ATTACHMENT BOOKLET 4

ENVIRONMENT AND INFRASTRUCTURE DIVISION REPORTS

PART 2

ORDINARY COUNCIL MEETING

TUESDAY 27 NOVEMBER 2018

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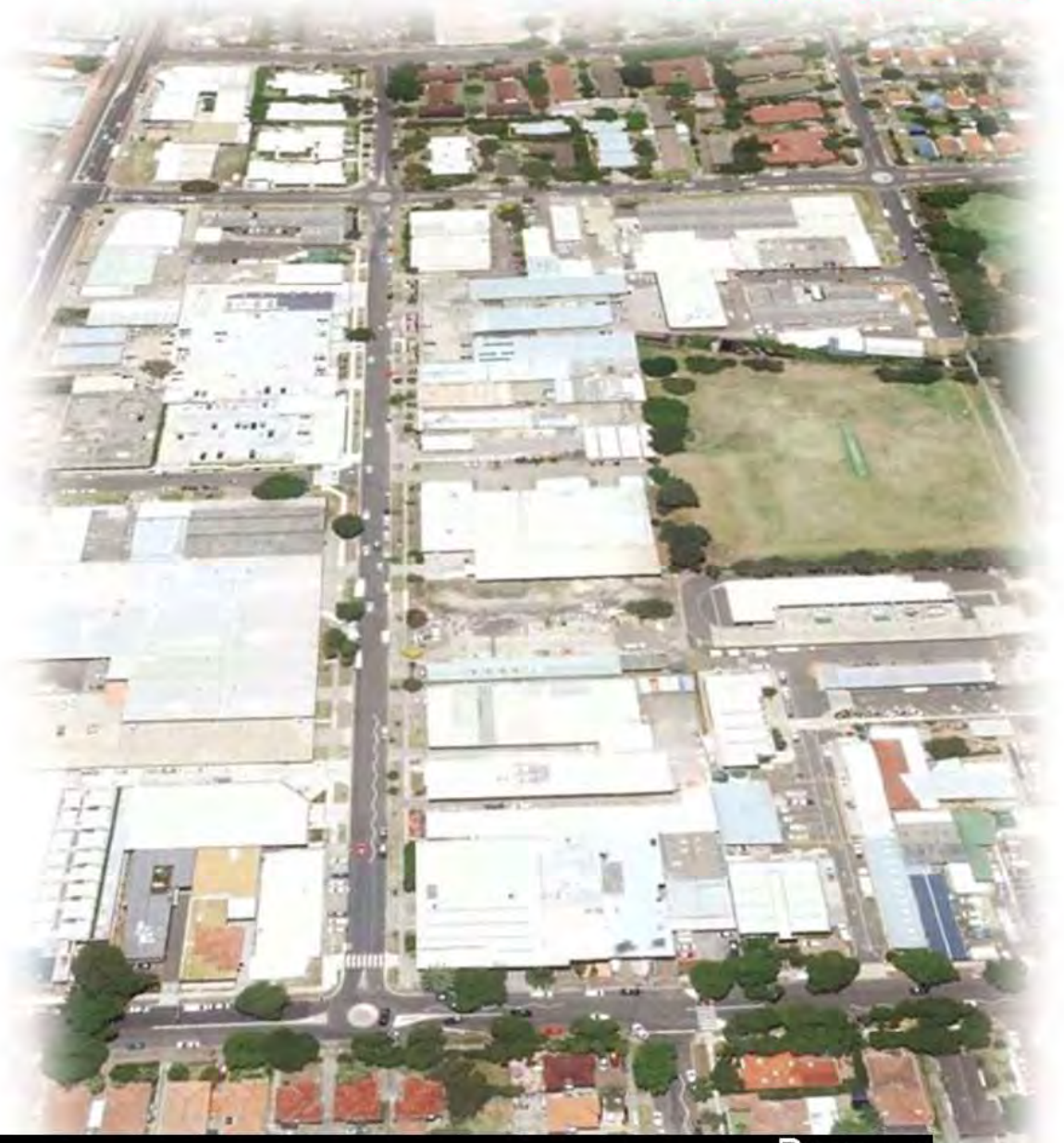
BALGOWLAH MANLY VALE TRAFFIC AND PARKING REVIEW

FOR

NORTHERN BEACHES COUNCIL



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1. INTRODUCTION

1.1 BACKGROUND

Bitzios Consulting has been commissioned by Northern Beaches Council ('Council') to prepare the Balgowlah Manly Vale Traffic and Parking Review. The key objective of this study is to devise a suite of measures and strategies to assist Council to manage future traffic and parking pressures within the study area as it continues to develop with more intensive land uses.

The study area is shown in Figure 1.1 and is generally bounded by Condamine Street to the west, King Street to the north, Quirk Road to the east and Griffiths Street to the south.

Source: Google Maps

Figure 1.1: Study Area

In 2015, Council resolved to rezone the land bounded by Condamine Street, Kenneth Road, Quirk Road and Balgowlah Road from IN2 Light Industrial to a more intensive B6 Enterprise Corridor land use. The approval and subsequent operations of large scale developments such as Bunnings, and Woolworths located on Roseberry Street have gradually increased traffic and parking pressures within the area. These pressures will be exacerbated with redevelopment and the introduction of the B Line multi storey car park on Kenneth Road and an Aldi development on Roseberry Street.

With redevelopment, there will be a rapid increase in local traffic heightening the mix of commercial traffic, industrial traffic, school traffic and commuter traffic in this constrained area. Given the predicted expansion and growth within the study area, it will be important to plan for traffic management, parking management and active transport provisions to ensure safety and accessibility is not compromised in future years.

It is acknowledged that there have been previous transport studies undertaken for the study area; however, this is the first study which considers an integrated approach across all transport modes.

1.2 Study Structure, Scope and Methodology

The study comprises two stages as follows:

- **Stage 1 – Existing Conditions Assessment:** this stage reviews the current situation for the study area in terms of existing road network form and function, key intersection performance, historic crash trends, alternative transport provisions, road infrastructure conditions, parking utilisation, findings of previous transport planning studies, community feedback on existing issues and significant development approvals. Stage 1 identifies emerging issues and challenges facing the study area and sets a series of objectives as a basis for developing and testing integrated strategies in the subsequent stage of the study (Stage 2); and
- **Stage 2 – Strategies and Implementation Plan:** this stage forecasts transport conditions in order to devise strategies and a prioritised implementation plan (including concepts and high level costings) to accommodate the growth in the study area. This leads to the creation of:
  - a Strategic Traffic Management Plan;
  - a Strategic Parking Plan; and
  - a Strategic Walking and Cycling Plan.

The study structure, scope and methodology are summarised in Figure 1.2.

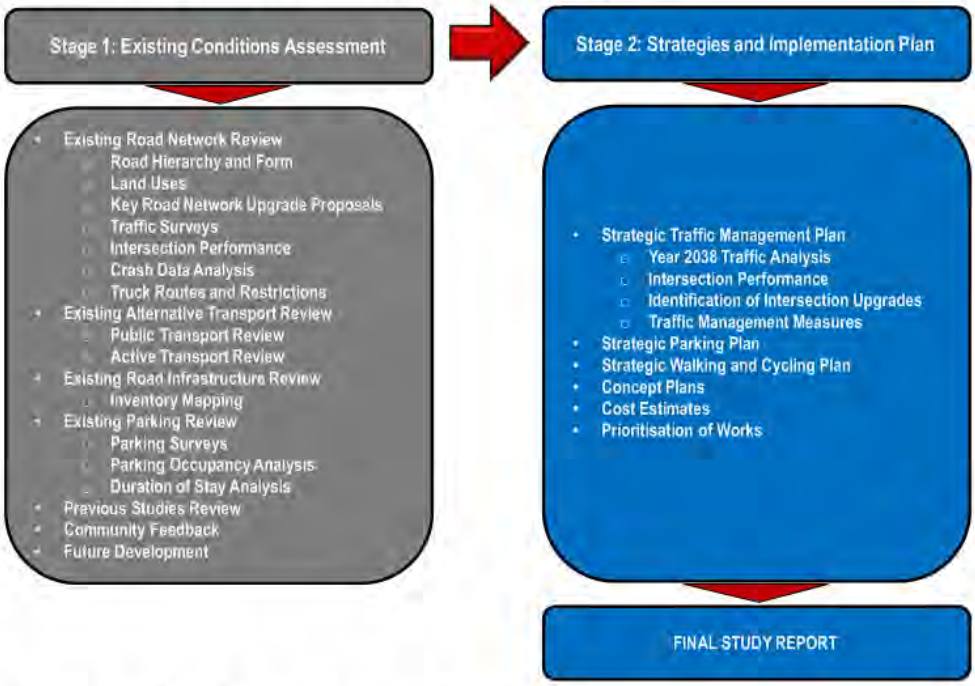


Figure 1.2: Study Structure, Scope and Methodology

2. EXISTING ROAD NETWORK CONDITIONS

2.1 ROAD HIERARCHY AND FORM

The road hierarchy and typical cross sections of key roads within the study area is shown in Figure 2.1.

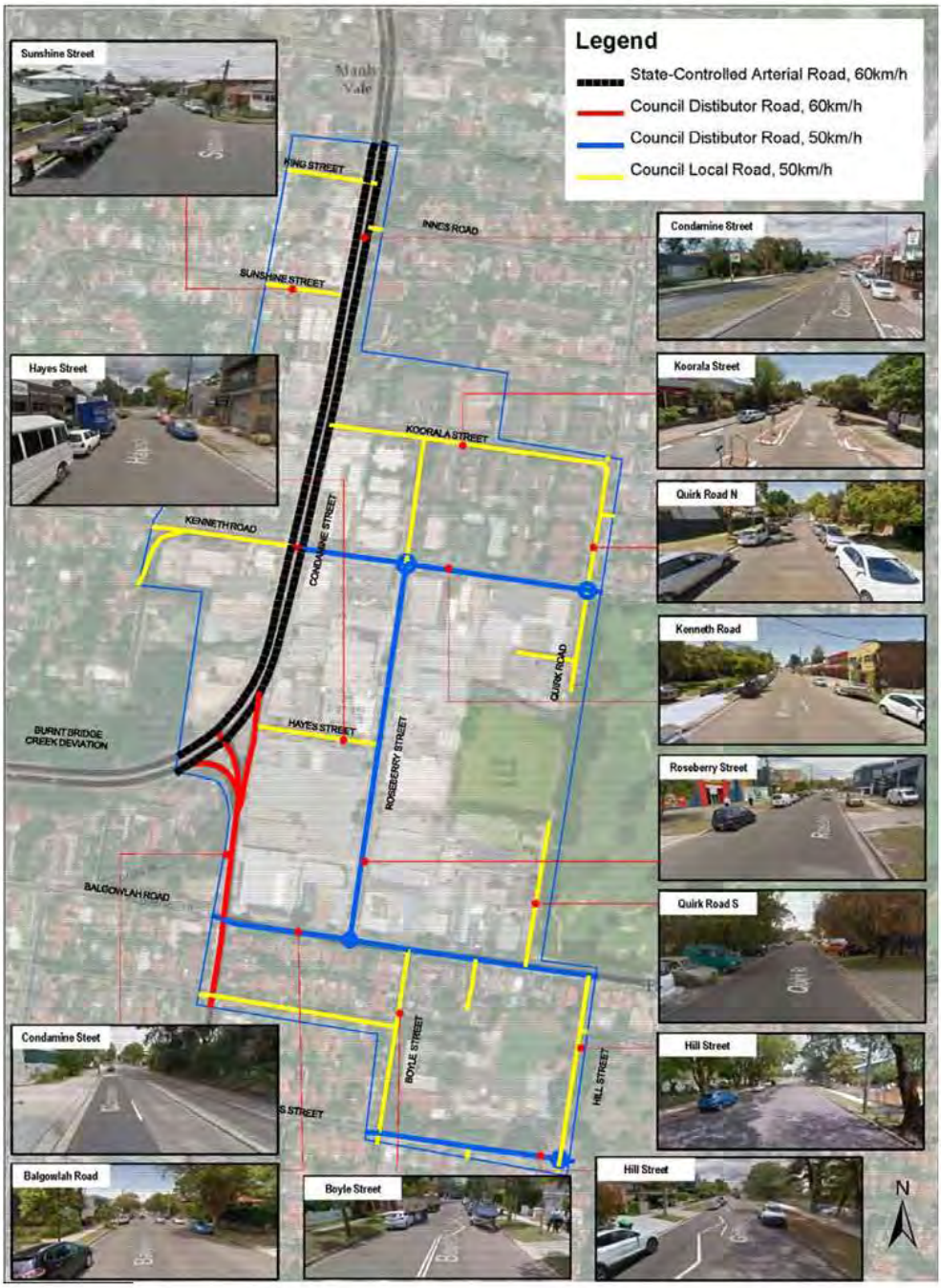


Figure 2.1: Study Area – Road Hierarchy

The key roads within the study area incorporate a range of deficiencies which are outlined in Table 2.1. These may include substandard pavement width and non compliant on street car parking.

Table 2.1: Cross Section Review

Road	No. of Lanes	Median Divided?	On Street Parking	Active Transport	Public Transport	Deficiencies
Condamine Street	6	Y	Y*	Y	Y	• Narrow lane widths (as low as 2.5m in some instances)
Koorala Street	2	N	Y	Y	N	• N/A
Quirk Road (North)	2	N	Y	Y	N	• Through lane widths restricted by parking (9m pavement with parking permitted on both sides) • Road terminates with no turning head • Through lane widths restricted by parking (11m pavement with parking permitted on both sides – eastern side is angled parking)
Kenneth Road	2	N	Y	Y	Y	• N/A
Roseberry Street	2	N	Y	Y	N	• Through lane widths restricted by on street parking • Access to/from 90 degree bays requires use of both through lanes
Quirk Road (South)	2	N	Y	Y	N	• Vehicles parking on verge blocking pedestrian access (western side)
Hill Street	2	N	Y	Y	N	• N/A
Boyle Street	2	N	Y	Y	N	• Through lane widths restricted by on street parking (9m pavement with parking permitted on both sides)
Balgowlah Road	2	N	Y	Y	Y	• N/A
Hayes Street	2	N	Y	Y	N	• N/A
Sunshine Street	2	N	Y	Y	Y	• Poor delineation of lanes on approach to Condamine Street • Through lane widths restricted by on street parking (9m pavement with parking permitted on both sides)

**clearways apply during peak times*

2.2 EXISTING LAND USES

The land uses in the study area include residential, education, commercial and light industrial as shown in Figure 2.2. However, Council resolved in its meeting on 7th December 2015 that the land bounded by Condamine Street, Kenneth Road, Quirk Road and Balgowlah Road be rezoned from IN2 Light Industrial to a more intensive B6 Enterprise Corridor.

In the 2015 Balgowlah Industrial Estate Rezoning Traffic and Transport Assessment prepared by Christopher Hallam & Associates, it was noted that the provision of the B6 Enterprise corridor has resulted in the development of a Bunnings and Woolworths and the report concluded that the "*change of zoning has not suddenly and dramatically altered the entire precinct. Rather it has provided a more flexible starting point to allow for future development*".

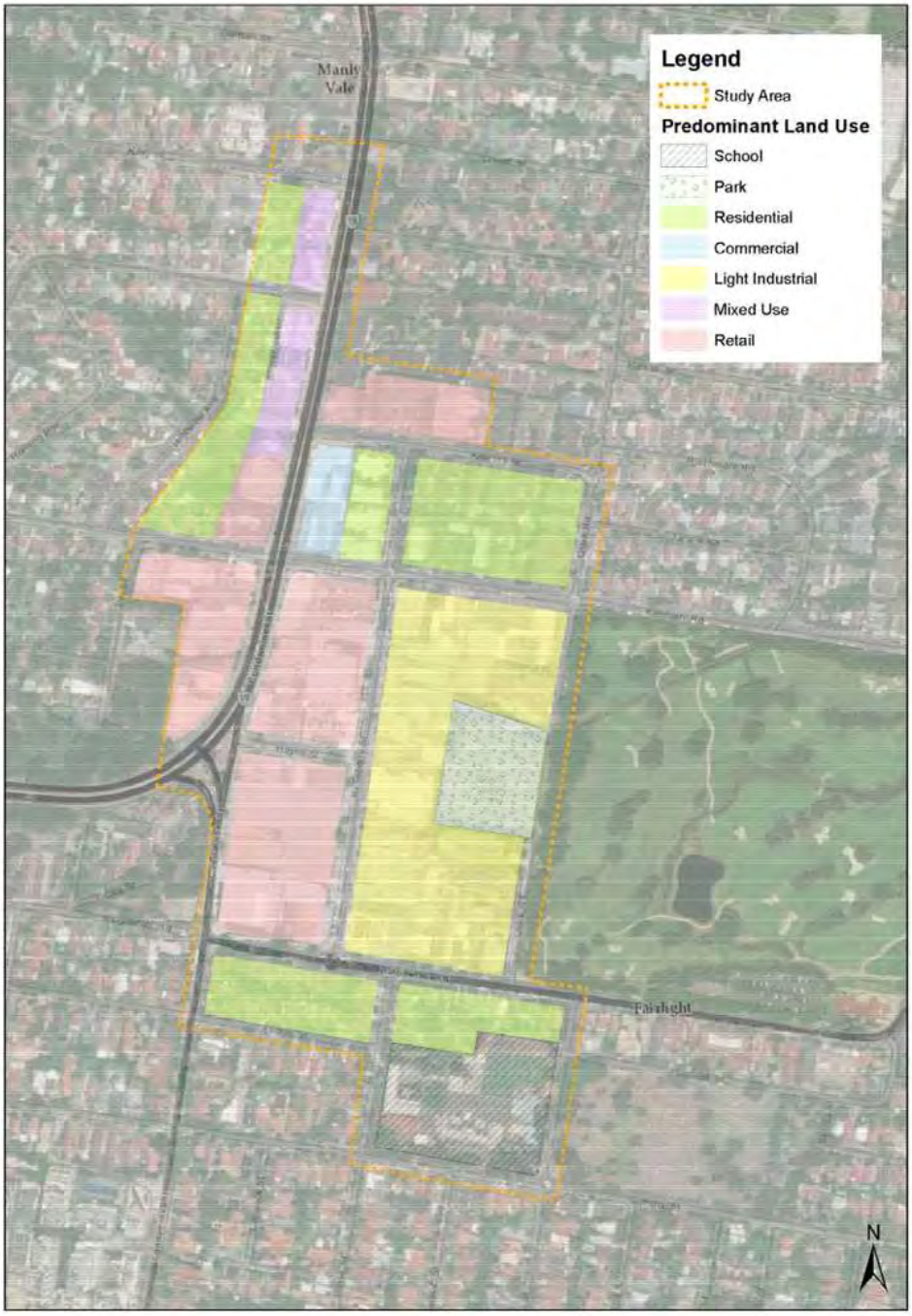


Figure 2.2: Land Uses in Study Area

2.3 KEY ROAD NETWORK UPGRADE PROPOSALS

Initial planning investigations have been undertaken by Roads and Maritime Services (RMS) for the Western Harbour Tunnel and Beaches Link. The project was announced in March 2017 by the NSW Government after lodgement of a State Significant Infrastructure Application (SSIA) by RMS. The project is planned to incorporate the following:

- the Western Harbour Tunnel will link the WestConnex Rozelle Interchange with Warringah Freeway at North Sydney;
- the Beaches Link will connect the Warringah Freeway with Burnt Bridge Creek Deviation at Balgowlah and the Wakehurst Parkway (this road is proposed to be upgraded to a four lane cross section between Seaforth and Frenchs Forest); and
- new east west connection with Lane Cove Tunnel and M2 Motorway.

A concept map for the project is shown in Figure 2.3. In discussions with Council, it is noted that this project is currently at high level investigations only and timing is yet to be determined. For this reason, the impacts of the project on traffic and transport considerations for the study area is unable to be determined at this time.

Source: www.rms.nsw.gov.au

Figure 2.3: Western Harbour Tunnel and Beaches Link

2.4 KEY INTERSECTIONS

Key intersections within the study area were determined using live traffic data to identify current congestion levels. The key intersections identified are as follows:

- Condamine Street and King Street;
- Condamine Street and Kenneth Road;
- Condamine Street and Burnt Bridge Creek Deviation;
- Condamine Street and Balgowlah Road;
- Balgowlah Road and Roseberry Street; and
- Kenneth Road and Roseberry Street.

The locations of the intersections are shown in Figure 2.4.

Source: Six Maps

Figure 2.4: Key Intersections

2.4.1 Condamine Street and King Street

The Condamine Street / King Street intersection is a signalised intersection in the northern section of the study area. The intersection currently operates a lagging right turn sequence. The southbound right turn has a filter option. Pedestrian protection is provided for the eastbound left turn, the southbound right turn, northbound left turn and for the eastbound left turn. The intersection operates in coordinated mode with other intersections on Condamine Street.

The Condamine Street / King Street intersection is shown in Figure 2.5.

Source: Nearmap

Figure 2.5: Condamine Street and King Street – Aerial

2.4.2 Condamine Street and Kenneth Road

The Condamine Street / Kenneth Road intersection is a signalised intersection located centrally in the study area. The intersection currently operates a double diamond overlap sequence. The northbound and southbound right turns both have filter options. The intersection operates in coordinated mode with other intersections on Condamine Street.

The Condamine Street / Kenneth Road intersection is shown in Figure 2.6.

Source: Nearmap

Figure 2.6: Condamine Street and Kenneth Road – Aerial

2.4.3 Condamine Street and Burnt Bridge Creek Deviation

The Condamine Street / Burnt Bridge Creek Deviation intersection is a signalised intersection in the southern section of the study area. The intersection currently operates a lagging right turn sequence with split side streets. The north western leg provides access to the adjacent retail development "Freedom". The intersection operates in coordinated mode with other intersections on Condamine Street.

The Condamine Street / Burnt Bridge Creek Deviation intersection is shown in Figure 2.7.

Source: Nearmap

Figure 2.7: Condamine Street and Burnt Bridge Creek Deviation – Aerial

2.4.4 Condamine Street and Balgowlah Road

The Condamine Street / Balgowlah Road intersection is a signalised intersection in the southern section of the study area. The intersection currently operates a conventional phase sequence with a trailing right turn. Pedestrian protection is provided for the south westbound right turn, northwest bound right turn, south eastbound right turn, north westbound left turn and south east bound left turn.

The Condamine Street / Balgowlah Road intersection is shown in Figure 2.8.

Source: Nearmap

Figure 2.8: Condamine Street and Balgowlah Road – Aerial

2.4.5 Balgowlah Road and Roseberry Street

The Balgowlah Road / Roseberry Street intersection is a single lane roundabout with three approaches. The intersection is located in the southern section of the study area.

The Balgowlah Road / Roseberry Street intersection is shown in Figure 2.9.

Source: Nearmap

Figure 2.9: Balgowlah Road and Roseberry Street – Aerial

2.4.6 Kenneth Road and Roseberry Street

The Kenneth Road / Roseberry Street intersection is a single lane roundabout with four approaches. The intersection is located centrally in the study area.

The Kenneth Road / Roseberry Street intersection is shown in Figure 2.10.

Source: Nearmap

Figure 2.10: Kenneth Road and Roseberry Street – Aerial

2.4.7 Data Collection

Traffic surveys were undertaken by Traffic Data and Control (TDC) on Thursday 21st June 2018 (AM and PM weekday peak periods) and on Saturday 23rd June 2018 (weekend peak) to determine background traffic volumes at the subject intersections. Peak hour periods for each intersection were identified as follows (based on volumes at each intersection):

- Condamine Street and King Street;
  - 8:00AM – 9:00AM;
  - 4:00PM – 5:00PM; and
  - 10:30AM – 11:30AM (weekend peak).
- Condamine Street and Kenneth Road;
  - 8:00AM – 9:00AM;
  - 3:15PM – 4:15PM; and
  - 12:00PM – 1:00PM (weekend peak).
- Condamine Street and Burnt Bridge Creek Deviation;
  - 8:00AM – 9:00AM;
  - 3:15PM – 4:15PM; and
  - 11:45AM – 12:45PM (weekend peak).
- Condamine Street and Balgowlah Road;
  - 8:00AM – 9:00AM;
  - 4:30PM – 5:30PM; and
  - 11:45AM – 12:45PM (weekend peak).

- Balgowlah Road and Roseberry Street;
  - 8:00AM – 9:00AM;
  - 4:30PM – 5:30PM; and.
  - 11:00AM – 12:00PM (weekend peak).
- Kenneth Road and Roseberry Street;
  - 8:00AM – 9:00AM;
  - 5:00PM – 6:00PM; and
  - 12:00PM – 1:00PM (weekend peak).

A network diagram is attached at Appendix A which summarises the 2018 survey traffic volumes. The TDC traffic survey data is attached at Appendix B.

2.4.8 Intersection Performance

Intersection modelling was undertaken using SIDRA Intersection 7 to assess the current operational performance levels of the subject intersections. The existing geometric layout for each intersection was used. It is noted that Condamine Street has time of day bus lanes as follows:

- southbound bus lane active between 6AM and 10AM, Monday to Friday; and
- northbound bus lane active between 3PM and 7PM, Monday to Friday.

To reflect this, separate layouts were prepared for the weekday AM, weekday PM and weekend assessments. When the bus lane is active, buses were assigned to use the designated lane and other vehicle classes were excluded, other than for performing left turns. When the bus lane is not active, the geometry was adjusted to reflect existing conditions (i.e. lane removal or provision of short turning lanes with parking).

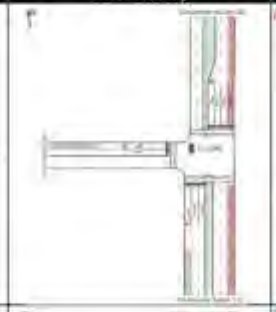
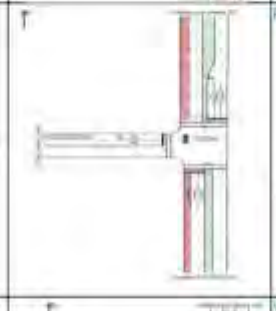
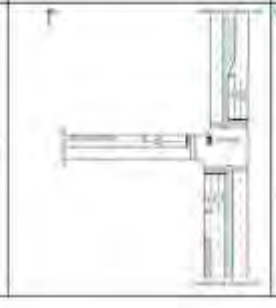
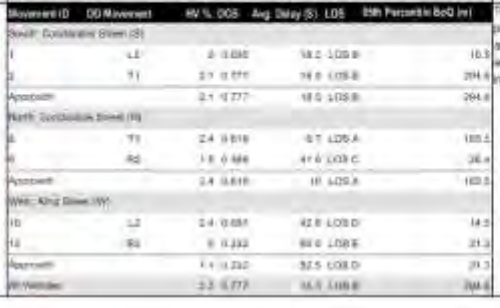
For the signalised intersections, the Traffic Control Site (TCS) plans and SCATS Intersection Diagnostic Monitor (IDM) signal data was obtained from RMS via Council to inform signal phasing and timing. TCS plans and SCATS IDM data is attached at Appendix C and Appendix D respectively.

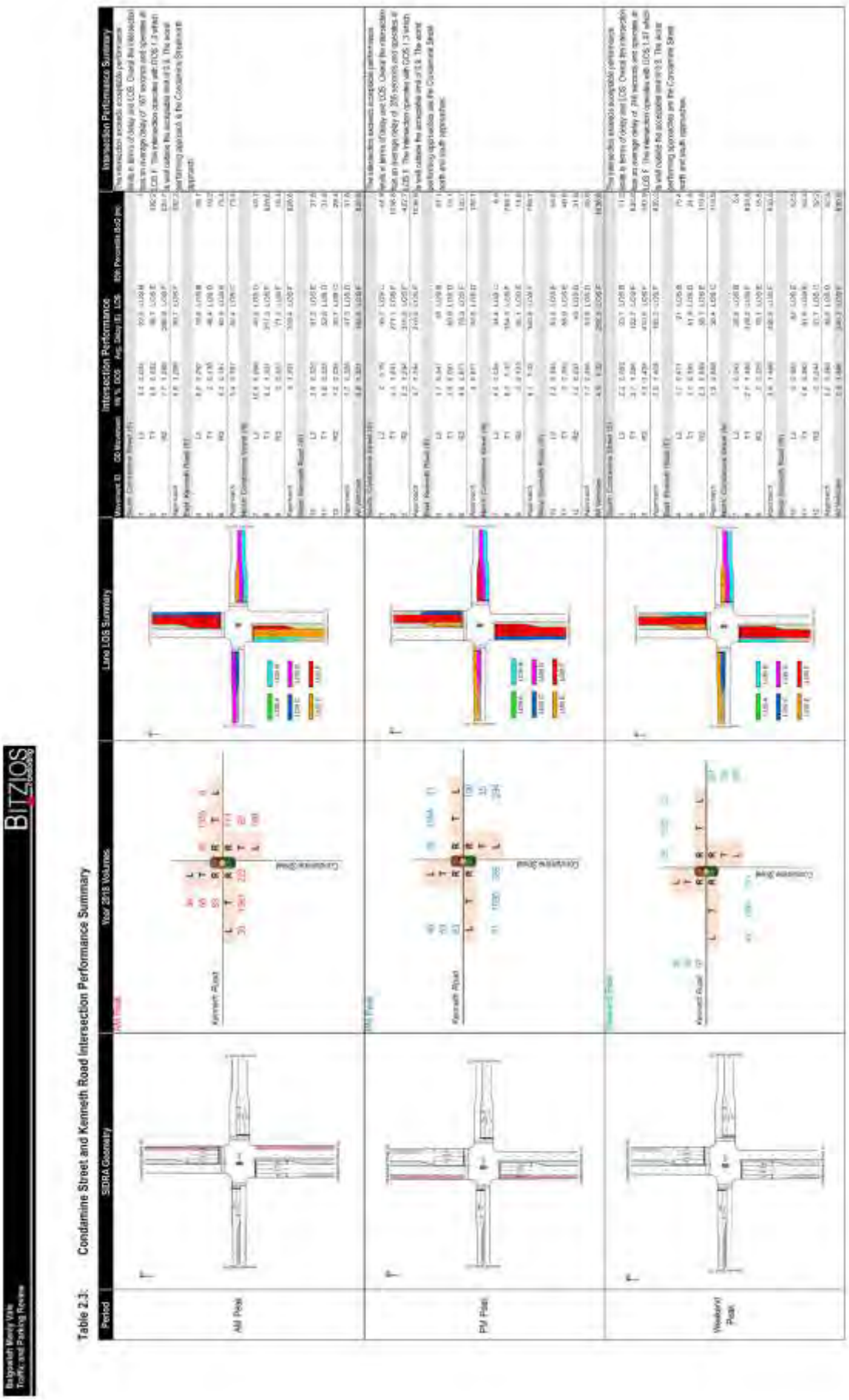
Condamine Street is a coordinated corridor and includes a series of signalised intersections in close proximity to one another. To reflect this, an Extra Bunching factor of 15% was applied in SIDRA to the northbound and southbound approaches for all intersections on Condamine Street, with the exception of the Burnt Creek Bridge Deviation (south west) approach to the Burnt Creek Bridge Deviation / Condamine Street intersection (due to the separation from the next intersection which is approximately 1.6km).

Extra Bunching of 20% was applied to the Condamine Street (south) approach to the Burnt Creek Bridge Deviation / Condamine Street intersection and for the Condamine Street (north) approach to the Condamine Street / Balgowlah Road intersection due to the separation between the two intersections.

The results of the SIDRA Intersection modelling for each intersection is summarised in the following Tables.

Table 2.2: Condamine Street and King Street Intersection Performance Summary

Period	SIDRA Geometry	Year 2018 Volumes	Lane LOS Summary	Intersection Performance	Intersection Performance Summary
AM Peak					The intersection operates at the threshold of acceptable performance limits. Overall the intersection has LOS C and the degree of saturation is 0.92 (which is just outside the acceptable limit of 0.9). The average delay across the intersection is 31 seconds.
PM Peak					The intersection operates at the threshold of acceptable performance limits. Overall the intersection has LOS B and the degree of saturation is 0.89 (which is just within the acceptable limit of 0.9). The average delay across the intersection is 25 seconds.
Weekend Peak					The intersection performs within acceptable performance limits. Overall the intersection has LOS B and the degree of saturation is 0.78 (vehicles within the acceptable limit of 0.9). The average delay across the intersection is 15 seconds.


Balgowlah Manly Vale Traffic and Parking Review
BITZIOS
Table 2.3: Condamine Street and Kenneth Road Intersection Performance Summary
Period
SIDRA Geometry
Year 2018 Volumes
Lane LOS Summary
Intersection Performance
Intersection Performance Summary
AM Peak
PM Peak
Weekend Peak
Kenneth Road
Condamine Street
Project No: 95960
Version: 001
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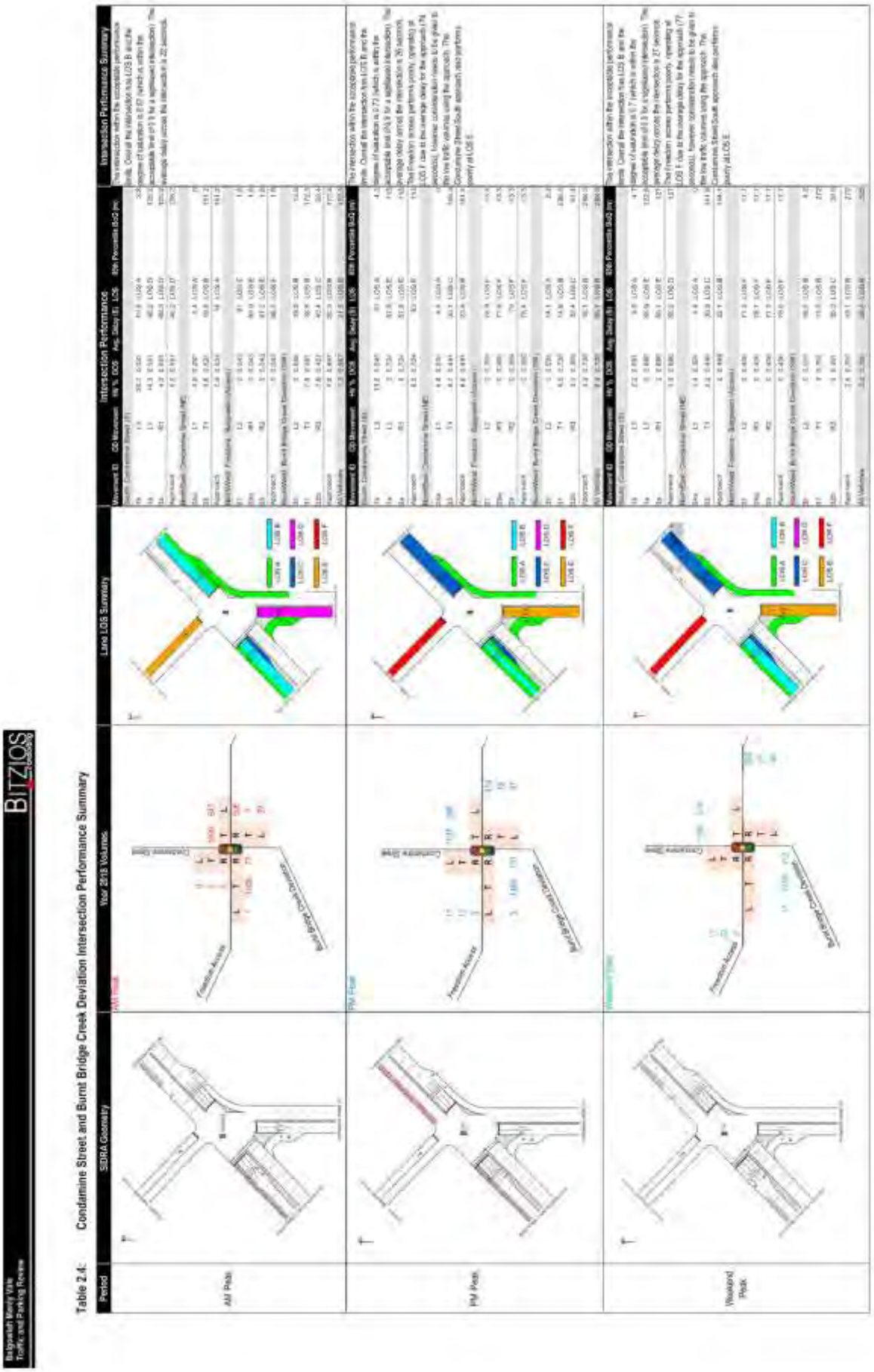
Balgowlah Manly Vale Traffic and Parking Review
BITZIOS
Table 2.4: Condamine Street and Burnt Bridge Creek Deviation Intersection Performance Summary
Period
SIDRA Geometry
Year 2018 Volumes
Lane LOS Summary
Intersection Performance
Intersection Performance Summary
AM Peak
PM Peak
Weekend Peak
Condamine Street
Burnt Bridge Creek Deviation
Frenchs Forest Road
Version: 091
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Table 2.5: Condamine Street and Balgowlah Road Intersection Performance Summary

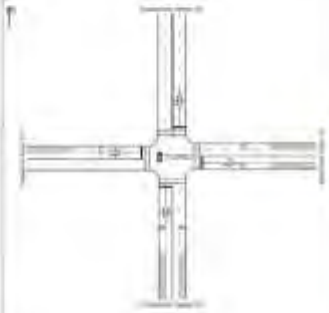
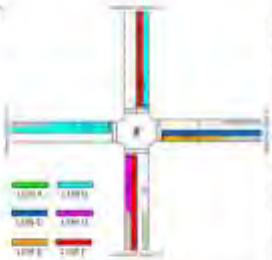
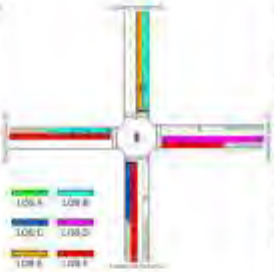
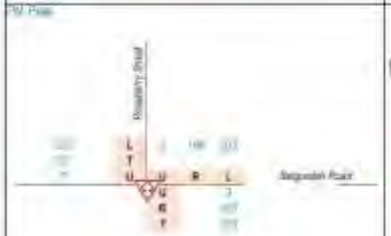
Period	SIDRA Geometry	Year 2018 Volumes	Lane LOS Summary	Intersection Performance	Intersection Performance Summary
AM Peak					The intersection exceeds acceptable performance levels in terms of delay and LOS. Overall the intersection has an average delay of 122 seconds and operates at LOS F. The intersection operates with DOS 1.37 which is well outside the acceptable limit of 0.9. This worst performing approaches are the Condamine Street north and south approaches.
PM Peak					The intersection exceeds acceptable performance levels in terms of delay and LOS. Overall the intersection has an average delay of 124 seconds and operates at LOS F. The intersection operates with DOS 1.3 which is well outside the acceptable limit of 0.9. The worst performing approaches are the Balgowlah west and east approaches.
Weekend Peak					The intersection exceeds acceptable performance levels in terms of delay and LOS. Overall the intersection has an average delay of 140 seconds and operates at LOS F. The intersection operates with DOS 1.49 which is well outside the acceptable limit of 0.9. All approaches perform poorly.

Table 2.6: Balgowlah Road and Roseberry Street Intersection Performance Summary

Period	SIDRA Geometry	Year 2018 Volumes	Lane LOS Summary	Intersection Performance	Intersection Performance Summary
AM Peak					The intersection performs within acceptable performance limits in terms of delay and LOS. All approaches operate with LOS A. The degree of saturation (worst case) is 0.07 which is well within the acceptable limit of 0.85 for a roundabout.
PM Peak					The intersection performs within acceptable performance limits in terms of delay and LOS. All approaches operate with LOS A. The degree of saturation (worst case) is 0.05 which is well within the acceptable limit of 0.85 for a roundabout.
Weekend Peak					The intersection performs within acceptable performance limits in terms of delay and LOS. All approaches operate with LOS A. The degree of saturation (worst case) is 0.06 which is well within the acceptable limit of 0.85 for a roundabout.

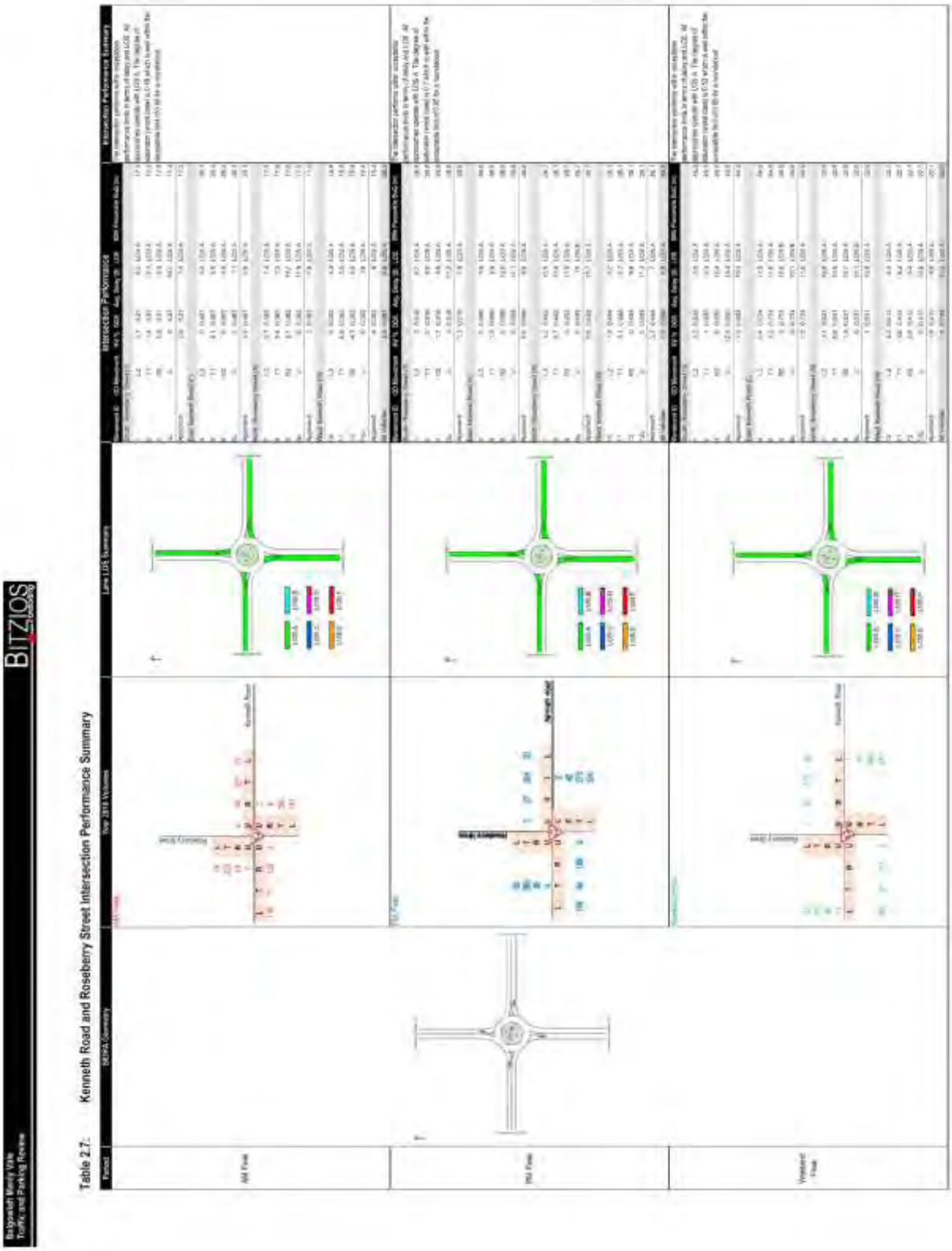


Table 2.7: Kenneth Road and Roseberry Street Intersection Performance Summary
Balgowlah Manly Vale Traffic and Parking Review
BITZIOS
Intersection Performance
Intersection Performance Summary
AM Peak
PM Peak
Weekend Peak
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The intersection operations are summarised in Table 2.8 based on the overall LOS recorded for each intersection and respective scenario.

Table 2.8: Performance Summary (Overall LOS) – All Intersections (Year 2018)

Intersection	AM Peak	PM Peak	Weekend Peak
Condamine Street / King Street	C	B	B
Condamine Street / Kenneth Street	F	F	F
Condamine Street / Burnt Bridge Creek Deviation	B	B	B
Condamine Street / Balgowlah Road	F	F	F
Balgowlah Road / Roseberry Street	A	A	A
Kenneth Road / Roseberry Street	A	A	A

As shown, the SIDRA modelling indicates that the intersections of Condamine Street / Kenneth Street and Condamine Street / Balgowlah Road are currently operating at LOS F (i.e. operating at or above saturation). All other intersections are shown to operate at LOS C or better, which indicates there is spare capacity at present. It is however noted that at peak times, the following intersections experience queue interaction due to proximity as shown by the SIDRA modelling:

- westbound queues at Condamine Street / Kenneth Street intersection can affect the Kenneth Road / Roseberry Street intersection; and
- westbound queues at the Condamine Street / Balgowlah Road intersection can affect the Balgowlah Road / Roseberry Street intersection.

A copy of the SIDRA outputs is attached at Appendix E.

2.5 Truck Routes and Restrictions

A Heavy Vehicle (HV) approved route map has been prepared and is shown in Figure 2.11. This map shows approved routes and restrictions (identified as part of the site inspection). HV restrictions have been identified from the RMS Restricted Access Vehicle (RAV) maps. The RAV maps indicate that Condamine Street (RMS controlled road) is an approved HV route.

Local streets under the jurisdiction of Northern Beaches Council, including Koorala Street, Kenneth Road, Quirk Road, Roseberry Street and Balgowlah Road permit unrestricted truck access, allowing service vehicles to access large commercial developments in the study area. Key observations noted during the site inspection are as follows:

- "No Trucks 3T and over" sign located on Balgowlah Road, east of the Balgowlah Road / Roseberry Street intersection;
- HV's (including truck and dog combinations) observed to travel eastbound along Kenneth Road (beyond the study area);
- HV's primarily use Kenneth Road to access Roseberry Street; and
- HV's performed reverse ingress manoeuvres from Roseberry Street for some of the existing commercial sites.

Figure 2.11: Heavy Vehicle Routes (Approved, Unrestricted and Restricted)

2.6 CRASH ANALYSIS

The crash history of the study area has been analysed based on validated data from reported crashes that occurred between 2012 and September 2017. Over these years, a total of 86 crashes were recorded within the study area. A thematic map has been prepared in Figure 2.12 to show crash clusters and a breakdown of crash statistics by location is shown in Figure 2.13.

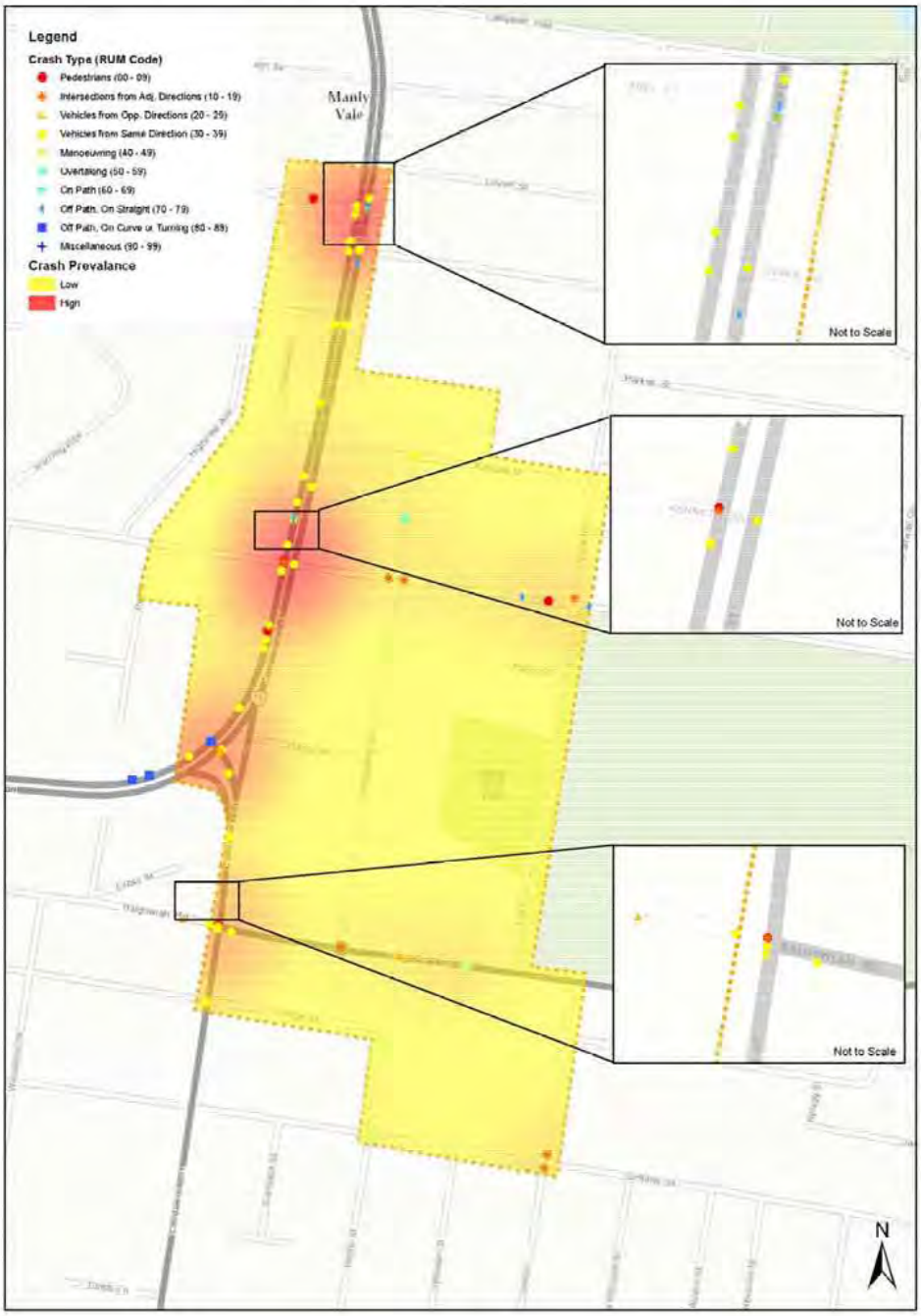


Figure 2.12: Reported Crash History (2012 2017) within Study Area – Thematic Map

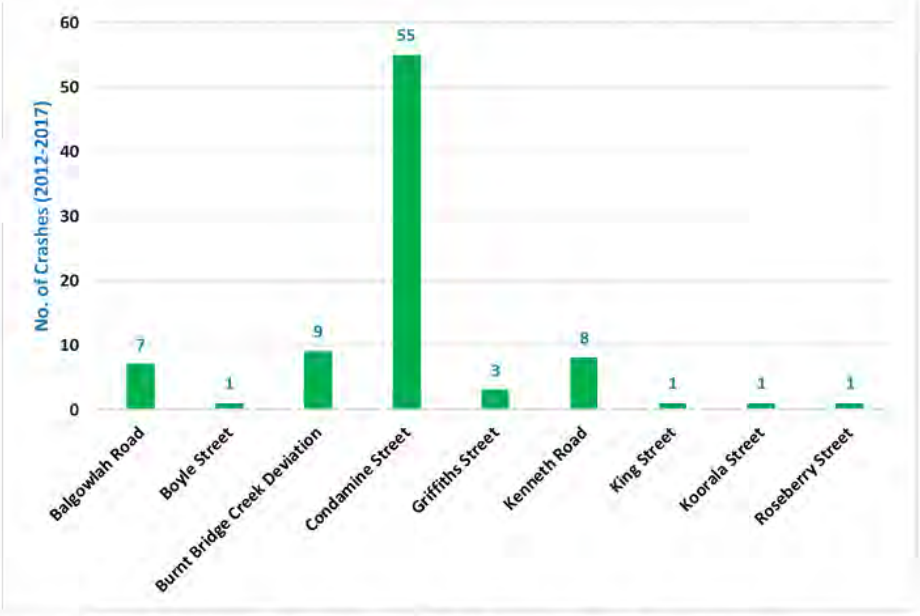


Figure 2.13: Reported Crash History (2012 2017) within Study Area – Statistics

As shown, most of the recorded crashes within the study area were on Condamine Street, which is under the jurisdiction of the RMS. A detailed review of these crashes is provided in Table 2.9. The Council roads with three or more recorded crashes include Balgowlah Road, Griffiths Street and Kenneth Road. A detailed review of the crash data did not identify any clear trends (i.e. recurring crash types) for these roads.

Table 2.9: Detailed Crash Analysis – Condamine Street

Road 1	Road 2	RUM Code	No. of Crashes
Condamine Street	Kenneth Road	30 (Vehicles from Same Direction)	6
	King Street		9
	Sunshine Street		4

The predominant crash type for Condamine Street was nose tail crashes at Kenneth Road, King Street and Sunshine Street. The prevalence of the crashes may suggest a deficiency with the current road form or environment, such as loss of skid resistance in the pavement wearing surface. It is recommended that RMS is advised of these trends.

2.7 ROAD NETWORK SUMMARY

- **Road Formation Deficiencies:**
  - narrow road widths due to on street car parking on Quirk Road (N), Roseberry Street, Boyle Street and Sunshine Street
  - Quirk Road (N) terminates with no turning head
  - delineation deficiencies on Sunshine Street approach to Condamine Street
- **Intersection Performance:** the intersections of Condamine Street / Kenneth Street and Condamine Street / Balgowlah Road are currently operating at LOS F (i.e. saturation). All other intersections are shown to operate at LOS C or better (i.e. spare capacity)
- **Crash Trends:** no crash trends for the Council roads within the study area; however, crash trends were identified on **Condamine Street (RMS jurisdiction)** at its intersections with Kenneth Road, King Street and Sunshine Street.

3. EXISTING PUBLIC TRANSPORT AND ACTIVE TRANSPORT CONDITIONS

3.1 PUBLIC TRANSPORT

The public transport bus routes within the study area are summarised in Figure 3.1 (including bus stop locations) and Table 3.1.

Figure 3.1: Bus Routes, Bus Stops and Service Frequency

Table 3.1: Bus Route Number, Description and Peak Frequency

Route Number	Description	Peak Frequency (mins)
132	Waringah Mall to Manly via North Balgowlah	30
135	North Head to Warringah Mall via Manly	30
142	Allambie to Manly	30
145	Warringah Mall to Seaforth	30
151	Mona Vale to City QVB	30
178	Cromer Heights to City Wynyard	30
180	Collaroy Plateau to City Wynyard	30
188	Mona Vale to City Wynyard	30
B1	B Line Mona Vale to City Wynyard	5 7
E54	Mona Vale to Milsons Point	5
E66	Allambie to City Wynyard	10
E68	Brookvale to City Wynyard via North Balgowlah	15
E75	Brookvale to City Wynyard	20
E76	Dee Why to City Wynyard via North Curl Curl	15
E77	Dee Why to City Wynyard via Wingala	20
E78	Cromer Heights to City Wynyard	15
E79	Wheeler Heights to City Wynyard	15

As shown, the study area is well serviced by high frequency public transport, namely via the B Line on Condamine Street. Importantly, the majority of the study area is within an 800m radius of the B Line bus stops on Condamine Street (north of Kenneth Road) as shown in Figure 3.1.

3.2 WALKING

The study area includes a highly connected network of pathways as shown in Figure 3.2. This figure includes land uses and crossing locations within the study area for ease of reference, as well as maintenance issues (i.e. uneven surfaces), 'pinch points' (i.e. narrowing of the pathway due to vertical obstructions such as street lights) and missing or poor condition kerb ramps identified in the site inspections undertaken on the 13th and 14th June 2018.

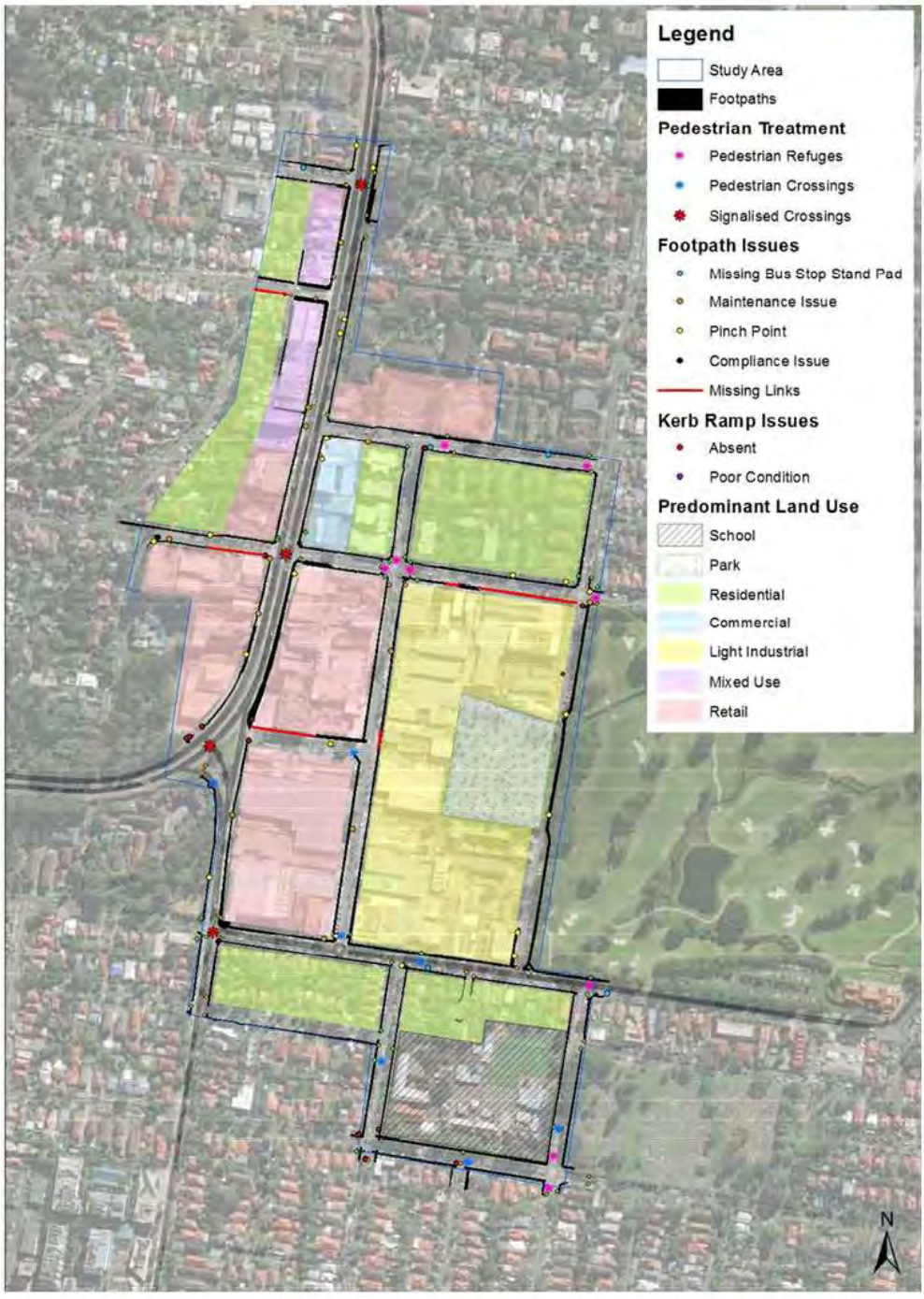


Figure 3.2: Pathway Network (Including Missing Links and Deficiencies)

It can be seen from Figure 3.2 that there are eight key missing links in the existing pathway network, as well as several pathway maintenance, pinch point, compliance and kerb ramp issues. While the latter is discussed further in Section 4, the eight key missing pathway links are described as follows:

- **Missing Path 1:** Sunshine Street: southern side, between Somerville Place and Highview Avenue;
- **Missing Path 2:** Kenneth Road: southern side, between Condamine Street and No. 9 Kenneth Road;
- **Missing Path 3:** Kenneth Road: southern side, fronting No. 71 Kenneth Road;
- **Missing Path 4:** Kenneth Road: southern side, fronting No. 61 63 Kenneth Road;

- **Missing Path 5:** Hayes Street: northern side, fronting No. 4 Hayes Street;
- **Missing Path 6:** Roseberry Street: eastern side, fronting No. 20 Roseberry Street;
- **Missing Path 7:** connection to westbound bus stop on Balgowlah Road (east of Quirk Road); and
- **Missing Path 8:** connection to westbound bus stop on Balgowlah Road (west of Quirk Road).

3.3 CYCLING

The cycling routes within the study area and external connections are shown in Figure 3.3. This figure includes land uses within the study area for ease of reference, as well as potential missing links for further investigation in Section 13.

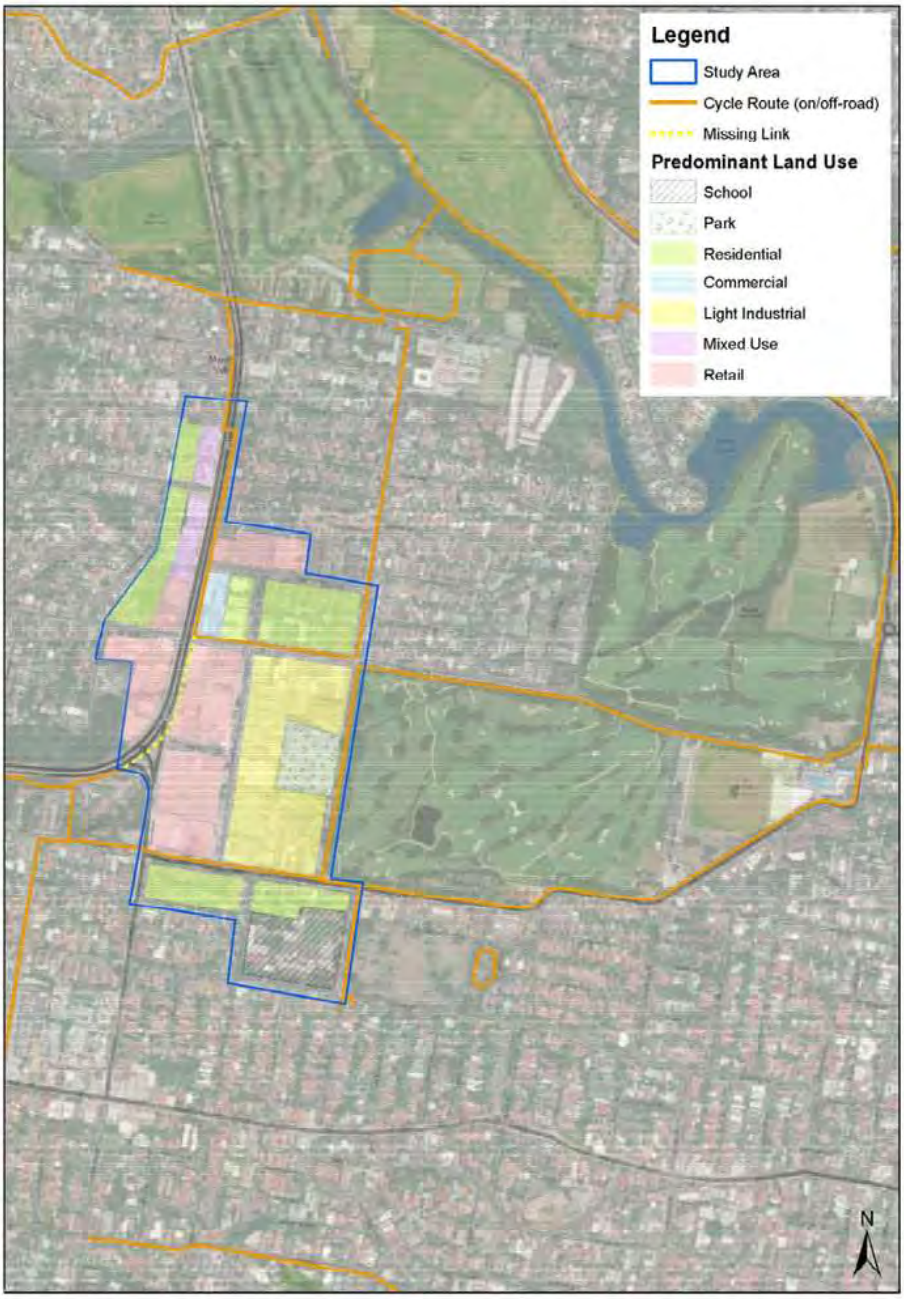


Figure 3.3: Cycling Network

It can be seen from Figure 3.3 that the study area is well connected in terms of cycle routes; however, the following potential missing links were identified:

- **Missing Cycle Link 1: Quirk Road (Kenneth Road to Campbell Parade)** – this section is shown as a sign posted cycle route in Council's Bicycle Network Signage and Wayfinding Project 2017. However, there are no on road or off road cycle facilities to make it clearly legible that this is a cycle route. This connection is considered a key missing link in the study area bicycle network; and
- **Missing Cycle Link 2: Condamine Street (Kenneth Road to Pitt Street)** – the existing shared pathway on Condamine Street extends between Campbell Parade and Kenneth Road. At Kenneth Road, the cycle route runs east to Quirk Road, then along Balgowlah Road and onto Condamine Street via Pitt Street. This represents a 1.3km deviation compared to the 300 400m trip length if the cycle route continued directly from Kenneth Road to Pitt Street along Condamine Street. However, there are a number of driveways along this section of Condamine Street, which may have prevented this connection being realised.

It is noted that only one set of public bike racks (catering for three bikes) were identified on the north western corner of the Roseberry Street / Balgowlah Road intersection.

3.4 Public Transport and Active Transport Summary

- **Public Transport:** the study area is well serviced by high frequency public transport, namely via the B Line on Condamine Street. Importantly, **the majority of the study area is within an 800m radius of the B Line bus stops** on Condamine Street
- **Walking:** the study area includes a highly connected pathway network. Eight key missing pathway links were identified in this network and are described as follows:
  - **Missing Path 1:** Sunshine Street: southern side, between Somerville Place and Highview Avenue;
  - **Missing Path 2:** Kenneth Road: southern side, between Condamine Street and No. 9 Kenneth Road;
  - **Missing Path 3:** Kenneth Road: southern side, fronting No. 71 Kenneth Road;
  - **Missing Path 4:** Kenneth Road: southern side, fronting No. 61 63 Kenneth Road;
  - **Missing Path 5:** Hayes Street: northern side, fronting No. 4 Hayes Street;
  - **Missing Path 6:** Roseberry Street: eastern side, fronting No. 20 Roseberry Street;
  - **Missing Path 7:** connection to westbound bus stop on Balgowlah Road (east of Quirk Road); and
  - **Missing Path 8:** connection to westbound bus stop on Balgowlah Road (west of Quirk Road).
- **Cycling:** the study area includes cycle routes with connections to the external cycle network. Two potential key missing cycle links were identified in this network and are described as follows:
  - **Missing Cycle Link 1:** Quirk Road (Kenneth Road to Campbell Parade)
  - **Missing Cycle Link 2:** Condamine Street (Kenneth Road to Pitt Street)

4. EXISTING ROAD INFRASTRUCTURE CONDITIONS

4.1 INVENTORY AND METHODOLOGY

Site inspections were undertaken on Wednesday 13th June 2018 and Thursday 14th June 2018 to record the following infrastructure within the study area:

- traffic signals;
- roundabouts;
- priority controlled intersections;
- turn bans;
- pathway issues (i.e. maintenance issues and 'pinch points');
- kerb ramps;
- pedestrian crossings;
- pedestrian refuges;
- bicycle route issues;
- public bicycle parking racks;
- street lighting;
- speed limit and school zone signs; and
- other (that is, faded pavement markings, speed bumps and barriers).

Each infrastructure item (except for street lighting as the site inspections were undertaken during daytime hours) was assessed in terms of poor, average and good condition. This assessment is detailed in the following subsection and provides a list of infrastructure items that are further investigated in Section 11 and costed for replacement (i.e. those assessed as poor condition) in Section 14.

4.2 INFRASTRUCTURE CONDITIONS

Table 4.1 summarises the condition of each infrastructure item recorded by poor, average and good condition.

Table 4.1: Infrastructure Conditions Assessment Summary

Item	Total Quantity	Infrastructure Condition		
		Poor	Average	Good
Bus stop	18	4	8	6
Kerb ramps	90	14	30	46
Other	7	3	3	1
Pathways – maintenance	12	12		
Pathways – 'pinch points'	21	21		
Pedestrian crossings	7		7	
Pedestrian refuges	9		7	2
Priority controlled intersections	6	1	5	
Public bike rack	1			1
Roundabouts	5		5	
Speed limit and school zone signs	47	5	8	34
Street lighting	115	*n/a*		
Traffic signals	4		2	2
Turn bans	6		5	1
Total	**348**	**60**	**80**	**93**

As shown, 60 locations have been assessed as poor condition, with most of these being pathway related. These locations are shown in Figure 4.1 for ease of reference.

Figure 4.1: Infrastructure Assessed as Poor Condition – Type and Location

4.3 TRANSPORT INFRASTRUCTURE CONDITIONS SUMMARY

- a total of 348 infrastructure items were recorded in the study area
- **60 infrastructure items were assessed as being in poor condition and required replacement. Most of these items are pathway related**
- 173 infrastructure items were assessed as being in average or good condition and not required to be replaced
- 115 street lights were recorded; however, no condition assessment was undertaken as site inspections were completed during daytime hours

5. EXISTING PARKING CONDITIONS

5.1 METHODOLOGY

5.1.1 Inventory

An inventory of all on street parking spaces was undertaken by Traffic Data & Control (TDC), showing the location and type of all parking bays within the study area. It should be noted that most of the streets within Balgowlah and Manly Vale, except for short sections of Roseberry Street on the western side (near Balgowlah Road) and Quirk Road on the eastern side (north of Balgowlah Road), do not have marked parking bays. As such, the supply of parking spaces identified within the inventory is an estimate based on the size of an average vehicle. A site visit was undertaken by TDC to determine the time/vehicle restrictions placed on each parking bay within the study area.

5.1.2 Existing Situation Observations

In addition to the parking surveys, site inspections were undertaken on Thursday 7th June 2018, Wednesday 13th June 2018 and Thursday 14th June 2018. During the site inspections, general observations of on street car parking utilisation within the study area were noted.

5.1.3 Parking Survey

Parking surveys were undertaken by TDC on Thursday 21st June 2018 and Saturday 23rd June 2018. Hourly occupancy surveys were undertaken from 9:00AM to 5:00PM on both days. The number of parked vehicles was recorded at hourly intervals for 49 parking sections within the study area. The disaggregation of the study area's on street parking into the 49 sections is shown in the following section.

Parking surveys were then conducted between 9:00AM and 5:00PM for all on street parking areas within the study area to identify utilisation trends. Parking turnover surveys were conducted at the following additional locations in order to understand duration of stay trends:

- Quirk Road between cul de sac and Kenneth Road (eastern side);
- Quirk Road between cul de sac and Balgowlah Road (eastern side);
- Quirk Road between cul de sac and Balgowlah Road (western side);
- Roseberry Street between Kenneth Road and No Stopping Zone;
- Roseberry Street between No Stopping Zone and 1P Zone;
- Roseberry Street 1P Zone;
- Roseberry Street 2P Zone;
- Roseberry Street 1/2P Zone;
- Woolworths Rooftop;
- Kenneth Road between Pitt Street and Condamine Street (southern side);
- Sunshine Street between Condamine Street and Sommerville Place (southern side);
- Sunshine Street between Condamine Street and Sommerville Place (northern side);
- Sunshine Street between Sommerville Place and Highview Avenue (southern side); and
- Sunshine Street between Sommerville Place and Highview Avenue (northern side).

5.2 INVENTORY AND OBSERVATIONS

5.2.1 Parking Supply

An audit of parking was undertaken within the identified study area to determine the composition of parking within Balgowlah and Manly Vale. The parking audit identified the approximate supply of car parking for each street section and the sign posted restrictions placed on parking bays. The composition of parking within the study area is provided in Figure 5.1.

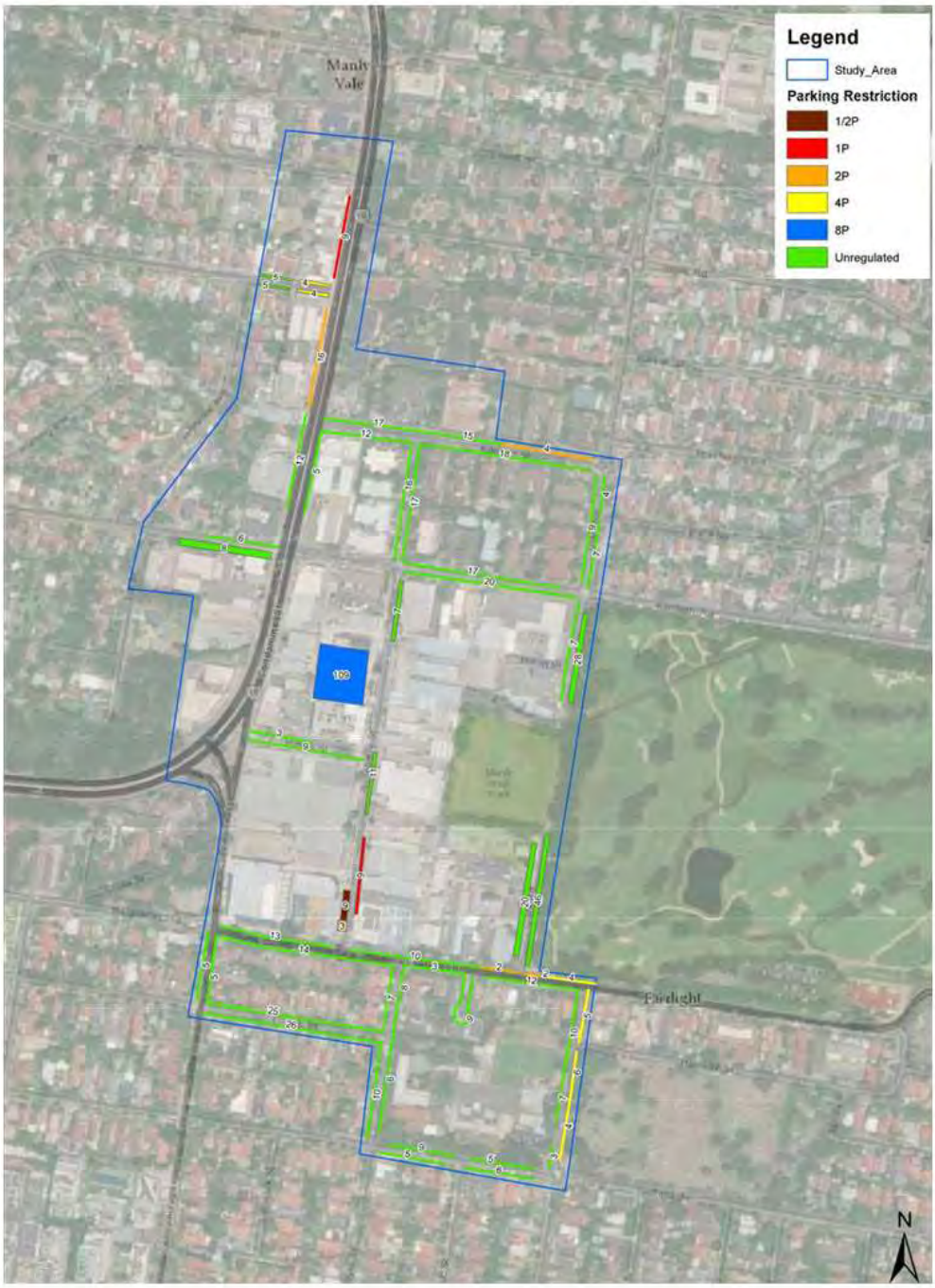


Figure 5.1: Parking Supply and Restrictions

5.2.2 Parking Observations

During the site inspections on Thursday 7th June 2018, Wednesday 13th June 2018 and Thursday 14th June 2018, the following general observations were noted with respect to on street car parking:

- high utilisation of parking adjacent to high activity employment and destination nodes on Roseberry Street, Balgowlah Street and Kenneth Road;
- medium to high utilisation on remaining roads within the study area; and
- a number of trailers were observed to be parked on Griffiths Street.

5.3 PARKING SURVEY

5.3.1 Precincts

To enable analysis of the parking utilisation with respect to adjacent land uses, the study area was divided into five key precincts as described in Table 5.1 and shown in Figure 5.2.

Table 5.1: Parking Precincts

Precinct	Description	Adjacent Land Use(s)
1	Condamine Street	Retail / Commercial
2	West of Condamine Street	Residential
3	East of Condamine Street and north of Kenneth Road	Residential
4	Area bounded by Kenneth Road, Roseberry Street, Balgowlah Road and Quirk Road	Industrial / Retail / Commercial
5	Hill Street, Griffiths Street, Boyle Street and Lodge Street	Residential / Education

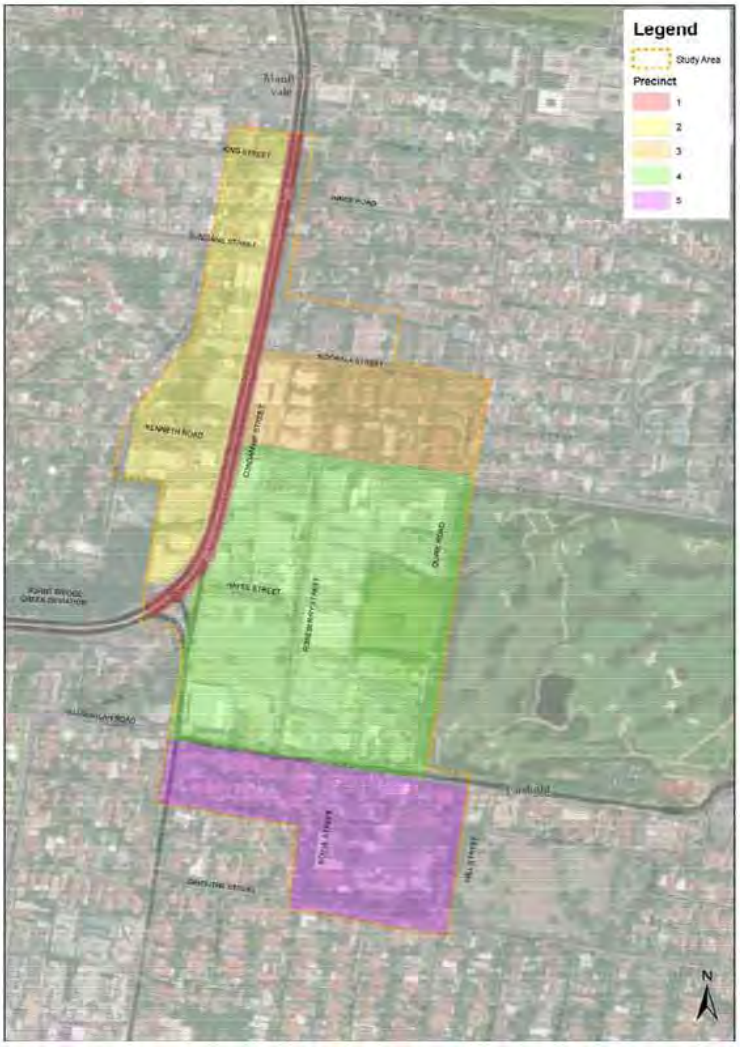


Figure 5.2: Parking Precincts within Study Area

5.3.2 Typical Weekday

The average typical weekday (Thursday) parking occupancy for each street section in the study area between the hours of 9:00AM and 5:00PM is summarised in Table 5.2. Maps showing hourly occupancy are attached at Appendix F, with detailed survey results attached at Appendix G.

Table 5.2: Typical Weekday Parking Occupancy by Street Section

Street	From	To	Total Bays	Weekday Average Occupancy	Weekday Peak Occupancy
Condamine Street	Lodge Street	Balgowlah Road	6	55%	80%
Condamine Street	Kenneth Road	Sunshine Street	28	72%*	86%
Condamine Street	Sunshine Street	King Street	9	61%*	89%
Condamine Street	Koorala Street	Kenneth Road	5	63%*	75%
Condamine Street	Balgowlah Road	Lodge Street	5	73%	100%
		Condamine Street	**52**	**68%**	**86%**
Balgowlah Road	Condamine Street	Roseberry Street	13	75%	85%
Balgowlah Road	Roseberry Street	Quirk Road	12	83%	100%
Balgowlah Road	Quirk Road	Hill Street	6	50%	84%
Balgowlah Road	Hill Street	Marjory Thomas Place	12	63%	75%
Balgowlah Road	Marjory Thomas Place	Boyle Street	3	92%	100%
Balgowlah Road	Boyle Street	Condamine Street	14	70%	100%
		Balgowlah Road	**60**	**72%**	**90%**
Kenneth Road West	**Highview Avenue**	**Condamine Street**	**6**	[illegible]	17%
Kenneth Road East	Roseberry Street	Quirk Road	17	95%	100%
Kenneth Road East	Quirk Road	Roseberry Street	20	94%	100%
		Kenneth Road East	**37**	[illegible]	[illegible]
Koorala Street	Condamine Street	Quirk Road	36	89%	100%
Koorala Street	Quirk Road	Roseberry Street	18	76%	89%
Koorala Street	Roseberry Street	Condamine Street	12	96%	100%
		Koorala Street	**66**	**87%**	[illegible]
Hayes Street	Condamine Street	Roseberry Street	3	50%	100%
Hayes Street	Roseberry Street	Condamine Street	9	72%	78%
		Hayes Street	**12**	**67%**	**84%**
Roseberry Street	Kenneth Road	Koorala Street	17	85%	88%
Roseberry Street	Koorala Street	Kenneth Road	16	95%	100%
		Roseberry Street	**33**	**90%**	[illegible]
Quirk Road	Cul de sac	Kenneth Road	7	100%	100%
Quirk Road	Kenneth Road	Koorala Street	9	42%	78%
Quirk Road	Burchmore Road	Laurie Road	4	81%	100%
Quirk Road	Laurie Road	Kenneth Road	7	96%	100%
		Quirk Road	**27**	**77%**	[illegible]
Hill Street	Balgowlah Road	Harland Road	5	45%	100%
Hill Street	Harland Road	Griffiths Street	10	46%	100%
Hill Street	Griffiths Street	Balgowlah Road	20	52%	100%
		Hill Street	**35**	**50%**	[illegible]
		Marjory Thomas Place	**9**	**75%**	**89%**
Boyle Street	Balgowlah Road	Griffiths Street	20	73%	100%
Boyle Street	Griffiths Street	Lodge Street	10	89%	100%
Boyle Street	Lodge Street	Balgowlah Road	7	84%	100%
		Boyle Street	**37**	**80%**	[illegible]
Griffiths Street	Boyle Street	Hill Street (excl. Bus Zone)	14	78%	93%
Griffiths Street	Hill Street	Waratah Street	6	88%	100%
Griffiths Street	Waratah Street	Boyle Street	5	93%	100%
		Griffiths Street	**25**	**84%**	[illegible]
Lodge Street	Boyle Street	Condamine Street	26	48%	62%
Lodge Street	Condamine Street	Boyle Street	25	51%	68%
		Lodge Street	**51**	**50%**	**65%**
		All Bays	**455**	**71%**	**78%**

The parking demand profile for each precinct for a typical weekday is shown in Figure 5.3.

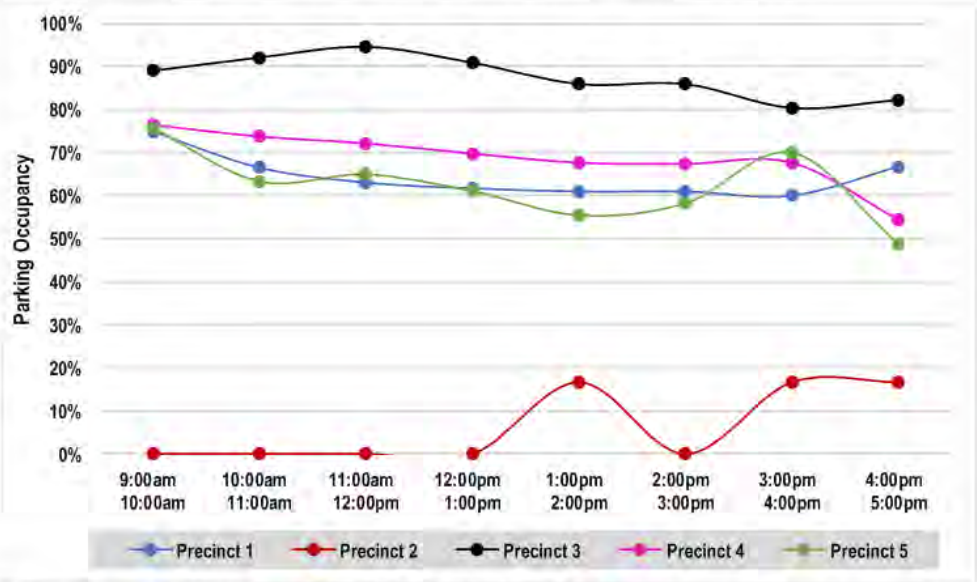


Figure 5.3: Parking Demand Profile by Precinct – Weekday

5.3.3 Typical Weekend

The average typical weekend (Saturday) parking occupancy for each street section in the study area between the hours of 9:00AM and 5:00PM is summarised in Table 5.3 overleaf.

Table 5.3: Typical Weekend Parking Occupancy by Street Section

Street	From	To	Total Bays	Weekday Average Occupancy	Weekday Peak Occupancy
Condamine Street	Lodge Street	Balgowlah Road	5	53%	80%
Condamine Street	Kenneth Road	Sunshine Street	28	79%	97%
Condamine Street	Sunshine Street	King Street	9	82%	100%
Condamine Street	Koorala Street	Kenneth Road	5	75%	100%
Condamine Street	Balgowlah Road	Lodge Street	5	45%	80%
		Condamine Street	**52**	**74%**	**[illegible]**
Balgowlah Road	Condamine Street	Roseberry Street	13	91%	100%
Balgowlah Road	Roseberry Street	Quirk Road	12	76%	100%
Balgowlah Road	Quirk Road	Hill Street	6	23%	50%
Balgowlah Road	Hill Street	Marjory Thomas Place	12	34%	42%
Balgowlah Road	Marjory Thomas Place	Boyle Street	3	96%	100%
Balgowlah Road	Boyle Street	Condamine Street	14	73%	93%
		Balgowlah Road	**60**	**66%**	**82%**
Kenneth Road West	**Highview Avenue**	**Condamine Street**	**6**	**[illegible]**	0%
Kenneth Road East	Roseberry Street	Quirk Road	17	86%	82%
Kenneth Road East	Quirk Road	Roseberry Street	20	72%	100%
		Kenneth Road East	**37**	**79%**	**[illegible]**
Koorala Street	Condamine Street	Quirk Road	36	79%	95%
Koorala Street	Quirk Road	Roseberry Street	18	84%	94%
Koorala Street	Roseberry Street	Condamine Street	12	66%	83%
		Koorala Street	**66**	**78%**	**[illegible]**
Hayes Street	Condamine Street	Roseberry Street	3	33%	33%
Hayes Street	Roseberry Street	Condamine Street	9	67%	89%
		Hayes Street	**12**	**59%**	**75%**
Roseberry Street	Kenneth Road	Koorala Street	17	72%	82%
Roseberry Street	Koorala Street	Kenneth Road	16	96%	100%
		Roseberry Street	**33**	**84%**	**[illegible]**
Quirk Road	Cul de sac	Kenneth Road	7	73%	100%
Quirk Road	Kenneth Road	Koorala Street	9	83%	100%
Quirk Road	Burchmore Road	Laurie Road	4	66%	75%
Quirk Road	Laurie Road	Kenneth Road	7	82%	100%
		Quirk Road	**27**	**78%**	**[illegible]**
Hill Street	Balgowlah Road	Harland Road	5	0%	0%
Hill Street	Harland Road	Griffiths Street	10	20%	130%**
Hill Street	Griffiths Street	Balgowlah Road	20	21%	26%
		Hill Street	**35**	**[illegible]**	**52%**
		Marjory Thomas Place	**9**	**76%**	**[illegible]**
Boyle Street	Balgowlah Road	Griffiths Street	20	42%	65%
Boyle Street	Griffiths Street	Lodge Street	10	71%	90%
Boyle Street	Lodge Street	Balgowlah Road	7	64%	71%
		Boyle Street	**37**	**54%**	**73%**
Griffiths Street	Boyle Street	Hill Street (excl. Bus Zone)	14	44%	50%
Griffiths Street	Hill Street	Waratah Street	6	73%	100%
Griffiths Street	Waratah Street	Boyle Street	5	40%	60%
		Griffiths Street	**25**	**50%**	**64%**
Lodge Street	Boyle Street	Condamine Street	26	44%	50%
Lodge Street	Condamine Street	Boyle Street	25	62%	68%
		Lodge Street	**51**	**53%**	**59%**
		All Bays	**455**	**63%**	**70%**

The parking demand profile for each precinct for a typical weekend is shown in Figure 5.4.

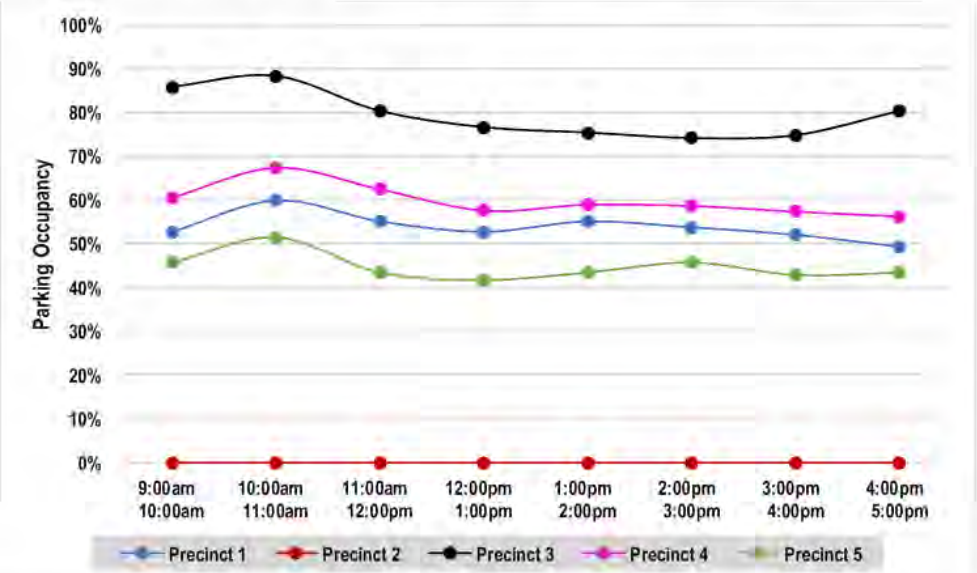


Figure 5.4: Parking Demand Profile by Precinct – Weekend

5.4 PARKING OCCUPANCY RESULTS SUMMARY AND DISCUSSION

On street parking within the study area is generally well utilised throughout a typical weekday, with an average occupancy of 71% and maximum occupancy of 78% recorded. This indicates that parking spaces within commercial and/or industrial precincts (i.e. Roseberry Street and Kenneth Road) are relatively easy to access and are of high demand. Additionally, on street parking in areas surrounding the Manly West Public School were observed to achieve maximum occupancy during peak school operating hours as expected.

In contrast, the demand for car parking on Koorala Street remained relatively consistent throughout the day. The absence of time restrictions for on street parking bays and provision for bays 'closer' to key generators coupled with nearby residential properties allows parking to be utilised by residents, employees and commuters.

The parking occupancy results indicate that parking demand for Precinct 1 remains reasonably consistent on weekdays and weekends due to adjacent retail land uses. The utilisation indicates that accessing car parking spaces should be relatively easy.

Parking demand for Precinct 2 is very low on weekdays and weekends. This is likely a combination of low density residential (i.e. off street car parking within lot) and minimal retail/commercial land uses with direct access to these roads and generally sufficient off street car parking.

The results for Precinct 3 show consistently high utilisation on weekdays and weekends. This is typical of residential streets with predominately medium to high density developments and limited off street car parking provisions.

On street parking within Precinct 4 (i.e. Kenneth Road, Roseberry Street, Balgowlah Road, Hayes Street and Quirk Road) appears to be utilised primarily by employees and customers of the adjacent retail, commercial and industrial developments, noting comparable parking occupancy profiles for a typical weekday and weekend. The Woolworths rooftop car parking shows steady utilisation of 60 80% throughout the weekday, except between 1:00PM to 2:00PM where the utilisation increases to 93%. On a weekend, utilisation of this car park is less than 30%.

Precinct 5 appears to be utilised by residents and parents / caretakers of students of West Manly Public School, with the demand for car parking noticeably increasing during peak school times. That is, large increases were noted during these times on a typical weekday in comparison to correlating times on a typical weekend.

In general, the data indicates that the spaces are relatively easy to access and there is spare capacity within these car parking areas.

5.5 DURATION OF STAY

The average duration of stay for each surveyed road section within the study area is shown in Figure 5.5.

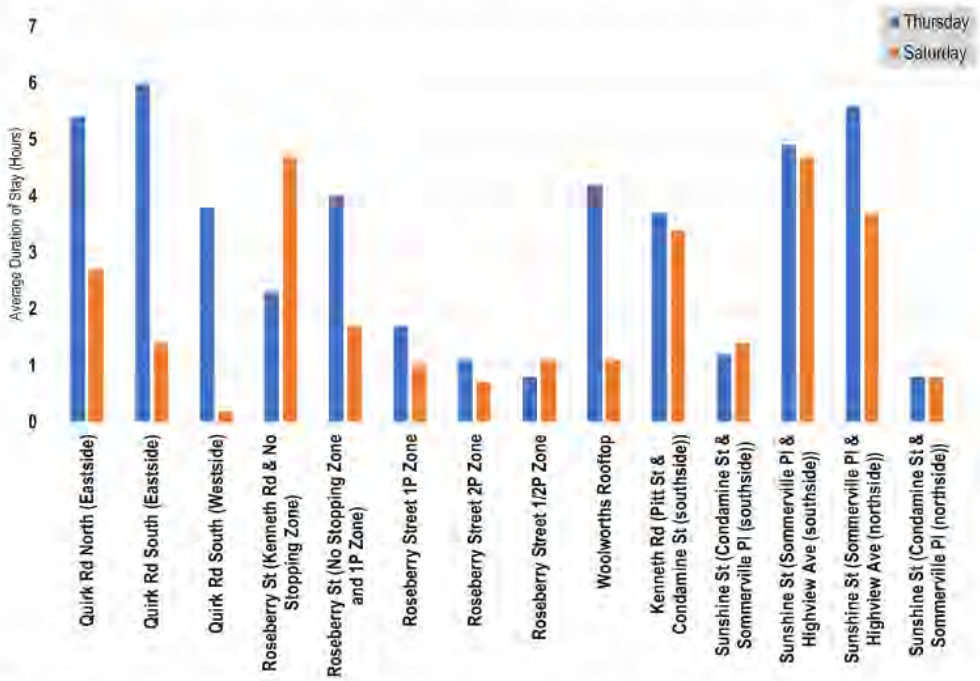


Figure 5.5: Average Duration of Stay

The average parking turnover for each parking type across all survey periods is summarised in Table 5.4. The turnover for each bay was calculated by analysing the unique license plates within a parking bay on an hourly basis and counting the number of changeovers which occurred.

Parking turnover is a measure of how many times the car parking spaces are used over a given time by different vehicles. For example, all day parking, where cars are parked at the start of the survey period and remain there for the duration, will have zero turnover. Short term parking may have many cars using the spaces (i.e. turning over) and will record a higher turnover. This is a good measure of the effectiveness of short stay parking as it gives an indication of how often the spaces are used.

Table 5.4: Duration of Stay by Parking Area/Section

Road Section	Parking Restriction	Average Turnover per Parking Space (9am – 5pm)	
		Thursday	Saturday
Quirk Road between cul de sac and Kenneth Road (eastern side)	Unrestricted	1.7	2.6
Quirk Road between cul de sac and Balgowlah Road (eastern side)	Unrestricted	1.2	1.1
Quirk Road between cul de sac and Balgowlah Road (western side)	Unrestricted	2.2	0.6
Roseberry Street between Kenneth Road and No Stopping Zone	Unrestricted	3	2.1
Roseberry Street between No Stopping Zone and 1P Zone	Unrestricted	2.5	4.8
Roseberry Street 1P Zone	1P	6.7	6
Roseberry Street 2P Zone	2P	5	8.7
Roseberry Street 1/2P Zone	1/2P	6.9	6.9
Woolworths Rooftop	8P	1.8	1.4
Kenneth Road between Pitt Street and Condamine Street (southern side)	Unrestricted	2.1	2.4
Sunshine Street between Condamine Street and Sommerville Place (southern side)	4P	4	2.5
Sunshine Street between Condamine Street and Sommerville Place (northern side)	4P	8.3	0.8
Sunshine Street between Sommerville Place and Highview Avenue (southern side)	Unrestricted	2.2	4.7
Sunshine Street between Sommerville Place and Highview Avenue (northern side)	Unrestricted	1.8	3.7

As expected, the highest parking turnover was observed in the commercial / industrial area on Roseberry Street and its surrounds. The average daily turnover per bay for a typical weekday and weekend is shown in Figure 5.6 and Figure 5.7 respectively.

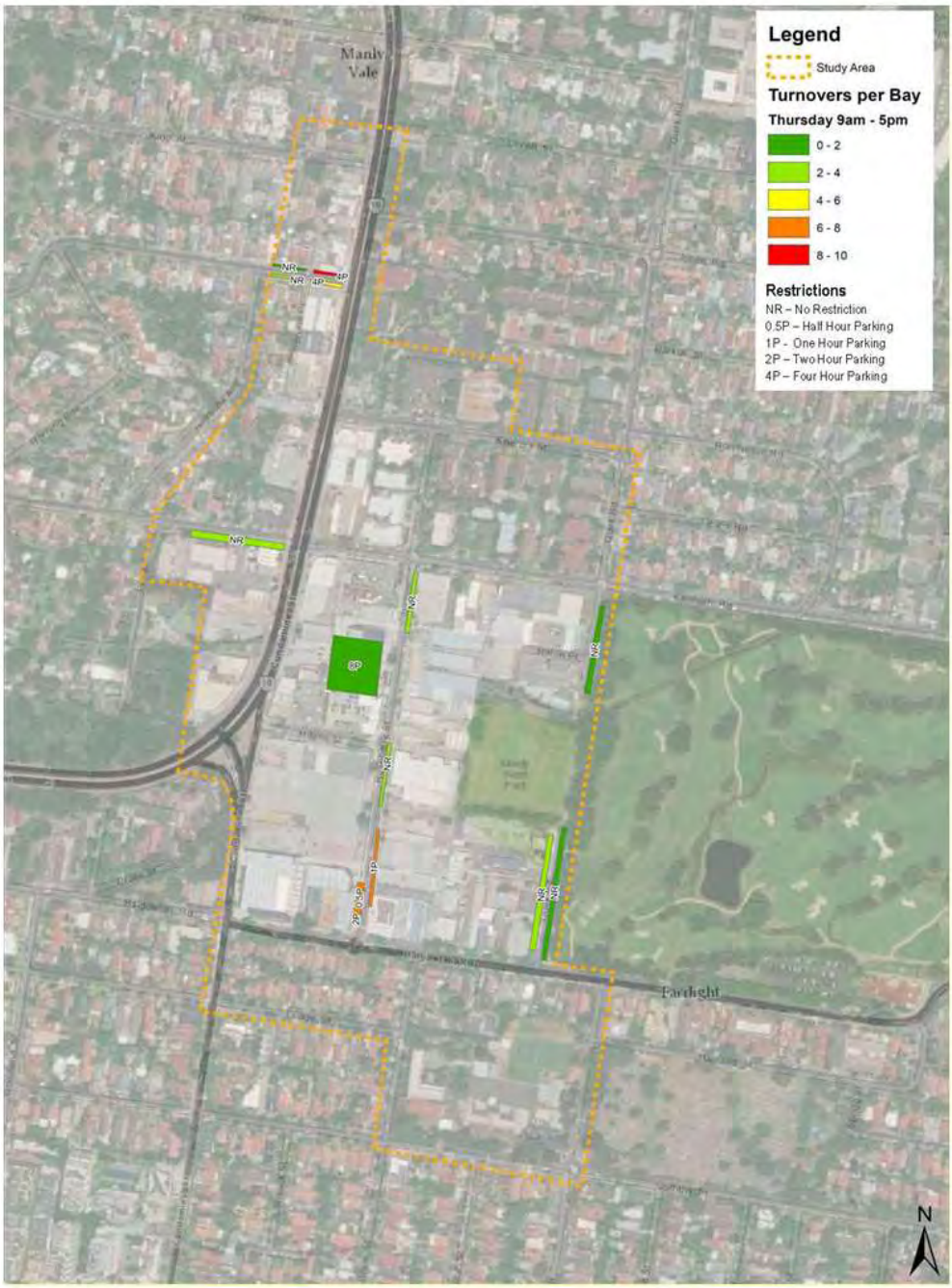


Figure 5.6: Average Daily Turnover Per Bay – Typical Weekday

Figure 5.7: Average Daily Turnover Per Bay – Typical Weekend

5.6 COMPLIANCE WITH TIME RESTRICTIONS

The duration of stay survey showed that instances of parking non compliance occurred at a similar frequency on weekdays to weekends. Relative to the number of spaces available, there is a disproportionately high number of overstays in parking spaces with shorter time restrictions. A summary of parking non compliance comparative to day of the week and bay type is shown in Table 5.5.

Table 5.5: Parking Non Compliance Summary

Restriction	Spaces Available	Total Number of Non Compliances	
		Thursday	Saturday
1/2P	9	14	15
1P	9	7	5
2P	3	1	0
Total	**21**	**22**	**20**

As expected, many occurrences of overstays on typical weekdays occur on the streets adjacent to commercial / industrial land uses. Parking non compliance was observed to be a serious problem on Roseberry Street with multiple occurrences of vehicles overstaying in 1/2P, 1P and 2P spaces.

A map showing street sections with parking non compliance is provided in Figure 5.8 and Figure 5.9 overleaf for a typical weekday and weekend respectively.

Figure 5.8: Locations of Parking Duration Non Compliances – Typical Weekday

Figure 5.9: Locations of Parking Duration Non Compliances – Typical Weekend

5.7 Other Parking Related Matters

In addition to the above assessment, additional parking related matters within the study area were identified as follows:

- parking wayfinding signage on Roseberry Street, Hayes Street and Condamine Street to identify best parking areas for key developments including Harvey Norman, Woolworths, the Public Car Park above Woolworths, Bunnings and the future Aldi supermarket;
- informal 90 degree angle parking was observed to occur on the southern side of Kenneth Road, west of Condamine Street. This presents a number of safety issues including introducing potential conflicts with pedestrians as vehicle are effectively parked across an informal pathway and conflicts with on coming vehicles as the parked vehicle attempts to reverse onto Kenneth Road; and
- formalised 90 degree on street parking on Roseberry Street is permitted within proximity to the intersection with Balgowlah Road. This is a safety issue and adversely affects the performance of the Roseberry Street / Balgowlah Road intersection.

5.8 Summary of Existing Parking Conditions

- **Parking Occupancy:**
  - in general, while there is high demand for parking in the study area, the data indicates that spaces are relatively easy to access and there is spare capacity in the parking areas
  - **Precinct 1** parking utilisation remains reasonably consistent on weekdays and weekends due to adjacent retail land uses. The utilisation indicates that accessing car parking spaces should be relatively easy
  - **Precinct 2** utilisation is very low on weekdays and weekends. This is likely a combination of low density residential (i.e. off street car parking within lot) and minimal retail/commercial land uses with direct access to these roads and generally sufficient off street car parking
  - **Precinct 3** shows consistently high utilisation on weekdays and weekends. This is typical of residential streets with predominately medium to high density developments and limited off street car parking provisions
  - **Precinct 4** appears to be utilised primarily by employees and customers of the adjacent retail, commercial and industrial developments, noting comparable parking occupancy profiles for a typical weekday and weekend. The Woolworths rooftop car parking shows steady utilisation of 60 80% throughout the weekday, except between 1:00PM to 2:00PM where the utilisation increases to 93%. On a weekend, utilisation of this car park is less than 30%
  - **Precinct 5** appears to be utilised by residents and parents / caretakers of students of West Manly Public School, with the demand for car parking noticeably increasing during peak school times
- **Parking Duration of Stay:**
  - highest parking turnover occurred on Roseberry Street
  - parking non compliance was observed to be a serious problem on Roseberry Street with multiple occurrences of vehicles overstaying in 1/2P, 1P and 2P spaces
- **Other Matters:**
  - parking wayfinding signage on Roseberry Street, Hayes Street and Condamine Street to assist drivers identifying best parking areas for key developments;
  - informal 90 degree angle parking was observed to occur on the southern side of Kenneth Road (west of Condamine Street) and in front of a pedestrian desire line (safety issue)
  - formalised 90 degree on street parking on Roseberry Street is permitted within proximity to the intersection with Balgowlah Road (safety issue)

6. REVIEW OF PREVIOUS STUDIES

6.1 2010 STUDY – MANLY INDUSTRIAL ZONE MASTER PLAN

In 2010, Christopher Hallam & Associates Pty Ltd prepared a traffic and access assessment for the Manly Industrial Zone Master Plan. The assessment analysed four options that were identified through the master plan process (with notable consideration to an approved Woolworths and Bunnings on Roseberry Street). The four options analysed are described as:

- **Option 1:** base option (retain existing road structure);
- **Option 2:** new Hayes Street / Condamine Street intersection;
- **Option 3:** Roseberry Street converted to one way (southbound) and Quirk Road opened (two way); and
- **Option 4:** Quirk Road opened (two way).

