistribution of trips, and then provides for an average annual increase of 0.4% to all movements. The resulting Future (2027) Base traffic volumes for the key peak periods are summarised in the figures below, noting that while flows increase, the broader suite of St Ives Town Centre infrastructure upgrades (included in the modelling) will generally increase capacity throughout the St Ives Town Centre.

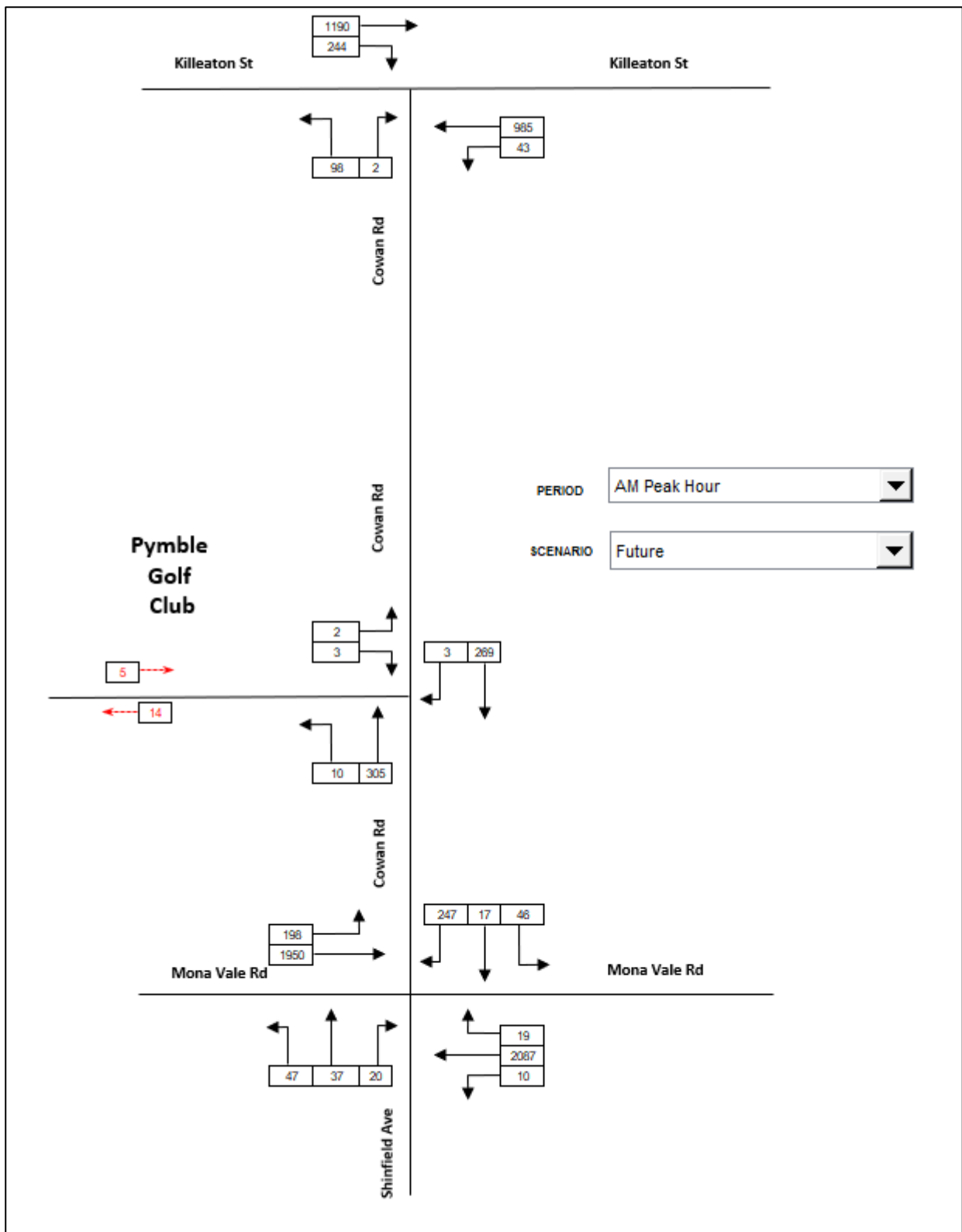


Figure 9: Traffic Volumes – Future (2027) AM Peak Hour

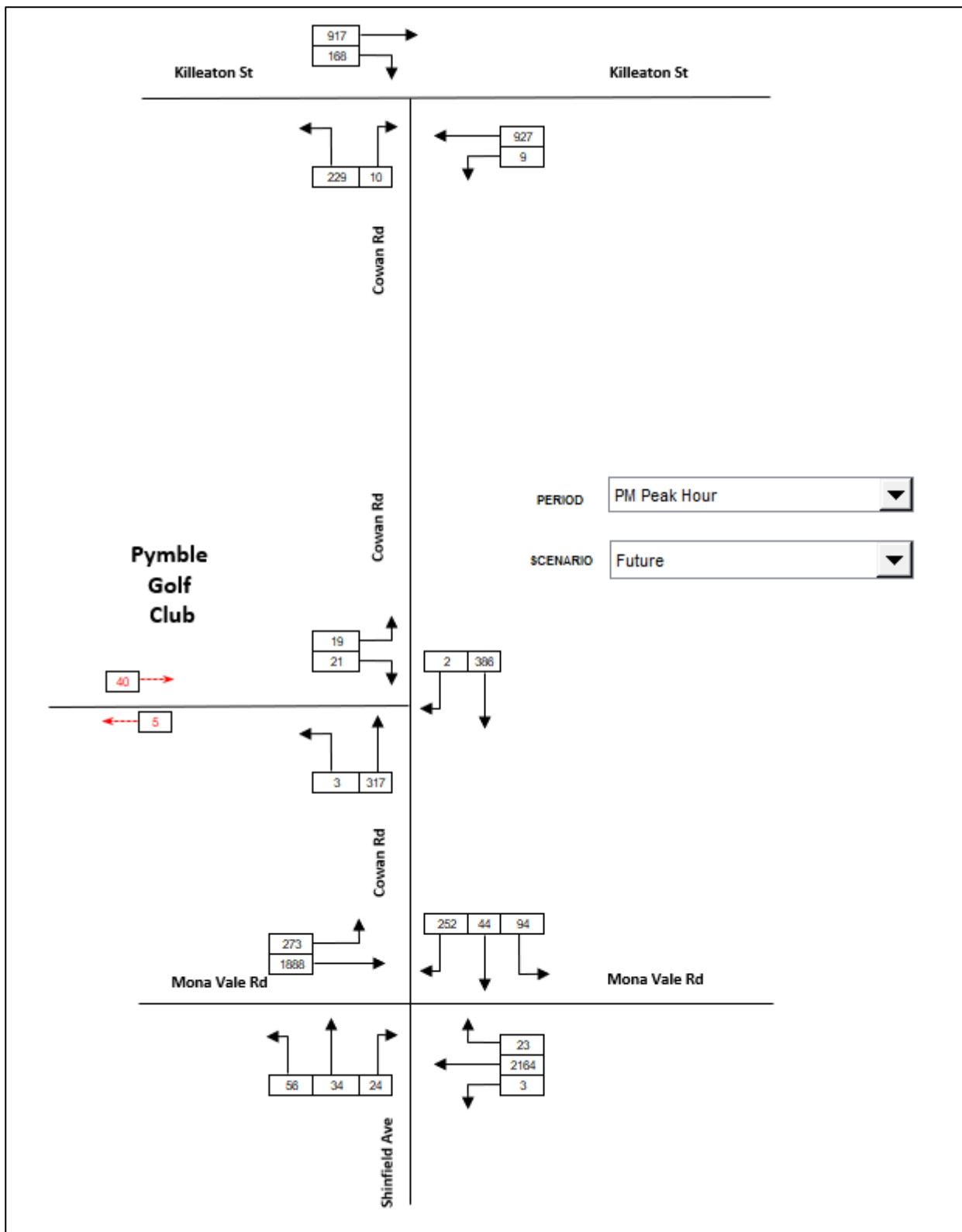


Figure 10: Traffic Volumes – Future (2027) PM Peak Hour

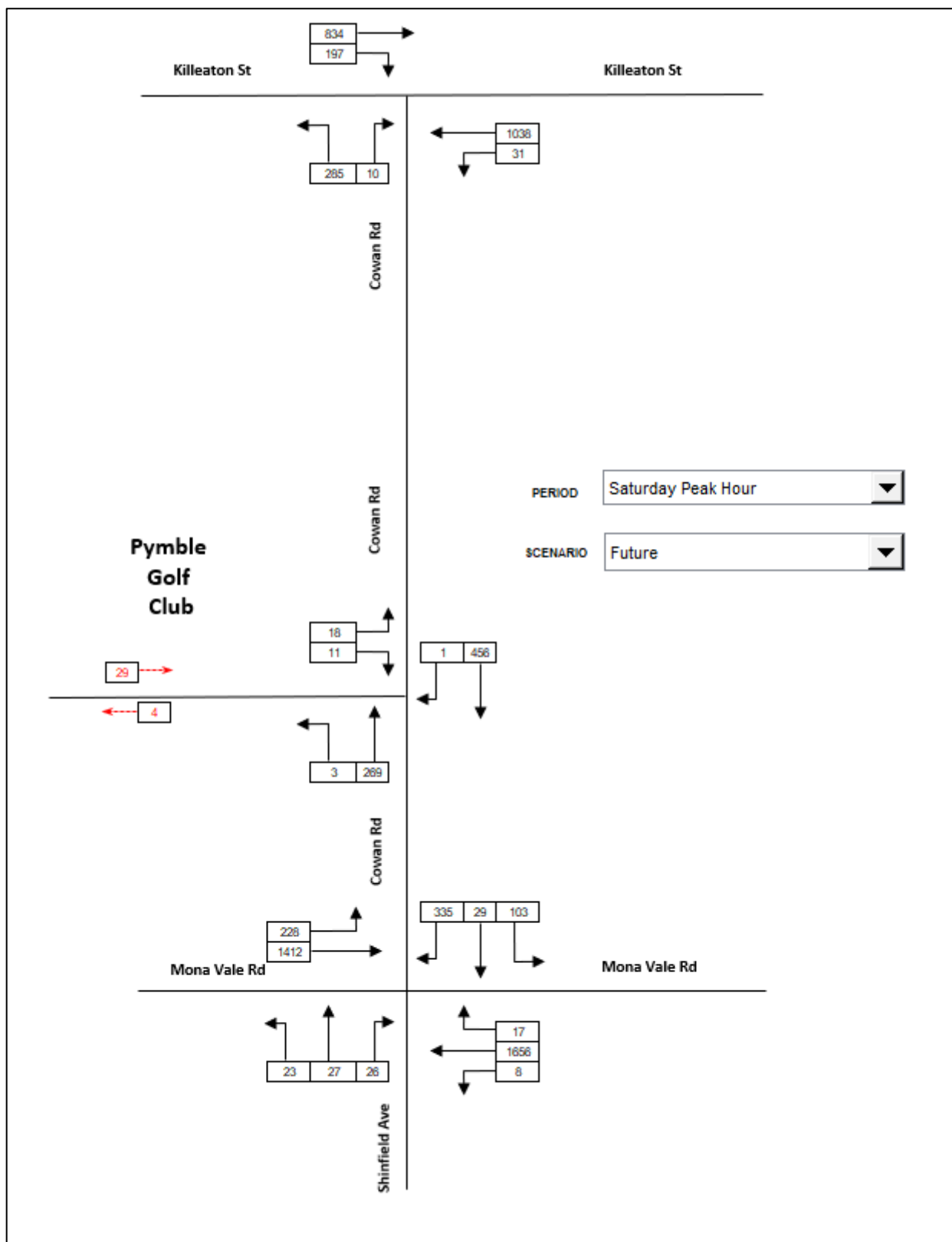


Figure 11: Traffic Volumes – Future (2027) Saturday (Noon) Peak Hour

### 3.8.2 2027 Baseline Intersection Operations

The results of the SIDRA analysis for the 2027 baseline conditions are summarised in **Table 7**.

**TABLE 7 FUTURE (2027) INTERSECTION PERFORMANCE**

Intersection	Period	Degree of Saturation (DOS)	Average Vehicle Delay (AVD)	Level of Service (LOS)
Killeaton Street / Cowan Road	AM	0.986	54.6 sec	D
	PM	0.806	13.7 sec	A
	Sat	0.904	22.3 sec	B
Pymble Golf Club Access / Cowan Road	AM	0.174	8.8 sec	A
	PM	0.210	8.9 sec	A
	Sat	0.247	8.7 sec	A
Mona Vale Road / Cowan Road	AM	1.131	15.0 sec	B
	PM	1.349	25.0 sec	B
	Sat	1.480	48.1 sec	D

The results, as shown in the table above, demonstrate that all intersections operate with acceptable delays, with a Level of Service D or better during both peak periods.

## 4 Planning Proposal Traffic Assessment

### 4.1 Proposed Development

As previously discussed, the Proposal seeks to amend Council's LEP 2015 to provide for higher residential densities to be provided across the Site than are permitted under the existing zoning.

For the purposes of this assessment, and further to discussions with the proponent, the indicative development yield outlined in Table 8 has been adopted to determine the likely traffic and transport impacts.

**TABLE 8 LAND USE ASSUMPTIONS**

Land Use	No. / Breakdown
Residential	80 – 100 dwellings
	10% 1 bed
	50% 2 bed
	40% 3 bed

It is important to note that the above development yield has been adopted for the purposes of traffic modelling in this TIA. Gateway determination or subsequent Planning Proposal approval does not in and of itself provide approval for any specific development mix or lock a future developer into a particular development outcome. Ultimately, any development proposal will need to be further considered with regard to specific uses and final yields as part of subsequent Master Planning and/or Development Applications following the rezoning of the Site to which this Planning Proposal relates.

### 4.2 Proposed Traffic Calming

Council has recently received funding from TfNSW to introduce a 40km/h High Pedestrian Activity Area (HPAA) in the area surrounding the St Ives Shopping Centre. HPAA measures are proposed to provide greater safety and amenity for motorists and pedestrians, noting that these measures do not primarily function to address network performance issues, and that the relevant network intersections are performing satisfactorily. HPAA measures proposed include:

- 40km/h speed limit in Cowan Road between Kanoona Avenue and Mona Vale Road, and on Memorial Avenue, between Killeaton Street and Mona Vale Road.
- 40km/h speed limit on Village Green Parade.

The primary reasons for proposing the measures are to reduce traffic speeds and improve safety and amenity for motorists and pedestrians - not to address any local road network performance issues, especially considering the Cowan Road / Village Green Parade intersection currently operates with a LoS A.. A copy of the indicative design of the ground floor plan is provided in **Figure 12** for context.





Figure 12: Indicative Design – Ground Floor Plan

## 4.3 Vehicle Access

It is proposed that vehicle access to the Site be restricted to left in/left out only—potentially by multiple access driveways, separating different uses / areas—in response to the observed (and modelled) queue lengths in Cowan Road on the northern approach to Mona Vale Road, which can extend past the Site.

Given that there are geometric constraints at the Mona Vale Road / Cowan Road intersection (retention of significant trees) which prevent any significant upgrades i.e. additional Cowan Road approach infrastructure; and further the TfNSW's more than appropriate reluctance to reduce green times along Mona Vale Road, there are limited options by which to mitigate this queue. As such, the removal of right turn movements to and from the Site will reduce the potential for additional queuing delays as well as reducing potential vehicle conflicts.

Notwithstanding, as previously discussed, there are excellent alternatives for access to/from the sub-regional and collector road network, such that the localised benefits of this restriction are not at the expense of any significant increase in travel time. Indeed, improvements in and around the St Ives Shopping Centre has since been completed, including provision of a roundabout at Cowan Road / Village Green Parade, allowing exiting vehicles to recirculate to Mona Vale Road in the future without needing to traverse Village Green Parade.

Detailed design of the access point(s) shall occur as part of future DA phase design development. It is expected that on-site loading shall need to make provision for access by the appropriate design vehicles – Heavy Rigid Vehicles (HRV) for fire appliance access at the ground level, including necessary on-site turning and passing facilities.

## 4.4 Trip Generation

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### 4.4.1 Residential

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The traffic generation rates adopted in this assessment are based on the rates published within the TfNSW Guide to Traffic Generating Developments and TfNSW TDT/04a.

