



CANBERRA LIGHT RAIL (STAGE 1) TRAFFIC ASSESSMENT REPORT

FEBRUARY 2016

TMA TRANSPORT
MODELLERS
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Contents

1	Introduction	1
1.1	Background & Project Objectives.....	1
1.2	Bus Route Changes	2
1.3	Report Outline	3
2	Baseline Traffic Conditions	4
2.1	Capital Metro Micro-Simulation Modelling	4
2.1.1	Model Scope	4
2.1.2	Model Data Inputs	4
3	Demand Development	6
3.1	2014 Base Case Demands	6
3.2	2031 Future Base and Project Demands	6
4	Canberra Metro LRV Route Geometry Changes	7
5	Modelling Assessments	8
5.1	Overview	8
5.2	2014 Existing Conditions.....	8
5.3	2031 Baseline Conditions	9
5.4	2031 With Project Conditions.....	10

List of Figures

Figure 1	Stage 1 Stop Locations.....	1
Figure 2	Light Rail Network Plan (Draft)	2
Figure 3	Study area extent.....	5
Figure 4	Route Geometry Changes	7

List of Tables

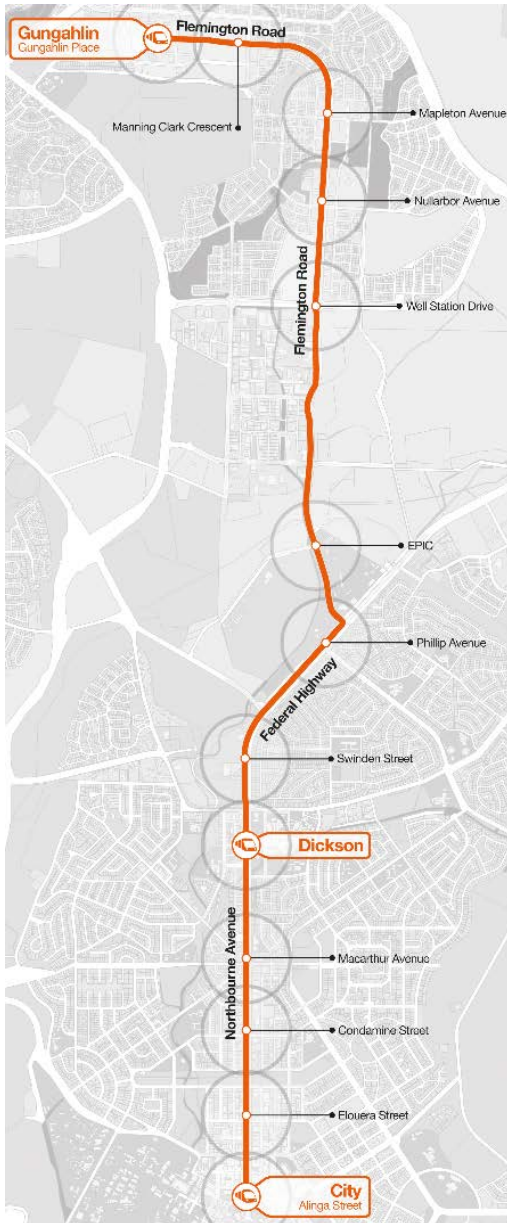
Table 1	Demand development Process	6
Table 2	Baseline Intersection Performance - 2014	8
Table 3	Baseline Intersection Performance - 2031	9
Table 4	'With Project' Intersection Performance - 2031	10



1 Introduction

1.1 BACKGROUND & PROJECT OBJECTIVES

The Canberra Light Rail project (Stage1) is the design and construction of a 12 km light rail route from the City to Gungahlin as shown in Figure 1.



Source: Capital Metro website

FIGURE 1 STAGE 1 STOP LOCATIONS

The project is anticipated to improve transport options, settlement patterns and employment opportunities and help to manage congestion and population growth along one of Canberra’s busiest transport corridors (which in turn will encourage efficient use of urban areas and reduce the need for greenfield development consistent with the ACT Government’s broader land supply program, transport strategy and land use policies).

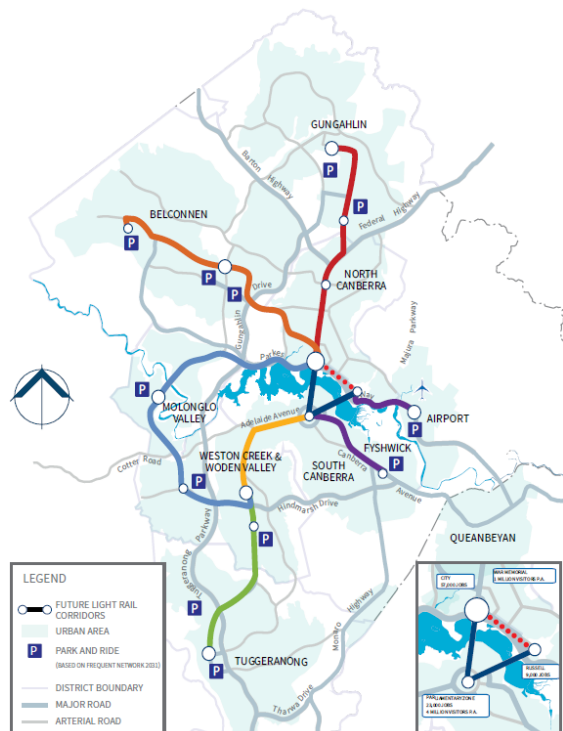


Objectives of this project are to:

- get people out of their cars and on to Capital Metro.
- provide safe, convenient, attractive, frequent, reliable, affordable and integrated with a modified bus and pedestrian network.
- operate in an integrated way with bus services to optimise frequency and service reliability
- provide direct and indirect stimulus to a Canberra economy
- stimulate sustainable, urban re-development along the corridor which complements other transformation and revitalisation initiatives for the city, including the Northbourne Avenue Corridor as an area for significant smart growth via re-development (see image 2 below)
- as a combined impact with other city transformation initiatives, and as result of congestion calming, improve access to the Airport
- Increase social and economic participation for non-motor vehicle owning people to access jobs, education, health services and other social activities
- reduce carbon and other emissions.

The addition of transport capacity in a way that addresses current traffic problems and integrates with other projects to revitalise urban areas and create a transformative urban living and working experience and allows Canberra to be free from a growing and unsustainable habit of car dependency, thus fulfilling Burley Griffin’s vision for a truly liveable city.

The consultation draft of the ACT Government’s Light Rail network plan identifies a further 5 routes extending from Tuggeranong in the south, the Airport and Fyshwick in the East and Belconnen and Molonglo Valley in the West as shown in



Source: Public Transport Improvement Plan 2015

FIGURE 2 LIGHT RAIL NETWORK PLAN (DRAFT)

1.2 BUS ROUTE CHANGES

The integration of bus routes to feed any future network will be required and it is likely that changes to the existing bus network will be sought in the future to avoid the duplication of services once light rail



is operational and to enable efficient interchange between travel modes. The following major interchange locations between bus and light rail will be explored with relevant ACT Government stakeholders (and noting such interchanges do not form part of the Capital Metro business case or traffic assessments):

- Gungahlin Town Centre: Bus network adjusted to a new terminus in Gungahlin Place.
- Mitchell: Bus stops in Sandford Street or Well Station Drive.
- Dickson: New bus interchanges in the Cape Street Extension on the east side of Northbourne Avenue.
- The City: Bus interchange in Alinga Street, Northbourne Avenue and East Row.

Although future bus network changes will be sought to avoid the duplication of services once light rail is operational, it is noted that a very limited number of bus routes may travel with general traffic in limited sections of the corridor on Flemington Rd. This may be the case where such routes are not a general duplication of the light rail service, and where re-routing to avoid conflict with the light rail corridor is not feasible. Bus route changes have not been considered as part of the microsimulation modelling traffic assessment of the Canberra Light Rail Project (Stage 1).

1.3 REPORT OUTLINE

This report sets-out the modelling approach, data employed and results obtained for the Baseline 2014 and 2031 network conditions. The “With Project” scenario at 2031 is compared to the 2031 Baseline and intersection levels of service (including individual turning movements) are provided.

As the traffic assessment for the Canberra Light Rail Project (Stage 1) utilises existing microsimulation models developed as part of the Stage 1 tender process, full network-wide statistical comparisons are not possible, as the Canberra Metro modelling used to support the tender also includes the Russell extension (adjoining the Stage 1 limits at London Circuit).

Section 2 of this report describes the extent and setup of the baseline modelling and section 3 provides an overview of the demand development process used to derive study area traffic demands at 2014 and 2031 with and without the project. A description of geometry changes proposed under the Canberra Metro proposal is discussed in section 4 while section 5 provides intersection assessments under each of the model assessments.



2 Baseline Traffic Conditions

An understanding of the base line traffic conditions not only provides insight into existing network performance and current operations but also enables the microsimulation traffic models to be compared to observed datasets ensuring they are capable of accurately representing network conditions.

To understand whether the models developed as part of this project can be relied upon to provide an indication of road network performance

2.1 CAPITAL METRO MICRO-SIMULATION MODELLING

The description of the base model setup for Canberra's Light Rail Project is given in the "Microsimulation Modelling" document produced on behalf of Capital Metro by Arup/Hassell/Parsons Brinkerhoff and is subject to Cabinet in Confidence restrictions.

An overview of the methodology used to establish the microsimulation model together with the underlying inputs and assumptions is provided with standard industry practice being followed at each of the critical stages of model development, In addition a peer review of the model development process was undertaken by Interfleet Transport Advisory with model development, calibration and validation meeting accepted good practice criteria.

2.1.1 Model Scope

The study area adopted for the microsimulation model is shown in and extends from Hibberson Street, Gungahlin in the north to London Circuit in the south taking in all signalised and significant priority controlled intersections between these points.