The assessment concluded Option 4 as the recommended option (with refinements) as follows:

- **Item 1:** connect Quirk Road;
- **Item 2:** roundabout upgrade at Quirk Road / Balgowlah Road intersection (delay until warranted by traffic flows);
- **Item 3:** Roseberry Street to include on street parking removal on eastern side between Hayes Street and Kenneth Road, and associated public parking area to be constructed on Woolworths site (corner of Hayes and Roseberry Streets);
- **Item 4:** construct left turn slip lane into Hayes Street at intersection with Condamine Street (consent condition for Woolworths);
- **Item 5:** construct raised platform at the Hayes Street / Roseberry Street intersection (consent condition for Woolworths);
- **Item 6:** upgrade Condamine Street / Balgowlah Road intersection to include westbound right turn phase (consent condition for both Woolworths and Bunnings); and
- **Item 7:** relocate bus stop on eastern side of Condamine Street, from north of Balgowlah Road to south of Balgowlah Road (consent condition for both Woolworths and Bunnings).

It is noted that Item 3, 5 and 6 have been completed to date (July 2018), and Item 4 has been deleted from Woolworths' consent conditions according to the Balgowlah Industrial Estate Rezoning report prepared by Christopher Hallam & Associates Pty Ltd dated 2015. It is further noted in the 2015 report that, in finalising the Master Plan, Council resolved in its meeting on 12th December 2011 to not give any further consideration to the Quirk Road extension; rather, it was resolved to write to RMS requesting a plan for Item 4.

6.2 2015 STUDY – BALGOWLAH INDUSTRIAL ESTATE REZONING

In 2015, Christopher Hallam & Associates Pty Ltd prepared a traffic and transport assessment for the Balgowlah Industrial Estate Rezoning. This study assessed medium (10% realisation) and long term (25% realisation) rezoning projections from IN2 Light Industrial to the more intensive B6 Enterprise Corridor for the area bounded by Condamine Street, Kenneth Road, Roseberry Street and Balgowlah Road. The Quirk Road extension that was recommended in the 2010 Manly Industrial Zone Master Plan study was not assumed to be in place as part of the assessment.

The key findings of the assessment were:

- Kenneth Road / Quirk Road: capable of accommodating forecast traffic conditions;
- Kenneth Road / Roseberry Street: capable of accommodating forecast traffic conditions;
- Balgowlah Road / Roseberry Street: capable of accommodating forecast traffic conditions; however, upgrade to roundabout control was recommended for improved accessibility;
- Condamine Street / Kenneth Road: currently operating at saturation during peak times. The report indicated that, while the additional traffic loadings in forecast scenarios was low, it was unable to determine a future operating performance because small increases can result in disproportional impacts;

- Condamine Street / Burnt Bridge Creek Deviation: capable of accommodating forecast traffic conditions;
- Balgowlah Road / Condamine Street: currently operating at saturation during peak times, with forecast traffic conditions increasing delays at the intersection. The report indicated that kerbside parking restrictions on the intersection approaches would be required (**Item 8**);
- the report indicates that the Quirk Road extension remains desirable for improved access and circulation in the area; and
- a marked crossing was indicated as desirable for Quirk Road, north of Balgowlah Road, when pedestrian flows meet prescribed warrants (**Item 9**).

6.3 PREVIOUS RECOMMENDATIONS

A summary of the recommendations from the 2010 and 2015 studies is detailed in Table 6.1. This includes whether the recommendations have been enacted to date and, if not, whether these are still reasonable for further consideration and investigation.

Table 6.1: Summary of Previous Recommendations

Item	Completed	Comment
Item 1: Quirk Road extension	No	The 2015 study indicates that this option would be expensive to build and may result in loss of amenity. Notwithstanding, this option remains valid for further investigation on the basis of saturated intersections on Condamine Street that are unable to be upgraded (in terms of capacity) any further, which is a typical trigger for additional network links.
Item 2: Roundabout upgrade at Quirk Road / Balgowlah Road intersection	No	The 2015 study concludes that a roundabout upgrade was not warranted under the long term traffic forecasts based on intersection performance. Notwithstanding, it is recommended that Council considers this as an option for improved access and traffic calming.
Item 3: Roseberry Street to include on street parking removal on eastern side between Hayes Street and Kenneth Road, and associated public parking area to be constructed on Woolworths site	Yes	
Item 4: Construct left turn slip lane into Hayes Street at intersection with Condamine Street	No	These works were assessed in the 2010 study, which found that the proposal would worsen intersection performance (compared to the current geometric layout) and be expensive to build. Given the cost to benefit ratio would likely be very low, this option is not considered viable for further consideration at this time.
Item 5: Construct raised platform at the Hayes Street / Roseberry Street intersection	Yes	
Item 6: Upgrade Condamine Street / Balgowlah Road intersection to include westbound right turn phase	Yes	
Item 7: Relocate bus stop on eastern side of Condamine Street, from north of Balgowlah Road to south of Balgowlah Road	No	Section 3.1 of the NSW State Transit Bus Infrastructure Guide (July 2011) states that "*it is often preferred to locate bus stops on the departure side of a signalised intersection*". This item is recommended to be raised with TfNSW.
Item 8: Parking restrictions on the approaches at Condamine Street / Balgowlah Road intersection	No	This will be tested in Section 11.
Item 9: Marked crossing on Quirk Road, north of Balgowlah Road	No	To be confirmed separately with pedestrian count data.

6.4 SUMMARY OF PREVIOUS STUDIES

- four options were assessed in the 2010 Manly Industrial Zone Master Plan, **which found Option 4 (extension of Quirk Road with refinements) as the preferred option**
- **Council resolved in its meeting on 12th December 2011 to not give any further consideration to the Quirk Road extension**; rather, it was resolved to write to RMS requesting a plan for the Hayes Street slip lane from Condamine Street
- the 2010 study found that **the Hayes Street slip lane would worsen intersection performance (compared to the current geometric layout) and be expensive to build**. Given the cost to benefit ratio would likely be very low, this option is not considered viable for further consideration at this time
- the 2015 study found that the Condamine Street / Kenneth Road intersection and Balgowlah Road / Condamine Street intersection were both currently operating at saturation in peak times
- a review of the previous recommendations from the 2010 and 2015 studies identified the following items for consideration in the subsequent strategies and implementation sections of this report:
  - the Quirk Road extension will be further investigated due to saturated intersections on Condamine Street that are unable to be upgraded (in terms of capacity) any further, which is a typical trigger for additional network links
  - parking restrictions on the approaches at Condamine Street / Balgowlah Road intersection will be analysed to determine any intersection performance benefits
- relocation of the bus stop on eastern side of Condamine Street (from north of Balgowlah Road to south of Balgowlah Road) is recommended to be raised with TfNSW
- a marked crossing on Quirk Road, north of Balgowlah Road, is recommended to be assessed separately with pedestrian survey data

7. COMMUNITY FEEDBACK

7.1 REVIEW OF COMMUNITY FEEDBACK

Council supplied historic community feedback for the study area. This information was reviewed to determine data clusters as shown in Figure 7.1. The data was aggregated in Table 7.1 to identify key community concerns.

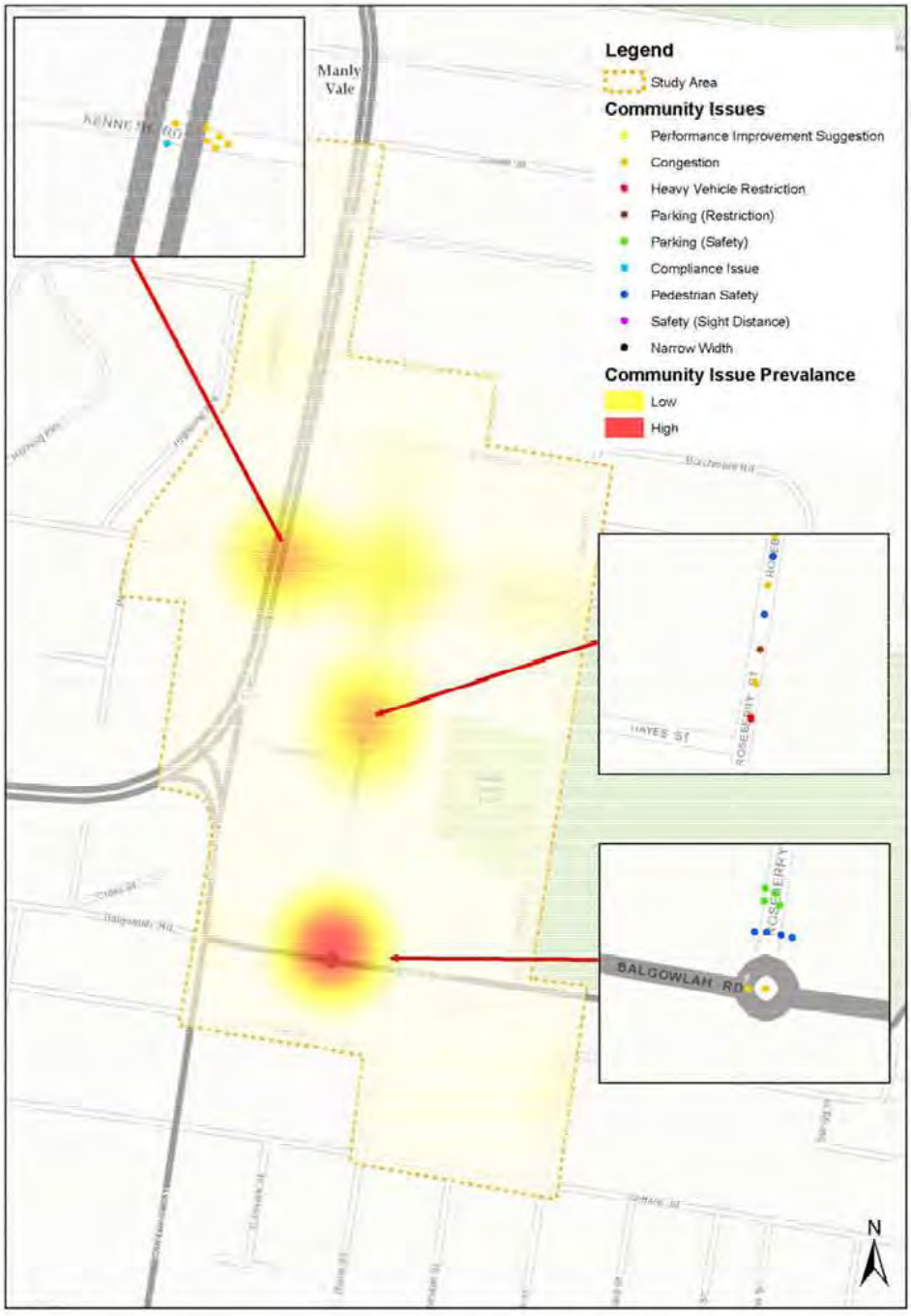


Figure 7.1: Community Feedback for Study Area – Thematic Map

Table 7.1: Summary of Community Feedback

Location	Issue Description	Count of Issue
28 Roseberry Street	Sight distance turning out of driveway	1
	Rat running through car park when Roseberry Street is congested	1
50 Roseberry Street	Request for zoned parking on northern end of Roseberry Street	1
Balgowlah Road / Quirk Road intersection	Sight distance turning out of Quirk Road is impeded by on street parking	3
Condamine Street / Balgowlah Road intersection	Request to extend no stopping distance on westbound approach kerbside lane	1
Condamine Street / Kenneth Street intersection	Congestion on westbound approach	6
	Illegal u turns (southbound to northbound)	1
Hill Street	Request for extension of pick up/drop off outside Balgowlah West Primary School	1
Kenneth Road	Illegally parked trailers (compliance issue)	1
Roseberry Street	General concern about congestion, particularly with emerging development	3
	Restricting heavy vehicle use to outside peak hours	1
	Request to restrict on street parking on Roseberry Street	1
	General concern about pedestrian safety with increased vehicular traffic movements from emerging development	2
Roseberry Street / Balgowlah Road intersection	90 degree parking on northern leg has been raised as being too close to roundabout and adversely affecting safety and performance	4
	Congestion	2
	Zebra crossing on northern leg has been raised as being too close to roundabout and adversely affecting pedestrian safety	4
Roseberry Street / Kenneth Road intersection	Congestion extending back from westbound approach at the Condamine Street / Kenneth Road intersection	3
	General concern about pedestrian safety with increased vehicular traffic movements from emerging development	1
Somerville Place	Request for one way only due to narrow road width	1

As shown, the community feedback primarily relates to Roseberry Street, Quirk Road, Kenneth Road and Condamine Street, with congestion, concern about emerging development and safety trending as key concerns.

7.2 SUMMARY OF KEY ISSUES RAISED BY THE COMMUNITY

- **Balgowlah Road / Quirk Road intersection:** sight distance turning out of Quirk Road is impeded by on street parking
- **Condamine Street / Kenneth Street intersection:** congestion on westbound approach
- **Roseberry Street:** general concern about congestion, particularly with emerging development
- **Roseberry Street / Balgowlah Road intersection:** 90 degree parking on northern leg has been raised as being too close to roundabout and adversely affecting safety and performance
- **Roseberry Street / Balgowlah Road intersection:** zebra crossing on northern leg has been raised as being too close to roundabout and adversely affecting pedestrian safety
- **Roseberry Street / Kenneth Road intersection:** congestion extending back from westbound approach at the Condamine Street / Kenneth Road intersection
- **Somerville Place (between King Street and Sunshine Street):** request for one way only due to narrow road width

8. KEY DEVELOPMENT APPROVALS

8.1 DEVELOPMENT DETAILS

Council has identified two key approved developments in the study area. The location of these developments is shown in Figure 8.1 and detailed in Table 8.1. Council's Strategic & Place Planning Team has advised that there are no significant intensification proposals for the study area on the immediate horizon.

Source: Google Maps

Figure 8.1: Approved Development Locations

Table 8.1: Development Details

Development	Location	Peak Hour Trips	Parking Required	Parking Supplied	Parking Situation
Aldi (1,761m² GFA)	22 26 Roseberry Street	160 200vph	71 spaces	76 spaces	(+) 5 spaces
B Line Car Park	North eastern corner of Condamine Street / Kenneth Road	92vph (AM) 68vph (PM) 50vph (Sat.)	*n/a*	150 spaces	(+) 150 spaces

As shown in Table 8.1, the Aldi development provides surplus car parking spaces compared to the Manly Development Control Plan (DCP) requirement, while the B Line Car Park creates 150 new spaces for the area. It is therefore not expected that adverse on street car parking utilisation will result from the developments once operational. It is noted that, at the time of writing, the B Line Car Park was in the construction phase.

The accompanying Traffic Impact Assessment (TIA) reports for the subject developments concluded the following with respect to external road network impacts:

- the TIA report for Aldi concludes that this development will have minor impacts on external road network; and
- the TIA report for the B Line car park concludes that the development will have minor impacts on the external road network. Notwithstanding, the development proposal included capacity upgrades to the Condamine Street / Kenneth Road intersection, which have since been constructed.

The traffic generated by these developments will be considered in the future year intersection analysis in Section 11.

8.2 DEVELOPMENT APPROVAL SUMMARY

- **Aldi Development:**
  - development is approved
  - off street car parking provision is surplus to DCP requirements and therefore not expected to result in adverse utilisation of on street car parking
  - TIA report concludes minor impacts to external road network
- **B Line Car Park Development:**
  - development is currently under construction
  - TIA report concludes minor impacts to external road network
  - the development proposal included capacity upgrades to the Condamine Street / Kenneth Road intersection, which have since been constructed

9. SUMMARY OF EXISTING CONDITIONS ASSESSMENT

A comprehensive review of existing transport conditions was undertaken to identify emerging issues facing the study area in order to set a series of objectives as a basis for developing and testing integrated strategies in the next report sections. Table 9.1 summarises the existing issues (including a unique ID for ease of reference) that form the basis of further assessment in the subsequent strategies and implementation sections of this report.

Table 9.1: Existing Issues Summary and ID

Item	ID
Narrow road width on Quirk Road (North) between Kenneth Road and End	RN 1
Narrow road width on Roseberry Street adjacent to Balgowlah Road	RN 2
Narrow road width Sunshine Street	RN 3
Narrow road width Boyle Street	RN 4
Delineation deficiencies on Sunshine Street on approach to Condamine Street	RN 5
Quirk Road (North) terminates with no turning head	RN 6
Condamine Street / Kenneth Road Intersection operating at LOS F	RN 7
Condamine Street / Balgowlah Road Intersection operating at LOS F	RN 8
60 road infrastructure items classified as "poor condition"	RI 1
Balgowlah Road / Quirk Road Intersection: sight distance turning out of Quirk Road is impeded by on street parking	CF 1
Condamine Street / Kenneth Road: congestion on westbound approach	CF 2
Roseberry Street: general concern about congestion, particularly with emerging development	CF 3
Roseberry Street / Balgowlah Road Intersection: 90 degree parking on northern leg has been raised as being too close to the roundabout and adversely affecting safety and performance	CF 4
Roseberry Street / Balgowlah Road Intersection: zebra crossing on northern leg has been raised as being too close to the roundabout and adversely affecting safety and performance	CF 5
Roseberry Street / Kenneth Road Intersection: congestion extending back from westbound approach at the Condamine Street / Kenneth Road intersection	CF 6
Request for Somerville Place to be converted to one way due to road width	CF 7
Parking wayfinding on Roseberry Street, Hayes Street and Condamine Street	PK 1
Missing Path 1: Sunshine Street southern side between Somerville Place and Highview Avenue	PN 1
Missing Path 2: Kenneth Road southern side between Condamine Street and No.9 Kenneth Road	PN 2
Missing Path 3: Kenneth Road southern side fronting No.71 Kenneth Road	PN 3
Missing Path 4: Kenneth Road southern side fronting No. 61 63 Kenneth Road	PN 4
Missing Path 5: Hayes Street southern side fronting No. 4 Hayes Street	PN 5
Missing Path 6: Roseberry Street eastern side fronting No. 20 Roseberry Street	PN 6
Missing Path 7: connection to westbound bus stop on Balgowlah Road (east of Quirk Road)	PN 7
Missing Path 8: connection to eastbound bus stop on Balgowlah Road (west of Quirk Road)	PN 8
Missing Cycle Link 1: Quirk Road (Kenneth Road to Campbell Parade)	CN 1
Missing Cycle Link 2: Condamine Street (Kenneth Road to Pitt Street)	CN 2

10. STRATEGIES AND IMPLEMENTATION PLAN – PROCESS AND METHODOLOGY

10.1 PROCESS AND METHODOLOGY

The Strategies and Implementation sections of the study herein have forecast transport conditions in order to devise strategies and a prioritised implementation plan (including concepts and high level costings) to accommodate the growth in the study area. This has led to the development of:

- a Strategic Traffic Management Plan;
- a Strategic Parking Plan; and
- a Strategic Walking and Cycling Plan.

Figure 10.1 outlines the process and methodology of the Strategies and Implementation Plan phase of the study, including the integration of key findings from the existing conditions assessment.

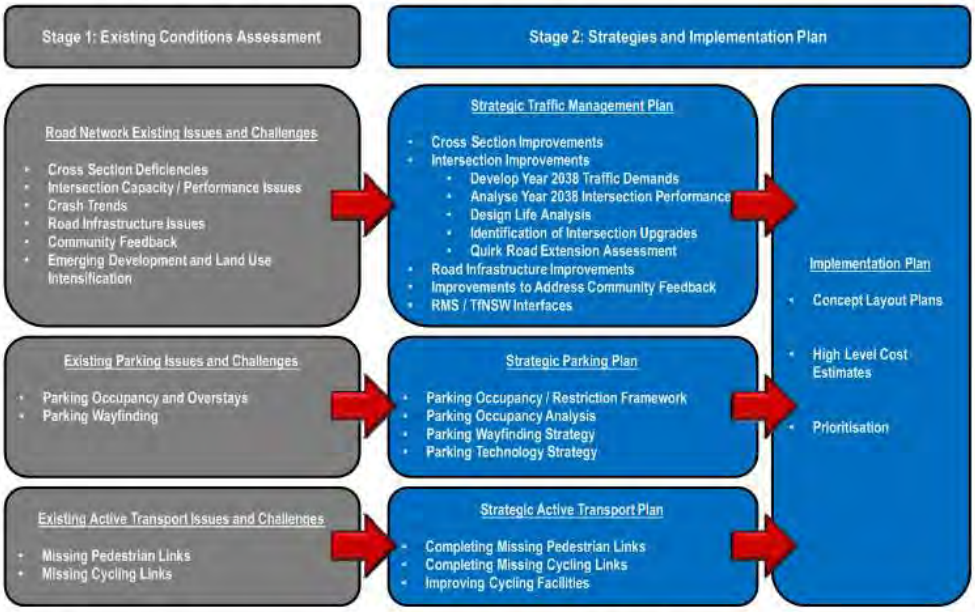


Figure 10.1: Strategies and Implementation Plan – Process and Methodology

10.2 NORTHERN BEACHES COMMUNITY STRATEGIC PLAN 2018 2028

The Northern Beaches Community Strategic Plan (CSP) 2018 2028 was reviewed to identify traffic and transport goals relevant to this study. The purpose of this is to ensure that the strategies recommended by this study align with the CSP.

Two key goals were identified in the CSP and are summarised in Table 10.1.

Table 10.1: CSP Goals Relevant to Traffic and Transport

Goal No.	Description	Strategies
16	Our integrated transport networks meet the needs of our community	Advocate for improved transport options and networks
		Ensure transport planning is integrated with land use planning and takes into account of emerging technologies
		Facilitate and promote safe transport options that reduce car based commuter travel
		Maintain and enhance roads and road related infrastructure
17	Our community can safely and efficiently travel within and beyond Northern Beaches	Improve public transport options and connectivity to better meet our community's travel needs
		Facilitate and promote safe cycling and walking networks as convenient transport options
		Improve parking options in centres, villages and places

11. STRATEGIC TRAFFIC MANAGEMENT PLAN

11.1 ROADWAY CROSS SECTION IMPROVEMENTS

Roadway cross section deficiencies identified in existing conditions assessment have been reviewed and recommended solutions have been developed as summarised in Table 11.1.

Table 11.1: Roadway Cross Section Recommended Improvements

Item	ID	Recommendation(s)
Narrow road width on Quirk Road (North) between Kenneth Road and End	RN 1	Remove kerbside parallel car parking from western side of subject road section and install 30 degree parking on eastern side (to be signed as "reverse in only" to reduce vehicles turning around at southern end of Quirk Road (North)). This achieves a compliant roadway width.
Narrow road width on Roseberry Street adjacent to Balgowlah Road	RN 2	Convert existing 90 degree car parking to 30 degree ("nose in only" for parking manoeuvre efficiency due to adjacent roundabout intersection). This achieves a compliant roadway width.
Narrow road width Sunshine Street	RN 3	No change residential street, low speed environment. Further monitoring is required.
Narrow road width Boyle Street	RN 4	No change residential street, low speed environment. Further monitoring is required.
Delineation deficiencies on Sunshine Street on approach to Condamine Street	RN 5	Installation of parking edge lines for delineation and driver guidance.
Quirk Road (North) terminates with no turning head	RN 6	A concrete apron at the cul de sac was tested using a refuse collection vehicle swept path. However, no suitable location was determined due to existing constraints. Further monitoring is required.

11.2 INTERSECTION IMPROVEMENTS

11.2.1 2038 Traffic Demand Development

Overview

The key intersections identified as part of the existing conditions assessment are as follows:

- Condamine Street and King Street;
- Condamine Street and Kenneth Road;
- Condamine Street and Burnt Bridge Creek Deviation;
- Condamine Street and Balgowlah Road;
- Balgowlah Road and Roseberry Street; and
- Kenneth Road and Roseberry Street.

These intersections have been assessed under a 20 year design horizon (i.e. Year 2038) to assess the future year intersection operations. The methodology used for estimating the Year 2038 traffic demands is as follows:

- utilise volumes from the 2018 traffic surveys as a base scenario;
- application of a growth factor over a 20 year period;
- inclusion of development trips from recently approved developments (not yet constructed) in the Study Area; and
- an assessment of potential traffic volume changes with the inclusion of the Quirk Road Extension.

Growth Factor

A linear growth factor of 1.25% p.a. was adopted for this assessment from the Traffic and Transport Assessment for the Balgowlah Industrial Estate Rezoning (i.e. from IN2 to B6) prepared by Christopher Hallam and Associates which identified an estimated intensification of use in the area by 25%. The growth factor was applied to the 2018 traffic volumes to determine the 2038 "background" traffic volumes.

Development Traffic

Development traffic volumes were included in the Year 2038 assessment for two recently approved developments in the study area which have not been constructed, namely:

- the Aldi supermarket development proposed for 22 26 Roseberry Street; and
- the Manly Vale Commuter Car Park proposed for the corner of Condamine Street and Kenneth Road.

Development traffic volumes were obtained from the traffic and transport assessments prepared by Colston Budd Rodgers and Kafes Pty Ltd and ARUP, respectively. Distributed traffic volumes from the intersection / network diagrams were used and added to the network diagrams for this traffic assessment. As the extent of the network used for this traffic assessment is greater than that of either traffic and transport assessment, the volumes were distributed through the remainder of the network.

11.2.2 2038 Design Traffic Volumes

The Year 2038 Design Traffic Volumes used for this assessment comprises of the 2038 background traffic volumes plus development traffic (i.e. the Aldi supermarket and Manly Vale Commuter Car Park). The network diagram showing the Year 2038 Design Traffic Volumes is attached at Appendix H.

11.2.3 2038 Base Scenario Assessment

Intersection modelling was undertaken for all key intersections in the study area. SIDRA Intersection 7 was used to assess the forecast operational performance levels of the subject intersections at year 2038. The existing geometric layout for each intersection was used, including the time of day bus lanes on Condamine Street.

All signalised intersections were typically analysed under "optimum cycle time" signal timing calculations in SIDRA.

It is noted that some intersections were identified to be operating outside acceptable performance limits in current year 2018 in the existing conditions assessment. For ease of reference, the overall year 2018 intersection performance operations are summarised below:

- Condamine Street and King Street – operates at the acceptable performance thresholds;
- Condamine Street and Kenneth Road – exceeds acceptable performance thresholds;
- Condamine Street and Burnt Bridge Creek Deviation – operates within the acceptable performance thresholds;
- Condamine Street and Balgowlah Road – exceeds acceptable performance thresholds;
- Balgowlah Road and Roseberry Street – operates within the acceptable performance thresholds; and
- Kenneth Road and Roseberry Street – operates within the acceptable performance thresholds.

The results of the Year 2038 SIDRA Intersection modelling for each intersection is summarised in the following Tables.

Table 11.2: King Street and Condamine Street Intersection Performance Summary – Year 2038

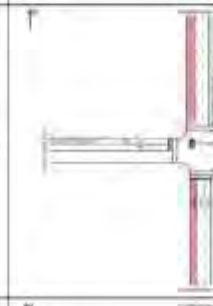
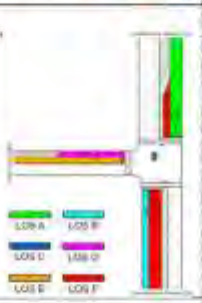
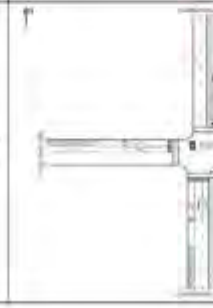
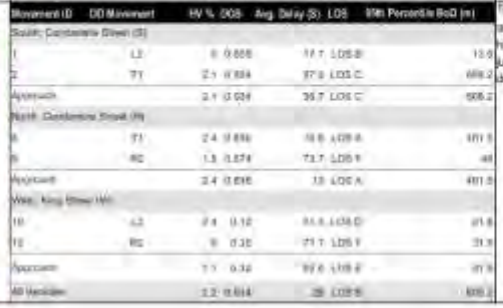
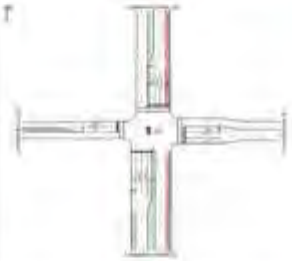
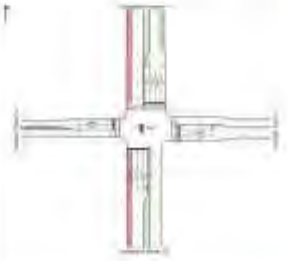
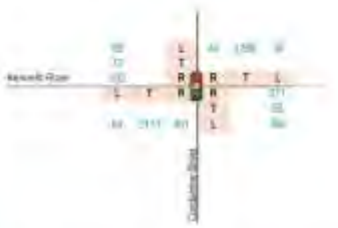
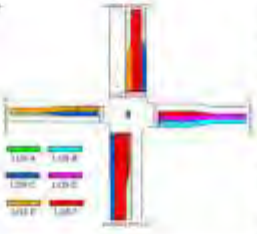
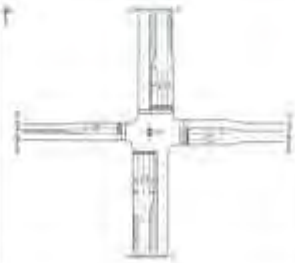
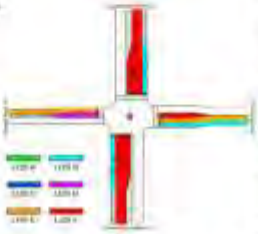
Period	SIDRA Geometry	Year 2038 Volumes	Lane LOS Summary	Intersection Performance	Intersection Performance Summary
AM Peak					The intersection exceeds acceptable performance limits in terms of delay and LOS. Overall the intersection has an average delay of 53 seconds and operates at LOS D. The intersection operates with DOS 1.06 which is outside the acceptable limit of 0.9. The worst performing approaches are the Condamine Street south approach and King Street west approach. Queues on the south approach extend for 750m (i.e. through the next two intersections to the south).
PM Peak					The intersection exceeds acceptable performance limits in terms of delay and LOS. Overall the intersection has an average delay of 61 seconds and operates at LOS E. The intersection operates with DOS 1.04 which is outside the acceptable limit of 0.9. The worst performing approaches are the Condamine Street south approach and King Street west approach. Queues on the south approach extend for over 800m (i.e. through the next two intersections to the south).
Weekend Peak					The intersection operates at the threshold of acceptable performance limits. Overall the intersection has LOS E and the degree of saturation is 0.93 (which is just outside the acceptable limit of 0.9). The average delay across the intersection is 55 seconds.

Table 11.3: Kenneth Road and Condamine Street Intersection Performance Summary – Year 2038

Period	SIDRA Geometry	Year 2038 Volumes	Lane LOS Summary	Intersection Performance	Intersection Performance Summary
AM Peak					The intersection exceeds acceptable performance limits in terms of delay and LOS. Overall the intersection has an average delay of 247 seconds and operates at LOS F. The intersection operates with DOS = 1.4 which is well outside the acceptable limit of 0.9. The worst performing approach is the Condamine Street north and south approaches approach. Queues on these approaches range from 900m to over 1200m
PM Peak					The intersection exceeds acceptable performance limits in terms of delay and LOS. Overall the intersection has an average delay of 353 seconds and operates at LOS F. The intersection operates with DOS = 1.82 which is well outside the acceptable limit of 0.9. The worst performing approach is the Condamine Street north and south approaches approach. Queues on these approaches are in the order of 1450m to 1650m.
Weekend Peak					The intersection exceeds acceptable performance limits in terms of delay and LOS. Overall the intersection has an average delay of 420 seconds and operates at LOS F. The intersection operates with DOS = 1.76 which is well outside the acceptable limit of 0.9. The worst performing approach is the Condamine Street but B and south approaches approach. Queues on these approaches are in the order of 1300m to 1500m.

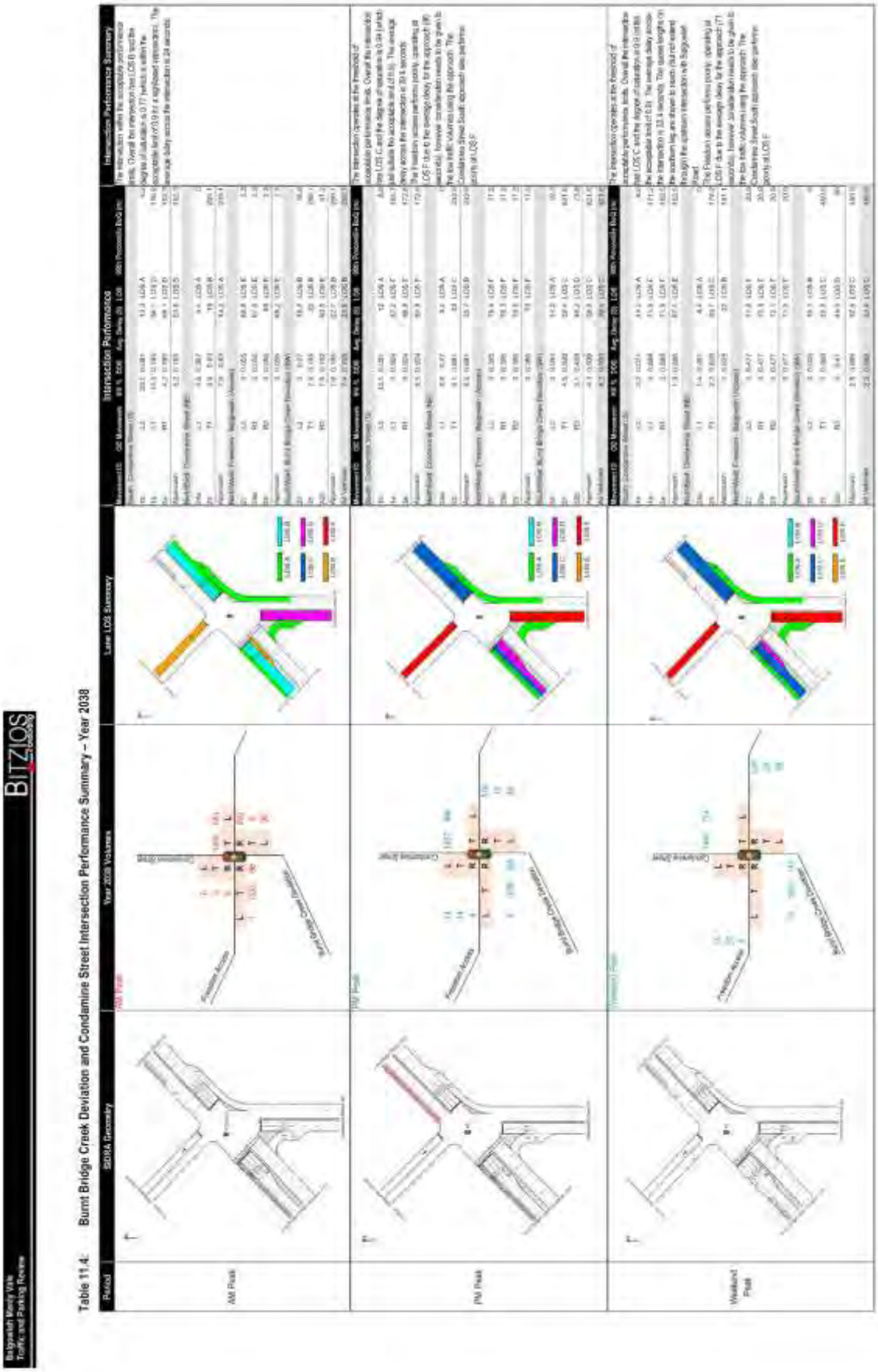

Balgowlah Manly Vale
Traffic and Parking Review
BITZIOS
Table 11.4: Bunn Bridge Creek Deviation and Condamine Street Intersection Performance Summary – Year 2038
Period
SIDRA Geometry
Year 2038 Volumes
Lane LOS Summary
Intersection Performance
Intersection Performance Summary
AM Peak
PM Peak
Weekend Peak
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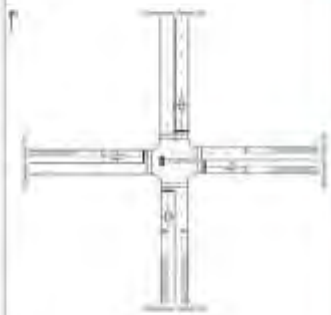
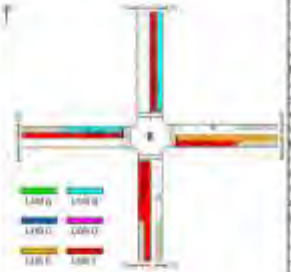
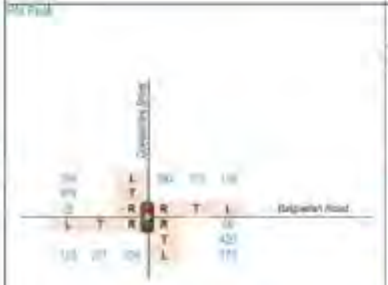
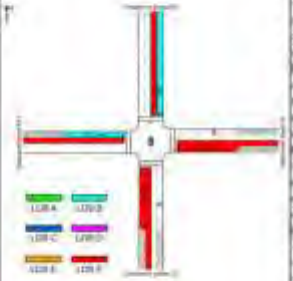
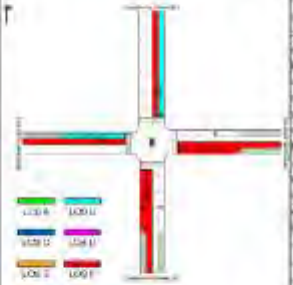
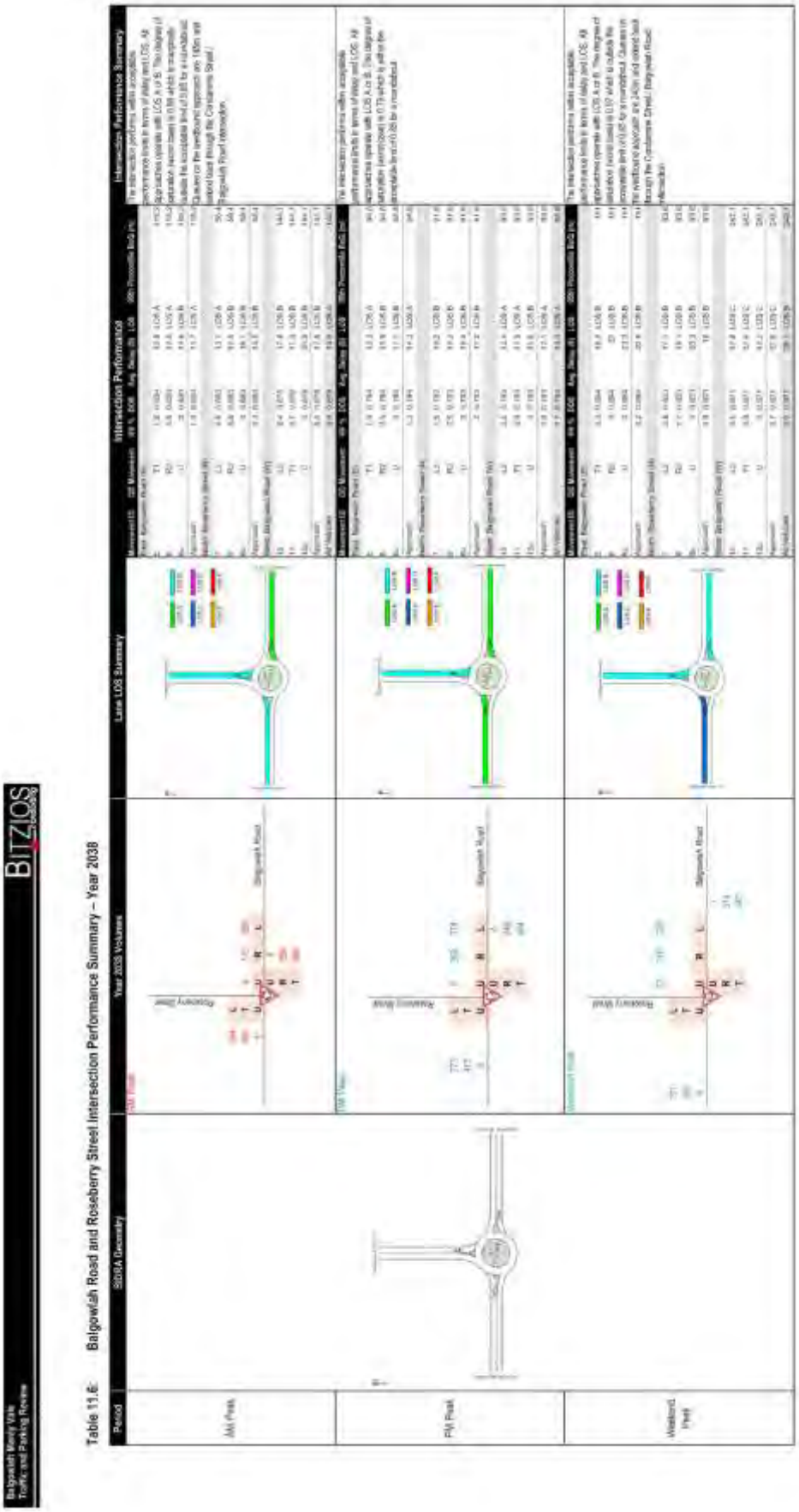
Table 11.5: Condamine Street and Balgowlah Road Intersection Performance Summary – Year 2038

Period	SIDRA Geometry	Year 2038 Volumes	Lane LOS Summary	Intersection Performance	Intersection Performance Summary
AM Peak					The intersection exceeds acceptable performance limits in terms of delay and LOS. Overall the intersection has an average delay of 269 seconds and operates at LOS F. The intersection operates with DOS 1.02 which is well outside the acceptable limit of 0.9. All approaches perform poorly with queuing of 340m to 500m++
PM Peak					The intersection exceeds acceptable performance limits in terms of delay and LOS. Overall the intersection has an average delay of 337 seconds and operates at LOS F. The intersection operates with DOS 1.4 which is well outside the acceptable limit of 0.9. All approaches perform poorly with queuing of 260m to 700m++
Weekend Peak					The intersection exceeds acceptable performance limits in terms of delay and LOS. Overall the intersection has an average delay of 343 seconds and operates at LOS F. The intersection operates with DOS 1.53 which is well outside the acceptable limit of 0.9. All approaches perform poorly with queuing of 460m to 900m++


Balgowlah Manly Vale Traffic and Parking Review
BITZIOS
Table 13.6: Balgowlah Road and Roseberry Street Intersection Performance Summary – Year 2038
Period
SIDRA Geometry
Year 2038 Volumes
Lane LOS Summary
Intersection Performance
Intersection Performance Summary
AM Peak
PM Peak
Weekend Peak
Balgowlah Road
Roseberry Street
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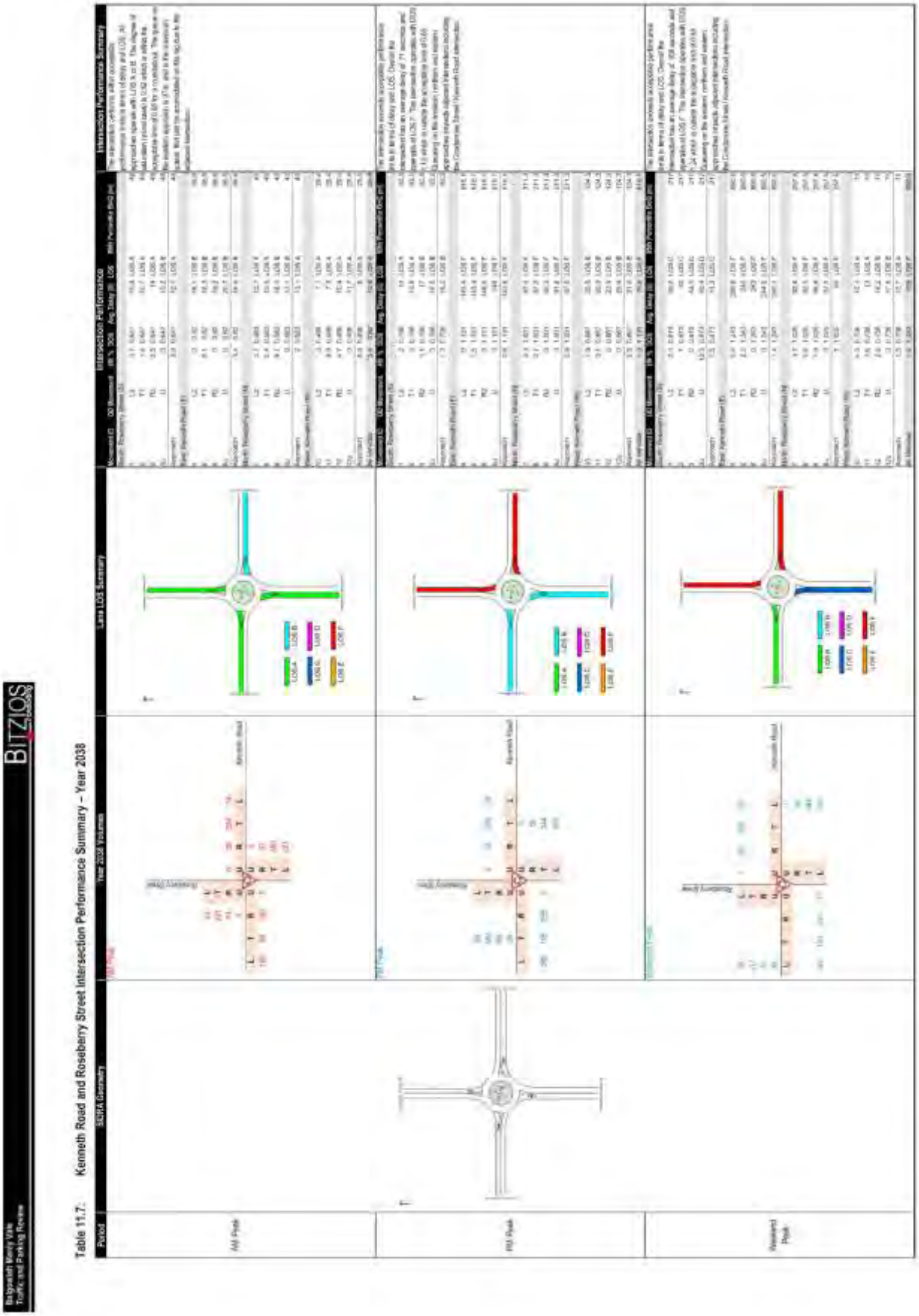
Balgowlah Manly Vale Traffic and Parking Review
BITZIOS
Table 11.7: Kenneth Road and Roseberry Street Intersection Performance Summary – Year 2038
Period
SIDRA Geometry
Year 2038 Volumes
Lane LOS Summary
Intersection Performance
Intersection Performance Summary
AM Peak
PM Peak
Weekend Peak
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11.2.4 Intersection Design Life Assessment

For the intersections identified as operating outside the acceptable performance limits (in terms of DOS, delays or LOS) or where approach queues impact adjacent intersections, a design life assessment was undertaken in SIDRA to identify the expected year of failure (noting no assessment was undertaken beyond Year 2038) as summarised below:

- Condamine Street and King Street – **Year 2018** (the intersection currently operates at the acceptable performance thresholds);
- Condamine Street and Kenneth Road – **Year 2018** (the intersection already exceeds acceptable performance thresholds);
- Condamine Street and Burnt Bridge Creek Deviation – intersection operates at acceptable performance thresholds in **Year 2038**;
- Condamine Street and Balgowlah Road – **Year 2018** (the intersection already exceeds acceptable performance thresholds);
- Balgowlah Road and Roseberry Street – queues on the western approach are expected to reach the approach length of around 120m after seven years (i.e. **Year 2025**); and
- Kenneth Road and Roseberry Street – the intersection reaches theoretical capacity (approaching DOS 1.0) in five years (i.e. **Year 2023**) in the weekend peak, however by this time the model shows the eastern approach with queues in the order of 240m which extend through the Quirk Road / Kenneth Road intersection. Further analysis demonstrated that queues are expected to reach the roundabout in two to three years. In the PM peak assessment, the intersection reaches theoretical capacity in 11 years (i.e. in 2029). Queues on the critical western approach are also at the limit of the approach length after 11 years (approximately 90m).

11.2.5 2038 "With Upgrade" Scenario Assessment

For each of the subject intersections which are not shown by the SIDRA analysis to operate within acceptable performance limits by Year 2038, upgrades have been developed (where possible) as detailed in Table 11.8. The upgrades have been analysed in SIDRA Intersection 7, with the upgraded geometric layouts and results presented in the Tables thereafter.

Table 11.8: Intersection Upgrade Option Development

Intersection	Description of Upgrade Option(s)
Condamine Street and King Street	No practical upgrade option identified – intersection is at its largest geometrical form given proximity of surrounding development and available land in the road reserve.
Condamine Street and Kenneth Road	Converting the eastern leg middle lane to a shared "through right turn" and conversion of the phase sequence from a "double diamond overlap" to a "single diamond overlap with split side streets". The traffic survey data shows that the eastern leg right turn movement is very high, and the through movement is very low, thus re balancing of underutilised capacity is proposed with the lane conversion. Other upgrade options were investigated (such as dual right turn lanes on the southern leg); however, no further upgrade options were identified as the intersection is at its largest geometrical form given proximity of surrounding development.
Condamine Street and Balgowlah Road	**Option 1:** removal of the eastbound right turn movement (this movement ranges from 25 35vph in peak times, and there are other convenient opportunities available for re routing), time of day kerbside parking restrictions on all approaches / departures and a phase sequence change. **Option 2:** as per Option 1; however, a left turn slip lane is included on the western leg (this volume is relatively high) and a new right turn lane on the northern leg (this volume is relatively high). Note: Council owned land on the north western corner is required to facilitate this upgrade.
Balgowlah Road and Roseberry Street	Signalised upgrade.
Kenneth Road and Roseberry Street	Signalised upgrade, including removal of the right turn from the eastern leg (this movement ranges from 36 57vph in peak times, and there are other convenient opportunities available for re routing) and time of day kerbside parking restrictions on all approaches / departures. B Line car park traffic movements bound for Condamine Street have been assumed to u turn at the Quirk Road / Kenneth Road roundabout.

Table 11.9: Kenneth Road and Condamine Street Intersection Performance Summary – Year 2038 Design Traffic Volumes "Without Upgrade" versus "With Upgrade"

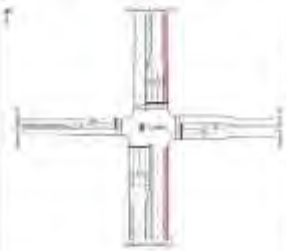
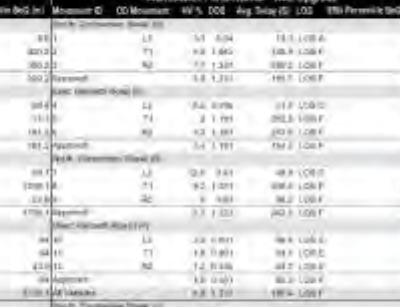
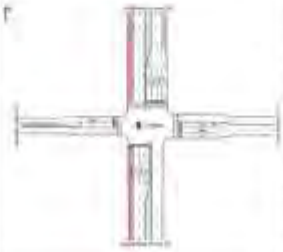
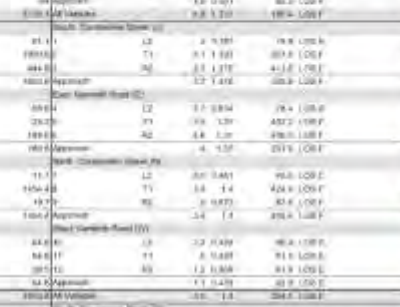
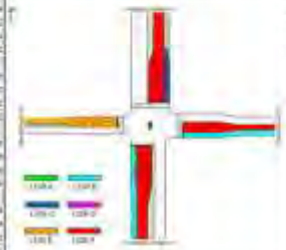
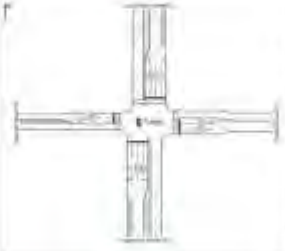
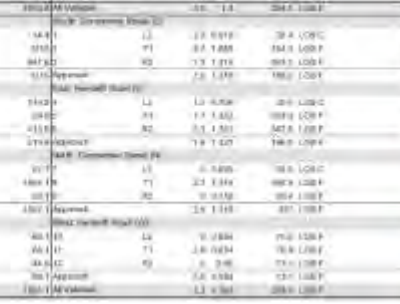
Period	Upgraded SIDRA Geometry	Intersection Performance - Without Upgrade	Intersection Performance - With Upgrade	Lane LOS Summary - With Upgrade	Intersection Performance Summary
AM Peak					The intersection still exceeds typically acceptable performance limits with the upgrade in place however the worst case queue lane have been reduced by around 20% and average delay has been reduced by over 25% (from 247 seconds to 185 seconds).
PM Peak					The intersection still exceeds typically acceptable performance limits with the upgrade in place however the worst case queue lane have been reduced by around 20% and average delay has been reduced by over 44% (from 783 seconds to 429 seconds).
Weekend Peak					The intersection still exceeds typically acceptable performance limits with the upgrade in place however the worst case queue lane have been reduced by around 20% and average delay has been reduced by over 44% (from 425 seconds to 238 seconds).

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Table 11.10: Condamine Street and Balgowlah Road Intersection Performance Summary – Year 2038 Design Traffic Volumes "Without Upgrade" versus "With Upgrade Option 1"

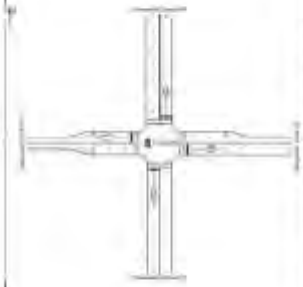
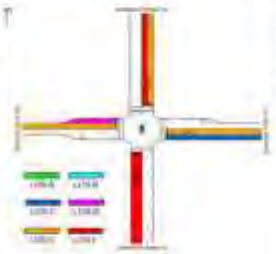
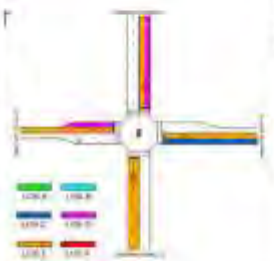
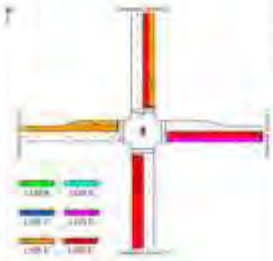
Period	SIDRA Geometry	Intersection Performance Without Upgrade	Intersection Performance With Upgrade Option 1	Lane LOS Summary With Upgrade	Intersection Performance Summary
AM Peak		[illegible]	[illegible]		The intersection still exceeds typically accepted performance limits with the upgrades in place however the worst case queues have been reduced by approximately 75% and average delay has been reduced by approximately 80% (from 207 seconds to 80 seconds). Queues on the northern approach subject through the Condamine Street / Bond Bridge Creek Elevation.
PM Peak		[illegible]	[illegible]		The intersection still exceeds typically accepted performance limits with the upgrades in place however the worst case queues have been reduced by approximately 75% and average delay has been reduced by approximately 80% (from 207 seconds to 80 seconds).
Weekend Peak		[illegible]	[illegible]		The intersection still exceeds typically accepted performance limits with the upgrades in place however the worst case queues have been reduced by approximately 75% and average delay has been reduced by approximately 80% (from 342 seconds to 70 seconds). Queues on the northern approach subject through the Condamine Street / Bond Bridge Creek Elevation.

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Table 11.11: Condamine Street and Balgowlah Road Intersection Performance Summary – Year 2038 Design Traffic Volumes "Without Upgrade" versus "With Upgrade Option 2"

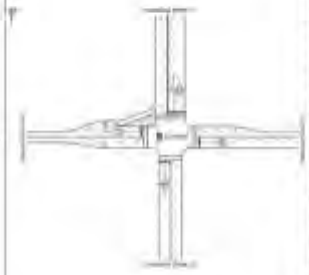
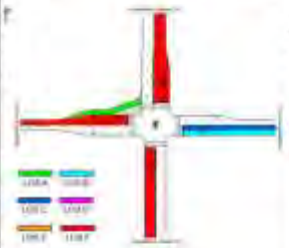
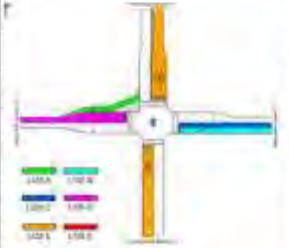
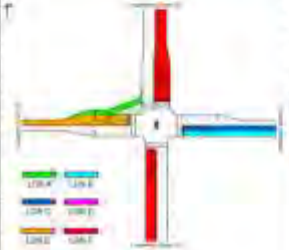
Period	SIDRA Geometry	Intersection Performance Without Upgrade	Intersection Performance With Upgrade Option 2	Lane LOS Summary With Upgrade	Intersection Performance Summary
AM Peak		[illegible]	[illegible]		The intersection still exceeds typically accepted performance limits with the upgrades in place however the worst case (Seeing Nine Lane) reduced by approximately 75% and average delay has been reduced by approximately 80% (from 297 seconds to 50 seconds). Importantly, queues on the northern approach are contained within the the approach.
PM Peak		[illegible]	[illegible]		The intersection still exceeds typically accepted performance limits with the upgrades in place however the worst case (Seeing Nine Lane) reduced by approximately 80% and average delay has been reduced by approximately 80% (from 257 seconds to 50 seconds). Importantly, queues on the northern approach are contained within the the approach.
Weekend Peak		[illegible]	[illegible]		The intersection still exceeds typically accepted performance limits with the upgrades in place however the worst case (Seeing Nine Lane) reduced by approximately 80% and average delay has been reduced by approximately 80% (from 342 seconds to 60 seconds). Queues on the northern approach are at the limit of the approach length - one or two vehicles (may spill into the Condamine Street / Burnt Bridge Creek Deviation intersection).

Table 11.12: Balgowlah Road and Roseberry Street Intersection Performance Summary – Year 2038 Design Traffic Volumes "Without Upgrade" versus "With Upgrade"

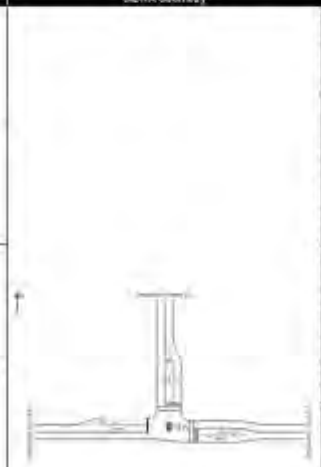
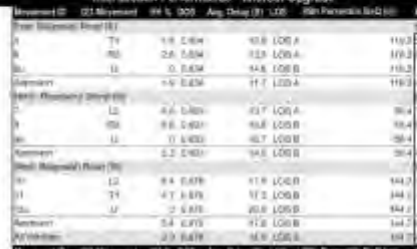
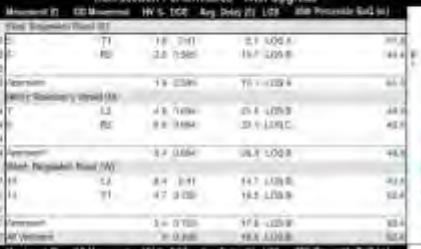
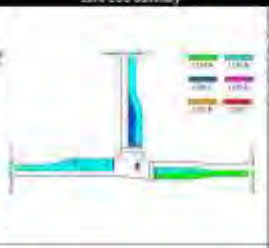
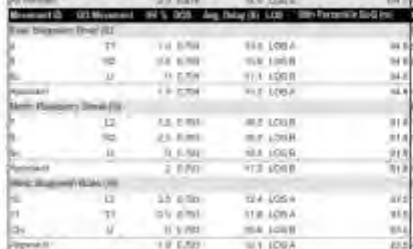
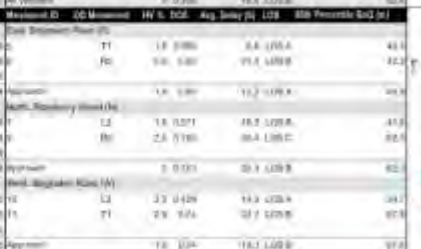
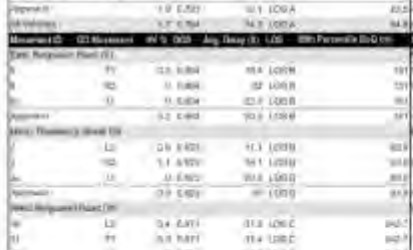
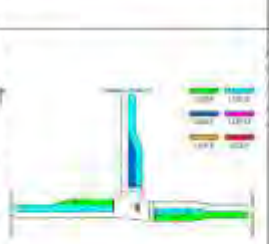
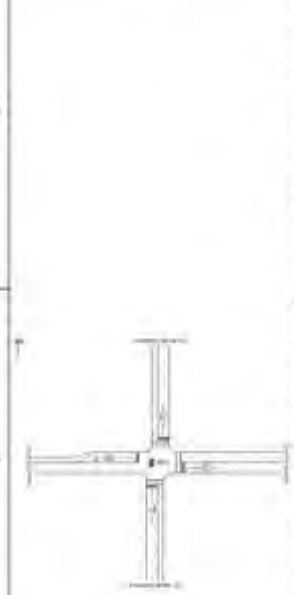
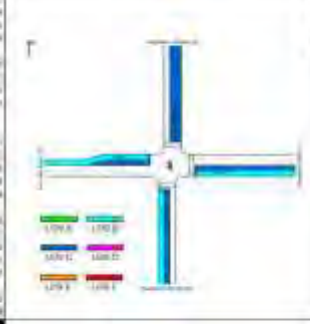
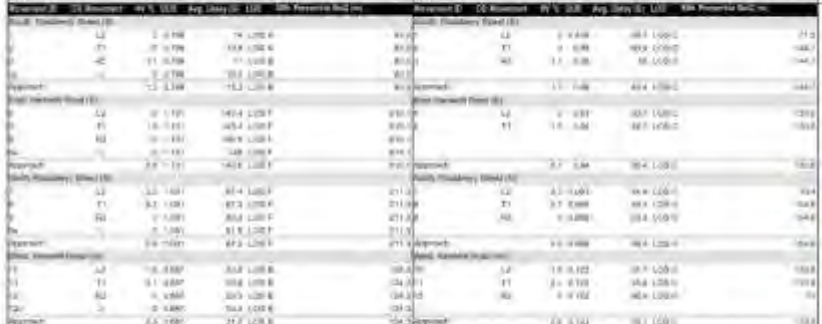
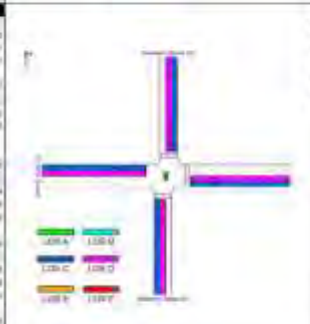
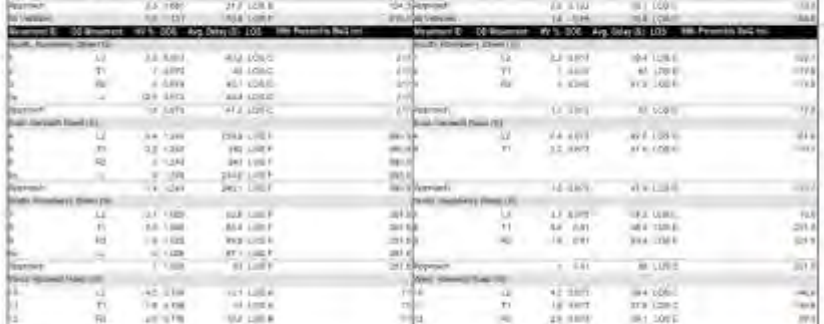
Period	SIDRA Geometry	Intersection Performance Without Upgrade	Intersection Performance With Upgrade	Lane LOS Summary	Intersection Performance Summary
AM Peak					The intersection performs within acceptable performance levels in terms of delay and LOS. All approaches operate with LOS A or B. The degree of saturation (worst case) is 0.71 which is well within the the acceptable limit of 0.9 for a signalised intersection. All queues are contained within the available approach storage lengths.
PM Peak					The intersection performs within acceptable performance levels in terms of delay and LOS. All approaches operate with LOS A or B. The degree of saturation (worst case) is 0.73 which is well within the the acceptable limit of 0.9 for a signalised intersection. All queues are contained within the available approach storage lengths.
Weekend Peak					The intersection performs within acceptable performance levels in terms of delay and LOS. All approaches operate with LOS A or B. The degree of saturation (worst case) is 0.61 which is within the the acceptable limit of 0.9 for a signalised intersection. All queues are contained within the available approach storage lengths.

Table 11.13: Kenneth Road and Roseberry Street Intersection Performance Summary – Year 2038 Design Traffic Volumes "Without Upgrade" versus "With Upgrade"

Period	SIDRA Geometry	Intersection Performance	Intersection Performance With Upgrade	Lane LOS Summary	Intersection Performance Summary
AM Peak					The intersection performs within acceptable performance limits in terms of delay and LOS. The degree of saturation (worst case) is 0.55 which is within the acceptable limit of 0.9 for a signalised intersection and the overall LOS is C. All queues are contained within the upstream approach distances.
PM Peak					The intersection performs within acceptable performance limits in terms of delay and LOS. The degree of saturation (worst case) is 0.69 which is within the acceptable limit of 0.9 for a signalised intersection and the overall LOS is C. Queueing on the western and northern approaches impacts adjacent intersections by 7 vehicle lengths and 6 vehicle lengths. Queues on the eastern approach are significantly reduced.
Weekend Peak					The intersection exceeds acceptable performance limits in terms of delay and LOS. Overall the intersection has an average delay of 48.4 seconds and operates at LOS D. The intersection operates with DOS 0.91 which is marginally outside the acceptable limit of 0.9. Queueing on the western and northern approaches impacts adjacent intersections although overall queueing is significantly reduced on the north, east and southern approaches.

11.2.6 "With Upgrade" Results Summary

The intersection operations are summarised in Table 11.14 based on the overall LOS recorded for each intersection and respective "without upgrade" and "with upgrade" scenario.

Table 11.14: Performance Summary (Overall LOS) – Year 2038 "Without Upgrade" versus "With Upgrade" Scenarios

Intersection	AM Peak	PM Peak	Weekend Peak
Condamine Street / Kenneth Street (Without Upgrade)	F	F	F
Condamine Street / Kenneth Street (With Upgrade)	F	F	F
Condamine Street / Balgowlah Road (Without Upgrade)	F	F	F
Condamine Street / Balgowlah Road (With Upgrade 1)	E	D	E
Condamine Street / Balgowlah Road (With Upgrade 2)	E	D	E
Balgowlah Road / Roseberry Street (Without Upgrade)	A	A	B
Balgowlah Road / Roseberry Street (With Upgrade)	B	B	B
Kenneth Road / Roseberry Street (Without Upgrade)	A	F	F
Kenneth Road / Roseberry Street (With Upgrade)	C	C	D

In summary, the SIDRA modelling indicates that:

- the Condamine Street / Kenneth Street intersection would remain at LOS F, noting that significant improvements are shown to DOS, delay and queuing for the overall intersection performance as a result of the proposed upgrade. However, queue lengths on Condamine Street remain substantially long;
- the overall intersection performance for Condamine Street / Balgowlah Road is improved from LOS F to LOS C/D with upgrade Option 1 and Option 2. Option 2 is recommended to ensure approach queues are contained in available storage limits (queue spilling through upstream intersections is shown to occur for Option 1);
- eastbound approach queues at the Balgowlah Road / Roseberry Street intersection are shown to be contained in available storage limits as a result of the signalised upgrade, which was a primary issue that was being resolved by this upgrade. The provision of pedestrian crossings on the eastern and northern legs will improve pedestrian safety and amenity; and
- the overall intersection performance for Kenneth Road / Roseberry Street is improved from LOS F in the PM and Weekend Peaks to LOS C/D with the signalised upgrade. However, queue storage on the western and northern intersection legs are shown to impact adjacent upstream intersections, which is a trigger for further assessment of the Quirk Road extension to perform the function of a local bypass. The provision of pedestrian crossings on the eastern, northern and southern legs will improve pedestrian safety and amenity.

A copy of the SIDRA outputs is attached at Appendix I.

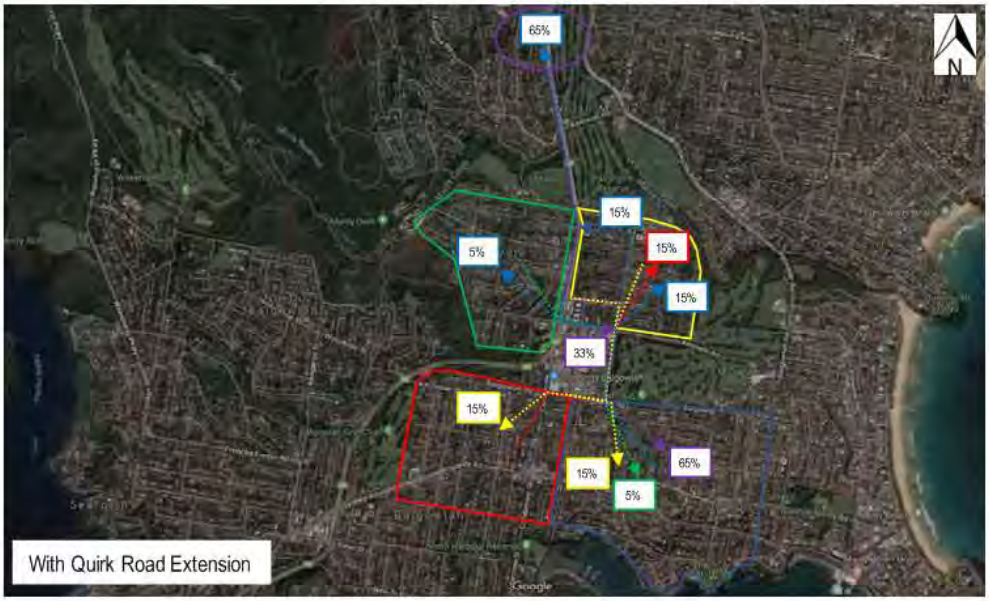
11.2.7 Quirk Road Extension Assessment

The SIDRA results presented in the previous section confirm that the Quirk Road extension is required in the long term to perform a local bypass function and reduce concentrated traffic loadings, particularly on the Kenneth Road / Roseberry Street intersection.

The two way daily traffic on Roseberry Street was estimated from the Year 2038 Design Traffic Volumes on the approaches to Balgowlah Road and Kenneth Road. That is, the AM and PM peak hour traffic volumes were combined and multiplied by a factor of five, which resulted in a two way daily traffic volume in the order of 10,000 vehicles per day (vpd). In collaboration with Council, it was estimated that approximately 35% of this volume would be local trips (i.e. 3,500vpd) that would re assign to the Quirk Road extension. The distribution of traffic using Roseberry Street for "without Quirk Road extension" and "with Quirk Road extension" scenarios was estimated based on a desktop study as shown in Figure 11.1 and Figure 11.2 respectively.

Source: Google Maps

Figure 11.1: Estimated Traffic Distributions for Roseberry Street (Without Quirk Road Extension)



Source: Google Maps

Figure 11.2: Estimated Traffic Distributions for Roseberry Street (With Quirk Road Extension)

Detailed calculations showing the Year 2038 Design Traffic Volumes with Quirk Road extension in place is attached at Appendix H.

The scope of the key intersections was expanded to include the Quirk Road / Kenneth Road roundabout intersection and the Quirk Road / Balgowlah Road priority controlled intersection to determine if upgrades are required as a result of the Quirk Road extension. Traffic volumes for these intersections were sourced from the 2015 Traffic and Transport Assessment for the Balgowlah Industrial Estate Rezoning (i.e. from IN2 to B6) prepared by Christopher Hallam and Associates. This report includes 2015 PM and Weekend peak traffic survey data at the two subject intersections. While it is noted that the AM Peak traffic survey data was not included in the 2015 Study, the PM and Weekend peaks are considered suitable given that these peaks have generally been the worst case scenario for the other intersections in the study area. Notwithstanding, AM Peak traffic surveys and analysis is recommended to be undertaken at a later stage to confirm this assumption.

The 2015 PM and Weekend peak traffic data was adopted for all movements at the subject intersections, except for the through movements on Kenneth Road and Balgowlah Road. These were derived from the Year 2018 traffic survey data at the adjacent intersections to ensure recent development traffic (i.e. Woolworths) was accounted for in the volumes. A 1.25% p.a. linear growth rate was applied to the Year 2015 traffic data to forecast Year 2038 traffic volumes. A copy of the network diagrams showing the Year 2038 Design Traffic Volumes with the Quirk Road extension in place is attached at Appendix H.

Due to the area of expected influence from the Quirk Road extension, the following intersections were assessed in SIDRA Intersection 7 using the Year 2038 Design Traffic Volumes "with Quirk Road extension" scenario:

- Condamine Street / Kenneth Road intersection ("with upgrade");
- Kenneth Road / Roseberry Street intersection ("with upgrade");
- Kenneth Road / Quirk Road intersection ("base");
- Balgowlah Road / Roseberry Street intersection ("with upgrade"); and
- Balgowlah Road / Quirk Road intersection ("base").

The results of the SIDRA analysis are presented in the following Tables.

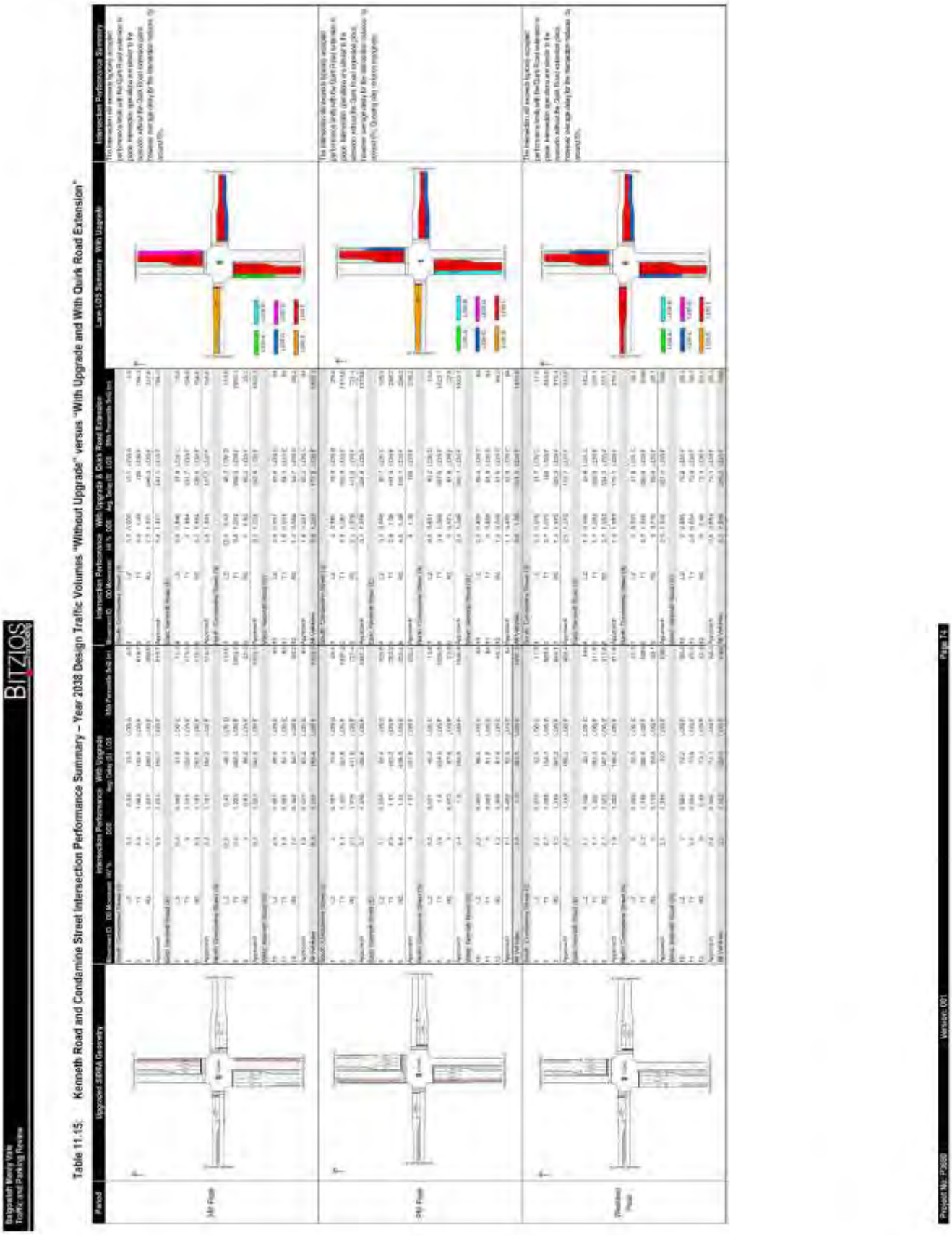


Table 11.15: Kenneth Road and Condamine Street Intersection Performance Summary – Year 2038 Design Traffic Volumes "Without Upgrade" versus "With Upgrade and With Quirk Road Extension"

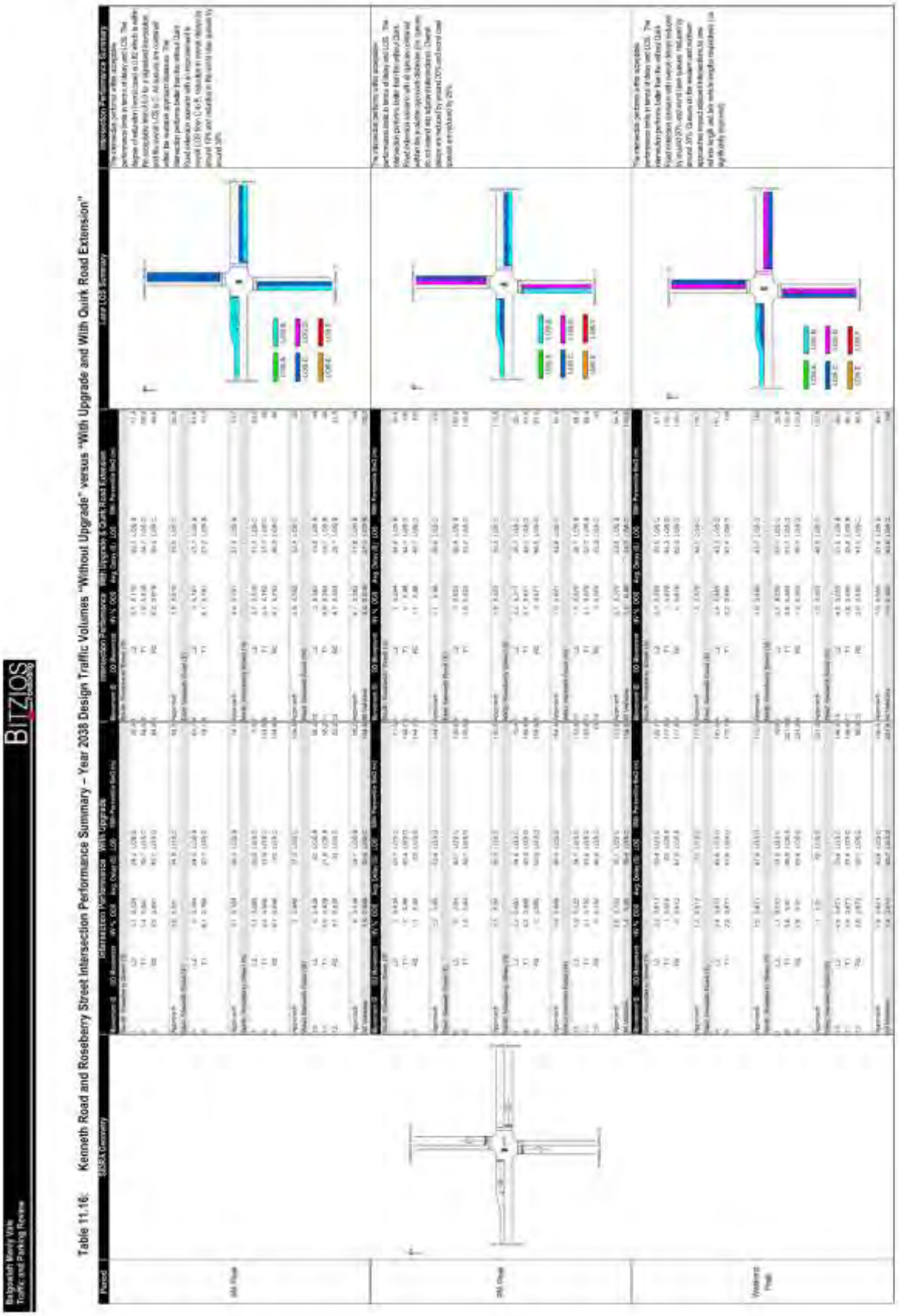


Table 11.16: Kenneth Road and Roseberry Street Intersection Performance Summary – Year 2038 Design Traffic Volumes "Without Upgrade" versus "With Upgrade and With Quirk Road Extension"

Table 11.17: Balgowlah Road and Roseberry Street Intersection Performance Summary – Year 2038 Design Traffic Volumes "Without Upgrade" versus "With Upgrade and With Quirk Road Extension"

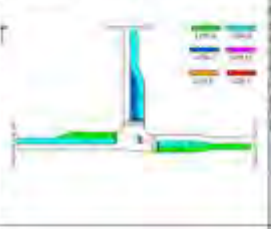
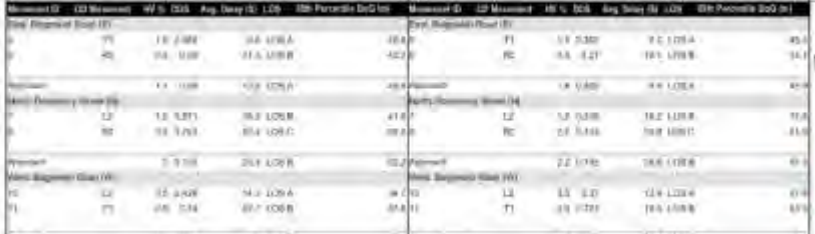
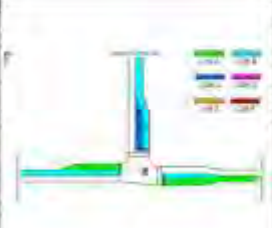
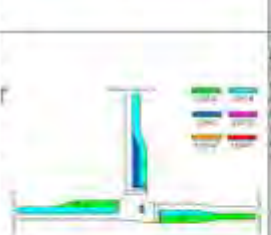
Period	SIDRA Geometry	Intersection Performance With Upgrade	Intersection Performance With Upgrade & Quirk Road Extension	Lane LOS Summary	Intersection Performance Summary
AM Peak					The intersection performs within acceptable performance limits in terms of delay and LOS. All approaches operate with LOS A, B or C. The degree of saturation (worst case) is 0.61 which is well within the the acceptable limit of 0.9 for a signalised intersection. All queues are contained within the available approach storage lengths. Overall performance is slightly improved when compared to the without Quirk Road extension scenario in terms of LOS, delays and queues.
PM Peak					The intersection performs within acceptable performance limits in terms of delay and LOS. All approaches operate with LOS A, B or C. The degree of saturation (worst case) is 0.75 which is well within the the acceptable limit of 0.9 for a signalised intersection. All queues are contained within the available approach storage lengths. Overall performance is slightly improved when compared to the without Quirk Road extension scenario in terms of delays and queues.
Weekend Peak					The intersection performs within acceptable performance limits in terms of delay and LOS. All approaches operate with LOS A, B or C. The degree of saturation (worst case) is 0.61 which is within the the acceptable limit of 0.9 for a signalised intersection. All queues are contained within the available approach storage lengths. Overall performance is slightly improved when compared to the without Quirk Road extension scenario in terms of delays and queues.

Table 11.18: Kenneth Road and Quirk Road Intersection Performance Summary – Year 2038 Design Traffic Volumes "With Quirk Road Extension"

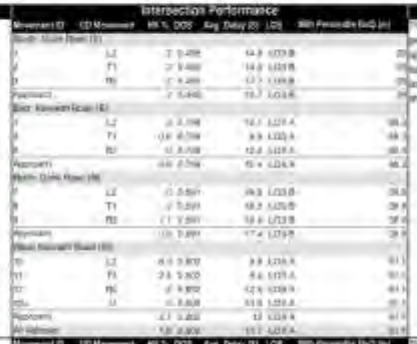
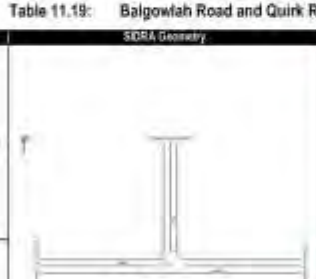
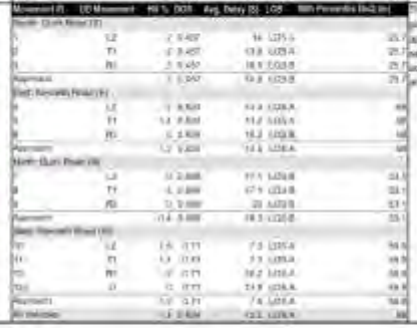
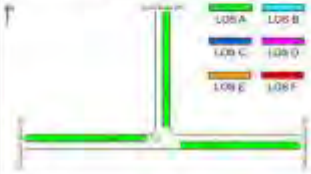
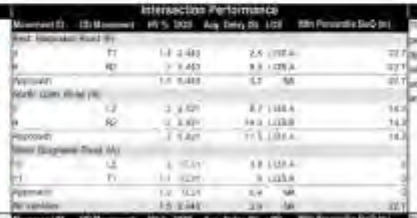
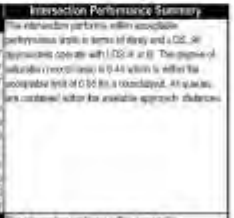
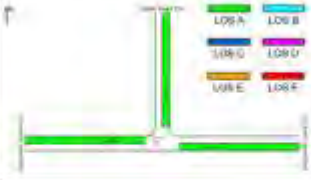
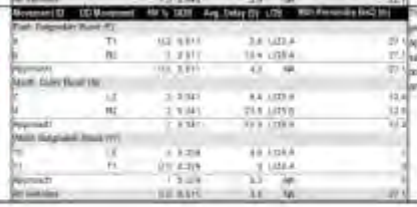
Period	SIDRA Geometry	Year 2038 Volumes	Lane LOS Summary	Intersection Performance	Intersection Performance Summary
PM Peak					
Weekend Peak					

Table 11.19: Balgowlah Road and Quirk Road Intersection Performance Summary – Year 2038 Design Traffic Volumes "With Quirk Road Extension"

Period	SIDRA Geometry	Year 2038 Volumes	Lane LOS Summary	Intersection Performance	Intersection Performance Summary
PM Peak					
Weekend Peak					

11.2.8 "With Upgrade and With Quirk Road Extension" Results Summary

The intersection operations are summarised in Table 11.20 based on the overall LOS recorded for each intersection and respective "without upgrade" and "with upgrade and with Quirk Road extension" scenario.

Table 11.20: Performance Summary (Overall LOS) – Year 2038 "Without Upgrade" versus "With Upgrade and With Quirk Road Extension" Scenarios

Intersection	AM Peak	PM Peak	Weekend Peak
Condamine Street / Kenneth Street (Base)	F	F	F
Condamine Street / Kenneth Street (With Upgrade)	F	F	F
Condamine Street / Kenneth Street (With Upgrade and With Quirk Road Extension)	F	F	F
Kenneth Road / Roseberry Street (Base)	A	F	F
Kenneth Road / Roseberry Street (With Upgrade)	C	C	D
Kenneth Road / Roseberry Street (With Upgrade and With Quirk Road Extension)	B	C	C
Kenneth Road / Quirk Road (Base with Quirk Road Extension)	N/A	A	A
Balgowlah Road / Roseberry Street (Base)	A	A	B
Balgowlah Road / Roseberry Street (With Upgrade)	B	B	B
Balgowlah Road / Roseberry Street (With Upgrade and With Quirk Road Extension)	A	B	B
Balgowlah Road / Quirk Road (Base with Quirk Road Extension)	N/A	A	A

The SIDRA analysis demonstrates that the Quirk Road extension provides operational improvements to the intersections of Condamine Street / Kenneth Road, Kenneth Road / Roseberry Street and Balgowlah Road / Roseberry Street. In particular, the modelling shows that the eastbound queues at the Kenneth Road / Roseberry Street intersection do not extend back to Condamine Street. Furthermore, the PM and Weekend peak analysis for the Quirk Road intersections with Kenneth Road and Balgowlah Road are expected to operate within satisfactory performance limits at Year 2038 with the extension in place in their current intersection forms.

The modelling concludes that the Quirk Road extension is essential to maintain access and alleviate circular congestion around the Condamine Street / Kenneth Road intersection and the Kenneth Road / Roseberry Street intersection. This finding confirms the 2010 and 2015 studies by Christopher Hallam and Associates which also recommended the Quirk Road extension.

11.2.9 Quirk Road Extension – Alignment and Constraints

Council's adopted Sportsground Strategy (July 2017) identifies current concerns about shortage of sporting fields within the area. As such, a key constraint for the Quirk Road extension will be to ensure that the Manly West Oval is retained to comply with this Strategy.

Furthermore, the extension will necessitate changes to the Quirk Road cross section with the removal of angled parking. This parking is relied upon and heavily utilised by adjoining businesses and Council's Depot. While the majority of parking can be replaced with on street kerbside parallel parking, it is recommended that additional car parking for the area is "sleeved" around the Manly West Oval. This will provide formalised parking for the Oval which can be cross utilised by surrounding businesses during daytime hours and by recreational users outside business hours (i.e. in the same way that the existing angle parking serves the temporal effects of the surrounding land uses now).

A shared pathway is recommended to be constructed between the Manly West Oval and Roseberry Street via Council owned land (described as 1C Quirk Road) for permeation, activation and improved active transport amenity.

11.2.10 Intersection Improvements Summary

The recommended intersection improvements (including the Quirk Road extension) are summarised in Table 11.21.

Table 11.21: Intersection Improvements Summary and ID

Location	ID	Recommendation(s)
Condamine Street / Kenneth Road	RN 7	Conversion of the eastern leg through lane to a shared "through right turn" and a change of the phase sequence from a "double diamond overlap" to a "single diamond overlap with split side streets"
Condamine Street / Balgowlah Road	RN 8	Removal of the eastbound right turn movement, inclusion of a left turn slip lane on the western leg, inclusion of a new southbound right turn pocket, time of day kerbside parking restrictions on all approaches / departures and a phase sequence change. Note: Council owned land on the north western corner is required to facilitate this upgrade.
Balgowlah Road / Roseberry Street	RN 9	Signalised upgrade, including pedestrian crossings on the northern and eastern legs.
Kenneth Road / Roseberry Street	RN 10	Signalised upgrade, including removal of the right turn from the eastern leg and time of day kerbside parking restrictions on all approaches / departures.
Quirk Road Extension	RN 11	Extension of Quirk Road between Kenneth Road and Balgowlah Road, including kerbside parallel car parking along most of new roadway. Proposed adjustment to the Manly West Oval and new public car parking and a new shared pathway between the Oval and Roseberry Street via Council owned land.

11.3 ROAD INFRASTRUCTURE IMPROVEMENTS

The road infrastructure items classified as "poor condition" in the existing conditions assessment have been investigated further to determine appropriate solutions. Table 11.22 details each item in terms of location, solution and whether any further action is required. For items where no further action is deemed required, supporting justification is provided. A map detailing location of each item and corresponding ID is attached at Appendix J. It is noted that five of the original 60 items were removed from the list due to duplicate points recorded for two kerb ramp items during the site inspection, and three bus stop items were later found to be for school routes only (that is, these were identified initially due to the layout being markedly different to a standard bus stop).

Table 11.22: Road Infrastructure "Poor Condition" Location, Issue and Solution/Other

Map ID	Type	Location	Issue	Solution	Action Required	Commentary
9	Bus Stop	2a King St	Absent hardstand	Construct concrete hardstand with TGSI tiles	Yes	N/A
39	Kerb ramps	Sunshine St / Somerville Pl SW Corner	No compliant kerb ramp (narrow and steep)	Replace kerb ramp	Yes	N/A
69	Kerb ramps	Kenneth Rd / Condamine St (SW corner)	Steep / non compliant kerb ramp	Replace kerb ramp	Yes	N/A
101	Kerb ramps	Koorala St / Roseberry St SE Corner	Absent Kerb Ramp	Provide kerb ramp	Yes	N/A
118	Kerb ramps	Condamine St / Hayes Ln NE Corner	Absent Kerb Ramp	Provide kerb ramp	Yes	N/A
123	Kerb ramps	Condamine St / Hayes Ln SE Corner	Substandard kerb ramp with lip at front of kerb	Replace kerb ramp	Yes	N/A
163	Kerb ramps	Comdaine St / Burnt Bridge Creek Deviation Left Slip	Steep kerb ramp with lip at front of kerb	Replace kerb ramp	Yes	N/A
171	Kerb ramps	Condamine St (W) Freedom Access (S)	Substandard kerb ramp with lip at front of kerb, directs pedestrians towards traffic	Replace kerb ramp	Yes	N/A
173	Kerb ramps	Condamine St (W) Freedom Access (N)	Substandard kerb ramp with lip at front of kerb, directs pedestrians towards traffic	Replace kerb ramp	Yes	N/A
326	Kerb ramps	Griffith St / Waratah St Intersection South leg	Both kerb ramps absent	Provide 2x kerb ramps	Yes	N/A
331	Kerb ramps	Griffith St / Boyle St Intersection South leg	Both kerb ramps absent	Provide 2x kerb ramps	Yes	N/A
338	Kerb ramps	Griffith St / Boyle St Intersection NW corner	Kerb ramp absent	Provide kerb ramp	Yes	N/A
339	Kerb ramps	Griffith St / Boyle St Intersection North leg	Both kerb ramps absent	Provide 2x kerb ramps	Yes	N/A
22	Other	269 Condamine St (W)	Retaining wall leaning towards footpath	Remove / repair / replace retaining wall	Yes	N/A
36	Other	2 Sunshine St	Faded / worn school zone	Repaint school zone pavement	Yes	N/A

Map ID	Type	Location	Issue	Solution	Action Required	Commentary
			pavement marking	marking		
255	Other	Many West Oval north access bridge	Worn / substandard fencing / railing over the watercourse	Replace barrier	Yes	N/A
365	Other	Hill St North of Griffith St	Faded / worn school zone pavement marking	Repaint school zone pavement marking	Yes	N/A
19	Pathways	Condamine St (W) fronting St Kierans Church	Shared path bends and posts are present in the shared path	Realign shared path or relocate posts	No	Posts do not pose a significant hazard and as such relocation / realignment is not warranted
24	Pathways	272 Condamine St (E)	Directional sign and lantern posts located on shared path	Relocate posts	No	Posts do not pose a significant hazard and are necessary for road operations
31	Pathways	333 Condamine St (W)	Missing / damaged footpath	Replace / repair footpath	Yes	N/A
48	Pathways	Condamine St (W) at Somerville Pl footpath connection	Damaged / missing / uneven footpath	Replace / repair footpath	Yes	N/A
50	Pathways	285 287 Condamine St (W)	Damaged / missing / uneven footpath	Replace / repair footpath (possibly will be repaired with the completion of the development)	Yes	N/A
60	Pathways	92 Kenneth Rd (N)	Footpath bends and narrows plus driveways create uneven surfaces / pinches	Realign footpath	No	Footpath alignment is constrained by an existing embankment
62	Pathways	Pitt St approaching Kenneth Rd (S)	Footpath bordering back of kerb becomes very narrow	Widen footpath	No	Area is constrained, and the minimal demand would not warrant the high expense to widen the path
65	Pathways	Pitt St / Kenneth Rd Intersection	Narrow substandard footpath bordering edge of kerb with steps leading into intersection	Remove unnecessary / unsafe footpath and provide fencing / barriers	Yes	N/A
66	Pathways	9 Kenneth Rd (S)	Uneven footpath	Repair footpath	Yes	N/A
67	Pathways	1 Kenneth Rd (S)	Absent / uneven footpath	Provide / repair / replace footpath	Yes	N/A
70	Pathways	269 Condamine St (W)	Damaged / uneven footpath	Repair / replace footpath	Yes	N/A
80	Pathways	240 Condamine St (E)	Post located on shared path	Relocate post	No	The existing line marking and hazard marking is deemed a sufficient treatment
82	Pathways	240 Condamine St (E)	Landscaping extrudes slightly into shared path	Move landscaping back and provide full shared path width	Yes	N/A
103	Pathways	214 Kenneth Rd (S)	Uneven footpath	Repair footpath	No	Levelling the footpath would affect access driveways and sufficient level footpath width is available

Map ID	Type	Location	Issue	Solution	Action Required	Commentary
106	Pathways	234 Condamine St (E)	Roadside sign located on shared path	Relocate road sign	No	The existing line marking and hazard marking is deemed a sufficient treatment
107	Pathways	232 Condamine St (E)	Roadside signs located on shared path	Relocate signs	No	The existing line marking and hazard marking is deemed a sufficient treatment
114	Pathways	214 Condamine St (E)	Services located on the shared path	Relocate services	No	Services pose minimal hazard and as such relocation is deemed not warranted
127	Pathways	182 Condamine St (E)	Uneven footpath	Repair / replace footpath	Yes	N/A
160	Pathways	Condamine St (W) opposite Harvey Norman	Uneven footpath narrows to create pinch point	Repair / replace footpath and realign if required	Yes	N/A
177	Pathways	259 Condamine St (W)	Posts located in the footpath	Remove / relocate posts	No	Posts do not result in notable adverse safety or amenity impacts and as such removal would be an unnecessary expense
179	Pathways	261 Condamine St (W)	Damaged / missing / uneven footpath	Replace / repair footpath (possibly will be repaired with the completion of the development)	Yes	N/A
195	Pathways	60 Kenneth Rd (N)	Services located on the shared path	Relocate services	No	Services pose minimal hazard and as such relocation is not warranted
198	Pathways	Kenneth Rd (N) west of Quirk Rd	Services located on the shared path	Relocate services	No	Services pose minimal hazard and as such relocation is not warranted
203	Pathways	Kenneth Rd / Quirk Rd NE Corner	Post located on shared path	Relocate post	No	Post is required for street lighting, signage and power transmission
207	Pathways	Kenneth Rd (S) east of Quirk Rd	Kerb ramp located across shared path	Relocate kerb ramp	No	Kerb ramp required for pedestrian crossing location
210	Pathways	61 Kenneth Rd (S)	Absent footpath	Provide footpath	No	No practical solution to install pathway due to existing embankment and transformer
231	Pathways	2/62 Balgowlah Rd	Footpath narrows behind carparking	Widen footpath	No	Refer RN 2 works
233	Pathways	Roseberry St (W) fronting Harvey Norman	Damaged Footpath	Repair / repair footpath (tree roots may impact repair)	Yes	N/A
240	Pathways	20 Roseberry St (E)	Absent footpath	Provide footpath	No	Works to be undertaken as part of PN 6
247	Pathways	Quirk Rd (W) north of Balgowlah Rd	Footath narrows behind parking	Realign footpath and provide wheel stops in parking to prevent vehicle	No	With the high quality shared path opposite, works are not warranted to widen this area of footpath

Map ID	Type	Location	Issue	Solution	Action Required	Commentary
				overhang		
275	Pathways	64 Balgowlah Rd (N)	Damaged / Uneven footpath	Repair / replace footpath	Yes	N/A
287	Pathways	Balgowlah Rd / Boyle St SE Corner	Post on footpath	Relocate post	No	Post is required for power transmission and street lighting
64	Priority controlled intersections	Pitt St / Kenneth Rd intersection	Pitt street approach is a blind corner and very narrow, insufficient sight distances at the intersection	Road safety audit	Yes	N/A
38	School Zone Signs	1 Sunshine St (W)	School zone speed limit sign obstructed by light pole	Relocate school zone speed limit sign to the west side of the light pole	Yes	N/A
119	Speed Limit Signs	2 Hayes St (N)	Worn / damaged speed sign	Replace speed limit sign	Yes	N/A
125	Speed Limit Signs	192 Condamine St (E)	Damaged speed limit sign	Replace speed limit sign	Yes	N/A
185	Speed Limit Signs	80 Roseberry St (W)	Damaged speed limit sign	Replace speed limit sign	Yes	N/A
321	Speed Limit Signs	36 Hills St (E)	End school zone sign obstructed by tree	Relocate sign or trim tree	Yes	N/A

11.4 IMPROVEMENTS TO ADDRESS COMMUNITY FEEDBACK

The key issues revealed though community feedback and summarised in the existing conditions assessment have been assessed and recommended solutions are proposed in Table 11.23.

Table 11.23: Key Community Feedback Issues and Recommended Solutions

Item	ID	Recommendation(s)
Balgowlah Road / Quirk Road Intersection: sight distance turning out of Quirk Road is impeded by on street parking.	CF 1	Install "No Parking" signage on eastbound approach and departure sides to improve sight distances for vehicles turning out of Quirk Road (south).
Condamine Street / Kenneth Road: congestion on westbound approach.	CF 2	Refer solution for RN 7.
Roseberry Street: general concern about congestion, particularly with emerging development.	CF 3	Refer solution for RN 11.
Roseberry Street / Balgowlah Road Intersection: 90 degree parking on northern leg has been raised as being too close to the roundabout and adversely affecting safety and performance.	CF 4	Convert existing 90 degree car parking to 30 degree (nose in) and include signage for Roseberry Street southbound traffic to access bays via u turn at roundabout.
Roseberry Street / Balgowlah Road Intersection: zebra crossing on northern leg has been raised as being too close to the roundabout and adversely affecting safety and performance.	CF 5	Convert zebra crossing to raised platform and relocate further away from roundabout.
Roseberry Street / Kenneth Road Intersection: congestion extending back from westbound approach at the Condamine Street / Kenneth Road intersection.	CF 6	Not a direct issue with the roundabout performance or capacity, but a queue interaction issue from westbound approach at Condamine Street / Kenneth Road intersection. Refer solution for RN 7.
Request for Somerville Place to be converted to one way due to road width	CF 7	Conversion of Somerville Place between King Street and Sunshine Street to one way southbound only. The southbound direction was determined to be the most suitable outcome based on the road network structure and accessibility to/from Condamine Street.

11.5 RMS / TFNSW INTERFACES

Engagement with RMS and TfNSW is recommended for the following matters:

- the SIDRA assessment identified significant vehicle queuing on Condamine Street at its signalised intersections with King Street and Kenneth Road. It is recommended that engagement with RMS is undertaken to plan for future capacity needs of this corridor (or alternative network links) to ensure a suitable level of access for the study area;
- the crash analysis in the existing conditions assessment identified a high number of recorded crashes on Condamine Street at its intersections with King Street, Kenneth Road and Sunshine Street. It is recommended that engagement with RMS is undertaken such that these crashes can be further investigated, and appropriate treatments selected and implemented; and
- engagement with TfNSW about the relocation of the bus stop on eastern side of Condamine Street, from north of Balgowlah Road to south of Balgowlah Road

11.6 SUMMARY OF STRATEGIC TRAFFIC MANAGEMENT PLAN RECOMMENDATIONS

A number of traffic management recommendations have been made in order to manage future growth in the study area, rectify existing issues and address community feedback. The recommendations work towards achieving Goal 17 of the Northern Beaches Community Strategic Plan by maintaining and enhancing roads and roads related infrastructure. Table 11.24 summarises the Strategic Traffic Management Plan key recommendations and associated concept layout plan drawing number references (where applicable), which are attached at Appendix K. Cost estimates and prioritisation of recommended works is presented in Section 14.