For higher density residential development, TfNSW TDT/04a provides summary trip rates (0.19 and 0.15 trips per dwelling in the AM and PM peak respectively) that reflect development in close proximity to sub-regional centres and public transport interchanges (i.e. rail); clearly, these rates are not appropriate for application to the Proposal. Notwithstanding, a more detailed review of the TfNSW TDT/04a indicates additional sites (such as Liberty Grove) without such immediate accessibility to transport (and with larger dwellings) where higher trip rates are evidenced (0.28 and 0.41 trips per dwelling in the AM and PM peak respectively).

In addition, the TfNSW Guide provides a medium density residential trip of 0.5 – 0.65 trips per dwelling in the peak hours.

With consideration of all available information, and to provide for a robust assessment, a trip rate of 0.5 trips per dwelling in the peak hours has been applied to a higher Site yield estimate of 100 units; this results in an estimated Site generation of 50 vehicle trips per hour during the weekday AM and PM peak periods. As a worst case, this generation has also been assigned to the Saturday AM peak hour.

### 4.4.2 Clubhouse

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As noted Section 1.1, any future renovations to the existing clubhouse comprising future Development Applications will not generate more trips as the trip rate is directly linked to the number of members and not GFA. Accordingly, any expansion will not see an increase in trip generation as there are no plans to increase the quantum of members from what is existing.

## 4.5 Trip Distribution

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### 4.5.1 Directional Distribution

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Site trips have been distributed to the surrounding road network based generally on the travel patterns evident from the existing traffic flows on the network, combined with a review of Journey to Work census data for residents and workers in the surrounding area, and the assumptions made in the St Ives Town Centre Traffic and Parking Study. In addition, the left-in/left-out Site access would result in a proportion of Site traffic circulating through the St Ives Town Centre or back up to Killeaton Street.

### 4.5.2 Arrival and Departure Distribution

---

With reference to the St Ives Town Centre Traffic and Parking Study, and our experience in the assessment of residential developments, the following arrival/departure distribution has been assigned:

- AM peak (Weekday): 20% arrival, 80% departure
- PM peak (Weekday): 80% arrival, 20% departure
- Saturday peak: 50% arrival, 50% departure

## 4.6 Trip Assignment

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The resulting trips generated by the Site have been assigned to the key intersections in addition to the Future Base flows as detailed in Section 2.8. The resulting future total flows are shown in the figures below.

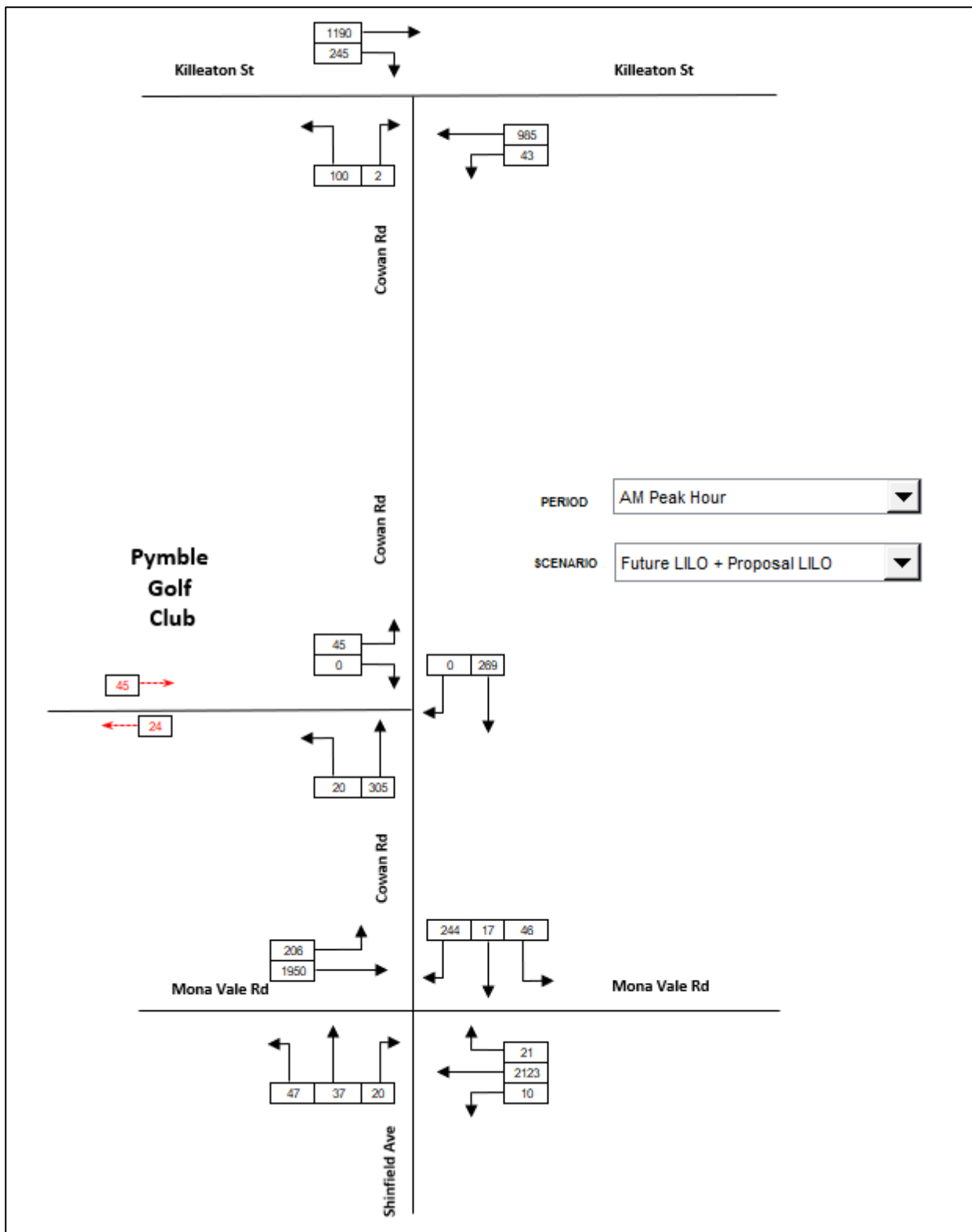


Figure 13: Traffic Volumes – Future (2027) AM Peak Hour + Proposal

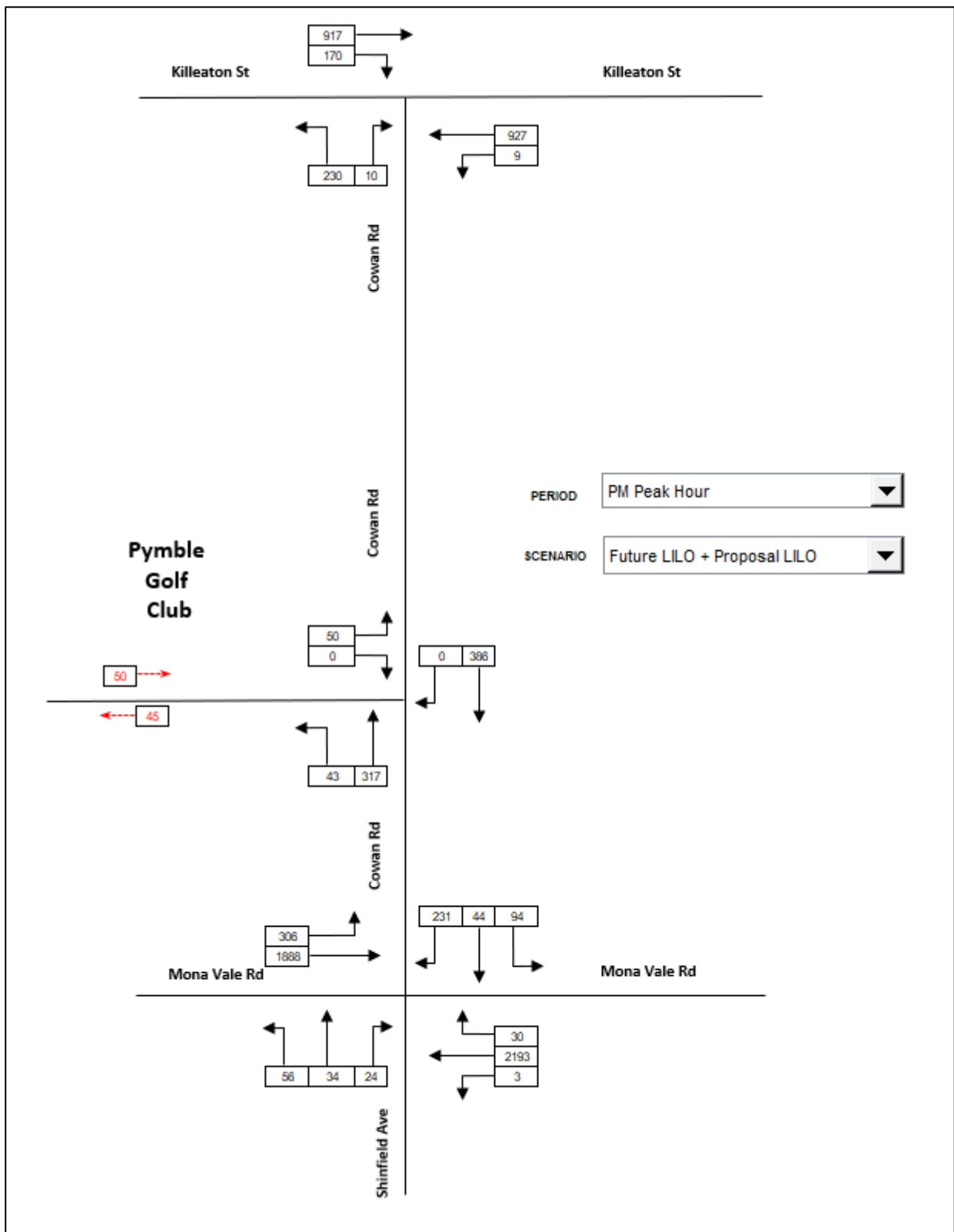


Figure 14: Traffic Volumes – Future (2027) PM Peak Hour + Proposal

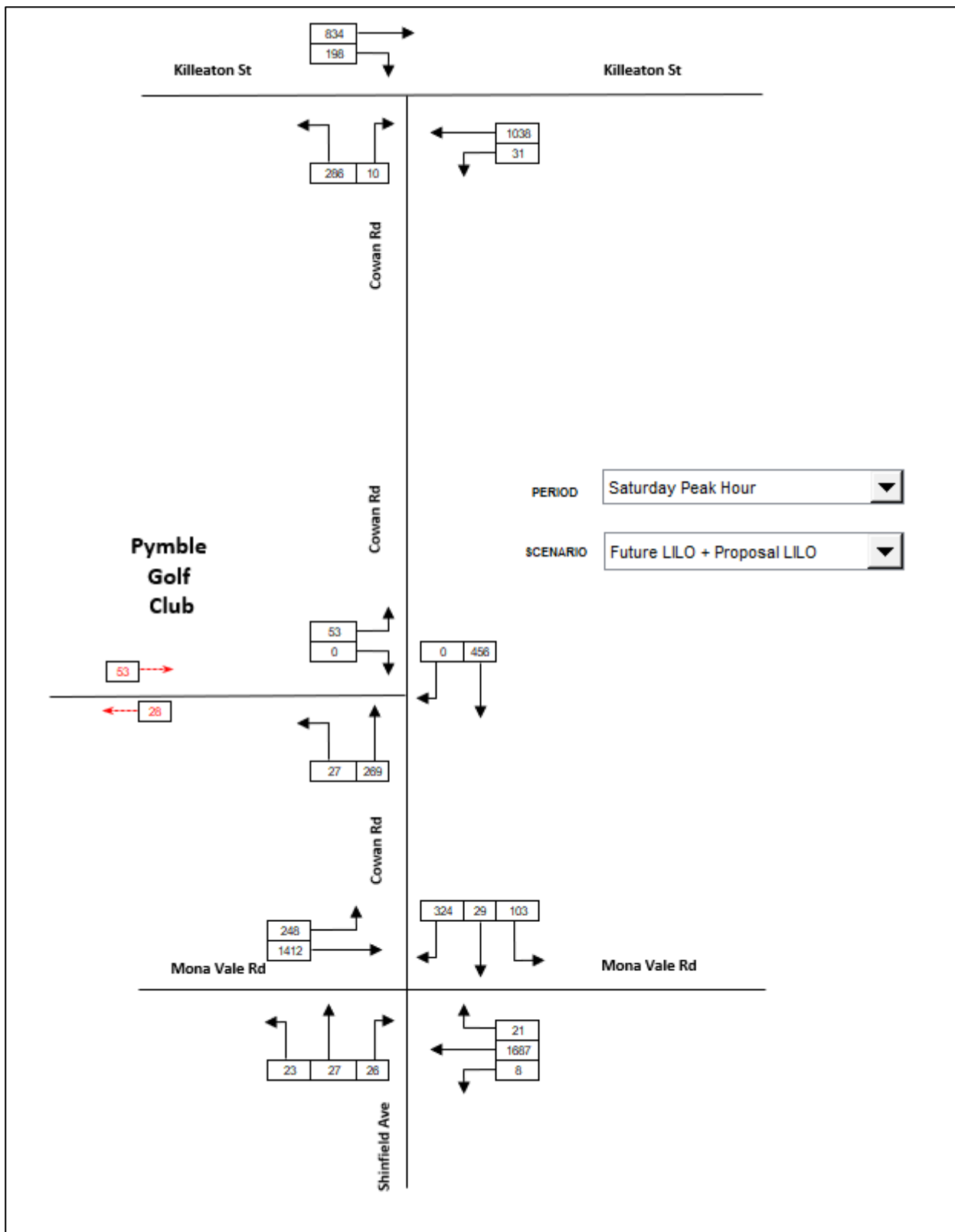


Figure 15: Traffic Volumes – Future (2027) Saturday (Noon) Peak Hour + Proposal

## 4.7 Future (2027) + Proposal Intersection Operations

### 4.7.1 Modelling Results

A comparison of the future performance of the key intersections – being the Future base flows with, and without the addition of the Proposal flows, is presented in Table 9.

**TABLE 9 INTERSECTION PERFORMANCE COMPARISON**

Intersection	Period	2027 Future Baseline			2027 Future Baseline + Proposal (LILO)		
		Degree of Saturation (DOS)	Average Vehicle Delay (AVD)	Level of Service (LOS)	Degree of Saturation (DOS)	Average Vehicle Delay (AVD)	Level of Service (LOS)
Killeaton Street / Cowan Road	AM	0.986	54.6 sec	D	1.003	55.5 sec	D
	PM	0.806	13.7 sec	A	0.806	13.7 sec	A
	Sat	0.904	22.3 sec	B	0.909	22.4 sec	B
Cowan Road / Village Green Parade	AM	0.208	5.5 sec	A	0.235	5.6 sec	A
	PM	0.278	5.2 sec	A	0.297	5.2 sec	A
	Sat	0.261	5.4 sec	A	0.284	5.5 sec	A
Pymble Golf Club Access / Cowan Road	AM	0.174	8.8 sec	A	0.180	8.2 sec	A
	PM	0.210	8.9 sec	A	0.209	8.2 sec	A
	Sat	0.247	8.7 sec	A	0.247	8.2 sec	A
Mona Vale Road / Cowan Road	AM	1.131	15.0 sec	B	1.120	14.3 sec	A
	PM	1.349	25.0 sec	B	1.259	19.8 sec	B
	Sat	1.480	48.1 sec	D	1.442	43.5 sec	D

With reference to **Table 9**, the Proposal has no significant impact on the operation of the key intersections, with only very minor increases in average delay compared to the Future base conditions. Notwithstanding, it is acknowledged that further investigation may be required during subsequent Development Application assessment to refine the impact of the Proposal and necessary infrastructure upgrades that may be required at that time. Such studies would obviously be based on a more detailed site yield, as well as the progress of broader infrastructure works/proposals throughout the St Ives Town Centre.

### 4.7.2 Public Transport

Using the ABS average persons per dwelling in St Ives of 2.83 and the 5% bus trips (from Section 3.6), the proposed maximum 100 dwellings would generate 14 additional bus patrons. Once distributed to varying work types and hours, the impact on the bus services and infrastructure will be minimal.