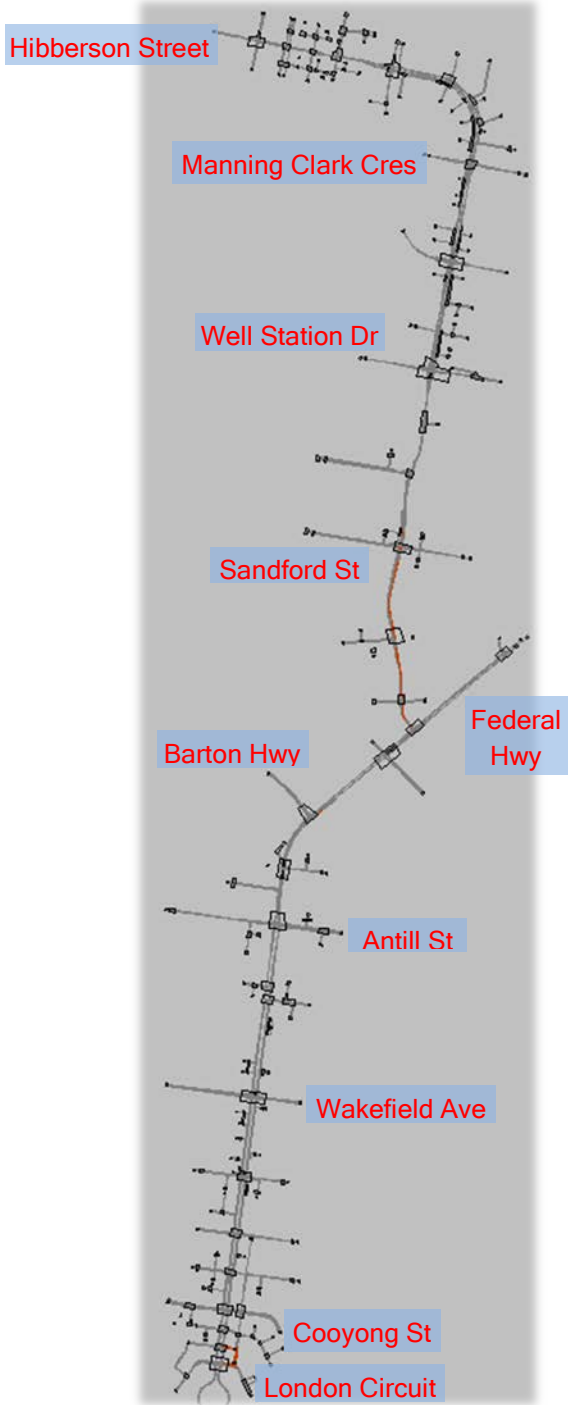
A simulation period of 0630-0930 and 1500-1800 covering the AM and PM peaks has been established with the periods of calibration extending from 0700-0900 and 1530 -1730 respectively. This results in a half-hour warm-up period (during which time the vehicles begin to get loaded onto the network to begin their journeys and as such the network starts with no vehicles and has to warm-up to reach realistic levels of congestion at the start of the calibration period) and half hour warm down period (during which time excess demand unable to traverse the network can be tracked).

2.1.2 Model Data Inputs

Data sources employed in the development of the VISSIM microsimulation model included:

- Classified traffic turning counts at all signalised intersections
- Directional journey time surveys along entire route
- SCATS signal and detector count data
- Timetabled public transport services
- Zenith strategic model trip matrices
- Site inspections

As data quality and quantity often dictates the accuracy of the microsimulation model the above list represents a reasonable coverage of data to be able to satisfy industry calibration and validation criteria for the model.



Model Coverage

- 12 km corridor
- 144 traffic zones
- 21 signalised intersections
- 47 bus routes

FIGURE 3 STUDY AREA EXTENT



3 Demand Development

3.1 2014 BASE CASE DEMANDS

The development of the demand matrices for the VISSIM microsimulation model for both cars and heavy vehicles was based on a recognised industry process of extracting sub-area cordon matrices from the available Zenith strategic model of the area and undertaking a rationalisation process for ensuring strategic model demands can be related directly to the VISSIM microsimulation traffic zones for the required 3 hour periods. An outline of the process for deriving the microsimulation model demand matrices from available data is summarised in Table

Demand Development Steps	Description
1	Sub-area matrices for AM and PM peak periods extracted from Zenith strategic model
2	Conversion of 2-hour average strategic matrix demands to hourly matrices for cars and heavies
3	Matrix estimation using SATURN software and hourly matrices from 2 above used as prior matrices with observed turn count data used to constrain the estimation process
4	Checks of matrix estimation process by comparing pre/post estimation matrices – desire lines, scatter plots, standard deviation of trip length distribution, zonal trip and zonal trip-end comparisons. Reductions in trip volumes as a result of matching to observed counts suggests that Zenith model over-estimates traffic in the corridor.
5	15-minute time slicing of hourly matrices to capture observed vehicle profiles across the network.

TABLE 1 DEMAND DEVELOPMENT PROCESS

The 15-minute matrices were then assigned to the VISSIM corridor network using dynamic assignment and travel times on paths were assumed to reach equilibrium when they did not vary by more than 15% between iterations which falls within accepted industry practice.

3.2 2031 FUTURE BASE AND PROJECT DEMANDS

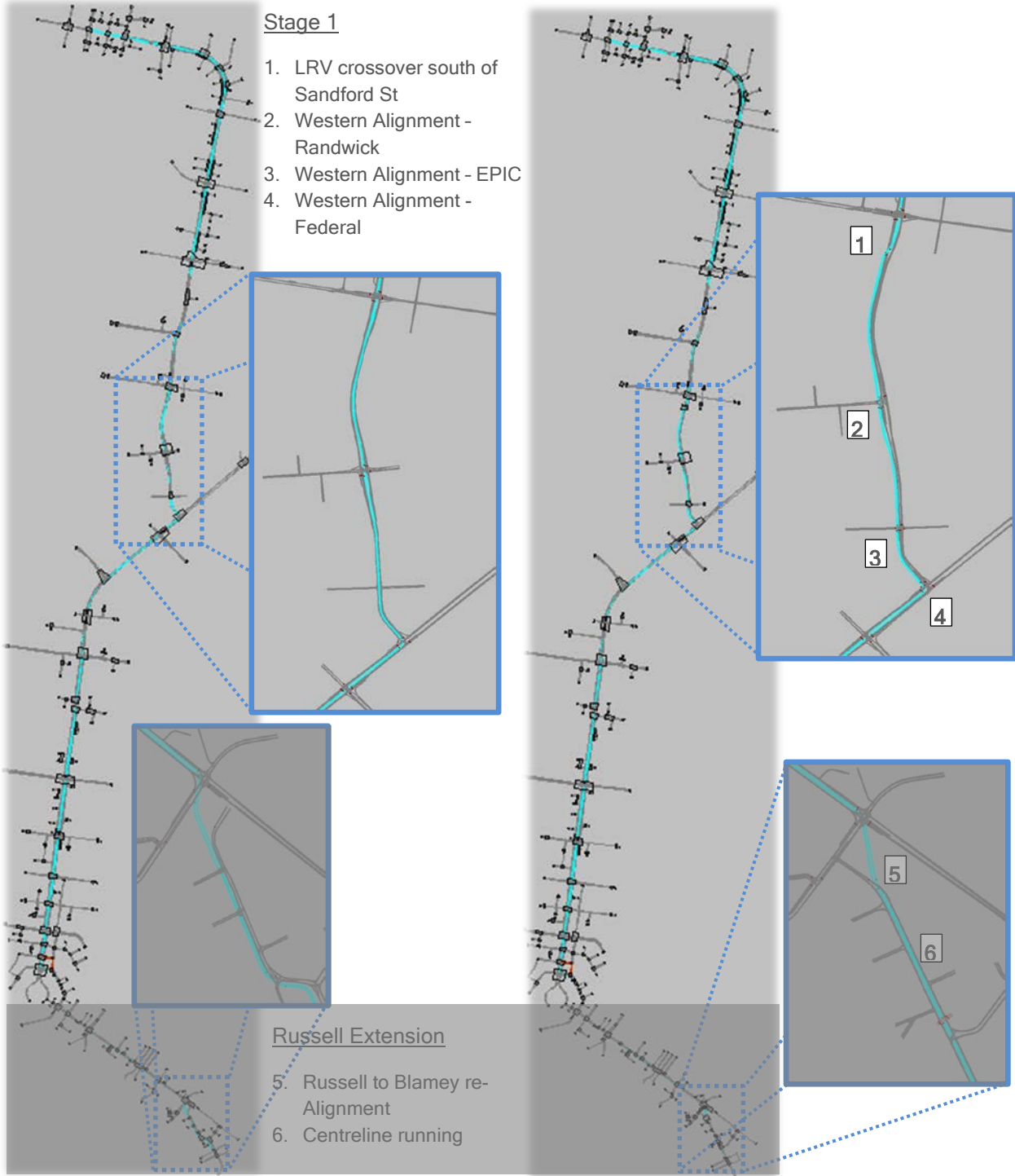
The development of the 2031 future year traffic demand matrices was based on the traffic growth from the Canberra Zenith Model which forecasts zonal traffic growth based on land use changes, road network changes as well as impacts of public transport changes.

The growth from the 'with' and 'without' light rail demands from the Zenith model were applied to derive 2031 future base and 2031 with Project demand growth that was applied to the VISSIM microsimulation traffic matrices.



4 Canberra Metro LRV Route Geometry Changes

Figure 4 illustrates the difference in geometry proposed by Canberra Metro over the Capital Metro Authority Enhanced Design for Stage 1 as well as the Russell Extension.



Capital Metro Authority - Enhanced Design

Canberra Metro - Western Alignment

FIGURE 4 ROUTE GEOMETRY CHANGES

Those intersections highlighted in Figure 4 have had alternative priorities developed to accommodate the Canberra Metro Western Alignment geometry while maintaining LRV priority and traffic delay performance to similar levels experienced in the Capital Metro Authority Enhanced Design Geometry.



5 Modelling Assessments

5.1 OVERVIEW

To understand the implications of the introduction of the Canberra Light Rail Project (Stage 1) it is necessary to understand the Baseline conditions both for the existing and future assessment years and compare these to the future “With Project” scenario assessment employing the following assessments:

- 2014 Existing Conditions
- 2031 Future Base - “No Project”
- 2031 with Canberra Light Rail (Stage 1) - “With Project”

The traffic volumes, delays and Levels of Service (LoS) are presented for each option.

5.2 2014 EXISTING CONDITIONS

The summary of intersection performance is shown in Table 2.