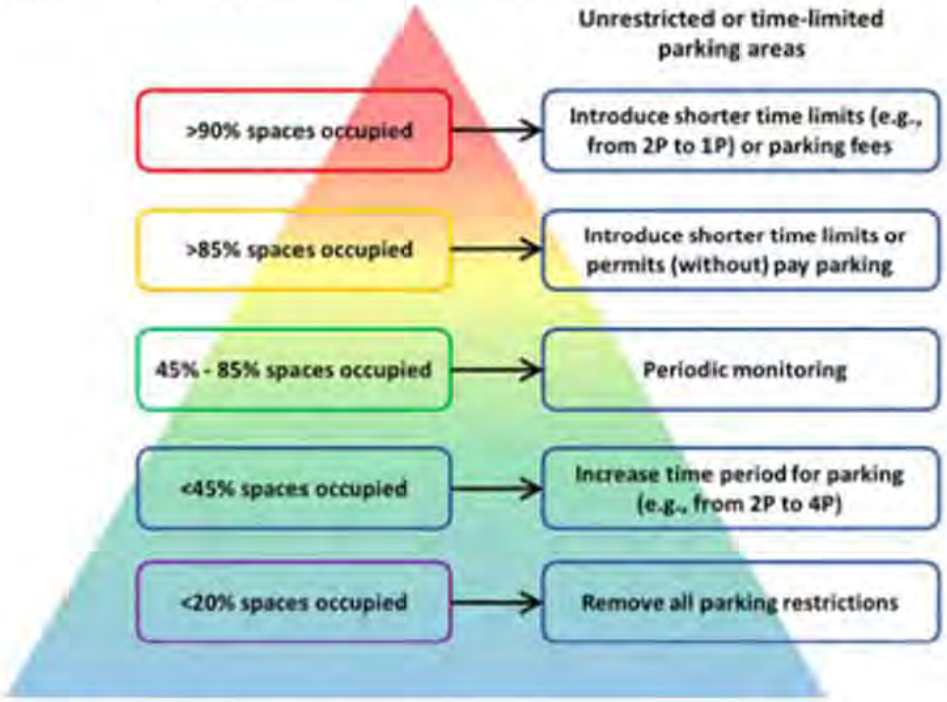
Table 11.24: Strategic Traffic Management Plan Recommendations

Location / Item	ID	Recommendation(s)	Drawing Number / Reference
Narrow road width on Quirk Road (North) between Kenneth Road and End	RN 1	Remove kerbside parallel car parking from western side of subject road section and install 30 degree parking on eastern side (to be signed as "reverse in only" to reduce vehicles turning around at southern end of Quirk Road (North)). This achieves a compliant roadway width.	RN SK001
Narrow road width on Roseberry Street adjacent to Balgowlah Road	RN 2	Convert existing 90 degree car parking to 30 degree ("nose in only" for parking manoeuvre efficiency due to adjacent roundabout intersection). This achieves a compliant roadway width.	RN SK002
Narrow road width: Sunshine Street	RN 3	No change - residential street, low speed environment. Further monitoring is required.	N/a
Narrow road width: Boyle Street	RN 4	No change - residential street, low speed environment. Further monitoring is required.	N/a
Delineation deficiencies on Sunshine Street on approach to Condamine Street	RN 5	Installation of parking edge lines for delineation and driver guidance.	RN SK003
Quirk Road (North) terminates with no turning head	RN 6	A concrete apron at the cul de sac was tested using a refuse collection vehicle swept path. However, no suitable location was determined due to existing constraints. Further monitoring is required.	N/a
Condamine Street / Kenneth Road intersection operating at LOS F	RN 7	Conversion of the eastern leg through lane to a shared "through right turn" and a change of the phase sequence from a "double diamond overlap" to a "single diamond overlap with split side streets"	RN SK004
Condamine Street / Balgowlah Road intersection operating at LOS F	RN 8	Removal of the eastbound right turn movement, inclusion of a left turn slip lane on the western leg, inclusion of a new southbound right turn pocket, time of day kerbside parking restrictions on all approaches / departures and a phase sequence change. Note: Council owned land on the north western corner is required to facilitate this upgrade.	RN SK005
Balgowlah Road / Roseberry Street	RN 9	Signalised upgrade, including pedestrian crossings on the northern and eastern legs.	RN SK006
Kenneth Road / Roseberry Street	RN 10	Signalised upgrade, including removal of the right turn from the eastern leg and time of day kerbside parking restrictions on all approaches / departures.	RN SK007
Quirk Road extension	RN 11	Extension of Quirk Road between Kenneth Road and Balgowlah Road, including kerbside parallel car parking along most of new roadway. Proposed adjustment to the Manly West Oval and new public car parking and a new shared pathway between the Oval and Roseberry Street via Council owned land.	RN SK008
60 road infrastructure items classified as "poor condition"	RI 1	Rectification / remedial works recommended for 35 items.	Appendix J
Balgowlah Road / Quirk Road intersection: sight distance turning out of Quirk Road is impeded by on street parking.	CF 1	Install "No Parking" signage on eastbound approach and departure sides to improve sight distances for vehicles turning out of Quirk Road (south).	CF SK001
Condamine Street / Kenneth Road: congestion on westbound approach.	CF 2	Refer solution for RN 7.	N/a
Roseberry Street: general concern about congestion, particularly with emerging development.	CF 3	Refer solution for RN 11.	Refer RN 11
Roseberry Street / Balgowlah Road Intersection: 90 degree parking on northern leg has been raised as being too close to the roundabout and adversely affecting safety and performance.	CF 4	Convert existing 90 degree car parking to 30 degree (nose in) and include signage for Roseberry Street southbound traffic to access bays via u turn at roundabout.	N/a
Roseberry Street / Balgowlah Road Intersection: zebra crossing on northern leg has been raised as being too close to the roundabout and adversely affecting safety and performance.	CF 5	Convert zebra crossing to raised platform and relocate further away from roundabout.	CF SK002
Roseberry Street / Kenneth Road Intersection: congestion extending back from westbound approach at the Condamine Street / Kenneth Road intersection.	CF 6	Not a direct issue with the roundabout performance or capacity, but a queue interaction issue from westbound approach at Condamine Street / Kenneth Road intersection. Refer solution for RN 7.	N/a
Request for Somerville Place to be converted to one way due to road width	CF 7	Conversion of Somerville Place between King Street and Sunshine Street to one way southbound only. The southbound direction was determined to be the most suitable outcome based on the road network structure and accessibility to/from Condamine Street.	CF SK003

12. STRATEGIC PARKING PLAN

12.1 ASSESSMENT FRAMEWORK AND METHODOLOGY

Figure 12.1 illustrates the parking assessment framework recommended for the study area. The framework provides parking occupancy thresholds and associated recommended actions to adjust parking restrictions to suit prevailing conditions. While it is identified as an option in the framework, the introduction of paid parking within the study area is not considered based on Council's current position on this matter. It is recommended that Council programmes regular parking surveys for the study area (usually every 3 5 years), or when major changes occur, such as large developments.



Source: Willoughby City Council

Figure 12.1: Parking Occupancy Framework

The methodology to apply the parking occupancy framework to the study area to assess the suitability of existing parking restrictions is as follows:

- determining average weekday and weekend parking occupancy / utilisation from survey data obtained by Traffic Data and Control (TDC) on Thursday the 21st of June and Saturday the 23rd of June;
- comparing collected data against the parking occupancy framework;
- identifying areas where consideration should be given to introducing, removing or changing parking restrictions;
- consulting with Council to understand the context of the area and ensure changes in parking restrictions do not adversely impact local residents / business owners; and
- presenting a suite of parking restriction changes as determined by the above steps.

12.2 PARKING RESTRICTION CHANGES

From the above methodology, several changes to parking restrictions within the study area were identified as detailed in Table 12.1 overleaf.

Table 12.1: Parking Restriction Changes

ID	Area	Restriction	Average Occupancy		Change Triggered?		Recommended Actions
			Weekday	Weekend	Weekday	Weekend	
1	Koorala St (N) Condamine St to 2P zone	NR	91%	74%	YES	NO	Introduce parking restriction (2P)
2	Koorala St (N) existing 3P zone	2P	[illegible]	[illegible]	YES	YES	Reduce parking restriction time limits (2P to 1P)
3	Koorala St (N) Quirk Rd to 2P zone	NR	87%	81%	YES	NO	Periodic monitoring residential land uses adjacent
4	Koorala St (S) Quirk Rd to Roseberry St	NR	76%	64%	NO	NO	Periodic monitoring
5	Quirk Rd (E) – Burchmore Rd to Laurie Rd	NR	81%	68%	NO	NO	Periodic monitoring
6	Quirk Rd (E) – Laurie Rd to Kenneth Rd	NR	95%	82%	YES	NO	Periodic monitoring residential land uses adjacent
7	Quirk Rd (W) – Kenneth Rd to Koorala St	NR	92%	83%	YES	NO	Periodic monitoring residential land uses adjacent
8	Quirk Rd (W) – Kenneth Rd to Manly West Oval	NR	100%	73%	YES	NO	Periodic monitoring adjacent businesses rely on this parking
9	Kenneth Rd (S) – Quirk Rd to Roseberry St	NR	91%	86%	YES	YES	Periodic monitoring adjacent businesses rely on this parking
10	Kenneth Rd (N) – Quirk Rd to Roseberry St	NR	95%	72%	YES	NO	Periodic monitoring residential land uses adjacent
11	Roseberry St (E) – Kenneth Rd to Koorala St	NR	85%	79%	NO	NO	Periodic monitoring residential land uses adjacent
12	Roseberry St (W) – Kenneth Rd to Koorala St	NR	94%	88%	YES	YES	Periodic monitoring residential land uses adjacent
13	Koorala St (S) – Roseberry St to Condamine St	NR	96%	68%	YES	NO	Introduce parking restriction (4P Mon Fri between 8AM 5PM) to encourage commuters to use B Line car park
14	Condamine St (E) – Koorala St to Kenneth Rd	NR	83%	85%	NO	NO	Periodic monitoring
15	Hayes St (N) – Condamine St to Roseberry St	NR	59%	93%	NO	YES	Periodic monitoring
16	Hayes St (S) – Condamine St to Roseberry St	NR	72%	61%	NO	NO	Periodic monitoring
17	Kenneth Rd (N) – Condamine St to Highview Av	NR	8%	0%	YES	YES	Periodic monitoring
18	Condamine St (W) – Kenneth Rd to Koorala St	NR	63%	79%	NO	NO	Periodic monitoring
19	Condamine St (W) – Koorala St to Sunshine St	2P	77%	78%	NO	NO	Periodic monitoring
20	Condamine St (W) – Sunshine St to King St	1P	61%	62%	NO	NO	Periodic monitoring
21	Balgowlah Rd (N) – Condamine St to Roseberry St	NR	75%	97%	NO	YES	Periodic monitoring residential land uses adjacent
22	Balgowlah Rd (N) –Roseberry St to 2P zone	NR	83%	69%	NO	NO	Periodic monitoring
23	Balgowlah Rd (N) – 2P zone west of Quirk Rd	2P	75%	56%	NO	NO	Periodic monitoring
24	Balgowlah Rd (N) – 2P zone east of Quirk Rd	2P	69%	69%	NO	NO	Periodic monitoring
25	Balgowlah Rd (N) – 4P zone east of Quirk Rd	4P	54%	9%	YES	YES	Periodic monitoring
26	Hill St (E) – Balgowlah Rd to Harland Rd	4P	45%	7%	NO	YES	Periodic monitoring
27	Hill St (E) – Harland Rd to Bus zone	4P	56%	11%	NO	YES	Periodic monitoring
28	Hill St (E) – Bus Zone to Griffiths St	4P	21%	0%	YES	YES	Periodic monitoring
29	Hill St (W) – Griffiths St to No Stopping zone	NR	28%	0%	YES	YES	Periodic monitoring
30	Hill St (W) – Drop off / Pick up zone	NR	54%	37%	NO	YES	Periodic monitoring
31	Hill St (W) – 4P zone south of Balgowlah Rd	NR	55%	14%	NO	YES	Periodic monitoring
32	Balgowlah Rd (S) – Hill St to Marjory Thomas Pl	NR	63%	34%	NO	YES	Periodic monitoring
33	Marjory Thomas Pl	NR	75%	78%	NO	NO	Periodic monitoring
34	Balgowlah Rd (S)– Marjory Thomas Pl to Boyle St	NR	93%	90%	YES	YES	Periodic monitoring adjacent businesses rely on this parking
35	Boyle St (E) – Balgowlah Rd to No Stopping zone	NR	89%	84%	NO	NO	Periodic monitoring
36	Boyle St (E) – Drop off / Pick up zone	NR	94%	95%	YES	YES	Periodic monitoring
37	Boyle St (E) – Drop off / Pick up zone to Griffith St	NR	93%	94%	YES	YES	Introduce permanent parking restriction to prohibit non motor vehicles
38	Griffiths St (N) – Boyle St to Waratah St	NR	63%	67%	YES	NO	Introduce permanent parking restriction to prohibit non motor vehicles
39	Griffiths St (N) – Bus zone	NR	13%	0%	YES	YES	Introduce permanent parking restriction to prohibit non motor vehicles
40	Griffiths St (N) – Bus Zone to Hill St	NR	93%	8%	NO	YES	Periodic monitoring
41	Griffiths St (S) – Hill St to Waratah St	NR	98%	73%	YES	NO	Introduce permanent parking restriction to prohibit non motor vehicles
42	Griffiths St (S) – Waratah St to Boyle St	NR	91%	93%	YES	YES	Introduce permanent parking restriction to prohibit non motor vehicles
43	Boyle St (W) – Griffiths St to Lodge St	NR	99%	71%	YES	NO	Introduce permanent parking restriction to prohibit non motor vehicles
44	Lodge St (S) – Boyle St to Condamine St	NR	48%	44%	NO	YES	Periodic monitoring
45	Lodge St (N) – Boyle St to Condamine St	NR	51%	62%	NO	NO	Periodic monitoring
46	Boyle St (W) – Lodge St to Balgowlah Rd	NR	94%	64%	NO	NO	Periodic monitoring
47	Balgowlah Rd (S) – Boyle St to Condamine St	NR	70%	73%	NO	NO	Periodic monitoring
48	Condamine St (E) – Balgowlah Rd to Lodge St	NR	73%	65%	NO	NO	Periodic monitoring
49	Condamine St (W) – Balgowlah Rd to Lodge St	NR	55%	53%	NO	NO	Periodic monitoring
50	Quirk Rd (E) – Kenneth Rd to Manly West Oval	NR	99%	61%	YES	NO	Periodic monitoring adjacent businesses rely on this parking
51	Quirk Rd (E) – Balgowlah Rd to Manly West Oval	NR/4P	81%	36%	NO	YES	Change all parking spaces to 3P
52	Quirk Rd (W) – Balgowlah Rd to Manly West Oval	NR	78%	7%	NO	YES	Install "No Parking on Verge" signage to prohibit parking on the verge
53	Roseberry St (E) – Kenneth Rd to No Stopping	NR	84%	84%	NO	NO	Periodic monitoring
54	Roseberry St (E) – Hayes St to 1P zone	NR	75%	81%	NO	NO	Periodic monitoring
55	Roseberry St (E) – 1P zone north of Balgowlah Rd	1P	74%	71%	NO	NO	Periodic monitoring
56	Roseberry St (W) – 2P zone fronting Cafe	2P	71%	79%	NO	NO	Periodic monitoring
57	Roseberry St (W) – 0.5P zone south of Bunnings	0.5P	67%	67%	NO	NO	Periodic monitoring
58	Roseberry St Woolworths Rooftop car park	8P	14%	33%	NO	YES	Periodic monitoring
59	Kenneth Rd (S) – Condamine St to Pitt St	NR	72%	69%	NO	NO	Periodic monitoring
60	Sunshine St (S) – Condamine St to Somerville Pl	4P	63%	31%	NO	YES	Periodic monitoring
61	Sunshine St (S) – Somerville Pl to Highview Ave	NR	93%	90%	YES	YES	Periodic monitoring residential land uses adjacent
62	Sunshine St (N) – Somerville Pl to Highview Ave	NR	86%	78%	YES	NO	Periodic monitoring residential land uses adjacent
63	Sunshine St (N) – Condamine St to Somerville Pl	4P	69%	53%	NO	NO	Periodic monitoring

As shown, several changes to parking restrictions in the study area have been identified and following discussions with Council the recommended parking changes are summarised as follows:

- introduce parking restrictions and reduce the time of existing parking restrictions on the north side of Koorala Street fronting the Caltex and Coles to improve turnover at these locations;
- introduce a 4P parking restriction on the south side of Koorala Street between Condamine Street and Roseberry Street to encourage commuters to instead use the B Line Commuter Car Park when it opens, freeing up on street parking for local businesses;
- introduce permanent parking restrictions allowing only motor vehicles to park on Boyle Street and Griffith Street in the vicinity of Manly West Public School. This prevents boats, caravans, trailers etc. from parking in the area improving parking availability for the school;
- install "No Parking On Verge" signage on the west side of Quirk Road, south of Manly West Oval to discourage illegal parking on the verge; and
- change 4P parking space to 8P on the east side of Quirk Road, south of Manly West Oval. This is to accommodate the majority of displaced parking from the above point, and to improve equitable use of these spaces for surrounding businesses.

12.3 PARKING WAYFINDING STRATEGY

A key issue identified in the existing conditions assessment was parking wayfinding for the major developments around Roseberry Street, Hays Street and Condamine Street. A key strategy of Goal 17 of the Northern Beaches Community Strategic Plan is to improve parking options in centres, villages and places. Parking wayfinding signage is recommended on the aforementioned streets to assist motorists in determining the most appropriate parking location for Harvey Norman, Woolworths, the Public Car Park above Woolworths, Bunnings and the future Aldi supermarket.

The parking wayfinding signage will consistent of information boards identifying the key parking areas and directional arrows on approach to Roseberry Street (after turning from Kenneth and Balgowlah Roads) and Hayes Street (after turning from Condamine Street). Individual parking signs will be installed at the access to each parking area. These signs may be accompanied by the development brand logo for ease of reference, or simply colour coded with regulatory parking sign (i.e. "P"). There is potential for a cost sharing arrangement between Council and these parties as the proposal is the mutually beneficial.

12.4 PARKING TECHNOLOGY

A key strategy of Goal 16 of the Northern Beaches Community Strategic Plan is to utilise emerging technologies to ensure transport planning is integrated with land use planning. Smart parking systems are emerging in Australia and internationally, utilising wireless communication technologies to more effectively manage large parking areas. As such, to improve parking management within the study area, it is recommended parking sensors be installed in key locations.

The installation of parking sensors provides Council with real time parking utilisation data. Benefits of this information include:

- targeted enforcement of parking restrictions;
- ability to adjust parking restrictions to meet the prevailing needs of the area as traffic and land use conditions change;
- remove the requirements for future parking surveys; and
- facilitates future public wayfinding technologies such as electronic parking guidance signs or the provision real time parking space availability.

It is recommended that parking sensors be installed at key locations predominantly fronting commercial / retail areas. The recommended locations for parking sensors to be installed and the number of parking bays at each location is shown in Figure 12.2.

Source: Nearmap

Figure 12.2: Parking Sensor Locations and Numbers

As shown, in the order of 218 parking sensors would be required to cater for all key parking spaces in the study area. Installing sensors in other parking areas within the study area (which are primarily residential) is expected to have minimal benefit and as such not recommended. It is noted that where parking sensors are installed, on street parking bays will have to be formalised as required.

The indicative installation cost of each sensor is estimated to be $350 per sensor. A further $200 per sensor per year is expected to be required in ongoing maintenance costs. A once off cost of $15,000 would also be required for the relevant software required to utilise the parking sensors.

12.5 SUMMARY OF STRATEGIC PARKING RECOMMENDATIONS

Table 12.2 summarises the key recommendations for the Strategic Parking plan and the associated concept layout plan drawing number references (where applicable), which are attached at Appendix K. Cost estimates and prioritisation of recommended works is presented in Section 14.

In addition, it is recommended that Council programmes regular parking surveys for the study area (usually every 3 5 years), or when major changes occur, such as large developments. This is to ensure that restrictions are reviewed to ensure suitability to meet the needs of prevailing conditions and demands.

Table 12.2: Strategic Parking Plan Recommendations

Item / Location	ID	Recommendation(s)	Drawing Number / Reference
Parking wayfinding	PK 1	Parking wayfinding signage is recommended on Condamine Street, Hayes Street and Roseberry Street to assist motorists in determining the most appropriate parking location for Harvey Norman, Woolworths, the Public Car Park above Woolworths, Bunnings and the future Aldi supermarket.	PK SK001
Koorala Street	PK 2	Introduce parking restrictions and reduce the time of existing parking restrictions on the north side of Koorala Street fronting the Caltex and Coles to improve turnover at these locations. Introduce a 4P parking restriction on the south side of Koorala Street between Condamine Street and Roseberry Street to encourage commuters to instead use the B Line Commuter Car Park when it opens, freeing up on street parking for local businesses.	PK SK002
Manly West Public School	PK 3	Introduce permanent parking restrictions allowing only motor vehicles to park on Boyle Street and Griffith Street in the vicinity of Manly West Public School. This prevents boats, caravans, trailers etc. from parking in the area improving parking availability for the school.	PK SK003
Quirk Road (S)	PK 4	Install "No Parking On Verge" signage on the west side of Quirk Road, south of Manly West Oval to discourage illegal parking on the verge. Change 4P parking space to 8P on the east side of Quirk Road, south of Manly West Oval. This is to accommodate the majority of displaced parking from the above point, and to improve equitable use of these spaces for surrounding businesses.	PK SK004
Parking technology	PK 5	Parking sensors (and associated software) for approximately 218 spaces in commercial / retail areas.	Figure 12.2

13. STRATEGIC ACTIVE TRANSPORT PLAN

13.1 PEDESTRIAN FACILITIES

As part of the existing conditions assessment, several missing pedestrian links were identified. The missing links were investigated further in order to develop feasible solutions. Table 13.1 details the outcomes of the investigation and whether a solution was determined.

Table 13.1: Pedestrian Network Issues and Solutions

Location	ID	Recommendation(s)
Missing Path 1: Sunshine Street southern side between Somerville Place and Highview Avenue	PN 1	Provide a footpath link on the southern side of Sunshine Street between Somerville Place and Highview Avenue with kerb ramps on the eastern leg of the Sunshine Street / Highview Avenue intersection.
Missing Path 2: Kenneth Road southern side between Condamine Street and No.9 Kenneth Road	PN 2	Provide a formalised footpath fronting Lot C//DP39108 and B//DP39108 on the southern side of Kenneth Road. Formalise parking and landscaping as required.
Missing Path 3: Kenneth Road southern side fronting No.71 Kenneth Road	PN 3	No actions proposed, see following justification.
Missing Path 4: Kenneth Road southern side fronting No. 61 63 Kenneth Road	PN 4	No actions proposed, see following justification.
Missing Path 5: Hayes Street southern side fronting No. 4 Hayes Street	PN 5	Provide a footpath link on the southern side of Hayes Street between Condamine Street and Roseberry Street.
Missing Path 6: Roseberry Street eastern side fronting No. 20 Roseberry Street	PN 6	Provide a formalised footpath fronting No. 20 Roseberry Street. Inclusion of a zebra crossing on Roseberry Street to accommodate east west movements and to provide a traffic calming measure.
Missing Path 7: connection to westbound bus stop on Balgowlah Road (east of Quirk Road)	PN 7	Provide a concrete hardstand for the Balgowlah Road at Hill Street bus stop (ID209419).
Missing Path 8: connection to eastbound bus stop on Balgowlah Road (west of Quirk Road)	PN 8	Provide a concrete hardstand for the Balgowlah Road at Boyle Street bus stop (ID209364).

As shown above, no actions have been determined for issues PN 3 and PN 4 regarding missing footpath links on the southern side of Kenneth Road between Quirk Road and Roseberry Street. No solution is proposed due to the constraints of the location. Pinch points created by a large embankment as well as a transformer located on the roadside make the provision of a footpath unfeasible. Furthermore, a high quality shared path is available on the northern side of Kenneth Road, meeting the needs of the majority of pedestrians.

13.2 CYCLIST FACILITIES

13.2.1 Missing Links

Missing cycle links were also identified as a part of the existing conditions assessment and these issues and recommended solutions are detailed in Table 13.2.

Table 13.2: Cycle Network Issues and Recommended Solutions

Location	ID	Recommendation(s)
Missing Cycle Link 1: Quirk Road (Kenneth Road to Campbell Parade)	CN 1	No actions proposed, see following justification.
Missing Cycle Link 2: Condamine Street (Kenneth Road to Pitt Street)	CN 2	Provide a formalised shared path on the east side of Condamine Street between Kenneth Road and Hayes Street. Provide a signalised crossing on the southern leg of the Condamine Street / Burnt Bridge Creek Deviation intersection and kerb ramps as required.

As shown above, no actions have been suggested to address issue CN 1 regarding the missing cycle link on Quirk Road between Kenneth Road and Campbell Parade. This is because Council has advised that Addiscombe Road is programmed to be upgraded to provide a north south cycle link. As such, this link will provide the primary cycle connection between Kenneth Road and the Passmore Reserve to the north, mitigating the need for cycle facilities on Quirk Road north of Kenneth Road.

The proposed Condamine Street cycle link resolving issue CN 2 is primarily a formalisation of existing pathway. The width of the proposed shared path, while compliant, is predominantly determined by existing conditions and not the width specified in design standards. As several existing driveways cross the proposed shared path creating a safety hazard, the shared path shall be highlighted in green, similar to treatments outlined in the Queensland Department of Transport and Main Roads' (DTMR) Technical Note 128, to emphasise the potential presence of cyclists at driveway locations. The proposed signalised crossing at the Condamine Street / Burnt Bridge Creek Deviation intersection shall be designed in accordance with the relevant requirements of the RMS Traffic Signal Design Manual.

13.2.2 Bicycle Parking

In addition to resolving missing cycle links, it is also recommended that additional bicycle parking be provided at key locations in the study area. Initially it is recommended that bicycle racks be provided on Roseberry Street at the Roseberry Street Cafe and Woolworths. It is also noted that, as per the site's Traffic Report, 14 bicycle parking spaces will be provided at the future Aldi site.

The Manly Vale B Line commuter car park is currently under construction on the north east corner of the Condamine Street / Kenneth Road intersection. However, as per the site's Traffic and Transport Assessment prepared by ARUP in 2016, no bicycle parking is provided as a part of the project. As such, it is recommended that Council provides bicycle parking in the vicinity of the Manly Bale B Line bus stops to encourage multi modal use between active and public transport options. It is recommended that bicycle racks or other secure parking facilities be provided near the north east, north west and south east corners of the Condamine Street / Kenneth road intersection servicing both bus stops and surrounding retail.

The utilisation of all bicycle parking recommended should be monitored periodically after installation. If the majority of available spaces at a location are being used additional facilities should be provided nearby. Figure 13.1 illustrates the recommended initial bicycle parking locations as well as some further optional locations should these be heavily utilised.

Source: Nearmap

Figure 13.1: Recommended Bicycle Parking Locations

13.3 SUMMARY OF STRATEGIC ACTIVE TRANSPORT PLAN RECOMMENDATIONS

By resolving pedestrian and cycle missing links, the recommended works are intended to provide a complete active transport network in the study area of high amenity. Combined with the provision of effective bicycle parking these upgrades work towards achieving Goal 17 of the Northern Beaches Community Strategic Plan, facilitating and promoting safe cycling and walking networks as convenient transport options. The achievement of this goal should encourage a mode shift from private vehicle use to active and public transport, a highly beneficial outcome as the area continues to grow.

For ease of reference, the recommended active transport works are summarised in Table 13.3. Concept layouts, cost estimates and prioritisation of recommended works is presented in Section 14.

Table 13.3: Strategic Active Transport Plan Recommendations

Location	ID	Recommendation(s)	Drawing Number / Reference
Missing Path 1: Sunshine Street southern side between Somerville Place and Highview Avenue	PN 1	Provide a footpath link on the southern side of Sunshine Street between Somerville Place and Highview Avenue with kerb ramps on the eastern leg of the Sunshine Street / Highview Avenue intersection.	PN SK001
Missing Path 2: Kenneth Road southern side between Condamine Street and No.9 Kenneth Road	PN 2	Provide a formalised footpath fronting Lot C//DP39108 and B//DP39108 on the southern side of Kenneth Road. Formalise parking and landscaping as required.	PN SK002
Missing Path 3: Kenneth Road southern side fronting No.71 Kenneth Road	PN 3	No actions proposed due to constraints.	N/a
Missing Path 4: Kenneth Road southern side fronting No. 61 63 Kenneth Road	PN 4	No actions proposed due to constraints.	N/a
Missing Path 5: Hayes Street southern side fronting No. 4 Hayes Street	PN 5	Provide a footpath link on the southern side of Hayes Street between Condamine Street and Roseberry Street.	PN SK003
Missing Path 6: Roseberry Street eastern side fronting No. 20 Roseberry Street	PN 6	Provide a formalised footpath fronting No. 20 Roseberry Street.	PN SK003
Missing Path 7: connection to westbound bus stop on Balgowlah Road (east of Quirk Road)	PN 7	Provide a concrete hardstand for the Balgowlah Road at Hill Street bus stop (ID209419).	PN SK004
Missing Path 8: connection to eastbound bus stop on Balgowlah Road (west of Quirk Road)	PN 8	Provide a concrete hardstand for the Balgowlah Road at Boyle Street bus stop (ID209364).	PN SK004
Missing Cycle Link 1: Quirk Road (Kenneth Road to Campbell Parade)	CN 1	No actions proposed as Council has a planned route via Addiscombe Road.	N/a
Missing Cycle Link 2: Condamine Street (Kenneth Road to Pitt Street)	CN 2	Provide a formalised shared path on the east side of Condamine Street between Kenneth Road and Hayes Street. Provide a signalised crossing on the southern leg of the Condamine Street / Burnt Bridge Creek Deviation intersection and kerb ramps as required.	CN SK001
Public bicycle parking	CN 3	Provide public bicycle parking in four locations as per Figure 13.1.	Figure 13.1

14. IMPLEMENTATION PLAN

14.1 CONCEPT LAYOUT PLANS

Concept layout plans have been prepared for the recommended works where physical changes are required and are attached at Appendix K. For ease of reference, a consolidated list of recommended works ID's and drawing numbers found in Appendix K are summarised in the table below.

Table 14.1: Concept Layout Plan Drawing Register

ID	Location	Description of Works	Drawing Number / Reference
RN 1	Quirk Road (Kenneth Road to End)	Rectification of narrow road width	RN SK001
RN 2	Roseberry Street (adjacent to Balgowlah Road)	Rectification of narrow road width	RN SK002
RN 5	Sunshine Street (between Condamine Street and Highview Avenue)	Delineation on Sunshine Street	RN SK003
RN 7	Condamine Street / Kenneth Road	Intersection improvements to eastern leg	RN SK004
RN 8	Condamine Street / Balgowlah Road	Intersection improvements on all legs	RN SK005
RN 9	Balgowlah Road / Roseberry Street	Upgrade of intersection to traffic signal control	RN SK006
RN 10	Kenneth Road / Roseberry Street	Upgrade of intersection to traffic signal control	RN SK007
RN 11	Quirk Road Extension	Quirk Road extension, sporting field alterations and new parking and pathway through Council owned land to Roseberry Street	RN SK008
CF 1	Balgowlah Road / Quirk Road	Sight line improvements	CF SK001
CF 5	Balgowlah Road / Roseberry Street	Pedestrian safety improvements	CF SK002
CF 7	Somerville Place	Conversion of road to one way (southbound) only	CF SK003
PK 1	Roseberry Street & Surrounds	Parking wayfinding improvements	PK SK001
PK 2	Koorala Street	Parking restriction changes	PK SK002
PK 3	Manly West School Surrounds	Parking restriction changes	PK SK003
PK 4	Quirk Road (between Balgowlah Road and End)	Parking restriction changes	PK SK004
PN 1	Sunshine Street (between Somerville Place and Highview Avenue)	Pathway improvements	PN SK001
PN 2	Kenneth Road (between No.9 and Condamine Street)	Pathway improvements	PN SK002
PN 5	Hayes Street (between Condamine Street and Roseberry Street)	Pathway improvements	PN SK003
PN 6	Roseberry Street (Outside No. 20)	Pathway improvements	PN SK003
PN 7	Balgowlah Road (bus stop east of Quirk Road)	Pathway improvements	PN SK004
PN 8	Balgowlah Road (bus stop west of Quirk Road)	Pathway improvements	PN SK004
CN 2	Condamine Street (Kenneth Road to Pitt Street)	Cycleway improvements	CN SK001

Limitations

The concept layout plans have been prepared based on publicly available aerial imagery for the study area. As no detailed survey information was available for the preparation of the plans, design considerations such as utilities, stormwater, vertical alignments and other such constraints/conflicts have not been evaluated or incorporated in any way. The plans are strictly conceptual only.

14.1.1 On Street Car Parking Changes

The recommended works will result in a number of on street car parking changes. Table 14.2 summarises the estimated loss (either permanently or during peak times) of on street car parking in the study area.

Table 14.2: On Street Car Parking Change from Recommended Works

ID	Drawing Number / Reference	On Street Parking Change
RN 1	RN SK001	( ) 21 spaces (permanently)
RN 2	RN SK002	( ) 8 (permanently)
RN 5	RN SK003	0 spaces
RN 7	RN SK004	0 spaces
RN 8	RN SK005	( ) 30 spaces (permanently) ( ) 76 spaces (peak time of day)
RN 9	RN SK006	( ) 7 spaces (permanently)
RN 10	RN SK007	( ) 18 spaces (permanently) ( ) 36 spaces (peak time of day)
RN 11	RN SK008	( ) 9 spaces (permanently)
CF 1	CF SK001	( ) 10 spaces (permanently)
CF 5	CF SK002	0 spaces
CF 7	CF SK003	0 spaces
PK 1	PK SK001	0 spaces
PK 2	PK SK002	0 spaces
PK 3	PK SK003	0 spaces
PK 4	PK SK004	( ) 11 spaces permanently
PN 1	PN SK001	0 spaces
PN 2	PN SK002	( ) 5 spaces (permanently)
PN 5	PN SK003	0 spaces
PN 6	PN SK003	0 spaces
PN 7	PN SK004	0 spaces
PN 8	PN SK004	0 spaces
CN 2	CN SK001	0 spaces

As shown, the recommended works will result in the order of 119 on street car parking spaces being removed permanently and 112 on street car parking spaces being restricted to use outside of peak times.

A review of the parking occupancy data presented in the existing conditions assessment identified the maximum number of parking spaces occupied at any given time in the study area was in the order of 450 spaces. The total parking supply in the study area is 723 spaces, which equates to a utilisation ratio of 62% (38% spare capacity or 273 available spaces). While it is acknowledged that displacement of car parking will occur with the recommended works, it is important to note that the works that will affect parking will occur gradually over a number of years to lessen the impact and allow time for drivers to adjust to the changes.

14.2 HIGH LEVEL COST ESTIMATES AND PRIORITISATION / TIMING

'High level' cost estimates have been prepared for all recommended works in the study area. Table 14.3 summarises the high level cost estimates for each of the recommended works. Detailed cost estimates are attached at Appendix L.

A 50% strategic contingency was adopted each estimate due to the conceptual nature of the estimates. A 20% Principal allowance was adopted for Council's internal costs for undertaking the works, such as design, project management and procurement activities.

All recommended works has been assigned a timeframe for delivery and completion based on short term (1 4 years), medium term (5 9 years) and long term (10 years plus), which generally align with Council's forward programming.

Limitations

The cost estimates are based on rates supplied by Council and publicly available information sourced online. Where required, provisional items have been allowed for, such as civil works and service relocations. The cost estimates should therefore be considered as 'order of magnitude' estimates.

Table 14.3: Summary of 'High Level' Cost Estimates for Recommended Works and Timing

ID	Location	Description of Works	Drawing Number / Reference	Cost Estimate	Timing
RN 1	Quirk Road (Kenneth Road to End)	Rectification of narrow road width	RN SK001	$ 3,700.00	Short term
RN 2	Roseberry Street (adjacent to Balgowlah Road)	Rectification of narrow road width	RN SK002	$ 11,365.00	Short term
RN 5	Sunshine Street (between Condamine Street and Highview Avenue)	Delineation on Sunshine Street	RN SK003	$ 2,720.00	Short term
RN 7	Condamine Street / Kenneth Road	Intersection improvements to eastern leg	RN SK004	$ 5,070.00	Short term
RN 8	Condamine Street / Balgowlah Road	Intersection improvements on all legs	RN SK005	$ 2,273,214.00	Short term
RN 9	Balgowlah Road / Roseberry Street	Upgrade of intersection to traffic signal control	RN SK006	$ 422,050.00	Medium term
RN 10	Kenneth Road / Roseberry Street	Upgrade of intersection to traffic signal control	RN SK007	$ 413,878.00	Medium term
RN 11	Quirk Road Extension	Quirk Road extension, sporting field alterations and new parking and pathway through Council owned land to Roseberry Street	RN SK008	$ 3,875,445.00	Long term
RI 1	Varies	Road infrastructure maintenance issues	Appendix J	$ 61,600.00	Short term
CF 1	Balgowlah Road / Quirk Road	Sight line improvements	CF SK001	$ 2,400.00	Long term
CF 5	Balgowlah Road / Roseberry Street	Pedestrian safety improvements	CF SK002	$ 42,900.00	Short term
CF 7	Somerville Place	Conversion of road to one way (southbound) only	CF SK003	$ 1,400.00	Short term
PK 1	Roseberry Street & Surrounds	Parking wayfinding improvements	PK SK001	$ 18,000.00	Short term
PK 2	Koorala Street	Parking restriction changes	PK SK002	$ 1,600.00	Short term
PK 3	Manly West School Surrounds	Parking restriction changes	PK SK003	$ 2,000.00	Short term
PK 4	Quirk Road (between Balgowlah Road and End)	Parking restriction changes	PK SK004	$ 1,000.00	Short term
PK 5	Varies	Parking technology (sensors) and software	Figure 12.2	$ 118,510.00	Medium term
PN 1	Sunshine Street (between Somerville Place and Highview Avenue)	Pathway improvements	PN SK001	$ 12,740.00	Short term
PN 2	Kenneth Road (between No.9 and Condamine Street)	Pathway improvements	PN SK002	$ 91,390.00	Short term
PN 5	Hayes Street (between Condamine Street and Roseberry Street)	Pathway improvements	PN SK003	$ 50,050.00	Short term
PN 6	Roseberry Street (Outside No. 20)	Pathway improvements	PN SK003	$ 2,660.00	Short term
PN 7	Balgowlah Road (bus stop east of Quirk Road)	Pathway improvements	PN SK004	$ 1,910.00	Short term
PN 8	Condamine Street (Kenneth Road to Pitt Street)	Cycleway improvements	PN SK004	$ 1,720.00	Short term
CN 2	Condamine Street (Kenneth Road to Pitt Street)	Cycleway improvements	CN SK001	$ 366,780.00	Medium term
CN 3	Varies	Bicycle racks	Figure 13.1	$ 4,800.00	Short term
			Sub Total	*$ 7,788,902.00*	
			Strategic Contingency (50%)	*$ 3,894,451.00*	
			Principal (20%)	*$ 1,557,781.00*	
			TOTAL	**$ 13,241,134.00**	

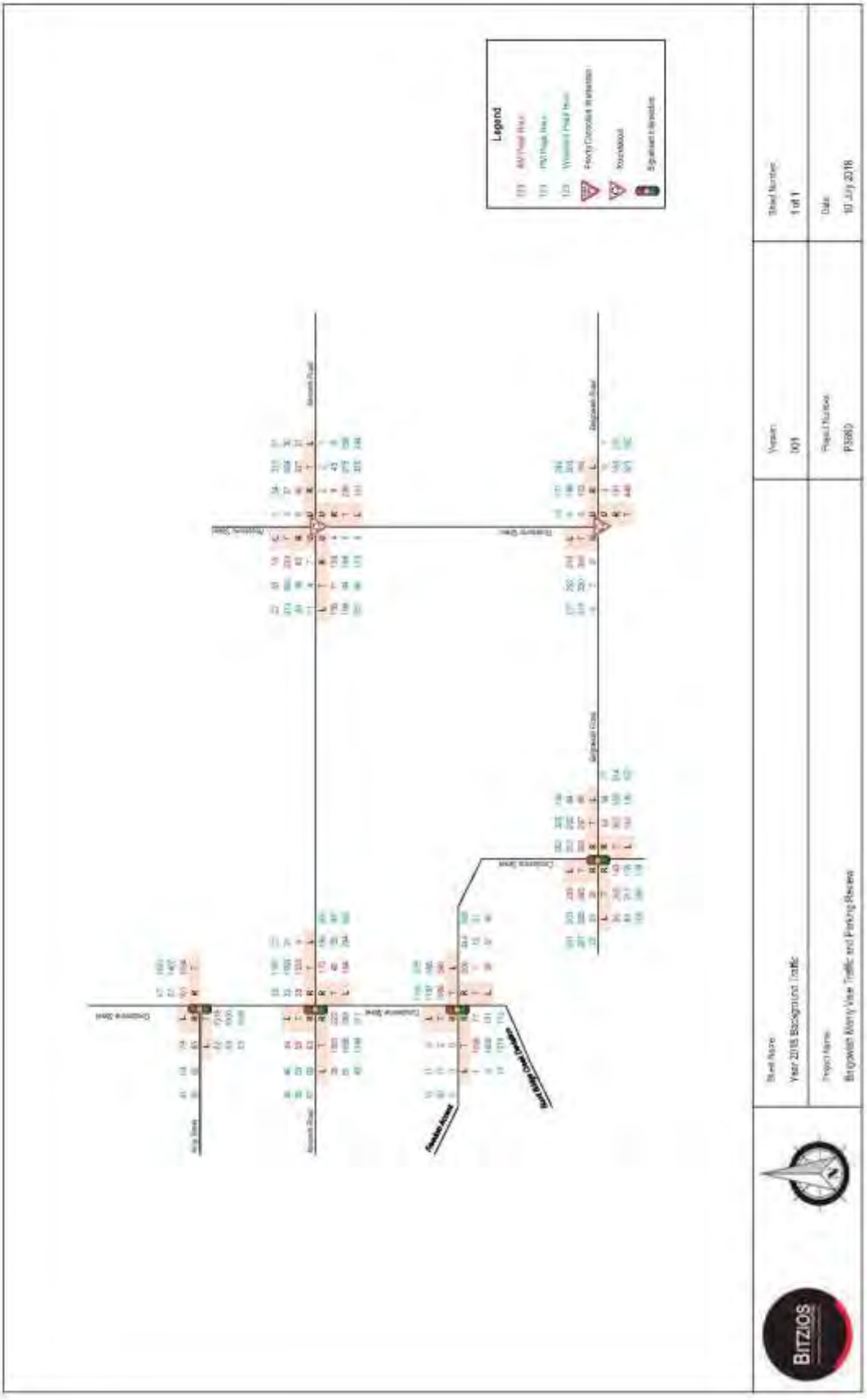
Table 14.4 summarises the recommended works by short, medium and long term expected timeframes for delivery and completion.

Table 14.4: Recommended Works – Cost Estimates by Timeframe

Timing	Sub Total	Contingency (50%)	Principal (20%)	Total
Short term (Years 1 4)	$ 2,592,239.00	50%	20%	$ 4,406,806.30
Medium term (Years 5 9)	$ 1,321,218.00	50%	20%	$ 2,246,070.60
Long term (10 Years Plus)	$ 3,875,445.00	50%	20%	$ 6,588,256.50
			TOTAL	$ 13,241,134.00

APPENDIX A

YEAR 2018 TRAFFIC VOLUME NETWORK DIAGRAM


Legend
Sheet Number
1 of 1
Version
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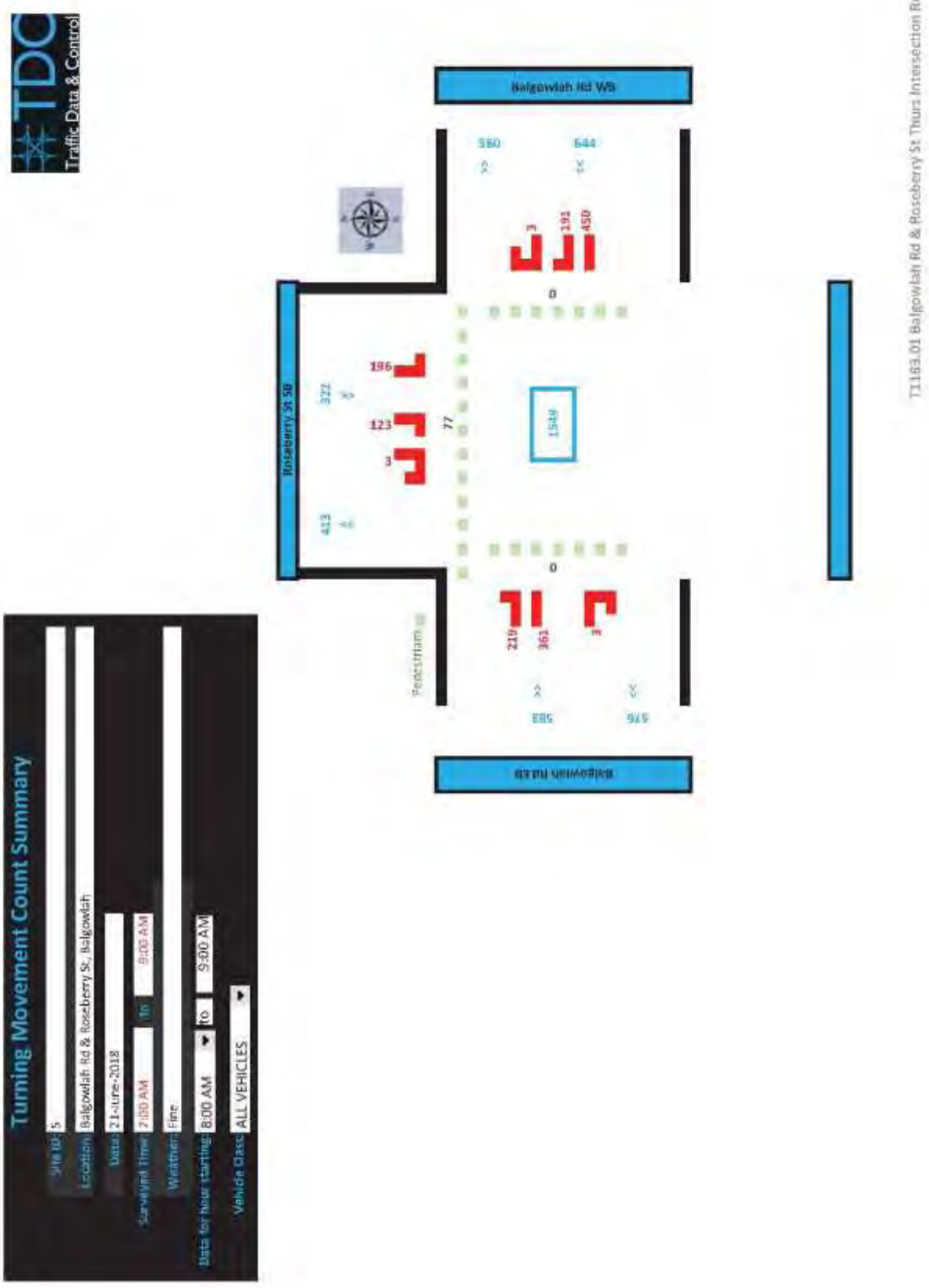
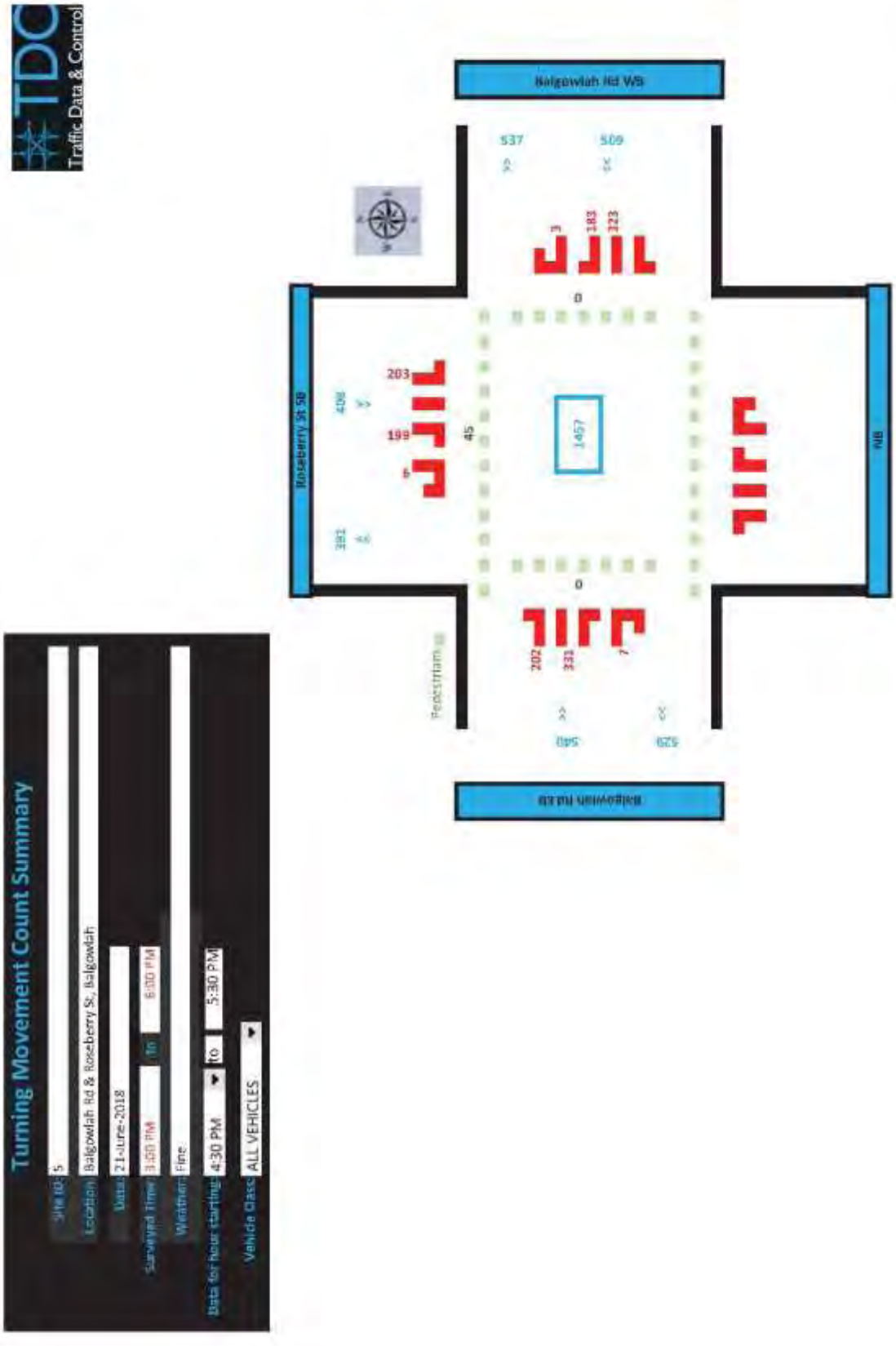
Date
10 July 2018
Project Number
P3980
Sheet Name
Year 2018 Background Traffic
Project Name
Balgowlah Manly Vale Traffic and Parking Review
BITZIOS

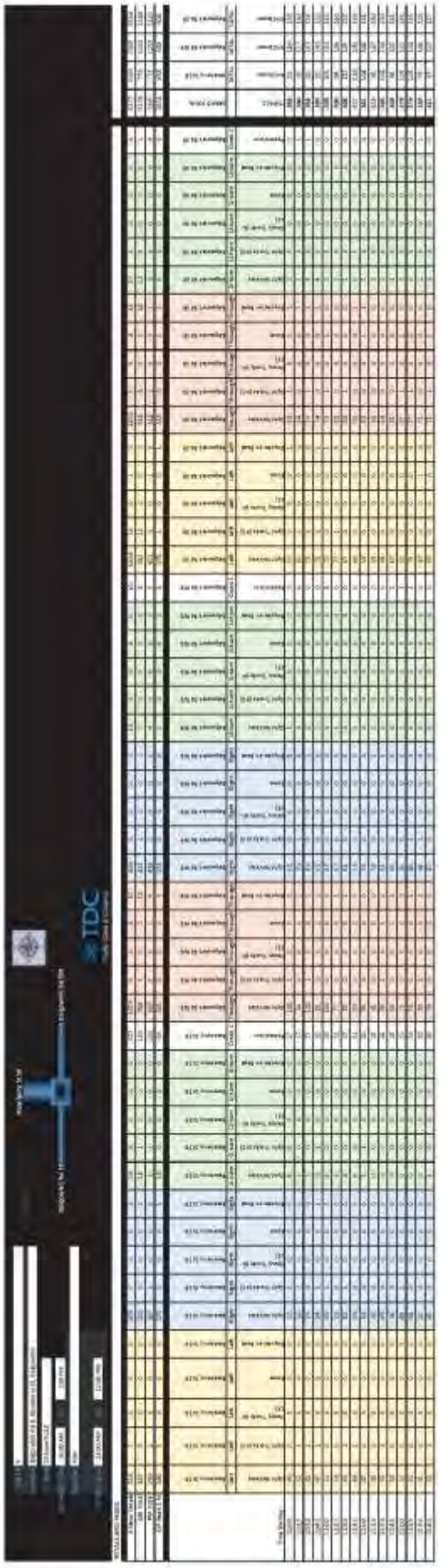
APPENDIX B

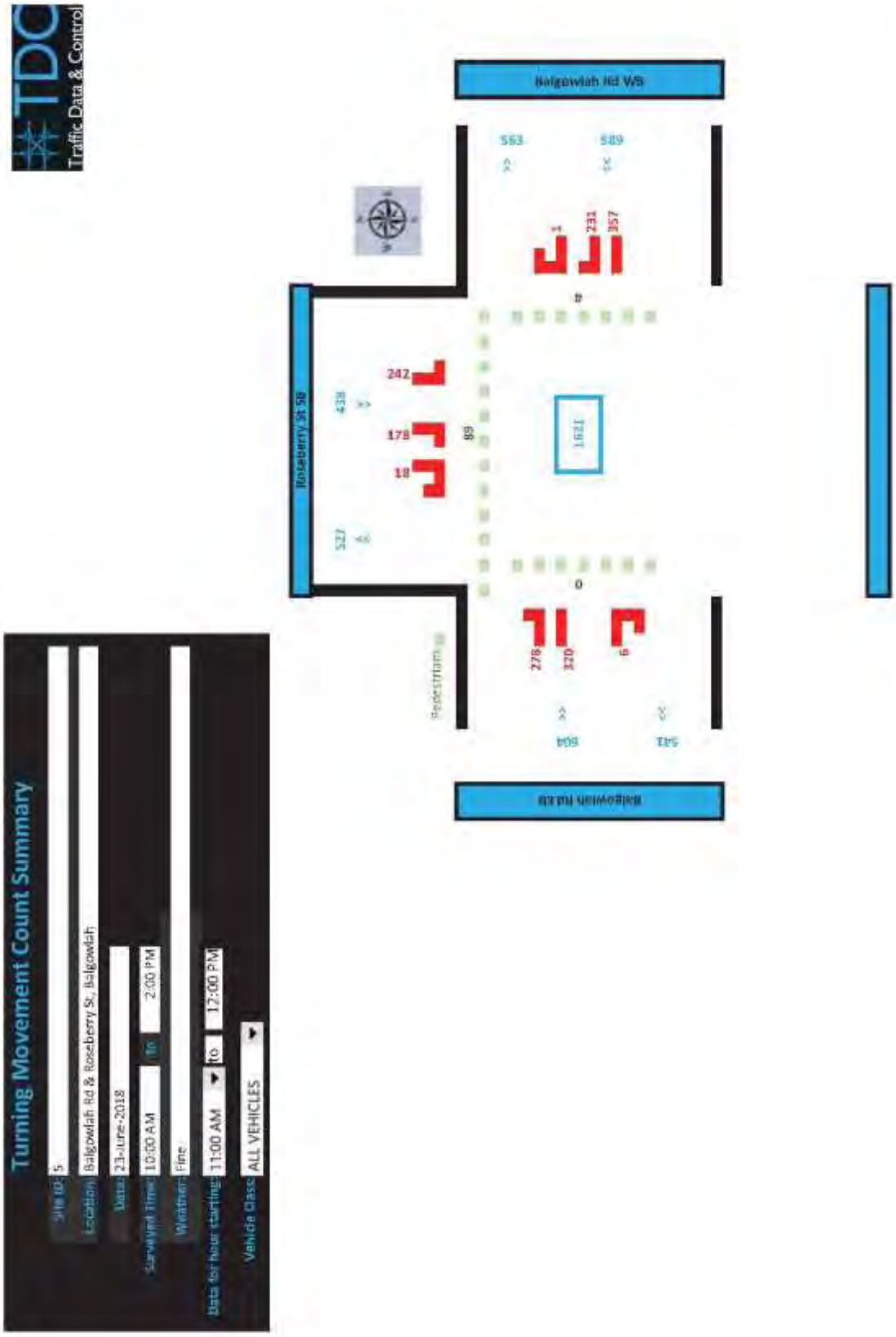
TDC TRAFFIC SURVEY DATA


TDC
Traffic Data & Control
Balgowlah Rd WB
Roseberry St SB
Balgowlah Rd EB
Pedestrian
560
644
3
191
450
0
196
322
123
77
1549
3
413
0
219
361
3
583
576
T1163.01 Balgowlah Rd & Roseberry St Thurs Intersection Report
Turning Movement Count Summary
Site ID: 5
Location: Balgowlah Rd & Roseberry St, Balgowlah
Date: 21-June-2018
Surveyed Time: 7:00 AM to 9:00 AM
Weather: Fine
Data for hour starting: 8:00 AM to 9:00 AM
Vehicle Class: ALL VEHICLES

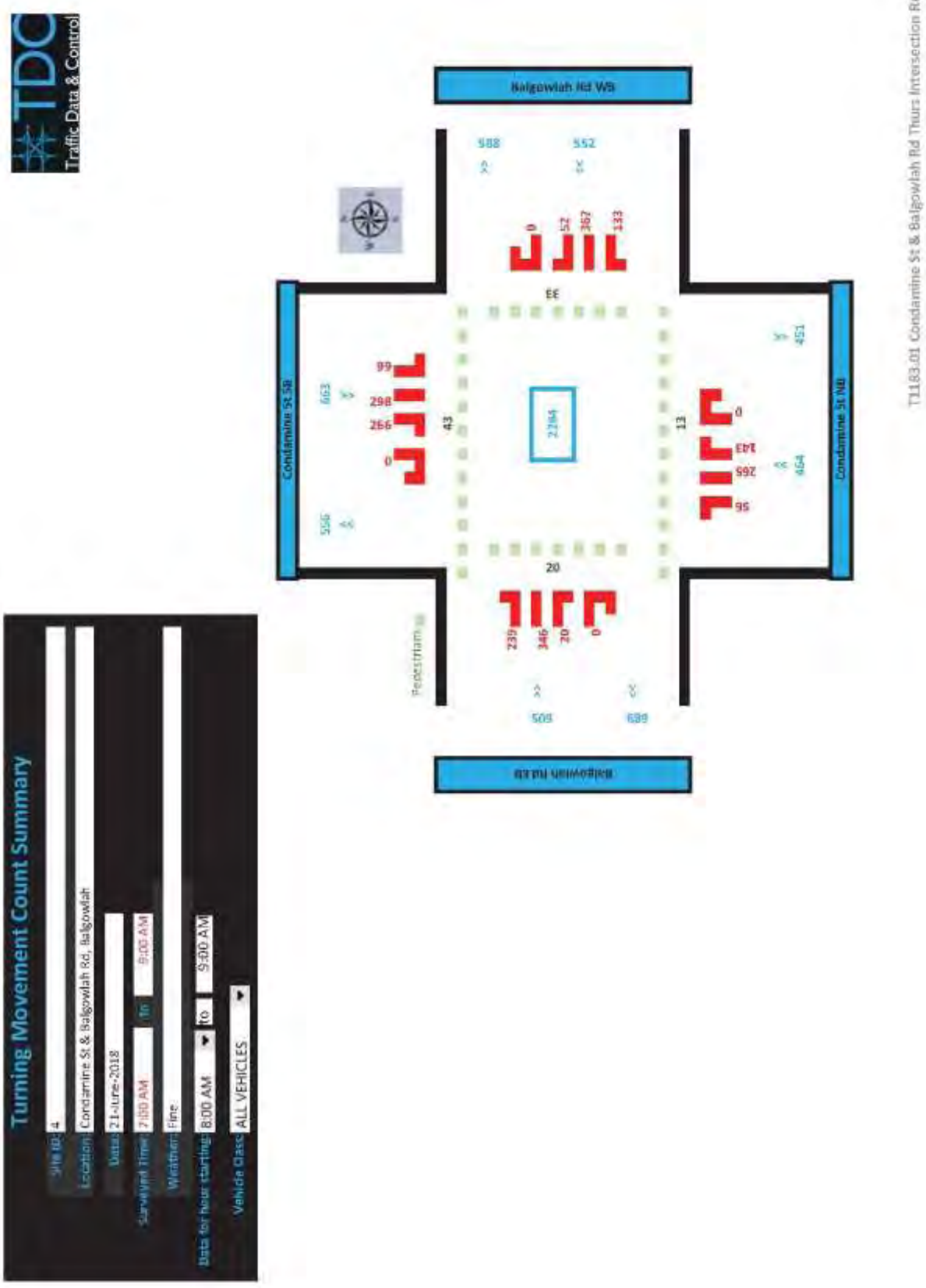


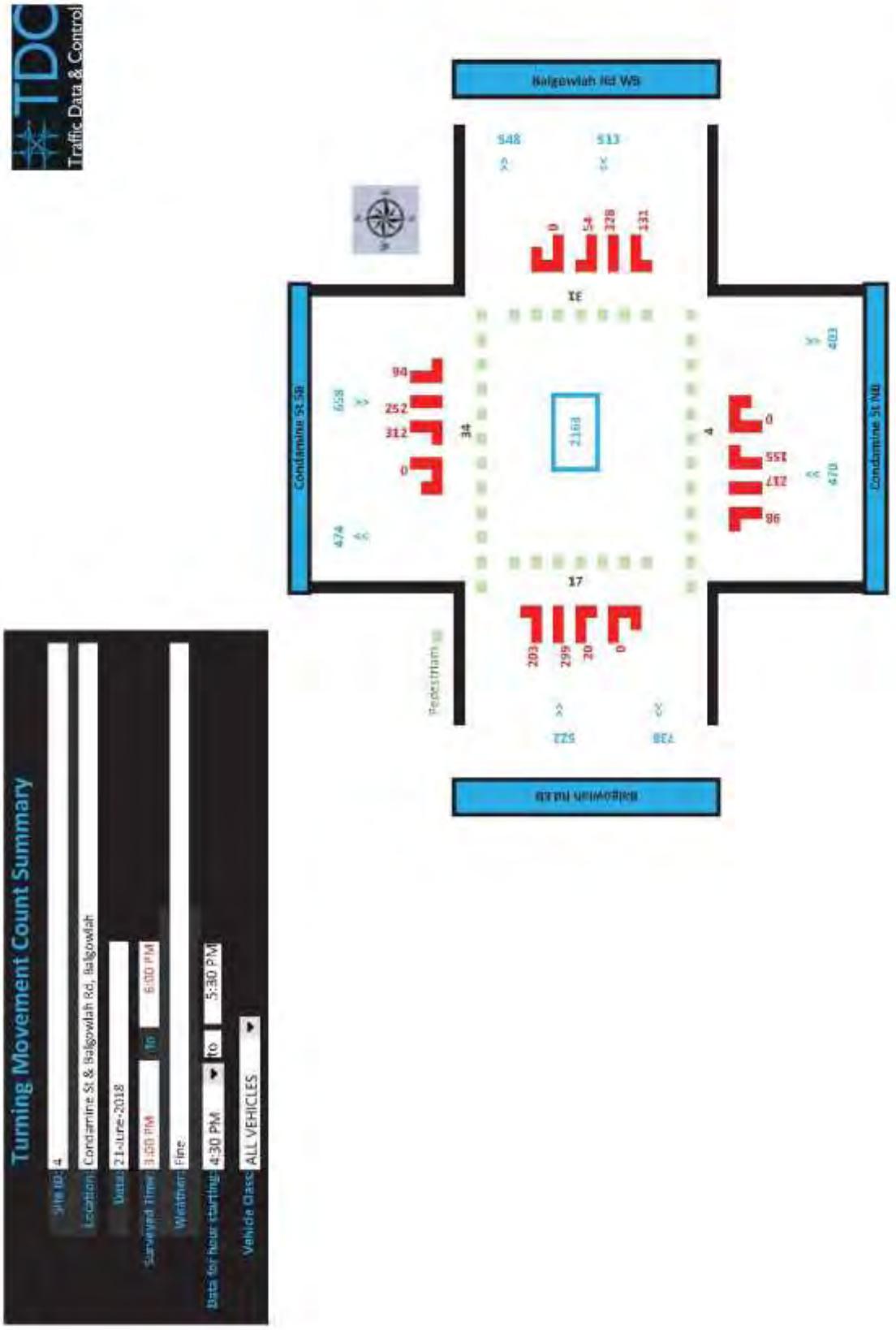
T1163.01 Balgowlah Rd & Roseberry St Thurs Intersection Report



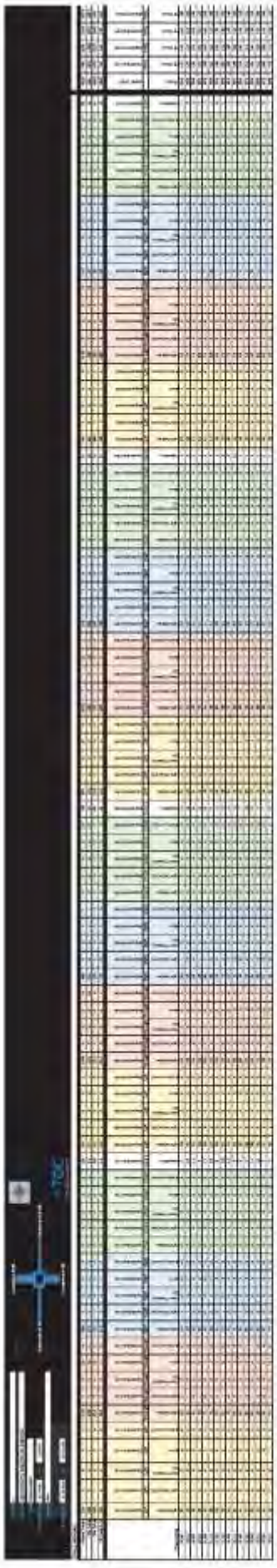


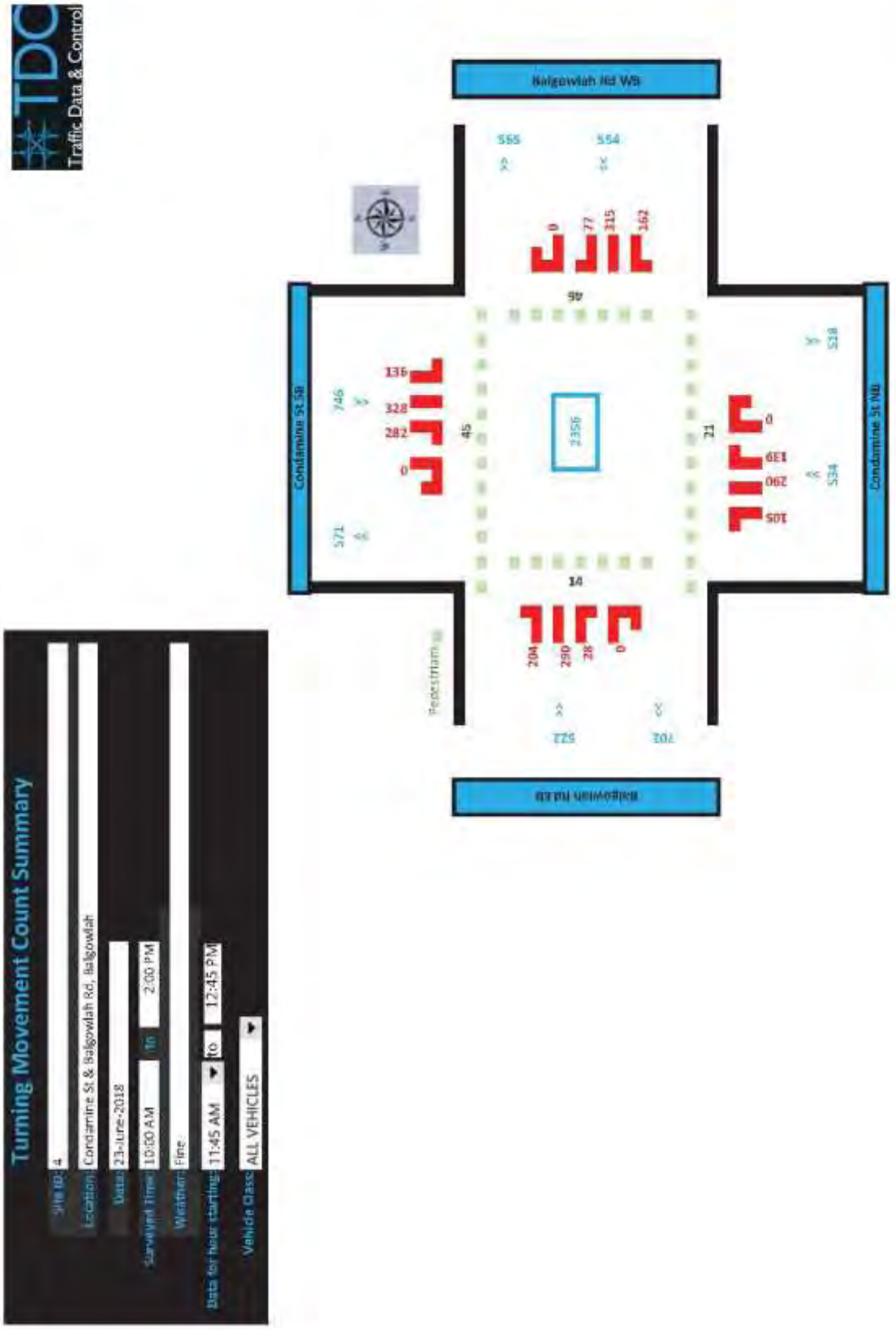
T1163.01 Balgowlah Rd & Roseberry St Sat Intersection Report


TDC
Traffic Data & Control
Turning Movement Count Summary
Site ID: 4
Location: Condamine St & Balgowlah Rd, Balgowlah
Date: 21-June-2018
Survey Hour: 7:00 AM to 8:00 AM
Weather: Fine
Data for hour starting: 8:00 AM to 9:00 AM
Vehicle Class: ALL VEHICLES
Balgowlah Rd WB
Balgowlah Rd EB
Condamine St SB
Condamine St NB
Pedestrians
T1183.01 Condamine St & Balgowlah Rd Thurs Intersection Report

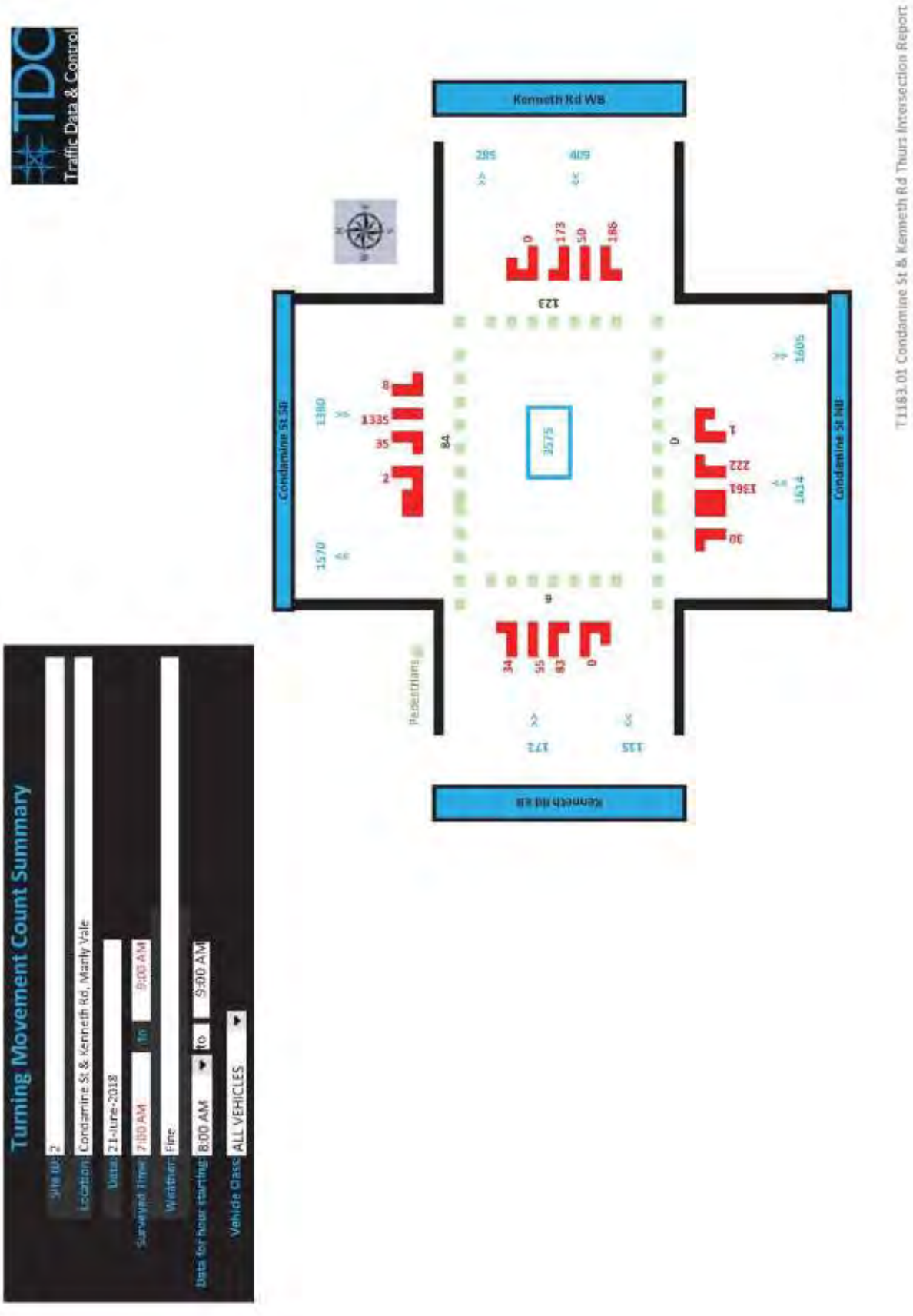


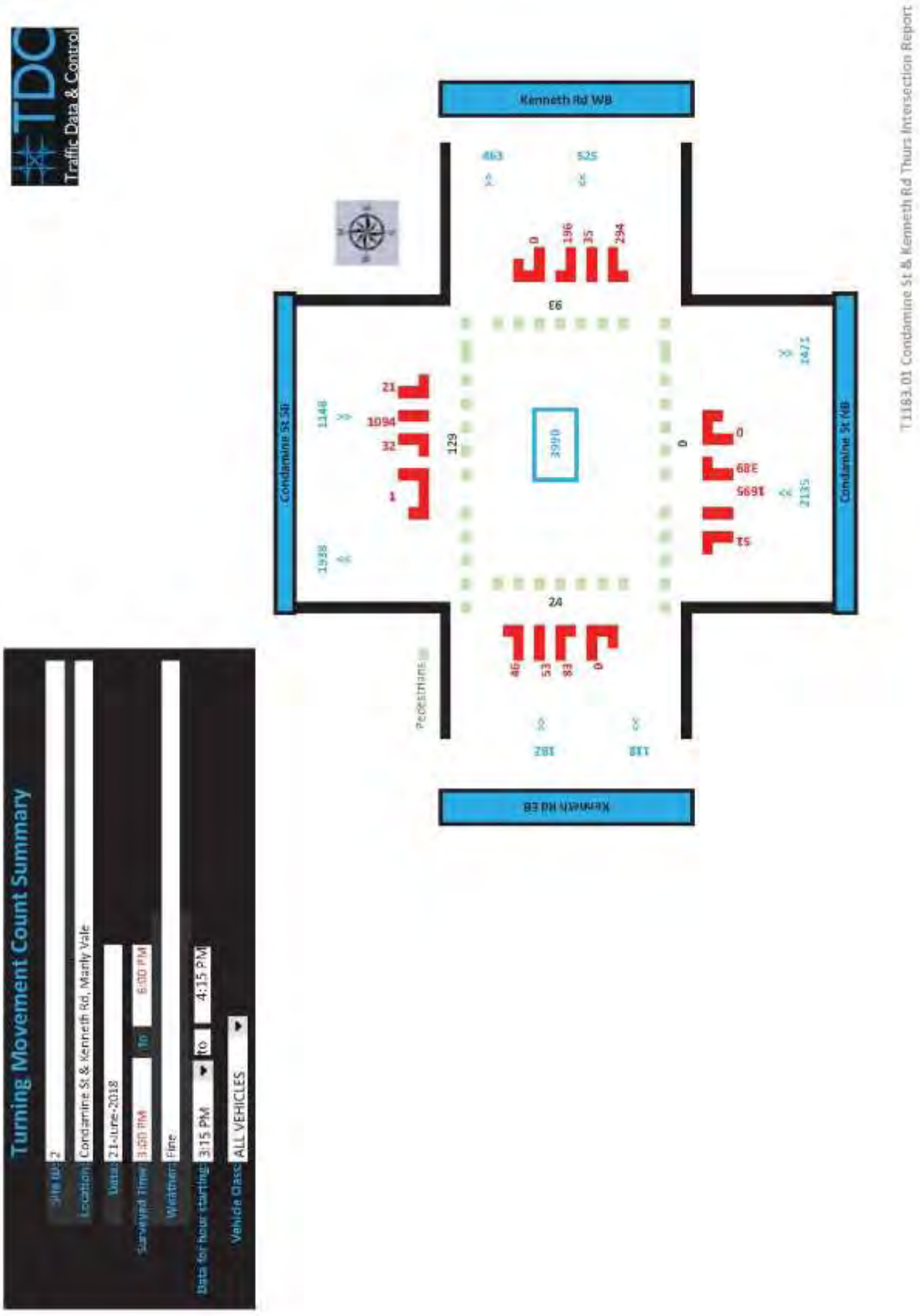
T1183.01 Condamine St & Balgowlah Rd Thurs Intersection Report

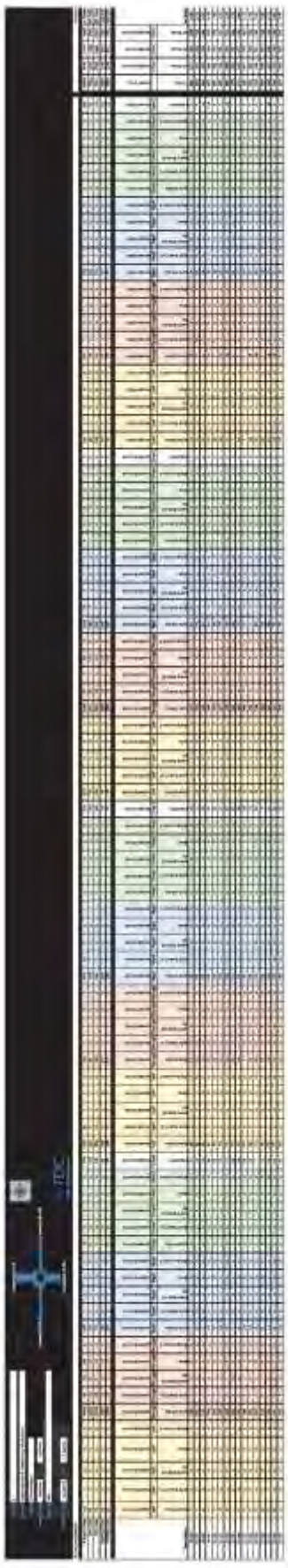


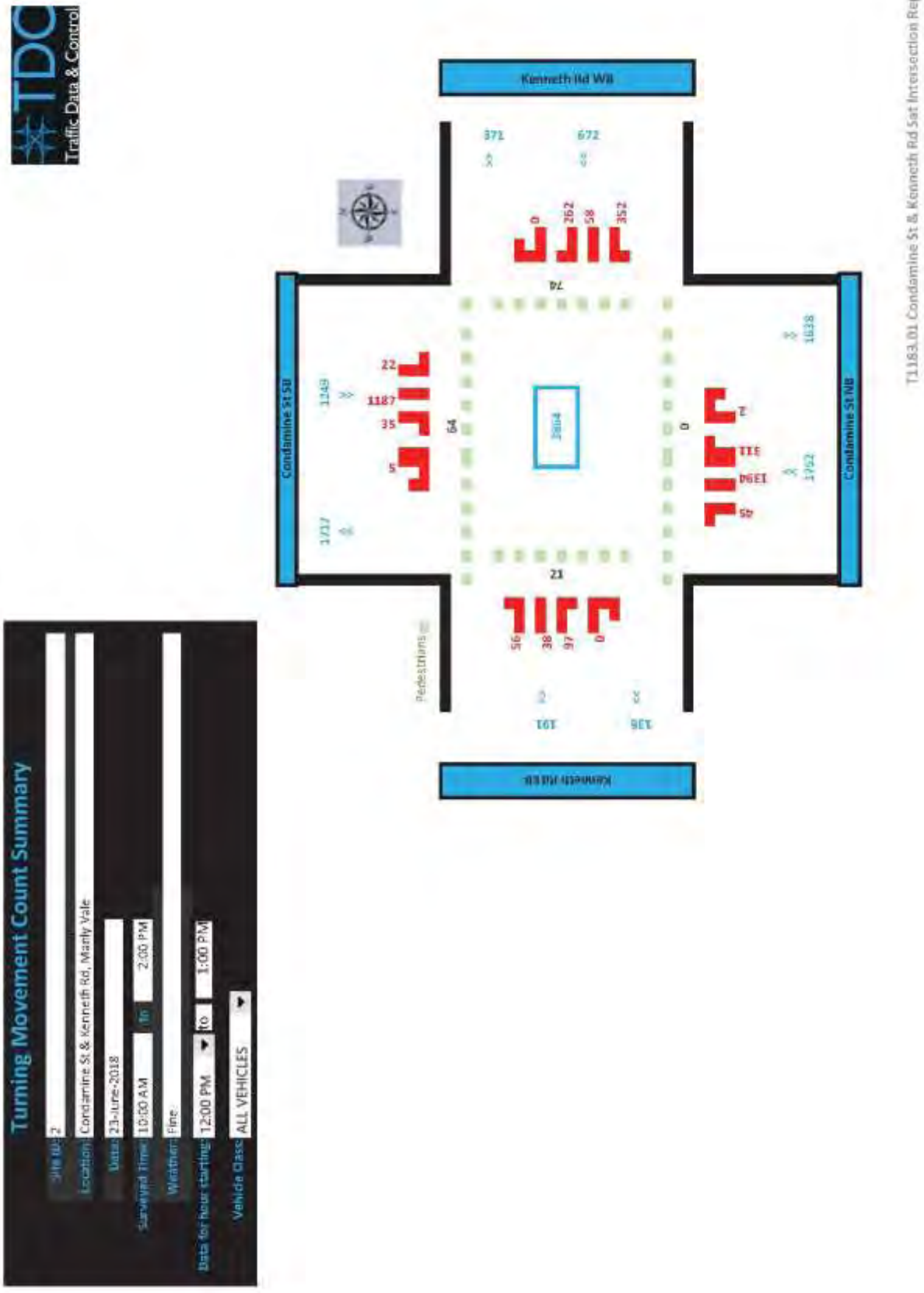


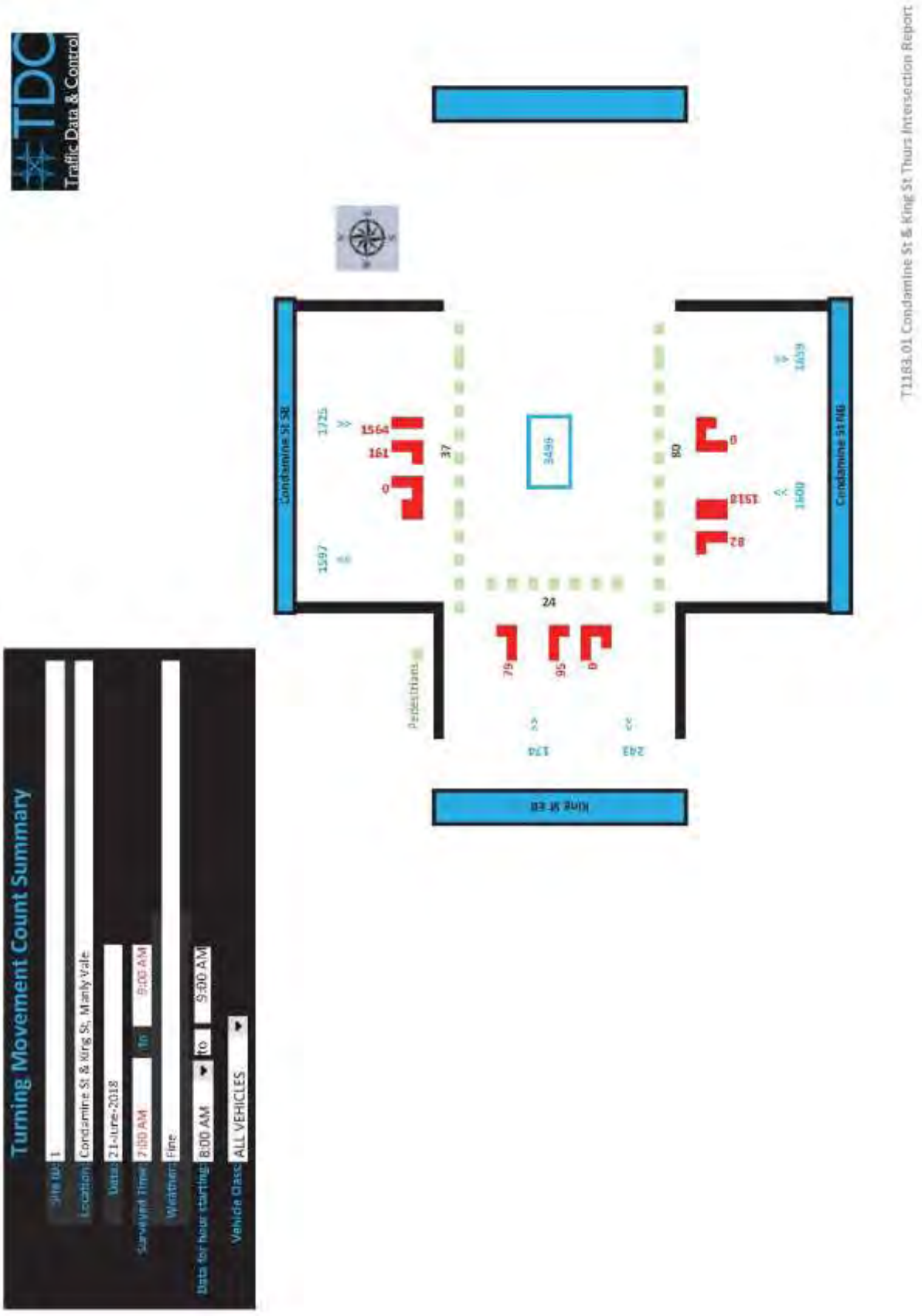
T1183.01 Condamine St & Balgowlah Rd Sat Intersection Report

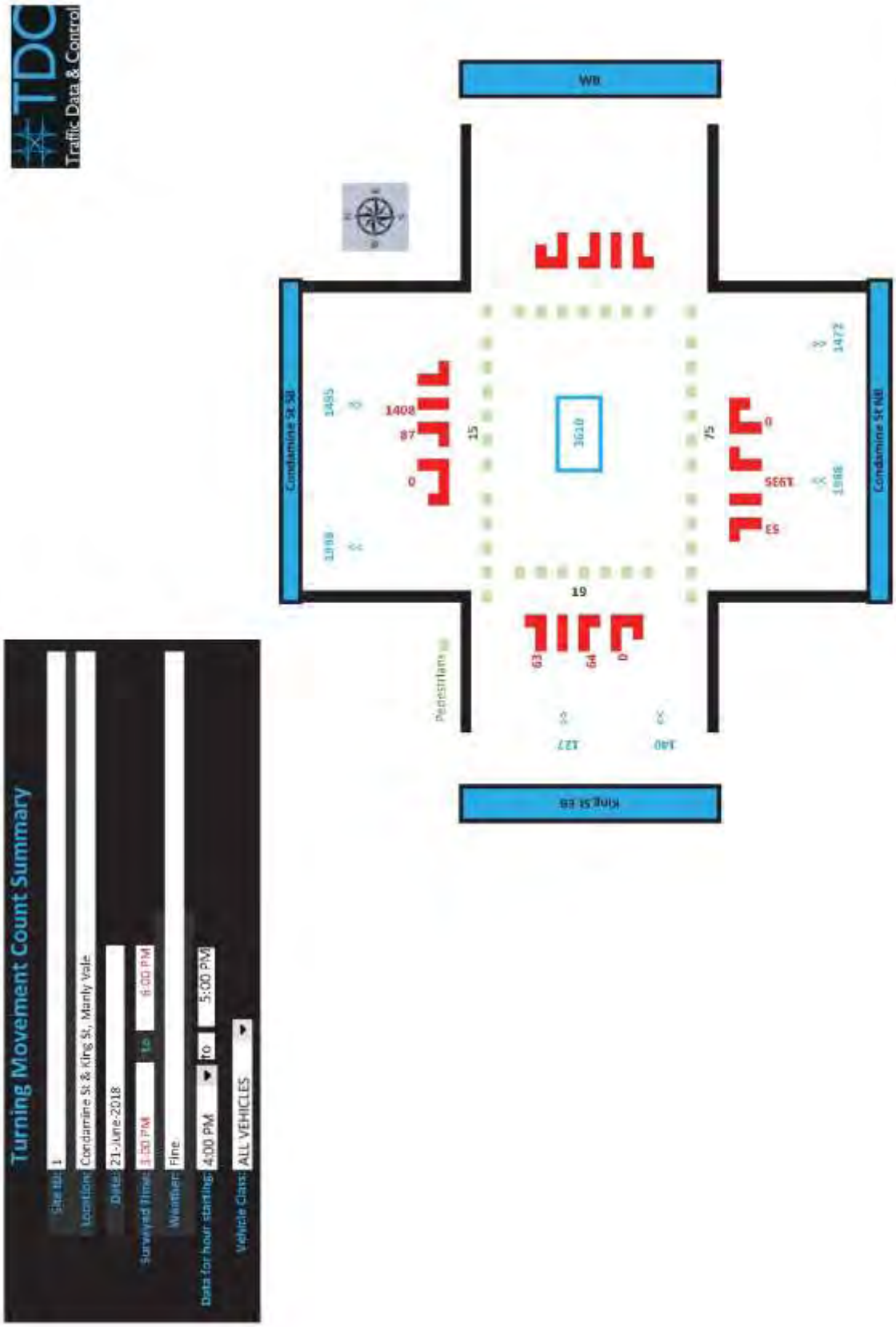

TDC
Traffic Data & Control
Turning Movement Count Summary
Site ID: 2
Location: Condamine St & Kenneth Rd, Manly Vale
Date: 21-June-2018
Surveyed Time: 7:00 AM to 9:00 AM
Weather: Fine
Data for hour starting: 8:00 AM to 9:00 AM
Vehicle Class: ALL VEHICLES
Kenneth Rd WB
Kenneth Rd EB
Condamine St SB
Condamine St NB
Pedestrians
T1183.01 Condamine St & Kenneth Rd Thurs Intersection Report


TDC
Traffic Data & Control
Turning Movement Count Summary
Site ID: 2
Location: Condamine St & Kenneth Rd, Manly Vale
Date: 21-June-2018
Surveyed Time: 3:00 PM to 6:00 PM
Weather: Fine
Data for hour starting: 3:15 PM to 4:15 PM
Vehicle Class: ALL VEHICLES
Kenneth Rd WB
Kenneth Rd EB
Condamine St SB
Condamine St NB
Pedestrians
T1183.01 Condamine St & Kenneth Rd Thurs Intersection Report

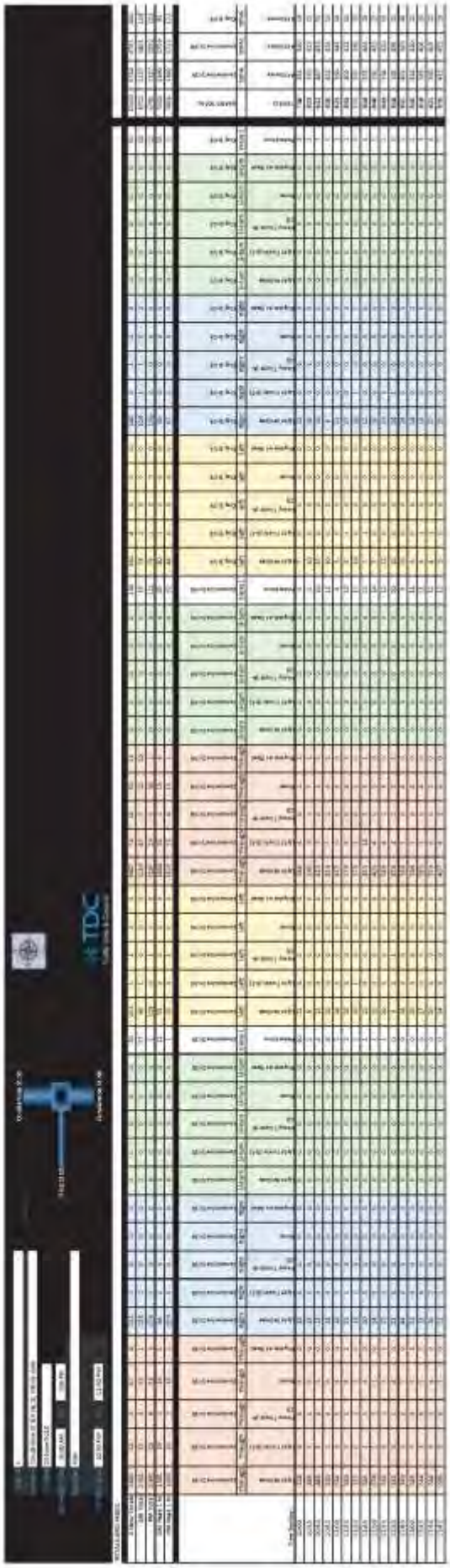


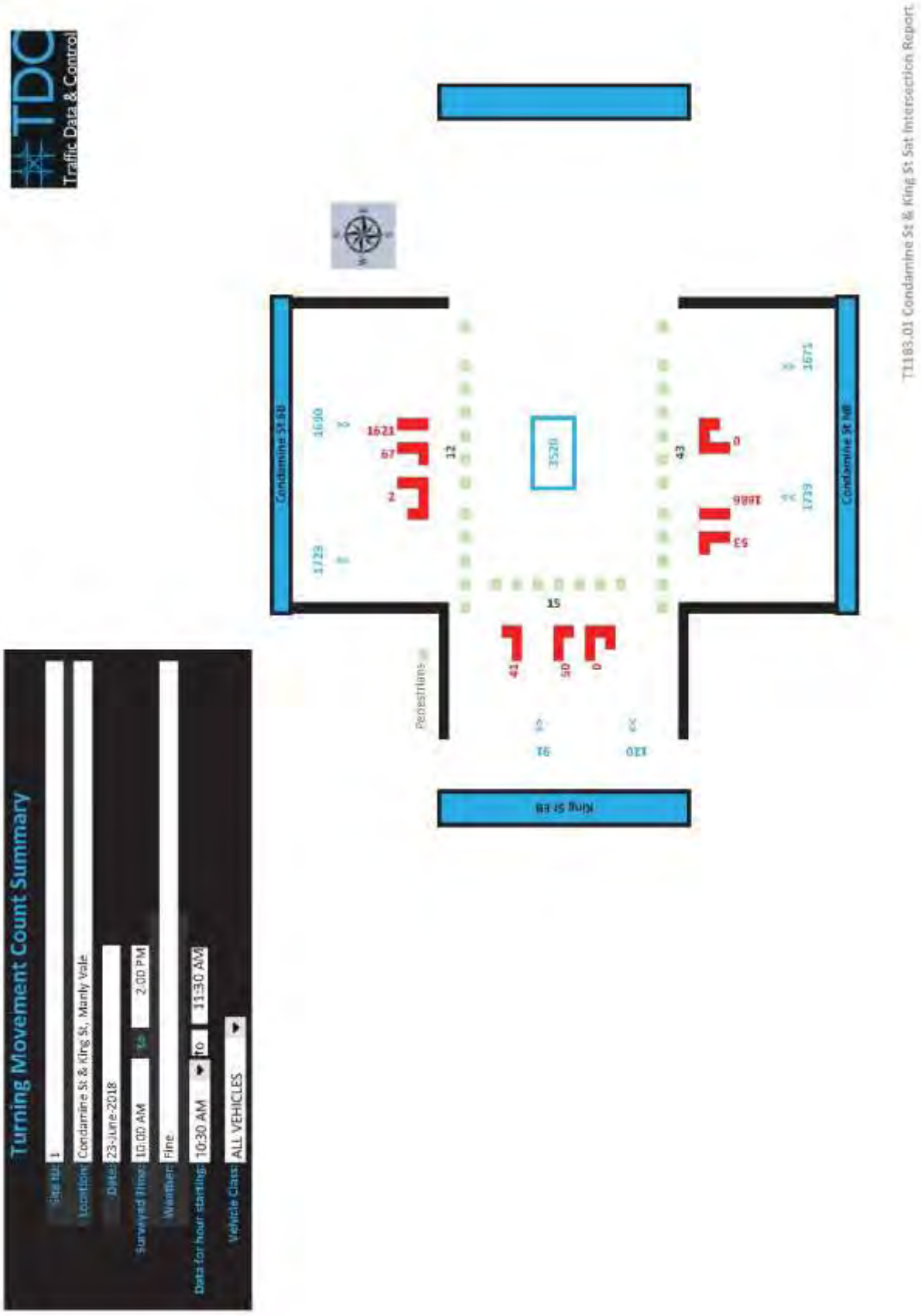

TDC
Traffic Data & Control
Turning Movement Count Summary
Site ID: 2
Location: Condamine St & Kenneth Rd, Manly Vale
Date: 23-June-2018
Surveyed Time: 10:00 AM to 2:00 PM
Weather: Fine
Data for hour starting: 12:00 PM to 1:00 PM
Vehicle Class: ALL VEHICLES
Kenneth Rd WB
Condamine St SB
Condamine St NB
Kenneth Rd EB
Pedestrians
Joint
T1183.01 Condamine St & Kenneth Rd Sat Intersection Report

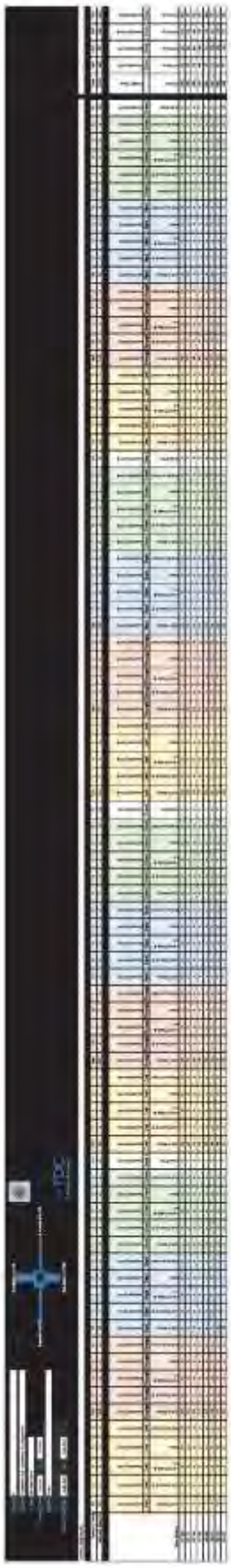

TDC
Traffic Data & Control
Turning Movement Count Summary
Site no: 1
Location: Condamine St & King St, Manly Vale
Date: 21-June-2018
Survey time: 7:00 AM to 9:00 AM
Weather: Fine
Data for hour starting: 8:00 AM to 9:00 AM
Vehicle Class: ALL VEHICLES
Condamine St SB
Condamine St NB
King St EB
Pedestrians
1725
1564
161
0
37
1597
3499
24
79
95
0
80
0
1518
82
1659
1600
174
243
T1183.01 Condamine St & King St Thurs Intersection Report



T1183.01 Condamine St & King St Thurs Intersection Report

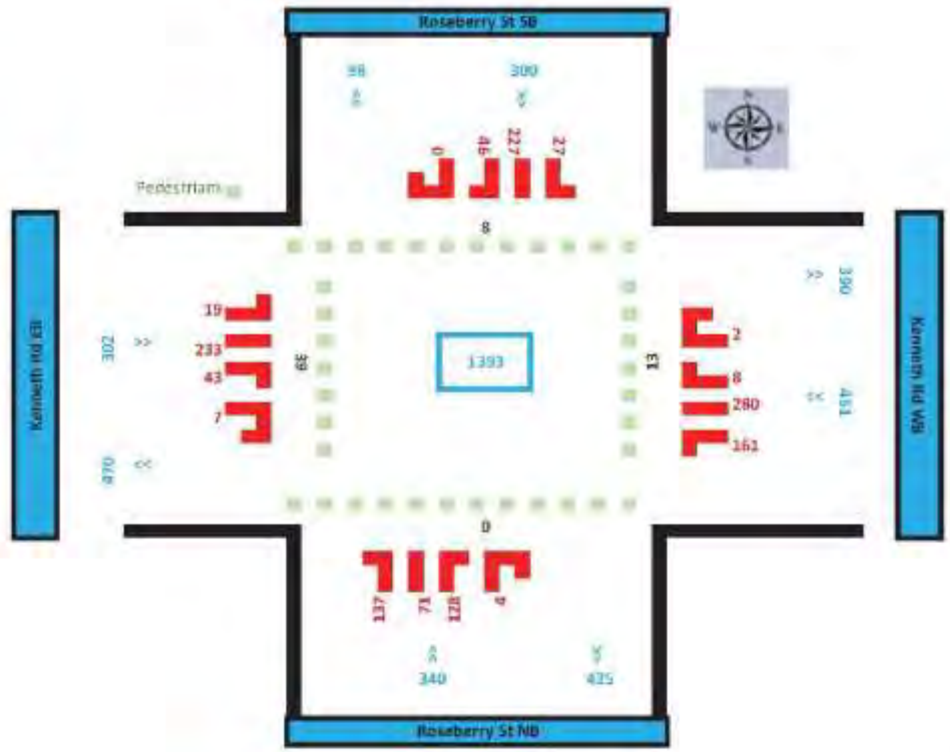



TDC
Traffic Data & Control
Turning Movement Count Summary
Site No: 1
Location: Condamine St & King St, Manly Vale
Date: 23-June-2018
Surveyed Time: 10:00 AM to 2:00 PM
Weather: Fine
Data for hour starting: 10:30 AM to 11:30 AM
Vehicle Class: ALL VEHICLES
Condamine St SB
Condamine St NB
King St EB
Pedestrians
3520
1621
67
2
12
43
0
1886
53
15
41
50
0
1690
1723
1671
1739
91
120
T1183.01 Condamine St & King St Sat Intersection Report

