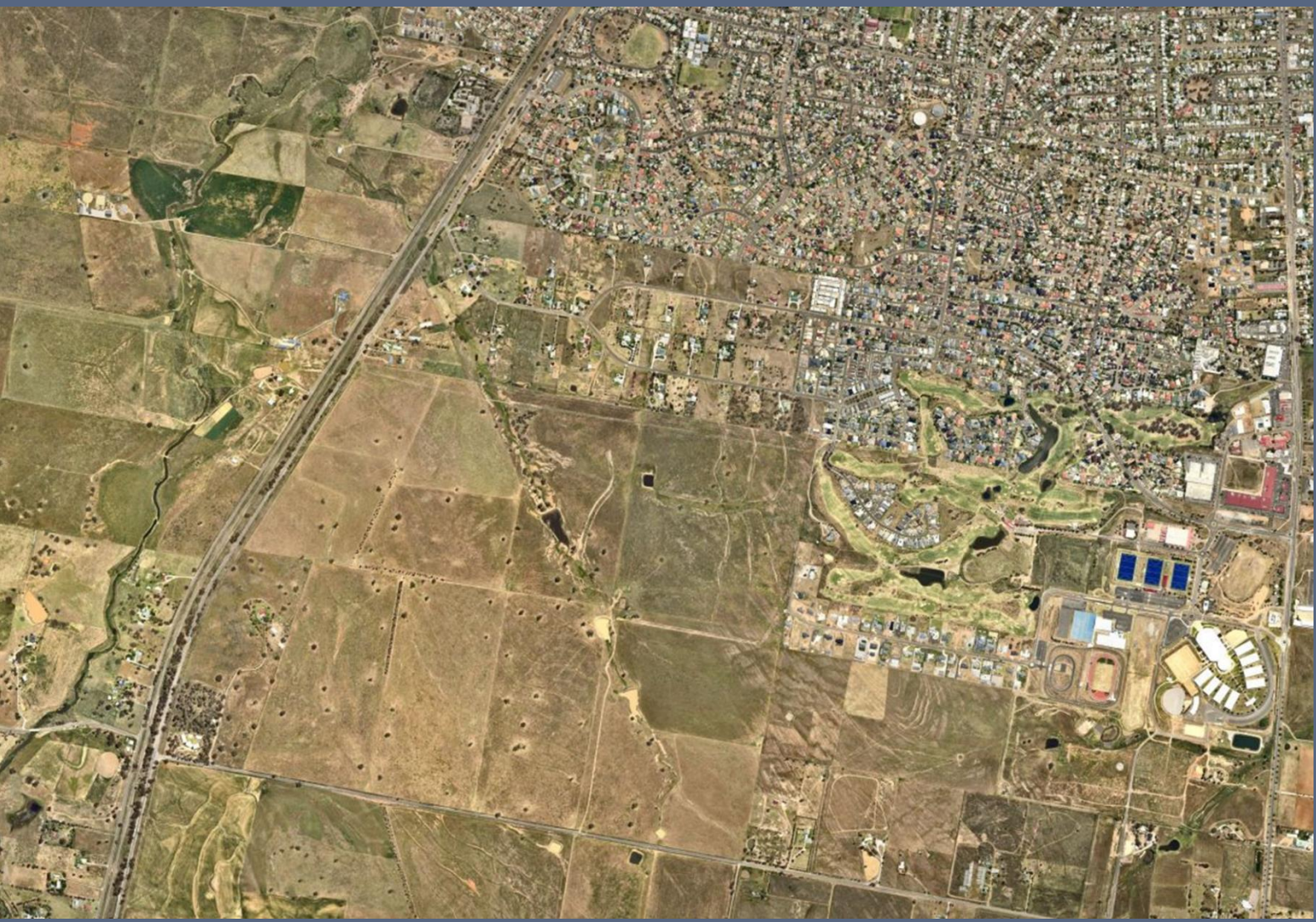
Arcadia Traffic Modelling Update

Strategic and Intersection Modelling
Transport Impact Assessment



Prepared by: Stantec Australia Pty Ltd for Tamworth Regional Council

on 11/02/2022

Reference: N156252 / 301401261

Issue #: C- Final

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1. INTRODUCTION

1.1. Background

Tamworth Regional Council (TRC) is currently investigating the impacts of changes to the proposed development schedule for the Arcadia Residential Precinct in Tamworth. The revised development schedule for the Arcadia precinct includes changes to lot sizes and housing types, and as such TRC requires a traffic assessment to identify appropriate intersection and/or carriageway treatments in order to appropriately service the forecast traffic demand expected to be generated by the development. The outcomes from this assessment will be used to guide decisions to be made by Transport for NSW (TfNSW) and TRC.

GTA, now Stantec previously developed the Tamworth Strategic Transport Model (TSTM) which provided a relevant strategic transport model that incorporated the region's growth. The TSTM was used to assess the Arcadia precinct for a site-specific investigation in 2017 and again in 2019/2020 which incorporated various changes to the mix of land use and other requirements indicated by TRC.

As such, GTA, now Stantec has been engaged by TRC to undertake a traffic and transport modelling which includes the following:

1. Update the TSTM to reflect the latest development schedule including growth area updates, structure plan changes, road layout changes (e.g., proposed Arcadia site layout, Goonoo Goonoo Road Lane duplication, etc.) and a further update to the planned mix of the structure plan.
2. Utilise the TSTM to understand the general road network impacts in the Tamworth region as a result of the revised Arcadia development schedule.
3. Undertake an intersection modelling assessment in SIDRA to inform the anticipated performance of a number of intersections that would service the Arcadia precinct, including determining the appropriate treatments at each site.

1.2. Purpose of this Report

This purpose of this report is to undertake a traffic assessment for the Arcadia precinct that includes consideration of the following:

- The approach to the strategic and intersection modelling completed to inform the traffic assessment
- Forecast network growth based on outputs from the updated TSTM for the current (2020) and future (2030 and 2040) horizon year scenarios
- The projected traffic generation by future developments, in particular the Arcadia precinct
- The assessment of the anticipated operation and performance of new and existing intersections related to the Arcadia precinct for the current (2020) and projected (2030 and 2040) horizon year scenarios, and
- Identification of appropriate intersection treatments (e.g., roundabout, priority controlled, etc.) based on the SIDRA model outcomes.

1.3. References

In preparing this report, reference has been made to the following:

- Roads and Maritime Services (now TfNSW) Traffic Modelling Guidelines, February 2013
- RTA Guide to Traffic Generating Developments, August 2013
- GTA's Memorandum, 'Design Criteria – Goonoo Goonoo Road, Hillvue', 27 August 2018 (Project No. N156250)
- Tamworth Strategic Transport Model (TSTM)
- Other documents and data as referenced in this report.

1.4. Disclaimer

The information presented in this report is based on the culmination of a number of assumptions that relate to land use information provided by TRC. GTA, now Stantec has assumed that this information is correct for the purposes of this report and have not externally reviewed or verified it.

1.5. Overview

The location of Arcadia precinct within Tamworth is illustrated in Figure 1-1.

Figure 1-1: Arcadia Precinct

The Duri Road starts from the Werris Creek Road/Gowrie Road intersection and extends north up to Gunnedah Road. However, in the report the Duri Road is being referred as Werris Creek Road for readability of this report.

2. MODEL METHODOLOGY

2.1. Modelling Approach

An overview of the overall approach to the modelling work completed for this traffic assessment is outlined below:

- Step 1: Review of the existing TSTM
  - The existing TSTM has been reviewed for modelling years of 2020, 2030 and 2040
  - The network configuration (i.e., number of lanes, posted speed and link class network characteristics), zonal system and land use inputs has been inspected to enable a better understanding for future zone splitting and required land use updates.
- Step 2: Apply network and land use updates in the TSTM
  - Key road network updates have been coded in the updated TSTM based on advice from TRC. These include:
    - Duplication of Goonoo Goonoo Road between Jack Smyth Drive and Calala Lane
    - Garden Street connection to Warwick Road
    - Taminda Bypass
    - Western Freight Link (Southern Bypass of Tamworth)
  - Land use updates based on the growth strategy management plan reflecting the revised Arcadia development schedule as provided by TRC.
- Step 3: TSTM scenario testing
  - A total of three (3) base network and seven (7) interim/ultimate network scenarios has been assessed in the TSTM – refer Section 3.2 of this report for details
  - The TSTM has been used to understand broader road network performance and impacts as a result of the updates to road network and land use inputs
  - Traffic volume outputs have been extracted from the TSTM at the nominated intersections and used as an input to the intersection analysis. An interrogation of the individual turning movements across the network has been undertaken in a spreadsheet format to ensure the appropriateness of the assumptions prior to modelling in SIDRA.
- Step 4: Intersection Analysis
  - Based on the traffic volume outputs from the TSTM, SIDRA models have been developed at the following intersections has been undertaken for the relevant base and future network scenarios in the AM and PM peak hours:
    - Burgmanns Lane / Site Access (Intersection 2-1)
    - Burgmanns Lane / Site Access (Intersection 2-2)
    - Werris Creek Road / Burgmanns Lane (Intersection 2-3)
    - Werris Creek Road / Site Access (Intersection 2-4)
    - Werris Creek Road/ Bylong Road (Intersection 2-5)

- Site Access / Bylong Road (Intersection 2-6)
- Rodeo Drive / Site Access (Intersection 2-7)
- Edward Street / Warwick Road / Greg Norman Drive (Intersection 2-8)
- Goonoo Goonoo Road / Greg Norman Drive (Intersection 2-9)
- Goonoo Goonoo Road / Jack Smyth Drive (Intersection 2-10)
- Goonoo Goonoo Road / Burgmanns Lane (Intersection 2-11)
- Garden Street / Hillvue Road (Intersection 2-12)
- Grant Street / Warwick Road (Intersection 2-13)
- Darien Avenue / Warwick Road (Intersection 2-14)
- Garden Street / Warwick Road (Intersection 2-15)

Refer to Figure 3-7 for map of location of intersections.

- The SIDRA models at each intersection have been used to inform likely intersection treatments required to service the Arcadia precinct – refer to Chapter 4 for full details.

3. STRATEGIC MODELLING

3.1. TSTM Assumptions

3.1.1. Road network scenarios

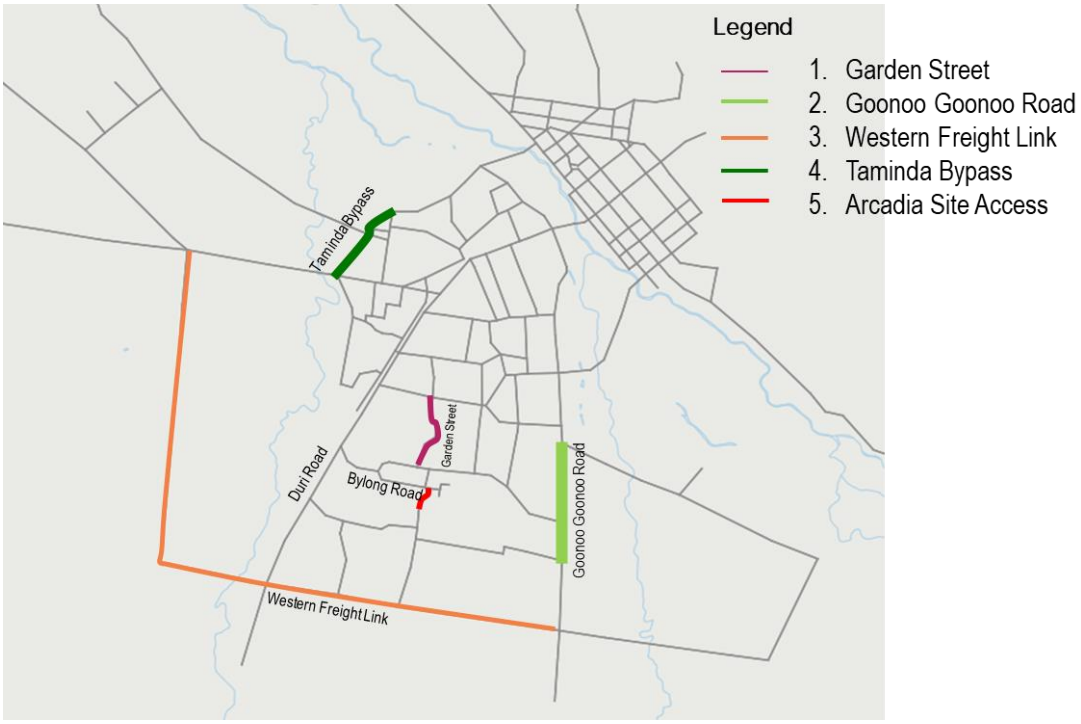
In addition to the Base Case (or existing) road network configuration, traffic modelling for the Interim and Ultimate Road network configurations has been undertaken in the TSTM.

The Interim network has only been assessed in 2020 and includes the duplication of Goonoo Goonoo Road between Jack Smyth Drive and Calala Lane, and Garden Street connection to Warwick Road.

The Ultimate network builds upon the Interim network to also include the Taminda Bypass and Western Freight Link, and has been assessed in all years (i.e., 2020, 2030 and 2040). It is noted that the Ultimate network has been assessed with the "site access" to the Arcadia precinct which represents the additional access at the northeast corner of the Arcadia precinct at Bylong Road.

The location of each road network upgrade is shown in Figure 3-1.

Figure 3-1: Interim and Ultimate Network Updates



3.1.2. Land use scenarios

Blueprint 100 – Growth Areas

The land use inputs for growth areas within the Tamworth region have been updated in the TSTM to reflect the latest development yields compiled in the growth strategy management plan provided by TRC (referred to as Blueprint 100 – Growth Areas).

Figure 3-2 illustrates the growth area locations which includes the Arcadia precinct (#3), while Figure 3-3 graphically illustrates the forecast number of lots developed for the respective horizon years.

Figure 3-2: Locations of Growth Areas

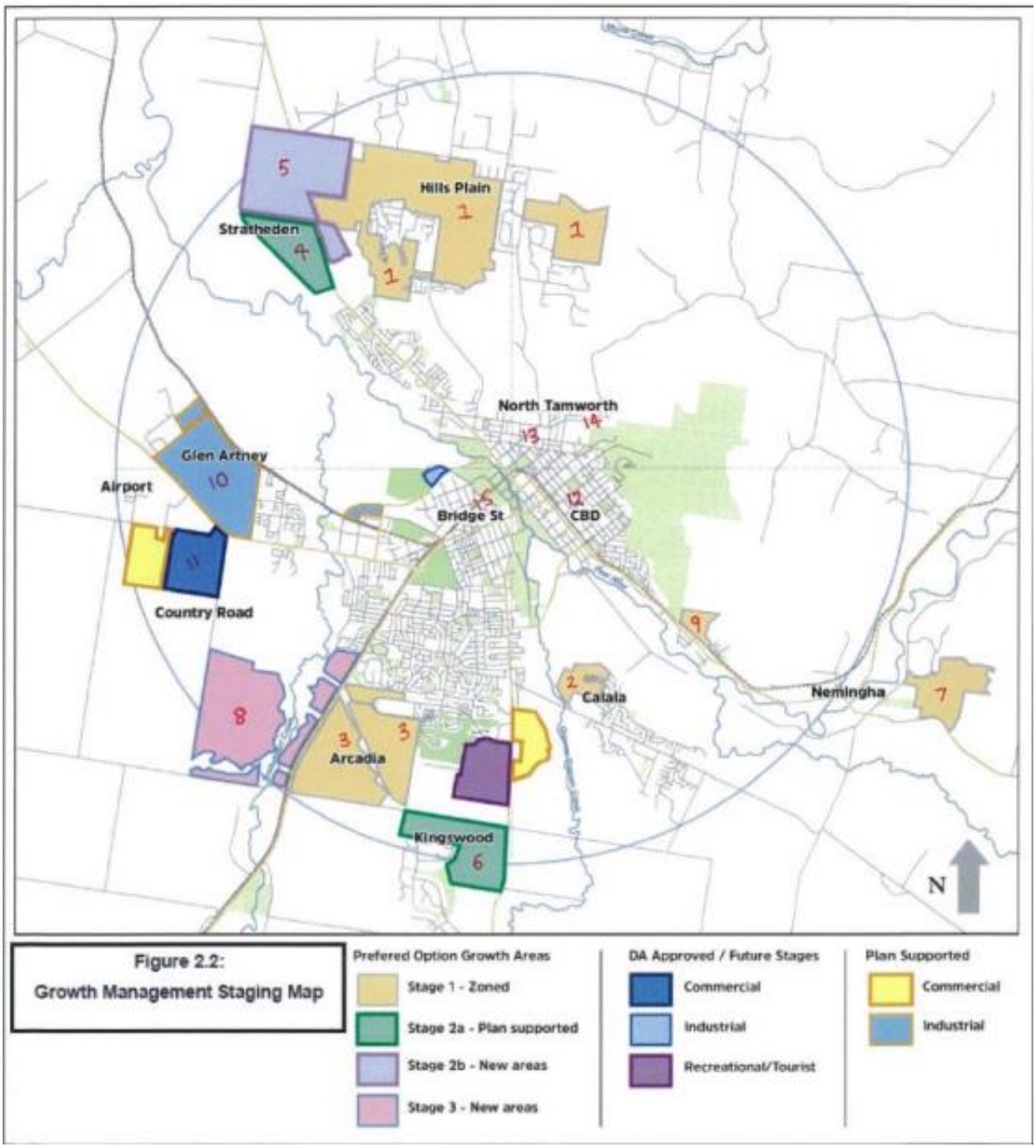
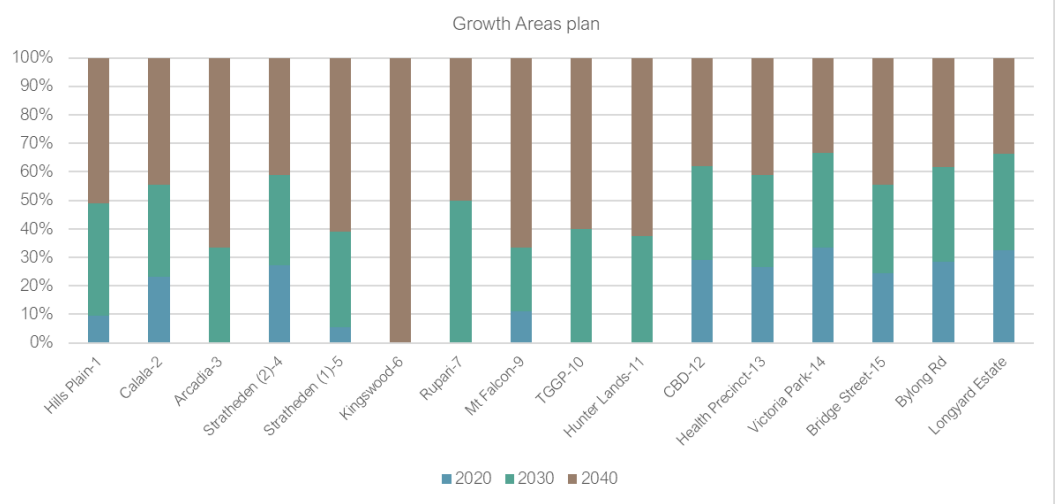


Figure 3-3: No of Lots Developed as per Blueprint 100 – Growth Areas



The Blueprint 100 – Growth Areas plan indicates that the largest growth in the number of lots developed can be expected in Hills Plain followed by the Arcadia precinct, Calala and Tamworth Global Gateway Park (TGGP) in the future years of 2030 and 2040.

Arcadia precinct

For the Arcadia precinct the number of lots developed has been revised by TRC for the purposes of this updated traffic assessment, noting that the precinct has been split into 'East' and 'West' development sites.

Table 3-1 outlines the revised development yields input into the TSTM which generally indicates significant growth expected at both Arcadia East and Arcadia West. Proportionally, the Arcadia West site is approximately double the density in comparison to Arcadia East with a total of 2,350 lots developed by 2040 across both sites. In addition, the staging of development up to 2040 indicates that approximately 50% of the site would be developed by 2030.

Table 3-1: Arcadia Precinct Land Use Summary

Description	2020	2030	2040
Arcadia East			
Number of dwelling units	10	421	850
Arcadia West			
Number of dwelling units	0	748	1,500
Arcadia Precinct Total	**10**	**1,169**	**2,350**

Demographic data

The TSTM demographic data has been reviewed in the Reference Case[1] to ensure the updated TSTM reflects the latest forecasts. In consultation with TRC, the demographic data has been updated according to the Blueprint 100- Growth areas plan which is outlined in the Table 3-2 with the resultant modelling inputs adopted in the TSTM scenario testing.

[1] The 'Reference Case' refers to the TSTM model updates undertaken in 2019/2020.

Table 3-2: Demographics for Tamworth

Demographic Data	2020		2030		2040	
	Reference Case[1]	Revised Land Uses (Growth Strategy)	Reference Case[1]	Revised Land Uses (Growth Strategy)	Reference Case[1]	Revised Land Uses (Growth Strategy)
Population	37,119	39,022	42,266	58,744	46,901	70,016
Jobs	16,382	16,382	18,416	18,416	23,436	23,436
Enrolments	8,431	8,431	8,461	11,760	8,461	12,631

Table 3-2 indicates that the revised population demographic data is approximately 39% and 49% higher than the reference case assumptions for 2030 and 2040 respectively which correlates with the forecast residential development in the growth areas. However, the level of employment (jobs) within Tamworth is assumed to be unchanged from the reference case assumptions.

It is also noted that the reference case enrolments were assumed to remain steady irrespective of the increase in the population in the future 2030 and 2040 horizon years. For the purposes of this assessment and as agreed with TRC, the total enrolments for all zones in the TSTM are apportioned with the increase in the number of dwellings in 2030 and 2040.

3.2. Overview of TSTM Scenarios

A summary of the scenarios assessed in the updated TSTM (AM and PM peaks) is provided in Table 3-3 which considers the above road network, land use and demographic changes.

Table 3-3: TSTM Scenarios

Network Upgrades	Development Yield / Year					
	2020		2030		2040	
	Reference Case	Revised Land Use (Growth Strategy)	Reference Case	Revised Land Use (Growth Strategy)	Reference Case	Revised Land Use (Growth Strategy)
Base Case Network	BC01		BC02		BC03	
Interim Network		PC01				
Ultimate Network (With site access)		PC03		PC05		PC07

Note: BC = Base Case; PC = Project Case

3.3. TSTM Results

A review of the TSTM outcomes has been undertaken to provide a broad level understanding of the road network performance and/or impacts as a result of the abovementioned updates to road network, land use and demographic data. The review also ensures the validity of model outputs from the TSTM prior to using the data to inform the more detailed assessment of intersections in SIDRA. The following sections present the relevant TSTM results – traffic volumes, volume-capacity ratio and network performance – as well as the key findings from the assessment.

3.3.1. Traffic volume forecasts

The AM and PM peak period (2 hour) traffic volume forecasts for each of the scenarios is provided in Appendix B.

In order to provide a summary of the changes in traffic volumes on key roads in the study area, Table 3-4 has been prepared. This provides the key locations where mid-block traffic volume data has been collected from the TSTM at the locations shown in Figure 3-4. Figure 3-5 and Figure 3-6 graphically illustrate the numbers presented in Table 3-4.

Figure 3-4: Mid-block Traffic Volume Locations

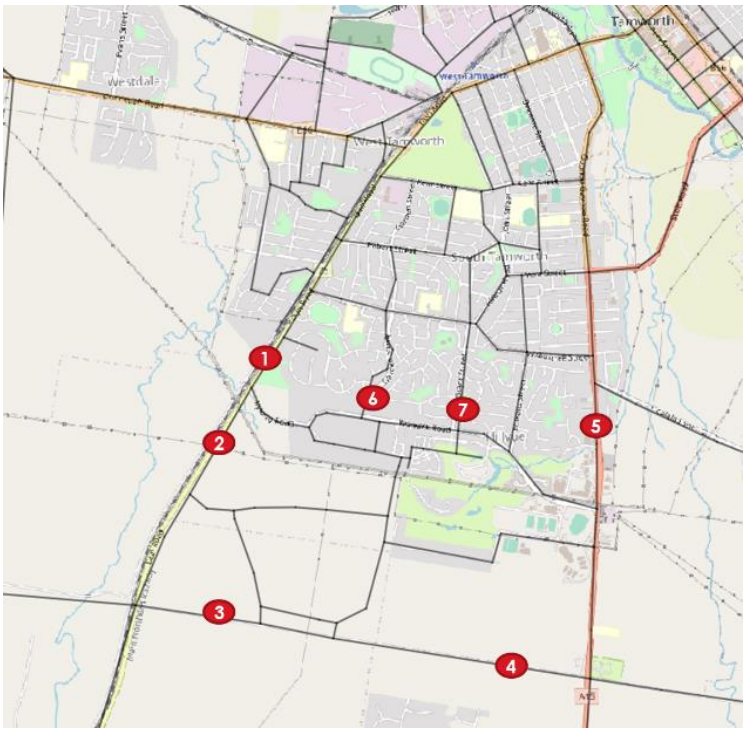


Table 3-4: Summary of Two-Way Traffic Volumes at Key Locations

Location	Road Name	2030		2040	
		2030-BC02	2030-PC05	2040-BC04	2040-PC07
AM Peak (2 Hour)					
1	Werris Creek Road -1	588	1,334	1,345	1,902
2	Werris Creek Road -2	614	1,932	637	2,595
3	Burgmanns Lane-1	139	674	219	1,136
4	Burgmanns Lane-2	136	674	274	1,237
5	Goonoo Goonoo Road	1,179	1,113	1,453	1,763
6	Garden Street	243	550	649	791
7	Grant Street	194	661	528	824
PM Peak (2 Hour)					
1	Werris Creek Road -1	629	1,430	1,385	1,950
2	Werris Creek Road -2	663	2,123	685	2,713
3	Burgmanns Lane-1	184	796	245	1,273
4	Burgmanns Lane-2	182	796	302	1,363
5	Goonoo Goonoo Road	1,273	1,187	1,698	1,886
6	Garden Street	280	639	651	898
7	Grant Street	209	697	521	876

Figure 3-5: AM Peak (2 hour) Two-Way Traffic Volumes at Key Locations

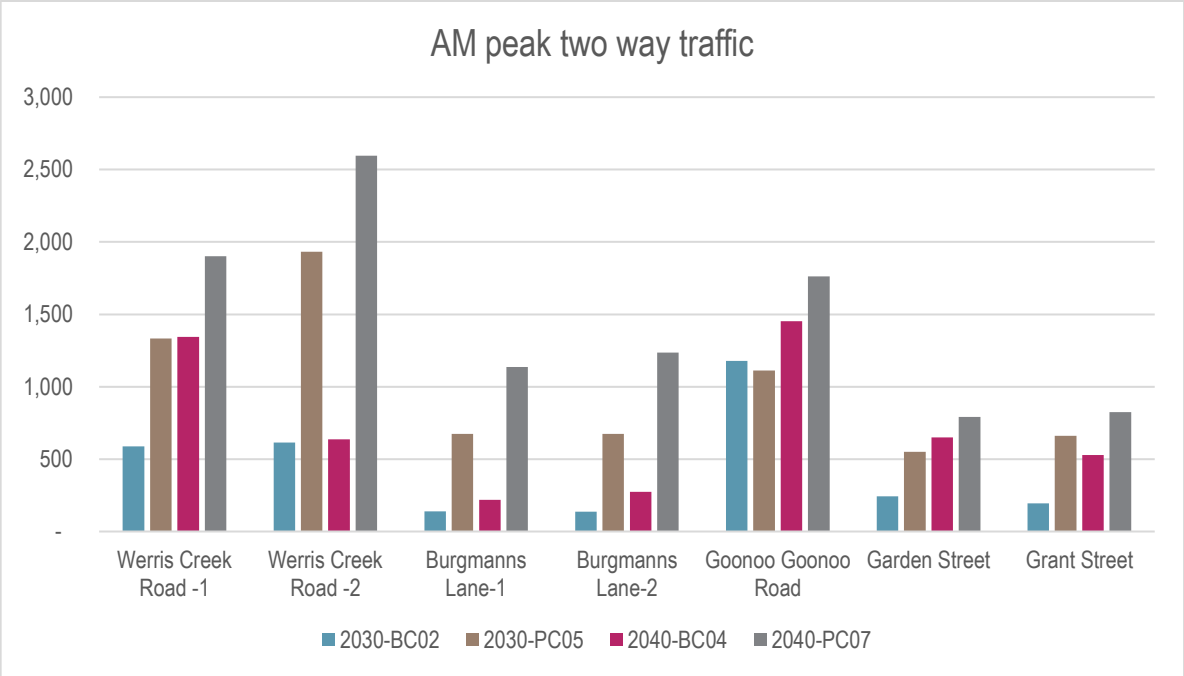
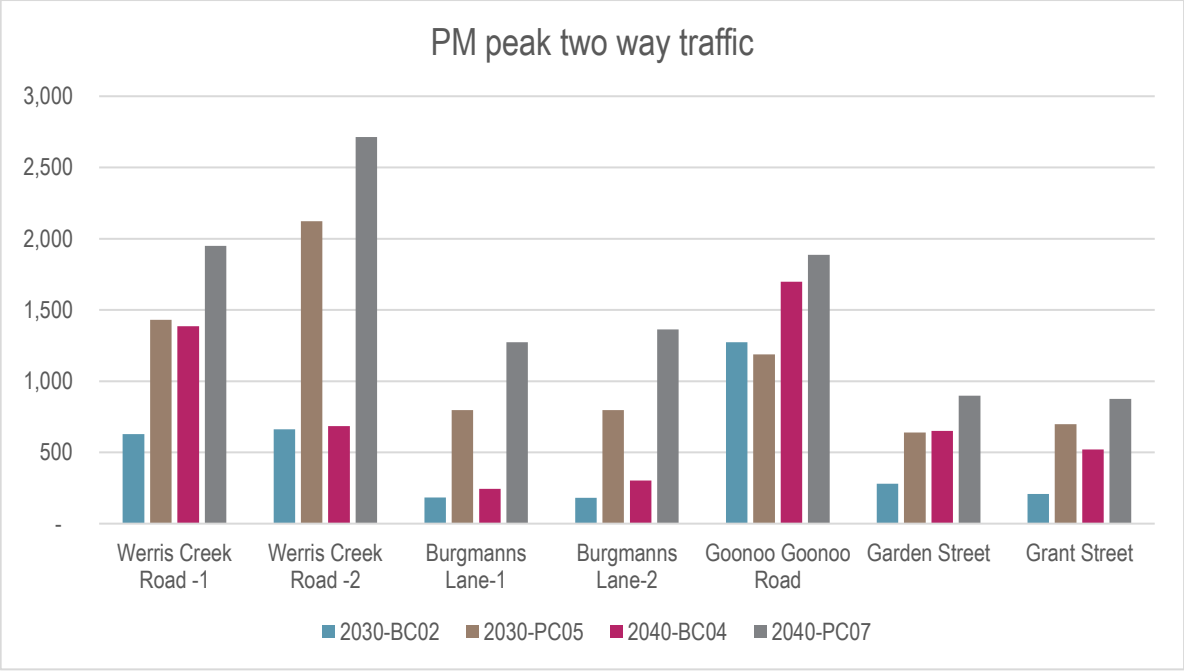


Figure 3-6: PM Peak (2 hour) Two-Way Traffic Volumes at Key Locations



The TSTM mid-block traffic volume outputs generally indicate the following key outcomes:

- The largest increase to traffic volumes is expected on Werris Creek Road and Burgmanns Lane due to the introduction of the Arcadia precinct in 2030 and 2040
- At Garden Street and Grant Street, an expected increase to traffic volumes is expected in 2030-PC05 and 2040-PC07 when compared to 2030-BC02 and 2040-BC04 respectively in both the AM and PM peaks. This increase is a result of the increase to congestion levels on Werris Creek Road which redistributes traffic via Garden and Grant Street which is also facilitated by the additional Arcadia precinct access via Bylong Road ("site access").

3.3.2. Volume-capacity ratio (VCR) assessment

The VCR (also referred to as degree of saturation) is a good indicator of road network performance at specific link locations. The VCR is also able to be correlated with mid-block Level of Service (LoS) definitions. The Victorian Department of Transport strategic modelling guidelines provides a useful classification of LoS definitions based on the VCR and has been adopted for the purposes of this assessment (refer to Table 3-5).

Table 3-5: Level of Service Definitions

LoS	Definition	Volume to Capacity Ratio
A	Virtually free flow; completely unimpeded	0.0-0.6
B-C	Stable flow with delays; less freedom to manoeuvre	0.6-0.8
D-E	Operating conditions at or near capacity; unstable flow	0.8-1.0
F	Forced flow; breakdown conditions	1.0+

Source: VicRoads (Department of Transport) Transport Modelling Guidelines. Volume 2: Strategic Modelling

Table 3-6 and Table 3-7 presents the VCR at each of the key mid-block locations for the AM and PM peaks respectively, with colour coding of individual cells matching the LoS definitions in Table 3-5. VCR plots for each scenario are provided in Appendix B.

Table 3-6: VCR Results – AM Peak (2 Hour)

Location	Road Name	2030		2040	
		2030-BC02	2030-PC05	2040-BC03	2040-PC07
1	Werris Creek Road -1	0.23	0.64	0.47	0.87
2	Werris Creek Road -2	0.18	0.57	0.2	0.81
3	Burgmanns Lane-1	0.07	0.36	0.1	0.61
4	Burgmanns Lane-2	0.07	0.36	0.1	0.57
5	Goonoo Goonoo Road	0.2	0.18	0.27	0.29
6	Garden Street	0.12	0.23	0.35	0.93
7	Grant Street	0.08	0.32	0.25	0.78

Table 3-7: VCR Results – PM Peak (2 Hour)

Location	Road Name	2030		2040	
		2030-BC02	2030-PC05	2040-BC03	2040-PC07
1	Werris Creek Road -1	0.25	0.68	0.47	0.89
2	Werris Creek Road -2	0.19	0.63	0.21	0.85
3	Burgmanns Lane-1	0.08	0.44	0.1	0.68
4	Burgmanns Lane-2	0.08	0.44	0.11	0.63
5	Goonoo Goonoo Road	0.23	0.13	0.31	0.31
6	Garden Street	0.14	0.27	0.4	0.48
7	Grant Street	0.06	0.33	0.23	0.4

The key outcomes from the VCR assessment are as follows:

- In 2030, all mid-block road sections can be expected to operate at a reasonable LoS (A-C) in both the AM and PM peaks. This indicates that the road network surrounding the Arcadia precinct would be able to accommodate the expected increase in traffic volumes
- In 2040, Werris Creek Road can be expected to approach operating capacity with a relatively high VCR (LoS D or E) in 2040-PC07 in both the AM and PM peaks

- While some increases to traffic volumes can be expected on Burgmanns Lane and Goonoo Goonoo Road in 2040, these roads can still be expected to operate at an acceptable LoS A to C in both the AM and PM peaks
- As a result of the increase to congestion on Werris Creek Road as indicated by the high VCR levels, Garden Street and Grant Street can also be expected to have increased VCR levels due to the redistribution of traffic. This is mostly evident in 2040-PC07 where the additional Arcadia precinct access is provided, particularly in the AM peak.

3.3.3. Overall network performance

The following key network performance metrics have been extracted for entire TSTM network to understand how the network responds to the various scenarios:

- The aggregated total **vehicle kilometres travelled** (VKT) by all the vehicles that have travelled through the network for the respective period
- The aggregated **vehicle hours travelled** (VHT) by all the vehicles that have travelled through the network for the respective period
- The **average network speed** can be determined by dividing the VKT by the VHT.

Table 3-8 and Table 3-9 presents the overall TSTM network performance metrics for the AM and PM peaks respectively.

Table 3-8: AM Peak Network Performance Metrics

Year	Scenario	VKT (km)	VHT (hr)	Average Network Speed (km/hr)
2020	2020-BC01	144,054	4,149	35
	2020-PC01	152,030	5,927	26
	2020-PC03	152,168	5,868	26
2030	2030-BC02	149,748	5,506	27
	2030-PC05	221,548	12,743	17
2040	2040-BC03	198,031	9,458	21
	2040-PC07	265,374	20,886	13

Table 3-9: PM Peak Network Performance Metrics

Year	Scenario	VKT (km)	VHT (hr)	Average Network Speed (km/hr)
2020	2020-BC01	155,885	4,658	33
	2020-PC01	164,407	6,956	24
	2020-PC03	164,722	6,864	24
2030	2030-BC02	161,789	4,876	33
	2030-PC05	241,117	15,677	15
2040	2040-BC03	215,097	11,649	18
	2040-PC07	288,024	26,328	11

The overall network performance metrics for the TSTM network indicates the following key outcomes:

- In comparison to the relevant Base Case (BC) scenarios, each Project Case (PC) scenario can be expected to experience an increase to VKT and VHT, resulting in a decrease to average network speed. This is a result of the forecast increase to traffic demands assumed in the Project Case (PC) scenarios as per the growth strategy management plan, as well as a relatively lower proportion of increase in the capacity of the road network.
- Average network speed in the Ultimate network scenarios is expected to decrease by:
    - Approximately 30% in 2020 (i.e., 2020-PC03 compared to 2020-BC01)
    - Approximately 40-55% in 2030 (i.e., 2030-PC05 compared to 2030-BC02)
    - Approximately 40% in 2040 (i.e., 2040-PC07 compared to 2040-BC03)
- The network performance for the Interim network (2020-PC01) in 2020 is expected to be very similar to the Ultimate network scenarios (2020-PC03) with only marginal differences to the key performance metrics

3.4. Intersection Volumes

Intersection turning movement volumes have been extracted from the TSTM for each of the nominated intersection requiring detailed intersection modelling analysis as shown in Figure 3-7. A review of the turning movements has been undertaken via spreadsheet analysis to ensure that traffic distribution at the localised intersection level is logical and generally representative of the anticipated level of traffic generation and distribution across the wider network. Some manual changes were updated to intersections to better reflect the likely volumes at each of the intersections, noting that the strategic model is coarse in its nature.

The resultant intersection volumes are presented in Appendix C with full details of the SIDRA analysis presented in the next chapter of this report.

Figure 3-7: Intersection Location

4. INTERSECTION ASSESSMENT

4.1. Overview

The operation of the key intersections within the study area (i.e., intersections adjacent to the Arcadia precinct) have been assessed using SIDRA INTERSECTION 9 (SIDRA), a computer based modelling package which calculates intersection performance.

The analysed intersections have been combined into a network and an assessment of operation and performance in the relevant Project Case scenarios has been undertaken. This ultimately informed the recommendations of appropriate intersection treatments based on the forecast turning movement volumes from the TSTM.

Section 4.2 outlines the methodology and assumptions that informed the SIDRA assessment, while the remaining sections of this chapter provides details on the assessment for the individual intersections including the existing layouts, proposed / recommended treatments and the results and outcomes of the SIDRA assessment.

4.2. SIDRA Methodology and Assumptions

4.2.1. Key intersection performance metrics

The commonly used measure of intersection performance is vehicle delay. SIDRA determines the average delay that vehicles encounter and provides a measure of the LoS. Table 4-1 shows the criteria that SIDRA adopts in assessing the LoS.

Table 4-1: SIDRA LoS Criteria

Level of Service (LOS)	Average Delay per vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Sign
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Near capacity	Near capacity, accident study required
E	57 to 70	At capacity, at signals incidents will cause excessive delays	At capacity, requires other control mode
F	Greater than 70	Extra capacity required	Extreme delay, major treatment required

Notwithstanding, Degree of Saturation (DoS) which is a measure of intersection capacity is also a commonly used measure of intersection performance and has also been reported in the relevant sections, along with 95th percentile queues.

4.2.2. Intersection control hierarchy

Table 4-2 lists the proposed treatment methods that have been considered and the order of progression from one treatment to another as required by the analysis.

As a starting point for investigations, the most economical treatment method has been assumed in SIDRA before proceeding to the next treatment method only if the DoS levels exceed the threshold limits or LoS exceeds D for the given analysis year.

Table 4-2: Intersection Treatments - Order of Preference

Preference	Treatment	Highest Acceptable LoS	Maximum Acceptable DoS
1	Channelised Right Turn	D	0.8
2	Seagull intersection	D	0.8
3	Roundabout	D	0.85
4	Traffic Signals	D	0.9

It is also noted that the first assessment of any given intersection in a future year scenario will continue on from any treatment previously recommended for that intersection in an earlier design year. For example, should a roundabout be required for a given intersection in 2020, the first assessment of this intersection for the 2030 design year will also be a roundabout. Although it is possible for intersection performance to improve in future years, due to changes to the broader road network, treatments should be administered when first required and remain in place for subsequent future year assessments.

Consideration has also been given to maintaining a level of consistency in proposed intersection types throughout the study area network, so that intersection designs do not appear to be random in nature.

In addition, where 'seagull' intersections have been assessed, a SIDRA network which simulates the behaviour of a single seagull intersection has been utilised. Due to software limitations, it is also noted that the 'seagull' intersections tested do not incorporate acceleration lanes and provide median storage for one car only.

4.2.3. 95th percentile ('95%ile') queue distance

Due to the potential for future traffic demand exceeding an existing intersections' short lane storage and causing potential safety concerns, in any modelled intersection where the 95%ile queue distance exceeds the short lane length adjacent to unobstructed through lanes, the next treatment method will be considered.

4.2.4. Peak flow factors

SIDRA uses peak hour factors to adjust the total hourly flows being modelled into flows that represent a peak period of, typically, 30 minutes where the flow is higher than average and the remaining flow being distributed over the remaining shoulder half hour. This peak hour factor defaults to 30 minutes at 0.95.

4.2.5. Pedestrians

Given that pedestrian data was not available at the time of this assessment, vehicle delays due to pedestrian crossings at signalised intersection arrangements have not been considered. Pedestrian crossing and phasings have been incorporated into these intersections; however pedestrian priority has not been coded.

4.3. Burgmanns Lane / Site Access 1 of 2 (2-1)

4.3.1. Existing layout

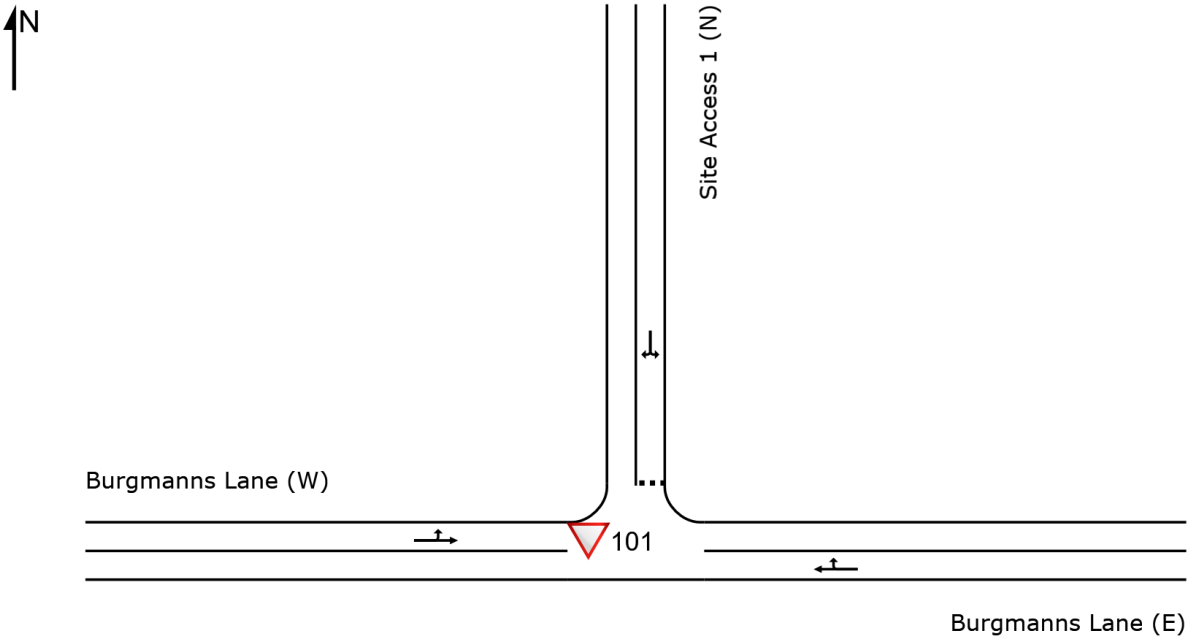
The location and layout of the Burgmanns Lane / Site Access (2-1) intersection is shown in Figure 4-1.