Intersection		AM Peak (2014)			PM Peak (2014)		
		Volume (vph)	Delay (S)	LoS	Volume (vph)	Delay (S)	LoS
Hibberson St	Gungahlin Pl	132	5	A	210	6	A
Hibberson St	Hinder	310	2	A	484	2	A
Flemington Rd	Kate Crace St	342	2	A	650	3	A
Flemington Rd	Manning Clark Cres	495	8	A	730	8	A
Flemington Rd	Wizard St	404	7	A	602	9	A
Flemington Rd	Manning Clark Cres / Mapleton	805	16	B	715	18	B
Flemington Rd	Nullarbor Av	865	17	B	778	14	B
Flemington Rd	Well Station Dr	996	20	B	921	21	C
Flemington Rd	Mitchell Res. Man. Cen	672	3	A	629	0	A
Flemington Rd	Lysaght St	640	1	A	748	2	A
Flemington Rd	Sandford St/Morriset Rd	880	21	B	867	21	C
Flemington Rd	Randwick Rd	676	3	A	742	2	A
Flemington Rd	Showground	649	1	A	735	1	A
Federal Highway	Flemington Rd	1156	21	B	1171	15	B
Federal Highway	Phillip Av	1010	10	A	1223	18	B
Northbourne Av	Barton Highway	2071	19	B	2148	13	B
Northbourne Av	Swinden St	1198	1	A	1377	1	A
Northbourne Av	Mouat St/Antill St	1745	31	C	1867	33	C
Northbourne Av	Murdoch St/Morphett St	1676	8	A	1736	5	A
Northbourne Av	Macarthur Av/Wakefield Av	1945	22	C	2143	25	C
Northbourne Av	Codamine St/Ipima St	1417	19	B	1618	22	C
Northbourne Av	Masson St/Girrawheen St	1409	16	B	1648	28	C
Northbourne Av	Gould St/Elouera St	1208	12	B	1482	18	B
Northbourne Av	Barry Dr/Cooyong St	1704	25	C	2172	37	D
Northbourne Av	Rudd St/Bunda St	1296	13	B	1499	18	B
Northbourne Av	Alinga St	1307	9	A	1467	10	A
Northbourne Av	London Circuit	1431	14	B	1707	21	C
	TOTAL	28439	15	B	32070	17	B

TABLE 2 BASELINE INTERSECTION PERFORMANCE - 2014



The full listing of turning movement volumes, delays and Levels of Service is provided in **Appendix A** for the 2014 Existing Conditions.

5.3 2031 BASELINE CONDITIONS

The 2031 “Without Project” scenario results are provided in Table 3 below.

Intersection		AM Peak (2031)			PM Peak (2031)		
		Volume (vph)	Delay (S)	LoS	Volume (vph)	Delay (S)	LoS
Hibberson St	Gungahlin Pl	512	1	A	727	1	A
Hibberson St	Hinder	963	2	A	1233	2	A
Flemington Rd	Kate Crace St	2054	37	D	1771	109	F
Flemington Rd	Manning Clark Cres	1839	17	B	1501	49	D
Flemington Rd	Wizard St	2549	14	B	2591	83	F
Flemington Rd	Manning Clark Cres / Mapleton	2599	80	F	2356	19	B
Flemington Rd	Nullarbor Av	2632	47	D	2486	17	B
Flemington Rd	Well Station Dr	2959	52	D	3307	45	D
Flemington Rd	Mitchell Res. Man. Cen	1931	9	A	1871	2	A
Flemington Rd	Lysaght St	2298	2	A	2134	9	A
Flemington Rd	Sandford St/Morisset Rd	2802	25	C	2577	43	D
Flemington Rd	Randwick Rd	1837	5	A	1907	1	A
Flemington Rd	Showground	1733	1	A	1884	0	A
Federal Highway	Flemington Rd	3381	29	C	3219	24	C
Federal Highway	Phillip Av	3561	23	C	3416	24	C
Northbourne Av	Barton Highway	5727	50	D	5771	21	C
Northbourne Av	Swinden St	3553	14	B	3713	3	A
Northbourne Av	Mouat St/Antill St	5384	66	E	5289	82	F
Northbourne Av	Murdoch St/Morphett St	4062	18	B	3992	15	B
Northbourne Av	Macarthur Av/Wakefield Av	5334	93	F	3748	51	D
Northbourne Av	Codamine St/Ipima St	4016	39	D	4283	52	D
Northbourne Av	Masson St/Girrawheen St	3821	20	B	4133	55	D
Northbourne Av	Gould St/Elouera St	3349	24	C	3695	54	D
Northbourne Av	Barry Dr/Cooyong St	4834	44	D	5258	45	D
Northbourne Av	Rudd St/Bunda St	3703	23	C	3612	25	C
Northbourne Av	Alinga St	3528	9	A	3455	14	B
Northbourne Av	London Circuit	4158	25	C	4313	36	C
	TOTAL	85121	34	C	84241	36	D

TABLE 3 BASELINE INTERSECTION PERFORMANCE - 2031

It can be seen that by comparing Table 2 with Table 3 there is a substantial increase in total volume of traffic travelling through the intersections within the Stage 1 study area. During the AM peak an increase in throughput of 199% is anticipated while during the PM peak an increase in intersection throughput of 163% over the 2014 conditions is expected. (It should be understood that although traffic demands have only increase marginally by 2031 the cumulative effect of these increases at all intersections on this corridor is compounded by traffic travelling through multiple intersections.)

These substantial throughput increases sees the average intersection delay increase from 15 seconds to 34 seconds in the AM peak (an increase of 127%) and by 19 seconds in the PM peak (an increase



of 112%). These increases are as a result of increased traffic volumes resulting from the development and intensification of land uses particularly in the north of the study area that are anticipated by 2031.

Intersection turning movement volumes, delays and Levels of Service is provided in **Appendix B** for the 2031 Baseline Conditions.

5.4 2031 WITH PROJECT CONDITIONS

The 2031 “With Project” scenario results are shown in Table 4.

Intersection		AM Peak (2031) Project			PM Peak (2031) Project		
		Volume (vph)	Delay (S)	LoS	Volume (vph)	Delay (S)	LoS
Hibberson St	Gungahlin Pl	765	1	A	741	2	A
Hibberson St	Hinder	474	14	B	704	24	C
Flemington Rd	Kate Crace St	1644	27	C	1863	32	C
Flemington Rd	Manning Clark Cres	1516	21	B	1483	18	B
Flemington Rd	Wizard St	1589	22	C	1555	21	B
Flemington Rd	Manning Clark Cres / Mapleton	2500	46	D	2168	31	C
Flemington Rd	Nullarbor Av	2619	28	C	2259	27	C
Flemington Rd	Well Station Dr	3087	49	D	3138	48	D
Flemington Rd	Mitchell Res. Man. Cen	2030	16	B	1611	2	A
Flemington Rd	Lysaght St	2344	24	C	1838	15	B
Flemington Rd	Sandford St/Morisset Rd	2989	71	E	2289	36	C
Flemington Rd	Randwick Rd	1902	5	A	1635	5	A
Flemington Rd	Showground	1842	8	A	1627	10	A
Federal Highway	Flemington Rd	3455	31	C	3048	27	C
Federal Highway	Phillip Av	3576	24	C	3195	53	D
Northbourne Av	Barton Highway	4308	43	D	4091	35	C
Northbourne Av	Swinden St	3842	18	B	3694	19	B
Northbourne Av	Mouat St/Antill St	6192	57	E	5828	70	E
Northbourne Av	Murdoch St/Morphett St	4312	12	B	3984	11	A
Northbourne Av	Macarthur Av/Wakefield Av	5405	96	F	5216	48	D
Northbourne Av	Codamine St/Ipima St	4086	43	D	4229	57	E
Northbourne Av	Masson St/Girrawheen St	3841	28	C	4088	56	D
Northbourne Av	Gould St/Elouera St	3568	30	C	3734	51	D
Northbourne Av	Barry Dr/Cooyong St	5001	56	E	5224	69	E
Northbourne Av	Rudd St/Bunda St	3746	32	C	3572	50	D
Northbourne Av	Alinga St	3630	21	B	3386	22	C
Northbourne Av	London Circuit	4357	30	C	4324	38	D
	TOTAL	84619	37	D	80522	39	D

TABLE 4 ‘WITH PROJECT’ INTERSECTION PERFORMANCE - 2031

Identifying the effect of the Project on traffic performance can be seen by comparing Table 3 with Table 4. It is apparent that the Light Rail Project is anticipated to reduce traffic throughput (due to mode shift) with the greatest reductions experienced in the PM peak. There will be some nominal increases in intersection delay as a result of the introduction of the Light Rail Project by 3 seconds on average in both the AM and PM peaks respectively.



Generally there is little if any difference in individual intersection performance although as a result of changed intersection linking and offsets some intersections appear to increase in delay while others reduce. In reality the network operations at 2031 (like today) will be managed by TAMS through an adaptive signal control system that will optimise progression and network performance.