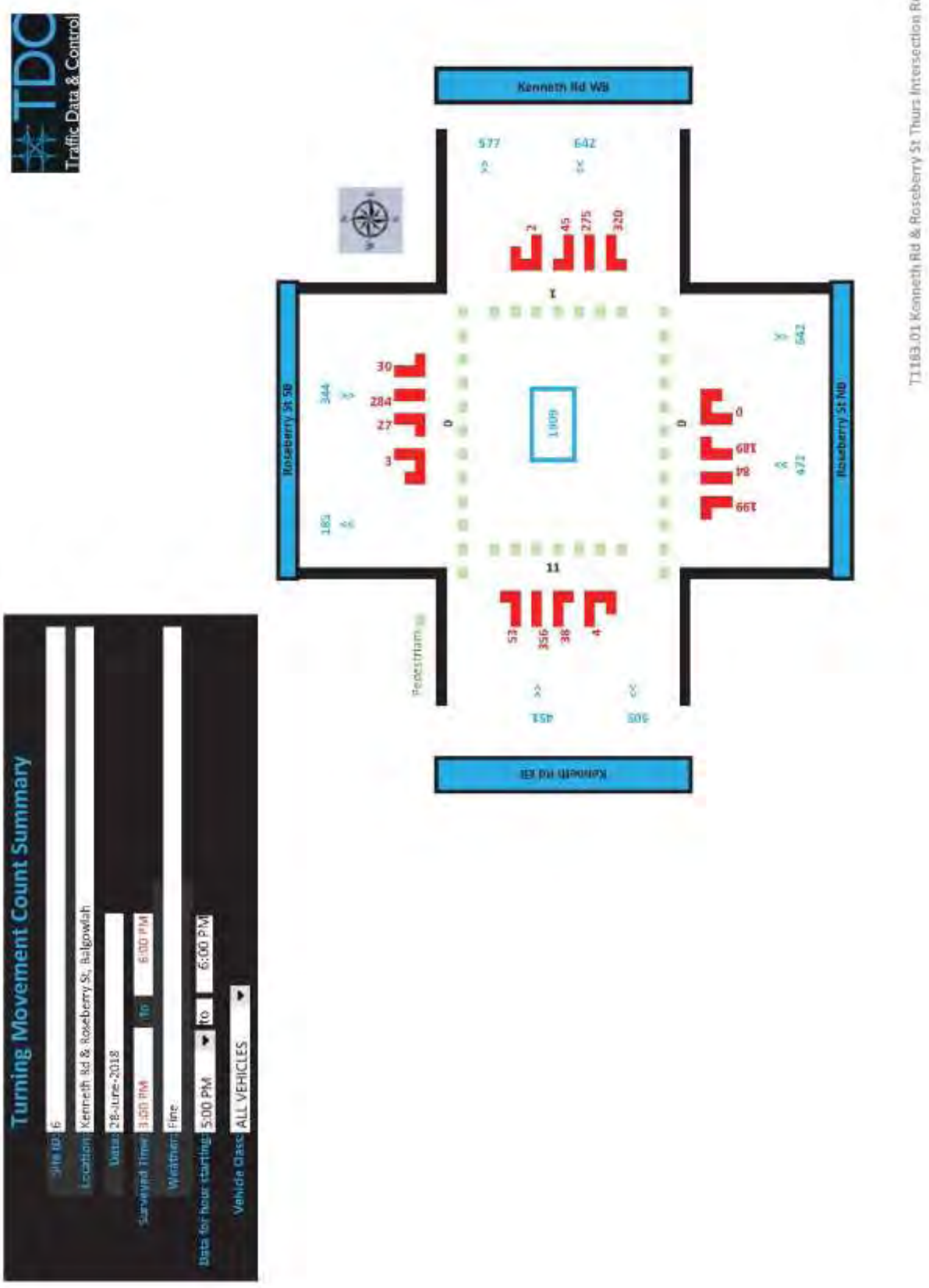


Turning Movement Count Summary

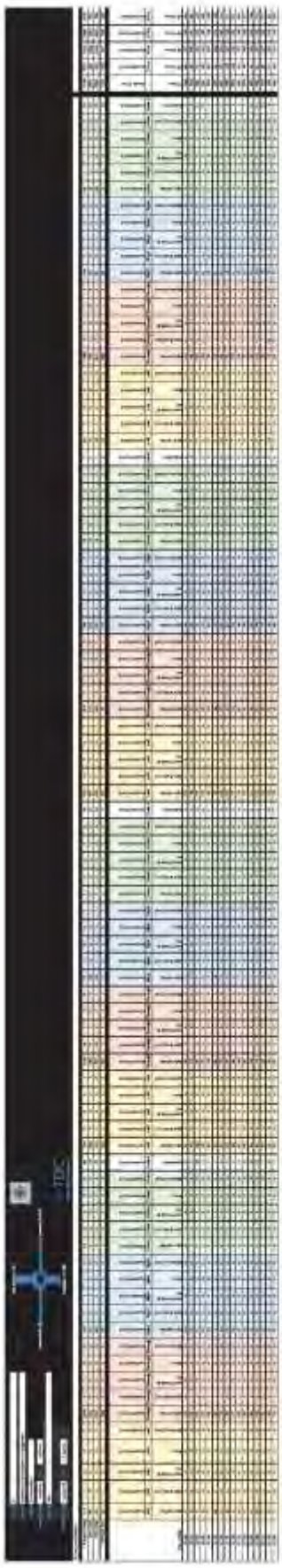
Site ID: 6
Location: Kenneth Rd & Roseberry St, Balgowlah
Date: 28-June-2018
Surveyed Time: 7:00 AM to 9:00 AM
Weather: Fine
Data for hour starting: 8:00 AM to 9:00 AM
Vehicle Class: ALL VEHICLES

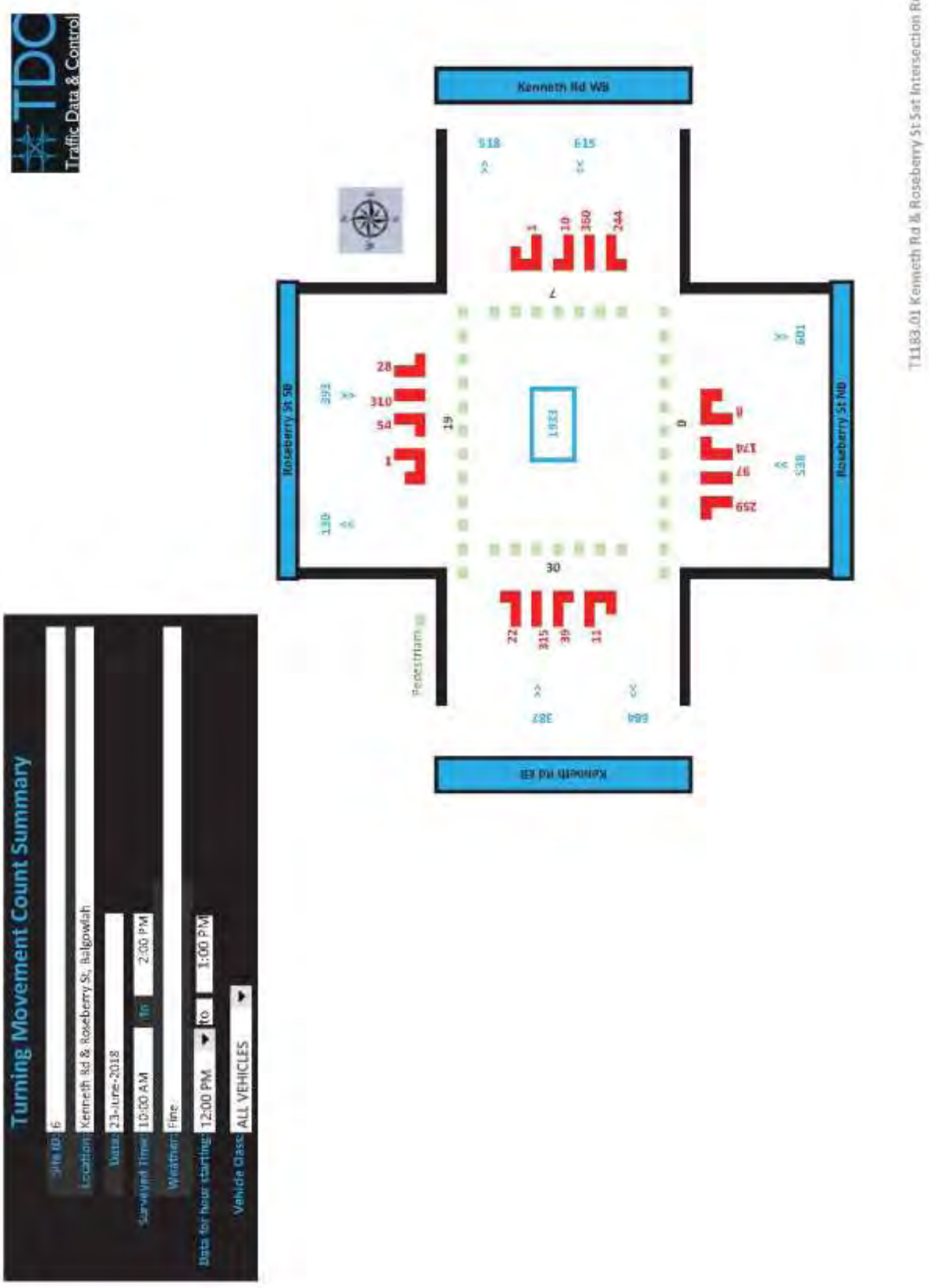


T1183.01 Kenneth Rd & Roseberry St Thurs Intersection Report



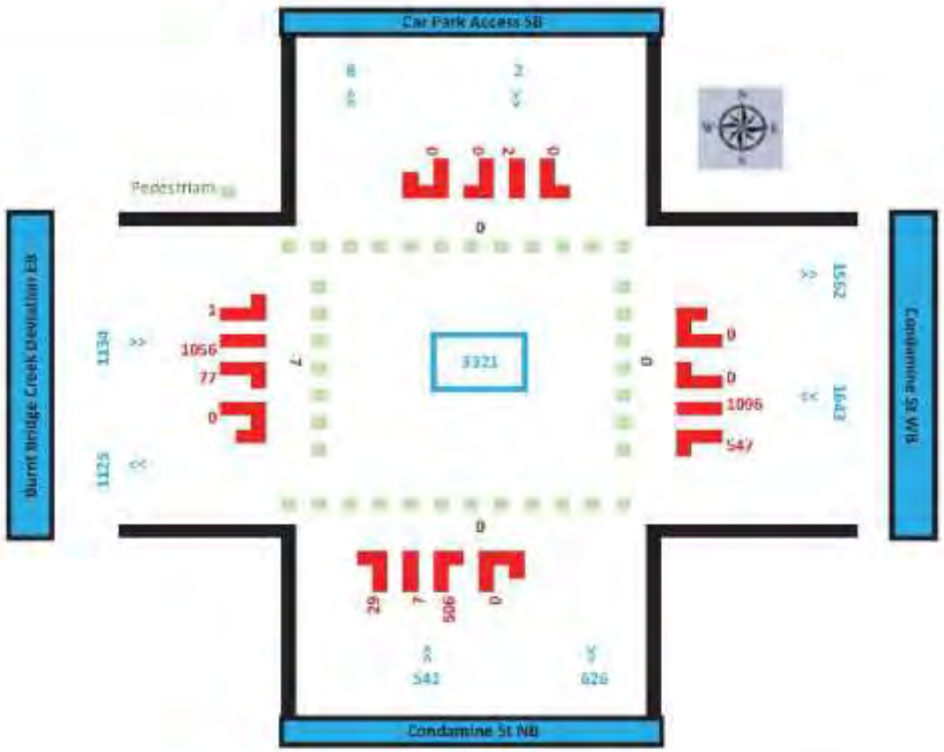
T1183.01 Kenneth Rd & Roseberry St Thurs Intersection Report



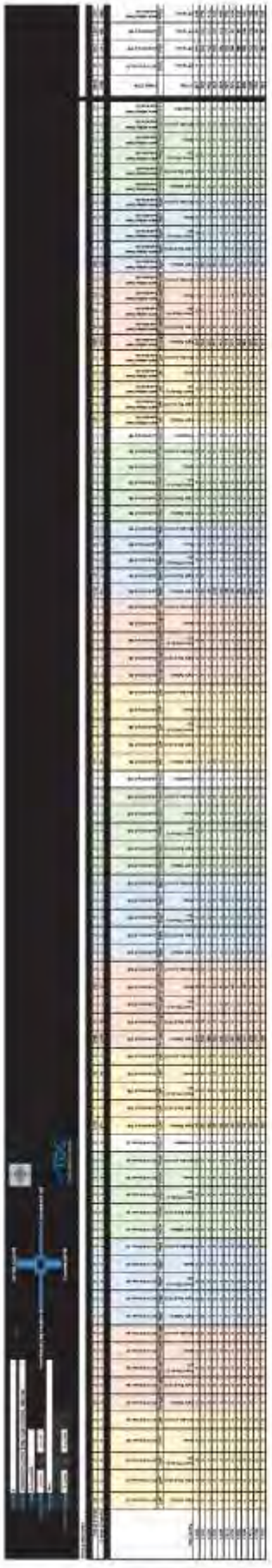

TDC
Traffic Data & Control
Turning Movement Count Summary
Site ID: 6
Location: Kenneth Rd & Roseberry St, Balgowlah
Date: 23-June-2018
Survey Hours: 10:00 AM to 2:00 PM
Weather: Fine
Data for hour starting: 12:00 PM to 1:00 PM
Vehicle Class: ALL VEHICLES
Kenneth Rd WB
Roseberry St SB
Roseberry St NB
Kenneth Rd EB
Pedestrians
T1183.01 Kenneth Rd & Roseberry St Sat Intersection Report

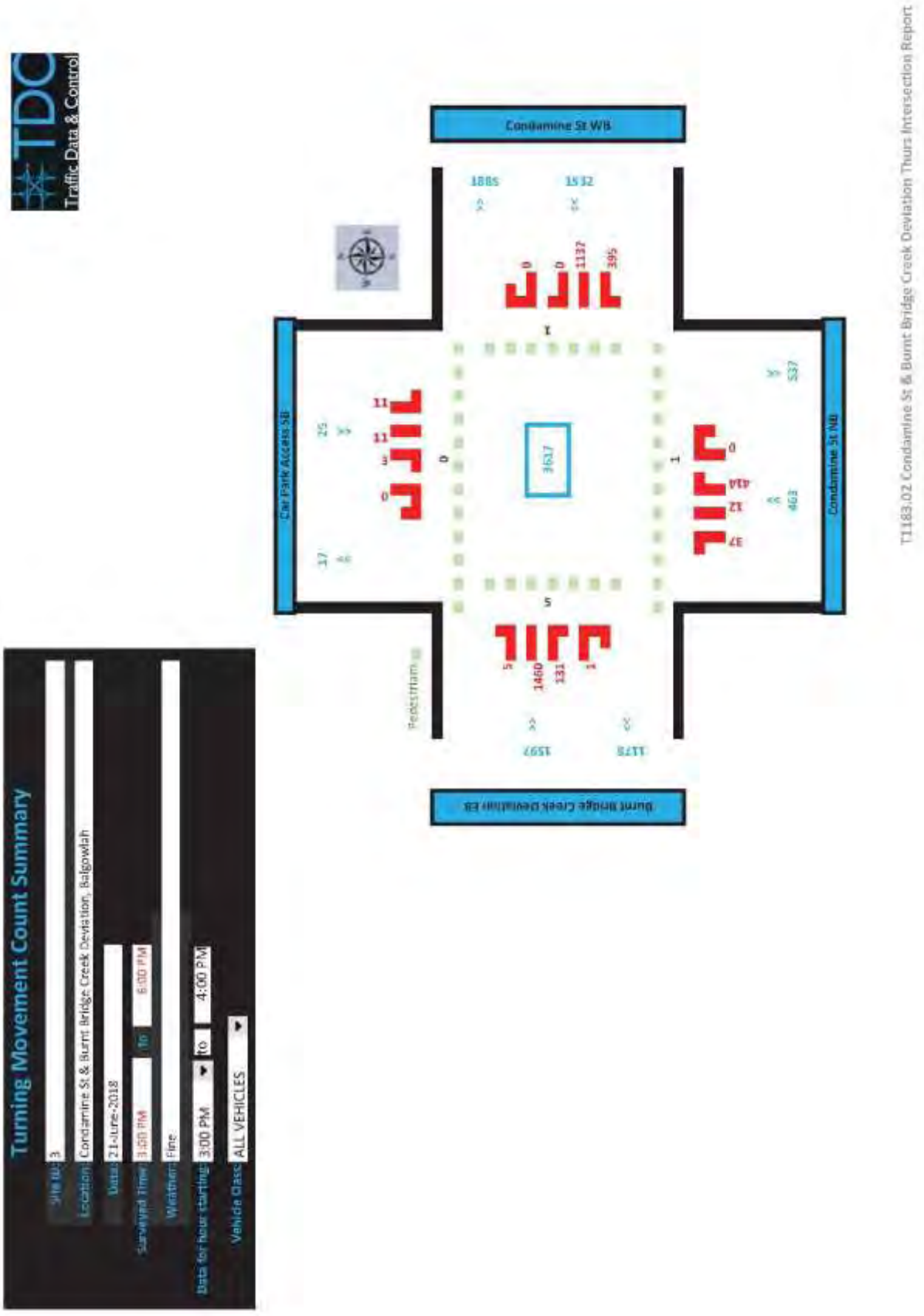
Turning Movement Count Summary

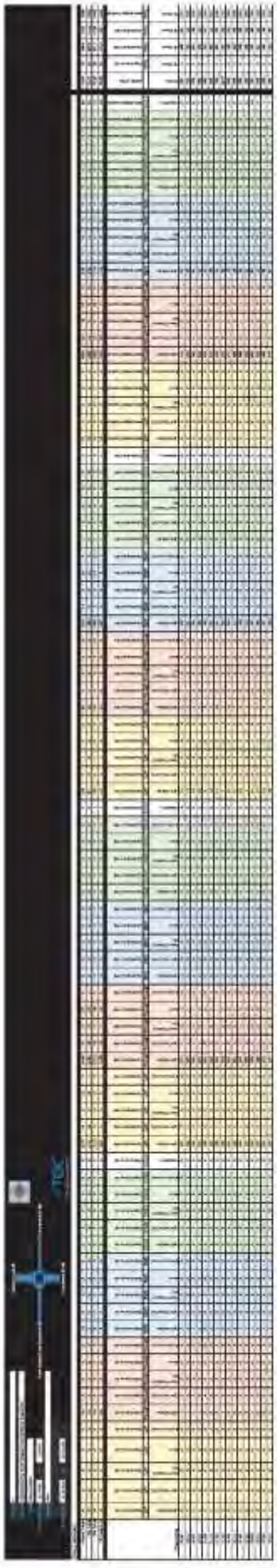
Site ID:	3
Location:	Condamine St & Burnt Bridge Creek Deviation, Balgowlah
Date:	21-June-2018
Surveyed Time:	7:00 AM to 9:00 AM
Weather:	Fine
Data for hour starting:	8:00 AM to 9:00 AM
Vehicle Class:	ALL VEHICLES

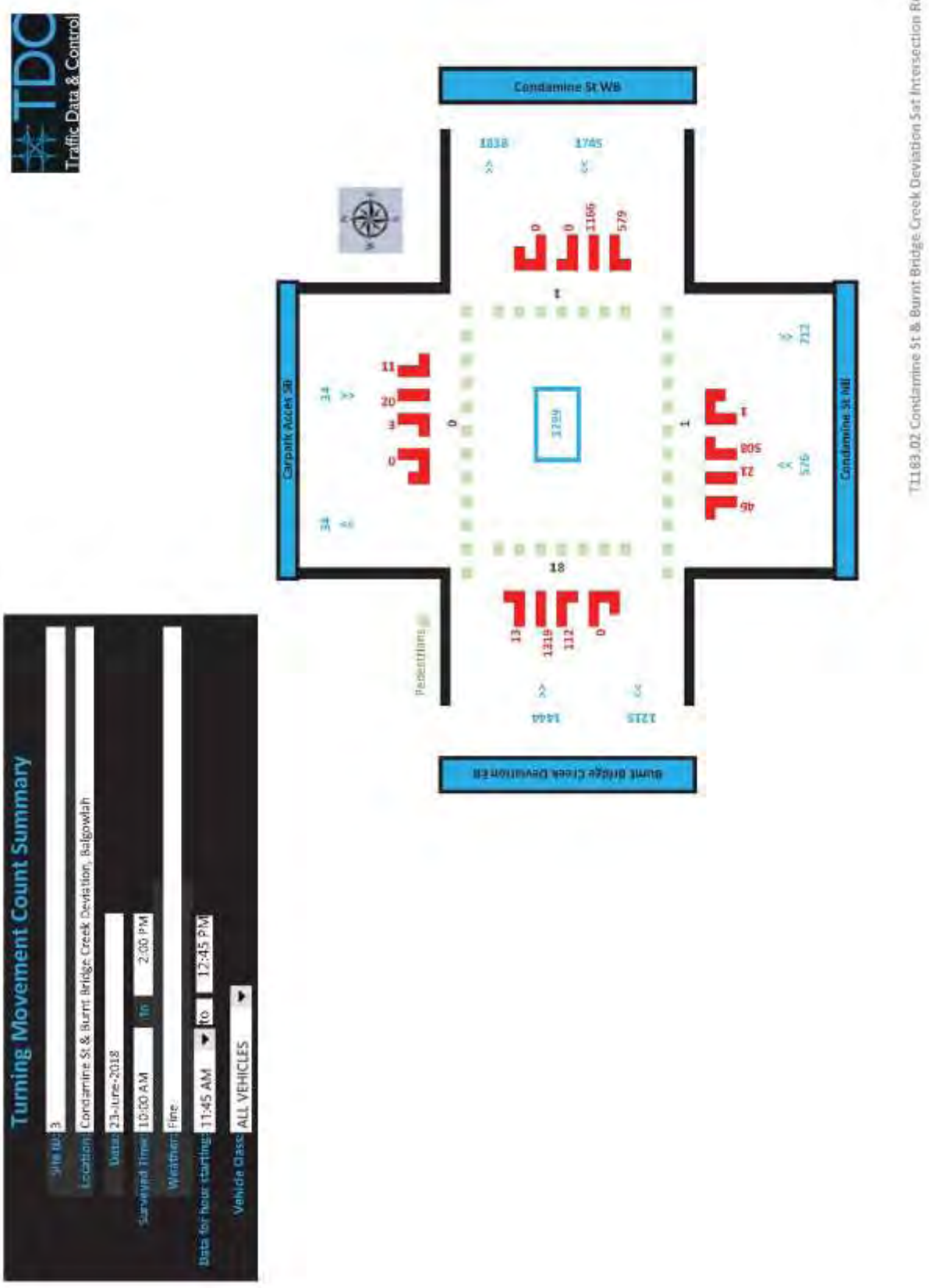


T1183.02 Condamine St & Burnt Bridge Creek Deviation Thurs Intersection Report



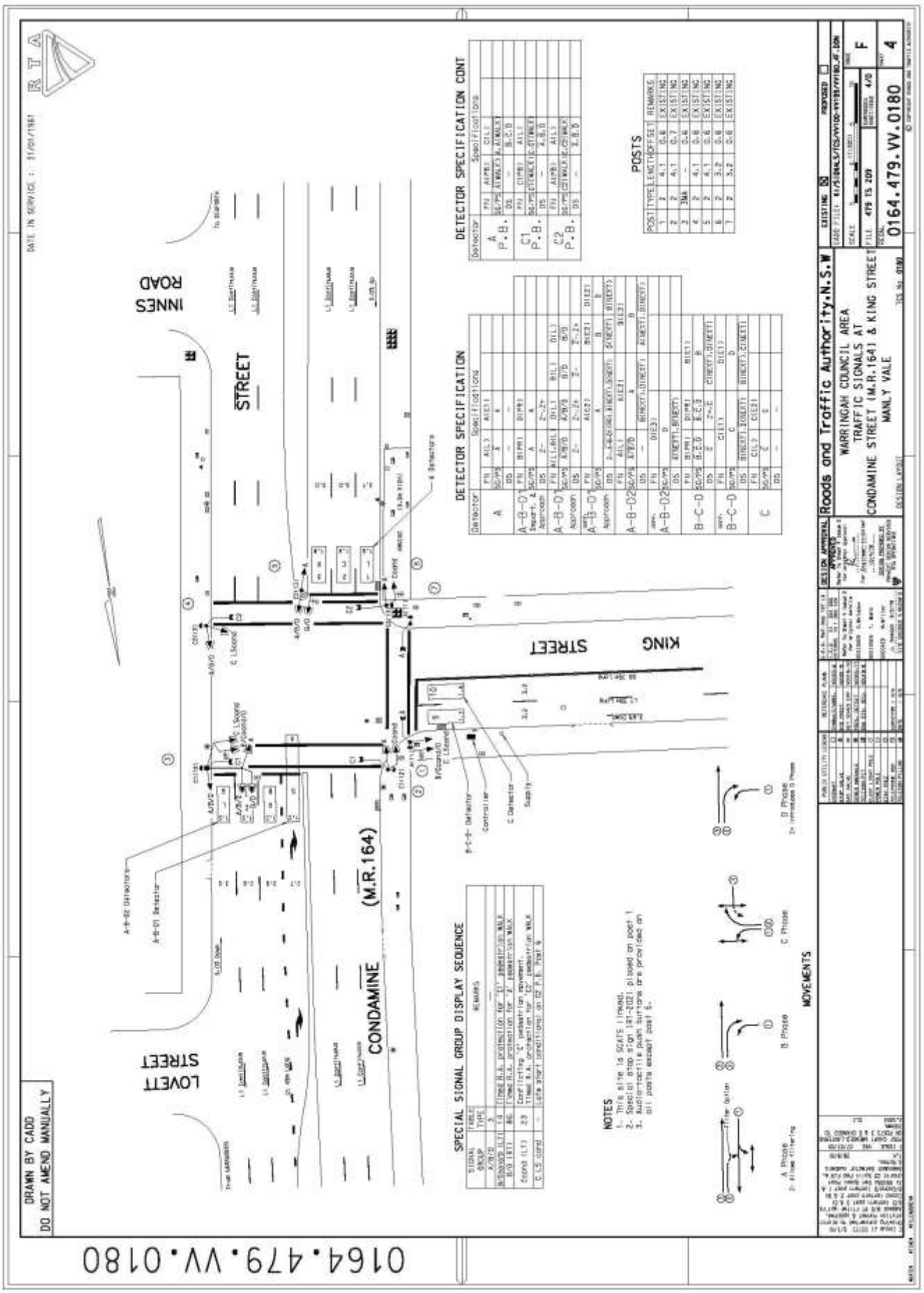

TDC
Traffic Data & Control
Turning Movement Count Summary
Site No: 3
Location: Condamine St & Burnt Bridge Creek Deviation, Balgowlah
Date: 21-June-2018
Surveyed Time: 3:00 PM to 6:00 PM
Weather: Fine
Data for hour starting: 3:00 PM to 4:00 PM
Vehicle Class: ALL VEHICLES
Condamine St WB
Car Park Access SB
Condamine St NB
Burnt Bridge Creek Deviation EB
Pedestrian
3617
T1183.02 Condamine St & Burnt Bridge Creek Deviation Thurs Intersection Report

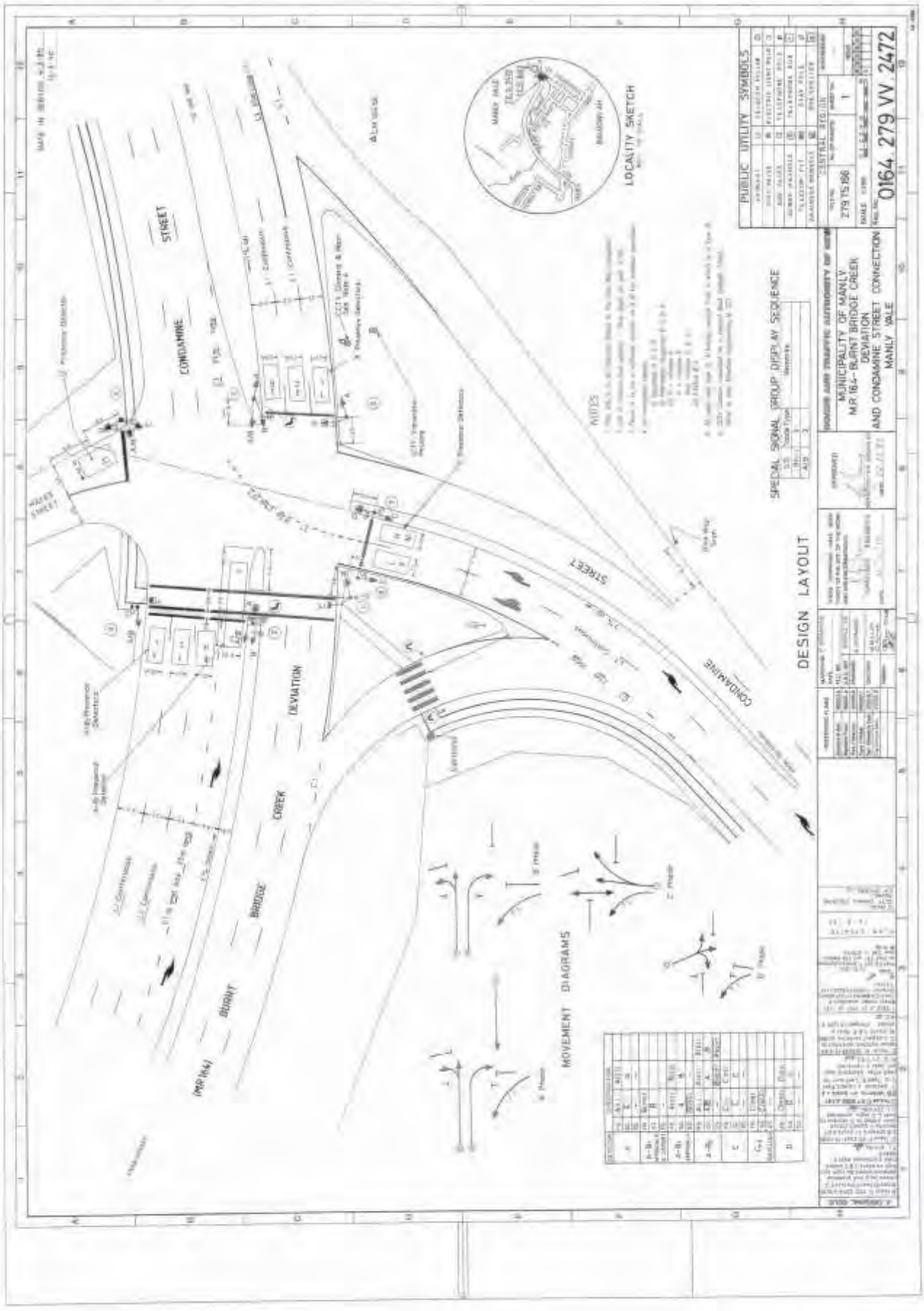


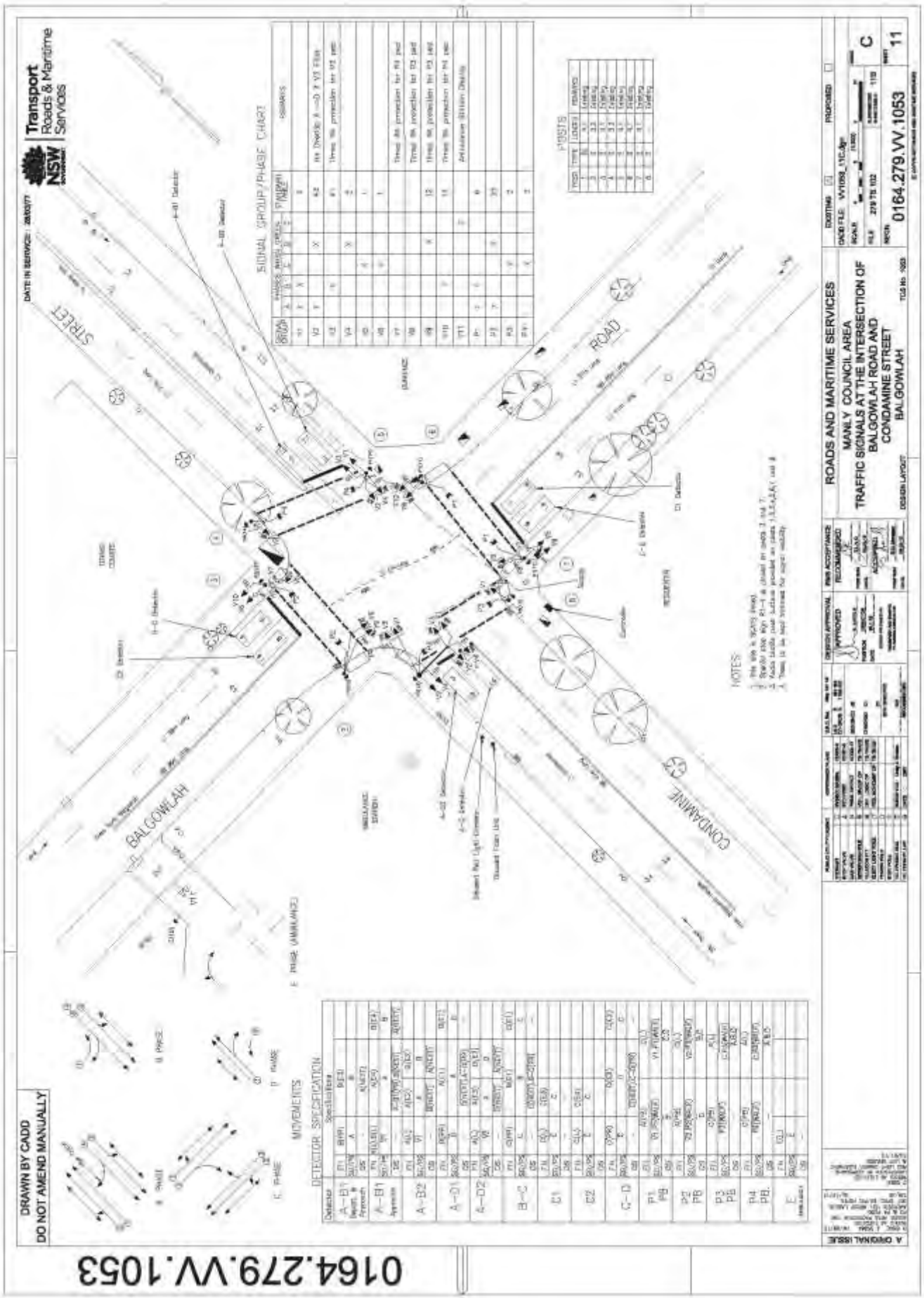

TDC
Traffic Data & Control
Turning Movement Count Summary
Site no: 3
Location: Condamine St & Burnt Bridge Creek Deviation, Balgowlah
Date: 23-June-2018
Surveyed Time: 10:00 AM to 2:00 PM
Weather: Fine
Data for hour starting: 11:45 AM to 12:45 PM
Vehicle Class: ALL VEHICLES
Condamine St WB
Carpark Access
Condamine St NB
Burnt Bridge Creek Deviation EB
Pedestrians
T1183.02 Condamine St & Burnt Bridge Creek Deviation Sat Intersection Report

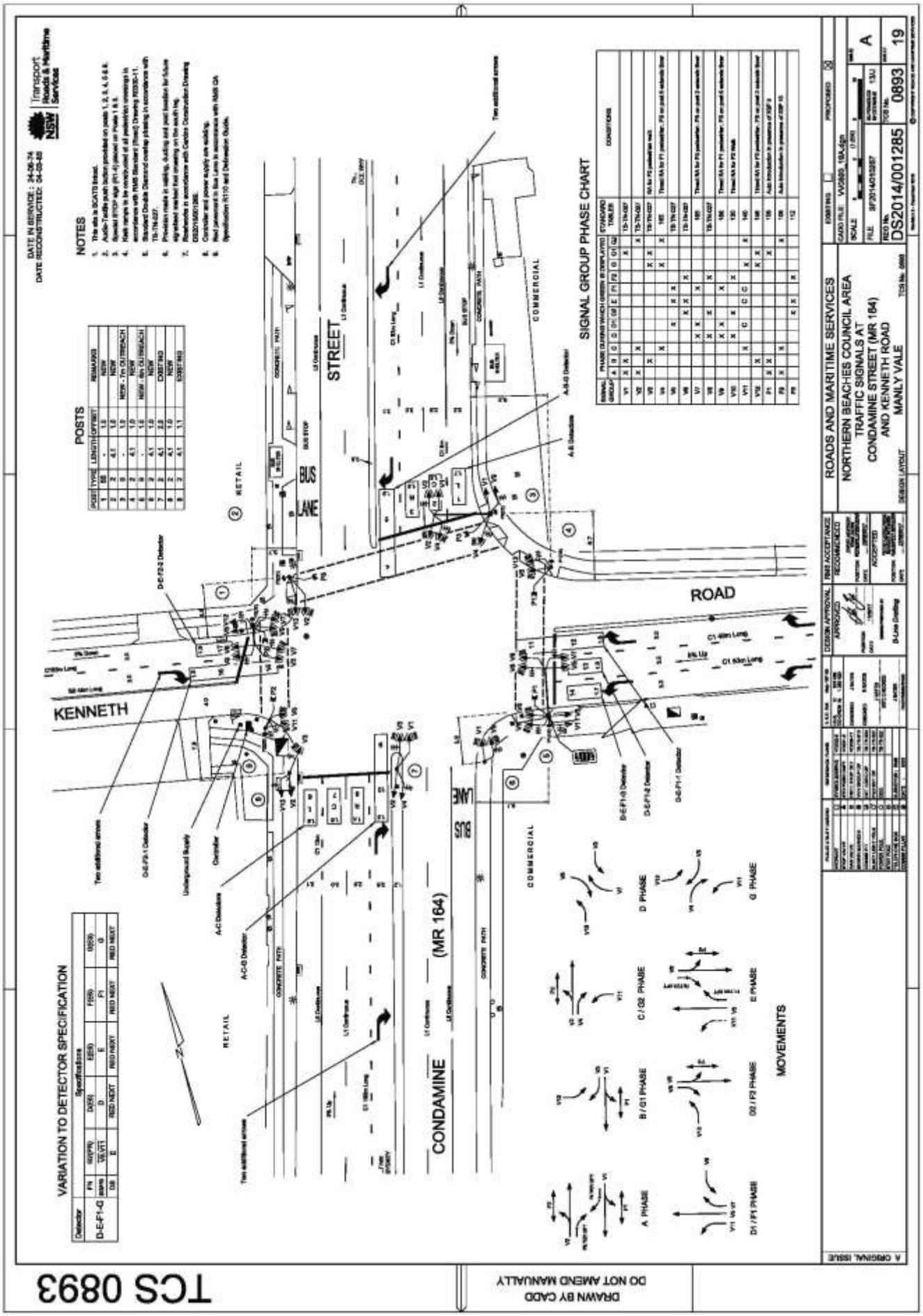
APPENDIX C

TCS PLANS


Roads and Traffic Authority N.S.W
WARRINGAH COUNCIL AREA
TRAFFIC SIGNALS AT
CONDAMINE STREET (M.R.164) & KING STREET
MANLY VALE
0164.479.VV.0180
DRAWN BY CADD
DO NOT AMEND MANUALLY
CONDAMINE (M.R.164)
LOVETT STREET
INNES ROAD
KING STREET
SPECIAL SIGNAL GROUP DISPLAY SEQUENCE
DETECTOR SPECIFICATION
DETECTOR SPECIFICATION CONT
POSTS
NOTES
MOVEMENTS


DESIGN LAYOUT
MOVEMENT DIAGRAMS
LOCALITY SKETCH
SPECIAL SIGNAL GROUP DISPLAY SEQUENCE
PUBLIC UTILITY SYMBOLS
MUNICIPALITY OF MANLY
MR 164 - BURNT BRIDGE CREEK
DEVIATION
AND CONDAMINE STREET CONNECTION
MANLY VALE
0164 279 VV 2472
CONDAMINE STREET
BURNT BRIDGE CREEK DEVIATION
(MR 164)

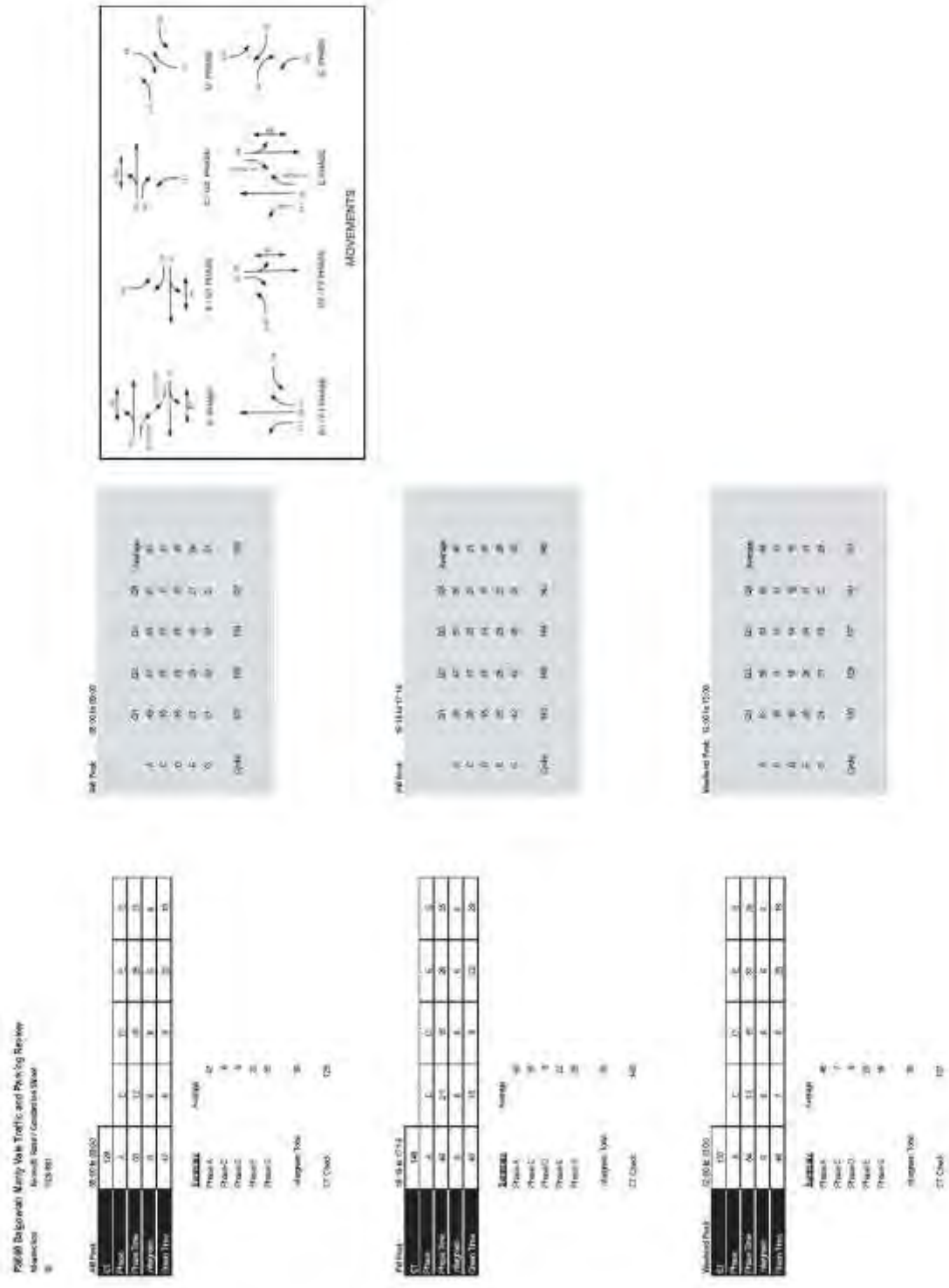

Transport Roads & Maritime Services
NSW
ROADS AND MARITIME SERVICES
MANLY COUNCIL AREA
TRAFFIC SIGNALS AT THE INTERSECTION OF BALGOWLAH ROAD AND CONDAMINE STREET BALGOWLAH
0164.279.VV.1053
DRAWN BY CADD
DO NOT AMEND MANUALLY
BALGOWLAH ROAD
CONDAMINE
STREET
SIGNAL GROUP/PHASE CHART
DETECTOR SPECIFICATION
MOVEMENTS
NOTES
POSTS

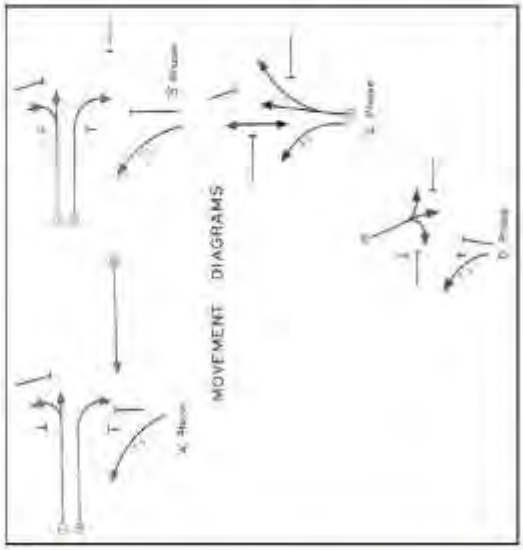

NOTES
POSTS
SIGNAL GROUP PHASE CHART
VARIATION TO DETECTOR SPECIFICATION
ROADS AND MARITIME SERVICES
NORTHERN BEACHES COUNCIL AREA
TRAFFIC SIGNALS AT
CONDAMINE STREET (MR 164)
AND KENNETH ROAD
MANLY VALE
DESIGN LAYOUT
DS2014/001285
0893
19
KENNETH
STREET
ROAD
CONDAMINE
(MR 164)
BUS LANE
RETAIL
COMMERCIAL
MOVEMENTS
A PHASE
B / G1 PHASE
C / G2 PHASE
D PHASE
E PHASE
G PHASE
D1 / F1 PHASE
D2 / F2 PHASE
DRAWN BY CADD
DO NOT AMEND MANUALLY
TCS 0893

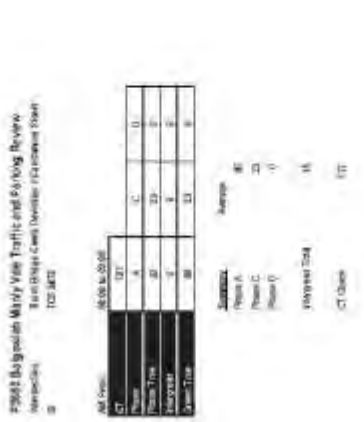
APPENDIX D

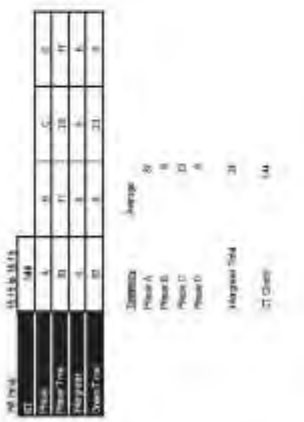
SCATS IDM DATA

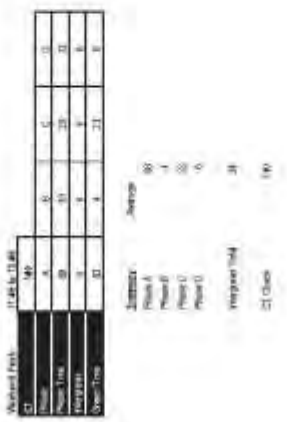
MOVEMENTS
A Phase
B Phase
C Phase
D Phase

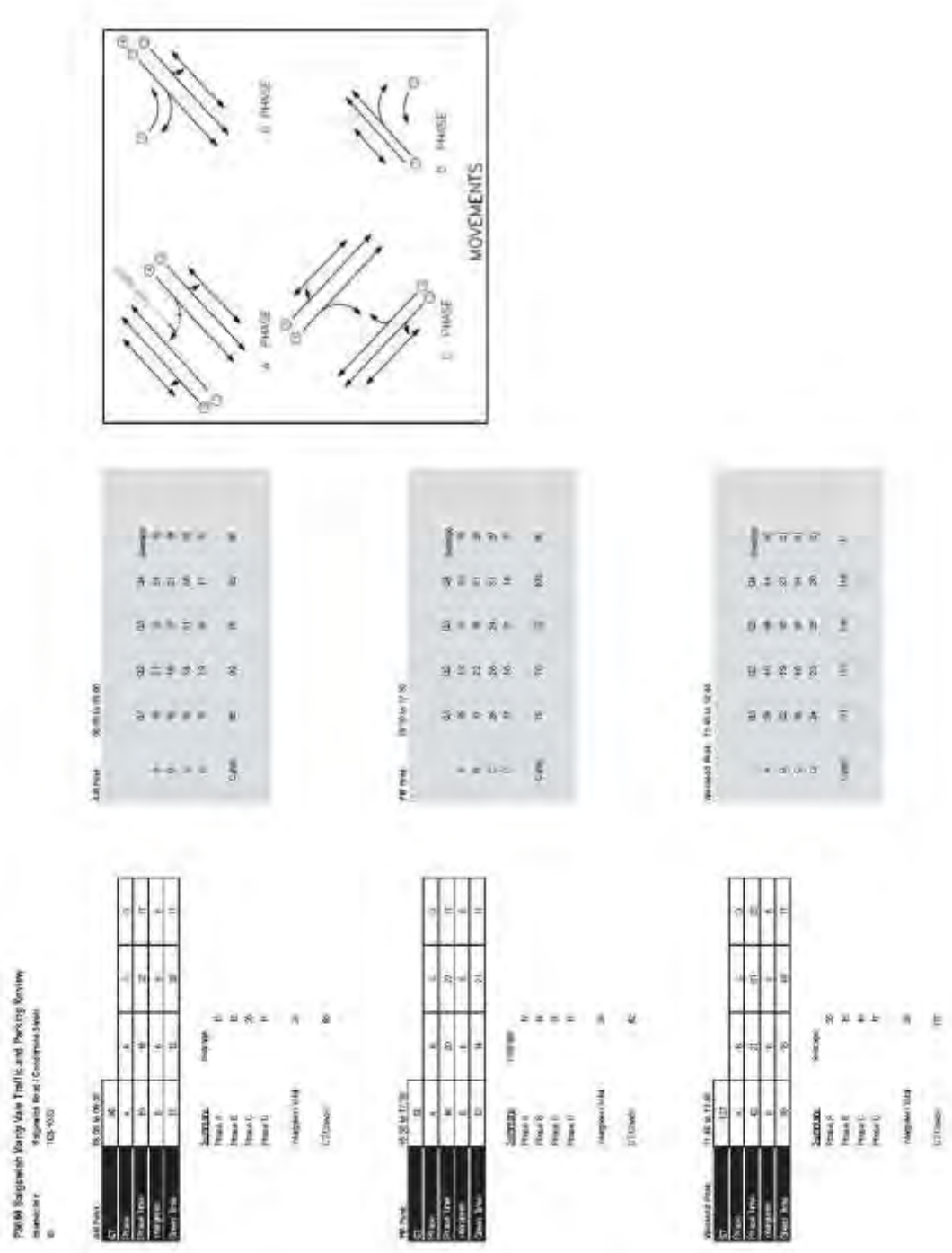



MOVEMENT DIAGRAMS








MOVEMENTS
A PHASE
B PHASE
C PHASE
D PHASE

APPENDIX E

YEAR 2018 SIDRA OUTPUTS

MOVEMENT SUMMARY

Site: TCS180 [2018 Base AM]

Condamine Street - King Street
2018 AM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 123 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	86	1.2	0.735	38.9	LOS C	3.8	26.7	0.63	0.81	33.5
2	T1	1598	5.5	0.916	45.7	LOS D	56.0	410.4	0.96	1.02	26.7
Approach		1684	5.3	0.916	45.3	LOS D	56.0	410.4	0.95	1.01	27.1
North: Condamine Street (N)											
8	T1	1646	8.1	0.631	11.8	LOS A	26.5	192.0	0.60	0.55	45.4
9	R2	169	0.6	0.637	59.2	LOS E	9.4	66.5	0.99	0.95	25.2
Approach		1816	7.4	0.637	16.2	LOS B	26.5	192.0	0.64	0.59	41.4
West: King Street (W)											
10	L2	83	1.3	0.119	30.7	LOS C	3.2	22.5	0.68	0.71	33.0
12	R2	100	2.1	0.402	57.9	LOS E	5.6	40.0	0.96	0.78	28.2
Approach		183	1.7	0.402	45.5	LOS D	5.6	40.0	0.83	0.75	30.0
All Vehicles		3683	6.1	0.916	31.0	LOS C	56.0	410.4	0.79	0.79	32.8

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 Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	84	51.2	LOS E	0.3	0.91	0.91
P3	North Full Crossing	39	49.3	LOS E	0.1	0.90	0.90
P4	West Full Crossing	25	20.5	LOS C	0.1	0.56	0.56
All Pedestrians		148	45.5	LOS E		0.85	0.85

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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MOVEMENT SUMMARY

Site: TCS180 [2018 Base PM]

Condamine Street - King Street
2018 PM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 131 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	56	0.0	0.151	20.4	LOS B	3.6	36.0	0.51	0.52	42.0
2	T1	2032	4.5	0.894	32.2	LOS C	60.1	426.4	0.94	0.92	32.0
Approach		2087	4.4	0.894	31.8	LOS C	60.1	426.4	0.92	0.91	32.2
North: Condamine Street (N)											
8	T1	1481	6.0	0.571	9.8	LOS A	22.8	167.9	0.53	0.49	47.4
9	R2	92	2.3	0.510	59.5	LOS E	5.7	40.9	1.00	0.85	25.4
Approach		1573	5.8	0.571	12.7	LOS A	22.8	167.9	0.56	0.51	44.4
West: King Street (W)											
10	L2	66	0.0	0.118	39.4	LOS C	3.0	21.1	0.76	0.72	30.0
12	R2	65	4.8	0.242	57.9	LOS E	3.7	27.1	0.92	0.75	28.2
Approach		132	2.4	0.242	48.6	LOS D	3.7	27.1	0.84	0.74	29.0
All Vehicles		3792	4.9	0.894	24.5	LOS B	60.1	426.4	0.77	0.74	36.1

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 Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	79	55.1	LOS E	0.3	0.92	0.92
P3	North Full Crossing	16	55.9	LOS E	0.1	0.92	0.92
P4	West Full Crossing	20	15.6	LOS B	0.0	0.49	0.49
All Pedestrians		115	48.4	LOS E		0.84	0.84

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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MOVEMENT SUMMARY

Site: TCS180 [2018 Base Weekend]

Condamine Street - King Street
2018 Weekend Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 129 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	56	0.0	0.095	18.2	LOS B	1.5	10.5	0.46	0.67	41.1
2	T1	1768	2.1	0.777	18.5	LOS B	41.3	294.6	0.78	0.72	39.9
Approach		1824	2.1	0.777	18.5	LOS B	41.3	294.6	0.77	0.72	39.9
North: Condamine Street (N)											
8	T1	1705	2.4	0.619	8.7	LOS A	25.7	183.5	0.53	0.49	48.5
9	R2	71	1.5	0.389	41.6	LOS C	3.7	26.4	0.88	0.80	28.5
Approach		1776	2.4	0.619	10.0	LOS A	25.7	183.5	0.54	0.50	47.0
West: King Street (W)											
10	L2	43	2.4	0.091	42.8	LOS D	2.0	14.5	0.79	0.71	27.6
12	R2	53	0.0	0.232	60.5	LOS E	3.0	21.3	0.94	0.74	26.6
Approach		96	1.1	0.232	52.5	LOS D	3.0	21.3	0.87	0.73	27.0
All Vehicles		3696	2.2	0.777	15.3	LOS B	41.3	294.6	0.66	0.61	42.2

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	45	57.8	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	13	55.8	LOS E	0.0	0.0	0.93	0.93
P4	West Full Crossing	16	13.0	LOS B	0.0	0.0	0.45	0.45
All Pedestrians		74	47.9	LOS E			0.84	0.84

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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MOVEMENT SUMMARY

Site: TCS893 [2018 Base AM]

Condamine Street - Kenneth Road
2018 AM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 129 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	32	3.3	0.035	22.5	LOS B	1.0	7.0	0.53	0.67	35.3
2	T1	1432	5.5	0.932	58.7	LOS E	53.5	392.2	1.00	1.09	22.9
3	R2	234	7.7	1.269	288.9	LOS F	30.3	225.7	1.00	1.52	3.2
Approach		1697	5.8	1.269	89.7	LOS F	53.5	392.2	0.99	1.14	15.7
East: Kenneth Road (E)											
4	L2	194	6.5	0.252	19.6	LOS B	5.4	39.7	0.66	0.74	26.7
5	T1	52	2.0	0.139	46.4	LOS D	2.7	19.2	0.86	0.66	23.9
6	R2	182	5.2	0.767	60.9	LOS E	10.0	73.4	1.00	0.98	18.6
Approach		427	5.4	0.767	40.4	LOS C	10.0	73.4	0.83	0.83	21.6
North: Condamine Street (N)											
7	L2	8	12.5	0.256	45.2	LOS D	3.8	46.7	0.83	0.69	24.7
8	T1	1403	9.2	1.301	317.3	LOS F	114.1	828.6	0.99	2.25	6.8
9	R2	37	0.0	0.323	71.2	LOS F	2.3	16.4	0.99	0.73	24.2
Approach		1448	9.0	1.301	309.4	LOS F	114.1	828.6	0.99	2.20	6.1
West: Kenneth Road (W)											
10	L2	36	2.9	0.325	57.2	LOS E	5.3	37.8	0.93	0.75	27.3
11	T1	58	1.8	0.325	52.6	LOS D	5.3	37.8	0.93	0.75	22.4
12	R2	87	1.2	0.225	39.7	LOS C	4.0	28.4	0.81	0.74	29.6
Approach		181	1.7	0.325	47.3	LOS D	5.3	37.8	0.87	0.75	26.8
All Vehicles		3754	6.8	1.301	166.8	LOS F	114.1	828.6	0.97	1.50	9.8

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 veh/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	129	41.3	LOS E	0.4	0.4	0.80	0.80
P3	North Full Crossing	88	54.2	LOS E	0.3	0.3	0.92	0.92
P4	West Full Crossing	9	38.8	LOS D	0.0	0.0	0.78	0.78
All Pedestrians		227	46.2	LOS E			0.85	0.85

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: TCS893 [2018 Base PM]

Condamine Street - Kenneth Road
2018 PM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 145 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	54	2.0	0.190	39.7	LOS C	4.6	44.9	0.73	0.65	29.2
2	T1	1784	4.1	1.241	277.1	LOS F	145.9	1036.8	0.99	1.99	7.1
3	R2	408	2.3	1.294	316.6	LOS F	59.2	422.7	1.00	1.51	2.9
Approach		2246	3.7	1.294	278.5	LOS F	145.9	1036.8	0.99	1.87	6.1
East: Kenneth Road (E)											
4	L2	309	3.7	0.347	19.0	LOS B	9.3	67.1	0.64	0.75	27.1
5	T1	37	2.9	0.097	50.6	LOS D	2.1	15.1	0.85	0.64	22.8
6	R2	206	4.6	0.877	78.9	LOS F	13.8	100.7	1.00	1.09	15.7
Approach		553	4.0	0.877	43.5	LOS D	13.8	100.7	0.79	0.87	19.9
North: Condamine Street (N)											
7	L2	22	9.5	0.054	34.4	LOS C	0.9	6.9	0.80	0.70	26.8
8	T1	1151	8.3	1.320	354.9	LOS F	105.2	788.7	1.00	2.23	5.3
9	R2	34	0.0	0.133	65.1	LOS E	2.1	14.8	0.91	0.73	25.5
Approach		1206	8.1	1.320	340.9	LOS F	105.2	788.7	0.99	2.16	5.6
West: Kenneth Road (W)											
10	L2	48	2.2	0.355	63.4	LOS E	6.6	46.6	0.93	0.77	26.0
11	T1	56	0.0	0.355	58.9	LOS E	6.6	46.6	0.93	0.77	21.1
12	R2	86	1.2	0.251	45.0	LOS D	4.5	31.9	0.83	0.74	27.9
Approach		191	1.1	0.355	53.8	LOS D	6.6	46.6	0.88	0.76	25.3
All Vehicles		4196	4.9	1.320	255.3	LOS F	145.9	1036.8	0.96	1.77	6.6

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	98	49.0	LOS E	0.3	0.3	0.82	0.82
P3	North Full Crossing	136	61.3	LOS F	0.5	0.5	0.92	0.92
P4	West Full Crossing	25	46.4	LOS E	0.1	0.1	0.80	0.80
All Pedestrians		259	55.2	LOS E			0.87	0.87

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: TCS893 [2018 Weekend]

Condamine Street - Kenneth Road
2018 Weekend Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 137 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	47	2.2	0.053	23.7	LOS B	1.6	11.2	0.53	0.68	34.7
2	T1	1467	2.7	1.084	152.7	LOS F	88.0	630.2	1.00	1.55	11.3
3	R2	327	1.3	1.405	410.6	LOS F	54.2	383.9	1.00	1.69	2.3
Approach		1842	2.5	1.405	195.2	LOS F	88.0	630.2	0.99	1.55	8.3
East: Kenneth Road (E)											
4	L2	371	1.7	0.471	21.0	LOS B	10.6	75.4	0.75	0.79	25.9
5	T1	61	1.7	0.182	51.9	LOS D	3.5	24.8	0.89	0.89	22.4
6	R2	275	2.3	0.859	58.7	LOS E	16.8	119.8	1.00	0.96	19.1
Approach		706	1.9	0.859	38.4	LOS C	16.8	119.8	0.86	0.85	21.7
North: Condamine Street (N)											
7	L2	23	0.0	0.042	26.8	LOS B	0.8	5.4	0.73	0.69	30.4
8	T1	1249	2.7	1.466	478.2	LOS F	129.9	930.5	1.00	2.58	4.1
9	R2	37	0.0	0.229	70.1	LOS E	2.4	16.5	0.97	0.73	24.4
Approach		1309	2.6	1.466	458.8	LOS F	129.9	930.5	0.99	2.49	4.3
West: Kenneth Road (W)											
10	L2	59	0.0	0.363	62.0	LOS E	6.0	42.5	0.94	0.77	26.2
11	T1	40	2.6	0.363	57.6	LOS E	6.0	42.5	0.94	0.77	21.3
12	R2	102	0.0	0.244	37.7	LOS C	4.6	32.2	0.82	0.75	30.4
Approach		201	0.5	0.363	48.8	LOS D	6.0	42.5	0.88	0.76	27.0
All Vehicles		4059	2.3	1.466	245.7	LOS F	129.9	930.5	0.96	1.69	6.9

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 Pedestrian Queue ped	Pedestrian Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	78	48.4	LOS E	0.3	0.3	0.84	0.84
P3	North Full Crossing	87	59.0	LOS E	0.2	0.2	0.93	0.93
P4	West Full Crossing	22	45.8	LOS E	0.1	0.1	0.82	0.82
All Pedestrians		187	52.3	LOS E			0.87	0.87

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: TCS2472 [2018 Base AM]

Burnt Bridge Creek Deviation - Condamine Street
2018 AM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 127 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1b	L3	31	20.7	0.042	10.8	LOS A	0.5	3.8	0.30	0.64	54.3
1a	L1	7	14.3	0.551	48.2	LOS D	14.2	105.2	0.92	0.82	11.9
3a	R1	533	4.2	0.551	48.3	LOS D	14.8	105.2	0.92	0.82	19.8
Approach		571	5.2	0.551	46.2	LOS D	14.8	105.2	0.89	0.81	22.7
NorthEast: Condamine Street (NE)											
24a	L1	575	4.6	0.293	4.4	LOS A	0.0	0.0	0.00	0.49	48.7
25	T1	1154	9.6	0.524	18.8	LOS B	20.9	151.2	0.67	0.60	51.5
Approach		1728	7.9	0.524	14.0	LOS A	20.9	151.2	0.45	0.56	51.2
NorthWest: Freedom - Balgowlah (Access)											
27	L2	1	0.0	0.043	67.0	LOS E	0.3	1.8	0.98	0.63	11.0
29a	R1	2	0.0	0.043	65.9	LOS E	0.3	1.8	0.98	0.63	10.3
29	R2	1	0.0	0.043	67.2	LOS E	0.3	1.8	0.98	0.63	36.0
Approach		4	0.0	0.043	66.5	LOS E	0.3	1.8	0.98	0.63	21.0
SouthWest: Burnt Bridge Creek Deviation (SW)											
30	L2	1	0.0	0.058	19.5	LOS B	1.1	13.8	0.49	0.38	47.0
31	T1	1112	7.6	0.567	18.8	LOS B	23.7	172.3	0.67	0.60	51.4
32b	R3	81	7.6	0.427	40.4	LOS C	3.9	29.4	0.79	0.79	43.7
Approach		1194	7.6	0.567	20.3	LOS B	23.7	172.3	0.68	0.61	50.8
All Vehicles		3497	7.3	0.567	21.5	LOS B	23.7	172.3	0.60	0.62	47.7

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.
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 Distance m	Prop. Queued	Effective Stop Rate per ped
P8	SouthWest Full Crossing	7	50.3	LOS E	0.0	0.89	0.89
All Pedestrians		7	50.3	LOS E		0.89	0.89

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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MOVEMENT SUMMARY

Site: TCS2472 [2018 Base PM]

Burnt Bridge Creek Deviation - Condamine Street
2018 PM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 144 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1b	L3	39	13.5	0.045	10.0	LOS A	0.5	4.3	0.26	0.64	54.8
1a	L1	13	0.0	0.724	67.6	LOS E	14.8	113.0	1.00	0.86	9.1
3a	R1	436	6.0	0.724	67.6	LOS E	15.9	113.0	1.00	0.86	15.7
Approach		487	6.5	0.724	63.0	LOS E	15.9	113.0	0.94	0.84	19.6
NorthEast: Condamine Street (NE)											
24a	L1	416	6.8	0.216	4.4	LOS A	0.0	0.0	0.00	0.49	49.2
25	T1	1197	9.1	0.491	30.1	LOS C	20.0	146.3	0.76	0.67	47.4
Approach		1613	8.5	0.491	23.5	LOS B	20.0	151.4	0.57	0.63	47.5
NorthWest: Freedom - Balgowlah (Access)											
27	L2	12	0.0	0.309	78.9	LOS F	1.9	13.3	1.00	0.71	9.6
29a	R1	12	0.0	0.309	77.8	LOS F	1.9	13.3	1.00	0.71	8.9
29	R2	3	0.0	0.309	79.0	LOS F	1.9	13.3	1.00	0.71	33.7
Approach		26	0.0	0.309	78.4	LOS F	1.9	13.3	1.00	0.71	14.3
SouthWest: Burnt Bridge Creek Deviation (SW)											
30	L2	5	0.0	0.035	14.1	LOS A	0.7	6.2	0.36	0.31	48.7
31	T1	1537	4.5	0.728	14.6	LOS B	41.6	298.3	0.63	0.58	53.1
32b	R3	138	3.1	0.309	32.4	LOS C	6.6	47.4	0.73	0.79	46.2
Approach		1680	4.3	0.728	16.1	LOS B	41.6	298.3	0.64	0.60	52.5
All Vehicles		3806	6.3	0.728	25.7	LOS B	41.6	298.3	0.65	0.64	46.8

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 Distance m	Prop. Queued	Effective Stop Rate per ped
P8	SouthWest Full Crossing	3	66.1	LOS F	0.0	0.96	0.96
All Pedestrians		3	66.1	LOS F		0.96	0.96

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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MOVEMENT SUMMARY

Site: TCS2472 [2018 Base Weekend]

Burnt Bridge Creek Deviation - Condamine Street
2018 Weekend Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1b	L3	48	2.2	0.051	9.8	LOS A	0.7	4.7	0.26	0.64	55.1
1a	L1	22	0.0	0.686	58.9	LOS E	17.0	122.6	0.97	0.84	10.1
3a	R1	534	2.0	0.686	59.1	LOS E	18.1	127.0	0.98	0.84	17.3
Approach		604	1.9	0.686	55.2	LOS D	18.1	127.0	0.92	0.82	21.3
NorthEast: Condamine Street (NE)											
24a	L1	608	1.4	0.304	4.4	LOS A	0.0	0.0	0.00	0.49	49.3
25	T1	1225	2.2	0.499	30.8	LOS C	20.0	141.9	0.78	0.69	47.2
Approach		1834	2.0	0.499	22.1	LOS B	20.0	144.1	0.52	0.62	47.4
NorthWest: Freedom - Balgowlah (Access)											
27	L2	12	0.0	0.406	77.2	LOS F	2.5	17.7	1.00	0.72	9.8
29a	R1	21	0.0	0.406	76.1	LOS F	2.5	17.7	1.00	0.72	9.1
29	R2	3	0.0	0.406	77.3	LOS F	2.5	17.7	1.00	0.72	34.0
Approach		36	0.0	0.406	76.6	LOS F	2.5	17.7	1.00	0.72	13.4
SouthWest: Burnt Bridge Creek Deviation (SW)											
30	L2	14	0.0	0.019	16.5	LOS B	0.5	4.2	0.41	0.50	46.7
31	T1	1388	3.0	0.705	17.8	LOS B	38.0	272.0	0.68	0.62	51.9
32b	R3	118	0.0	0.301	35.3	LOS C	5.7	39.9	0.78	0.79	45.4
Approach		1520	2.8	0.705	19.1	LOS B	38.0	272.0	0.68	0.63	51.3
All Vehicles		3994	2.2	0.705	26.4	LOS B	38.0	272.0	0.65	0.66	45.8

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 Distance m	Prop. Queued	Effective Stop Rate per ped
P8	SouthWest Full Crossing	19	59.5	LOS E	0.1	0.92	0.92
All Pedestrians		19	59.5	LOS E		0.92	0.92

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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MOVEMENT SUMMARY

Site: TCS1053 [2018 Base AM]

Condamine Street - Balgowlah Road
2018 AM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 86 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow [veh/h]	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue [Vehicles veh]	95% Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	59	3.6	0.881	48.6	LOS D	15.8	116.6	0.94	1.03	31.9
2	T1	279	6.8	0.881	43.1	LOS D	15.8	116.6	0.94	1.03	27.9
3	R2	151	7.7	1.309	328.4	LOS F	21.9	163.7	1.00	1.84	5.5
Approach		488	6.7	1.309	131.7	LOS F	21.9	163.7	0.96	1.28	13.5
East: Balgowlah Road (E)											
4	L2	139	4.5	0.949	60.9	LOS E	29.5	210.6	0.99	1.24	21.8
5	T1	381	1.4	0.949	56.3	LOS D	29.5	210.6	0.99	1.24	22.2
6	R2	55	3.8	0.291	39.8	LOS C	2.1	15.3	0.91	0.75	18.1
Approach		575	2.4	0.949	55.9	LOS D	29.5	210.6	0.99	1.20	21.8
North: Condamine Street (S)											
7	L2	104	15.2	0.310	25.8	LOS B	6.0	46.1	0.74	0.70	25.4
8	T1	313	6.4	1.366	249.8	LOS F	74.5	541.3	0.92	1.67	7.4
9	R2	280	3.0	1.366	363.4	LOS F	74.5	541.3	1.00	2.13	5.7
Approach		697	6.3	1.366	261.9	LOS F	74.5	541.3	0.92	1.71	6.9
West: Balgowlah Road (W)											
10	L2	252	2.1	0.335	17.1	LOS B	5.9	41.8	0.72	0.75	37.4
11	T1	363	0.3	0.665	26.1	LOS B	13.7	96.6	0.90	0.78	31.7
12	R2	21	10.0	0.665	30.7	LOS C	13.7	96.6	0.90	0.78	37.5
Approach		636	1.3	0.665	22.7	LOS B	13.7	96.6	0.82	0.76	34.1
All Vehicles		2396	4.1	1.366	122.4	LOS F	74.5	541.3	0.92	1.25	13.3

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 [veh/h]	Average Delay sec	Level of Service	Average Back of Queue [Pedestrian ped]	Average Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	14	25.3	LOS C	0.0	0.0	0.77	0.77
P2	East Full Crossing	35	22.4	LOS C	0.1	0.1	0.72	0.72
P3	North Full Crossing	45	26.1	LOS C	0.1	0.1	0.78	0.78
P4	West Full Crossing	21	37.2	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		115	26.9	LOS C			0.79	0.79

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: TCS1053 [2018 Base PM]

Condamine Street - Balgowlah Road
2018 PM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 82 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	103	2.0	0.800	37.3	LOS C	12.8	92.1	0.90	0.90	35.3
2	T1	228	3.7	0.800	31.7	LOS C	12.8	92.1	0.90	0.90	32.1
3	R2	163	2.6	1.227	256.4	LOS F	20.2	144.2	1.00	1.74	6.9
Approach		495	3.0	1.227	107.0	LOS F	20.2	144.2	0.93	1.17	16.1
East: Balgowlah Road (E)											
4	L2	137	3.1	1.301	318.4	LOS F	68.9	489.0	1.00	2.74	5.8
5	T1	345	0.9	1.301	313.8	LOS F	68.9	489.0	1.00	2.74	6.2
6	R2	57	5.6	0.723	52.9	LOS D	2.5	18.7	1.00	0.81	14.9
Approach		539	2.0	1.301	287.4	LOS F	68.9	489.0	1.00	2.54	6.3
North: Condamine Street (S)											
7	L2	99	1.1	0.218	18.4	LOS B	4.4	31.5	0.61	0.63	30.8
8	T1	265	3.2	0.960	42.6	LOS D	23.6	167.8	0.86	1.07	27.3
9	R2	328	1.3	0.960	64.8	LOS E	23.6	167.8	1.00	1.31	22.5
Approach		693	2.0	0.960	49.7	LOS D	23.6	167.8	0.89	1.12	24.7
West: Balgowlah Road (W)											
10	L2	214	4.4	0.311	17.7	LOS B	4.9	35.4	0.73	0.75	37.0
11	T1	311	0.3	1.042	103.7	LOS F	24.5	171.8	1.00	1.57	15.1
12	R2	21	0.0	1.042	108.2	LOS F	24.5	171.8	1.00	1.57	20.2
Approach		545	1.9	1.042	70.1	LOS E	24.5	171.8	0.90	1.25	20.3
All Vehicles		2272	2.2	1.301	123.5	LOS F	68.9	489.0	0.93	1.50	13.6

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	4	33.4	LOS D	0.0	0.0	0.90	0.90
P2	East Full Crossing	33	15.9	LOS B	0.0	0.0	0.62	0.62
P3	North Full Crossing	36	34.4	LOS D	0.1	0.1	0.92	0.92
P4	West Full Crossing	18	35.2	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		91	27.8	LOS C			0.81	0.81

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: TCS1053 [2018 Base Weekend]

Condamine Street - Balgowlah Road
2018 Weekend Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 137 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow [veh/h]	HV [%]	Deg. Satn [v/c]	Average Delay [sec]	Level of Service	95% Back of Queue [Vehicles veh]	95% Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate [per veh]	Average Speed [km/h]
South: Condamine Street (S)											
1	L2	111	2.9	1.040	136.6	LOS F	44.6	319.0	1.00	1.37	17.4
2	T1	305	2.4	1.040	131.1	LOS F	44.6	319.0	1.00	1.37	13.3
3	R2	146	0.0	1.164	235.7	LOS F	20.3	142.0	1.00	1.35	7.4
Approach		562	1.9	1.164	159.4	LOS F	44.6	319.0	1.00	1.37	12.0
East: Balgowlah Road (E)											
4	L2	171	1.2	1.008	112.8	LOS F	49.3	346.3	1.00	1.26	14.1
5	T1	331	0.0	1.008	108.2	LOS F	49.3	346.3	1.00	1.26	14.7
6	R2	81	1.3	1.494	506.9	LOS F	17.0	120.6	1.00	1.63	2.0
Approach		582	0.5	1.494	165.0	LOS F	49.3	346.3	1.00	1.31	9.9
North: Condamine Street (S)											
7	L2	143	0.7	0.248	33.8	LOS C	8.0	56.4	0.70	0.72	21.2
8	T1	345	1.8	1.094	114.8	LOS F	61.6	436.4	0.96	1.19	11.7
9	R2	297	1.1	1.094	132.2	LOS F	61.6	436.4	1.00	1.25	11.2
Approach		785	1.3	1.094	106.6	LOS F	61.6	436.4	0.93	1.13	12.0
West: Balgowlah Road (W)											
10	L2	212	1.5	0.271	24.9	LOS B	8.2	58.3	0.82	0.77	33.9
11	T1	302	0.0	1.189	210.6	LOS F	41.0	287.1	0.97	1.62	8.6
12	R2	29	0.0	1.189	248.2	LOS F	41.0	287.1	1.00	1.77	10.8
Approach		543	0.6	1.189	140.3	LOS F	41.0	287.1	0.92	1.30	12.5
All Vehicles		2473	1.1	1.494	139.6	LOS F	61.6	436.4	0.96	1.26	11.6

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 [veh/h]	Average Delay [sec]	Level of Service	Average Back of Queue [Pedestrian ped]	Average Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate [per ped]
P1	South Full Crossing	22	40.3	LOS E	0.1	0.1	0.77	0.77
P2	East Full Crossing	48	28.3	LOS C	0.1	0.1	0.64	0.64
P3	North Full Crossing	47	41.1	LOS E	0.1	0.1	0.78	0.78
P4	West Full Crossing	15	57.1	LOS E	0.1	0.1	0.91	0.91
All Pedestrians		133	38.1	LOS D			0.74	0.74

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: 101 [2018 Base AM]

Balgowlah Road - Rosbery Street
2018 AM Peak
Background Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	472	1.6	0.597	5.5	LOS A	6.4	45.5	0.64	0.59	42.8
6	R2	201	2.6	0.597	8.2	LOS A	6.4	45.5	0.64	0.59	44.6
6u	U	3	0.0	0.597	9.3	LOS A	6.4	45.5	0.64	0.59	48.3
Approach		676	1.9	0.597	6.3	LOS A	6.4	45.5	0.64	0.59	43.5
North: Roseberry Street (N)											
7	L2	206	4.6	0.435	7.9	LOS A	3.0	22.0	0.72	0.79	43.3
9	R2	128	6.6	0.435	10.0	LOS A	3.0	22.0	0.72	0.79	39.7
9u	U	3	0.0	0.435	11.0	LOS A	3.0	22.0	0.72	0.79	45.8
Approach		338	5.3	0.435	8.7	LOS A	3.0	22.0	0.72	0.79	42.3
West: Balgowlah Road (W)											
10	L2	231	6.4	0.611	6.9	LOS A	5.9	43.1	0.73	0.66	40.9
11	T1	379	4.7	0.611	6.4	LOS A	5.9	43.1	0.73	0.66	42.8
12u	U	3	0.0	0.611	10.1	LOS A	5.9	43.1	0.73	0.66	35.9
Approach		613	5.3	0.611	6.6	LOS A	5.9	43.1	0.73	0.66	42.1
All Vehicles		1628	3.9	0.611	6.9	LOS A	6.4	45.5	0.69	0.66	42.8

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2018 Base PM]

Balgowlah Road - Rosbery Street
2018 PM Peak
Background Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue vehicles	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	348	1.9	0.550	6.4	LOS A	5.0	35.6	0.72	0.69	42.3
6	R2	183	0.5	0.550	9.0	LOS A	5.0	35.6	0.72	0.69	44.2
6u	U	3	0.0	0.550	10.2	LOS A	5.0	35.6	0.72	0.69	47.9
Approach		536	1.4	0.550	7.3	LOS A	5.0	35.6	0.72	0.69	43.2
North: Roseberry Street (N)											
7	L2	214	1.5	0.515	8.1	LOS A	4.1	28.9	0.74	0.80	43.1
9	R2	209	2.5	0.515	10.2	LOS A	4.1	28.9	0.74	0.80	39.5
9u	U	6	0.0	0.515	11.3	LOS A	4.1	28.9	0.74	0.80	45.5
Approach		429	2.0	0.515	9.2	LOS A	4.1	28.9	0.74	0.80	41.8
West: Balgowlah Road (W)											
10	L2	213	3.5	0.554	6.6	LOS A	5.1	36.1	0.68	0.64	41.1
11	T1	347	0.9	0.554	6.0	LOS A	5.1	36.1	0.68	0.64	43.0
12u	U	7	0.0	0.554	9.8	LOS A	5.1	36.1	0.68	0.64	36.2
Approach		567	1.9	0.554	6.3	LOS A	5.1	36.1	0.68	0.64	42.3
All Vehicles		1533	1.7	0.554	7.5	LOS A	5.1	36.1	0.71	0.70	42.5

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 [2018 Base Weekend]

Balgowlah Road - Rosbery Street
2018 Weekend Peak
Background Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	371	0.3	0.617	6.4	LOS A	6.1	42.9	0.75	0.69	42.2
6	R2	243	0.0	0.617	9.0	LOS A	6.1	42.9	0.75	0.69	44.1
6u	U	1	0.0	0.617	10.3	LOS A	6.1	42.9	0.75	0.69	47.8
Approach		615	0.2	0.617	7.4	LOS A	6.1	42.9	0.75	0.69	43.2
North: Roseberry Street (N)											
7	L2	255	0.8	0.540	8.2	LOS A	4.6	32.4	0.77	0.80	43.2
9	R2	186	1.1	0.540	10.2	LOS A	4.6	32.4	0.77	0.80	39.7
9u	U	19	0.0	0.540	11.4	LOS A	4.6	32.4	0.77	0.80	45.6
Approach		460	0.9	0.540	9.1	LOS A	4.6	32.4	0.77	0.80	42.3
West: Balgowlah Road (W)											
10	L2	292	0.4	0.663	8.7	LOS A	7.6	53.4	0.82	0.77	39.8
11	T1	335	0.9	0.663	8.2	LOS A	7.6	53.4	0.82	0.77	41.8
12u	U	6	0.0	0.663	12.0	LOS A	7.6	53.4	0.82	0.77	34.0
Approach		633	0.7	0.663	8.5	LOS A	7.6	53.4	0.82	0.77	40.9
All Vehicles		1707	0.6	0.663	8.3	LOS A	7.6	53.4	0.78	0.75	42.2

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.
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Roundabout Capacity Model: SIDRA Standard.
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MOVEMENT SUMMARY

Site: 101 [2018 Base AM]

Kenneth Road - Rosbery Street
2018 AM Peak
Background Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	136	3.7	0.370	6.2	LOS A	2.4	17.3	0.62	0.71	40.5
2	T1	71	1.4	0.370	6.1	LOS A	2.4	17.3	0.62	0.71	42.3
3	R2	128	5.5	0.370	9.3	LOS A	2.4	17.3	0.62	0.71	42.6
3u	U	4	0.0	0.370	10.7	LOS A	2.4	17.3	0.62	0.71	47.5
Approach		339	3.8	0.370	7.4	LOS A	2.4	17.3	0.62	0.71	41.8
East: Kenneth Road (E)											
4	L2	161	0.0	0.487	6.4	LOS A	3.6	26.3	0.70	0.70	42.2
5	T1	280	6.1	0.487	6.5	LOS A	3.6	26.3	0.70	0.70	37.6
6	R2	8	0.0	0.487	9.5	LOS A	3.6	26.3	0.70	0.70	38.5
6u	U	2	0.0	0.487	11.0	LOS A	3.6	26.3	0.70	0.70	41.9
Approach		451	3.8	0.487	6.6	LOS A	3.6	26.3	0.70	0.70	40.0
North: Roseberry Street (N)											
7	L2	27	3.7	0.362	7.4	LOS A	2.5	17.5	0.70	0.73	36.5
8	T1	227	0.4	0.362	7.3	LOS A	2.5	17.5	0.70	0.73	42.1
9	R2	46	8.7	0.362	10.7	LOS A	2.5	17.5	0.70	0.73	27.3
9u	U	1	0.0	0.362	11.9	LOS A	2.5	17.5	0.70	0.73	29.8
Approach		301	2.0	0.362	7.8	LOS A	2.5	17.5	0.70	0.73	40.1
West: Kenneth Road (W)											
10	L2	19	0.0	0.302	5.3	LOS A	2.1	15.4	0.54	0.59	34.5
11	T1	233	6.9	0.302	5.5	LOS A	2.1	15.4	0.54	0.59	38.3
12	R2	43	4.7	0.302	8.8	LOS A	2.1	15.4	0.54	0.59	42.2
12u	U	7	0.0	0.302	10.0	LOS A	2.1	15.4	0.54	0.59	26.8
Approach		302	6.0	0.302	6.0	LOS A	2.1	15.4	0.54	0.59	38.7
All Vehicles		1393	3.9	0.487	6.9	LOS A	3.6	26.3	0.65	0.69	40.3

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

Site: 101 [2018 Base PM]

Kenneth Road - Rosbery Street
2018 PM Peak
Background Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	199	2.0	0.516	6.7	LOS A	4.1	28.8	0.73	0.77	40.1
2	T1	84	0.0	0.516	6.6	LOS A	4.1	28.8	0.73	0.77	41.8
3	R2	189	1.1	0.516	9.8	LOS A	4.1	28.8	0.73	0.77	42.2
3u	U	1	0.0	0.516	11.2	LOS A	4.1	28.8	0.73	0.77	47.1
Approach		473	1.3	0.516	7.9	LOS A	4.1	28.8	0.73	0.77	41.3
East: Kenneth Road (E)											
4	L2	320	0.0	0.696	9.5	LOS A	8.4	58.8	0.88	0.90	40.0
5	T1	275	1.5	0.696	9.5	LOS A	8.4	58.8	0.88	0.90	34.3
6	R2	45	0.0	0.696	12.6	LOS A	8.4	58.8	0.88	0.90	35.2
6u	U	2	0.0	0.696	14.1	LOS A	8.4	58.8	0.88	0.90	38.6
Approach		642	0.6	0.696	9.8	LOS A	8.4	58.8	0.88	0.90	38.0
North: Roseberry Street (N)											
7	L2	30	3.3	0.492	10.5	LOS A	4.1	28.7	0.86	0.92	33.4
8	T1	284	0.7	0.492	10.4	LOS A	4.1	28.7	0.86	0.92	39.6
9	R2	27	0.0	0.492	13.5	LOS A	4.1	28.7	0.86	0.92	26.7
9u	U	3	0.0	0.492	15.0	LOS B	4.1	28.7	0.86	0.92	29.0
Approach		344	0.9	0.492	10.7	LOS A	4.1	28.7	0.86	0.92	38.4
West: Kenneth Road (W)											
10	L2	53	1.9	0.494	6.7	LOS A	3.9	28.1	0.73	0.71	33.4
11	T1	356	3.1	0.494	6.7	LOS A	3.9	28.1	0.73	0.71	37.3
12	R2	38	0.0	0.494	9.8	LOS A	3.9	28.1	0.73	0.71	41.5
12u	U	4	0.0	0.494	11.3	LOS A	3.9	28.1	0.73	0.71	29.4
Approach		451	2.7	0.494	7.0	LOS A	3.9	28.1	0.73	0.71	37.4
All Vehicles		1910	1.3	0.696	8.8	LOS A	8.4	58.8	0.80	0.83	38.9

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

Site: 101 [2018 Base Weekend]

Kenneth Road - Rosbery Street
2018 Weekend Peak
Background Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	257	2.3	0.635	9.4	LOS A	6.4	45.5	0.85	0.92	38.1
2	T1	96	1.0	0.635	9.3	LOS A	6.4	45.5	0.85	0.92	39.8
3	R2	174	0.0	0.635	12.4	LOS A	6.4	45.5	0.85	0.92	40.4
3u	U	8	12.5	0.635	14.4	LOS A	6.4	45.5	0.85	0.92	44.9
Approach		535	1.5	0.635	10.4	LOS A	6.4	45.5	0.85	0.92	39.3
East: Kenneth Road (E)											
4	L2	244	0.4	0.724	11.5	LOS A	9.2	64.9	0.93	1.01	38.7
5	T1	359	2.2	0.724	11.6	LOS A	9.2	64.9	0.93	1.01	32.3
6	R2	9	0.0	0.724	14.6	LOS B	9.2	64.9	0.93	1.01	33.3
6u	U	1	0.0	0.724	16.1	LOS B	9.2	64.9	0.93	1.01	36.7
Approach		613	1.5	0.724	11.6	LOS A	9.2	64.9	0.93	1.01	35.7
North: Roseberry Street (N)											
7	L2	27	3.7	0.531	10.6	LOS A	4.7	32.9	0.85	0.93	33.2
8	T1	310	0.6	0.531	10.5	LOS A	4.7	32.9	0.85	0.93	39.4
9	R2	54	1.9	0.531	13.7	LOS A	4.7	32.9	0.85	0.93	26.5
9u	U	1	0.0	0.531	15.1	LOS B	4.7	32.9	0.85	0.93	28.8
Approach		392	1.0	0.531	10.9	LOS A	4.7	32.9	0.85	0.93	37.9
West: Kenneth Road (W)											
10	L2	22	4.5	0.413	6.3	LOS A	3.2	22.7	0.68	0.67	33.3
11	T1	313	1.6	0.413	6.2	LOS A	3.2	22.7	0.68	0.67	37.5
12	R2	39	2.6	0.413	9.4	LOS A	3.2	22.7	0.68	0.67	41.7
12u	U	11	0.0	0.413	10.8	LOS A	3.2	22.7	0.68	0.67	26.2
Approach		385	1.8	0.413	6.6	LOS A	3.2	22.7	0.68	0.67	37.7
All Vehicles		1925	1.5	0.724	10.2	LOS A	9.2	64.9	0.84	0.90	37.7

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D)
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APPENDIX F

PARKING OCCUPANCY AND TURNOVER HOURLY MAPS

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P: (02) 9557-6202

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Project Number: P3680
Date: 09/07/2018
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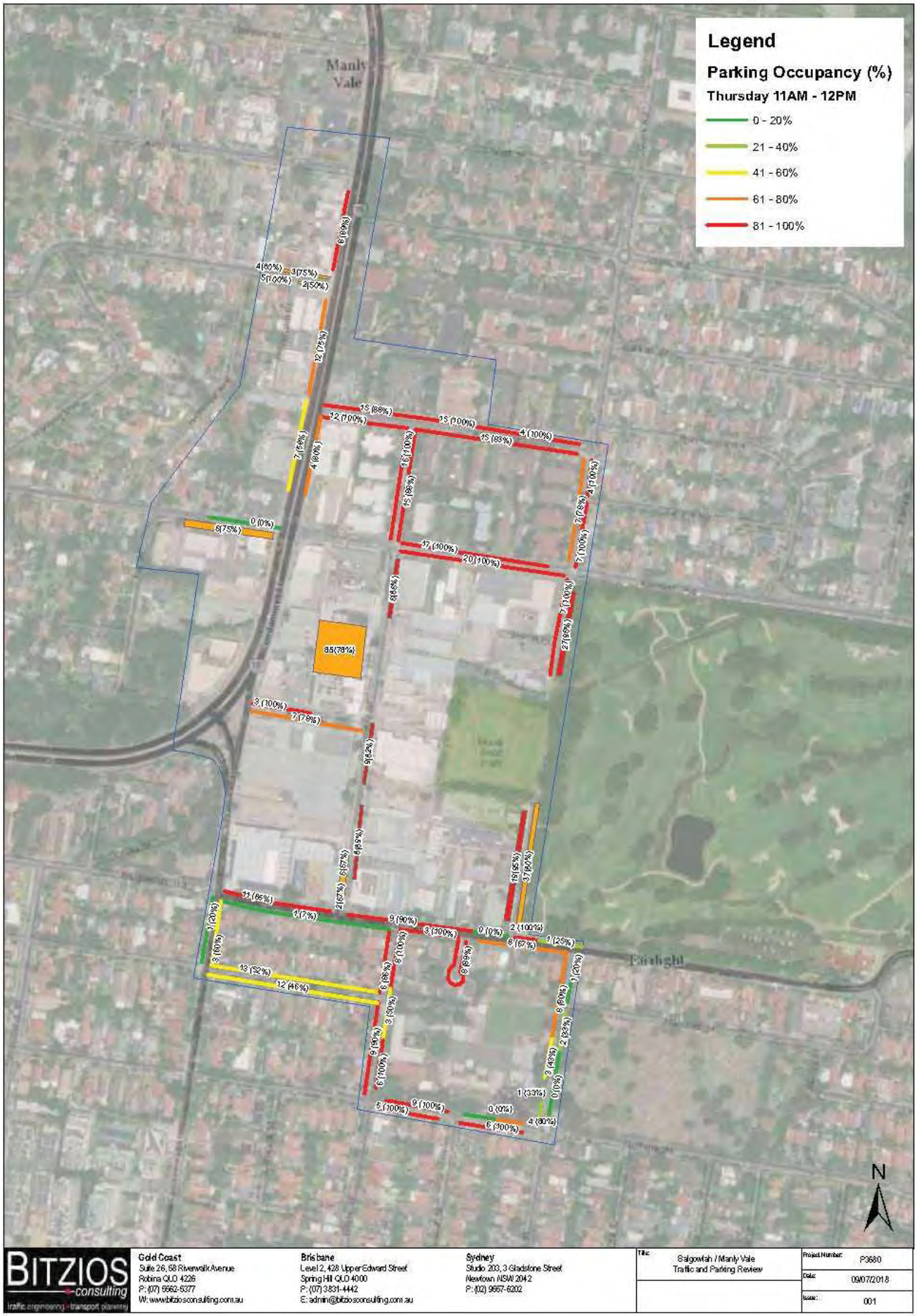

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Legend
Parking Occupancy (%)
Thursday 3PM - 4PM
0 - 20%
21 - 40%
41 - 60%
61 - 80%
81 - 100%
Manly Vale
Fairlight
N
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Legend
Parking Occupancy (%)
Saturday 9AM - 10AM
0 - 20%
21 - 40%
41 - 60%
61 - 80%
81 - 100%
Manly Vale
Fairlight
N
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P: (02) 9557-6202

Title: Balgowlah / Manly Vale Traffic and Parking Review

Project Number: P3680
Date: 09/07/2018
Issue: 001

Legend
Parking Occupancy (%)
Saturday 2PM - 3PM
0 - 20%
21 - 40%
41 - 60%
61 - 80%
81 - 100%
Manly Vale
Fairlight
N
BITZIOS consulting
traffic engineering - transport planning
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Balgowlah / Manly Vale
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Title: Balgowlah / Manly Vale Traffic and Parking Review

Project Number: P3680
Date: 09/07/2018
Issue: 001

Legend
Study Area
Turnovers per Bay
Thursday 9am - 5pm
0 - 2
2 - 4
4 - 6
6 - 8
8 - 10
Restrictions
NR No Restriction
0.5P Half Hour Parking
1P - One Hour Parking
2P Two Hour Parking
4P Four Hour Parking
Manly Vale
Fairlight
N
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Newtown NSW 2042
P: (02) 9557-6202
Balgowlah / Manly Vale
Traffic and Parking Review
P3680
13/07/2018
001

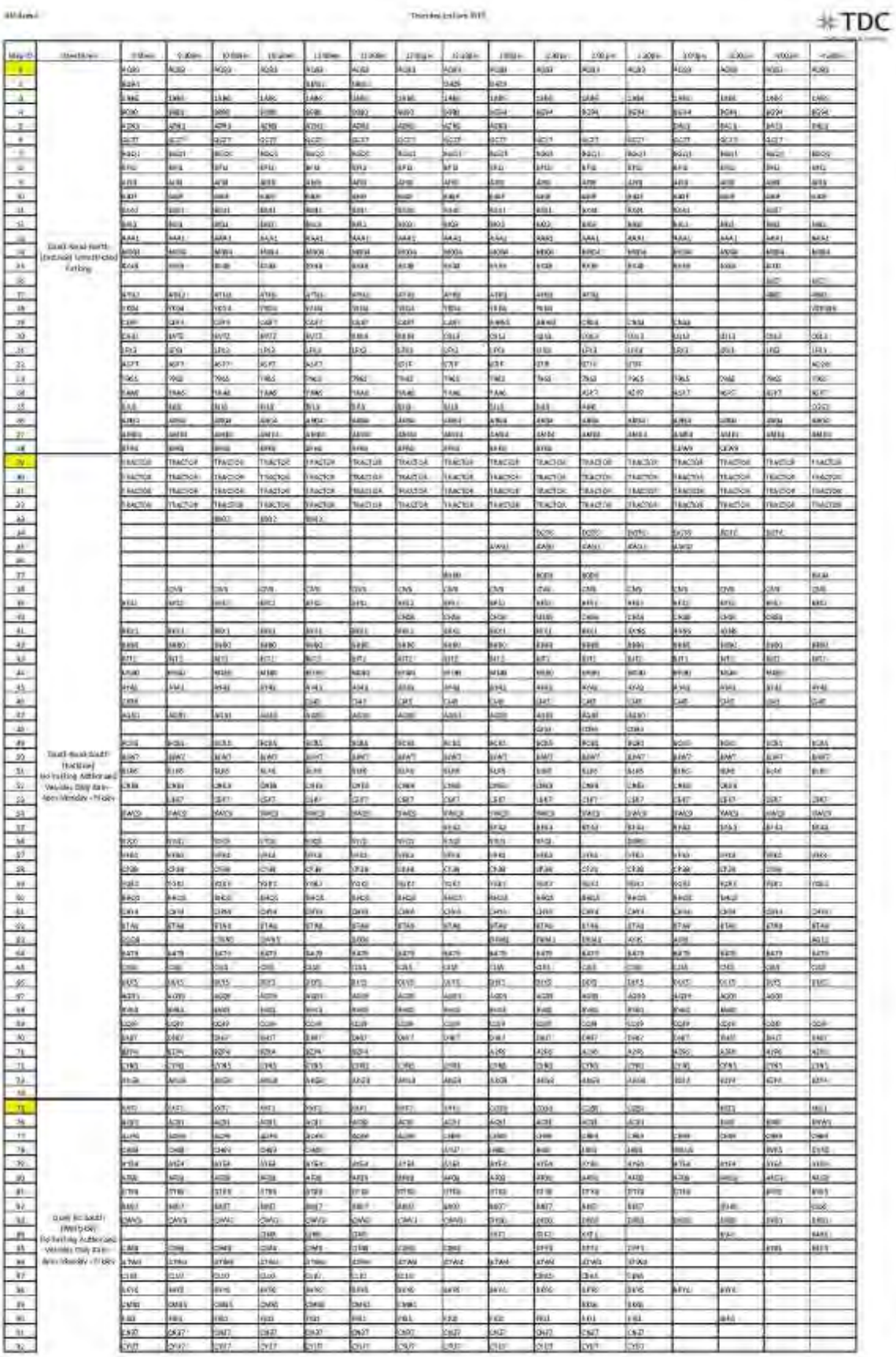
Legend
Study Area
Turnovers per Bay
Saturday 9am - 5pm
0 - 2
2 - 4
4 - 6
6 - 8
8 - 10
Restrictions
NR – No Restriction
0.5P – Half Hour Parking
1P – One Hour Parking
2P – Two Hour Parking
4P – Four Hour Parking
Manly Vale
N
BITZIOS consulting
Gold Coast
Brisbane
Sydney
Balgowlah / Manly Vale Traffic and Parking Review

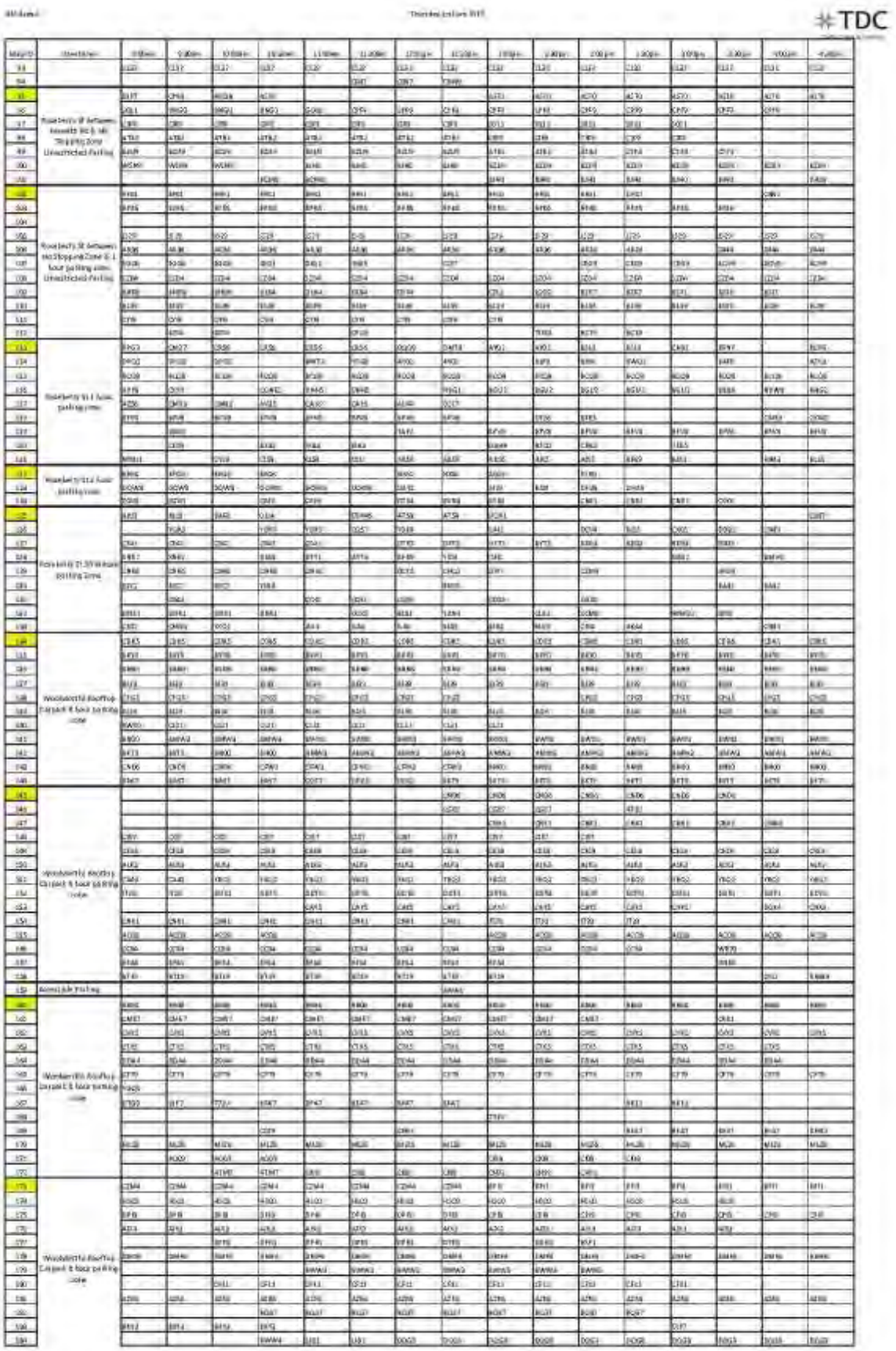
APPENDIX G

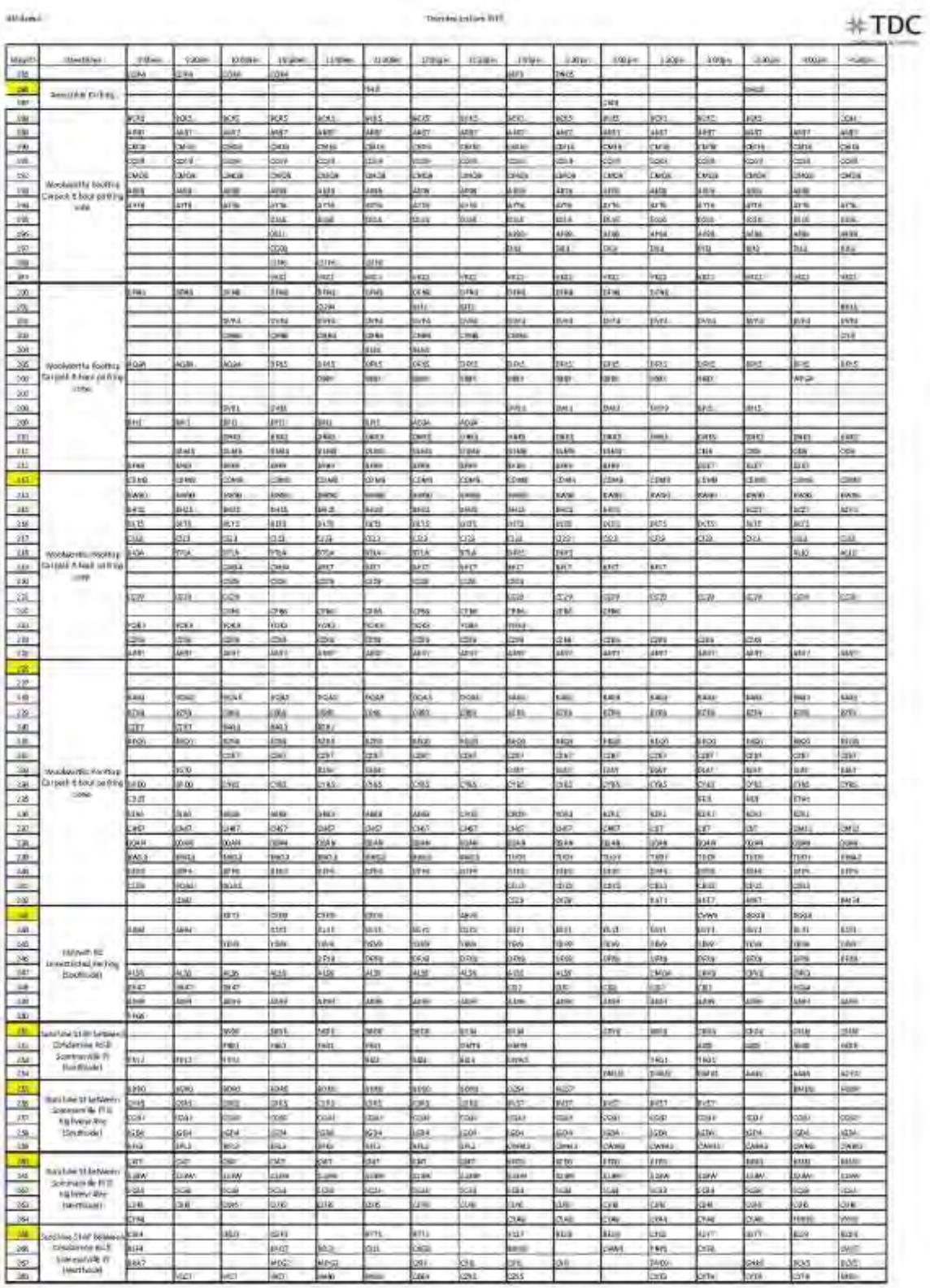
TDC PARKING OCCUPANCY AND TURNOVER SURVEY DATA

TDC
Traffic Data & Control

Day/Date	Supply	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	Average Spaces Occupied 9:00am - 5:00pm	Max Spaces Occupied 9:00am - 5:00pm
Thursday 21st June 2018	455	355	344	338	328	318	318	317	268	323	355
Saturday 23rd June 2018		294	319	292	279	284	278	274	275	287	319
2 Day Average		325	332	315	304	301	298	296	272	305	337