## 5 Conclusions

Ason Group has prepared a detailed Transport Impact Assessment examining the Proposal, with specific consideration of accessibility to services and public transport; existing and future base traffic conditions; and the potential impacts of the Proposal on the local traffic network, focusing on the key intersections as identified by Council. Ason Group has determined the following:

- The Proposal offers an excellent urban infill opportunity within the Ku-ring-gai LGA, aligning with the broader Government objectives and the Sydney Metropolitan strategy to increase and accelerate housing supply. The proposed increase in housing density is within an identified local precinct whose impacts are alleviated through the Proposed Community Infrastructure requirements stipulated in DCP 2022.
- The Site has excellent and immediate access to retail, commercial and recreational services within the St Ives Shopping Village and St Ives Town Centre as well as convenient access to surrounding strategic centres, Sydney CBD, health and education precincts.
- The Site has excellent and immediate access to public transport, with local buses providing access not only to rail at Gordon Railway Station, but also to key local and regional centres. The impact of the Proposal on the bus services and infrastructure will be minimal.
- The travel mode by private car in St Ives is high, but it is encouraging that there have been increases in the number of people using public transport rather than private vehicles for the key trip to work. Implementation of the Green Travel Plan will see a shift away from private transport use.
- Using a conservative trip rate of 0.5 trips per dwelling in the peak hours applied to a higher Site yield estimate of 100 units, an estimated Site generation of 50 vehicle trips per hour during the weekday AM and PM peak periods is forecast.
- The clubhouse will not generate more trips as the trip rate is directly linked to the number of members and not GFA. Accordingly, any renovations will not see an increase in trip generation as there are no plans to increase the quantum of members from what is existing.
- The operation of the key intersections as identified by Council has been assessed for the Weekday (AM and PM) and Weekday (Saturday Noon) peak periods, with consideration of:
  - Existing (2017) conditions.
  - Future (2027) Base conditions, which in turn consider traffic flow increases as well as planned infrastructure upgrades within the local road network).
  - Future (2027) Base conditions plus the trip generation of the Proposal, which itself is based on rates determined with reference to TfNSW guidelines and our background experience in the assessment of residential development.
  - Proposed left in/left out access at the Site from/to Cowan Road.
- Further to this assessment Ason Group has determined that:
  - The network generally operates within capacity with some intersections nearing capacity. Queueing on Cowan Road does not affect the existing Site access.
  - Under future base conditions (without the Proposal) all intersections operate with acceptable delays (Level of Service D or better during both peak periods) further to consideration of annual background traffic growth. Analysis shows the queue lengths in Cowan Road on the northern approach to Mona Vale can occasionally extend past the existing Site access.
  - The proposed Site access restriction to left-in/left-out only – potentially by multiple access driveways, separating different uses/areas – limits queuing within Cowan Road and reduces the potential for vehicle conflicts associated with right turn movements in a constrained environment (Cowan Road). While this results in Site traffic circulating through the St Ives Town Centre or back up to Killeaton Street, the analysis indicates that this has no significant impact on the operation of the key intersections.

- Detailed design of the access point(s) shall occur as part of future DA phase design development. It is expected that on-site loading shall need to make provision for access by the appropriate design vehicles.
- A Green Travel Plan (GTP) has been developed as part of a proposed management strategy and comprises a package of measures designed to address the specific travel needs and impacts of the Proposal. The overall intention of the GTP in Appendix B is to encourage and facilitate the use of alternatives to single-occupancy car travel for journeys associated with the Site.

In summary, the transport impacts of the Proposal are considered supportable, though it is acknowledged that further detailed assessment will be required as part of future Master Planning or Development Applications for the Site.

# Appendix A. SIDRA Modelling Outputs

# MOVEMENT SUMMARY

▽ Site: 101 [[Existing AM] Killeaton St / Cowan Rd]

Killeaton St / Cowan Rd  
Site Category: (None)  
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	99	6.4	0.361	19.4	LOS B	1.3	9.5	0.85	0.99	1.06	29.8
3	R2	2	50.0	1.000	2367.9	LOS F	2.3	23.2	1.00	1.04	1.16	0.7
Approach		101	7.3	1.000	68.3	LOS E	2.3	23.2	0.86	0.99	1.06	15.4
East: Killeaton St (125m)												
4	L2	43	2.4	0.024	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	47.9
5	T1	996	3.8	0.537	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		1039	3.7	0.537	0.3	NA	0.0	0.0	0.00	0.02	0.00	58.4
West: Killeaton St (60m)												
11	T1	1203	2.4	0.647	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.7
12	R2	246	0.4	0.782	30.2	LOS C	4.9	34.4	0.94	1.29	2.17	25.0
Approach		1449	2.0	0.782	5.2	NA	4.9	34.4	0.16	0.22	0.37	42.0
All Vehicles		2589	2.9	1.000	5.7	NA	4.9	34.4	0.12	0.17	0.25	41.1

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

▽ Site: 101 [[Existing PM] Killeaton St / Cowan Rd]

Killeaton St / Cowan Rd  
Site Category: (None)  
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	232	0.5	0.658	20.9	LOS B	3.3	23.3	0.89	1.16	1.61	29.0
3	R2	11	0.0	0.500	241.2	LOS F	1.4	9.5	0.99	1.03	1.12	6.3
Approach		242	0.4	0.658	30.5	LOS C	3.3	23.3	0.89	1.16	1.59	24.7
East: Killeaton St (125m)												
4	L2	9	0.0	0.005	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	48.1
5	T1	938	1.3	0.498	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		947	1.3	0.498	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.5
West: Killeaton St (60m)												
11	T1	927	0.6	0.495	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
12	R2	169	0.0	0.443	16.4	LOS B	1.9	13.6	0.83	1.01	1.15	32.4
Approach		1097	0.5	0.495	2.5	NA	1.9	13.6	0.13	0.16	0.18	48.4
All Vehicles		2286	0.8	0.658	4.5	NA	3.3	23.3	0.16	0.20	0.25	43.3

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

▽ Site: 101 [[Existing Sat] Killeaton St / Cowan Rd]

Killeaton St / Cowan Rd  
Site Category: (None)  
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	288	0.4	1.069	116.2	LOS F	21.1	147.9	1.00	2.80	7.24	10.3
3	R2	11	0.0	0.688	394.9	LOS F	1.9	13.1	1.00	1.05	1.20	4.0
Approach		299	0.4	1.069	126.0	LOS F	21.1	147.9	1.00	2.74	7.03	9.7
East: Killeaton St (125m)												
4	L2	32	0.0	0.017	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	48.1
5	T1	1049	0.7	0.555	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		1081	0.7	0.555	0.2	NA	0.0	0.0	0.00	0.02	0.00	58.8
West: Killeaton St (60m)												
11	T1	843	0.2	0.448	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	199	0.5	0.684	26.9	LOS B	3.5	24.5	0.93	1.17	1.70	26.5
Approach		1042	0.3	0.684	5.1	NA	3.5	24.5	0.18	0.22	0.33	42.1
All Vehicles		2422	0.5	1.069	17.8	NA	21.1	147.9	0.20	0.44	1.01	26.2

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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# MOVEMENT SUMMARY

 **Site: 101v [[Existing AM] Killeaton St / Cowan Rd (2)]**

Killeaton St / Cowan Rd

Site Category: (None)

Signals - Fixed Time Isolated    Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	99	6.4	0.183	21.0	LOS B	2.7	20.0	0.68	0.71	0.68	28.9
3	R2	2	50.0	0.024	52.6	LOS D	0.1	1.0	0.96	0.62	0.96	19.1
Approach		101	7.3	0.183	21.7	LOS B	2.7	20.0	0.69	0.71	0.69	28.5
East: Killeaton St (125m)												
4	L2	43	2.4	0.041	14.2	LOS A	0.8	5.9	0.44	0.66	0.44	36.2
5	T1	996	3.8	0.942	42.8	LOS D	57.5	415.9	0.96	1.12	1.25	13.0
Approach		1039	3.7	0.942	41.6	LOS C	57.5	415.9	0.94	1.10	1.21	13.9
West: Killeaton St (60m)												
11	T1	1203	2.4	0.931	26.3	LOS B	47.9	342.2	0.58	0.71	0.78	18.7
12	R2	246	0.4	0.865	56.0	LOS D	12.9	91.0	1.00	0.96	1.33	17.5
Approach		1449	2.0	0.931	31.4	LOS C	47.9	342.2	0.65	0.75	0.88	18.3
All Vehicles		2589	2.9	0.942	35.1	LOS C	57.5	415.9	0.77	0.89	1.00	16.8

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	10.2	LOS B	0.1	0.1	0.46	0.46	
P2	East Full Crossing	53	41.8	LOS E	0.1	0.1	0.94	0.94	
P4	West Full Crossing	53	41.8	LOS E	0.1	0.1	0.94	0.94	
All Pedestrians		158	31.3	LOS D			0.78	0.78	

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

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

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

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Organisation: ASON GROUP PTY LTD | Processed: Thursday, 3 October 2019 3:08:41 PM

Project: C:\Users\DanBudai\Downloads\0407m01 Killeaton St\_Cowan Rd.sip8

# MOVEMENT SUMMARY

 **Site: 101v [[Existing PM] Killeaton St / Cowan Rd (2)]**

Killeaton St / Cowan Rd

Site Category: (None)

Signals - Fixed Time Isolated    Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	232	0.5	0.392	16.6	LOS B	6.1	42.8	0.64	0.73	0.64	31.5
3	R2	11	0.0	0.094	55.0	LOS D	0.5	3.6	0.97	0.67	0.97	19.2
Approach		242	0.4	0.392	18.3	LOS B	6.1	42.8	0.65	0.73	0.65	30.5
East: Killeaton St (125m)												
4	L2	9	0.0	0.008	12.3	LOS A	0.2	1.1	0.37	0.62	0.37	37.7
5	T1	938	1.3	0.784	13.7	LOS A	32.5	229.9	0.78	0.72	0.78	27.8
Approach		947	1.3	0.784	13.7	LOS A	32.5	229.9	0.78	0.72	0.78	28.0
West: Killeaton St (60m)												
11	T1	927	0.6	0.692	3.4	LOS A	15.7	110.3	0.38	0.36	0.38	46.8
12	R2	169	0.0	0.781	55.6	LOS D	8.8	61.7	1.00	0.89	1.20	17.6
Approach		1097	0.5	0.781	11.4	LOS A	15.7	110.3	0.48	0.44	0.51	32.0
All Vehicles		2286	0.8	0.784	13.1	LOS A	32.5	229.9	0.62	0.59	0.64	30.2

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	8.4	LOS A	0.1	0.1	0.41	0.41	
P2	East Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94	
P4	West Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94	
All Pedestrians		158	32.3	LOS D			0.77	0.77	

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

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

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

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Organisation: ASON GROUP PTY LTD | Processed: Thursday, 3 October 2019 3:08:42 PM

Project: C:\Users\DanBudai\Downloads\0407m01 Killeaton St\_Cowan Rd.sip8



# MOVEMENT SUMMARY

 **Site: 101v [[Existing Sat] Killeaton St / Cowan Rd ]**

Killeaton St / Cowan Rd

Site Category: (None)

Signals - Fixed Time Isolated    Cycle Time = 115 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	288	0.4	0.548	24.2	LOS B	10.8	76.1	0.77	0.79	0.77	27.3
3	R2	11	0.0	0.109	63.6	LOS E	0.6	4.2	0.98	0.67	0.98	17.5
Approach		299	0.4	0.548	25.6	LOS B	10.8	76.1	0.78	0.78	0.78	26.7
East: Killeaton St (125m)												
4	L2	32	0.0	0.026	12.6	LOS A	0.6	4.1	0.36	0.64	0.36	37.6
5	T1	1049	0.7	0.860	18.5	LOS B	46.8	329.7	0.83	0.80	0.86	23.5
Approach		1081	0.7	0.860	18.4	LOS B	46.8	329.7	0.82	0.79	0.84	24.1
West: Killeaton St (60m)												
11	T1	843	0.2	0.638	2.7	LOS A	13.0	91.4	0.31	0.28	0.31	49.0
12	R2	199	0.5	0.846	65.4	LOS E	12.2	86.1	1.00	0.93	1.28	15.8
Approach		1042	0.3	0.846	14.6	LOS B	13.0	91.4	0.44	0.41	0.49	28.8
All Vehicles		2422	0.5	0.860	17.6	LOS B	46.8	329.7	0.65	0.63	0.68	26.4

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	8.4	LOS A	0.1	0.1	0.38	0.38	
P2	East Full Crossing	53	51.8	LOS E	0.2	0.2	0.95	0.95	
P4	West Full Crossing	53	51.8	LOS E	0.2	0.2	0.95	0.95	
All Pedestrians		158	37.3	LOS D			0.76	0.76	

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

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

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

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Project: C:\Users\DanBudai\Downloads\0407m01 Killeaton St\_Cowan Rd.sip8

# MOVEMENT SUMMARY

 **Site: 101v [[Future AM] Killeaton St / Cowan Rd]**

Killeaton St / Cowan Rd

Site Category: (None)

Signals - Fixed Time Isolated    Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	103	6.1	0.202	22.7	LOS B	2.9	21.3	0.73	0.72	0.73	28.0
3	R2	2	50.0	0.023	49.7	LOS D	0.1	0.9	0.95	0.62	0.95	19.7
Approach		105	7.0	0.202	23.2	LOS B	2.9	21.3	0.74	0.72	0.74	27.7
East: Killeaton St (125m)												
4	L2	45	2.3	0.043	13.8	LOS A	0.8	5.9	0.44	0.66	0.44	36.6
5	T1	1037	3.7	0.982	59.9	LOS E	68.6	495.1	1.00	1.31	1.48	9.9
Approach		1082	3.6	0.982	58.0	LOS E	68.6	495.1	0.98	1.28	1.44	10.7
West: Killeaton St (60m)												
11	T1	1253	2.3	0.979	48.7	LOS D	66.5	474.3	0.66	0.96	1.08	11.8
12	R2	257	0.4	0.986	81.9	LOS F	16.5	116.2	1.00	1.16	1.82	13.5
Approach		1509	2.0	0.986	54.4	LOS D	66.5	474.3	0.72	0.99	1.21	12.2
All Vehicles		2697	2.8	0.986	54.6	LOS D	68.6	495.1	0.82	1.10	1.28	12.1

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	9.8	LOS A	0.1	0.1	0.47	0.47	
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94	
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94	
All Pedestrians		158	29.5	LOS C			0.78	0.78	

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

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

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

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Project: C:\Users\DanBudai\Downloads\0407m01 Killeaton St\_Cowan Rd.sip8

# MOVEMENT SUMMARY

 **Site: 101v [[Future PM] Killeaton St / Cowan Rd]**

Killeaton St / Cowan Rd

Site Category: (None)

Signals - Fixed Time Isolated    Cycle Time = 105 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	241	0.4	0.425	18.6	LOS B	7.1	49.7	0.67	0.74	0.67	30.3
3	R2	11	0.0	0.099	57.9	LOS E	0.5	3.8	0.97	0.67	0.97	18.6
Approach		252	0.4	0.425	20.2	LOS B	7.1	49.7	0.68	0.74	0.68	29.4
East: Killeaton St (125m)												
4	L2	9	0.0	0.008	12.4	LOS A	0.2	1.2	0.37	0.62	0.37	37.7
5	T1	976	1.3	0.806	14.4	LOS A	36.1	255.5	0.80	0.74	0.80	27.2
Approach		985	1.3	0.806	14.4	LOS A	36.1	255.5	0.79	0.74	0.79	27.3
West: Killeaton St (60m)												
11	T1	965	0.5	0.714	3.3	LOS A	17.0	119.3	0.38	0.35	0.38	46.9
12	R2	177	0.0	0.790	57.9	LOS E	9.6	67.5	1.00	0.89	1.20	17.1
Approach		1142	0.5	0.790	11.8	LOS A	17.0	119.3	0.48	0.44	0.51	31.6
All Vehicles		2379	0.8	0.806	13.7	LOS A	36.1	255.5	0.63	0.59	0.64	29.6

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	8.4	LOS A	0.1	0.1	0.40	0.40
P2	East Full Crossing	53	46.8	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	46.8	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		158	34.0	LOS D			0.76	0.76

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

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

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

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Project: C:\Users\DanBudai\Downloads\0407m01 Killeaton St\_Cowan Rd.sip8

# MOVEMENT SUMMARY

 **Site: 101v [[Future Sat] Killeaton St / Cowan Rd]**

Killeaton St / Cowan Rd

Site Category: (None)

