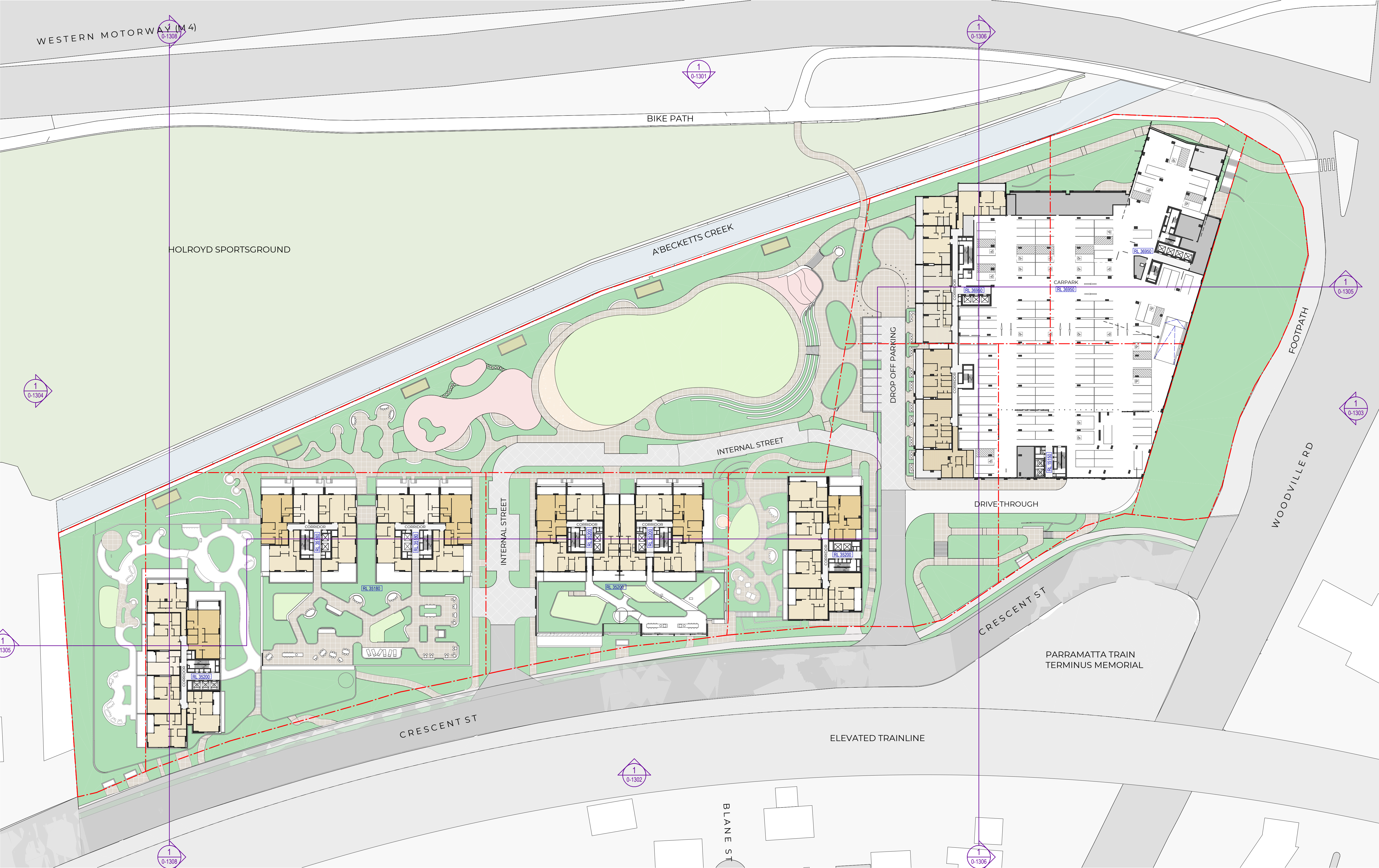




Recent revision history			Notes
#	Status	Description	Date
A		SSDA Submission	08/11/24
B		SSDA Submission Update	20/11/24
			Copyright © Woods Bagot 2018 All Rights Reserved No material may be reproduced without prior permission Contractor must verify all dimensions on site before commencing work or preparing shop drawings. Do not scale drawings.

Date generated 11/20/2024 11:48:47 PM

Project Crescent Parklands		Issuer W-B WOODS BAGOT		Sheet title Overall Plan Level 06	
Client Tiberius (Holroyd) Pty Ltd (as trustee for the Holroyd Unit Trust)		Project number 121784	Size check 25mm	Sheet number DA -0-1206	Revision B
Checked Checker	Approved Approver	Sheet size A1	Scale 1 : 500	Status For information	

Appendix F

Traffic Flow Diagrams

Existing AM Peak 8am-9am

Total
HV

Pitt St				West Block Access (Towers 4-7)				East Block Access (Towers 1-3)			
				22 674 ↓	1 71 ↘	↕ →		↕ →		↖ ↗	
				Walpole St				Crescent St			
↑ 777 29								↑ 272 16			
↗								↗			
				↖ 96 179	1 17			↖ 96 179	1 17		
				↖ 4 169 ↖	↘ 26 288 ↓	↘ 3 270 ↘		↖ 4 169 ↖	↘ 26 288 ↓	↘ 3 270 ↘	
Neil St											
↖ 14 0				↑ 307 26				↗ 179 9			
				↖ 382 400 ↘ 140				↖ 382 400 ↘ 140			

Existing PM Peak 3.30pm-4.30pm

Total
HV

Pitt St			West Block Access (Towers 4-7)			East Block Access (Towers 1-3)		
			32 791 ↓	2 44 ↘	↕ →	↕ →	↖	↗
			Walpole St			Crescent St		
			↑ 60 ↓ 262	3 10	↑ ←	↑ ←		
			1 3	118 465	↕ →	4 224 ↖	22 371 ↓	7 277 ↘
Neil St			↖ 27 0	↑ 312 16	↗ 252 5	↑ 337 469 ↓ 216	5 2 3	
			13	187	↕	2 256 ↖		
Merrylands Rd						↑ 343 ← 102	13 17	

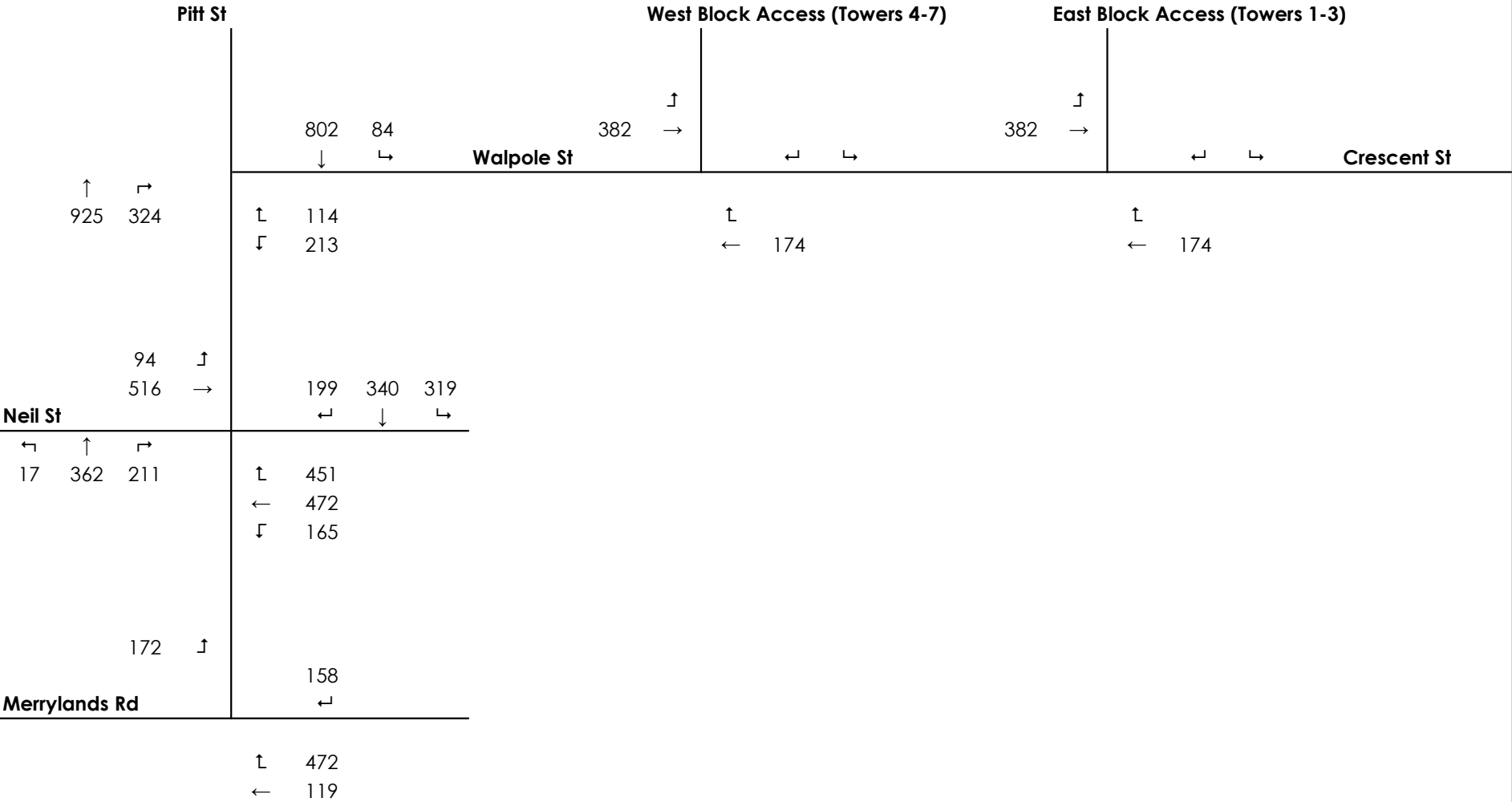
Existing SAT Peak 12pm-1pm

Total
HV

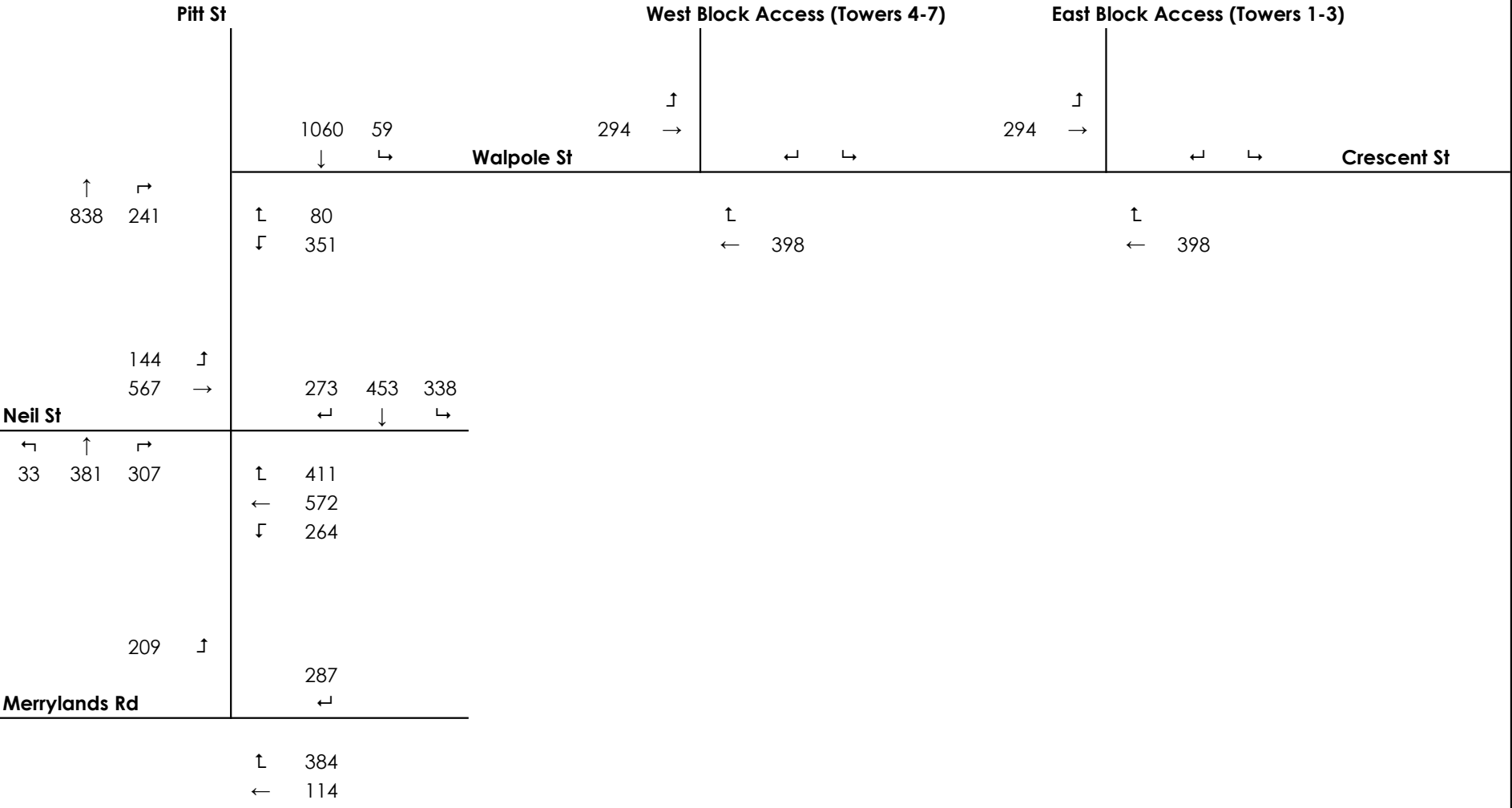
Pitt St			West Block Access (Towers 4-7)			East Block Access (Towers 1-3)		
			13 566 ↓	0 48 ↘	↗ →	↗ →		
			Walpole St			Crescent St		
			↑ 617 12	↗ 196 2				
			↑ 55 ↓ 210	0 3	↑ ←	↑ ←		
			0 4	131 417	↗ →			
Neil St			2 234 ↘	12 245 ↓	3 219 ↘			
			↖ 38 0	↑ 353 11	↗ 333 6			
			↑ 247 ← 477 ↓ 190	6 2 3				
			9	211	↗			
Merrylands Rd			2 219 ↖					
			↑ 393 ← 116	10 9				

10-Yr Future AM Peak

10



10-Yr Future PM Peak



10-Yr Future SAT Peak

Pitt St			West Block Access (Towers 4-7)			East Block Access (Towers 1-3)		
			758 ↓	64 ↘	294 ↗	294 ↗		
			Walpole St			Crescent St		
			↕ 74 ↘ 281		↕ ← 398	↕ ← 398		
			160 509	↗				
Neil St			285 ↖	299 ↓	267 ↘			
			↖ 46 ↑ 431 ↗ 406					
			↕ 301 ← 582 ↘ 232					
			236 ↗					
Merrylands Rd			245 ↖					
			↕ 440 ← 130					

10-Yr Future + Proposed Development AM Peak

Pitt St			West Block Access (Towers 4-7)				East Block Access (Towers 1-3)									
			799 ↓		116 ↘		17 456 →		84 441 →		139 ↖		125 ↘		Crescent St	
Walpole St																
			↖ 186 ↘ 343				↖ 17 ← 309				↖ 128 ← 187					
			99 516 →		↖ 229 ↓ 391 ↘ 367											
Neil St																
↖ 17 ↑ 383 ↗ 211			↖ 474 ← 472 ↘ 165													
			177 ↗													
Merrylands Rd			209 ↖													
			↖ 488 ← 119													

10-Yr Future + Proposed Development PM Peak

Pitt St			West Block Access (Towers 4-7)			East Block Access (Towers 1-3)							
			1055 ↓	132 ↘	Walpole St	67 410	↕ →	124 303	↕ →	111 ↖	75 ↘	Crescent St	
↑ 834 ↗ 344			↕ 117 ↘ 431				↕ 68 ← 498				↕ 150 ← 456		
158 ↕ 567 →			294 ↖ 487 ↓ 363 ↘										
Neil St													
↖ 33	↑ 424	↗ 307	↕ 452 ← 572 ↘ 264										
223 ↕			321 ↖										
Merrylands Rd													
			↕ 413 ← 114										

10-Yr Future + Proposed Development SAT Peak

Pitt St			West Block Access (Towers 4-7)			East Block Access (Towers 1-3)									
			752 ↓	102 ↘	Walpole St	42 ↖	43 ↘	94 ↖	328 ↘	121 ↖	88 ↘	Crescent St			
↑ 822 ↗ 345			↑ 116 ↓ 391				↑ 43 ← 508				↑ 115 ← 429				
173 ↗ 509 →			322 ↖	338 ↓	301 ↘										
Neil St															
↖ 46	↑ 471	↗ 406	↑ 325 ← 582 ↓ 232												
249 ↗			284 ↖												
Merrylands Rd															
			↑ 467 ← 130												

10-Yr Future + Approved Developments AM Peak

Pitt St			West Block Access (Towers 4-7)			East Block Access (Towers 1-3)		
			817 ↓	84 ↘	0 410	↗ →	0 410	↗ →
			Walpole St					
			↖ 114		↖ 0		↖ 0	
			↘ 249		← 210		← 210	
						Crescent St		
			↖ 199	366 ↓	331 ↘			
Neil St								
↖ 17	↑ 409	↗ 238	↖ 451					
			← 472					
			↘ 165					
			185	↗				
Merrylands Rd			162 ↖					
			↖ 533					
			← 123					

10-Yr Future + Approved Developments PM Peak

Pitt St			West Block Access (Towers 4-7)			East Block Access (Towers 1-3)		
			1081 ↓	59 ↘	0 322	↑ →	0 322	↑ →
			Walpole St			0 ↙	0 ↘	Crescent St
↑ 848 ↗ 269			↖ 80 ↘ 373				↖ 0 ← 420	
144 ↗ 567 →			273 ↙ 477 ↓ 347 ↘					
Neil St								
↖ 33 ↑ 409 ↗ 329			↖ 411 ← 572 ↘ 264					
215 ↗								
Merrylands Rd			293 ↙					
			↖ 428 ← 118					

10-Yr Future + Approved Developments SAT Peak

Pitt St			West Block Access (Towers 4-7)			East Block Access (Towers 1-3)		
			778 ↓	64 ↘	Walpole St	0 ↙	0 ↘	0 ↙
			0 316	↗ →		0 316	↗ →	0 ↘
								Crescent St
			↑ 835	↗ 285		↑ 0	↗ 418	
			↘ 74	↘ 301		↘ 0	↘ 418	
			160 509	↗ →		285 ↙	320 ↓	277 ↘
Neil St			↙ 46	↑ 456		↙ 301	↙ 582	↘ 232
			↘ 430					
			241	↗		249 ↙		
Merrylands Rd								
			↑ 483					
			↙ 134					

10-Yr Future + All Developments AM Peak

Pitt St			West Block Access (Towers 4-7)			East Block Access (Towers 1-3)					
			814 ↓	116 ↘	17 ↑ 484 →	67 ↙	68 ↘	84 ↑ 469 →	139 ↙	125 ↘	
			Walpole St						Crescent St		
↑ 937	↗ 406		↖ 186 ↘ 378			↖ 17 ← 345			↖ 128 ← 223		
</											

10-Yr Future + All Developments PM Peak

Pitt St			West Block Access (Towers 4-7)			East Block Access (Towers 1-3)							
			1075 ↓	132 ↘	Walpole St	67 437	↑ →	124 330	↑ →	111 ↘	75 ↘	Crescent St	
↑ 843 ↗ 372			⤴ 117 ⤵ 453				⤴ 68 ← 520				⤴ 150 ← 477		
158 ↑ 567 →			294 ↘ 511 ↓ 372 ↘										
Neil St			⤴ 452 ← 572 ⤵ 264										
↖ 33 ↑ 452 ↗ 329													
229 ↑			327 ↖										
Merrylands Rd			⤴ 457 ← 118										

10-Yr Future + All Developments SAT Peak

[illegible]

Appendix G

Aimsun Model Development Report



Crescent Parklands Model Development Report

Prepared for:

Tiberius (Holroyd) Pty Ltd

30 October 2020

The Transport Planning Partnership

E: info@tpp.net.au

Crescent Parklands Model Development Report

Client: Tiberius (Holroyd) Pty Ltd

Version: version 1

Date: 30 October 2020

TPP Reference: 16241

Quality Record

Version	Date	Prepared by	Reviewed by	Approved by	Signature
01	30/10/2020	S.Read	K.Hollyoak	Ken Hollyoak	

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APPENDICES

- A. MODEL PLOT
- B.

1 Introduction

The Transport Planning Partnership (TPPP) has been commissioned by Tiberius (Holroyd) Pty Ltd to undertake Aimsun Micro-simulation modelling for the Crescent Parklands Development planning proposal. This report sets out the development and calibration of a micro-simulation model based on the Parramatta Road Corridor Urban Transformation Strategy (PRCUTS) meso-scopic model that was developed GTA Consultants.

1.1 Background

The model has been calibrated for micro-simulation as requested by TfNSW to test the traffic impact on the surrounding road network of a development at 1 Crescent Street, Holyroyd.

The subject site is located at 1 Crescent Street, Holroyd and is located approximately 1km south of Parramatta city centre. The site fronts Crescent Street and is enclosed by Parramatta Road/M4 Motorway to the north and Woodville Road to the east. The neighbouring sites directly to the north and west of the site include a recreational sporting field, and light industrial land uses, respectively.

The site was formerly operated by WesTrac as a modern industrial facility providing administration offices, amenities, training facilities, workshops, machine servicing bays, spare parts warehousing, and on-site parking for specialist heavy earthmoving equipment and motor vehicles. The use has now ceased.

According to the Cumberland Council (former Holroyd Council) Local Environmental Plan (LEP) 2013 the subject site is zoned as B5 Business Development. The surrounding properties predominately include mixed density housing (low, medium and high density), public recreation, and light industrial uses.

The planning proposal includes the demolition of the existing industrial building and the construction of a new high-density mixed-use development.

It is intended that the proposal will seek to rezone the site to deliver a high-density mixed-use development, as summarised in Table 1.1.

Table 1.1 Development Schedule

Use	Size
Residential	1109 - 1255 units
Retail (shopping centre)	7,752.5 m ²
Office	7,752.5 m ²

Figure 1.1 presents the indicative masterplan layout of the planning proposal.