TDC





TDC
Traffic Data & Control

Map ID	Street Area	9:00am	9:30am	10:00am	10:30am	11:00am	11:30am	12:00pm	12:30pm	1:00pm	1:30pm	2:00pm	2:30pm	3:00pm	3:30pm	4:00pm	4:30pm
1		CH24	CH24				BD58		AT16	AT16	AT16	AT16	AT16	AT16	AT16		CQH7
2		AQ6D	AQ6D	AQ6D	AQ6D	AQ6D	AQ6F	AQ6D	AQ6D	AQ6D	AQ6D	AQ6D	AQ6D	AQ6D	AQ6D	AQ6D	AQ6D
3		BM9P	BM9P	BM9P	BM9P	BM9P									DL87	DL87	
4		CS19	CS19	CS19	CS19	CS19	CS19										
5		CC98	CC98	CC98	CC98	CC98	CC98	CC98	CC98	CC98	CC98	CC98	CC98	CC98	CC98	CC98	CC98
6		DDH2	BAY9	BAY9	BAY9									DJ17	DJ17	DJ17	HR67
7		DWF7	DT12	DT12	DT12									CZ62		CY84	CY84
8		ZB25	DBL7	DBL7	DBL7	DBL7								ATF1	ATF1	ATF1	ATF1
9		DDC9			BH88	BH88	BH88	BH88						CD81	CD81	CD81	CD81
10		CYQ4	BR86	BR86	BR86	CY04	CY04		BR86					CN68	CN68	CN68	CN68
11		DD59	DD53		DD53	DD53	WR83	DD15	DD53					CNW2	CNW2	CNW2	CNW2
12		AAA1	AAA1	AAA1	AAA1	AAA1	AAA1	AAA1	AAA1	AAA1	AAA1	AAA1	AAA1	AAA1	AAA1	AAA1	AAA1
13		DUF5	CZ73	CZ73	CZ73	CZ73										BAF9	BAF9
14	Quirk Road North (Eastside) Unrestricted Parking	BIP5	CNH6	CNH6	CNH6	CNH6										BVT2	BVT2
15		CN36	YDN9	YDN9	YDN9	CN10			BD80					CJ14			RJ41
16														AB19		AC15	AC15
17										BD27	BD29	BD29	BD27	BD28	BD29	BD27	BD29
18		BY98	BY98	BY98	BY98			CT29	CT29	CT29	CT29	CT29	CT29	CT29	CT29		
19		DJ55	AX18	AX18	AX18	REY	DEL7	DEL7						AX18	AX18	AX18	AX18
20		CN71	CN71	CN71	CN71	CN71	CN71	CN71	CN71	CN71	CN71	CN71	CN71	CN71	CN71	CN71	CN71
21		DC29	DC29	DC29	AXP4	AXP4	AXP4	AXP4	AXP4	BD55	BD55	BD55	BD55	BD55	[illegible]	[illegible]	[illegible]
22		BJJ8	BJJ8	CJ27	CJ27	CJ27	CJ27	CJ27						CM77	CM77	CD18	CD18
23																	AM78
24			BTY2	BTY2	BTY2	BTY2				DK97	DK97	DK97	DK97	DK97	DK97		
25		AN94	AN94	AN94	AN94	AN94	AN94	AN94	AN94	AN94	AN94	AN94	AN94	AN94	AN94	AN94	
26		AU88	DWU5	DWU5	DWU5			BW28	BW28					DH17	DH17	DH17	DH17
27		BZ59	BZ59	BZ59	BZ59	BZ59			CSL2	CSL2	CSL2	CSL2	CSL2	CSL2			
28															AAB9	DG92	
29		BFC4							BH52	BH52	BH52	BH52	BH52	BH52	BH52	BH52	BH52
30			BD90						DQ27	DQ27	DQ27	DQ27	DQ27	DQ27	DQ27		
31						CN08	CN08	CN08	CN08	CN08	CN08	CN08	CN08	CS67	CS67	CD86	
32										BA4				CT58			
33				CB81	CB81	CB81	CB81	CB81	DG65	DG65	DG65	DG65	DG65				
34									BM2	BM2	BM2	BM2	BM2				
35				AWC9	AWC9	AWC9	AWC9	AWC9		CU89	CU89	CU89	CU89	BG86	BG86	BG86	BG86
36										BET1	BET1	BET1	BET1	BET1	BET1	DTK8	DTK8
37						WJ11	WJ11	WJ11	WJ11								
38										CM09	CM09	CM09	CM09			BWV8	BWV8
39													CJ01	CJ01	CJ01		
40										CH51	CH51	CH51	CH51	CH51	CH51	BS81	
41								JNP5	JNP5	JNP5	JNP5	JNP5	JNP5	JNP5	JNP5		
42									ARP8	ARP8	ARP8	ARP8	ARP8	ARP8	ARP8		
43																	
44																	
45								BPA3	BPA3	BPA3	BPA3	BPA3	BPA3	BPA3	BPA3	BPA3	BPA3
46				[illegible]									AJ14				
47					DNV4	DNV4	DNV4	DNV4		YF7	YF7	YF7	YF7	YF7	YF7		
48													CN14	CN14	CN14	CN14	CN14
49																	
50									CD58	CD58	CD58	CD58	CD58				
51	Quirk Road South (Eastside) No Parking Authorised Vehicles Only 8am-4pm Monday - Friday													WR81	WR81	WR81	WR81
52													CP42	CP42	CP42	CP42	CP42
53																BKF8	
54																	
55													CEK7	CEK7	CEK7	CEK7	CEK7
56																	
57														BX58	BX58	BX58	BX58
58																	
59														CA57	CA57	CA57	CA57
60																	
61														DST8			
62																	
63									DLV8	DLV8	DLV8	DLV8	DLV8	CD8	CD8	CD8	CD8
64		DJ17	DJ17							CT82	CT82	CT82	CT82	CT82			
65																	
66														CUPY	CUPY		
67																	
68					ADE7	ADE7								CS80	CS80		
69																	
70														CY8	CY8	CY8	CY8
71		[illegible]	DR12														
72				CWP8	CWP8	CWP8											
73																	
74																	

TDC

Map ID	Street Area	9:00am	9:30am	10:00am	10:30am	11:00am	11:30am	12:00pm	12:30pm	1:00pm	1:30pm	2:00pm	2:30pm	3:00pm	3:30pm	4:00pm	4:30pm
75	Quirk Rd South (Wandella) No Parking Authorised Vehicles Only 8am - 4pm Monday - Friday	[illegible]	[illegible]		[illegible]					[illegible]							
76		[illegible]	[illegible]							[illegible]							
77		[illegible]	[illegible]							[illegible]							
78										[illegible]							
79																	
80																	
81										[illegible]							
82										[illegible]							
83										[illegible]							
84																	
85										[illegible]							
86																	
87																	
88																	
89																	
90																	
91																	
92																	
93																	
94																	
95	Roseberry St between Kenneth Rd & Rio Shopping Zone Unrestricted Parking	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
96		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]							[illegible]	[illegible]
97		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
98		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
99			[illegible]	[illegible]	[illegible]	[illegible]										[illegible]	[illegible]
100		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
101		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
102	Roseberry St between No Stopping Zone & 1 hour parking zone Unrestricted Parking	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		
103		[illegible]				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	
104		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
105		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
106		[illegible]	[illegible]		[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
107		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	
108		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
109		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
110		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
111		[illegible]		[illegible]													
112		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	
113	Roseberry St 1 hour parking zone	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]			
114		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]						
115		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	
116		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
117		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
118		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]
119		[illegible]	[illegible]	[illegible]	[illegible]					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
120		[illegible]	[illegible]			[illegible]	[illegible]			[illegible]	[illegible]			[illegible]			
121				[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
122	Roseberry St 2 hour parking zone	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
123		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]					
124		[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
125	Roseberry St 30 minute parking Zone	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				[illegible]	[illegible]	[illegible]			
126		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		
127		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]				
128		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
129		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]			
130		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
131		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
132		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
133		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			[illegible]	
134	Woolworths Rooftop Carpark 3 hour parking area		[illegible]	[illegible]						[illegible]	[illegible]						
135		[illegible]															
136														[illegible]	[illegible]	[illegible]	
137																	
138		[illegible]	[illegible]	[illegible]													
139																	
140										[illegible]							
141																	
142																	
143			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
144			[illegible]														

TDC Traffic Data & Control

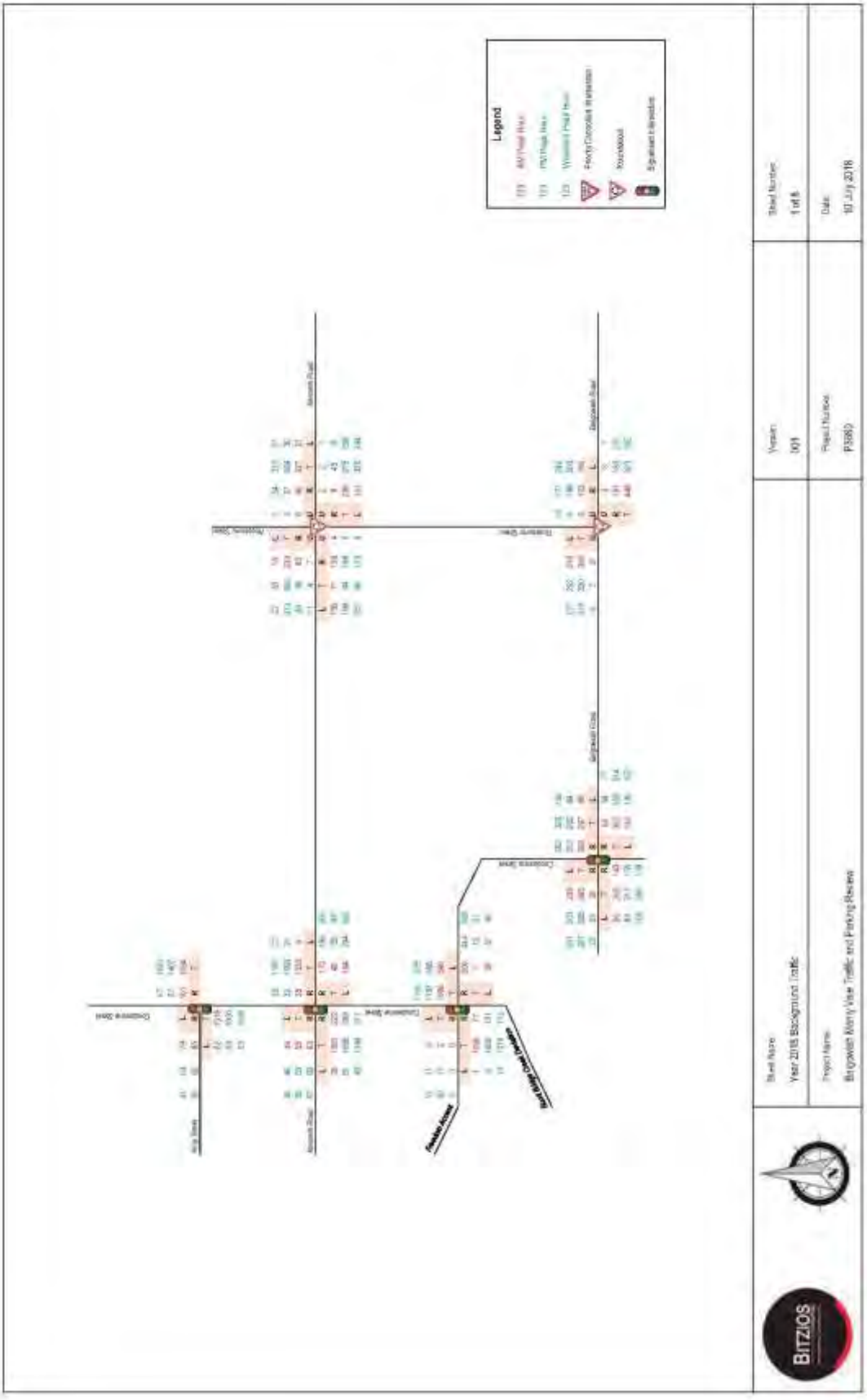
Map ID	Street Area	9:00am	9:30am	10:00am	10:30am	11:00am	11:30am	12:00pm	12:30pm	1:00pm	1:30pm	2:00pm	2:30pm	3:00pm	3:30pm	4:00pm	4:30pm
145	Woolworths Rooftop Carpark 8 hour parking zone															CH49	CH49
146																	
147																	
148									FVD8	BVC3							
149																	
150								BIE5				DTE1					
151			DC06														
152									EBV8	KAT6	BVU8	BVU8					
153		XWL5	XWL3	XWL4	XWL0	XWL3	XWL4	XWL6	XWL9	LNA2	LNA2	LNA7	DPW9	DPW5			
154					DNF7	DNF7			CX85			DJ80					CYU7
155		CE58	CE58	CE58	CE58	CE58	CE58	CF86	CE58	CE58	CF86	CE58					
156								BI25	BL26	CQ84		BZE8		BI13			
157					BK87	DKY7	BN28	CG08	CG38							CK8	BHE5
158		BOT0	BH95		BA76	BA26	AZK8	AZK8	AZK8	CI34		DC2F	BKN7	CW44			CAH8
159	Accessible Parking																
160	Woolworths Rooftop Carpark 8 hour parking zone	CME7	CME7	CME7	CME7	CME7	CME7	CME7	CME7	CME7	CME7	CME7		DEY3		CQ10	
161						BCU8		AA58		BHL9	BHL9	BHL9		DHY2			YY37
162		WPW8	WPW8	WPW8	WPW8	WPW8	WPW8	WPW8	WPW8	WPW8	WPW8	WPW8	WPW8	WPW8	WPW8	WPW8	
163				AL87	AL87	AL87					DK59	DK59					
164		CT59						CR86	BZE3	BZE3	BZE3	BZE3	BZE3	BZE3			
165																	CY86
166																	
167													DK58				YRP4
168													EWW1	EWW1			
169																	
170																	
171																	
172																	
173	Woolworths Rooftop Carpark 8 hour parking zone																
174																	
175																	
176																	
177		ALR3	ALR3	ALR3	ALR3	ALR3	ALR3	ALR3	ALR3	ALR3	ALR3	ALR3					
178																	
179																	
180												DTE1					
181		AH82		CSL6	BP30												
182																	
183																	
184		CD94	CD94	CD94					EWA3					CI98			
185																	
186	Accessible Parking								CE72		DU99		GL28	BEW7			
187													BU35				
188	Woolworths Rooftop Carpark 8 hour parking zone			BR45	CZ01	CZ18	DX75		CPV3	UR8R	CR88	CR88	AW02	AW02			
189					CS98							CP75		CI68			
190		DVR6						DU17							CTK8		
191				DW22		BN12			EWK3			AW08					
192						DTE8				EWP1			AN87	AN87	AN87	AN87	AN87
193		ABY7	ABY7									BBW6	BBW6		BA02	BA02	BA02
194						DU1F	DU1F	DU1F	DU1F	DU1F	DU1F	DU1F	DU1F	DU1F	DU1F	DU1F	DU1F
195																	
196																	
197									XC80								
198		CN93	CN93	CN93	CN93	CN93	CN93	CN93	CN93	CN93	CN93						
199		AJE8	AJE8	AJE8	AJE8	AJE8	AJE8	AJE8	AJE8	AJE8	AJE8	AJE8	AJE8	AJE8	AJE8	AJE8	AJE8
200	Woolworths Rooftop Carpark 8 hour parking zone													BIV6			
201		BS94															BYD4
202																	
203				CQ84	CQ84												
204		AQ05															
205		CC29															
206		CH88															
207																	
208		CWE3															
209							DQ07										
210		BU95	BU95	BL85													
211		CN47					BT13	CF36									
212		DE52	DE52	DE52	DE52	DE52	DE52	DE52	DE52								

TDC Traffic Data & Control

Map ID	Street Area	9:00am	9:30am	10:00am	10:30am	11:00am	11:30am	12:00pm	12:30pm	1:00pm	1:30pm	2:00pm	2:30pm	3:00pm	3:30pm	4:00pm	4:30pm
213	Woolworths Rooftop Carpark 3 hour parking zone									AXL8	AXL8	AXL8	AXL8		CH86	CH86	
214		BSP4	BSP4	BSP4	CU75	CW71	CW70						SAM2	SAM2	SAM2	BNE9	BNE9
215									ALJ9		AT08	AT08	AT08				
216						HP81	HP81								DCN7	DCN7	
217		AQD5															
218		CC29	CC29	CC29	CC29	CC29	CC29	CC29	CC29								
219		BHC9	BHC9	BHC9	BHC9												
220																	
221					BHJ8												
222																	
223																	
224		T29F	T29F	T29F	T29F	T29F											
225		AB57	AB57	AB57	AB57	AB57	AB57	AB57	AB57	AB57							
226	Woolworths Rooftop Carpark 3 hour parking zone					DTW4	DTW4	DTW4	DTW4	DTW4	DTW4	DTW4	DTW4	DTW4	DTW4	DTW4	DTW4
227																	
228																	
229																	
230																	
231			BXQ8						CS24	CS24	CS24	CS24	CS24	CS24	CS24	CS24	CS24
232																	
233		CDR5	CDR5				DHR8	DHR8								AX92	AX92
234																	
235							BJ12										
236																	
237						DTW8	DTW8										
238			DB17	CR07								BTH9	BTH9	BTH9	BTH9		LVD4
239			DKH7		AL18	AL18	PPA2	PPA2							AXL8	AXL8	AXL8
240		RW45	RW45		C866	C866	C866	C866		CD13	CD29			DY45	DY45	DY45	
241		YXQ1	YXQ1	YXQ1	YXQ1	YXQ1	YXQ1	YXQ1	YXQ1								
242			DMA3	DMA3			DRE7		CQ19	CQ19	CY19	GC90	GC90	GC91	GC91	GC91	GC91
243	Kenneth Rd Unrestricted Parking (Southside)	AR99	AR96	AB84	AR99	AR99	AB84	AR99	AR99	AB84	AR99	AR99	AB84	AR99	AR99	AB84	AR99
244		DDN9	DON3	DDN9	DON3	DON3	DDN9	DDN9	DON3		BZ13	BZ13	BZ13	BZ13	BZ13	BZ13	BZ13
245		BL38	BC35		CP58	CP58	CP58	CP58	CP58	CP58							
246		YEV9	YEV9	YEV9	YEV9	YEV9	YEV9	YEV9	YEV9	CZ74	AJ53		AL56	AL56	AL56	AL56	AL56
247										BH40	BH40		[illegible]				DR82
248													YEV9	YEV9	YEV9	YEV9	YCL4
249		DQE4	DQE4	DQE4	DQE4	DQE4	DQE4	DQE4	DQE4	DQE4	DQE4	DQE4	DQE4	DQE4	DQE4	DQE4	
250		B454	B454	B454	B454	B454	B454	B454	B454	B454	BB50	BKA0			ZUJ7	ZUJ7	ZUJ7
251	Sunshine St Aff between Condamine Rd & Sommerville Pl (Southside)			AQ29	AQ29	AQ29			YGK8	YGK8	YGK8						
252				DK59	DK59	DK59	DK59	DF37									
253		DX68	CP44					DKA0	DKA0		B0D3	B0D3	B0D3				
254		BI04	BI04		CF16	CF16	CF16	CF16	CF16	CF16							
255	Sunshine St between Sommerville Pl & Highview Ave (Southside)	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87	AZ87
256		BPP9	BPP9	BPP9	BPP9	BPP9	BPP9	BPP9	BPP9	BPP9	BPP9	BPP9	BPP9	BPP9	BPP9		CJV4
257		CD32	CD32	DBM5	DBM5	DBM5	DBM5	DBM5	DBM5	DBM5	DBM5	DAJ3	DAJ3				
258		HGD4	HGD4	HGD4	HGD4	HGD4	HGD4	HGD4	HGD4	HGD4	HGD4	HGD4	HGD4	HGD4	HGD4	HGD4	HGD4
259		DR87	DR87	DR87	DR87		BW03	CW98		BK09	BK09	BK09	BK09	BK09	BK09	BK09	BK09
260	Sunshine St between Sommerville Pl & Highview Ave (Northside)	VGD6	VGD6	VGD6	VGD6	VGD6	VGD6	BB93	BB93						EV16	EV16	
261		HYT2	HYT2	HYT2	HYT2	HYT2	HYT2	HYT2	HYT2	HYT2	HYT2						
262		CVA8	CVA8	CVA8	CVA8	CVA8	CVA8	CVA8	CVA8	CVA8	CVA8	CVA8	CVA8	CVA8	CVA8		
263		CK15	CK15	CK15	CK15	CK15	CK15	CK15	CK15	CK15	CK15	DDA1	DDA1	DDA1	DDA1		[illegible]
264		BZ34	BZ34	BZ34	BZ34	BZ34	BZ34	BZ34	BZ34	BZ34	BZ34	BZ34	BZ34	BZ34	DFF3		NMF1
265	Sunshine St Aff between Condamine Rd & Sommerville Pl (Northside)	H001	H001	AJ44	AJ44	AJ44		CT98	DJ85			BB07		PT29			
266		DAA3	BPA5	BM85	BF62			LPV9		AG07		CWN1					
267		AZM6				CEN1			DY51			BM46	BJL8			LUBE	
268		EDR9	BDR9	BDR9		VK89	BM63	BM63	BM63	CX15	CX15						

APPENDIX H

YEAR 2038 TRAFFIC VOLUME DIAGRAMS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Version
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Project Number
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Sheet Number
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Date
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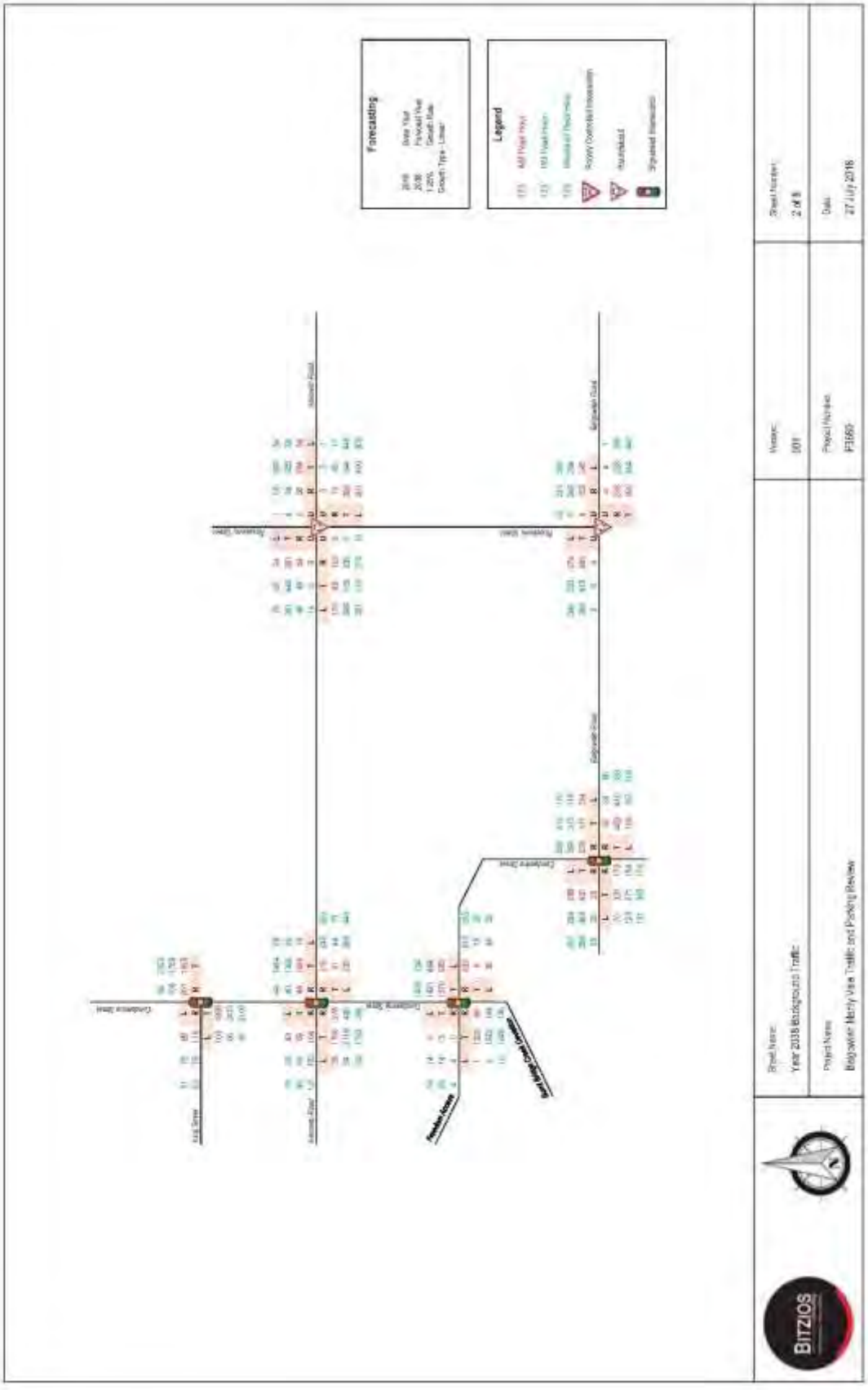
BITZIOS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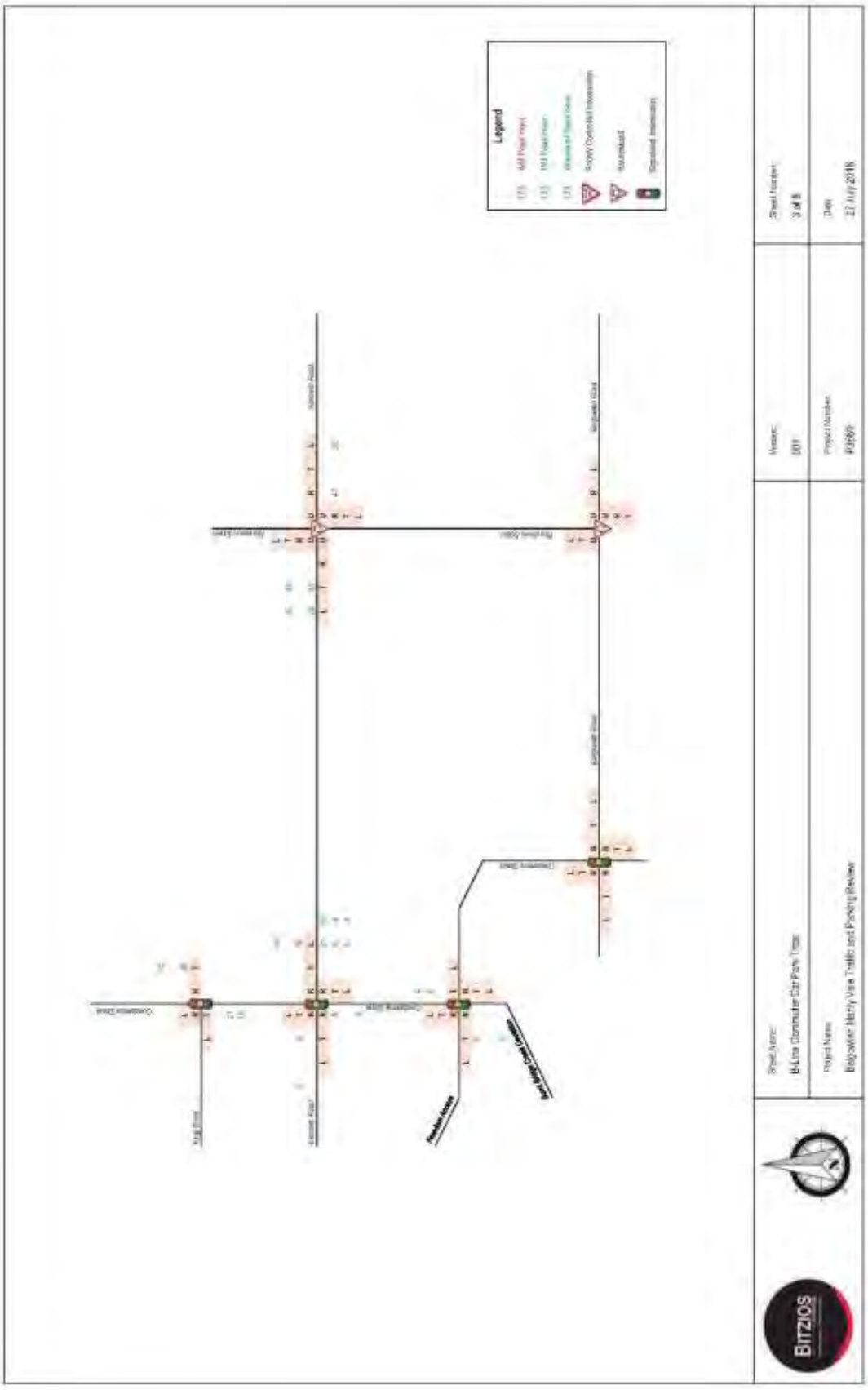
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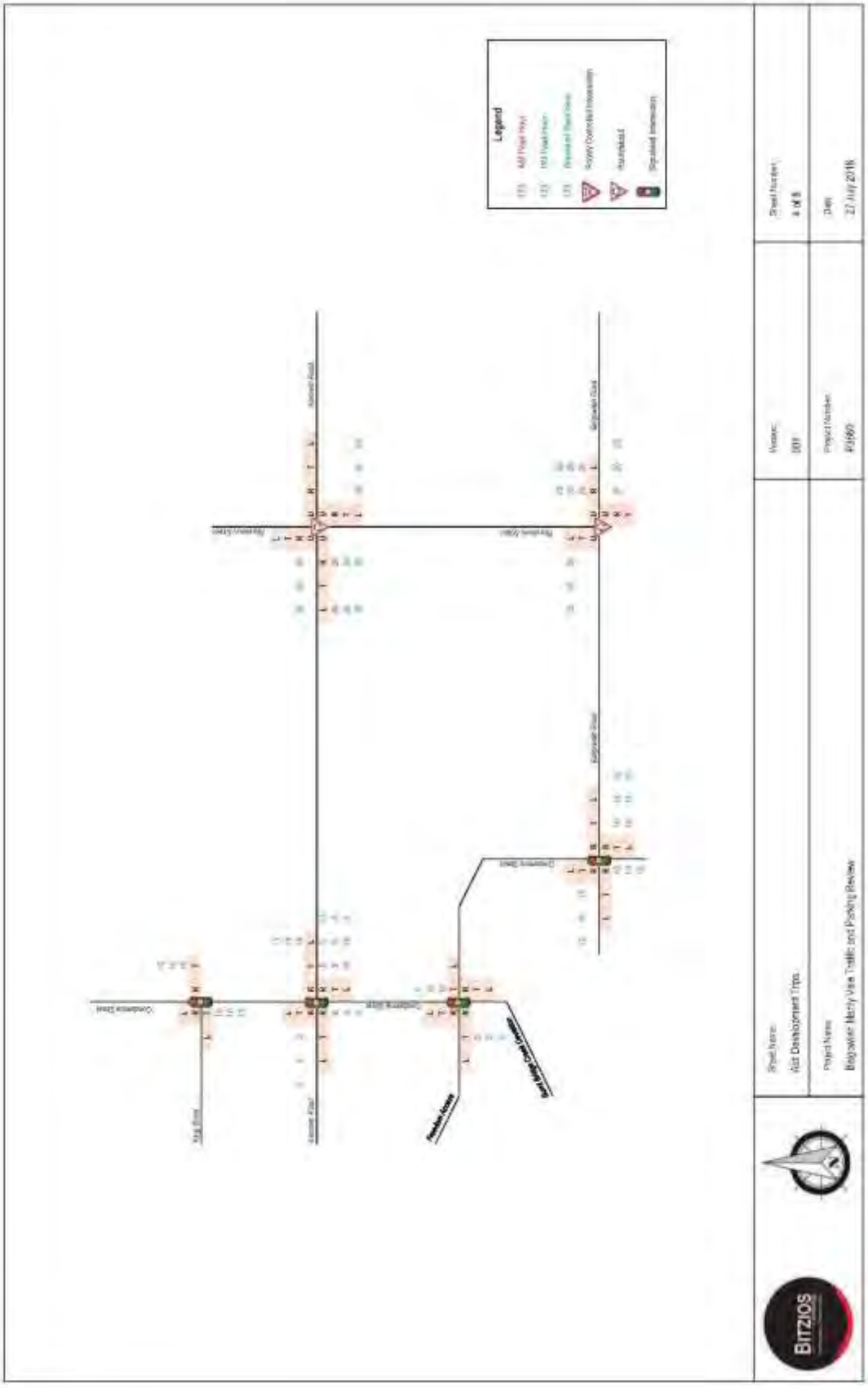
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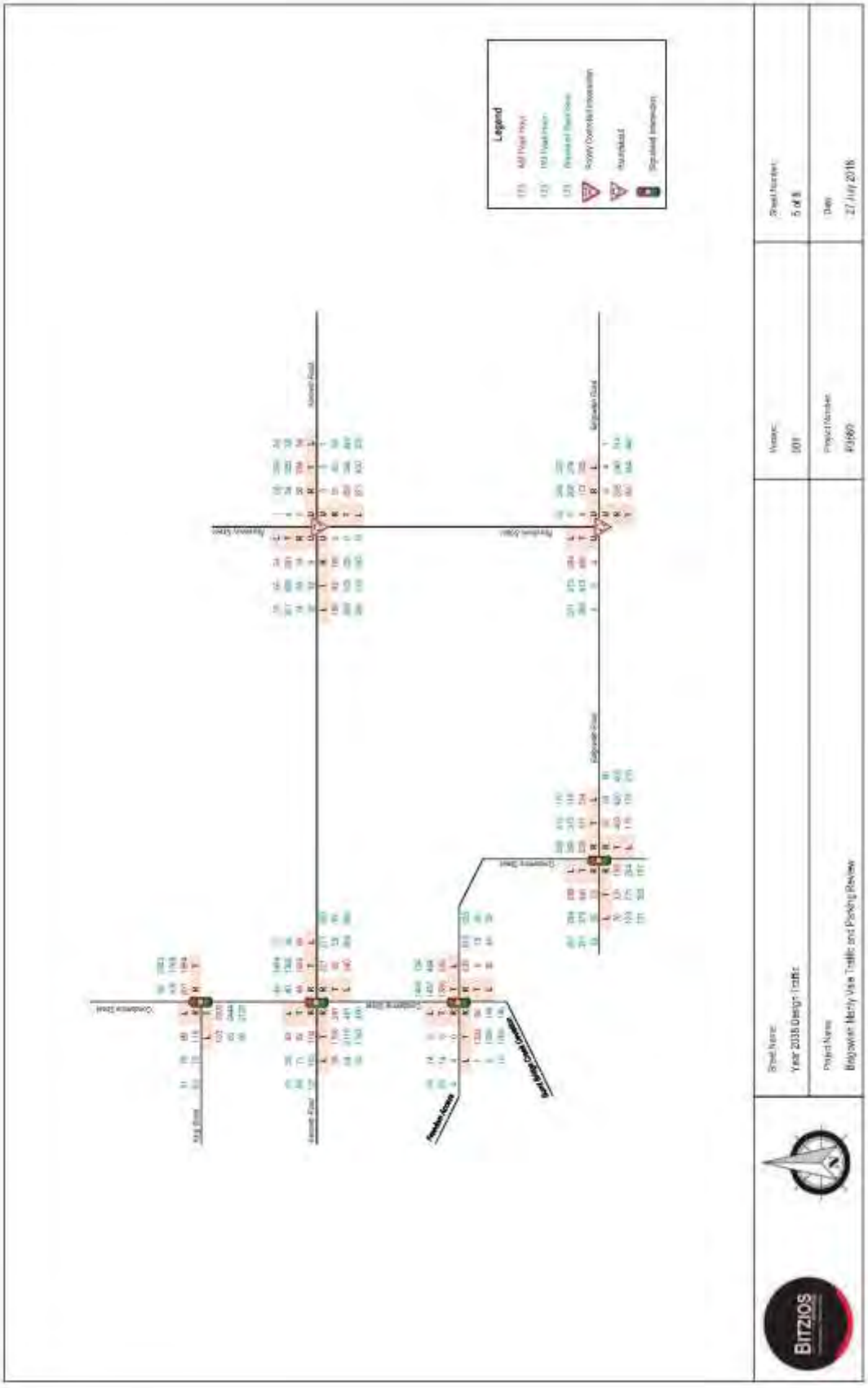
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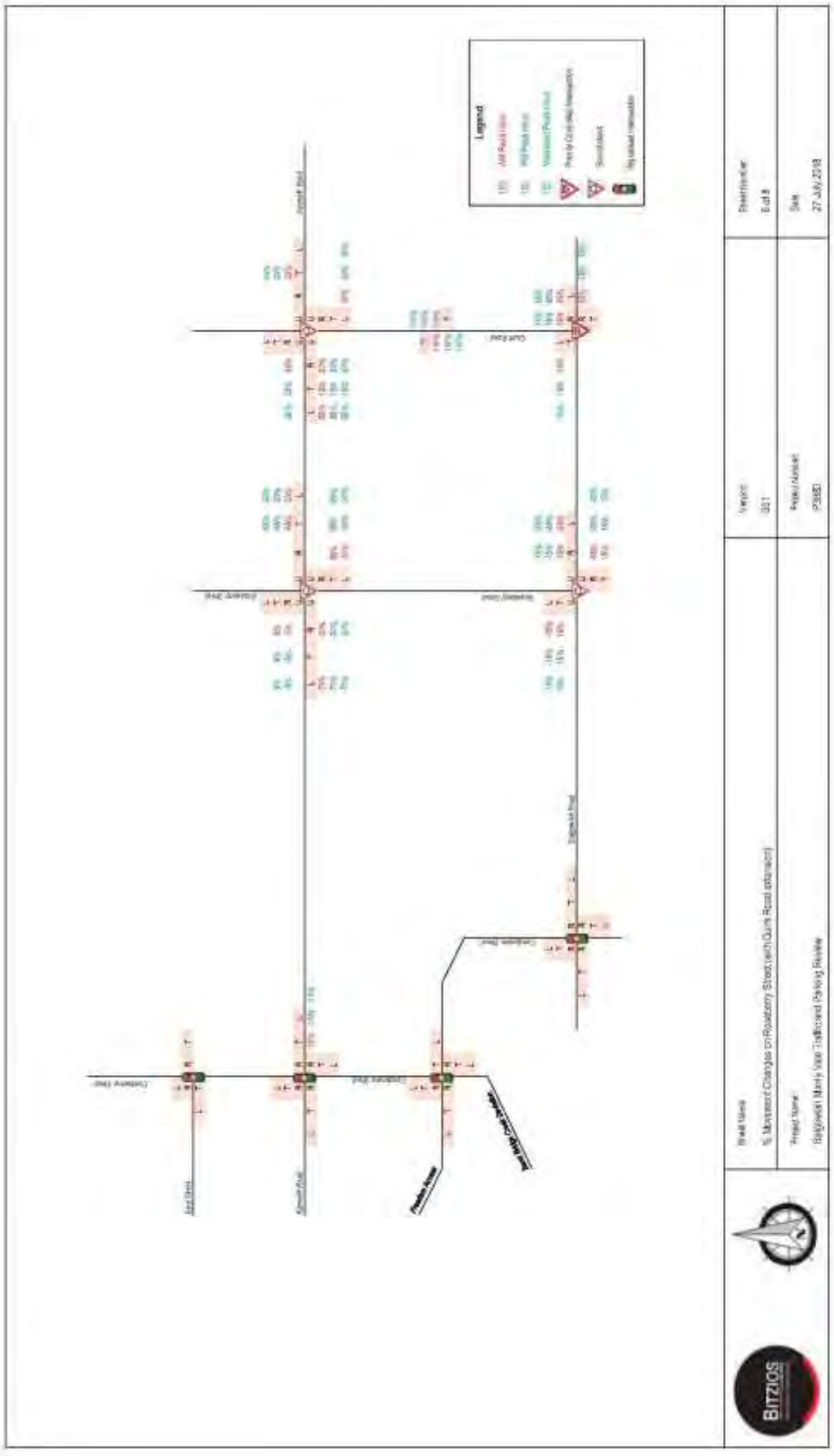
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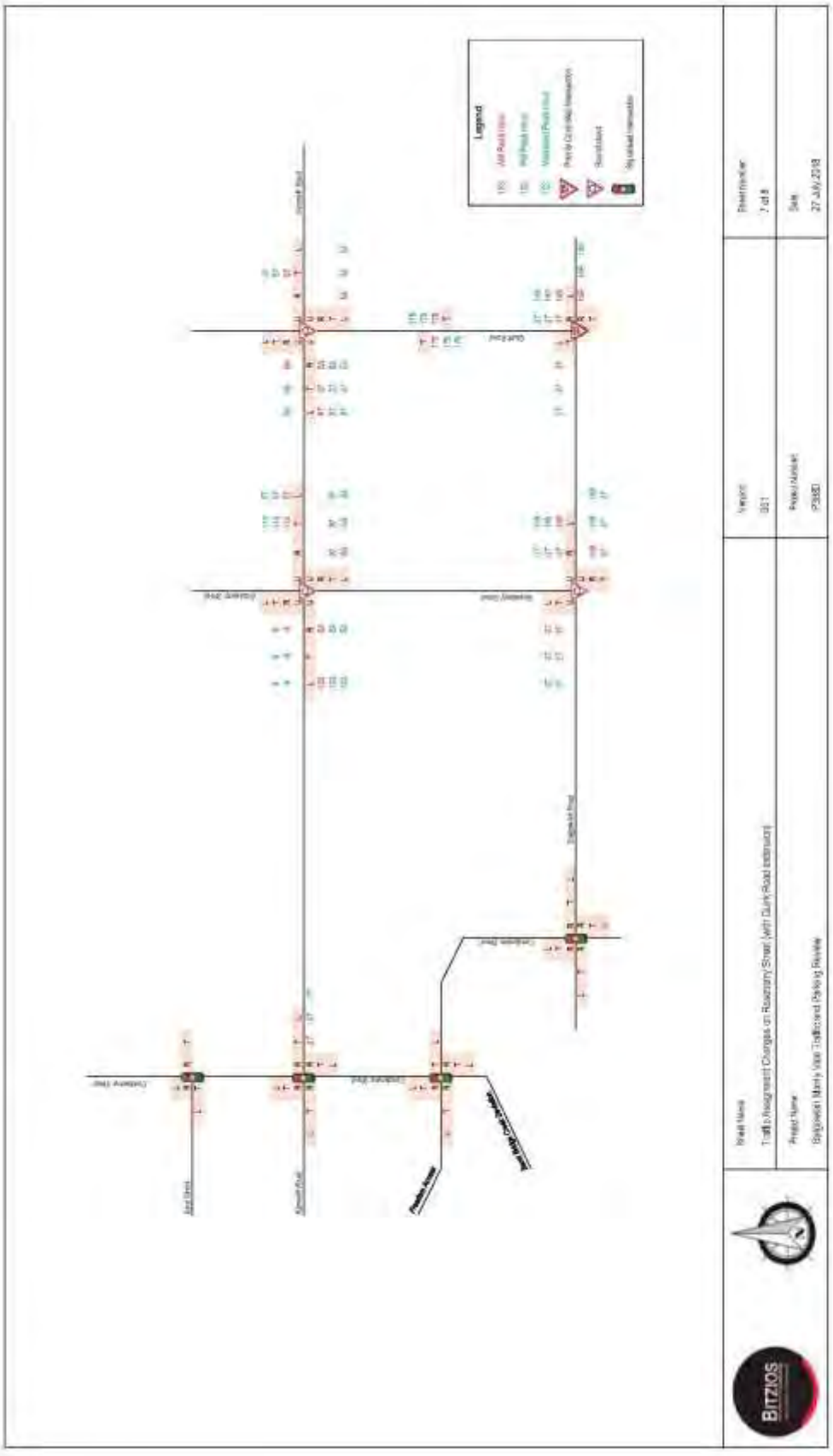
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Revision
Sheet Number
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Date
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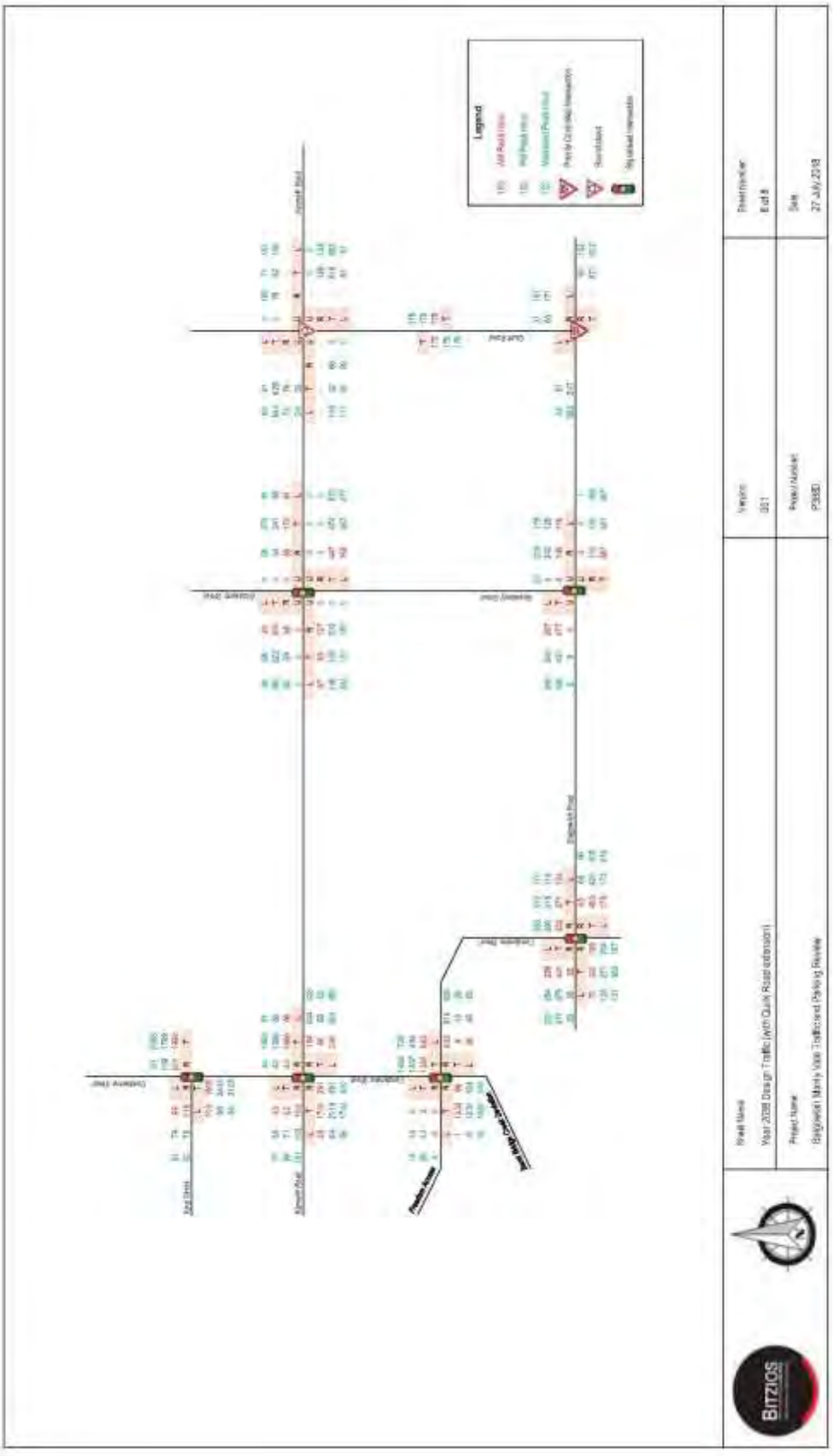
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Balgowlah Manly Vale Traffic and Parking Review
Version
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Project Number
P3880
Sheet Number
E of 8
Date
27 July 2018
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APPENDIX I

YEAR 2038 SIDRA OUTPUTS

MOVEMENT SUMMARY

Site: TCS180 [2038 Design AM]

Condamine Street - King Street
2038 AM Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 140 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows [Total veh/h]	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue [Vehicles veh]	95% Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	108	1.2	0.896	76.3	LOS F	7.1	50.4	0.55	0.93	24.8
2	T1	2008	5.5	1.000	81.1	LOS F	102.6	751.9	0.98	1.20	18.7
Approach		2117	5.3	1.000	80.9	LOS F	102.6	751.9	0.96	1.19	19.0
North: Condamine Street (N)											
8	T1	2099	8.1	0.800	13.0	LOS A	47.6	344.5	0.67	0.63	44.4
9	R2	212	0.6	1.061	107.4	LOS F	21.4	150.9	1.00	1.08	13.5
Approach		2311	7.4	1.061	21.6	LOS B	47.6	344.5	0.70	0.67	34.9
West: King Street (W)											
10	L2	104	1.3	0.178	40.9	LOS C	5.1	35.8	0.76	0.74	29.6
12	R2	125	2.1	0.609	70.0	LOS E	8.4	59.8	1.00	0.80	25.8
Approach		229	1.7	0.609	56.8	LOS E	8.4	59.8	0.89	0.77	27.2
All Vehicles		4657	6.2	1.061	50.3	LOS D	102.6	751.9	0.83	0.91	25.1

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]	Average Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	84	59.6	LOS E	0.3	0.3	0.92	0.92
P3	North Full Crossing	39	57.7	LOS E	0.1	0.1	0.91	0.91
P4	West Full Crossing	25	17.0	LOS B	0.0	0.0	0.49	0.49
All Pedestrians		148	51.9	LOS E			0.85	0.85

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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MOVEMENT SUMMARY

Site: TCS180 [2038 Design PM]

Condamine Street - King Street
2038 PM Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	69	0.0	0.172	18.8	LOS B	4.5	46.2	0.46	0.49	42.9
2	T1	2573	4.5	1.037	98.6	LOS F	139.2	987.3	0.98	1.28	16.6
Approach		2642	4.4	1.037	96.4	LOS F	139.2	987.3	0.97	1.26	16.6
North: Condamine Street (N)											
8	T1	1862	6.0	0.704	10.3	LOS A	37.1	272.6	0.58	0.53	46.8
9	R2	115	2.3	0.774	84.2	LOS F	8.5	60.8	1.00	0.97	20.9
Approach		1977	5.8	0.774	14.6	LOS B	37.1	272.6	0.59	0.55	42.8
West: King Street (W)											
10	L2	83	0.0	0.170	49.6	LOS D	4.6	32.4	0.81	0.74	27.2
12	R2	82	4.8	0.348	89.2	LOS E	5.6	40.5	0.95	0.77	25.9
Approach		165	2.4	0.348	59.3	LOS E	5.6	40.5	0.88	0.76	26.5
All Vehicles		4784	4.9	1.037	61.4	LOS E	139.2	987.3	0.81	0.95	22.6

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 per ped
P1	South Full Crossing	79	64.6	LOS F	0.3	0.3	0.93	0.93
P3	North Full Crossing	16	65.4	LOS F	0.1	0.1	0.93	0.93
P4	West Full Crossing	20	13.7	LOS B	0.0	0.0	0.43	0.43
All Pedestrians		115	55.8	LOS E			0.84	0.84

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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MOVEMENT SUMMARY

Site: TCS180 [2038 Design Weekend]

Condamine Street - King Street
2038 Weekend Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	69	0.0	0.505	17.7	LOS B	2.0	13.9	0.42	0.66	41.3
2	T1	2241	2.1	0.934	37.3	LOS C	85.3	608.2	0.93	0.95	29.7
Approach		2311	2.1	0.934	36.7	LOS C	85.3	608.2	0.92	0.94	30.1
North: Condamine Street (N)											
8	T1	2161	2.4	0.836	10.6	LOS A	56.2	401.5	0.63	0.59	46.6
9	R2	88	1.5	0.574	73.7	LOS F	6.5	46.0	1.00	0.89	21.1
Approach		2249	2.4	0.836	13.0	LOS A	56.2	401.5	0.64	0.61	44.1
West: King Street (W)											
10	L2	54	2.4	0.120	51.3	LOS D	3.0	21.6	0.81	0.73	25.4
12	R2	66	0.0	0.320	71.7	LOS F	4.6	31.9	0.96	0.76	24.4
Approach		120	1.1	0.320	62.6	LOS E	4.6	31.9	0.89	0.75	24.8
All Vehicles		4680	2.2	0.934	26.0	LOS B	85.3	608.2	0.79	0.78	35.1

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 per ped
P1	South Full Crossing	45	67.3	LOS F	0.2	0.2	0.95	0.95
P3	North Full Crossing	13	65.4	LOS F	0.1	0.1	0.93	0.93
P4	West Full Crossing	16	12.4	LOS B	0.0	0.0	0.41	0.41
All Pedestrians		74	55.2	LOS E			0.83	0.83

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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MOVEMENT SUMMARY

Site: TCS893 [2038 Design AM]

Condamine Street - Kenneth Road
2038 AM Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	40	3.3	0.042	23.0	LOS B	1.4	9.8	0.50	0.67	35.1
2	T1	1789	5.5	1.119	180.3	LOS F	125.5	920.2	1.00	1.61	9.8
3	R2	306	7.7	1.354	367.8	LOS F	46.9	350.2	1.00	1.58	2.6
Approach		2136	5.8	1.354	204.3	LOS F	125.5	920.2	0.99	1.59	8.1
East: Kenneth Road (E)											
4	L2	253	6.5	0.341	24.6	LOS B	9.3	68.4	0.71	0.76	23.9
5	T1	69	2.0	0.209	57.3	LOS E	4.4	31.1	0.90	0.70	21.3
6	R2	233	5.2	1.031	100.3	LOS F	22.0	161.2	1.00	1.11	9.9
Approach		555	5.4	1.031	60.4	LOS E	22.0	161.2	0.86	0.90	13.9
North: Condamine Street (N)											
7	L2	101	12.5	0.504	43.5	LOS D	9.8	99.7	0.89	0.79	24.5
8	T1	1754	9.2	1.395	400.4	LOS F	170.1	1236.1	0.99	2.30	5.8
9	R2	46	0.0	0.291	76.6	LOS F	3.3	22.9	0.97	0.75	23.2
Approach		1901	9.2	1.395	373.5	LOS F	170.1	1236.1	0.99	2.18	5.1
West: Kenneth Road (W)											
10	L2	45	2.9	0.501	68.6	LOS E	9.0	64.0	0.97	0.79	24.9
11	T1	86	1.8	0.501	64.1	LOS E	9.0	64.0	0.97	0.79	20.0
12	R2	109	1.2	0.328	49.7	LOS D	6.2	43.9	0.88	0.76	26.5
Approach		241	1.8	0.501	58.4	LOS E	9.0	64.0	0.92	0.78	23.8
All Vehicles		4833	6.9	1.395	247.1	LOS F	170.1	1236.1	0.97	1.70	6.9

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 veh/h	Average Delay sec	Level of Service	95% Back of Queue Pedestrian ped	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	129	41.3	LOS E	0.4	0.4	0.74	0.74
P3	North Full Crossing	88	63.7	LOS F	0.3	0.3	0.92	0.92
P4	West Full Crossing	9	38.9	LOS D	0.0	0.0	0.72	0.72
All Pedestrians		227	49.9	LOS E			0.81	0.81

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: TCS893 [2038 Design AM - Option 1]

Condamine Street - Kenneth Road
2038 AM Peak
Design Traffic | Option 1 - Phase Seq & Lane Discipline Change
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flow total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	40	3.3	0.040	13.3	LOS A	0.7	4.9	0.46	0.66	40.6
2	T1	1789	5.5	1.063	135.9	LOS F	111.7	818.7	1.00	1.42	12.4
3	R2	306	7.7	1.231	290.2	LOS F	49.4	368.6	1.00	1.47	3.4
Approach		2136	5.8	1.231	155.7	LOS F	111.7	818.7	0.99	1.41	10.4
East: Kenneth Road (E)											
4	L2	253	6.5	0.496	31.8	LOS C	10.2	75.3	0.88	0.81	20.6
5	T1	69	2.0	1.191	252.9	LOS F	24.2	175.3	1.00	1.50	6.8
6	R2	233	5.2	1.191	257.6	LOS F	24.2	175.3	1.00	1.43	5.9
Approach		555	5.4	1.191	154.2	LOS F	24.2	175.3	0.94	1.15	7.9
North: Condamine Street (N)											
7	L2	101	12.5	0.430	48.3	LOS D	10.9	110.6	0.83	0.74	23.0
8	T1	1754	9.2	1.223	258.3	LOS F	138.1	1003.3	0.99	1.87	7.9
9	R2	46	0.0	0.630	88.2	LOS F	3.6	25.3	1.00	0.77	21.4
Approach		1901	9.2	1.223	242.9	LOS F	138.1	1003.3	0.98	1.79	7.5
West: Kenneth Road (W)											
10	L2	45	2.9	0.501	68.6	LOS E	9.0	64.0	0.97	0.79	24.9
11	T1	86	1.8	0.501	64.1	LOS E	9.0	64.0	0.97	0.79	20.0
12	R2	109	1.2	0.348	64.7	LOS E	7.1	50.2	0.93	0.78	22.9
Approach		241	1.8	0.501	65.2	LOS E	9.0	64.0	0.95	0.79	22.3
All Vehicles		4833	6.9	1.231	185.4	LOS F	138.1	1003.3	0.98	1.50	9.0

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	129	36.2	LOS D	0.4	0.4	0.70	0.70
P3	North Full Crossing	88	63.7	LOS F	0.3	0.3	0.92	0.92
P4	West Full Crossing	9	24.1	LOS C	0.0	0.0	0.57	0.57
All Pedestrians		227	46.4	LOS E			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.

MOVEMENT SUMMARY

Site: TCS893 [2038 Design AM - Option 2 (With Quirk Ext)]

Condamine Street - Kenneth Road
2038 AM Peak
Design Traffic | Option 2 - Phase Seq & Lane Discipline Change & Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	40	3.3	0.039	13.1	LOS A	0.7	4.8	0.46	0.66	40.8
2	T1	1789	5.5	1.050	126.0	LOS F	108.4	794.3	1.00	1.38	13.2
3	R2	306	7.7	1.177	246.3	LOS F	45.3	337.6	1.00	1.38	4.0
Approach		2136	5.8	1.177	141.1	LOS F	108.4	794.3	0.99	1.36	11.3
East: Kenneth Road (E)											
4	L2	253	6.5	0.496	31.9	LOS C	10.2	75.6	0.88	0.81	20.6
5	T1	69	2.0	1.164	231.7	LOS F	21.4	154.6	1.00	1.44	7.4
6	R2	204	5.2	1.164	236.5	LOS F	21.4	154.6	1.00	1.38	6.3
Approach		526	5.4	1.164	137.7	LOS F	21.4	154.6	0.94	1.11	8.7
North: Condamine Street (N)											
7	L2	101	12.5	0.430	48.3	LOS D	10.9	110.6	0.83	0.74	23.0
8	T1	1754	9.2	1.223	258.3	LOS F	138.1	1003.3	0.99	1.87	7.9
9	R2	46	0.0	0.630	88.2	LOS F	3.6	25.3	1.00	0.77	21.4
Approach		1901	9.2	1.223	242.9	LOS F	138.1	1003.3	0.98	1.79	7.5
West: Kenneth Road (W)											
10	L2	45	2.9	0.501	68.6	LOS E	9.0	64.0	0.97	0.79	24.9
11	T1	86	1.8	0.501	64.1	LOS E	9.0	64.0	0.97	0.79	20.0
12	R2	109	1.2	0.348	64.7	LOS E	7.1	50.2	0.93	0.78	22.9
Approach		241	1.8	0.501	65.2	LOS E	9.0	64.0	0.95	0.79	22.3
All Vehicles		4804	6.9	1.223	177.2	LOS F	138.1	1003.3	0.98	1.47	9.4

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	129	36.2	LOS D	0.4	0.4	0.70	0.70
P3	North Full Crossing	88	63.7	LOS F	0.3	0.3	0.92	0.92
P4	West Full Crossing	9	23.5	LOS C	0.0	0.0	0.56	0.56
All Pedestrians		227	46.4	LOS E			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.

MOVEMENT SUMMARY

Site: TCS893 [2038 Design PM]

Condamine Street - Kenneth Road
2038 PM Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	67	2.0	0.251	43.8	LOS D	6.3	61.1	0.76	0.68	27.9
2	T1	2231	4.1	1.630	611.6	LOS F	267.5	1900.6	0.99	2.61	3.8
3	R2	517	2.3	1.762	730.6	LOS F	118.3	844.6	1.00	1.99	1.4
Approach		2815	3.7	1.762	619.8	LOS F	267.5	1900.6	0.99	2.61	2.9
East: Kenneth Road (E)											
4	L2	404	3.7	0.475	21.2	LOS B	12.3	88.8	0.72	0.79	25.7
5	T1	56	2.9	0.157	54.0	LOS D	3.5	25.2	0.87	0.67	22.0
6	R2	285	4.6	0.982	99.5	LOS F	23.3	169.6	1.00	1.14	13.3
Approach		747	4.0	0.982	53.7	LOS D	23.3	169.6	0.84	0.92	17.6
North: Condamine Street (N)											
7	L2	36	9.5	0.150	32.8	LOS C	1.5	11.7	0.77	0.70	27.5
8	T1	1438	8.3	1.817	792.5	LOS F	193.9	1454.4	1.00	3.06	2.5
9	R2	42	0.0	0.191	70.4	LOS E	2.8	19.7	0.94	0.74	24.5
Approach		1518	8.1	1.817	753.5	LOS F	193.9	1454.4	0.99	2.94	2.7
West: Kenneth Road (W)											
10	L2	61	2.2	0.478	67.5	LOS E	9.2	64.6	0.96	0.79	25.1
11	T1	75	0.0	0.478	63.0	LOS E	9.2	64.6	0.96	0.79	20.2
12	R2	108	1.2	0.283	41.7	LOS C	5.4	38.5	0.83	0.76	29.0
Approach		244	1.1	0.478	54.7	LOS D	9.2	64.6	0.90	0.78	25.0
All Vehicles		5324	4.9	1.817	552.6	LOS F	267.5	1900.6	0.97	2.38	3.3

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	98	53.1	LOS E	0.4	0.4	0.84	0.84
P3	North Full Crossing	136	63.8	LOS F	0.5	0.5	0.93	0.93
P4	West Full Crossing	25	50.5	LOS E	0.1	0.1	0.82	0.82
All Pedestrians		259	58.5	LOS E			0.88	0.88

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: TCS893 [2038 Design PM - Option 1]

Condamine Street - Kenneth Road
2038 PM Peak
Design Traffic | Option 1 - Phase Seq & Lane Discipline Change
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	67	2.0	0.187	19.6	LOS B	3.0	29.4	0.63	0.59	38.1
2	T1	2231	4.1	1.303	327.8	LOS F	210.7	1497.2	0.99	2.12	6.5
3	R2	517	2.3	1.376	411.6	LOS F	101.0	721.4	1.00	1.66	2.5
Approach		2815	3.7	1.376	335.8	LOS F	210.7	1497.2	0.98	2.00	5.2
East: Kenneth Road (E)											
4	L2	404	3.7	0.634	28.4	LOS B	14.6	105.5	0.88	0.83	22.0
5	T1	58	2.9	1.370	402.2	LOS F	34.8	252.2	1.00	1.76	4.5
6	R2	285	4.6	1.370	406.9	LOS F	34.8	252.2	1.00	1.68	3.9
Approach		747	4.0	1.370	201.8	LOS F	34.8	252.2	0.94	1.23	6.0
North: Condamine Street (N)											
7	L2	38	9.5	0.451	40.2	LOS C	1.8	13.8	0.70	0.69	24.6
8	T1	1438	3.4	1.400	424.9	LOS F	146.7	1056.8	1.00	2.39	4.5
9	R2	42	0.0	0.573	87.6	LOS F	3.3	22.8	1.00	0.75	21.6
Approach		1518	3.4	1.400	405.9	LOS F	146.7	1056.8	0.99	2.30	4.8
West: Kenneth Road (W)											
10	L2	61	2.2	0.459	66.4	LOS E	9.1	64.0	0.95	0.79	25.3
11	T1	75	0.0	0.459	61.9	LOS E	9.1	64.0	0.95	0.79	20.4
12	R2	108	1.2	0.309	61.6	LOS E	6.8	48.3	0.90	0.78	23.5
Approach		244	1.1	0.459	62.9	LOS E	9.1	64.0	0.93	0.78	23.2
All Vehicles		5324	3.5	1.400	324.5	LOS F	210.7	1497.2	0.98	1.92	5.4

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	129	45.9	LOS E	0.4	0.4	0.78	0.78
P3	North Full Crossing	88	63.7	LOS F	0.3	0.3	0.92	0.92
P4	West Full Crossing	9	25.8	LOS C	0.0	0.0	0.59	0.59
All Pedestrians		227	52.0	LOS E			0.83	0.83

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: TCS893 [2038 Design PM - Option 2 (With Quirk Ext)]

Condamine Street - Kenneth Road
2038 PM Peak
Design Traffic | Option 2 - Phase Seq & Lane Discipline Change & Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flow total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	67	2.0	0.185	19.5	LOS B	3.0	29.4	0.62	0.59	38.3
2	T1	2231	4.1	1.287	313.9	LOS F	207.0	1470.6	0.99	2.08	6.7
3	R2	517	2.3	1.376	411.6	LOS F	101.0	721.4	1.00	1.66	2.5
Approach		2815	3.7	1.376	324.8	LOS F	207.0	1470.6	0.98	1.97	5.4
East: Kenneth Road (E)											
4	L2	404	3.7	0.646	30.7	LOS C	14.7	105.9	0.89	0.85	21.1
5	T1	58	2.9	1.380	411.4	LOS F	32.6	236.2	1.00	1.74	4.4
6	R2	257	4.6	1.380	416.1	LOS F	32.6	236.2	1.00	1.68	3.8
Approach		719	4.0	1.380	199.0	LOS F	32.6	236.2	0.94	1.22	6.0
North: Condamine Street (N)											
7	L2	38	9.5	0.451	40.2	LOS C	1.8	13.8	0.70	0.69	24.6
8	T1	1438	3.4	1.369	397.6	LOS F	142.1	1023.7	1.00	2.32	4.8
9	R2	42	0.0	0.573	87.6	LOS F	3.3	22.8	1.00	0.75	21.6
Approach		1518	3.4	1.369	380.1	LOS F	142.1	1023.7	0.99	2.23	5.1
West: Kenneth Road (W)											
10	L2	61	2.2	0.459	66.4	LOS E	9.1	64.0	0.95	0.79	25.3
11	T1	75	0.0	0.459	61.9	LOS E	9.1	64.0	0.95	0.79	20.4
12	R2	108	1.2	0.309	61.6	LOS E	6.8	48.3	0.90	0.78	23.5
Approach		244	1.1	0.459	62.9	LOS E	9.1	64.0	0.93	0.78	23.2
All Vehicles		5296	3.5	1.380	311.5	LOS F	207.0	1470.6	0.98	1.89	5.6

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	129	45.1	LOS E	0.4	0.4	0.78	0.78
P3	North Full Crossing	88	63.7	LOS F	0.3	0.3	0.92	0.92
P4	West Full Crossing	9	25.2	LOS C	0.0	0.0	0.58	0.58
All Pedestrians		227	51.5	LOS E			0.83	0.83

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: TCS893 [2038 Design Weekend]

Condamine Street - Kenneth Road
2038 Weekend Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow [veh/h]	HV [%]	Deg. Satn [v/c]	Average Delay [sec]	Level of Service	95% Back of Queue [Vehicles veh]	95% Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate [per veh]	Average Speed [km/h]
South: Condamine Street (S)											
1	L2	59	2.2	0.062	23.2	LOS B	2.0	14.4	0.51	0.68	35.0
2	T1	1835	2.7	1.307	341.9	LOS F	169.6	1215.0	1.00	2.17	5.6
3	R2	421	1.3	1.696	670.4	LOS F	91.5	647.6	1.00	1.95	1.5
Approach		2315	2.5	1.696	393.5	LOS F	169.6	1215.0	0.99	2.09	4.5
East: Kenneth Road (E)											
4	L2	474	1.7	0.618	28.4	LOS B	15.6	110.5	0.83	0.86	22.0
5	T1	87	1.7	0.273	59.0	LOS E	5.6	39.8	0.92	0.72	20.9
6	R2	374	2.3	1.262	296.4	LOS F	58.0	413.8	1.00	1.50	4.9
Approach		935	1.9	1.262	138.4	LOS F	58.0	413.8	0.91	1.10	8.1
North: Condamine Street (N)											
7	L2	85	0.0	0.278	27.8	LOS B	3.1	21.7	0.73	0.72	29.9
8	T1	1562	2.7	1.757	738.8	LOS F	209.6	1501.1	1.00	3.03	2.7
9	R2	53	0.0	0.330	76.9	LOS F	3.7	26.1	0.98	0.75	23.2
Approach		1700	2.5	1.757	682.7	LOS F	209.6	1501.1	0.99	2.84	2.9
West: Kenneth Road (W)											
10	L2	74	0.0	0.526	69.9	LOS E	9.3	66.1	0.97	0.80	24.6
11	T1	62	2.6	0.526	65.4	LOS E	9.3	66.1	0.97	0.80	19.7
12	R2	127	0.0	0.343	42.8	LOS D	6.4	44.9	0.89	0.78	28.6
Approach		263	0.6	0.526	55.7	LOS D	9.3	66.1	0.93	0.79	25.1
All Vehicles		5213	2.3	1.757	425.0	LOS F	209.6	1501.1	0.97	2.09	4.2

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 [veh/h]	Average Delay [sec]	Level of Service	Average Back of Queue [Pedestrian ped]	Average Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate [per ped]
P2	East Full Crossing	78	49.8	LOS E	0.3	0.3	0.82	0.82
P3	North Full Crossing	87	64.6	LOS F	0.3	0.3	0.93	0.93
P4	West Full Crossing	22	47.2	LOS E	0.1	0.1	0.79	0.79
All Pedestrians		187	55.4	LOS E			0.86	0.86

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: TCS893 [2038 Design Weekend - Option 1]

Condamine Street - Kenneth Road
2038 Weekend Peak
Design Traffic | Option 1 - Phase Seq & Lane Discipline Change
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flow total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	59	2.2	0.078	32.4	LOS C	2.5	17.8	0.62	0.71	31.0
2	T1	1835	2.7	1.088	154.3	LOS F	121.4	869.4	1.00	1.50	11.2
3	R2	421	1.3	1.319	363.2	LOS F	76.9	544.1	1.00	1.58	2.8
Approach		2315	2.5	1.319	189.2	LOS F	121.4	869.4	0.99	1.50	8.7
East: Kenneth Road (E)											
4	L2	474	1.7	0.706	30.1	LOS C	20.3	144.0	0.91	0.85	21.3
5	T1	87	1.7	1.322	363.3	LOS F	43.8	311.8	1.00	1.82	5.0
6	R2	374	2.3	1.322	367.8	LOS F	43.8	311.8	1.00	1.68	4.2
Approach		935	1.9	1.322	196.2	LOS F	43.8	311.8	0.95	1.27	6.3
North: Condamine Street (N)											
7	L2	85	0.0	0.689	35.9	LOS C	3.9	27.3	0.58	0.75	26.3
8	T1	1562	2.7	1.316	350.9	LOS F	149.3	1069.0	1.00	2.19	5.4
9	R2	53	0.0	0.716	89.4	LOS F	4.2	29.1	1.00	0.81	21.2
Approach		1700	2.5	1.316	327.0	LOS F	149.3	1069.0	0.98	2.07	5.8
West: Kenneth Road (W)											
10	L2	74	0.0	0.654	75.2	LOS F	9.8	69.3	1.00	0.82	23.7
11	T1	62	2.6	0.654	70.8	LOS F	9.8	69.3	1.00	0.82	19.8
12	R2	127	0.0	0.550	73.1	LOS F	8.9	62.5	0.99	0.80	21.2
Approach		263	0.6	0.654	73.1	LOS F	9.8	69.3	0.99	0.81	21.4
All Vehicles		5213	2.3	1.322	229.5	LOS F	149.3	1069.0	0.98	1.61	7.3

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	78	39.7	LOS D	0.2	0.2	0.73	0.73
P3	North Full Crossing	67	69.3	LOS F	0.3	0.3	0.96	0.96
P4	West Full Crossing	22	24.1	LOS C	0.1	0.1	0.57	0.57
All Pedestrians		167	49.6	LOS E			0.80	0.80

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: TCS893 [2038 Design Weekend - Option 2 (With Quirk Ext)]

Condamine Street - Kenneth Road
2038 Weekend Peak
Design Traffic | Option 2 - Phase Seq & Lane Discipline Change & Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flow total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	59	2.2	0.076	31.7	LOS C	2.5	17.6	0.62	0.71	31.2
2	T1	1835	2.7	1.075	144.0	LOS F	118.0	845.6	1.00	1.46	11.8
3	R2	421	1.3	1.272	323.3	LOS F	72.4	512.4	1.00	1.52	3.1
Approach		2315	2.5	1.272	173.7	LOS F	118.0	845.6	0.99	1.45	9.3
East: Kenneth Road (E)											
4	L2	474	1.7	0.706	30.6	LOS C	20.2	143.3	0.91	0.85	21.1
5	T1	87	1.7	1.283	329.8	LOS F	39.0	278.1	1.00	1.74	5.4
6	R2	345	2.3	1.283	334.3	LOS F	39.0	278.1	1.00	1.61	4.6
Approach		906	1.9	1.283	175.1	LOS F	39.0	278.1	0.95	1.23	6.9
North: Condamine Street (N)											
7	L2	85	0.0	0.702	37.8	LOS C	4.0	28.1	0.59	0.76	25.6
8	T1	1562	2.7	1.316	350.9	LOS F	149.3	1069.0	1.00	2.19	5.4
9	R2	53	0.0	0.716	89.4	LOS F	4.2	29.1	1.00	0.81	21.2
Approach		1700	2.5	1.316	327.1	LOS F	149.3	1069.0	0.98	2.07	5.8
West: Kenneth Road (W)											
10	L2	74	0.0	0.654	75.2	LOS F	9.8	69.3	1.00	0.82	23.7
11	T1	62	2.6	0.654	70.8	LOS F	9.8	69.3	1.00	0.82	18.8
12	R2	127	0.0	0.550	73.1	LOS F	8.9	62.5	0.99	0.80	21.2
Approach		263	0.6	0.654	73.1	LOS F	9.8	69.3	0.99	0.81	21.4
All Vehicles		5184	2.3	1.316	219.2	LOS F	149.3	1069.0	0.98	1.55	7.6

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	78	39.7	LOS D	0.2	0.2	0.73	0.73
P3	North Full Crossing	67	69.3	LOS F	0.3	0.3	0.96	0.96
P4	West Full Crossing	22	23.5	LOS C	0.1	0.1	0.56	0.56
All Pedestrians		167	49.5	LOS E			0.80	0.80

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: TCS893 [2018 Base AM - Design Life]

Condamine Street - Kenneth Road
2018 AM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 129 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 0 years

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flow total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	32	3.3	0.036	23.1	LOS B	1.0	7.1	0.54	0.67	35.0
2	T1	1432	5.5	0.950	65.6	LOS E[11]	56.5	414.3	1.00	1.13	21.3
3	R2	247	7.7	1.254	276.2	LOS F[11]	31.3	233.2	1.00	1.52	3.3
Approach		1711	5.8	1.254	95.4	LOS F[11]	56.5	414.3	0.99	1.18	14.9
East: Kenneth Road (E)											
4	L2	204	6.5	0.261	19.2	LOS B	5.6	41.3	0.66	0.74	27.0
5	T1	57	2.0	0.153	46.5	LOS D[11]	3.0	21.2	0.87	0.67	23.8
6	R2	187	5.2	0.788	62.2	LOS E[11]	10.4	76.4	1.00	1.00	18.4
Approach		448	5.4	0.788	40.7	LOS C	10.4	76.4	0.83	0.84	21.5
North: Condamine Street (N)											
7	L2	99	12.5	0.539	37.1	LOS C	7.3	72.1	0.92	0.78	26.8
8	T1	1403	9.2	1.338	346.9	LOS F[11]	119.4	867.3	1.00	2.34	6.5
9	R2	37	0.0	0.287	69.7	LOS E[11]	2.3	16.1	0.98	0.73	24.5
Approach		1539	9.2	1.338	320.2	LOS F[11]	119.4	867.3	0.99	2.20	5.9
West: Kenneth Road (W)											
10	L2	36	2.9	0.367	56.7	LOS E[11]	6.1	43.3	0.93	0.76	27.4
11	T1	72	1.8	0.367	52.2	LOS D[11]	6.1	43.3	0.93	0.76	22.5
12	R2	87	1.2	0.227	39.7	LOS C	4.0	28.4	0.81	0.74	29.6
Approach		195	1.7	0.367	47.4	LOS D[11]	6.1	43.3	0.88	0.75	26.5
All Vehicles		3893	6.9	1.338	175.6	LOS F[11]	119.4	867.3	0.97	1.52	9.4

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.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	129	42.1	LOS E[12]	0.4	0.4	0.81	0.81
P3	North Full Crossing	88	54.2	LOS E[12]	0.3	0.3	0.92	0.92
P4	West Full Crossing	9	39.6	LOS D	0.0	0.0	0.78	0.78
All Pedestrians		227	46.7	LOS E[12]			0.85	0.85

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: TCS893 [2018 Base PM - Design Life]

Condamine Street - Kenneth Road
2018 PM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 145 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 0 years

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	54	2.0	0.206	42.8	LOS D [11]	4.8	47.0	0.76	0.67	28.2
2	T1	1784	4.1	1.327	350.6	LOS F [11]	161.9	1150.3	0.99	2.22	5.9
3	R2	415	2.3	1.485	484.4	LOS F [11]	76.9	549.3	1.00	1.75	2.0
Approach		2253	3.7	1.485	367.9	LOS F [11]	161.9	1150.3	0.99	2.10	4.7
East: Kenneth Road (E)											
4	L2	326	3.7	0.382	19.2	LOS B	9.1	65.7	0.67	0.76	27.0
5	T1	48	2.9	0.127	51.0	LOS D [11]	2.8	20.1	0.86	0.65	22.7
6	R2	234	4.6	0.746	53.5	LOS D [11]	13.6	98.8	0.98	0.89	20.2
Approach		608	4.0	0.746	34.9	LOS C	13.6	98.8	0.81	0.80	22.8
North: Condamine Street (N)											
7	L2	33	9.5	0.074	32.9	LOS C	1.3	9.9	0.78	0.71	27.5
8	T1	1151	8.3	1.495	506.9	LOS F [11]	126.4	947.7	1.00	2.55	3.8
9	R2	34	0.0	0.156	68.4	LOS E [11]	2.2	15.2	0.93	0.73	24.8
Approach		1217	8.1	1.495	482.0	LOS F [11]	126.4	947.7	0.99	2.45	4.1
West: Kenneth Road (W)											
10	L2	48	2.2	0.372	63.6	LOS E [11]	7.0	49.1	0.93	0.77	25.9
11	T1	61	0.0	0.372	59.1	LOS E [11]	7.0	49.1	0.93	0.77	21.0
12	R2	86	1.2	0.209	39.1	LOS C	4.1	29.0	0.79	0.74	29.9
Approach		196	1.1	0.372	51.4	LOS D [11]	7.0	49.1	0.87	0.76	25.8
All Vehicles		4274	4.9	1.495	338.5	LOS F [11]	161.9	1150.3	0.96	1.95	5.1

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.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	98	52.4	LOS E [12]	0.3	0.3	0.85	0.85
P3	North Full Crossing	136	61.3	LOS F [12]	0.5	0.5	0.92	0.92
P4	West Full Crossing	25	49.7	LOS E [12]	0.1	0.1	0.83	0.83
All Pedestrians		259	56.8	LOS E [12]			0.89	0.89

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: TCS893 [2018 Weekend - Design Life]

Condamine Street - Kenneth Road
2018 Weekend Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 137 seconds (User-Given Cycle Time)
Design Life Analysis (Practical Capacity): Results for 0 years

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	47	2.2	0.051	22.7	LOS B	1.5	10.9	0.52	0.68	35.2
2	T1	1467	2.7	1.046	124.9	LOS F [11]	80.1	573.7	1.00	1.41	13.3
3	R2	339	1.2	1.454	453.1	LOS F [11]	59.2	418.6	1.00	1.79	2.1
Approach		1854	2.4	1.454	182.3	LOS F [11]	80.1	573.7	0.99	1.46	8.8
East: Kenneth Road (E)											
4	L2	381	1.7	0.484	21.1	LOS B	10.9	77.4	0.76	0.79	25.8
5	T1	72	1.5	0.213	52.3	LOS D [11]	4.1	29.2	0.90	0.70	22.3
6	R2	305	2.1	0.983	93.1	LOS F [11]	23.6	168.1	1.00	1.14	13.9
Approach		758	1.8	0.983	53.0	LOS D [11]	23.6	168.1	0.87	0.92	18.0
North: Condamine Street (N)											
7	L2	79	0.0	0.265	27.1	LOS B	2.7	18.8	0.76	0.72	30.3
8	T1	1249	2.7	1.528	533.2	LOS F [11]	142.8	1022.8	1.00	2.68	3.7
9	R2	37	0.0	0.275	72.8	LOS F [11]	2.4	17.0	0.98	0.73	23.9
Approach		1365	2.5	1.528	491.5	LOS F [11]	142.8	1022.8	0.99	2.51	4.0
West: Kenneth Road (W)											
10	L2	59	0.0	0.411	62.5	LOS E [11]	6.8	47.9	0.95	0.78	26.1
11	T1	52	2.0	0.411	58.0	LOS E [11]	6.8	47.9	0.95	0.78	21.2
12	R2	102	0.0	0.247	37.7	LOS C	4.6	32.2	0.82	0.75	30.4
Approach		213	0.5	0.411	49.5	LOS D [11]	6.8	47.9	0.89	0.77	26.6
All Vehicles		4189	2.2	1.528	253.0	LOS F [11]	142.8	1022.8	0.96	1.67	6.7

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.
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.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	78	48.4	LOS E [12]	0.3	0.3	0.84	0.84
P3	North Full Crossing	67	59.0	LOS E [12]	0.2	0.2	0.93	0.93
P4	West Full Crossing	22	45.8	LOS E [12]	0.1	0.1	0.82	0.82
All Pedestrians		167	52.3	LOS E [12]			0.87	0.87

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: TCS2472 [2038 Design AM]

Burnt Bridge Creek Deviation - Condamine Street
2038 AM Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 130 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1b	L3	38	20.7	0.061	13.3	LOS A	0.7	6.2	0.37	0.66	53.2
1a	L1	9	14.3	0.765	56.1	LOS D	19.7	146.8	0.98	0.88	10.7
3a	R1	666	4.2	0.765	56.1	LOS D	21.5	152.3	0.99	0.88	17.9
Approach		714	5.2	0.765	53.8	LOS D	21.5	152.3	0.96	0.87	20.7
NorthEast: Condamine Street (NE)											
24a	L1	719	4.6	0.367	4.4	LOS A	0.0	0.0	0.00	0.49	48.7
25	T1	1453	9.6	0.630	19.0	LOS B	28.3	205.1	0.71	0.64	51.4
Approach		2172	7.9	0.630	14.2	LOS A	28.3	205.1	0.47	0.59	51.1
NorthWest: Freedom - Balgowlah (Access)											
27	L2	1	0.0	0.055	68.9	LOS E	0.3	2.3	0.98	0.64	10.8
29a	R1	3	0.0	0.055	67.8	LOS E	0.3	2.3	0.98	0.64	10.1
29	R2	1	0.0	0.055	69.0	LOS E	0.3	2.3	0.98	0.64	35.7
Approach		5	0.0	0.055	68.2	LOS E	0.3	2.3	0.98	0.64	19.0
SouthWest: Burnt Bridge Creek Deviation (SW)											
30	L2	1	0.0	0.070	18.4	LOS B	1.3	16.8	0.46	0.37	47.4
31	T1	1403	7.6	0.765	20.0	LOS B	39.7	288.7	0.74	0.67	51.0
32b	R3	101	7.6	0.752	60.5	LOS E	6.9	51.2	0.94	0.94	38.7
Approach		1505	7.6	0.765	22.7	LOS B	39.7	288.7	0.75	0.69	49.9
All Vehicles		4396	7.4	0.765	23.6	LOS B	39.7	288.7	0.65	0.67	46.8

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 Distance m	Prop. Queued	Effective Stop Rate per ped
P8	SouthWest Full Crossing	7	53.6	LOS E	0.0	0.91	0.91
All Pedestrians		7	53.6	LOS E		0.91	0.91

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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MOVEMENT SUMMARY

Site: TCS2472 [2038 Design PM]

Burnt Bridge Creek Deviation - Condamine Street
2018 PM Peak
Background Traffic
Signals - Fixed Time Isolated Cycle Time = 144 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1b	L3	48	13.5	0.061	12.0	LOS A	0.9	6.9	0.32	0.65	54.0
1a	L1	16	0.0	0.924	87.2	LOS F	21.7	165.7	1.00	1.03	7.4
3a	R1	545	6.0	0.924	86.9	LOS F	24.4	172.8	1.00	1.02	13.0
Approach		609	6.5	0.924	80.9	LOS F	24.4	172.8	0.96	0.99	16.5
NorthEast: Condamine Street (NE)											
24a	L1	520	6.8	0.270	4.4	LOS A	0.0	0.0	0.00	0.49	49.2
25	T1	1513	9.1	0.691	33.0	LOS C	31.9	232.9	0.84	0.75	46.5
Approach		2033	8.5	0.691	25.7	LOS B	31.9	232.9	0.62	0.68	46.6
NorthWest: Freedom - Balgowlah (Access)											
27	L2	15	0.0	0.395	79.4	LOS F	2.5	17.2	1.00	0.72	9.5
29a	R1	15	0.0	0.395	78.3	LOS F	2.5	17.2	1.00	0.72	8.8
29	R2	4	0.0	0.395	79.5	LOS F	2.5	17.2	1.00	0.72	33.6
Approach		34	0.0	0.395	79.0	LOS F	2.5	17.2	1.00	0.72	14.5
SouthWest: Burnt Bridge Creek Deviation (SW)											
30	L2	6	0.0	0.044	14.2	LOS A	0.9	10.3	0.36	0.32	48.7
31	T1	1926	4.5	0.938	39.4	LOS C	86.7	621.8	0.82	0.88	44.6
32b	R3	173	3.1	0.438	46.2	LOS D	10.3	73.8	0.90	0.89	42.2
Approach		2105	4.3	0.938	39.9	LOS C	86.7	621.8	0.82	0.88	44.3
All Vehicles		4781	6.3	0.938	39.4	LOS C	86.7	621.8	0.78	0.81	42.0

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 Distance m	Prop. Queued	Effective Stop Rate per ped
P8	SouthWest Full Crossing	3	66.1	LOS F	0.0	0.96	0.96
All Pedestrians		3	66.1	LOS F		0.96	0.96

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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MOVEMENT SUMMARY

Site: TCS2472 [2038 Design Weekend]

Burnt Bridge Creek Deviation - Condamine Street
2038 Weekend Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 130 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows [Total veh/h	HV] %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue [Vehicles veh	Distance m]	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1b	L3	61	2.2	0.071	13.2	LOS A	1.2	8.5	0.38	0.67	53.6
1a	L1	27	0.0	0.898	71.8	LOS F	23.7	171.2	1.00	1.00	8.6
3a	R1	668	2.0	0.898	71.8	LOS F	26.0	182.5	1.00	0.99	15.0
Approach		757	1.9	0.898	67.1	LOS E	26.0	182.5	0.96	0.97	16.8
NorthEast: Condamine Street (NE)											
24a	L1	762	1.4	0.381	4.4	LOS A	0.0	0.0	0.00	0.49	49.3
25	T1	1545	2.2	0.628	30.7	LOS C	25.3	179.2	0.84	0.75	47.2
Approach		2307	2.0	0.628	22.0	LOS B	25.3	181.1	0.56	0.66	47.4
NorthWest: Freedom - Balgowlah (Access)											
27	L2	15	0.0	0.477	71.9	LOS F	3.0	20.9	1.00	0.73	10.4
29a	R1	26	0.0	0.477	70.8	LOS F	3.0	20.9	1.00	0.73	9.7
29	R2	4	0.0	0.477	72.1	LOS F	3.0	20.9	1.00	0.73	35.1
Approach		45	0.0	0.477	71.3	LOS F	3.0	20.9	1.00	0.73	14.3
SouthWest: Burnt Bridge Creek Deviation (SW)											
30	L2	17	0.0	0.024	16.1	LOS B	0.6	5.0	0.42	0.50	46.8
31	T1	1747	3.0	0.898	31.5	LOS C	62.9	450.5	0.83	0.85	46.9
32b	R3	147	0.0	0.470	49.6	LOS D	8.4	59.0	0.94	0.88	41.4
Approach		1912	2.8	0.898	32.8	LOS C	62.9	450.5	0.83	0.85	46.5
All Vehicles		5021	2.2	0.898	33.4	LOS C	62.9	450.5	0.73	0.78	43.2

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 per ped
P8	SouthWest Full Crossing	19	57.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		19	57.3	LOS E			0.94	0.94

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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MOVEMENT SUMMARY

Site: TCS1053 [2038 Design AM]

Condamine Street - Balgowlah Road
2038 AM Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	74	3.6	1.107	166.3	LOS F	43.5	320.8	1.00	1.74	15.1
2	T1	348	6.8	1.107	160.7	LOS F	43.5	320.8	1.00	1.74	11.3
3	R2	199	7.7	1.626	609.7	LOS F	41.8	311.6	1.00	2.33	3.1
Approach		621	6.7	1.626	305.2	LOS F	43.5	320.8	1.00	1.93	6.7
East: Balgowlah Road (E)											
4	L2	184	4.5	1.255	284.5	LOS F	94.8	676.1	1.00	2.45	6.4
5	T1	487	1.4	1.255	279.9	LOS F	94.8	676.1	1.00	2.45	6.8
6	R2	68	3.8	0.918	64.4	LOS E	3.7	26.8	1.00	0.97	13.0
Approach		740	2.4	1.255	261.1	LOS F	94.8	676.1	1.00	2.31	6.9
North: Condamine Street (S)											
7	L2	131	15.2	0.353	27.2	LOS B	7.9	60.8	0.74	0.71	24.6
8	T1	391	6.4	1.558	378.6	LOS F	118.8	864.0	0.92	1.84	5.2
9	R2	351	3.0	1.558	532.2	LOS F	118.8	864.0	1.00	2.31	4.1
Approach		872	6.3	1.558	387.8	LOS F	118.8	864.0	0.93	1.86	4.9
West: Balgowlah Road (W)											
10	L2	315	2.1	0.397	18.0	LOS B	8.1	57.6	0.72	0.76	37.0
11	T1	464	0.3	1.351	363.4	LOS F	79.2	558.3	1.00	2.76	5.4
12	R2	26	10.0	1.351	368.1	LOS F	79.2	558.3	1.00	2.76	7.9
Approach		805	1.3	1.351	228.6	LOS F	79.2	558.3	0.89	1.98	8.5
All Vehicles		3038	4.1	1.626	297.8	LOS F	118.8	864.0	0.95	2.02	6.5

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.
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 veh/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	14	29.6	LOS C	0.0	0.0	0.79	0.79
P2	East Full Crossing	35	22.3	LOS C	0.1	0.1	0.69	0.69
P3	North Full Crossing	45	30.5	LOS D	0.1	0.1	0.80	0.80
P4	West Full Crossing	21	41.7	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		115	29.9	LOS C			0.79	0.79

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: TCS1053 [2038 Design AM - Option 1]

Condamine Street - Balgowlah Road
2038 AM Peak
Design Traffic | Option 1 - Phase Seq & Cap. Upgrades & EB RT Removed
Signals - Fixed Time Coordinated Cycle Time = 130 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	74	3.6	0.900	75.1	LOS F	22.8	167.9	1.00	1.05	25.6
2	T1	348	6.8	0.900	69.6	LOS E	22.8	167.9	1.00	1.04	20.9
3	R2	199	7.7	0.900	75.4	LOS F	22.2	165.3	1.00	1.01	18.8
Approach		621	6.7	0.900	72.1	LOS F	22.8	167.9	1.00	1.03	20.9
East: Balgowlah Road (E)											
4	L2	184	4.5	0.690	39.3	LOS C	23.7	169.3	0.85	0.78	27.9
5	T1	487	1.4	0.853	45.2	LOS D	23.7	169.3	0.91	0.91	24.7
6	R2	68	3.8	0.853	65.2	LOS E	16.6	118.1	1.00	1.08	13.4
Approach		740	2.4	0.853	45.6	LOS D	23.7	169.3	0.90	0.89	24.4
North: Condamine Street (N)											
7	L2	131	15.2	0.902	70.3	LOS E	33.4	251.5	1.00	1.08	12.9
8	T1	391	8.4	0.902	64.7	LOS E	33.4	251.5	1.00	1.07	22.0
9	R2	351	3.0	0.902	71.3	LOS F	28.8	207.8	1.00	0.99	21.0
Approach		872	6.3	0.902	68.2	LOS E	33.4	251.5	1.00	1.04	20.4
West: Balgowlah Road (W)											
10	L2	315	2.1	0.845	50.9	LOS D	19.1	135.9	1.00	1.04	25.1
11	T1	464	0.3	0.845	55.6	LOS D	25.5	178.8	1.00	0.99	22.4
Approach		779	1.0	0.845	53.7	LOS D	25.5	178.8	1.00	1.01	23.5
All Vehicles		3012	4.1	0.902	59.7	LOS E	33.4	251.5	0.98	0.99	22.2

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 Distance ped	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	14	31.2	LOS D	0.0	0.69	0.69
P2	East Full Crossing	35	39.3	LOS D	0.1	0.78	0.78
P3	North Full Crossing	45	45.8	LOS E	0.1	0.84	0.84
P4	West Full Crossing	21	50.0	LOS E	0.1	0.88	0.88
All Pedestrians		115	42.9	LOS E		0.81	0.81

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: TCS1053 [2038 Design AM - Option 2]

Condamine Street - Balgowlah Road
2038 AM Peak
Design Traffic | Option 2 - Phase Seq & Cap. Upgrades & EB RT Removed
Signals - Fixed Time Coordinated Cycle Time = 130 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	74	3.6	0.937	84.2	LOS F	24.4	179.6	1.00	1.12	24.0
2	T1	348	6.8	0.937	78.7	LOS F	24.4	179.6	1.00	1.10	19.4
3	R2	199	7.7	0.937	84.6	LOS F	23.8	176.9	1.00	1.07	17.4
Approach		621	6.7	0.937	81.3	LOS F	24.4	179.6	1.00	1.09	19.4
East: Balgowlah Road (E)											
4	L2	184	4.5	0.445	26.1	LOS B	14.1	101.0	0.62	0.65	33.7
5	T1	487	1.4	0.541	28.9	LOS C	14.8	105.1	0.71	0.76	30.1
6	R2	68	3.8	0.541	38.7	LOS C	14.8	105.1	0.77	0.84	19.8
Approach		740	2.4	0.541	29.1	LOS C	14.8	105.1	0.70	0.74	30.1
North: Condamine Street (N)											
7	L2	131	15.2	0.919	76.5	LOS F	23.9	181.4	1.00	1.11	12.0
8	T1	391	6.4	0.919	72.7	LOS F	23.9	181.4	1.00	1.09	20.4
9	R2	351	3.0	0.919	81.5	LOS F	21.7	159.0	1.00	1.02	19.5
Approach		872	6.3	0.919	76.8	LOS F	23.9	181.4	1.00	1.07	19.0
West: Balgowlah Road (W)											
10	L2	315	2.1	0.297	8.5	LOS A	4.9	34.6	0.38	0.64	43.6
11	T1	464	0.3	0.908	73.4	LOS F	19.6	137.3	1.00	1.08	19.3
Approach		779	1.0	0.908	47.2	LOS D	19.6	137.3	0.75	0.90	25.3
All Vehicles		3012	4.1	0.937	58.3	LOS E	24.4	181.4	0.88	0.95	22.5

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.
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 Distance ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	14	22.8	LOS C	0.0	0.0	0.59	0.59
P2	East Full Crossing	35	49.2	LOS E	0.1	0.1	0.87	0.87
P3	North Full Crossing	45	57.4	LOS E	0.2	0.2	0.94	0.94
P4	West Full Crossing	21	50.9	LOS E	0.1	0.1	0.89	0.89
All Pedestrians		115	49.6	LOS E			0.87	0.87

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: TCS1053 [2038 Design PM]

Condamine Street - Balgowlah Road
2038 PM Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	129	2.0	0.999	96.0	LOS F	32.2	231.2	0.94	1.29	22.1
2	T1	285	3.7	0.999	90.4	LOS F	32.2	231.2	0.94	1.29	17.6
3	R2	215	2.6	1.375	399.0	LOS F	37.4	267.4	1.00	1.82	4.6
Approach		629	3.0	1.375	196.8	LOS F	37.4	267.4	0.96	1.47	10.1
East: Balgowlah Road (E)											
4	L2	182	3.1	1.285	316.0	LOS F	97.1	688.5	1.00	2.33	5.8
5	T1	442	0.9	1.285	311.4	LOS F	97.1	688.5	1.00	2.33	6.2
6	R2	72	5.6	1.116	172.6	LOS F	7.5	54.8	1.00	1.25	5.6
Approach		696	2.0	1.285	298.3	LOS F	97.1	688.5	1.00	2.22	6.1
North: Condamine Street (S)											
7	L2	124	1.1	0.308	29.7	LOS C	8.3	58.9	0.73	0.70	23.5
8	T1	332	3.2	1.360	252.3	LOS F	101.7	723.9	0.92	1.54	7.2
9	R2	411	1.3	1.360	360.3	LOS F	101.7	723.9	1.00	1.91	5.7
Approach		866	2.0	1.360	271.6	LOS F	101.7	723.9	0.93	1.60	6.6
West: Balgowlah Road (W)											
10	L2	267	4.4	0.340	20.0	LOS B	7.8	56.9	0.69	0.75	35.8
11	T1	399	0.3	1.378	393.0	LOS F	74.3	521.4	1.00	2.57	5.1
12	R2	26	0.0	1.378	397.6	LOS F	74.3	521.4	1.00	2.57	7.3
Approach		693	1.9	1.378	249.2	LOS F	74.3	521.4	0.88	1.87	7.9
All Vehicles		2884	2.2	1.378	256.3	LOS F	101.7	723.9	0.94	1.78	7.4

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	4	36.0	LOS D	0.0	0.0	0.81	0.81
P2	East Full Crossing	33	24.9	LOS C	0.1	0.1	0.67	0.67
P3	North Full Crossing	36	36.9	LOS D	0.1	0.1	0.82	0.82
P4	West Full Crossing	18	46.4	LOS E	0.1	0.1	0.92	0.92
All Pedestrians		91	34.4	LOS D			0.79	0.79

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: TCS1053 [2038 Design PM - Option 1]

Condamine Street - Balgowlah Road
2038 PM Peak
Design Traffic | Option 1 - Phase Seq & Cap. Upgrades & EB RT Removed
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	129	2.0	0.900	70.9	LOS F	21.3	153.1	1.00	1.05	26.2
2	T1	285	3.7	0.900	65.3	LOS E	21.3	153.1	1.00	1.04	21.6
3	R2	215	2.6	0.900	70.9	LOS F	21.2	152.4	1.00	1.02	19.6
Approach		629	3.0	0.900	68.4	LOS E	21.3	153.1	1.00	1.04	22.1
East: Balgowlah Road (E)											
4	L2	182	3.1	0.689	39.3	LOS C	21.0	148.9	0.87	0.80	27.9
5	T1	442	0.9	0.851	44.1	LOS D	21.0	148.9	0.93	0.92	25.0
6	R2	72	5.6	0.851	61.8	LOS E	14.7	105.1	1.00	1.09	13.9
Approach		696	2.0	0.851	44.7	LOS D	21.0	148.9	0.92	0.90	24.6
North: Condamine Street (N)											
7	L2	124	1.1	0.790	50.2	LOS D	24.8	177.3	0.98	0.94	16.9
8	T1	332	3.2	0.790	44.7	LOS D	24.8	177.3	0.98	0.94	27.2
9	R2	411	1.3	0.887	63.9	LOS E	26.9	190.6	1.00	0.96	22.2
Approach		866	2.0	0.887	54.6	LOS D	26.9	190.6	0.99	0.95	23.4
West: Balgowlah Road (W)											
10	L2	267	4.4	0.862	50.2	LOS D	14.9	107.4	1.00	1.05	25.3
11	T1	399	0.3	0.862	56.5	LOS D	21.0	147.2	1.00	1.02	22.2
Approach		666	2.0	0.862	54.0	LOS D	21.0	147.2	1.00	1.03	23.4
All Vehicles		2858	2.2	0.900	55.1	LOS D	26.9	190.6	0.98	0.98	23.3

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 Distance ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	14	31.6	LOS D	0.0	0.0	0.73	0.73
P2	East Full Crossing	35	35.3	LOS D	0.1	0.1	0.77	0.77
P3	North Full Crossing	45	46.9	LOS E	0.1	0.1	0.89	0.89
P4	West Full Crossing	21	46.9	LOS E	0.1	0.1	0.88	0.88
All Pedestrians		115	41.6	LOS E			0.83	0.83

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: TCS1053 [2038 Design PM - Option 2]

Condamine Street - Balgowlah Road
2038 PM Peak
Design Traffic | Option 2 - Phase Seq & Cap. Upgrades & EB RT Removed
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	129	2.0	0.900	70.9	LOS F	21.3	153.1	1.00	1.05	26.2
2	T1	285	3.7	0.900	65.3	LOS E	21.3	153.1	1.00	1.04	21.7
3	R2	215	2.6	0.900	70.9	LOS F	21.2	152.4	1.00	1.02	19.6
Approach		629	3.0	0.900	68.4	LOS E	21.3	153.1	1.00	1.04	22.1
East: Balgowlah Road (E)											
4	L2	182	3.1	0.441	26.0	LOS B	12.7	90.6	0.65	0.66	33.7
5	T1	442	0.9	0.535	27.0	LOS B	13.4	95.0	0.73	0.73	30.9
6	R2	72	5.6	0.535	35.4	LOS C	13.4	95.0	0.78	0.78	21.0
Approach		696	2.0	0.535	27.6	LOS B	13.4	95.0	0.71	0.72	30.7
North: Condamine Street (N)											
7	L2	124	1.1	0.881	64.8	LOS E	21.7	155.2	1.00	1.06	13.8
8	T1	332	3.2	0.881	60.8	LOS E	21.7	155.2	1.00	1.04	22.7
9	R2	411	1.3	0.881	70.0	LOS E	17.9	127.3	1.00	0.98	21.3
Approach		866	2.0	0.881	65.7	LOS E	21.7	155.2	1.00	1.02	21.0
West: Balgowlah Road (W)											
10	L2	267	4.4	0.250	7.5	LOS A	3.2	23.0	0.35	0.62	44.3
11	T1	399	0.3	0.659	52.5	LOS D	11.3	79.4	0.99	0.83	23.3
Approach		666	2.0	0.659	34.5	LOS C	11.3	79.4	0.73	0.74	29.2
All Vehicles		2858	2.2	0.900	49.7	LOS D	21.7	155.2	0.87	0.89	24.7

