Appendix 3:

Preliminary Traffic Assessment and Risk Analysis Report

MT Management Pty Ltd

Preliminary Traffic and Transport Assessment

87 Bay Street Glebe

221610-A

Issue | October 2011

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1 Introduction

Arup has been commissioned by MT Management Pty Ltd. to undertake a preliminary traffic and transport assessment due to the proposed mixed use development at 87 Bay Street, Glebe, Sydney.

The proposal is to rezone the site to allow more intensive urban development. This report details preliminary traffic and transport assessments which are likely to occur as a result of the proposed mixed use development. This preliminary transport assessment report will be submitted to City of Sydney Council with the rezoning application.

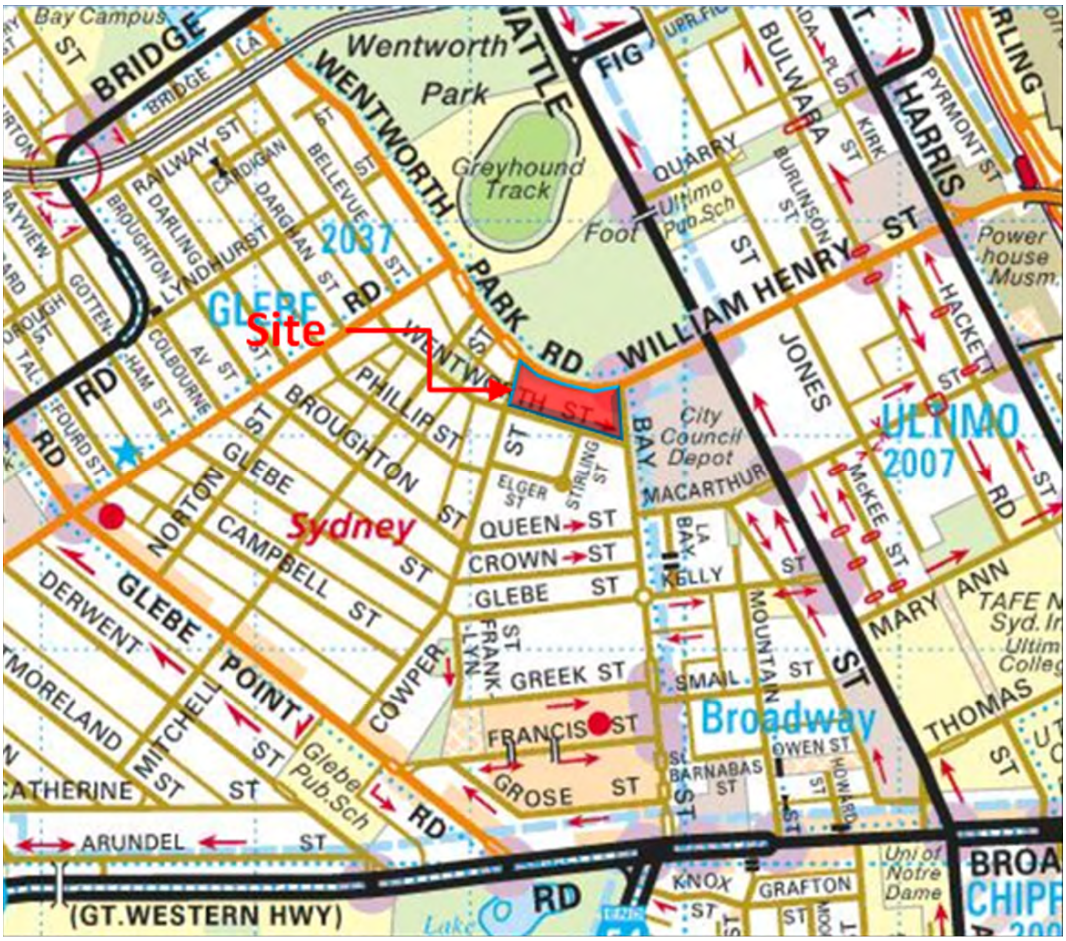
2 Existing Condition

2.1 Site Location

Glebe is a suburb in inner western Sydney located 2km southwest of the Central Business District (CBD). The suburb is bounded by Pyrmont to the north, Ultimo to the east, Chippendale to the southeast, Camperdown to the southwest and Forest Lodge and Annandale to the west.