Figure 1.1 Indicative Masterplan Layout



As shown in the above figure, three vehicular access points are proposed. The access driveway closest to the Woodville Road intersection would be predominately used by retail development. The remaining two access points will generally be used by residential components. All three access roads will provide two-way vehicular flows.

1.2 Project Objective

In response to TfNSW / Council and other submissions additional micro-simulation modelling has been undertaken to test impacts of the proposed development at 1 Crescent Street.

The objective of this project is to assess the traffic and transport impacts of the proposed development on the road network. In particular the model is to assess the impacts on:

- Woodville Road / Crescent Street
- Parramatta Road / Woodville Road/ Church Street / M4 Westbound entry ramp
- Church Street / M4 Eastbound exit ramp.
-

1.3 Scope of Work

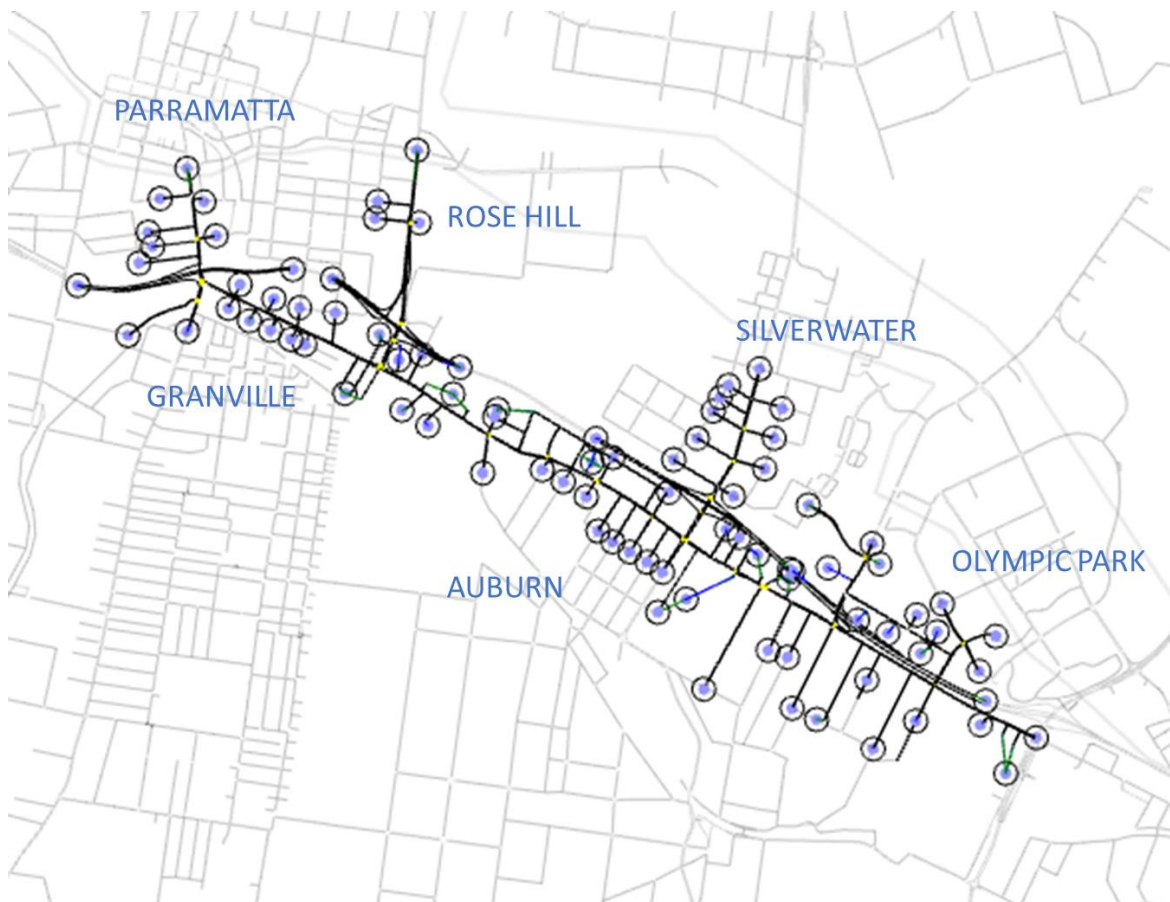
The scope of the modelling covers:

- Morning Peak from 7:00am – 9:00am
- Evening Peak from 4:00pm – 6:00pm
- Includes light vehicles, heavy vehicles and buses

1.4 Study Area

The model area covers the Parramatta Road Corridor from Church Street to Olympic Park based on the PRCUTS model as shown in Figure 1.2.

Figure 1.2: PRCUTS Model Area



The focus for this study is the area of Church Street from Marion Street to Parramatta Road, Parramatta Road between Church Street and James Ruse Drive and Woodville Road and Crescent Street.

1.5 Report Outline

This report has been prepared in accordance with the Roads and Maritime technical direction for Operational Modelling Reporting Structure (TDT 2017/001). The report is structured as follows:

Section 2 – Existing Conditions – background information about the study area.

Section 3 – Model Assumptions – the modelling assumptions, settings and calibration and validation targets.

Section 4 – Calibration Results – presents the calibration and validation results for the model and the core area.

Section 4 – Model Limitations – sets out the limitations for using this model.

Section 5 – Conclusion

2 Existing Conditions

2.1 Traffic Surveys

Traffic data was provided from the PRCUTS modelling project. This included:

- Classified Turn Counts – 30 August 2018
- Travel Time Surveys – 30 August 2018

2.1.1 Intersection counts

The locations for the 33 intersection counts were:

- 1 Parramatta Road/ Woodville Road Signals
- 2 Bold Street/ Parramatta Road Signals
- 3 Bold Street/ Cowper Street Give-way
- 4 Good Street/ Parramatta Road Signals
- 5 Alfred Street/ Parramatta Road Signals
- 6 Carlton Street/ Railway Parade Signals
- 7 James Ruse Drive/ Parramatta Road Signals
- 8 James Ruse Drive/ M4 Interchange Signals
- 9 Parramatta Road/ Woodville Road/ Church Street/ M4 Motorway Signals
- 10 Crescent Street/ Woodville Road (Identified Frame Area) Signals
- 11 William Street/ Woodville Road Signals
- 12 William Street/ Lumley Street Give-way
- 13 Pitt Street/ Walpole Street Signals
- 14 Great Western Highway/ Marion Street Signals
- 15 Greater Western Highway/ Boundary St/ Raymond St Signals
- 16 James Ruse Drive/ Prospect Street Signals
- 17 Parramatta Road/ Wentworth Street Signals
- 18 Rawson Street/ Parramatta Road/ Duck Street Signals
- 19 Station Road/ Parramatta Road Signals
- 20 Parramatta Road/ St Hilliers Road/ Silverwater Road Signals
- 21 St Hilliers Road/ Rawson Street Signals
- 22 Birnie Avenue/ Parramatta Road Signals

- 23 Stubbs Street/ Parramatta Road Signals
- 24 Hill Road/ Parramatta Road. Signals
- 25 Olympic Drive/ Boorea Street Signals
- 26 Parramatta Road/ John Street Signals
- 27 Silverwater Road/ M4 Interchange Signals
- 28 Carnarvon Street/ Silverwater Road Signals
- 29 Hill Road/ John Ian Wing Parade Signals
- 30 Birnie Avenue/ Edwin Flack Avenue Signals
- 31 Parramatta Road/ Campus Business Park Signals
- 32 Rawson Street/ South Parade Signals
- 33 Rawson Street/ Station Road Signals

Travel time surveys were undertaken along Church Street and Parramatta Road. The route is shown in Figure 2.1.

Figure 2.1: Travel Time Survey Route



2.2 Congestion Locations

Congestion on the road network is mostly around the intersection of Woodville Road / Parramatta Road / Church Street and Parramatta Road.

In the morning peak congestion on Parramatta Road was observed westbound to Church Street. In the opposite direction congestion was observed southbound on Church Street and eastbound on Parramatta Road on approach to James Ruse Drive. This is shown in Figure 2.2.

In the evening peak the queue westbound on Parramatta Road from Church Street extends further east from Church Street. This is shown in Figure 2.3.

Figure 2.2: Weekday Morning Congestion



Figure 2.3: Weekday Evening Congestion



2.3 Road Network

The key roads in the study are:

Crescent Street

Crescent Street is a local road with an east-west configuration and a 10m wide carriageway. It is a two-way road with one travel lane in each direction. Within the vicinity of the site double-line marking divides the opposing traffic lanes. It currently allows access from all directions to/from the site.

The sign-posted speed limit on Crescent Street is 50 km/h. Along the site frontage on-street parking is not permitted, however, about 140m in length of unrestricted parking that could accommodate some 20 car spaces is located south-west of the site.

Woodville Road

Woodville Road is classified as a state road and is aligned in a north-south direction. Proximal to the site, Woodville Road is a six-lane median divided road with a carriage width of approximately 19m. The sign-posted speed limit is 60 km/h.

Up to 300m south of the site, Woodville Road operates as a clearway between Monday and Friday, specifically from 6:00am - 10:00am and 3:00pm - 7:00pm.

Parramatta Road

Parramatta Road is also a state road with two traffic lanes in each direction. Parramatta Road has a speed limit of 60 km/h and is generally configured in an east-west direction. Proximal to the site, clearways are in operation along Parramatta Road from Monday to Friday during peak times.

The following intersections currently exist in the vicinity of the site:

- Crescent Street / Woodville Road (signalised)
- Church Street / Parramatta Road / Woodville Road (signalised).
- M4 Eastbound exit ramps

3 Model Assumptions

3.1 Overview

The model has been based on the PRCUTs Meso-scopic model using the same network and traffic demands.

3.2 Modelling Platform

The models have been developed in Aimsun Version 8.4.0 using the micro-simulations.

3.3 Time Period

Time periods from:

- 7:00am – 9:00am
- 4:00pm – 6:00pm

For both the morning and evening models a 30 minute warmup period has been applied.

3.4 Assignment Type

The assignment has been based on the path files from the Meso-scopic model.

Notwithstanding, the amount of route choice in the model has effectively been constrained by the M4 Motorway being cut so that there is no route choice between Parramatta Road and the M4 Motorway.

3.5 Vehicle Types

The vehicle types have been adopted from the Greater Sydney Aimsun model with no changes.

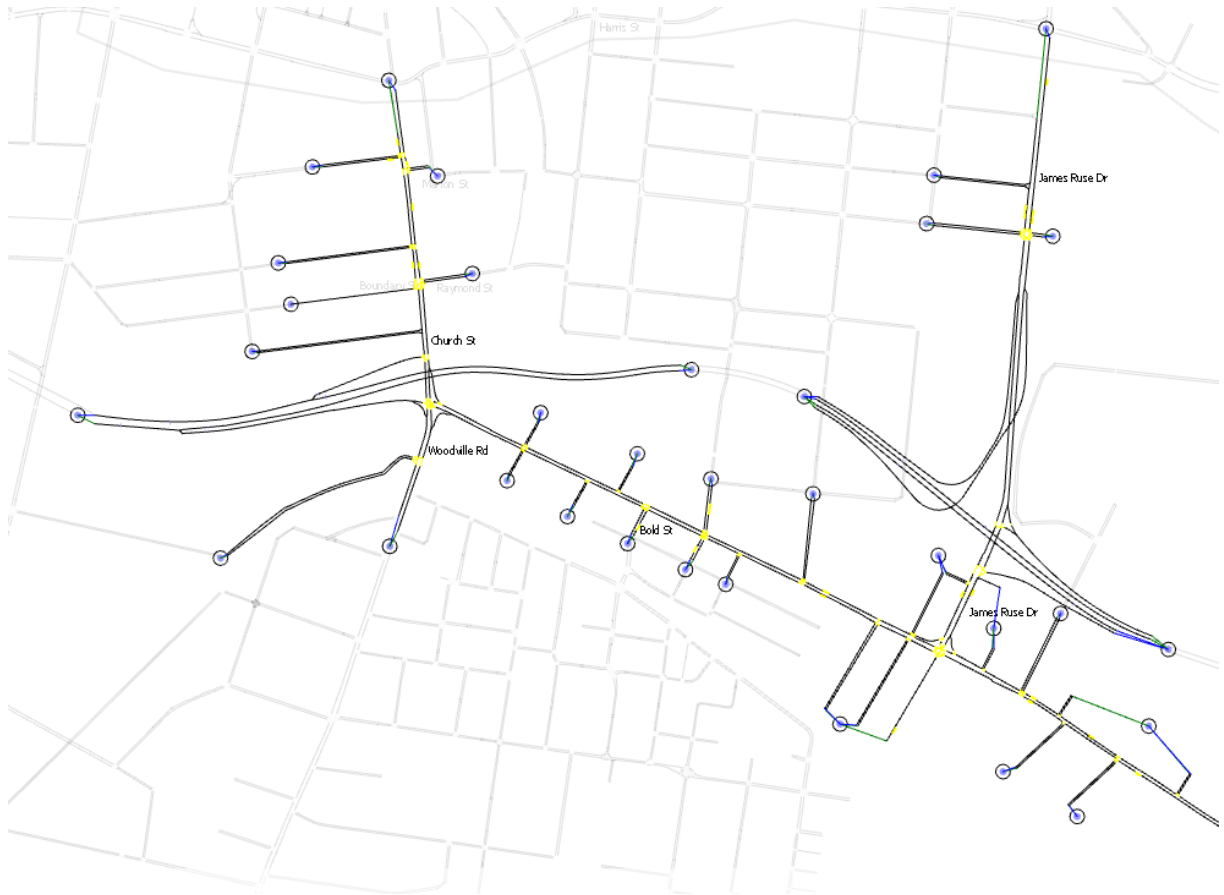
3.6 Traffic Zones / Inputs

The centroid configuration has been based on the PRCUTS model and has not been modified.

3.7 Road Types

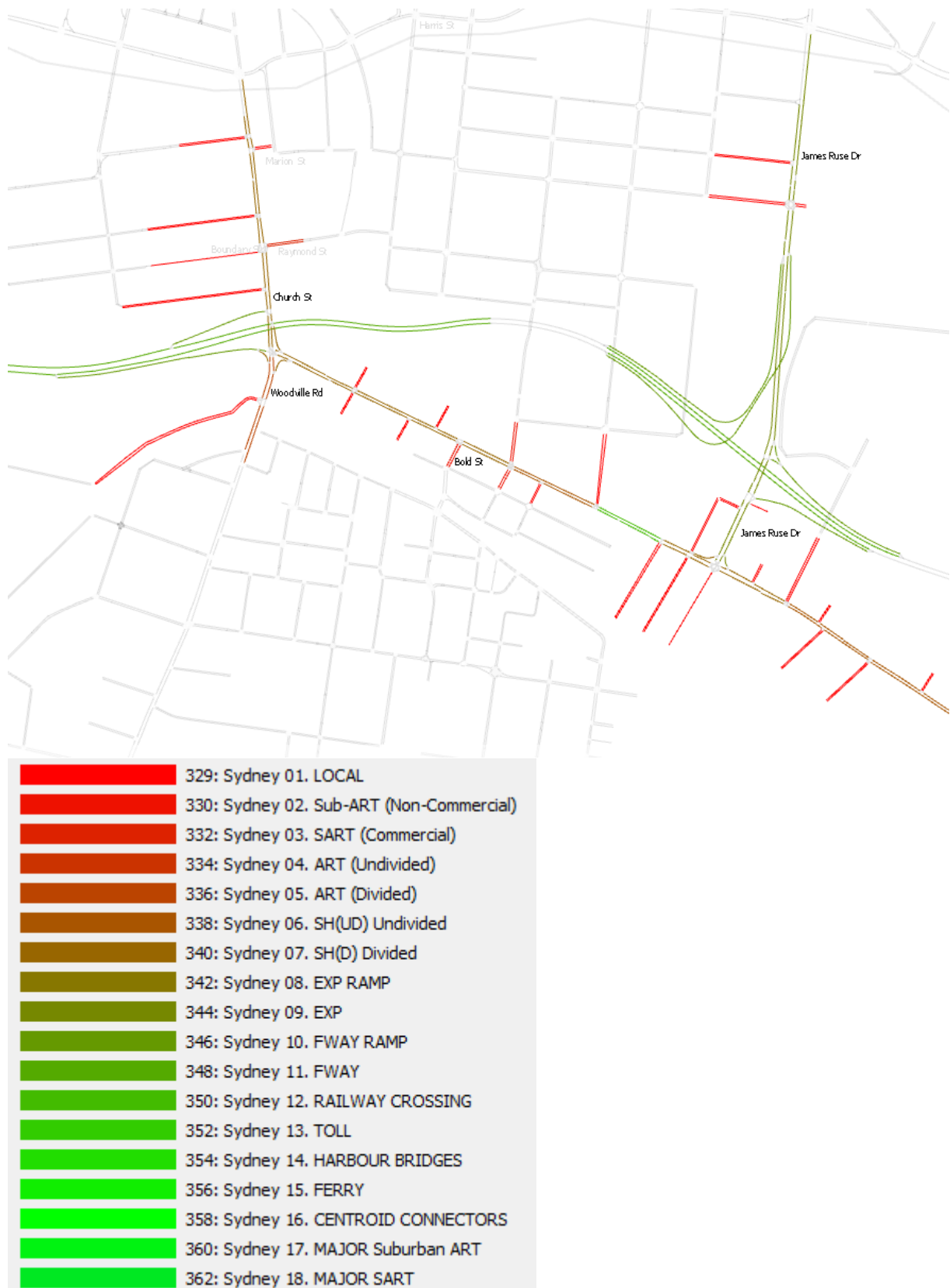
The road types are consistent with the PRCUTS Model and have not been modified. The centroid locations near the project site are shown in Figure 3.1.

Figure 3.1: Centroid Locations



The road types have not been changed from the PRCUTS model. The road types are shown in Figure 3.2.

Figure 3.2: Road Types



3.8 Speed Profiles

The speed profiles have been adopted from the Greater Sydney Aimsun Model with no changes.

Light Vehicles

	Mean	Deviation	Minimum	Maximum
Max Acceleration	3.00 m/s ²	0.20 m/s ²	2.60 m/s ²	3.40 m/s ²
Normal Deceleration	4.00 m/s ²	0.25 m/s ²	3.50 m/s ²	4.50 m/s ²
Max. Deceleration	6.00 m/s ²	0.50 m/s ²	5.00 m/s ²	7.00 m/s ²
Safety Margin Factor	1.00	0.00	1.00	1.00

Heavy Vehicles

	Mean	Deviation	Minimum	Maximum
Max Acceleration	0.80 m/s ²	0.25 m/s ²	0.60 m/s ²	1.00 m/s ²
Normal Deceleration	2.00 m/s ²	0.50 m/s ²	2.00 m/s ²	4.00 m/s ²
Max. Deceleration	3.50 m/s ²	0.30 m/s ²	3.20 m/s ²	3.80 m/s ²
Safety Margin Factor	1.00	0.00	1.00	1.00

3.9 School Zones

A 40km per hour speed limit has been applied on Parramatta Road for the Auburn North Public School and does not affect the evening peak model which begins after 4:00pm. The school zone has been applied using the school zone policy and comes into effect at 8:00am.

3.10 Traffic Signals

Traffic signals timing has been based on the PRCUTS model which in turn was derived from recorded SCATS signal timings. Modifications were made to the offsets of key intersections to reflect the coordination of the traffic signals.

In addition, the actuated signal logic was used for the intersection of Church Street / Parramatta Road / Woodville Road to reflect the bus phase which is only called when a bus arrives. Likewise, the intersection of Bold Street and Parramatta Road was also coded as actuated for the same reason.

3.11 Public Transport

The bus routes have been adopted from the PRCUTS model with no changes. This was in turn derived from the POP mesoscopic model.

3.12 Demand Assumptions

Traffic demands were adopted from PRCUTS model. Minor manual changes to the demands were made to meet the core area calibration criteria however, this is unlikely to have changed the pattern or trip distribution of the matrix.

3.13 Trip Length Distribution

The demands have been directly adopted from the PRCUTS model.

3.14 Traffic Profiles

The models have 15 minute time slices. These time slices create the profile of traffic based on the traffic count data. The profiles for the morning and evening peaks are shown in Figure 3.3 and Figure 3.4 for the morning and evening peak respectively.