Appendix A 2014 Existing Intersection Performance



Node	Main Road Name	Secondary Road Name(s)	Approach	Movement	2014 AM Base			2014 Base		
					Volume	Delay	LOS	Volume	Delay	LOS
101	Hibberson St	Gungahlin Pl	Gungahlin Pl (N)	Right	4	1	A	10	1	A
				Through	11	0	A	19	1	A
				Left						
			Hibberson St(E)	Right	0	0	A	19	0	A
				Through	51	0	A	87	0	A
				Left						
			Gungahlin Pl (S)	Right	26	1	A	13	1	A
				Through	5	0	A	25	0	A
				Left	11	1	A	2	1	A
			Hibberson St (W)	Right	5	19	B	20	29	C
				Through	10	26	C	8	35	C
				Left	10	26	C	8	35	C
						Total	All	132	5	A
222	Hibberson St	Hinder	Hinder St (N)	Right	5	0	A	3	1	A
				Through	45	1	A	37	1	A
				Left	44	1	A	38	1	A
			Hibberson St(E)	Right	9	1	A	43	1	A
				Through	61	4	A	119	3	A
				Left	13	1	A	44	1	A
			Hinder St (S)	Right	21	2	A	9	2	A
				Through	10	1	A	59	1	A
				Left	6	0	A	16	1	A
			Hibberson St (W)	Right	15	0	A	21	1	A
				Through	74	5	A	80	2	A
				Left	6	0	A	16	1	A
						Total	All	310	2	A
103	Flemington Road	Kate Crace St	Kate Crace St (N)	Right						
				Through						
				Left						
			Flemington Rd (E)	Right	27	3	A	131	4	A
				Through	54	3	A	183	4	A
				Left	46	2	A	74	3	A
			Kate Crace St. (S)	Right	43	1	A	92	3	A
				Through	30	1	A	41	3	A
				Left	4	3	A	1	7	A
			Flemington Rd (W)	Right	4	3	A	2	2	A
Through	121	2		A	116	2	A			
Left	14	1		A	10	2	A			
			Total	All	342	2	A	650	3	A
107	Flemington Road	Manning Clark Cres	Manning Clark Cres (N)	Right						
				Through						
				Left	11	1	A	2	4	A



			Right						
		Flemington Rd (E)	Through	108	9	A	369	7	A
			Left	5	1	A	4	1	A
			U-turn						
		Manning Clark Cres (S)	Right				2	32	C
			Through				3	35	C
			Left				49	1	A
		Flemington Rd (W)	Right	10	3	A	59	3	A
			Through	313	3	A	176	2	A
			Left	49	36	C	67	37	D
		Total	All	495	8	A	730	8	A
109	Flemington Road	Wizard Street	Right	3	49	D	5	40	D
		Wizard St (N)	Through						
			Left	80	1	A	10	0	A
			Right	14	45	D	71	36	C
		Flemington Rd (E)	Through				346	1	A
			Left						
			U-turn						
		Wizard St (S)	Right						
			Through						
			Left						
		Flemington Rd (W)	Right						
			Through	306	7	A	169	15	B
			Left	0	0	A	1	0	A
		Total	All	404	7	A	602	9	A
112	Flemington Road	Manning Clark Cres / Mapleton	Right	12	47	D	14	55	D
		Flemington Rd (N)	Through	455	14	B	145	15	B
			Left	48	3	A			
			U-turn	2	58	E	5	48	D
		Mapleton Ave (E)	Right	29	43	D	65	37	D
			Through	4	49	D	16	34	C
			Left	92	1	A	35	1	A
			Right	24	65	E	59	37	D
		Flemington Rd (S)	Through	65	8	A	351	10	A
			Left						
			U-turn	0	15	B	0	0	A
		Manning Clark Cres (W)	Right	53	38	D	12	36	D
			Through	17	43	D	12	43	D
			Left	5	0	A			
		Total	All	805	16	B	715	18	B
117	Flemington Road	Nullarbor Avenue	Right	11	43	D	13	56	D
		Flemington Rd (N)	Through	549	16	B	166	6	A
			Left	21	7	A	7	1	A
			U-turn	0	14	B	0	0	A
		Nullarbor Avenue (E)	Right	12	38	D	48	42	D
			Through	12	43	D	26	43	D



			Left	82	2	A	43	1	A	
			Right	30	48	D	63	42	D	
		Flemington Rd (S)	Through	81	10	A	356	7	A	
			Left	12	0	A	14	1	A	
			U-turn	3	59	E	7	50	D	
		Nullarbor Avenue (W)	Right	22	41	D	12	40	D	
			Through	26	43	D	11	37	D	
			Left	5	0	A	12	2	A	
		Total	All	865	17	B	778	14	B	
122	Flemington Road	Well Staion Drive	Flemington Rd (N)	Right	174	17	B	84	45	D
				Through	487	17	B	151	9	A
			Left	0	0	A	0	0	A	
		Well Station Dr (E)	Right	10	44	D	10	39	D	
			Through	46	40	D	42	37	D	
			Left	50	4	A	24	1	A	
		Flemington Rd (S)	Right	12	42	D	48	31	C	
			Through	68	34	C	343	23	C	
			Left	7	1	A	40	2	A	
		Well Station Dr (W)	Right	31	37	D	16	41	D	
			Through	61	41	D	58	35	C	
			Left	51	1	A	105	1	A	
		Total	All	996	20	B	921	21	C	
203	Flemington Road	Mitchell Res. Man. Cen	Flemington Rd (N)	Right	584	4	A	198	1	A
				Through	0	0	A	0	0	A
			Left	0	0	A	0	0	A	
		Mitchell Res. Man. Cen (E)	Right							
			Through							
			Left	0	0	A	0	0	A	
		Flemington Rd (S)	Right	88	0	A	431	0	A	
			Through							
			Left							
			Right							
			Through							
			Left							
		Total	All	672	3	A	629	0	A	
125	Flemington Road	Lysaght Street	Flemington Rd (N)	Right	72	1	A	49	2	A
				Through	503	0	A	150	0	A
			Left							
			Right							
			Through							
			Left							
		Flemington Rd (S)	Right	65	2	A	371	2	A	
			Through							
			Left				60	2	A	
		Lysaght St (W)	Right				56	2	A	
			Through							



			Left				63	2	A		
			Total	All	640	1	A	748	2	A	
131	Flemington Road	Sandford St/Morrisset Rd		Right	13	46	D	10	30	C	
			Flemington Rd (N)	Through	448	17	B	174	20	B	
				Left	66	1	A	14	1	A	
				U-turn							
			Morrisset Rd (E)	Right	28	33	C	0	0	A	
				Through	56	40	D	13	39	D	
				Left	0	0	A	29	46	D	
			Flemington Rd (S)	Right	0	6	A	0	0	A	
				Through	93	15	B	0	0	A	
				Left	66	14	B	370	18	B	
			Sandford Street (W)	Right	58	38	D	90	18	B	
				Through	40	40	D	102	28	C	
				Left	12	41	D	64	30	C	
				Total	All	880	21	B	867	21	C
136	Flemington Road	Randwick Road		Right	25	2	A	7	2	A	
			Flemington Rd (N)	Through	478	3	A	267	1	A	
				Left							
			Randwick Rd (E)	Right							
				Through							
				Left							
			Flemington Rd (S)	Right							
				Through	153	3	A	460	2	A	
				Left	13	2	A	2	9	A	
			Randwick Rd (W)	Right	3	4	A	1	2	A	
	Through										
	Left	4	0	A	4	0	A				
	Total	All	676	3	A	742	2	A			
201	Flemington Road	Showground		Right	0	0	A	0	0	A	
			Flemington Rd (N)	Through	476	1	A	268	0	A	
				Left	0	0	A	1	0	A	
			Showground (E)	Right							
				Through	0	0	A	0	0	A	
				Left	1	0	A	5	1	A	
			Flemington Rd (S)	Right							
				Through	172	0	A	461	1	A	
				Left							
			Showground (W)	Right	0	0	A	0	0	A	
	Through	0	0	A	0	0	A				
	Left	0	0	A	0	0	A				
	Total	All	649	1	A	735	1	A			
138	Federal Highway	Flemington Road		Right	29	55	D	17	62	E	
			Federal Highway (NE)	Through	391	23	C	178	10	A	
				Left							
				Right							



			Through						
			Left						
			Right						
		Federal Highway (SW)	Through	122	22	C	293	15	B
			Left	145	2	A	449	2	A
		Flemington Rd (NW)	Right	469	22	C	234	41	D
			Through						
			Left						
		Total	All	1156	21	B	1171	15	B
140	Federal Highway	Phillip Avenue	Right						
		Federal Highway (NE)	Through	672	9	A	359	28	C
			Left						
		Phillip Avenue (SE)	Right	44	46	D	143	39	D
			Through	0	0	A	0	0	A
			Left	35	0	A	74	1	A
		Federal Highway (SW)	Right	36	47	D	49	75	E
			Through	223	3	A	597	4	A
			Left	0	0	A	0	0	A
		Phillip Avenue (NW)	Right	0	0	A	0	0	A
			Through	0	0	A	0	0	A
			Left	0	0	A	0	0	A
		Total	All	1010	10	A	1223	18	B
141	Federal Highway / Northbourne Avenue	Barton Highway	Right						
		Federal Highway (NE)	Through	556	17	B	314	22	C
			Left	556	17	B	314	22	C
			Right						
			Through						
			Left	74	1	A	351	2	A
		Northbourne Ave (SW)	Right						
			Through	182	40	D	562	5	A
			Left	74	1	A	351	2	A
		Barton Highway (NW)	Right	550	22	C	171	50	D
			Through						
			Left	78	1	A	85	1	A
		Total	All	2071	19	B	2148	13	B
145	Northbourne Avenue	Swinden Street	Right						
		Northbourne Ave (N)	Through	935	1	A	474	1	A
			Left						
		Swinden Streett (E)	Right						
			Through						
			Left	16	2	A	18	1	A
			Right						
		Northbourne Ave (S)	Through	246	0	A	886	1	A
			Left						
		Swinden	U-Turn						
			Right						



		Street (W)	Through								
			Left								
		Total	All	1198	1	A	1377	1 A			
151	Northbourne Avenue	Mouat Street/Antill Street	Northbourne Ave (N)	Right	42	56	E	65	37	D	
			Through	859	28	C	359	63	E		
			Left	59	1	A	99	2	A		
			Antill St (E)	Right							
			Through								
			Left								
			Northbourne Ave (S)	Right	36	44	D	89	29	C	
			Through	189	33	C	680	24	C		
			Left	46	3	A	181	4	A		
			Mouat St (W)	U-Turn	3	57	E				
			Right	305	42	D	105	49	D		
			Through	171	42	D	199	51	D		
			Left	35	2	A	88	3	A		
			Total	All	1745	31	C	1867	33	C	
156/157	Northbourne Avenue	Murdoch Street/Morphett St	Northbourne Ave (N)	Right	25	2	A	19	2	A	
			Through	1256	9	A	552	4	A		
			Left	48	1	A	8	1	A		
			Morphett St (E)	U-Turn							
			Right								
			Through								
			Left	1	1	A					
			Northbourne Ave (S)	Right	64	6	A	29	1	A	
			Through	257	4	A	149	3	A		
			Left	4	1	A	969	6	A		
Murdoch St (W)	Right				9	1	A				
Through											
Left	20	1	A								
Total	All	1676	8	A	1736	5	A				
161	Northbourne Avenue	Macarthur Avenue/Wakefield Avenue	Northbourne Ave (N)	Right	38	43	D	71	59	E	
			Through	852	20	B	408	18	B		
			Left	301	4	A					
			Wakefield Ave (E)	Right	62	45	D	207	46	D	
			Through	65	52	D	151	46	D		
			Left	25	2	A	32	1	A		
			Northbourne Ave (S)	Right	15	57	E	35	75	E	
			Through	217	18	B	793	13	B		
			Left	48	3	A	116	5	A		
			Macarthur Ave (W)	U-Turn	4	46	D				
			Right	119	47	D	86	54	D		
			Through	138	48	D	133	56	D		
			Left	61	1	A	110	1	A		
			Total	All	1945	22	C	2143	25	C	
164	Northbourne	Codamine	Northbourne	Right	4	79	E	8	49	D	