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.
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 Distance ped	Prop. Queued m	Effective Stop Rate per ped	
P1	South Full Crossing	14	23.5	LOS C	0.0	0.0	0.63	0.63
P2	East Full Crossing	35	45.1	LOS E	0.1	0.1	0.87	0.87
P3	North Full Crossing	45	53.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	21	46.9	LOS E	0.1	0.1	0.88	0.88
All Pedestrians		115	46.1	LOS E			0.87	0.87

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: TCS1053 [2038 Design Weekend]

Condamine Street - Balgowlah Road
2038 Weekend Peak
Design Traffic
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	138	2.9	1.199	237.4	LOS F	64.9	463.9	1.00	2.15	11.4
2	T1	382	2.4	1.199	231.8	LOS F	64.9	463.9	1.00	2.15	8.3
3	R2	197	0.0	1.476	476.3	LOS F	35.9	251.1	1.00	2.16	3.9
Approach		717	1.8	1.476	300.0	LOS F	64.9	463.9	1.00	2.16	7.0
East: Balgowlah Road (E)											
4	L2	227	1.2	1.475	474.4	LOS F	120.3	845.4	1.00	3.24	4.0
5	T1	426	0.0	1.475	469.8	LOS F	120.3	845.4	1.00	3.24	4.3
6	R2	101	1.3	1.271	292.9	LOS F	13.8	98.0	1.00	1.65	3.5
Approach		755	0.5	1.475	447.5	LOS F	120.3	845.4	1.00	3.03	4.2
North: Condamine Street (S)											
7	L2	179	0.7	0.348	23.8	LOS B	8.1	57.1	0.71	0.72	26.4
8	T1	432	1.8	1.534	395.7	LOS F	128.9	913.5	0.93	2.02	5.0
9	R2	372	1.1	1.534	510.8	LOS F	128.9	913.5	1.00	2.40	4.3
Approach		982	1.3	1.534	371.5	LOS F	128.9	913.5	0.92	1.93	5.0
West: Balgowlah Road (W)											
10	L2	264	1.5	0.357	18.2	LOS B	6.5	46.3	0.73	0.76	36.9
11	T1	391	0.0	1.354	363.9	LOS F	67.9	475.2	1.00	2.70	5.4
12	R2	37	0.0	1.354	368.4	LOS F	67.9	475.2	1.00	2.70	7.8
Approach		692	0.6	1.354	232.0	LOS F	67.9	475.2	0.90	1.96	8.5
All Vehicles		3145	1.1	1.534	342.8	LOS F	128.9	913.5	0.95	2.25	5.7

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.
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 veh/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	22	32.1	LOS D	0.0	0.0	0.85	0.85
P2	East Full Crossing	48	19.4	LOS B	0.1	0.1	0.66	0.66
P3	North Full Crossing	47	33.0	LOS D	0.1	0.1	0.86	0.86
P4	West Full Crossing	15	39.2	LOS D	0.0	0.0	0.93	0.93
All Pedestrians		133	28.6	LOS C			0.79	0.79

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: TCS1053 [2038 Design Weekend - Option 1]

Condamine Street - Balgowlah Road
2038 Weekend Peak
Design Traffic | Option 1 - Phase Seq & Cap. Upgrades & EB RT Removed
Signals - Fixed Time Isolated Cycle Time = 135 seconds (User-Given Phase Times)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	138	2.9	0.935	84.1	LOS F	28.4	203.3	1.00	1.09	23.8
2	T1	382	2.4	0.935	78.5	LOS F	28.6	202.2	1.00	1.08	19.3
3	R2	197	0.0	0.935	84.0	LOS F	28.6	202.2	1.00	1.07	17.6
Approach		717	1.8	0.935	81.1	LOS F	28.6	203.3	1.00	1.08	19.9
East: Balgowlah Road (E)											
4	L2	227	1.2	0.794	48.8	LOS D	30.8	217.0	0.97	0.89	24.8
5	T1	426	0.0	0.981	63.1	LOS E	30.8	217.0	0.98	1.04	20.6
6	R2	101	1.3	0.981	104.4	LOS F	19.9	140.3	1.00	1.34	9.1
Approach		755	0.5	0.981	64.3	LOS E	30.8	217.0	0.98	1.04	19.8
North: Condamine Street (N)											
7	L2	179	0.7	0.915	70.8	LOS F	39.6	280.5	1.00	1.08	12.9
8	T1	432	1.8	0.915	65.8	LOS E	39.6	280.5	1.00	1.06	21.6
9	R2	372	1.1	0.915	74.1	LOS F	34.1	240.8	1.00	1.00	20.5
Approach		982	1.3	0.915	69.8	LOS E	39.6	280.5	1.00	1.04	19.9
West: Balgowlah Road (W)											
10	L2	264	1.5	0.874	58.1	LOS E	17.2	121.7	1.00	1.06	23.4
11	T1	391	0.0	0.874	64.7	LOS E	23.2	162.1	1.00	1.03	20.6
Approach		655	0.6	0.874	62.0	LOS E	23.2	162.1	1.00	1.04	21.7
All Vehicles		3108	1.1	0.981	69.4	LOS E	39.6	280.5	0.99	1.05	20.2

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 Distance ped	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	14	34.9	LOS D	0.0	0.0	0.72	0.72
P2	East Full Crossing	35	38.6	LOS D	0.1	0.1	0.76	0.76
P3	North Full Crossing	45	52.5	LOS E	0.2	0.2	0.88	0.88
P4	West Full Crossing	21	49.9	LOS E	0.1	0.1	0.86	0.86
All Pedestrians		115	45.7	LOS E			0.82	0.82

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: TCS1053 [2038 Design Weekend - Option 2]

Condamine Street - Balgowlah Road
2038 Weekend Peak
Design Traffic | Option 2 - Phase Seq & Cap. Upgrades & EB RT Removed
Signals - Fixed Time Coordinated Cycle Time = 135 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Condamine Street (S)											
1	L2	138	2.9	0.935	84.1	LOS F	28.4	203.3	1.00	1.09	23.9
2	T1	382	2.4	0.935	78.5	LOS F	28.6	202.2	1.00	1.08	19.3
3	R2	197	0.0	0.935	84.0	LOS F	28.6	202.2	1.00	1.07	17.6
Approach		717	1.8	0.935	81.1	LOS F	28.6	203.3	1.00	1.08	19.9
East: Balgowlah Road (E)											
4	L2	227	1.2	0.494	30.3	LOS C	17.0	119.7	0.69	0.70	31.5
5	T1	426	0.0	0.600	34.4	LOS C	17.0	119.7	0.78	0.83	27.9
6	R2	101	1.3	0.600	45.3	LOS D	16.3	114.4	0.85	0.92	17.8
Approach		755	0.5	0.600	34.6	LOS C	17.0	119.7	0.76	0.80	27.7
North: Condamine Street (N)											
7	L2	179	0.7	0.913	73.4	LOS F	27.1	191.5	1.00	1.07	12.4
8	T1	432	1.8	0.913	71.1	LOS F	27.1	191.5	1.00	1.07	20.7
9	R2	372	1.1	0.913	81.1	LOS F	25.1	178.2	1.00	1.01	19.5
Approach		982	1.3	0.913	75.3	LOS F	27.1	191.5	1.00	1.05	19.0
West: Balgowlah Road (W)											
10	L2	264	1.5	0.252	8.5	LOS A	4.1	28.9	0.36	0.63	43.7
11	T1	391	0.0	0.749	62.1	LOS E	14.1	98.5	1.00	0.88	21.3
Approach		655	0.6	0.749	40.5	LOS C	14.1	98.5	0.74	0.78	27.2
All Vehicles		3108	1.1	0.935	59.4	LOS E	28.6	203.3	0.89	0.94	22.3

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 Distance ped	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	14	26.1	LOS C	0.0	0.0	0.62	0.62
P2	East Full Crossing	35	49.1	LOS E	0.1	0.1	0.85	0.85
P3	North Full Crossing	45	59.8	LOS E	0.2	0.2	0.94	0.94
P4	West Full Crossing	21	49.9	LOS E	0.1	0.1	0.86	0.86
All Pedestrians		115	50.7	LOS E			0.86	0.86

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: 101 [2038 Design AM]

Balgowlah Road - Rosbery Street
2038 AM Peak
Design Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	589	1.6	0.834	10.8	LOS A	16.6	118.2	1.00	0.81	39.4
6	R2	273	2.6	0.834	13.5	LOS A	16.6	118.2	1.00	0.81	41.9
6u	U	4	0.0	0.834	14.6	LOS B	16.6	118.2	1.00	0.81	45.5
Approach		866	1.9	0.834	11.7	LOS A	16.6	118.2	1.00	0.81	40.4
North: Roseberry Street (N)											
7	L2	279	4.6	0.693	13.7	LOS A	7.7	56.4	0.95	1.06	40.2
9	R2	182	6.6	0.693	15.8	LOS B	7.7	56.4	0.95	1.06	35.4
9u	U	4	0.0	0.693	16.7	LOS B	7.7	56.4	0.95	1.06	42.0
Approach		465	5.3	0.693	14.5	LOS B	7.7	56.4	0.95	1.06	38.8
West: Balgowlah Road (W)											
10	L2	309	6.4	0.878	17.9	LOS B	19.8	144.7	1.00	1.07	33.4
11	T1	474	4.7	0.878	17.3	LOS B	19.8	144.7	1.00	1.07	35.8
12u	U	4	0.0	0.878	20.9	LOS B	19.8	144.7	1.00	1.07	25.4
Approach		787	5.4	0.878	17.6	LOS B	19.8	144.7	1.00	1.07	34.9
All Vehicles		2119	3.9	0.878	14.5	LOS A	19.8	144.7	0.99	0.98	38.1

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design AM - With Quirk Ext]

Balgowlah Road - Rosbery Street
2038 AM Peak
Design Traffic | With Quirk Road Extension
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	617	1.6	0.679	6.1	LOS A	7.9	56.4	0.77	0.64	42.5
6	R2	116	2.6	0.679	8.8	LOS A	7.9	56.4	0.77	0.64	44.4
6u	U	4	0.0	0.679	9.9	LOS A	7.9	56.4	0.77	0.64	46.1
Approach		737	1.7	0.679	6.5	LOS A	7.9	56.4	0.77	0.64	43.0
North: Roseberry Street (N)											
7	L2	122	4.6	0.411	8.9	LOS A	2.8	20.2	0.78	0.85	42.6
9	R2	154	8.6	0.411	11.0	LOS A	2.8	20.2	0.78	0.85	38.6
9u	U	4	0.0	0.411	12.0	LOS A	2.8	20.2	0.78	0.85	44.8
Approach		280	5.6	0.411	10.1	LOS A	2.8	20.2	0.78	0.85	40.8
West: Balgowlah Road (W)											
10	L2	282	6.4	0.680	6.1	LOS A	8.3	60.8	0.69	0.57	41.0
11	T1	501	4.7	0.680	5.6	LOS A	8.3	60.8	0.69	0.57	43.0
12u	U	4	0.0	0.680	9.3	LOS A	8.3	60.8	0.69	0.57	36.1
Approach		787	5.3	0.680	5.8	LOS A	8.3	60.8	0.69	0.57	42.3
All Vehicles		1804	3.9	0.680	6.8	LOS A	8.3	60.8	0.74	0.64	42.3

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design AM | Signals]

Balgowlah Road - Rosbery Street
2038 AM Peak
Design Traffic | Signals
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow [Total veh/h]	Flows HV [%]	Deg. Satn [v/c]	Average Delay [sec]	Level of Service	95% back of Queue [Vehicles veh]	95% back of Queue [Distance m]	Prop. Queued	Effective Stop Rate [per veh]	Average Speed [km/h]
East: Balgowlah Road (E)											
5	T1	589	1.6	0.470	5.7	LOS A	8.7	61.8	0.54	0.48	44.5
6	R2	273	2.6	0.595	19.7	LOS B	6.2	44.4	0.93	0.83	38.1
Approach		862	1.9	0.595	10.1	LOS A	8.7	61.8	0.66	0.59	41.7
North: Roseberry Street (N)											
7	L2	279	4.6	0.684	21.8	LOS B	6.4	46.9	0.97	0.86	37.2
9	R2	182	6.6	0.664	33.1	LOS C	5.5	40.6	0.99	0.86	26.4
Approach		461	5.4	0.684	26.3	LOS B	6.4	46.9	0.98	0.86	33.5
West: Balgowlah Road (W)											
10	L2	309	6.4	0.470	14.7	LOS B	5.5	40.4	0.81	0.77	35.6
11	T1	474	4.7	0.708	19.5	LOS B	12.7	92.4	0.92	0.84	35.0
Approach		783	5.4	0.708	17.6	LOS B	12.7	92.4	0.88	0.81	35.2
All Vehicles		2106	4.0	0.708	16.5	LOS B	12.7	92.4	0.81	0.73	37.2

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]	Average Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate [per ped]
P2	East Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	19.2	LOS B	0.1	0.1	0.80	0.80
All Pedestrians		105	21.8	LOS C			0.85	0.85

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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MOVEMENT SUMMARY

Site: 101v [2038 Design AM | Signals - With Quirk Ext]

Balgowlah Road - Rosbery Street
2038 AM Peak
Design Traffic | Signals | With Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 65 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	618	1.6	0.473	5.4	LOS A	9.3	65.9	0.51	0.46	44.8
6	R2	116	2.6	0.279	16.4	LOS B	2.3	16.3	0.76	0.74	39.7
Approach		734	1.7	0.473	7.1	LOS A	9.3	65.9	0.55	0.50	43.6
North: Roseberry Street (N)											
7	L2	122	4.6	0.428	24.5	LOS B	3.1	22.3	0.95	0.77	36.1
9	R2	154	6.6	0.607	35.1	LOS C	4.9	36.4	0.99	0.82	25.7
Approach		276	5.7	0.607	30.4	LOS C	4.9	36.4	0.97	0.80	30.8
West: Balgowlah Road (W)											
10	L2	281	6.4	0.339	12.1	LOS A	4.3	31.9	0.67	0.73	37.5
11	T1	502	4.7	0.589	14.7	LOS B	12.1	88.2	0.80	0.71	37.8
Approach		783	5.3	0.589	13.8	LOS A	12.1	88.2	0.76	0.71	37.7
All Vehicles		1793	3.9	0.607	13.6	LOS A	12.1	88.2	0.71	0.64	38.5

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.
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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	26.8	LOS C	0.1	0.1	0.91	0.91
P3	North Full Crossing	53	15.6	LOS B	0.1	0.1	0.69	0.69
All Pedestrians		105	21.2	LOS C			0.80	0.80

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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MOVEMENT SUMMARY

Site: 101 [2038 Design PM]

Balgowlah Road - Rosbery Street
2038 PM Peak
Design Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	425	1.9	0.794	13.3	LOS A	13.4	94.6	1.00	0.98	37.6
6	R2	262	0.5	0.794	15.9	LOS B	13.4	94.6	1.00	0.98	40.6
6u	U	4	0.0	0.794	17.1	LOS B	13.4	94.6	1.00	0.98	44.1
Approach		692	1.3	0.794	14.3	LOS A	13.4	94.6	1.00	0.98	39.0
North: Roseberry Street (N)											
7	L2	288	1.5	0.793	16.2	LOS B	11.5	81.6	1.00	1.12	39.0
9	R2	283	2.5	0.793	18.2	LOS B	11.5	81.6	1.00	1.12	33.9
9u	U	5	0.0	0.793	19.4	LOS B	11.5	81.6	1.00	1.12	40.4
Approach		580	2.0	0.793	17.2	LOS B	11.5	81.6	1.00	1.12	37.0
West: Balgowlah Road (W)											
10	L2	287	3.5	0.793	12.4	LOS A	13.1	93.5	1.00	0.93	37.0
11	T1	435	0.9	0.793	11.8	LOS A	13.1	93.5	1.00	0.93	39.2
12u	U	9	0.0	0.793	15.6	LOS B	13.1	93.5	1.00	0.93	30.0
Approach		732	1.9	0.793	12.1	LOS A	13.1	93.5	1.00	0.93	38.3
All Vehicles		2003	1.7	0.794	14.3	LOS A	13.4	94.6	1.00	1.00	38.2

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design PM - With Quirk Ext]

Balgowlah Road - Rosbery Street
2038 PM Peak
Design Traffic | With Quirk Road Extension
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	453	1.9	0.622	8.2	LOS A	6.7	47.2	0.82	0.78	41.5
6	R2	105	0.5	0.622	10.7	LOS A	6.7	47.2	0.82	0.78	43.6
6u	U	4	0.0	0.622	12.0	LOS A	6.7	47.2	0.82	0.78	47.3
Approach		562	1.6	0.622	8.7	LOS A	6.7	47.2	0.82	0.78	42.1
North: Roseberry Street (N)											
7	L2	132	1.5	0.533	10.0	LOS A	4.4	31.3	0.81	0.90	41.9
9	R2	256	2.5	0.533	12.0	LOS A	4.4	31.3	0.81	0.90	37.9
9u	U	8	0.0	0.533	13.2	LOS A	4.4	31.3	0.81	0.90	44.0
Approach		396	2.1	0.533	11.4	LOS A	4.4	31.3	0.81	0.90	39.8
West: Balgowlah Road (W)											
10	L2	259	3.5	0.615	5.8	LOS A	6.9	48.9	0.61	0.55	41.4
11	T1	462	0.9	0.615	5.2	LOS A	6.9	48.9	0.61	0.55	43.3
12u	U	9	0.0	0.615	9.1	LOS A	6.9	48.9	0.61	0.55	36.6
Approach		731	1.8	0.615	5.5	LOS A	6.9	48.9	0.61	0.55	42.6
All Vehicles		1688	1.8	0.622	7.9	LOS A	6.9	48.9	0.73	0.71	41.7

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design PM | Signals]

Balgowlah Road - Rosbery Street
2038 PM Peak
Design Traffic | Signals
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	425	1.9	0.366	6.6	LOS A	6.4	45.5	0.55	0.48	43.7
6	R2	262	0.5	0.590	21.3	LOS B	6.0	42.2	0.93	0.83	37.5
Approach		687	1.4	0.590	12.2	LOS A	6.4	45.5	0.70	0.61	40.5
North: Roseberry Street (N)											
7	L2	288	1.5	0.571	18.3	LOS B	5.9	41.6	0.91	0.80	38.8
9	R2	283	2.5	0.753	32.4	LOS C	8.7	62.2	1.00	0.91	26.8
Approach		572	2.0	0.753	25.3	LOS B	8.7	62.2	0.95	0.86	33.3
West: Balgowlah Road (W)											
10	L2	287	3.5	0.428	14.3	LOS A	4.8	34.7	0.79	0.77	36.0
11	T1	435	0.9	0.740	22.7	LOS B	12.4	87.8	0.96	0.89	33.4
Approach		722	1.9	0.740	19.3	LOS B	12.4	87.8	0.89	0.84	34.3
All Vehicles		1981	1.7	0.753	18.6	LOS B	12.4	87.8	0.84	0.77	36.1

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 per ped
P2	East Full Crossing	53	24.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	21.7	LOS C	0.1	0.1	0.85	0.85
All Pedestrians		105	23.0	LOS C			0.88	0.88

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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MOVEMENT SUMMARY

Site: 101v [2038 Design PM | Signals - With Quirk Ext]

Balgowlah Road - Rosbery Street
2038 PM Peak
Design Traffic | Signals | With Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 55 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	Flow HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	454	1.9	0.392	6.2	LOS A	6.4	45.6	0.56	0.49	44.0
6	R2	105	0.5	0.279	18.1	LOS B	2.0	14.1	0.86	0.75	38.9
Approach		559	1.6	0.392	8.5	LOS A	6.4	45.6	0.62	0.54	42.6
North: Roseberry Street (N)											
7	L2	132	1.5	0.318	18.2	LOS B	2.5	17.6	0.88	0.75	38.8
9	R2	255	2.5	0.745	30.9	LOS C	7.3	51.9	1.00	0.92	27.3
Approach		386	2.2	0.745	26.6	LOS B	7.3	51.9	0.96	0.86	31.7
West: Balgowlah Road (W)											
10	L2	259	3.5	0.370	12.9	LOS A	3.9	27.8	0.76	0.75	36.9
11	T1	463	0.9	0.723	19.4	LOS B	11.8	83.5	0.94	0.87	35.1
Approach		722	1.8	0.723	17.1	LOS B	11.8	83.5	0.87	0.83	35.6
All Vehicles		1667	1.8	0.745	16.4	LOS B	11.8	83.5	0.81	0.74	36.7

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.
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	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	21.9	LOS C	0.1	0.1	0.89	0.89
P3	North Full Crossing	53	19.3	LOS B	0.1	0.1	0.84	0.84
All Pedestrians		105	20.6	LOS C			0.87	0.87

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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MOVEMENT SUMMARY

Site: 101 [2038 Design Weekend]

Balgowlah Road - Rosbery Street
2038 Weekend Peak
Design Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	463	0.3	0.894	19.4	LOS B	21.5	151.0	1.00	1.11	34.2
6	R2	331	0.0	0.894	22.0	LOS B	21.5	151.0	1.00	1.11	37.7
6u	U	1	0.0	0.894	23.3	LOS B	21.5	151.0	1.00	1.11	41.0
Approach		795	0.2	0.894	20.5	LOS B	21.5	151.0	1.00	1.11	35.9
North: Roseberry Street (N)											
7	L2	345	0.8	0.823	17.1	LOS B	13.3	93.6	1.00	1.13	38.7
9	R2	259	1.1	0.823	19.1	LOS B	13.3	93.6	1.00	1.13	33.5
9u	U	24	0.0	0.823	20.3	LOS B	13.3	93.6	1.00	1.13	40.0
Approach		628	0.9	0.823	18.0	LOS B	13.3	93.6	1.00	1.13	37.1
West: Balgowlah Road (W)											
10	L2	391	0.4	0.971	37.8	LOS C	34.5	242.7	1.00	1.60	24.8
11	T1	419	0.9	0.971	37.4	LOS C	34.5	242.7	1.00	1.60	27.2
12u	U	8	0.0	0.971	41.2	LOS C	34.5	242.7	1.00	1.60	16.2
Approach		818	0.7	0.971	37.6	LOS C	34.5	242.7	1.00	1.60	26.0
All Vehicles		2241	0.6	0.971	26.1	LOS B	34.5	242.7	1.00	1.29	32.4

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design Weekend - With Quirk Ext]

Balgowlah Road - Rosbery Street
2038 Weekend Peak
Design Traffic | With Quirk Road Extension
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows [Total veh/h]	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue [Vehicles veh]	[Distance m]	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	491	0.3	0.722	9.7	LOS A	9.8	68.4	0.91	0.84	40.3
6	R2	174	0.0	0.722	12.3	LOS A	9.8	68.4	0.91	0.84	42.6
6u	U	1	0.0	0.722	13.6	LOS A	9.8	68.4	0.91	0.84	46.2
Approach		665	0.2	0.722	10.4	LOS A	9.8	68.4	0.91	0.84	41.1
North: Roseberry Street (N)											
7	L2	188	0.8	0.602	10.8	LOS A	5.8	41.0	0.87	0.94	41.7
9	R2	232	1.1	0.602	12.8	LOS A	5.8	41.0	0.87	0.94	37.6
9u	U	24	0.0	0.602	14.0	LOS A	5.8	41.0	0.87	0.94	43.7
Approach		444	0.9	0.602	12.0	LOS A	5.8	41.0	0.87	0.94	40.1
West: Balgowlah Road (W)											
10	L2	363	0.4	0.774	9.1	LOS A	12.0	84.7	0.91	0.75	39.5
11	T1	446	0.9	0.774	8.6	LOS A	12.0	84.7	0.91	0.75	41.5
12u	U	8	0.0	0.774	12.4	LOS A	12.0	84.7	0.91	0.75	33.5
Approach		818	0.7	0.774	8.8	LOS A	12.0	84.7	0.91	0.75	40.6
All Vehicles		1927	0.6	0.774	10.1	LOS A	12.0	84.7	0.90	0.82	40.6

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design Weekend | Signals]

Balgowlah Road - Rosbery Street
2038 Weekend Peak
Design Traffic | Signals
Signals - Fixed Time Isolated Cycle Time = 55 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow [Total veh/h]	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue [Vehicles veh]	95% back of Queue [Distance m]	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	463	0.3	0.409	6.8	LOS A	6.9	48.2	0.59	0.51	43.5
6	R2	331	0.0	0.809	27.5	LOS B	8.1	56.9	1.00	1.03	35.0
Approach		794	0.2	0.809	15.4	LOS B	8.1	56.9	0.76	0.73	38.7
North: Roseberry Street (N)											
7	L2	345	0.8	0.712	19.7	LOS B	7.4	51.9	0.98	0.87	38.2
9	R2	259	1.1	0.682	28.7	LOS C	7.0	49.5	0.98	0.87	28.2
Approach		604	1.0	0.712	23.6	LOS B	7.4	51.9	0.97	0.87	34.5
West: Balgowlah Road (W)											
10	L2	391	0.4	0.574	14.3	LOS A	6.5	45.9	0.85	0.80	36.0
11	T1	419	0.9	0.735	21.3	LOS B	11.1	78.4	0.96	0.90	34.1
Approach		809	0.7	0.735	17.9	LOS B	11.1	78.4	0.91	0.85	34.9
All Vehicles		2207	0.6	0.809	18.6	LOS B	11.1	78.4	0.87	0.81	36.2

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]	Average Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	21.9	LOS C	0.1	0.1	0.89	0.89
P3	North Full Crossing	53	21.0	LOS C	0.1	0.1	0.87	0.87
All Pedestrians		105	21.4	LOS C			0.88	0.88

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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MOVEMENT SUMMARY

Site: 101v [2038 Design Weekend | Signals - With Quirk Ext]

Balgowlah Road - Rosbery Street
2038 Weekend Peak
Design Traffic | Signals
Signals - Fixed Time Isolated Cycle Time = 65 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	492	0.3	0.410	6.9	LOS A	8.0	56.2	0.55	0.49	45.4
6	R2	174	0.0	0.441	19.4	LOS B	4.0	27.8	0.86	0.78	38.3
Approach		665	0.2	0.441	10.2	LOS A	8.0	56.2	0.63	0.56	41.6
North: Roseberry Street (N)											
7	L2	188	0.8	0.257	19.4	LOS B	4.1	29.1	0.72	0.74	38.3
9	R2	231	1.1	0.607	31.3	LOS C	7.0	49.3	0.96	0.82	27.2
Approach		419	1.0	0.607	26.0	LOS B	7.0	49.3	0.85	0.78	32.7
West: Balgowlah Road (W)											
10	L2	362	0.4	0.419	12.2	LOS A	5.6	39.4	0.71	0.75	37.5
11	T1	447	0.9	0.594	17.4	LOS B	11.5	81.1	0.85	0.74	36.2
Approach		809	0.7	0.594	15.1	LOS B	11.5	81.1	0.79	0.75	36.7
All Vehicles		1894	0.6	0.607	15.8	LOS B	11.5	81.1	0.75	0.69	37.3

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 Pedestrian Queue ped	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	26.8	LOS C	0.1	0.1	0.91	0.91
P3	North Full Crossing	53	18.5	LOS B	0.1	0.1	0.76	0.76
All Pedestrians		105	22.7	LOS C			0.83	0.83

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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MOVEMENT SUMMARY

Site: 101 [Design AM - Design Life]

Balgowlah Road - Rosbery Street
AM Peak
Design Traffic - Design Life
Roundabout
Design Life Analysis (Capacity): Results for 7 years

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	513	1.6	0.708	6.6	LOS A	9.0	63.8	0.82	0.67	42.1
6	R2	242	2.6	0.708	9.3	LOS A	9.0	63.8	0.82	0.67	44.1
6u	U	3	0.0	0.708	10.4	LOS A	9.0	63.8	0.82	0.67	47.8
Approach		758	1.9	0.708	7.5	LOS A	9.0	63.8	0.82	0.67	42.9
North: Roseberry Street (N)											
7	L2	247	4.6	0.564	9.9	LOS A	5.0	36.3	0.83	0.90	42.2
9	R2	163	6.6	0.564	12.0	LOS A	5.0	36.3	0.83	0.90	38.1
9u	U	3	0.0	0.564	13.0	LOS A	5.0	36.3	0.83	0.90	44.4
Approach		413	5.3	0.564	10.7	LOS A	5.0	36.3	0.83	0.90	41.0
West: Balgowlah Road (W)											
10	L2	274	6.4	0.732	10.1	LOS A	10.1	74.0	0.90	0.82	38.7
11	T1	412	4.7	0.732	9.5	LOS A	10.1	74.0	0.90	0.82	40.8
12u	U	3	0.0	0.732	13.2	LOS A	10.1	74.0	0.90	0.82	32.4
Approach		689	5.4	0.732	9.8	LOS A	10.1	74.0	0.90	0.82	40.0
All Vehicles		1860	3.9	0.732	9.0	LOS A	10.1	74.0	0.85	0.78	41.4

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.
Roundabout Capacity Model: SIDRA Standard.
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 [Design AM | Signals - Design Life]

Balgowlah Road - Roseberry Street
AM Peak
Design Traffic | Signals | Design Life
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	472	1.6	0.421	6.3	LOS A	6.5	45.9	0.59	0.52	43.9
6	R2	222	2.6	0.545	17.5	LOS B	4.1	29.3	0.93	0.79	39.2
Approach		694	1.9	0.545	9.9	LOS A	6.5	45.9	0.70	0.61	41.9
North: Roseberry Street (N)											
7	L2	227	4.6	0.292	15.1	LOS B	3.7	27.2	0.70	0.74	40.3
9	R2	149	6.6	0.454	25.6	LOS B	3.5	25.6	0.94	0.78	29.4
Approach		377	5.4	0.454	19.3	LOS B	3.7	27.2	0.79	0.76	36.5
West: Balgowlah Road (W)											
10	L2	252	6.4	0.438	13.9	LOS A	3.8	28.0	0.83	0.77	36.2
11	T1	379	4.7	0.708	19.4	LOS B	9.1	66.2	0.95	0.88	35.1
Approach		631	5.4	0.708	17.2	LOS B	9.1	66.2	0.91	0.83	35.5
All Vehicles		1701	4.0	0.708	14.7	LOS B	9.1	66.2	0.80	0.72	38.3

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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
All Pedestrians		105	19.4	LOS B			0.88	0.88

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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MOVEMENT SUMMARY

Site: 101 [Design PM - Design Life]

Balgowlah Road - Rosbery Street
PM Peak
Design Traffic - Design Life
Roundabout
Design Life Analysis (Capacity): Results for 7 years

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	370	1.9	0.660	8.6	LOS A	7.8	55.0	0.86	0.80	40.8
6	R2	232	0.5	0.660	11.2	LOS A	7.8	55.0	0.86	0.80	43.1
6u	U	3	0.0	0.660	12.4	LOS A	7.8	55.0	0.86	0.80	46.7
Approach		606	1.3	0.660	9.6	LOS A	7.8	55.0	0.86	0.80	41.9
North: Roseberry Street (N)											
7	L2	255	1.5	0.642	10.5	LOS A	6.6	47.2	0.86	0.91	41.8
9	R2	251	2.5	0.642	12.5	LOS A	6.6	47.2	0.86	0.91	37.7
9u	U	7	0.0	0.642	13.7	LOS A	6.6	47.2	0.86	0.91	43.9
Approach		513	2.0	0.642	11.5	LOS A	6.6	47.2	0.86	0.91	40.3
West: Balgowlah Road (W)											
10	L2	254	3.5	0.663	8.3	LOS A	7.6	54.3	0.82	0.75	40.1
11	T1	378	0.9	0.663	7.7	LOS A	7.6	54.3	0.82	0.75	42.1
12u	U	8	0.0	0.663	11.6	LOS A	7.6	54.3	0.82	0.75	34.6
Approach		640	1.9	0.663	8.0	LOS A	7.6	54.3	0.82	0.75	41.3
All Vehicles		1758	1.7	0.663	9.6	LOS A	7.8	55.0	0.85	0.81	41.2

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.
Roundabout Capacity Model: SIDRA Standard.
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 [Design PM | Signals - Design Life]

Balgowlah Road - Rosbery Street
PM Peak
Design Traffic | Signals | Design Traffic
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow [Total veh/h]	Flows HV [%]	Deg. Satn [v/c]	Average Delay [sec]	Level of Service	95% back of Queue [Vehicles veh]	95% back of Queue [Distance m]	Prop. Queued	Effective Stop Rate [per veh]	Average Speed [km/h]
East: Balgowlah Road (E)											
5	T1	340	1.9	0.304	5.8	LOS A	4.3	30.3	0.54	0.47	44.4
6	R2	214	0.5	0.493	16.5	LOS B	3.8	26.5	0.90	0.79	39.6
Approach		554	1.4	0.493	10.0	LOS A	4.3	30.3	0.68	0.59	42.0
North: Roseberry Street (N)											
7	L2	235	1.5	0.295	15.1	LOS B	3.9	27.4	0.70	0.74	40.3
9	R2	231	2.5	0.681	27.6	LOS B	5.8	41.5	0.98	0.87	28.7
Approach		465	2.0	0.681	21.3	LOS B	5.8	41.5	0.84	0.81	35.1
West: Balgowlah Road (W)											
10	L2	234	3.5	0.399	13.7	LOS A	3.5	24.9	0.82	0.76	36.3
11	T1	347	0.9	0.633	17.9	LOS B	7.8	55.2	0.93	0.80	35.9
Approach		581	1.9	0.633	16.2	LOS B	7.8	55.2	0.88	0.79	36.1
All Vehicles		1600	1.8	0.681	15.5	LOS B	7.8	55.2	0.80	0.72	37.7

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.
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]	Average Back of Queue [Distance m]	Prop. Queued	Effective Stop Rate [per ped]
P2	East Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.88	0.88
All Pedestrians		105	19.4	LOS B			0.88	0.88

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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MOVEMENT SUMMARY

Site: 101 [Design Weekend - Design Life]

Balgowlah Road - Rosbery Street
Weekend Peak
Design Traffic - Design Life
Roundabout
Design Life Analysis (Capacity): Results for 7 years

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	403	0.3	0.766	11.1	LOS A	11.7	82.2	0.97	0.89	39.0
6	R2	293	0.0	0.766	13.7	LOS A	11.7	82.2	0.97	0.89	41.7
6u	U	1	0.0	0.766	15.0	LOS B	11.7	82.2	0.97	0.89	45.2
Approach		697	0.2	0.766	12.2	LOS A	11.7	82.2	0.97	0.89	40.3
North: Roseberry Street (N)											
7	L2	320	0.8	0.731	12.4	LOS A	9.4	66.1	0.95	0.99	40.9
9	R2	242	1.1	0.731	14.5	LOS A	9.4	66.1	0.95	0.99	36.5
9u	U	22	0.0	0.731	15.7	LOS B	9.4	66.1	0.95	0.99	42.8
Approach		584	0.9	0.731	13.4	LOS A	9.4	66.1	0.95	0.99	39.6
West: Balgowlah Road (W)											
10	L2	362	0.4	0.847	16.2	LOS B	16.6	117.0	1.00	1.06	34.4
11	T1	382	0.9	0.847	15.8	LOS B	16.6	117.0	1.00	1.06	36.7
12u	U	7	0.0	0.847	19.6	LOS B	16.6	117.0	1.00	1.06	26.5
Approach		751	0.7	0.847	16.0	LOS B	16.6	117.0	1.00	1.06	35.6
All Vehicles		2033	0.6	0.847	14.0	LOS A	16.6	117.0	0.97	0.98	38.5

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 [Design Weekend | Signals - Design Life]

Balgowlah Road - Rosbery Street
2038 Weekend Peak
Design Traffic | Signals | Design Traffic
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)
Design Life Analysis (Practical Capacity): Results for 19 years

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flow total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	459	0.3	0.393	7.9	LOS A	8.2	57.3	0.56	0.49	42.7
6	R2	333	0.0	0.785	32.7	LOS C	10.3	71.9	1.00	1.04	33.2
Approach		792	0.2	0.785	18.3	LOS B	10.3	71.9	0.74	0.72	37.2
North: Roseberry Street (N)											
7	L2	388	0.8	0.446	18.6	LOS B	9.1	64.1	0.73	0.77	38.7
9	R2	293	1.1	0.676	32.7	LOS C	9.6	68.2	0.97	0.85	26.7
Approach		681	1.0	0.676	24.7	LOS B	9.6	68.2	0.83	0.81	34.0
West: Balgowlah Road (W)											
10	L2	439	0.4	0.547	14.4	LOS A	8.2	57.9	0.79	0.79	35.9
11	T1	462	0.9	0.852	30.7	LOS C	16.9	119.2	0.94	1.01	29.9
Approach		901	0.7	0.852	22.7	LOS B	16.9	119.2	0.87	0.90	32.3
All Vehicles		2374	0.6	0.852	21.8	LOS B	16.9	119.2	0.82	0.81	34.5

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.
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	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P2	East Full Crossing	73	27.5	LOS C	0.1	0.1	0.89	0.89
P3	North Full Crossing	73	22.5	LOS C	0.1	0.1	0.80	0.80
All Pedestrians		145	25.0	LOS C			0.85	0.85

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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MOVEMENT SUMMARY

Site: 101 [2038 Design AM]

Kenneth Road - Rosbery Street
2038 AM Peak
Design Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	200	3.7	0.647	10.8	LOS A	6.6	48.0	0.90	1.01	36.9
2	T1	94	1.4	0.647	10.7	LOS A	6.6	48.0	0.90	1.01	38.5
3	R2	189	5.5	0.647	14.0	LOS A	6.6	48.0	0.90	1.01	39.1
3u	U	5	0.0	0.647	15.2	LOS B	6.6	48.0	0.90	1.01	44.3
Approach		488	3.9	0.647	12.1	LOS A	6.6	48.0	0.90	1.01	38.2
East: Kenneth Road (E)											
4	L2	233	0.0	0.820	16.1	LOS B	13.3	95.6	1.00	1.20	35.6
5	T1	368	6.1	0.820	16.3	LOS B	13.3	95.6	1.00	1.20	28.0
6	R2	60	0.0	0.820	19.2	LOS B	13.3	95.6	1.00	1.20	29.3
6u	U	3	0.0	0.820	20.7	LOS B	13.3	95.6	1.00	1.20	32.4
Approach		664	3.4	0.820	16.5	LOS B	13.3	95.6	1.00	1.20	31.6
North: Roseberry Street (N)											
7	L2	36	3.7	0.583	12.7	LOS A	5.6	40.0	0.91	1.03	31.3
8	T1	299	0.4	0.583	12.5	LOS A	5.6	40.0	0.91	1.03	37.8
9	R2	61	8.7	0.583	16.1	LOS B	5.6	40.0	0.91	1.03	23.4
9u	U	1	0.0	0.583	17.1	LOS B	5.6	40.0	0.91	1.03	25.7
Approach		397	2.0	0.583	13.1	LOS A	5.6	40.0	0.91	1.03	35.7
West: Kenneth Road (W)											
10	L2	25	0.0	0.496	7.1	LOS A	4.0	29.4	0.77	0.76	32.7
11	T1	306	6.9	0.496	7.3	LOS A	4.0	29.4	0.77	0.76	36.4
12	R2	78	4.7	0.496	10.4	LOS A	4.0	29.4	0.77	0.76	40.9
12u	U	9	0.0	0.496	11.7	LOS A	4.0	29.4	0.77	0.76	25.5
Approach		419	5.9	0.496	8.0	LOS A	4.0	29.4	0.77	0.76	37.2
All Vehicles		1968	3.8	0.820	12.9	LOS A	13.3	95.6	0.91	1.02	35.2

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design AM - With Quirk Extension]

Kenneth Road - Rosbery Street
2038 AM Peak
Design Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	72	3.7	0.449	8.9	LOS A	3.3	24.2	0.84	0.91	38.2
2	T1	94	1.4	0.449	8.8	LOS A	3.3	24.2	0.84	0.91	40.0
3	R2	135	5.5	0.449	12.1	LOS A	3.3	24.2	0.84	0.91	40.4
3u	U	5	0.0	0.449	13.4	LOS A	3.3	24.2	0.84	0.91	45.5
Approach		305	3.7	0.449	10.4	LOS A	3.3	24.2	0.84	0.91	39.9
East: Kenneth Road (E)											
4	L2	178	0.0	0.746	10.1	LOS A	10.1	73.0	0.90	0.92	39.5
5	T1	469	6.1	0.746	10.4	LOS A	10.1	73.0	0.90	0.92	33.4
6	R2	60	0.0	0.746	13.3	LOS A	10.1	73.0	0.90	0.92	34.5
6u	U	3	0.0	0.746	14.8	LOS B	10.1	73.0	0.90	0.92	37.8
Approach		711	4.0	0.746	10.6	LOS A	10.1	73.0	0.90	0.92	35.7
North: Roseberry Street (N)											
7	L2	96	3.7	0.469	9.6	LOS A	3.7	26.5	0.83	0.88	34.0
8	T1	179	0.4	0.469	9.4	LOS A	3.7	26.5	0.83	0.88	40.1
9	R2	61	8.7	0.469	13.0	LOS A	3.7	26.5	0.83	0.88	25.6
9u	U	1	0.0	0.469	14.0	LOS A	3.7	26.5	0.83	0.88	28.0
Approach		337	2.9	0.469	10.1	LOS A	3.7	26.5	0.83	0.88	36.6
West: Kenneth Road (W)											
10	L2	25	0.0	0.460	6.3	LOS A	3.6	26.3	0.70	0.69	33.3
11	T1	316	6.9	0.460	6.6	LOS A	3.6	26.3	0.70	0.69	37.1
12	R2	68	4.7	0.460	9.8	LOS A	3.6	26.3	0.70	0.69	41.4
12u	U	9	0.0	0.460	11.0	LOS A	3.6	26.3	0.70	0.69	26.0
Approach		419	5.9	0.460	7.2	LOS A	3.6	26.3	0.70	0.69	37.7
All Vehicles		1772	4.2	0.746	9.6	LOS A	10.1	73.0	0.83	0.86	37.2

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design AM | Signals]

Kenneth Road - Rosbery Street
2038 AM Peak
Design Traffic | With Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 75 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	200	3.7	0.324	24.2	LOS B	5.5	39.4	0.78	0.76	29.6
2	T1	94	1.4	0.841	39.1	LOS C	11.7	84.5	1.00	1.01	24.0
3	R2	189	5.5	0.841	43.7	LOS D	11.7	84.5	1.00	1.01	24.8
Approach		483	3.9	0.841	34.8	LOS C	11.7	84.5	0.91	0.91	26.2
East: Kenneth Road (E)											
4	L2	233	0.0	0.764	24.5	LOS B	9.0	63.7	0.99	0.91	32.1
5	T1	368	6.1	0.764	30.7	LOS C	10.1	74.1	1.00	0.93	19.6
Approach		601	3.7	0.764	28.3	LOS B	10.1	74.1	0.99	0.92	25.2
North: Roseberry Street (N)											
7	L2	36	3.7	0.089	29.6	LOS C	1.0	7.6	0.82	0.70	21.6
8	T1	299	0.4	0.846	37.3	LOS C	14.7	104.8	1.00	1.04	25.3
9	R2	61	8.7	0.846	42.0	LOS C	14.7	104.8	1.00	1.04	14.7
Approach		396	2.0	0.846	37.3	LOS C	14.7	104.8	0.98	1.01	23.7
West: Kenneth Road (W)											
10	L2	25	0.0	0.438	25.0	LOS B	7.9	58.2	0.81	0.70	21.6
11	T1	306	6.9	0.438	21.8	LOS B	7.9	58.2	0.83	0.71	23.7
12	R2	78	4.7	0.438	33.0	LOS C	4.4	32.2	0.93	0.75	26.5
Approach		409	6.0	0.438	24.1	LOS B	7.9	58.2	0.85	0.71	24.3
All Vehicles		1889	3.9	0.846	30.9	LOS C	14.7	104.8	0.94	0.89	25.0

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 Distance ped	Prop. Queued m	Effective Stop Rate ped	Travel Speed m/sec
P1	South Full Crossing	53	30.9	LOS D	0.1	0.1	0.91	0.91
P2	East Full Crossing	53	30.0	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	21.0	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		158	27.3	LOS C			0.85	0.85

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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MOVEMENT SUMMARY

Site: 101v [2038 Design AM | Signals - With Quirk Ext]

Kenneth Road - Rosbery Street
2038 AM Peak
Design Traffic | With Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 65 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	72	3.7	0.119	20.7	LOS B	1.6	11.4	0.72	0.71	31.4
2	T1	94	1.4	0.818	34.7	LOS C	8.1	58.8	1.00	1.00	25.5
3	R2	135	5.5	0.818	39.3	LOS C	8.1	58.8	1.00	1.00	26.2
Approach		300	3.8	0.818	33.5	LOS C	8.1	58.8	0.93	0.93	26.9
East: Kenneth Road (E)											
4	L2	178	0.0	0.761	27.7	LOS B	9.4	67.8	0.98	0.96	31.0
5	T1	469	6.1	0.761	27.2	LOS B	10.0	73.7	0.99	0.95	21.0
Approach		647	4.4	0.761	27.3	LOS B	10.0	73.7	0.99	0.95	24.5
North: Roseberry Street (N)											
7	L2	96	3.7	0.318	31.3	LOS C	2.8	20.2	0.92	0.76	20.9
8	T1	179	0.4	0.762	31.7	LOS C	8.1	58.0	1.00	0.94	27.1
9	R2	61	8.7	0.762	36.3	LOS C	8.1	58.0	1.00	0.94	16.3
Approach		336	2.9	0.762	32.4	LOS C	8.1	58.0	0.98	0.89	24.0
West: Kenneth Road (W)											
10	L2	25	0.0	0.363	19.3	LOS B	6.0	44.0	0.74	0.64	25.3
11	T1	316	6.9	0.363	16.1	LOS B	6.0	44.0	0.77	0.66	27.2
12	R2	68	4.7	0.363	25.1	LOS B	3.8	27.9	0.88	0.72	30.1
Approach		409	6.1	0.363	17.8	LOS B	6.0	44.0	0.79	0.67	27.8
All Vehicles		1693	4.4	0.818	27.1	LOS B	10.0	73.7	0.93	0.87	25.6

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 Distance ped	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	25.9	LOS C	0.1	0.89	0.89
P2	East Full Crossing	53	26.8	LOS C	0.1	0.91	0.91
P3	North Full Crossing	53	16.3	LOS B	0.1	0.71	0.71
All Pedestrians		158	23.0	LOS C		0.84	0.84

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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MOVEMENT SUMMARY

Site: 101 [2038 Design PM]

Kenneth Road - Rosbery Street
2038 PM Peak
Design Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	283	2.0	0.798	14.0	LOS A	11.8	83.2	1.00	1.13	34.7
2	T1	111	0.0	0.798	13.8	LOS A	11.8	83.2	1.00	1.13	36.3
3	R2	269	1.1	0.798	17.0	LOS B	11.8	83.2	1.00	1.13	37.0
3u	U	1	0.0	0.798	18.5	LOS B	11.8	83.2	1.00	1.13	42.3
Approach		664	1.3	0.798	15.2	LOS B	11.8	83.2	1.00	1.13	36.0
East: Kenneth Road (E)											
4	L2	442	0.0	1.131	143.4	LOS F	87.4	615.1	1.00	4.03	11.4
5	T1	362	1.5	1.131	143.4	LOS F	87.4	615.1	1.00	4.03	6.3
6	R2	59	0.0	1.131	146.5	LOS F	87.4	615.1	1.00	4.03	6.9
6u	U	3	0.0	1.131	148.0	LOS F	87.4	615.1	1.00	4.03	8.0
Approach		866	0.6	1.131	143.6	LOS F	87.4	615.1	1.00	4.03	9.1
North: Roseberry Street (N)											
7	L2	40	3.3	1.001	87.4	LOS F	30.0	211.3	1.00	2.27	10.5
8	T1	374	0.7	1.001	87.2	LOS F	30.0	211.3	1.00	2.27	15.6
9	R2	36	0.0	1.001	90.3	LOS F	30.0	211.3	1.00	2.27	7.8
9u	U	4	0.0	1.001	91.8	LOS F	30.0	211.3	1.00	2.27	8.8
Approach		454	0.9	1.001	87.5	LOS F	30.0	211.3	1.00	2.27	14.6
West: Kenneth Road (W)											
10	L2	69	1.9	0.867	20.8	LOS B	17.4	124.3	1.00	1.30	21.7
11	T1	505	3.1	0.867	20.9	LOS B	17.4	124.3	1.00	1.30	25.0
12	R2	72	0.0	0.867	23.9	LOS B	17.4	124.3	1.00	1.30	31.7
12u	U	40	0.0	0.867	25.4	LOS B	17.4	124.3	1.00	1.30	18.9
Approach		686	2.5	0.867	21.5	LOS B	17.4	124.3	1.00	1.30	25.3
All Vehicles		2671	1.3	1.131	70.8	LOS F	87.4	615.1	1.00	2.31	15.5

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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design PM - With Quirk Extension]

Kenneth Road - Rosbery Street
2038 PM Peak
Design Traffic | With Quirk Road Extension
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	154	2.0	0.689	13.1	LOS A	7.6	53.9	0.96	1.11	35.2
2	T1	111	0.0	0.689	13.0	LOS A	7.6	53.9	0.96	1.11	36.8
3	R2	215	1.1	0.689	16.2	LOS B	7.6	53.9	0.96	1.11	37.5
3u	U	1	0.0	0.689	17.6	LOS B	7.6	53.9	0.96	1.11	42.7
Approach		480	1.1	0.689	14.4	LOS A	7.6	53.9	0.96	1.11	36.7
East: Kenneth Road (E)											
4	L2	387	0.0	1.012	52.5	LOS D	46.7	329.1	1.00	2.16	22.2
5	T1	463	1.5	1.012	52.6	LOS D	46.7	329.1	1.00	2.16	14.1
6	R2	59	0.0	1.012	55.6	LOS D	46.7	329.1	1.00	2.16	15.3
6u	U	3	0.0	1.012	57.1	LOS E	46.7	329.1	1.00	2.16	17.4
Approach		913	0.7	1.012	52.8	LOS D	46.7	329.1	1.00	2.16	18.2
North: Roseberry Street (N)											
7	L2	99	3.3	0.819	33.1	LOS C	12.1	85.8	1.00	1.43	20.3
8	T1	254	0.7	0.819	33.0	LOS C	12.1	85.8	1.00	1.43	27.2
9	R2	36	0.0	0.819	36.0	LOS C	12.1	85.8	1.00	1.43	15.5
9u	U	4	0.0	0.819	37.5	LOS C	12.1	85.8	1.00	1.43	17.3
Approach		393	1.3	0.819	33.3	LOS C	12.1	85.8	1.00	1.43	24.7
West: Kenneth Road (W)											
10	L2	69	1.9	0.810	15.1	LOS B	13.6	97.3	1.00	1.12	25.4
11	T1	515	3.1	0.810	15.2	LOS B	13.6	97.3	1.00	1.12	29.0
12	R2	62	0.0	0.810	18.2	LOS B	13.6	97.3	1.00	1.12	35.1
12u	U	40	0.0	0.810	19.7	LOS B	13.6	97.3	1.00	1.12	22.2
Approach		686	2.5	0.810	15.8	LOS B	13.6	97.3	1.00	1.12	29.1
All Vehicles		2472	1.4	1.012	32.0	LOS C	46.7	329.1	0.99	1.55	24.3

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design PM | Signals]

Kenneth Road - Rosbery Street
2038 PM Peak
Design Traffic | With Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 95 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	283	2.0	0.439	29.7	LOS C	10.0	71.5	0.81	0.79	27.2
2	T1	111	0.0	0.890	50.4	LOS D	20.5	144.7	1.00	1.03	21.0
3	R2	269	1.1	0.890	55.0	LOS D	20.5	144.7	1.00	1.03	21.9
Approach		663	1.3	0.890	43.4	LOS D	20.5	144.7	0.92	0.93	23.5
East: Kenneth Road (E)											
4	L2	442	0.0	0.840	30.7	LOS C	18.6	130.6	1.00	0.95	29.1
5	T1	399	1.5	0.840	42.7	LOS D	18.6	130.6	1.00	1.00	16.0
Approach		841	0.7	0.840	36.4	LOS C	18.6	130.6	1.00	0.97	23.3
North: Roseberry Street (N)											
7	L2	40	3.3	0.093	34.8	LOS C	1.4	10.4	0.81	0.71	19.7
8	T1	374	0.7	0.889	49.3	LOS D	22.0	154.6	1.00	1.09	21.9
9	R2	36	0.0	0.889	53.9	LOS D	22.0	154.6	1.00	1.09	12.3
Approach		449	0.9	0.889	48.4	LOS D	22.0	154.6	0.98	1.08	21.2
West: Kenneth Road (W)											
10	L2	69	1.9	0.722	34.7	LOS C	18.6	133.8	0.93	0.83	17.1
11	T1	540	3.1	0.722	33.6	LOS C	18.6	133.8	0.95	0.87	18.5
12	R2	72	0.0	0.722	46.9	LOS D	10.2	73.0	0.99	0.97	22.4
Approach		681	2.6	0.722	35.1	LOS C	18.6	133.8	0.95	0.88	19.0
All Vehicles		2635	1.4	0.890	39.9	LOS C	22.0	154.6	0.98	0.95	22.1

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 Distance ped	Prop. Queued m	Effective Stop Rate per ped	Travel Speed m/sec
P1	South Full Crossing	53	35.5	LOS D	0.1	0.1	0.87	0.87
P2	East Full Crossing	53	34.6	LOS D	0.1	0.1	0.85	0.85
P3	North Full Crossing	53	25.8	LOS C	0.1	0.1	0.74	0.74
All Pedestrians		158	32.0	LOS D			0.82	0.82

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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MOVEMENT SUMMARY

Site: 101v [2038 Design PM | Signals - With Quirk Ext]

Kenneth Road - Rosbery Street
2038 PM Peak
Design Traffic | With Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	154	2.0	0.244	24.6	LOS B	4.3	30.6	0.75	0.75	29.5
2	T1	111	0.0	0.880	44.1	LOS D	14.9	105.0	1.00	1.06	22.6
3	R2	215	1.1	0.880	48.7	LOS D	14.9	105.0	1.00	1.06	23.4
Approach		479	1.1	0.880	39.9	LOS C	14.9	105.0	0.92	0.96	24.7
East: Kenneth Road (E)											
4	L2	387	0.0	0.823	26.4	LOS B	14.8	103.9	0.98	0.95	31.0
5	T1	500	1.5	0.823	33.2	LOS C	16.3	115.8	1.00	0.99	18.7
Approach		887	0.8	0.823	30.2	LOS C	16.3	115.8	0.99	0.97	24.8
North: Roseberry Street (N)											
7	L2	99	3.3	0.317	36.7	LOS C	3.5	25.1	0.92	0.76	19.1
8	T1	254	0.7	0.871	44.1	LOS D	13.1	91.9	1.00	1.07	23.3
9	R2	36	0.0	0.871	48.6	LOS D	13.1	91.9	1.00	1.07	13.3
Approach		388	1.3	0.871	42.6	LOS D	13.1	91.9	0.98	0.99	21.7
West: Kenneth Road (W)											
10	L2	69	1.9	0.579	24.7	LOS B	13.2	94.4	0.83	0.74	21.6
11	T1	552	3.1	0.579	22.7	LOS B	13.2	94.4	0.86	0.75	23.1
12	R2	62	0.0	0.579	32.3	LOS C	8.8	63.0	0.92	0.76	27.4
Approach		683	2.7	0.579	23.8	LOS B	13.2	94.4	0.86	0.75	23.6
All Vehicles		2438	1.5	0.880	32.3	LOS C	16.3	115.8	0.94	0.91	23.9

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 Distance ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	28.1	LOS C	0.1	0.1	0.84	0.84
P2	East Full Crossing	53	34.3	LOS D	0.1	0.1	0.93	0.93
P3	North Full Crossing	53	18.9	LOS B	0.1	0.1	0.69	0.69
All Pedestrians		158	27.1	LOS C			0.82	0.82

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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MOVEMENT SUMMARY

Site: 101 [2038 Design Weekend]

Kenneth Road - Rosbery Street
2038 Weekend Peak
Design Traffic | With Quirk Road Extension
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	364	2.3	0.973	40.2	LOS C	30.6	217.0	1.00	1.89	23.2
2	T1	126	1.0	0.973	40.0	LOS C	30.6	217.0	1.00	1.89	24.5
3	R2	256	0.0	0.973	43.1	LOS D	30.6	217.0	1.00	1.89	25.6
3u	U	11	12.5	0.973	45.4	LOS D	30.6	217.0	1.00	1.89	30.6
Approach		757	1.5	0.973	41.2	LOS C	30.6	217.0	1.00	1.89	24.4
East: Kenneth Road (E)											
4	L2	347	0.4	1.243	239.9	LOS F	125.7	890.5	1.00	5.48	7.5
5	T1	473	2.2	1.243	240.0	LOS F	125.7	890.5	1.00	5.48	3.9
6	R2	38	0.0	1.243	243.0	LOS F	125.7	890.5	1.00	5.48	4.4
6u	U	1	0.0	1.243	244.5	LOS F	125.7	890.5	1.00	5.48	5.1
Approach		859	1.4	1.243	240.1	LOS F	125.7	890.5	1.00	5.48	5.5
North: Roseberry Street (N)											
7	L2	36	3.7	1.025	92.8	LOS F	36.5	257.5	1.00	2.51	10.0
8	T1	408	0.6	1.025	92.5	LOS F	36.5	257.5	1.00	2.51	14.9
9	R2	72	1.9	1.025	95.8	LOS F	36.5	257.5	1.00	2.51	7.4
9u	U	1	0.0	1.025	97.1	LOS F	36.5	257.5	1.00	2.51	8.4
Approach		517	1.0	1.025	93.0	LOS F	36.5	257.5	1.00	2.51	13.6
West: Kenneth Road (W)											
10	L2	29	4.5	0.736	13.1	LOS A	10.0	71.0	0.99	1.06	26.8
11	T1	439	1.6	0.736	13.0	LOS A	10.0	71.0	0.99	1.06	30.7
12	R2	78	2.6	0.736	16.2	LOS B	10.0	71.0	0.99	1.06	36.5
12u	U	40	0.0	0.736	17.6	LOS B	10.0	71.0	0.99	1.06	21.5
Approach		586	1.8	0.736	13.7	LOS A	10.0	71.0	0.99	1.06	31.0
All Vehicles		2719	1.4	1.243	108.0	LOS F	125.7	890.5	1.00	2.96	11.4

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design Weekend - With Quirk Extension]

Kenneth Road - Rosbery Street
2038 Weekend Peak
Design Traffic
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	236	2.3	0.883	27.1	LOS B	16.1	114.3	1.00	1.48	27.9
2	T1	126	1.0	0.883	26.9	LOS B	16.1	114.3	1.00	1.48	29.3
3	R2	200	0.0	0.883	30.0	LOS C	16.1	114.3	1.00	1.48	30.3
3u	U	11	12.5	0.883	32.3	LOS C	16.1	114.3	1.00	1.48	35.4
Approach		573	1.4	0.883	28.2	LOS B	16.1	114.3	1.00	1.48	29.2
East: Kenneth Road (E)											
4	L2	293	0.4	1.118	131.0	LOS F	85.7	607.8	1.00	3.86	12.2
5	T1	574	2.2	1.118	131.1	LOS F	85.7	607.8	1.00	3.86	6.8
6	R2	38	0.0	1.118	134.1	LOS F	85.7	607.8	1.00	3.86	7.5
6u	U	1	0.0	1.118	135.6	LOS F	85.7	607.8	1.00	3.86	8.7
Approach		905	1.5	1.118	131.2	LOS F	85.7	607.8	1.00	3.86	8.8
North: Roseberry Street (N)											
7	L2	96	3.7	0.845	32.5	LOS C	14.0	99.1	1.00	1.48	20.5
8	T1	288	0.6	0.845	32.3	LOS C	14.0	99.1	1.00	1.48	27.4
9	R2	72	1.9	0.845	35.5	LOS C	14.0	99.1	1.00	1.48	15.7
9u	U	1	0.0	0.845	36.9	LOS C	14.0	99.1	1.00	1.48	17.5
Approach		457	1.5	0.845	32.8	LOS C	14.0	99.1	1.00	1.48	24.6
West: Kenneth Road (W)											
10	L2	29	4.5	0.687	10.6	LOS A	8.4	59.9	0.92	0.94	29.1
11	T1	448	1.6	0.687	10.5	LOS A	8.4	59.9	0.92	0.94	33.2
12	R2	68	2.6	0.687	13.7	LOS A	8.4	59.9	0.92	0.94	38.5
12u	U	40	0.0	0.687	15.1	LOS B	8.4	59.9	0.92	0.94	23.2
Approach		586	1.7	0.687	11.2	LOS A	8.4	59.9	0.92	0.94	33.2
All Vehicles		2521	1.6	1.118	62.1	LOS E	85.7	607.8	0.98	2.21	16.3

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.
Roundabout Capacity Model: SIDRA Standard.
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 [2038 Design Weekend | Signals]

Kenneth Road - Rosbery Street
2038 Weekend Peak
Design Traffic | With Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 115 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	364	2.3	0.613	39.4	LOS C	17.2	122.7	0.90	0.83	25.8
2	T1	126	1.0	0.912	63.0	LOS E	25.3	177.8	1.00	1.04	18.5
3	R2	256	0.0	0.912	67.5	LOS E	25.3	177.8	1.00	1.04	19.4
Approach		746	1.3	0.912	53.0	LOS D	25.3	177.8	0.95	0.94	21.0
East: Kenneth Road (E)											
4	L2	347	0.4	0.873	42.6	LOS D	22.9	161.6	1.00	0.97	25.2
5	T1	500	2.2	0.873	51.6	LOS D	23.9	170.7	1.00	1.02	14.0
Approach		847	1.5	0.873	47.9	LOS D	23.9	170.7	1.00	1.00	19.0
North: Roseberry Street (N)											
7	L2	36	3.7	0.072	37.2	LOS C	1.5	10.6	0.77	0.70	18.9
8	T1	405	0.6	0.910	58.9	LOS E	31.5	221.9	1.00	1.08	19.7
9	R2	72	1.9	0.910	63.4	LOS E	31.5	221.9	1.00	1.08	10.7
Approach		516	1.0	0.910	58.0	LOS E	31.5	221.9	0.98	1.05	18.7
West: Kenneth Road (W)											
10	L2	29	4.5	0.673	39.4	LOS C	20.6	146.6	0.91	0.80	15.6
11	T1	466	1.6	0.673	37.6	LOS C	20.6	146.6	0.92	0.82	17.4
12	R2	78	2.6	0.673	59.1	LOS E	8.0	56.9	1.00	0.93	19.2
Approach		574	1.9	0.673	40.6	LOS C	20.6	146.6	0.93	0.83	17.7
All Vehicles		2683	1.4	0.912	49.7	LOS D	31.5	221.9	0.97	0.96	19.3

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 Distance ped	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	39.3	LOS D	0.1	0.1	0.83	0.83
P2	East Full Crossing	53	36.9	LOS D	0.1	0.1	0.80	0.80
P3	North Full Crossing	53	30.9	LOS D	0.1	0.1	0.72	0.72
All Pedestrians		158	35.4	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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MOVEMENT SUMMARY

Site: 101v [2038 Design Weekend | Signals - With Quirk Ext]

Kenneth Road - Rosbery Street
2038 Weekend Peak
Design Traffic | With Quirk Road Extension
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% back of Queue Vehicles veh	95% back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	236	2.3	0.393	29.5	LOS C	8.0	57.1	0.81	0.78	27.3
2	T1	126	1.0	0.878	48.3	LOS D	16.5	116.1	1.00	1.04	21.6
3	R2	200	0.0	0.878	52.9	LOS D	16.5	116.1	1.00	1.04	22.5
Approach		562	1.2	0.878	42.1	LOS C	16.5	116.1	0.92	0.93	23.9
East: Kenneth Road (E)											
4	L2	293	0.4	0.885	43.3	LOS D	21.4	151.3	1.00	1.06	25.2
5	T1	609	2.2	0.885	43.9	LOS D	21.7	155.0	1.00	1.08	15.6
Approach		902	1.6	0.885	43.7	LOS D	21.7	155.0	1.00	1.08	19.3
North: Roseberry Street (N)											
7	L2	96	3.7	0.255	37.1	LOS C	3.6	25.8	0.87	0.76	18.9
8	T1	288	0.6	0.903	51.1	LOS D	19.0	133.8	1.00	1.13	21.4
9	R2	72	1.9	0.903	55.7	LOS D	19.0	133.8	1.00	1.13	11.8
Approach		456	1.5	0.903	48.9	LOS D	19.0	133.8	0.97	1.05	19.7
West: Kenneth Road (W)											
10	L2	29	4.5	0.555	27.6	LOS B	13.9	99.1	0.83	0.73	20.1
11	T1	474	1.6	0.555	25.8	LOS B	13.9	99.1	0.88	0.74	21.7
12	R2	68	2.6	0.555	41.5	LOS C	6.8	48.5	0.96	0.81	23.8
Approach		572	1.9	0.555	27.8	LOS B	13.9	99.1	0.87	0.75	22.0
All Vehicles		2492	1.6	0.903	40.6	LOS C	21.7	155.0	0.95	0.96	21.0

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 Distance ped	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	53	30.5	LOS D	0.1	0.1	0.82	0.82
P2	East Full Crossing	53	35.6	LOS D	0.1	0.1	0.89	0.89
P3	North Full Crossing	53	21.4	LOS C	0.1	0.1	0.69	0.69
All Pedestrians		158	29.2	LOS C			0.80	0.80

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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MOVEMENT SUMMARY

Site: 101 [Design AM - Design Life]

Kenneth Road - Rosbery Street
2018 AM Peak
Design Traffic - Design Life Assessment
Roundabout
Design Life Analysis (Capacity): Results for 20 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	205	3.7	0.669	11.5	LOS A	7.2	51.8	0.92	1.04	36.4
2	T1	93	1.4	0.669	11.3	LOS A	7.2	51.8	0.92	1.04	38.0
3	R2	195	5.5	0.669	14.7	LOS B	7.2	51.8	0.92	1.04	38.6
3u	U	5	0.0	0.669	15.9	LOS B	7.2	51.8	0.92	1.04	43.9
Approach		499	3.9	0.669	12.7	LOS A	7.2	51.8	0.92	1.04	37.7
East: Kenneth Road (E)											
4	L2	238	0.0	0.843	17.7	LOS B	14.8	106.3	1.00	1.25	34.6
5	T1	368	6.1	0.843	18.0	LOS B	14.8	106.3	1.00	1.25	26.8
6	R2	72	0.0	0.843	20.8	LOS B	14.8	106.3	1.00	1.25	28.1
6u	U	3	0.0	0.843	22.3	LOS B	14.8	106.3	1.00	1.25	31.2
Approach		682	3.3	0.843	18.2	LOS B	14.8	106.3	1.00	1.25	30.5
North: Roseberry Street (N)											
7	L2	36	3.7	0.589	13.0	LOS A	5.7	40.9	0.92	1.04	31.1
8	T1	299	0.4	0.589	12.8	LOS A	5.7	40.9	0.92	1.04	37.6
9	R2	61	8.7	0.589	16.5	LOS B	5.7	40.9	0.92	1.04	23.2
9u	U	1	0.0	0.589	17.5	LOS B	5.7	40.9	0.92	1.04	25.4
Approach		396	2.0	0.589	13.4	LOS A	5.7	40.9	0.92	1.04	35.4
West: Kenneth Road (W)											
10	L2	25	0.0	0.511	7.5	LOS A	4.3	31.4	0.78	0.79	32.4
11	T1	307	6.9	0.511	7.8	LOS A	4.3	31.4	0.78	0.79	36.1
12	R2	83	4.7	0.511	10.9	LOS A	4.3	31.4	0.78	0.79	40.7
12u	U	9	0.0	0.511	12.2	LOS A	4.3	31.4	0.78	0.79	25.3
Approach		424	5.9	0.511	8.5	LOS A	4.3	31.4	0.78	0.79	37.0
All Vehicles		2000	3.7	0.843	13.8	LOS A	14.8	106.3	0.92	1.06	34.6

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.
Roundabout Capacity Model: SIDRA Standard.
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 [Design AM | Signals - Design Life]

Kenneth Road - Rosbery Street
AM Peak
Design Traffic | Design Life
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Practical Cycle Time)
Design Life Analysis (Capacity): Results for 20 years

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	205	3.7	0.329	25.3	LOS B	5.9	42.9	0.78	0.77	29.1
2	T1	93	1.4	0.799	38.0	LOS C	12.0	86.9	1.00	0.95	24.3
3	R2	195	5.5	0.799	42.6	LOS D[11]	12.0	86.9	1.00	0.95	25.1
Approach		493	4.0	0.799	34.5	LOS C	12.0	86.9	0.91	0.87	26.3
East: Kenneth Road (E)											
4	L2	238	0.0	0.768	25.7	LOS B	9.7	69.1	0.99	0.90	31.5
5	T1	368	6.1	0.768	32.7	LOS C	10.8	79.6	1.00	0.93	18.9
Approach		607	3.7	0.768	30.0	LOS C	10.8	79.6	0.99	0.92	24.5
North: Roseberry Street (N)											
7	L2	36	3.7	0.084	30.4	LOS C	1.1	7.9	0.81	0.70	21.3
8	T1	299	0.4	0.805	35.9	LOS C	14.8	104.9	1.00	0.98	25.7
9	R2	61	8.7	0.805	40.6	LOS C	14.8	104.9	1.00	0.98	15.1
Approach		395	2.0	0.805	36.2	LOS C	14.8	104.9	0.96	0.95	24.2
West: Kenneth Road (W)											
10	L2	25	0.0	0.462	27.0	LOS B	8.8	64.8	0.83	0.71	20.5
11	T1	307	6.9	0.462	23.7	LOS B	8.8	64.8	0.85	0.72	22.7
12	R2	83	4.7	0.462	35.4	LOS C	4.7	34.2	0.95	0.77	25.5
Approach		414	6.0	0.462	26.2	LOS B	8.8	64.8	0.87	0.73	23.4
All Vehicles		1909	3.9	0.805	31.6	LOS C	14.8	104.9	0.94	0.87	24.8

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.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Distance [ped] ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	74	32.5	LOS D	0.2	0.2	0.90	0.90
P2	East Full Crossing	74	30.7	LOS D	0.1	0.1	0.88	0.88
P3	North Full Crossing	74	22.6	LOS C	0.1	0.1	0.75	0.75
All Pedestrians		221	28.6	LOS C			0.84	0.84

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: 101 [Design PM - Design Life]

Kenneth Road - Rosbery Street
2018 PM Peak
Design Traffic - Design Life Assessment
Roundabout
Design Life Analysis (Capacity): Results for 11 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	262	2.0	0.751	12.5	LOS A	9.7	68.9	0.96	1.07	35.7
2	T1	101	0.0	0.751	12.3	LOS A	9.7	68.9	0.96	1.07	37.3
3	R2	250	1.1	0.751	15.5	LOS B	9.7	68.9	0.96	1.07	36.0
3u	U	1	0.0	0.751	17.0	LOS B	9.7	68.9	0.96	1.07	43.2
Approach		614	1.3	0.751	13.7	LOS A	9.7	68.9	0.96	1.07	36.9
East: Kenneth Road (E)											
4	L2	407	0.0	0.995	49.2	LOS D [1]	37.7	265.3	1.00	2.09	23.0
5	T1	329	1.5	0.995	49.3	LOS D [1]	37.7	265.3	1.00	2.09	14.8
6	R2	54	0.0	0.995	52.3	LOS D [1]	37.7	265.3	1.00	2.09	15.9
6u	U	2	0.0	0.995	53.8	LOS D [1]	37.7	265.3	1.00	2.09	18.1
Approach		793	0.6	0.995	49.5	LOS D [1]	37.7	265.3	1.00	2.09	19.7
North: Roseberry Street (N)											
7	L2	36	3.3	0.842	36.0	LOS C	13.4	94.8	1.00	1.49	19.4
8	T1	340	0.7	0.842	35.9	LOS C	13.4	94.8	1.00	1.49	26.2
9	R2	32	0.0	0.842	38.9	LOS C	13.4	94.8	1.00	1.49	14.8
9u	U	4	0.0	0.842	40.4	LOS C	13.4	94.8	1.00	1.49	16.5
Approach		412	0.9	0.842	36.1	LOS C	13.4	94.8	1.00	1.49	24.9
West: Kenneth Road (W)											
10	L2	63	1.9	0.786	14.6	LOS B	12.2	87.0	1.00	1.11	25.7
11	T1	468	3.1	0.786	14.7	LOS B	12.2	87.0	1.00	1.11	29.4
12	R2	69	0.0	0.786	17.6	LOS B	12.2	87.0	1.00	1.11	35.5
12u	U	44	0.0	0.786	19.2	LOS B	12.2	87.0	1.00	1.11	22.5
Approach		645	2.4	0.786	15.3	LOS B	12.2	87.0	1.00	1.11	29.6
All Vehicles		2464	1.3	0.995	29.4	LOS C	37.7	265.3	0.99	1.48	26.0

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.
Roundabout Capacity Model: SIDRA Standard.
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.

[1] Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

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MOVEMENT SUMMARY

Site: 101v [Design PM | Signals - Design Life]

Kenneth Road - Rosbery Street
PM Peak
Design Traffic | Design Life
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Practical Cycle Time)
Design Life Analysis (Capacity): Results for 15 years

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	274	2.0	0.427	28.4	LOS B	9.2	65.4	0.81	0.79	27.7
2	T1	105	0.0	0.894	49.4	LOS D [11]	19.0	134.2	1.00	1.05	21.2
3	R2	261	1.1	0.894	54.0	LOS D [11]	19.0	134.2	1.00	1.05	22.1
Approach		640	1.3	0.894	42.3	LOS C	19.0	134.2	0.92	0.94	23.8
East: Kenneth Road (E)											
4	L2	425	0.0	0.809	26.5	LOS B	15.7	109.8	0.97	0.92	30.8
5	T1	385	1.5	0.809	38.5	LOS C	15.7	109.8	1.00	0.96	17.1
Approach		810	0.7	0.809	32.2	LOS C	15.7	109.8	0.98	0.94	24.8
North: Roseberry Street (N)											
7	L2	38	3.3	0.090	33.9	LOS C	1.3	9.4	0.82	0.71	20.0
8	T1	355	0.7	0.875	46.0	LOS D [11]	19.5	137.0	1.00	1.07	22.8
9	R2	34	0.0	0.875	50.6	LOS D [11]	19.5	137.0	1.00	1.07	12.9
Approach		426	0.9	0.875	45.3	LOS D [11]	19.5	137.0	0.98	1.04	22.0
West: Kenneth Road (W)											
10	L2	66	1.9	0.683	31.8	LOS C	16.5	118.7	0.91	0.80	18.2
11	T1	530	3.1	0.683	30.4	LOS C	16.5	118.7	0.93	0.84	19.7
12	R2	73	0.0	0.683	42.6	LOS D [11]	9.6	66.5	0.98	0.92	23.6
Approach		669	2.6	0.683	31.9	LOS C	16.5	118.7	0.93	0.84	20.2
All Vehicles		2545	1.4	0.894	36.9	LOS C	19.5	137.0	0.95	0.93	23.0

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.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Distance [Ped ped]	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	68	33.9	LOS D	0.2	0.2	0.87	0.87
P2	East Full Crossing	68	33.9	LOS D	0.2	0.2	0.87	0.87
P3	North Full Crossing	68	24.3	LOS C	0.1	0.1	0.74	0.74
All Pedestrians		205	30.7	LOS D			0.82	0.82

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: 101 [Design Weekend - Design Life]

Kenneth Road - Rosbery Street
2018 Weekend Peak
Design Traffic - Design Life
Roundabout
Design Life Analysis (Capacity): Results for 3 years

Movement Performance - Vehicles

Mov ID	O/D Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	308	2.3	0.840	18.3	LOS B	13.7	97.3	1.00	1.28	32.2
2	T1	105	1.0	0.840	18.2	LOS B	13.7	97.3	1.00	1.28	33.7
3	R2	217	0.0	0.840	21.2	LOS B	13.7	97.3	1.00	1.28	34.6
3u	U	9	12.5	0.840	23.4	LOS B	13.7	97.3	1.00	1.28	39.5
Approach		639	1.5	0.840	19.3	LOS B	13.7	97.3	1.00	1.28	33.4
East: Kenneth Road (E)											
4	L2	294	0.4	0.949	34.7	LOS C	26.4	186.7	1.00	1.72	27.3
5	T1	392	2.2	0.949	34.8	LOS C	26.4	186.7	1.00	1.72	16.7
6	R2	37	0.0	0.949	37.8	LOS C	26.4	186.7	1.00	1.72	20.0
6u	U	1	0.0	0.949	39.3	LOS C	26.4	186.7	1.00	1.72	22.5
Approach		724	1.4	0.949	34.9	LOS C	26.4	186.7	1.00	1.72	23.0
North: Roseberry Street (N)											
7	L2	29	3.7	0.710	19.2	LOS B	8.6	60.6	1.00	1.24	26.8
8	T1	339	0.6	0.710	19.0	LOS B	8.6	60.6	1.00	1.24	33.7
9	R2	59	1.9	0.710	22.2	LOS B	8.6	60.6	1.00	1.24	20.9
9u	U	1	0.0	0.710	23.6	LOS B	8.6	60.6	1.00	1.24	23.0
Approach		428	1.0	0.710	19.5	LOS B	8.6	60.6	1.00	1.24	32.0
West: Kenneth Road (W)											
10	L2	24	4.5	0.592	8.8	LOS A	5.9	42.1	0.85	0.85	31.0
11	T1	370	1.6	0.592	8.7	LOS A	5.9	42.1	0.85	0.85	35.1
12	R2	70	2.6	0.592	11.8	LOS A	5.9	42.1	0.85	0.85	39.9
12u	U	38	0.0	0.592	13.3	LOS A	5.9	42.1	0.85	0.85	24.6
Approach		502	1.8	0.592	9.5	LOS A	5.9	42.1	0.85	0.85	35.2
All Vehicles		2293	1.4	0.949	22.1	LOS B	26.4	186.7	0.97	1.32	29.4

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.
Roundabout Capacity Model: SIDRA Standard.
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 [Design Weekend | Signals - Design Life]

Kenneth Road - Rosbery Street
Weekend Peak
Design Traffic | Design Life
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Practical Cycle Time)
Design Life Analysis (Capacity): Results for 11 years

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Roseberry Street (S)											
1	L2	338	2.3	0.524	37.2	LOS C	15.6	111.2	0.84	0.81	24.5
2	T1	115	1.0	0.738	45.2	LOS D[11]	19.4	136.4	0.98	0.87	22.2
3	R2	238	0.0	0.738	49.8	LOS D[11]	19.4	136.4	0.98	0.87	23.1
Approach		691	1.3	0.738	42.9	LOS D[11]	19.4	136.4	0.91	0.84	23.6
East: Kenneth Road (E)											
4	L2	322	0.4	0.837	40.2	LOS C	20.7	145.7	1.00	0.93	25.9
5	T1	459	2.2	0.837	50.2	LOS D[11]	21.9	155.9	1.00	0.97	14.3
Approach		781	1.5	0.837	46.1	LOS D[11]	21.9	155.9	1.00	0.96	19.5
North: Roseberry Street (N)											
7	L2	32	3.7	0.068	39.7	LOS C	1.4	10.1	0.78	0.70	18.2
8	T1	371	0.6	0.863	53.6	LOS D[11]	27.2	192.0	1.00	1.00	20.9
9	R2	65	1.9	0.863	58.1	LOS E[11]	27.2	192.0	1.00	1.00	11.5
Approach		468	1.0	0.863	53.2	LOS D[11]	27.2	192.0	0.98	0.98	19.7
West: Kenneth Road (W)											
10	L2	26	4.5	0.654	41.8	LOS C	20.0	142.5	0.91	0.80	14.9
11	T1	435	1.6	0.654	39.7	LOS C	20.0	142.5	0.92	0.81	16.8
12	R2	77	2.6	0.654	60.4	LOS E[11]	7.9	56.5	1.00	0.91	18.9
Approach		538	1.9	0.654	42.8	LOS D[11]	20.0	142.5	0.93	0.83	17.1
All Vehicles		2477	1.4	0.863	45.8	LOS D[11]	27.2	192.0	0.96	0.90	20.3

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.

11 Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Distance[12] m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	64	41.8	LOS E[12]	0.2	0.84	0.84
P2	East Full Crossing	64	39.3	LOS D	0.2	0.81	0.81
P3	North Full Crossing	64	32.4	LOS D	0.2	0.74	0.74
All Pedestrians		193	37.8	LOS D		0.79	0.79

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.

12 Level of Service is worse than the Pedestrian Level of Service Target specified in the Parameter Settings dialog.

MOVEMENT SUMMARY

Site: [2038 PM Peak]

Kenneth Road / Quirk Road (North)
Year 2038 PM Peak
Design Traffic Volumes | With Quirk Road Extension
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Quirk Road (S)											
1	L2	122	2.0	0.495	14.8	LOS B	4.1	29.0	0.97	1.07	36.1
2	T1	34	2.0	0.495	14.6	LOS B	4.1	29.0	0.97	1.07	36.1
3	R2	69	2.0	0.495	17.7	LOS B	4.1	29.0	0.97	1.07	40.3
Approach		225	2.0	0.495	15.7	LOS B	4.1	29.0	0.97	1.07	37.7
East: Kenneth Road (E)											
4	L2	64	2.0	0.799	10.1	LOS A	12.6	88.3	0.92	0.86	42.6
5	T1	642	0.6	0.799	9.9	LOS A	12.6	88.3	0.92	0.86	41.6
6	R2	133	0.0	0.799	12.9	LOS A	12.6	88.3	0.92	0.86	41.0
Approach		839	0.6	0.799	10.4	LOS A	12.6	88.3	0.92	0.86	41.6
North: Quirk Road (N)											
7	L2	137	0.0	0.591	16.6	LOS B	5.5	38.8	1.00	1.13	36.1
8	T1	65	2.0	0.591	16.5	LOS B	5.5	38.8	1.00	1.13	35.1
9	R2	80	1.7	0.591	19.6	LOS B	5.5	38.8	1.00	1.13	29.6
Approach		282	0.9	0.591	17.4	LOS B	5.5	38.8	1.00	1.13	34.5
West: Kenneth Road (W)											
10	L2	85	6.3	0.802	9.8	LOS A	12.7	91.1	0.91	0.82	34.7
11	T1	662	2.4	0.802	9.5	LOS A	12.7	91.1	0.91	0.82	42.0
12	R2	80	2.0	0.802	12.5	LOS A	12.7	91.1	0.91	0.82	40.7
12u	U	35	0.0	0.802	13.9	LOS A	12.7	91.1	0.91	0.82	38.9
Approach		862	2.7	0.802	10.0	LOS A	12.7	91.1	0.91	0.82	41.3
All Vehicles		2208	1.6	0.802	11.7	LOS A	12.7	91.1	0.93	0.90	40.2

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.
Roundabout Capacity Model: SIDRA Standard.
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: [2038 Weekend Peak]

Kenneth Road / Quirk Road (North)
Year 2038 Weekend Peak
Design Traffic Volumes | With Quirk Road Extension
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Quirk Road (S)											
1	L2	117	2.0	0.457	14.0	LOS A	3.6	25.7	0.96	1.04	36.7
2	T1	32	2.0	0.457	13.8	LOS A	3.6	25.7	0.96	1.04	36.7
3	R2	59	2.0	0.457	16.9	LOS B	3.6	25.7	0.96	1.04	40.7
Approach		207	2.0	0.457	14.8	LOS B	3.6	25.7	0.96	1.04	38.1
East: Kenneth Road (E)											
4	L2	64	2.0	0.824	13.4	LOS A	13.9	98.0	1.00	1.07	40.8
5	T1	566	1.4	0.824	13.2	LOS A	13.9	98.0	1.00	1.07	39.4
6	R2	135	0.0	0.824	16.2	LOS B	13.9	98.0	1.00	1.07	38.8
Approach		765	1.2	0.824	13.8	LOS A	13.9	98.0	1.00	1.07	39.5
North: Quirk Road (N)											
7	L2	159	0.0	0.689	17.1	LOS B	7.6	53.1	0.99	1.19	35.7
8	T1	74	2.0	0.689	17.1	LOS B	7.6	53.1	0.99	1.19	34.6
9	R2	168	0.0	0.689	20.0	LOS B	7.6	53.1	0.99	1.19	29.1
Approach		401	0.4	0.689	18.3	LOS B	7.6	53.1	0.99	1.19	33.3
West: Kenneth Road (W)											
10	L2	89	1.5	0.710	7.3	LOS A	8.5	59.8	0.78	0.72	37.1
11	T1	573	1.1	0.710	7.1	LOS A	8.5	59.8	0.78	0.72	43.4
12	R2	82	2.0	0.710	10.2	LOS A	8.5	59.8	0.78	0.72	42.2
12u	U	25	0.0	0.710	11.6	LOS A	8.5	59.8	0.78	0.72	41.1
Approach		769	1.2	0.710	7.6	LOS A	8.5	59.8	0.78	0.72	42.8
All Vehicles		2143	1.1	0.824	12.5	LOS A	13.9	98.0	0.92	0.96	39.3

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.
Roundabout Capacity Model: SIDRA Standard.
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: v [2038 PM Peak]

Balgowlah Road / Quirk Road
Year 2038 PM Peak
Design Traffic Volumes | With Quirk Road Extension
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Of Queue Vehicles veh	95% Back Of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	497	1.4	0.443	2.5	LOS A	3.2	22.7	0.46	0.21	46.1
6	R2	169	2.0	0.443	9.3	LOS A	3.2	22.7	0.46	0.21	46.0
Approach		666	1.5	0.443	4.2	NA	3.2	22.7	0.46	0.21	46.1
North: Quirk Road (N)											
7	L2	180	2.0	0.421	8.7	LOS A	2.0	14.3	0.65	0.94	42.2
9	R2	65	2.0	0.421	19.3	LOS B	2.0	14.3	0.65	0.94	38.4
Approach		245	2.0	0.421	11.5	LOS A	2.0	14.3	0.65	0.94	41.4
West: Balgowlah Road (W)											
10	L2	53	2.0	0.310	4.6	LOS A	0.0	0.0	0.00	0.05	48.6
11	T1	544	1.1	0.310	0.0	LOS A	0.0	0.0	0.00	0.05	49.6
Approach		597	1.2	0.310	0.4	NA	0.0	0.0	0.00	0.05	49.5
All Vehicles		1508	1.5	0.443	3.9	NA	3.2	22.7	0.31	0.27	46.3

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: v [2038 Weekend Peak]

Balgowlah Road / Quirk Road
Year 2038 Weekend Peak
Design Traffic Volumes | With Quirk Road Extension
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Balgowlah Road (E)											
5	T1	635	0.2	0.511	2.6	LOS A	3.8	27.1	0.44	0.17	46.1
6	R2	160	2.0	0.511	10.4	LOS A	3.8	27.1	0.44	0.17	46.0
Approach		795	0.5	0.511	4.2	NA	3.8	27.1	0.44	0.17	46.1
North: Quirk Road (N)											
7	L2	165	2.0	0.341	8.4	LOS A	1.5	10.4	0.64	0.90	42.5
9	R2	32	2.0	0.341	23.8	LOS B	1.5	10.4	0.64	0.90	38.8
Approach		197	2.0	0.341	10.9	LOS A	1.5	10.4	0.64	0.90	42.1
West: Balgowlah Road (W)											
10	L2	43	2.0	0.329	4.6	LOS A	0.0	0.0	0.00	0.04	48.7
11	T1	592	0.9	0.329	0.0	LOS A	0.0	0.0	0.00	0.04	49.6
Approach		635	1.0	0.329	0.3	NA	0.0	0.0	0.00	0.04	49.6
All Vehicles		1626	0.9	0.511	3.5	NA	3.8	27.1	0.29	0.21	46.7

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.

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APPENDIX J

MAP OF "POOR CONDITION" ROAD INFRASTRUCTURE ITEMS

Legend
Study Area
Actionable Poor Infrastructure
Bus Stop
Kerb ramps
Other
Pathways
Priority controlled intersections
Speed Limit Signs
Manly Vale
Pittwater
N
BITZIOS consulting
Gold Coast
Suite 26, 58 Riverwalk Avenue
Robina QLD 4226
P: (07) 5562 6377
W: www.bitziosconsulting.com.au
Brisbane
Level 2, 428 Upper Edward Street
Spring Hill QLD 4000
P: (07) 3831 4442
F: admin@bitziosconsulting.com.au
Sydney
Studio 203, 3 Gladstone Street
Newtown NSW 2042
P: (02) 9557 6202
Balgowlah / Manly Vale
Traffic and Parking Review
P3680
27/06/2018
001

APPENDIX K

CONCEPT LAYOUT PLANS

Balgowlah / Manly Vale Traffic and Parking Review for Northern Beaches Council

JOB NUMBER: P3680

LOCALITY PLAN
(Not to scale)

Sheet Number	Drawing Reference Number
1	RN-SK001
2	RN-SK002
3	RN-SK003
4	RN-SK004
5	RN-SK005-A
6	RN-SK005-B
7	RN-SK006
8	RN-SK007
9	RN-SK008-A
10	RN-SK008-B
11	RN-SK008-C
12	RN-SK008-D
13	RN-SK008-E
14	PK-SK001
15	PK-SK002
16	PK-SK003
17	PK-SK004
18	PN-SK001
19	PN-SK002
20	PN-SK003
21	PN-SK004
22	CN-SK001-A
23	CN-SK001-B
24	CN-SK001-C
25	CF-SK001
26	CF-SK002
27	CF-SK003

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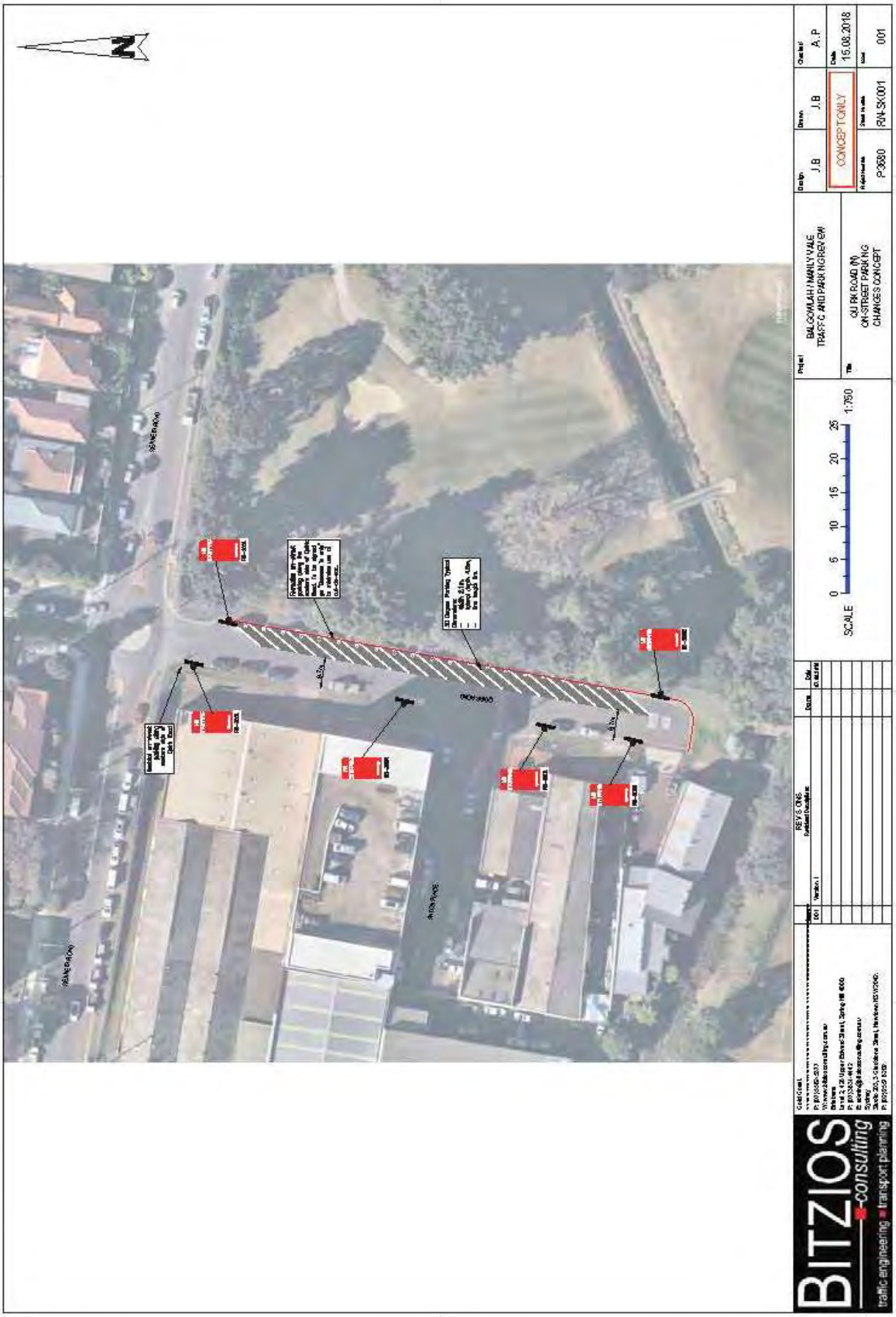
Issue	REVISIONS Revision/Description	Done	Date
001	Version 1 for External Issue	BH	27/08/2018

Project: BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW	Design: J.B	Drawn: A.P	Checked: A.P
	CONCEPT ONLY		Date: 27.08.2018
Title: TITLE AND LOCALITY PLAN	Reference: P3680	Sheet Number: 001	Issue: 001


N
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traffic engineering transport planning
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
QUIRK ROAD (W) ON-STREET PARKING CHANGES CONCEPT
CONCEPT ONLY
SCALE 1:750
0 5 10 15 20 25
15.08.2018
P3680
RW-SK001
001

N
ROSEBERRY STREET
BALGOWLAH ROAD
BALGOWLAH ROAD
8.5m
Proposed landscaping over existing car parking spaces
30 Degree Parking
Typical Dimensions:
- width 2.1m,
- interval depth 4.5m,
- line length 5m.
Re-orientate car parking spaces at 30 degrees so that there is separation between to travel lane and parking bay
Proposed landscaping over existing car parking spaces
Scale @ A3
0 5 10 15 20 25
1:500
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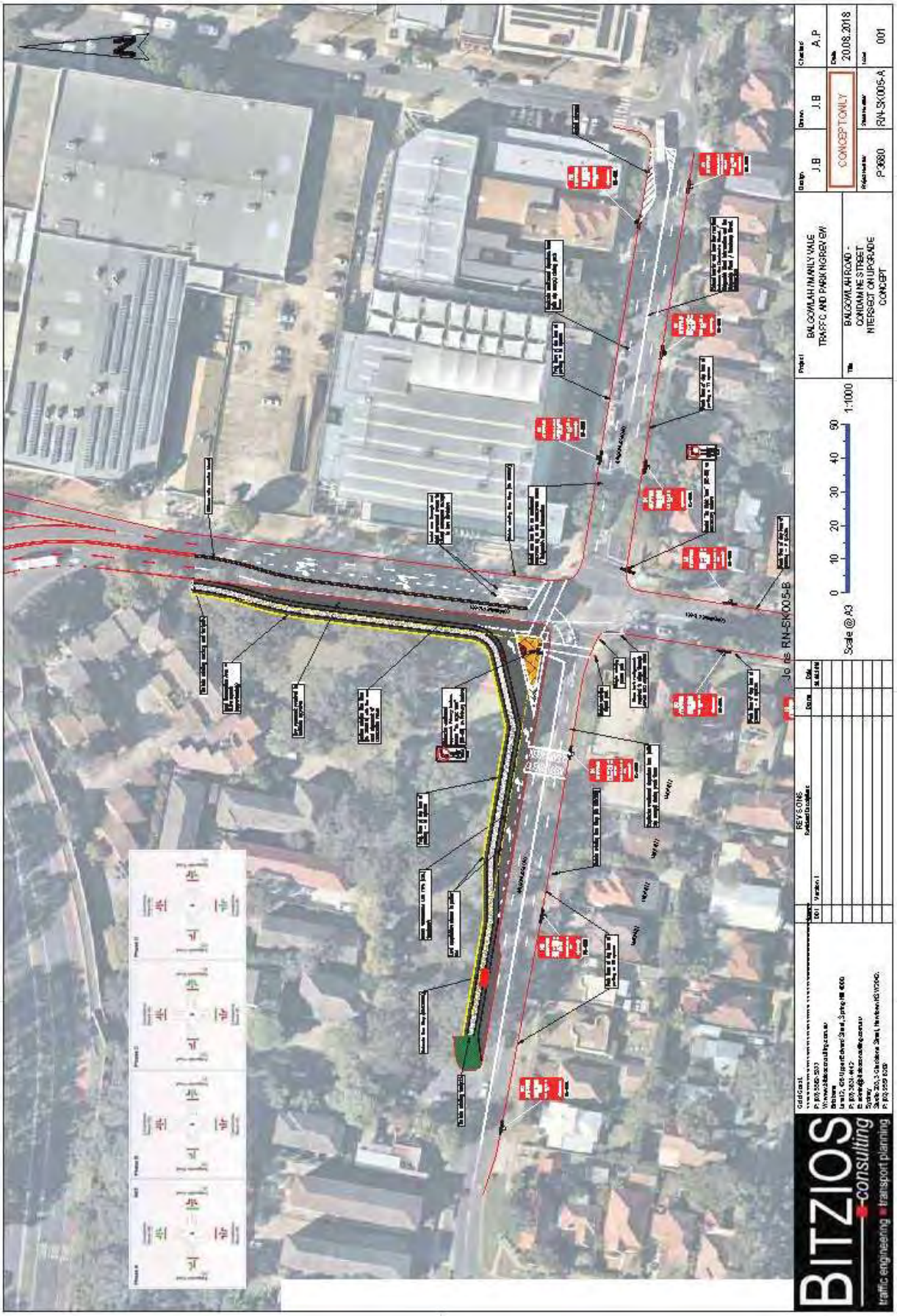
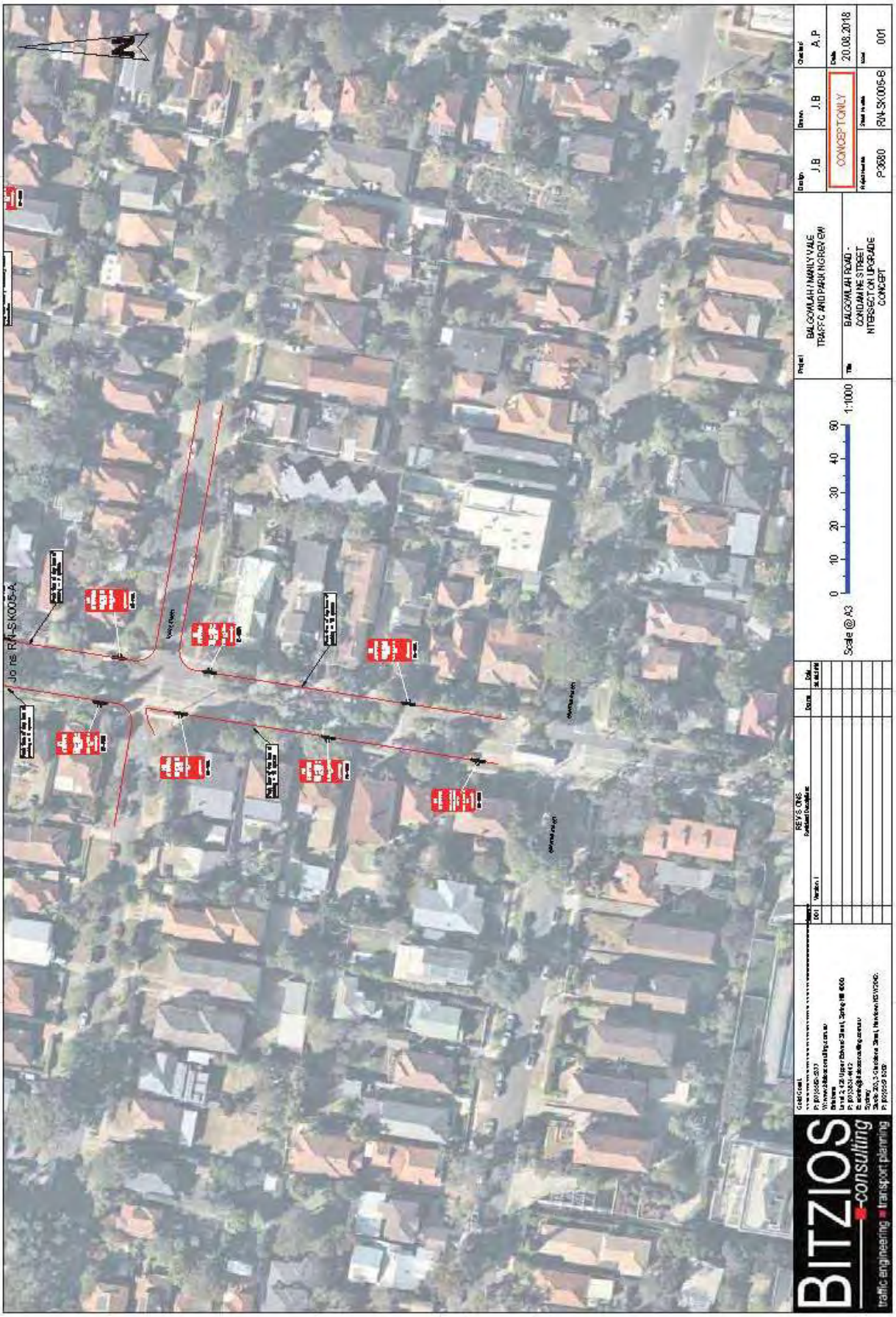
traffic engineering transport planning
REVISIONS
001 Version 1
Project
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
Title
ROSEBERRY STREET - PARKING REALIGNMENT CONCEPT
Design
A.P2
Drawn
A.P2
Checked
A.P
CONCEPT ONLY
Date
15.08.2018
Attachments
P3680
Sheet no.
BW-SK002
Issue
001

CONDAMINE STREET
SUNSHINE STREET
BALGOWLAH / MANLY VALE
TRAFFIC AND PARKING REVIEW
SUNSHINE STREET
LINEMARKING CONCEPT
CONCEPT ONLY
A.P2
A.P2
A.P
15.08.2018
P3030
RN-SK003
001
Scale @ A3
1:500
BITZIOS
consulting
traffic engineering
transport planning

KENNETH ROAD
CONDAMINE STREET
CONDAMINE STREET
Install new through and right assessment arrows to clearly distinguish change in lane discipline
Change lane discipline of centre lane from through to through and right
Replace existing "Broken Lane Line" (L1) with compliant "Continuity Line" (C1)
Install new turn lane line marking
Scale @A3
0 5 10 15 20 25
1:500
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
CONDAMINE STREET - KENNETH ROAD LANE DISCIPLINE CHANGE CONCEPT
CONCEPT ONLY
J.W.G
A.P
15.08.2018
P3680
RN-SK004
001
BITZIOS consulting
traffic engineering transport planning