Figure 3.3: Morning Peak Traffic Profiles

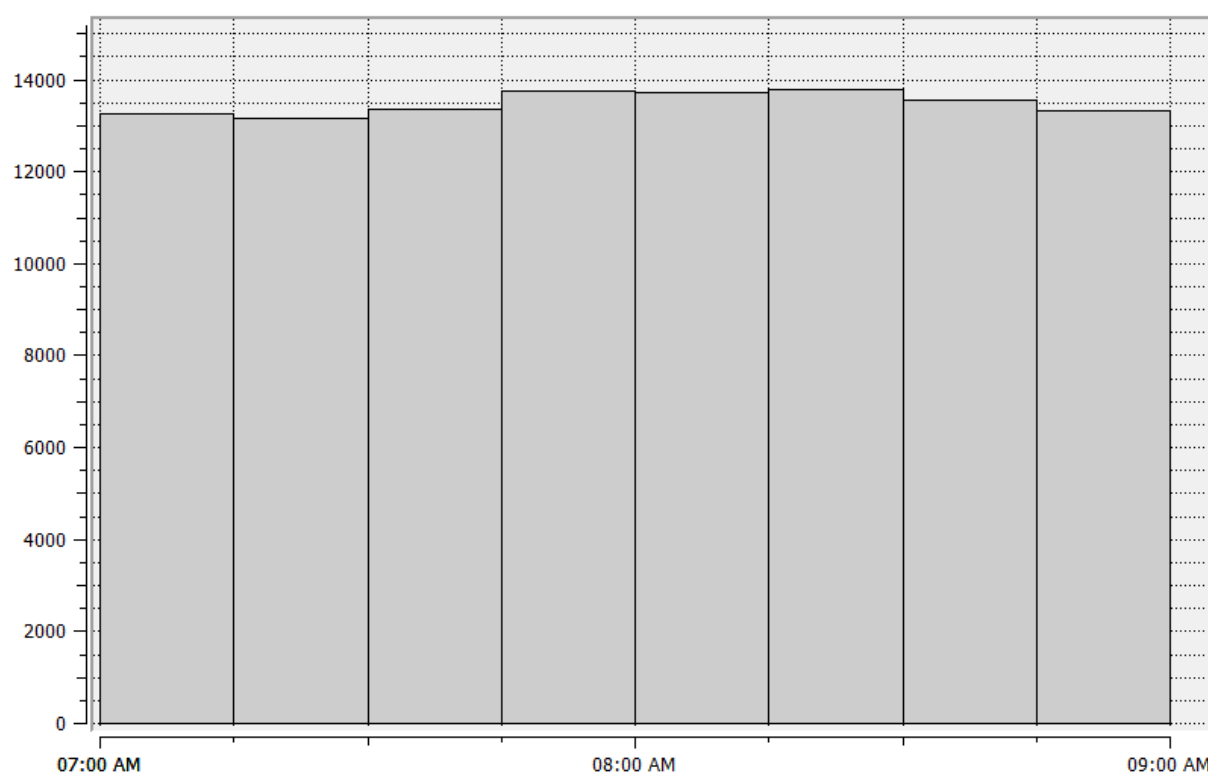
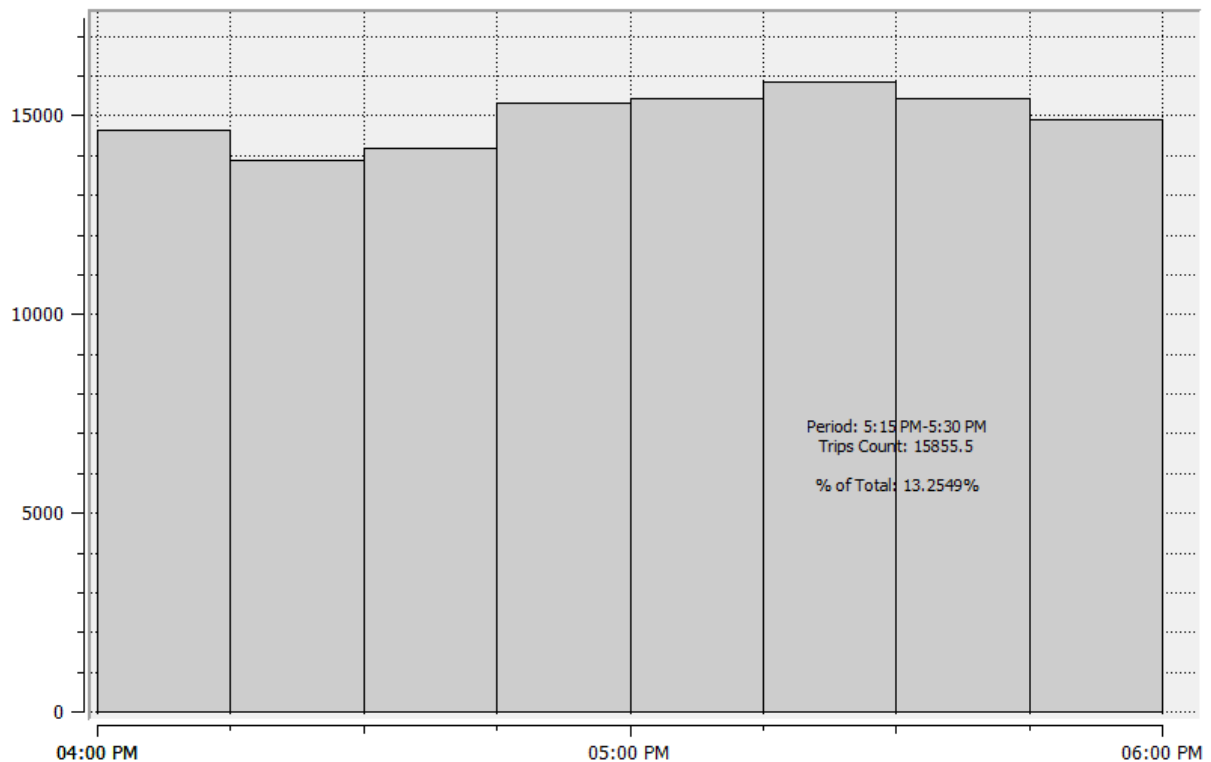


Figure 3.4: Evening Peak Traffic Profiles



3.15 Pedestrians and Cyclists

Pedestrians and cyclists have not been included in the model as the core area of the model is not within high pedestrian activity area.

3.16 Calibration and Validation Targets

The following sets out the calibration and validation targets that have been adopted.

3.16.1 Calibration

The calibration criteria have been based on the RMS Modelling guidelines for micro-simulation models.

Calibration of the base model has adopted the following targets from the guidelines:

- 85% of all turns with a GEH of less than 5
- 100% of all turns with a GEH of less than 10
- Linear regression R^2 value > 0.9

The GEH statistic is a measure of goodness of fit used by traffic modellers. Using the GEH Statistic avoids some problems that occur when using simple percentages to compare two sets of volumes. This is because the traffic volumes vary over a wide range. For example, the mainline of a freeway/motorway might carry 5000 vehicles per hour, while one of the on-ramps leading to the freeway might carry only 50 vehicles per hour (in that situation it would not be possible to select a single percentage of variation that is acceptable for both volumes). The equation for GEH is an empirical formula:

$$GEH = \sqrt{\frac{2(M - C)^2}{M + 2}}$$

Where:

M = the modelled traffic flow for one hour

C = the observed traffic flow for one hour

The lower the GEH is the closer the model is to the observed traffic flows.

3.16.2 Core Area Calibration

The calibration of a core area has been used to ensure the model is more robust in the area that would be directly impacted by the development.

The core area calibration targets from the Roads and Maritime Services Guidelines is:

- Flows < 99 – to be within 10 vehicles or the observed value
- Flows 100 – 999 – to be within 10% of the observed flows
- Flows 1000 to 1999 to be within 100 vehicles of observed value
- Flows > 2000 to be within 5 % of observed values
- 100% percent of observations to be within tolerance limits

3.16.3 Validation

Validation of the models has been based on travel times on Church Street and Parramatta Road. The target for travel time validation is +/- 15% of the observed travel times.

4 Model Stability

To ensure that the models have not been biased and to take into account random variation the models have been run for 5 random seed values as prescribed by Transport for NSW. These random seed values are:

- 560
- 28
- 7771
- 86524
- 2849

Seed numbers begin the sequence of random numbers that is used to generate the release patterns from the centroids. Model stability has been assessed based on the model Vehicle Hours Travelled (VHT). The median VHT has been adopted as the representative result on which the calibration results have been based.

The morning peak model stability is shown in Table 4.1.

Table 4.1: Morning Peak Model Stability

Seed Value	VHT
560	6004
28	5892
2849	6485
86429	5909
7771	6115
Median	6004 (seed 560)
Standard Deviation	243

The median seed value was seed 28 and the standard deviation was 243.

The evening peak stability is shown in Table 4.2.

Table 4.2: Evening Peak Model Stability

Seed Value	VHT
560	6817
28	7073
2849	7232
86429	7017
7771	6939
Mean	7017 (Seed 86429)
Standard Deviation	155

The median seed value for the evening peak is 86429 and standard deviation of 155.

5 Calibration and Validation Results

5.1 Overview

The following section presents the model calibration and validation in accordance with the TfNSW guidelines to the targets that have been described in Section 3.

5.2 Model Calibration

5.2.1 Model Calibration All Turns GEH Statistic

The model as a whole has been calibrated to turn counts for the whole model. There were 211 turn counts used in the model. The results of the turn calibration are shown in Table 5.1

Table 5.1: Model Calibration GEH Statistic

Time Period	GEH < 5	GEH > 10
Morning Peak Period		
7:00am – 8:00am	96.7%	100%
8:00am – 9:00am	95.7%	100%
Evening Peak Period		
4:00pm – 5:00pm	91.9%	100%
5:00pm – 6:00pm	92.4%	100%

In all time periods the model exceeds the calibration criteria. In the evening peak the data was missing for two count locations at the eastern extremity of the model at the intersection of Birnie Avenue and Edward Flack Avenue in Olympic Park. These turns are located furthest away from the subject site have low flows and have minimal impact on the models purpose.

The observed flows have been plotted against the modelled flows and a trend line added with an intercept of 0. The plots for the morning peak are shown in Figure 5.1 and Figure 5.2.

Figure 5.1: Morning Peak Volume Plot (7:00am – 8:00am)

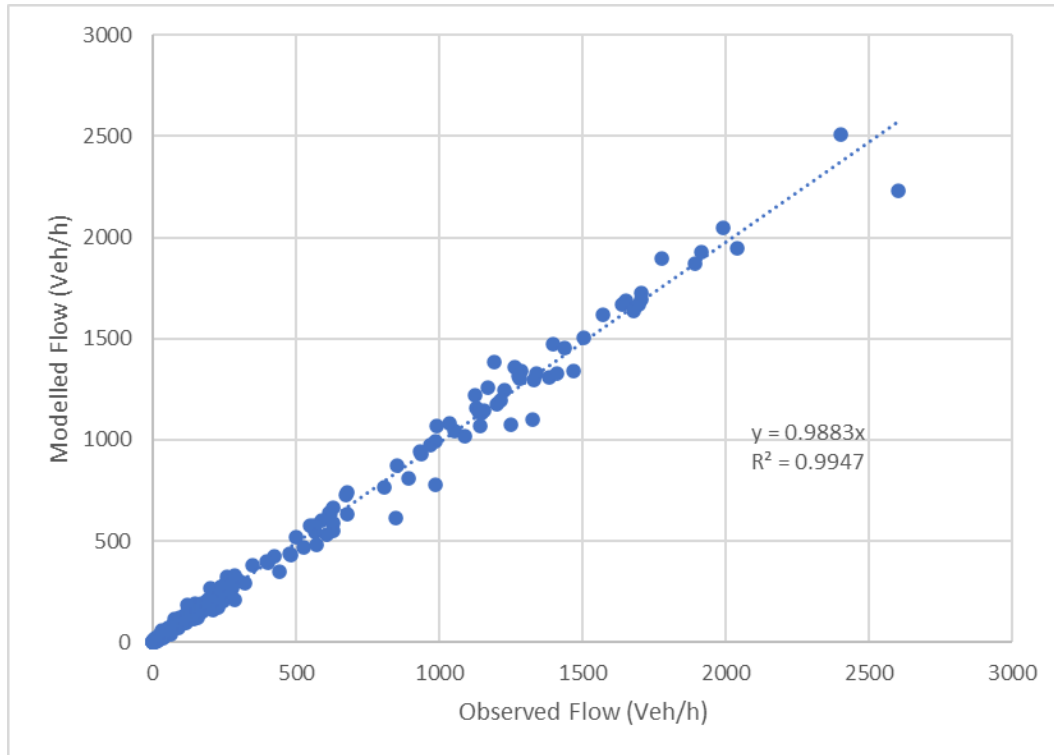
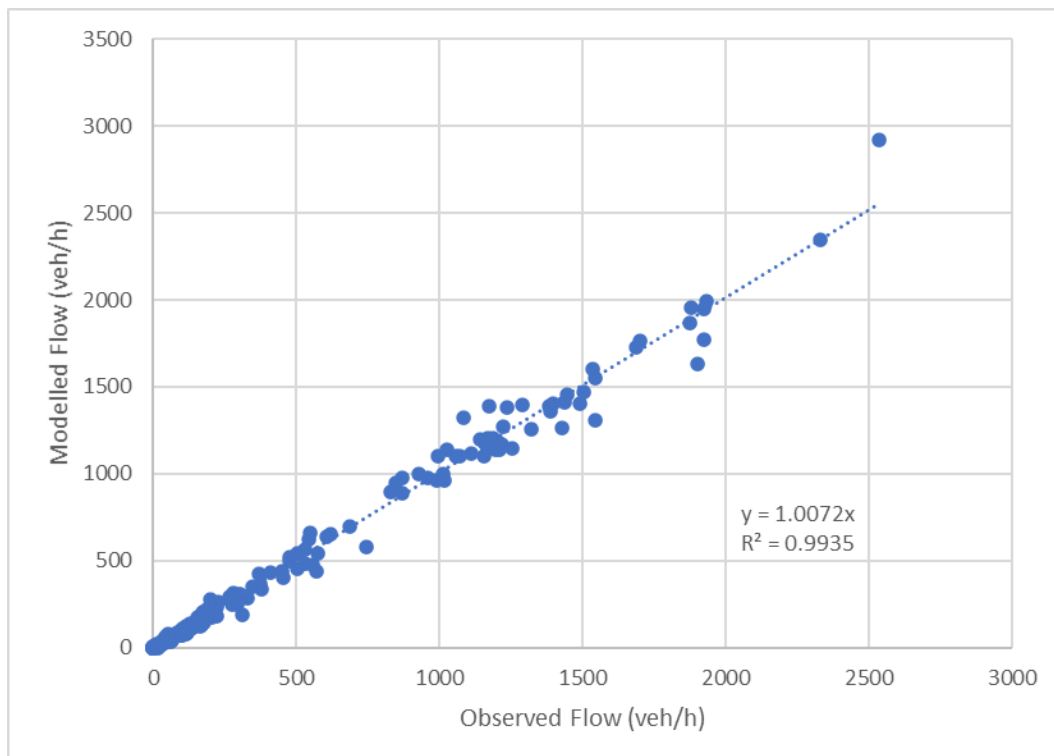


Figure 5.2: Morning Peak Volume Plot (8:00am – 9:00am)



In both the morning peak periods the model shows a strong correlation with the observed traffic flows and exceeds the calibration criteria for both $R^2 > 0.9$ and the slope close to 1.

The evening peak period graphs are shown in Figure 5.3 and Figure 5.4 for the hours starting 4:00pm and 5:00pm respectively.

Figure 5.3: Evening Peak Volume Plot (4:00pm – 5:00pm)

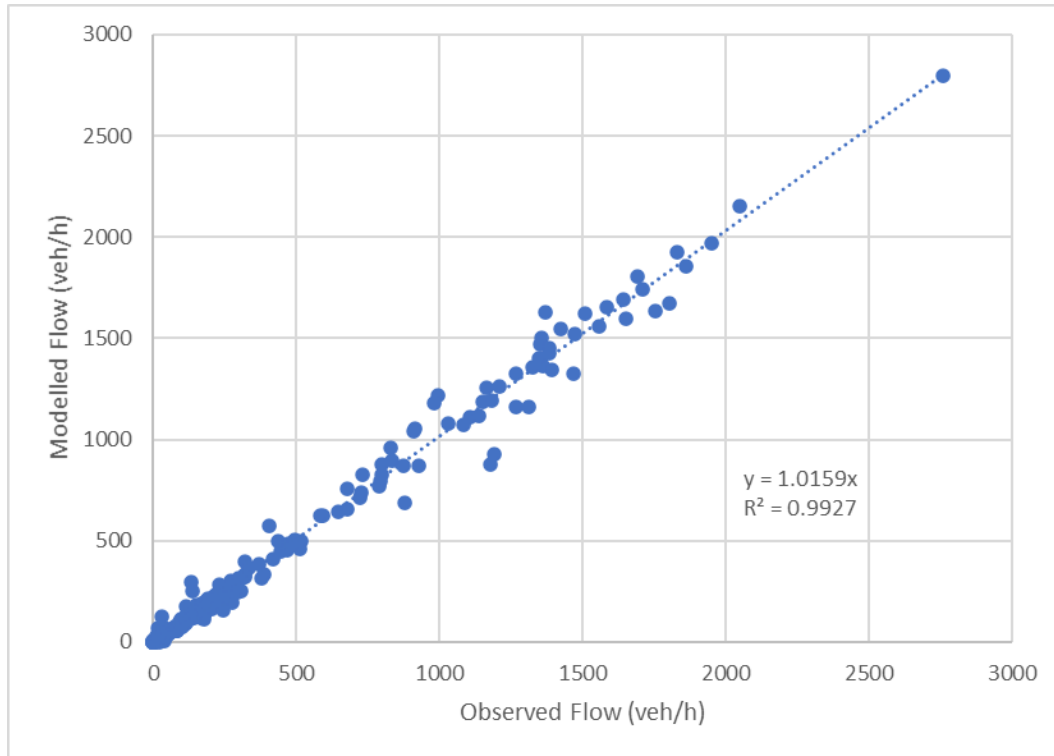
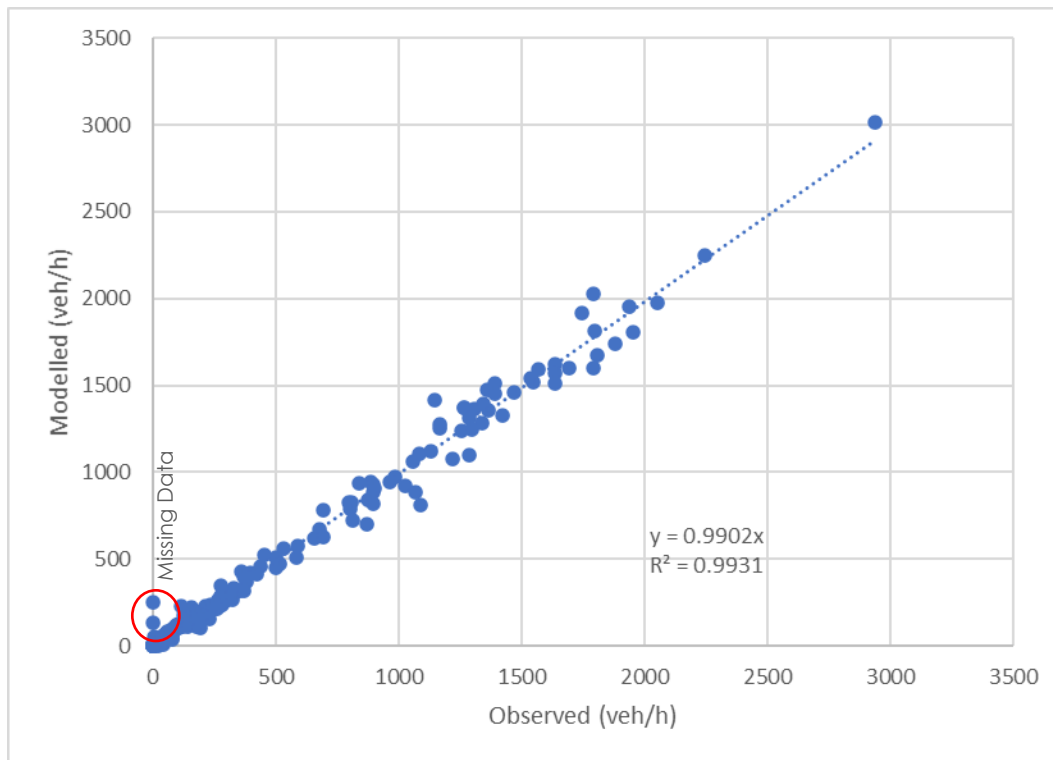


Figure 5.4: Evening Peak Volume Plot (5:00pm – 6:00pm)



In the evening peak model the calibration exceeds the criteria for $R^2 > 0.9$ and the slope is close to 1.

The overall model is considered to be calibrated and exceeds the relevant targets for the model as whole.

5.2.2 Model Core Area Calibration

The model has been calibrated in more detail for a core area. The purpose of the model is to test the impacts the Crescent Parklands and therefore the core area has been adopted to include the intersections of:

- Church Street / M4 Exit Ramp (intersection 1)
- Church Street / Parramatta Road / Woodville Road / M4 Entry Ramp (intersection 2)
- The Crescent / Woodville Road (intersection 3)

This core area is shown in Figure 5.5.

Figure 5.5: Core Area



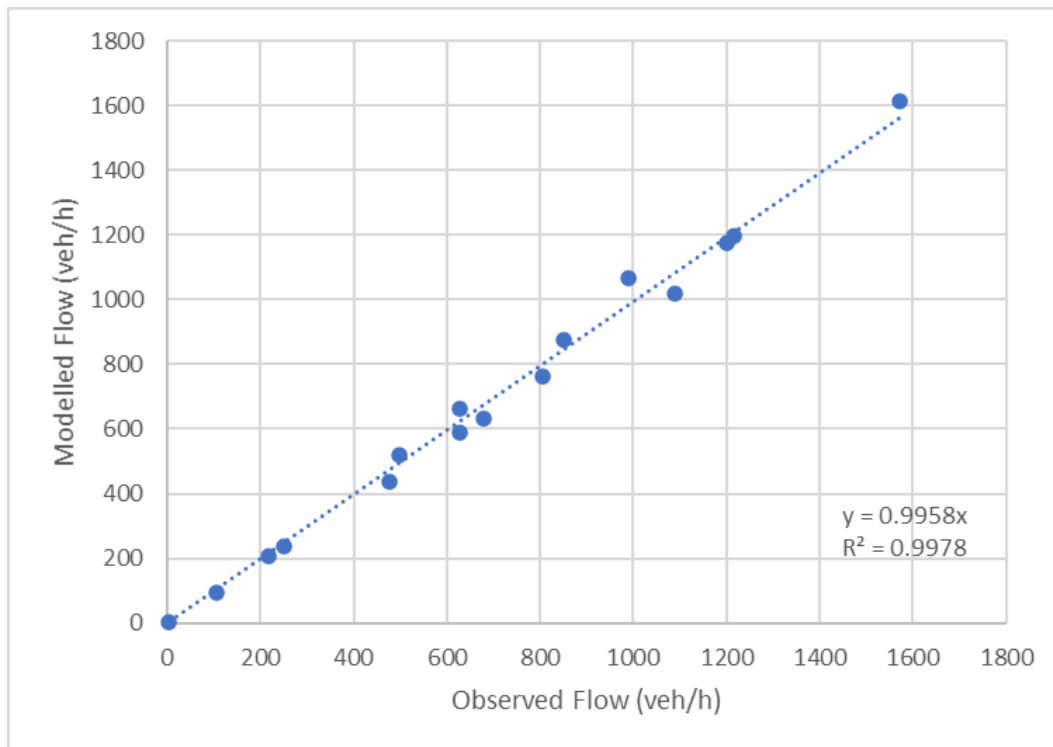
The comparison of turn counts between the modelled and the observed is shown in Table 5.2.

Table 5.2: Morning Peak Core Area Model Calibration (7:00am – 8:00am)

	Turn	Observed	Modelled	Difference	% Difference`	Meets Criteria
Intersection 1	Church Street Northbound Through	852	875	23	3%	True
	M4 Exit Ramp Left Turn	478	435	43	9%	True
	Church Street Southbound Through	678	631	47	7%	True
	M4 Exit Ramp Right turn	1215	1197	18	1%	True
	Church Street Through	806	763	43	5%	True
Intersection 2	Woodville Road Right Turn	627	590	37	6%	True
	Woodville Road Through	628	665	37	6%	True
	Parramatta Road Right Turn	218	208	10	5%	True
	Parramatta Road through	1088	1020	68	6%	True
	Church Street Left Turn	990	1068	78	8%	True
	Parramatta Road Left turn	499	519	20	4%	True
Intersection 3	Woodville Road Southbound Through	1200	1176	24	2%	True
	Woodville Road Northbound Left Turn	4	3	1	25%	True
	Woodville Road Southbound Right Turn	105	95	10	9.5%	True
	Woodville Road Northbound Through	1573	1615	42	3%	True
	The Crescent Left Turn	251	239	12	5%	True

In the first hour, 7:00am – 8:00am, all of the turns meet the criteria. The volume plot is shown in Figure 5.6.