	Avenue	Street/Ipima Street	Ave (N)	Through	855	16	B	455	31	C			
				Left	96	9	A		47	6	A		
				U-Turn	4	63	E						
			Ipima Street (E)	Right	33	52	D	100	44	44	D		
				Through	20	58	E						
				Left									
			Northbourne Ave (S)	Right	22	60	E	823	10	85	F		
				Through	264	12	B						
				Left	8	2	A						
			Codamine Street (W)	Right	53	52	D	29	53	47	D		
				Through	53	51	D						
				Left	4	10	A						
						Total	All	1417	19	B	1618	22	C
			167	Northbourne Avenue	Masson Street/Girrahween Street	Northbourne Ave (N)	Right	20	77	E	449	14	48
Through	775	8					A	49	18	B			
Left	163	5					A	84	0	0		A	
Girrahween Street (E)	U-Turn	3				63	E	111	45	47	D		
	Right	34				52	D						
	Through	25				57	E						
Northbourne Ave (S)	Left	21				52	D	33	47	69	E		
	Right	15				35	C						
	Through	264				20	B						
Masson Street (W)	Left	4				19	B	9	51	55	D		
	Right	24				46	D						
	Through	58				58	E						
						Left	4	8	A	38	2	A	
						Total	All	1409	16	B	1648	28	C
172	Northbourne Avenue	Gould Street/Elouera Street	Northbourne Ave (N)	Right	4	31	C	485	0	0	A		
				Through	771	3	A		14	4	A		
				Left	12	17	B		8	0	0	A	
			Elouera Street (E)	U-Turn	0	0	A	44	48	47	D		
				Right	13	49	D						
				Through	24	48	D						
			Northbourne Ave (S)	Left	25	55	D	62	46	91	F		
				Right	31	55	D						
				Through	266	18	B						
			Gould Street (W)	Left	20	21	B	8	17	59	E		
				U-Turn	8	54	D						
				Right	5	59	E						
			Cooyong	Through	19	56	D	11	56	53	D		
				Left	10	47	D						
Total	All	1208		12	B	1482	18					B	
175	Northbourne Avenue	Barry Drive/Cooyong Street	Northbourne Ave (N)	Right	90	75	E	385	96	55	D		
				Through	616	5	A		58	28	C		
				Left	96	6	A		87	41	D		
			Cooyong	Right	38	46	D	136					



		Street (E)	Through	80	47	D	239	41	D	
			Left	25	52	D	74	43	D	
		Northbourne Ave (S)	Right	58	79	E	83	81	F	
			Through	265	12	B	556	11	B	
			Left	37	6	A	79	7	A	
		Barry Drive (W)	Right	135	45	D	136	52	D	
			Through	225	48	D	204	55	D	
			Left	38	2	A	97	2	A	
		Total	All	1704	25	C	2172	37	D	
178	Northbourne Avenue	Rudd Street/Bunda Street	Northbourne Ave (N)	Right	23	81	F	15	84	F
				Through	717	6	A	558	17	B
				Left						
			Bunda Street (E)	Right	10	39	D	24	48	D
				Through	22	42	D	28	43	D
				Left	34	46	D	50	38	D
				Right	52	50	D	51	46	D
			Northbourne Ave (S)	Through	333	7	A	652	7	A
				Left	43	5	A	29	9	A
				U-Turn	10	48	D	3	52	D
			Rudd Street (W)	Right	7	50	D	26	50	D
				Through	26	50	D	24	52	D
				Left	20	47	D	40	46	D
				Total	All	1296	13	B	1499	18
182	Northbourne Avenue	Alinga Street	Northbourne Ave (N)	Right	7	50	D	15	57	E
				Through	754	4	A	622	4	A
				Left	0	0	A	0	0	A
			Alinga Street (E)	Right	2	63	E	3	80	F
				Through	26	57	E	28	71	E
				Left	1	17	B	0	19	B
			Northbourne Ave (S)	Right	0	0	A	0	0	A
				Through	416	6	A	705	7	A
				Left	15	4	A	9	4	A
			Alinga Street (W)	Right	35	48	D	31	47	D
				Through	32	55	D	27	44	D
	Left	19	47	D	27	48	D			
	Total	All	1307	9	A	1467	10	A		
183	Northbourne Avenue	London Circuit	Northbourne Ave (N)	Right	34	58	E	25	72	E
				Through	650	2	A	515	1	A
				Left	106	2	A	114	3	A
			London Circuit (E)	Right	28	48	D	63	51	D
				Through	27	54	D	62	50	D
				Left	3	1	A	20	1	A
			Northbourne Ave (S)	Right	29	62	E	55	68	E
				Through	371	16	B	576	23	C
	Left	50	2	A	45	6	A			



		Right	68	48	D	110	43	D
	London Circuit (W)	Through	31	46	D	50	47	D
		Left	35	49	D	73	41	D
	Total	All	1431	14	B	1707	21	C



Appendix B 2031 Future Baseline Intersection Performance

Node	Main Road Name	Secondary Road Name(s)	Approach	Movement	2031 Base AM Peak			2031 Base PM Peak		
					Volume	Delay	LOS	Volume	Delay	LOS
101	Hibberson St	Gungahlin Pl	Gungahlin Pl (N)	Right	103	2	A	13	2	A
				Through	32	1	A	4	1	A
			Hibberson St(E)	Left	21	1	A	22	1	A
				Right	0	0	A	89	1	A
			Gungahlin Pl (S)	Through	178	0	A	201	0	A
				Left	28	0	A	88	0	A
			Hibberson St (W)	Right	65	3	A	48	4	A
				Through	55	2	A	16	2	A
			Hibberson St (W)	Left	15	2	A	6	1	A
				Right	4	1	A	38	2	A
			Hibberson St (W)	Through	6	0	A	101	2	A
Left	6	0		A	101	2	A			
			Total	All	512	1	A	727	1	A
222	Hibberson St	Hinder	Hinder St (N)	Right	7	4	A	12	7	A
				Through	188	4	A	54	5	A
			Hibberson St(E)	Left	119	2	A	114	1	A
				Right	109	1	A	150	1	A
			Hinder St (S)	Through	183	1	A	349	1	A
				Left	28	1	A	116	1	A
			Hibberson St (W)	Right	42	4	A	29	5	A
				Through	59	3	A	176	4	A
			Hibberson St (W)	Left	2	4	A	11	4	A
				Right	41	2	A	49	4	A
			Hibberson St (W)	Through	144	0	A	114	1	A
Left	40	1		A	60	2	A			
			Total	All	963	2	A	1233	2	A
103	Flemington Road	Kate Crace St	Kate Crace St (N)	Right	48	66	E	141	7	A
				Through	202	63	E	104	6	A
			Flemington Rd (E)	Left	632	65	E	89	6	A
				Right	208	22	C	240	161	F
			Kate Crace St. (S)	Through	279	22	C	485	160	F
				Left	137	22	C	133	161	F
			Flemington Rd (W)	Right	125	8	A	129	173	F
				Through	86	7	A	171	171	F
			Flemington Rd (W)	Left	5	16	B	4	169	F
				Right	5	19	B	4	21	C
			Flemington Rd (W)	Through	275	9	A	237	8	A
Left	52	8		A	35	9	A			
			Total	All	2054	37	D	1771	109	F
107	Flemington Road	Manning Clark Cres	Manning Clark Cres (N)	Right	2	44	D	0	0	A
				Through	16	45	D	6	35	C
			Left	39	1	A	7	1	A	



			Right	41	50	D	43	49	D		
			Flemington Rd (E) Through	585	5	A	802	70	E		
			Left	2	0	A	8	11	A		
			U-turn	70	52	D	75	50	D		
			Manning Clark Cres (S) Right	1	20	B	0	0	A		
			Through	0	14	B	14	42	D		
			Left	45	2	A	90	48	D		
			Flemington Rd (W) Right	7	14	B	15	21	C		
			Through	947	22	C	379	19	B		
			Left	83	51	D	62	47	D		
			Total All	1839	17	B	1501	49	D		
109	Flemington Road	Wizard Street	Wizard St (N) Right	2	43	D	36	76	E		
			Through								
			Left	141	15	B	40	1	A		
			Wizard St (S) Right	104	57	E	151	50	D		
			Flemington Rd (E) Through	628	10	A	956	98	F		
			Left	628	10	A	956	98	F		
			U-turn	6	64	E					
			Wizard St (S) Right								
			Through								
			Left								
			Flemington Rd (W) Right								
			Through	974	15	B	379	42	D		
Left	67	9	A	73	5	A					
			Total All	2549	14	B	2591	83	F		
112	Flemington Road	Manning Clark Cres / Mapleton	Flemington Rd (N) Right	36	59	E	74	59	E		
			Through	917	137	F	351	21	C		
			Left	267	103	F	135	4	A		
			U-turn	3	68	E	9	44	D		
			Mapleton Ave (E) Right	191	63	E	174	53	D		
			Through	67	63	E	57	42	D		
			Left	158	64	E	49	2	A		
			U-turn								
			Flemington Rd (S) Right	65	62	E	198	22	C		
			Through	532	12	B	1096	10	A		
			Left	43	2	A	74	3	A		
			U-turn	28	70	E	0	0	A		
			Manning Clark Cres (W) Right	146	74	E	36	44	D		
			Through	118	52	D	60	42	D		
			Left	27	5	A	42	5	A		
			Total All	2599	80	F	2356	19	B		
117	Flemington Road	Nullarbor Avenue	Flemington Rd (N) Right	24	19	B	27	32	C		
			Through	1042	54	D	359	21	C		
			Left	120	23	C	39	6	A		
			U-turn	2	27	C	0	0	A		
			Nullarbor Right	162	54	D	126	42	D		