Signals - Fixed Time Isolated    Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	300	0.4	0.600	27.9	LOS B	11.9	83.9	0.84	0.81	0.84	25.6
3	R2	11	0.0	0.104	60.7	LOS E	0.6	4.0	0.98	0.67	0.98	18.1
Approach		311	0.3	0.600	29.0	LOS C	11.9	83.9	0.85	0.81	0.85	25.2
East: Killeaton St (125m)												
4	L2	33	0.0	0.028	12.5	LOS A	0.6	4.2	0.37	0.64	0.37	37.6
5	T1	1093	0.7	0.904	27.4	LOS B	56.9	400.6	0.89	0.92	1.00	18.2
Approach		1125	0.7	0.904	26.9	LOS B	56.9	400.6	0.88	0.91	0.98	18.8
West: Killeaton St (60m)												
11	T1	878	0.2	0.669	2.9	LOS A	14.0	98.5	0.33	0.31	0.33	48.3
12	R2	207	0.5	0.904	69.6	LOS E	13.1	92.0	1.00	0.99	1.43	15.1
Approach		1085	0.3	0.904	15.6	LOS B	14.0	98.5	0.46	0.44	0.54	27.9
All Vehicles		2521	0.5	0.904	22.3	LOS B	56.9	400.6	0.69	0.69	0.78	23.2

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	8.4	LOS A	0.1	0.1	0.39	0.39
P2	East Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		158	35.7	LOS D			0.76	0.76

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

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

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

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Project: C:\Users\DanBudai\Downloads\0407m01 Killeaton St\_Cowan Rd.sip8

# MOVEMENT SUMMARY

 **Site: 101v [[Future+Dev AM] Killeaton St / Cowan Rd]**

Killeaton St / Cowan Rd

Site Category: (None)

Signals - Fixed Time Isolated    Cycle Time = 90 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	105	6.0	0.191	21.3	LOS B	2.8	20.9	0.71	0.71	0.71	28.7
3	R2	2	50.0	0.017	46.9	LOS D	0.1	0.9	0.93	0.62	0.93	20.4
Approach		107	6.9	0.191	21.8	LOS B	2.8	20.9	0.71	0.71	0.71	28.4
East: Killeaton St (125m)												
4	L2	45	2.3	0.043	13.8	LOS A	0.8	5.9	0.44	0.66	0.44	36.6
5	T1	1037	3.7	0.982	59.9	LOS E	68.6	495.1	1.00	1.31	1.48	9.9
Approach		1082	3.6	0.982	58.0	LOS E	68.6	495.1	0.98	1.28	1.44	10.7
West: Killeaton St (60m)												
11	T1	1253	2.3	0.980	49.0	LOS D	66.6	475.6	0.66	0.96	1.09	11.7
12	R2	258	0.4	1.003	90.6	LOS F	17.6	123.7	1.00	1.20	1.92	12.5
Approach		1511	2.0	1.003	56.1	LOS D	66.6	475.6	0.72	1.00	1.23	11.9
All Vehicles		2700	2.8	1.003	55.5	LOS D	68.6	495.1	0.82	1.10	1.29	11.9

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	9.8	LOS A	0.1	0.1	0.47	0.47	
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94	
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94	
All Pedestrians		158	29.5	LOS C			0.78	0.78	

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

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

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

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Organisation: ASON GROUP PTY LTD | Processed: Thursday, 3 October 2019 3:08:46 PM

Project: C:\Users\DanBudai\Downloads\0407m01 Killeaton St\_Cowan Rd.sip8

# MOVEMENT SUMMARY

 **Site: 101v [[Future+Dev PM] Killeaton St / Cowan Rd]**

Killeaton St / Cowan Rd

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 105 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	242	0.4	0.402	17.4	LOS B	6.8	47.7	0.64	0.73	0.64	31.0
3	R2	11	0.0	0.074	54.9	LOS D	0.5	3.6	0.96	0.67	0.96	19.2
Approach		253	0.4	0.402	19.0	LOS B	6.8	47.7	0.66	0.73	0.66	30.1
East: Killeaton St (125m)												
4	L2	9	0.0	0.008	12.4	LOS A	0.2	1.2	0.37	0.62	0.37	37.7
5	T1	976	1.3	0.806	14.4	LOS A	36.1	255.5	0.80	0.74	0.80	27.2
Approach		985	1.3	0.806	14.4	LOS A	36.1	255.5	0.79	0.74	0.79	27.3
West: Killeaton St (60m)												
11	T1	965	0.5	0.716	3.3	LOS A	17.0	119.3	0.38	0.35	0.38	46.9
12	R2	179	0.0	0.799	58.4	LOS E	9.8	68.7	1.00	0.90	1.22	17.1
Approach		1144	0.5	0.799	11.9	LOS A	17.0	119.3	0.48	0.44	0.51	31.4
All Vehicles		2382	0.8	0.806	13.7	LOS A	36.1	255.5	0.63	0.59	0.64	29.6

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	8.4	LOS A	0.1	0.1	0.40	0.40	
P2	East Full Crossing	53	46.8	LOS E	0.1	0.1	0.94	0.94	
P4	West Full Crossing	53	46.8	LOS E	0.1	0.1	0.94	0.94	
All Pedestrians		158	34.0	LOS D			0.76	0.76	

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

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

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

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Organisation: ASON GROUP PTY LTD | Processed: Thursday, 3 October 2019 3:09:02 PM

Project: C:\Users\DanBudai\Downloads\0407m01 Killeaton St\_Cowan Rd.sip8

# MOVEMENT SUMMARY

 **Site: 101v [[Future+Sat AM] Killeaton St / Cowan Rd]**

Killeaton St / Cowan Rd

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (345m)												
1	L2	301	0.3	0.602	27.9	LOS B	12.0	84.3	0.85	0.81	0.85	25.6
3	R2	11	0.0	0.104	60.7	LOS E	0.6	4.0	0.98	0.67	0.98	18.1
Approach		312	0.3	0.602	29.0	LOS C	12.0	84.3	0.85	0.81	0.85	25.2
East: Killeaton St (125m)												
4	L2	33	0.0	0.028	12.5	LOS A	0.6	4.2	0.37	0.64	0.37	37.6
5	T1	1093	0.7	0.904	27.4	LOS B	56.9	400.6	0.89	0.92	1.00	18.2
Approach		1125	0.7	0.904	26.9	LOS B	56.9	400.6	0.88	0.91	0.98	18.8
West: Killeaton St (60m)												
11	T1	878	0.2	0.670	2.9	LOS A	14.0	98.5	0.33	0.31	0.33	48.3
12	R2	208	0.5	0.909	70.4	LOS E	13.2	93.1	1.00	1.00	1.44	15.0
Approach		1086	0.3	0.909	15.8	LOS B	14.0	98.5	0.46	0.44	0.55	27.7
All Vehicles		2523	0.5	0.909	22.4	LOS B	56.9	400.6	0.69	0.70	0.78	23.2

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians									
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate	
P1	South Full Crossing	53	8.4	LOS A	0.1	0.1	0.39	0.39	
P2	East Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95	
P4	West Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95	
All Pedestrians		158	35.7	LOS D			0.76	0.76	

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

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

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

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Project: C:\Users\DanBudai\Downloads\0407m01 Killeaton St\_Cowan Rd.sip8



# MOVEMENT SUMMARY

▽ Site: 103 [[Existing AM] PGC Access / Cowan Rd]

Pymble Golf Club / Cowan Rd

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (125m)												
1	L2	11	0.0	0.168	8.2	LOS A	0.0	0.0	0.00	0.04	0.00	24.0
2	T1	308	3.8	0.168	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	49.3
Approach		319	3.6	0.168	0.3	NA	0.0	0.0	0.00	0.04	0.00	48.2
North: Cowan Rd (170m)												
8	T1	272	1.9	0.143	0.0	LOS A	0.0	0.2	0.01	0.01	0.01	49.7
9	R2	3	0.0	0.143	7.9	LOS A	0.0	0.2	0.01	0.01	0.01	24.2
Approach		275	1.9	0.143	0.1	NA	0.0	0.2	0.01	0.01	0.01	49.2
West: Pymble Golf Club Access (65m)												
10	L2	2	0.0	0.006	1.0	LOS A	0.0	0.1	0.41	0.26	0.41	20.2
12	R2	3	0.0	0.006	2.5	LOS A	0.0	0.1	0.41	0.26	0.41	17.7
Approach		5	0.0	0.006	1.9	LOS A	0.0	0.1	0.41	0.26	0.41	18.8
All Vehicles		599	2.8	0.168	0.2	NA	0.0	0.2	0.01	0.03	0.01	48.2

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Users\DanBudai\Downloads\0407m03 Existing Site Access Driveway.sip8

# MOVEMENT SUMMARY

▽ Site: 103 [[Existing PM] PGC Access / Cowan Rd]

Pymble Golf Club / Cowan Rd

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (125m)												
1	L2	3	0.0	0.167	8.2	LOS A	0.0	0.0	0.00	0.01	0.00	24.1
2	T1	321	0.3	0.167	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.8
Approach		324	0.3	0.167	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.5
North: Cowan Rd (170m)												
8	T1	391	0.3	0.202	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	49.9
9	R2	2	0.0	0.202	8.0	LOS A	0.0	0.1	0.01	0.01	0.01	24.2
Approach		393	0.3	0.202	0.1	NA	0.0	0.1	0.01	0.01	0.01	49.6
West: Pymble Golf Club Access (65m)												
10	L2	19	0.0	0.049	1.1	LOS A	0.2	1.2	0.43	0.34	0.43	20.0
12	R2	21	0.0	0.049	3.6	LOS A	0.2	1.2	0.43	0.34	0.43	17.5
Approach		40	0.0	0.049	2.4	LOS A	0.2	1.2	0.43	0.34	0.43	18.7
All Vehicles		757	0.3	0.202	0.2	NA	0.2	1.2	0.03	0.03	0.03	46.5

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Users\DanBudai\Downloads\0407m03 Existing Site Access Driveway.sip8

# MOVEMENT SUMMARY

▽ Site: 103 [[Existing Sat] PGC Access / Cowan Rd]

Pymble Golf Club / Cowan Rd

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (125m)												
1	L2	3	0.0	0.141	8.2	LOS A	0.0	0.0	0.00	0.01	0.00	24.1
2	T1	272	0.0	0.141	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.8
Approach		275	0.0	0.141	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.4
North: Cowan Rd (170m)												
8	T1	461	0.2	0.238	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	49.9
9	R2	1	0.0	0.238	7.8	LOS A	0.0	0.1	0.00	0.00	0.00	24.2
Approach		462	0.2	0.238	0.0	NA	0.0	0.1	0.00	0.00	0.00	49.8
West: Pymble Golf Club Access (65m)												
10	L2	18	0.0	0.033	0.8	LOS A	0.1	0.8	0.38	0.27	0.38	20.1
12	R2	12	0.0	0.033	3.8	LOS A	0.1	0.8	0.38	0.27	0.38	17.6
Approach		29	0.0	0.033	2.0	LOS A	0.1	0.8	0.38	0.27	0.38	19.2
All Vehicles		766	0.1	0.238	0.1	NA	0.1	0.8	0.02	0.02	0.02	47.4

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Users\DanBudai\Downloads\0407m03 Existing Site Access Driveway.sip8

# MOVEMENT SUMMARY

▽ Site: 103 [[Future AM] PGC Access / Cowan Rd]

Pymble Golf Club / Cowan Rd

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (125m)												
1	L2	11	0.0	0.174	8.2	LOS A	0.0	0.0	0.00	0.04	0.00	24.2
2	T1	321	3.6	0.174	0.0	LOS A	0.0	0.0	0.00	0.04	0.00	49.4
Approach		332	3.5	0.174	0.3	NA	0.0	0.0	0.00	0.04	0.00	48.3
North: Cowan Rd (170m)												
8	T1	283	1.9	0.149	0.0	LOS A	0.0	0.2	0.01	0.01	0.01	49.7
9	R2	3	0.0	0.149	8.8	LOS A	0.0	0.2	0.01	0.01	0.01	24.3
Approach		286	1.8	0.149	0.1	NA	0.0	0.2	0.01	0.01	0.01	49.2
West: Pymble Golf Club Access (65m)												
10	L2	2	0.0	0.002	1.0	LOS A	0.0	0.0	0.37	0.17	0.37	20.4
12	R2	3	0.0	0.004	2.6	LOS A	0.0	0.1	0.47	0.33	0.47	17.5
Approach		5	0.0	0.004	2.0	LOS A	0.0	0.1	0.43	0.26	0.43	18.7
All Vehicles		623	2.7	0.174	0.2	NA	0.0	0.2	0.01	0.03	0.01	48.3

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Users\DanBudai\Downloads\0407m03 Existing Site Access Driveway.sip8

# MOVEMENT SUMMARY

▽ Site: 103 [[Future PM] PGC Access / Cowan Rd]

Pymble Golf Club / Cowan Rd

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (125m)												
1	L2	3	0.0	0.173	8.2	LOS A	0.0	0.0	0.00	0.01	0.00	24.3
2	T1	334	0.3	0.173	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.8
Approach		337	0.3	0.173	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.5
North: Cowan Rd (170m)												
8	T1	406	0.3	0.210	0.0	LOS A	0.0	0.1	0.01	0.01	0.01	49.9
9	R2	2	0.0	0.210	8.9	LOS A	0.0	0.1	0.01	0.01	0.01	24.4
Approach		408	0.3	0.210	0.1	NA	0.0	0.1	0.01	0.01	0.01	49.6
West: Pymble Golf Club Access (65m)												
10	L2	20	0.0	0.017	1.1	LOS A	0.1	0.4	0.37	0.22	0.37	20.4
12	R2	22	0.0	0.036	3.7	LOS A	0.1	0.8	0.54	0.49	0.54	17.1
Approach		42	0.0	0.036	2.5	LOS A	0.1	0.8	0.46	0.36	0.46	18.7
All Vehicles		787	0.3	0.210	0.2	NA	0.1	0.8	0.03	0.03	0.03	46.5

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Users\DanBudai\Downloads\0407m03 Existing Site Access Driveway.sip8

# MOVEMENT SUMMARY

▽ Site: 103 [[Future Sat] PGC Access / Cowan Rd ]

Pymble Golf Club / Cowan Rd

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (125m)												
1	L2	3	0.0	0.147	8.2	LOS A	0.0	0.0	0.00	0.01	0.00	24.3
2	T1	283	0.0	0.147	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.8
Approach		286	0.0	0.147	0.1	NA	0.0	0.0	0.00	0.01	0.00	49.4
North: Cowan Rd (170m)												
8	T1	480	0.2	0.247	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	49.9
9	R2	1	0.0	0.247	8.7	LOS A	0.0	0.1	0.00	0.00	0.00	24.4
Approach		481	0.2	0.247	0.0	NA	0.0	0.1	0.00	0.00	0.00	49.8
West: Pymble Golf Club Access (65m)												
10	L2	19	0.0	0.015	0.9	LOS A	0.1	0.4	0.34	0.18	0.34	20.4
12	R2	12	0.0	0.020	3.9	LOS A	0.1	0.4	0.55	0.48	0.55	17.0
Approach		31	0.0	0.020	2.0	LOS A	0.1	0.4	0.42	0.30	0.42	19.2
All Vehicles		798	0.1	0.247	0.1	NA	0.1	0.4	0.02	0.02	0.02	47.5

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: C:\Users\DanBudai\Downloads\0407m03 Existing Site Access Driveway.sip8

# MOVEMENT SUMMARY

▽ Site: 103 [[Future+Dev AM] PGC Access / Cowan Rd]

Pymble Golf Club / Cowan Rd

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (125m)												
1	L2	21	0.0	0.180	8.2	LOS A	0.0	0.0	0.00	0.07	0.00	23.8
2	T1	321	3.6	0.180	0.0	LOS A	0.0	0.0	0.00	0.07	0.00	48.8
Approach		342	3.4	0.180	0.5	NA	0.0	0.0	0.00	0.07	0.00	46.8
North: Cowan Rd (170m)												
8	T1	283	1.9	0.147	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		283	1.9	0.147	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: Pymble Golf Club Access (65m)												
10	L2	47	0.0	0.039	1.1	LOS A	0.2	1.1	0.37	0.24	0.37	20.4
Approach		47	0.0	0.039	1.1	LOS A	0.2	1.1	0.37	0.24	0.37	20.4
All Vehicles		673	2.5	0.180	0.3	NA	0.2	1.1	0.03	0.05	0.03	44.6

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.