Figure 5.6: Core Area Volume Plot (7:00am – 8:00am)



The R^2 for the first hour exceeds the 0.95 target and the slope is close to 1.

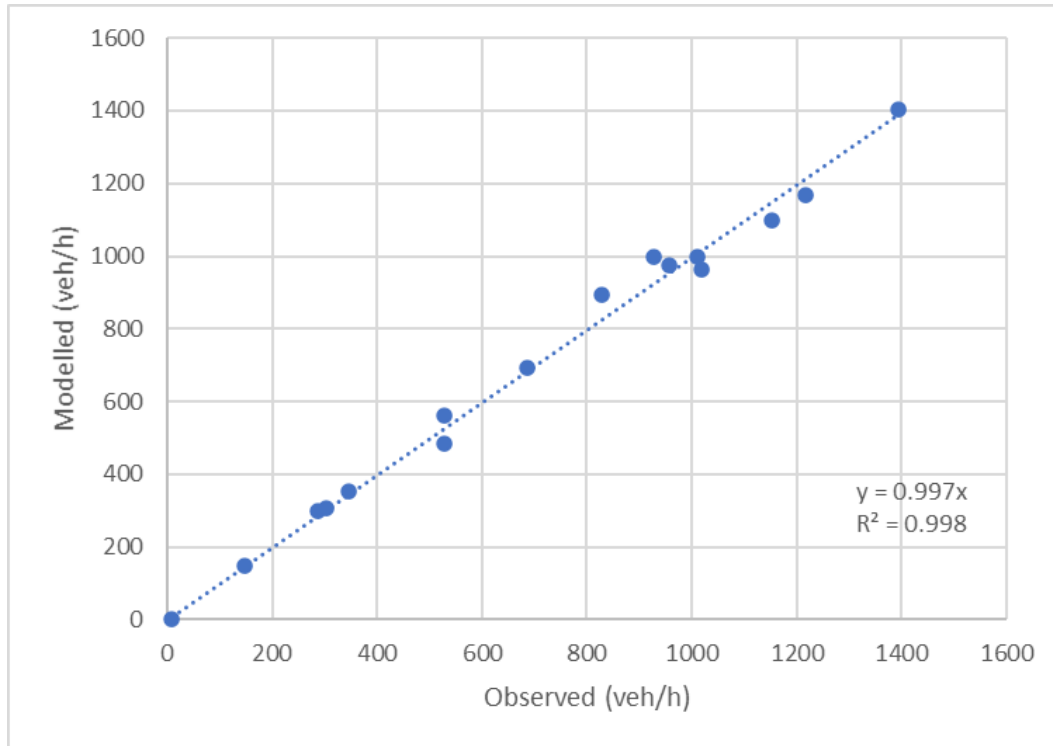
The results for the second hour are shown in Table 5.3.

Table 5.3: Morning Peak Core Area Model Calibration (8:00am – 9:00am)

	Turn	Observed	Modelled	Difference	% Difference`	Meets Criteria
Intersection 1	Church Street Northbound Through	1012	999	13	1%	True
	M4 Exit Ramp Left Turn	528	485	43	8%	True
	Church Street Southbound Through	829	894	65	8%	True
	M4 Exit Ramp Right turn	1154	1100	54	5%	True
	Church Street Through	1018	964	54	5%	True
Intersection 2	Woodville Road Right Turn	529	561	32	6%	True
	Woodville Road Through	686	693	7	1%	True
	Parramatta Road Right Turn	303	308	5	2%	True
	Parramatta Road through	927	998	71	8%	True
	Church Street Left Turn	956	974	18	2%	True
	Parramatta Road Left turn	346	353	7	2%	True
Intersection 3	Woodville Road Southbound Through	1216	1169	47	4%	True
	Woodville Road Northbound Left Turn	8	2	6	75%	True
	Woodville Road Southbound Right Turn	148	148	0	0%	True
	Woodville Road Northbound Through	1395	1404	9	1%	True
	The Crescent Left Turn	288	298	10	3%	True

In the second hour each of the turns in the core area satisfy the core area calibration requirements. The volume plot is shown in Figure 5.6.

Figure 5.7: Core Area Volume Plot (8:00am – 9:00am)



The R^2 for the second hour exceeds the 0.95 criteria.

The model meets the core area calibration requirement in both hours of the model and is considered to be well calibrated.

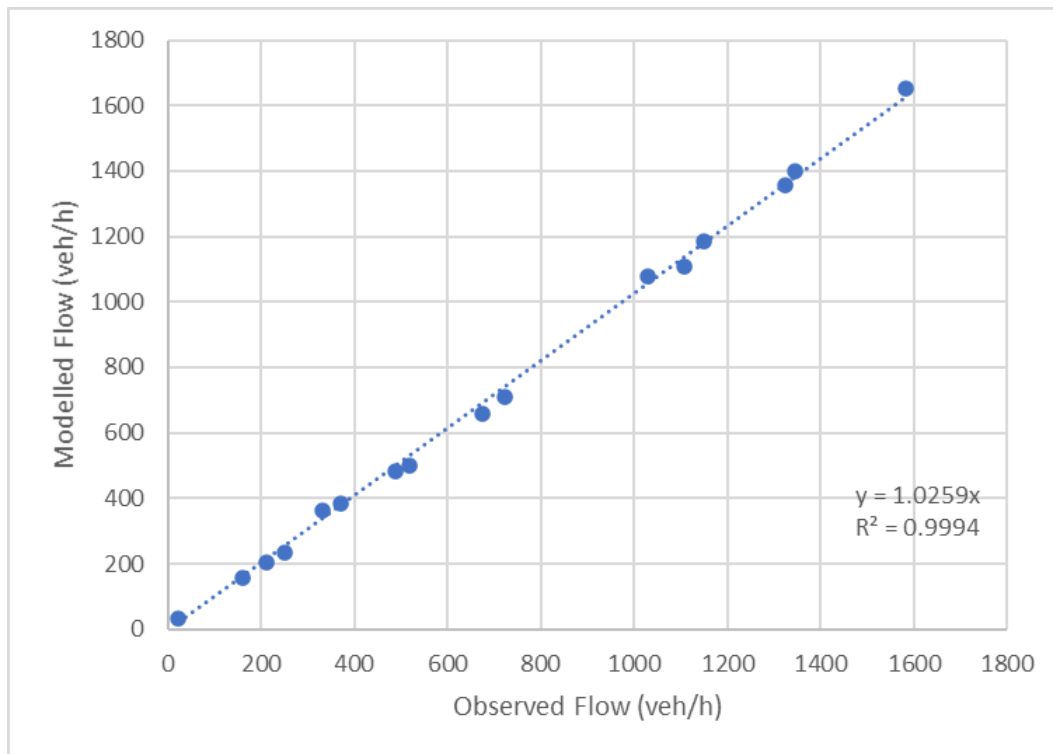
The results for the evening peak first hour are shown in Table 5.4.

Table 5.4: Evening Peak Core Area Model Calibration (4:00pm – 5:00pm)

	Turn	Observed	Modelled	Difference	% Difference`	Meets Criteria
Intersection 1	Church Street Northbound Through	852	855	3	0%	True
	M4 Exit Ramp Left Turn	478	515	37	8%	True
	Church Street Southbound Through	678	654	24	4%	True
	M4 Exit Ramp Right turn	1215	1130	85	7%	True
	Church Street Through	806	771	35	4%	True
Intersection 2	Woodville Road Right Turn	627	635	8	1%	True
	Woodville Road Through	628	663	35	6%	True
	Parramatta Road Right Turn	218	208	10	5%	True
	Parramatta Road through	1088	1020	68	6%	True
	Church Street Left Turn	990	1018	28	3%	True
	Parramatta Road Left turn	499	542	43	9%	True
Intersection 3	Woodville Road Southbound Through	1200	1196	4	0%	True
	Woodville Road Northbound Left Turn	4	4	0	0%	True
	Woodville Road Southbound Right Turn	105	105	0	0%	True
	Woodville Road Northbound Through	1573	1617	44	3%	True
	The Crescent Left Turn	251	274	23	9%	True

The first hour of the evening peak meets the targets for the core area calibration. The observed and modelled flows have been plotted and are shown in Figure 5.8.

Figure 5.8: Core Area Volume Plot (4:00pm – 5:00pm)



The plot shows that the R^2 exceeds 0.95 target.

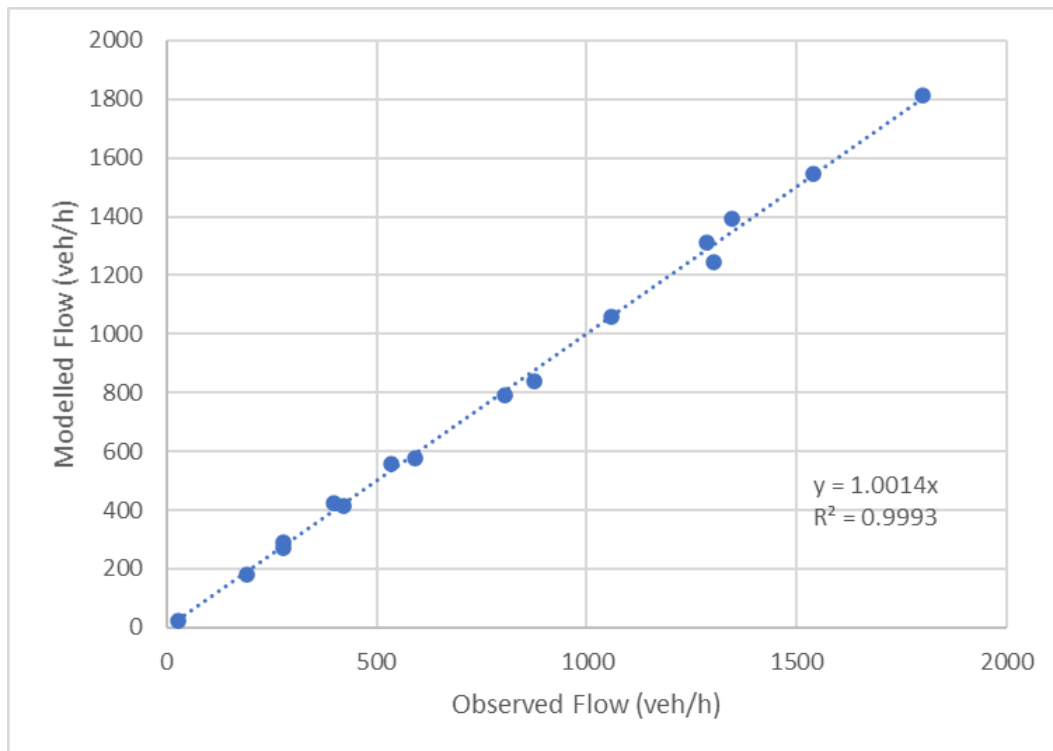
The second hour core area results are shown in Table 5.5.

Table 5.5: Evening Peak Core Area Model Calibration (5:00pm – 6:00pm)

	Turn	Observed	Modelled	Difference	% Difference`	Meets Criteria
Intersection 1	Church Street Northbound Through	852	855	3	0%	True
	M4 Exit Ramp Left Turn	478	515	37	8%	True
	Church Street Southbound Through	678	654	24	4%	True
	M4 Exit Ramp Right turn	1215	1130	85	7%	True
	Church Street Through	806	771	35	4%	True
Intersection 2	Woodville Road Right Turn	627	635	8	1%	True
	Woodville Road Through	628	663	35	6%	True
	Parramatta Road Right Turn	218	208	10	5%	True
	Parramatta Road through	1088	1020	68	6%	True
	Church Street Left Turn	990	1018	28	3%	True
	Parramatta Road Left turn	499	542	43	9%	True
Intersection 3	Woodville Road Southbound Through	1200	1196	4	0%	True
	Woodville Road Northbound Left Turn	4	4	0	0%	True
	Woodville Road Southbound Right Turn	105	105	0	0%	True
	Woodville Road Northbound Through	1573	1617	44	3%	True
	The Crescent Left Turn	251	274	23	9%	True

The model meets the targets for the core area in the second hour of the evening peak. The volumes for the second hour are plotted in Figure 5.9.

Figure 5.9: Core Area Volume Plot (5:00pm – 6:00pm)



The R^2 for the second hour also meets the target of 0.95.

In each of the hours modelled the core area has been calibrated to exceed the targets set out by Transport for NSW. The model is considered to be well calibrated for the core area that has been adopted.

5.3 Model Validation Travel Time

The model validation has been based on travel times on Church Street and Parramatta Road between Marion Street and James Ruse Drive. The results for the morning peak periods are shown in Figure 5.10, Figure 5.11, Figure 5.12 and Figure 5.13. The graphs show the average observed travel times with 15% variability as well as the fastest and slowest recorded travel times. In each hour the travel time falls within the 15% of the average observed travel times.

Figure 5.10: Morning Peak Travel Time Eastbound (7:00am – 8:00am)

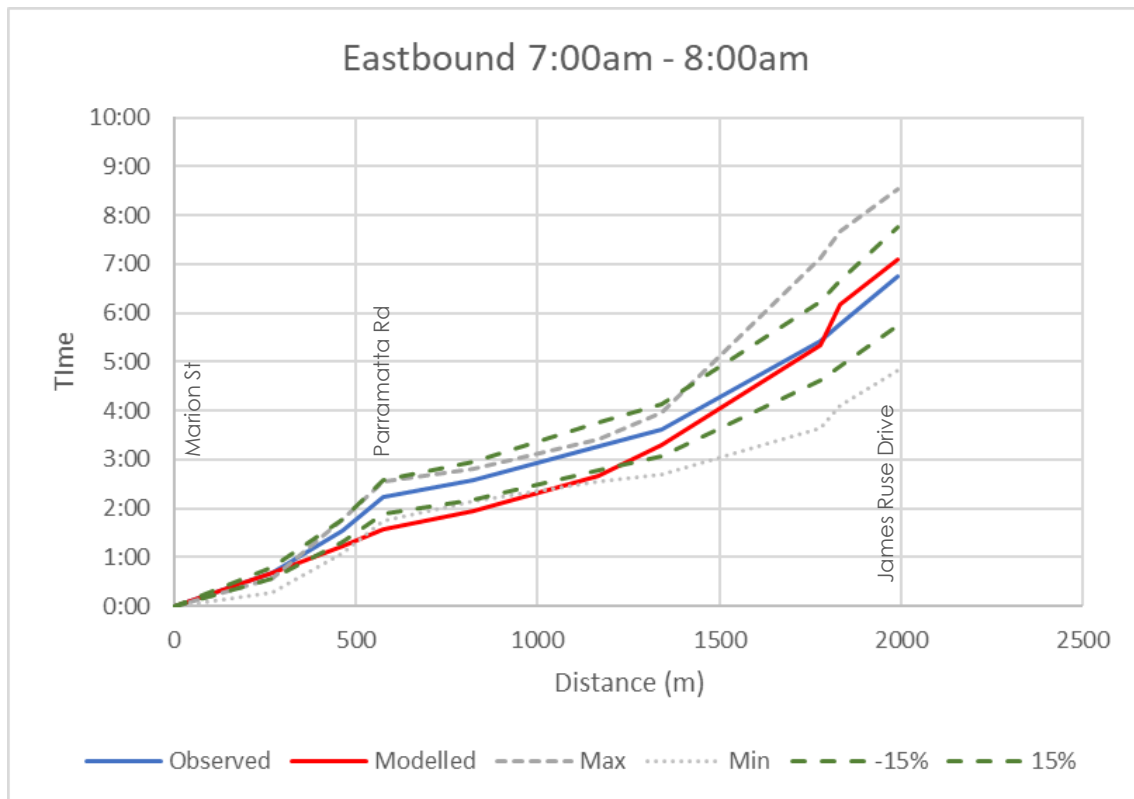


Figure 5.11: Morning Peak Travel Time Eastbound (8:00am – 9:00am)

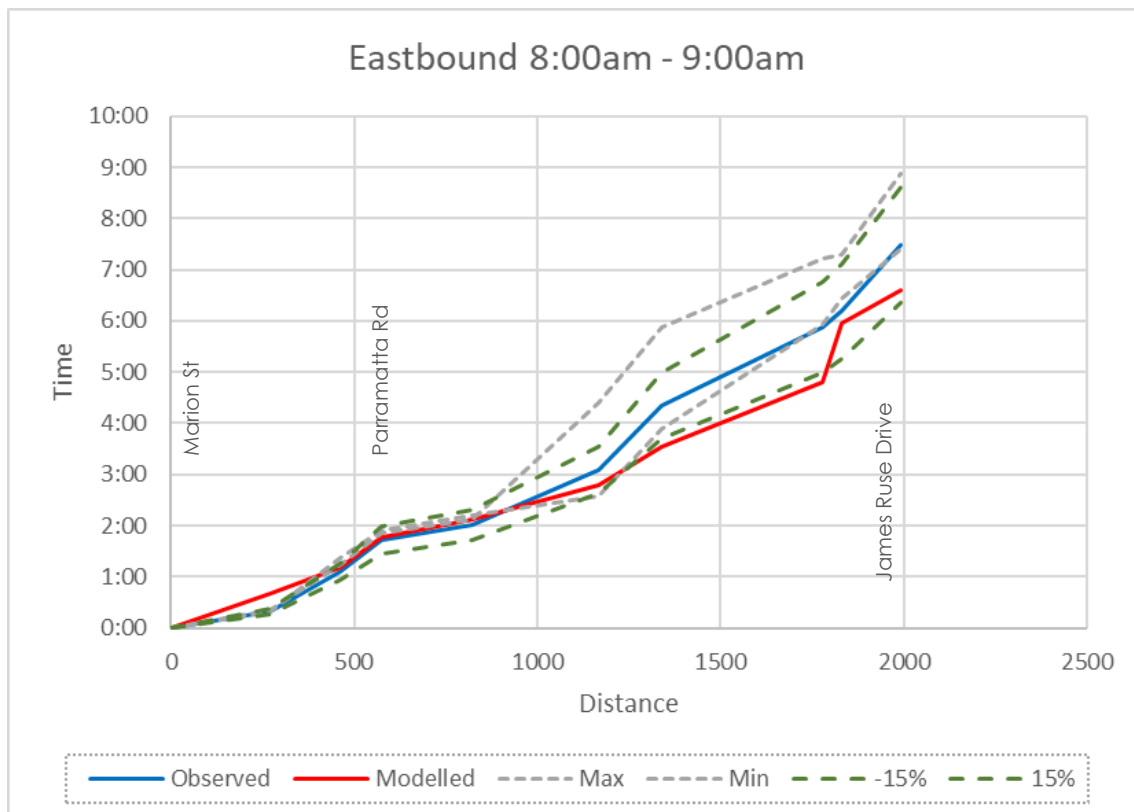


Figure 5.12: Morning Peak Travel Time Westbound (7:00am – 8:00am)

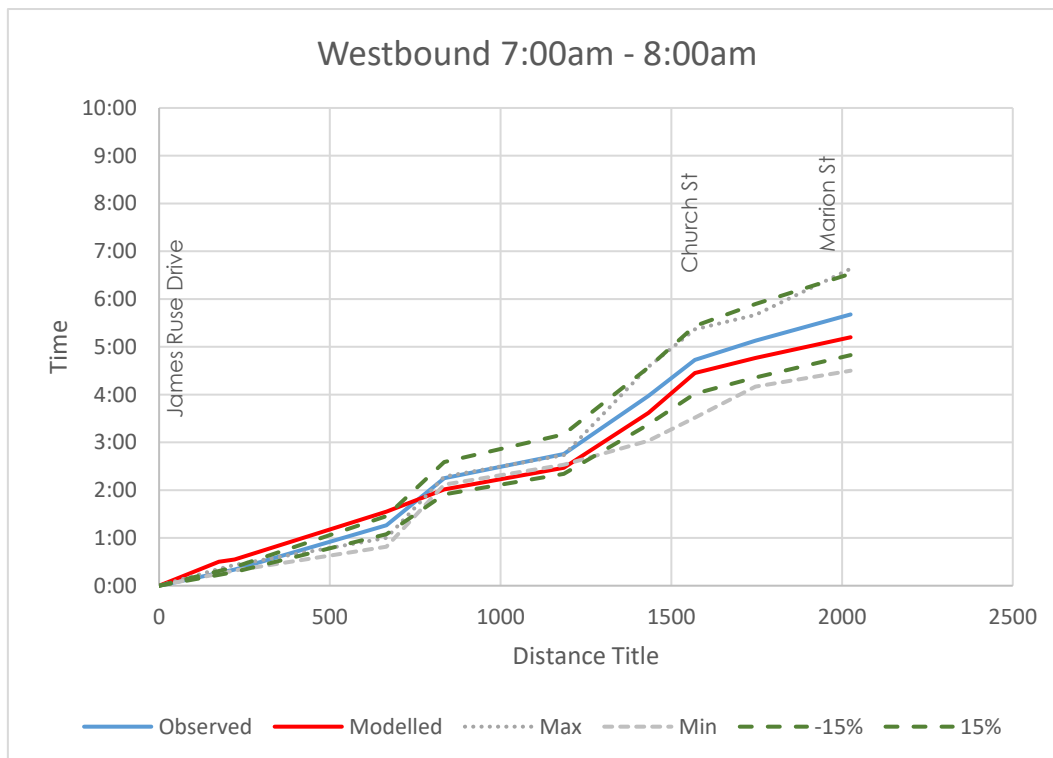
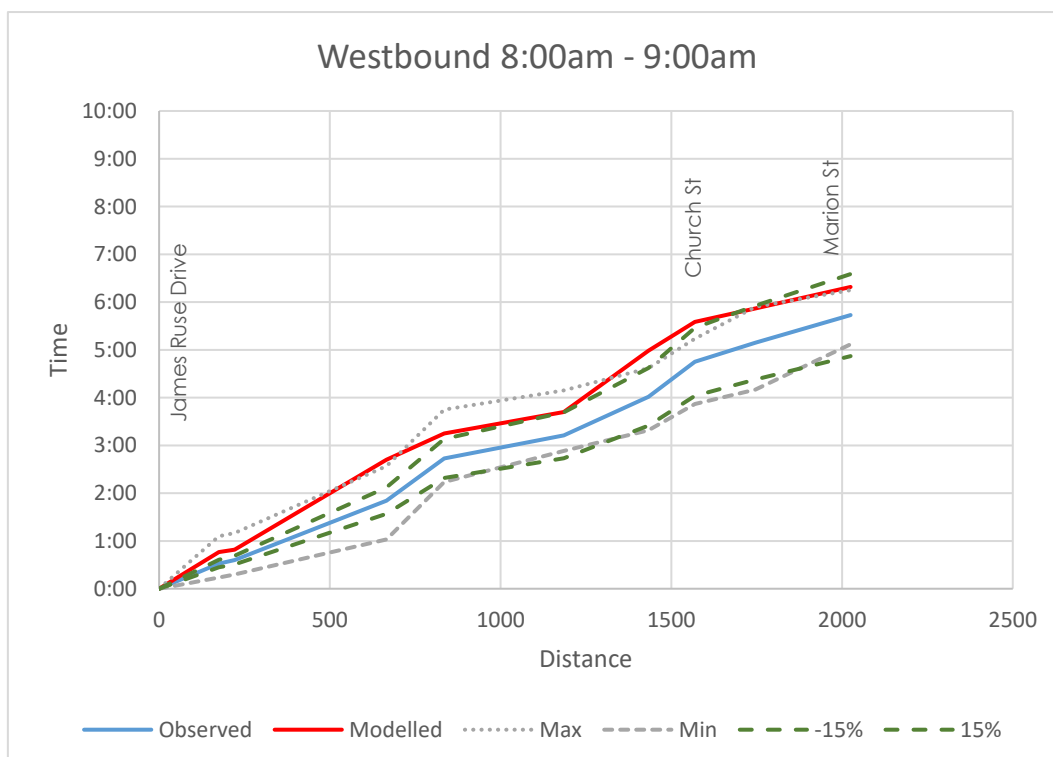


Figure 5.13: Morning Peak Travel Time Westbound (8:00am – 9:00am)



In the morning peak the modelled travel times reflect the observed travel times and are completed withing the 15% of the observed travel time for all hours..