Figure 4-1: Proposed Location of the Burgmanns Lane / Site Access Intersection

4.3.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-2.

Figure 4-2: SIDRA Layout of the Burgmanns Lane / Site Access (2-1) Intersection (2040)



4.3.3. Burgmanns Lane / Site Access (2-1) intersection performance

Table 4-3 summarises the operation of the Burgmanns Lane / Site Access intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-3: Burgmanns Lane / Site Access (2-1) Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2040 (PC07)	Priority controlled T-Junction	Burgmanns Lane (E)	0.3	-	0s	1m	0.14	-	3s	4m
		Site Access 1 (N)	0.17	A	9s	4m	0.1	A	9s	2m
		Burgmanns Lane (W)	0.09	-	1s	0m	0.35	-	1s	0m
		Intersection	**0.3**	**-**	**2s**	**4m**	**0.35**	**-**	**2s**	**4m**

Based on the results, the T-Junction treatment for the Burgmanns Lane / Site Access intersection is expected to operate at favourable levels and have an average delay of less than 10 seconds in both peak periods in 2040. DoS for both scenarios and time periods are between 0.1 to 0.3, which is well below desired level.

It is noted that this design tests the operational performance of the intersection and consideration of treatments such as channelised or auxiliary lanes could be implemented as part of the design process in accordance with Austroads requirements.

4.4. Burgmanns Lane / Site Access 2 of 2 (2-2)

4.4.1. Existing layout

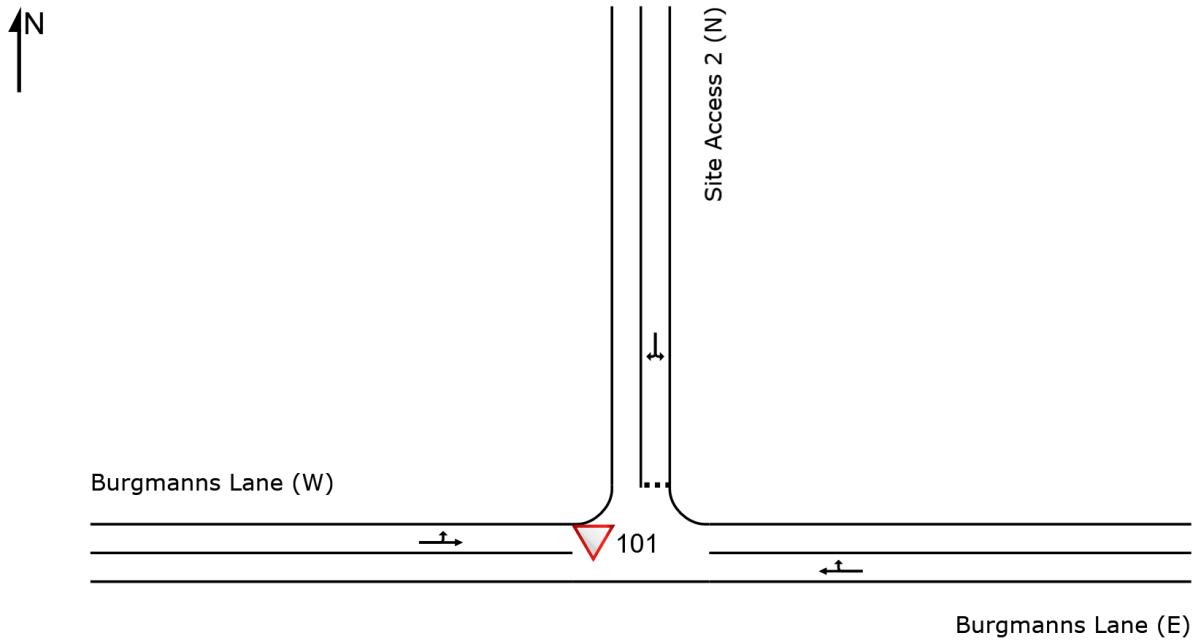
The location and layout of the Burgmanns Lane / Site Access (2-2) intersection is shown in Figure 4-3.

Figure 4-3: Proposed Location of the Burgmanns Lane / Site Access Intersection

4.4.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-4.

Figure 4-4: SIDRA Layout of the Burgmanns Lane / Site Access (2-2) Intersection (2040)



4.4.3. Burgmanns Lane / Site Access (2-2) intersection performance

Table 4-4 summarises the operation of the Burgmanns Lane / Site Access (2-2) intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-4: Burgmanns Lane / Site Access (2-2) Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2040 (PC07)	Priority controlled T-Junction	Burgmanns Lane (E)	0.34	-	1s	3m	0.17	-	7s	7m
		Site Access 2 (N)	0.29	A	9s	8m	0.05	A	9s	1m
		Burgmanns Lane (W)	0.06	-	0s	0m	0.42	-	2s	0m
		Intersection	**0.34**	**-**	**3s**	**8m**	**0.42**	**-**	**3s**	**7m**

The Burgmanns Lane / Site Access (2-2) intersection is expected to have a similar level of performance with the Burgmanns Lane / Site Access (2-1) intersection. Based on the results, the T-Junction treatment for the Burgmanns Lane / Site Access (2-2) intersection is expected to operate at favourable levels and have an average delay of up to 9 seconds in both peak periods in 2040. DoS levels for both time periods are less than 0.4, which is well below the desired level.

Similar to the Burgmanns Lane / Site Access (2-1) intersection, this design tests the operational performance of the intersection and consideration of treatments such as channelised or auxiliary lanes could be implemented as part of the design process in accordance with Austroads requirements.

4.5. Werris Creek Road / Burgmanns Lane (2-3)

4.5.1. Existing layout

The location and existing layout of the Werris Creek Road / Burgmanns Lane intersection is shown in Figure 4-5.

Figure 4-5: Existing Layout of the Werris Creek Road / Burgmanns Lane Intersection

4.5.2. Intersection layout

A conceptual layout of the proposed intersection treatments assessed in SIDRA is shown in Figure 4-6.

It is noted that the Burgmanns Lane western leg of the intersection is introduced in the relevant future year scenarios to reflect the proposed Western Freight Link.

Figure 4-6: SIDRA Layout of the Werris Creek Road / Burgmanns Lane Intersection (2020)

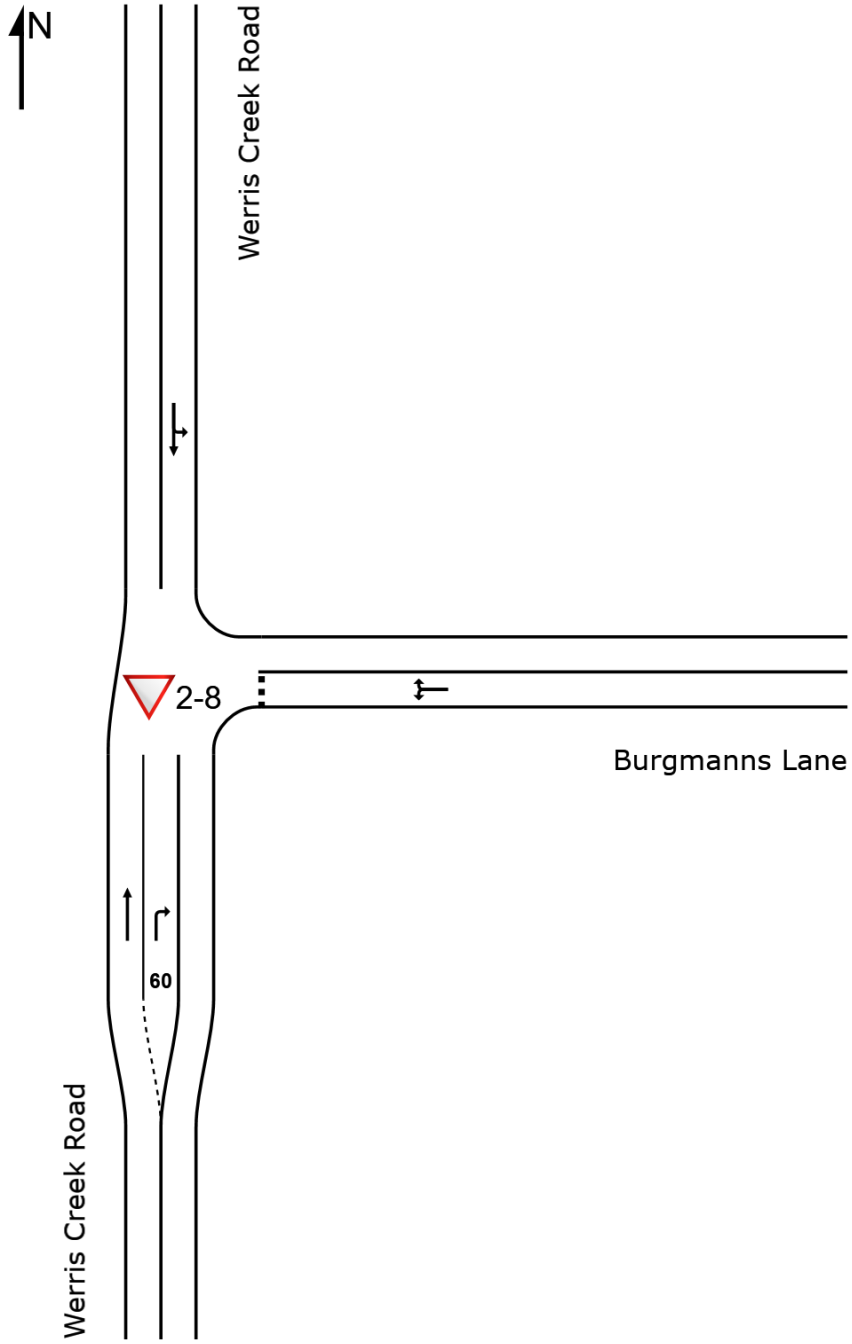


Figure 4-7: SIDRA Layout of the Werris Creek Road / Burgmanns Lane Intersection (2020 and 2030)

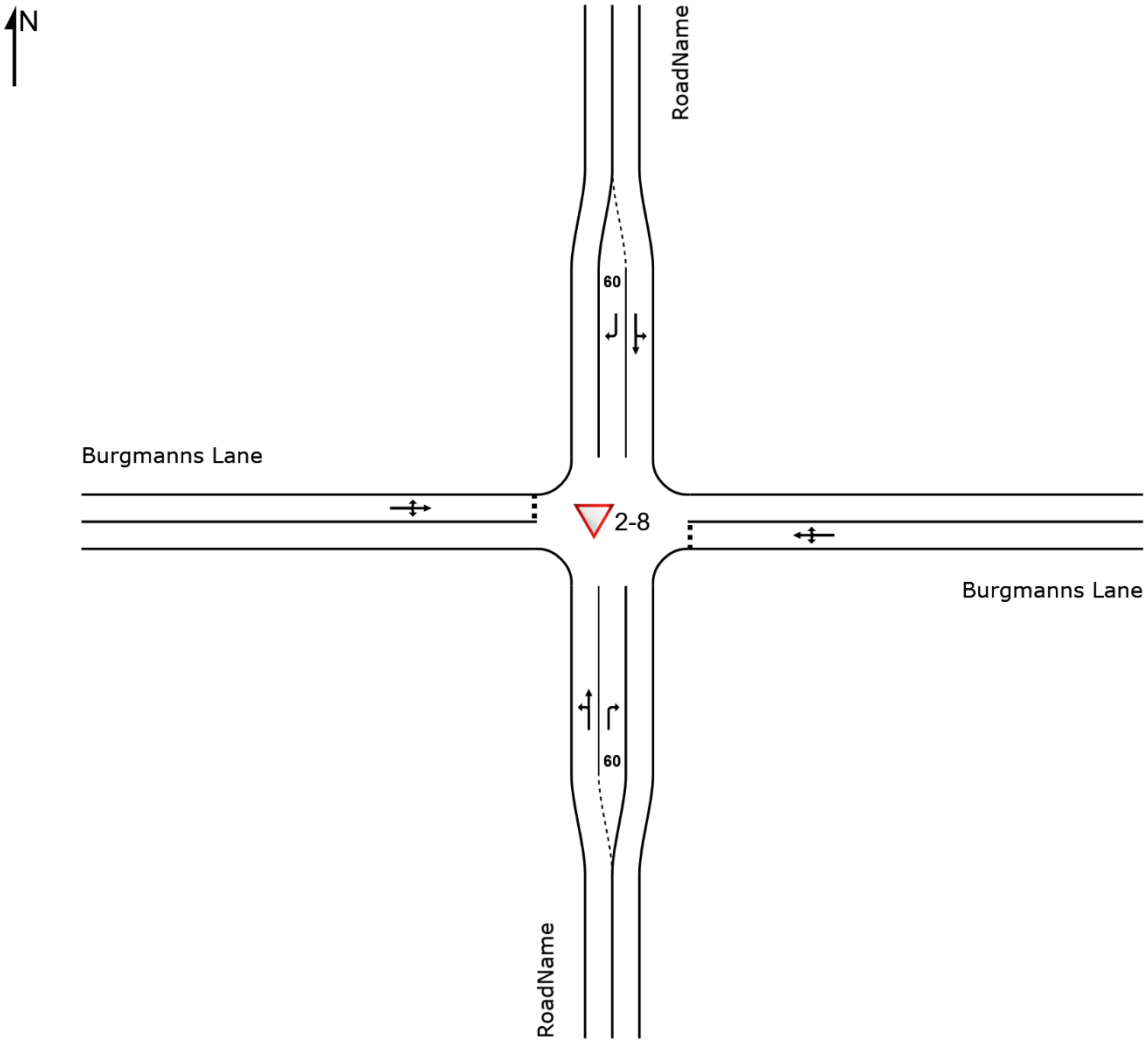
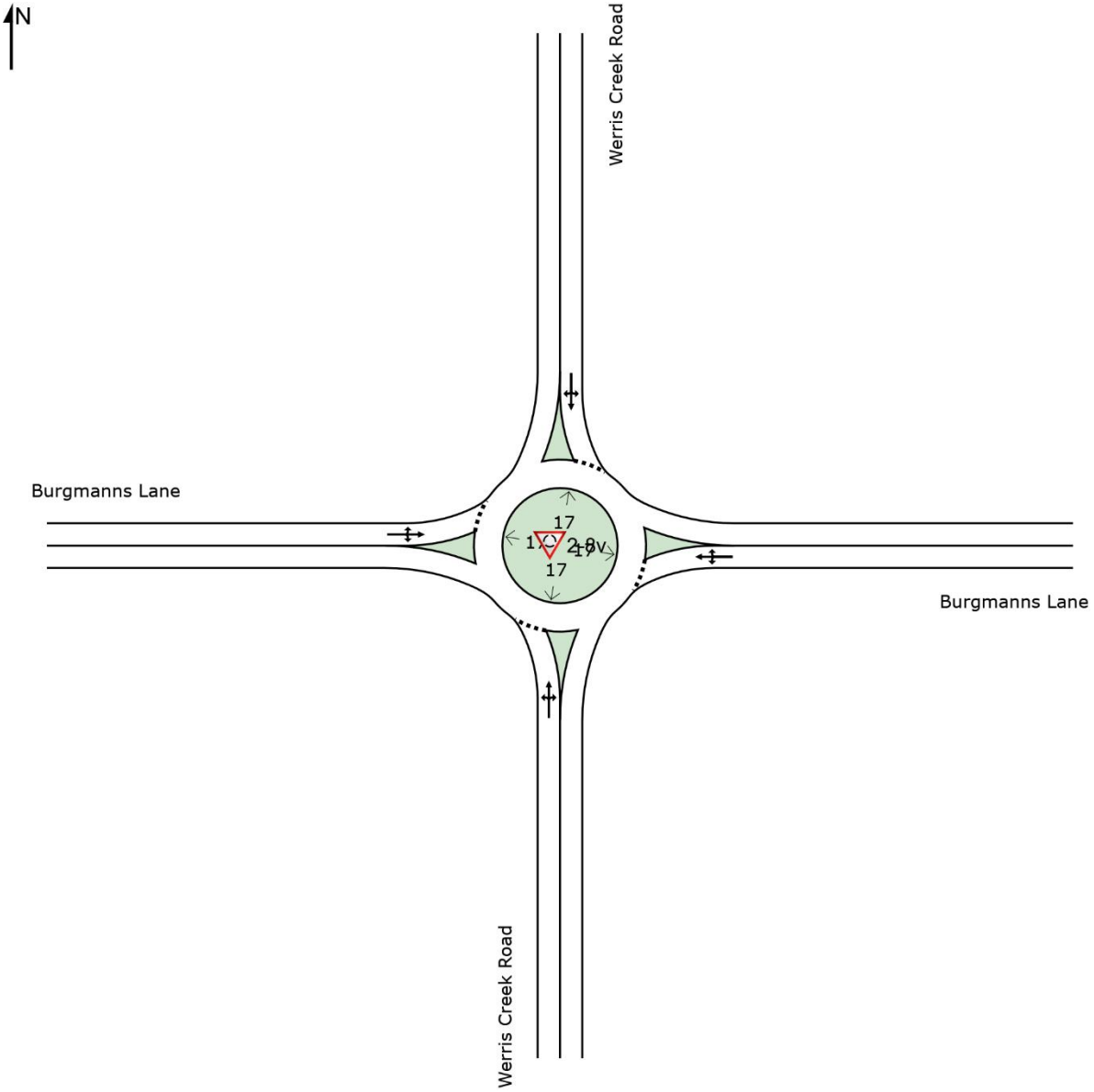


Figure 4-8: SIDRA Layout of the Werris Creek Road / Burgmanns Lane Intersection (2040)



4.5.3. Werris Creek Road / Burgmanns Lane intersection performance

Table 4-5 summarises the operation of the Werris Creek Road / Burgmanns Lane intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators, intersection layouts are included in Appendix D.

Table 4-5: Werris Creek Road / Burgmanns Intersection Performance Summary

Year	Treatment	Arm	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Existing priority controlled T-Junction	Werris Creek Road (S)	0.08	-	1s	0m	0.1	-	1s	1m
		Burgmanns Lane (E)	0.1	A	7s	3m	0.03	A	7s	1m
		Werris Creek Road (N)	0.09	-	0s	0m	0.13	-	2s	0m
		Intersection	**0.1**	**-**	**2s**	**3m**	**0.13**	**-**	**2s**	**1m**
2020 (PC03)	Priority controlled 4-Leg Junction	Werris Creek Road (S)	0.08	-	1s	0m	0.1	-	1s	1m
		Burgmanns Lane (E)	0.22	A	9s	7m	0.05	A	8s	1m
		Werris Creek Road (N)	0.09	-	1s	1m	0.1	-	1s	0m
		Burgmanns Lane (W)	0.02	A	9s	1m	0.24	A	8s	8m
		Intersection	**0.22**	**-**	**3s**	**7m**	**0.24**	**-**	**3s**	**8m**
2030 (PC05)	Priority controlled 4-Leg Junction	Werris Creek Road (S)	0.09	-	1s	1m	0.11	-	1s	1m
		Burgmanns Lane (E)	0.81	B	28s	69m	0.16	A	14s	4m
		Werris Creek Road (N)	0.17	-	4s	6m	0.11	-	1s	0m
		Burgmanns Lane (W)	0.08	A	12s	2m	0.94	C	34s	205m
		Intersection	**0.81**	**-**	**12s**	**69m**	**0.94**	**-**	**20s**	**205m**
2040 (PC07)	Roundabout	Werris Creek Road (S)	0.48	B	20s	32m	0.2	A	6s	10m
		Burgmanns Lane (E)	0.85	B	24s	129m	0.1	A	6s	5m
		Werris Creek Road (N)	0.39	A	8s	23m	0.54	A	13s	38m
		Burgmanns Lane (W)	0.09	A	7s	4m	0.84	A	13s	130m
		Intersection	**0.85**	**B**	**17s**	**129m**	**0.84**	**A**	**12s**	**130m**

The Werris Creek Road / Burgmanns Lane intersection is expected to operate at a satisfactory level under the existing T-Junction arrangement in the 2020 PC01 scenario with low DoS levels (0.1 – 0.2) and average delays of less than 10 seconds.

In the 2020-PC03 and 2030-PC05 scenarios, the Western Freight Link is introduced and a 4-leg priority intersection layout has been adopted. This arrangement also results in a satisfactory level of performance with average delays of up to 30 seconds approximately.

By 2040, Burgmanns Lane experiences delays, DoS and LoS above the acceptable threshold in the priority controlled arrangement. As such, a roundabout layout is proposed which indicates average delays of less than 30 seconds across the intersection and DoS of up to 0.85. The critical peak is the AM Peak which is expected to experience slightly higher delays than the PM peak.

4.6. Werris Creek Road / Site Access (2-4)

4.6.1. Proposed layout

The location and layout of the Werris Creek Road / Site Access intersection is shown in Figure 4-9.

Figure 4-9: Proposed Location of the Werris Creek Road / Site Access Intersection

4.6.2. Intersection layout

A conceptual layout of the proposed intersection treatments assessed in SIDRA is shown in Figure 4-10 and Figure 4-11.

Figure 4-10: SIDRA Layout of the Werris Creek Road / Site Access Intersection (2030)

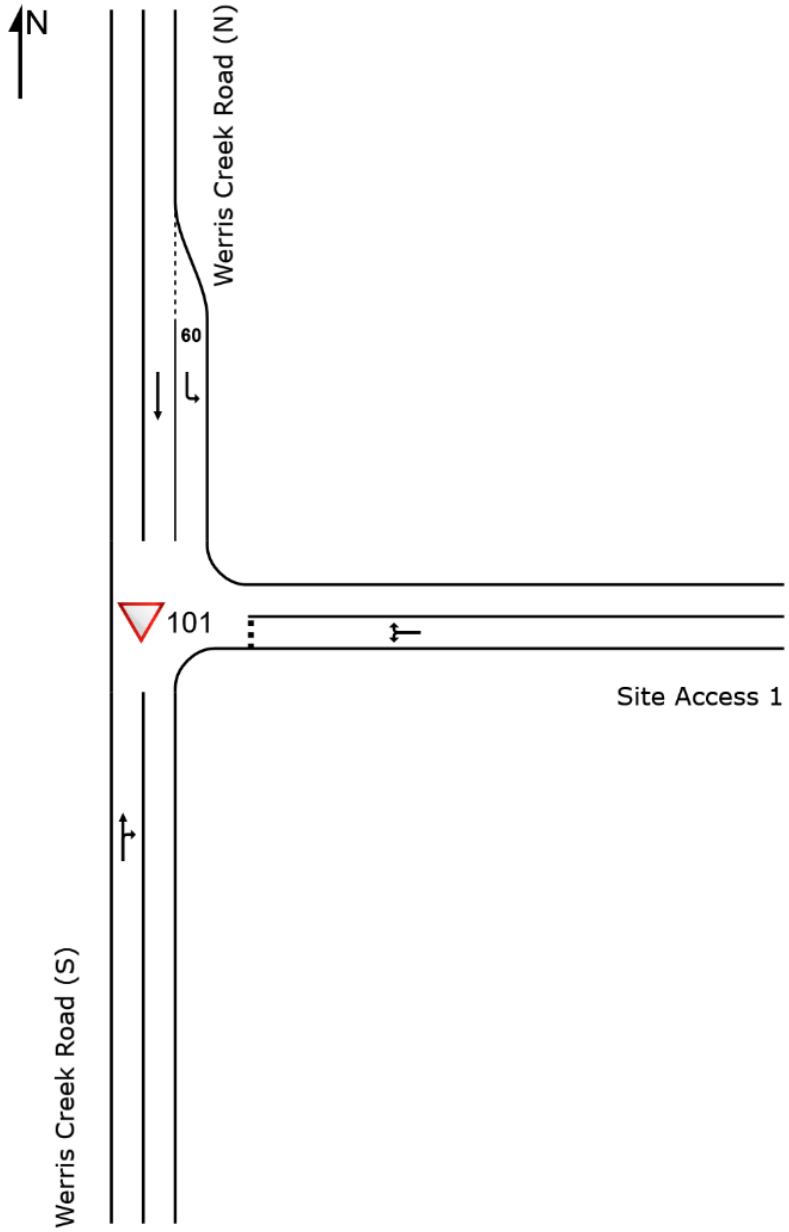
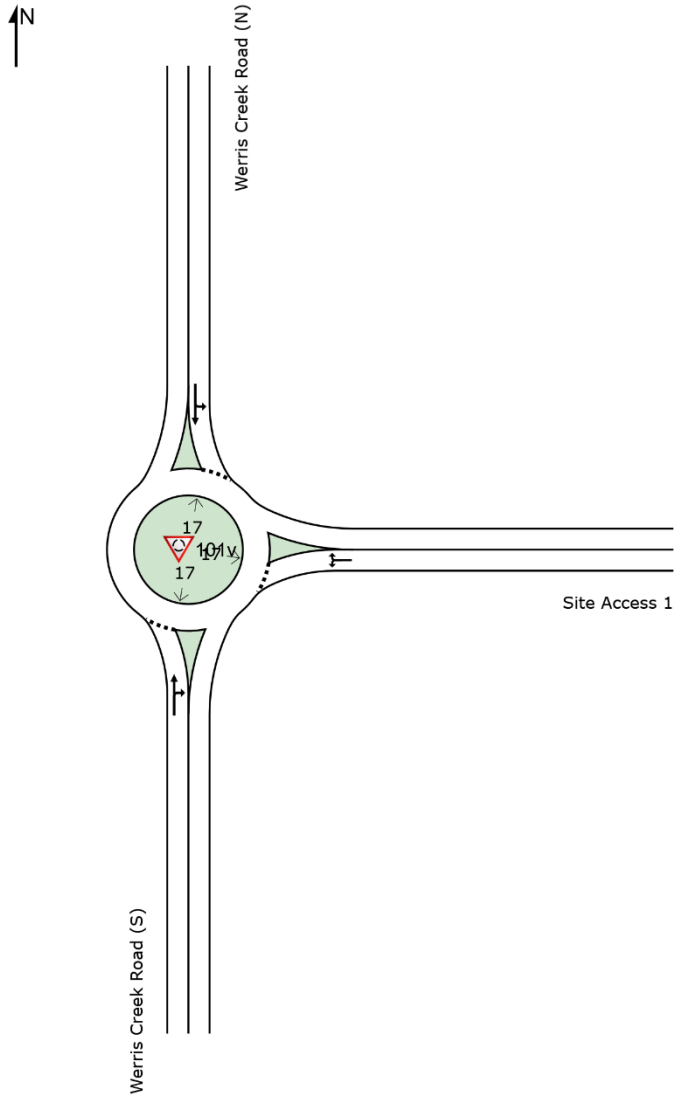


Figure 4-11: SIDRA Layout of the Werris Creek Road / Site Access Intersection (2040)



4.6.3. Werris Creek Road / Site Access intersection performance

Table 4-6 summarises the operation of the Werris Creek Road / Site Access intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-6: Werris Creek Road / Site Access Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2030 (PC05)	Priority controlled T-Junction	Werris Creek Road (S)	0.12	-	1s	2m	0.32	-	2s	9m
		Site Access 1	0.83	B	24s	66m	0.89	E	64s	75m
		Werris Creek Road (N)	0.22	-	2s	0m	0.22	-	5s	0m
		Intersection	**0.83**	**-**	**10s**	**66m**	**0.89**	**-**	**12s**	**75m**
2040 (PC07)	Roundabout	Werris Creek Road (S)	0.41	A	13s	25m	0.54	A	12s	37m
		Site Access 1	0.63	A	14s	48m	0.3	A	11s	15m
		Werris Creek Road (N)	0.44	A	8s	35m	0.62	A	9s	53m
		Intersection	**0.63**	**A**	**11s**	**48m**	**0.62**	**A**	**10s**	**53m**

The Werris Creek Road / Site Access intersection is expected to approach capacity under the priority controlled T-Junction treatment in 2030. In particular, the 2030-PC05 scenario in the PM peak indicates that the intersection performance will exceed the performance thresholds for the site access approach (DoS 0.89 and LoS E).

As such, it is proposed to upgrade the intersection to a roundabout in 2040 (2040-PC07). The roundabout layout in 2040 indicates average delays across the intersection of up to 15 seconds, with DoS levels in the order of 0.6 for both scenarios and time periods.

It is noted that this design tests the operational performance of the intersection and consideration of treatments such as channelised or auxiliary lanes could be implemented on the south approach for the priority controlled intersection as part of the design process in accordance with Austroads requirements.

4.7. Werris Creek Road/ Bylong Road (2-5)

4.7.1. Existing layout

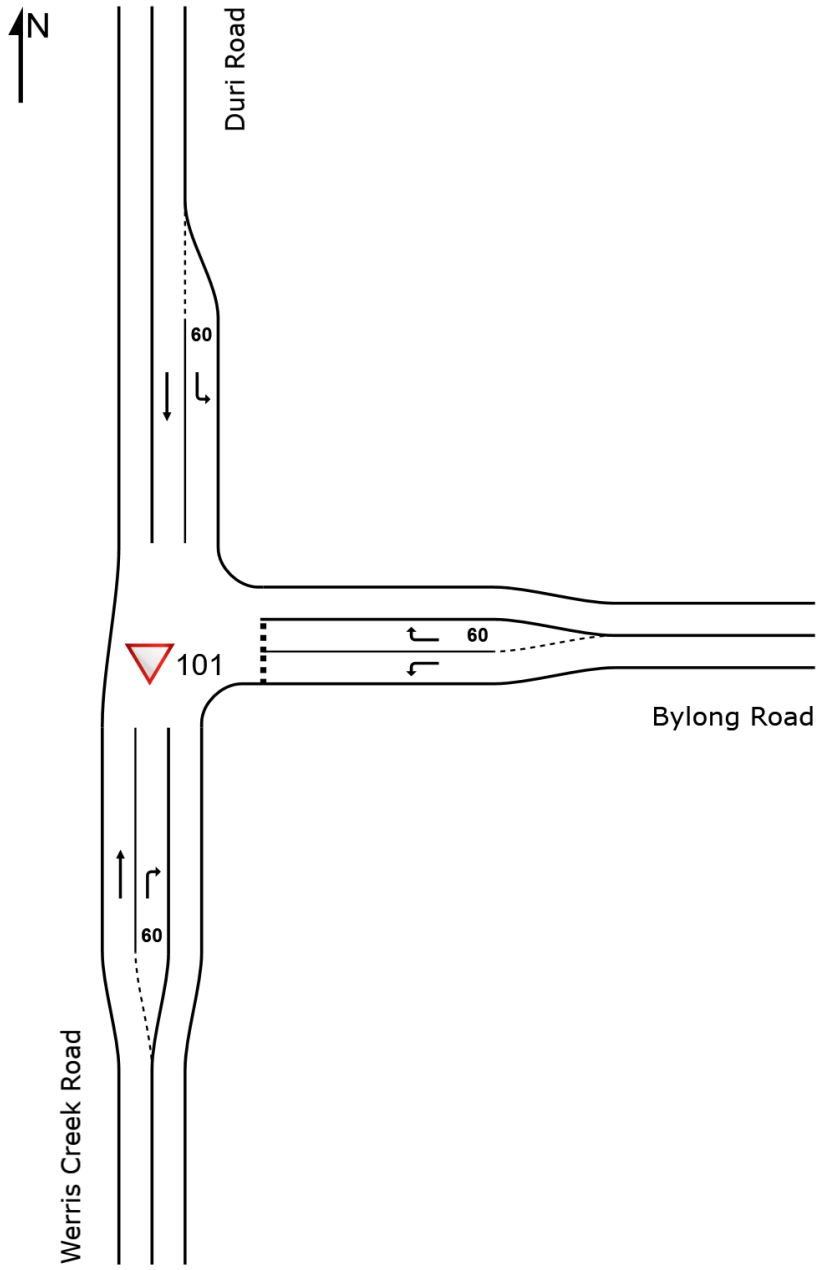
The location and existing layout of the Werris Creek Road/ Bylong Road intersection is shown in Figure 4-12.

Figure 4-12: Existing Layout of the Werris Creek Road/ Bylong Road Intersection

4.7.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-13.

Figure 4-13: SIDRA Layout of the Werris Creek Road/ Bylong Road Intersection (2020, 2030, 2040)



4.7.3. Werris Creek Road/ Bylong Road intersection performance

Table 4-7 summarises the operation of the Werris Creek Road/ Bylong Road intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-7: Werris Creek Road/ Bylong Road Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2020 (PC01)	Priority controlled T-Junction	Werris Creek Road	0.11	-	0s	0m	0.07	-	4s	2m
		Bylong Road	0.07	A	5s	2m	0.01	A	7s	0m
		Duri Road	0.05	-	0s	0m	0.12	-	0s	0m
		Intersection	**0.11**	**-**	**1s**	**2m**	**0.12**	**-**	**2s**	**2m**
2020 (PC03)	Priority controlled T-Junction	Werris Creek Road	0.09	-	0s	0m	0.13	-	5s	4m
		Bylong Road	0.11	A	5s	3m	0.01	A	6s	0m
		Duri Road	0.05	-	0s	0m	0.1	-	0s	0m
		Intersection	**0.11**	**-**	**2s**	**3m**	**0.13**	**-**	**3s**	**4m**
2030 (PC05)	Priority controlled T-Junction	Werris Creek Road	0.29	-	1s	1m	0.47	-	7s	19m
		Bylong Road	0.31	A	6s	9m	0.12	A	9s	3m
		Duri Road	0.14	-	0s	0m	0.3	-	0s	0m
		Intersection	**0.31**	**-**	**2s**	**9m**	**0.47**	**-**	**4s**	**19m**
2040 (PC07)	Priority controlled T-Junction	Werris Creek Road	0.39	-	1s	3m	0.6	-	8s	26m
		Bylong Road	0.39	A	8s	14m	0.29	A	13s	7m
		Duri Road	0.22	-	0s	0m	0.4	-	0s	0m
		Intersection	**0.39**	**-**	**2s**	**14m**	**0.6**	**-**	**5s**	**26m**

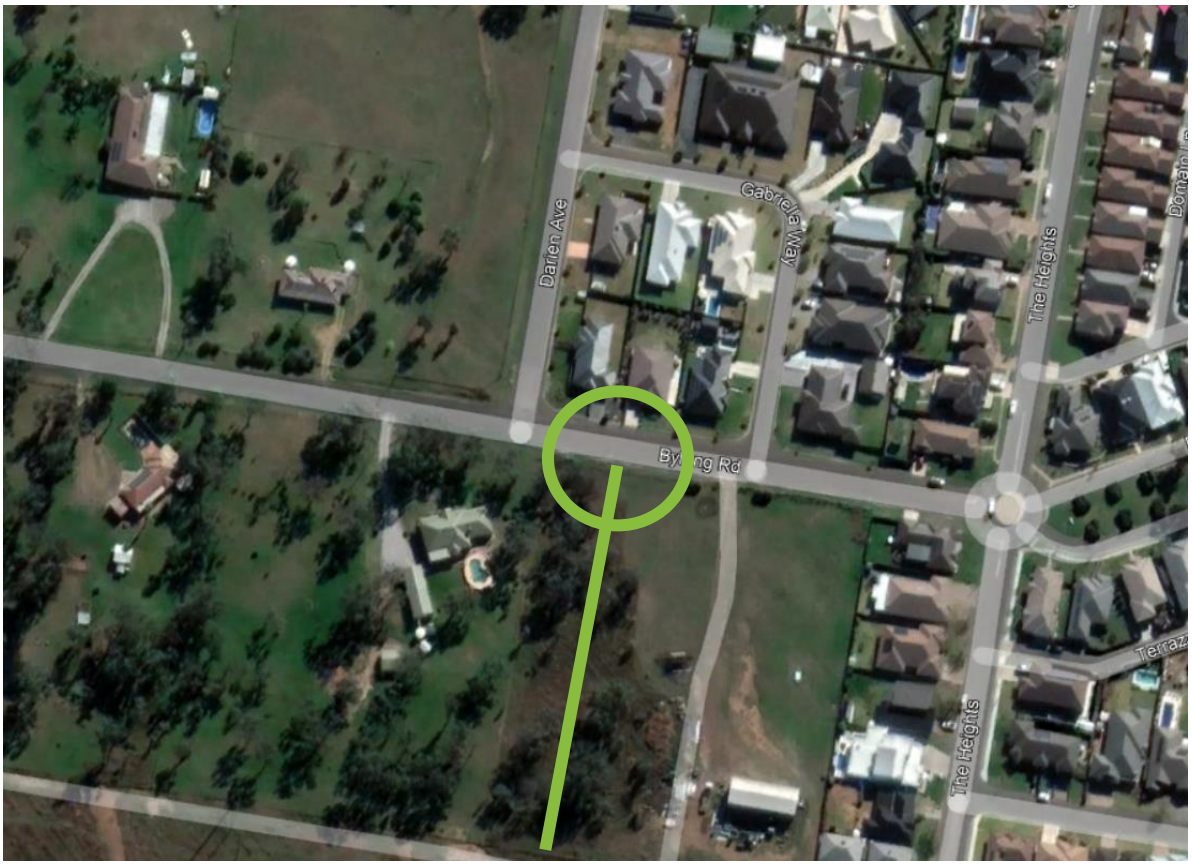
The Werris Creek Road/ Bylong Road intersection in the existing priority controlled T-Junction arrangement is expected to operate at favourable levels for all three years and all scenarios. Average delays are expected to be no more than 15 seconds for all intersection approaches with DoS levels between 0.1 – 0.6. As such, the intersection layout proposed can be retained as the assessment indicates that it has sufficient capacity to accommodate forecast traffic demands expected at the intersection.

4.8. Site Access / Bylong Road (2-6)

4.8.1. Proposed layout

The location and layout of the intersection is shown in Figure 4-14.

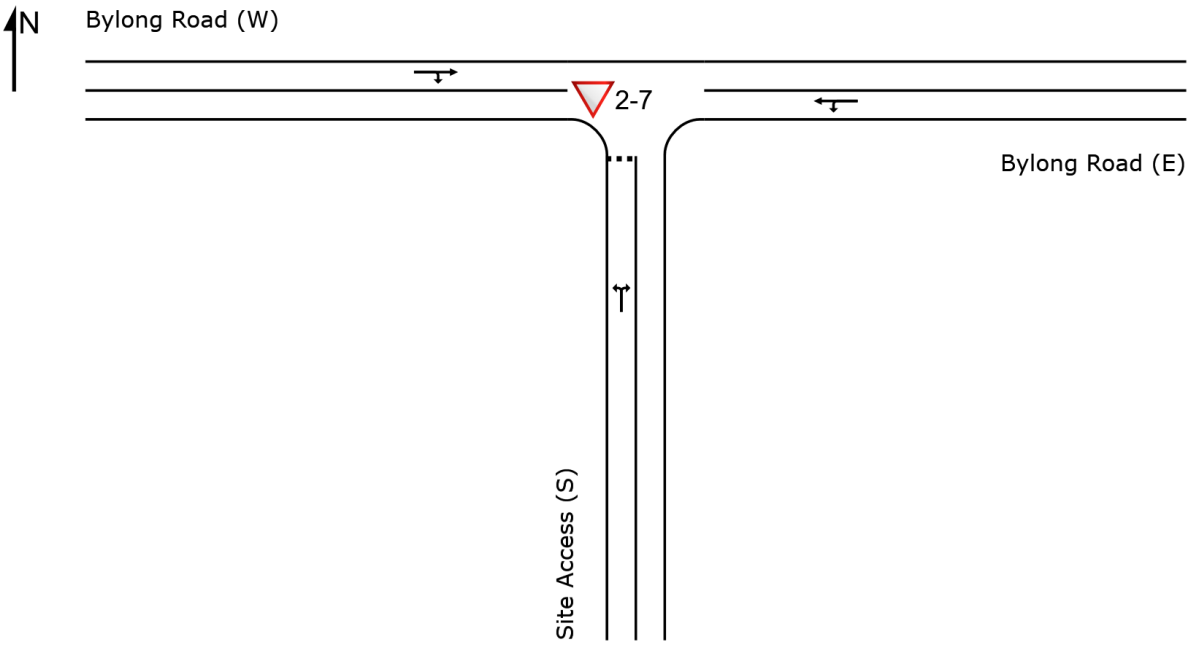
Figure 4-14: Proposed Location of the Site Access / Bylong Road Intersection



4.8.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-15.

Figure 4-15: SIDRA Layout of the Site Access / Bylong Road Intersection (2020, 2030, 2040)



4.8.3. Intersection performance

Table 4-8 summarises the operation of the intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-8: Site Access / Bylong Road Intersection Performance Summary

Year	Treatment	Arm	AM Peak				PM Peak			
			DOS	LOS	Avg Delay	95th %ile Queue	DOS	LOS	Avg Delay	95th %ile Queue
2020 (PC03)	Proposed T-Junction	Site Access (S)	0.01	A	5s	0m	0.01	A	5s	0m
		Bylong Road (E)	0.02	-	1s	0m	0.01	-	3s	0m
		Bylong Road (W)	0	-	3s	0m	0.02	-	1s	0m
		Intersection	**0.02**	**-**	**2s**	**0m**	**0.02**	**-**	**2s**	**0m**
2030 (PC05)	Proposed T-Junction	Site Access (S)	0.16	A	5s	5m	0.16	A	5s	5m
		Bylong Road (E)	0.07	-	2s	0m	0.07	-	2s	0m
		Bylong Road (W)	0.03	-	4s	1m	0.03	-	4s	1m
		Intersection	**0.16**	**-**	**4s**	**5m**	**0.16**	**-**	**4s**	**5m**
2040 (PC07)	Proposed T-Junction	Site Access (S)	0.3	A	5s	9m	0.17	A	6s	4m
		Bylong Road (E)	0.1	-	3s	0m	0.15	-	5s	0m
		Bylong Road (W)	0.03	-	5s	1m	0.15	-	4s	5m
		Intersection	**0.3**	**-**	**4s**	**9m**	**0.17**	**-**	**5s**	**5m**

The Site Access / Bylong Road intersection is expected to operate at a satisfactory level under the proposed priority controlled T-Junction arrangement. Average delays of less than 6 seconds can be expected on each intersection approach for all years and scenarios. DoS levels for all scenarios and years are very low (between 0.01 to 0.3) which is well below desired level.