# MOVEMENT SUMMARY

▽ Site: 103 [[Future+Dev PM] PGC Access / Cowan Rd]

Pymble Golf Club / Cowan Rd

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (125m)												
1	L2	45	0.0	0.196	8.2	LOS A	0.0	0.0	0.00	0.14	0.00	23.4
2	T1	334	0.3	0.196	0.0	LOS A	0.0	0.0	0.00	0.14	0.00	47.8
Approach		379	0.3	0.196	1.0	NA	0.0	0.0	0.00	0.14	0.00	44.1
North: Cowan Rd (170m)												
8	T1	406	0.3	0.209	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		406	0.3	0.209	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: Pymble Golf Club Access (65m)												
10	L2	53	0.0	0.044	1.1	LOS A	0.2	1.2	0.38	0.25	0.38	20.3
Approach		53	0.0	0.044	1.1	LOS A	0.2	1.2	0.38	0.25	0.38	20.3
All Vehicles		838	0.3	0.209	0.5	NA	0.2	1.2	0.02	0.08	0.02	43.9

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: ASON GROUP PTY LTD | Processed: Thursday, 3 October 2019 3:23:12 PM

Project: C:\Users\DanBudai\Downloads\0407m03 Existing Site Access Driveway.sip8

# MOVEMENT SUMMARY

▽ Site: 103 [[Future+Dev Sat] PGC Access / Cowan Rd]

Pymble Golf Club / Cowan Rd

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Cowan Rd (125m)												
1	L2	28	0.0	0.161	8.2	LOS A	0.0	0.0	0.00	0.10	0.00	23.6
2	T1	283	0.0	0.161	0.0	LOS A	0.0	0.0	0.00	0.10	0.00	48.3
Approach		312	0.0	0.161	0.7	NA	0.0	0.0	0.00	0.10	0.00	45.4
North: Cowan Rd (170m)												
8	T1	480	0.2	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach		480	0.2	0.247	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
West: Pymble Golf Club Access (65m)												
10	L2	56	0.0	0.044	0.9	LOS A	0.2	1.2	0.35	0.21	0.35	20.4
Approach		56	0.0	0.044	0.9	LOS A	0.2	1.2	0.35	0.21	0.35	20.4
All Vehicles		847	0.1	0.247	0.3	NA	0.2	1.2	0.02	0.05	0.02	44.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).  
 Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY



**Site: TCS3053 [[Existing AM] Mona Vale Rd / Cowan Rd]**

Mona Vale Rd / Cowan Rd / Shinfield Ave

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 156 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Shinfield Ave (150m)												
21	L2	47	0.0	0.090	48.2	LOS D	2.6	18.3	0.77	0.71	0.77	17.8
22	T1	38	0.0	0.120	44.2	LOS D	3.2	22.6	0.78	0.65	0.78	16.0
23	R2	20	0.0	0.120	48.7	LOS D	3.2	22.6	0.78	0.65	0.78	25.9
Approach		105	0.0	0.120	46.9	LOS D	3.2	22.6	0.78	0.68	0.78	19.0
NorthEast: Mona Vale Rd (445m)												
24	L2	11	0.0	0.589	6.7	LOS A	2.9	21.4	0.06	0.06	0.06	54.4
25	T1	2111	6.4	0.589	1.0	LOS A	2.9	21.4	0.05	0.05	0.05	58.4
26	R2	19	0.0	0.127	29.4	LOS C	0.8	5.9	0.61	0.71	0.61	31.8
Approach		2140	6.3	0.589	1.3	LOS A	2.9	21.4	0.06	0.06	0.06	58.0
NorthWest: Cowan Rd (125m)												
27	L2	46	4.5	0.125	22.4	LOS B	2.1	15.3	0.63	0.64	0.63	35.9
28	T1	17	0.0	0.125	17.8	LOS B	2.1	15.3	0.63	0.64	0.63	25.3
29	R2	249	0.8	0.990	118.4	LOS F	25.2	178.0	0.96	1.11	1.53	8.6
Approach		313	1.3	0.990	98.8	LOS F	25.2	178.0	0.89	1.02	1.35	10.9
SouthWest: Mona Vale Rd (200m)												
30	L2	200	5.3	0.694	15.3	LOS B	17.3	128.9	0.35	0.43	0.35	35.8
31	T1	1973	7.9	0.694	5.1	LOS A	17.3	128.9	0.23	0.24	0.23	52.6
Approach		2173	7.7	0.694	6.1	LOS A	17.3	128.9	0.24	0.26	0.24	51.4
All Vehicles		4731	6.5	0.990	10.9	LOS A	25.2	178.0	0.21	0.23	0.24	46.0

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	3	14.0	LOS B	0.0	0.0	0.42	0.42
P6	NorthEast Full Crossing	2	55.0	LOS E	0.0	0.0	0.84	0.84
P7	NorthWest Full Crossing	4	18.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		9	25.1	LOS C			0.54	0.54

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

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

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

# MOVEMENT SUMMARY



**Site: TCS3053 [[Existing PM] Mona Vale Rd / Cowan Rd]**

Mona Vale Rd / Cowan Rd / Shinfield Ave

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 156 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Shinfield Ave (150m)												
21	L2	57	0.0	0.109	48.5	LOS D	3.2	22.1	0.78	0.72	0.78	17.8
22	T1	35	0.0	0.128	44.4	LOS D	3.3	23.1	0.78	0.66	0.78	15.9
23	R2	24	0.0	0.128	48.9	LOS D	3.3	23.1	0.78	0.66	0.78	25.8
Approach		116	0.0	0.128	47.4	LOS D	3.3	23.1	0.78	0.69	0.78	19.2
NorthEast: Mona Vale Rd (445m)												
24	L2	3	0.0	0.608	6.6	LOS A	2.8	20.7	0.06	0.05	0.06	54.7
25	T1	2188	6.2	0.608	1.0	LOS A	2.8	20.7	0.05	0.05	0.05	58.5
26	R2	23	0.0	0.157	32.7	LOS C	1.1	7.8	0.65	0.72	0.65	30.3
Approach		2215	6.1	0.608	1.3	LOS A	2.8	20.7	0.06	0.06	0.06	58.0
NorthWest: Cowan Rd (125m)												
27	L2	95	2.2	0.279	27.0	LOS B	5.4	38.2	0.75	0.71	0.75	33.5
28	T1	44	0.0	0.279	22.5	LOS B	5.4	38.2	0.75	0.71	0.75	22.9
29	R2	255	0.8	1.217	287.7	LOS F	42.7	300.8	1.00	1.50	2.36	3.8
Approach		394	1.1	1.217	195.2	LOS F	42.7	300.8	0.91	1.22	1.80	6.2
SouthWest: Mona Vale Rd (200m)												
30	L2	276	3.8	0.699	17.6	LOS B	20.6	152.5	0.41	0.51	0.41	33.1
31	T1	1909	8.2	0.699	5.5	LOS A	20.6	152.5	0.24	0.25	0.24	52.1
Approach		2185	7.6	0.699	7.0	LOS A	20.6	152.5	0.26	0.29	0.26	50.1
All Vehicles		4909	6.2	1.217	20.5	LOS B	42.7	300.8	0.24	0.27	0.31	37.9

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	3	14.0	LOS B	0.0	0.0	0.42	0.42
P6	NorthEast Full Crossing	2	55.0	LOS E	0.0	0.0	0.84	0.84
P7	NorthWest Full Crossing	4	18.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		9	25.1	LOS C			0.54	0.54

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

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

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

# MOVEMENT SUMMARY



**Site: TCS3053 [[Existing Sat] Mona Vale Rd / Cowan Rd]**

Mona Vale Rd / Cowan Rd / Shinfield Ave

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 156 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Shinfield Ave (150m)												
21	L2	23	0.0	0.044	47.5	LOS D	1.3	8.8	0.76	0.69	0.76	18.0
22	T1	38	0.0	0.138	44.5	LOS D	3.6	25.3	0.78	0.66	0.78	15.9
23	R2	26	0.0	0.138	49.0	LOS D	3.6	25.3	0.78	0.66	0.78	25.7
Approach		87	0.0	0.138	46.7	LOS D	3.6	25.3	0.78	0.67	0.78	19.9
NorthEast: Mona Vale Rd (445m)												
24	L2	8	0.0	0.455	6.6	LOS A	1.8	12.8	0.05	0.05	0.05	54.6
25	T1	1675	1.9	0.455	0.9	LOS A	1.8	12.8	0.04	0.04	0.04	58.6
26	R2	17	0.0	0.082	24.5	LOS B	0.6	4.5	0.54	0.68	0.54	34.3
Approach		1700	1.9	0.455	1.2	LOS A	1.8	12.8	0.05	0.05	0.05	58.2
NorthWest: Cowan Rd (125m)												
27	L2	104	0.0	0.256	26.6	LOS B	5.3	37.2	0.68	0.69	0.68	33.5
28	T1	29	0.0	0.256	22.1	LOS B	5.3	37.2	0.68	0.69	0.68	22.8
29	R2	339	0.3	1.344	391.9	LOS F	66.4	465.8	1.00	1.69	2.72	2.8
Approach		473	0.2	1.344	288.3	LOS F	66.4	465.8	0.91	1.41	2.14	4.3
SouthWest: Mona Vale Rd (200m)												
30	L2	231	0.0	0.508	16.5	LOS B	13.2	92.5	0.35	0.48	0.35	34.1
31	T1	1428	0.7	0.508	4.7	LOS A	13.2	92.5	0.17	0.19	0.17	53.0
Approach		1659	0.6	0.508	6.4	LOS A	13.2	92.5	0.20	0.23	0.20	50.8
All Vehicles		3919	1.1	1.344	39.0	LOS C	66.4	465.8	0.23	0.30	0.38	28.2

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	3	14.0	LOS B	0.0	0.0	0.42	0.42
P6	NorthEast Full Crossing	2	55.0	LOS E	0.0	0.0	0.84	0.84
P7	NorthWest Full Crossing	4	18.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		9	25.1	LOS C			0.54	0.54

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

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

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

# MOVEMENT SUMMARY

 **Site: TCS3053 [[Future AM] Mona Vale Rd / Cowan Rd]**

Mona Vale Rd / Cowan Rd / Shinfield Ave

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 156 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Shinfield Ave (150m)												
21	L2	49	0.0	0.094	48.3	LOS D	2.7	19.1	0.77	0.72	0.77	17.8
22	T1	39	0.0	0.125	44.3	LOS D	3.4	23.5	0.78	0.65	0.78	16.0
23	R2	21	0.0	0.125	48.8	LOS D	3.4	23.5	0.78	0.65	0.78	25.9
Approach		109	0.0	0.125	47.0	LOS D	3.4	23.5	0.78	0.68	0.78	19.0
NorthEast: Mona Vale Rd (445m)												
24	L2	11	0.0	0.612	6.7	LOS A	3.2	23.2	0.06	0.07	0.06	54.4
25	T1	2197	6.2	0.612	1.0	LOS A	3.2	23.2	0.06	0.06	0.06	58.4
26	R2	20	0.0	0.138	31.1	LOS C	0.9	6.5	0.63	0.71	0.63	31.0
Approach		2227	6.1	0.612	1.3	LOS A	3.2	23.2	0.06	0.06	0.06	58.0
NorthWest: Cowan Rd (125m)												
27	L2	48	4.3	0.131	22.2	LOS B	2.2	15.9	0.64	0.64	0.64	36.0
28	T1	18	0.0	0.131	17.6	LOS B	2.2	15.9	0.64	0.64	0.64	25.4
29	R2	260	0.8	1.047	157.6	LOS F	31.9	225.0	1.00	1.22	1.76	6.7
Approach		326	1.3	1.047	129.8	LOS F	31.9	225.0	0.93	1.10	1.53	8.6
SouthWest: Mona Vale Rd (200m)												
30	L2	208	5.1	0.721	15.5	LOS B	18.9	140.1	0.37	0.44	0.37	35.5
31	T1	2053	7.6	0.721	5.3	LOS A	18.9	140.1	0.25	0.25	0.25	52.5
Approach		2261	7.4	0.721	6.2	LOS A	18.9	140.1	0.26	0.27	0.26	51.3
All Vehicles		4924	6.2	1.047	13.1	LOS A	31.9	225.0	0.22	0.24	0.26	43.9

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	3	14.0	LOS B	0.0	0.0	0.42	0.42
P6	NorthEast Full Crossing	2	55.0	LOS E	0.0	0.0	0.84	0.84
P7	NorthWest Full Crossing	4	18.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		9	25.1	LOS C			0.54	0.54

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

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

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

# MOVEMENT SUMMARY

 **Site: TCS3053 [[Future PM] Mona Vale Rd / Cowan Rd]**

Mona Vale Rd / Cowan Rd / Shinfield Ave

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 156 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Shinfield Ave (150m)												
21	L2	59	0.0	0.113	48.6	LOS D	3.3	22.9	0.78	0.72	0.78	17.7
22	T1	36	0.0	0.133	44.5	LOS D	3.4	24.0	0.78	0.66	0.78	15.9
23	R2	25	0.0	0.133	49.0	LOS D	3.4	24.0	0.78	0.66	0.78	25.7
Approach		120	0.0	0.133	47.4	LOS D	3.4	24.0	0.78	0.69	0.78	19.2
NorthEast: Mona Vale Rd (445m)												
24	L2	3	0.0	0.632	6.6	LOS A	3.1	22.8	0.06	0.06	0.06	54.6
25	T1	2278	6.0	0.632	1.0	LOS A	3.1	22.8	0.06	0.05	0.06	58.5
26	R2	24	0.0	0.170	34.6	LOS C	1.2	8.6	0.67	0.73	0.67	29.5
Approach		2305	5.9	0.632	1.4	LOS A	3.1	22.8	0.06	0.06	0.06	58.0
NorthWest: Cowan Rd (125m)												
27	L2	99	2.1	0.292	26.5	LOS B	5.5	39.1	0.76	0.72	0.76	33.8
28	T1	46	0.0	0.292	21.9	LOS B	5.5	39.1	0.76	0.72	0.76	23.2
29	R2	265	0.8	1.289	347.4	LOS F	48.9	344.6	1.00	1.61	2.59	3.2
Approach		411	1.0	1.289	233.3	LOS F	48.9	344.6	0.92	1.30	1.94	5.3
SouthWest: Mona Vale Rd (200m)												
30	L2	287	3.7	0.727	17.9	LOS B	22.4	165.0	0.43	0.53	0.43	32.8
31	T1	1987	7.8	0.727	5.7	LOS A	22.4	165.0	0.26	0.27	0.26	51.9
Approach		2275	7.3	0.727	7.2	LOS A	22.4	165.0	0.28	0.30	0.28	49.9
All Vehicles		5111	6.0	1.289	23.7	LOS B	48.9	344.6	0.25	0.28	0.33	35.8

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	3	14.0	LOS B	0.0	0.0	0.42	0.42
P6	NorthEast Full Crossing	2	55.0	LOS E	0.0	0.0	0.84	0.84
P7	NorthWest Full Crossing	4	18.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		9	25.1	LOS C			0.54	0.54

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

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

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



# MOVEMENT SUMMARY

 **Site: TCS3053 [[Future Sat] Mona Vale Rd / Cowan Rd]**

Mona Vale Rd / Cowan Rd / Shinfield Ave

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 156 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Shinfield Ave (150m)												
21	L2	24	0.0	0.046	47.5	LOS D	1.3	9.2	0.76	0.69	0.76	18.0
22	T1	28	0.0	0.123	44.3	LOS D	3.1	21.9	0.78	0.66	0.78	15.8
23	R2	27	0.0	0.123	48.9	LOS D	3.1	21.9	0.78	0.66	0.78	25.7
Approach		80	0.0	0.123	46.8	LOS D	3.1	21.9	0.77	0.67	0.77	20.3
NorthEast: Mona Vale Rd (445m)												
24	L2	8	0.0	0.473	6.6	LOS A	1.9	13.6	0.05	0.05	0.05	54.6
25	T1	1743	1.9	0.473	0.9	LOS A	1.9	13.6	0.04	0.04	0.04	58.6
26	R2	18	0.0	0.091	25.3	LOS B	0.7	4.9	0.55	0.69	0.55	33.9
Approach		1769	1.8	0.473	1.2	LOS A	1.9	13.6	0.05	0.05	0.05	58.2
NorthWest: Cowan Rd (125m)												
27	L2	108	0.0	0.266	26.2	LOS B	5.5	38.4	0.68	0.69	0.68	33.7
28	T1	31	0.0	0.266	21.7	LOS B	5.5	38.4	0.68	0.69	0.68	23.1
29	R2	353	0.3	1.388	429.7	LOS F	72.3	507.3	1.00	1.75	2.84	2.6
Approach		492	0.2	1.388	315.3	LOS F	72.3	507.3	0.91	1.45	2.23	4.0
SouthWest: Mona Vale Rd (200m)												
30	L2	240	0.0	0.529	16.7	LOS B	14.0	98.3	0.36	0.48	0.36	33.9
31	T1	1486	0.7	0.529	4.8	LOS A	14.0	98.3	0.18	0.20	0.18	52.9
Approach		1726	0.6	0.529	6.5	LOS A	14.0	98.3	0.20	0.24	0.20	50.7
All Vehicles		4067	1.1	1.388	42.3	LOS C	72.3	507.3	0.23	0.31	0.39	27.0