			Avenue (E)	Through	113	67	E	100	49	D
				Left	315	38	D	139	4	A
				Right	108	58	E	296	22	C
			Flemington Rd (S)	Through	475	38	D	1249	12	B
				Left	25	8	A	39	2	A
				U-turn	23	58	E	21	20	B
			Nullarbor Avenue (W)	Right	40	54	D	22	34	C
				Through	155	49	D	34	38	D
				Left	27	8	A	34	5	A
			Total	All	2632	47	D	2486	17	B
122	Flemington Road	Well Staion Drive	Flemington Rd (N)	Right	250	34	C	158	54	D
				Through	1192	67	E	362	14	B
				Left	0	0	A	0	0	A
			Well Station Dr (E)	Right	110	60	E	68	90	F
				Through	255	45	D	416	90	F
				Left	78	32	C	80	26	C
			Flemington Rd (S)	Right	117	59	E	213	58	E
				Through	441	37	D	1081	46	D
				Left	34	6	A	79	28	C
			Well Station Dr (W)	Right	46	73	E	25	40	D
				Through	338	50	D	327	50	D
				Left	99	6	A	498	13	B
			Total	All	2959	52	D	3307	45	D
203	Flemington Road	Mitchell Res. Man. Cen	Flemington Rd (N)	Right						
				Through	1336	13	B	487	2	A
				Left	0	0	A	0	0	A
			Mitchell Res. Man. Cen (E)	Right						
				Through						
				Left	0	0	A	0	0	A
			Flemington Rd (S)	Right	0	0	A	0	0	A
				Through	595	0	A	1384	2	A
			Total	All	1931	9	A	1871	2	A
125	Flemington Road	Lysaght Street	Flemington Rd (N)	Right	178	3	A	116	15	B
				Through	1157	0	A	372	1	A
				Left						
				Right						
				Through						
				Left						
Flemington Rd (S)	Right									
	Through	435	3	A	1176	8	A			
	Left	224	2	A	121	6	A			



			Lysaght St (W)	Right Through	145	6	A	137	20	B			
				Left	159	3	A	211	17	B			
			Total	All	2298	2	A	2134	9	A			
131	Flemington Road	Sandford St/Morisset Rd	Flemington Rd (N)	Right	46	49	D	26	58	E			
				Through	864	24	C	385	19	B			
				Left	371	4	A	79	2	A			
				U-turn	1	28	C						
			Morisset Rd (E)	Right	107	36	C	75	29	C			
				Through	258	37	D	140	32	C			
				Left	1	5	A	1	2	A			
			Flemington Rd (S)	Right	1	31	C	0	0	A			
				Through	505	21	C	1170	59	E			
			Sandford Street (W)	Left	213	21	B	174	48	D			
				Right	213	38	D	110	26	C			
				Through	221	41	D	366	36	C			
							Left				52	30	C
						Total	All	2802	25	C	2577	43	D
136	Flemington Road	Randwick Road	Flemington Rd (N)	Right	115	11	B	13	14	B			
				Through	961	8	A	484	2	A			
			Randwick Rd (E)	Right									
				Through									
			Flemington Rd (S)	Right									
				Through	700	1	A	1366	1	A			
			Randwick Rd (W)	Left	46	3	A	24	2	A			
				Right	1	12	B	7	10	A			
							Through						
							Left	14	1	A	12	0	A
			Total	All	1837	5	A	1907	1	A			
201	Flemington Road	Showground	Flemington Rd (N)	Right	0	0	A	0	0	A			
				Through	966	2	A	491	1	A			
				Left	1	1	A	1	0	A			
			Showground (E)	Right									
				Through	0	0	A	0	0	A			
			Flemington Rd (S)	Left	3	7	A	1	1	A			
				Right	1	4	A	2	1	A			
			Showground (W)	Through	759	0	A	1388	0	A			
				Left	3	1	A	0	0	A			
							Right	0	0	A	1	10	A
							Through	0	0	A	0	0	A
				Left	0	0	A	0	0	A			
			Total	All	1733	1	A	1884	0	A			
138	Federal Highway	Flemington Road	Federal	Right	113	82	F	83	62	E			



			Highway (NE)	Through	1181	29	C	616	8	A
				Left						
				Right						
				Through						
				Left						
			Federal Highway (SW)	Right	466	28	C	715	30	C
				Through	652	10	A	1307	16	B
				Left	957	36	C	462	54	D
			Flemington Rd (NW)	Right						
				Through						
				Left	12	9	A	35	3	A
			Total	All	3381	29	C	3219	24	C
140	Federal Highway	Phillip Avenue	Federal Highway (NE)	Right	0	0	A	0	0	A
				Through	1681	16	B	890	22	C
				Left	497	6	A	214	5	A
			Phillip Avenue (SE)	Right	212	45	D	380	51	D
				Through	0	0	A	0	0	A
				Left	144	2	A	123	2	A
			Federal Highway (SW)	Right	118	72	E	162	67	E
				Through	909	37	D	1648	18	B
				Left	0	0	A	0	0	A
			Phillip Avenue (NW)	Right	0	0	A	0	0	A
				Through	0	0	A	0	0	A
				Left	0	0	A	0	0	A
			Total	All	3561	23	C	3416	24	C
141	Federal Highway / Northbourne Avenue	Barton Highway	Federal Highway (NE)	Right	383	151	F	303	57	E
				Through	1409	50	D	692	17	B
				Left	1409	50	D	692	17	B
				Right						
				Through						
				Left	198	2	A	971	7	A
			Northbourne Ave (SW)	Right						
				Through	755	33	C	1626	30	C
				Left	198	2	A	971	7	A
			Barton Highway (NW)	Right	1104	55	D	314	48	D
				Through						
				Left	270	17	B	204	7	A
			Total	All	5727	50	D	5771	21	C
145	Northbourne Avenue	Swinden Street	Northbourne Ave (N)	Right						
				Through	1998	20	B	1027	2	A
				Left	526	10	A	13	2	A
			Swinden Streett (E)	Right	21	26	C	14	18	B
				Through						
				Left	53	32	C	41	2	A
			Northbourne	Right	25	18	B	60	3	A



		Ave (S)	Through	930	1	A	2558	4	A	
			Left							
			U-Turn							
		Swinden Street (W)	Right							
			Through							
			Left							
		Total	All	3553	14	B	3713	3	A	
151	Northbourne Avenue	Mouat Street/Antill Street	Northbourne Ave (N)	Right	149	144	F			F
				Through	1765	89	F	157	105	F
				Left	118	23	C	732	60	E
				Right	195	55	D	216	3	A
			Antill St (E)	Through	406	60	E	607	151	F
				Left	451	11	B	551	143	F
				Right	178	112	F	244	53	D
			Northbourne Ave (S)	Through	654	50	D	190	47	D
				Left	147	5	A	1879	69	E
				U-Turn	7	108	F			
			Mouat St (W)	Right	555	61	E	4	50	D
				Through	648	61	E	265	61	E
				Left	111	35	C	445	71	E
			Total	All	5384	66	E	5289	82	F
156/157	Northbourne Avenue	Murdoch Street/Morphett St	Northbourne Ave (N)	Right	211	13	B	58	9	A
				Through	2597	24	C	1198	14	B
				Left	61	1	A	15	1	A
				U-Turn						
			Morphett St (E)	Right						
				Through						
				Left	0	0	A			
			Northbourne Ave (S)	Right	183	12	B	91	2	A
				Through	895	4	A	172	7	A
				Left	12	1	A	2437	17	B
Murdoch St (W)	Right									
	Through									
	Left	103	2	A	21	1	A			
Total	All	4062	18	B	3992	15	B			
161	Northbourne Avenue	Macarthur Avenue/Wakefield Avenue	Northbourne Ave (N)	Right	157	38	D	37	4	A
				Through	1830	41	D			
				Left	635	15	B	177	84	F
				Right	182	57	E	206	3	A
			Wakefield Ave (E)	Through	306	58	E	368	52	D
				Left	69	14	B	377	50	D
				Right	47	49	D	47	15	B
			Northbourne Ave (S)	Through	714	61	E	67	85	F
				Left	230	21	C	1874	50	D
				U-Turn	7	85	F			



		Macarthur Ave (W)	Right	331	281	F	7	116	F
			Through	616	293	F	234	63	E
			Left	209	242	F	351	66	E
		Total	All	5334	93	F	3748	51	D
164	Northbourne Avenue	Northbourne Ave (N)	Right	28	70	E	54	65	E
			Through	1840	23	C	1041	41	D
			Left	262	17	B	145	22	C
			U-Turn	53	73	E	5	75	E
		Ipima Street (E)	Right	97	59	E	267	131	F
			Through	115	62	E	189	133	F
			Left	139	21	B	116	105	F
		Northbourne Ave (S)	Right	86	41	D	125	84	F
			Through	879	34	C	2091	37	D
			Left	41	20	B	95	31	C
		Codamine Street (W)	Right	192	117	F	46	52	D
			Through	264	120	F	87	56	D
			Left	22	94	F	21	18	B
				Total	All	4016	39	D	4283
167	Northbourne Avenue	Northbourne Ave (N)	Right	84	65	E	33	62	E
			Through	1691	13	B	1020	60	E
			Left	433	11	B	165	42	D
			U-Turn	16	49	D	9	46	D
		Girrahween Street (E)	Right	101	57	E	308	211	F
			Through	59	61	E	187	208	F
			Left	65	62	E	66	203	F
		Northbourne Ave (S)	Right	46	62	E	20	69	E
			Through	946	8	A	2016	15	B
			Left	39	3	A	36	18	B
		Masson Street (W)	Right	119	61	E	38	52	D
			Through	206	61	E	98	58	E
			Left	15	31	C	136	15	B
				Total	All	3821	20	B	4133
172	Northbourne Avenue	Northbourne Ave (N)	Right	24	41	D	0	0	A
			Through	1693	4	A	1122	15	B
			Left	63	26	C	33	10	A
			U-Turn	26	86	F	14	65	E
		Elouera Street (E)	Right	44	57	E	177	258	F
			Through	97	60	E	140	265	F
			Left	99	55	D	162	365	F
		Northbourne Ave (S)	Right	108	43	D	34	82	F
			Through	915	44	D	1803	16	B
			Left	84	47	D	28	28	C
		Gould Street (W)	U-Turn	22	67	E	30	50	D
			Right	28	59	E	25	48	D
			Through	110	59	E	52	54	D