The evening peak travel times are shown in Figure 5.14, Figure 5.15, Figure 5.16 and Figure 5.17.

Figure 5.14: Evening Peak Travel Time Eastbound (4:00pm – 5:00pm)

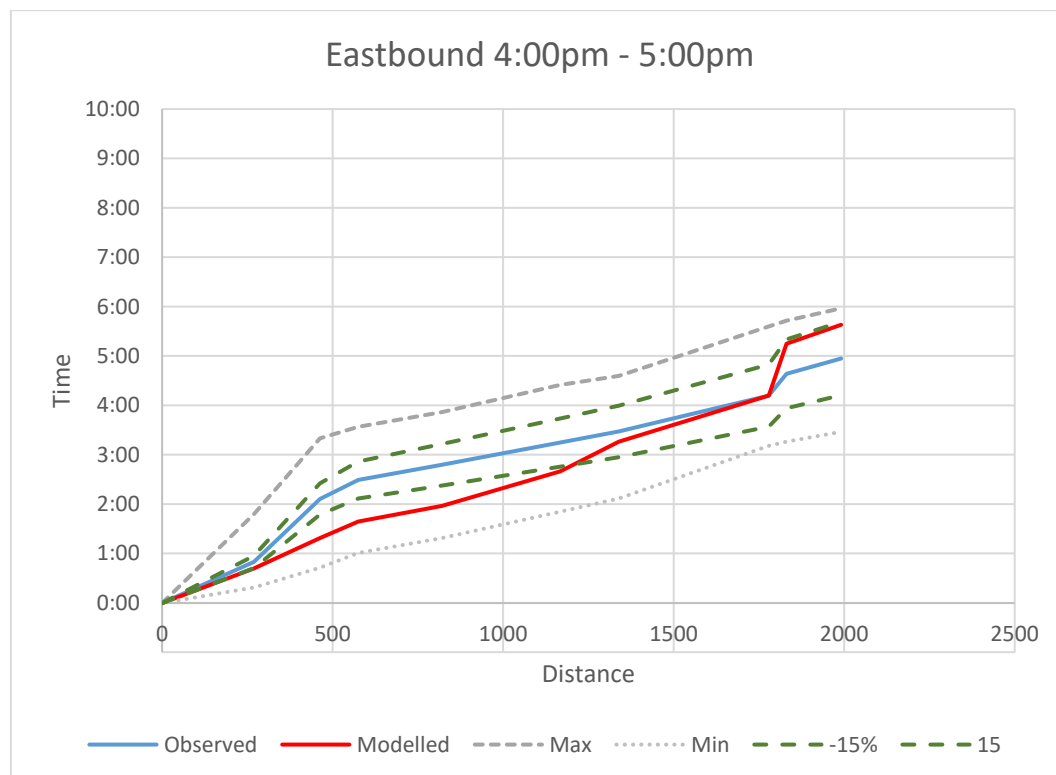


Figure 5.15: Evening Peak Travel Time Eastbound (5:00pm – 6:00pm)

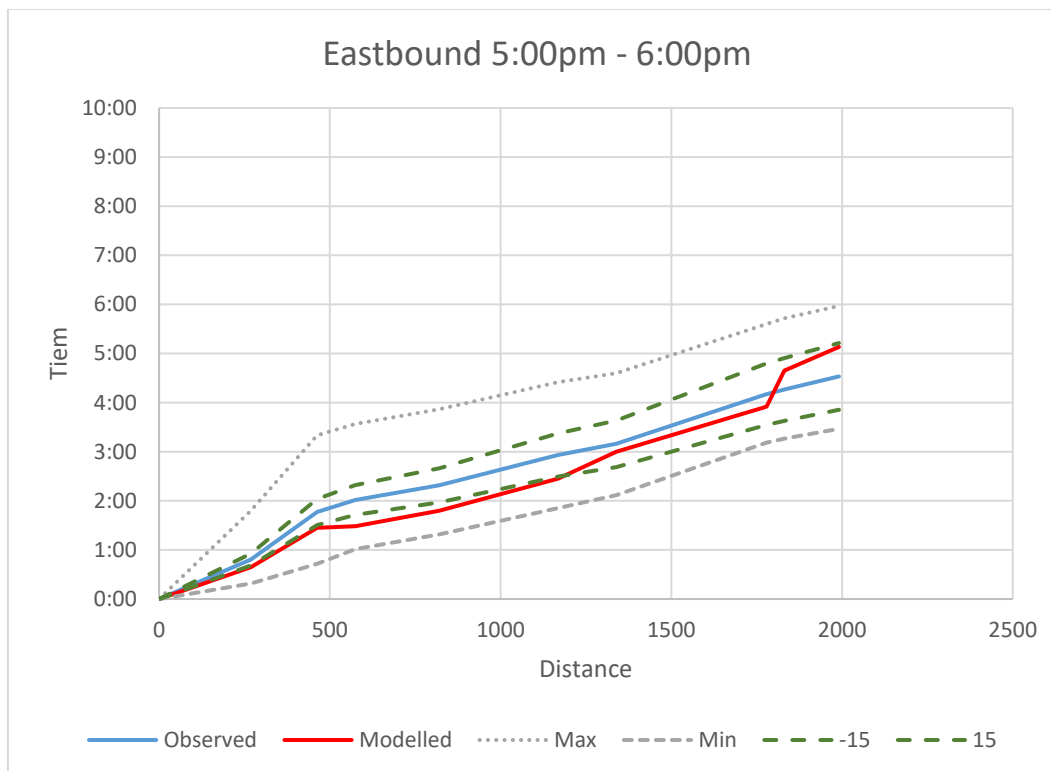


Figure 5.16: Evening Peak Travel Time Eastbound (4:00pm – 5:00pm)

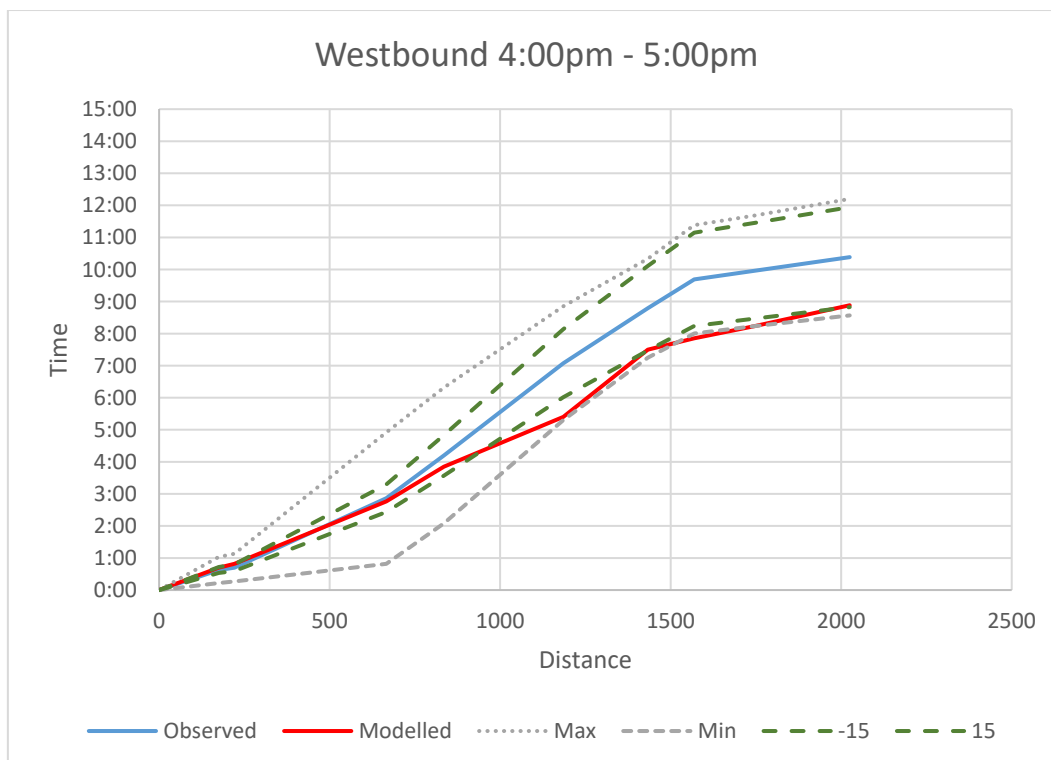
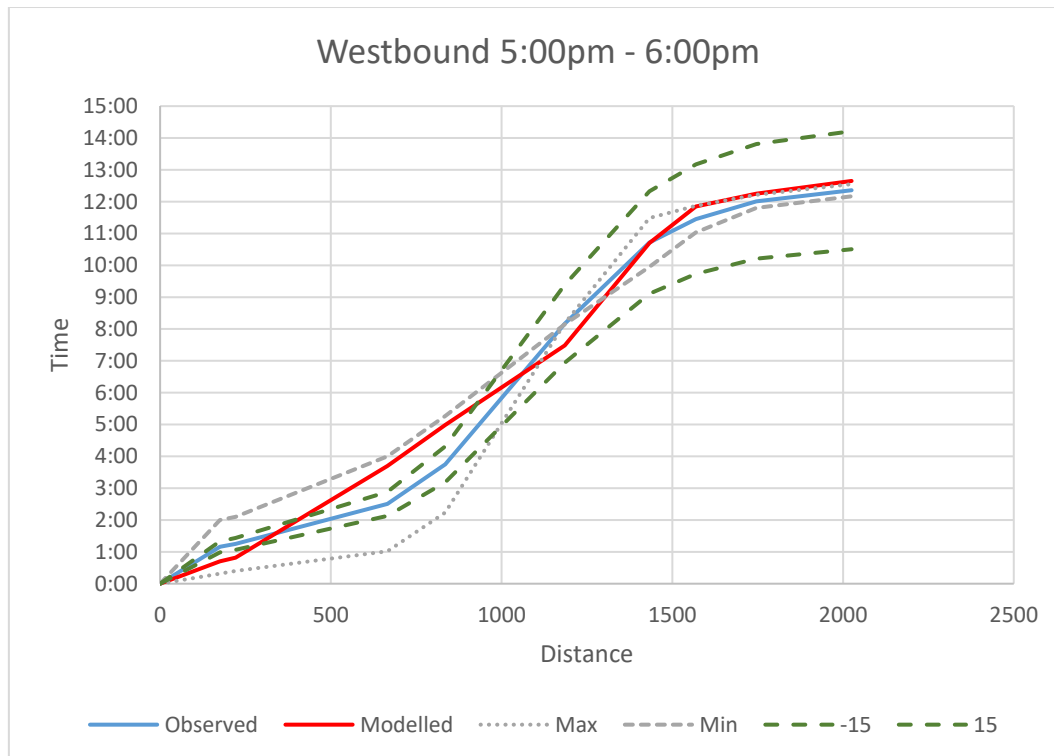


Figure 5.17: Evening Peak Travel Time Eastbound (5:00pm – 6:00pm)



Evening peak validation falls within the 15% tolerance for the end of the trip. It is noted that the second hour which is the peak has a very close replication of the observed travel times.

The model is considered to be validated for both the morning and evening peak periods replicating the congestion and travel times that were observed in the travel time surveys.

5.4 Calibration and Validation Conclusion

The model calibration and validation results meet the criteria and show that the model is able to replicate the existing traffic conditions and can be used for testing of future scenarios.

6 Model Limitations

The model has been calibrated for the purpose of testing the impacts of the Crescent Parklands Development. It is well calibrated and validated for the eastern section of the model near Church Street and James Ruse Drive.

The model inherited from the PRCUTS model has limited route choice due to the structure of the model and would not test the diversion of traffic from the M4 Motorway or be sensitive to future changes in tolls or congestion in the model.

7 Conclusion

TTPP has calibrated and validated a micro-simulation model based on the PRCUTS Mesoscopic model. The model was calibrated and validated based on the Roads and Maritime Services (now TfNSW) modelling guidelines.

The model has been run for 5 random seeds in both the morning and evening peak periods and results presented here are based on the median run.

The model has been calibrated to achieve the criteria for GEH and R^2 for turns and a core area has been calibrated which meets core area requirements. Validation of the model has been undertaken based on travel times. The model shows a strong correlation with the travel times.

The model is considered well calibrated and suitable for the purpose of modelling the impacts of the Crescent Parklands Development.

Appendix A

Model Plot



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Appendix H

Green Travel Plan



SSD-70283710: 1 Crescent Street, Holroyd

Green Travel Plan

Prepared for:

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the Holroyd Unit Trust (ABN 42 891 308 354)

10 December 2024

The Transport Planning Partnership

SSD-70283710: 1 Crescent Street, Holroyd

Green Travel Plan

Client: Tiberius (Holroyd) Holdings Pty Ltd

Version: V03

Date: 10 December 2024

TPP Reference: 16241

Quality Record

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APPENDICES

- A. PRIORITISED INFRASTRUCTURE UPGRADES
- B. TRANSPORT ACCESS GUIDE

1 Introduction

This Green Travel Plan report has been prepared by The Transport Planning Partnership (TTPP) to accompany a State Significant Development Application (**SSDA**) for a proposed mixed-use precinct located at 1 Crescent Street, Holroyd (**the site**).

This report has been prepared to encapsulate strategies for managing travel demand that embraces the principles of sustainable transport.

The Green Travel Plan indicates the measures that will be put in place to influence the travel patterns to/from the site, with a view to encourage more sustainable travel modes from Day One of occupation.

Following the implementation of the site-specific measures, the proposed SSDA at 1 Crescent, Holroyd will be capable of accommodating the future development.

1.1 Types of Travel Plan

There are two distinct types of travel plans:

- To change the travel behaviour at an existing site (i.e. reduction of car use, especially if only used by one person). Such plans would be implemented at large administrative buildings (e.g. government hospitals). This would aim to achieve a modal shift when compared against a stated benchmark. This would include monitoring the plan over a period after opening with more measures introduced if stated objectives were not achieved.
- To influence the travel behaviour of a site prior to it being occupied. This can include such measures as locating the site next to a railway station, reducing on-site parking (especially for commercial buildings), providing information and ensuring the development ties in with the sustainable active travel initiatives outside of the site. This travel plan would aim to achieve a lower car driver mode upon occupation compared with comparable sites.

This GTP falls into the latter category where the majority of green travel initiatives are provided prior to occupation of the site.

1.2 The Role of a Green Travel Plan

The purpose of a GTP is to encapsulate a strategy for managing travel demand that embraces the principles of sustainable transport.

In its simplest form, this GTP encourages use of transport modes that have low environmental impacts, for example active transport modes including walking, cycling, public transport, and provides better management of car use.

Active transport presents a number of interrelated benefits including:

- improved personal health benefits
- reduced traffic congestion, noise and air pollution caused by motor vehicles
- greater social connections within communities, and
- cost savings to the economy and individual.

A GTP is a package of coordinated strategies and measures to promote and encourage active/sustainable travel. This GTP aims to influence the way people move to/from the proposed development site to deliver better environmental outcomes and provide a range of travel choices, whilst also reducing the reliance on private car usage, particularly single occupancy car trips.

The planning of new developments needs to accommodate innovative ideas to better manage the transport demand arising from the developments. As part of an ongoing process, it is necessary to review and/or introduce new measures to ensure that trips generated by the proposed development are not solely private car based, particularly single occupancy trips.

In order to ensure that the GTP meets its intended objectives, a review of 'best practice' guidelines such as the City of Sydney 'Guide to Travel Plans', 'The Essential Guide to Travel Planning' prepared by the United Kingdom Department of Transport and Transport for NSW's 'Integrated Public Transport Service Planning Guidelines' has been undertaken.

From the above review, the key themes applicable to the GTP include:

- **Site audit and data collection:** A desktop audit has been undertaken in order to identify and document the existing issues and opportunities relevant to site and its accessibility particularly by non-car modes. Opportunities to improve amenity, incentivise non-car travel and remove barriers to the use of sustainable transport modes are then dealt with under the Site-Specific Measures, detailed in Section 5.1. Notably, as the site is not currently occupied by the proposed development, travel surveys based on recent 2016 Census data have been used to inform the baseline data for modal splits.
- **Audit of policies:** An audit of key policy documents has been undertaken to assist with defining the direction and purpose of the GTP, aligned with the key targets and objectives from a local and regional perspective.
- **Private vehicle travel management:** This GTP provides a strategy to reduce travel by private vehicles.

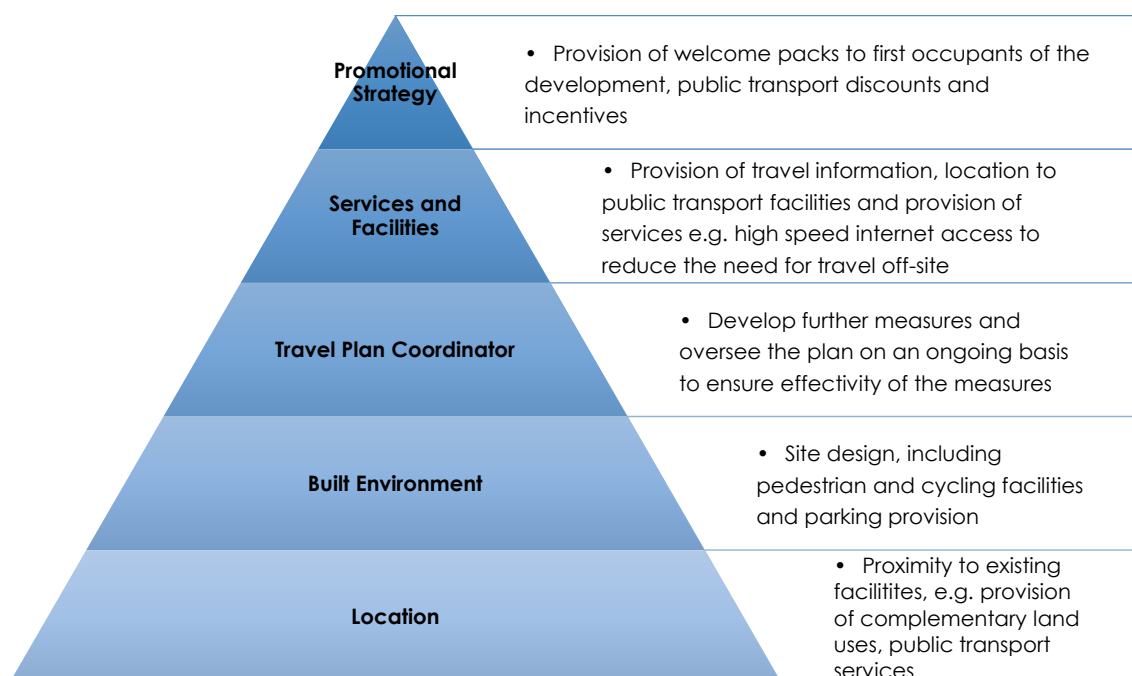
- **Local alliances:** The development of relationships between the Proponent and various stakeholders (such as Council, Transport for New South Wales) will assist the Proponent in delivering improved transport options.

1.3 Travel Plan Pyramid

The GTP will need to be tailored to the proposed development site to ensure appropriate measures are in place for the different land uses to promote a modal shift away from car usage.

The key elements of the GTP are shown in the Travel Plan Pyramid in Figure 1.1.

Figure 1.1: Travel Plan Pyramid



All elements in the Travel Plan Pyramid are critical to the success of the GTP, but Figure 1.1 illustrates that the key foundations to ensure the success of a GTP are:

- **Location** – proximity to existing public transport services and proximity to mixed land uses, e.g. shops and services, such that walking or cycling becomes the natural choices, and
- **Built Environment** – provision of high-quality pedestrian and cycling facilities, end-of-trip facilities and reduced car parking provision to encourage sustainable transport choices.

1.4 Drivers of the Travel Plan

There are a number of social, environmental and economic drivers for developing and implementing a GTP for developments as detailed below.

1.4.1 Car Parking

Car parks utilise valuable land resources and impact amenity. If the area continues to grow and there is no modal shift towards non-car transport modes, the car parking demand could increase significantly. As such, the provision of car parking, especially destination parking, must reflect the site's proximity to public transport to influence a modal shift to more sustainable transport modes.