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	3	14.0	LOS B	0.0	0.0	0.42	0.42
P6	NorthEast Full Crossing	2	55.0	LOS E	0.0	0.0	0.84	0.84
P7	NorthWest Full Crossing	4	18.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		9	25.1	LOS C			0.54	0.54

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

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

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

# MOVEMENT SUMMARY

 **Site: TCS3053 [[Future+Dev AM] Mona Vale Rd / Cowan Rd]**

Mona Vale Rd / Cowan Rd / Shinfield Ave

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 156 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Shinfield Ave (150m)												
21	L2	49	0.0	0.094	48.3	LOS D	2.7	19.1	0.77	0.72	0.77	17.8
22	T1	39	0.0	0.125	44.3	LOS D	3.4	23.5	0.78	0.65	0.78	16.0
23	R2	21	0.0	0.125	48.8	LOS D	3.4	23.5	0.78	0.65	0.78	25.9
Approach		109	0.0	0.125	47.0	LOS D	3.4	23.5	0.78	0.68	0.78	19.0
NorthEast: Mona Vale Rd (445m)												
24	L2	11	0.0	0.622	6.8	LOS A	3.3	24.1	0.06	0.07	0.06	54.3
25	T1	2235	6.1	0.622	1.1	LOS A	3.3	24.1	0.06	0.06	0.06	58.4
26	R2	22	0.0	0.153	32.2	LOS C	1.1	7.4	0.64	0.72	0.64	30.5
Approach		2267	6.0	0.622	1.4	LOS A	3.3	24.1	0.06	0.06	0.06	57.9
NorthWest: Cowan Rd (125m)												
27	L2	48	4.3	0.132	22.2	LOS B	2.2	15.9	0.64	0.64	0.64	36.0
28	T1	18	0.0	0.132	17.6	LOS B	2.2	15.9	0.64	0.64	0.64	25.4
29	R2	257	0.8	1.038	151.5	LOS F	30.9	217.8	1.00	1.20	1.73	6.9
Approach		323	1.3	1.038	124.7	LOS F	30.9	217.8	0.93	1.09	1.51	8.9
SouthWest: Mona Vale Rd (200m)												
30	L2	217	4.9	0.724	15.8	LOS B	19.4	143.5	0.38	0.45	0.38	35.2
31	T1	2053	7.6	0.724	5.3	LOS A	19.4	143.5	0.25	0.26	0.25	52.4
Approach		2269	7.3	0.724	6.3	LOS A	19.4	143.5	0.26	0.27	0.26	51.1
All Vehicles		4969	6.2	1.038	12.7	LOS A	30.9	217.8	0.23	0.24	0.26	44.3

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	3	14.0	LOS B	0.0	0.0	0.42	0.42
P6	NorthEast Full Crossing	2	55.0	LOS E	0.0	0.0	0.84	0.84
P7	NorthWest Full Crossing	4	18.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		9	25.1	LOS C			0.54	0.54

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

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

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

# MOVEMENT SUMMARY

 **Site: TCS3053 [[Future+Dev PM] Mona Vale Rd / Cowan Rd]**

Mona Vale Rd / Cowan Rd / Shinfield Ave

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 156 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Shinfield Ave (150m)												
21	L2	59	0.0	0.113	48.6	LOS D	3.3	22.9	0.78	0.72	0.78	17.7
22	T1	36	0.0	0.133	44.5	LOS D	3.4	24.0	0.78	0.66	0.78	15.9
23	R2	25	0.0	0.133	49.0	LOS D	3.4	24.0	0.78	0.66	0.78	25.7
Approach		120	0.0	0.133	47.4	LOS D	3.4	24.0	0.78	0.69	0.78	19.2
NorthEast: Mona Vale Rd (445m)												
24	L2	3	0.0	0.640	6.6	LOS A	3.2	23.5	0.06	0.06	0.06	54.6
25	T1	2308	5.9	0.640	1.0	LOS A	3.2	23.5	0.06	0.06	0.06	58.5
26	R2	32	0.0	0.225	37.8	LOS C	1.7	12.1	0.72	0.75	0.72	28.2
Approach		2343	5.8	0.640	1.5	LOS A	3.2	23.5	0.07	0.06	0.07	57.7
NorthWest: Cowan Rd (125m)												
27	L2	99	2.1	0.292	26.5	LOS B	5.5	39.1	0.76	0.72	0.76	33.8
28	T1	46	0.0	0.292	21.9	LOS B	5.5	39.1	0.76	0.72	0.76	23.2
29	R2	243	0.9	1.207	280.1	LOS F	40.2	283.3	1.00	1.49	2.34	3.9
Approach		388	1.1	1.207	184.7	LOS F	40.2	283.3	0.91	1.20	1.75	6.6
SouthWest: Mona Vale Rd (200m)												
30	L2	322	3.3	0.738	19.0	LOS B	24.4	179.2	0.46	0.56	0.46	31.7
31	T1	1987	7.8	0.738	5.8	LOS A	24.4	179.2	0.27	0.28	0.27	51.7
Approach		2309	7.2	0.738	7.7	LOS A	24.4	179.2	0.30	0.32	0.30	49.3
All Vehicles		5161	5.9	1.207	19.1	LOS B	40.2	283.3	0.25	0.28	0.31	38.8

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	3	14.0	LOS B	0.0	0.0	0.42	0.42
P6	NorthEast Full Crossing	2	55.0	LOS E	0.0	0.0	0.84	0.84
P7	NorthWest Full Crossing	4	18.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		9	25.1	LOS C			0.54	0.54

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

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

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

# MOVEMENT SUMMARY

 **Site: TCS3053 [[Future+Dev Sat] Mona Vale Rd / Cowan Rd]**

Mona Vale Rd / Cowan Rd / Shinfield Ave

Site Category: (None)

Signals - Fixed Time Coordinated Cycle Time = 156 seconds (Site Optimum Cycle Time - Minimum Delay)

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
SouthEast: Shinfield Ave (150m)												
21	L2	24	0.0	0.046	47.5	LOS D	1.3	9.2	0.76	0.69	0.76	18.0
22	T1	28	0.0	0.123	44.3	LOS D	3.1	21.9	0.78	0.66	0.78	15.8
23	R2	27	0.0	0.123	48.9	LOS D	3.1	21.9	0.78	0.66	0.78	25.7
Approach		80	0.0	0.123	46.8	LOS D	3.1	21.9	0.77	0.67	0.77	20.3
NorthEast: Mona Vale Rd (445m)												
24	L2	8	0.0	0.482	6.6	LOS A	2.0	14.0	0.05	0.05	0.05	54.6
25	T1	1776	1.8	0.482	0.9	LOS A	2.0	14.0	0.04	0.04	0.04	58.6
26	R2	22	0.0	0.115	26.3	LOS B	0.9	6.3	0.57	0.70	0.57	33.3
Approach		1806	1.8	0.482	1.3	LOS A	2.0	14.0	0.05	0.05	0.05	58.1
NorthWest: Cowan Rd (125m)												
27	L2	108	0.0	0.266	26.2	LOS B	5.5	38.4	0.68	0.69	0.68	33.7
28	T1	31	0.0	0.266	21.7	LOS B	5.5	38.4	0.68	0.69	0.68	23.1
29	R2	341	0.3	1.354	400.5	LOS F	67.6	474.1	1.00	1.70	2.75	2.8
Approach		480	0.2	1.354	291.8	LOS F	67.6	474.1	0.91	1.41	2.15	4.3
SouthWest: Mona Vale Rd (200m)												
30	L2	261	0.0	0.536	17.4	LOS B	14.9	104.9	0.38	0.51	0.38	33.2
31	T1	1486	0.7	0.536	4.9	LOS A	14.9	104.9	0.18	0.20	0.18	52.8
Approach		1747	0.6	0.536	6.8	LOS A	14.9	104.9	0.21	0.25	0.21	50.3
All Vehicles		4114	1.1	1.354	38.4	LOS C	67.6	474.1	0.23	0.30	0.38	28.4

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

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

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

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P5	SouthEast Full Crossing	3	14.0	LOS B	0.0	0.0	0.42	0.42
P6	NorthEast Full Crossing	2	55.0	LOS E	0.0	0.0	0.84	0.84
P7	NorthWest Full Crossing	4	18.5	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		9	25.1	LOS C			0.54	0.54

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

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

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

# Appendix B. Green Travel Plan

## Green Travel Plan

### Planning Proposal

No.'s 4, 12 and 14 Cowan Road, St Ives (Pymble Golf Club)

Ref: P0407r02v04  
02/06/2022

## Document Control

**Project No:** P0407

**Project:** Pymble Golf Club

**Client:** DMPS on Behalf of Pymble Golf Club

**File Reference:** P0407r02v04 GTP Pymple Golf Club, Planning Proposal GTP

## Revision History

Revision	Date	Details	Author	Approved by
-	10/09/2018	Draft	D. Budai	
1	12/10/2018	Issue I	S. Hu	D. Budai
2	18/02/2019	Issue II	S. Hu	D. Budai
3	3/10/2019	Issue III	D. Budai	T. Lewis
4	02/06/2022	Issue IV	J. Wu	T. Lewis

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## Table of Contents

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Background .....	1
1.2	Document References.....	1
1.3	Report Structure .....	1
<b>2</b>	<b>ASSESSMENT OBJECTIVES .....</b>	<b>2</b>
<b>3</b>	<b>PROPOSED DEVELOPMENT .....</b>	<b>4</b>
3.1	Land-use and Yield .....	4
<b>4</b>	<b>SITE AUDIT AND TARGETS .....</b>	<b>5</b>
4.1	Private Vehicles.....	6
4.2	Public Transport .....	7
4.2.1	Bus services .....	7
4.2.2	Rail services .....	8
4.3	Active Transport .....	8
4.3.1	Bicycles.....	8
4.3.2	Walking.....	9
4.4	Mode Share.....	9
<b>5</b>	<b>ACTION STRATEGIES .....</b>	<b>11</b>
<b>6</b>	<b>IMPLEMENTATION.....</b>	<b>14</b>
6.1	Green Travel Welcome Information .....	14
6.2	Monitoring and Review.....	14

## Appendices

Appendix GTP-A: Transport Access Guide



# 1 Introduction

## 1.1 Background

This Green Travel Plan (GTP) has been developed on behalf of Pymble Golf Club to support a Planning Proposal to amend the Ku-ring-gai Local Environmental Plan 2015 to permit medium-density residential flat buildings of greater density, in addition to retention of the existing golf course (the Proposal).

## 1.2 Document References

In preparing this GTP, Ason Group has referenced the following key planning control documents:

- NSW Government, Ku-ring-gai Local Environmental Plan (Local Centres) 2012;
- NSW Government, Ku-ring-gai Local Environmental Plan 2015;
- Ku-ring-gai Council, Traffic and Transport Plan 2011-2021, September 2011;
- Transport & Urban Planning, Extension to St Ives Town Centre Traffic and Parking Study, 2008;
- NSW Government, Long Term Transport Master Plan, December 2012, (LTTMP); and
- TfNSW Integrated Public Transport Service Planning Guidelines (TfNSW Guideline)

This TIA also references general access, traffic and parking guidelines, including:

- Transport for New South Wales (formerly, Roads Traffic Authority) Guide to Traffic Generating Developments 2002 (TfNSW Guide);
- TfNSW Technical Direction TDT 2013/04a, Guide to Traffic Generating Developments – Updated Traffic Surveys (TfNSW TDT/04a); and
- Australian Standards 2980 (AS2890).

## 1.3 Report Structure

The report is structured as follows:

- Section 2 provides a summary of the objectives of the GTP
- Section 3 provides a summary of the Proposal
- Section 4 describes the findings of the Site Audit and proposed transport targets
- Section 5 provides a summary of the key action strategies
- Section 6 identifies methodologies for implementation, monitoring and review

## 2 Assessment Objectives

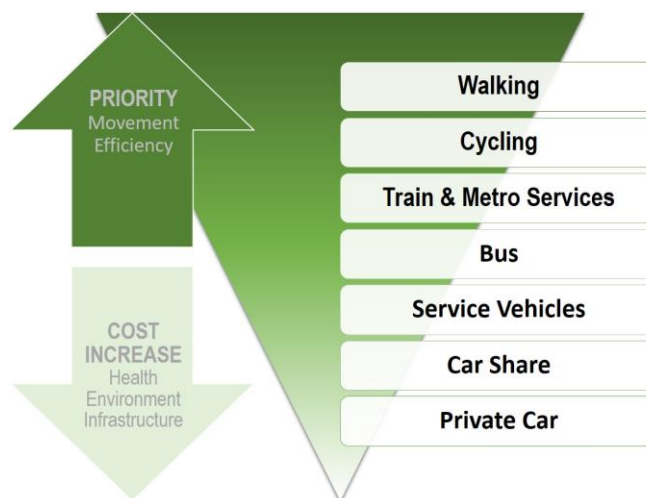
This management strategy comprises a package of measures designed to address the specific travel needs and impacts of the Proposal at No.'s 4, 12 and 14 Cowan Road, St Ives (the Site). The overall intention of this Green Travel Plan (GTP) is to encourage and facilitate the use of alternatives to single-occupancy car travel for journeys associated with the future residential development.

Incorporation of physical infrastructure into the proposed development will avoid the need and expense associated with retro-fitting facilities, and other measures i.e. marketing and promotion, etc. can be developed and ready to roll out at first occupation of the Site. This therefore provides a significant opportunity to influence travel behaviour before a tendency towards single occupancy car travel is entrenched. In addition, the availability of a GTP at this stage helps planning and road authorities to better understand the likely impacts of the development, bearing in mind the mitigating effects of the GTP, as part of the approval process.

The overall aim of the GTP is to bring about better transport arrangements for employees/residents at the Site and the primary objectives of the GTP will be to:

- Reduce the environmental footprint of the proposed development
- Promote the use of active transport modes, particularly for short-medium distance journeys
- Reduce reliance on the use of private vehicles for all journeys
- Encourage a healthier, happier and more active social culture.

Having regard for the above, this GTP would seek to adopt the movement hierarchy shown in **Figure 1** with priority given to 'active transport'.



**Figure 1: Movement Hierarchy**

This GTP promotes the use of alternative modes of transport, other than the private car, and provides choices for residents to travel to and from the Site that are more sustainable and environmentally friendly. There are a range of non-car transport options that are available at the Site which have been described in this report.

The implementation and monitoring of a GTP will act to encourage the use of sustainable transport as an alternative to car use and help support the objectives of the GTP.

## 3 Proposed Development

### 3.1 Land-use and Yield

The Planning Proposal is to amend Council's LEP 2015. The proposed amendment would provide for the medium density residential dwelling of a higher density than currently provided for in LEP 2015 at the Site, being Pymble Golf Club and 4, 12 and 14 Cowan Road, St Ives (the Proposal).

For the purposes of this Plan, the indicative development yield outlined in **Table 1** has been adopted to determine the likely traffic and transport impacts.

**Table 1: Land Use Assumptions**

Land Use	No. / Breakdown
	80–100 dwellings
Residential	10% 1 bed 50% 2 bed 40% 3 bed

It is important to note that the above development yield has been adopted for the purposes of the Transport Impact Assessment. Gateway determination (or subsequent Planning Proposal approval) does not in and of itself provide approval for any specific development mix or lock a future developer into a particular development outcome. Ultimately, any development proposal will need to be further considered with regard to specific uses and final yields as part of subsequent Master Planning and/or Development Applications following the rezoning of the Site to which this Planning Proposal relates. Accordingly, the GTP and accompanying Transport Access Guide (TAG) should also be updated at the appropriate time, where required.

## 4 Site Audit and Targets

An audit of the Site and proposed development was conducted to determine facilities in the area and projected modal splits. The audit considered the following:

- Public transport services in the area including proximity to the Site, frequency of services and accessibility
- Location of nearby car share vehicles
- Bicycle and pedestrian facilities, including accessibility, connectivity and safety
- Mode split data for the Site and local area.

Travel Zones (TZs) are the geographic units of the Bureau of Transport Statistics' (BTS) data collection, transport modelling and analysis. TZs allow for detailed spatial analysis as they are smaller than Statistical Local Areas (SLA), but generally larger than an ABS Collection District (CD) or Mesh Block (MB). In order to provide for a similar level of trip generation across zones, TZs are configured so that they tend to be small in areas with high land-use densities and larger in areas of lower density. Key land-uses of interest in defining TZs are employment, housing and transport infrastructure.