The site area is 5,427m² and is currently occupied by buildings designed for industrial and commercial use. The site is bounded by Wentworth Park Road to the north, Bay Street to the east, Wentworth Street to the south and Cowper Street to the west(refer to Figure 1).

Figure 1: Site Location



2.2 Existing Site Access

The existing site accesses are provided by a number of driveways at Wentworth Park Road, Wentworth Street and Cowper Street.

2.3 Surrounding Road Network

Wentworth Park Road provides acts as a Collector Road which provides east – west connection between Bridge Road (west) and George Street (east) (refer to photograph 1). East of Bay Street Wentworth Park Road is renamed as William Henry Street. It is predominately a two lane two way road with restricted speed limit to 50 km/h.

A bidirectional tube count survey has been undertaken on Wentworth Park Road (between Bay Street & Cowper Street) by Arup appointed private contractor CFEIT. The survey data shows that the Five Day AADT (Average Annual Daily Traffic) on Wentworth Park Road was 7269. The average 85%ile speed on Wentworth Park road was recorded as 40 km/h which is acceptable for a collector road next to the CBD fringe.

Wentworth Street runs along the southern boundary of the site. It provides east west connection between Copwer Street (west) and Bay Street (east). It is a two lane two – way local road primarily provides access to residential properties. A bidirectional tube count is undertaken at Wentworth Street. The data shows that Wentworth Street carried 387 vehicles (Five day AADT) which equates to approximately 40 vehicles in the peak hour. The details of the traffic survey data is attached in Appendix A.

Photograph 1: Wentworth Park Road

2.4 Public and Active Transport

2.4.1 Bus routes

The current bus network provides several bus routes from Glebe to the city, Balmain, Coogee and Leichhardt. The nearest bus stop is located approximately 400 metres away at the corner of Cowper Street and Glebe Point Road. This bus stop provides access to the Route 370 bus from Leichhardt to Coogee. The bus stop on Mountain Street at Broadway, which is located approximately 500 metres (10 minutes walk) from the site gives access to a much wider selection of bus routes, namely;

- **Route M10:** Maroubra Junction – Pioneer Memorial Park, Leichhardt via City and CBD:
- **Route 431:** Glebe Point - Millers Point/The Rocks; via Central Station, City and CBD:
- **Route 432:** Birchgrove - Millers Point; via Glebe, Central Station, City and CBD:
- **Route 433:** Balmain - Millers Point; via Glebe, Central Station, City and CBD:
- **Route 434:** Balmain - Millers Point; via Glebe Point, Glebe, Central Station, City and CBD:
- **Route 370:** Leichhardt to Coogee; via Glebe, Newtown, Alexandria, Randwick, Kensington and the University of New South Wales:
- **Route 449:** Pyrmont/Star City to Glebe; via Harris Street, Broadway Shopping Centre, Wentworth Park; and
- **Route 470:** Lilyfield/Leichhardt Marketplace - Circular Quay, via Forest Lodge.

2.4.2 Central Train Station

The closest train station to the site is Central Station, located 1.5km to the east (about a 30 minute walk for commuters). Central Station is situated on all lines except for Cumberland, Carlingford and Hunter. Connections to Central Station can be made via the light rail system closer to the site.