1.4.2 Environmental Impacts

The transport sector (road, rail, air and ship) is Australia's third largest source of greenhouse gas emissions (GHG), accounting for 18 per cent of emissions in Australia in 2015 (Climate Council of Australia, 2016). Mitigating this impact is a key driver of the GTP. Within Australia, the transport sector has the highest rate of growth of GHG emissions per year having risen by 51 per cent since 1990 with private vehicles responsible for almost half of transport emissions. In comparison, travel modes such as walking and cycling produce the lowest emissions while public transportation has a significantly lower impact than private vehicles.

1.4.3 Health Benefits

The use of sustainable transport modes can have wide-ranging health benefits due to a corresponding reduction in greenhouse gas emissions and increase in physical activity from walking and cycling. The shift from private cars to sustainable transport “can yield much greater immediate health “co-benefits” than improving fuel and vehicle efficiencies” (World Health Organisation, 2011). The potential benefits can include reduced respiratory diseases from better air quality, prevention of heart disease, some cancers, type 2 diabetes and some obesity-related risks.

1.4.4 Social Equity

Transport has a fundamental role in supporting social equity, that is the equitable distribution of services, amenities and opportunities. The provision of sustainable transport modes can provide a more affordable alternative to car use. As such, it offers better mobility for women, children, young people, the aged, persons with disabilities and the poor, who have less access to private vehicles, thereby enhancing social equity.

1.4.5 Site Attraction

Provision of high-quality transport facilities (public transport, cycling and walking infrastructure) has a significant impact on the accessibility and therefore attractiveness of a site.

As Sydney's population grows and road congestion alongside it, the need for alternative travel modes increases. A site with well provisioned transport systems becomes a key attractor for employees, customers and visitors.

1.5 Transport Objectives

The following objectives have been identified in order to achieve the vision of the GTP:

Objective 1: Facilitate a modal shift towards more sustainable transport modes

- Improve access, safety, amenity and convenience of sustainable transport modes for travel to/from the site
- Incentivise sustainable transport modes and establish a culture of active and public transport use, and
- Improve awareness and knowledge of transport options available in the area.

Objective 2: Reduce car ownership and promote car share use

- Improve awareness and access to car share facilities available within the area
- Incentivise car share use as an alternative to owning a car.

Objective 3: Reduce the need to travel off-site

- Provide complementary uses on-site to reduce travel requirements for residents, and
- Encourage social interactions amongst residents to create a vibrant community on-site.

2 Existing Transport Policy Context

2.1 Summary of Key Policy Directions

A review of existing relevant policy clearly illustrates a number of themes that should inform the approach to ongoing management of transport demand, and investment in the transport network. These themes include:

- provision of high-quality local transport infrastructure, improved bike paths and networks, and improving accessibility and connectivity
- address car parking issues in key locations, including residential and business districts, and encouraging active transport
- create connected, liveable communities where people can walk, cycle and use public transport to promote healthier, active communities.

A summary of the existing policy framework documents is provided in Table 2.1.

Table 2.1: Summary of Policy Framework

Policy/Strategy	Key Aims/Objectives/Goals
Cumberland Council	
Cumberland 2030: Our Local Strategic Planning Statement	The Local Strategic Planning Statement sets plans for the Cumberland area's economic, social and environmental land use needs over the next 10 years, and is aligned to the 20 year vision for Cumberland. It has a focus on improving transport accessibility and options throughout Cumberland.
Cumberland City Council Community Strategic Plan 2017-2027	The Community Strategic Plan (CSP) fulfils Council's obligation under the Integrated Planning and Reporting Framework by: • Taking a long-term outlook covering a minimum term of 10 years • Establishing the strategic outcomes together with strategies to achieve them • Addressing social, environmental, economic and civic leadership issues equally • Having a basis in the social justice principles of equity, access, participation and rights • Aligning to and referencing other relevant state and regional plans
NSW State Government	
New South Wales Long Term Transport Masterplan (NSW State Government, 2012)	The Long Term Transport Master Plan provides measures that go beyond addressing the visible incidence of congestion and extend to the management of the States' transport systems as a whole, by: • Accommodating land use, growth and urban renewal and ensuring land use policies make a positive impact on congestion • Managing demand through priority measures, demand-responsive technology, better customer information and pricing • Managing congestion on roads by encouraging the use of public transport by: ◦ Developing an integrated, fast, and reliable bus network ◦ Improving public transport interchanges • Employing a coherent, whole-of-network planning strategy through the Strategic Transit Network

Policy/Strategy	Key Aims/Objectives/Goals
NSW State Infrastructure Strategy 2018-2038: Building Momentum	The recommendations in the 2018 SIS for the transport sector need to be read in the context of Future Transport 2056 and the Greater Sydney Region Plan. Both documents have been key inputs to this strategy. Some key recommendations include: • Encourage travel patterns that are tailored to the capacity of the network and help to manage congestion with mobility pricing reform and demand management initiatives. • Reallocate road space in key commuter corridors to give priority to the most productive and sustainable transport modes, improve the integration of services across modes, remove network bottlenecks and upgrade operational systems and infrastructure. • Further develop the Sydney rail network with new rail links and system-wide upgrades. Develop extensive on-road rapid transit networks and active transport links to support the mass transit system and link key centres across Greater Sydney. Plan and deliver critical links in the motorway network that will serve Sydney well into the future.
Future Transport Strategy 2056	The Strategy aims to increase the mode share of public transport services and reduce the use of single occupant vehicles. The proposal will look to reduce private vehicle travel and aligning with the objectives of the Strategy.
Greater Sydney Region Plan: A Metropolis of Three Cities – Connecting People	The site is well located to contribute towards creating a 30-minute city. The close proximity of the site to Granville Station and Harris Park Station means people/prospective residents can easily access the site via public transport modes. The site thus aligns with the objects of the Plan in creating good access between jobs and public transport facilities to contribute towards a 30-minute city.
Sydney's Cycling Future, Cycling for Everyday Transport (NSW State Government, 2013)	Sydney's Cycling Future's key strategy is to improve cycling infrastructure. The Three Pillars of Sydney's Cycling Future include: • investing in separated cycleways • providing connected bicycle networks to major centres and transport interchanges promoting better use of our existing network; and, • engaging with our partners across government, councils, developers and bicycle users.

2.1.1 Greater Sydney Region Plans: 30-minute City

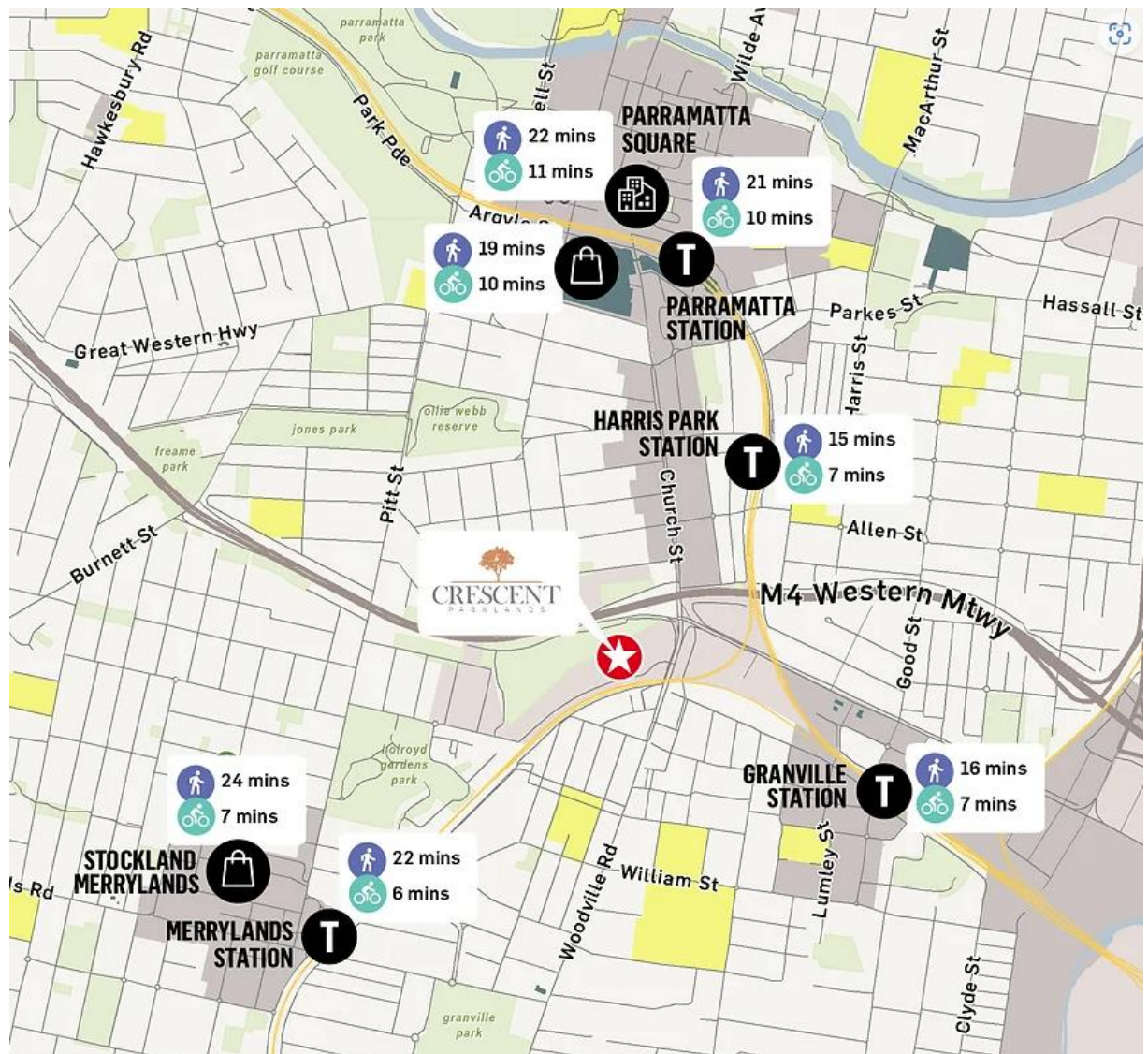
As indicated above, the Greater Sydney Commission's Greater Sydney Region Plan, the key purpose of the plan is to deliver a 30-minute city where jobs, services and quality public transport spaces are in easy reach of residences.

However, a recent study conducted by Deloitte Access Economics found that only 75 of the 313 Sydney neighbourhoods could currently be deemed to have easy access to major job hubs and other key services within half an hour. Based on the findings of the Deloitte study and work undertaken by Arup, a number of key performance criteria have been identified in order to achieve a 30-minute city:

- **Access to healthcare** – hospitals provide an important facility to many people and play a role in employment, education and training facilities. Parking is often limited at hospitals and as such, access via a variety of transport modes is required.
- **Access to retail services** – access to all forms of retail (supermarkets and specialist stores) is essential to achieve a 30-minute city. There has already been an increase in the number of mixed-use developments within Sydney to create micro-communities, which provide mixed retail services, residential, commercial and community facility uses.

- **Access to schools** – access to good schools relies on housing affordability, which also shape where teachers live. In particular, many residents have good access to local schools, however some have to travel outside their catchment areas for specialist and selective schools. As such, it is important to create strong transport link to provide good access to local schools and connect teachers with their place of work.
- **Quality of public transport facilities** –Whilst Sydney is a liveable city; it is often constrained by transport issues. As such, the provision of good quality, reliable public transport facilities are essential to achieve a 30-minute city.
- **Access to jobs** – people being able to live close to their jobs is fundamental to delivering a 30-minute city. The current Sydney CBD has the highest concentration of jobs but as found by the Deloitte study, the average one-way commute for those travelling into the CBD from outside the city is 63 minutes. The locations with the best access to jobs currently are located near railway stations, or close to major employment centres such as the Sydney CBD.
- **Access to residents** – a way of minimising travel needs is to locate jobs and services close to where residents live.

Figure 2.1: 30-minute City from Crescent Parklands



Source: [A 30-minute City | 1 Crescent Street, Holroyd \(crescentparklands.com.au\)](https://www.crescentparklands.com.au) (accessed, 16/03/2023)

3 Existing Transport Context

3.1 Site Location

3.2 Site Description

The land to which this SSDA relates is located at 1 Crescent Parklands, Holroyd (**the site**). The site is legally described as Lot 700 in Deposited Plan 1241836.

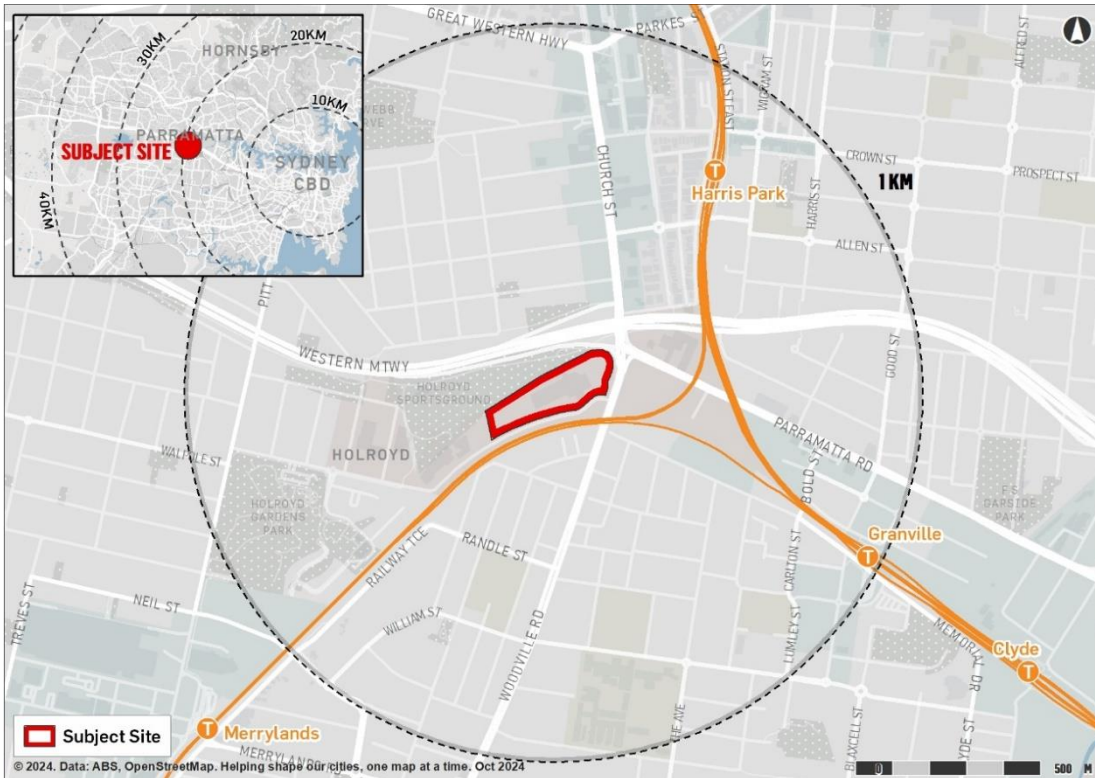
The site comprises an irregularly shaped allotment with an area of 36,353m² and has a primary frontage to Crescent Street to the south and a frontage to Woodville Road to the east. The northern boundary of the site adjoins the Holroyd Sportsground with the M4 Motorway beyond.

The site is located in the Cumberland Local Government Area (**LGA**) and is currently vacant and cleared after WesTrac ceased operations of an industrial facility at the site in early 2018. The site contains existing scattered pockets of landscaped vegetation, predominately located along the site's southern and eastern boundaries to Crescent Street and Woodville Road.

The site is bounded by Parramatta Road/Church Street/Woodville Road intersection to the north east, Woodville Road to the east and Crescent Street to the south. The northern frontage of the site faces the Holroyd Sportsground and the M4 Motorway beyond. It is noted that the eastern portion of the site fronting Woodville Road has been identified for potential future acquisition by Transport of NSW for future planned intersection upgrades to Woodville/Parramatta Road/M4.

A Location Plan including the site is provided in Figure 3.1 and an aerial photo of the site is provided in Figure 3.2.

Figure 3.1: Location Plan



Source: Urbis, 2024

Figure 3.2: Aerial Photography



Source: Urbis, 2024

3.3 Surrounding Road Network

Crescent Street

Crescent Street is a local road with an east-west configuration and a 10m wide carriageway. It is a two-way road with one travel lane provided in each direction. Within the vicinity of the site double-line marking divides the opposing traffic lanes. It currently allows access from all directions to/from the site.

The sign-posted speed limit on Crescent Street is 50 km/h. Along the site frontage on-street parking is not provided, however, about 140m in length of unrestricted parking that could accommodate some 20 car spaces is provided south-west of the site.

Woodville Road

Woodville Road is classified as a State road and is aligned in a north-south direction. Proximal to the site, Woodville Road is a six-lane median divided road with a carriage width of approximately 19m. The sign-posted speed limit is 60 km/h.

Up to 300m south of the site, Woodville Road operates as a clearway between Monday and Friday, specifically from 6:00am - 10:00am and 3:00pm - 7:00pm.

Parramatta Road

Parramatta Road is also a State road providing two traffic lanes in each direction. Parramatta Road has a speed limit of 60 km/h and is generally configured in an east-west direction. Proximal to the site, clearways are in operation along Parramatta Road from Monday to Friday during peak times.

The following intersections currently exist in the vicinity of the site:

- Crescent Street / Woodville Road (signalised)
- Church Street / Parramatta Road / Woodville Road (signalised).
- M4 Eastbound Off Ramps

3.4 Public Transport

3.4.1 Train Services

The site is located close to three train stations, namely, Harris Park in the north, Granville in the east and Merrylands in the south. The distance between the site and the following stations are:

- Harris Park – 743m – specific study undertaken by Urbis to confirm distance.
- Granville – 1.1km

- Merrylands – 1.2km – A new car park with 98 spaces was completed in August 2018
- Parramatta – 1.4km

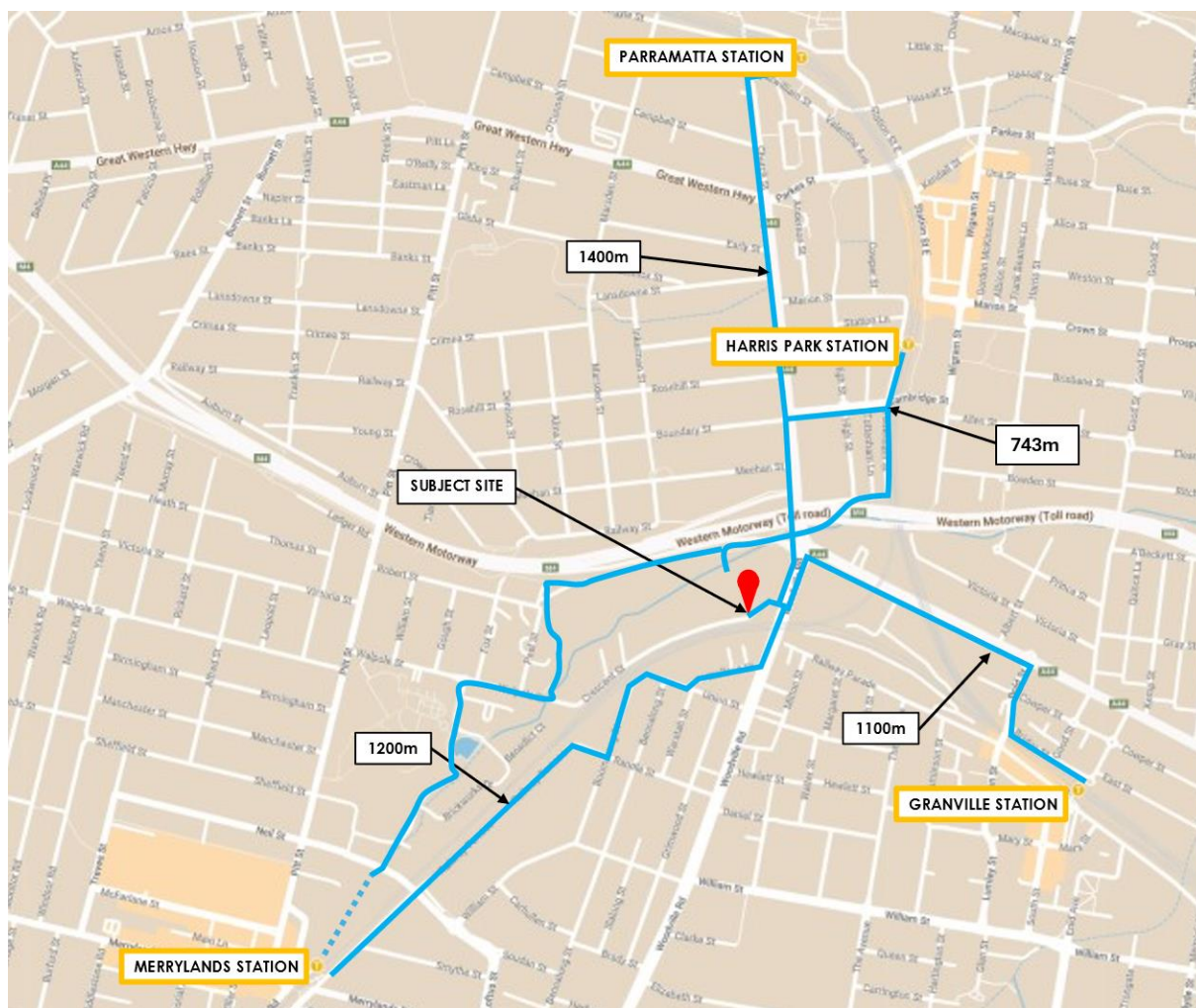
The frequency of current train services at all four stations is summarised in Table 3.1. the proximity of these stations to the site is shown in Figure 3.3.

Table 3.1: Public Transport Provision (Trains)

Station	Route Description	Frequency (to City)		
		Weekday AM Peak (7-9am)	Weekday PM Peak (4-6pm)	Weekday Off-Peak
Granville	T1 Western Line T2 Inner West & South Line	3-10 mins	3-10 mins	5-15 mins
Harris Park	T1 Western Line T2 Inner West & South Line	3-10 mins	3-10 mins	5-15 mins
Merrylands	T2 Inner West & South Line	3-15 mins	3-15 mins	5-20 mins
Parramatta	T1 Western Line T2 Inner West & South Line	3-10 mins	3-10 mins	5-15 mins

Table 3.1 indicates that a good level of train services to the city is provided at these train stations.