BITZIOS consulting
traffic engineering transport planning
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
BALGOWLAH ROAD - CONDAMINE STREET INTERSECTION UPGRADE CONCEPT
CONCEPT ONLY
J.B
A.P
20.08.2018
P3680
RN-SK005-A
001
Scale @ A3
1:1000
Joins RN-SK005-B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traffic engineering transport planning
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
BALGOWLAH ROAD - CONDAMINE STREET INTERSECTION UPGRADE CONCEPT
CONCEPT ONLY
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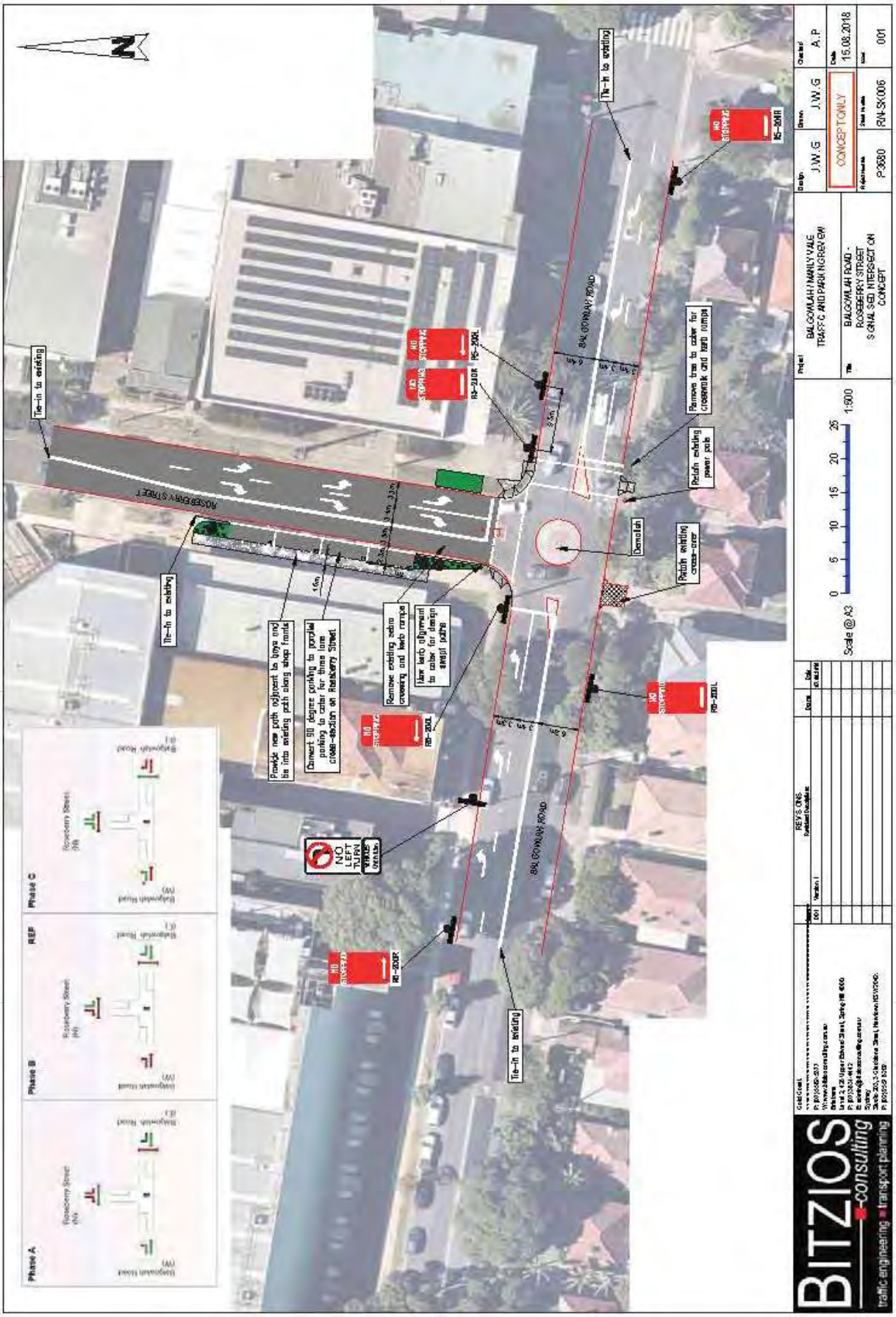
20.08.2018
P3680
RN-SK005-B
001
Scale @ A3
1:1000
REVISIONS


BALGOWLAH MANLY VALE TRAFFIC AND PARKING REVIEW
BALGOWLAH ROAD - ROSEBERRY STREET SIGNALISED INTERSECTION CONCEPT
CONCEPT ONLY
J.W.G
A.P
15.08.2018
P3680
RW-SK006
001
Scale @ A3
1:500
BITZIOS consulting
traffic engineering transport planning
Phase A
Phase B
REF
Phase C
Tie-in to existing
Demolish
Remove tree to cater for crosswalk and kerb ramps
Retain existing power pole
Retain existing cross-over
Remove existing zebra crossing and kerb ramps
Kerb alignment to cater for design swept paths
Convert 90 degree parking to parallel parking to cater for three lane cross-section on Roseberry Street
Provide new path adjacent to bays and tie into existing path along shop fronts
NO LEFT TURN
ROSEBERRY STREET
BALGOWLAH ROAD

N
Phase A
Phase B
Phase C
Phase D
0 5 10 15 20 25 30 35
Scale @ A3
1:750
BALGOWLAH/MANLY VALE TRAFFIC AND PARKING REVIEW
KENNETH ROAD - ROSEBERRY STREET SIGNALISED INTERSECTION CONCEPT
CONCEPT ONLY
J.W.G
J.W.G
15.08.2018
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P3680
RN-SK007
001
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KENNETH ROAD
Retain existing shared pathway (alignment subject to change)
Formalise on-street parking through the implementation of a formal parking line
Provide double barrier line (BB) to clearly delineate travel lanes
Provide edge lines to clearly delineate travel lanes from parking lanes
15 car parking spaces
2 car parking spaces
Retain existing crossover
7 car parking spaces
Retain existing crossover
Retain existing crossover
7 car parking spaces
PATON PLACE
Scale @ A3
1:500
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
QUINN ROAD ROAD EXTENSION CONCEPT
CONCEPT ONLY
16.06.2016
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traffic engineering transport planning

Provide double barrier line (B8) to clearly delineate travel lanes
Provide edge lines to clearly delineate travel lanes from parking lanes
16 car parking spaces
Bridge structure required to cross Burnt Bridge Creek
2 car parking spaces
Retain existing crossover
PATON PLACE
Retain existing crossover
2 car parking spaces
Retain existing crossover
Retain existing crossover
Alignment of connecting road subject to the location of services
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
QUIRK ROAD ROAD EXTENSION CONCEPT
CONCEPT ONLY
P3680
RN-SK008-B
001
16.08.2018
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I.B
Scale @ A3
BITZIOS consulting
traffic engineering transport planning

Section A-A - Not to Scale
Verge 6.5m
Travel Lane 3.5m
Travel Lane 3.5m
Parking Lane 2.1m
1m
Shared Footpath 2m
Verge 1.4m
Relocate sporting field to provide separation between the proposed car parking area and the field
Tie into existing path on Rosebery Street
Pedestrian connection between Rosebery Street and Quirk Road
6.5m radius turning area provided for cars to turnaround
Alignment of connecting road subject to the location of services
4 car parking spaces
Install new raised pedestrian (warrant) crossing
Basic Augmented Right Turn (BAR) treatment provided to
SECTION A-A
Scale @ A3
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
QUIRK ROAD ROAD EXTENSION CONCEPT
CONCEPT ONLY
P3680
RN-SK008-C
001
16.08.2018
BITZIOS consulting
traffic engineering transport planning

Basic Augmented Right Turn (BAR) treatment provided to ensure the efficiency of Quirk Road
SECTION B-B
33 car parking spaces
Install new crossover to provide access to opening field car parking area
14 car parking spaces
30 Degree Parking Typical Dimensions
- width 2.1m,
- lateral depth 4.5m,
- line length 9m.
8.5m radius turning area provided for cars to turnaround
Section B-B - Not to Scale
Verge 2m
Footpath 1.5m
0.9m
Parking Lane 2.1m
Travel Lane 3.5m
Travel Lane 3.5m
Passing Area 2.1m
1m
Shared Footpath 2m
Verge 1.4m
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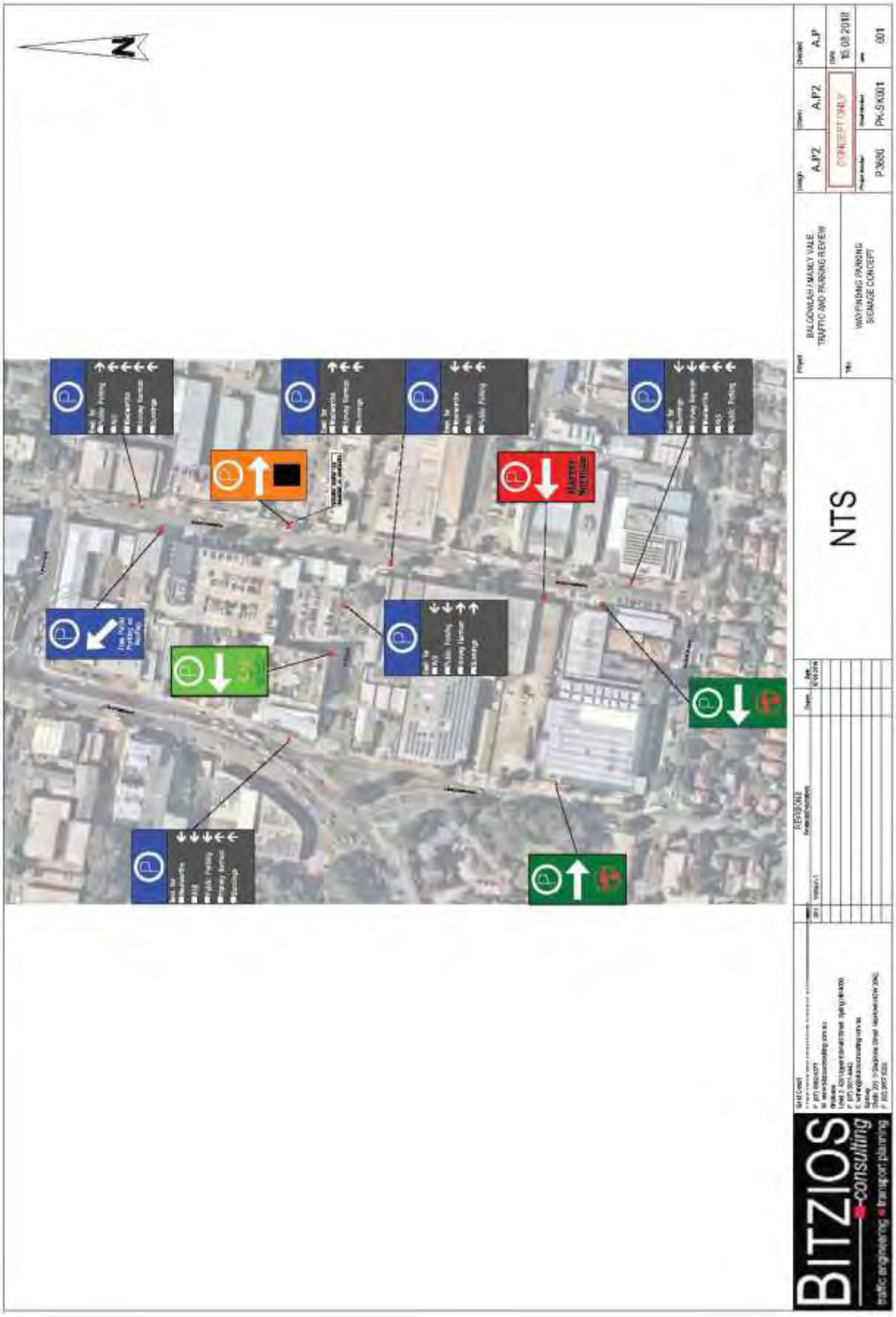
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
QUIRK ROAD ROAD EXTENSION CONCEPT
CONCEPT ONLY
P3680
RN-SK008-D
001
16.08.2018
A.P
Scale @ A3
0 5 10 15 20 25
1:500

Section A-A - Not to Scale
Verge 2m
Footpath 1.5m
Parking Lane 2.1m
Travel Lane 3.5m
Travel Lane 3.5m
Parking Lane 2.1m
Shared Footpath 2m
Verge 1.4m
14 car parking spaces
Formalise existing unsealed crossover
Retain existing crossover
4 car parking spaces
On-street parking lane to utilise existing kerb alignment
On-street parking lane removed for passing area
On-street parking lane to utilise existing kerb alignment
SECTION A-A
BALGOWLAH ROAD
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
QUIRK ROAD ROAD EXTENSION CONCEPT
CONCEPT ONLY
P3680
RN-SK008-E
001
16.08.2018
BITZIOS consulting
traffic engineering transport planning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traffic engineering
transport planning
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
WAYFINDING PARKING SIGNAGE CONCEPT
NTS
CONCEPT ONLY
A.P2
A.P2
A.P
P3680
PK-SK001
001

N
1P
1P
1P
1P
2P
2P
4P
4P
SCALE
0 5 10 15 20 25
1:750
BALGOWLAH / MANLY VALE
TRAFFIC AND PARKING REVIEW
KOORALA STREET
PARKING RESTRICTION
CONCEPT ONLY
15.08.2018
BITZIOS
consulting

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traffic engineering • transport planning
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
MANLY WEST SCHOOL PARKING RESTRICTIONS
DONCEPT ONLY
A.P2
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15.08.2018
P3680
PK-SK003
001
SCALE
0 5 10 15 20 25
1:750
REVISIONS
NOTOR VEHICLES EXCEPTED
R5-41-4L
R5-41-4R
R5-41-4R
R5-41-4L
R5-41-4R
R5-41-4L
R5-41-4R
R5-41-4L
R5-41-4R
R5-41-4L
R5-41-4R

N
8P
8P
8P
SCALE
0 5 10 15 20 25
1:750
BALGOWLAH / MANLY VALE
TRAFFIC AND PARKING REVIEW
QUIRK ROAD (S)
PARKING RESTRICTIONS
CONCEPT ONLY
15.08.2018
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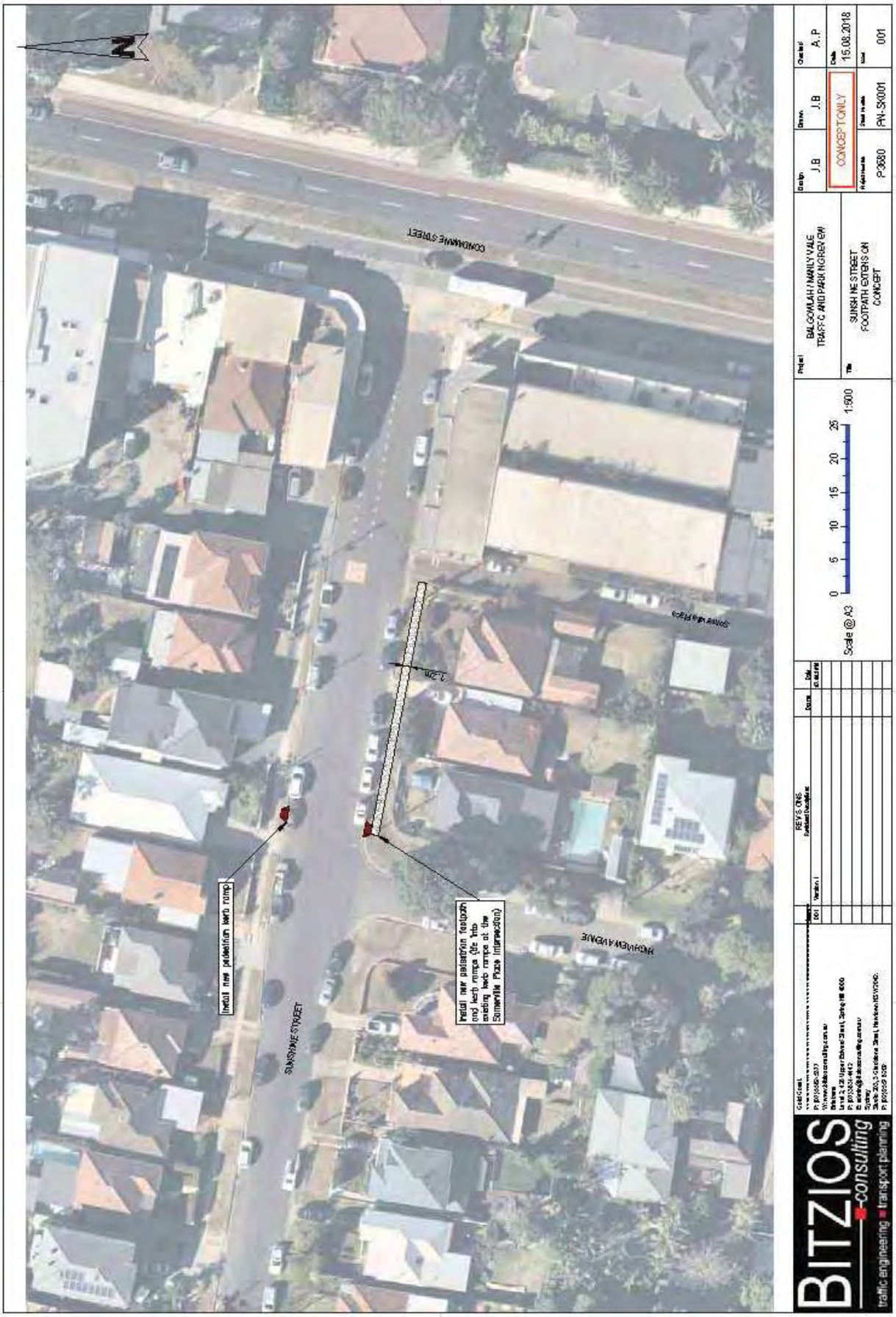
consulting


CONDAMINE STREET
SUNSHINE STREET
HIGHVIEW AVENUE
Install new pedestrian kerb ramp
Install new pedestrian footpath and kerb ramps (tie into existing kerb ramps at the Somerville Plaza intersection)
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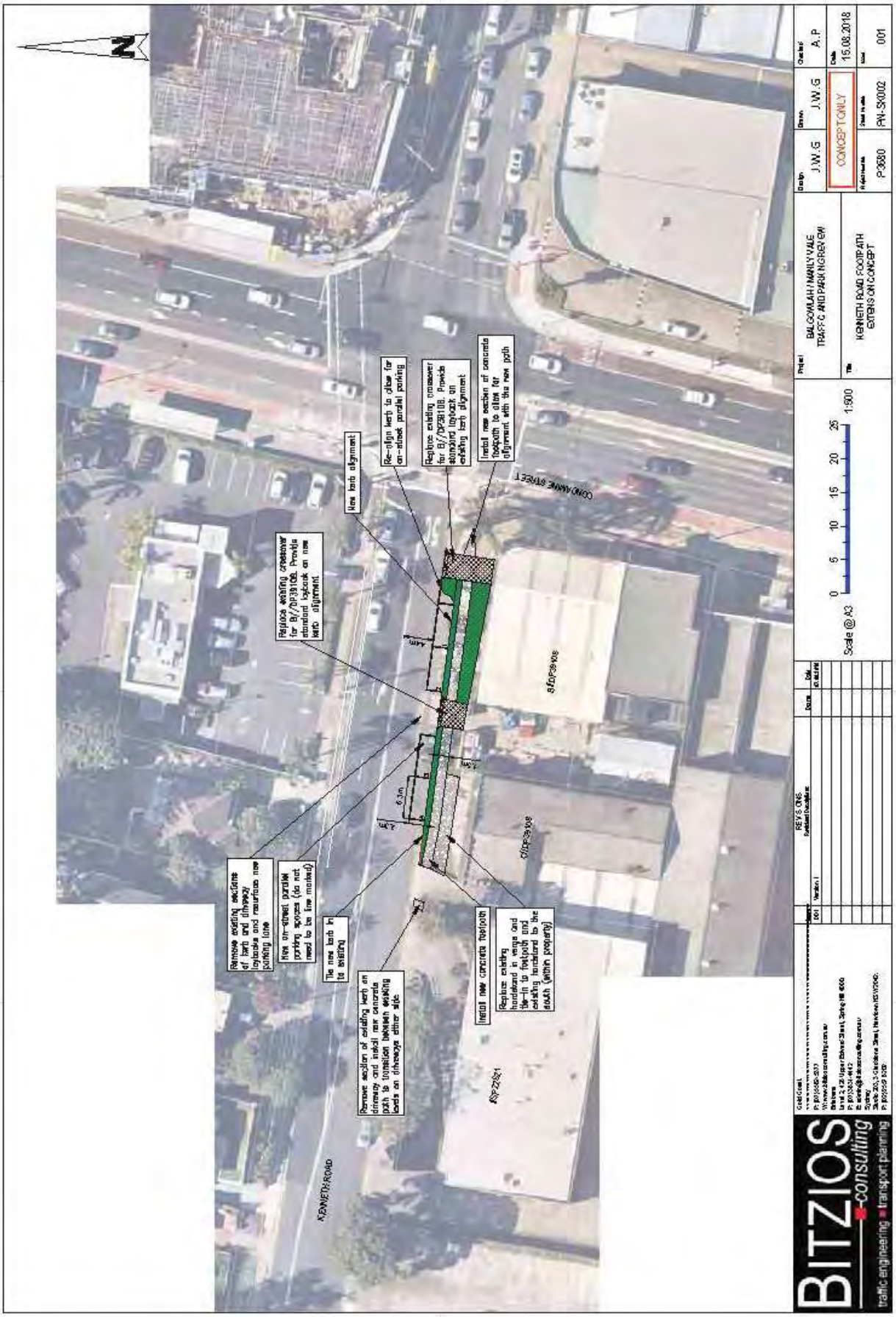
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
SUNSHINE STREET FOOTPATH EXTENSION CONCEPT
CONCEPT ONLY
P3680
PW-SK001
001
15.08.2018
A.P
J.B
Scale @ A3
1:500


N
KENNETH ROAD
COMO AVENUE STREET
Remove existing sections of kerb and driveway layback and reinstate new parking lane
New on-street parallel parking spaces (do not need to be line marked)
Tie new kerb in to existing
Remove section of existing kerb on driveway and install new concrete path to transition between existing levels on driveways either side
Install new concrete footpath
Replace existing hardstand at verge and tie-in to footpath and existing hardstand to the south (within property)
Replace existing crossover for B/DP39106. Provide standard layback on new kerb alignment
New kerb alignment
Re-align kerb to allow for on-street parallel parking
Replace existing crossover for B/DP39106. Provide standard footpath on existing kerb alignment
Install new section of concrete footpath to allow for alignment with the new path
6.1m
8/DP39106
7/DP39106
1/DP1121
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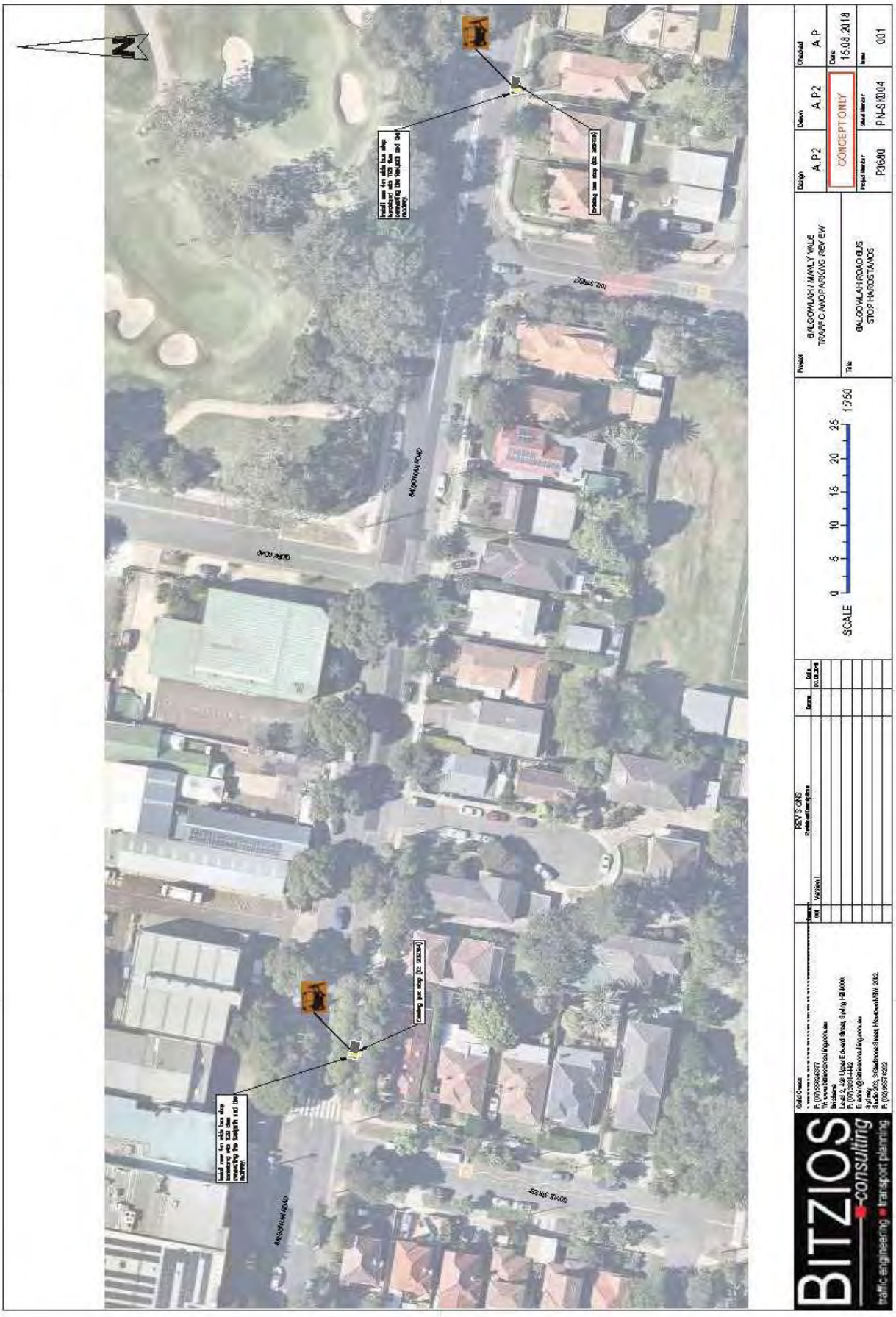
traffic engineering transport planning
REYS ONS
Project
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
Title
KENNETH ROAD FOOTPATH EXTENSION CONCEPT
Design J.W.G
Drawn J.W.G
Checked A.P
CONCEPT ONLY
Date 15.08.2018
Job No P3680
Drawing No PW-SK002
Issue 001
Scale @ A3 1:500
0 5 10 15 20 25

Tie-in to existing pathway
Install 1.2m wide pathway fronting No. 25 Rosebery Street
Existing pathway
ROSEBERY STREET
Install new pedestrian (zebra) crossing with kerb build-outs
Provide western wing of pedestrian ramp
New 1.2m wide pathway
HAYES STREET
CONDAMINE STREET
Tie-in to existing pathway
Scale @ A3
0 5 10 15 20 25
1:500
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
HAYES LANE & ROSEBERY STREET FOOTPATH EXTENSIONS ON AND CROSSING CONCEPT
J.B
J.B
A.P
CONCEPT ONLY
15.08.2018
P3680
PW-SK003
001
BITZIOS consulting
traffic engineering transport planning


BITZIOS consulting
traffic engineering transport planning
BALGOWLAH / MANLY VALE
TRAFFIC AND PARKING REVIEW
BALGOWLAH ROAD BUS
STOP HARDSTANDS
SCALE
0 5 10 15 20 25 1:750
CONCEPT ONLY
A.P2
A.P2
A.P
15.08.2018
P3680
PN-SK004
001
REVISIONS
Version 1

N
Install new section of concrete path
Path and bus stop recently upgraded
Path and kerb ramp recently upgraded
Tie-in to existing
Replace existing section of concrete path
CONDAMINE STREET
KENNETH ROAD
Scale @ A3
0 5 10 15 20 25
1:500
BITZIOS consulting
traffic engineering transport planning
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
CONDAMINE STREET - SHARED PATH EXTENSION CONCEPT
CONCEPT ONLY
J.W.G
A/P
15.08.2018
P9680
CN-SK001-A
001

N
Tie-in to existing
Install painted threshold treatment at driveway crossovers
Install painted thresh-hold treatment at driveway crossovers
3m
CONDAMINE STREET
Install painted thresh-hold treatment at driveway crossovers
Install painted thresh-hold treatment at driveway crossovers
Join CN-SK001-A
Join CN-SK001-C
Scale @ A3
1:500
0 5 10 15 20 25
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
CONDAMINE STREET - SHARED PATH EXTENSION CONCEPT
CONCEPT ONLY
J.W.G
J.W.G
A.P
15.08.2018
P3680
CN-SK001-B
001
BITZIOS consulting
traffic engineering transport planning

HAYES STREET
CONDAMINE STREET
Relocate existing section of concrete path
New kerb ramps to match existing shared path kerb ramps to the north
Tie-in to existing
Retain existing power pole
Remove existing path and kerb ramp
Relocate existing stop sign clear of new kerb ramp
Relocate existing directional fingerboard clear of new path
New signalised pedestrian crossing
Retain existing light pole and signal post
Tie-in to existing
Relocate stop bar to prior for new crossmark
Modify median to cater for new crossmark and relocated traffic signal hardware
Tie-in to existing
Jo ns.CN-SK001-B
Scale @ A3
1:500
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
CONDAMINE STREET - SHARED PATH EXTENSION CONCEPT
CONCEPT ONLY
15.08.2018
P3680
CN-SK001-C
001
BITZIOS consulting
traffic engineering transport planning

N
BITZIOS consulting
traffic engineering transport planning
SCALE
0 5 10 15 20 25
1:750
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
BALGOWLAH ROAD - QUIBERON ROAD PARKING RESTRICTIONS
A.P2
A.P2
CONCEPT ONLY
15.08.2018
P3680
CF-SK001
001
A.P

N
BALGOWLAH ROAD
ROSEBERY STREET
Install new raised pedestrian crossing (with piano keys)
Upgrade to be completed in conjunction with or after proposed parking changes (see drawing SK-SK002)
ON SIDE ROAD
ON SIDE ROAD
BALGOWLAH ROAD
Scale @ A3
0 5 10 15 20 25
1:500
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
ROSEBERY STREET PEDESTRIAN CROSSING CONCEPT
CONCEPT ONLY
J.B
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A.P
15.08.2018
P3680
CF-SK002
001
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traffic engineering transport planning

SOMERVILLE PLACE
SOMERVILLE PLACE
SOMERVILLE STREET
SUNKHAVE STREET
NO ENTRY
NO ENTRY
Install pavement arrows to clearly delineate direction of travel
Scale @A3
0 5 10 15 20 25
1:500
BALGOWLAH / MANLY VALE TRAFFIC AND PARKING REVIEW
SOMERVILLE PLACE ONE-WAY CONCEPT
CONCEPT ONLY
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15.08.2018
P3680
CF-SK003
001
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APPENDIX L

HIGH-LEVEL COST ESTIMATES

ID	Road(s) Name	Description of Works	Drawing Number	Treatment Cost	Timing
RN-1	Quirk Road (Kenneth Road to End)	Rectification of narrow road width	RN-SK001	$ 3,700.00	Short-term
RN-2	Roseberry Street (adjacent to Balgowlah Road)	Rectification of narrow road width	RN-SK002	$ 11,385.00	Short-term
RN-3	Sunshine Street (between Condamine Street and Highview Avenue)	Delineation on Sunshine Street	RN-SK003	$ 2,220.00	Short-term
RN-7	Condamine Street / Kenneth Road	Intersection improvements to eastern leg	RN-SK004	$ 5,070.00	Short-term
RN-8	Condamine Street / Balgowlah Road	Intersection improvements on all legs	RN-SK005A-B	$ 2,273,274.00	Short-term
RN-9	Balgowlah Road / Roseberry Street	Upgrade of intersection to traffic signal control	RN-SK006	$ 422,050.00	Medium-term
RN-10	Kenneth Road / Roseberry Street	Upgrade of intersection to traffic signal control	RN-SK007	$ 413,878.00	Medium-term
RN-11	Quirk Road Extension	Quirk Road extension, sporting field alterations and new parking and pathway through Council land to Roseberry Street	RN-SK008A-E	$ 3,875,445.00	Long-term
RD-1	Varies	Road infrastructure maintenance issues	Appendix J	$ 61,600.00	Short-term
CF-1	Balgowlah Road / Quirk Road	Sight line improvements	CF-SK001	$ 2,400.00	Short-term
CF-5	Balgowlah Road / Roseberry Street	Pedestrian safety improvements	CF-SK002	$ 42,900.00	Short-term
CF-7	Somerville Place	Conversion of road to one-way (southbound) only	CF-SK003	$ 1,400.00	Short-term
PK-1	Roseberry Street & Surrounds	Parking wayfinding improvements	PK-SK001	$ 18,000.00	Short-term
PK-2	Kondala Street	Parking restriction changes	PK-SK002	$ 1,800.00	Short-term
PK-3	Manly West School Surrounds	Parking restriction changes	PK-SK003	$ 2,900.00	Short-term
PK-4	Quirk Road (between Balgowlah Road and End)	Parking restriction changes	PK-SK004	$ 1,900.00	Short-term
PK-5	Varies	Parking technology (pressure) and software	Figure 2.2	$ 116,500.00	Medium-term
PN-1	Sunshine Street (between Somerville Place and Highview Avenue)	Pathway improvements	PN-SK001	$ 12,740.00	Short-term
PN-2	Kenneth Road (between No 9 and Condamine Street)	Pathway improvements	PN-SK002	$ 99,299.00	Short-term
PN-5	Hayes Street (between Condamine Street and Roseberry Street)	Pathway improvements	PN-SK003	$ 50,050.00	Short-term
PN-6	Roseberry Street (Outside No. 20)	Pathway improvements	PN-SK003	$ 2,660.00	Short-term
PN-7	Balgowlah Road (bus stop east of Quirk Road)	Pathway improvements	PN-SK008	$ 1,870.00	Short-term
PN-8	Balgowlah Road (bus stop west of Quirk Road)	Pathway improvements	PN-SK004	$ 1,720.00	Short-term
CN-2	Condamine Street (Kenneth Road to Pine Street)	Cycleway improvements	CN-SK001A-C	$ 386,760.00	Medium-term
CN-3	Varies	Bicycle racks	Figure 3.1	$ 4,600.00	Short-term

Sub-Total		$ 7,788,902.00
Contingency	50 %	$ 3,894,451.00
Principal	20 %	$ 1,557,781.00

TOTAL	$ 13,241,134.00

Drawing Number: RN-SK001
Road(s) Name: Quirk Road (Kenneth Road to End)
Description of Works: Rectification of narrow road width

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 3,700.00
Line marking	*m*	*$5*	*200*	$ 1,000	
Traffic Sign	*each*	*$200*	*6*	$ 1,200	
Traffic Control	*day*	*$1,500*	*1*	$ 1,500	
Total Cost					$ 3,700.00
Contingency	**50 %**				$ 1,850.00
Principal	**20 %**				$ 740.00
				TOTAL	$ 6,290.00

Drawing Number: RN-SK002
Road(s) Name: Roseberry Street (adjacent to Balgowlah Road)
Description of Works: Rectification of narrow road width

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					**$ 11,365.00**
Line marking	*m*	*$5*	*41*	$ 205	
Pavement grinding	*each*	*$1,500*	*1*	$ 1,500	
Traffic control	*day*	*$1,500*	*1*	$ 1,500	
Kerb	*m*	*$55*	*52*	$ 2,860	
Landscaping	*sqm*	*$100*	*53*	$ 5,300	
Total Cost					**$ 11,365.00**
Contingency	**50 %**				**$ 5,683.00**
Principal	**20 %**				**$ 2,273.00**
				TOTAL	**$ 19,321.00**

Drawing Number: RN-SK003
Road(s) Name: Sunshine Street (between Condamine Street and Highview Avenue)
Description of Works: Delineation on Sunshine Street

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					**$ 2,720.00**
Line marking	*m*	*$5*	*144*	$ 720	
Traffic control	*day*	*$1,500*	*1*	$ 1,500	
Pavement Arrow	*each*	*$250*	*2*	$ 500	
Total Cost					**$ 2,720.00**
Contingency	**50 %**				**$ 1,360.00**
Principal	**20 %**				**$ 544.00**
				TOTAL	**$ 4,624.00**

Drawing Number: RN-SK004
Road(s) Name: Condamine Street / Kenneth Road
Description of Works: Intersection improvements to eastern leg

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					**$ 5,070.00**
Pavement Arrow	*each*	*$250*	*2*	$ 500	
Remove existing arrows	*each*	*$100*	*2*	$ 200	
Line Marking	*m*	*$5*	*60*	$ 300	
PROM Change and testing	*each*	*$4,070*		$ 4,070	
Total Cost					**$ 5,070.00**
Contingency	**50 %**				**$ 2,535.00**
Principal	**20 %**				**$ 1,014.00**
				TOTAL	**$ 8,619.00**

Drawing Number: RN-SK005A-B
Road(s) Name: Condamine Street / Balgowlah Road
Description of Works: Intersection improvements on all legs

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 2,273,214.00
Shared concrete footpath	*sqm*	*$210*	*413*	$ 86,730	
Kerb ramps	*each*	*$2,000*	*4*	$ 8,000	
Concrete median infill	*sqm*	*$210*	*123*	$ 25,830	
Pavement	*sqm*	*$145*	*865*	$ 125,425	
Kerb	*m*	*$55*	*584*	$ 32,120	
Minor kerb re-alignment	*each*	*$7,500*	*1*	$ 7,500	
Landscaping	*sqm*	*$100*	*597*	$ 59,700	
Traffic signs (incl. reinstatement of existing signs)	*each*	*$200*	*19*	$ 3,800	
Pavement arrows	*each*	*$250*	*10*	$ 2,500	
Line marking	*m*	*$5*	*2079*	$ 10,395	
Street lights	*each*	*$6,210*	*3*	$ 18,630	
Conduit through existing road	*m*	*$1,540*	*100*	$ 154,000	
Conduit through existing concrete	*m*	*$290*	*25*	$ 7,250	
Conduit through earth	*m*	*$132*	*10*	$ 1,320	
Electrical pit	*each*	*$2,695*	*1*	$ 2,695	
Traffic signal post	*each*	*$233*	*5*	$ 1,166	
Traffic lantern	*each*	*$3,274*	*6*	$ 19,642	
Pedestrian lantern	*each*	*$1,100*	*5*	$ 5,500	
Push button	*each*	*$1,155*	*5*	$ 5,775	
Detector loops	*each*	*$1,540*	*3*	$ 4,620	
PROM and testing	*each*	*$4,070*	*1*	$ 4,070	
Traffic control	*day*	*$1,500*	*90*	$ 135,000	
Land acquisition	*sqm*	*$2*	*773*	$ 1,546	
Provisional Items					
Demolition of existing assets / Earthworks	*lump sum*	*$500,000*	*1*	$ 500,000	
Service and utility relocation	*lump sum*	*$1,000,000*	*1*	$ 1,000,000	
Bus stop infrastructure	*lump sum*	*$25,000*	*2*	$ 50,000	
Total Cost					$ 2,273,214.00
Contingency	**50 %**				$ 1,136,607.00
Principal	**20 %**				$ 454,643.00
				TOTAL	$ 3,864,464.00

Drawing Number: RN-SK006
Road(s) Name: Balgowlah Road / Roseberry Street
Description of Works: Upgrade of intersection to traffic signal control

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 422,050.00
Conduit Existing Road	*m*	*$1,540*	*50*	$ 77,000	
Conduit Earth	*m*	*$132*	*70*	$ 9,240	
Conduit Concrete	*m*	*$290*	*20*	$ 5,808	
Electrical pit	*each*	*$2,695*	*6*	$ 16,170	
Traffic signal post	*each*	*$233*	*6*	$ 1,399	
Traffic lantern	*each*	*$3,274*	*9*	$ 29,462	
Target boards	*each*	*$196*	*9*	$ 1,762	
Pedestrian lantern	*each*	*$1,100*	*4*	$ 4,400	
Push button	*each*	*$1,155*	*4*	$ 4,620	
Detector loops	*each*	*$1,540*	*6*	$ 9,240	
Traffic Signal Controller	*each*	*$35,200*	*1*	$ 35,200	
PROM and testing	*each*	*$4,070*	*1*	$ 4,070	
Kerb ramp	*each*	*$2,000*	*4*	$ 8,000	
Line marking	*m*	*$5*	*510*	$ 2,550	
Pavement arrows	*each*	*$250*	*12*	$ 3,000	
Street lights	*each*	*$6,210*	*3*	$ 18,629	
Remove islands and roundabout	*each*	*$15,000*	*1*	$ 15,000	
Indented bays	*each*	*$10,000*	*4*	$ 40,000	
Concrete footpath	*sqm*	*$190*	*65*	$ 12,350	
Traffic signs	*each*	*$200*	*8*	$ 1,600	
Kerb re-alignment	*each*	*$15,000*	*1*	$ 15,000	
Traffic control	*day*	*$1,500*	*60*	$ 90,000	
Pavement	*sqm*	*$145*	*90*	$ 13,050	
Pavement grinding	*each*	*$500*	*1*	$ 500	
Landscaping	*sqm*	*$100*	*40*	$ 4,000	
Total Cost					$ 422,050.00
Contingency	**50 %**				$ 211,025.00
Principal	**20 %**				$ 84,410.00
				TOTAL	$ 717,485.00

Drawing Number: RN-SK007
Road(s) Name: Kenneth Road / Roseberry Street
Description of Works: Upgrade of intersection to traffic signal control

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 413,878.00
Kerb ramps	each	$2,000	6	$ 12,000	
Remove islands and roundabout	each	$15,000	1	$ 15,000	
Traffic signs	each	$200	19	$ 3,800	
Pavement arrows	each	$250	8	$ 2,000	
Line marking	m	$5	1296	$ 6,480	
Street lights	each	$6,210	3	$ 18,629	
Conduit through existing road	m	$1,540	60	$ 92,400	
Conduit through existing concrete	m	$290	25	$ 7,250	
Conduit through earth	m	$132	10	$ 1,320	
Electrical pit	each	$2,695	4	$ 10,780	
Traffic signal post	each	$233	8	$ 1,866	
Traffic lantern	each	$3,274	8	$ 26,189	
Pedestrian lantern	each	$1,100	8	$ 8,800	
Push button	each	$1,155	5	$ 5,775	
Detector loops	each	$1,540	8	$ 12,320	
Traffic Signal Controller	each	$35,200	1	$ 35,200	
PROM and testing	each	$4,070	1	$ 4,070	
Traffic control	day	$1,500	90	$ 135,000	
Remove islands and roundabout	each	$15,000	1	$ 15,000	
Total Cost					$ 413,878.00
Contingency	50 %				$ 206,939.00
Principal	20 %				$ 82,776.00
				TOTAL	$ 703,593.00

Drawing Number: RN-SK008A-E
Road(s) Name: Quirk Road Extension
Description of Works: Quirk Road extension, sporting field alterations and new parking and pathway through Council land to Roseberry Street

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 3,875,445.00
Pavement	*sqm*	*$145*	*2519*	$ 365,255	
Kerb	*m*	*$55*	*542*	$ 29,810	
Line marking	*m*	*$5*	*1500*	$ 7,500	
Shared concrete footpath	*sqm*	*$210*	*843*	$ 177,030	
Pedestrian concrete footpath	*sqm*	*$190*	*310*	$ 58,900	
Kerb ramps	*each*	*$2,000*	*2*	$ 4,000	
Concrete median infill	*sqm*	*$210*	*10*	$ 2,100	
Concrete crossover	*sqm*	*$210*	*45*	$ 9,450	
Landscaping	*sqm*	*$100*	*2258*	$ 225,800	
Bridge structure	*each*	*$860,000*	*1*	$ 860,000	
Traffic control	*day*	*$1,500*	*90*	$ 135,000	
Traffic signs	*each*	*$200*	*3*	$ 600	
Provisional Items					
Demolition of existing assets / Earthworks / Civil works	*lump sum*	*$1,000,000*	*1*	$1,000,000	
Service and utility relocation	*lump sum*	*$1,000,000*	*1*	$1,000,000	
Total Cost					$ 3,875,445.00
Contingency	**50 %**				$ 1,937,723.00
Principal	**20 %**				$ 775,089.00
				TOTAL	$ 6,588,257.00

Drawing Number: PK-SK001
Road(s) Name: Roseberry Street & Surrounds
Description of Works: Parking wayfinding improvements

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 18,000.00
Wayfinding Signs	*each*	*$1,500*	*12*	$ 18,000	
Total Cost					$ 18,000.00
Contingency	50 %				$ 9,000.00
Principal	20 %				$ 3,600.00
				TOTAL	$ 30,600.00

Drawing Number: PK-SK002
Road(s) Name: Koorala Street
Description of Works: Parking restriction changes

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 1,600.00
Traffic signs	*each*	*$200*	*8*	$ 1,600	
Total Cost					$ 1,600.00
Contingency	**50 %**				$ 800.00
Principal	**20 %**				$ 320.00
				TOTAL	$ 2,720.00

Drawing Number: PK-SK003
Road(s) Name: Manly West School Surrounds
Description of Works: Parking restriction changes

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 2,000.00
Traffic signs	*each*	*$200*	*10*	$ 2,000	
Total Cost					$ 2,000.00
Contingency	**50 %**				$ 1,000.00
Principal	**20 %**				$ 400.00
				TOTAL	$ 3,400.00

Drawing Number: PK-SK004
Road(s) Name: Quirk Road (between Balgowlah Road and End)
Description of Works: Parking restriction changes

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 1,000.00
Traffic signs	*each*	*$200*	*5*	$ 1,000	
Total Cost					$ 1,000.00
Contingency	**50 %**				$ 500.00
Principal	**20 %**				$ 200.00
				TOTAL	$ 1,700.00

Drawing Number: N/A
Road(s) Name: Varies
Description of Works: Parking technology (sensors) and software

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					**$ 118,510.00**
Parking sensors	*each*	*$350*	*218*	$ 76,300	
Parking software	*each*	*$15,000*	*1*	$ 15,000	
Line marking	*each*	*$5*	*2442*	$ 12,210	
Traffic Control	*day*	*$1,500*	*10*	$ 15,000	
Total Cost					**$ 118,510.00**
Contingency	**50 %**				**$ 59,255.00**
Principal	**20 %**				**$ 23,702.00**
				TOTAL	**$ 201,467.00**

Drawing Number: PN-SK001
Road(s) Name: Sunshine Street (between Somerville Place and Highview Avenue)
Description of Works: Pathway improvements

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 12,740.00
Concrete Footpath	*sqm*	*$190*	*46*	$ 8,740	
Kerb Ramp	*each*	*$2,000*	*2*	$ 4,000	
Total Cost					$ 12,740.00
Contingency	**50 %**				$ 6,370.00
Principal	**20 %**				$ 2,548.00
				TOTAL	$ 21,658.00

Drawing Number: PN-SK002
Road(s) Name: Kenneth Road (between No.9 and Condamine Street)
Description of Works: Pathway improvements

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					**$ 91,390.00**
Concrete Footpath	*sqm*	*$190*	*92*	$ 17,480	
Concrete Driveway	*sqm*	*$190*	*44*	$ 8,360	
Landscaping (Provisional)	*sqm*	*$100*	*75*	$ 7,500	
Indented Parking	*each*	*$10,000*	*4*	$ 40,000	
Existing Concrete Removal (Provisional)	*sqm*	*350*	*211*	$ 10,550	
Traffic Control	*day*	*$1,500*	*5*	$ 7,500	
Total Cost					**$ 91,390.00**
Contingency	**50 %**				**$ 45,695.00**
Principal	**20 %**				**$ 18,278.00**
				TOTAL	**$ 155,363.00**

Drawing Number: PN-SK003
Road(s) Name: Hayes Street (between Condamine Street and Roseberry Street)
Description of Works: Pathway improvements

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					**$ 50,050.00**
Concrete footpath	*sqm*	*$190*	*115*	$ 21,850	
Kerb ramps	*each*	*$2,000*	*2*	$ 4,000	
Kerb	*m*	*$55*	*46*	$ 2,530	
Line marking	*sqm*	*$25*	*7*	$ 175	
Landscaping	*sqm*	*$100*	*20*	$ 2,000	
Pavement	*sqm*	*$145*	*31*	$ 4,495	
Traffic Control	*day*	*$1,500*	*10*	$ 15,000	
Total Cost					**$ 50,050.00**
Contingency	**50 %**				**$ 25,025.00**
Principal	**20 %**				**$ 10,010.00**
				TOTAL	**$ 85,085.00**

Drawing Number: PN-SK003
Road(s) Name: Roseberry Street (Outside No. 20)
Description of Works: Pathway improvements

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 2,660.00
Concrete Footpath	*sqm*	*$190*	*14*	$ 2,660	
Total Cost					$ 2,660.00
Contingency	**50 %**				$ 1,330.00
Principal	**20 %**				$ 532.00
				TOTAL	$ 4,522.00

Drawing Number: PN-SK004
Road(s) Name: Balgowlah Road (bus stop east of Quirk Road)
Description of Works: Pathway improvements

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 1,910.00
Concrete Footpath	*sqm*	*$190*	*9*	$ 1,710	
TGSI Tiles	*each*	*$200*	*1*	$ 200	
Total Cost					$ 1,910.00
Contingency	**50 %**				$ 955.00
Principal	**20 %**				$ 382.00
				TOTAL	$ 3,247.00

Drawing Number: PN-SK004
Road(s) Name: Balgowlah Road (bus stop west of Quirk Road)
Description of Works: Pathway improvements

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 1,720.00
Concrete Footpath	*sqm*	*$190*	*8*	$ 1,520	
TGSI Tiles	*each*	*$200*	*1*	$ 200	
Total Cost					$ 1,720.00
Contingency	**50 %**				$ 860.00
Principal	**20 %**				$ 344.00
				TOTAL	$ 2,924.00

Drawing Number: CN-SK001A-C
Road(s) Name: Condamine Street (Kenneth Road to Pitt Street)
Description of Works: Cycleway improvements

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 366,780.00
Concrete Shared Path	sqm	$210	230	$ 48,300	
Kerb Ramp	each	$2,000	6	$ 12,000	
Signs	each	$200	2	$ 400	
Pavement Stamps (Path)	each	$35	18	$ 630	
Shared Path Line Marking	m	$5	190	$ 950	
Green Surface Colouring	sqm	$100	225	$ 22,500	
Existing Concrete Removal	sqm	$50	40	$ 2,000	
Signalised Pedestrian Crossing	each	$250,000	1	$ 250,000	
Traffic control	day	$1,500	20	$ 30,000	
Total Cost					$ 366,780.00
Contingency	50 %				$ 183,390.00
Principal	20 %				$ 73,356.00
				TOTAL	$ 623,526.00

Drawing Number: N/a
Road(s) Name: Varies
Description of Works: Bicycle racks

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 4,800.00
Install bike rack and pad	*each*	*$1,200*	*4*	$ 4,800	
Total Cost					$ 4,800.00
Contingency	50 %				$ 2,400.00
Principal	20 %				$ 960.00
				TOTAL	$ 8,160.00

Drawing Number: CF-SK001
Road(s) Name: Balgowlah Road / Quirk Road
Description of Works: Sight line improvements

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 2,400.00
Line marking	*m*	*$5*	*100*	$ 500	
Traffic sign	*each*	*$200*	*2*	$ 400	
Traffic control	*day*	*$1,500*	*1*	$ 1,500	
Total Cost					$ 2,400.00
Contingency	50 %				$ 1,200.00
Principal	20 %				$ 480.00
				TOTAL	$ 4,080.00

Drawing Number: CF-SK002
Road(s) Name: Balgowlah Road / Roseberry Street
Description of Works: Pedestrian safety improvements

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 42,900.00
Raised crossing	*each*	*$35,000*	*1*	$ 35,000	
Traffic sign	*each*	*$200*	*2*	$ 400	
Traffic control	*day*	*$1,500*	*5*	$ 7,500	
Total Cost					$ 42,900.00
Contingency	**50 %**				$ 21,450.00
Principal	**20 %**				$ 8,580.00
				TOTAL	$ 72,930.00

Drawing Number: CF-SK003
Road(s) Name: Somerville Place
Description of Works: Conversion of road to one-way (southbound) only

Item	Unit	Rate	Qty	Sub-Total	TOTAL
Treatment Costs					$ 1,400.00
Traffic signs	*each*	*$200*	*2*	$ 400	
Pavement arrows	*each*	*$250*	*4*	$ 1,000	
Total Cost					$ 1,400.00
Contingency	50 %				$ 700.00
Principal	20 %				$ 280.00
				TOTAL	$ 2,380.00

29 November 2018

The Hon. Melinda Pavey MP
Minister for Roads, Maritime and Freight
GPO Box 5341
SYDNEY NSW 2001

Dear Minister

Northern Beaches Council Beaches Link Tunnel Reference Design tunnel submission

Thank you for the opportunity to provide feedback on the NSW Government's Beaches Link Tunnel Reference design prior to finalising the design and formalising the Environmental Impact Assessment.

The Northern Beaches Council resolved on 27 November 2018 that Council:

A. *Note the community feedback received on the NSW Government's proposed Beaches Link project, including the overall support for Beaches Link as vital infrastructure and also serious concerns about the local construction, traffic and environmental impacts as well as the need for the tunnel provide a fast public transport link to further enhance the B-line.*

B. *Endorse the delivery of the Beaches Link tunnel for the community of the Northern Beaches.*

C. *Strongly support the inclusion of enhanced public transport in the tunnel and the NSW Government minimising impacts on local residents as detailed in Council's submission.*

D. *Adopt the Council submission to the NSW Government and write to the Hon. Melinda Pavey MP Minister for Roads and Maritime advocating strongly for the community of the Northern Beaches.*

E. *Continue to work with the Community to achieve the best outcome for the Northern Beaches Community should the NSW State Government advance the project to the next stage – Environmental Impact Statement assessment.*

Enclosed is Northern Beaches Council's submission, developed following significant community engagement by Council and review by Council's traffic engineers of reference design in regards to impacts and opportunities for enhancement.

Sincerely,

Ray Brownlee PSM
Chief Executive Officer

Northern Beaches Council

Beaches Link tunnel Reference design

Northern Beaches Council submission November 2018

Executive Summary

Council recognises that the Beaches Link Tunnel Project would be the largest single investment in infrastructure by the NSW Government on the Northern Beaches. This State Significant Infrastructure project will be the most strategic change to transport on the Northern Beaches for generations.

It is acknowledged that significant improvement is needed in the way our community travel around the Northern Beaches and connect to Greater Sydney. A well-functioning transport network is vital to the Northern Beaches' future. The current road network is congested, adding to delays that impacts local quality of life, economic viability and the way we move around. Council's key priority is improved public transport and the NSW Government's B-line has been a welcome addition that has significantly improved public transport patronage.

The community feedback received on the NSW Government's proposed Beaches Link project shows the overall support for Beaches Link as vital infrastructure with the need for the tunnel to provide a fast public transport link to further enhance the B-line.

Following significant community engagement and review of the proposed project, Northern Beaches Council endorses delivery of the Beaches Link tunnel for the community of the Northern Beaches.

However it is clear also that local residents have serious concerns about the local construction, traffic and environmental impacts of the project. It is critical these concerns be addressed by the NSW Government as it further refines the project design and develops its Environmental Impact Assessment for the project.

Council strongly support the inclusion of enhanced public transport in the tunnel and the NSW Government minimising impacts on local residents. Key considerations in revising the project design should include:

- Ensuring enhances public transport within the tunnel to support increased mode shift from private to public transport use
- Exploring alternate options to address the community concerns regarding the Link Road and connectivity to the portal
- Maximising the green space at Balgowlah
- Ensuring independent scientific review of the project's potential air emissions from ventilation outlets by the Office of the Chief Scientist and Engineer and publicly available pre and post monitoring of emissions
- Potential impacts on flora and fauna
- Construction compound locations
- Enhanced consultation for future stages of the project

The staff from Roads and Maritime Services particularly the Project Director have been pro-active in working with Council and briefing Councillors and are thanked for their efforts to date.

Council looks forward to continuing to work with the RMS and the community to achieve the best outcome for the Northern Beaches Community should the NSW State Government advance the project to the next stage – Environmental Impact Statement assessment.

1. Background and alignment with the existing strategic plans

The Northern Beaches Council area is home to 270,000 residents, 108,000 jobs and generates an economic value for NSW and Australia of almost $20 billion. Yet there are only 3 congested roads that connect the Northern Beaches with the rest of Sydney and our public transport system, while improving significantly with the B-line, requires significant improvement to deliver a real alternative to private car use. Our community continues to tell us that transport is the highest priority issue that needs to be addressed as we plan for the future.

The Northern Beaches Community Strategic Plan was endorsed by Council in April 2018 and concludes that our community shares a vision for '*a safe, inclusive and connected community that lives in balance with its extraordinary coastal and bush land environment*'.

Council's *Move – Northern Beaches Transport Strategy 2028* sets out Northern Beaches Council's policy directions for improving transport during the next 20 years. It includes our vision to '…*enable freedom of movement to, from and within the Northern Beaches using a safe, smart, efficient, integrated and sustainable transport network*". The Transport Strategy's position is supportive of the Beaches Link Tunnel project subject to the inclusion of public transport and minimising the impact on local residents.

Council is committed to working in partnership with key state agencies, neighbouring councils, businesses and community groups to deliver these outcomes to radically improve our public transport, network infrastructure and regional connections.

Council has conducted a significant community engagement exercise as part of its review of the Reference design. This public engagement program has included a public forum attended by over 200 residents, an on- line survey, drop in sessions and meetings with community groups. This feedback has informed Council's view on the reference design and this submission.

2. Overall endorsement of the Beaches Link project

It is clear the road and public transport network of the Northern Beaches cannot sustain our current needs. The government has highlighted the Pittwater/Spit/Military Road corridor as the most congested in Sydney, and the second slowest morning commute of the major corridors. The B-line has provided a significant improvement in public transport however only significant investment in road and public transport will address the congestion.

The community feedback received on the NSW Government's proposed Beaches Link project shows the overall support for Beaches Link as vital infrastructure with the need for the tunnel to provide a fast public transport link to further enhance the B-line.

Following significant community engagement and review of the proposed project, Northern Beaches Council endorses delivery of the Beaches Link tunnel for the community of the Northern Beaches.

3. Key issues for consideration and modification of the design

There were clear common themes in the discussions we had with the community and through submissions and feedback received via the community forum and the follow up surveys. We request

that RMS carefully review the community engagement summary we have attached to this letter. It represents the views of the issues that are important to our community and which we believe RMS needs to address in progressing the reference design through to the Environmental Impact Assessment phase.

There was also some confusion around the timeframe and process for the Environmental Impact Assessment and we suggest that further engagement with the community be undertaken to identify the key milestones that RMS is working towards and the level of involvement that residents will be able to have in these milestones.

The key issues that we wish for RMS to address are detailed below and are consistent with concerns, comments and requests made by the community in respect to the reference design.

1. Link Road and connectivity to the portal
2. Temporary and permanent impacts on green space at Balgowlah
3. Emission – stacks, filters and location
4. Potential impacts on flora and fauna
5. Burnt Bridge Creek Deviation
6. Wakehurst Parkway environmental considerations
7. Necessity of additional road infrastructure
8. Construction impacts on local roads
9. Construction and operational noise and vibration
10. Construction compound locations
11. Traffic modelling and predicted growth figures
12. Future consultation

3.1. Link Road and connectivity to the portal

The purpose and design of the Link Road and its connectivity to the portal was a key issue for our community, particularly for those communities located within close proximity (Balgowlah, Seaforth, Manly Vale).

Community members were concerned that there was insufficient justification for the Link Road, that it would create potential for congestion (with the introduction of traffic lights), that its could potentially destroy the open space and recreational facilities in this area, that members of the Golf Club would lose an asset that they have worked hard to protect and grow for future generations and they queried what other areas further north had been considered that could have less impact on the community and environment.

Whilst Council supports access to the motorway for residents of, we request that;

- RMS presents the options that were considered to the community so there is a better understanding as to why the Link Road was derived to be the best option for connecting the local community to the tunnel
- RMS further examines the location of the Link Road so the amount of open space can be maximised and the Link Road can be potentially submerged/ hidden
- RMS further reduce the amount of space required and maximise the space available so that Council can begin to liaise with the community on the best use for this future open space
- RMS considers whether Dudley Street is a viable location (generally) for the Link Road and what the result of this investigation is
- RMS advises the community of the results of these investigations/options.

In considering the Link Road we recognise that the Kitchener Street overbridge will be upgraded and we ask that RMS further considers the potential this upgrade may have on "rat-running" on local roads, the impact additional road widening might have on neighbouring properties and the wider noise impacts that this overpass upgrade could have on local communities. Also consider if it could be used to carry further traffic, and whether the separation of local and tunnel traffic using the Kitchener Street Bridge had been considered as an option to remove the signalised intersection on Burnt Bridge Creek Deviation.

Since the release of the reference design, local community groups have put significant time in workshopping and developing alternatives to minimise impacts on local communities and provide for better connections to the tunnel entry. We ask RMS to carefully consider each of these suggestions and model these options against those options that RMS has already prepared to determine if there are any advantages in adopting an alternate solution to accessing and exiting the tunnel entry and Balgowlah. These options should be considered in respect to how much improvement to proposed use, the local environment (including the nearby creek and vegetation), the construction footprint and the long term visual and environmental impacts it would have.

We recognise that RMS has considered upgrades to the existing road network; however, we understand traffic modelling indicates that existing roads do not have enough capacity and would require significant upgrading to provide the additional capacity needed. We also understand that this would require additional property acquisitions for road widening and intersection improvements at the key intersections along the route. It would be beneficial to share any information about the potential improvements that have been considered in these areas, associated costs, and any impacts they would have on nearby property and overall performance of the road network.

In summary Council's view is that:

- The priority is minimising the impact on local residents and maximising the green space
- The RMS should further explore the following opportunities to identify if they feasible:
    - Upgrading the existing roads to provide a connection to the tunnel
    - Adjusting the Kitchener street overpass to enable the traffic lights on the Burnt Bridge Creek deviation to be deleted
- If there is no other feasible option, Council supports the Link Road subject to:
    - Maximising future green space area, including constructing 'green land bridges' over link road and relocating the tunnel facilities onto the tunnel roof
    - Deleting the traffic lights at the tunnel portal if an alternative option is available

3.2. Temporary and permanent impacts on green space at Balgowlah

Construction activities in Balgowlah to support the construction of the Beaches Link will have a significant impact on the current green space in this area. This includes the closure of the golf course and restricted access to this area through the extended construction period. There is considerable concern from the local community that construction impacts will have an adverse and extended impact on this local area.

We ask RMS to do further work to understand how the footprint of the construction site and the proposed Link Road can be minimised during the construction period and how the design of the Link Road can be refined to ensure the maximum amount of space is available.

We request that RMS further examine the local area of the Link Road and what proportion can be covered and that further work is done to determine how the construction footprint in this area can be minimised during construction.

In regard to the future use of the current Balgowlah Golf Course, the view of Council is that:

- Council will engage with the community regarding the future use of the green space
- The NSW Government should fund all site development costs post-construction of the Beaches Link.

3.3. Emission – stacks, filters and location

Throughout the feedback period, Council has received considerable correspondence in respect to the location of the stack in Balgowlah, relative to schools and residents. There are concerns that no filtration has been proposed despite the level of investment that would be required to build the tunnel and there have been suggestions that the emissions should be re-distributed from Balgowlah to the Seaforth stacks.

Council has sought advice from the Office of the Chief Scientist and Engineer and understands that for this project:

- The Office of the Chief Scientist and Engineer will coordinate a scientific review of the project's air emissions from ventilation outlets, using two international experts which is made public when the EIS is public
- The NSW Chief Health Officer will issue a statement on the impacts of the outlets at the same time
- The Office of the Chief Scientist and Engineer will conduct a second stage full review of the air quality aspects of the EIS once it's on public exhibition. This includes ambient, in-tunnel air quality and construction impacts.
- Once operational, the EPA will regulate the ventilation outlets to standards set through an Environmental Protection Licence (EPL)

The briefings provided by the Office of the Chief Scientist and Engineer and the RMS on the emissions were informative in regard to the potential impacts and the significant costs involved in filtering the emissions stacks. It is the view of Council that the RMS should publicly release detailed overviews of the emission's studies and reports so that the community can be better informed.

Council in addition requests the RMS to:

- Investigate the feasibility of the community request to direct the majority of emissions to the Seaforth facility to minimise the impact on air quality in the Balgowlah area.
- Provide a report on the feasibility of the future filtration of the ventilation structures associated with the project and measures to minimise the impacts, including the visual amenity on the local communities around the portal sites. This should also include a full assessment of emission impacts not only on the local scale but through the supply chain of generation of power to drive the filtration system.

3.4. Potential impacts on flora and fauna

We recognise that the Environmental Impact Assessment must consider the impacts the proposal will have on flora and fauna and identify measures to minimise any impacts on the local environment.

Prior to completing the assessment Council requests to see the proposed controls that will be in place to minimise any risk to flora and fauna. This includes any specialist studies that have been undertaken to identify flora and fauna throughout the extent of the proposal, the potential impacts and how risks are proposed to be mitigated.

Council requests that stringent controls are included as part of the construction tender and that the successful contractor ensures that flora and fauna can be protected throughout the construction of the project. Design should also be refined to ensure that the operation of the tunnel does not have any long-term impacts on the local flora and fauna. Council requests that further information be provided by RMS on how flora and fauna will be managed.

3.5. Burnt Bridge Creek Deviation

Should widening of the road on Burnt Bridge Creek Deviation to incorporate the entrance to the tunnel result in encroachment of riparian areas of Burnt Bridge Creek, Council requests the following:

- The weir on Burnt Bridge Creek (near the proposed Motorway facilities building) functions as a sediment basin. The basin is important, capturing enough sediment that warrants Council cleaning it out every two years. The sediment basin must be retained or replaced if the creek is removed on this section of Burnt Bridge Creek Deviation and its function should not be compromised if it is to be relocated.

- Widening of the road to incorporate ramps to the Beaches Link results in the loss of the current riparian zone for the reach of Burnt Bridge Creek located between the underpass near Dudley Street and Kitchener Street. This is a 'first order' creek, which means that a 10-metre riparian corridor is required (under the *Water Management Act 2000*). The widening of Burnt Bridge Creek would mean the removal of the majority of the riparian zone of the creek in this section. Therefore, Council asks that you re-route this section of the creek to meander through the new recreational area in order to allow the creek to have a riparian area. This will see creeks that are well incorporated into reserves and increase the recreational value, public amenity and habitat areas.

- There is also an opportunity to redesign this section of creek to incorporate additional water quality treatment, after the sediment basin, to treat the additional road surface run off from the new road through to the reserve area and from additional impervious surface on Burnt Bridge Creek Deviation.

- Lot 21 DP 836340 owned by RMS appears to have been used as a stockpile location for at least the last ten years. It is included in the area impacted by works, but the future of the lot is unclear. We note that having a site like this in a riparian zone of the creek is not ideal due to sediment contribution and wish for further work to be undertaken on this. Council seek further clarity on the future use of this site in the future.

3.6. Wakehurst Parkway environmental considerations

On page 26-27 of the August 2018 Project Update it shows basins on the drawing, which we presume is proposed for treatment/detention and that more information will be provided in the detailed design. Council wishes to understand if these facilities will have enough capacity to offset the increased impervious area along Wakehurst Highway on the basis of two additional lanes.

Please note that the basin proposed for the western side of Wakehurst Parkway is close to an Aboriginal Heritage site for rock carvings and the basin should not impact this site.

3.7. Necessity of additional road infrastructure

Feedback received through the community forum that Council hosted on 17 October 2018 and captured in surveys raised, concerns over the necessity of the tunnel. That it could have the potential to create greater car use. Council does not support the increase in car use and one key objective of Council's Transport Strategy is to see a significant increase in the number of people, who utilise public transport over the next 5 years.

Whilst Council is in support of the tunnel, it must be supported by public transport. Public transport options must be further expanded prior to the completion of the tunnel to create the necessary mode shift from private vehicles to public transport or ride share. We recognise that the introduction of B-Line services has been a real success and is offering great benefits for the residents of the Northern Beaches but investment in public transport cannot stop here.

3.8. Construction impacts on local roads

Any significant infrastructure project is likely to generate a significant increase in construction vehicles transporting spoil and materials to and from the site. The impact of construction vehicles on our local road network and on neighbouring properties was a concern that was raised consistently in the feedback we received.

Council wishes to see defined access routes to service the project and all measures taken to minimise the impact on local roads and properties located near construction compounds or on the haulage routes.

We request RMS to:

- define and restrict access routes
- restrict vehicle movements to the State Road Network
- only use the Balgowlah site compound for local works.

We see this will minimise the impact on properties in Balgowlah and Seaforth and reduce congestion and safety risks on local roads.

3.9. Construction and operational noise and vibration

Residents are concerned about prolonged construction noise and potential vibration (with tunnelling); potential property damage and drops in local property prices associated with construction and operational noise issues.

We appreciate that the EIS will include specialist studies addressing expected construction noise and vibration levels and outline mitigation measures to minimise these impacts. Council requests to be briefed on these specialist studies closer to the release of the EIS so we can better understand how RMS intends to manage these and to ensure that these expected impacts are communicated with those likely to be impacted by these works.

We would also like to see a greater use of less-impactful construction compounds across the project to ensure the impacts on local residents can be minimised.

3.10. Construction compound locations

Council has been asked to indicate a preference in respect to Options A and B compounds at Seaforth. We acknowledge that both options will have impacts and that local residents are requesting that alternate locations to access and construct the tunnel be further investigated.

We request greater detail about each of the site compounds and the likely impact (type and duration) they will have on the local community.

At this stage Council's preference is to proceed with option A at Seaforth Oval overflow parking area as this appears to be the lesser impact option. We recognise that the Balgowlah site compound is necessary to allow construction to take place, but we ask that every effort is made to minimise the impacts of traffic access to the Spit West area during peak hours.

In regards to the temporary construction site at Balgowlah Golf Course, it is noted that impacts to the creek will be 'minimised'. The creek and riparian zone should be excluded from the designated work site. An alternative option is to divert creek flows around the work site, as used on some of the sites for the Northern Beaches Hospital road upgrades.

In respect to the Middle Harbour tunnel, Council wishes to get confirmation on how stormwater will be discharged from the tunnel to the Harbour waterway, whether it will be treated first and how treatment is intended.

3.11. Traffic modelling and predicted growth figures

Whilst the Northern Beaches supports growth and welcomes investment and major infrastructure projects, such as the tunnel, there are fears amongst members of the community that major infrastructure must be supported by upscaling of current public transport. Investing in public transport early will encourage an early mode shift and a more competitive option to car use.

We recognise that the tunnel is designed to meet the current and future demands of the Northern Beaches and is long overdue but investment in a road tunnel is not the only thing necessary to meet expected growth on the Northern Beaches. Any growth must be complimented with investments in public transport and social infrastructure, such as health services and investment, to encourage industries and local business growth.

3.12. Future consultation

Through our consultation activities we were able to canvass the views of the community, many of which live in close proximity to each of the sites that will be used to build and operate the Beaches Link Tunnel.

We recognise that RMS has been considering the alignment and the portal locations for the Beaches Link for some time now. To give the community an appreciation and some understanding of the work put into this project to date Council considers it would be advantageous for RMS to:

- Publish a report detailing what options have been considered in reaching the reference design

- Provide a summary of any additional options or refinements that have been made to the proposal as a result of the most recent engagement and feedback received from the community
- Re-engage with the community to explain the expected timeframes for upcoming project milestones including a public display of the EIS
- Continue to liaise with Council and other areas of Transport for NSW to discuss other transport options that are being considered to address future transport needs on the northern beaches.

Release of these supporting documents will give the community a better understanding of future transport on the Northern Beaches and provide Council with an opportunity to partner with the NSW Government to deliver the best outcomes for the northern beaches community.

Once again, we appreciate the opportunity to provide our feedback on the reference design and look forward to receiving regular updates on how this feedback is being considered and addressed.

Community Engagement Report

Beaches Link Tunnel submission

09 November 2018

Summary

Northern Beaches Council committed to provide feedback on Roads and Maritime Services' (RMS) Western Harbour Tunnel and Beaches Link reference design which was released to Council and community in July 2018.

As part of the submission development process Council facilitated community engagement activities to collect feedback on the reference design. The objective was to listen and collect the views of the Northern Beaches community to help inform Council's submission to RMS. Engagement activities included[1]:

- Stakeholder meetings (6 meetings)
- Receipt of community submissions (64 submissions)
- Community forum (200+ attendees, 21 speakers)
- Public survey (217 responses)

Considered feedback, received via the engagement activities, is discussed in this report and informs part of the submission Council is to send to RMS by 30 November 2018.

Key Findings

Through our engagement activities we were able to canvass the views of the community, many of which live in close proximity to the sites that will be used to build and operate the Western Harbour Tunnel and Beaches Link.

There were eleven key themes identified in the data we collected through submissions received, via the community forum, stakeholder meetings and in surveys completed.

Themes identified through engagement included:

- Link Road and connectivity to the portal
- Temporary and permanent impacts on green space at Balgowlah
- Emission – stacks, filters and location
- Potential impacts on flora and fauna
- Burnt Bridge Creek Deviation
- Wakehurst Parkway environmental considerations
- Necessity of additional road infrastructure
- Construction impacts on local roads
- Construction and operational noise and vibration

[1] *Throughout the engagement process Council also encouraged interested community members to provide feedback directly to RMS.*

- Construction compound locations
- Traffic modelling and predicted growth figures

Overall, we heard that the community was generally supportive of the principle of a tunnel but this support was conditional on the key themes being addressed by RMS in progressing the reference design through to the Environmental Impact Assessment phase.

It was evident from the RMS information sessions and the Northern Beaches Council forum that the community felt underwhelmed by the amount of publicly available information, particularly on the options that had been considered as alternatives to the Link Road.

There was community concern for the proposed method of managing emissions and the long term impacts it would have on nearby properties, education facilities and future green space use. There also appeared to be a lack of understanding of RMS' timeframes and next steps.

Background

Given the strategic significance of the Western Harbour Tunnel and Beaches Link, Northern Beaches Council committed to develop a submission with consideration of the Community Strategic Plan; the draft Northern Beaches Transport Strategy and through engagement with the local community.

In addition, at the August 2018 Northern Beaches Council meeting, a Notice of Motion was passed and resolved to seek community feedback on the Western Harbour Tunnel and Beaches Link reference design by facilitating a community forum.

Subsequent to this Notice of Motion, Council officers received community submissions, reviewed community sentiment in the public domain, met with community groups to discuss alternate solutions, provided a public survey to collect community feedback, and analysed community submissions on the RMS social mapping page.

Engagement Findings

Community Forum

The community forum was an open public event where community members provided and listened to feedback on RMS' reference design. Feedback was captured to inform the submission to RMS.

To raise awareness and attendance, the following promotional actions were implemented:

1. Forum announced 12 days prior to the event on Friday 5 October
2. Council homepage banner carousal (1,458 unique page views; 2:16m av. time on page)
3. Council Your Say website (193 unique page views, 2:48m av. time on page)
4. Council Facebook boosted post (14,476 people reached; 1,447 engaged post; 113 clicked link)
5. Direct email to existing stakeholder lists (38 people; 58 percent clicked link)
6. Advertised in Manly Daily 'Northern Beaches Weekly News' and noted in the 'Message from the Mayor'
7. Media release distributed

The forum was held on Wednesday 17 October 2018 from 6 to 8:00pm at Balgowlah RSL. It was independently moderated and each speaker had three minutes to provide their feedback on the RMS Western Harbour Tunnel and Beaches Link reference design.

Forum participation was:

- 200 attendees (250 RSVP's)
- 14 pre-registered speakers
- 21 speakers (two pre-registered speakers did not attend, however 9 additional speakers registered at the forum)

55 percent of the 21 speakers were opposed to the reference design. Of those that were opposed many questioned the necessity of the Link Road and questioned whether the tunnel was the best transport solution for the Northern Beaches, for example, what alternate major transport options (i.e. heavy rail or light rail) had been considered by RMS.

There were a number of speakers in favour of the NSW Government building the tunnel as soon as possible. There were also speakers who raised issues around the safety of residents and nearby school children and the need to consider the impact the proposal would have on local streets. Some speakers had concerns relating to the expediency of current RMS consultations contrasted with the investment significance and the cost benefit ratio.

At the end of the formal speakers there was a roving microphone taking further comments from the floor. Many of these comments echoed the sentiment and concerns of the speakers before them.

Lastly, while the intent of the forum was to listen to the community, a number of questions were taken on notice by Council. These questions related to Council's ability to advocate for change, Council's timeframe for considering comments and Council's submission development process[2].

Direct Submissions

A total of 64 submissions were received between August and 6 November 2018. A summary of these submissions is available in the appendix.

Prior to the community forum, over 40 submissions had been received by Council. The majority of these submissions were provided by:

- Balgowlah local residents
- Balgowlah Golf Club members
- Parents and family of Balgowlah area school children

The majority of these submissions were not opposed to the tunnel but strongly objected to the Link Road and the loss of green space. Many respondents were also concerned about the environmental impacts the project would generate during construction and operation.

Furthermore, a recurring theme in these submissions was the potential loss of property value associated with the Link Road.

[2] *Questions put on notice were responded to on Friday October 19, 2018 via direct email to forum participants and made publicly available via the Council's Your Say Beaches Link Tunnel Community forum webpage.*

Survey

A survey was released after the community forum to offer attendees, those who could not attend, and the broader community with an opportunity to provide additional quantitative and qualitative feedback on the identified key themes.

The survey was promoted by:

- Announcement at the community forum (200+ attendees)
- Direct email to forum RSVP and attendee list (254 people; 38% clicked survey link)
- Council Facebook post (2,285 people reached; 26 engaged post; 23 clicked survey link)

A total of 217 survey responses were received. The following table identifies which of the key themes were of most importance to survey respondents:

9.56%	Construction impacts on local roads
8.26%	Construction impacts on flora and fauna
11.98%	Road connectivity (to tunnel portal)
11.05%	Emission stack operation and location
9.75%	Construction impacts on green space
7.52%	Construction and operational noise impacts
10.21%	Traffic modelling
9.66%	Additional road infrastructure
4.74%	Construction compound locations
5.11%	Consultation to date
7.99%	Environmental Impact Assessment
4.18%	Other[3]

Road connectivity to the tunnel was the highest ranking issue, followed by the operation and location of the emission stack. Traffic modelling was considered as the third top issue.

Survey results, including free text comments, are available in Appendix.

Stakeholder Meetings

Council met with community groups on a number of occasions and has considered the suggestions put forward by these groups. We also understand that similar discussions have occurred with RMS.

[3] *Other comments (sic): Only be for public transport. Reduce car usage. Already overused Hilltop Crescent and its potential to become the local rat run. Loss of existing housing. No car tunnel. We need a rail link. The viability, or otherwise, of the proposal. Toll coasts & increased congestion on the beaches. Addition population plans. Business case weighing public transport alternative and human and social cost of the design proposal that invoke use of the Balgowlah golf course. I am worried about it not going ahead due to a possible change in government. Public transport alternatives. Ongoing increase in traffic. Impact on local streets, impact on walkability. Public transport options! Public transport connectivity. Nothing negative! Trust - Look at the Westconnex inquiry! Cost vs benefit analysis? Is an estimated $8 billion not better spent on something that makes sense? Property devaluation, loss of amenity where we live. The significant impact on the value of impacted properties. Public / Mass Transport. Financial Loss. Impact on local and main roads of increased traffic re: congestion and required upgrades at council expense. School kids nearby. Public consultation, transparency, predictable modelling of impacts to residents close (e.g. health hazards) and far (further congestion) of the tunnel. Mental health impacts. Overdevelopment.*

A total of six stakeholder meetings were facilitated by Council officers between August and November 2018.

Next Steps

Council has reviewed the feedback received during the community engagement period and has prepared a draft submission for consideration by Council at the November 2018 meeting.

The Council report will be available via the Northern Beaches Council website on the Thursday prior to the Council meeting. The Council recommendation will be published as part of the Council minutes and will also be available via the Have Your Say project page.

Council will also continue to meet with RMS to understand how they are considering the submission and what changes are being made to the reference design as a consequence. Council will inform the community once feedback on the submission has been received[4].

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[4] *Council understands that RMS does not intend to release the Environmental Impact Statement on the revised design until mid-2019*

northern beaches council

Community Engagement Report

Beaches Link Tunnel submission

Appendix 1 Community Comments

The comments below reflect the themes that arose through the engagement process.

Theme	Community Comment	Recommendations
Supportive of the tunnel	As a supporter of tunnel I did not speak to the forum in fear of being heckled and ridiculed in public. We need to add an additional route into Sydney CBD. I feel strongly that we need the tunnel to ease congestion and improve travel times for those who commute into the city every day. We need this vital piece of infrastructure to commence as it has been postponed too many times. The identified issues are progress blockers, this project needs to be started as soon as possible. Connect the Northern Beaches to Sydney quickly. A tunnel is needed however construction and design have to be conducted in a smart manner that considers community welfare, feedback and impacts of construction on operation on green space, animals, plants and residents. The Beaches Link Tunnel is necessary to the whole of the Northern Beaches to relieve congestion and to speed up the movement between the NB and the rest the city.	The tunnel is consistent with Council's Transport Strategy however all efforts should be made to minimise impacts and consider greater public transport options to benefit further from the tunnel and discourage private car use.
Concerns about Link Road	Rationale around the current reference design, querying whether it's the best option and wanting to better understand what options were considered. The potential for congestion with the introduction of traffic signals on Burnt Bridge Creek Deviation. The Link Road will destroy the open space and recreational facilities in this area Members of the golf club will be losing an asset they have worked hard to preserve and grow for future generations Why other areas further north cannot be considered as entry points to the tunnel	Consider repositioning the Link Road so green space can be maximised. Consider other upgrades to local roads to relieve congestion and minimise the potential for "rat-running"
Emissions – stacks, filters and locations	The proposed location of the emission stack in Balgowlah Valley relative to schools and nearby residents The technology being applied to this scale of tunnel is insufficient to other countries and the level of investment in the project (i.e. more should be spent coming up with a better solution)	Request RMS redistribute emissions to Seaforth stack and relocate motorway facilities (including the stack) to the roof of the tunnel. Minimise any visual impacts from the

Theme	Community Comment	Recommendations
	Suggested re-distribution of emissions from Balgowlah to Seaforth stacks	emissions stack Further consider whether filtration is necessary and the associated cost and benefit
Construction impacts on local roads	Impact construction vehicles will have on local road network and on neighbouring properties (noise, hours of operation, long duration)	Use of State Roads Limiting use of Balgowlah site compound for tunnel entrances only.
Temporary and permanent impacts on green space	The construction works proposed in Balgowlah will have a significant impact on properties in proximity to the golf course The long term plans for the golf course will see a valued green open space lost The construction works in this area will see local flora and fauna at risk	Consider repositioning the Link Road so green space can be maximised. Consider other upgrades to local roads to relieve congestion and minimise the potential for "rat-running" Stringent controls on contractors in areas were flora and fauna is identified
Impacts on flora and fauna	The project will put local waterways and fauna habitat at risk What controls will be in place to minimise risk to flora and fauna	Stringent controls on contractors in areas were flora and fauna is identified
Consultation to date	There's been insufficient consultation with the community on how the reference option was determined, and what other options were considered in determining the best option is being taken forward The speed of the project needs to be slowed down or halted so there is sufficient time for the community to discuss what other options are available to address future transport Publish a report outlining all the other designs were considered prior to releasing the reference design	Explain the upcoming milestones and timeframes Release a report detailing the options (20) that were considered by RMS Release a report detailing what other transport solutions were considered and how these compared to a road tunnel
Construction and operational noise and vibration	Serious concerns about prolonged construction noise and potential vibration (with tunnelling) Concerns around potential property damage associated with tunnelling and vibration Concern around drop in property price for those homes in close proximity to the project	Stringent controls to be placed on the contractor Detailed information in the EIS regarding expected construction and operational noise and vibration
Necessity of additional road infrastructure	Rationale for introducing a Link Road and why existing roadways cannot be utilised Congestion issues associated with introducing further traffic lights Risks that additional roadways will have on nearby schools and local roads	Release of a report detailing what other options were considered (apart from the Link Road) Investigate upgrading local intersections and what benefit they would add to the overall traffic network Investigate whether there is any merit in considering a Link to the tunnel via Dudley Street so the green open space can be retained

Theme	Community Comment	Recommendations
Construction compound locations	The locations of both compounds (A and B) in Seaforth will have impacts on the local community. Alternative locations to access and construct the tunnel should be considered so the Balgowlah Golf Course remain	Restrict use of the Balgowlah Compound Utilise Option A compound in Seaforth
Traffic modelling and predicted growth figures	Concerns around future traffic levels Fears that major infrastructure will create growth too substantial for the area Tunnel cost prohibitive, resulting in low use (and therefore minimal benefit).	

Appendix 2 Survey Responses

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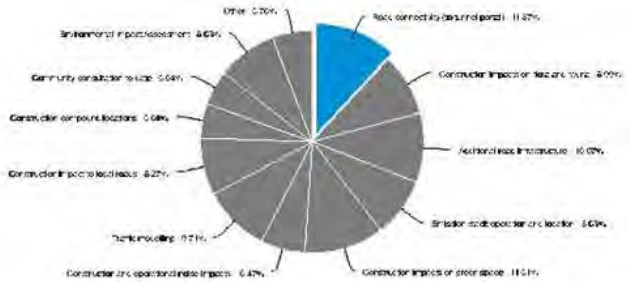
Please tell us your general views on the Beaches Link Tunnel project

Please tell us your general views on the Beaches Link Tunnel project		
10/26/2018	1605681221	current proposed 4 lane connected road to tunnel causes an issue regarding the capacity for Kitchener street to cope with the increased vehicle build up during construction and used as an alternate route.
10/26/2018	1605677679	The planned road tunnel is not compatible with sustainable transport planning. The immense cost of building the tunnel is not justified and funding would be far better spent on new technology and public transport options. The adverse consequences of the Beaches Tunnel have not been adequately considered. The planned Beaches Tunnel would have multiple lanes that would cater mainly for car travel, not public transport. Priority should be given to public transport improvements rather than road projects that will increase car dependency. The tunnel has the potential to increase reliance on cars, congestion on local roads, convergence of traffic entering the CBD and demand for car parking facilities. The Northern Beaches is likely to be a magnet for cars in summer and additional parking would be required to cope with the influx of cars. The associated at grade road widening along Wakehurst Parkway would mean the irreversible loss of a wide swathe of bushland adjoining Garigal National Park and Manly Dam Reserve.
10/26/2018	1605677883	While necessary to reduce congestion it will only be a short term measure unless fuel prices climb drastically. I suggest that your organisation do not oppose a railway out towards the Northern Beaches which is also necessary now not in 20 years time.
10/25/2018	1605676452	Constructing an expensive and disruptive tunnel to put more cars on the road is not the answer. It would be a better idea if it was a public transport ONLY tunnel. You could more move people more efficiently this way. We know that building more roads just attracts more cars and then we're back at square one, needing another road. Also, by limiting the population on the Northern Beaches, ie limiting development, you eliminate the problem of having to continually provicling more infrastructure.
10/25/2018	1605676436	Impact on air quality due to unfiltered exhaust stacks. Impact on traffic during works, roads already clogged. Impact on traffic post completion due to lack of flow and feeder roads.
10/23/2018	1605673230	I fully support the Beaches Link Tunnel project. I anticipate it will alleviate major congestion on the beaches-city route and provide better transport corridors in Australia's busiest and biggest city. Its long overdue
10/24/2018	1605671893	This project is one of the most vital pieces of infrastructure need for the future of the Northern Beaches
10/23/2018	1605666843	As a resident of Frenchs forest and only 300 meters from the new hospital, I believe that the tunnel is essential to provide realistic transport for this area. I believe it should be complemented by widening and flood proofing the Wakehurst Parkway to Narrabeen.
10/23/2018	1605666177	Excellent project & long overdue. Please don't drown it in red tape. Commuters and families really need this!
10/23/2018	1605663966	Hurry up and build it.
10/22/2018	1605661063	I think there needs to be multiple approaches to fixing the traffic problems of Northern beaches residents. The tunnel should have been built years ago and it will only get harder to build the longer we wait. Public transport improvements using the tunnel are very important.
10/22/2018	1605660719	I do not want a Tunnel to the Northern Beaches. I feel the infrastructure and the extra traffic will ruin the area.
10/22/2018	1605660392	Strongly in favour. Improve traffic flow. Improve life on the northern beaches. Reduce pollution from idling cars.

10/22/2018	1605060566	Very positive. It will be a vital amenity for the Peninsula.
10/22/2018	1605060435	A tunnel is fine but it has to prioritise public transport. More cars is simply ridiculous and a short term strategy.
10/22/2018	1605060330	Probably a good idea, if it does not cause environmental damage and residents disturbed by the construction are adequately compensated.
10/22/2018	1605060185	
10/22/2018	1605058268	Very supportive!
10/22/2018	1605056216	Council call for a stop on progressing the current proposal until the whole of government genuine engaged with Council and the community to identify was the problem is we are trying g to solve, a genuine review of options is considered linked to planning for the wider area, consideration of finding options etc. I do not support a road tunnel.
10/21/2018	1605054641	Supportive of the overall initiative however concerned with traffic management and project delays.
10/21/2018	1605054584	I am sceptical that it will generate a benefit cost ratio of greater than unity if the construction disruption and environmental costs are properly included. I believe we need better public transport connectivity from Dee Why to Chatswood and the beaches to the CBD. The public transport alternatives must be considered and evaluated against the road tunnel alternative.
10/21/2018	1605054433	
10/21/2018	1605054384	There is no need for a tunnel opening at Burnt Bridge, it simply does not work there is not enough land there for a tunnel opening and the emissions are concentrated at the bottom of the valley. If there is to be a tunnel on Burnt Bridge the stack has to be filtered. If no filtering of the stack then only proceed with the tunnel at Wakehurst Parkway and make Military Road a 24 hour clearway this would also reduce the cost of the tunnel. They could still place a toll on Spit Bridge and possibly upgrade Spit Bridge.
10/21/2018	1605054379	I think it's a great plan, and I hope it goes beyond plan and actually happens, in my lifetime.
10/21/2018	1605054373	Very positive
10/21/2018	1605054369	We feel there other alternatives than the tunnel link - such as congestion charges and continues bus improvements. We do not at all like the tunnel portal negatively impacting Balgowlah. We are scared about the impact of traffic changes along Wanganella street, creating rat runs and parking issues near our family home. We are greatly disappointed with the loss of green space around the oval and Balgowlah golf club - we use that all the time and even if they do something new with the space in 7 years it will have a major road hacked through it We are nervous about the loss of value on property in Balgowlah We are worried and unhappy about having the emission stack within 1km of our home We are worried about the construction and impact for such a long period right on our doorstep!
10/21/2018	1605054365	
10/21/2018	1605053066	I do not believe it will be anywhere near economically feasible due to the relatively low population on The Northern Beaches (which I like)so it scares me what overdevelopment will have to occur to massively increase the population to try and fund all these works. If it goes ahead cars will be able to get to the Northern Beaches more quickly but when here won't be able to travel around, even with the stupid idea to make Pittwater Rd a clearway most of the day, which would ruin the day trade of many businesses on Pittwater Rd. Leave the population where it is and we will all have to live with the roads we have, as we have done for the last 20+ years.
10/21/2018	1605052654	
10/21/2018	1605052665	
10/21/2018	1605051921	
10/21/2018	1605051721	Against proliferation of road tunnels and increases in roads across sydney including this one. Against proliferation of toll roads. For massively improved mass transit across Sydney & greater Sydney. For much better active transport. For reduction in roads.
10/21/2018	1605051668	
10/20/2018	1605051523	
10/20/2018	1605051438	Adding another means of entering and leaving the beaches is a must however this should be concentrated towards public transport means and not just private transport.
10/20/2018	1605051414	I'm on the fence. Congestion on Spit and Military Roads is terrible- I drive it every day of the week. However, I already pay more than $4,000 per year in tolls and don't wish to pay any more. I'm alos concerned the Beach Link road will end up causing complete chaos around all the lower northern beaches on the weekend with a massive increase in beach goers.
10/20/2018	1605051340	The only justification for such a tunnel would be if its sole focus was on providing public transport. As simply (a totally expensive) roadway for cars, all it would do would be to further encourage people to use their own vehicles.
10/20/2018	1605051342	I think you need to get cars off the roads and be investing in rail.
10/20/2018	1605051329	I think we need to stop and ask the question - what is the problem they are trying to solve. Then, come up with some solutions - public transport, perhaps a tunnel, or a tunnel for buses or trains only. But to spend $6Billion of the tax payers money without the community consultation is a crime. Especially when they can't tell us the problem they are solving.
10/20/2018	1605051325	I would prefer investment in improving public transport instead of the tunnel.
10/20/2018	1605051313	
10/20/2018	1605051311	Do not support road link. Support rail or light rail link
10/20/2018	1605051307	we desperately need a solution to our traffic issues

10/20/2018	1605051293	Not keen. Prefer to see money spent on better public transport. High tolls will defeat the object. Concern that will encourage further high rise development.
10/20/2018	1605051302	I oppose a car tunnel totally. A train tunnel should be the only option.
10/20/2018	1605051301	Just want it to go ahead
10/20/2018	1605051294	We have been waiting 35 years for a solution with a tunnel and answer to the problems plagued by the Spit Bridge and Roads to the city for northern Beaches residents. North Seaforth and North Balgowlah residents should have easy access to the tunnels and always seem to be overlooked. There should be loop roads or roundabout at exit / entry points so that these residents don't have to travel backwards to get access. An example is at Wakehurst parkway exit, there should be a loop road to allow north seaforth , North Balgowlah and seaforth residents to exit easily at this point. Similarly the link rd exit should connect with Burnt Bridge Creek rd from golf course and exit right for seaforth residents at seaforth intersection and left for Balgowlah and Manly residents at seaforth intersection. This will also lead to less congestion in the future.
10/20/2018	1605051284	It can't come soon enough!
10/20/2018	1605051178	I welcome the improvement in travel times for beaches residents, but I am concerned that the prime motive is to allow for massive population increase. We must plan for this in a strategic way, to prevent ugly high rise and tacky estates!
10/20/2018	1605051124	In ten years time. Electric vehicles only. Clear way through Mosman till 8pm now. Ask the EU drivers on the dozen upgrades that we all make the roads better. Now When all unit developments over 6 units have primary sewage primary treatment on site (Hawaii) now. When there is an understanding of future jobs, majority of office jobs will be done with a few technicians feeding in data. When we take all the Smokey vehicles of the road and ban diesels (London soon) When all new houses have charge points for electric vehicles (London now)
10/20/2018	1605050471	
10/20/2018	1605049644	Concerned about the delivery of the project. Concerned about it being on time and on budget and the disruption to every day traffic! Thanks
10/20/2018	1605049620	While I think it's a good idea to improve traffic along the corridor into the city, I don't think the tunnel will actually alleviate the bottlenecks for traffic getting out of the norther beaches. the pinch points at spit and mosman will remain and the negative impacts (road changes, smoke stacks, cost) outweigh the benefits.
10/20/2018	1605049340	The hospital roads project has been a disaster in terms of impact on local residents. This must not happen for the tunnel. No way the golf course should be used as a construction site.
10/20/2018	1605049222	We don't need it, we need public transport not another road infrastructure. Environment needs to be protected, and people to work in the peninsula.
10/19/2018	1605049073	I am totally opposed to it unless it is for public transport only
10/19/2018	1605048013	A good thing and long overdue.
10/19/2018	1605048878	I think it's a vital and important addition to the Northern Beaches transport infrastructure. The current situation is ludicrous and certainly not sustainable.

Please select the elements of the project that are most important to you.



Answer	Count	Percent	20%	40%	60%	80%	100%
Road connectivity (to tunnel portal)	33	11.87%					
Construction impacts on flora and fauna	25	8.99%					
Additional road infrastructure	28	10.07%					
Emission stack operation and location	24	8.63%					
Construction impacts on green space	32	11.51%					

Beaches Link Tunnel community forum - follow up survey 20/10

QuestionPro

Construction and operational noise impacts	18	6.47%
Traffic modelling	27	9.71%
Construction impact to local roads	23	8.27%
Construction compound locations	14	5.04%
Community consultation to date	14	5.04%
Environmental impact Assessment	24	8.63%
Other	16	5.76%
Total	278	100 %

Please select the elements of the project that are most important to you. - Text Data for Other

10/23/2018	1605066177	Nothing negative!!
10/22/2018	1605061663	Public transport connectivity
10/22/2018	1605060435	Public Transport options!
10/22/2018	1605056216	Ongoing increase in traffic. Impact on local streets, impact on walkability
10/21/2018	1605054584	Public transport alternatives
10/21/2018	1605054273	I am worried about the it not going ahead due to a possible change in government
10/21/2018	1605054065	Business case weighing public transport alternative and human and social cost of the design proposal that involve use of the Balgowlah golf course.
10/21/2018	1605053666	Addition population plans
10/20/2018	1605051414	Toll costs & increased congestion on the beaches
10/20/2018	1605051340	the viability -or otherwise- of the proposal
10/20/2018	1605051311	We need a rail link
10/20/2018	1605051295	Loss of existing housing
10/20/2018	1605051282	No car tunnel
10/20/2018	1605051284	Already overused Hilltop Crescent and its potential to become the local rat run
10/20/2018	1605049222	Reduce car usage
10/19/2018	1605048675	as above, should only be for public transport

Please provide detailed feedback on any of the important elements identified above.

Please provide detailed feedback on any of the important elements identified above.

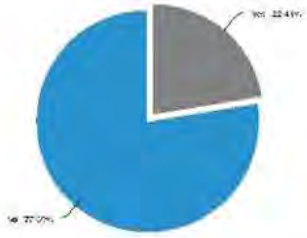
10/26/2018	1605081221	consideration is needed on local roads servicing the tunnel and alternate routes.

10/26/2018	1605077679	Impact on southern suburbs of Northern Beaches In order to access the tunnel, heavy traffic is likely to converge on the southern suburbs of the Northern Beaches. This includes Seaforth and Balgowlah, where tunnel openings would be located, as well as surrounding suburbs, such as Manly Vale and Brookvale, which would be affected by through traffic. Local traffic The motorway tunnel is likely to cause more congestion on local roads. A faster travel time via the motorway will encourage travel by car and generate more traffic. It will also increase the demand for car based infrastructure including parking. Traffic forecast Traffic predictions are based on current peak hour traffic. The traffic modelling apparently does not factor in the influx of traffic to the Northern Beaches, particularly in summer. This inevitable influx in traffic will lead to an increased demand for car parking near the beaches. Wakehurst Parkway It is important to give priority to the long term social and environmental benefits of a viaduct (above ground) road to avoid the extensive widening at grade and the loss of bushland and habitat. Along the stretch of Wakehurst Parkway between Seaforth and Warringah Road side turn offs are not currently provided or required. Nearly all the traffic would continue to be through traffic, except for cars that require local access for recreation purposes. Recreation Use The reserves on either side of Wakehurst Parkway are well used for recreation, walking and cycling. A raised road would allow for the land underneath to be used for this purpose i.e. for local access and recreation. This would have a substantial long term benefit for residents, visitors and the environment, including native fauna. Wakehurst Parkway North The northern section of Wakehurst Parkway a raised road would be the best option to avoid the flood prone sections and avoid the devastating clearance of bushland that would be required if the road was widened to 4 lanes. A raised road would allow for a predominantly recreation use and access at ground level. It would also avoid the significant problem of road kill along this stretch of road. Public Transport Public transport initiatives should be given first priority to reduce car dependency. An East to West public transport service could be introduced at minimal cost. An express bus service would be easily implemented without additional road infrastructure. Other initiatives include flexible intra-urban routes and shuttle bus services to provide circuit routes and a link to facilities and transport nodes. Balgowlah Golf Course The proposed tunnel feeder road through the Balgowlah Golf Course would have multiple adverse impacts. The traffic lights required on the Burnt Bridge Deviation would interrupt traffic flow. The proposal would fragment existing open space, result in loss of riparian habitat, and require relocation of the creek and the bike path. The connecting road would have a constant stream of traffic entering and emerging opposite Balgowlah Boys High School. This would result in air and noise pollution affecting health and stress levels. Short term solution The motorway is not a sustainable transport solution for the Northern Beaches. Constructing motorways that feed more cars into the CBD and urban areas is outdated transport planning. It has been demonstrated in many locations that constructing motorways in urban areas increases car dependency. The tunnel project ignores the lessons learned in Europe and elsewhere. Public transport should be given priority and car based motorways avoided in urban areas. Open Space The tunnel and connecting roads would severely impact on Balgowlah Golf Course, Burnt Bridge Creek and riparian area as well as bushland along Wakehurst Parkway adjoining Garigal National Park and Manly Dam Reserve. The impact of the tunnel and connecting roads on open space area is unacceptable. Warringah Freeway The widening of Warringah Freeway and inclusion of additional traffic lanes to accommodate the tunnel would create a confusing network of lanes. It would be another stressful scenario for drivers, particularly inexperienced drivers and those who are unfamiliar with the area. Public consultation The Department of Transport has decided on a road tunnel and motorway without any prior public consultation, including with residents on the Northern Beaches. The motorway option was an announcement made in conjunction with a State election; it was not subject to any prior community consultation about sustainable and public transport options. Air pollution The air vents would be located at either end of the tunnel, which would be 7 or 8 km long. These vents would disperse exhaust emissions over the surrounding area. Fans would operate to blow the exhaust fumes out of the tunnel. However, air pollution and haze could also build up inside the tunnels. Safety Breakdowns in a tunnel is always a risk. Heavy vehicles, such as trucks and buses, would share the same lanes as lightweight vehicles. Confinement in a tunnel is claustrophic for many people, particularly in a long tunnel under water. Tunnels can also be a target for terrorist attacks, which has to be taken into account as a potential safety risk. East West Corridors Public transport could be greatly improved with additional bus services, including express services and east to west along Mona Vale Road, Warringah Road and connecting links via Forest Way. Innovative and equitable options to reduce car dependency is the preferred transport strategy for the Northern Beaches. Fossil fuels The tunnel will increase the demand for fossil fuels, even though we have already passed the peak oil phase of supply. Compared with public transport, including buses, the increase in car dependency will mean higher dependency on fossil fuels. Transport options that reduce fossil fuel use would also reduce air pollution. Stressful scenario The tunnel has the potential to become a stressful scenario with additional traffic flooding into the Northern Beaches, particularly in summer. Other adverse impacts include increased air pollution, loss of open space and bushland, reduced urban amenity etc. It is a scenario that we should not wish for, let alone impose upon, the next generation. The 'insular peninsular' has hitherto provided some protection from road tunnels and motorways. Cost The billion dollar cost is exorbitant and would eclipse other transport priorities. It would also compromise public transport opportunities. The ongoing maintenance of the tunnel would be very expensive ensuring that a toll would be imposed for the foreseeable future.
10/26/2018	1605077692	The tunnel Construction will cause congestion as all works projects do. Exhaust sites need to be properly filtered and away from schools and dense residential areas. Wildlife safety needs to be considered too. Don't get caught in the "Yes Minister" syndrome.
10/25/2018	1605076452	
10/25/2018	1605076430	
10/25/2018	1605073230	
10/24/2018	1605071895	
10/23/2018	1605066843	The construction process should be part of long term planning for the Northern Beaches and the construction should be planned to minimize disruption.
10/23/2018	1605066477	I don't have concerns. Not sure why feedback necessarily has to be negative? This is a piece of infrastructure that is long overdue! Please consider that there may be people who just want to get on with it rather than everyone complaining about it and delaying it. Council should be supporting this.
10/23/2018	1605063966	
10/22/2018	1605061663	Building new roads will not resolve the problem. As a result of the new tunnel other services should not be cut (public transport timetables) and walking and cycling paths should not be compromised.
10/22/2018	1605060718	
10/22/2018	1605060592	
10/22/2018	1605060566	The tunnel will draw more traffic into the area and it is vital that roads around the tunnel area can cope.
10/22/2018	1605060435	I am interested in seeing significant priority given to public transport, lanes etc.