4.9. Rodeo Drive / Site Access (2-7)

4.9.1. Proposed layout

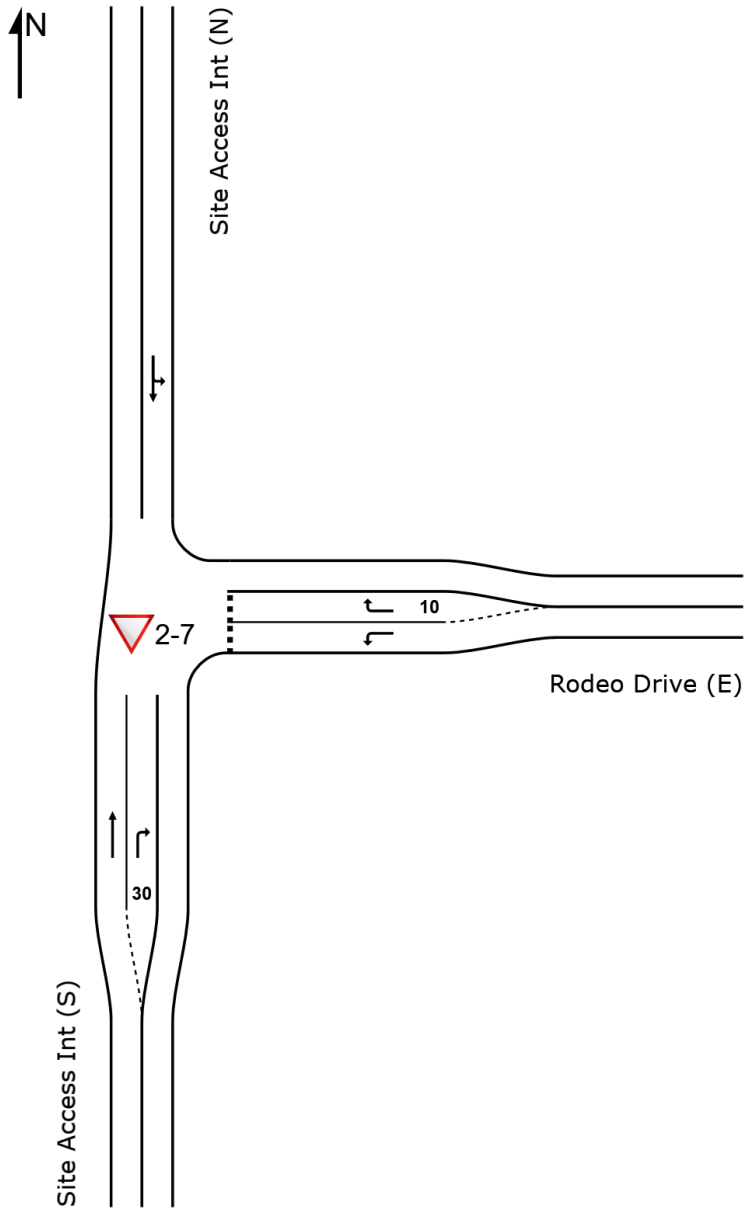
The location and layout of the Rodeo Drive / Site Access intersection is shown in Figure 4-16.

Figure 4-16: Proposed Location of the Rodeo Drive / Site Access Intersection

4.9.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-17.

Figure 4-17: SIDRA Layout of the Rodeo Drive / Site Access Intersection (2020, 2030, 2040)



4.9.3. Rodeo Drive / Site Access intersection performance

Table 4-9 summarises the operation of the Rodeo Drive / Site Access intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-9: Rodeo Drive / Site Access Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2020 (PC01)	Priority controlled T-Junction	Site Access Int (S)	0.01	-	3s	0m	0.01	-	3s	0m
		Site Access Int (N)	0	-	2s	0m	0	-	2s	0m
		Rodeo Drive (W)	0.01	A	5s	0m	0.01	A	5s	0m
		Intersection	**0.01**	**-**	**4s**	**0m**	**0.01**	**-**	**4s**	**0m**
2020 (PC03)	Priority controlled T-Junction	Site Access Int (S)	0	-	1s	0m	0	-	1s	0m
		Site Access Int (N)	0.01	-	3s	0m	0.01	-	3s	0m
		Rodeo Drive (W)	0.01	A	5s	0m	0.01	A	5s	0m
		Intersection	**0.01**	**-**	**3s**	**0m**	**0.01**	**-**	**3s**	**0m**
2030 (PC05)	Priority controlled T-Junction	Site Access Int (S)	0.01	-	2s	0m	0.01	-	2s	0m
		Site Access Int (N)	0.06	-	4s	2m	0.13	-	4s	5m
		Rodeo Drive (W)	0.13	A	5s	4m	0.07	A	5s	2m
		Intersection	**0.13**	**-**	**4s**	**4m**	**0.13**	**-**	**4s**	**5m**
2040 (PC07)	Priority controlled T-Junction	Site Access Int (S)	0.02	-	1s	0m	0.01	-	1s	0m
		Site Access Int (N)	0.08	-	4s	3m	0.22	-	4s	9m
		Rodeo Drive (W)	0.21	A	5s	7m	0.1	A	5s	3m
		Intersection	**0.21**	**-**	**4s**	**7m**	**0.22**	**-**	**4s**	**9m**

The Rodeo Drive / Site Access intersection is expected to operate at a satisfactory level under the priority controlled T-Junction arrangement. Average delays of less than 5 seconds can be expected on each intersection approach for all years and scenarios. DoS levels for all scenarios and years are very low (between 0.01 to 0.2) which is well below desired level.

It is noted that this design tests the operational performance of the intersection and consideration of treatments such as channelised or auxiliary lanes could be implemented on the south approach for the priority controlled intersection as part of the design process in accordance with Austroads requirements.

4.10. Edward Street / Warwick Road / Greg Norman Drive (2-8)

4.10.1.Existing layout

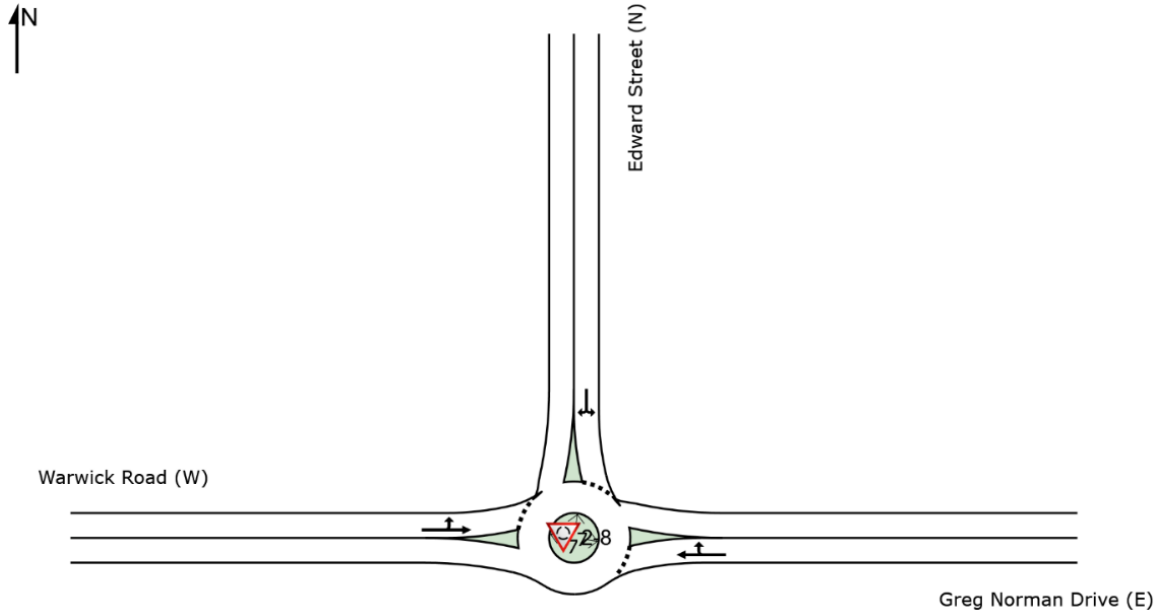
The location and existing layout of the Edward Street / Warwick Road / Greg Norman Drive intersection is shown in Figure 4-18.

Figure 4-18: Existing Layout of the Edward Street / Warwick Road / Greg Norman Drive Intersection

4.10.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-19.

Figure 4-19: SIDRA Layout of the Edward Street / Warwick Road / Greg Norman Drive Intersection (2020, 2030, 2040)



4.10.3.Edward Street / Warwick Road / Greg Norman Drive intersection performance

Table 4-10 summarises the operation of the Edward Street / Warwick Road / Greg Norman Drive intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators and intersection layouts are included in Appendix D.

Table 4-10: Edward Street / Warwick Road / Greg Norman Drive Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2020 (PC01)	Existing Roundabout	Greg Norman Drive (E)	0.06	A	5s	2m	0.04	A	4s	1m
		Edward Street (N)	0.01	A	5s	0m	0.07	A	4s	3m
		Warwick Road (W)	0.04	A	4s	1m	0.04	A	4s	2m
		Intersection	**0.06**	**A**	**5s**	**2m**	**0.07**	**A**	**4s**	**3m**
2020 (PC03)	Existing Roundabout	Greg Norman Drive (E)	0.05	A	5s	2m	0.04	A	4s	1m
		Edward Street (N)	0.01	A	5s	0m	0.05	A	4s	2m
		Warwick Road (W)	0.04	A	4s	1m	0.04	A	4s	2m
		Intersection	**0.05**	**A**	**5s**	**2m**	**0.05**	**A**	**4s**	**2m**

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2030 (PC05)	Existing Roundabout	Greg Norman Drive (E)	0.1	A	5s	4m	0.06	A	4s	2m
		Edward Street (N)	0.01	A	6s	0m	0.16	A	5s	7m
		Warwick Road (W)	0.08	A	4s	3m	0.07	A	4s	3m
		Intersection	**0.1**	**A**	**5s**	**4m**	**0.16**	**A**	**5s**	**7m**
2040 (PC07)	Existing Roundabout	Greg Norman Drive (E)	0.2	A	6s	9m	0.08	A	4s	3m
		Edward Street (N)	0.01	A	7s	0m	0.24	A	5s	10m
		Warwick Road (W)	0.1	A	5s	4m	0.1	A	4s	4m
		Intersection	**0.2**	**A**	**5s**	**9m**	**0.24**	**A**	**4s**	**10m**

The Edward Street / Warwick Road / Greg Norman Drive intersection is expected to operate at favourable levels for all three years and all scenarios under the existing roundabout arrangement. Minimal delays and low DoS levels are expected indicating that the existing intersection layout would be able to accommodate the forecast traffic demand expected at this intersection.

4.11. Goonoo Goonoo Road / Greg Norman Drive (2-9)

4.11.1.Existing layout

The location and existing layout of the Goonoo Goonoo Road / Greg Norman Drive intersection is shown in Figure 4-20.

Figure 4-20: Existing Layout of the Goonoo Goonoo Road / Greg Norman Drive Intersection

4.11.2. Intersection layout

A conceptual layout of the proposed intersection treatments assessed in SIDRA is shown in Figure 4-21 and Figure 4-22.

Figure 4-21: SIDRA Layout of the Goonoo Goonoo Road / Greg Norman Drive Intersection (2020, 2030)

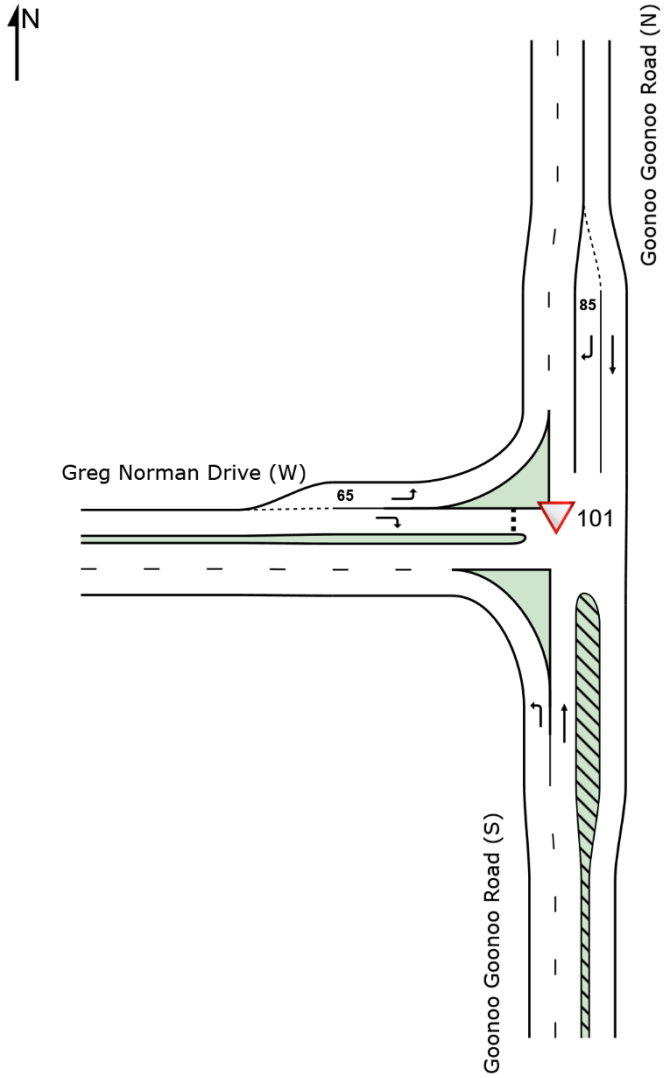
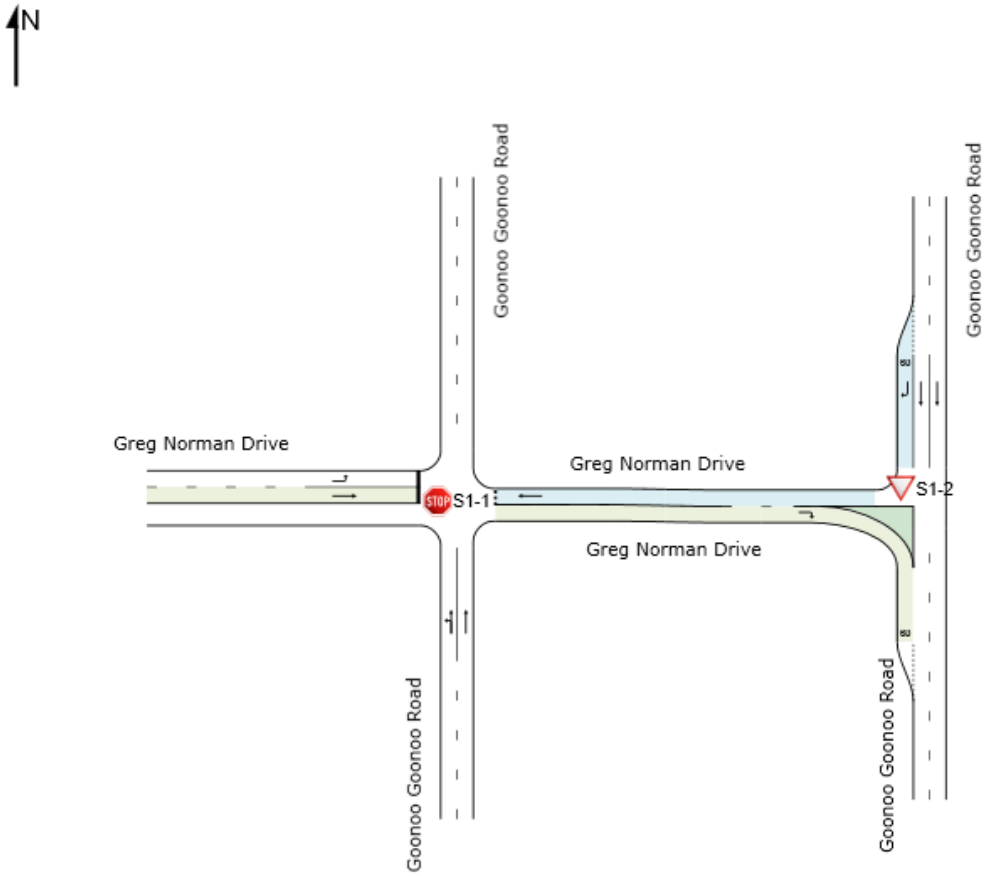


Figure 4-22: SIDRA Layout of the Goonoo Goonoo Road / Greg Norman Drive Intersection (2040) [2]



4.11.3.Goonoo Goonoo Road / Greg Norman Drive intersection performance

Table 4-11 summarises the operation of the Goonoo Goonoo Road / Greg Norman Drive intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

[2] The SIDRA layout presented here is not the actual intersection configuration, but rather has been modelled this way to reflect seagull intersection operations.

Table 4-11: Goonoo Goonoo Road / Greg Norman Drive Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95%ile Queue	DOS	LOS	Avrg Delay	95%ile Queue
2020 (PC01)	Existing priority controlled T-Junction	Goonoo Goonoo Road (S)	0.09	-	2s	0m	0.06	-	2s	0m
		Goonoo Goonoo Road (N)	0.06	-	3s	2m	0.11	-	3s	4m
		Greg Norman Drive (W)	0.11	A	5s	3m	0.15	A	7s	4m
		Intersection	**0.11**	**-**	**3s**	**3m**	**0.15**	**-**	**4s**	**4m**
2020 (PC03)	Existing priority controlled T-Junction	Goonoo Goonoo Road (S)	0.09	-	1s	0m	0.07	-	2s	0m
		Goonoo Goonoo Road (N)	0.07	-	2s	2m	0.13	-	3s	4m
		Greg Norman Drive (W)	0.11	A	5s	3m	0.1	A	6s	3m
		Intersection	**0.11**	**-**	**3s**	**3m**	**0.13**	**-**	**4s**	**4m**
2030 (PC05)	Existing priority controlled T-Junction	Goonoo Goonoo Road (S)	0.12	-	2s	0m	0.15	-	2s	0m
		Goonoo Goonoo Road (N)	0.13	-	2s	3m	0.12	-	1s	1m
		Greg Norman Drive (W)	0.17	A	7s	5m	0.15	A	6s	4m
		Intersection	**0.17**	**-**	**3s**	**5m**	**0.15**	**-**	**3s**	**4m**
2040 (PC07)	Seagull	Goonoo Goonoo Road (S)	0	-	0s	0m	0	-	0s	0m
		Goonoo Goonoo Road (S)	0.11	-	2s	0m	0.13	-	1s	0m
		Greg Norman Drive (W)	0.03	-	1s	0m	0.01	-	1s	0m
		Intersection	**0.11**	**-**	**2s**	**0m**	**0.13**	**-**	**1s**	**0m**

The Goonoo Goonoo Road / Greg Norman Drive intersection is expected to operate at a satisfactory level in 2020 and 2030 under the existing priority controlled T-Junction arrangement. The intersection is expected to experience minimal average delays of up to 10 seconds on all intersection approaches with DoS levels between 0.1 and 0.2.

However, this intersection would exceed the performance thresholds if it were to remain as a priority controlled T-Junction in 2040. In particular, performance on the Burgmanns Lane approach is expected to deteriorate and experiences high delays and DoS as it must give way to Goonoo Goonoo Road. As such, it is proposed to upgrade this intersection to a seagull intersection which significantly reduces average delay at the intersection.

4.12. Goonoo Goonoo Road / Jack Smyth Drive (2-10)

4.12.1.Existing layout

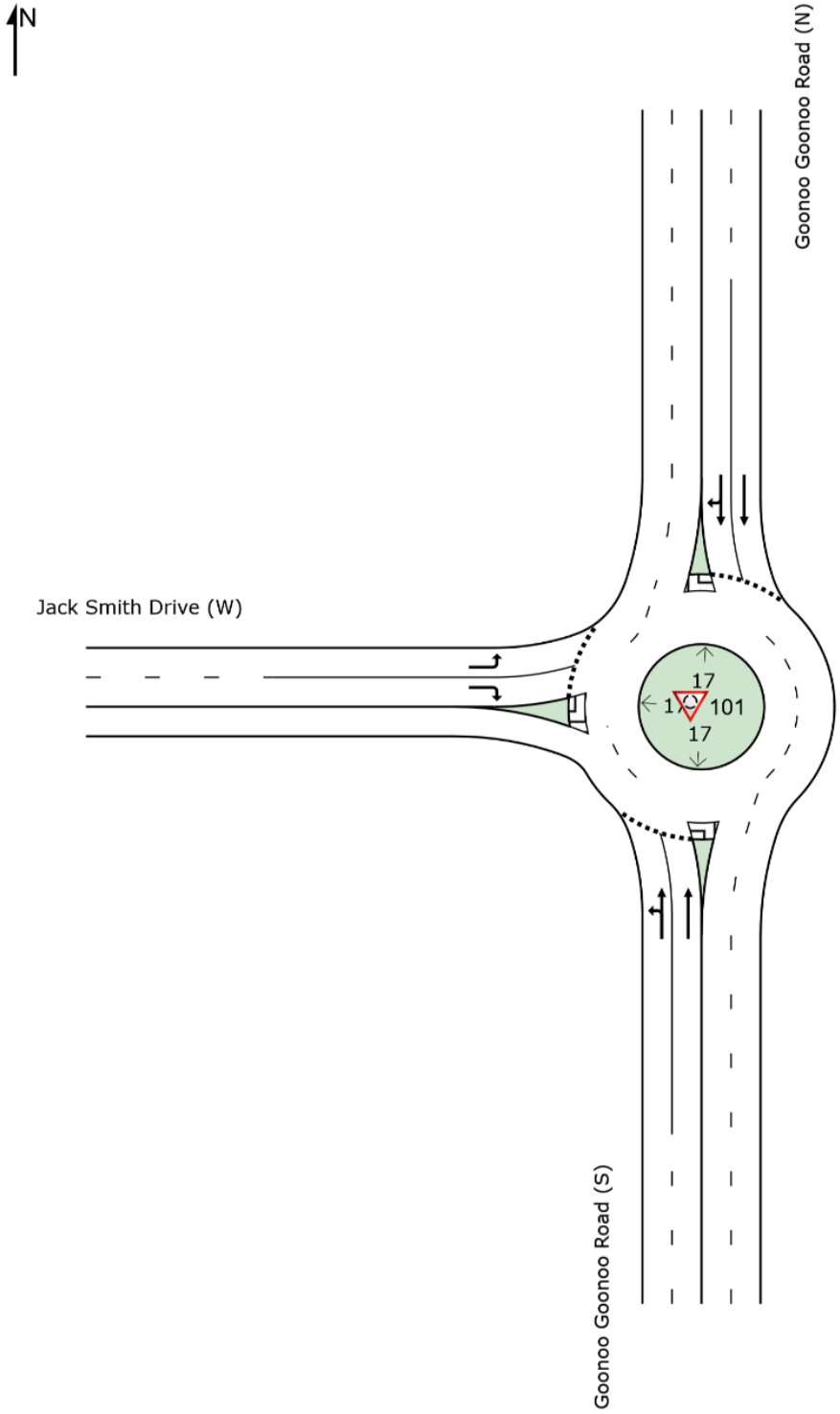
The location and existing layout of the Goonoo Goonoo Road / Jack Smyth Drive intersection is shown in Figure 4-23.

Figure 4-23: Existing Layout of the Goonoo Goonoo Road / Jack Smyth Drive Intersection

4.12.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-24.

Figure 4-24: SIDRA Layout of the Goonoo Goonoo Road / Jack Smyth Drive Intersection (2020, 2030, 2040)



4.12.3.Goonoo Goonoo Road / Jack Smyth Drive intersection performance

Table 4-12 summarises the operation of the Goonoo Goonoo Road / Jack Smyth Drive intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators and intersection layouts are included in Appendix D.

Table 4-12: Goonoo Goonoo Road / Jack Smyth Drive Intersection Performance Summary

Year	Treatment	Arm	AM Peak				PM Peak			
			DOS	LOS	Avg Delay	95%ile Queue	DOS	LOS	Avg Delay	95%ile Queue
2020 (PC01)	Roundabout	Goonoo Goonoo Road (S)	0.08	A	5s	3m	0.06	A	5s	2m
		Goonoo Goonoo Road (N)	0.06	A	5s	2m	0.09	A	5s	4m
		Jack Smith Drive (W)	0.01	A	4s	0m	0.01	A	4s	0m
		Intersection	**0.08**	**A**	**5s**	**3m**	**0.09**	**A**	**5s**	**4m**
2020 (PC03)	Roundabout	Goonoo Goonoo Road (S)	0.07	A	4s	3m	0.06	A	4s	2m
		Goonoo Goonoo Road (N)	0.06	A	5s	3m	0.08	A	5s	3m
		Jack Smith Drive (W)	0	A	5s	0m	0.01	A	5s	0m
		Intersection	**0.07**	**A**	**5s**	**3m**	**0.08**	**A**	**5s**	**3m**
2030 (PC05)	Roundabout	Goonoo Goonoo Road (S)	0.09	A	5s	3m	0.11	A	5s	4m
		Goonoo Goonoo Road (N)	0.1	A	5s	4m	0.1	A	5s	4m
		Jack Smith Drive (W)	0.02	A	3s	1m	0.03	A	4s	1m
		Intersection	**0.1**	**A**	**5s**	**4m**	**0.11**	**A**	**5s**	**4m**
2040 (PC07)	Roundabout	Goonoo Goonoo Road (S)	0.3	A	5s	14m	0.37	A	5s	18m
		Goonoo Goonoo Road (N)	0.31	A	5s	18m	0.32	A	5s	19m
		Jack Smith Drive (W)	0.08	A	4s	3m	0.06	A	5s	2m
		Intersection	**0.31**	**A**	**5s**	**18m**	**0.37**	**A**	**5s**	**19m**

The Goonoo Goonoo Road / Jack Smyth Drive intersection is expected to operate at favourable levels for all three years and all scenarios under the existing roundabout configuration. Very low average delays (less than 10 seconds) and DoS levels (up to 0.4) can be expected indicating that the existing roundabout layout has sufficient capacity to accommodate forecast traffic demand expected at this intersection.

A fourth leg into the business zone area in the future may be added subject to a separate development application.

4.13. Goonoo Goonoo Road / Burgmanns Lane (2-11)

4.13.1.Existing layout

The location and existing layout of the Goonoo Goonoo Road / Burgmanns Lane intersection is shown in Figure 4-25.

Figure 4-25: Existing Layout of the Goonoo Goonoo Road / Burgmanns Lane Intersection

4.13.2. Intersection layout

A conceptual layout of the proposed intersection treatments assessed in SIDRA is shown in Figure 4-26 and Figure 4-27.

Figure 4-26: SIDRA Layout of the Goonoo Goonoo Road / Burgmanns Lane Intersection (2020, 2030)

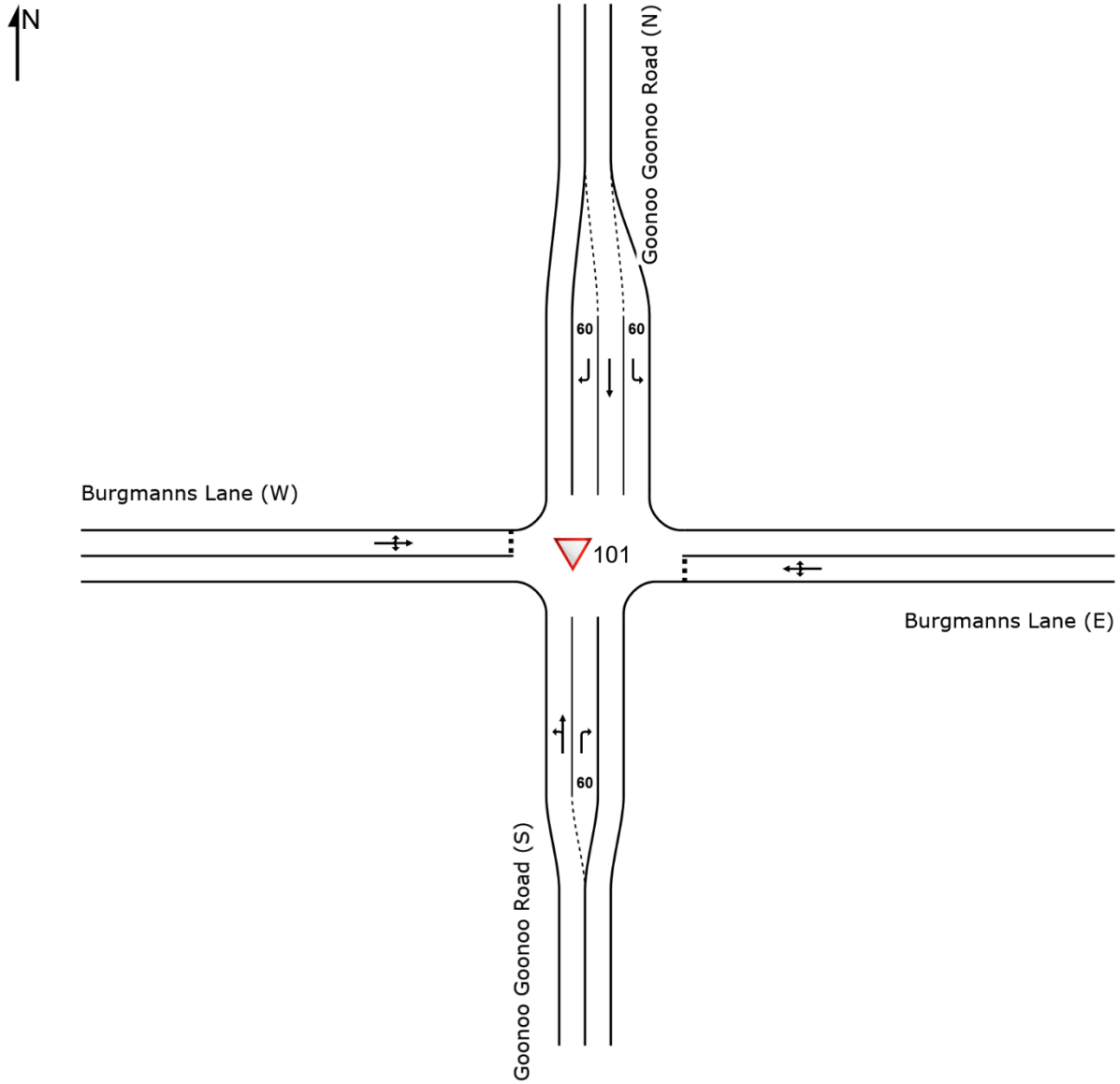
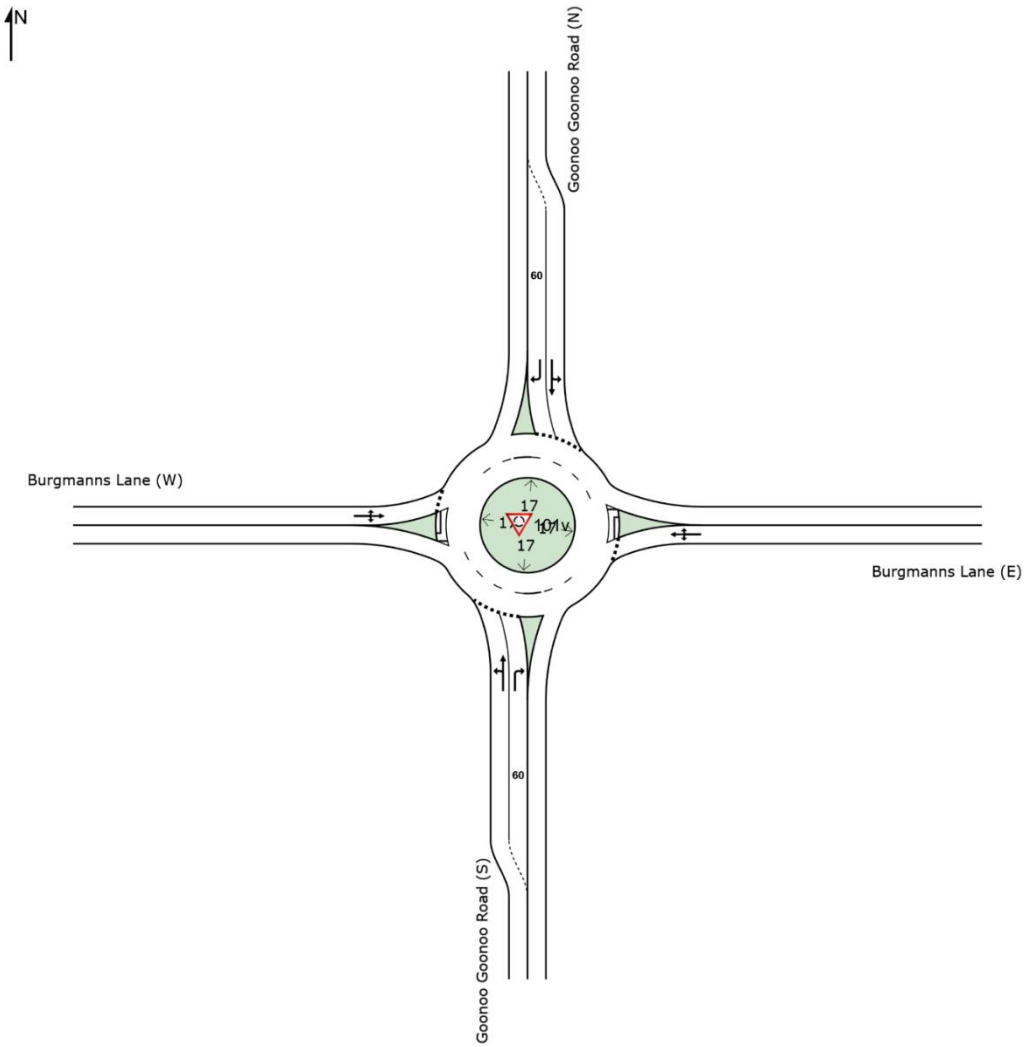


Figure 4-27: SIDRA Layout of the Goonoo Goonoo Road / Burgmanns Lane Intersection (2040)



4.13.3. Goonoo Goonoo Road / Burgmanns Lane intersection performance

Table 4-13 summarises the operation of the Goonoo Goonoo Road / Burgmanns Lane intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-13: Goonoo Goonoo Road / Burgmanns Lane Intersection Performance Summary

Year	Treatment	Arm	AM Peak				PM Peak			
			DOS	LOS	Avg Delay	95%ile Queue	DOS	LOS	Avg Delay	95%ile Queue
2020 (PC01)	Priority controlled 4-Leg Junction	Goonoo Goonoo Road (S)	0.14	-	1s	0m	0.09	-	1s	1m
		Burgmanns Lane (E)	0.16	A	9s	4m	0.03	A	10s	1m
		Goonoo Goonoo Road (N)	0.08	-	0s	0m	0.11	-	1s	0m
		Burgmanns Lane (W)	0.05	A	8s	1m	0.24	A	12s	7m
		Intersection	**0.16**	**-**	**3s**	**4m**	**0.24**	**-**	**3s**	**7m**
2020 (PC03)	Priority controlled 4-Leg Junction	Goonoo Goonoo Road (S)	0.14	-	1s	0m	0.1	-	1s	1m
		Burgmanns Lane (E)	0.18	A	10s	5m	0.03	A	10s	1m
		Goonoo Goonoo Road (N)	0.08	-	1s	1m	0.11	-	1s	0m
		Burgmanns Lane (W)	0.06	A	9s	1m	0.34	A	12s	12m
		Intersection	**0.18**	**-**	**3s**	**5m**	**0.34**	**-**	**4s**	**12m**
2030 (PC05)	Priority controlled 4-Leg Junction	Goonoo Goonoo Road (S)	0.15	-	1s	0m	0.12	-	1s	0m
		Burgmanns Lane (E)	0.56	B	19s	28m	0.04	A	11s	1m
		Goonoo Goonoo Road (N)	0.1	-	2s	2m	0.13	-	1s	1m
		Burgmanns Lane (W)	0.11	A	11s	3m	0.82	B	25s	82m
		Intersection	**0.56**	**-**	**7s**	**28m**	**0.82**	**-**	**12s**	**82m**
2040 (PC07)	Roundabout	Goonoo Goonoo Road (S)	0.34	A	8s	17m	0.22	A	6s	10m
		Burgmanns Lane (E)	0.33	A	9s	17m	0.05	A	8s	2m
		Goonoo Goonoo Road (N)	0.17	A	7s	8m	0.31	A	8s	16m

Year	Treatment	Arm	AM Peak				PM Peak			
			DOS	LOS	Avg Delay	95%ile Queue	DOS	LOS	Avg Delay	95%ile Queue
		Burgmanns Lane (W)	0.18	A	7s	8m	0.54	A	7s	35m
		Intersection	**0.34**	**A**	**7s**	**17m**	**0.54**	**A**	**7s**	**35m**

The Goonoo Goonoo Road / Burgmanns Lane intersection is expected to operate at a satisfactory level in 2020 and 2030 with average delays of no more than 30 seconds on all approaches and DoS levels between 0.1 and 0.8

However, the priority controlled intersection layout is expected to exceed the performance thresholds in 2040 and is proposed to be upgraded to a roundabout. Burgmanns Lane is shown to suffer high delays and DoS levels as it must give way to Goonoo Goonoo Road. As a roundabout in 2040, the results indicate minimal average delays (less than 10 seconds) and relatively low DoS levels of up to 0.6.

4.14. Garden Street / Hillvue Road (2-12)

4.14.1.Existing layout

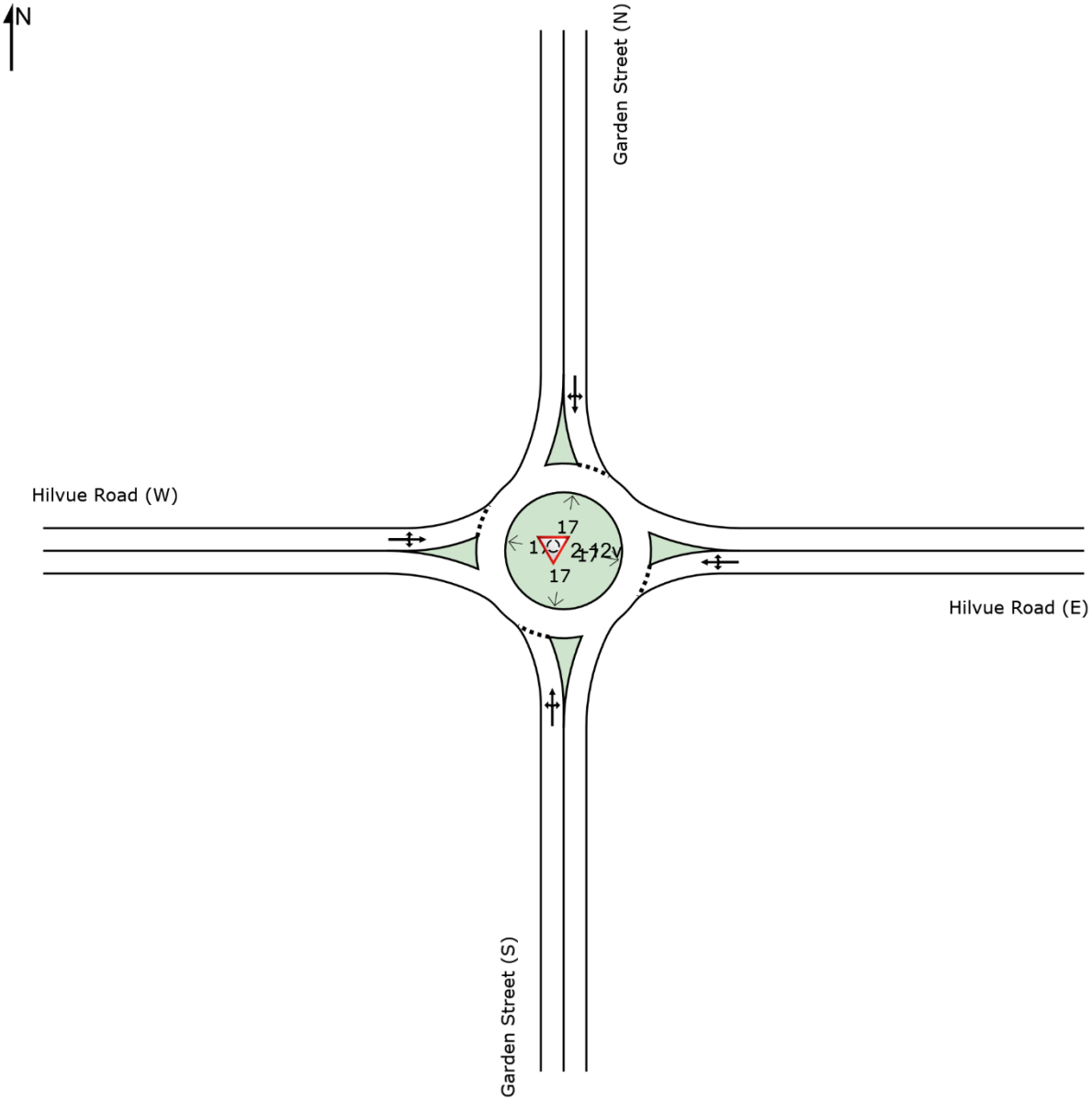
The location and existing layout of the Garden Street / Hillvue Road intersection is shown in Figure 4-28.

Figure 4-28: Existing Layout of the Garden Street / Hillvue Road Intersection

4.14.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-29.

Figure 4-29: SIDRA Layout of the Garden Street / Hillvue Road Intersection (2020, 2030, 2040)



4.14.3. Garden Street / Hillvue Road intersection performance

Table 4-14 summarises the operation of the Garden Street / Hillvue Road intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-14: Garden Street / Hillvue Road Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2020 (PC01)	Existing Roundabout	Garden Street (S)	0.44	A	6s	24m	0.14	A	6s	6m
		Hillvue Road (E)	0.26	A	6s	13m	0.29	A	8s	14m
		Garden Street (N)	0.17	A	5s	8m	0.49	A	5s	30m
		Hillvue Road (W)	0.11	A	7s	5m	0.15	A	6s	7m
		Intersection	**0.44**	**A**	**6s**	**24m**	**0.49**	**A**	**6s**	**30m**
2020 (PC03)	Existing Roundabout	Garden Street (S)	0.44	A	7s	24m	0.14	A	6s	7m
		Hillvue Road (E)	0.32	A	6s	17m	0.38	A	8s	20m
		Garden Street (N)	0.24	A	4s	11m	0.51	A	5s	31m
		Hillvue Road (W)	0.12	A	8s	5m	0.18	A	6s	8m
		Intersection	**0.44**	**A**	**6s**	**24m**	**0.51**	**A**	**6s**	**31m**
2030 (PC05)	Existing Roundabout	Garden Street (S)	0.36	A	6s	19m	0.23	A	7s	11m
		Hillvue Road (E)	0.29	A	7s	15m	0.33	A	8s	17m
		Garden Street (N)	0.23	A	4s	11m	0.49	A	5s	31m
		Hillvue Road (W)	0.14	A	7s	7m	0.07	A	5s	3m
		Intersection	**0.36**	**A**	**6s**	**19m**	**0.49**	**A**	**6s**	**31m**
2040 (PC07)	Existing Roundabout	Garden Street (S)	0.57	A	8s	38m	0.11	A	5s	5m
		Hillvue Road (E)	0.28	A	6s	14m	0.45	A	10s	26m
		Garden Street (N)	0.2	A	5s	10m	0.67	A	6s	51m
		Hillvue Road (W)	0.29	A	9s	15m	0.23	A	5s	11m
		Intersection	**0.57**	**A**	**7s**	**38m**	**0.67**	**A**	**7s**	**51m**

The existing roundabout at the Garden Street / Hillvue Road intersection is expected to operate at a satisfactory level for all three years and scenarios. Average delays of less than 10 seconds can be expected and DoS levels between 0.4 and 0.7, indicating that the existing intersection configuration has sufficient capacity to accommodate forecast traffic demand expected at this intersection.