St Ives's commuting statistics shown in **Table 2** reveal the main modes of transport by which residents get to work. There are a number of reasons why people use different modes of transport to get to work including the availability of affordable and effective public transport options, the number of motor vehicles available within a household, and the distance travelled to work.

**Table 2: 2016 Method of Travel to Work in St Ives**

Main Method of Travel	Number	%
Car – as driver	4,315	54.4
Train	1,502	18.9
Bus	402	5
Car – as passenger	239	3
Walked only	144	1.8
Other Mode	59	0.8
Motorbike/Scooter	31	0.4
Truck	9	0.1
Bicycle	6	0.1
Worked at home	658	8.3
Did not go to work	556	7
Not stated	19	0.2
Total employed persons aged 15+	7,936	100

With reference to **Table 2**, it is evident that private vehicle (car) is the overwhelmingly preferred mode of choice for residents travelling to work in the area. The data indicates that approximately 57% travel to work by car, with 54% as the driver and 3% as the passenger i.e. car-pooling. It should be noted that approximately 8% of total persons employed aged 15+ in the St Ives area work from home, in addition to 7% which do not go to work.

The GTP is intended to develop a package of Site specific measures to promote and maximise the use of sustainable travel modes, including walking, cycling, public transport and car sharing. It will include a review of existing transport choices and sets targets so that the effective implementation of the plan can be assessed. These targets are to be realistic but ambitious enough to initiate substantive behavioural change to achieve the desired outcomes. The plan shall be monitored as part of an ongoing review to ensure it remains relevant and reflective of current conditions.

With regards to the Proposal, the existing public transport infrastructure available within close proximity to the Site has been identified in the Transport Access Guide in Appendix A. Due to the existing provision of multiple bus stops within close proximity to the Site, no additional infrastructure is proposed.

#### 4.1 Private Vehicles

It is proposed that vehicle access to the Site be restricted to left in/left out only; this is in response to the observed (and modelled) queue lengths in Cowan Road on the northern approach to Mona Vale Road, which can extend past the Site.

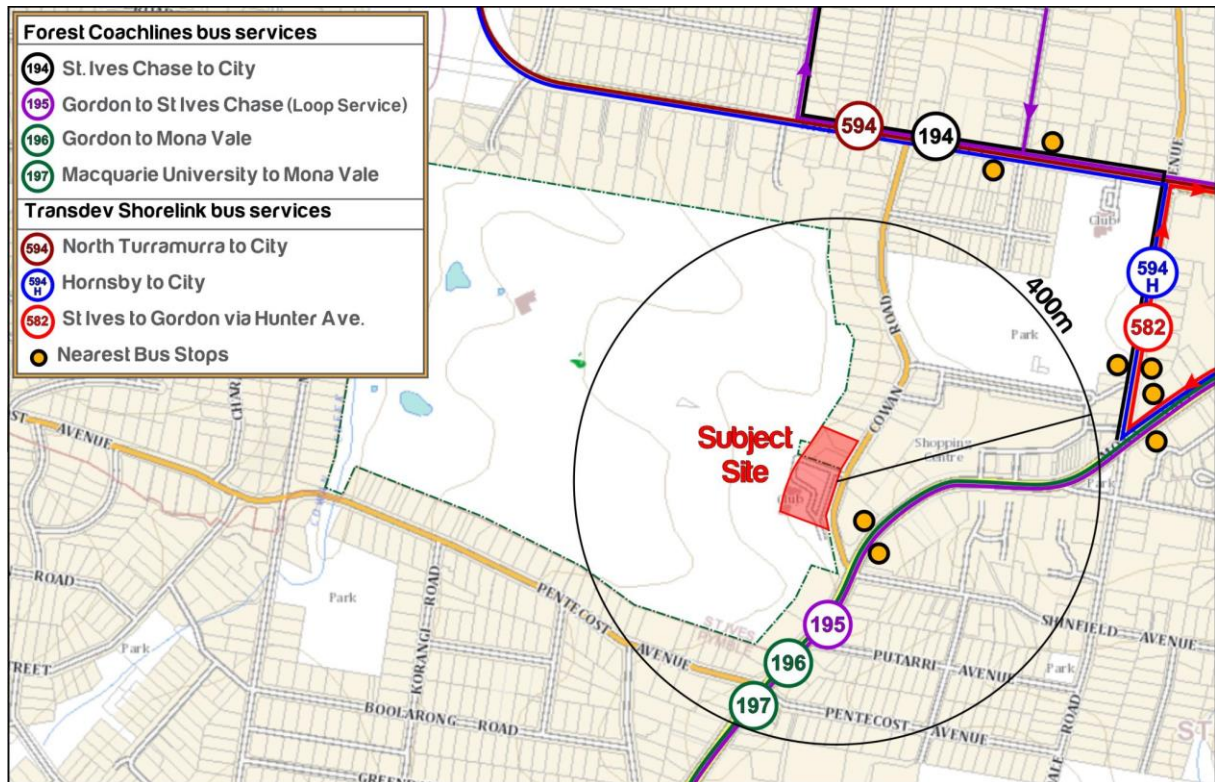
Given that there are geometric constraints at the Mona Vale Road / Cowan Road intersection (retention of significant trees) which prevent any significant upgrades (i.e. additional Cowan Road approach infrastructure); and further the TfNSW's (more than appropriate) reluctance to reduce green times along Mona Vale Road, there are limited options by which to mitigate this queue. As such, the removal of right turn movements to and from the Site will reduce the potential for additional queuing delays as well as reducing potential vehicle conflicts.

Notwithstanding the above, as previously discussed there are excellent alternatives for access to/from the sub-regional and collector road network, such that the (localised benefits of this) restriction are not at the expense of any significant increase in VKT.

The aim of this GTP to reduce travel to the Site by private vehicles and encourage the use of more sustainable and healthy travel modes such as public and active transport as well as nearby car share vehicles also supports the proposed parking provision. The GTP is a framework for the development and implementation of action strategies for the Proposal and the Transport Access Guide contained in **Appendix A** would be integrated into the operation of the Site and its day-to-day activities.

## 4.2 Public Transport

The Site lies in close proximity to public transport services, as shown in **Figure 2**. A summary of the existing public transport services is discussed further below.



**Figure 2: Public Transport Services**

### 4.2.1 Bus services

As shown in **Figure 2**, bus stops are located within 400m of the Site in Mona Vale Road (immediately east of Cowan Road) for bus services operating along Mona Vale Road. It is noted that TfNSW Guidelines state that bus services within 400m of a site can have a significant influence on travel mode choice, with that level of influence in turn depending on the frequency and destinations of those services.

The details of each bus service that use the Mona Vale Road bus stops are presented in **Table 3**.

**Table 3: Bus Service Weekday Peak Frequencies**

Route No.	Route Description	Peak Hour Frequency
195	Gordon to St Ives Chase (Loop Service – Northbound)	3
	Gordon to St Ives Chase (Loop Service – Southbound )	3
196	Gordon to Mona Vale	3
	Mona Vale to Gordon	1
197	Mona Vale to Macquarie University via Gordon	5
	Macquarie University to Mona Vale via Gordon	5

Importantly, and with reference to the TfNSW Trip Planner application, during the AM and PM peak periods, a bus service to (or from) Gordon Railway Station is available every 5-10 minutes, while outside of the commuter peaks a bus service is available every 10-15 minutes. This means that there is a frequent and direct service available connecting the Site to the Sydney rail network.

Additional bus services connecting to Turramurra, Hornsby and Sydney City operate along Memorial Avenue and Killeaton Road, with bus stops located approximately 500m from the Site in Memorial Avenue, and approximately 600m from the Site in Killeaton Road.

#### 4.2.2 Rail services

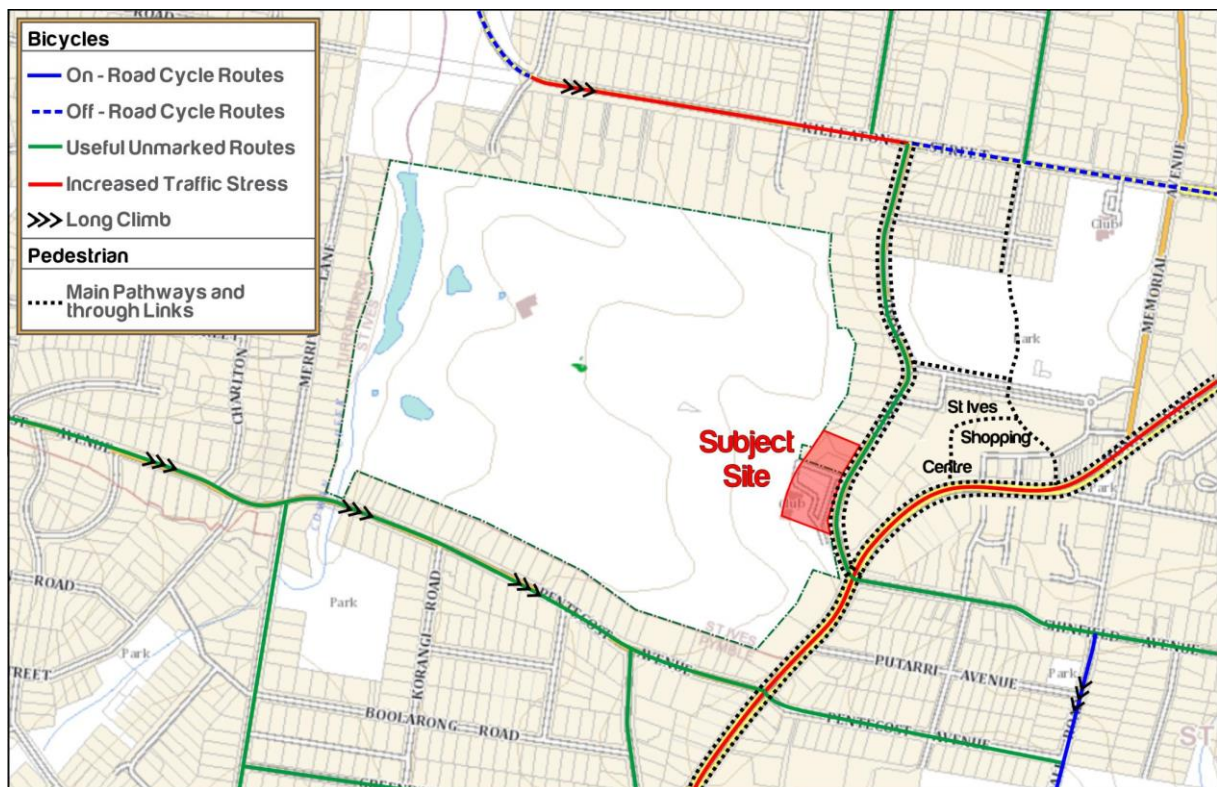
The Site is not located within walking distance of any railway stations, but as described above regular bus services are available to Gordon Railway Station, which in turn provides access to the metropolitan rail network.

### 4.3 Active Transport

#### 4.3.1 Bicycles

The bicycle network in the vicinity of the Site is shown in **Figure 3**. A “useful unmarked route” (as designated by Council for a known cycle route that does not provide a formal cycle path) runs along Cowan Road past the Site, connecting to Mona Vale Road and the off-road cycle route along Killeaton Street. These routes in turn provide access to the wider walking and cycling network, including links to Gordon, Pymble and Turramurra Railway Stations.





**Figure 3: Regional Cycle & Pedestrian Connectivity**

#### 4.3.2 Walking

Key pedestrian desire lines in the vicinity of the Site primarily relate to connections to existing public transport infrastructure (i.e. bus stops); the St Ives Shopping Village; and nearby recreational spaces. In this regard, formal footpaths are provided in all local roads, while signalised and pedestrian (zebra) crossings are provided at the intersections of Mona Vale Road & Cowan Road and Memorial Avenue & Pentecost Avenue. Other pedestrian connections are provided by way of footpaths in and around the St Ives Shopping Village and broader St Ives Town Centre.

#### 4.4 Mode Share

The existing travel mode(s) for the journey to work for residents of St Ives was surveyed in the 2011 and 2016 Census and collated in Journey to Work (JTW) data provided by the Bureau of Transport Statistics. A summary of travel modes comparing the 2016 JTW data with the 2011 JTW data has been compiled by .id and is presented in **Table 4**.

**Table 4: St Ives Journey to Work Data 2011 and 2016 – Method of Travel to Work**

St Ives - Employed Persons (Enumerated)	2016			2011			Change
Main method of travel	Number	%	Ku-ring-gai LGA %	Number	%	Ku-ring-gai LGA %	2011 to 2016
Car – as driver	4,315	54.4	47.4	4,120	57.9	50.8	195
Train	1,502	18.9	26	1,112	15.6	21.4	389
Bus	402	5	2.3	209	2.9	1.8	+192
Car – as passenger	239	3	2.9	240	3.4	3.2	-1
Walked only	144	1.8	2.1	92	1.3	2.1	53
Other Mode	59	0.8	0.9	21	0.3	0.8	39
Motorbike/Scooter	31	0.4	0.5	37	0.5	0.4	-5
Truck	9	0.1	0.2	10	0.1	0.3	-1
Bicycle	6	0.1	0.6	10	0.1	0.6	-5
Worked at home	658	8.3	8.4	592	8.3	8	66
Did not go to work	556	7	8	620	8.7	9.4	-64
Not stated	19	0.2	0.5	53	0.7	1	-33
Total employed persons aged 15+	7,936	100	100	7,112	100	100	824

Source: Australian Bureau of Statistics, Census of Population

With reference to **Table 4**, while the travel mode to private car is still quite high, it is certainly encouraging that there have been increases in the number of people using public transport rather than private vehicles for the key trip to work.

## 5 Action Strategies

Six main strategies have been identified and the actions required for each are detailed in **Table 5**. The table details how the targets the specific actions to be implemented as part of this GTP and who will be responsible for implementing each action. In developing this GTP and the strategies and actions comprising it, it is recognised that the end user is not known to the developer. Consequently, it is vital that the developer explains to future tenants the expectations regarding travel planning that are agreed for the Site to facilitate the important process of monitoring and review.