10/22/2018	1605060330	It is not close to me so will not affect me. But I am concerned about environmental impacts and loss of green spaces and the impact of construction on people who live near the construction works.
10/22/2018	1605060185	Great idea, well overdue, hope all can agree on this
10/22/2018	1605058268	
10/22/2018	1605056210	Bats runs increased in traffic Problem with parking Impact on manly - visitors currently travel by PT will come by car, Consultation has been a sham - no information shared, always in school holidays in areas where the impact will be felt, no engagement on establishing real problem or developing option. Induced demand - tunnel will attract more people to drive. Should just charge for existing road and spend money on PT
10/21/2018	1605054641	My biggest concern is how road closures and the associated traffic management will be handled. The experience with the roadworks around the new Northern Beaches hospital has been so disruptive and resulted in at least an extra 1 hour in traffic everyday! While I appreciate there will be some disruption it needs to be better than the hospital. I am concerned that we are looking at another 10 years or longer of traffic pain before things get better on completion.
10/21/2018	1605054586	When will the traffic modelling be released to the public and when will the draft business case be published with assessments of the public transport alternative schemes to the road tunnels
10/21/2018	1605054433	
10/21/2018	1605054384	The stack has to be filtered, Even if our air at Seaforth is very clean that is no reason to make it dirty and have emissions concentrated at the bottom of the Valley at Burnt Bridge. Either filter the stack at Burnt Bridge or do not put the tunnel there just have it at Wakehurst Parkway. The only other solution to reduce pollution is to have the stack up on top of the hill at Sydney Rd and not have it at the bottom of the valley. I really do not want to have to live with 5 plus years of construction in my local area. This is right in the heart of Seaforth. The construction on Wakehurst parkway seems feasible as it is in the bush. The Burnt Bridge site has been allowed to be come too populated over the years and is not suitable for a tunnel and 5 years of construction.
10/21/2018	1605054379	Community meetings are important so all voices can be heard. People living near construction sites are naturally very anxious about noise, obstructions and loss of property value. They need answers.
10/21/2018	1605054373	
10/21/2018	1605054360	See above.
10/21/2018	1605054365	
10/21/2018	1605053066	It really scares me what population growth plans the NSW government has for The Northern Beaches
10/21/2018	1605052654	
10/21/2018	1605052665	
10/21/2018	1605051821	Balgowlah Golf Course is a most necessary recreational facility especially with the densification of the Shire
10/21/2018	1605051721	
10/21/2018	1605051668	
10/20/2018	1605051533	
10/20/2018	1605051438	
10/20/2018	1605051414	
10/20/2018	1605051340	The disadvantages (see above selected elements) of attempting to build this tunnel far outweigh any possible benefits. Has a cost benefit study been done at all, to justify this ridiculous project?
10/20/2018	1605051342	
10/20/2018	1605051329	Again, there has been no community consultation. If we lose the golf course, we won't get back the green space. It is most important not to lose the trees and the green space. The trucks on our roads will destroy them plus be a major hazard to all traffic and pedestrians. All of the above are seriously important and need to be considered.
10/20/2018	1605051325	Very concerned about the impact of unfiltered smoke stacks on the health of my young family. Also worried about the impact of the building works on our currently quiet and safe suburb.
10/20/2018	1605051313	I am very concerned regarding the widening of Warringah Road and subsequent impact on Manly Dam and loss of bushland
10/20/2018	1605051311	the tunnel will only relocate congestion points. Where is the cost benefit study?
10/20/2018	1605051307	
10/20/2018	1605051295	Construction inconvenience is of concern but long term emission stack location should not be an eyesore and not near properties. 2 Lanes for Wakehurst parkway is overkill at this stage. Minimal loss of housing and construction near housing is a priority.
10/20/2018	1605051302	
10/20/2018	1605051301	
10/20/2018	1605051294	Please note my suggestions in general comments of entry and exit points for North Seaforth and North Balgowlah residents. Provide a loop rd at exit of Wakehurst parkway that leads south for these residents. Connect link Rd to burnt Bridge rd instead of another exit at Mareeba rd for natural links to seaforth.

10/20/2018	1605031284	Sydney Road shops between Balgowlah and Fairlight already suffer from excessive noise because of the terrible condition of Sydney Road. It is so bad for business and residents alike. How can they be assured noise and pollution won't increase because of traffic flow. Keep general Manly traffic along Kenneth Road away from already congested Sydney Road.
10/20/2018	1605031178	The design of the link road in Balgowlah needs review. At the info session I learnt that over 20 options were considered - surely this is not the best one? Loss of golf course green space, more traffic near Bally Boys and busy Sydney Rd intersection, etc. Is it needed at all?
10/20/2018	1605031124	The state government will override council and take all the stamp duty for many more Mansions that will choke the beaches. Like they showed the Warriewood developments down our throats.
10/20/2018	1605030471	
10/20/2018	1605049644	
10/20/2018	1605049620	The proposed location of the smoke stacks don't seem to consider negative health impacts. Too close to schools and housing - surely in this modern age, filtering should be a better option - if we can carbon capture coal surely we can clean the air.
10/20/2018	1605049240	Keep Balgowlah golf course. No construction adjacent to residential areas. Spoil to be trucked out of area not stockpiled
10/20/2018	1605049222	The environment impact of the construction and operations of such project will ruin our lives and our environment. Will vote for anyone who stops it!
10/19/2018	1605048975	
10/19/2018	1605048913	
10/19/2018	1605048878	Impact to flora and fauna is an inevitable part of the construction process, however every effort should be maintained to recreate greenery in the affected area post construction work

Did you attend the Northern Beaches Council Beaches Link Tunnel Community Forum?



Answer	Count	Percent
Yes	12	22.41%
No	43	77.59%
Total	58	100 %

Are there any additional items you would like Council to consider in its submission to the RMS?

Are there any additional items you would like Council to consider in its submission to the RMS?	
10/26/2018	1605681231

10/26/2018	1605077679	Beaches Link Tunnel I do not support the Beaches Link Tunnel. It will create a serious imbalance in favour of car travel and will greatly increase car dependency. The tunnel will adversely affect air quality and the environment. The road infrastructure will affect local amenity, alternate active travel options and allow car travel to become an overly dominate transport mode. The proposal is for three lanes of traffic each way in the tunnel, which will be 7.2km long. No dedicated public transport lane is proposed. Public transport options should be given priority in terms of investment. This includes public transport options that do not require additional roads. Issues / concerns include: • Traffic congestion on local roads • Car parking demand, especially at beaches • Environmental impacts • Air quality • Balgowlah Golf Course • Seaforth temporary depot Wakehurst Parkway The project would have an extensive environmental impact on adjoining bushland areas and reserves. The long term benefit of protecting the bushland warrants a high rating in any cost/benefit analysis. If the project proceeds, at grade widening should be avoided by extending the tunnel or constructing an elevated road. The Beaches Tunnel project is likely to overwhelm all other transport projects in terms of cost, traffic generation, environmental impacts and quality of life. This road infrastructure will have a major impact on the Northern Beaches and result in many changes, including negative impacts, over which the Northern Beaches Council and residents will have little control. The tunnel will bring to closer fruition the nightmare reality depicted in the Manly Daily headline: The Cars that Ate the Northern Beaches. Residents who support the tunnel appear do so primarily because they want to shorten their driving time to the CBD and across the city. By the same token the tunnel will also provide a wide open passage for a high volume of traffic emerging from 3 lanes. This will result in a significant increase in the number of cars converging on the Northern Beaches, particularly at weekends and in summer. The consequent increase in traffic is likely to cause congestion in local streets, which in turn will become more hazardous for pedestrians and cyclists. An increased demand of parking, particularly near the beaches in summer, is inevitable. The existing problem of coping with parking demand will be exacerbated multiple times. This will result in increased hard surfaces and conflict between residents and visitors for limited on-street parking. The Beaches tunnel will encourage car travel to the Northern Beaches from all Sydney metropolitan areas to the west of the tunnel entrance. A far better alternative is to invest in public transport, including buses. This will avoid / reduce problems associated with traffic and parking. It will also be more compatible with active travel options. Public transport is an equitable and sustainable transport option that is strongly aligned with the strategy objectives of reducing car dependency and carbon emissions. The funding priority for the Northern Beaches should be public transport. Further road expansion, which will encourage car usage and generate more traffic is inappropriate and will exacerbate existing problems.
10/26/2018	1605077893	The need to move cars rather than people
10/25/2018	1605076452	Why not build a tunnel under the existing infrastructure, eg under the Spit Bridge. There would be less impact on surroundings
10/25/2018	1605075430	the main bottleneck for traffic is the Mosmon area of Military road. Fix the Spit Bridge and clear way through Mosman. Use tunnel for train into metro.
10/25/2018	1605073230	Addition of a dedicated bes lane both ways. So, the tunnels would be three lanes each way i bus and 2 x other vehicles.
10/24/2018	1605071895	A B Line service from Dee Why to Chatswood.
10/23/2018	1605066843	No
10/23/2018	1605066177	Please get on with it without delay.
10/23/2018	1605063966	
10/22/2018	1605061063	
10/22/2018	1605060719	
10/22/2018	1605060592	
10/22/2018	1605060566	Additional tunnel space for expansion in the future such as a light rail or T-Way bus lane.
10/22/2018	1605060438	
10/22/2018	1605060336	It will reduce the pressure on the harbour bridge and existing tunnel. This will benefit my area in Belrose as we use Warringah Road to get into town and will continue to do so
10/22/2018	1605060165	Not sure if the buses to city will use tunnel, some buses would be good
10/22/2018	1605058268	
10/22/2018	1605056210	Metro or other PT options should be consider linked to development of large sites including Big Bear, Spit Junction, Balgowlah, manly Vale, part of Warringah Golf Course, mixed use redevelopment of Warringah Mall to create a town centre with reduced car parking, redevelopment of bus depot, redevelopment of car yards, stop at Dee Why and the to new hospital
10/21/2018	1605054641	Restricted traffic on local roads once the tunnel in complete. Local traffic only, particularly want to avoid increased traffic due to people trying to avoid paying the toll.
10/21/2018	1605054584	
10/21/2018	1605054433	
10/21/2018	1605054384	What business case is there for a tunnel at Burnt Bridge given the Spit Bridge needs to be upgraded at some stage. Spit Bridge is a more urgent priority.
10/21/2018	1605054379	Make it happen.
10/21/2018	1605054373	
10/21/2018	1605054360	(my husband attended the forum - [redacted]

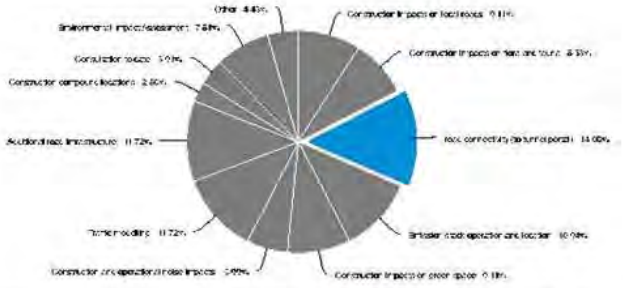
10/21/2018	1605054365	Yes, could the RMS envelop a design that does not involve the use of the Balgowlah golf course and ensures that tunnel portals stacks and construction site are located well away from residential areas and that any smoke racks are filtered to ensure safe air quality on completion. In addition traffic survey need to be performed to ascertain the impacts of all the vehicles that will pw from the tunnel onto the northern beaches one it is complete,- will existing surface roads be able to handle this capacity and where will all thee additional vehicles park. Also where is the RMS business case that examines public transport alternatives for the northern beaches and the social and human cst of the current deign that use the golf course. Could the council please ask that any further approvals or pursuit of the current piposed design be stayed until all these issues are properly addressed . Thank you
10/21/2018	1605053066	They need to be very upfront about the amount of the expected toll and how they think it will be enough based on the current number of road users and how they will restrict the use of Military Rd (like they did when the Lane Cove Tunnel was put it) to force drivers to use the tunnel (if they don't and half the drivers (35,000) use the current route and only half use the tunnel, it cannot pay for itself. The RMS say that 100,000 cars use the Eastern Distributor (ED) each day for a tunnel that is one quarter the length of this proposed tunnel and that costs $7.46 each way.
10/21/2018	1605052654	One of the speakers at the forum, Mr Lee Furlong, is the current vice-president of the Liberal Party Warringah FEC. I am concerned that he was permitted to speak representing himself as an ordinary resident, and not made to disclose his clear conflict of interest in regards to the tunnel project and it's support by the Liberal Party. It must be appropriate to publish his office holder status when reporting his comments from the forum and in submission to RMS.
10/21/2018	1605052665	
10/21/2018	1605051821	
10/21/2018	1605051721	Pause the tunnel. Invoke a moratorium. Give up the 'roads over public transport' policy.
10/21/2018	1605051665	
10/20/2018	1605051523	
10/20/2018	1605051438	
10/20/2018	1605051414	
10/20/2018	1605051349	Focus should be primarily on the provision of a variety of public transport options and a variety of links, eg the east/west link between DY and Chatswood past the new NB Hospital, as well as any new harbour crossing by public transport.
10/20/2018	1605051342	
10/20/2018	1605051329	The huge impact on the environment and the residents if the tunnel was to proceed. If there is a study done, and the best option is the tunnel - then fine. Make it happen. But get experts involved, not the RMS who have identified the Link Road as a solution. That is just absurd.
10/20/2018	1605051325	
10/20/2018	1605051313	No negative impact on Burnt Bridge Creek or loss of trees on Balgowlah Golf Course.
10/20/2018	1605051311	Links to second harbour tunnel, bicycle access. rail link.
10/20/2018	1605051307	make it big enough for future generations and we need to take deli rd as an option for northern beaches people to head west with this project.
10/20/2018	1605051295	Council's priority is it's residents. It seems more people would prefer better public transport than encouraging more car use. Encourage RMS to concentrate on this first. There appears to have been no 'big picture' consideration of this tunnel project with the stage 2 hospital roadworks which concentrates on free flowing west & east traffic movement yet the tunnel traffic coming south up wakehurst parkway will need to stop at lights at a major junction. Consider postponing the tunnel project until full effects of stage 2 are monitored. Motorists currently using spit bridge may now use roseville bridge if traffic moves quicker.
10/20/2018	1605051302	
10/20/2018	1605051301	
10/20/2018	1605051294	Please give North Seaforth and North Balgowlah residents exit and entry close access by providing loop rd or roundabout to their residential homes. Stop ignoring these residents.
10/20/2018	1605051284	Thank you for considering our concerns and we look forward to the next forum. Please try and keep more traffic away from Balgowlah, it currently is a frustrating experience on any given day to get from Manly to Seaforth.
10/20/2018	1605051178	
10/20/2018	1605051124	Stop and think. Just leave it for ten years. Clear way through neutral bay to Narrabeen till 8pm now. And minor fixes to roads.
10/20/2018	1605050471	
10/20/2018	1605049644	
10/20/2018	1605049620	how about there is some study and research performed on current road / traffic flows and ensure they are optimal, before spending tax payers money. there are so many obvious changes that could be made to improve traffic before a major project is started.
10/20/2018	1605049240	
10/20/2018	1605049222	Do a proper traffic modelling for the NB traffic during week and WE days, tell us the real impact for our network here. Do the same for demographics with impact on population growth.
10/19/2018	1605049075	
10/19/2018	1605049013	

Please tell us your general views on the Beaches Link Tunnel project

Please tell us your general views on the Beaches Link Tunnel project

No Data To Display

Please select the elements of the project that are most important to you.



Answer	Count	Percent
Construction impacts on local roads	35	9.11%
Construction impacts on flora and fauna	32	8.33%
road connectivity (to tunnel portal)	54	14.06%
Emission stack operation and location	42	10.94%
Construction impacts on green space	35	9.11%
Construction and operational noise impacts	23	5.99%
Traffic modelling	45	11.72%
Additional road infrastructure	45	11.72%
Construction compound locations	11	2.86%
Consultation to date	15	3.91%
Environmental Impact Assessment	30	7.81%
Other	17	4.43%
Total	384	100 %

Please provide detailed feedback on any of the important elements identified above.

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10/19/2018	1605048933	I am in favor of the Beaches Tunnel as this will provide a long awaited better to the city. It would great to have 2 lanes plus a bus lane from Wartingah road to to the tunnel and inside the tunnel as well for both directions. We need to think long term and be short sighted and limit only two lanes plus bus lane in both directions.
10/19/2018	1605048902	
10/19/2018	1605048898	I do not understand why we are building a road tunnel and not a train tunnel. I think a train tunnel with a big parking lot would make a lot more sense.
10/19/2018	1605048866	I would like to see dedicated lane(s) in the tunnel for public transport, buses and taxis as just adding further cars to the transport system will not help the environment or the transport impact of climate change. While any changes can be a negative to the environment it is important that this can be minimised and possibly remediated.
10/19/2018	1605048825	
10/19/2018	1605048817	

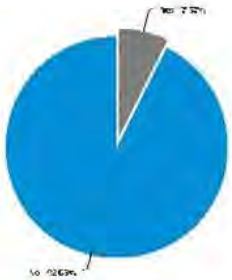
10/19/2018	1605048762	Will it simply move traffic bottlenecks further up the peninsula? Concerns about construction impacts on residents living near Balgowlah site.
10/19/2018	1605048743	Reduced load on Spit Bridge and Military Road is essential to the future lower northern Beaches. Fully support the new Beaches Link.
10/19/2018	1605048695	The tunnel is fine but it could be moved further north The link Road is unecessary
10/19/2018	1605048671	My main issue is how this 2 lane tunnel that will cost many billions of dollars to build will automatically solve the northern beaches traffic problems to the city when the M2, M4 and M5 consistently have major traffic problems? These 3 toll roads all proof beyond reasonable doubt that more roads do not solve the traffic problems.
10/19/2018	1605048668	
10/19/2018	1605048665	It is imperative that if the tunnel happens - which I hope it will - that the traffic flow will be improved, not inhibited. Feeder roads need to be well considered and also have good flow. Location of emission stacks must be well considered and the newest technology for filtering be used so that only clean air is dispersed. No resident should be made to suffer ill health because of this improvement. Otherwise many thanks for a great contribution to the Sydney infrastructure!
10/19/2018	1605048672	
10/19/2018	1605048659	Absolutely against a new road project, whether underground or up in the air. Instead, promote local economy to create jobs in the peninsula that don't require commuting, improve local public transport, foster innovation and ability for people to work from home, make the NB economy a new technology hub with car sharing,renewables for fossile free transport, and much more...
10/19/2018	1605048507	
10/19/2018	1605048496	
10/19/2018	1605048345	The proposed loss of Balgowlah Golf Course as a golf course and the impact of this proposal on Balgowlah Boys High School are untenable.
10/19/2018	1605048307	I think it is unbelievable that public transport is not central to this project. While I support a tunnel, I believe it should include mass public transport options. It is incredibly short sighted to build a tunnel only for cars! Please preserve Balgowlah golf course and use underground tunnelling for link road. I also don't understand why the emission stacks can't be filtered. Surely this is better for everyone.
10/19/2018	1605048125	I think it's a great initiative for the area and must go ahead.
10/19/2018	1605047933	Support improved road access to city, but if additional public transport, especially trains are not provided, car growth will soon make the tunnel over congested.
10/19/2018	1605047798	The tunnel will provide access to more cars, trucks and buses. I think this lack vision for the future. A light rail should be included.
10/19/2018	1605047633	Impact during peak hour times Mon- Friday (to cars public transportation). Need a fast turnaround timeframe? Need to do more construction on weekends. Cannot have it take 5 years to complete. Should not be able to dig up a site/roads and have it untouched on weekends, especially when there is less traffic and less impact.
10/19/2018	1605047674	
10/19/2018	1605046696	I am opposed to the use of the open space for a link road and stack/operations facilities. This is the only green space in the area and these infrastructure items proposed will reduce the amount of open space. The possible conversion of the open space from golf course to sporting fields is a totally separate debate and unrelated to the tunnel. Also concerned about the stacks being close to the schools and residents. These could be moved to the Manly Vale commercial/light industrial area along with the portals. Ultimately, if the green space of Balgowlah didn't exist, where would the link tunnel have its portals? Where is this option from the RMS?
10/19/2018	1605045475	I believe the tunnel is necessary. Your survey should have included the option "no concern"
10/19/2018	1605044898	
10/19/2018	1605044551	
10/19/2018	1605044492	We should have a rail, not road tunnel built to the Northern Beaches. A subway would take away pressure from the existing road, would be faster and would be more sustainable with regards to greenhouse gas emissions. Another tunnel will just create congestion problems elsewhere. Also, a new tunnel will create greater demand, and a few years down the track, we will have a congestion problem again, as we still all drive our cars everywhere and alone.
10/19/2018	1605044380	The major factor is that the tunnel should be a train/light rail one and not a traffic on
10/19/2018	1605044337	The tunnel seems like a good idea, however I'm concerned that good acces about from Manly and Balgowlah should be included. We need additional sports fields, it's. Good thing that the golf course will be replaced with other green space.
10/19/2018	1605044012	I moved to the Nth Beaches in 1992. At that time there was land set aside in Seaforth off the Wakehurst Parkway for tunnel construction. The State government sold it off. The Nth beaches needs this tunnel and more, possibly a monorail causing less disruption to land use. This will be a massive project causing disruption to the lives of those living close to the construction site, they need to be considered a priority when planning the movement of materials to and from site. The emission stacks have to go somewhere as far from residences, schools and workplaces as possible. But most importantly these emissions must be filtered to remove dangerous particles and gasses before they are released into the atmosphere. The potential for concentrated poisonous air being released anywhere is not an acceptable scenario in this era of climate change and emissions awareness. I was in Tasmania during the Tunnel community Forum.
10/19/2018	1605043878	
10/19/2018	1605043860	Build the tunnel.
10/19/2018	1605043771	
10/19/2018	1605043433	

10/19/2018	1605043501	Public transportation incorporated into design
10/19/2018	1605043125	I have read each of the released documents however have been unable to attend any information sessions. To date, the consultation process has been poor. There has been little shared thought about reasonable alternatives. The stacks and air quality are a huge issue. The lives and homes affected are too many. Rail connection from Chatswood to the new French's Forest proposed Hub near the Hospital has to be considered. The area is already being developed and rail could be included. Rail to the Northern Beaches will encourage more public transport use while a tunnel will encourage more private transport use. It's a no brained! The negative impact on the environment with the tunnel is unacceptable and not what the Northern Beaches residents want on the whole. A transport solution is needed but the infrastructure does not support the additional private use with population growth etc. The proposed tunnel transport solution is not the best solution for the future. Rail and increased bus services is. Needed and French's Forest is already losing the residential community to a business hub. Add a rail station
10/19/2018	1605043172	
10/19/2018	1605043158	
10/19/2018	1605043122	I believe this is long overdue for the long suffering Nothern Beaches motorists after the decades ago non completion of the 'Warringah Expressway'
10/19/2018	1605043098	I would not like to see any impact to the Balgowlah Golf course.
10/19/2018	1605043004	Tunnel should provide optimal flow for traffic, connecting with arterial roads that benefit residents, visitors and businesses.
10/19/2018	1605042953	I would like to see Northern Beaches Council support the on-going development in the municipality. The Beaches Tunnel link is so overdue. Yes there are residents that don't want any changes, but if you want to keep living in a growing city, changes are necessary. I support the ongoing growth and development of the Northern Beaches.
10/19/2018	1605042927	
10/19/2018	1605042912	just get on with it and support it. This is the sun LE biggest priority for the Northern Beaches
10/19/2018	1605042903	
10/19/2018	1605042522	Dear Sir or Madam, Thank you for the opportunity to contribute to the process.. I have nominated a series of items in the preceeding list: Construction impacts on local roads - the roads and infrastructure around the Northern Beaches are becoming akin to a war-zone. Sadly the upgrades are not carried out by a local body but the RMS. RMS is a state body and doese not care about the impact on residents (ref the ongoing farce around the hospital) and neither do contractors (as they respond to RMS). An the majority of the contractors treat the works zone and surrounding area like a public toilet literally - port-a-loos or not. This is unacceptable. Construction impacts on flora and fauna: The wholesale destruction around the Warringah road upgrade has been overwhelming, depressing and overwhelming - if this had been planned properly I would speculate that for a modest impact on cost 50% of the destruction of flora and fauna could have been avoided however RMS has demonstrates an almost total lack of care. Road connectivity (to tunnel portal): the feeder roads to the feeders will be over whelmed - as these are largely council roads what plans have been made to address the increassed usage? Emission stack operation and location: it is difficult to tell where the stacks are please can we have some clarity around this the eastern tower around Condomine Rd is surrounded by residencies on both sides of Burnt Creek deviation - please can RMS include class leading filtration, otherwise the particulates from the tunnel will be pumped out in to the surrounding residents and we will all participate in a class action. Construction impacts on green space: As above it is turned in to a toilet. Observing the works at Warringah Road, concrete spill and construction waste is largely buried or covered in turf, the most minimal ammount of topsoil is provided. Full construction staff vechile cigarette trays are emptied, cascades of palstic bottles and cans are left on the streets together with coffee cups, old reo-bars, fast food wrappers, pedestrian acess is completely ignored etc. Construction and operational noise impacts: A couple of enviro sheet sound absorbing blankets are utterly inadequate - these are major works - noise, shouting (swearing contractors) night and day. You did not refer to lighting at night, vibrations 24 x 7 and fumes 24 x 7 - these are not enviable environmental conditions to experience Traffic modelling: Fantasy land !!! Do it properly and honestly. If this invokes greater cost so be it. Construction compound locations: I would suggest that RMS managers are given a location close to the works they are responsible for. Unfortunately RMS has a habit of consolidating a township of multi level site sheds for sites which are broadly spread. The result is both the managers have no idea and little vested interest in their area(s) of responsibility, ther eis a vast eyesore of site sheds, associated rubbish, traffic density etc. Consultation to date: I have found it difficult to find anthing difinitve surrounding this major project. This is a concern as this leads me to feel that something is being concealed. Environmental Impact Assessment: Fantasy land - see above.
10/19/2018	1605042683	Please ensure there is a dedicated cycle path along Wakehurst Parkway as it is currently dangerous for cyclists using the very narrow shoulder. I think more cyclists would consider riding to the City if the Cycle path connections especially from the new hospital to Seaforth shops were improved. Also please ensure bus bays on the road are long enough to allow the bus to pull over and stop gently without slowing the traffic. Ensure there is parking for those who park their cars off Wakehurst Parkway for walking/mountain biking down to Manly Dam.
10/19/2018	1605042761	Generally support the tunnel Don't support the loss of green space and golf course The link road engineering is terrible and will cause more problems than it seeks to solve. It will cause a traffic problem if not properly designed to allow flowing traffic in and out of the tunnel.
10/19/2018	1605042451	I don't have a great deal of confidence that the Government can complete such a major project within budget and on time given the current projects commenced by the Government - over budget and over time
10/19/2018	1605042326	Will there be access to the tunnel from more than one access point? Important to avoid bottle neck problems. Will lost green space get compensated for in the area?
10/18/2018	1605042341	Please filter the emissions.
10/18/2018	1605042311	I'm concerned about the planning of the tunnel. The construction of the roads has been a nightmare for local resident traffic flow and complete disruption with no regard for the locals. I'm concerned this will continue with the tunnel construction. There needs to be adequate on/off ramp entries, exits so more congestion isn't caused at these points. The noise has already been bad, what is the ongoing noise likely to be like and when will this noise occur, day/night etc. The infrastructure surrounding the tunnel needs to be thought about, with better local traffic roads maintenance and provision for improvement. When will this tunnel be finished, when is there an end date. As right now the locals have had enough of poor construction, poor planning, poor notification of closures. We want to ensure there is an end point and know exactly when this will be.
10/18/2018	1605042295	A fast construction process therefore providing least amount of impact on everyday users, both car and bus

10/18/2018	1605042285	Why does the golf course have to lose some of it's ground for the tunnel? Also, why does the baseball field at Willoughby be impacted? The baseball fields at Aquatic Reserve are already being taken for the new high school. Leave the green spaces as green spaces
10/18/2018	1605042263	
10/18/2018	1605042178	Build a metro train line and tunnel.
10/18/2018	1605042134	While there are issues with traffic on Spit Bridge, I feel it is an ineffective use of public money to build a tunnel. There is much research out there to suggest building new roads contributes to, rather than relieves, road congestion as it encourages driving rather than using public or active transport. Cars are very space inefficient. The same money and space used to build the tunnel would be more effectively spent on building a subway or metro train, that gets cars off the road, reduces air pollution, reduces use of fossil fuels, etc. RMS has not released their traffic modelling, so it is difficult to say whether the claimed benefits will truly stack up against the cost. With the projected population growth of the Northern Beaches and Sydney generally under various planning instruments, I am concerned that the tunnel will be near capacity by the time it is built anyway. If the tunnel is to be built, then the concerns of the community about placement of connections and stacks should be listened to. It is naive to assume that issues with filtering can be dealt with in the future by assuming adoption of low-emission cars. While for big infrastructure projects it is inevitable that some properties will need to be acquired or lose their outlook, however this should be done in a fair and transparent way. Further, if the tunnel is to be built, then Council should vigorously oppose any proposal for privatisation. Most toll roads in Sydney are owned by the one entity, removing any real competition.
10/18/2018	1605042146	Concerned about tunnel entrace near Balgowlah Boys High School
10/18/2018	1605042126	The full impact of the tunnel during construction and use has not been fully explored.
10/18/2018	1605042053	If this planned tunnel was to go ahead (which I really hope it does!), I want to make sure thy the surrounding road capacity and structure have been taken into account and that the design of then Beaches tunnel has been truely thought through. An example of what I hope doesn't happen is the M5 tunnel enterence at the airport. 2 turning lanes merge with 2 turning lanes from the oncoming direction, merge into the 2 lanes that flow through the M5 tunnel. It's a bottle neck at best and a nightmare at worst. This is my biggest concern- if you do something at this size and grandeur, do it properly, please! I trust that all environmental and flora/fauna evil actions are conducted and adhearded to when planning and construction take place. It's important we look after our wild life. I also hope that through construction, green spaces are kept (or added) where possible and we don't build high density accomodation in empty blocks. The beaches is incredibly over populated for our road infersturcture as it is, and the beaches tunnel is a step in the right direction to amend these issues. Please don't add more people to the mix because "you can". People love the beaches for its quiet, laid back life style (some people love this so much that they are opposed to any change and that's where many of our issues come in: the new hospital, the end of B-line starting in Newport, the eternal fight to straighten The Bends etc). We need to move forward with the times but need to keep as much of the beaches feel we possibly can.
10/18/2018	1605042037	Building more roads means more cars on the roads. It would be preferable to spend the money on more effective public transport. The B-Line service is a step in the right direction. What about a raised monorail built above the existing road corridor with frequent services running to and from the city? And also from Dee Why to Chatswood?
10/18/2018	1605042047	The tunnel concept is a poor initiative that is based primarily on political and investor needs rather than creating a long term viable transport solution for Northern Beaches residents and travellers. Has there been genuine investigation in to alternatives transport solutions that will lead to better access, reduced overall congestion and future viability. It is a toll road/tunnel which immediately creates a two-class system and disadvantages poorer people. It creates an additional and unnecessary financial burden on travellers - infrastructure and access needs to be accessible and not a premium service to tax payers. Other major road projects demonstrate that motorways and tollway projects shift congestion - particularly as traffic to the city is not reducing so peak hour travel will primarily shift the congestion without genuinely solving congestion by fosters smarter transportation alternatives such as; car pooling, improved public transport, improved cycle transport, increase in local work opportunities. The Frenches Forest intersection has been redesigned however the increased traffic and importance of the hospital create a congestion hotspot. More vehicles will converge on the tunnel access and create a daily peak our grid lock which has already been the standard scenario in this area. Wakehurst Parkway already suffers from serious peak hour congestion and this will worsen as drivers north of Narrabeen orient to the tunnel rather then Pittwater road. Considering this should also be an import link for hospital access, a tunnel project is programmed to fail. The tunnel serves as a political stunt to attempt to appease the ongoing transportation access problem of the Northern Beaches however as a private toll road which is designed to create a congestion host spot and simply shift congestion, this is not the appropriate solution to provide a smart transport solution that allow more people better access and with future viability. Instead a of tunnel, a Northern Beaches train line following Pittwater road would deliver a significant transport improvement and immediate reduce motor traffic congestion while increasing access and convenient to residents and visitors... plus with future viability. A final concern is 'honesty' and the WestConnex is an example where promises can't be met, there are vested interested and the ultimate audience, the residents are a burden. Before the Northern Beaches Tunnel continues... what provisions have been made to ensure that it is not corrupt?
10/18/2018	1605042034	What are the overall benefits and disadvantages of the proposed tunnels? Are they going to be cost effective?
10/18/2018	1605042032	
10/18/2018	1605042075	We were overseas when the forum was on, but like to see the tunnel work commenced asap
10/18/2018	1605042077	My main concern is that there is no provision for railway extension and that again too much attention is given to cars and not public transport.
10/18/2018	1605042079	
10/18/2018	1605042074	
10/18/2018	1605042058	Concerned about the projected destruction of fragile bushland along Wakehurst Parkway, the loss of important green spaces and polluting emission stacks.
10/18/2018	1605042067	Smokestack location Smokestacks must be "filtered"
10/18/2018	1605042062	
10/18/2018	1605042059	As we'll soon be losing the North Manly Bowling Club and no doubt eventually part of Warringah Golf Club, I'm really concerned about losing another community leisure and green space location in Balgowlah Golf Club. I understand the benefit of a Beaches Link Tunnel, but at the expense of our way of life?

10/18/2018	1605042046	Traffic flow in surrounding suburbs as rat runs develop due to more development and car flow. Planning around this flow may include blocking some streets access or opening others.
10/18/2018	1605042054	is there not a better route?
10/18/2018	1605042039	It is important to retain public green space and regenerate it after construction completion. Good access to tunnel is also vital to ensure it improves the pinch point at the corner of Sydney Rd , manly Rd and the B.B. deviation. Ensure that 3 lane access is retained in peak times to military Rd and Mosman/ Cremorne
10/18/2018	1605042051	
10/18/2018	1605042040	
10/18/2018	1605042043	It is important that the air quality is regularly tested and an excellent filtration system put in place before allowing it to travel amongst suburban homes and businesses.
10/18/2018	1605042027	Impact on 3 local schools is of utmost importance.
10/18/2018	1605042031	
10/18/2018	1605042024	
10/18/2018	1605041951	Why a toll road when public transport infrastructure is so severely lacking on the Northern Beaches? The single road access at Maitland Street through Balgowlah Golf Course, streaming 3 westward lanes from Seaforth, 3 eastward lanes from Manly through new traffic lights into a single lane to yet more new traffic lights will not work. The stack is unfiltered - best practice, community expectation would be that filtration to world's best practice is a must. The positioning at Balgowlah does nothing to alleviate already crowded one lane local roads and will simply worsen local, inconvenience all. The impacts to our health, our green space and amenity have been dismissed.
10/18/2018	1605041982	The tunnel is not looking to our needs for the next 50 years and beyond. The cost to travel ($10 each way) is a tax for living here. The golf course must be retained it meets the needs of older residents and is the cheapest option on the Northern Beaches. The design will destroy the creek through the golf course and will destroyed the habitats of the eastern water dragons. The link road is not need and will be traffic bottlenecks. The design shows cars can by pass the tunnel entry, this will not happen when a tunnel operator takes control eg Epping road saga for LCT The number of cars based on RMS figures of 40 % less on Spit road and 25% on Warringah Road.will not make this viable with out a large toll
10/18/2018	1605041954	Where can I find detail on this project? What will the impact be to traffic onto and off the beaches while this project is running. How long will the project take to complete? Will there be a toll for usage? How much will it be?
10/18/2018	1605041952	Why is this survey geared toward the negative? Why do we not have an option to just get the damn thing built?
10/18/2018	1605041930	Entire construction needs to have solid environmental consultation and planning. Emission from this infrastructure needs to take into account the next 100 years not just today. Government planning has a dreadful track record on this! Traffic needs to be removed from the roads and replaced with high quality public transport. Any infrastructure needs to prioritise this, again with 100 year plan foresight.
10/18/2018	1605041923	Please build the tunnel
10/18/2018	1605041918	
10/18/2018	1605041912	
10/18/2018	1605041898	Whilst I support the tunnel, I believe that it must be primarily a train tunnel. In the Greater Sydney Commission's 2056 vision, French's Forest is the only Health and Education Precinct without rail, and Brookvale and Dee Why are the only strategic centres without access to rail. Building more roads is not a sufficiently long term approach. Research has clearly demonstrated that new roads increase demand and reach capacity quickly. The impact of roads and the associated dive structures is far more detrimental to the landscape than a metro tunnel. In addition, to support the GSC's vision for Parramatta as the River City it needs an employment catchment. Without rail, the northern beaches cannot be part of that catchment, or the Macquarie Park/ Chatswood economic corridor. Data shows that many northern beaches residents work in the economic corridor. Without public transport they are forced to drive. This trend will increase with more road provisions. People must have a convenient rail option. Note B-line buses are not a 'rapid transport' option. They are nothing more than a yellow bus, subject to all of the same road congestion as any other bus. Metro rail is the only long term option. If the road does go ahead, the vent stacks must be filtered
10/18/2018	1605041895	I object to this project. Council should to. We must see a metro option instead.
10/17/2018	1605037026	Dear Mayor Reagan and Councillors Thank you for the opportunity to make our voices heard. I am a resident of Seaforth & am hugely impacted by this proposal. These are my main issues of concern: 1. Impact on residents - mental health & associated health issues / reduction in quality of life during AND post construction (5+years) 2. Reduction in House Values - particularly where the tunnel is proposed under people's homes. We can never recover from not having a tunnel under our home to forever having a tunnel under our home! 3. Lack of consideration of an equitable / sustainable long term solution - We should be making public transport the BEST & ONLY option to travel to & from the Sydney CBD. If ferries & bus travel remain affordable and reliable - the population WILL use public transport. Let's not encourage car dependency! 4. Lack of alternative solutions for the proposed cost+++ $$$ of tax payers money - what about alternative suggestions? We DO not wish for a concrete jungle.. This plan has been hastily pushed upon us by the State Govt. This current proposal is NOT supported by the majority of residents. Thank you Regards [redacted]
10/15/2018	1605023885	Please see attached highlighted information from a DOTARS (Federal Govt. Transport Dept) report in 2003 - Working Paper 52 - which modelled travel time savings for tunnelled motorway options and in its conclusions conflicts with claims made by the State Coalition Govt. through RMS. This effectively implies that stated benefits will not be nearly as significant as RMS claims, so support by Council for what has been designed should be more cautious pending further investigation (which investigation should be independent like the Kirby Inquiry was).
10/15/2018	1605023254	There is no case for additional car infrastructure. Rail must be prioritised. Additional car capacity fills out and adds congestion. Replace cars with trains. We must be acting to improve public transport not encourage more single occupancy driving.
10/14/2018	1605017454	dfkdkfkdc\'c /r dv,knv

Did you attend the Northern Beaches Council Beaches Link Tunnel Community Forum?



Answer	Count	Percent	20%	40%	60%	80%	100%
Yes	7	7.37%					
No	88	92.63%					
Total	95	100 %					

Are there any additional items you would like Council to consider in its submission to the RMS?

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10/19/2018	1605048955	1. Add two lanes to Wakehurst parkway north of Warringah road to Narrabeen 2. extend the current roadworks to allow through traffic to come out at government road beacon hill instead of Allambie road.3. The entrance to the tunnel will have minimal impact on some residents compared to the huge benefit for the rest of the residents on the northern beaches. 4. Please also consider to have at all bus stops, the ability for at least two buses to be able to stop in stopping zones, not within the bus lane, so that's the bus lanes are free for traffic to flow better when buses are stopping to allow passagers to board or disembark. 5.Also only cars and buses should be allow to use the tunnel during peak hour, no trucks. Trucks can use Warringah road or Pittwater roads for access to the city. 6. No cyclist to use the tunnel or north or south wakehurst parkway or Warringah Road. 7.If there is only to be 2 car lanes in both directions, then consider the buses lanes for peak hour , however after peak hour , cars can also use the buses lanes. 8. Also consider the option to have the ability to varying the use of bus lanes as buses only or buses and cars. This would great when there heavy traffic or breakdowns/ accidents, to provide additional lanes to get to traffic flowing.
10/19/2018	1605048902	
10/19/2018	1605048888	
10/19/2018	1605048866	As above, dedicated lanes for public transport options. Also, make sure that bike lanes are enhanced, not disadvantaged in the construction and final solution.
10/19/2018	1605048825	
10/19/2018	1605048817	
10/19/2018	1605048762	
10/19/2018	1605048743	
10/19/2018	1605048685	
10/19/2018	1605048671	Instead of building more roads, for a fraction of the price add more buses - this would mean more cars off the road and more jobs. Make a bus lane only from Mona Vale to the city for morning and evening peak. Consider a car tax for the CBD - this will discourage people from driving to the CBD
10/19/2018	1605048668	
10/19/2018	1605048665	
10/19/2018	1605048672	
10/19/2018	1605048659	Better Public transport for the peninsula, more ferries, more buses, no tolls!
10/19/2018	1605048507	
10/19/2018	1605048496	
10/19/2018	1605048343	
10/19/2018	1605048307	

10/19/2018	1605048125	
10/19/2018	1605047933	Need to look at impact and especially other pinch points before or after tunnel. We are already starting to see in Francis Forest & Forestville, that changing traffic signal timings to get more flow on Warringah Road, is having impact on local residents trying to access or cross Warringah Road. Similar challenges will impact residents around the tunnel approach and exit roads.
10/19/2018	1605047798	The way of the future is a train link at least to Dee Why and between Dee Why and Chatswood. I have recently seen and used light rail transport in other cities in the world. It is so fast and efficient.
10/19/2018	1605047633	
10/19/2018	1605047674	
10/19/2018	1605046696	I was not in Sydney when the forum was held. I believe traffic modelling of the intersections needs to be performed to determine the likely performance and also a survey of the Seaforth, Balgowlah, Balgowlah Heights, Fairlight community to determine the frequency of use of the tunnel based on an estimated toll fee.
10/19/2018	1605045475	
10/19/2018	1605044398	
10/19/2018	1605044551	
10/19/2018	1605044492	I would like for the Council to oppose the project of a road tunnel out to the Northern Beaches altogether.
10/19/2018	1605044386	Scrap the idea of a tunnel for cars and replace it as a tunnel for rail or light rail. The Northern Beaches cannot absorb any more cars
10/19/2018	1605044337	
10/19/2018	1605044012	The Tunnel is urgently needed to cope with the population growth on the Northern Beaches, but it alone won't be enough. Consider above ground solar powered monorail.
10/19/2018	1605043878	
10/19/2018	1605043860	Start building the tunnel
10/19/2018	1605043771	
10/19/2018	1605043433	Flow through traffic from Wakhurst Parkway through North Balgowlah to Condimine Street. North Balgowlah public school always increasing and a new hospital meaning increasing traffic through North Balgowlah. Would like to see changes to the road traffic.
10/19/2018	1605043361	Filters must be filtered 24/7 Train line within tunnel optimal 24/7 Bus line in tunnel minimum
10/19/2018	1605043125	
10/19/2018	1605043172	
10/19/2018	1605043158	
10/19/2018	1605043122	
10/19/2018	1605043098	
10/19/2018	1605043004	Get it done and not leave it at planning stage with costly case studies like the Spit Bridge
10/19/2018	1605042953	Make it happen! Residents have to get used to the idea that we have to leave our cars at home and use public transport.
10/19/2018	1605042927	
10/19/2018	1605042912	Please support its construction unconditionally. This is essential infrastructure and a once in a lifetime opportunity for our region.
10/19/2018	1605042903	
10/19/2018	1605042522	Why is the RMS proposing a road tunnel. We all understand that for an area with a constricted transport network at all levels cars are not a very suitable solution. Now that the B-line is in place why isn't the Norther Beaches tunel a train tunnel - it is a substantially cheaper construction option, kinder to the environment and doesn't simply dump the traffic some where else. Given the NSW State Government's war cry of building as manny new dwellings across the state and particularly on the Northern Beaches why isn't a half decent level of public transport being embraced in the form of trains or light rail by the NSW State Government? Use your own cars or may be a bus is a rubbish reasponse. This is especially so given the revenue that will be delivered by the new residential development. It puts the NSW State Govenment in a very poor light. I am sure that this is not their intention however it it yet to be established that the NSW State Government will do the best it can for NSW residents.
10/19/2018	1605042683	
10/19/2018	1605042761	Human health impacts from emissions from tunnel ventilation Increased construction traffic around schools and the increased hazards to children The is no obvious parking or ease of access to the proposed retained disjointed green spaces. This requires better planning.
10/19/2018	1605042451	Has any other form of transport into the CBD been considered. Light rail; trams (we used to have them). More public transport and fewer toll ways is what we need. Let's get away from cars. The big 12 lane tollways that have been installed in Los Angles in the past decades are really congested still. Can we learn from others mistakes?
10/18/2018	1605042328	
10/18/2018	1605042341	Very supportive of the tunnel, but please filter the stacks.

10/18/2018	1605042311	
10/18/2018	1605042295	complete the job quickly and do not let it drag on. Making sure the infrastructure above ground is completed BEFORE the tunnel is finished. (unlike the hospital)
10/18/2018	1605042285	
10/18/2018	1605042263	
10/18/2018	1605042178	Change the tunnel from a road tunnel to a metro train tunnel. Request a metro train line all underground from Mona Vale to Sydney's Badgerys Creek Airport via Narrabeen, Collaroy, Brookvale, Neutral Bay, Mosman, the city, Balmain, Drumoyne, Ryde, Ermington all under Victoria road to Parramatta and onto Badgerys Creek Airport. If this was implemented the NBs would set up for 100 years
10/18/2018	1605042154	
10/18/2018	1605042146	Concerned about tunnel entrace near Balgowlah Boys High School
10/18/2018	1605042120	
10/18/2018	1605042083	
10/18/2018	1605042087	Having travelled to other capital cities in Europe it is obvious that the public transport in Sydney is inadequate for a modern and rapidly expanding city. Put the focus on public transport and NOT on more cars.
10/18/2018	1605042047	A private toll road is not the right solution - a smarter mix transport approach will offer residents and future generations more benefits.
10/18/2018	1605042084	
10/18/2018	1605042082	Just the route the tunnel will take - under which streets / houses and where it will come out.
10/18/2018	1605042075	
10/18/2018	1605042077	
10/18/2018	1605042079	
10/18/2018	1605043074	
10/18/2018	1605042058	Mike Baird promised to return the surplus Sydney Water site at Kirkwood St, Seaforth to Manly Dam (MWWMP) after much public pressure. This is now being earmarked as a potential tunnel access construction area which would destroy the entire natural environment there and threaten the water catchment.
10/18/2018	1605042067	Spend the extra money to get underground link from Sydney Road to Tunnel
10/18/2018	1605042062	
10/18/2018	1605042059	
10/18/2018	1605042046	
10/18/2018	1605042054	denegration of green space and gold course
10/18/2018	1605042039	
10/18/2018	1605042051	Train rather than road
10/18/2018	1605042040	Connecting the north end of manly and in particular Queensdiff to the tunnel entry during peak hour. At the moment, no right turn signs of the manly beach front during peak hour prevent Queenscliff traffic from being able to access pittwater Rd and out to Kenneth or balgowlah roads without having to crawl the whole way into the centre of manly first. This needs to be rectified to ease traffic along the manly beach front.
10/18/2018	1605042043	
10/18/2018	1605042027	This would bring more traffic and development to the Northern Beaches
10/18/2018	1605042031	
10/18/2018	1605042024	
10/18/2018	1605041991	Think of our health, the reasons people want to bring up families on the Northern Beaches and demand instead investment in overdue, clean public transport alternatives. Thank you!
10/18/2018	1605041982	Better public transport nodes eg east west to Chatswood north south to Manly and fast ferries at 15 minute intervals are better options for 8-16 Billion dollars
10/18/2018	1605041954	
10/18/2018	1605041952	BUILD THE TUNNEL
10/18/2018	1605041930	Set up a seperate portal on line to maintain transparency, and ongoing feedback with all residents on the beaches.
10/18/2018	1605041923	No
10/18/2018	1605041918	
10/18/2018	1605041912	Please just do this ASAP as it is critical infrastructure for this area

10/18/2018	1605041598	RAIL (underground metro)
10/18/2018	1605041895	
10/17/2018	1605037026	As per above
10/15/2018	1605023685	RESULTS Institute of Transport Studies (University of Sydney) travel projections, undertaken for the study using the Transport and Environment Strategy Impact Simulator (TRESIS) model, indicate a significant reduction in travel time of around 7 per cent for Warringah region residents from both options. These reductions result from increased road capacity in both directions, together with bypassing of local congestion, traffic signals and associated queues. These savings accrue to travellers on all major routes, not solely those using the tunnel bypass.
10/15/2018	1605020254	Has train vs road modelling been performed?
10/14/2018	1605017454	klmlkdmcecdevfnvj

Please tell us your general views on the Beaches Link Tunnel project

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10/26/2018	1605078335	The current plan has been hastily devised with a lack of meaningful or timely consultation with the community. There must be a moratorium placed on this project so that the best long term solution can be delivered. The RMS must design and evaluate a number of other possible alternatives particularly those utilising light rail. The RMS must allow the Northern Beaches Council time to fully discuss and evaluate the concerns of local residents. No destruction of Balgowlah Golf Course. No link road. No unfiltered stacks.
10/25/2018	1605076553	Public Transport should be improved first,perhaps free transport would be cheaper than a tunnel. If it must happen it must be filtered for the sake of all residents and nearby Schools and Kinder garden schools Once the green space is gone it is gone forever also!!!
10/25/2018	1605076428	Although I think a tunnel is a valid idea to reduce congestion the current designs seem rushed and designed without any real understanding of the local area. The use of unfiltered stacks is abhorrent and will greatly impact the health of locals. If you can't afford filtered stacks you can't afford the tunnel. The planned placement of the tunnel near Balgowlah Golf course seems a cost cutting exercise when moving that entrance further down towards the start of the Bypass would have less impacts on residents and would not require the creation of a surplus feeder road from Sydney Rd cutting through the current golf course/ future green space.
10/25/2018	1605072448	While I think it will alleviate some of the traffic gridlocks in some areas, I am concerned that the construction will have detrimental affects in my local area near Seaforth Oval.
10/24/2018	1605072230	I think that there should be an alternative solution as there are SO many single drivers commuting to the city in their cars. Surely it's better to introduce a congestion charge and invest the money into more buses into the city?
10/24/2018	1605072128	I am against the tunnel. I feel that it is a costly short term solution. Traffic will not improve for long. Building density will increase. There is poor consultation with locals on what they want. The environment is important to the northern beaches. Pollution and noise from the tunnel and smokestacks will negatively impact thousands of residents. The RMS has a terrible track record of consultation, environmental management and noise pollution. They are not under any oversight.
10/24/2018	1605068469	100% against this project and the way it is being conducted.
10/23/2018	1605067056	I understand the logic of the need for the tunnel however the 2 things that I find most disturbing are: the loss of the green space of Balgowlah Golf Club and the Balgowlah Valley location of a (one?) non filtered tunnel air stack. It would also make sense to me for there to be some form of railway incorporated into the tunnel to make it more future proof.
10/23/2018	1605066824	Completely against the link road 100%. Completely against the construction site on the golf course. In regards of the tunnel - maybe it could be a good project, BUT needs to be filtering properly as we live in the area and it is going to affect our children and elder people. Needs to be done in a clever way. I would love to see more initiatives as in rail work, or public transport options - that's the future
10/23/2018	1605062208	I understand that traffic has increased over the years - particularly from the Northern Beaches to the city. Whilst I'm not opposed to improvement and progress - I'm very against smoke stack pollution in particular (current proposition appears very close to our home and our son's school) but also the impact the link may have on local businesses, toll implications and concerns around whether it's a solution that caters for the long term.
10/23/2018	1605062178	Against the loss of green space and added cars on Balgowlah residential streets this proposal brings. Concerned regarding the emmison stacks so close to schools and children's sports grounds.
10/23/2018	1605061944	
10/22/2018	1605060546	Generally support tunnel to remove through traffic from spit bridge however I am concerned over proposal for link road at expense of local recreational resource. Impact on local roads particularly maretimo street and impact on balgowlah boys school
10/22/2018	1605060512	I have serious concerns over the ventilation stacks not being filtered.
10/22/2018	1605060487	The Link Tunnel will be useless in the scheme of things because all it does is get people more quickly to another area of traffic jam. Further, for the northern beaches, it does not address the congestion from Seaforth heading north in afternoon peak period, or Saturdays and Sundays. What we need is better public transport options. 2 LINES to North Sydney and Chatswood to get people to trainlines. Dedicated roads to Buses, no cars or cyclists in bus lanes. If they then choose to sit in their cars to drive to work, to sit in an office all day, then sitting in traffic is the consequence and price of not going public transport. The children of Balgowlah and Seaforth, and home owners should not have to bear the pollution brunt of the entitled class who believe they are too good for buses.
10/22/2018	1605060354	another encouragement for people to use their cars instead of public transport
10/22/2018	1605060348	Totally unnecessary Better public transport is needed
10/22/2018	1605060306	My main concern about the project is that the exhaust stacks will not be filtering the exhaust fumes, and that one is located very close to Seaforth Public School
10/22/2018	1605060096	I support it but the pros and cons of the different configurations need to be more clearly explained

Beaches Link Tunnel community forum - follow up survey

QuestionPro

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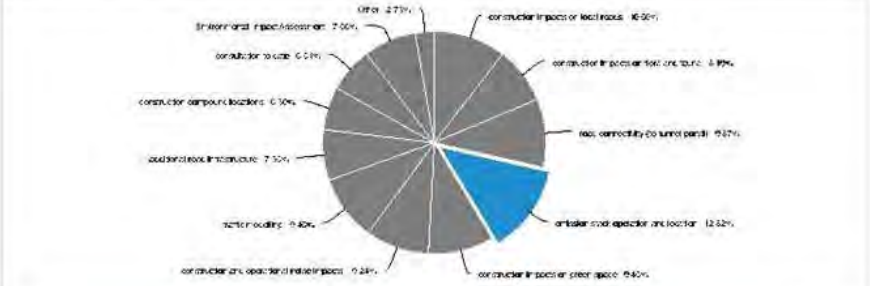
10/22/2018	1605059753	I oppose the construction of the tunnel and consider it to be a short term solution for the congestion problems in the NB. It will increase car dependency of residents and make the NB an increasingly "unwalkable" region with substantial air pollution issues. Please refer to the recent studies where two NB suburbs are the least walkable in Sydney. A solution must be found for better less polluting public transport options, not only is it equitable and affordable for the masses but will increase the liveability of our region.
10/22/2018	1605059741	Supportive but want confidence it will minimise impact on our neighbourhood, particular Seaforth Public School. We have also just endured nearly 24 months of BLine construction, much of it right outside our house so further work in the near vicinity will be very difficult for us.
10/22/2018	1605057885	
10/22/2018	1605056882	I have never thought the tunnel was a good idea - endless international research shows that creating road space encourages more cars to use the roads and congestion is not solved. In fact, in a successful city, congestion is unavoidable - a sign of success! But public transport must improve. Invest in new public transport and making the best use of existing road space.
10/22/2018	1605056470	It is an environmentally damaging hugely expensive and very poor solution to present and future transport needs
10/22/2018	1605056377	Concerned that it is not a future proff option for increasing populations since a train won't be put through. Much prefer improved public transport
10/22/2018	1605056199	If it is to be built, there should be rail/light rail incorporated into the plan.
10/21/2018	1605054787	We are totally desperate for it to happen ASAP
10/21/2018	1605064657	I am opposed to a road tunnel. I believe public transport options, private car disincentives need to be explored.
10/21/2018	1605064626	I support the tunnel fully. There has been a lot of supposed knowledgeable comments which to me are not supported by facts. The disruption to BBHS is a little over done. I was a student at the school during the building of Manly road and my son also attended the school during the construction of the "Bypass" neither of us were effected by the activities. I often travel down the bypass, northward, after 9am and observe the traffic going towards the spit, its like a parking station how much pollution from idling vehicles compared to traffic travelling at 60 kph.
10/21/2018	1605054517	It should not be going ahead. End of story
10/21/2018	1605054494	An improvement to the 4-lane Spit Bridge and travel through Mosman as a means of getting to the Northern Beaches is long overdue. I agree with one of the speakers on Wednesday that perfect should not get in the way of good.
10/21/2018	1605054475	I think it is a wonderful transaction which will be of significant benefit to all commuters on the Northern Beaches as well as residents and commuters in the Mosman to Neutral Bay region and beyond
10/21/2018	1605051565	The tunnel is not a solution to the future transport needs of the Northern Beaches. Induced demand will result in the tunnel being a carpark like all other Sydney motorways, pushing traffic congestion to the next bottleneck. Even projected travel times advertised by RMS are a modest 15 minutes for an expensive toll. If built at such great expense of $8-10M, the Northern Beaches will see minimal spending on transport from NSW government after that. For the same amount of funding, the equivalent of 16-20 BLines could be paid for that would revolutionize public transport, and be built in a fraction of the time to improve travel times sooner. Council's own transport surveys prove how popular public transport improvements are. The east-west connection through Frenchs Forest is desperately needed, and will impact on the business case for the tunnel, but has not been factored in. When operational, I worry our public transport spend will be downgraded to push more people into cars to boost the tunnel patronage and profits. The tunnel is a short-sighted political solution not suited for the future of transport on the Northern Beaches or anywhere.
10/20/2018	1605051343	I believe it is a good thing for the area and a solution to the traffic woes is warranted. There needs to be extensive future proofing/planning done though before it is green-lighted.
10/20/2018	1605051324	I am generally in favour of the tunnel. However I am concerned about the location of the stacks and the impact on air quality for those living nearby. I am totally against the link road as it completely ruins the existing green space. There are superior options available. I do not want the cheap option that ruins our community and smashes property values.
10/20/2018	1605051322	I believe it is essential to the continued health and growth of the Northern Beaches in General. It will help to provide employment opportunities by encouraging more businesses to locate on the Northern Beaches. It will also make life a lot easier for thousands of residents and workers.
10/20/2018	1605051314	
10/20/2018	1605051315	I feel the project is ill conceived and poorly planned. The Nothern beaches needs a better public transport system rather than a tunnel that will become a parking lot at peak times. The link road constructed at the expense of the green space that is currently Balgowlah Golf Course (and should remain so) is EXTREMELY poorly designed. The construction phase will severely affect the physical and mental health of local residents. The nano particles from the exhaust stacks WILL impact the health of the young and the elderly in particular. You really should be trying to reduce the number of vehicles on the roads not increasing them.
10/20/2018	1605051316	While there is need for transport improvements in our area the tunnel proposal has no appropriate analysis that would benefit the majority of travelers in the congested peak periods and concentrates the negative aspects of the project like air pollution and congestion on specific areas like Balgowlah.
10/20/2018	1605051297	We need a traffic solution, but we should to put the tunnel on hold & develop a fully integrated plan that is the best solution, not just an expensive car tunnel. Public transport needs to be considered as a high priority
10/20/2018	1605049725	The Beaches Link Tunnel is necessary to the whole of Northern Beaches to relieve traffic congestion and to speed up movement between the NB and the rest of City.
10/20/2018	1605049534	Seems like the Council is promoting rapid development? Does this stack up for the generations to come?

10/26/2018	1605049447	I object to tunnels being built and sold to Transurban, then residents being funneled into the tolled tunnel because RMS and state government have close "deals" with Transurban to ensure profits from tolls. The RMS will close lanes on Sydney Rd in order to ensure maximum patronage to tunnel. Similarly Ernest St Cammeray access to Harbour Bridge and Eastern Distributor will be closed to ensure cars use tunnel and not Military Rd. I object to government rushing this project through before the election in March 2019. I believe alternative public transport must be investigated more buses, possible trains and more ferry services. What about a service from Cleveland to city? I object to chaos it's going to cause the NB. I object to the governments lack of transparency. They have not provided any cost benefit analysis. For such an expensive project all other options of public transport will full cost benefits must be provided.
10/26/2018	1605049311	
10/26/2018	1605049435	I like the idea of the tunnel and reduced travel time to the city and Lane Cove tunnel. I don't like the idea of the link road proposed to run through Balgowlah golf course.
10/19/2018	1605049141	It is a dangerous, badly thought out project. There has to be a better way to improve our traffic issues and not enough thought has been directed towards options.

Please select the elements of the project that are most important to you.



Answer	Count	Percent
construction impacts on local roads	50	10.51%
construction impacts on flora and fauna	39	8.19%
road connectivity (to tunnel portal)	47	9.87%
emission stack operation and location	61	12.82%
construction impacts on green space	45	9.45%
construction and operational noise impacts	44	9.24%
traffic modelling	45	9.45%
additional road infrastructure	35	7.35%
construction compound locations	30	6.3%
consultation to date	31	6.51%
Environmental Impact Assessment	36	7.56%
Other	13	2.73%
Total	476	100 %

Please select the elements of the project that are most important to you. - Text Data for Other

10/25/2018	1605076553	flora and fauna
10/24/2018	1605072128	Overdevelopment
10/22/2018	1605066354	Mental health impacts
10/22/2018	1605059753	Public consultation, transparency, predictable modelling of impacts to residents close (eg health hazards) and far (further congestion) of the tunnel
10/21/2018	1605054317	School kids nearby
10/21/2018	1605051563	Impact on local and main roads of increased traffic re congestion and required upgrades at council expense

10/20/2018	1605051324	Financial Loss
10/20/2018	1605051314	property devaluation, loss of amenity where we live
10/20/2018	1605051315	The significant impact on the value of impacted properties.
10/20/2018	1605051316	Public / Mass Transport
10/20/2018	1605049334	Is an estimated $8 billion not better spent on something that makes sense?
10/20/2018	1605049447	Trust. Look at the Westconnex inquiry!
10/20/2018	1605049311	Costvs benefit analysis?

Please provide detailed feedback on any of the important elements identified above.

Please provide detailed feedback on any of the important elements identified above.		
10/26/2018	1605078335	The current RMS tunnel proposal is a seriously flawed plan. Construction zones are much too close to houses, childcare centres and schools, particularly Balgowlah Boys High School and Seaforth Public School. The safety and health of students, teachers and parents would be at constant risk. They would be exposed to up to 7 years of constant noise, dust, pollution, traffic congestion and exhaust emissions. A 6 to 7 storey high unfiltered ventilation stack is to be placed on the site of Balgowlah Golf Course, pumping out pollution and carcinogenic particles. The Seaforth stack is to be constructed at the bottom of a valley. A NSW Government planning document identifies a risk of 'plume downwash' where pollution is drawn close to the ground. Engineering maps show a 500 metre radius around homes, schools and green space where dispersed pollution will mix with air - entering schools, houses and other buildings. This unfiltered stack will then cause health issues for local residents, particularly impacting the students of Balgowlah Boys H.S., Seaforth P.S. and several local childcare centres – Seaforth Childcare, Northside Preschool and Balgowlah Kinder Haven. The need for a link road is strongly refutable. The current link road plan is ill-conceived and poorly designed. Credible alternatives to the current link road proposal must be explored. The proposed link road through the Balgowlah Golf Course will mean the destruction of a popular golf course. Its destruction would impact strongly on the physical, emotional and mental health of the club members. It would also impact on the social fabric of the community. The current link road proposal would mean the destruction of over 500 mature trees, the destruction of a natural wildlife habitat and the destruction of a flourishing creek ecosystem. Over 40 species of birds can be found in this habitat. Balgowlah Golf Club has been the responsible custodians of this precious wildlife habitat for 90 years. The members of Balgowlah Golf Club and many dedicated regeneration volunteers, have spent years rehabilitating the creek which runs through the course. The destruction of the aquatic life in the creek would unbalance an entire ecosystem. The destruction of the creek ecosystem would also have a flow-on environmental impact on the ecosystems of Manly Dam and Garigal National Park. The existing green space is a popular multi-purpose space used by schools, sporting clubs, dog walkers, runners, scouts, golfers and regeneration volunteers. This precious and greatly used area must be preserved for future generations. The RMS proposal would place a busy main road through the middle of a greatly reduced green space. The people and animals using this space would be put at great risk by the constant volume of traffic. The current proposal would have a catastrophic affect on the lives of the residents who live near the proposed link road. Property values in this area have already plummeted by up to 25%. The proposal would also have a significant impact on Balgowlah Boys High School. The students and staff would be exposed to constant noise and pollution for a significant number of years – for some students through their entire time at high school. The streets around the high school are already very busy. Large numbers of gridlocked trucks would be waiting in nearby roads and causing traffic chaos. The greatly increased traffic in the area, particularly in Maretimo Street, would make it extremely difficult for students, teachers and parents to safely access the school. To avoid the construction zone at Seaforth, traffic would use rat runs through Balgowlah and Balgowlah Heights. These rat runs would increase traffic through narrow local streets not designed to handle this volume of traffic. They would impact the streets around Balgowlah Heights Public School and St Cecilia's Primary School, putting the students' safety at risk. A reduction in house values along the rat runs would be created. The tunnel proposal does not include a dedicated lane for public transport. This would mean a very high volume of traffic with an imbalance in favour of cars. This would have negative effects on air quality. The ever increasing number of cars would then mean an increased demand for parking. Studies both here and overseas have shown that new motor vehicle tunnels and motorways have a positive impact on travel times for only a short period. Within a couple of years, the increased volume of traffic becomes increasingly gridlocked as more cars have been encouraged onto the roads. The proposed tunnel will add to traffic congestion rather than reducing it. A projected 40% increase in the population of the northern beaches would also contribute to the future gridlock of the tunnel and of the wider road system. The government must invest in public transport which is more equitable and sustainable. Government has a social responsibility to lessen carbon dioxide emissions. Frequent, affordable and non-polluting public transport is needed. The government must seriously consider the development of a light rail corridor along the northern beaches. The RMS proposal is already archaic as it does not take into consideration the transport of the near future. Electric road vehicles are increasing in usage and driverless vehicles are already being road tested in Australia. This proposal is seriously flawed, not best practice and must be reconsidered.
10/23/2018	1605076532	Exhaust Filtration is essential
10/23/2018	1605076428	The placement and plan for unfiltered stacks seems reckless and poorly thought out. Would it not make more sense to place these at the highest point (rather than the current plan of off Sydney road. So the pollutants have some chance of being blown away). Unfiltered stacks are a huge health hazard. The danger of these particulates are well known and The govt of NSW already has data suggesting an increase in respiratory complaints from locals living near and not so near existing stacks.so why would you continue to install them? The topography, especially in the valley bordering Seaforth and North Balgowlah becomes clogged with smoke for days after bush fires and burnoffs. as far away as the Blue Mountains so one can only presume that sandwiched between the 2 planned stacks the air in the valley will be in a constant state of contamination with devastating short and long term effects on residents. The traffic modelling also appears to be remiss. Locals surveyed from Seaforth, North Balgowlah, Balgowlah Heights, have strongly indicated they are unlikely to use the tunnel yet an unneeded filter road has been designed to cut through the current Balgowlah golf course impacting on green space and with likely local bottlenecks occuring. It appears a cynical move to shunt residents onto a pay for service toll road. Moving the tunnel entrance further down to Manly Vale a predominantly industrial area would greatly reduce the impact on residents, no new feeder roads would need to be created as the few locals from surrounding suburbs (Manly, Balgowlah Heights, Seaforth and North Balgowlah) who wished to use it could access it from Condamine St as they currently do the Bypass rd to the Spit Bridge. Making Condamine St a no parking from Sydney Rd to the bypass would open it up into a four lane road at considerably less cost and upheaval than a new feeder road 200 (?) meters further up Sydney Rd.
10/23/2018	1605072448	If the proposed construction site A is used at Seaforth Oval, this will have a huge impact on residents in this area. I believe a separate exit road will be used by trucks which will create a dangerous situation for traffic and residents living opposite the site.

10/24/2018	1605072239	I am most concerned about the singular unfiltered emissions stack for such a long tunnel and the impact it will have on our children as they grow up. No other tunnel in the world has one stack for such a long tunnel...
10/24/2018	1605072128	the proposed smokestacks should be filtered to the best available technology. Tunnelling shoul minimise noise and disruption to residents. True community consultation and representation is vital. The pollution from road run-off to manly dam should be managed better. The risk to health from motor vechile pollution is enourmous. We should be investing in trains, electric cars and electric buses.
10/24/2018	1605068469	Completely against the project for following reasons: 1) Process has not been transparent with regards to assumptions and business case, which don't stack up. 2) Pollution impacts on our community, schools and children. 3) Destruction of green space in the area 4) Huge impact to the community during construction 5) Non-scalable solution - we should only be entertaining mass transport options like train and bus. No more cars. 6) There are infinitely better places to spend $8m plus 7) Negative impacts to traffic congestion in arterial roads and population growth requirements of the peninsula to justify business case.
10/23/2018	1605067056	I've documented my summarised concerns in the general views section above.
10/23/2018	1605066524	I am aware of most of the issues above, I think the construction and operational impacts are the most important together with the link road killing the golf course
10/23/2018	1605062208	I'm concerned about loss of flora and fauna to the Northern Beaches - however we're mostly concerned about the emission stack operation and location. I'm certain that no North Balgowlah resident wishes to be impacted by this.
10/23/2018	1605062178	Loss of green space, in a suburb that doesn't have a lot.
10/23/2018	1605061944	Negative impact (noise, pollution, increase traffic) so close to Balgowlah Boys school. Traffic changes, road closures to burnt bridge means bad access to North Balgowlah.
10/22/2018	1605060546	Traffic modelling and need for link road - what evidence is there that directing traffic through Mona vale and Condamine street isn't the best choice? What traffic calming measures are proposed for local roads if link roads goes ahead? Maretimo street is already congested with parking for school and limited room for passing buses- needs speed restrictions and footpath on eastern side of road to improve safety - if link goes ahead General road safety and pedestrian safety around proposed traffic light junction at bottom of maretimo street Air quality and unfiltered emissions impact on local area including school
10/22/2018	1605060512	I have looked through the report that the RMS used to do their cost benefit analysis on filtering the ventilation stacks and I have found that they have incorrectly used the report in arriving at the $280k per tonne health cost of not filtering the tunnel. The area around the tunnel is much more dense than what has been assumed in arriving at the $280k figure and as such the health costs have been grossly understated.
10/22/2018	1605060487	There is nowhere where the unfiltered stack will not affect the community - the area is too densely populated. The works will create noise and dust close to the school. The entrance at Condamine St will be just as bad - there are the lights for Stocklands, the lights for Balgowlah Rd and the crossing for the school children to Manly West. There would be even more problems relocating the stack to Coedamine St.
10/22/2018	1605060354	Construction impacts will not simply be a little pain now for big gain later. The Berejiklian govt CANNOT be trusted to efficiently carry out anything, not even a fire services levy let alone major infrastructure. People's lives will be ruined here just as lives have been ruined from George Street to St Peters
10/22/2018	1605060345	It is unecessay Use the money for public transport Schools and hospitals
10/22/2018	1605060305	I understand that the exhaust stacks will not be filtering the exhaust fumes, and that one is located very close to Seaforth Public School
10/22/2018	1605060096	I'm concerned about Burnt Bridge Creek environment
10/22/2018	1605059753	I oppose the stacks particularly as they're unfiltered. I oppose the link road and the destruction of our green spaces. I demand that better more equitable solutions be found for the masses, in particular trains and better bus connections and other public transport options.
10/22/2018	1605059741	-
10/22/2018	1605057835	Proposed smoke stack location at the Balgowlah golf course is way too close to residential area and nearby schools. Major health concern for our children and the elderly. And construction noise and traffic noise post construction will have major impact on peaceful living in the surrounding areas.
10/22/2018	1605056892	I am more concerned about the long term outcome in terms of wasted money, destroyed green space and ever increasing car traffic than in imminent construction issues. However, my boys will suffer the construction nightmare throughout their high school years and I feel very sorry for residents adjacent to the new roads.
10/22/2018	1605056470	Disingenuous so called community consultation. Community concerns ignored.
10/22/2018	1605056377	Tunnel is not the best option
10/22/2018	1605056199	My biggest concern (apart from not having any mass public transport system with the tunnel) is the refusal to filter the stacks. Every major country now building tunnels filters the emissions.
10/21/2018	1605054787	Keen to know where we can enter this wonderful tunnel!
10/21/2018	1605054657	-
10/21/2018	1605054626	Many speakers spoke about plans they had submitted but nothing was produced for discussion.
10/21/2018	1605054517	None
10/21/2018	1605054494	Ideally, an improvement to Northern Beaches access should have minimal environmental impact and represent best use of funds available.
10/21/2018	1605054475	I think the project is a great compromise to cover all interested groups enabling good connectivity from the Balgowlah, Clontarf and Seaforth side as well as from further north as well as providing a sensible level of additional public space (rather than sacrificing additional private property). Giving the community back a large part of the existing golf course in Balgowlah represents a win win for the community

10/21/2018	1605051565	The impacts of both tunnel construction and operation are very significant to local residents, and are too high a price to be paid for any infrastructure project. Residents will be forced to live within 100m of exhaust stacks, be subjected to significant decreases in air quality and are condescendingly told that they will not be affected, and receive no compensation. Leaked cabinet documents early on in the project revealed issues with exhaust dispersal in low-lying areas and plume downwash, yet these issues are now denied by RMS. Some residents will be to forced to live next to construction sites with noise and dust pollution for years - with nightwork construction required for a significant period. Rat-runs around the Balgowlah portal will be extensive – impacting 10-20 streets in the nearby areas, even down to Manly as traffic diverts from Sydney Rd to Condamine St, Balgowlah Rd and Kenneth Rd.
10/20/2018	1605051343	Stacks should be filtered - no question. As much replanting/green space should be reinstated where possible. Extensive thought should be given to surrounding traffic flow both during and after construction.
10/20/2018	1605051324	The North Balgowlah community raised their concerns about the original plans so "the problem" was shifted to our community (those who live on or around the golf course). The Link Road will destroy the existing green space, cause massive traffic jams on Sydney Road, the Link road itself and the tunnel exit. peak hour traffic will be chaos. There are superior options available. The link road is the ill consider, cheap option. I also wonder about the impact of a 9km tunnel and all the exhaust coming out two exits.
10/20/2018	1605051322	I am against the residents alternative proposal for ingress and egress of the tunnel at Balgowlah.
10/20/2018	1605051314	As advised above, all these issues are important to me. As a very long term resident who stayed living in our house due to the amenity of the Balgowlah Golf Course and Burnt Bridge Creek environs, I believe there has been a distinct lack of transparency, empathy and honesty regarding the Beaches link proposal. There has been no consideration given to the impact of the proposal on the local community and environs, either during the proposed project or on completion. During the 5 + years of construction we will be impacted by construction noise, pollution and dust, road chaos, gridlock caused by multiple construction trucks and other issues yet to be revealed. We will lose our local amenity with the proposed link road, deviation widening, ventilation stack and construction site destroying the Balgowlah Golf Course and BBCreek wildlife habitat. Post construction we will be permanently left with the noise, pollution, health issues especially related to the unfiltered stack and property devaluation with no compensation likely. Already our properties have devalued by the proposal by hundreds of thousands of dollars . All the short and long term impacts will bring little benefit to us. I believe this project is mostly for the benefit of people living further up the Northern Beaches who will not be detrimentally impacted. More cynically, the main beneficiaries will be developers and possibly council. I implore Council to say no to the current poorly thought out proposals to allow time to develop the best long term solution for transport on the Northern Beaches. The latter must include effective community consultation.
10/20/2018	1605051315	See above. I feel so strongly about this that I cannot support a council or a state government that will push this project ahead in its current form. Thankfully elections are not that far off.
10/20/2018	1605051316	Basically as said above this proposal Doesn't provide good transport options for the majority who use public transport in the peaks and concentrates negative impacts of congestion and pollution on the Balgowlah area
10/20/2018	1605051297	The current plans appear to only increase congestion around Balgowlah & Seaforth, with no likely benefits to traffic. The construction timeline is incredibly long & the unfiltered stacks are madness.
10/20/2018	1605049725	See first comment
10/20/2018	1605049534	Anyone who has travelled like me, mysister, an engineer living Germany who visits often laughs at how naive people here are. Would love to refute some detail if only the RMS would provide some!
10/20/2018	1605049447	This government can not be trusted. They are selling our public assets including roads before any of the community knows about it. Then decide to build car tunnels, sell it to private multi national companies, then create contacts with these companies for decades to charge tolls. The proposed design of the tunnel and portal entrance is in the wrong place. It should be further north and not in Burnt Creek Deviation. Perhaps down near Millers Reserve where there are no properties nearby. Then the overpass at Kitchener St would not need to be made higher nor would you need to widen Burnt Creek Deviation.
10/20/2018	1605049511	This tunnel proposal does not meet any health, cost, benefit, amenity measure. The community deserves better from elected officials than a tired old pre last election stunt.
10/20/2018	1605049435	My main concern is the link road through the golf course as the golf course is my back yard. The local community have developed some outstanding solutions to avoid this, and I have no doubt that if modelled there would be a positive impact on traffic levels. Having worked on road projects in the past, there is no foreseeable way that traffic lights at the entrance to the tunnel is the best solution.
10/19/2018	1605049143	The tunnel will be choked with traffic within a short time of opening. Toxic fumes will spew into local schools. Open spaces and biodiversity will be decimated.
10/19/2018	1605048954	no need for the proposed "Link Road" - use the exising Burnt Ck Rd Deviation to access the tunnel. Maintenance of exising green space is mandatory.
10/19/2018	1605048925	Loss of green space and pollution. Dudley st will be surrounded by expressways. No respite for noise and pollution. We will be an island in a sea of roads.
10/19/2018	1605048798	A tunnel is needed, however construction and design have to be conducted in a smart manner that considers community welfare, feedback and impacts of construction and operation on green space, animals, plants and residents. Northern beaches hospital and associated road works are examples of poorly designed work pushed through without consideration.
10/19/2018	1605048752	I don't understand the need for more roads when we don't have a train line.
10/19/2018	1605048687	The requirement for a filtration system and location

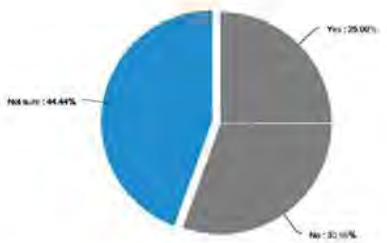
10/19/2018	9605043795	Current proposal concerns (most likely copied of a project design 50 years ago when it was initially reviewed 1. Excessive overflow of traffic on Sydney Road, including number of traffic lights between Balgowlah Boys and Burnt Bridge Road to allow turns for road leading to entrance of tunnel, parking in community green space and intersection of Sydney Road and Burnt Bridge Road. Also issues surrounding traffic flow right next to a school 2. Single lane on Burnt Bridge Road over the tunnel . This will create traffic jams for people wishing to avoid the tunnel (in tough economic time they will even more) hence the so called green space that is being created on top of tunnel will most likely be removed within 6 mths to create extra lanes and or the trees on the kerb removed to make space for additional traffic lanes. 3. There has been several suggestions for tunnel to start at Warringah golf course and have a link to Manly utilizing Condamine Street. This will mean Manly ferries can be used more rather than currently half empty ferries going to and from the city. Also its better to have improved road system further out in northern beaches so people can afford to live further out and yet be able to travel to cbd and other central locations creating Warringah as a hub and using public shuttle buses rather than more and more cars on the road creating more pollution and affecting peoples health . Overall government revenue collected from tolls will be spent on healthcare resulting in zero benefit. Whilst Warringah area is flood prone , it can be dealt with a higher spend on construction costs 4. I feel post construction of this tunnel there will be a lot more people travelling to Manly and Northern beaches due to reduced travel time which will eventually mean Sydney Road and surrounding roads will become traffic jammed even in the weekends hence all car parking spots on this road will become clearways and affect businesses on this road all the way from Seaforth to Manly. 5. My view on alternate road system is 1. Like everyone else - create the shortest route from point A to point B impacting the community greatly or 2. Create an alternate longer route underneath the existing road such that traffic flow is shared on both roads, the tunnel needs to have public transport lanes. this will encourage people to use public transport rather than drive 6. Finally , the biggest appeal for the north shore is the green space, I don't understand why we need to save 20 minutes in travel time and destroy the existing ecosystem that needs to be protected for future generations, The cost of the project is massive and we only get one chance to do it right, a green and sustainable solution not for cars but for public transport.
10/19/2018	9605043512	The identified issues are progress blockers. This project needs to be started as soon as possible... connect the Northern Beaches to Sydney quickly. I think you are asking questions that could potentially slow everything down.
10/19/2018	9605042445	Proposed construction of roads close to both St Cecilia's and Balgowlah Boys Schools worries me greatly seeing as we, like many others in our area, have three children who will be attending both schools. The link road through Balgowlah Golf course is a poor and hastily hatched proposal. Placing a major intersection on the corner of an already congested road (Sydney Rd) which houses a school filled with 1,000 students simply beggars belief. Wanganella and Maretimo Streets will become car parks if they aren't already with traffic filtering down from Balgowlah Heights. Health issues caused by fumes from unfiltered exhaust stacks. I honestly cannot believe that these would be considered in this day and age. Has the Government not considered the potential legal implications they will likely face from those people whose health is adversely affected by this pollution? I guess there will be a new Government by then so why would they worry.
10/18/2018	9605042610	I think it is a pity that the State Government rushed into this project when it did rather than waiting for the Northern Beaches Council to get established and then developing something with Council that would have taken much greater heed of the transport needs of the Northern Beaches. Councillor Harris recently said that "The Community...want to know we're working in partnership with the State Government" –let's hope we haven't lost the opportunity for that. Councillor Sprott, in commenting on Council priorities, recently said We need to take the time to plan correctly. If we spend more time now in the design phase we can build a future that works but if we buckle to pressure and rush things through without proper consultation we can get it wrong and then we will be stuck with it for the next 50 years. Had that collaboration occurred, the outcome might well have included a tunnel – but one with more focus on public transport rather than one that just encourages drivers to get back into their cars. There is no priority for buses in the tunnel under the current plans. With the current reference design there are some glaring issues that need to be highlighted. The Link Road was not in the 2017 preliminary designs. It appeared from nowhere and all sections of the local community were blindsided with this. RMS says it's necessary to get motorists from Manly, Fairlight, Balgowlah, Clontarf and Seaforth into the toll road. It's ill-conceived, not necessary and poorly designed. RMS says it's only designed for light traffic but there are already feeder roads from the areas mentioned that will cope with "light traffic" particularly if some of the junctions are upgraded. The Link Road will have major junctions at each end with traffic lights. One junction will be right outside Bally Boys and will present additional and unnecessary risks to the 1,000 or so pupils, which will include my grandchildren. The other junction in BBCD is so close to the tunnel exit, it has the potential to cause tailbacks into the tunnel. The Link Road and Tunnel works will have a devastating impact on the local environment. Despite our local MP, James Griffin, and the Minister for Planning saying government policy is there should be no loss of green space, over 550 trees will be removed and the creek bank ecology destroyed. The Link Road and the RMS site with an exhaust stack will take at 30% of the green space – this will be lost to the community for ever. Councillors Sprott and McTaggart in particular, have supported the current initiatives of Council with its Urban Tree Canopy Plan. Very laudable objectives – but removing 550 trees, most of which are mature natives, doesn't seem to fit well into that Plan. A commitment to plant at least 2 trees for every one removed sounds good but it takes far more than that to replace the environmental benefits of the mature trees that have been destroyed. Another issue is exhaust emissions – the current design has an exhaust stack at just about the lowest point of the Balgowlah Valley – and just where over 550 trees will have been removed with their amazing properties to absorb carbon and other toxins. In September last year Councillor Bingham penned a very well prepared article pointing out the concerns for Seaforth Public School with the then proposed exhaust stack and other local groups supported those views. All RMS did was move the stack 200 metres to the other side of BBCD without advising anyone - but that, as the Clean Air Seaforth Group recently pointed out, does nothing to address the issues raised by Councillor Bingham and it moves the stack closer to Bally Boys and other schools. RMS claim the emissions will be forced upwards and will disperse – as the stack sits at the bottom of the valley, that dispersal should just be about at the right height for the schools and residents that sit on the ridges surrounding the course. RMS claim the emissions are harmless but other studies have very different results – I think there is still a lot more work needed on this issue. RMS propose to realign the creek – that means move it. RMS states it will be retaining the bush along the creek bank but then admits it will only be a small section on the Deviation side – the rest, and the habitat for over 40 species of birds that frequent the creek bank and the course, will go. In recent years, Manly and Warringah Councils, the State Government and Manly and Balgowlah golf clubs have spent millions of dollars rehabilitating the health of Burnt Bridge Creek and Manly Lagoon. These improvements to water management and water quality are likely to be reversed with the current plans. BUT there are viable alternatives that RMS must consider that will produce a much better outcome for the local residents and the environment. These alternatives are well conceived, designed and costed. Council should acknowledge this and require RMS advise how it would implement the alternatives – not merely to dismiss them as "impractical or "too expensive". If we're going to have a tunnel, let's have the best we can. Balgowlah Golf Club is a vital community asset and its history and contribution should not be sacrificed for an unwanted and unnecessary link road. Councillors Grattan and De Luca have said that local residents must be listened to and our Mayor has pledged that Council will do that. James Griffin says he does that and the Premier said she did that recently in her electorate in relation to development in St Leonards. I just hope these people really are listening to what the community affected by this project wants!

10/18/2018	1605041967	I am worried about the pollution and especially its effects on children and the elderly. Also there are safety issues with the link road and work site on the golf course. By moving part of Burnt Bridge creek habitats will be destroyed and many animals also use the golf course. There is a dam on the golf course that is an important part of Manly lagoon catchment and any new work around there and the creek will lead to a dangerous increase in level of sedimentation. Just visit Manly Environment Centre. The Manly and Warringah reports from 2003 are there as proof. I cannot believe the RMS would place the link road right opposite Balgowlah Boys High and an unfiltered stack within a kilometre of several schools and preschools. Really I think tunnel planning is too hasty and is encouraging cars on road when we should be doing the opposite. Finally I went to several RMS sessions and got different answers to similar questions and details were sadly lacking. I disagree with their traffic modelling or lack thereof. I disagree with their pollution acceptable levels as there are many experts disputing them and I fail to see why a link road is needed at all and why our local community should lose valuable green space.
10/18/2018	1605041960	All of these need to be carefully addressed by RMS. Most important is traffic modelling. I do not believe that the tunnel will assist in relieving traffic congestion.
10/18/2018	1605041953	Having lived in Clareville for 22 years, we have experienced unprecedented development and increase in population - with virtually no improvement in infrastructure, roads or traffic management. It now takes up to 2 hours in the morning to travel from Clareville to North Sydney or the CBD, depending on the time and traffic and road closures such as the Wakehurst Parkway which is frequently flooded
10/18/2018	1605041947	I believe the emission stacks should be filtered, so the health of the residents surrounding the stacks are not adversely affected.
10/18/2018	1605041938	I feel strongly that we need the tunnel to ease congestion and improve travel times for those who commute into the City every day. However, it is vital that as part of that project, there is a flyover or underpass constructed for Wakehurst Parkway as it intersects with Warringah Road - travel times are INSANELY impacted for those traveling from the beaches by having to negotiate that intersection. It is also IMPERATIVE that the section of Wakehurst Pky from Warringah Rd to Narrabeen is upgraded to two lanes in each direction. Please ensure that the residents who live on the Beaches side do not feel forgotten and second-class citizens.
10/18/2018	1605041936	1. I think the exhaust stack being placed in a semi enclosed valley should not be allowed without a filter. 2. The Link Road design and outcome will cause many more problems than it solves. 3. The Link Road appears to just be an easy solution to deal with the construction trucks, rather than finding an alternate solution. 4. Doing a major construction over 5+ years in the bottleneck deviation will cause untolled delays 5. The tunnel exit should be moved north 1.5km to Millers or Passmore Reserve where disruption is less, main roads are still close for the final link, and the exhaust can be spread over a wide flat distance closer to sea breezes, rather than trapped in a valley.
10/18/2018	1605041922	Especially opposed to the link road through the golf course and the unfiltered smoke stacks. Would like to see more emphasis placed on public transport and less on cars.
10/18/2018	1605041917	a simplistic suggestion, wouldn't a bridge be cheaper with less complications ???
10/18/2018	1605041913	Excellent night with good speakers
10/18/2018	1605041909	We need upgrades to local roads - balgowlah, Kenneth & Sydney rd to keep the traffic moving I support the golf course link (unless a better alternative can be found) Emissions stack should be in bushland.
10/18/2018	1605041901	My comments will be part of the Submission by the North Harbour Community Group to the RMS and the Council
10/18/2018	1605041905	Overall I agree with the proposal however my only concern is where the exhaust stacks will be places and if they will be some form of filter to minimize the impact on the nearby community
10/18/2018	1605038931	xx
10/17/2018	1605037100	Lack of an overall transport plan for the Northern Beaches supposedly by the RMS and NBC given the population projections and current lack of east west transport which is then published so people can see what the future for the area looks like.
10/17/2018	1605034101	Thank you to council for facilitating this forum for many voices to be heard. It was clear from tonight's meeting where the groundswell of public opinion lies - but I was expecting level of involvement on some level, and a clear "next steps" from the council. Thanks to Ben at the end for some clarity on this. Michael Regan's non engagement over a couple of direct questions towards the end of the evening ..."questions taken on notice" did not paint him in a good light and was devoid of respect for the attendees in an otherwise respectfully led forum. A clear indication of what the council can, and will ACTUALLY do with the feedback was not forthcoming. How much influence do council have on the state governments plans? How much influence will they exert? I look forward to receiving answers to those questions "put on notice" within the next 24/48 hours as advised by ? Philip.? We are clearly being given the chance to talk... but are our opinions going to make any difference or is it just ticking boxes? I await eagerly the next steps of action out of this.
10/17/2018	1605034075	I would like to see the stacks filtered to ensure air quality and I believe it is important to take into consideration impacts on local roads.
10/14/2018	1605017443	ad[illegible]

Were there any issues not covered in the forum that are important to you? Please detail these below.

Beaches Link Tunnel community forum - follow up survey

QuestionPro



Answer	Count	Percent
Yes	18	25%
No	22	30.56%
Not sure	32	44.44%
Total	72	100 %

Were there any issues not covered in the forum that are important to you? Please detail these below. - Dynamic Text / Comments

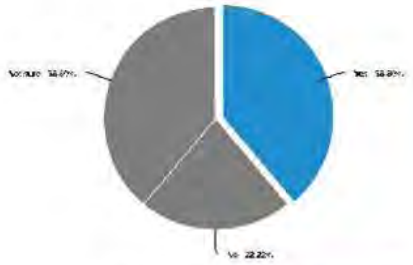
10/22/2018	1605060354	[Yes] Property values & state govt's record of grossly inadequate compensation to those affected
10/22/2018	1605060096	[Yes] Stricter vehicle emission standards should be enforced, particularly in urban areas
10/21/2018	1605051565	[Yes] RMS consultation processes are entirely unsatisfactory to give the community confidence in the project. When attending sessions, residents have found that the answers received are inconsistent or contradictory – if you talk to different people, or even the same person on different days, you will get a different answer. We have received different answers about why houses were acquired, been told different figures of traffic data and projected demand (and also told this info was cabinet in confidence so we couldn't be told this info), been told traffic signals were both final and not final in the design, and that air quality from the exhaust stacks would be both indistiguishable from surrounding air quality and be a measurable reduction – and many other examples. Necessarily this means that some residents are being told incorrect information, which cannot be acceptable in this process. RMS process also does not answer anything but basic queries in writing, making residents suspicious that they do not want to be held to account for the information they give out.
10/20/2018	1605051314	[Yes] In you own words, Council is meant to be an advocate for the best outcome for the Northern Beaches community. In my opinion there has been an apparent lack of interest in providing this role. I gather Sarah Grattan organised the Council Forum held last Wednesday night despite resistance from Council. The Forum was the perfect opportunity for Councillors to interact with the community yet we were essentially left with silence. Several important questions were directly asked but none were answered on the spot. NOT GOOD ENOUGH COUNCILLORS. REMEMBER WE ELECTED YOU TO BE THE VOICE OF THE COMMUNITY, OF US.
10/20/2018	1605051315	[Yes] The mental and physical health implications of the construction phase on surrounding communities were barely mentioned.
10/20/2018	1605051316	[Yes] I believe the proposed tunnel system would provide a significant target for terrorist activity as in busy periods large numbers of people would be trapped by such activity which could be easily undertaken. Harmful activity could be easily undertaken now, but done even easier when self drive vehicles become usable, which is expected to be around the time the tunnel could come into use.
10/20/2018	1605049534	[Yes] The engineers seemed unable to address basic "need" questions. As a retired businessman I felt their insincerity in addressing the impacts on the community. No mention of costs, of health and the need for development to match a new six lane toll road, make it pay for itself. No mention of recouping costs? How sadly naive.
10/20/2018	1605049467	[Yes] Property prices in areas of Balgowlah will decrease. Unfiltered stacks. Loss of green space loss of animal habitats. Construction for too long. Health risks associated with construction. Toll costs not being told to residents. Safety to students and young children. Lack of Trust in NSW State government. Lack of faith in contractors doing the "right thing " by residents living near construction - proof in Westconnex inquiry. Closure of "free" non tolled roads to make it difficult for cars to use forcing you to use expensive tunnels. Pollution includes noise, dust etc due to construction. Tradesmen parking and clogging up narrow local streets. Feeling unsafe. Opening NB to more high rise over development. Moratorium on high rise development. No high rise apartments!
10/20/2018	1605049511	[Yes] All issues. The RMS are clearly protecting their jobs.

Beaches Link Tunnel community forum - follow up survey

QuestionPro

10/19/2018	1605049141	[Yes] Alternative solutions: More ferries, changes on military Rd, free public transport
10/19/2018	1605048752	[Yes] Alternate transportation models
10/19/2018	1605043795	[Yes] I felt people who supported the project (very few infact) had personal reasons in reducing travel time because they needed to get home to family/kids , they came across a bit selfish, this project needs to be viewed from a community's perspective and has to be the right and best solution for everyone including the animals, bird life etc living amongst us. A few years ago there was a strong govt initiative to have people move jobs away from cbd and hence areas such as Macquarie business park , parramatta got a real boost . We need to look at creating a similar hub somewhere in the northern beaches so we can have a business park and a central hub in northern beaches which means less people will travel to cbd. During school holidays the run into the city is 20 minutes shorter on existing roads. If the council looks at initiatives in pulling cars off the road and get people to start using public transport (and yes there should be a peak hour toll at spit bridge), we wont have traffic congestion on Military Road
10/19/2018	1605043312	[Yes] Independant local project management - don't let this turn out like the city mess.
10/18/2018	1605042016	[Yes] Unfortunately, the necessarily short speaking time and absence of a question and answer session, meant that most topics were only touched on (albeit some quite often). With Council's own initiatives on public transport, it would have been very useful for Council to explain how that fits with the Tunnel plans. The B-Line has been working very well but may well lose some of its benefits having to share road lanes with other vehicles.
10/18/2018	1605041947	[Yes] A lot of people were concerned about the environmental impact on the golf course, but no one mentioned that the tunnel will dramatically reduce the overall total amount of emissions. By avoiding the stop/start 18 sets of traffic lights on Military Road, there will be a large positive impact on the amount of total emissions.
10/18/2018	1605041909	[Yes] More info on emissions & impact on balgowlahboys high school
10/18/2018	1605041901	[Yes] The issue of transparency. What was the role or contribution of Council staff in the development of the Link Road through the Balgowlah Golf Course ?
10/17/2018	1605034075	[Yes] The state government has invested $500 million into rapid transport connections on the northern beaches, but it has done very little to ease congestion and traffic times. You cannot simply add more buses onto the same road and expect drastic changes. We need to add an additional route into the Sydney CBD.

Did the community forum meet your expectations



Answer	Count	Percent	20%	40%	60%	80%	100%
Yes	28	38.89%					
No	16	22.22%					
Not sure	28	38.89%					
Total	72	100 %					

Are there any additional items you would like Council to consider in its submission to the RMS?

Are there any additional items you would like Council to consider in its submission to the RMS?

10/26/2018	1605078335	No thank you but may I please say that I appreciate Council running the forum as I learnt a great deal from the well- informed and eloquent speakers.
10/25/2018	1605076553	If it goes ahead Exhaust Filtration is essential
10/25/2018	1605076428	Filtering stacks near residents and schools is imperative if this is to go ahead.
10/25/2018	1605072448	It is absolutely essential that Option B site is chosen which is north of the oval and away from residents.
10/24/2018	1605072230	An alternative congestion charge and increased city bus option to be proposed
10/24/2018	1605072128	Please stand for your local community values and the environment.
10/24/2018	1605068469	Toll roads are not the answer to long term transport requirements for the Northern Beaches. It is almost like building new coal fired power stations. Council should reject this project with all of it's powers.
10/23/2018	1605067056	I think asking the RMA for an extension to allow continued community involvement. It seems rushed to me. If it's going to take 7-10 years surely another month or two delay is not going to significantly impact the process.
10/23/2018	1605066824	Please listen to the community, we all want to progress, but do it in a clever way. And support the people who can be affected, business, children, a whole area will be destroyed.
10/23/2018	1605062208	Emission stacks must be located in a place where residents are not impacted.
10/23/2018	1605062178	Added road pressure to local streets. Danger for young families with additional traffic issues. Change of how Balgowlah suburb feels and is seen.
10/23/2018	1605061944	Non
10/22/2018	1605060546	No
10/22/2018	1605060512	Ensuring cycleways link up.
10/22/2018	1605060487	Yes - for the government to consider alternatives to getting single passenger vehicles off the road.
10/22/2018	1605060354	Listen to the electorate not the developers
10/22/2018	1605060348	Yes standing up to this government
10/22/2018	1605060300	No
10/22/2018	1605060096	No
10/22/2018	1605059753	Public transport over more roads and tunnels, and preservation of our green spaces
10/22/2018	1605059741	-
10/22/2018	1605057885	Why can't the tunnel entrance and smoke stack located near wakehurst parkway few kms away from residential areas?
10/22/2018	1605056882	Please spend much more time considering every aspect of this project, put forward properly costed alternatives including dedicated public transit corridors and keep talking to the community.
10/22/2018	1605056470	No
10/22/2018	1605056377	Would like to have released the business case and future modelling of the tunnel as we feel the beaches are better served instead by better public transport
10/22/2018	1605056199	Push for a better public transport option.
10/21/2018	1605054787	Please look at her long term picture. We have needed improvements in infrastructure on the northern beaches forever and now have the chance and cannot let it slip us by. We need to improve transport links desperately
10/21/2018	1605054657	I couldn't attend the whole forum. I arrived late. I am very grateful to council in managing the forum, a much better result than RMS organised "forums".
10/21/2018	1605054626	The community Forum was stacked with small single minded NIMB.
10/21/2018	1605054517	None
10/21/2018	1605054494	Priority be given to options facilitating improved public transport infrastructure.
10/21/2018	1605054475	No I am very happy with what is currently proposed.
10/21/2018	1605051585	The process has been very stressful for residents and mental health has been affected, with one resident I know hospitalised for depression/anxiety. We need to know that government appreciates our concerns and will action them, not just "tick-the-Boxes" for community consultation and leave us to suffer the consequences of this ill-conceived project.
10/20/2018	1605051343	No
10/20/2018	1605051324	Deliver the best possible solution to our community. The cost will be the cost. Cutting corners to save costs is not in the best interests of our community.
10/20/2018	1605051322	It is appropriate for Balgowlah Golf Club to be used as the off ramp for the tunnel.

10/20/2018	1605051314	Look long term consider a comprehensive Public transport strategy rather than short term vehicle management which just encourages more people to drive. With a growing community, the emphasis must be on public transport. You are also developing tree preservation strategy yet 600+ trees including a magnificent mature fig tree will be destroyed.
10/20/2018	1605051315	Unfortunately I have little faith that Council's submissions on a State Sigificant Infrastructure (SSI) project will have any impact at all. However I hope you prove me wrong and prove to be a strong advocate for the people you represent. I also hope that Council does not have it's own (undisclosed) agenda on some aspects of the proposed project.
10/20/2018	1605051316	As I explained at the meeting the RMS modelling for sustainability for this project expects a 40% population increase by the mid 2030ies. I would like Council and the State Government to explain How this is to take place and where.
10/20/2018	1605051297	Public transport needs to be incorporated in any plan & the RMS traffic modelling included a substantial increase in car volumes & population. this needs to be queried. If the numbers are correct, it appears that the state govt is planning on a massive increase in population for the beaches & this must be challenged.
10/20/2018	1605049725	No
10/20/2018	1605049534	Council might take community concern more seriously given the lack of details RMS provide.
10/20/2018	1605049447	A halt to the proposed tunnel until a full open investigation with cost benefit analysis of all options for public transport for the NB is performed. Honesty from the NB Council and the NSW State Government with transparency as to why they want to build a car tunnel instead of other more efficient public transport solutions. Just as a comment why didn't the new general manager introduce himself at this meeting? I would have thought this would have been a good opportunity for him to speak?
10/20/2018	1605049511	Population densities & public transport. Cost vs benefit analysis. Toll road costs, full journey to the city? Exit, access to the city. Filtration of pollution to global best practice. Load or relief to local roads. Cost to bring Spit Bridge up to standard. Loss of green, open space. Impact of development.
10/20/2018	1605049435	No. Thank you for the opportunity to voice my opinion.
10/19/2018	1605049141	Yes. Don't do it!
10/19/2018	1605048954	no
10/19/2018	1605048925	No unnecessary link road. More consultation time.
10/19/2018	1605048798	Listen to community. I object to the tunnel in its present form.
10/19/2018	1605048752	Train line
10/19/2018	1605048687	No
10/19/2018	1605043795	Yes please lets not rush this project. I really feel there should be more community sessions to look at alternate solutions. that is the only way we will achieve something that is visionary and forward thinking, something people 100 years in the future will appreciate the foresight todays individuals had.
10/19/2018	1605043512	Take control of this now or you will not be effective at any point.
10/19/2018	1605042445	I simply ask for a longer period of more thorough consultation with the community. An alternative to the link road is an absolute must.
10/18/2018	1605042010	Balgowlah Golf Club will be making a detailed submission to RMS and James Griffin and will copy this to NBC
10/18/2018	1605041967	Maybe question the time frame and ask why our local area only had 3 months consultation with no option b when other areas had at least 12 months. Surely they dont want another West Connect debacle
10/18/2018	1605041960	All of the above are of concern to me. My main issue is that the State Govt have just decided on a tunnel with a toll, and have not considered any other options. The RMS were detailed with providing a tunnel solution, and not whether a tunnel would be suitable. They do not deal with public transport and were not tasked with looking into this. The State Govt fast tracked this, as a means to winning the byelection in Mosman, where voters were particularly unhappy about council amalgamation. My opinion is that the tunnel is a complete waste of money which will cause huge disruption and environmental damage and will not improve traffic flow.
10/18/2018	1605041953	We need dual lane roads for the entire length of Mona Vale Road and Wakehurst Parkway - this is essential to having access to the new hospital within the "Golden Hour" - necessary for life saving treatment. WakeHurst Parkway needs to be raised in the flood prone area, with an animal corridor beneath the road. We also need the tunnel from Seaforth to Warringah Freeway to be committed to and commenced - this vital piece of infrastructure has been post poned too many times. Without the tunnel traffic gridlock and delay will become even worse across the Northern Beaches. We look forward to your full commitment and timing on all these items.
10/18/2018	1605041947	I feel the demographics of the meeting was very skewed to retired people living in Balgowlah, and is not representative of the whole Northern Beaches. For the Council submission to be properly informed, a much wider method is required, such as a random phone survey. The meeting was severely under-represented by commuters, younger people, and those living further north on the Northern Beaches - population groups I believe will all be heavily in favour of the tunnel.
10/18/2018	1605041938	Yes as mentioned above, it is vital that as part of that project, there is a flyover or underpass constructed for Wakehurst Parkway where it intersects with Warringah Road - travel times are INSANELY impacted for those traveling from the beaches by having to negotiate that intersection. It is also IMPERATIVE that the section of Wakehurst Pky from Warringah Rd to Narrabeen is upgraded to two lanes in each direction. Please ensure that the residents who live on the Beaches side do not feel forgotten and second-class citizens.
10/18/2018	1605041910	1. Look at an alternate exit like Millers and Passmore Reserves. 2. Insist stacks are filtered or other solutions are sought like cross tunnels rather than longitudinal. 3. Don't allow the Deviation and Link Road to happen as the traffic congestion for 5+ years will cripple the beaches and reflect poorly on the Council for not doing more to change it.

10/16/2018	1605041922	Would like Council to take a stronger position in support of the residents who are opposing this tunnel - the unfiltered stacks and the link road in particular. This is going to destroy Balgowlah and the Council are just standing by and letting it happen. It's one thing to listed to feedback etc but quite another to actively support residents.
10/16/2018	1605041917	Transparity
10/16/2018	1605041913	NO
10/18/2018	1605041909	Emissions requirements need to be stronger . Making sure traffic Keeps flowing along Sydney, Balgowlah & Kenneth roads is very important. Personally I support the link through the golf course to ease congestion. Also make the tunnel toll free for electric cars, or let them travel in the transit lane. There are heaps of good initiatives in Europe.
10/18/2018	1605041901	Support for the long term retention of the green open space that is currently the Balgowlah Golf Course
10/18/2018	1605041905	no
10/16/2018	1605038951	Just worried that as I couldn't attend in the end that from what I hear the last few people were shouting for a pause in the project. That's the last thing we need. Another 50 yr delay!
10/17/2018	1605037100	Alternatives to the Link Road. There appear to other options which should be considered, cost benefit analysis prepared and shared with the community Upgrading of Condamine St, Kenneth Road access points to Burnt St deviation and their feeder roads of Balgowlah rd and Wanganella st Clearly after hearing Balgowlah Boys high school reps presentation some works needs to be done on their current traffic problems
10/17/2018	1605034101	A moratorium/pause button on the entire process - to thoroughly research and consider the consequences of this proposal and present the business case that deems the tunnel and the link road essential.
10/17/2018	1605034075	As a supporter of the tunnell I didnt feel as though I good speak at the forum in fear of being heckled and ridiculed in public. I dont believe the forum provided an opportunity for those in favour to speak freely. It was more of an opportunity for those against the tunnel to gather support.
10/14/2018	1605017443	test test