4.15. Grant Street / Warwick Road (2-13)

4.15.1.Existing layout

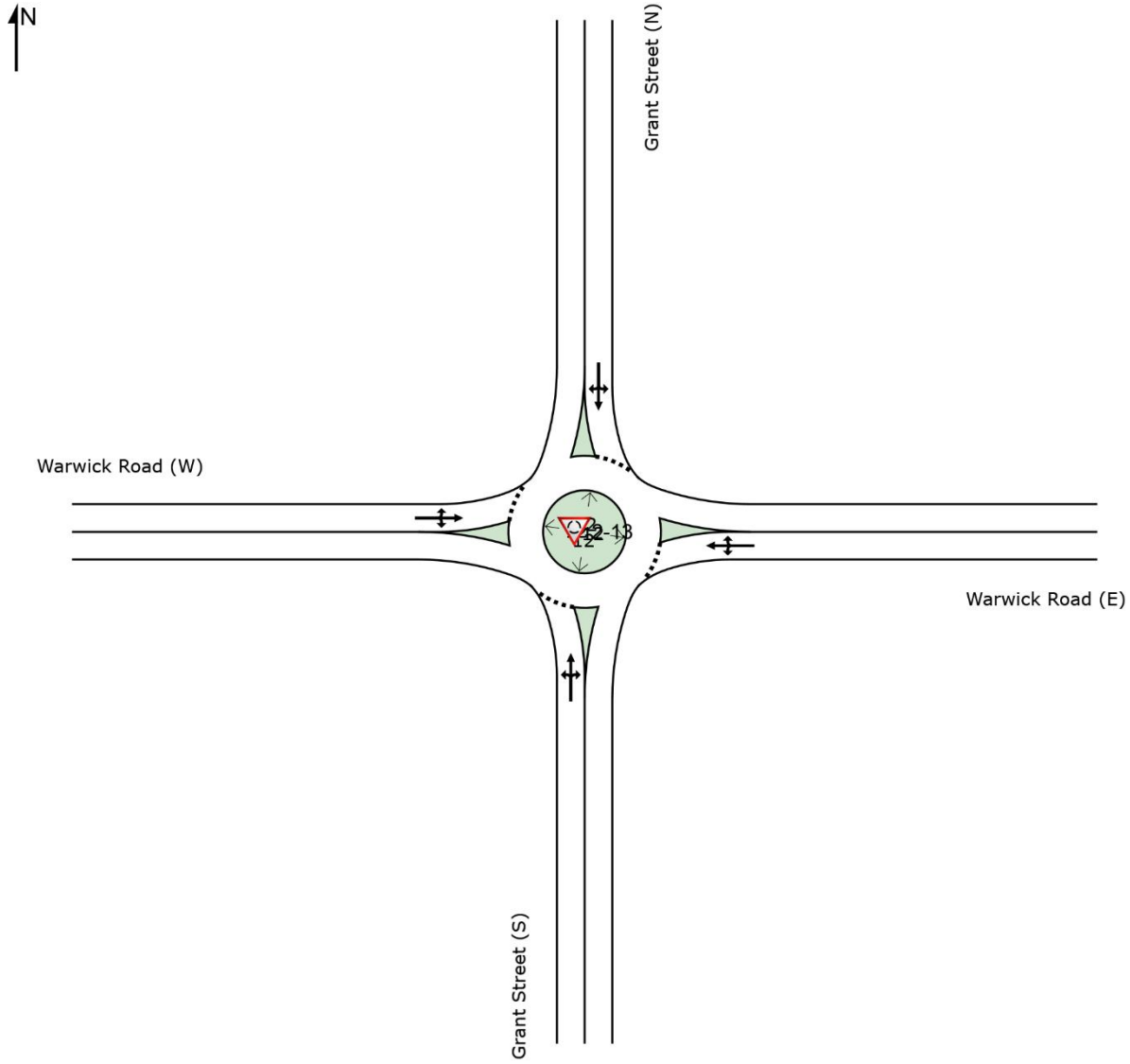
The location and existing layout of the Grant Street / Warwick Road intersection is shown in Figure 4-30.

Figure 4-30: Existing Layout of the Grant Street / Warwick Road Intersection

4.15.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-31.

Figure 4-31: SIDRA Layout of the Grant Street / Warwick Road Intersection (2020, 2030, 2040)



4.15.3. Grant Street / Warwick Road intersection performance

Table 4-15 summarises the operation of the Grant Street / Warwick Road intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-15: Grant Street / Warwick Road Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2020 (PC01)	Existing Roundabout	Grant Street (S)	0.15	A	4s	5m	0.05	A	4s	2m
		Warwick Road (E)	0.04	A	5s	1m	0.04	A	6s	1m
		Grant Street (N)	0.05	A	4s	2m	0.14	A	4s	5m
		Warwick Road (W)	0.03	A	5s	1m	0.09	A	6s	3m
		Intersection	**0.15**	**A**	**4s**	**5m**	**0.14**	**A**	**5s**	**5m**
2020 (PC03)	Existing Roundabout	Grant Street (S)	0.14	A	4s	5m	0.05	A	4s	2m
		Warwick Road (E)	0.04	A	5s	1m	0.04	A	6s	1m
		Grant Street (N)	0.05	A	4s	2m	0.13	A	4s	5m
		Warwick Road (W)	0.02	A	5s	1m	0.08	A	5s	3m
		Intersection	**0.14**	**A**	**4s**	**5m**	**0.13**	**A**	**5s**	**5m**
2030 (PC05)	Existing Roundabout	Grant Street (S)	0.24	A	4s	10m	0.1	A	4s	4m
		Warwick Road (E)	0.1	A	4s	3m	0.08	A	6s	3m
		Grant Street (N)	0.1	A	4s	4m	0.23	A	4s	10m
		Warwick Road (W)	0.04	A	5s	1m	0.14	A	5s	5m
		Intersection	**0.24**	**A**	**4s**	**10m**	**0.23**	**A**	**5s**	**10m**
2040 (PC07)	Existing Roundabout	Grant Street (S)	0.29	A	5s	13m	0.13	A	4s	5m
		Warwick Road (E)	0.15	A	5s	5m	0.1	A	7s	4m
		Grant Street (N)	0.13	A	4s	5m	0.3	A	5s	13m
		Warwick Road (W)	0.03	A	5s	1m	0.2	A	6s	8m
		Intersection	**0.29**	**A**	**4s**	**13m**	**0.3**	**A**	**5s**	**13m**

The existing roundabout at the Grant Street / Warwick Road intersection is expected to operate at a satisfactory level for all three years and scenarios. Average delays of less than 10 seconds can be expected and DoS levels between 0.1 and 0.3, indicating that the existing intersection configuration has sufficient capacity to accommodate forecast traffic demand expected at this intersection.

4.16. Darien Avenue / Warwick Road (2-14)

4.16.1.Existing layout

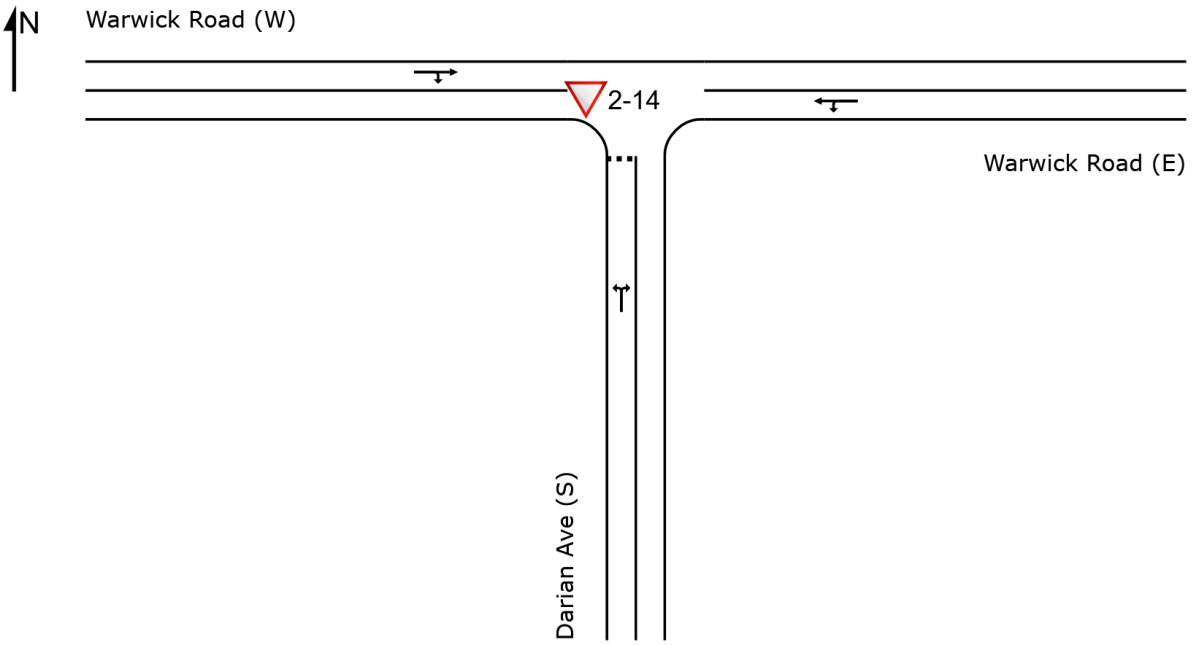
The location and existing layout of the Darien Avenue / Warwick Road intersection is shown in Figure 4-32.

Figure 4-32: Existing Layout of the Darien Avenue / Warwick Road Intersection

4.16.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-33.

Figure 4-33: SIDRA Layout of the Darien Avenue / Warwick Road Intersection (2020, 2030, 2040)



4.16.3. Darien Avenue / Warwick Road intersection performance

Table 4-16 summarises the operation of the Darien Avenue / Warwick Road intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-16: Darien Avenue / Warwick Road Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2020 (PC01)	Existing T-Junction	Darien Avenue (S)	0	A	5s	0m	0	A	5s	0m
		Warwick Road (E)	0.04	-	0s	0m	0.02	-	0s	0m
		Warwick Road (W)	0.01	-	1s	0m	0.06	-	0s	0m
		Intersection	**0.04**	**-**	**1s**	**0m**	**0.06**	**-**	**0s**	**0m**
2020 (PC03)	Existing T-Junction	Darien Avenue (S)	0	A	5s	0m	0	A	5s	0m
		Warwick Road (E)	0.03	-	0s	0m	0.02	-	0s	0m
		Warwick Road (W)	0.01	-	1s	0m	0.05	-	0s	0m
		Intersection	**0.03**	**-**	**1s**	**0m**	**0.05**	**-**	**0s**	**0m**
2030 (PC05)	Existing T-Junction	Darien Avenue (S)	0.07	A	5s	2m	0.03	A	5s	1m
		Warwick Road (E)	0.07	-	0s	0m	0.03	-	0s	0m
		Warwick Road (W)	0.04	-	3s	1m	0.15	-	2s	5m

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
		Intersection	**0.07**	**-**	**2s**	**2m**	**0.15**	**-**	**2s**	**5m**
2040 (PC07)	Existing T-Junction	Darien Avenue (S)	0.1	A	5s	3m	0.03	A	5s	1m
		Warwick Road (E)	0.1	-	0s	0m	0.02	-	0s	0m
		Warwick Road (W)	0.04	-	3s	1m	0.2	-	2s	6m
		Intersection	**0.1**	**-**	**2s**	**3m**	**0.2**	**-**	**2s**	**6m**

The existing priority T-Junction at the Darien Avenue / Warwick Road intersection is expected to operate at a satisfactory level for all three years and scenarios. Average delays of less than 5 seconds can be expected and DoS levels of up to 0.2, indicating that the proposed intersection configuration has sufficient capacity to accommodate forecast traffic demand expected at this intersection.

4.17. Garden Street / Warwick Road (2-15)

4.17.1. Proposed layout

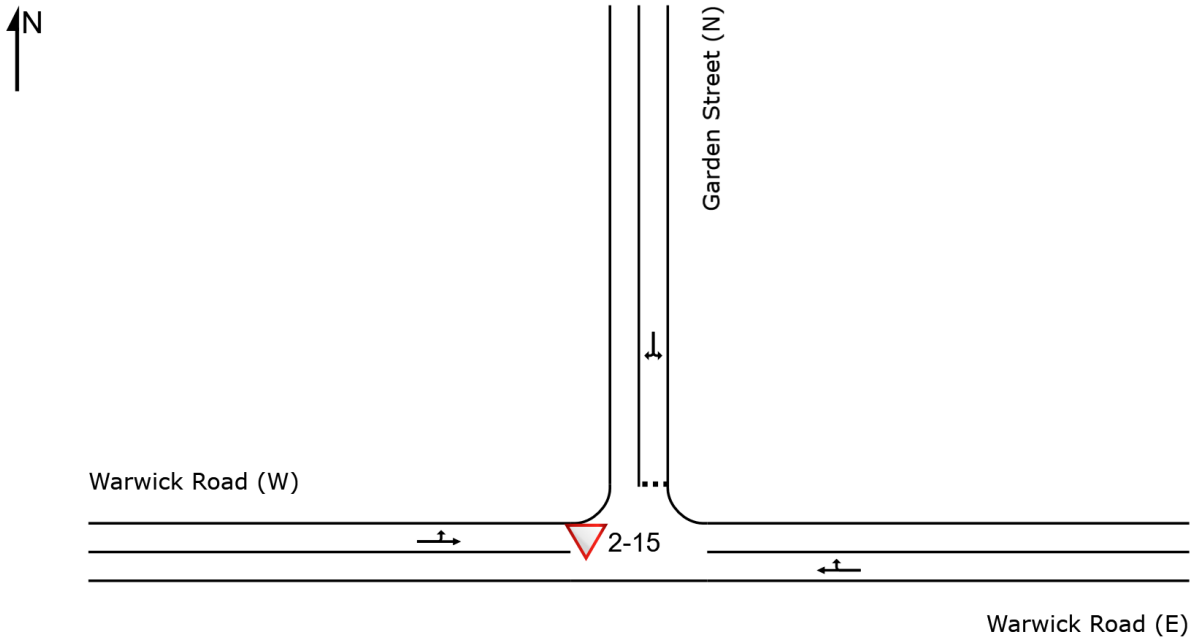
The location and layout of the Garden Street / Warwick Road intersection is shown in Figure 4-34.

Figure 4-34: Proposed Layout of the Garden Street / Warwick Road Intersection

4.17.2. Intersection layout

A conceptual layout of the proposed intersection treatment assessed in SIDRA is shown in Figure 4-35.

Figure 4-35: SIDRA Layout of the Garden Street / Warwick Road Intersection (2020, 2030, 2040)



4.17.3. Garden Street / Warwick Road intersection performance

Table 4-17 summarises the operation of the Garden Street / Warwick Road intersection for the given design scenarios in the AM and PM peaks. Full SIDRA results, including individual movement LoS indicators are included in Appendix D.

Table 4-17: Garden Street / Warwick Road Intersection Performance Summary

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
2020 (PC01)	Proposed T-Junction	Warwick Road (E)	0.04	-	4s	1m	0.02	-	4s	1m
		Garden Street (N)	0.03	A	5s	1m	0.06	A	5s	2m
		Warwick Road (W)	0	-	2s	0m	0.02	-	3s	0m
		Intersection	**0.04**	**-**	**4s**	**1m**	**0.06**	**-**	**4s**	**2m**
2020 (PC03)	Proposed T-Junction	Warwick Road (E)	0.03	-	3s	1m	0.02	-	4s	1m
		Garden Street (N)	0.04	A	5s	1m	0.05	A	5s	1m
		Warwick Road (W)	0	-	2s	0m	0.03	-	3s	0m
		Intersection	**0.04**	**-**	**4s**	**1m**	**0.05**	**-**	**4s**	**1m**
2030 (PC05)	Proposed T-Junction	Warwick Road (E)	0.14	-	3s	5m	0.05	-	4s	2m

Year / Scenario	Treatment	Arm	AM Peak				PM Peak			
			DoS	LoS	Avg Delay	95%ile Queue	DoS	LoS	Avg Delay	95%ile Queue
		Garden Street (N)	0.11	A	5s	3m	0.14	A	5s	4m
		Warwick Road (W)	0.01	-	2s	0m	0.08	-	2s	0m
		Intersection	**0.14**	**-**	**4s**	**5m**	**0.14**	**-**	**4s**	**4m**
2040 (PC07)	Proposed T-Junction	Warwick Road (E)	0.19	-	4s	7m	0.04	-	5s	1m
		Garden Street (N)	0.11	A	5s	3m	0.28	A	5s	9m
		Warwick Road (W)	0.04	-	4s	0m	0.08	-	2s	0m
		Intersection	**0.19**	**-**	**4s**	**7m**	**0.28**	**-**	**4s**	**9m**

The proposed priority T-Junction at the Garden Street / Warwick Road intersection is expected to operate at a satisfactory level for all three years and scenarios. Average delays of less than 5 seconds can be expected and DoS levels of up to 0.3, indicating that the proposed intersection configuration has sufficient capacity to accommodate forecast traffic demand expected at this intersection.

5. CONCLUSION

The updated TSTM generally indicates that there would be sufficient mid-block capacity to accommodate the forecast traffic growth in the region having consideration to the updated land use assumptions for the growth areas, including the Arcadia precinct. While Werris Creek Road and Burgmanns Lane can be expected to approach capacity in 2040, the TSTM assumes the redistribution of some trips to travel via the local road network north of the Arcadia precinct (e.g., Garden Street and Grant Street), particularly in scenarios where the additional Bylong Road access is provided. Nevertheless, the TSTM outputs have been reviewed and considered to be a reasonable representation of expected traffic generation and distribution both at a wider network and local intersection level.

The SIDRA modelling has adopted intersection turning movements from the updated TSTM. The results of the SIDRA assessment presented in this report indicate that the anticipated and proposed operational performance of all 13 intersections will operate at desirable levels. Each intersection modelled follows the intersection control hierarchy where the progression from one intersection treatment to another had been decided if it falls above the threshold (i.e., acceptable DoS and LoS).

Based on the results above, several existing intersections are expected to operate at desirable levels and below capacity in their existing form. These intersections include:

- Werris Creek Road/ Bylong Road (2-5)
- Edward Street / Warwick Road / Greg Norman Drive (2-8)
- Goonoo Goonoo Road / Jack Smyth Drive (2-10)
- Garden Street / Hillvue Road (2-12)
- Grant Street / Warwick Road (2-13)
- Darien Avenue / Warwick Road (2-14)
- Garden Street / Warwick Road (2-15).

Site access intersections that require a new T-Junction and has shown to operate at desirable levels include:

- Burgmanns Lane / Site Access 1 (2-1)
- Burgmanns Lane / Site Access 2 (2-2)
- Site Access / Bylong Road (2-6)
- Rodeo Drive / Site Access (2-7).

The following intersections require upgrades in 2040 due to the existing layout likely to operate at capacity in 2020/2030:

- Werris Creek Road / Burgmanns Lane (2-3) – proposed upgrade to a roundabout in 2040
- Werris Creek Road / Site Access (2-4) – proposed upgrade to a roundabout in 2040
- Goonoo Goonoo Road / Greg Norman Drive (2-9) – proposed upgrade to a seagull layout in 2040
- Goonoo Goonoo Road / Burgmanns Lane (2-11) – proposed upgrade to a roundabout in 2040.

As summary of the recommended intersection treatments is provided in Table 5-1.

Table 5-1: Recommended Intersection Treatments

Site ID	Intersection	2020	2030	2040
2-1	Burgmanns Lane / Site Access			Existing T-Junction
2-2	Burgmanns Lane / Site Access			Existing T-Junction
2-3	Werris Creek Road / Burgmanns Lane	Existing T-Junction (PC01) 4-Leg Priority (PC02-PC03)	4-Leg Priority	Roundabout
2-4	Werris Creek Road / Site Access		Existing T-Junction	Roundabout
2-5	Werris Creek Road/ Bylong Road	Existing T-Junction	Existing T-Junction	Existing T-Junction
2-6	Site Access / Bylong Road	Existing T-Junction	Existing T-Junction	Existing T-Junction
2-7	Rodeo Drive / Site Access	Existing T-Junction	Existing T-Junction	Existing T-Junction
2-8	Edward Street / Warwick Road / Greg Norman Drive	Existing Roundabout	Existing Roundabout	Existing Roundabout
2-9	Goonoo Goonoo Road / Greg Norman Drive	Existing T-Junction	Existing T-Junction	Seagull Intersection
2-10	Goonoo Goonoo Road / Jack Smyth Drive	Existing Roundabout	Existing Roundabout	Existing Roundabout
2-11	Goonoo Goonoo Road / Burgmanns Lane	Existing 4-leg Priority	Existing 4-leg Priority	Roundabout
2-12	Garden Street / Hillvue Road	Existing Roundabout	Existing Roundabout	Existing Roundabout
2-13	Grant Street / Warwick Road	Existing Roundabout	Existing Roundabout	Existing Roundabout
2-14	Darien Avenue / Warwick Road	Existing T-Junction	Existing T-Junction	Existing T-Junction
2-15	Garden Street / Warwick Road	Existing T-Junction	Existing T-Junction	Existing T-Junction

Finally, it is noted that the intersection analysis has been undertaken to understand the operational performance of the intersection and consideration of the design requirements per Austroads should be included in the development and preparation of concept plans.

A. TSTM INPUTS

A

ARCADIA TRAFFIC MODEL UPDATE

NETWORK & LAND USE INPUTS

Tamworth Regional Council
Stantec Ref: 301401261

PRESENTATION OUTLINE

The purpose of this paper is to present the inputs and assumptions that will be used in the Arcadia Traffic Modelling Update. Specifically, we are seeking Council to confirm:

1. the scenarios to be assessed,
2. the road network, and
3. the land use inputs and assumptions.

SCENARIOS

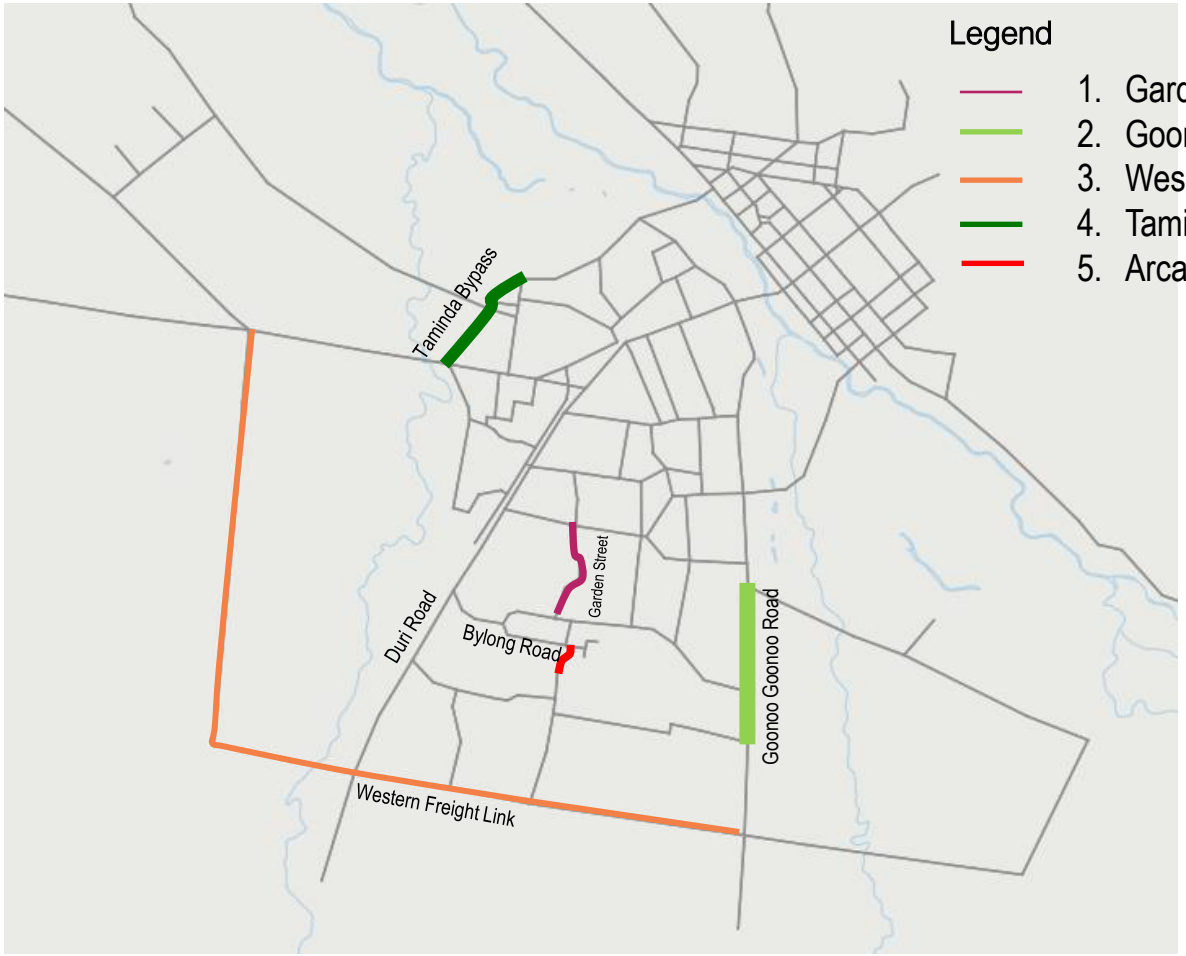
01

FUTURE SCENARIOS – AS PER THE PROJECT BRIEF

Network Upgrades	Development Yield / Year					
	2020		2030		2040	
	TSTM development yield (10 lots)	Arcadia development with (10 lots)	TSTM development yield (1,169 lots)	Arcadia development with 1,169 lots	TSTM development yield (1,169 lots)	Arcadia development with 2,350 lots
Base Case Network	BC01		BC02		BC03	
Interim Network		PC01				
Ultimate Network (With site access)		PC03		PC05		PC07
Interim Network	1. Garden Street connection to Warwick Road					
	2. Duplication of Goonoo Goonoo Road between Jack Smyth Drive and Calala Lane					
Ultimate Network	1. Garden Street connection to Warwick Road					
	2. Duplication of Goonoo Goonoo Road between Jack Smyth Drive and Calala Lane					
	3. Southern Bypass of Tamworth					
	4. Taminda Bypass					

The Base Case (BC) Models represent the reference case networks which the Project Case (PC) models will be compared to each Project Case will test a combination of network and land use changes.

PROJECT CASE NETWORK UPDATES

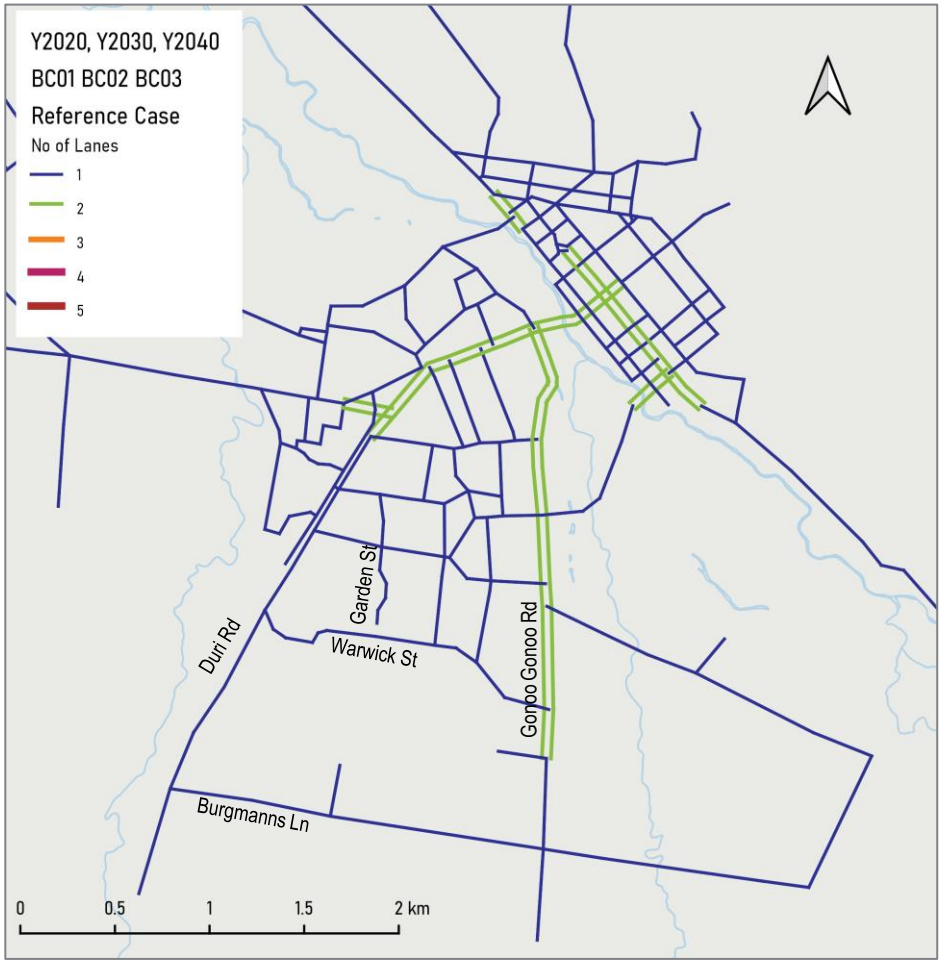


NETWORK AND LAND USE INPUT ASSUMPTIONS

02

REFERENCE CASE NETWORKS (BC01, BC02 & BC03)

No of Lanes



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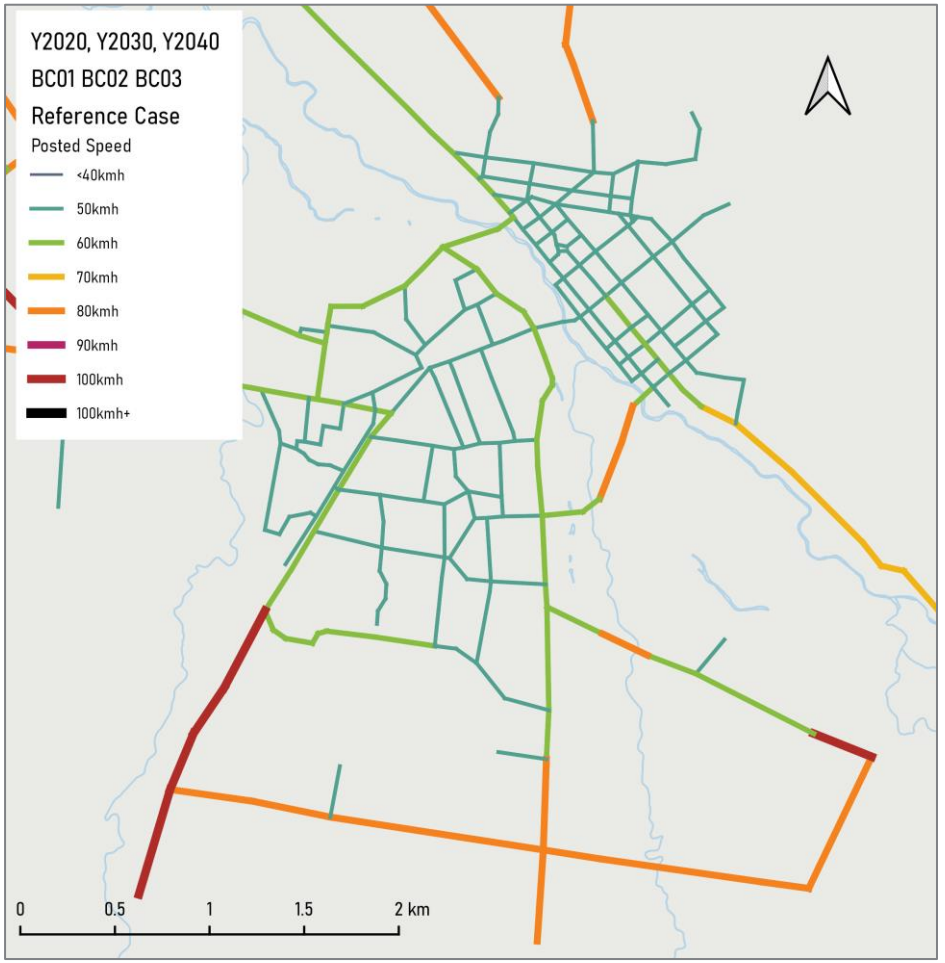
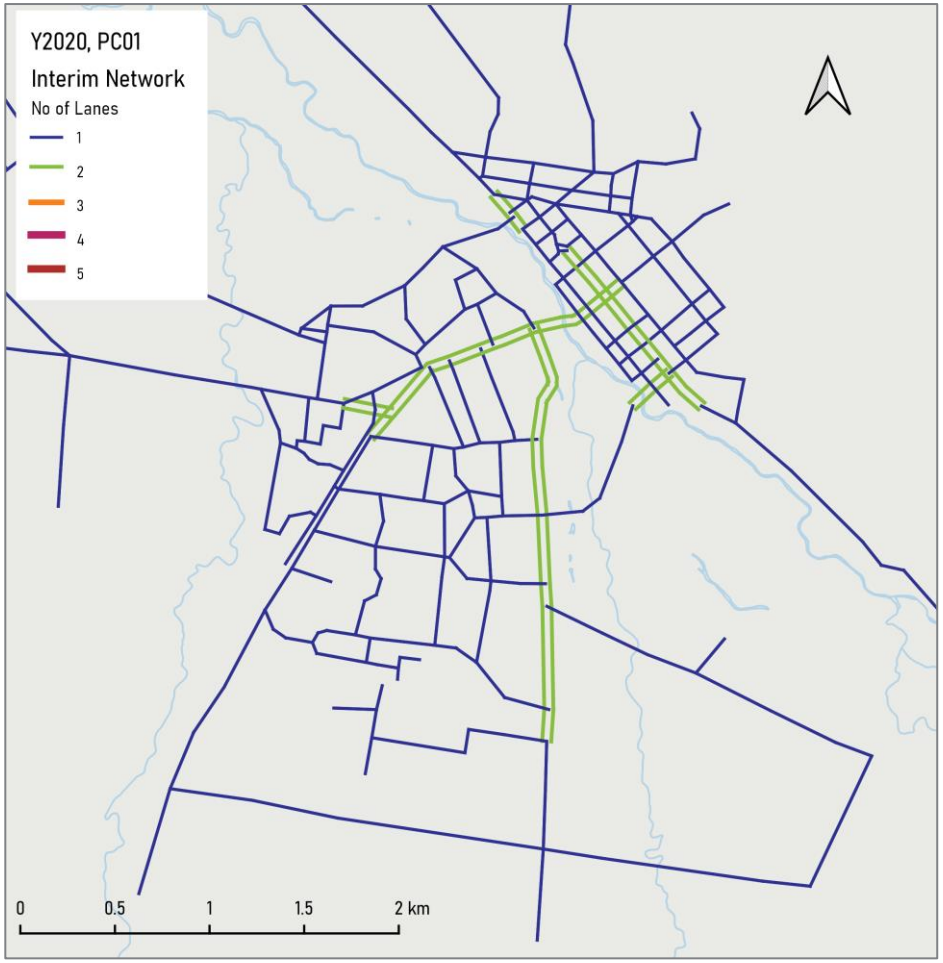


2020 NETWORK INPUTS

INTERIM AND ULTIMATE SCENARIO

2020 PROJECT CASE NETWORK PC01

No of Lanes



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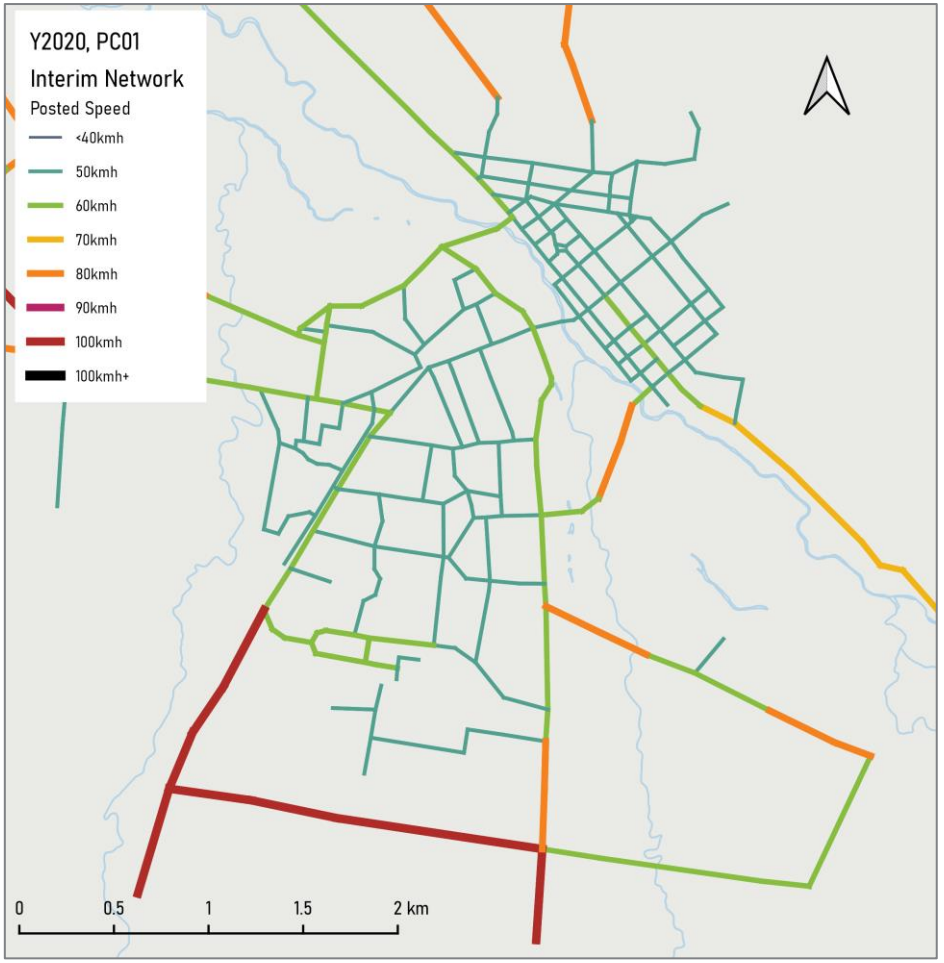
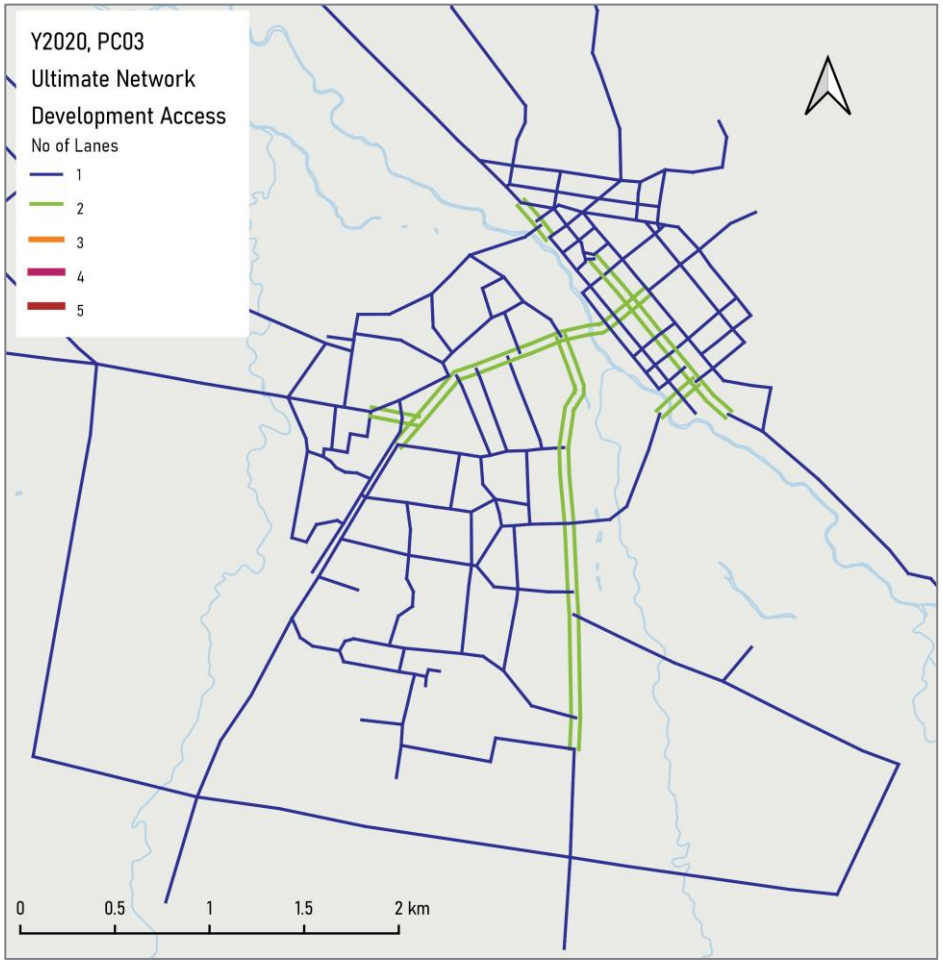