**Table 5: Proposed GTP Strategies**

STRATEGY	HOW IT WORKS	IMPLEMENTATION	RESOURCES / RESPONSIBILITY
<b>1 Travel Planning and Demand Management</b>			
1.1 Car Sharing	<p>Utilisation and extension of existing, established car share schemes to set up a car sharing network for the Site, reducing residents need to own and operate their own vehicle.</p> <p>Promote existing car sharing schemes.</p>	<p>Residents can conveniently utilise the pods either on-site or within 400m of the Site to easily achieve a 2% mode share target. Council should also consider extending this provision to make car share vehicles even more accessible.</p>	Developer, Council
1.2 Travel Plans	<ul style="list-style-type: none"> <li>Develop mandatory Travel Plans and provide information for Workplace Travel Plans.</li> <li>Management of Travel Plans</li> <li>Promotion of Travel Plans</li> </ul>	<p>Provide information and resources and implement a range of additional incentives (free public transport and car share, cycling merchandise etc) to reward and encourage those who travel actively to help develop a healthy, active culture and meet travel targets.</p> <p>Continued support of the person/organisation in charge of managing the GTP.</p> <p>Undertake a GTP event annually.</p> <p>Promote the follow-up initiatives via web pages:</p> <ul style="list-style-type: none"> <li>Travel Survey Results; and</li> <li>Progress and update of GTP.</li> </ul>	Developer and building management
1.3 Flexible Working hours	<p>Allowing the building manager and staff the flexibility to commute outside peak periods to reduce overall congestion and travel time by taking advantage of accessible and convenient off peak public transport discounts and the close proximity nearby bus stops.</p>	<p>Manage staff rosters where possible to facilitate off peak start/finish times.</p>	Employers

STRATEGY	HOW IT WORKS	IMPLEMENTATION	RESOURCES / RESPONSIBILITY
<b>2 Promoting Public Transport and Car Share</b>			
2.1 Travel Pass Loan Schemes  Discount Opal	Commercial business may consider subsidising staff travel passes to increase public transport use. Alternatively, staff can pay for their own annual travel pass through their salary, spreading the cost over the year to make it more affordable.	Subject to owner/tenant negotiations and incentives. Opal cards can be provided for residents to facilitate achieving public transport mode share targets and incentivise ongoing use.	Residents to negotiate with employers
2.2 Public Transport and Car Share for Business travel	Promotion of public transport or car share as the first preference for business travel.	This should be supported by employees having access to Opal and GoGet accounts, subject to owner/tenant negotiations and incentives.	Residents to negotiate with employers
<b>3 Promoting Cycling</b>			
3.1 Bicycle Fleets	Building management staff and commercial tenant should consider having bicycle fleets which employees can use for local trips.	Utilisation of on-site bicycle parking facilities and purchase/lease of shared bicycles to achieve mode shift towards bicycle trips.	Building management
3.2 Providing / Maintaining End of Journey Facilities	Providing facilities such as showers, change rooms, lockers.	Bicycle parking spaces will be provided for residents and staff and have access to the appropriate facilities.	Developer
3.3 Promote Bicycle User Groups	Bicycle User Groups (BUG) encourage bicycle use and promote bicycle rides and initiatives.	Encourage the residents and staff to join the local BUG, Bike North to lobby for facilities and promote cycling.	Building Manager, Bike North
3.4 Promote Bicycle Initiatives	Promotion of bicycle initiatives – NSW bicycle week, cycle to workday etc.	In addition to Bike North, promote and encourage cycling in the area. Actively participate in recognised NSW government bicycle initiatives such as bicycle week and cycle to workday.	Local businesses, Council
3.5 Provide bicycle training	Encourages those who wouldn't previously consider cycle as a mode choice to do so.	Provide short training sessions by qualified people.	Employers, Building Management
<b>4 Promoting Walking</b>			
4.1 Develop Pedestrian Network	Development and maintenance of a high quality, highly permeable pedestrian network around the Site.	Design, construct and maintain TfNSW funded St Ives High Pedestrian Activity Area. Limit delays to walk trips and make them convenient, direct, and integrated with land uses.	TfNSW, Council, developer
4.2 Providing End of Journey Facilities	Provision of sufficient end of trip facilities such, showers, change rooms, lockers etc to maximise pedestrian activity to and from the Site as the wider LGA.	Provide access to the appropriate facilities.	Developer

STRATEGY		HOW IT WORKS	IMPLEMENTATION	RESOURCES / RESPONSIBILITY
<b>5 Restraining Parking</b>				
5.1	Reduce Residential Parking Rates	Restrain parking requirements for the Site high density residential apartments to account for the availability of other travel options.	The Site has very good access by public transport, as well as good quality pedestrian and cycle networks, and a good range of local shops, services and facilities in close proximity, thereby reducing residents need to own and operate a car.	Developer
5.2	Transport Access Guide	Provide residents and staff with a Transport Access Guide (Appendix A) and advise them of the transport options available in the area.	Keep a copy of the Transport Access Guide current, relevant, useful and accessible. The TAG should be clearly displayed in communal areas.	Building management
<b>6 Influencing Travel Behaviour</b>				
6.1	Provision of Sustainable Travel Packs to Residents	Introduces residents to the GTP and provides information on walking and cycling routes, and travel by bus & train. Contact details for who is responsible for the GTP will also be provided	To be provided on first occupation of dwellings	Building management
6.2	Promotional Free Travel	Providing the option to work remotely means there will be fewer vehicles on the road.	Manage staff rosters and develop work-from-home policies and procedures, where possible.	Employers
6.3	Transport Access Guide	Provide residents and staff with a Transport Access Guide advising them of the transport options available in the area.	Keep a copy of the Transport Access Guide current, relevant, useful and accessible. The TAG should be clearly displayed in communal areas.	Building management

## 6 Implementation

### 6.1 Green Travel Welcome Information

All new residents will be provided with a welcome information pack that outlines the Site's green and sustainable transport initiatives. This welcome information will be prepared, maintained and distributed by Building Management and may be delivered as a hard copy or electronically (via email or equivalent). Welcome information will include:

- General information on the arrangement and management of car parking and bicycle parking on-site and details of the relevant contact;
- Advice on how to access public transport timetables and real time travel information through the building's intranet web page OR hard copies of timetables for public transport routes within approximately 5 minutes' walk from the Site;
- Advice on how to access public transport / cycling / walking maps and a map of key destinations (that identifies distances and estimated walking times and should include key services, nearby public transport stops and share care locations) through the building's intranet web page OR hard copies of these maps;
- Information on other sustainable transport information available either online OR via a hard copy pamphlet providing equivalent contact details.
- A redeemable offer of an Opal card to the value of one week along with registration information and details of the closest Opal top-up point; and
- Information on other Green Travel initiatives that may be implemented by the Building Manager.

The ongoing implementation of the Green Travel Plan will be the responsibility of the Building Manager. This includes a minimum annual review of all information provided within welcome information packs, accessible via the building's relevant online web page and displayed within the building lobbies to ensure that information is relevant and current.

The management of bicycle parking and implementation of other sustainable transport initiatives would be managed as part of the role of the Building Manager.

### 6.2 Monitoring and Review

In order to monitor the success of existing green travel initiatives and to inform the implementation of any new initiatives, a staged staff questionnaire system regarding travel habits will be implemented by the Building Manager.

Questionnaires would be implemented on-line either through a generic survey site or through an online management system. This system should generally have three stages:

- Stage 1 is a questionnaire survey of occupiers of the building upon occupation and used to collect information on their travel characteristics, to gauge interest in the various initiatives and to seek ideas for other initiatives.
- Stage 2 is a questionnaire and feedback form to be filled out 6 months after occupation and used to confirm travel habits and seek feedback on the efficiency and use of implemented green travel initiatives.
- Stage 3 is an annual Green Travel Plan review of travel habits for all occupants and provides an opportunity for occupants to suggest additional measures for implementation.

## **Appendix GTP-A**

### Transport Access Guide



 Pedestrian Entry 
  Lifts from Basement  
 Vehicle Entry 
  Basement Carparks  
 69 Total Spaces (B1 & B2)

## Appendix C. Consultation Emails

## 2018 Correspondence

**From:** KEANE Venetia E <venetia.e.keane@rms.nsw.gov.au> on behalf of buspriorityinfrastructureprogram@rms.nsw.gov.au <buspriority@rms.nsw.gov.au>  
**Sent:** Tuesday, 11 September 2018 2:05 PM  
**To:** Dan Budai  
**Cc:** buspriorityinfrastructureprogram@rms.nsw.gov.au  
**Subject:** RE: Planned alteration/expansion of bus services along the Mona Vale Road corridor

Good afternoon Dan

Thank you for contacting the Bus Priority Infrastructure Program regarding planned alteration/expansion of bus services along the Mona Vale Road corridor.

The BPIP team we are not currently proposing any changes in this area.

You may wish to contact Transport for NSW on 131 500 or provide feedback via the their website [TfNSW - bus-feedback](#). Transport for NSW is the agency which plans bus services in Sydney.

You also may wish to visit [Future Transport Strategy 2056](#) for more information on specific bus priority projects as the program is rolled out.

Your email has been forwarded to Transport for NSW for their consideration.

Regards

***Bus Priority Infrastructure Program***

E: [buspriority@rms.nsw.gov.au](mailto:buspriority@rms.nsw.gov.au)

W: [www.rms.nsw.gov.au/bpp](http://www.rms.nsw.gov.au/bpp)

***Every journey matters***

---

**From:** Dan Budai [<mailto:dan.budai@asongroup.com.au>]  
**Sent:** Tuesday, 11 September 2018 11:46 AM  
**To:** [buspriorityinfrastructureprogram@rms.nsw.gov.au](mailto:buspriorityinfrastructureprogram@rms.nsw.gov.au)  
**Subject:** Planned alteration/expansion of bus services along the Mona Vale Road corridor

I am currently developing a Transport Impact Assessment for a site within the Ku-ring-gai Council LGA. As the site is close to a classified arterial road (Mona Vale Road), I require details regarding any potential alteration/expansion of bus services along the Mona Vale Road corridor.

Can you please provide these details for inclusion in our report? I can be contacted on the numbers below if you need to discuss any details.

Regards,

**Dan Budai**

Senior Traffic Engineer | Ason Group

T: +61 2 9083 6601 | M: +61 450 524 500 | E: [dan.budai@asongroup.com.au](mailto:dan.budai@asongroup.com.au)

A: Suite 1202, Level 12, 220 George Street, Sydney NSW 2000



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## 2022 Correspondence

## Tim Lewis

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**From:** Tim Lewis  
**Sent:** Friday, 2 September 2022 5:08 PM  
**To:** Tricia Zapanta; Keith Peters  
**Cc:** Rebecca Butler-Madden; Daniel McNamara  
**Subject:** RE: Pre Planning Proposal Information request for Pymble Golf Course Rezoning Cowan Street, St Ives

Thanks Tricia and Keith.

That Waterloo Rd / Lane Cove Rd intersection is approximately 6.9 km from the Mona Vale Rd / Cowan Rd intersection that development traffic would access the classified road network.

As such, I wouldn't expect the works below to require any special consideration in relation to this particular Planning Proposal.

Unless you advise otherwise, I'll respond to Council as such.

Google Maps link to Mona Vale Rd / Cowan Rd intersection: <https://goo.gl/maps/iSHV7viRaJyH5onGA>

Thanks again,

**Tim Lewis**

Ason Group | Principal Lead  
Development Assessment & Advisory

**M:** +61 412 299 692 | **T:** +61 2 9083 6601 | **E:** [tim.lewis@asongroup.com.au](mailto:tim.lewis@asongroup.com.au)

**A:** Suite 17.02, Level 17, 1 Castlereagh Street, Sydney NSW 2000



<https://www.september.org.au/fundraisers/asongroup>

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**From:** Tricia Zapanta <Tricia.Zapanta@transport.nsw.gov.au>  
**Sent:** Friday, 2 September 2022 3:59 PM  
**To:** Keith Peters <Keith.Peters@transport.nsw.gov.au>; Tim Lewis <tim.lewis@asongroup.com.au>  
**Subject:** Pre Planning Proposal Information request for Pymble Golf Course Rezoning Cowan Street, St Ives

Thanks Keith.

Tim – please note below the latest information regarding a Bus Priority Infrastructure Program (BPIP) project at the Lane Cove Road and Waterloo Road intersection at Macquarie Park. If you need more specific information, please contact Keith directly.

Regards

Tricia

---

**From:** Keith Peters <[Keith.Peters@transport.nsw.gov.au](mailto:Keith.Peters@transport.nsw.gov.au)>  
**Sent:** Friday, 2 September 2022 3:44 PM  
**To:** Tricia Zapanta <[Tricia.Zapanta@transport.nsw.gov.au](mailto:Tricia.Zapanta@transport.nsw.gov.au)>  
**Cc:** Anthony Cunningham <[anthony.j.cunningham@transport.nsw.gov.au](mailto:anthony.j.cunningham@transport.nsw.gov.au)>; Roisin Kim <[Roisin.Kim@transport.nsw.gov.au](mailto:Roisin.Kim@transport.nsw.gov.au)>  
**Subject:** RE: Pre Planning Proposal Information request for Pymble Golf Course Rezoning Cowan Street, St Ives

Hi Tricia,

The Lance Cove Rd and Waterloo Rd intersection was awarded to Quickway Constructions Pty Ltd on 27 June 2022.

Construct is due to commence 04 Sep 2022 with an approximate 20 month construction duration. Works will be predominantly night shift Sun-Thu, from 9pm to 5am.

Kind regards,

Keith Peters  
Senior Project Manager  
SPD Delivery Strategy and Improvement  
Infrastructure and Place  
**Transport for NSW**

E [Keith.Peters@transport.nsw.gov.au](mailto:Keith.Peters@transport.nsw.gov.au) | M 0416 972 575  
71-79 Pyrmont Bridge Road, Pyrmont  
PO Box 609, Pyrmont NSW 2009



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**From:** Tricia Zapanta <[Tricia.Zapanta@transport.nsw.gov.au](mailto:Tricia.Zapanta@transport.nsw.gov.au)>  
**Sent:** Friday, 2 September 2022 3:35 PM  
**To:** Anthony Cunningham <[anthony.j.cunningham@transport.nsw.gov.au](mailto:anthony.j.cunningham@transport.nsw.gov.au)>; Keith Peters <[Keith.Peters@transport.nsw.gov.au](mailto:Keith.Peters@transport.nsw.gov.au)>  
**Subject:** Pre Planning Proposal Information request for Pymble Golf Course Rezoning Cowan Street, St Ives

Hi Anthony / Keith,

I have received an enquiry from a traffic consultant preparing a TIA for a Planning Proposal at Pymble Golf Course at St Ives (see email below). They're after the latest information regarding upgrades along Mona Vale Road and the proposed rapid bus line between Mona Vale and Macquarie Park.

Hilary has referred me to you in relation to your work on the BPIP project at Lane Cove and Waterloo Road intersection. Are you able to provide more information I can pass onto the consultant or can I refer them directly to you?

Regards  
Tricia

Tricia Zapanta  
Strategic Landuse



Planning & Programs, Greater Sydney  
**Transport for NSW**  
E: [Tricia.Zapanta@transport.nsw.gov.au](mailto:Tricia.Zapanta@transport.nsw.gov.au)

Please note: My work days are Tuesday to Friday



**Transport  
for NSW**

---

**From:** Hilary Johnson <[Hilary.JOHNSON@transport.nsw.gov.au](mailto:Hilary.JOHNSON@transport.nsw.gov.au)>  
**Sent:** Thursday, 1 September 2022 5:43 PM  
**To:** Tricia Zapanta <[Tricia.Zapanta@transport.nsw.gov.au](mailto:Tricia.Zapanta@transport.nsw.gov.au)>; Leonardo Ferreri <[Leonardo.FERRERI@transport.nsw.gov.au](mailto:Leonardo.FERRERI@transport.nsw.gov.au)>; Peter Carruthers <[Peter.CARRUTHERS@transport.nsw.gov.au](mailto:Peter.CARRUTHERS@transport.nsw.gov.au)>  
**Subject:** Re: RFC - Ku-ring-gai Council - SYD22/00945/01 - PP - Pre Planning Proposal Information request for Pymble Golf Course Rezoning Cowan Street, St Ives

Hi Tricia,

Only one current BPIP project on the corridor and that is at Lane Cove Rd and Waterloo Road intersection. Just started construction and is under the federal stimulus pinch point program (BPIP funded the design) with I&P managing the delivery currently. It might be Keith Peters (someone under Anthony Cunningham from memory).

Sorry I'm not back in the office til Monday to chase it up for you.

Thanks  
Hilary

Tricia Zapanta  
Strategic Landuse  
Planning & Programs, Greater Sydney  
**Transport for NSW**  
E: [Tricia.Zapanta@transport.nsw.gov.au](mailto:Tricia.Zapanta@transport.nsw.gov.au)

Please note: My work days are Tuesday to Friday



**Transport  
for NSW**

---

**From:** Tim Lewis <[tim.lewis@asongroup.com.au](mailto:tim.lewis@asongroup.com.au)>  
**Sent:** Wednesday, 10 August 2022 6:05 PM  
**To:** Development Sydney <[Development.Sydney@transport.nsw.gov.au](mailto:Development.Sydney@transport.nsw.gov.au)>  
**Cc:** Daniel McNamara <[daniel@dmps.com.au](mailto:daniel@dmps.com.au)>; Rebecca Butler-Madden <[Rebecca.BMadden@asongroup.com.au](mailto:Rebecca.BMadden@asongroup.com.au)>  
**Subject:** Pymble Golf Club Rezoning - Mona Vale Road ITAP and works planning

Dear Assessments Team,

Ason Group has been engaged to prepare a traffic report supporting a Planning Proposal for Pymble Golf Club. As part of that process, we engaged with TfNSW back in 2018. Council is now undertaking further assessment of a new scheme – addressing separate comments from Council – and has provided the following comments:

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*Through its discussions with Transport for NSW, however, Council is now aware that upgrade proposals at various locations along Mona Vale Road being considered/planned by Transport for NSW as part of its Mona Vale Road Integrated Transport Action Plan, and that the status of the proposed rapid bus line between Mona Vale and Macquarie Park may have changed.*

*Given that the correspondence between the applicant and Transport for NSW is dated 2018, it would be beneficial for the Planning Proposal that the applicant re-engage with Transport for NSW to understand the status of any proposed road and transport improvements along the corridor, and update the TIA with any new information.*

---

Can you please advise whom we should liaise with in relation to the above and availability for a meeting?

As you can understand, this has been a long process to date with Council and the Applicant is keen to resolve things as soon as possible.

Regards,

**Tim Lewis**

Ason Group | Principal Lead  
Development Assessment & Advisory

M: +61 412 299 692 | T: +61 2 9083 6601 | E: [tim.lewis@asongroup.com.au](mailto:tim.lewis@asongroup.com.au)

A: Suite 17.02, Level 17, 1 Castlereagh St, Sydney NSW 2000

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