			Left	37	55	D	74	49	D
			Total All	3349	24	C	3695	54	D
175	Northbourne Avenue	Barry Drive/Cooyong Street	Northbourne Ave (N) Right	334	131	F	265	73	E
			Northbourne Ave (N) Through	1357	28	C	904	51	D
			Northbourne Ave (N) Left	165	23	C	178	39	D
			Cooyong Street (E) Right	199	55	D	352	50	D
			Cooyong Street (E) Through	370	58	E	704	55	D
			Cooyong Street (E) Left	101	59	E	138	61	E
			Northbourne Ave (S) Right	187	71	E	176	57	E
			Northbourne Ave (S) Through	882	24	C	1299	24	C
			Northbourne Ave (S) Left	172	16	B	201	20	B
			Barry Drive (W) Right	387	53	D	279	57	E
			Barry Drive (W) Through	563	53	D	517	62	E
			Barry Drive (W) Left	117	16	B	245	18	B
						Total All	4834	44	D
178	Northbourne Avenue	Rudd Street/Bunda Street	Northbourne Ave (N) Right	47	88	F	22	86	F
			Northbourne Ave (N) Through	1752	10	A	1261	16	B
			Northbourne Ave (N) Left	58	3	A	41	4	A
			Bunda Street (E) Right	41	60	E	85	58	E
			Bunda Street (E) Through	76	59	E	69	58	E
			Bunda Street (E) Left	117	55	D	152	54	D
			Northbourne Ave (S) Right	148	164	F	131	74	E
			Northbourne Ave (S) Through	1097	11	A	1522	19	B
			Northbourne Ave (S) Left	127	7	A	76	14	B
			Northbourne Ave (S) U-Turn	33	144	F	10	59	E
			Rudd Street (W) Right	13	58	E	77	54	D
			Rudd Street (W) Through	99	62	E	79	52	D
			Rudd Street (W) Left	95	51	D	85	52	D
			Total All	3703	23	C	3612	25	C
182	Northbourne Avenue	Alinga Street	Northbourne Ave (N) Right	45	61	E	72	92	F
			Northbourne Ave (N) Through	1872	7	A	1422	13	B
			Northbourne Ave (N) Left	0	0	A	0	0	A
			Alinga Street (E) Right	2	89	F	2	89	F
			Alinga Street (E) Through	25	61	E	26	61	E
			Alinga Street (E) Left	2	17	B	4	45	D
			Northbourne Ave (S) Right	0	0	A	0	0	A
			Northbourne Ave (S) Through	1392	5	A	1675	7	A
			Northbourne Ave (S) Left	95	3	A	70	6	A
			Alinga Street (W) Right	50	61	E	92	59	E
			Alinga Street (W) Through	30	57	E	30	63	E
			Alinga Street (W) Left	14	50	D	63	57	E
						Total All	3528	9	A
183	Northbourne Avenue	London Circuit	Northbourne Ave (N) Right	102	80	F	69	87	F
			Northbourne Ave (N) Through	1499	7	A	1155	6	A
			Northbourne Ave (N) Left	299	9	A	278	11	A



	London Circuit (E)	Right	129	57	E	260	55	D
		Through	87	56	E	154	53	D
		Left	7	4	A	63	10	A
	Northbourne Ave (S)	Right	125	85	F	171	147	F
		Through	1211	23	C	1298	38	D
		Left	123	13	B	129	23	C
	London Circuit (W)	Right	286	52	D	388	50	D
		Through	150	51	D	162	53	D
		Left	140	53	D	185	50	D
	Total	All	4158	25	C	4313	36	C



Appendix C 2031 Future Project Intersection Performance



Node	Main Road Name	Secondary Road Name(s)	Approach	Movement	2031 Project AM Peak			2031 Project PM Peak			
					Volume	Delay	LOS	Volume	Delay	LOS	
101	Hibberson St	Gungahlin PI	Gungahlin PI (N)	Right	49	1	A	8	1	A	
				Through	218	1	A	37	1	A	
			Hibberson St(E)	Left							
				Right							
			Gungahlin PI (S)	Through	110	1	A	236	2	A	
				Left	231	1	A	224	2	A	
			Hibberson St (W)	Right	79	2	A	58	1	A	
				Through							
				Left	78	2	A	177	2	A	
			Total	All	765	1	A	741	2	A	
222	Hibberson St	Hinder	Hinder St (N)	Right							
				Through	168	13	B	110	13	B	
			Hibberson St(E)	Left							
				Right	11	5	A	11	4	A	
			Hinder St (S)	Through	283	16	B	571	26	C	
				Left							
			Hibberson St (W)	Right							
				Through	12	7	A	12	7	A	
				Left							
			Total	All	474	14	B	704	24	C	
103	Flemington Road	Kate Crace St	Kate Crace St (N)	Right							
				Through	257	38	D	220	40	D	
			Flemington Rd (E)	Left	635	9	A	330	8	A	
				Right	164	47	D	158	46	D	
			Kate Crace St. (S)	Through	347	15	B	713	22	C	
				Right	207	71	E	209	73	E	
			Flemington Rd (W)	Through	22	51	D	220	47	D	
				Left							
				Right							
				Through	12	11	A	12	5	A	
	Left										
Total	All	1644	27	C	1863	32	C				
107	Flemington Road	Manning Clark Cres	Manning Clark Cres (N)	Right	0	0	A	0	0	A	
				Through	34	52	D	3	57	E	
				Left	47	3	A	8	1	A	



			Right	10	68	E	10	55	D	
		Flemington Rd (E)	Through	468	14	B	756	10	A	
			Left	3	2	A	10	1	A	
			U-turn	61	66	E	45	61	E	
		Manning Clark Cres (S)	Right	1	17	B	1	33	C	
			Through	0	19	B	10	67	E	
			Left	50	57	E	106	61	E	
		Flemington Rd (W)	Right	7	9	A	24	13	B	
			Through	726	17	B	434	15	B	
			Left	110	64	E	78	55	D	
		Total	All	1516	21	B	1483	18	B	
109	Flemington Road	Wizard Street	Wizard St (N)	Right	3	30	C	19	38	D
			Through							
			Left	146	44	D	45	40	D	
			Right	104	59	E	191	37	D	
		Flemington Rd (E)	Through	485	3	A	809	6	A	
			Left							
			U-turn	5	66	E				
		Wizard St (S)	Right							
			Through							
			Left							
		Flemington Rd (W)	Right							
			Through	787	26	C	446	39	D	
			Left	58	3	A	46	5	A	
		Total	All	1589	22	C	1555	21	B	
112	Flemington Road	Manning Clark Cres / Mapleton	Flemington Rd (N)	Right	47	81	F	84	110	F
			Through	950	42	D	369	31	C	
			Left	253	35	C	148	25	C	
			U-turn	2	81	F	6	85	F	
		Mapleton Ave (E)	Right	185	62	E	138	45	D	
			Through	80	60	E	77	48	D	
			Left	158	60	E	74	45	D	
			Right	58	101	F	184	33	C	
		Flemington Rd (S)	Through	387	19	B	896	19	B	
			Left	43	2	A	64	10	A	
			U-turn	30	106	F	0	0	A	
		Manning Clark Cres (W)	Right	158	71	E	40	52	D	
			Through	119	74	E	55	56	D	
			Left	29	82	F	34	61	E	
		Total	All	2500	46	D	2168	31	C	
117	Flemington Road	Nullarbor Avenue	Flemington Rd (N)	Right	25	47	D	22	65	E
			Through	1132	21	B	402	25	C	
			Left	115	8	A	46	6	A	
			U-turn	3	43	D	0	0	A	
		Nullarbor Avenue (E)	Right	144	76	E	88	52	D	
			Through	130	48	D	98	43	D	



			Left	318	12	B	149	3	A
			Right	120	71	E	277	60	E
		Flemington Rd (S)	Through	356	25	C	1034	20	B
			Left	24	4	A	32	6	A
			U-turn	22	68	E	21	69	E
		Nullarbor Avenue (W)	Right	36	50	D	25	45	D
			Through	174	48	D	41	44	D
			Left	19	10	A	23	3	A
		Total	All	2619	28	C	2259	27	C
122	Flemington Road	Well Station Drive	Flemington Rd (N) Right	225	35	C	168	68	E
			Through	1350	36	C	383	31	C
			Left	0	0	A	1	2	A
		Well Station Dr (E)	Right	36	84	F	72	71	E
			Through	341	79	E	458	65	E
			Left	84	22	C	96	17	B
		Flemington Rd (S)	Right	135	83	F	175	117	F
			Through	409	37	D	844	48	D
			Left	26	13	B	75	28	C
		Well Station Dr (W)	Right	34	61	E	25	44	D
			Through	348	94	F	367	53	D
			Left	99	32	C	475	14	B
		Total	All	3087	49	D	3138	48	D
203	Flemington Road	Mitchell Res. Man. Cen	Flemington Rd (N) Right						
			Through	1464	21	C	504	2	A
			Left	0	0	A	0	0	A
		Mitchell Res. Man. Cen (E)	Right	0	0	A	0	0	A
			Through						
			Left	0	0	A	0	0	A
		Flemington Rd (S)	Right	0	0	A	0	0	A
			Through	566	2	A	1108	2	A
			Left						
			Right						
			Through						
			Left						
		Total	All	2030	16	B	1611	2	A
125	Flemington Road	Lysaght Street	Flemington Rd (N) Right	165	60	E	126	27	C
			Through	1296	19	B	386	3	A
			Left						
			Right						
			Through						
			Left						
		Flemington Rd (S)	Right						
			Through	427	15	B	946	13	B
			Left	181	18	B	106	10	A
		Lysaght St (W)	Right	136	69	E	107	52	D
			Through						