2020 PROJECT CASE NETWORK PC03

No of Lanes



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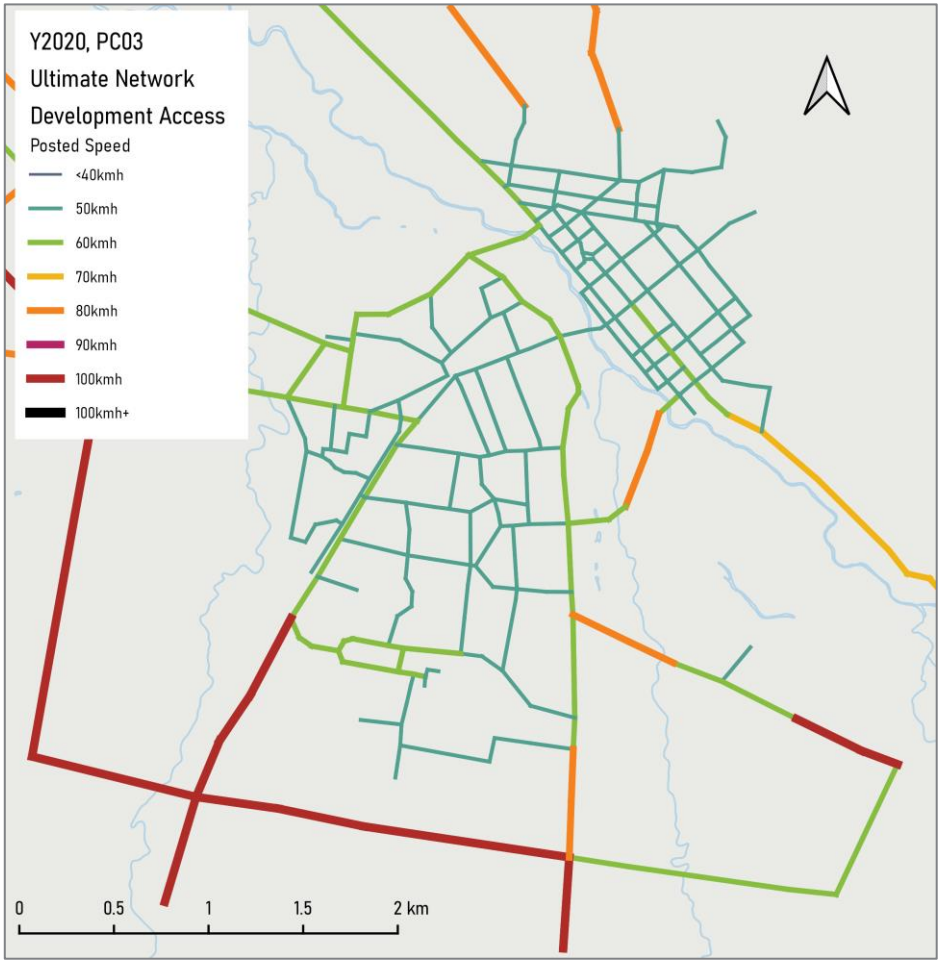
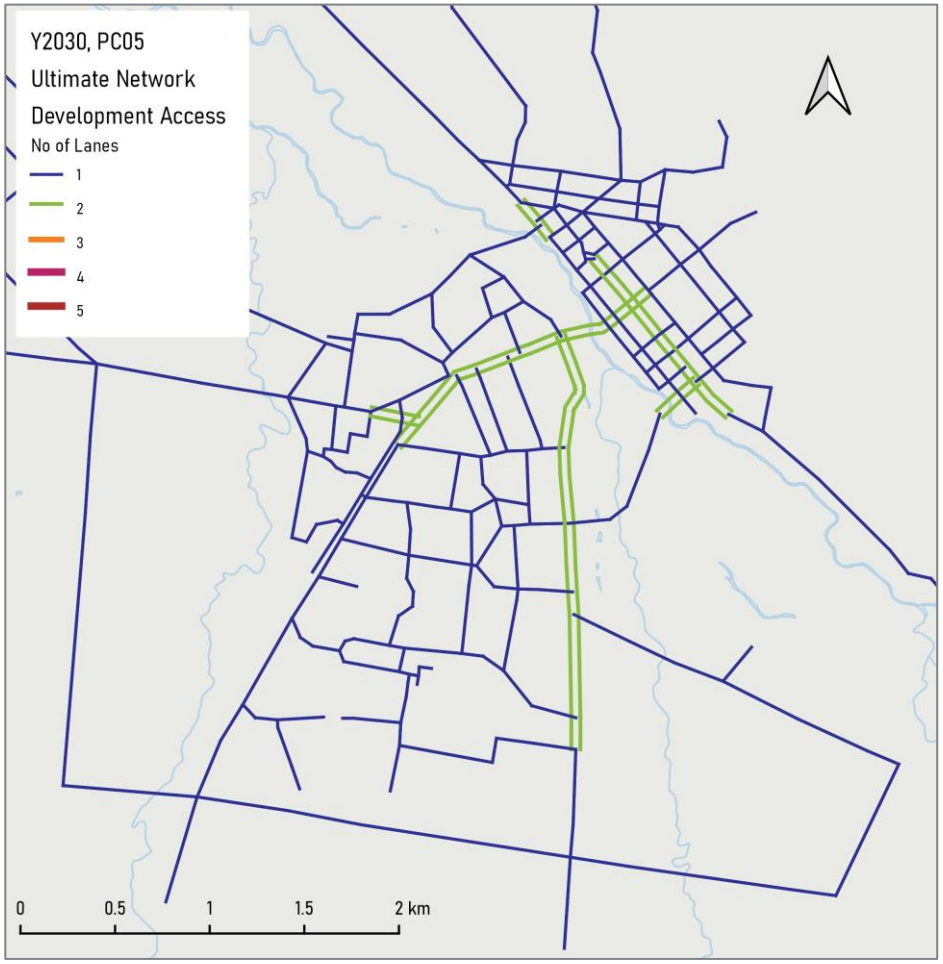


2030 NETWORK INPUTS

INTERIM AND ULTIMATE SCENARIO

2030 PROJECT CASE NETWORK PC05

No of Lanes



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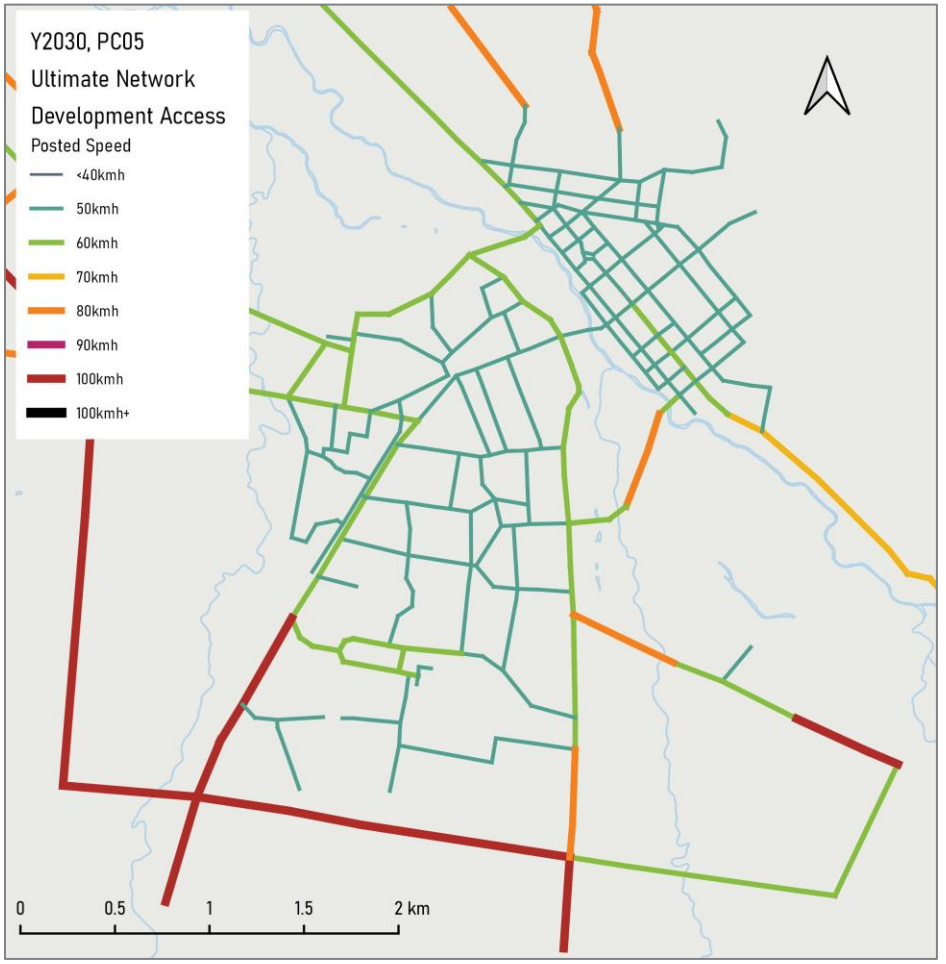
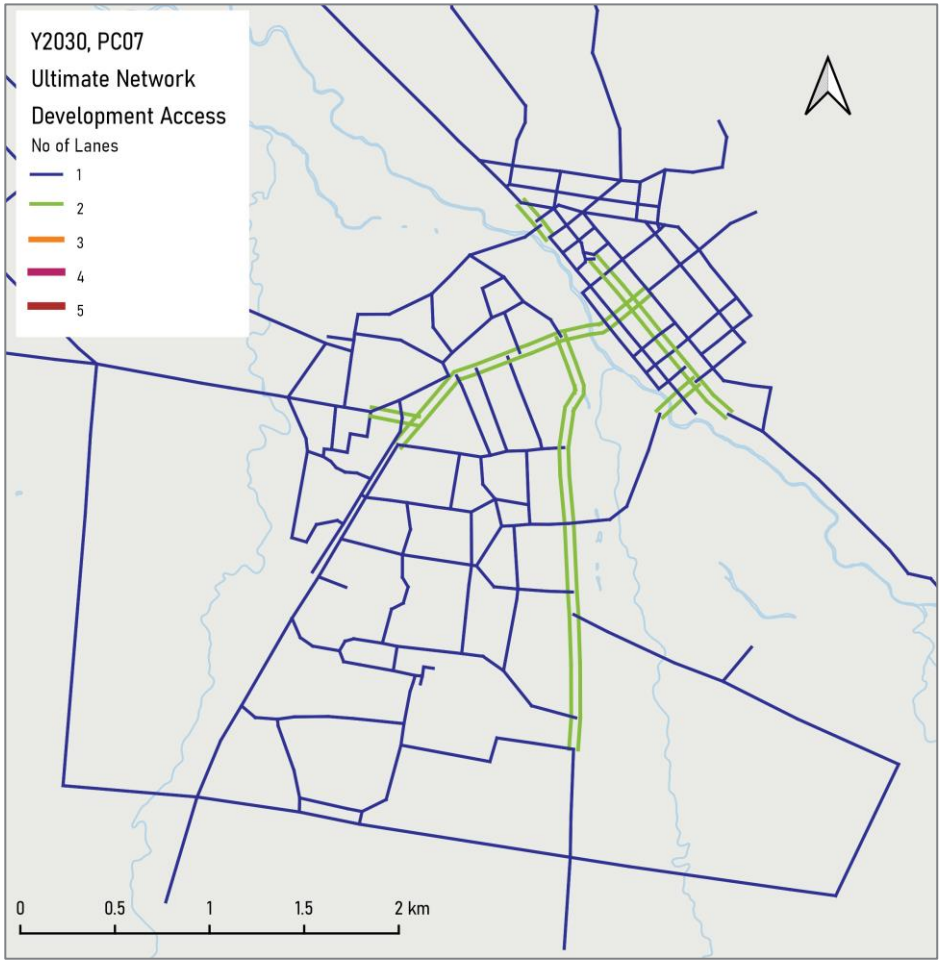


2040 NETWORK INPUTS

INTERIM AND ULTIMATE SCENARIO

2040 PROJECT CASE NETWORK PC07

No of Lanes



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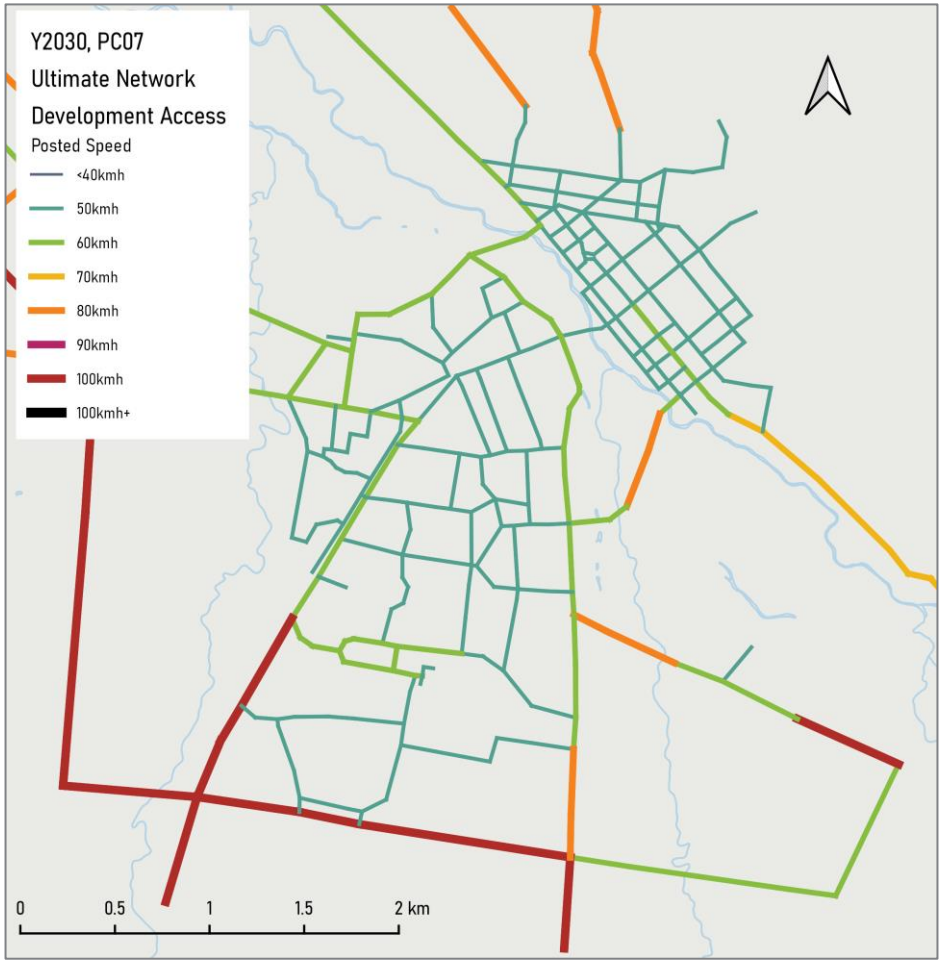
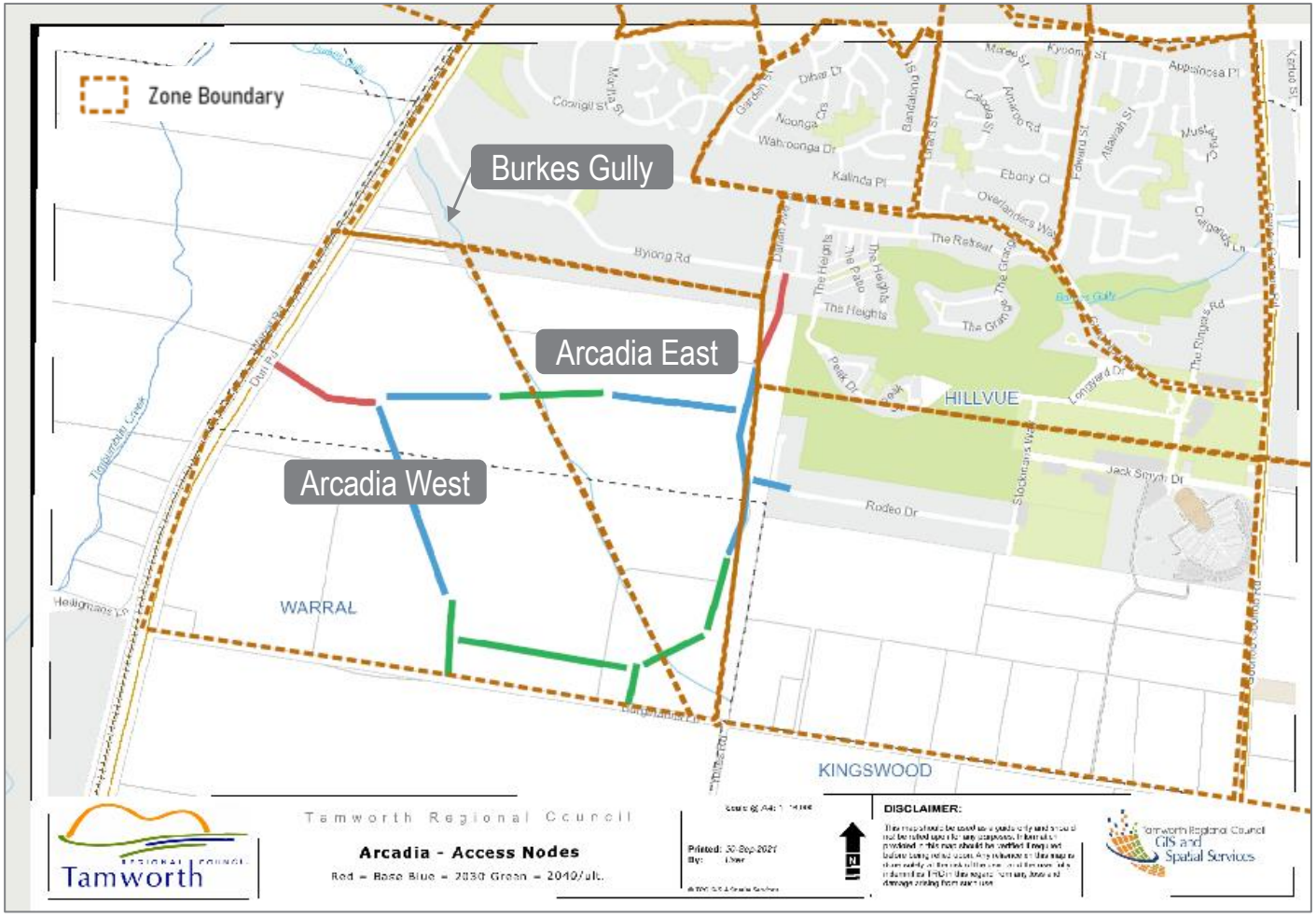


ZONING AND CONNECTORS

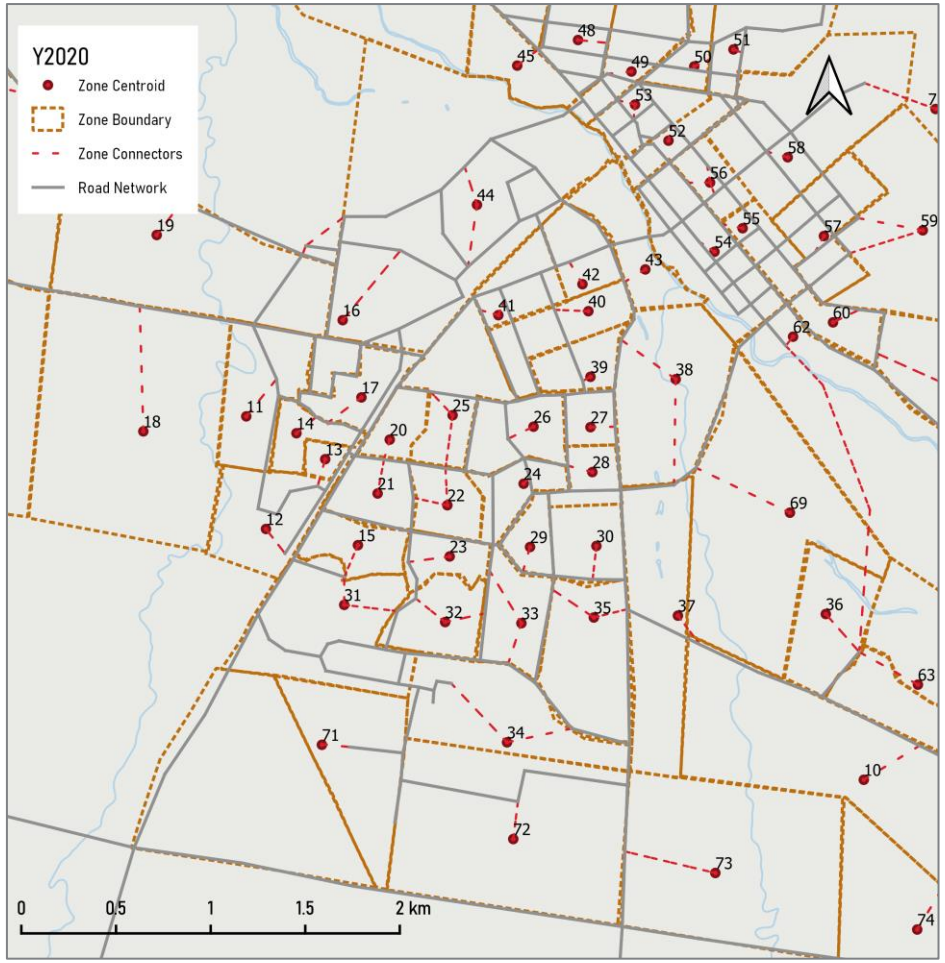
ARCADIA DEVELOPMENT



Note: Zone boundaries for Arcadia East and West matches with creek alignment

ARCADIA DEVELOPMENT LAND USE ASSUMPTIONS

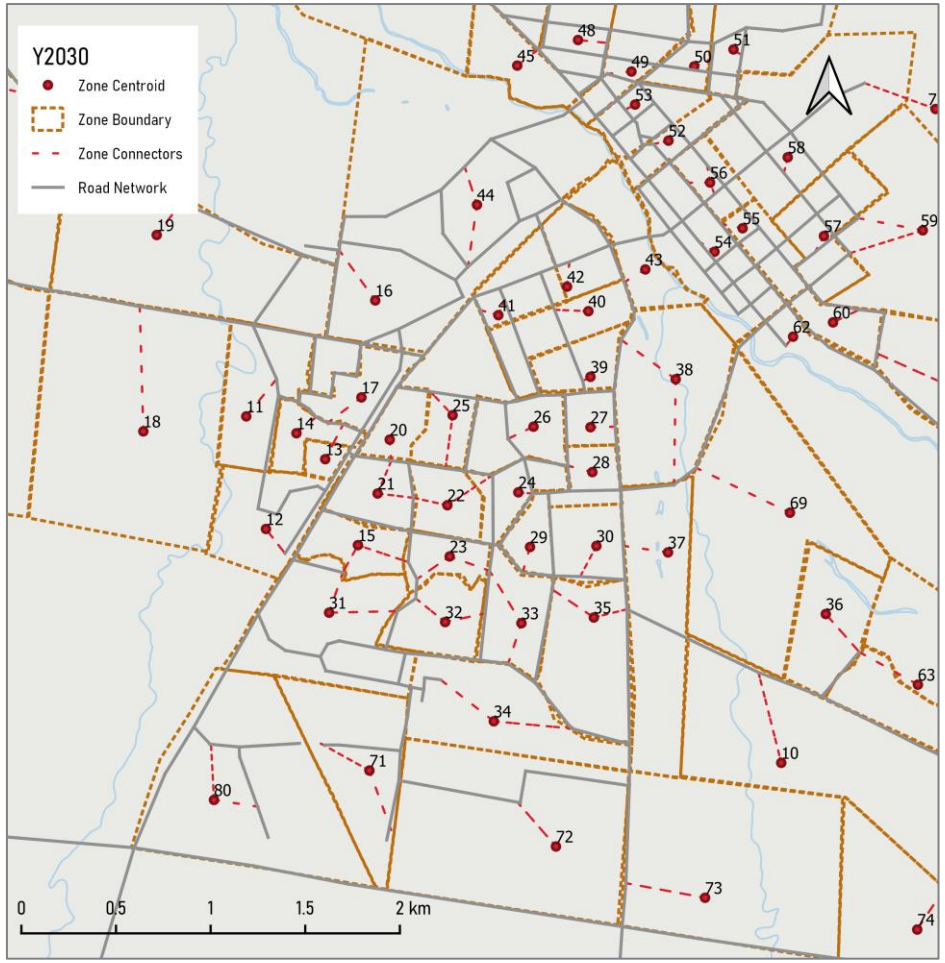
Y2020



Arcadia Development- Land Use Assumptions	
Description	**2020**
Arcadia East - Zone 71	
No of Dwelling Units	10
Arcadia West - Zone 80	
No of Dwelling Units	0
Total	**10**

ARCADIA DEVELOPMENT LAND USE ASSUMPTIONS

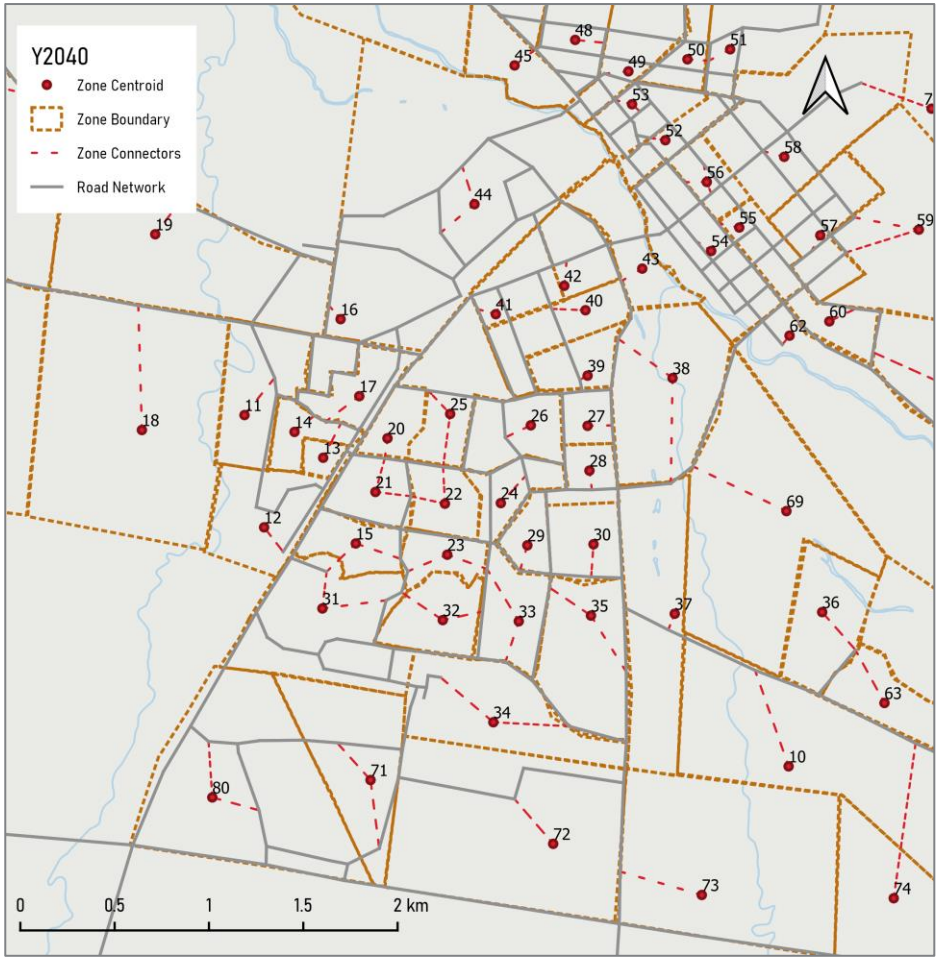
Y2030



Arcadia Development- Land Use Assumptions	
Description	**2030**
Arcadia East - Zone 71	
No of Dwelling Units	421
Arcadia West - Zone 80	
No of Dwelling Units	748
Total	**1,169**

ARCADIA DEVELOPMENT LAND USE ASSUMPTIONS

Y2040

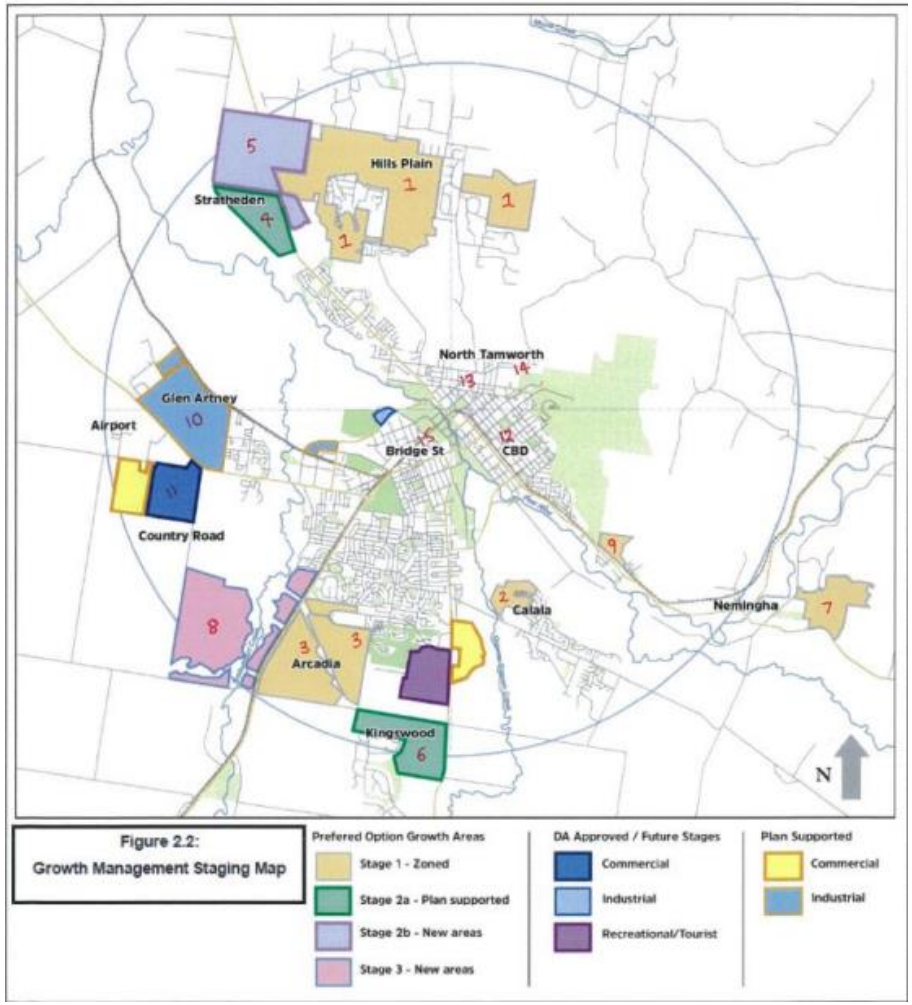


Arcadia Development- Land Use Assumptions	
Description	**2040**
Arcadia East - Zone 71	
No of Dwelling Units	850
Arcadia West - Zone 80	
No of Dwelling Units	1,500
Total	**2,350**

LAND USE INPUTS

03

GROWTH MANAGEMENT STRATEGY PLAN- TAMWORTH



Latest No. of Dwellings updated by the Council

Map Value	Development	2020	2030	2040	2060 Ultimate (Total)
1	Hills Plain	670	2,800	3,600	3600
2	Calala	1,137	1,587	2,200	2,200
3	Arcadia	10	245	1,200	2350
4	Stratheden (2)	290	340	440	484
5	Stratheden (1)	20	120	220	1255
6	Kingswood	0	0	200	200
7	Rupari	0	66	66	66
8	Country Road	0	0	0	2100
9	Mt Falcon	30	60	180	470
10	TGGP	0	*1,000*	*1,500*	*2000*
11	Hunter Lands	0	*210*	*350*	*550*
12	CBD	Base 559	75	175	275
13	Health Precinct	Base226	50	126	126
14	Victoria Park	Base301	0	0	20
15	Bridge Street	Base 215	60	180	260
	Bylong Rd	410	480	550	550
	Longyard Estate	450	470	470	470
	Total	4,318	7,563	11,457	16,976

LAND USE INPUTS – PROPOSED NUMBER OF DWELLINGS

Description	Map Value	Development	2020					2030				2040			
			Reference Case [1]	Updated with council comments	2019 Model Updates [2]	GMSP [3]	Resultant Model Inputs [4]	Reference Case [1]	2019 Model Updates [2]	GMSP [3]	Resultant Model Inputs [4]	Reference Case [1]	2019 Model Updates [2]	GMSP [3]	Resultant Model Inputs [4]
	1	Hills Plain	670	670	670	0	670	1,170	1,170	2,800	3,470	1,582	1,582	3,600	4,270
	2	Calala	310	1,684	310	0	1,137	330	330	1,587	2,724	340	340	2,200	3,337
	3	Arcadia	10	10	10	0	10	210	*250*	*245*	*1,179*	*610*	*670*	*1,200*	*2,360*
	4	Stratheden (2)	290	290	290	0	290	320	320	340	630	320	320	440	730
	5	Stratheden (1)	95	20	95	0	20	175	175	120	140	283	283	220	240
	6	Kingswood	200	0	0	0	0	0	0	0	0	0	0	200	200
Starategy	7	Rupari	0	0	0	0	0	0	0	66	66	0	0	66	66
Plan	8	Country Road	0	0	0	0	0	0	0	0	0	0	0	0	0
developments	9	Mt Falcon	310	30	310	0	30	330	330	60	90	340	340	180	210
	10	TGGP	0	0	0	0	0	0	*0*	*1,000*	*1,000*	*0*	*0*	*1,500*	*1,500*
	11	Hunter Lands	0	0	0	0	0	0	0	210	210	0	0	350	350
	12	CBD	559	559	559	0	559	559	559	75	634	559	559	175	734
	13	Health Precinct	226	226	226	0	226	226	226	50	276	226	226	126	352
	14	Victoria Park	301	301	301	0	301	301	301	0	301	301	301	0	301
	15	Bridge Street	215	215	215	0	215	215	215	60	275	215	215	180	395
	-	Bylong Rd	390	410	410	0	410	440	480	480	480	490	550	550	550
[5]	-	Longyard Estate	450	450	450	0	450	470	470	470	470	470	470	470	470
Sub-total (lots)			3,826	4,318	3,846	0	4,318	4,746	4,826	7,563	11,945	5,736	5,856	11,457	16,065
Rest of Tamworth (lots)			12,159	12,159	12,159	0	12,159	13,342	13,342	13,342	13,342	14,225	14,225	14,225	14,225
Total Tamworth (lots)			**15,985**	**16,477**	**16,005**	**0**	**16,477**	**18,088**	**18,168**	**20,905**	**25,287**	**19,961**	**20,081**	**25,682**	**30,290**

Notes:

1. Reference Case represents the land use forecasts in the Reference Case Model provided in 2018
2. The 2019 Model Updates are the updated inputs provided by TRC
3. GMSP – Growth Management Strategy Plan as provided by TRC in the project brief
4. Resultant Model Inputs have added the GMSP [3] to the 2020 Reference Case [1] for the respective design year.
5. The lots inputs on Bylong Road and Longyard development previously provided by TRC

Note:

For Arcadia development the number of lots developed for year 2030 and 2040 are 1,169 and 2,350 which are inclusive of the lots in the latest No. of Dwellings updated by the Council

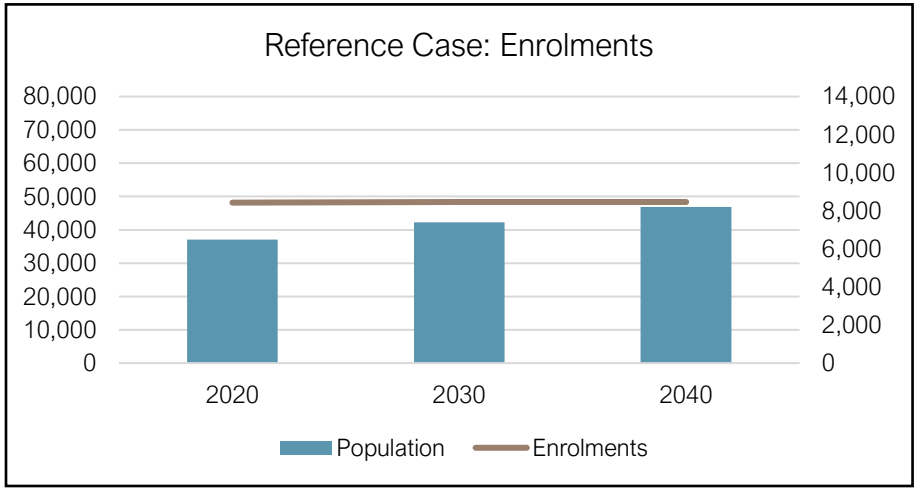
LAND USE INPUTS – RESULTANT POPULATION, EMPLOYMENT AND ENROLMENTS

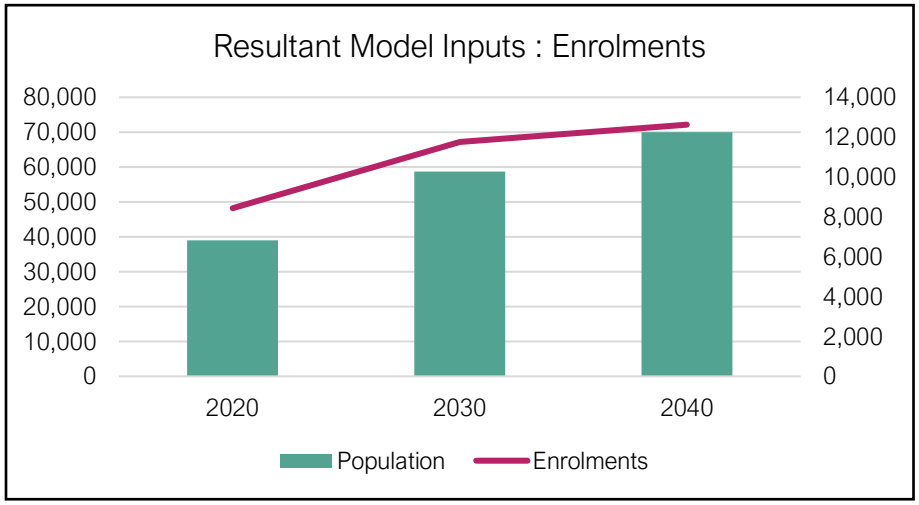
Description	Map Value	Development	2020 Reference Case [1]	2020 Updated with council comments	2020 2019 Model Updates [2]	2020 GMSP [3]	2020 Resultant Model Inputs [4]	2030 RC	2030 2019 Model Updates	2030 Growth management strategy plan- Tamworth	2030 Resultant modelling inputs	2040 RC	2040 2019 Model Updates	2040 Growth management strategy plan- Tamworth	2040 Resultant modelling inputs
Starategy Plan developments	1	Hills Plain	1,675	1,675	1,675	0	1,675	2,925	2,925	7,000	8,675	3,955	3,955	9,000	10,675
	2	Calala	720	2,641	720	0	2,641	720	720	3,463	5,943	720	720	4,800	7,281
	3	Arcadia	30	30	30	0	30	525	*625*	*613*	*2,946*	*1,525*	*1,675*	*3,000*	*5,900*
	4	Stratheden (2)	700	700	700	0	700	770	770	818	1,516	770	770	1,059	1,757
	5	Stratheden (1)	238	50	238	0	50	404	404	277	323	707	707	508	554
	6	Kingswood	0	0	0	0	0	0	0	0	0	0	0	0	0
	7	Rupari	0	0	0	0	0	0	0	132	132	0	0	132	132
	8	Country Road	0	0	0	0	0	0	0	0	0	0	0	0	0
	9	Mt Falcon	720	70	720	0	70	720	720	131	196	720	720	393	458
	10	TGGP	0	0	0	0	0	0	*0*	*2,000*	*2,000*	*0*	*0*	*3,000*	*3,000*
	11	Hunter Lands	0	0	0	0	0	0	0	420	420	0	0	700	700
	12	CBD	1,083	1,083	1,083	0	1,083	1,083	1,083	113	956	1,083	1,083	264	1,107
	13	Health Precinct	417	417	417	0	417	417	417	92	509	417	417	232	649
	14	Victoria Park	843	843	843	0	843	843	843	0	843	843	843	0	843
	15	Bridge Street	389	389	389	0	389	389	389	109	498	389	389	326	715
Previously agreed	-	Bylong Rd	1,070	1,125	1,125	0	1,125	1,190	1,298	1,298	1,298	1,325	1,487	1,487	1,487
	-	Longyard Estate	450	1,215	1,215	0	1,215	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270
Sub-total (lots)			8,335	10,237	9,155	0	10,237	11,256	11,464	17,735	27,526	13,724	14,036	26,170	36,527
Rest of Tamworth (population)			28,784	28,784	27,701	0	28,784	31,010	31,218	31,218	31,218	33,177	33,488	33,488	33,488
Total Tamworth (population)			**37,119**	**39,021**	**36,856**	**0**	**39,022**	**42,266**	**42,683**	**48,954**	**58,744**	**46,901**	**47,525**	**59,659**	**70,016**
Total Tamworth (Jobs)					**16,382**				**18,416**					**23,436**	
Total Tamworth (Enrolments) adjusted with increase in population					**8,431**				**11,760**					**12,631**	

Notes:

1. Reference Case represents the land use forecasts in the Reference Case Model provided in 2018
2. The 2019 Model Updates are the updated inputs provided by TRC
3. GMSP – Growth Management Strategy Plan as provided by TRC in the project brief
4. Resultant Model Inputs have added the GMSP [3] to the 2020 Reference Case [1] for the respective design year.
5. The lots inputs on Bylong Road and Longyard development previously provided by TRC

TOTAL ENROLMENTS ESTIMATION





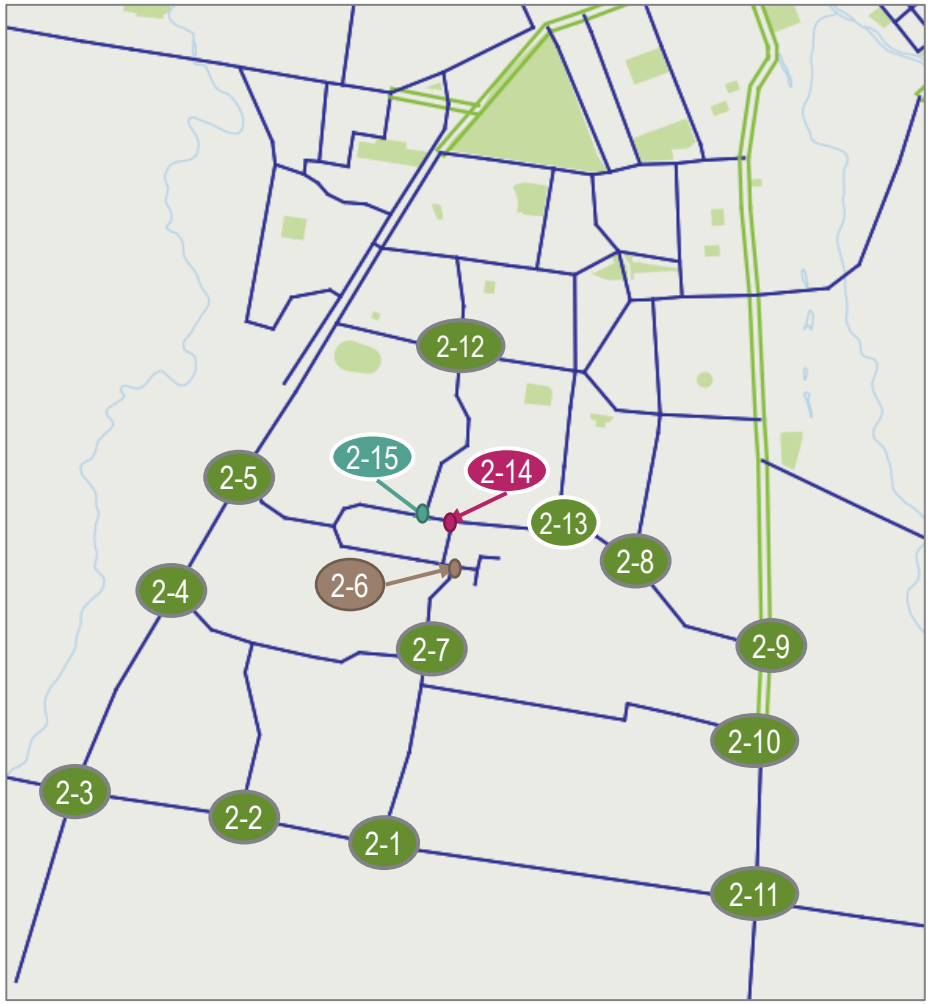
Description	Demographics	2020	2030	2040
Reference Case	Population	37,119	42,266	46,901
	Enrolments	8,431	8,461	8,461
Resultant Model Inputs	Population	39,022	58,744	70,016
	Enrolments	8,431	11,760	12,631