Figure 3.3: Nearby Railway Stations – Walking Distances



Basemap Source: Google My Maps

3.4.2 Bus Services

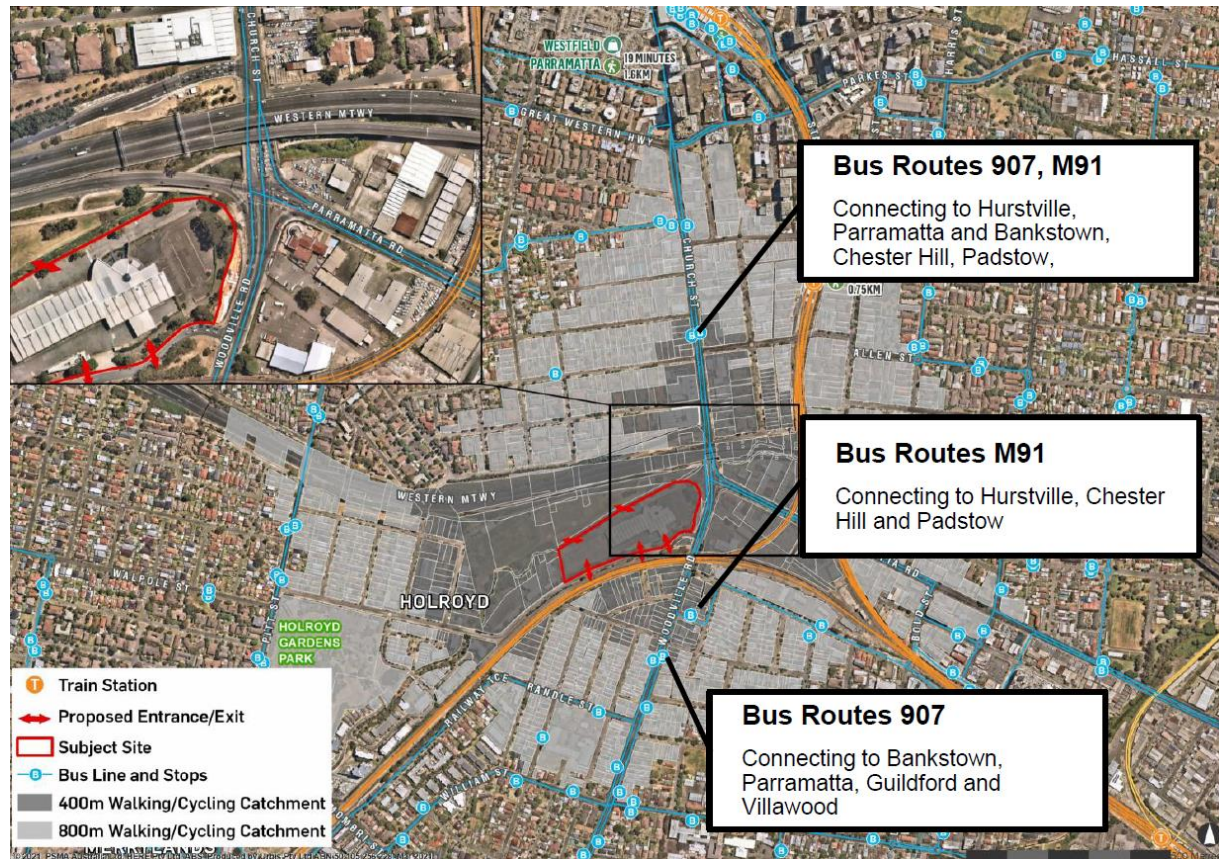
There are bus stops within close walking distance to the site and are summarised in Table 3.2.

Table 3.2: Public Transport Provision (Buses)

Location of stop	Route #	Route Description	Distance to Nearest Stop
Woodville Road	907	Bankstown to Parramatta via Bass Hill and Villawood	450m
Halsall Street	M91	Hurstville to Parramatta via Padstow, Bankstown and Chester Hill	350m
Pitt Street	802	Liverpool to Parramatta via Cartwright, Miller, Bonnyrigg, Fairfield, Merrylands	1km
	804	Liverpool to Parramatta via Hinchinbrook, Bonnyrigg, Greenfield Park, Fairfield, Merrylands	
	806	Liverpool to Parramatta via Mt Pritchard, Abbotsbury, Prairiewood, Wetherill Pk, Merrylands	

The bus routes that service the bus stops close to the site are shown in Figure 3.4.

Figure 3.4: Bus Routes in the Vicinity of the Site



Source: Active Transport Assessment (Urbis, 2021)

3.4.3 Shuttle Services

A shuttle bus zone is proposed on site. The shuttle bus will provide services to Harris Park Train Station and Parramatta.

3.5 Walking and Cycling Infrastructure

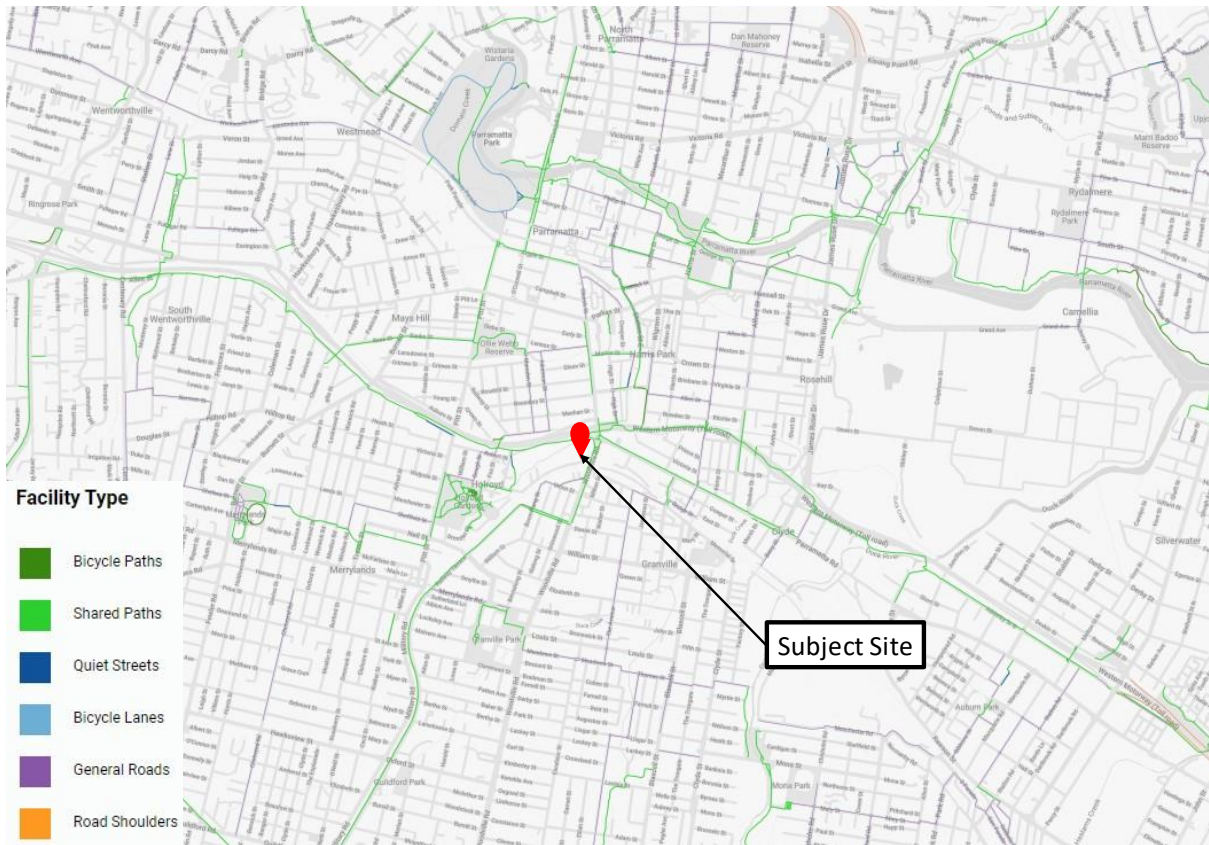
Along the site frontage there is a formal pedestrian path on the northern side of Crescent Street. Footpaths are located on both sides of Woodville Road.

Nearby signalised crossing points with marked foot crossings include:

- Crescent Street / Woodville Road – western leg
- Church Street / Parramatta Road / Woodville Road – eastern, southern and western legs.

Figure 3.5 shows the cycle network map for the Holroyd area. It can be seen that the off-road bicycle route currently exists along the northern boundary of the Holroyd Sportsground and is therefore very close to the subject site.

Figure 3.5: Cycle Network Map



Source: TfNSW Cycleway Finder (accessed 14/03/23)

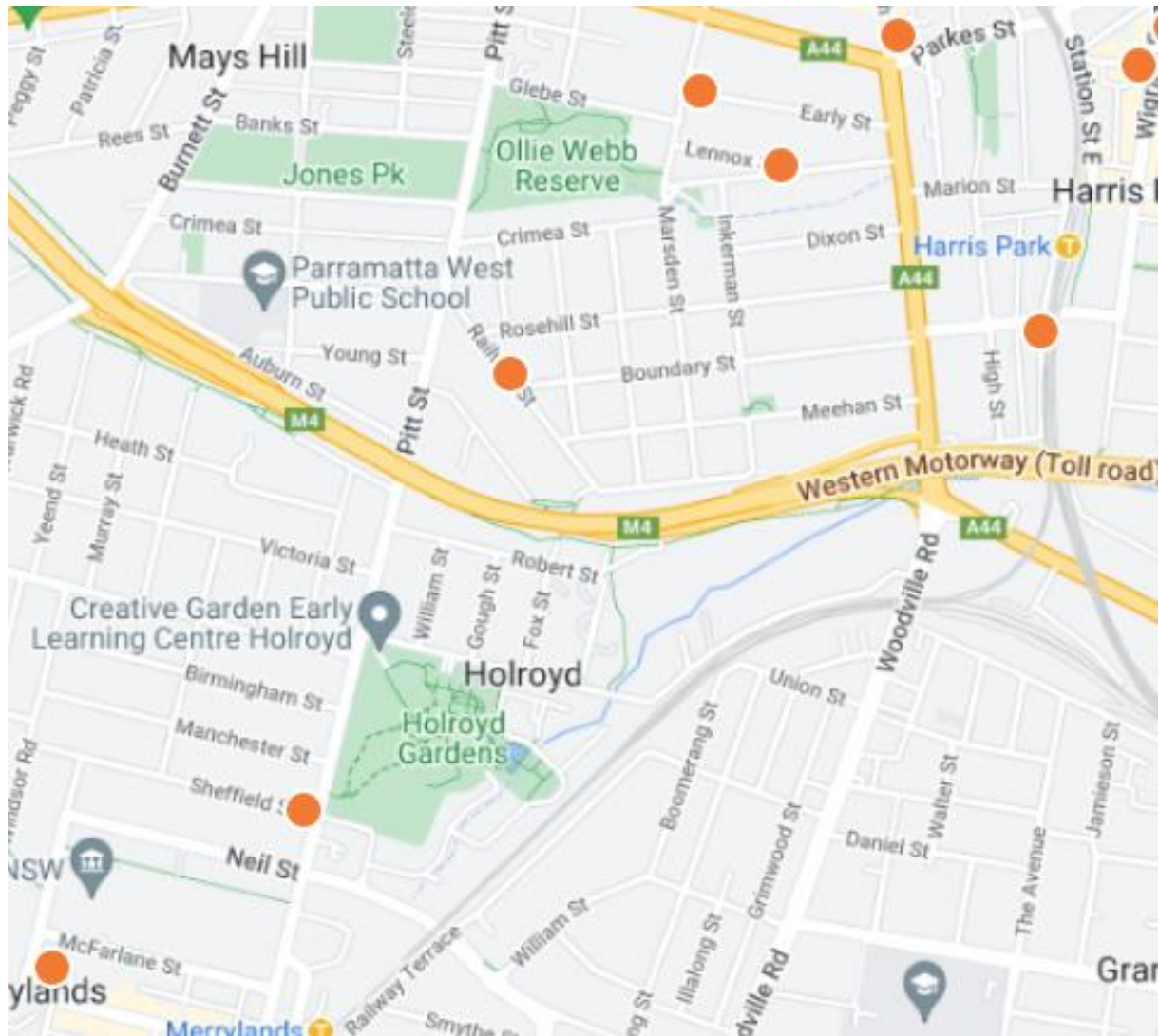
3.6 Car Share Facilities

Car sharing is a flexible, cost effective alternative to car ownership and is a convenient and reliable way for residents to use a car when they need one. GoGet is a car share company operating in Australia, with a number of vehicles positioned within walking distance of the site as shown in Figure 3.6.

A study was commissioned by the International Carsharing Association in 2016, to review the impact of the car share services in Australia after more than a decade of operation (Phillip Boyle & Associates, 2016). The study focuses on the City of Sydney council area which had about 20,000 users and 805 car share vehicles at the time of the study. The findings of the study indicate that car share users reduce their overall vehicle kilometres travelled (VKT) per year by 50 per cent compared with people who own a private vehicle. The resulting impact is reduced congestion on roads, lower levels of CO₂ pollution, fewer casualty accidents and an increase in use of active transport methods. Notably, the City of Sydney Council has reported

that “a single car share vehicle can replace up to 12 private vehicles that would otherwise compete for local parking”.

Figure 3.6: GoGet Car Locations



Source: GoGet (accessed 16/03/2023)

Notwithstanding this, car share spaces will be provided on site.

3.7 Existing Modal share

The 2016 Census data from Australian Bureau of Statistics (ABS) has been obtained to understand the existing method of travel to work patterns of residents living in Holroyd. Please note that the 2021 census data was significantly impacted by the Covid-19 pandemic and could not be used.

The existing mode share of residents is shown in Table 3.3.

Table 3.3: Existing Mode Share of Residents

Method of Travel	Existing Mode Share
Car	66%
Train	27%
Bus	5%
Taxi	2%
Walked Only	1%
Motorbike/scooter	1%

The data indicates that the primary mode of travel is car (66%) followed by train (27%), bus (5%), taxi (2%), walked only (1%) and motorbike/ scooter (1%).

4 GTP Objectives and Targets

4.1 Objectives

The following have been identified as the key objectives of this GTP:

- promote sustainable travel and establish a culture of active and public transport use
- continue to encourage non-car based modes by providing on-site bicycle parking facilities
- engage the residents in the development of the GTP to promote and gain support for the GTP measures, and
- improve access and mobility and enhance the sense of place.

4.2 Mode Share Targets

The success of the GTP is measured by setting modal share targets and identifying the measures and actions that have the greatest impact.

It is noted that a modal shift of up to 5 per cent is typically considered to be a significant achievement (based on knowledge of local and international GTPs, and as stated by experts in Land Environment Court proceedings).

On this basis, a summary of the existing and projected modal splits for each user type is provided in Table 4.1.

In TTPP's view, these proposed modal split targets are considered realistic and a significant achievement based on our previous experience at similar developments, subject to the implementation of green travel strategies and initiatives.

Table 4.1: Mode Share Target

Method of Travel	Proposed Mode Share
Car	61% (-5%)
Train	29% (+2%)
Bus	7% (+2%)
Taxi	2%
Walked Only	2% (+1%)
Motorbike/scooter	1%

The above represents a modal shift of some 5% from car travel based on existing modes to/from the development. The above modal splits are considered achievable based on the existing public transport facilities within the immediate vicinity of the site discussed in Section 3.4.

5 Methods of Encouraging Sustainable Transport

To achieve the objectives of the GTP, measures will be put in place to influence the travel patterns to/from the site, with a view to encourage more sustainable travel modes from Day One.

5.1 Site Specific Measures

5.1.1 Public Transport

Public transport maps will be provided on noticeboards, newsletters, websites, social media to make residents more aware of the alternative transport options available in the area. The format of the map will be based upon the travel access guide.

This transport access guide will form part of a welcome pack for all residents to ensure that they are made aware of the available transport options. In addition to this, upon initial occupation, it is recommended for residents to receive an Opal card to ensure that travel patterns can be influenced from day one to establish better transport habits at the start of occupation.

5.1.2 Private Shuttle Bus

The proponents have during the planning proposal stage committed to providing a private shuttle bus service between the site and Harris Park Station and Parramatta that would run at regular intervals throughout the morning and afternoon periods. This would provide better access to rail connections at Harris Park and Parramatta.

This shuttle bus service has been provided with the provision of a bus bay and costs shared between body corporates in the development.

5.1.3 Walking and Cycling

As mentioned in Section 3.5, the site is already well serviced by adequate pedestrian infrastructure, with train services, bus services and amenities located within short walking distance from the site.

The Active Transport Assessment (Urbis, 2021) estimates the average walk-only trips in the Cumberland and Parramatta LGAs is 1.9km.

Figure 5.1: Average Distance Residents Walk in Cumberland and Parramatta LGAs

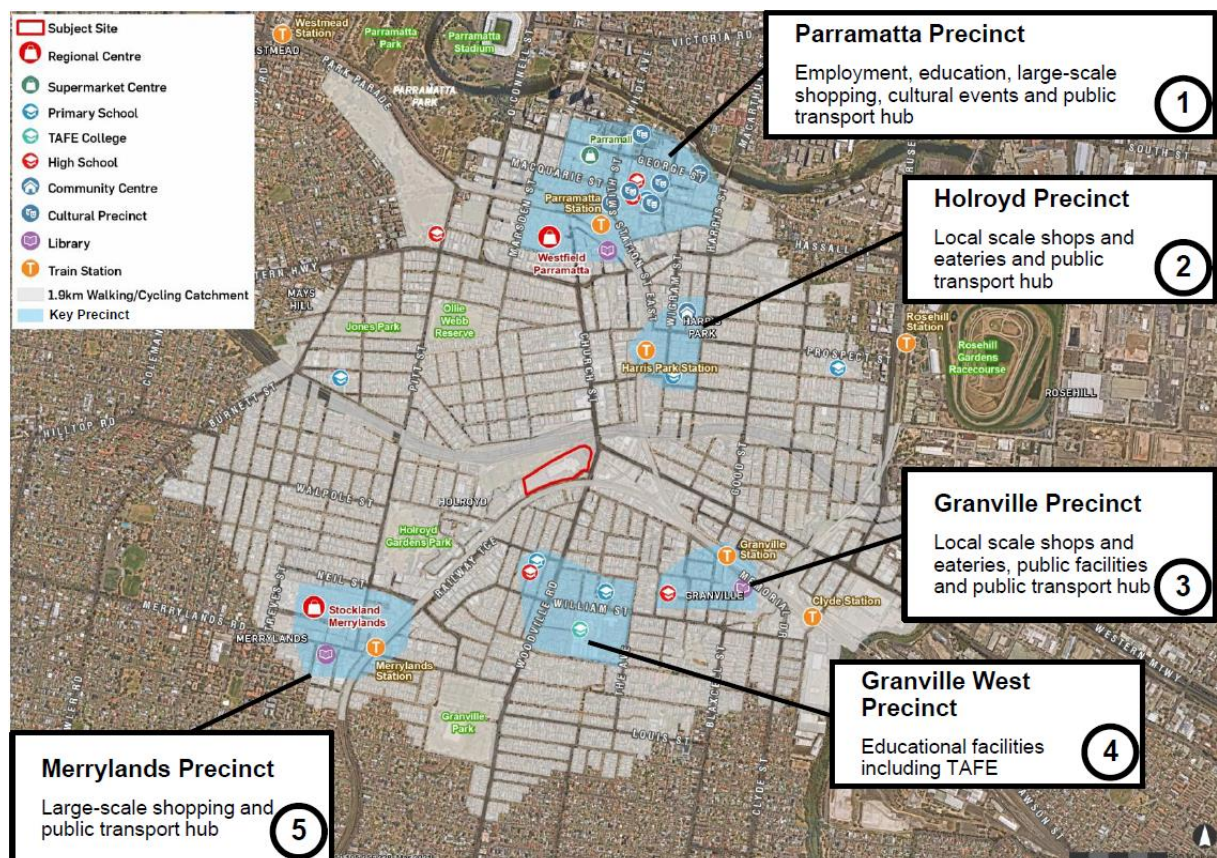


Source: Active Transport Assessment (Urbis, 2021)

A walking map showing essential amenities in the vicinity of the site will be provided on noticeboards, newsletters, websites and social media to inform residents that they need not travel far to access supermarkets, restaurants, medical centres, sports facilities, etc.

The five precincts that are within the 1.9km walking/cycling catchment are shown in Figure 5.2.

Figure 5.2: Catchment Analysis



Source: Active Transport Assessment (Urbis, 2021)

The provision of bicycle parking will be subject to the number of dwellings and commercial / retail GFA proposed in future detailed DAs.

However, the proposed building envelopes will be able to accommodate an appropriate amount of parking and will not exceed the maximum car parking requirement.

Further to this, the Proponent should consider establishing a walking and cycling group, where all residents would be invited to walk and/or cycle together around the neighbourhood, followed by recreational activities/special events within the site.

This initiative would help promote and encourage social inclusion, as well as promote walking and cycling as the choice of travel.

5.1.4 Car Sharing

As detailed in Section 3.6, there are a number of car share facilities on site and within the vicinity of the site. If car use is required, residents will be encouraged to use existing car share facilities in the area.

In sites such as Harold Park in Sydney, the landowner was able to negotiate with the car share company to provide all residents within the postcode with free GoGet membership.

Information of the existing car share facilities within the immediate vicinity of the site will be made available to all residents as part of the welcome pack.

5.1.5 On-Site Measures

The provision of high-quality internet services will also be provided to enable residents to work and/or study on-site, rather than travelling off-site.

This would also be accompanied by the provision of a small café/retail shop and communal space within the site to negate the need to travel off-site.

5.1.6 Off-site Measures

There are various off-site measures that are described in the Active Transport Assessment (Urbis, 2021).

These include various prioritised infrastructure upgrades on certain walking and cycling routes in Parramatta, Granville, Merrylands and Parramatta West. These are detailed in Appendix A.

5.2 Transport Access Guide

The information provided within the GTP will be provided to residents in the form of a package of easy-to-understand travel information known as a Travel Access Guide (TAG). This will be included in the welcome pack provided to residents.

TAGs provide customised travel information for people travelling to and from a particular site using sustainable forms of transport – walking, cycling and public transport.

It provides a simple quick visual look at a location making it easy to see the relationship of the site to public transport facilities and walking and cycling routes.

Such TAGs encourage the use of non-vehicle modes of transport and can reduce associated greenhouse gas emissions and traffic congestion while improving health through active transport choices.