			Left	138	26	C	165	25	C
		Total	All	2344	24	C	1838	15	B
131	Flemington Road	Sandford St/Morriset Rd	Right	59	99	F	26	136	F
			Flemington Rd (N) Through	996	60	E	401	17	B
			Left	399	59	E	63	15	B
			U-turn	1	35	C			
			Morriset Rd (E) Right	83	226	F	74	64	E
			Through	271	227	F	141	71	E
			Left	0	27	C	0	1	A
			Flemington Rd (S) Right	1	33	C	0	0	A
			Through	481	26	C	935	32	C
			Left	246	28	C	165	33	C
			Sandford Street (W) Right	146	45	D	95	38	D
			Through	241	52	D	344	45	D
			Left	65	47	D	45	41	D
			Total	All	2989	71	E	2289	36
136	Flemington Road	Randwick Road	Flemington Rd (N) Right	49	63	E	15	64	E
			Through	1100	1	A	484	1	A
			Left						
			Randwick Rd (E) Right						
			Through						
			Left						
			Flemington Rd (S) Right						
			Through	718	2	A	1097	4	A
			Left	22	101	F	23	67	E
			Randwick Rd (W) Right	1	27	C	6	69	E
Through									
Left	12	60	E	10	66	E			
Total	All	1902	5	A	1635	5	A		
201	Flemington Road	Showground	Flemington Rd (N) Right				0	0	A
			Through	1101	8	A	492	6	A
			Left				2	9	A
			Showground (E) Right						
			Through	0	0	A	0	0	A
			Left	3	76	E	7	73	E
			Flemington Rd (S) Right				3	277	F
			Through	738	7	A	1123	11	A
			Left				0	0	A
			Showground (W) Right						
			Through	0	0	A	0	0	A
			Left	0	0	A	0	0	A
Total	All	1842	8	A	1627	10	A		
138	Federal Highway	Flemington Road	Federal Highway (NE) Right	87	65	E	71	67	E
			Through	1135	23	C	650	13	B
			Left						
			Right						



			Through Left Right Through Left Right Through Left Total	Federal Highway (SW) Flemington Rd (NW) All	461 654 1107 12 3455	31 12 48 37 31	C B D D C	769 1058 459 41 3048	26 25 51 16 27	C C D B C
140	Federal Highway	Phillip Avenue	Right Through Left Right Through Left Right Through Left Total	Federal Highway (NE) Phillip Avenue (SE) Federal Highway (SW) Phillip Avenue (NW) All	0 1798 438 192 0 128 95 924 0 0 3576	0 23 5 69 0 10 85 23 0 0 24	A C A E A A F C A A C	0 936 173 315 0 124 135 1512 0 0 3195	0 27 3 74 0 7 119 69 0 0 53	A C A E A A F E A A D
141	Federal Highway / Northbourne Avenue	Barton Highway	Right Through Left Right Through Left Right Through Left Total	Federal Highway (NE) Northbourne Ave (SW) Barton Highway (NW) All	359 1584 776 209 1132 248 4308	68 25 46 3 68 26 43	E C D A E C D	319 736 1438 1008 363 227 4091	75 11 49 22 47 10 35	E B D C D A C
145	Northbourne Avenue	Swinden Street	Right Through Left Right Through Left Right Through Left U-Turn Right	Northbourne Ave (N) Swinden Streett (E) Northbourne Ave (S) Swinden	9 2713 31 17 1 46 28 977 11 1 4	12 22 19 65 41 55 1 5 8 3 82	B C B E D D A A A A F	6 1091 1 13 1 41 65 2411 13 17 60	2 9 6 58 48 53 6 22 11 60	A A A E D D A C B E



		Street (W)	Through	2	79	E	0	0	A	
			Left	4	39	D	34	56	E	
		Total	All	3842	18	B	3694	19	B	
151	Northbourne Avenue	Northbourne Ave (N)	Right	137	111	F	152	98	F	
			Through	1915	75	E	779	65	E	
			Left	677	34	C	240	5	A	
		Antill St (E)	Right	218	69	E	605	120	F	
			Through	419	88	F	574	119	F	
			Left	457	11	A	251	35	C	
		Northbourne Ave (S)	Right	173	113	F	183	59	E	
			Through	680	20	B	1763	66	E	
			Left	141	3	A	402	15	B	
		Mouat St (W)	U-Turn	47	121	F				
			Right	543	62	E	258	69	E	
			Through	666	67	E	436	79	E	
			Left	117	31	C	185	21	C	
		Total	All	6192	57	E	5828	70	E	
156/157	Northbourne Avenue	Northbourne Ave (N)	Right	224	54	D	65	32	C	
			Through	2751	11	A	1240	9	A	
			Left	110	1	A	38	1	A	
			U-Turn	6	41	D				
		Morphett St (E)	Right							
			Through							
		Northbourne Ave (S)	Left	0	0	A	90	2	A	
			Right	167	38	D	146	35	C	
			Through	935	4	A	2344	10	A	
		Murdoch St (W)	Left	12	1	A	23	0	A	
			Right							
			Through							
		Total	Left	107	2	A	38	6	A	
			All	4312	12	B	3984	11	A	
161	Northbourne Avenue	Northbourne Ave (N)	Right	194	77	E	140	76	E	
			Through	1884	58	E	972	41	D	
			Left	642	23	C	207	3	A	
		Wakefield Ave (E)	Right	186	64	E	362	68	E	
			Through	322	66	E	383	64	E	
			Left	78	5	A	49	14	B	
		Northbourne Ave (S)	Right	45	59	E	65	97	F	
			Through	728	50	D	1796	48	D	
			Left	208	24	C	359	39	D	
		Macarthur Ave (W)	U-Turn	14	83	F				
			Right	305	277	F	231	70	E	
			Through	585	290	F	346	72	E	
			Left	214	238	F	306	9	A	
		Total	All	5405	96	F	5216	48	D	
164	Northbourne	Codamine Street/Ipima Street	Northbour	Right	25	163	F	63	82	F



	Avenue	ne Ave (N)	Through	1885	35	C	1062	46	D	
			Left	273	28	C	149	22	C	
			U-Turn	32	124	F				
			Right	102	56	D	285	123	F	
			Ipima Street (E)	Through	119	59	E	210	122	F
				Left	131	15	B	130	92	F
				Right	86	77	E	121	112	F
			Northbourne Ave (S)	Through	876	47	D	1971	44	D
				Left	45	28	C	88	36	C
			Codamine Street (W)	Right	190	69	E	45	55	D
				Through	300	65	E	87	58	E
				Left	22	14	B	18	0	A
			Total	All	4086	43	D	4229	57	E
			167	Northbourne Avenue	Masson Street/Girrahween Street	Right	96	71	E	39
Northbourne Ave (N)	Through	1915				14	B	1050	59	E
	Left	258				11	A	162	36	D
	U-Turn	13				65	E			
Girrahween Street (E)	Right	98				53	D	304	169	F
	Through	57				58	E	192	170	F
	Left	56				54	D	68	169	F
Northbourne Ave (S)	Right	24				57	E	18	87	F
	Through	940				28	C	1935	22	C
Masson Street (W)	Left	24				9	A	37	25	C
	Right	103				83	F	38	62	E
	Through	227				95	F	94	69	E
Left	29	79				E	150	47	D	
Total	All	3841				28	C	4088	56	D
172	Northbourne Avenue	Gould Street/Elouera Street	Right	17	65	E	0	0	A	
			Northbourne Ave (N)	Through	1950	10	A	1156	29	C
				Left	44	33	C	36	29	C
				U-Turn	12	99	F	13	91	F
			Elouera Street (E)	Right	67	85	F	211	139	F
				Through	120	79	E	184	142	F
				Left	73	73	E	198	200	F
			Northbourne Ave (S)	Right	106	88	F	35	105	F
				Through	891	43	D	1685	29	C
			Gould Street (W)	Left	68	44	D	32	35	C
				U-Turn	18	119	F	32	68	E
				Right	27	66	E	24	62	E
			Left	Through	140	69	E	52	67	E
				Left	35	59	E	76	64	E
Total	All	3568	30	C	3734	51	D			
175	Northbourne Avenue	Barry Drive/Cooyong Street	Right	395	74	E	328	106	F	
			Northbourne Ave (N)	Through	1459	45	D	933	54	D
				Left	193	50	D	155	59	E
			Cooyong	Right	200	54	D	332	58	E



		Street (E)	Through	388	68	E	719	87	F
			Left	102	89	F	131	95	F
		Northbourne Ave (S)	Right	239	81	F	166	95	F
			Through	841	41	D	1224	61	E
			Left	172	41	D	208	69	E
		Barry Drive (W)	Right	329	74	E	287	65	E
			Through	596	65	E	509	61	E
			Left	89	70	E	231	78	E
		Total	All	5001	56	E	5224	69	E
178	Northbourne Avenue	Rudd Street/Bunda Street	Northbourne Ave (N)	Right					
			Through	1831	32	C	1312	36	C
			Left	57	29	C	45	39	D
		Bunda Street (E)	Right	38	67	E	83	68	E
			Through	78	60	E	89	71	E
			Left	117	63	E	135	71	E
			Right	130	91	F	131	55	D
		Northbourne Ave (S)	Through	1119	12	B	1448	54	D
			Left	130	11	A	85	49	D
			U-Turn	33	107	F	0	0	A
		Rudd Street (W)	Right	17	81	F	81	73	E
			Through	97	84	F	81	67	E
			Left	99	81	F	82	78	E
		Total	All	3746	32	C	3572	50	D
182	Northbourne Avenue	Alinga Street	Northbourne Ave (N)	Right					
			Through	1991	22	C	1516	19	B
			Left	0	0	A	0	0	A
		Alinga Street (E)	Right	2	77	E	3	86	F
			Through	33	71	E	28	59	E
			Left	3	71	E	3	71	E
		Northbourne Ave (S)	Right						
			Through	1392	13	B	1642	22	C
			Left	109	12	B	67	20	B
		Alinga Street (W)	Right	50	100	F	57	64	E
			Through	37	87	F	27	55	D
			Left	15	109	F	43	71	E
		Total	All	3630	21	B	3386	22	C
183	Northbourne Avenue	London Circuit	Northbourne Ave (N)	Right					
			Through	1708	25	C	1302	26	C
			Left	303	20	B	268	19	B
		London Circuit (E)	Right	126	40	D	240	50	D
			Through	94	41	D	144	47	D
			Left	8	32	C	59	47	D
		Northbourne Ave (S)	Right						
			Through	1231	30	C	1279	43	D
			Left	286	17	B	259	28	C



		Right	309	53	D	410	50	D
	London Circuit (W)	Through	150	61	E	168	57	E
		Left	141	53	D	194	68	E
	Total	All	4357	30	C	4324	38	D