Note:
The total enrolments for all zones in the Tamworth model are apportioned with increase in the dwellings

JUNCTION ASSESSMENT IN SIDRA

04

INTERSECTION ASSESSMENT- REVISED



- 2-1 Burgmanns Lane / Site Access (Intersection 2-1)
- 2-2 Burgmanns Lane / Site Access (Intersection 2-2)
- 2-3 Werris Creek Road / Burgmanns Lane (Intersection 2-3)
- 2-4 Werris Creek Road / Site Access (Intersection 2-4)
- 2-5 Duri Road / Bylong Road (Intersection 2-5)
- 2-6 Site Access / Bylong Road (Intersection 2-6)
- 2-7 Rodeo Drive / Site Access (Intersection 2-7)
- 2-8 Edward Street / Greg Norman Drive (Intersection 2-8)
- 2-9 New England Highway / Greg Norman Drive (Intersection 2-9)
- 2-10 New England Highway / Jack Smyth Drive (Intersection 2-10)
- 2-11 New England Highway / Burgmanns Lane (Intersection 2-11)
- 2-12 Garden Street / Hillvue Road (Intersection 2-12)
- 2-13 Grant Street / Warwick Road (Intersection 2-13)
- 2-14 Darien Avenue / Warwick Road (Intersection 2-14)
- 2-15 Garden Street / Warwick Road (Intersection 2-15)

REECE HUMPHREYS

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B. TSTM OUTPUTS

B

ARCADIA TRAFFIC MODEL UPDATE

MODELLING OUTPUTS

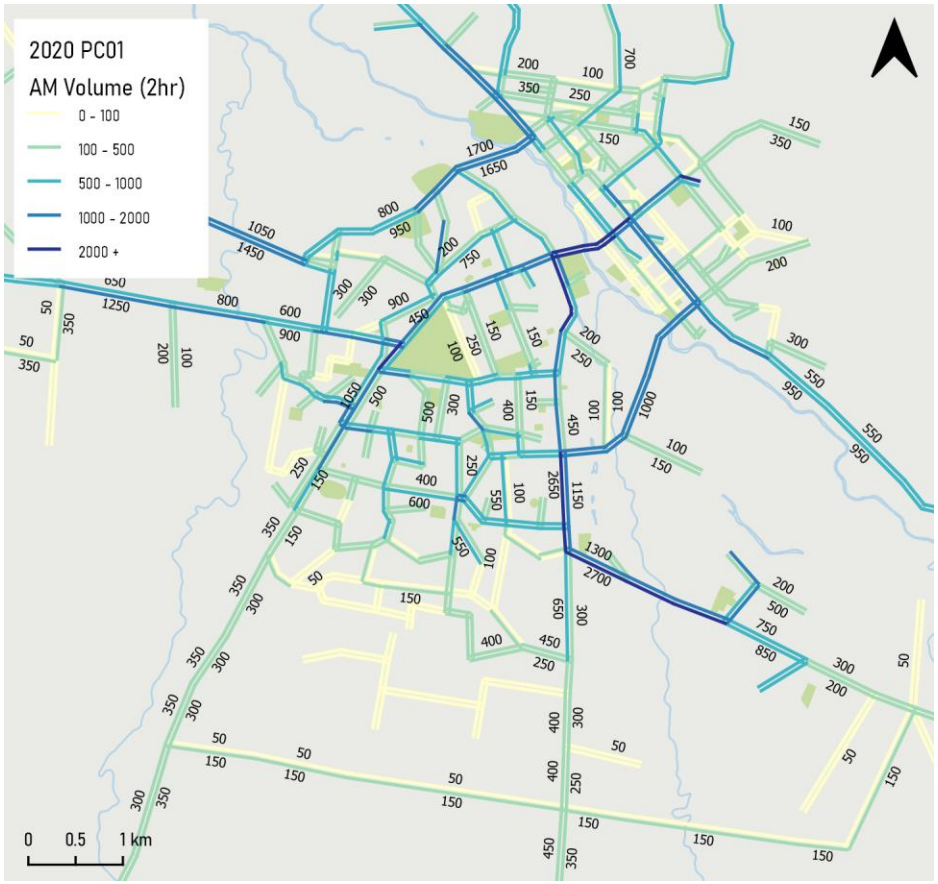
Tamworth Regional Council
Stantec Ref: 301401261