TAGs can take many forms from a map printed on the back of business cards or brochures. Best practice suggests that the information should be as concise, simple and site centred as possible and where possible provided on a single side/sheet. If instructions are too complex, people are likely to ignore them.

This TAG should be available for residents and visitors to see, such as at front entrances and noticeboards.

A TAG has been prepared and provided in Appendix B.

5.3 Information and Communication

Several opportunities exist to provide residents with information about nearby transport options. Connecting residents with information would help to facilitate journey planning and increase their awareness of convenient and inexpensive transport options which support change in travel behaviour.

Transport NSW info

- Bus and train routes, timetables and journey planning are provided by Transport for New South Wales through their Transport Info website: <http://www.transportnsw.info/>

Cycleway Finder

- The Roads and Maritime Services provides a map with detailed cycling route information to encourage people of all levels of experience to travel by bicycle:
http://www.rms.nsw.gov.au/maps/cycleway_finder

Similarly, phone apps such as TripView display Sydney public transport timetable data and shows a summary view showing current and subsequent services, as well as a full timetable viewer. This timetable data is stored on the phone, so it can be used offline.

Connecting residents via social media may provide a platform to informally pilot new programs or create travel-buddy networks and communication.

The above web links and any social media platforms may be included within the GTP/TAG.

5.4 Actions

A summary of the key strategy and framework action table is shown in Table 5.1. It should be noted that this framework action table will be updated as required. However, it is stressed that the availability of the suggested strategies upon occupation is a key factor in influencing travel patterns.

As mentioned in Section 4.1, the transport objectives are summarised below:

- Objective 1: Facilitate a modal shift towards more sustainable transport modes
- Objective 2: Reduce car ownership and promote car share use
- Objective 3: Reduce the need to travel off-site

Table 5.1: Framework Action Table

Action	Objective	Responsibility	Timeline
1. Provide secure bicycle parking and end-of-trip facilities	1	Proponent	Prior to Occupation
2. Provide public transport noticeboard at key locations within the site in the form of a travel access guide. This will also be posted on the provider's website and included as part of the welcome pack distributed to all residents on Day One	1, 2	Travel Plan Coordinator	Prior to Occupation
3. Provide a shuttle bus service between the site and Harris Park/ Parramatta to run at regular intervals.	1,2	Proponent	Upon Occupation
4. Provide high quality services and complementary uses on-site	3	Proponent	Prior to Occupation
5. Provide residents with the Sustainable Travel and Access Plan to encourage active travel	1, 2, 3	Travel Plan Coordinator	Upon Occupation
6. Provide residents with a TAG on day one during induction and post the TAG on noticeboards, front entrances, website, social media etc.	1, 2, 3	Travel Plan Coordinator	Upon Occupation
7. Establish Walking Groups and Bicycle User Groups with associated online forums	1, 2, 3	Travel Plan Coordinator	Ongoing
8. Provide regular social events to encourage social interaction to eliminate social barriers to encourage car sharing	1, 2, 3	Travel Plan Coordinator	Ongoing
9. Review the GTP to introduce additional measures or modify current measures as required	1, 2, 3	Travel Plan Coordinator	Ongoing

6 Management and Monitoring of the Plan

6.1 Management

There is no standard methodology for the implementation and management of a GTP. However, the GTP will be monitored to ensure that it is achieving the desired benefits. The mode share targets set out in Section 4.2 are used in this regard to ensure there is an overall goal in the management of the GTP.

The monitoring of the GTP would require travel surveys to be undertaken with a focus to establish travel patterns including mode share of trips to and from the Site. It is anticipated that the first set of surveys would be undertaken within six months of first occupation to obtain the baseline mode shares for the site.

The implementation of the GTP will need a formal Travel Plan Co-ordinator (TPC), who will have responsibility for developing, implementing and monitoring the GTP.

It will also be necessary to provide feedback to residents to ensure that they can see the benefits of sustainable transport.

Indeed, there are several keys to the development and implementation of a successful GTP. These include:

- **Communications** – Good communications are an essential part of the GTP. It will be necessary to explain the reason for adopting the plan to promote the benefits of sustainable transport options.
- **Commitment** – GTPs involve changing established habits or providing the impetus for people in new developments to choose a travel mode other than car use. To achieve co-operation, it is essential to promote positively the wider objectives and benefits of the plan. This commitment includes the provision of the necessary resources to implement the plan, beginning with the introduction of the 'carrots' or incentives for changing travel modes upon occupation.
- **Building Consensus** – It will be necessary to obtain broad support for the introduction of the plan from the residents.

Once the plan has been adopted, it is essential to maintain interest in the scheme. Each new initiative in the plan will need to be publicised and marketing of the project as a whole will be important.

6.2 Remedial Actions

A continuous review should take place to identify remedial actions should the modal share targets not be achieved.

Alternatively, the assigned Travel Plan Coordinator (TPC) could work with Council to see how the measures might be aligned with those identified in Council's sustainable transport strategies.

6.3 Consultation

The results of the GTP will be communicated with residents via the noticeboard, newsletters, email and website.

As such, it is recommended that a summary letter is produced presenting the results of the survey within one month of undertaking travel surveys (e.g. 6-months post-occupation). The travel survey can be undertaken by the TPC. The letter/report may be also appended to the GTP.

Communication to residents may be carried out in a similar form by public display of the GTP on noticeboards. Alternatively, a news article on the matter could be included on emails to residents. Travel provisions can also be outlined in a travel access guide (TAG) to new residents.

Appendix A

Prioritised Infrastructure Upgrades

PRIORITISED INFRASTRUCTURE UPGRADES- THE PARRAMATTA ROUTE



1. Upgrade traffic signalling with bicycle crossing lanterns at Station Street East & Parkes Street.



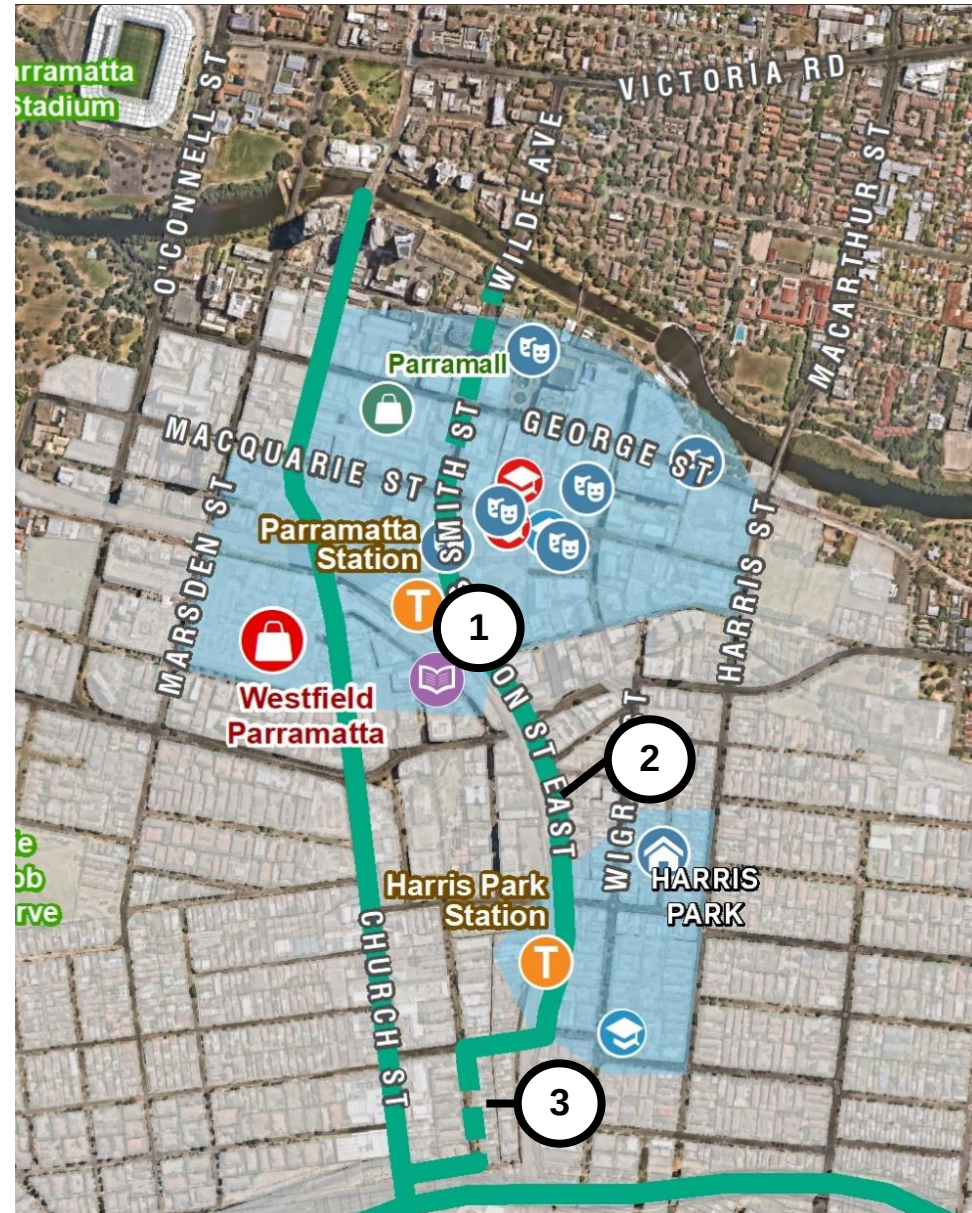
2. Repaint Shared Path line marking between Parramatta Station and 1 Crescent Street, Holroyd.



3. Create a 'Quiet Way' on High Street.



4.3: REQUIRED UPGRADES ON THE PARRAMATTA ROUTE



PRIORITISED INFRASTRUCTURE UPGRADES- THE GRANVILLE ROUTES

4.4: REQUIRED UPGRADES ON THE GRANVILLE ROUTES



1. Repaint shared path line marking on Parramatta Road (Woodville Road to Bold Street).



2. Add shared path between Bold Street and Granville library.



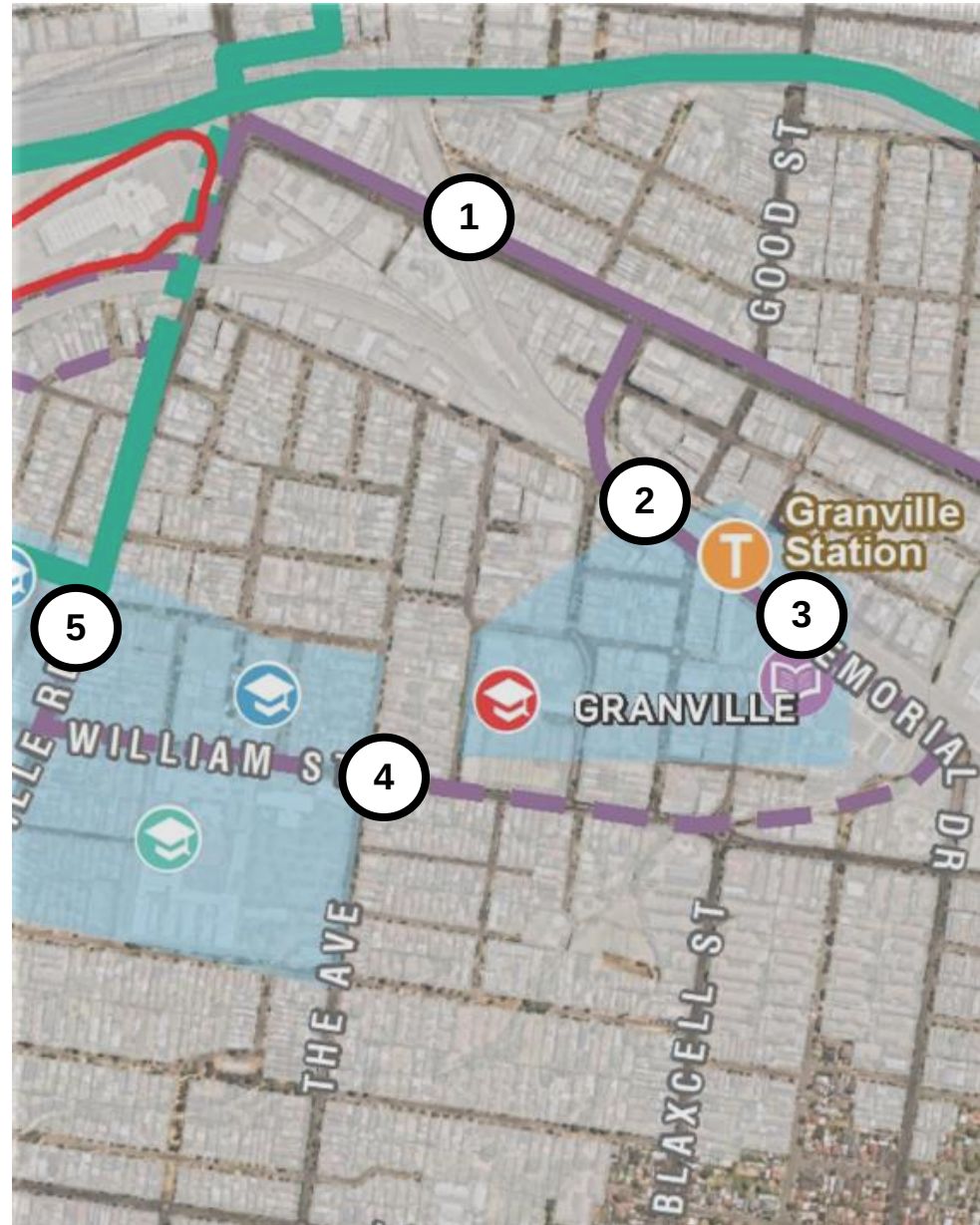
3. Add a raised pedestrian crossing at new library to join with proposed share path.



4. Add shared path on William Street between Woodville Road and Enid Avenue.



5. Widen footpath to accommodate new shared path treatment along Woodville between William and Randle Streets.



PRIORITISED INFRASTRUCTURE UPGRADES- THE MERRYLANDS ROUTE

4.5: REQUIRED UPGRADES ON THE MERRYLANDS ROUTES



1. Add cycling lanterns on the north arm of the Neil Street/ Pitt Street intersection



2. Add new shared path on Pitt St between Holroyd Gardens and Neill Street.



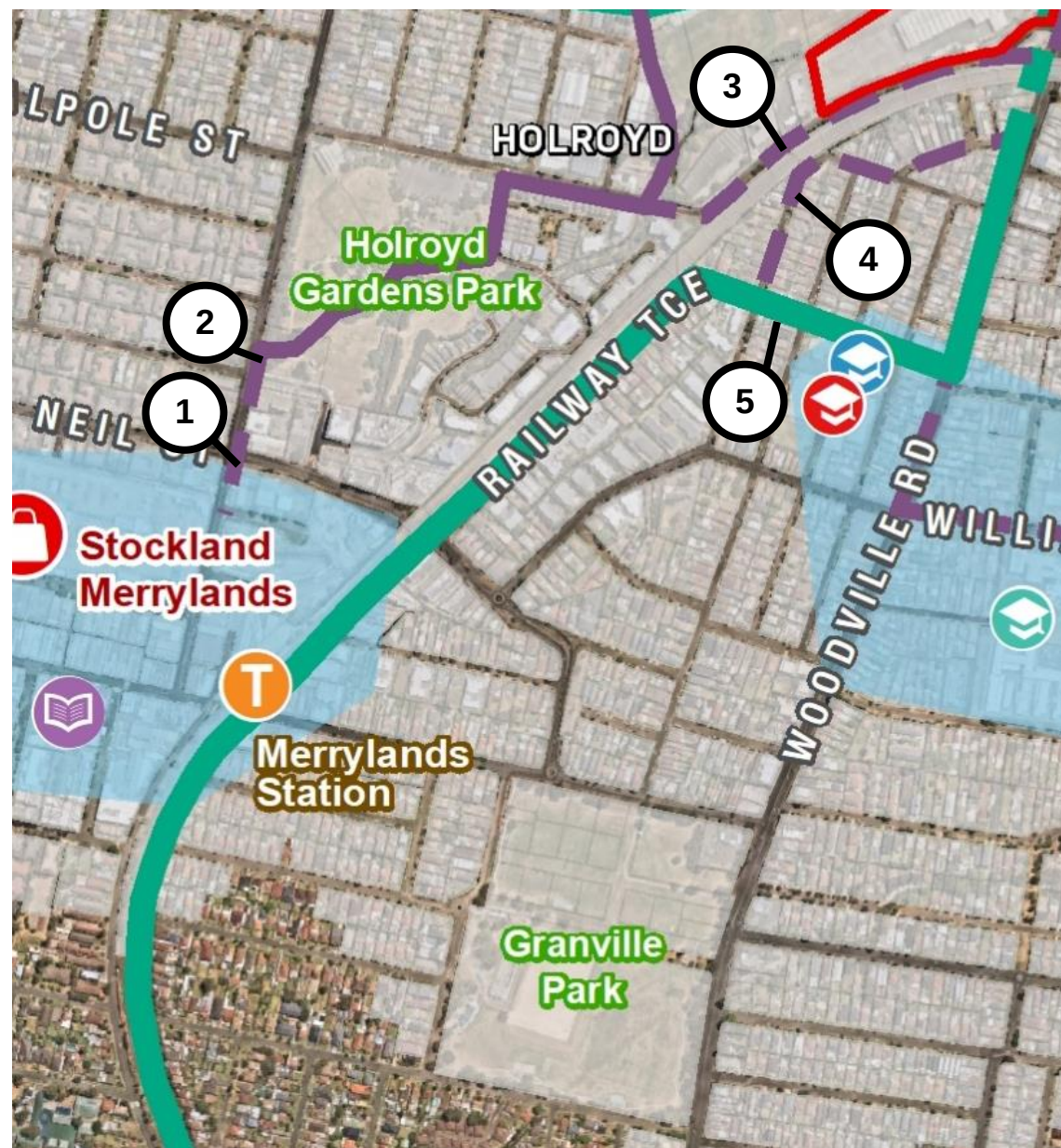
3. Add new shared path on Crescent St between Holroyd Gardens & Woodville Rd.



4. Quiet Way connection on Wallace Street Union Street, Boomerang Street and Randle Street with design to manage local access and property access.



5. Repaint shared path and add new signs along Randle St between Boomerang St & Woodville Rd.



PRIORITISED INFRASTRUCTURE UPGRADES- THE PARRAMATTA WEST ROUTE

4.6: REQUIRED UPGRADES ON THE PARRAMATTA WEST ROUTE



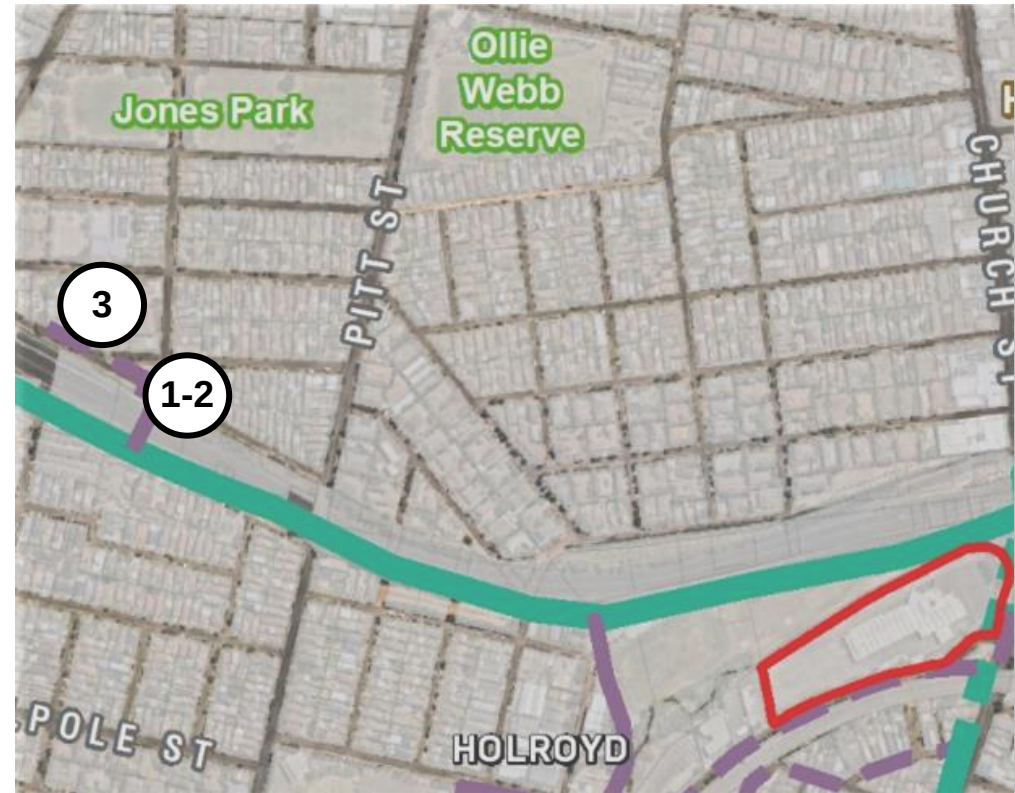
1. Add shared path signage across footbridge connecting M4 Cycleway and Auburn St.



2. Upgrade existing crossing on Auburn St to a raised pedestrian crossing.



3. Widen footpath and add shared path treatment on Auburn St between Franklin Street and Parramatta West P.S.



Appendix B

Transport Access Guide



Train



Harris park Station – 14-minute walk
Granville Station – 15-minute walk
Merrylands Station – 21-minute walk
Parramatta Station – 22-minute walk

Train Services



North Shore & Western Line



Inner West & Leppington Line



Bus

Location of stop	Route No.	Route Description	Distance to Nearest Stop
Woodville Road	907	Bankstown to Parramatta via Bass Hill and Villawood	450m
Halsall Street	M91	Hurstville to Parramatta via Padstow, Bankstown and Chester Hill	350m



Cycle

Visit https://roads-waterways.transport.nsw.gov.au/maps/cycleway_finder/index.html to view the city's cycling route map

There is bicycle parking provided on site.



Walk



Stockland Merrylands – 26-minute walk
Granville Library – 22-minute walk
Granville Swimming Centre – 21-minute walk
TAFE NSW Granville – 17-minute walk



Information

Sydney's Trip Planning Tool at <https://transportnsw.info/>

Google directions at <http://maps.google.com.au/directions>

The mobile app, **Trip View**, which provides live train and bus timetables



CRESCENT
P A R K L A N D S



Transport Access Guide



Bus Stop



Swimming Centre

Walking Route



The Transport Planning Partnership
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