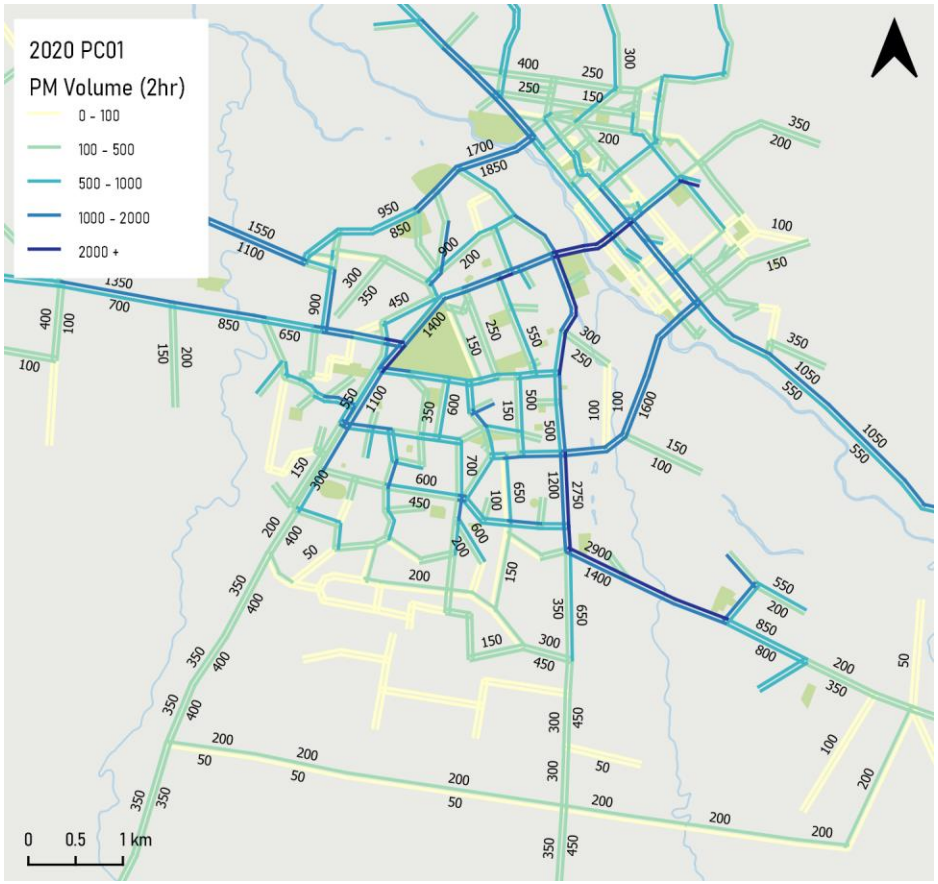
MODELLING OUTPUTS

VOLUME PLOTS

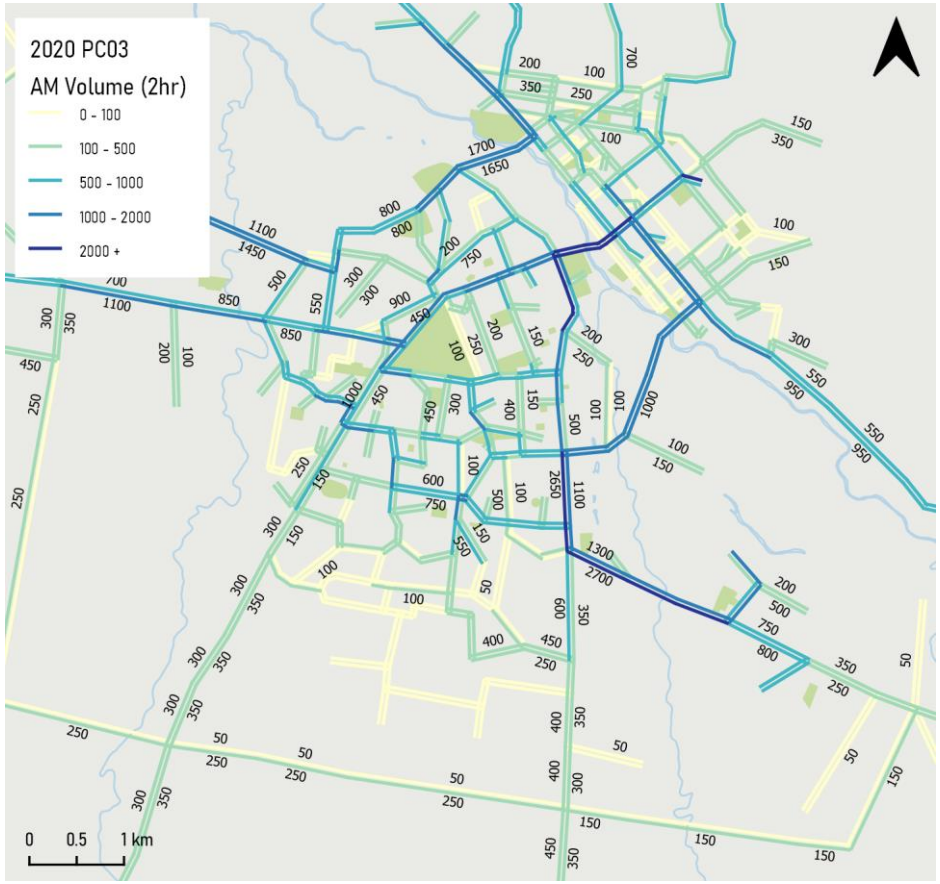
01

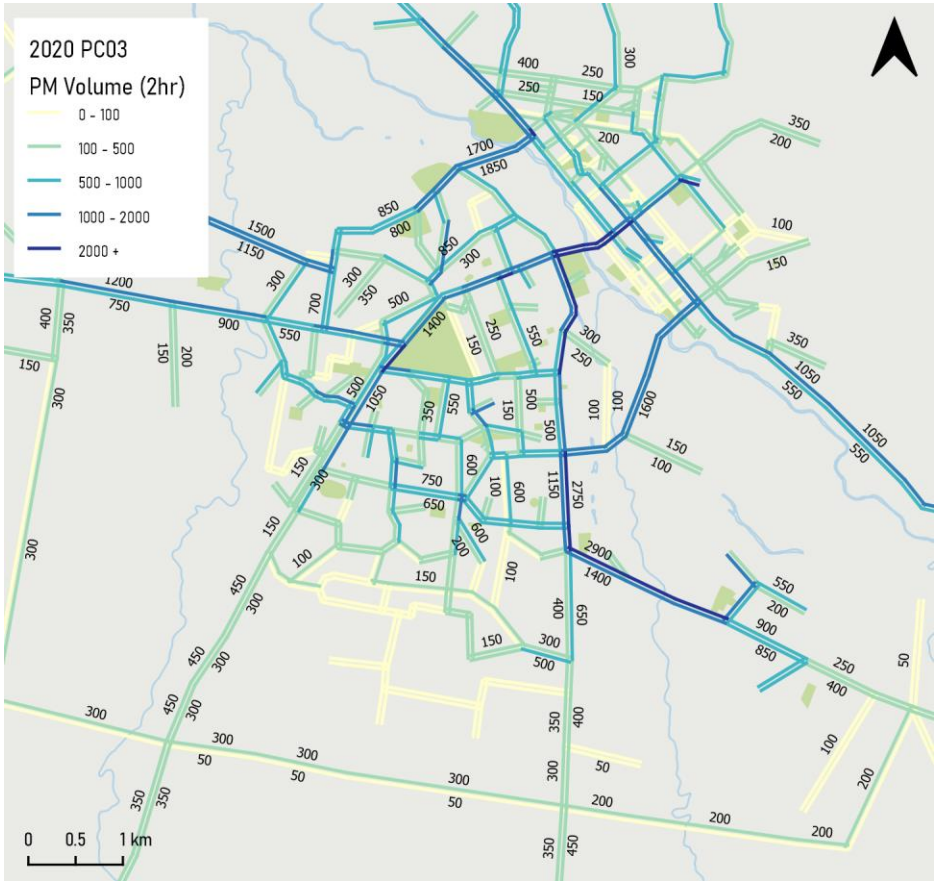
YEAR 2020 PC01



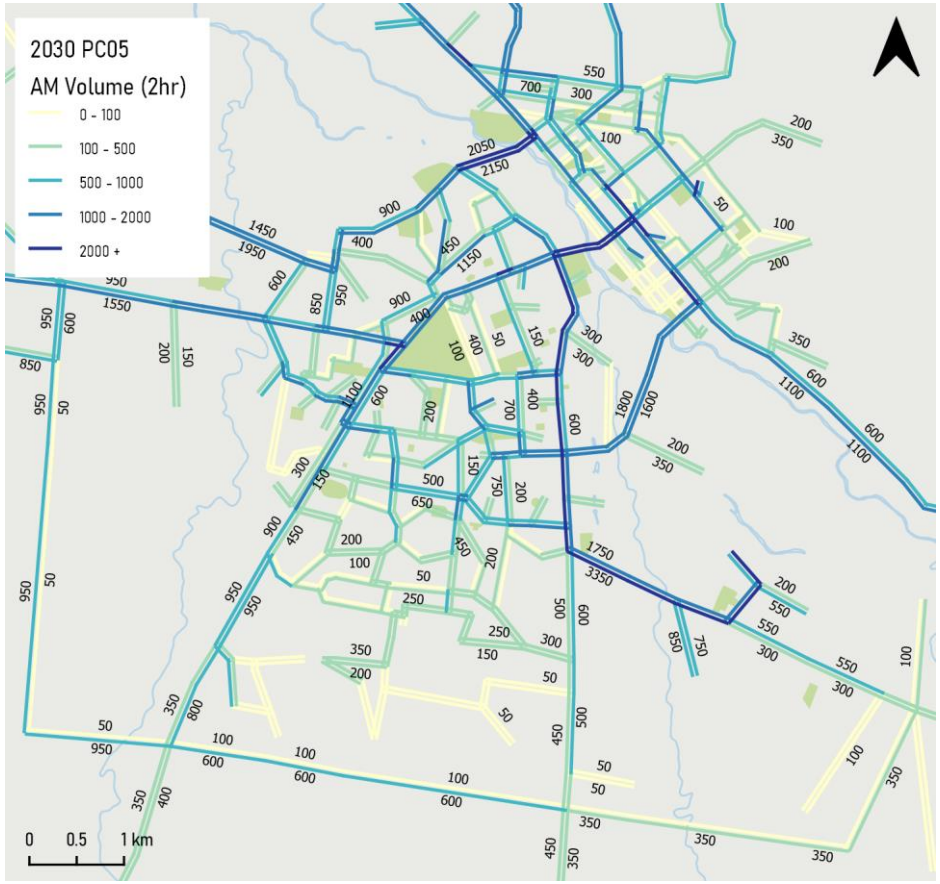


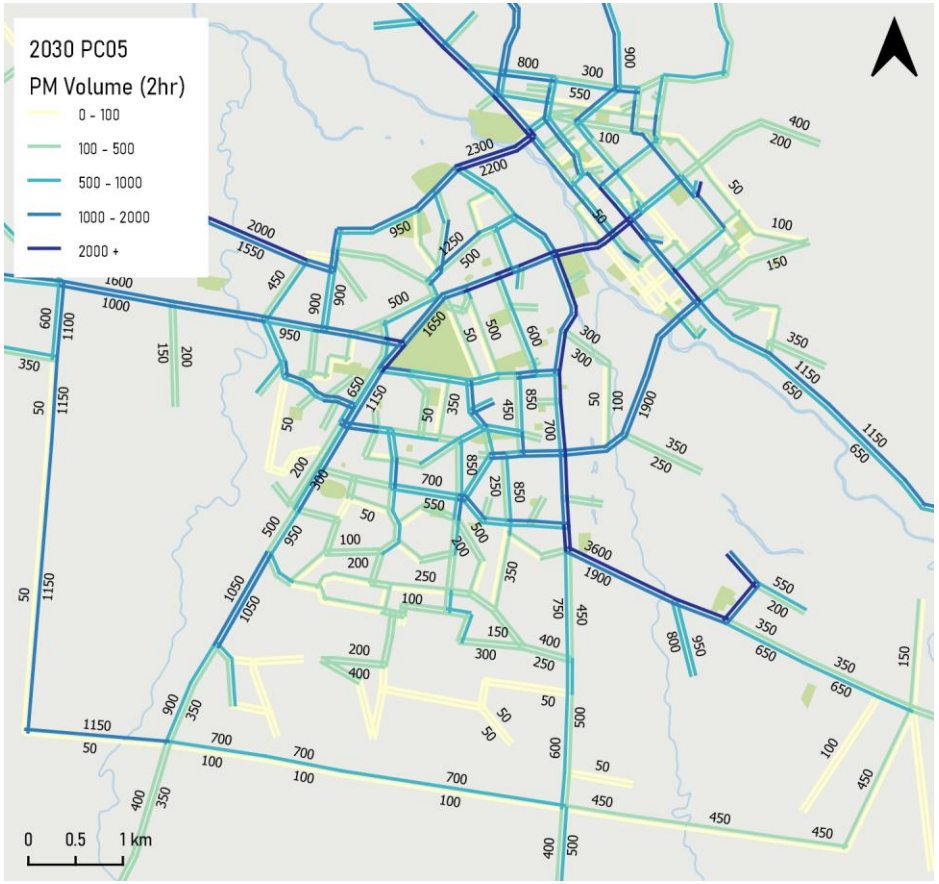
YEAR 2020 PC03



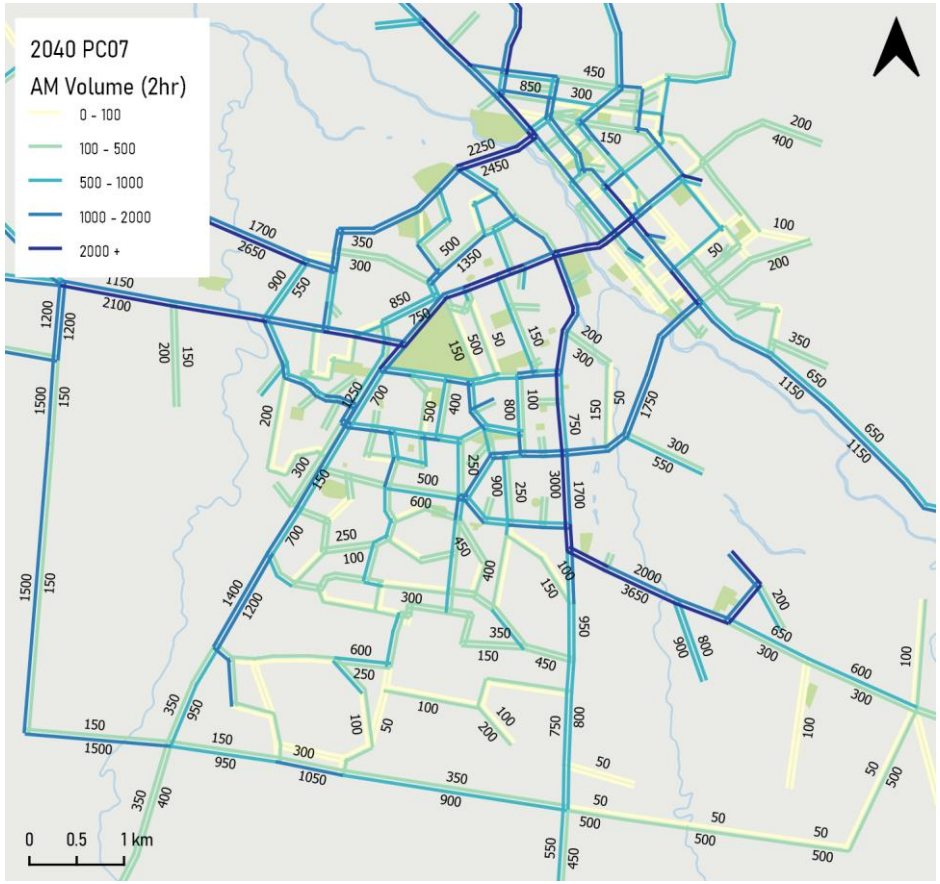


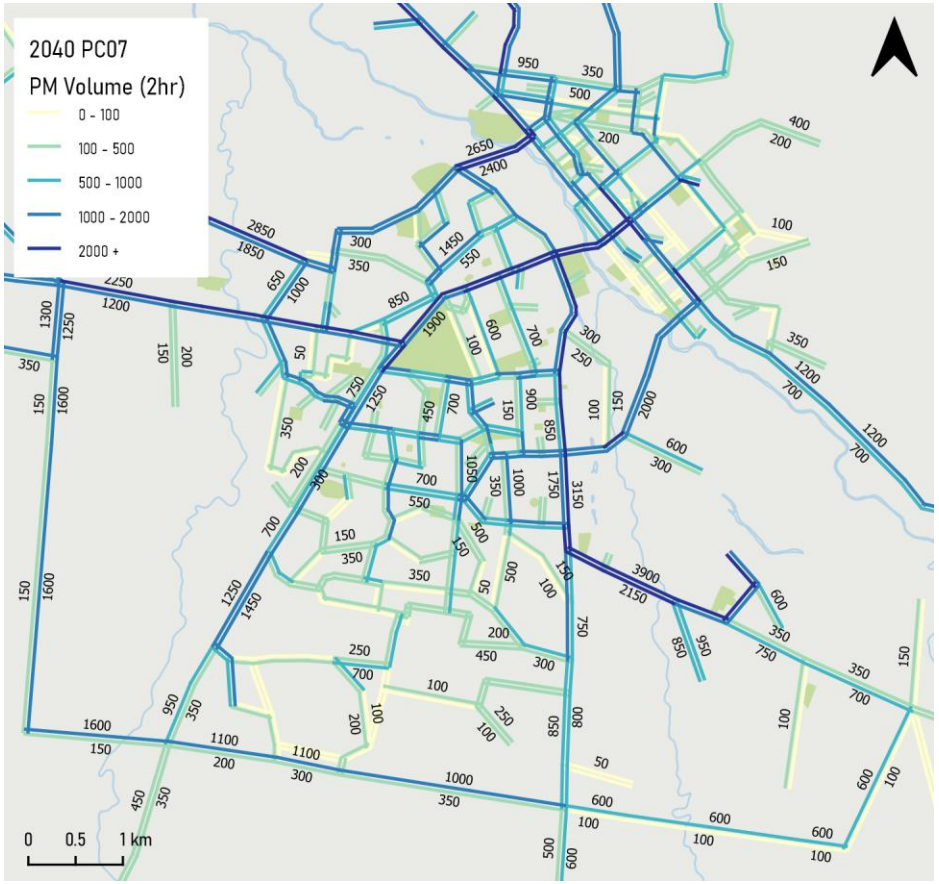
YEAR 2030 PC05





YEAR 2040 PC07

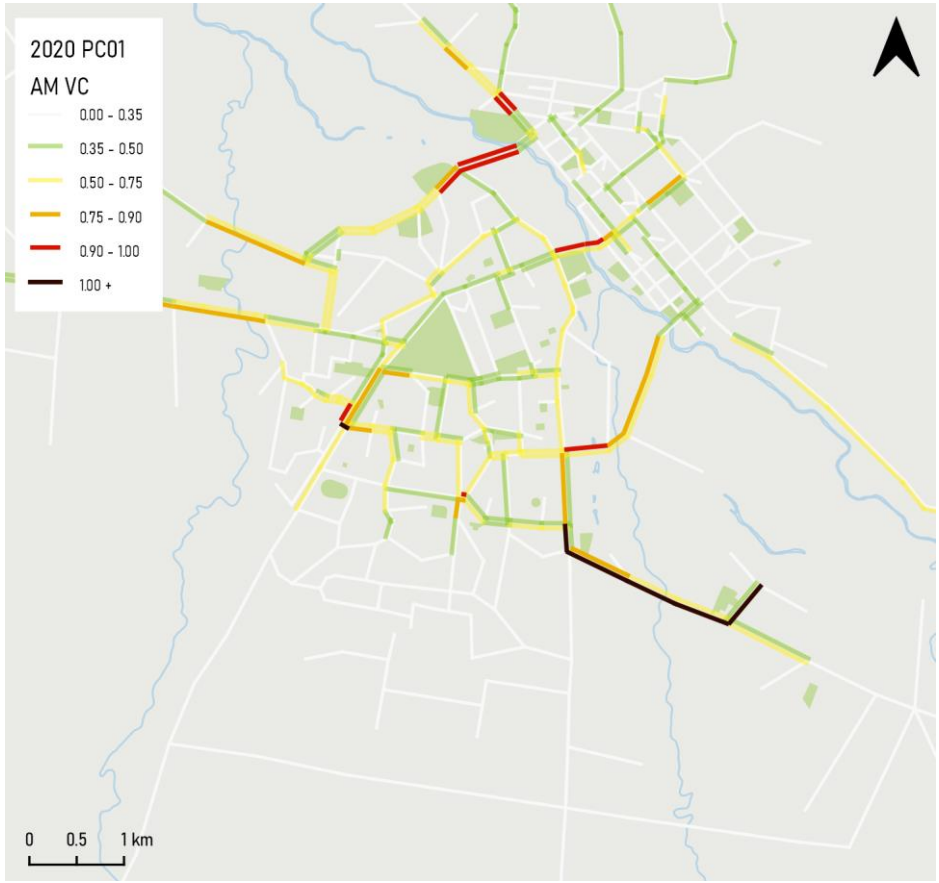


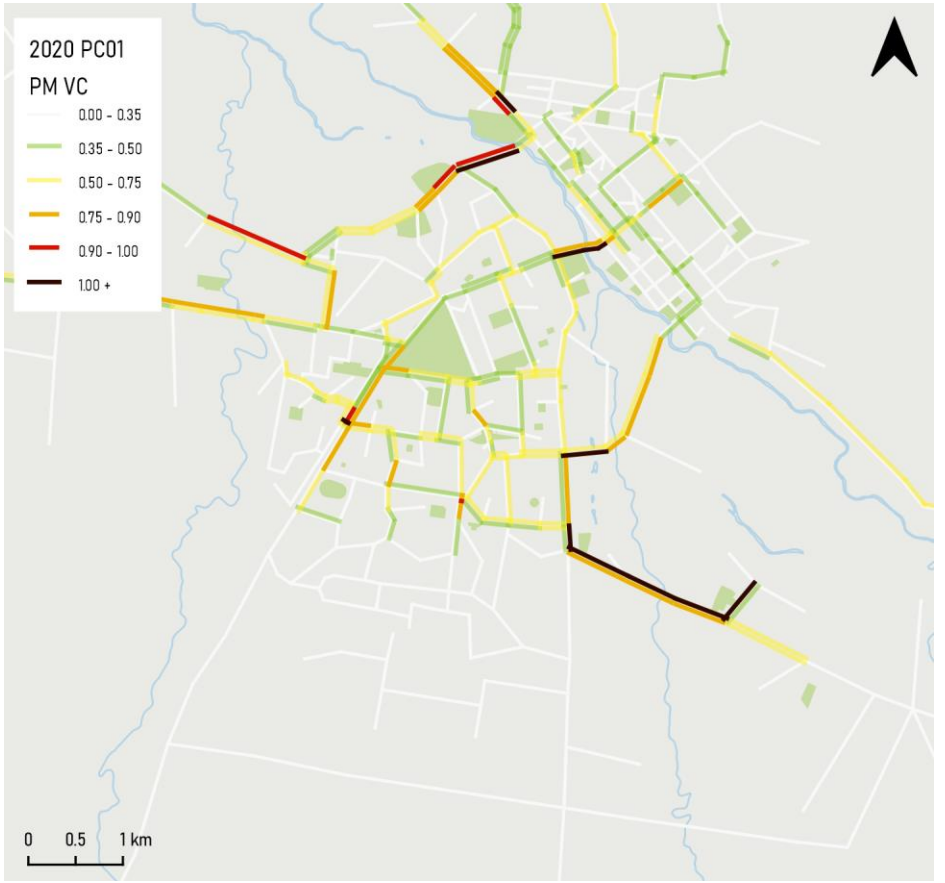


NETWORK OUTPUTS
VC RATIO

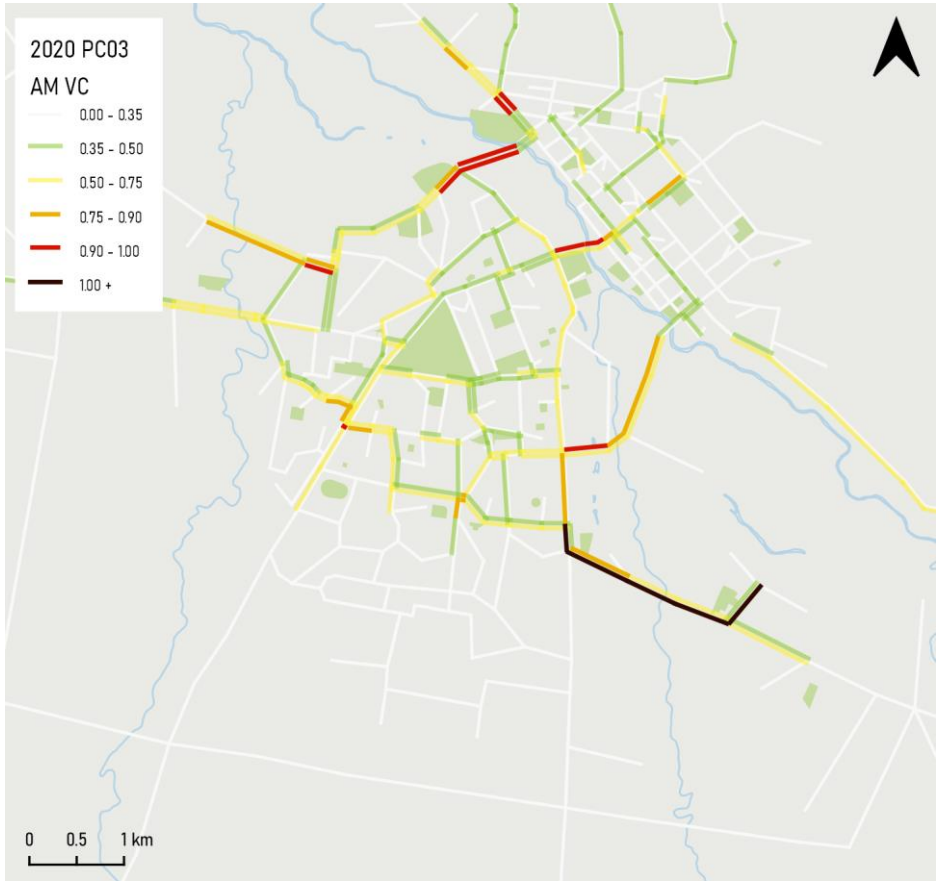
02

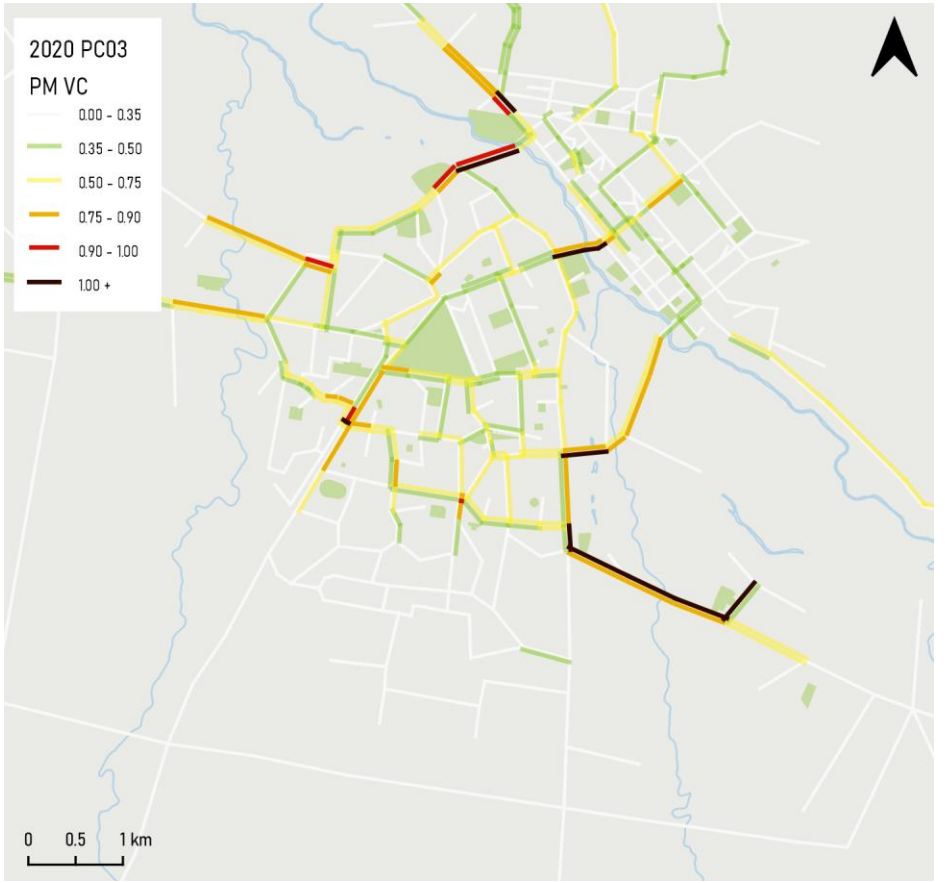
YEAR 2020 PC01



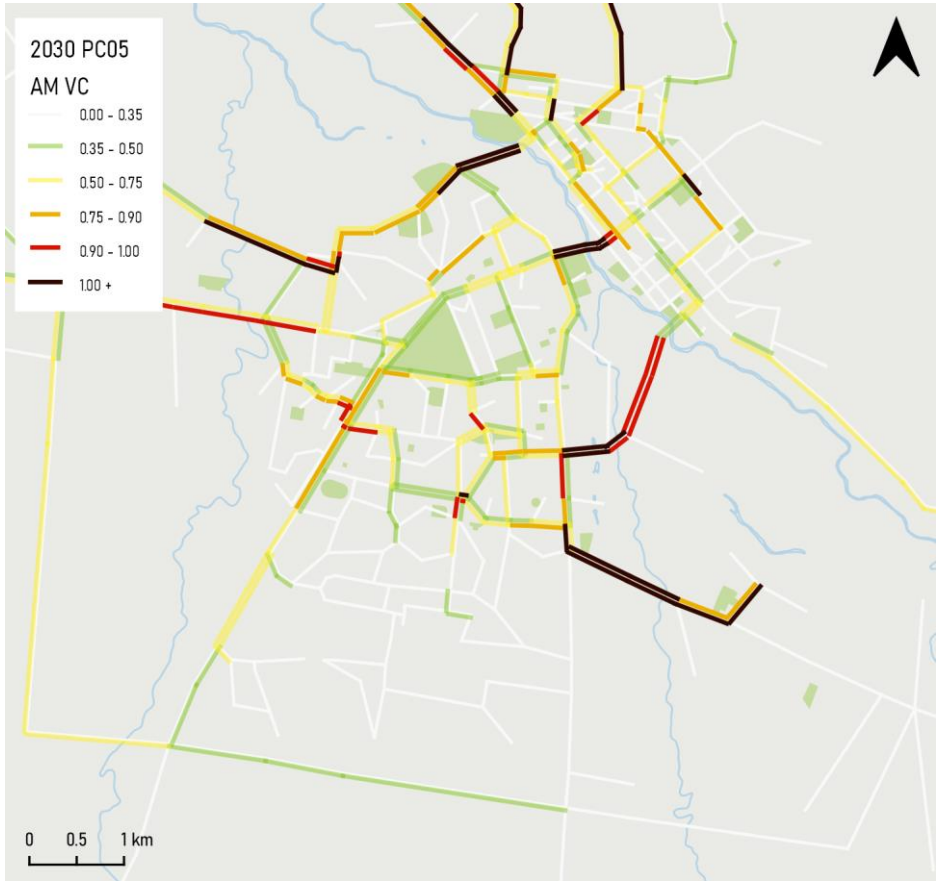


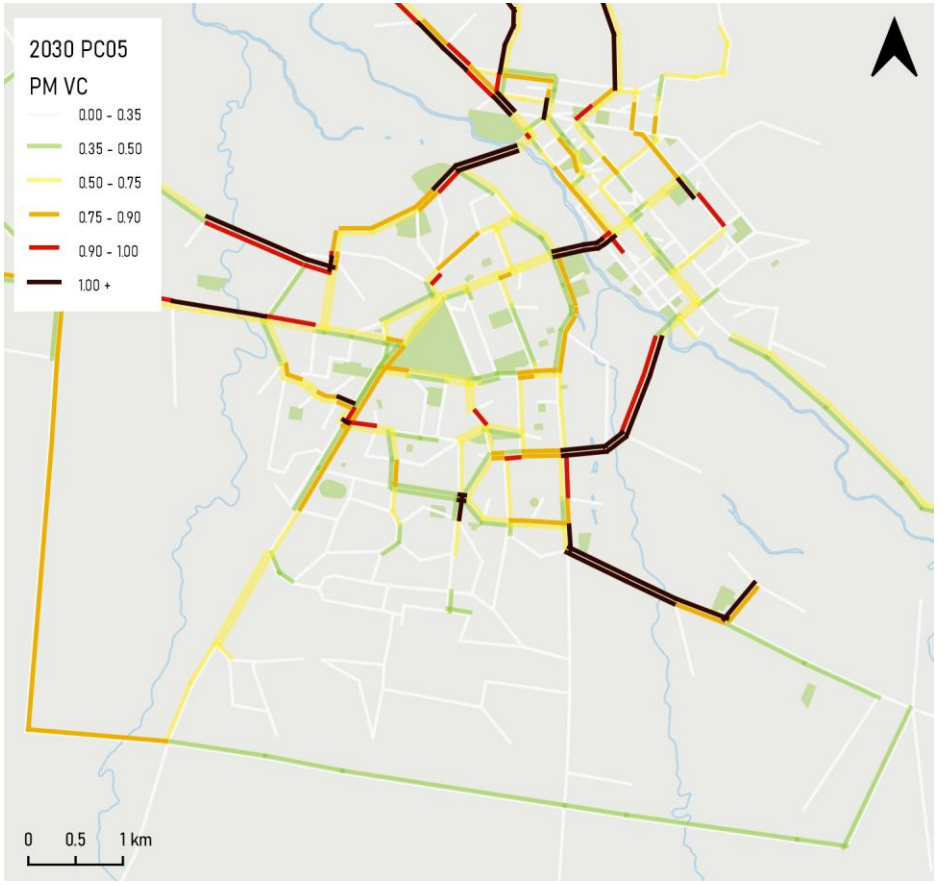
YEAR 2020 PC03



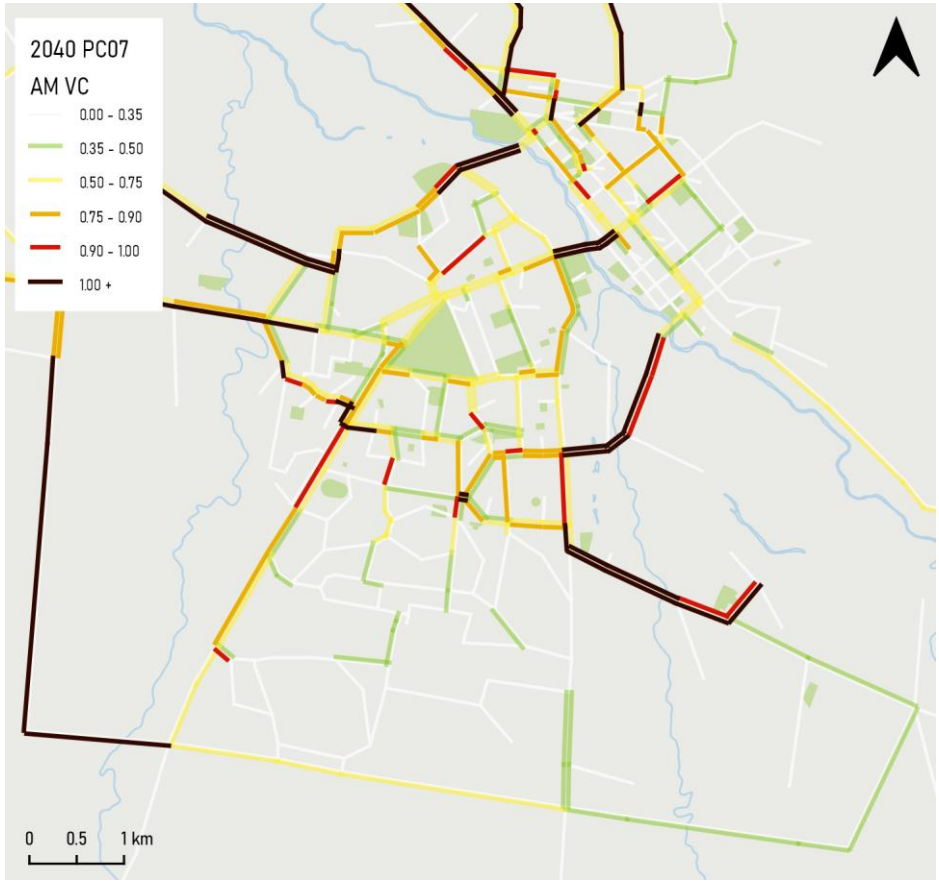


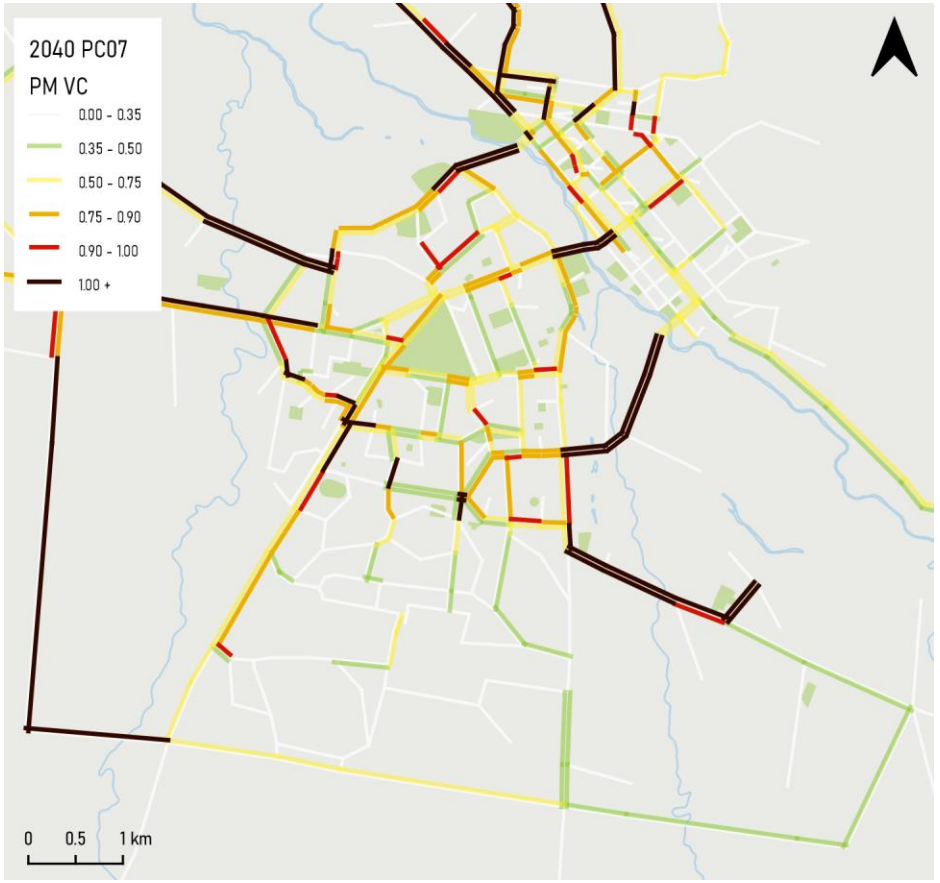
YEAR 2030 PC05





YEAR 2040 PC07





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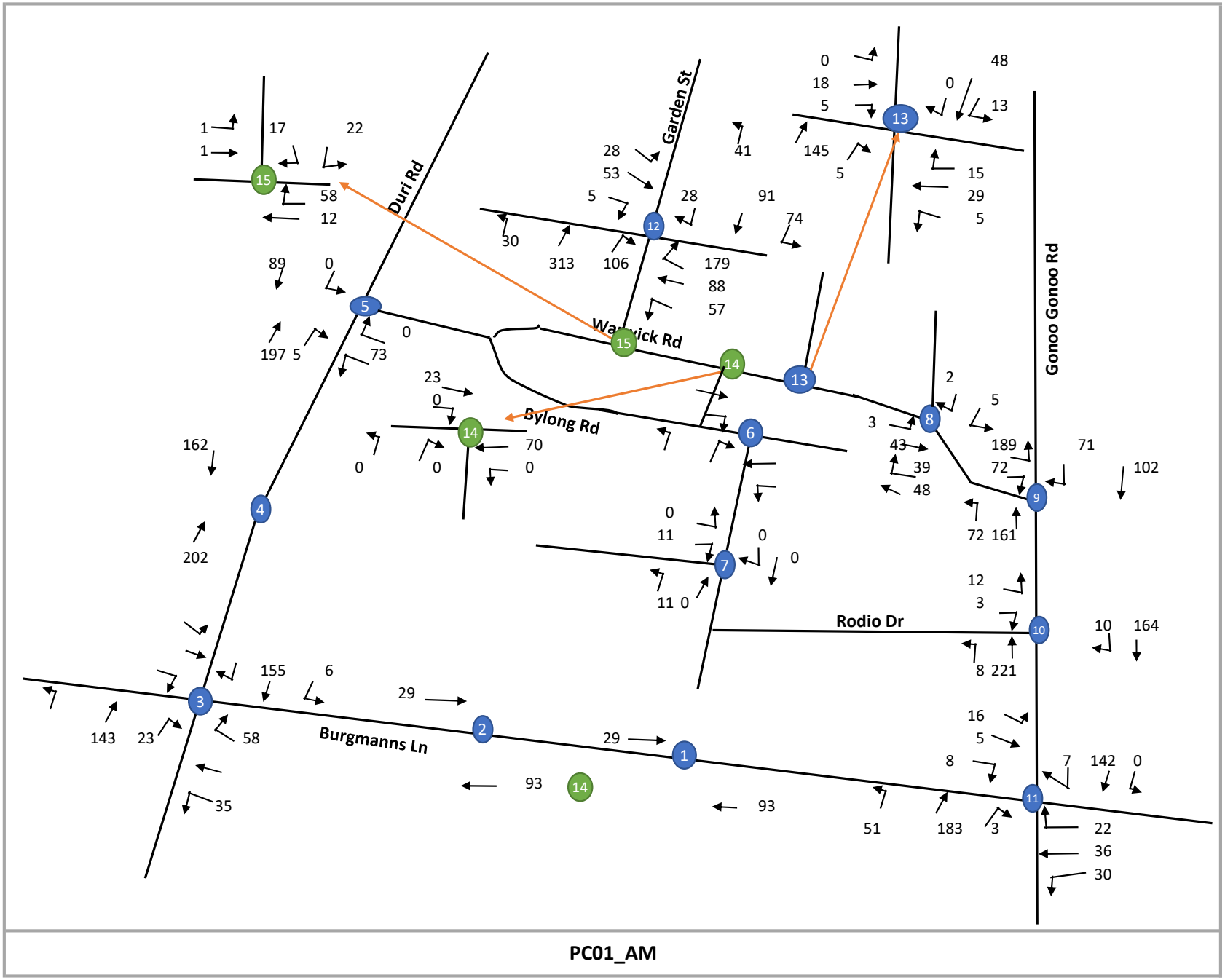
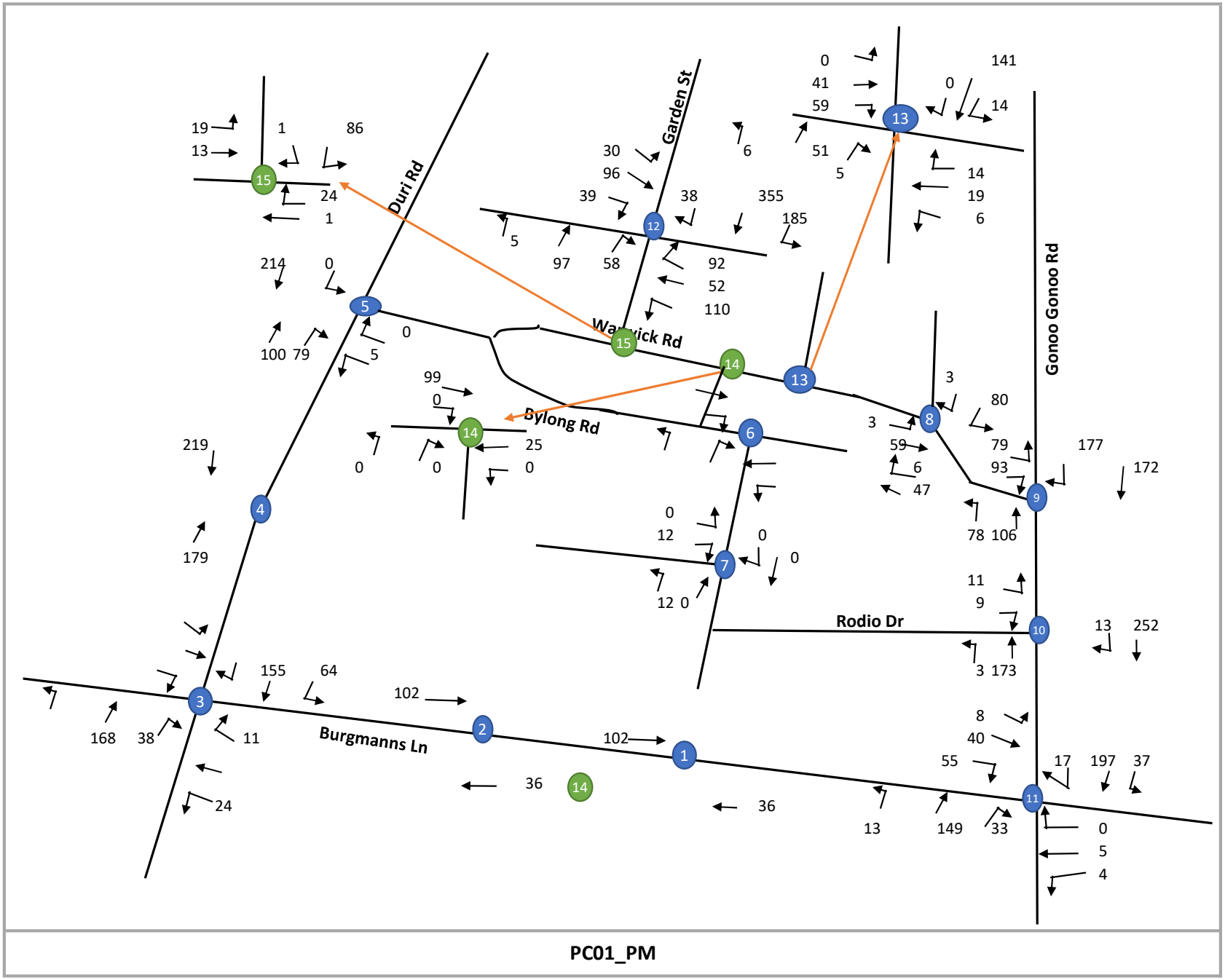
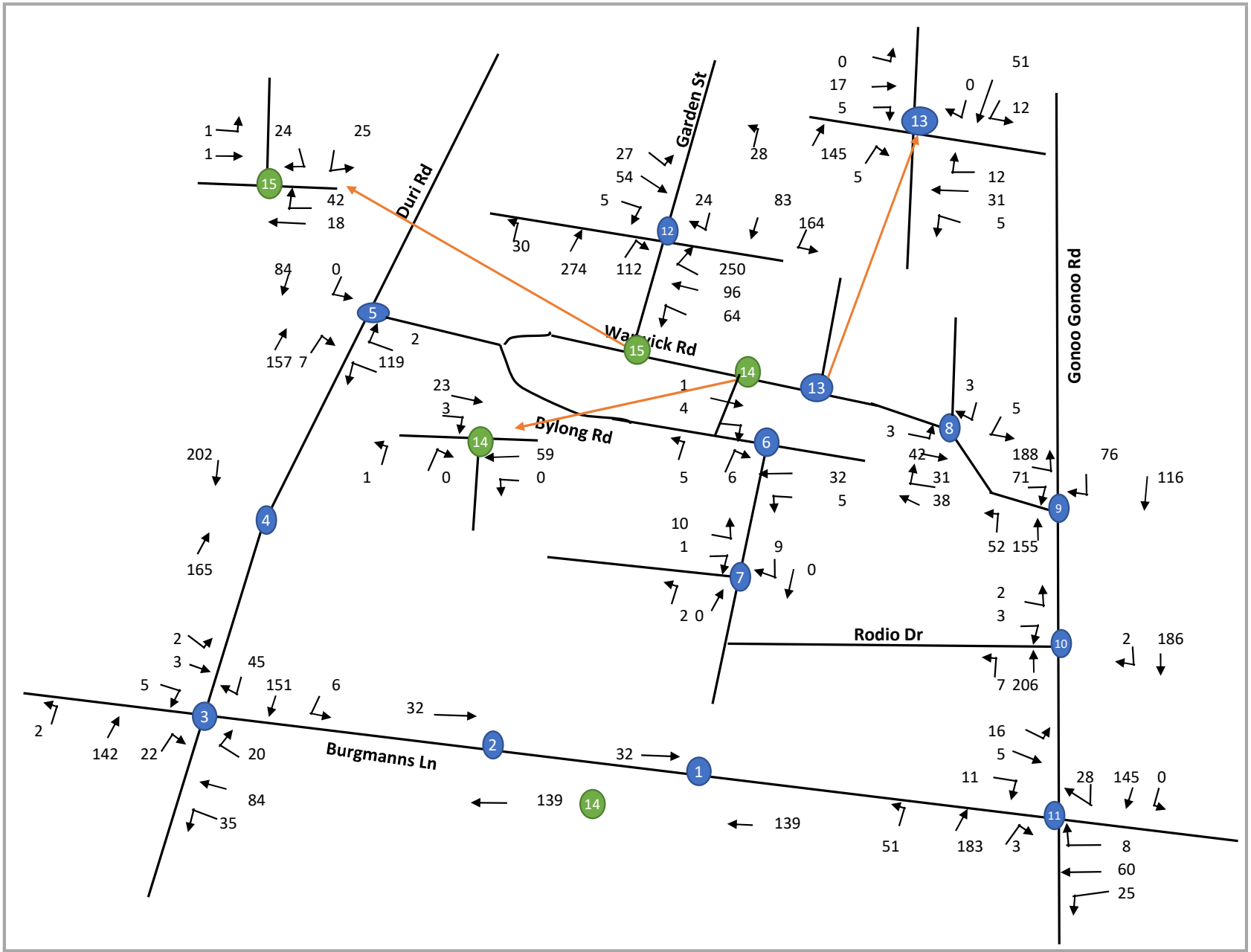
C. INTERSECTION TURNING VOLUMES

C



PC01_AM





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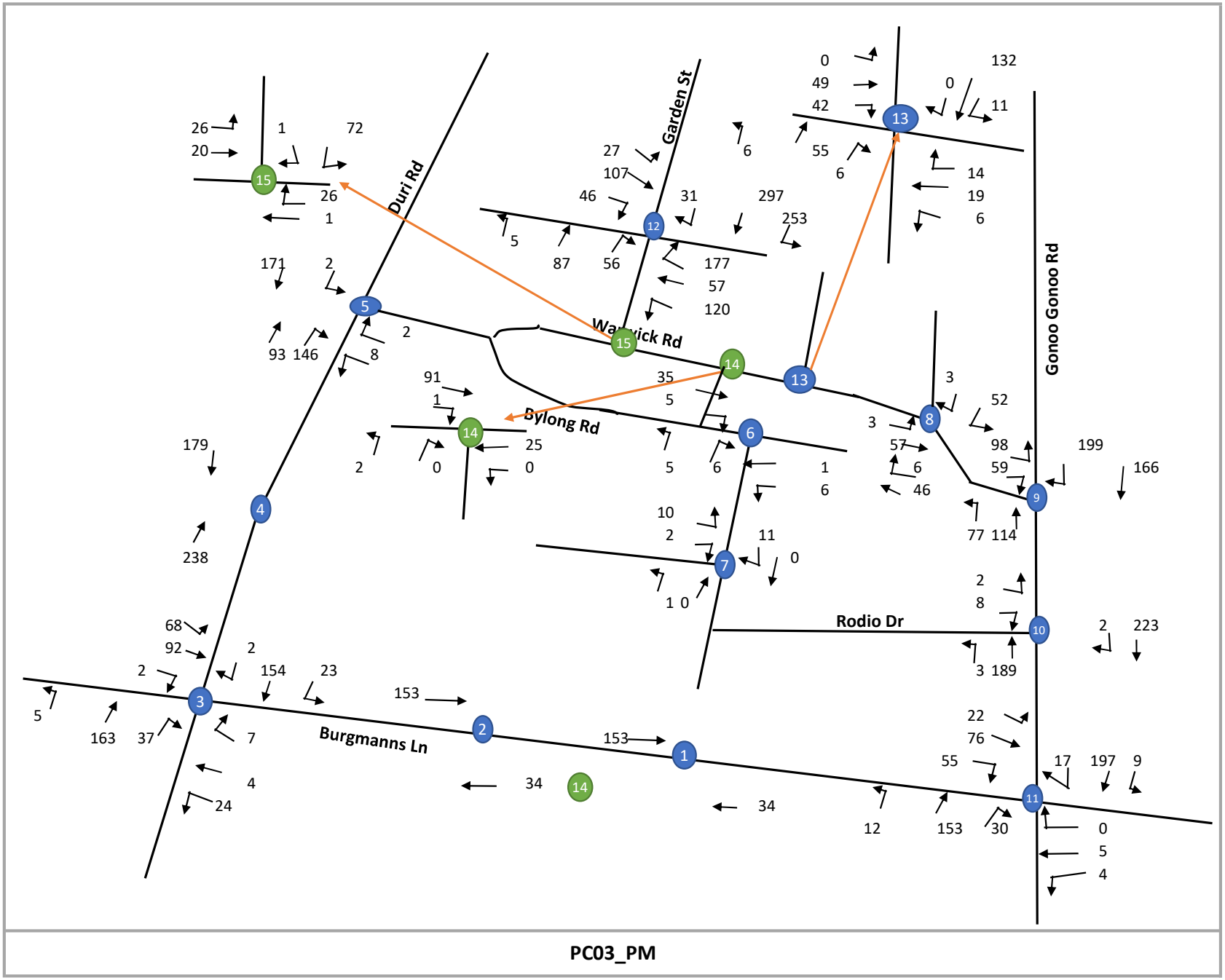
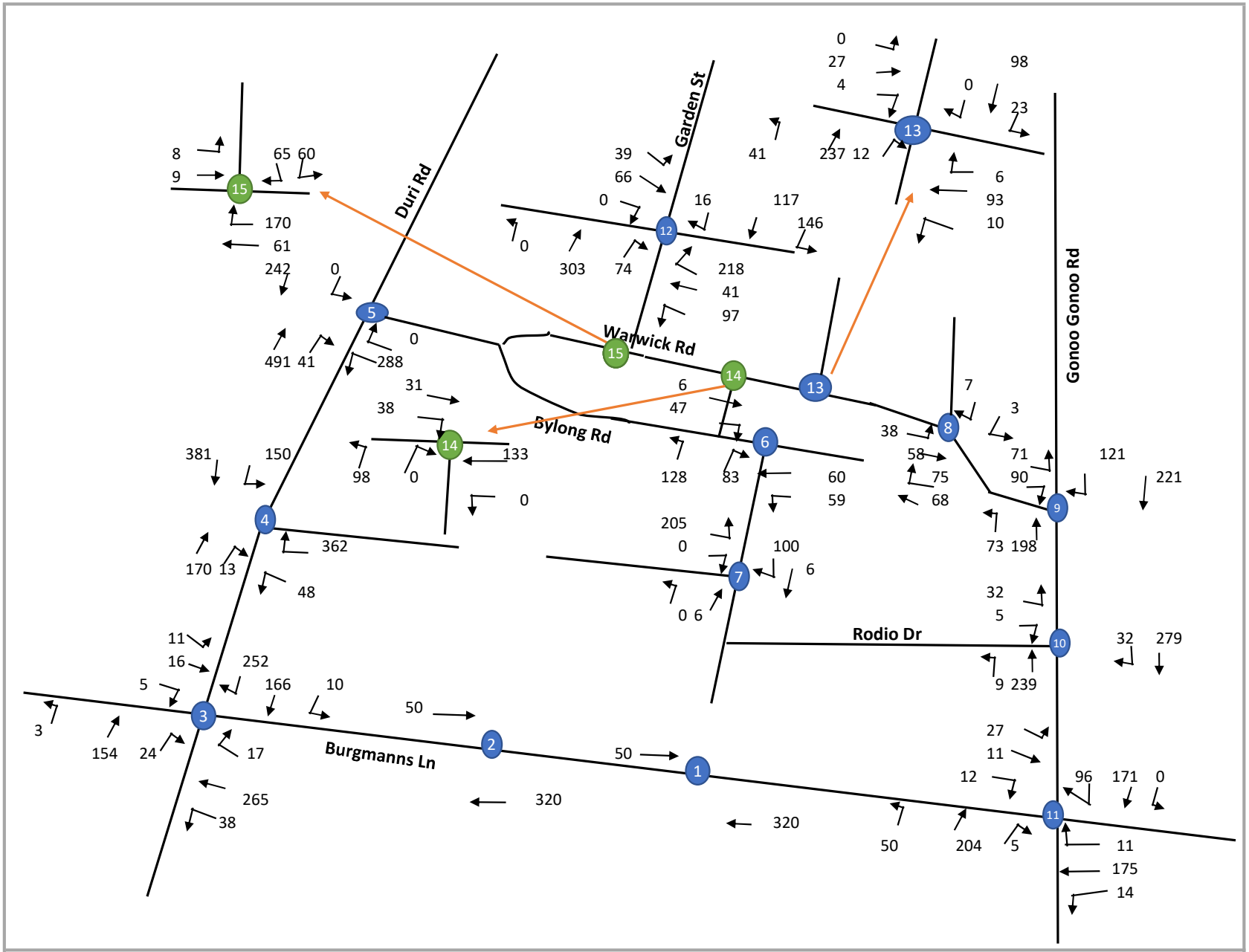
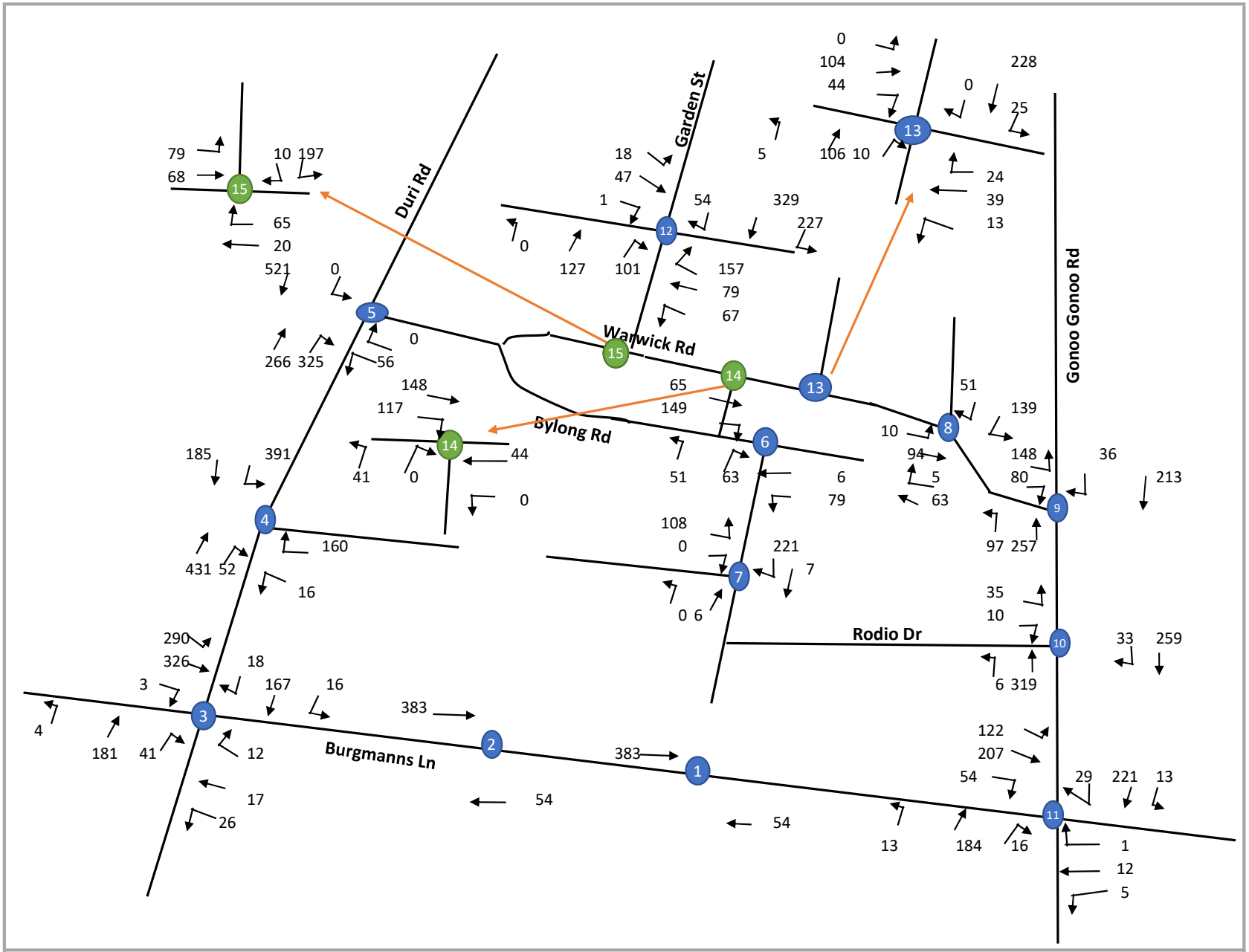
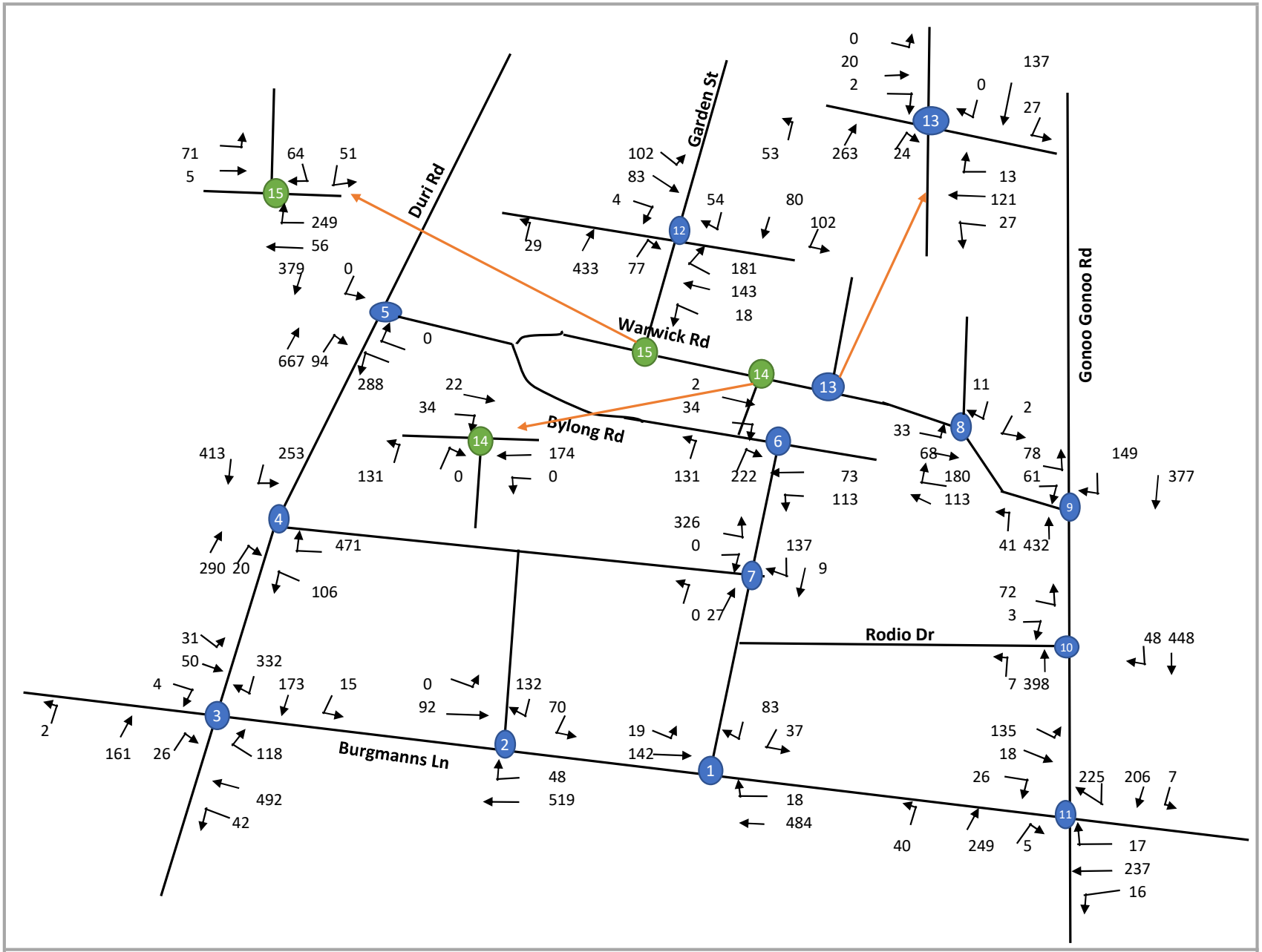


PC03_PM

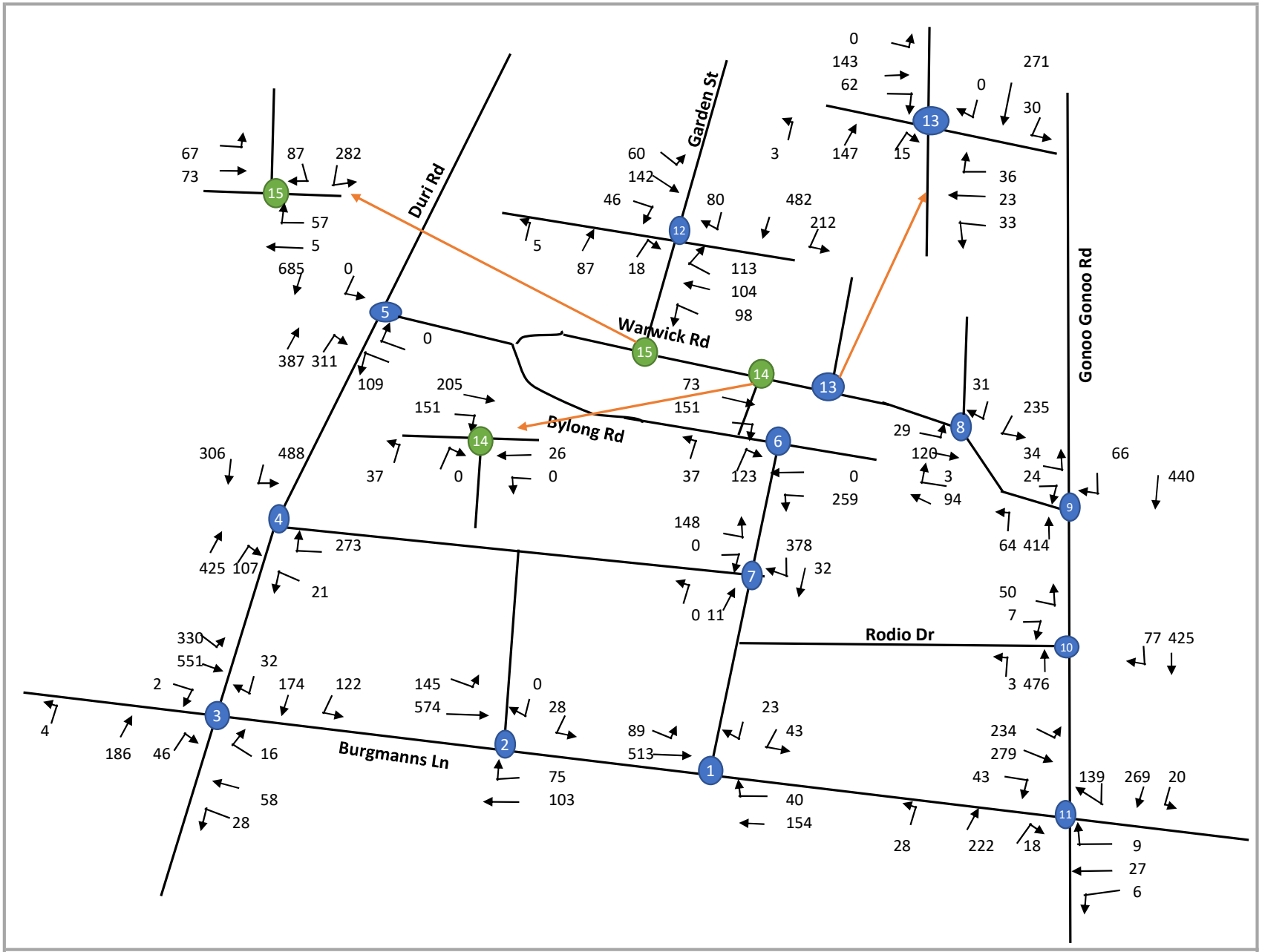


PC05_AM





PC07_AM



PC07_PM

D. SIDRA SUMMARY

D

SIDRA All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2040 (PC07)	Burgmanns Lane (E)	Thru	0.3	A	0s	1m	0.14	A	1s	4m
		Right	0.3	A	7s	1m	0.14	A	10s	4m
		Approach	0.3	-	0s	1m	0.14	-	3s	4m
	Site Access 1 (N)	Left	0.17	A	6s	4m	0.1	A	8s	2m
		Right	0.17	A	10s	4m	0.1	A	11s	2m
		Approach	0.17	A	9s	4m	0.1	A	9s	2m
	Burgmanns Lane (W)	Left	0.09	A	7s	0m	0.35	A	7s	0m
		Thru	0.09	A	0s	0m	0.35	A	0s	0m
		Approach	0.09	-	1s	0m	0.35	-	1s	0m
		Intersection	**0.3**	**-**	**2s**	**4m**	**0.35**	**-**	**2s**	**4m**

Table 5-2: Intersection 2-1 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2040 (PC07)	Burgmanns Lane (E)	Thru	0.34	A	0s	3m	0.17	A	4s	7m
		Right	0.34	A	7s	3m	0.17	A	11s	7m
		Approach	0.34	-	1s	3m	0.17	-	7s	7m
	Site Access 2 (N)	Left	0.29	A	6s	8m	0.05	A	8s	1m
		Right	0.29	A	11s	8m	0.05	A	11s	1m
		Approach	0.29	A	9s	8m	0.05	A	9s	1m
	Burgmanns Lane (W)	Left	0.06	A	7s	0m	0.42	A	7s	0m
		Thru	0.06	A	0s	0m	0.42	A	0s	0m
		Approach	0.06	-	0s	0m	0.42	-	2s	0m
		Intersection	**0.34**	**-**	**3s**	**8m**	**0.42**	**-**	**3s**	**7m**

Table 5-3: Intersection 2-2 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Werris Creek Road	Thru	0.08	A	0s	0m	0.1	A	0s	0m
		Right	0.02	A	6s	0m	0.03	A	6s	1m
		Approach	0.08	-	1s	0m	0.1	-	1s	1m
	Burgmanns Lane	Left	0.1	A	6s	3m	0.03	A	6s	1m
		Right	0.1	A	8s	3m	0.03	A	8s	1m
		Approach	0.1	A	7s	3m	0.03	A	7s	1m
	Werris Creek Road	Left	0.09	A	6s	0m	0.13	A	6s	0m
		Thru	0.09	A	0s	0m	0.13	A	0s	0m
		Approach	0.09	-	0s	0m	0.13	-	2s	0m
		Intersection	**0.1**	**-**	**2s**	**3m**	**0.13**	**-**	**2s**	**1m**
2020 (PC02)	Werris Creek Road	Left	0.1	A	6s	0m	0.1	A	6s	0m
		Thru	0.1	A	0s	0m	0.1	A	0s	0m
		Right	0.03	A	6s	1m	0.03	A	6s	1m
		Approach	0.1	-	1s	1m	0.1	-	1s	1m
	Burgmanns Lane	Left	0.05	A	6s	1m	0.05	A	6s	1m
		Thru	0.05	A	9s	1m	0.05	A	9s	1m
		Right	0.05	A	12s	1m	0.05	A	12s	1m
		Approach	0.05	A	8s	1m	0.05	A	8s	1m
	Werris Creek Road	Left	0.1	A	6s	0m	0.1	A	6s	0m
		Thru	0.1	A	0s	0m	0.1	A	0s	0m
		Right	0	A	6s	0m	0	A	6s	0m
		Approach	0.1	-	1s	0m	0.1	-	1s	0m
	Burgmanns Lane	Left	0.23	A	6s	8m	0.23	A	6s	8m
		Thru	0.23	A	9s	8m	0.23	A	9s	8m
		Right	0.23	A	11s	8m	0.23	A	11s	8m
		Approach	0.23	A	8s	8m	0.23	A	8s	8m
		Intersection	**0.23**	**-**	**3s**	**8m**	**0.23**	**-**	**3s**	**8m**

2020 (PC03)	Werris Creek Road	Left	0.08	A	6s	0m	0.1	A	6s	0m
		Thru	0.08	A	0s	0m	0.1	A	0s	0m
		Right	0.02	A	6s	0m	0.03	A	6s	1m
		Approach	0.08	-	1s	0m	0.1	-	1s	1m
	Burgmanns Lane	Left	0.22	A	6s	7m	0.05	A	6s	1m
		Thru	0.22	A	9s	7m	0.05	A	9s	1m
		Right	0.22	A	10s	7m	0.05	A	12s	1m
		Approach	0.22	A	9s	7m	0.05	A	8s	1m
	Werris Creek Road	Left	0.09	A	6s	0m	0.1	A	6s	0m
		Thru	0.09	A	0s	0m	0.1	A	0s	0m
		Right	0.03	A	6s	1m	0	A	6s	0m
		Approach	0.09	-	1s	1m	0.1	-	1s	0m
	Burgmanns Lane	Left	0.02	A	6s	1m	0.24	A	6s	8m
		Thru	0.02	A	8s	1m	0.24	A	9s	8m
		Right	0.02	A	11s	1m	0.24	A	11s	8m
		Approach	0.02	A	9s	1m	0.24	A	8s	8m
		Intersection	**0.22**	**-**	**3s**	**7m**	**0.24**	**-**	**3s**	**8m**
2030 (PC04)	Werris Creek Road	Left	0.09	A	6s	0m	0.11	A	6s	0m
		Thru	0.09	A	0s	0m	0.11	A	0s	0m
		Right	0.02	A	6s	1m	0.03	A	6s	1m
		Approach	0.09	-	1s	1m	0.11	-	1s	1m
	Burgmanns Lane	Left	0.85	B	23s	87m	0.22	A	6s	6m
		Thru	0.85	C	33s	87m	0.22	A	10s	6m
		Right	0.85	C	35s	87m	0.22	C	36s	6m
		Approach	0.85	C	32s	87m	0.22	B	15s	6m
	Werris Creek Road	Left	0.11	A	6s	0m	0.11	A	6s	0m
		Thru	0.11	A	0s	0m	0.11	A	0s	0m
		Right	0.16	A	6s	5m	0.01	A	6s	0m
		Approach	0.16	-	4s	5m	0.11	-	1s	0m
	Burgmanns Lane	Left	0.08	A	6s	2m	0.96	C	36s	237m
		Thru	0.08	A	12s	2m	0.96	D	45s	237m
		Right	0.08	B	24s	2m	0.96	D	47s	237m
		Approach	0.08	A	12s	2m	0.96	C	41s	237m
		Intersection	**0.85**	**-**	**13s**	**87m**	**0.96**	**-**	**24s**	**237m**

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Werris Creek Road	Thru	0.08	A	0s	0m	0.1	A	0s	0m
		Right	0.02	A	6s	0m	0.03	A	6s	1m
		Approach	0.08	-	1s	0m	0.1	-	1s	1m
	Burgmanns Lane	Left	0.1	A	6s	3m	0.03	A	6s	1m
		Right	0.1	A	8s	3m	0.03	A	8s	1m
		Approach	0.1	A	7s	3m	0.03	A	7s	1m
	Werris Creek Road	Left	0.09	A	6s	0m	0.13	A	6s	0m
		Thru	0.09	A	0s	0m	0.13	A	0s	0m
		Approach	0.09	-	0s	0m	0.13	-	2s	0m
		Intersection	**0.1**	**-**	**2s**	**3m**	**0.13**	**-**	**2s**	**1m**
2020 (PC03)	Werris Creek Road	Left	0.08	A	6s	0m	0.1	A	6s	0m
		Thru	0.08	A	0s	0m	0.1	A	0s	0m
		Right	0.02	A	6s	0m	0.03	A	6s	1m
		Approach	0.08	-	1s	0m	0.1	-	1s	1m
	Burgmanns Lane	Left	0.22	A	6s	7m	0.05	A	6s	1m
		Thru	0.22	A	9s	7m	0.05	A	9s	1m
		Right	0.22	A	10s	7m	0.05	A	12s	1m
		Approach	0.22	A	9s	7m	0.05	A	8s	1m
	Werris Creek Road	Left	0.09	A	6s	0m	0.1	A	6s	0m
		Thru	0.09	A	0s	0m	0.1	A	0s	0m
		Right	0.03	A	6s	1m	0	A	6s	0m
		Approach	0.09	-	1s	1m	0.1	-	1s	0m
	Burgmanns Lane	Left	0.02	A	6s	1m	0.24	A	6s	8m
		Thru	0.02	A	8s	1m	0.24	A	9s	8m
		Right	0.02	A	11s	1m	0.24	A	11s	8m
		Approach	0.02	A	9s	1m	0.24	A	8s	8m
		Intersection	**0.22**	**-**	**3s**	**7m**	**0.24**	**-**	**3s**	**8m**
		Left	0.09	A	6s	0m	0.11	A	6s	0m

2030 (PC05)	Werris Creek Road	Thru	0.09	A	0s	0m	0.11	A	0s	0m
		Right	0.02	A	6s	1m	0.03	A	6s	1m
		Approach	0.09	-	1s	1m	0.11	-	1s	1m
	Burgmanns Lane	Left	0.81	B	19s	69m	0.16	A	6s	4m
		Thru	0.81	C	29s	69m	0.16	A	9s	4m
		Right	0.81	C	31s	69m	0.16	C	35s	4m
		Approach	0.81	B	28s	69m	0.16	A	14s	4m
	Werris Creek Road	Left	0.1	A	6s	0m	0.11	A	6s	0m
		Thru	0.1	A	0s	0m	0.11	A	0s	0m
		Right	0.17	A	6s	6m	0.01	A	6s	0m
		Approach	0.17	-	4s	6m	0.11	-	1s	0m
	Burgmanns Lane	Left	0.08	A	6s	2m	0.94	C	29s	205m
		Thru	0.08	A	13s	2m	0.94	C	38s	205m
		Right	0.08	B	23s	2m	0.94	C	40s	205m
		Approach	0.08	A	12s	2m	0.94	C	34s	205m
		Intersection	**0.81**	**-**	**12s**	**69m**	**0.94**	**-**	**20s**	**205m**
2040 (PC07) - rdbt	Werris Creek Road	Left	0.48	B	18s	32m	0.2	A	5s	10m
		Thru	0.48	B	19s	32m	0.2	A	5s	10m
		Right	0.48	B	23s	32m	0.2	A	9s	10m
		Approach	0.48	B	20s	32m	0.2	A	6s	10m
	Burgmanns Lane	Left	0.85	B	22s	129m	0.1	A	5s	5m
		Thru	0.85	B	24s	129m	0.1	A	6s	5m
		Right	0.85	B	27s	129m	0.1	A	10s	5m
		Approach	0.85	B	24s	129m	0.1	A	6s	5m
	Werris Creek Road	Left	0.39	A	5s	23m	0.54	A	12s	38m
		Thru	0.39	A	5s	23m	0.54	A	13s	38m
		Right	0.39	A	9s	23m	0.54	B	16s	38m
		Approach	0.39	A	8s	23m	0.54	A	13s	38m
	Burgmanns Lane	Left	0.09	A	6s	4m	0.84	A	13s	130m
		Thru	0.09	A	7s	4m	0.84	A	14s	130m
		Right	0.09	A	11s	4m	0.84	B	18s	130m
		Approach	0.09	A	7s	4m	0.84	A	13s	130m
		Intersection	**0.85**	**B**	**17s**	**129m**	**0.84**	**A**	**12s**	**130m**

Table 5-4: Intersection 2-3 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2030 (PC05)	Werris Creek Road (S)	Thru	0.12	A	0s	2m	0.32	A	1s	9m
		Right	0.12	A	11s	2m	0.32	A	12s	9m
		Approach	0.12	-	1s	2m	0.32	-	2s	9m
	Site Access 1	Left	0.83	B	18s	66m	0.89	D	43s	75m
		Right	0.83	B	25s	66m	0.89	E	66s	75m
		Approach	0.83	B	24s	66m	0.89	E	64s	75m
	Werris Creek Road (N)	Left	0.09	A	8s	0m	0.22	A	8s	0m
		Thru	0.22	A	0s	0m	0.11	A	0s	0m
		Approach	0.22	-	2s	0m	0.22	-	5s	0m
		Intersection	**0.83**	**-**	**10s**	**66m**	**0.89**	**-**	**12s**	**75m**
2040 (PC07)	Werris Creek Road (S)	Thru	0.41	A	12s	25m	0.54	A	11s	37m
		Right	0.41	B	16s	25m	0.54	B	15s	37m
		Approach	0.41	A	13s	25m	0.54	A	12s	37m
	Site Access 1	Left	0.63	A	10s	48m	0.3	A	6s	15m
		Right	0.63	B	15s	48m	0.3	A	11s	15m
		Approach	0.63	A	14s	48m	0.3	A	11s	15m
	Werris Creek Road (N)	Left	0.44	A	7s	35m	0.62	A	8s	53m
		Thru	0.44	A	9s	35m	0.62	A	10s	53m
		Approach	0.44	A	8s	35m	0.62	A	9s	53m
		Intersection	**0.63**	**A**	**11s**	**48m**	**0.62**	**A**	**10s**	**53m**

Table 5-5: Intersection 2-4 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Werris Creek Road	Thru	0.11	A	0s	0m	0.06	A	0s	0m
		Right	0	A	8s	0m	0.07	A	8s	2m
		Approach	0.11	-	0s	0m	0.07	-	4s	2m
	Bylong Road	Left	0.07	A	5s	2m	0.01	A	5s	0m
		Right	0.07	A	7s	2m	0.01	A	8s	0m
		Approach	0.07	A	5s	2m	0.01	A	7s	0m
	Duri Road	Left	0	A	8s	0m	0	A	8s	0m
		Thru	0.05	A	0s	0m	0.12	A	0s	0m
		Approach	0.05	-	0s	0m	0.12	-	0s	0m
		Intersection	**0.11**	**-**	**1s**	**2m**	**0.12**	**-**	**2s**	**2m**
2020 (PC03)	Werris Creek Road	Thru	0.09	A	0s	0m	0.05	A	0s	0m
		Right	0.01	A	8s	0m	0.13	A	8s	4m
		Approach	0.09	-	0s	0m	0.13	-	5s	4m
	Bylong Road	Left	0.11	A	5s	3m	0.01	A	5s	0m
		Right	0.11	A	7s	3m	0.01	A	8s	0m
		Approach	0.11	A	5s	3m	0.01	A	6s	0m
	Duri Road	Left	0	A	8s	0m	0	A	8s	0m
		Thru	0.05	A	0s	0m	0.1	A	0s	0m
		Approach	0.05	-	0s	0m	0.1	-	0s	0m
		Intersection	**0.11**	**-**	**2s**	**3m**	**0.13**	**-**	**3s**	**4m**
2030 (PC05)	Werris Creek Road	Thru	0.29	A	0s	0m	0.16	A	0s	0m
		Right	0.04	A	9s	1m	0.47	A	13s	19m
		Approach	0.29	-	1s	1m	0.47	-	7s	19m
	Bylong Road	Left	0.31	A	6s	9m	0.12	A	8s	3m
		Right	0.31	B	19s	9m	0.12	B	27s	3m
		Approach	0.31	A	6s	9m	0.12	A	9s	3m
	Duri Road	Left	0	A	8s	0m	0	A	8s	0m
		Thru	0.14	A	0s	0m	0.3	A	0s	0m
		Approach	0.14	-	0s	0m	0.3	-	0s	0m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Intersection	**0.31**	**-**	**2s**	**9m**	**0.47**	**-**	**4s**	**19m**
2040 (PC07)	Werris Creek Road	Thru	0.39	A	0s	0m	0.23	A	0s	0m
		Right	0.11	A	10s	3m	0.6	B	18s	26m
		Approach	0.39	-	1s	3m	0.6	-	8s	26m
	Bylong Road	Left	0.35	A	8s	12m	0.23	A	11s	6m
		Right	0.04	C	30s	1m	0.06	D	45s	1m
		Approach	0.35	A	8s	12m	0.23	A	12s	6m
	Duri Road	Left	0	A	8s	0m	0	A	8s	0m
		Thru	0.22	A	0s	0m	0.4	A	0s	0m
		Approach	0.22	-	0s	0m	0.4	-	0s	0m
		Intersection	**0.39**	**-**	**2s**	**12m**	**0.6**	**-**	**5s**	**26m**

Table 5-6: Intersection 2-5 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC03)	Site Access (S)	Left	0.01	A	5s	0m	0.01	A	5s	0m
		Thru	0.01	A	5s	0m	0.01	A	5s	0m
		Approach	0.01	A	5s	0m	0.01	A	5s	0m
	Bylong Road (E)	Thru	0.02	A	5s	0m	0.01	A	5s	0m
		Right	0.02	A	0s	0m	0.01	A	0s	0m
		Approach	0.02	-	1s	0m	0.01	-	3s	0m
	Bylong Road (W)	Left	0	A	0s	0m	0.02	A	0s	0m
		Right	0	A	5s	0m	0.02	A	5s	0m
		Approach	0	-	3s	0m	0.02	-	1s	0m
		Intersection	**0.02**	**-**	**2s**	**0m**	**0.02**	**-**	**2s**	**0m**
2030 (PC05)		Left	0.16	A	5s	5m	0.16	A	5s	5m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
	Site Access (S)	Thru	0.16	A	5s	5m	0.16	A	5s	5m
		Approach	0.16	A	5s	5m	0.16	A	5s	5m
	Bylong Road (E)	Thru	0.07	A	5s	0m	0.07	A	5s	0m
		Right	0.07	A	0s	0m	0.07	A	0s	0m
		Approach	0.07	-	2s	0m	0.07	-	2s	0m
	Bylong Road (W)	Left	0.03	A	0s	1m	0.03	A	0s	1m
		Right	0.03	A	5s	1m	0.03	A	5s	1m
		Approach	0.03	-	4s	1m	0.03	-	4s	1m
		Intersection	**0.16**	**-**	**4s**	**5m**	**0.16**	**-**	**4s**	**5m**
2040 (PC07)	Site Access (S)	Left	0.3	A	5s	9m	0.17	A	5s	4m
		Thru	0.3	A	5s	9m	0.17	A	6s	4m
		Approach	0.3	A	5s	9m	0.17	A	6s	4m
	Bylong Road (E)	Thru	0.1	A	5s	0m	0.15	A	5s	0m
		Right	0.1	A	0s	0m	0.15	A	0s	0m
		Approach	0.1	-	3s	0m	0.15	-	5s	0m
	Bylong Road (W)	Left	0.03	A	1s	1m	0.15	A	1s	5m
		Right	0.03	A	5s	1m	0.15	A	6s	5m
		Approach	0.03	-	5s	1m	0.15	-	4s	5m
		Intersection	**0.3**	**-**	**4s**	**9m**	**0.17**	**-**	**5s**	**5m**

Table 5-7: Intersection 2-6 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Site Access Int (S)	Left	0.01	A	5s	0m	0.01	A	5s	0m
		Thru	0.01	A	0s	0m	0.01	A	0s	0m
		Approach	0.01	-	3s	0m	0.01	-	3s	0m
	Site Access Int (N)	Thru	0	A	0s	0m	0	A	0s	0m
		Right	0	A	5s	0m	0	A	5s	0m
		Approach	0	-	2s	0m	0	-	2s	0m
	Redeo Drive (W)	Left	0	A	5s	0m	0	A	5s	0m
		Right	0.01	A	5s	0m	0.01	A	5s	0m
		Approach	0.01	A	5s	0m	0.01	A	5s	0m
		Intersection	**0.01**	**-**	**4s**	**0m**	**0.01**	**-**	**4s**	**0m**
2020 (PC03)	Site Access Int (S)	Left	0	A	5s	0m	0	A	5s	0m
		Thru	0	A	0s	0m	0	A	0s	0m
		Approach	0	-	1s	0m	0	-	1s	0m
	Site Access Int (N)	Thru	0	A	0s	0m	0	A	0s	0m
		Right	0.01	A	5s	0m	0.01	A	5s	0m
		Approach	0.01	-	3s	0m	0.01	-	3s	0m
	Redeo Drive (W)	Left	0.01	A	5s	0m	0.01	A	5s	0m
		Right	0	A	5s	0m	0	A	5s	0m
		Approach	0.01	A	5s	0m	0.01	A	5s	0m
		Intersection	**0.01**	**-**	**3s**	**0m**	**0.01**	**-**	**3s**	**0m**

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2030 (PC05)	Site Access Int (S)	Left	0.01	A	5s	0m	0.01	A	5s	0m
		Thru	0.01	A	0s	0m	0.01	A	0s	0m
		Approach	0.01	-	2s	0m	0.01	-	2s	0m
	Site Access Int (N)	Thru	0	A	0s	0m	0	A	0s	0m
		Right	0.06	A	5s	2m	0.13	A	5s	5m
		Approach	0.06	-	4s	2m	0.13	-	4s	5m
	Redeo Drive (W)	Left	0.13	A	5s	4m	0.07	A	5s	2m
		Right	0.01	A	5s	0m	0.01	A	6s	0m
		Approach	0.13	A	5s	4m	0.07	A	5s	2m
		Intersection	**0.13**	**-**	**4s**	**4m**	**0.13**	**-**	**4s**	**5m**
2040 (PC07)	Site Access Int (S)	Left	0.02	A	5s	0m	0.01	A	5s	0m
		Thru	0.02	A	0s	0m	0.01	A	0s	0m
		Approach	0.02	-	1s	0m	0.01	-	1s	0m
	Site Access Int (N)	Thru	0	A	0s	0m	0.02	A	0s	0m
		Right	0.08	A	5s	3m	0.22	A	5s	9m
		Approach	0.08	-	4s	3m	0.22	-	4s	9m
	Redeo Drive (W)	Left	0.21	A	5s	7m	0.1	A	5s	3m
		Right	0.01	A	5s	0m	0.01	A	7s	0m
		Approach	0.21	A	5s	7m	0.1	A	5s	3m
		Intersection	**0.21**	**-**	**4s**	**7m**	**0.22**	**-**	**4s**	**9m**

Table 5-8: Intersection 2-7 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Greg Norman Drive (E)	Thru	0.06	A	4s	2m	0.04	A	4s	1m
		Right	0.06	A	7s	2m	0.04	A	7s	1m
		Approach	0.06	A	5s	2m	0.04	A	4s	1m
	Edward Street (N)	Left	0.01	A	4s	0m	0.07	A	4s	3m
		Right	0.01	A	7s	0m	0.07	A	7s	3m
		Approach	0.01	A	5s	0m	0.07	A	4s	3m
	Warwick Road (W)	Left	0.04	A	4s	1m	0.04	A	4s	2m
		Thru	0.04	A	4s	1m	0.04	A	4s	2m
		Approach	0.04	A	4s	1m	0.04	A	4s	2m
		Intersection	**0.06**	**A**	**5s**	**2m**	**0.07**	**A**	**4s**	**3m**
2020 (PC03)	Greg Norman Drive (E)	Thru	0.05	A	4s	2m	0.04	A	4s	1m
		Right	0.05	A	7s	2m	0.04	A	7s	1m
		Approach	0.05	A	5s	2m	0.04	A	4s	1m
	Edward Street (N)	Left	0.01	A	4s	0m	0.05	A	4s	2m
		Right	0.01	A	7s	0m	0.05	A	7s	2m
		Approach	0.01	A	5s	0m	0.05	A	4s	2m
	Warwick Road (W)	Left	0.04	A	4s	1m	0.04	A	4s	2m
		Thru	0.04	A	4s	1m	0.04	A	4s	2m
		Approach	0.04	A	4s	1m	0.04	A	4s	2m
		Intersection	**0.05**	**A**	**5s**	**2m**	**0.05**	**A**	**4s**	**2m**
2030 (PC05)	Greg Norman Drive (E)	Thru	0.1	A	4s	4m	0.06	A	4s	2m
		Right	0.1	A	7s	4m	0.06	A	7s	2m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Approach	0.1	A	5s	4m	0.06	A	4s	2m
	Edward Street (N)	Left	0.01	A	4s	0m	0.16	A	5s	7m
		Right	0.01	A	7s	0m	0.16	A	7s	7m
		Approach	0.01	A	6s	0m	0.16	A	5s	7m
	Warwick Road (W)	Left	0.08	A	4s	3m	0.07	A	4s	3m
		Thru	0.08	A	4s	3m	0.07	A	4s	3m
		Approach	0.08	A	4s	3m	0.07	A	4s	3m
		Intersection	**0.1**	**A**	**5s**	**4m**	**0.16**	**A**	**5s**	**7m**
2040 (PC07)	Greg Norman Drive (E)	Thru	0.2	A	4s	9m	0.08	A	4s	3m
		Right	0.2	A	7s	9m	0.08	A	7s	3m
		Approach	0.2	A	6s	9m	0.08	A	4s	3m
	Edward Street (N)	Left	0.01	A	4s	0m	0.24	A	5s	10m
		Right	0.01	A	7s	0m	0.24	A	8s	10m
		Approach	0.01	A	7s	0m	0.24	A	5s	10m
	Warwick Road (W)	Left	0.1	A	5s	4m	0.1	A	4s	4m
		Thru	0.1	A	5s	4m	0.1	A	4s	4m
		Approach	0.1	A	5s	4m	0.1	A	4s	4m
		Intersection	**0.2**	**A**	**5s**	**9m**	**0.24**	**A**	**4s**	**10m**

Table 5-9: Intersection 2-8 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Goonoo Goonoo Road (A15)	Left	0.04	A	6s	0m	0.04	A	6s	0m
		Thru	0.09	A	0s	0m	0.06	A	0s	0m
		Approach	0.09	-	2s	0m	0.06	-	2s	0m
	Goonoo Goonoo Road (A15)	Thru	0.06	A	0s	0m	0.1	A	0s	0m
		Right	0.05	A	6s	2m	0.11	A	6s	4m
		Approach	0.06	-	3s	2m	0.11	-	3s	4m
	Greg Norman Drive	Left	0.11	A	4s	0m	0.04	A	4s	0m
		Right	0.1	A	7s	3m	0.15	A	8s	4m
		Approach	0.11	A	5s	3m	0.15	A	7s	4m
		Intersection	**0.11**	**-**	**3s**	**3m**	**0.15**	**-**	**4s**	**4m**
2020 (PC03)	Goonoo Goonoo Road (A15)	Left	0.03	A	6s	0m	0.04	A	6s	0m
		Thru	0.09	A	0s	0m	0.07	A	0s	0m
		Approach	0.09	-	1s	0m	0.07	-	2s	0m
	Goonoo Goonoo Road (A15)	Thru	0.07	A	0s	0m	0.1	A	0s	0m
		Right	0.05	A	6s	2m	0.13	A	6s	4m
		Approach	0.07	-	2s	2m	0.13	-	3s	4m
		Left	0.11	A	4s	0m	0.06	A	4s	0m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
	Greg Norman Drive	Right	0.1	A	7s	3m	0.1	A	9s	3m
		Approach	0.11	A	5s	3m	0.1	A	6s	3m
		Intersection	**0.11**	**-**	**3s**	**3m**	**0.13**	**-**	**4s**	**4m**
2030 (PC05)	Goonoo Goonoo Road (A15)	Left	0.04	A	6s	0m	0.05	A	6s	0m
		Thru	0.12	A	0s	0m	0.15	A	0s	0m
		Approach	0.12	-	2s	0m	0.15	-	2s	0m
	Goonoo Goonoo Road (A15)	Thru	0.13	A	0s	0m	0.12	A	0s	0m
		Right	0.09	A	6s	3m	0.03	A	6s	1m
		Approach	0.13	-	2s	3m	0.12	-	1s	1m
	Greg Norman Drive	Left	0.04	A	4s	0m	0.08	A	4s	0m
		Right	0.17	A	10s	5m	0.15	A	9s	4m
		Approach	0.17	A	7s	5m	0.15	A	6s	4m
		Intersection	**0.17**	**-**	**3s**	**5m**	**0.15**	**-**	**3s**	**4m**
2040 (PC07)	Goonoo Goonoo Road	Approach	0	-	0s	0m	0	-	0s	0m
	Goonoo Goonoo Road	Thru	0.11	A	0s	0m	0.13	A	0s	0m
		Right	0.08	A	6s	0m	0.04	A	6s	0m
		Approach	0.11	-	2s	0m	0.13	-	1s	0m
	Greg Norman Drive	Right	0.03	A	1s	0m	0.01	A	1s	0m
		Approach	0.03	-	1s	0m	0.01	-	1s	0m
		Intersection	**0.11**	**-**	**2s**	**0m**	**0.13**	**-**	**1s**	**0m**

Table 5-10: Intersection 2-9 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Goonoo Goonoo Road (S)	Left	0.08	A	4s	3m	0.06	A	4s	2m
		Thru	0.08	A	5s	3m	0.06	A	5s	2m
		Approach	0.08	A	5s	3m	0.06	A	5s	2m
	Goonoo Goonoo Road (N)	Thru	0.06	A	5s	2m	0.09	A	5s	4m
		Right	0.06	A	9s	2m	0.09	A	9s	4m
		Approach	0.06	A	5s	2m	0.09	A	5s	4m
	Jack Smith Drive (W)	Left	0.01	A	3s	0m	0.01	A	3s	0m
		Right	0	A	7s	0m	0.01	A	6s	0m
		Approach	0.01	A	4s	0m	0.01	A	4s	0m
		Intersection	**0.08**	**A**	**5s**	**3m**	**0.09**	**A**	**5s**	**4m**
2020 (PC03)	Goonoo Goonoo Road (S)	Left	0.07	A	4s	2m	0.06	A	4s	2m
		Thru	0.07	A	4s	3m	0.06	A	4s	2m
		Approach	0.07	A	4s	3m	0.06	A	4s	2m
	Goonoo Goonoo Road (N)	Thru	0.06	A	5s	3m	0.08	A	5s	3m
		Right	0.06	A	9s	2m	0.08	A	9s	3m
		Approach	0.06	A	5s	3m	0.08	A	5s	3m
	Jack Smith Drive (W)	Left	0	A	3s	0m	0	A	3s	0m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Right	0	A	6s	0m	0.01	A	6s	0m
		Approach	0	A	5s	0m	0.01	A	5s	0m
		Intersection	**0.07**	**A**	**5s**	**3m**	**0.08**	**A**	**5s**	**3m**
2030 (PC05)	Goonoo Goonoo Road (S)	Left	0.09	A	4s	3m	0.11	A	4s	4m
		Thru	0.09	A	5s	3m	0.11	A	5s	4m
		Approach	0.09	A	5s	3m	0.11	A	5s	4m
	Goonoo Goonoo Road (N)	Thru	0.1	A	5s	4m	0.1	A	5s	4m
		Right	0.1	A	9s	4m	0.1	A	9s	4m
		Approach	0.1	A	5s	4m	0.1	A	5s	4m
	Jack Smith Drive (W)	Left	0.02	A	3s	1m	0.03	A	3s	1m
		Right	0.01	A	7s	0m	0.01	A	7s	0m
		Approach	0.02	A	3s	1m	0.03	A	4s	1m
		Intersection	**0.1**	**A**	**5s**	**4m**	**0.11**	**A**	**5s**	**4m**
2040 (PC07)	Goonoo Goonoo Road (S)	Left	0.14	A	5s	6m	0.18	A	5s	7m
		Thru	0.14	A	5s	6m	0.18	A	5s	7m
		Approach	0.14	A	5s	6m	0.18	A	5s	7m
	Goonoo Goonoo Road (N)	Thru	0.16	A	5s	8m	0.16	A	5s	8m
		Right	0.16	A	9s	7m	0.16	A	9s	8m
		Approach	0.16	A	5s	8m	0.16	A	5s	8m
	Jack Smith Drive (W)	Left	0.06	A	4s	2m	0.04	A	4s	2m
		Right	0	A	8s	0m	0.01	A	8s	0m
		Approach	0.06	A	4s	2m	0.04	A	5s	2m
		Intersection	**0.16**	**A**	**5s**	**8m**	**0.18**	**A**	**5s**	**8m**

Table 5-11: Intersection 2-10 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Goonoo Goonoo Road	Left	0.14	A	6s	0m	0.09	A	6s	0m
		Thru	0.14	A	0s	0m	0.09	A	0s	0m
		Right	0	A	6s	0m	0.03	A	6s	1m
		Approach	0.14	-	1s	0m	0.09	-	1s	1m
	Burgmanns Lane	Left	0.16	A	6s	4m	0.03	A	6s	1m
		Thru	0.16	A	11s	4m	0.03	A	11s	1m
		Right	0.16	A	11s	4m	0.03	A	12s	1m
		Approach	0.16	A	9s	4m	0.03	A	10s	1m
	Goonoo Goonoo Road	Left	0	A	6s	0m	0.02	A	6s	0m
		Thru	0.08	A	0s	0m	0.11	A	0s	0m
		Right	0.01	A	6s	0m	0.01	A	6s	0m
		Approach	0.08	-	0s	0m	0.11	-	1s	0m
	Burgmanns Lane	Left	0.05	A	6s	1m	0.24	A	6s	7m
		Thru	0.05	A	10s	1m	0.24	A	12s	7m
		Right	0.05	A	11s	1m	0.24	A	12s	7m
		Approach	0.05	A	8s	1m	0.24	A	12s	7m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Intersection	**0.16**	**-**	**3s**	**4m**	**0.24**	**-**	**3s**	**7m**
2020 (PC03)	Goonoo Goonoo Road	Left	0.14	A	6s	0m	0.1	A	6s	0m
		Thru	0.14	A	0s	0m	0.1	A	0s	0m
		Right	0	A	6s	0m	0.03	A	6s	1m
		Approach	0.14	-	1s	0m	0.1	-	1s	1m
	Burgmanns Lane	Left	0.18	A	6s	5m	0.03	A	6s	1m
		Thru	0.18	A	11s	5m	0.03	A	10s	1m
		Right	0.18	A	11s	5m	0.03	A	13s	1m
		Approach	0.18	A	10s	5m	0.03	A	10s	1m
	Goonoo Goonoo Road	Left	0	A	6s	0m	0.01	A	6s	0m
		Thru	0.08	A	0s	0m	0.11	A	0s	0m
		Right	0.02	A	6s	1m	0.01	A	6s	0m
		Approach	0.08	-	1s	1m	0.11	-	1s	0m
	Burgmanns Lane	Left	0.06	A	6s	1m	0.34	A	7s	12m
		Thru	0.06	A	10s	1m	0.34	A	13s	12m
		Right	0.06	A	12s	1m	0.34	A	13s	12m
		Approach	0.06	A	9s	1m	0.34	A	12s	12m
		Intersection	**0.18**	**-**	**3s**	**5m**	**0.34**	**-**	**4s**	**12m**

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2030 (PC05)	Goonoo Goonoo Road	Left	0.15	A	6s	0m	0.12	A	6s	0m
		Thru	0.15	A	0s	0m	0.12	A	0s	0m
		Right	0	A	6s	0m	0.02	A	6s	0m
		Approach	0.15	-	1s	0m	0.12	-	1s	0m
	Burgmanns Lane	Left	0.56	A	11s	28m	0.04	A	7s	1m
		Thru	0.56	B	20s	28m	0.04	A	11s	1m
		Right	0.56	B	20s	28m	0.04	B	22s	1m
		Approach	0.56	B	19s	28m	0.04	A	11s	1m
	Goonoo Goonoo Road	Left	0	A	6s	0m	0.01	A	6s	0m
		Thru	0.1	A	0s	0m	0.13	A	0s	0m
		Right	0.07	A	6s	2m	0.02	A	6s	1m
		Approach	0.1	-	2s	2m	0.13	-	1s	1m
	Burgmanns Lane	Left	0.11	A	6s	3m	0.82	B	18s	82m
		Thru	0.11	A	13s	3m	0.82	B	28s	82m
		Right	0.11	B	19s	3m	0.82	C	29s	82m
		Approach	0.11	A	11s	3m	0.82	B	25s	82m
		Intersection	**0.56**	**-**	**7s**	**28m**	**0.82**	**-**	**12s**	**82m**
2040 (PC07)	Goonoo Goonoo Road	Left	0.34	A	7s	17m	0.22	A	5s	10m
		Thru	0.34	A	8s	17m	0.22	A	5s	10m
		Right	0.01	A	13s	0m	0.02	A	10s	1m
		Approach	0.34	A	8s	17m	0.22	A	6s	10m
	Burgmanns Lane	Left	0.33	A	8s	17m	0.05	A	7s	2m
		Thru	0.33	A	8s	17m	0.05	A	8s	2m
		Right	0.33	A	12s	17m	0.05	A	11s	2m
		Approach	0.33	A	9s	17m	0.05	A	8s	2m
	Goonoo Goonoo Road	Left	0.17	A	5s	8m	0.31	A	6s	16m
		Thru	0.17	A	5s	8m	0.31	A	7s	16m
		Right	0.16	A	9s	7m	0.18	A	11s	7m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Approach	0.17	A	7s	8m	0.31	A	8s	16m
	Burgmanns Lane	Left	0.18	A	6s	8m	0.54	A	6s	35m
		Thru	0.18	A	7s	8m	0.54	A	7s	35m
		Right	0.18	A	11s	8m	0.54	A	11s	35m
		Approach	0.18	A	7s	8m	0.54	A	7s	35m
		Intersection	**0.34**	**A**	**7s**	**17m**	**0.54**	**A**	**7s**	**35m**

Table 5-12: Intersection 2-11 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Garden Street (S)	Left	0.44	A	5s	24m	0.14	A	4s	6m
		Thru	0.44	A	5s	24m	0.14	A	4s	6m
		Right	0.44	A	10s	24m	0.14	A	8s	6m
		Approach	0.44	A	6s	24m	0.14	A	6s	6m
	Hilvue Road (E)	Left	0.26	A	4s	13m	0.29	A	6s	14m
		Thru	0.26	A	4s	13m	0.29	A	6s	14m
		Right	0.26	A	8s	13m	0.29	A	10s	14m
		Approach	0.26	A	6s	13m	0.29	A	8s	14m
	Garden Street (N)	Left	0.17	A	4s	8m	0.49	A	5s	30m
		Thru	0.17	A	4s	8m	0.49	A	5s	30m
		Right	0.17	A	8s	8m	0.49	A	9s	30m
		Approach	0.17	A	5s	8m	0.49	A	5s	30m
	Hilvue Road (W)	Left	0.11	A	7s	5m	0.15	A	4s	7m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Thru	0.11	A	7s	5m	0.15	A	5s	7m
		Right	0.11	A	11s	5m	0.15	A	9s	7m
		Approach	0.11	A	7s	5m	0.15	A	6s	7m
		Intersection	**0.44**	**A**	**6s**	**24m**	**0.49**	**A**	**6s**	**30m**
2020 (PC03)	Garden Street (S)	Left	0.44	A	6s	24m	0.14	A	5s	7m
		Thru	0.44	A	6s	24m	0.14	A	5s	7m
		Right	0.44	A	10s	24m	0.14	A	9s	7m
		Approach	0.44	A	7s	24m	0.14	A	6s	7m
	Hilvue Road (E)	Left	0.32	A	4s	17m	0.38	A	6s	20m
		Thru	0.32	A	4s	17m	0.38	A	6s	20m
		Right	0.32	A	8s	17m	0.38	A	10s	20m
		Approach	0.32	A	6s	17m	0.38	A	8s	20m
	Garden Street (N)	Left	0.24	A	4s	11m	0.51	A	5s	31m
		Thru	0.24	A	4s	11m	0.51	A	5s	31m
		Right	0.24	A	8s	11m	0.51	A	9s	31m
		Approach	0.24	A	4s	11m	0.51	A	5s	31m
	Hilvue Road (W)	Left	0.12	A	7s	5m	0.18	A	5s	8m
		Thru	0.12	A	7s	5m	0.18	A	5s	8m
		Right	0.12	A	12s	5m	0.18	A	9s	8m
		Approach	0.12	A	8s	5m	0.18	A	6s	8m
		Intersection	**0.44**	**A**	**6s**	**24m**	**0.51**	**A**	**6s**	**31m**
		Left	0.36	A	5s	19m	0.23	A	5s	11m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2030 (PC05)	Garden Street (S)	Thru	0.36	A	5s	19m	0.23	A	5s	11m
		Right	0.36	A	9s	19m	0.23	A	9s	11m
		Approach	0.36	A	6s	19m	0.23	A	7s	11m
	Hilvue Road (E)	Left	0.29	A	4s	15m	0.33	A	6s	17m
		Thru	0.29	A	4s	15m	0.33	A	6s	17m
		Right	0.29	A	8s	15m	0.33	A	10s	17m
		Approach	0.29	A	7s	15m	0.33	A	8s	17m
	Garden Street (N)	Left	0.23	A	4s	11m	0.49	A	4s	31m
		Thru	0.23	A	4s	11m	0.49	A	4s	31m
		Right	0.23	A	8s	11m	0.49	A	9s	31m
		Approach	0.23	A	4s	11m	0.49	A	5s	31m
	Hilvue Road (W)	Left	0.14	A	7s	7m	0.07	A	5s	3m
		Thru	0.14	A	7s	7m	0.07	A	5s	3m
		Right	0.14	A	11s	7m	0.07	A	10s	3m
		Approach	0.14	A	7s	7m	0.07	A	5s	3m
		Intersection	**0.36**	**A**	**6s**	**19m**	**0.49**	**A**	**6s**	**31m**
2040 (PC07)	Garden Street (S)	Left	0.57	A	7s	38m	0.11	A	5s	5m
		Thru	0.57	A	7s	38m	0.11	A	5s	5m
		Right	0.57	A	12s	38m	0.11	A	9s	5m
		Approach	0.57	A	8s	38m	0.11	A	5s	5m
	Hilvue Road (E)	Left	0.28	A	4s	14m	0.45	A	8s	26m
		Thru	0.28	A	4s	14m	0.45	A	8s	26m
		Right	0.28	A	8s	14m	0.45	A	13s	26m
		Approach	0.28	A	6s	14m	0.45	A	10s	26m
	Garden Street (N)	Left	0.2	A	4s	10m	0.67	A	5s	51m
		Thru	0.2	A	4s	10m	0.67	A	5s	51m
		Right	0.2	A	8s	10m	0.67	A	10s	51m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Approach	0.2	A	5s	10m	0.67	A	6s	51m
	Hilvue Road (W)	Left	0.29	A	8s	15m	0.23	A	4s	11m
		Thru	0.29	A	8s	15m	0.23	A	4s	11m
		Right	0.29	A	13s	15m	0.23	A	9s	11m
		Approach	0.29	A	9s	15m	0.23	A	5s	11m
		Intersection	**0.57**	**A**	**7s**	**38m**	**0.67**	**A**	**7s**	**51m**

Table 5-13: Intersection 2-12 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Grant Street (S)	Left	0.15	A	4s	5m	0.05	A	4s	2m
		Thru	0.15	A	4s	5m	0.05	A	4s	2m
		Right	0.15	A	7s	5m	0.05	A	7s	2m
		Approach	0.15	A	4s	5m	0.05	A	4s	2m
	Warwick Road (E)	Left	0.04	A	4s	1m	0.04	A	4s	1m
		Thru	0.04	A	4s	1m	0.04	A	4s	1m
		Right	0.04	A	7s	1m	0.04	A	8s	1m
		Approach	0.04	A	5s	1m	0.04	A	6s	1m
	Grant Street (N)	Left	0.05	A	4s	2m	0.14	A	4s	5m
		Thru	0.05	A	4s	2m	0.14	A	4s	5m
		Right	0.05	A	7s	2m	0.14	A	8s	5m
		Approach	0.05	A	4s	2m	0.14	A	4s	5m
	Warwick Road (W)	Left	0.03	A	4s	1m	0.09	A	4s	3m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Thru	0.03	A	4s	1m	0.09	A	4s	3m
		Right	0.03	A	8s	1m	0.09	A	7s	3m
		Approach	0.03	A	5s	1m	0.09	A	6s	3m
		Intersection	**0.15**	**A**	**4s**	**5m**	**0.14**	**A**	**5s**	**5m**
2020 (PC03)	Grant Street (S)	Left	0.14	A	4s	5m	0.05	A	4s	2m
		Thru	0.14	A	4s	5m	0.05	A	4s	2m
		Right	0.14	A	7s	5m	0.05	A	7s	2m
		Approach	0.14	A	4s	5m	0.05	A	4s	2m
	Warwick Road (E)	Left	0.04	A	4s	1m	0.04	A	4s	1m
		Thru	0.04	A	4s	1m	0.04	A	4s	1m
		Right	0.04	A	7s	1m	0.04	A	8s	1m
		Approach	0.04	A	5s	1m	0.04	A	6s	1m
	Grant Street (N)	Left	0.05	A	4s	2m	0.13	A	4s	5m
		Thru	0.05	A	4s	2m	0.13	A	4s	5m
		Right	0.05	A	7s	2m	0.13	A	8s	5m
		Approach	0.05	A	4s	2m	0.13	A	4s	5m
	Warwick Road (W)	Left	0.02	A	4s	1m	0.08	A	4s	3m
		Thru	0.02	A	4s	1m	0.08	A	4s	3m
		Right	0.02	A	8s	1m	0.08	A	7s	3m
		Approach	0.02	A	5s	1m	0.08	A	5s	3m
		Intersection	**0.14**	**A**	**4s**	**5m**	**0.13**	**A**	**5s**	**5m**
		Left	0.24	A	4s	10m	0.1	A	4s	4m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2030 (PC05)	Grant Street (S)	Thru	0.24	A	4s	10m	0.1	A	4s	4m
		Right	0.24	A	8s	10m	0.1	A	7s	4m
		Approach	0.24	A	4s	10m	0.1	A	4s	4m
	Warwick Road (E)	Left	0.1	A	4s	3m	0.08	A	5s	3m
		Thru	0.1	A	4s	3m	0.08	A	5s	3m
		Right	0.1	A	8s	3m	0.08	A	8s	3m
		Approach	0.1	A	4s	3m	0.08	A	6s	3m
	Grant Street (N)	Left	0.1	A	4s	4m	0.23	A	4s	10m
		Thru	0.1	A	4s	4m	0.23	A	4s	10m
		Right	0.1	A	7s	4m	0.23	A	8s	10m
		Approach	0.1	A	4s	4m	0.23	A	4s	10m
	Warwick Road (W)	Left	0.04	A	5s	1m	0.14	A	4s	5m
		Thru	0.04	A	5s	1m	0.14	A	4s	5m
		Right	0.04	A	8s	1m	0.14	A	8s	5m
		Approach	0.04	A	5s	1m	0.14	A	5s	5m
		Intersection	**0.24**	**A**	**4s**	**10m**	**0.23**	**A**	**5s**	**10m**
2040 (PC07)	Grant Street (S)	Left	0.29	A	4s	13m	0.13	A	4s	5m
		Thru	0.29	A	4s	13m	0.13	A	4s	5m
		Right	0.29	A	8s	13m	0.13	A	7s	5m
		Approach	0.29	A	5s	13m	0.13	A	4s	5m
	Warwick Road (E)	Left	0.15	A	4s	5m	0.1	A	5s	4m
		Thru	0.15	A	4s	5m	0.1	A	5s	4m
		Right	0.15	A	8s	5m	0.1	A	9s	4m
		Approach	0.15	A	5s	5m	0.1	A	7s	4m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
	Grant Street (N)	Left	0.13	A	4s	5m	0.3	A	5s	13m
		Thru	0.13	A	4s	5m	0.3	A	5s	13m
		Right	0.13	A	7s	5m	0.3	A	8s	13m
		Approach	0.13	A	4s	5m	0.3	A	5s	13m
	Warwick Road (W)	Left	0.03	A	5s	1m	0.2	A	5s	8m
		Thru	0.03	A	5s	1m	0.2	A	5s	8m
		Right	0.03	A	8s	1m	0.2	A	8s	8m
		Approach	0.03	A	5s	1m	0.2	A	6s	8m
		Intersection	**0.29**	**A**	**4s**	**13m**	**0.3**	**A**	**5s**	**13m**

Table 5-14: Intersection 2-13 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Darien Ave(S)	Left	0	A	5s	0m	0	A	5s	0m
		Thru	0	A	5s	0m	0	A	5s	0m
		Approach	0	A	5s	0m	0	A	5s	0m
	Warwick Road (E)	Thru	0.04	A	5s	0m	0.02	A	5s	0m
		Right	0.04	A	0s	0m	0.02	A	0s	0m
		Approach	0.04	-	0s	0m	0.02	-	0s	0m
	Warwick Road (W)	Left	0.01	A	0s	0m	0.06	A	0s	0m
		Right	0.01	A	5s	0m	0.06	A	5s	0m
		Approach	0.01	-	1s	0m	0.06	-	0s	0m
		Intersection	**0.04**	**-**	**1s**	**0m**	**0.06**	**-**	**0s**	**0m**

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC03)	Darien Ave(S)	Left	0	A	5s	0m	0	A	5s	0m
		Thru	0	A	5s	0m	0	A	5s	0m
		Approach	0	A	5s	0m	0	A	5s	0m
	Warwick Road (E)	Thru	0.03	A	5s	0m	0.02	A	5s	0m
		Right	0.03	A	0s	0m	0.02	A	0s	0m
		Approach	0.03	-	0s	0m	0.02	-	0s	0m
	Warwick Road (W)	Left	0.01	A	0s	0m	0.05	A	0s	0m
		Right	0.01	A	5s	0m	0.05	A	5s	0m
		Approach	0.01	-	1s	0m	0.05	-	0s	0m
		Intersection	**0.03**	**-**	**1s**	**0m**	**0.05**	**-**	**0s**	**0m**
2030 (PC05)	Darien Ave(S)	Left	0.07	A	5s	2m	0.03	A	5s	1m
		Thru	0.07	A	5s	2m	0.03	A	6s	1m
		Approach	0.07	A	5s	2m	0.03	A	5s	1m
	Warwick Road (E)	Thru	0.07	A	5s	0m	0.03	A	5s	0m
		Right	0.07	A	0s	0m	0.03	A	0s	0m
		Approach	0.07	-	0s	0m	0.03	-	0s	0m
	Warwick Road (W)	Left	0.04	A	0s	1m	0.15	A	0s	5m
		Right	0.04	A	5s	1m	0.15	A	5s	5m
		Approach	0.04	-	3s	1m	0.15	-	2s	5m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Intersection	**0.07**	**-**	**2s**	**2m**	**0.15**	**-**	**2s**	**5m**
2040 (PC07)	Darien Ave(S)	Left	0.1	A	5s	3m	0.03	A	5s	1m
		Thru	0.1	A	6s	3m	0.03	A	6s	1m
		Approach	0.1	A	5s	3m	0.03	A	5s	1m
	Warwick Road (E)	Thru	0.1	A	5s	0m	0.02	A	5s	0m
		Right	0.1	A	0s	0m	0.02	A	0s	0m
		Approach	0.1	-	0s	0m	0.02	-	0s	0m
	Warwick Road (W)	Left	0.04	A	0s	1m	0.2	A	0s	6m
		Right	0.04	A	5s	1m	0.2	A	5s	6m
		Approach	0.04	-	3s	1m	0.2	-	2s	6m
		Intersection	**0.1**	**-**	**2s**	**3m**	**0.2**	**-**	**2s**	**6m**

Table 5-15: Intersection 2-14 - All Movement Results

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
2020 (PC01)	Warwick Road (E)	Left	0.04	A	0s	1m	0.02	A	0s	1m
		Thru	0.04	A	5s	1m	0.02	A	5s	1m
		Approach	0.04	-	4s	1m	0.02	-	4s	1m
	Garden Street (N)	Thru	0.03	A	5s	1m	0.06	A	5s	2m
		Right	0.03	A	5s	1m	0.06	A	5s	2m
		Approach	0.03	A	5s	1m	0.06	A	5s	2m
	Warwick Road (W)	Left	0	A	5s	0m	0.02	A	5s	0m
		Right	0	A	0s	0m	0.02	A	0s	0m
		Approach	0	-	2s	0m	0.02	-	3s	0m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Intersection	**0.04**	**-**	**4s**	**1m**	**0.06**	**-**	**4s**	**2m**
2020 (PC03)	Warwick Road (E)	Left	0.03	A	0s	1m	0.02	A	0s	1m
		Thru	0.03	A	5s	1m	0.02	A	5s	1m
		Approach	0.03	-	3s	1m	0.02	-	4s	1m
	Garden Street (N)	Thru	0.04	A	5s	1m	0.05	A	5s	1m
		Right	0.04	A	5s	1m	0.05	A	5s	1m
		Approach	0.04	A	5s	1m	0.05	A	5s	1m
	Warwick Road (W)	Left	0	A	5s	0m	0.03	A	5s	0m
		Right	0	A	0s	0m	0.03	A	0s	0m
		Approach	0	-	2s	0m	0.03	-	3s	0m
		Intersection	**0.04**	**-**	**4s**	**1m**	**0.05**	**-**	**4s**	**1m**
2030 (PC05)	Warwick Road (E)	Left	0.14	A	0s	5m	0.05	A	0s	2m
		Thru	0.14	A	5s	5m	0.05	A	5s	2m
		Approach	0.14	-	3s	5m	0.05	-	4s	2m
	Garden Street (N)	Thru	0.11	A	5s	3m	0.14	A	5s	4m
		Right	0.11	A	6s	3m	0.14	A	5s	4m
		Approach	0.11	A	5s	3m	0.14	A	5s	4m
	Warwick Road (W)	Left	0.01	A	5s	0m	0.08	A	5s	0m

Year	Arm	Mvmt	AM Peak				PM Peak			
			DOS	LOS	Avrg Delay	95th %ile Q	DOS	LOS	Avrg Delay	95th %ile Q
		Right	0.01	A	0s	0m	0.08	A	0s	0m
		Approach	0.01	-	2s	0m	0.08	-	2s	0m
		Intersection	**0.14**	**-**	**4s**	**5m**	**0.14**	**-**	**4s**	**4m**
2040 (PC07)	Warwick Road (E)	Left	0.19	A	0s	7m	0.04	A	0s	1m
		Thru	0.19	A	5s	7m	0.04	A	5s	1m
		Approach	0.19	-	4s	7m	0.04	-	5s	1m
	Garden Street (N)	Thru	0.11	A	5s	3m	0.28	A	5s	9m
		Right	0.11	A	6s	3m	0.28	A	5s	9m
		Approach	0.11	A	5s	3m	0.28	A	5s	9m
	Warwick Road (W)	Left	0.04	A	5s	0m	0.08	A	5s	0m
		Right	0.04	A	0s	0m	0.08	A	0s	0m
		Approach	0.04	-	4s	0m	0.08	-	2s	0m
		Intersection	**0.19**	**-**	**4s**	**7m**	**0.28**	**-**	**4s**	**9m**