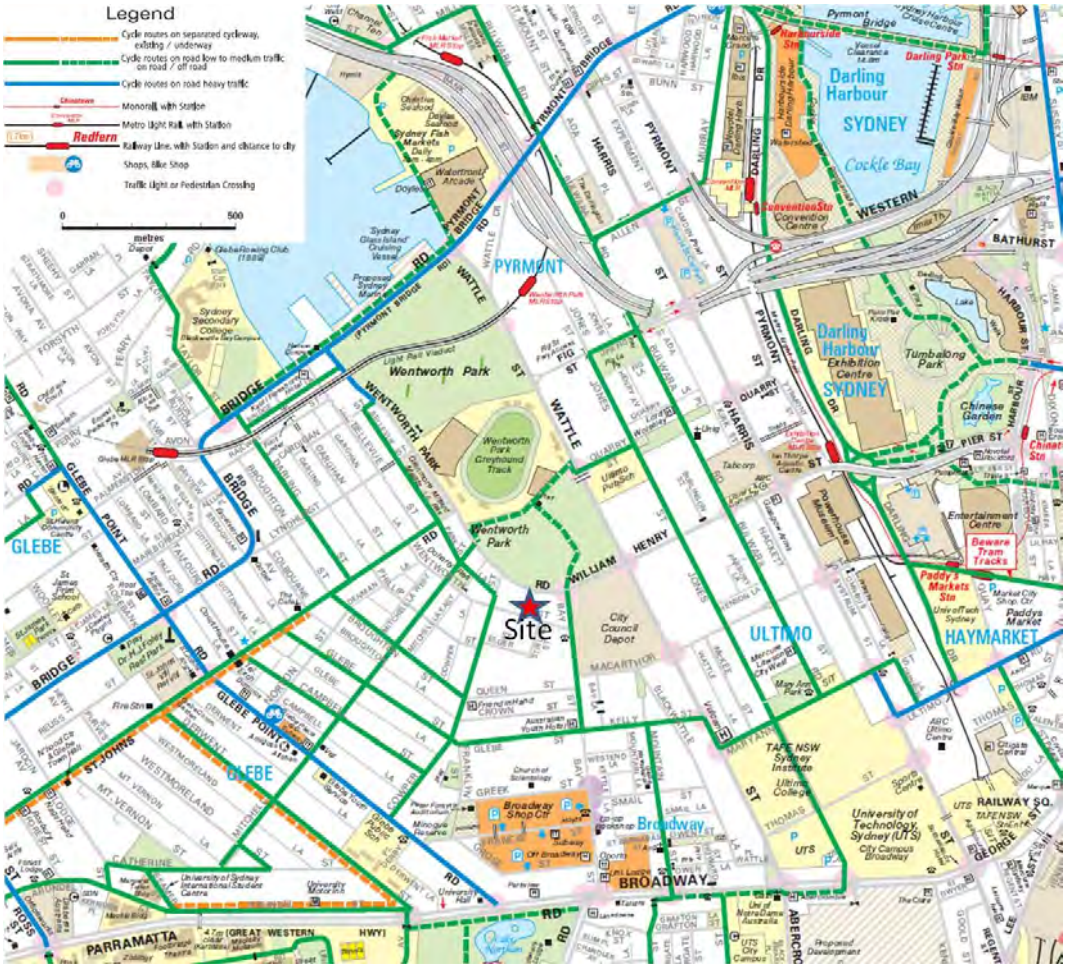
2.4.3 Light Rail

The Metro Light Rail tram runs between Central Station and Lilyfield. Wentworth Park tram stop is located approximately 600m to the north of the site at which trams operate every 10 to 15 minutes in either direction typically throughout the day (7-8 minute frequency in peak periods). The most direct pedestrian route from the site to the tram stop is through Wentworth Park which is equipped with pedestrian footpaths and pedestrian bridges reducing the number of potential conflicts between pedestrians and vehicles.

2.4.4 Cycling

There is an existing on street shared bicycleway along Bay Street (refer to Figure 2). This cycleway route runs through the middle of Wentworth Park and joins at Quarry Street at north of the park. This shared pedestrian and cycleway provides improved connections to the Sydney CBD.

Figure 2: Existing Bicycleway Routes in the vicinity of the site



Source: City of Sydney website

2.4.5 Pedestrians

The speed limit on Wentworth Park Road, Wentworth Street, Bay Street and Cowper Street is 50km per hour. The reduced speed limits lower pedestrian to vehicle conflicts and therefore provide a safer environment for pedestrians.

The area surrounding the site is equipped with many pedestrian facilities. Footpaths are in place in the surrounding area with pram ramps at designated crossing points. Pedestrian crossing facilities are currently provided in all the major intersections between the site and the Broadway shopping centre.

Wide footpaths are provided on both sides of Bay Street. However, the footpaths widths which are currently provided along Wentworth Street may be considered deficient due to trees imbedded in the footpath (refer to Photograph 2). This

encourages pedestrians to walk on the road, creating potential vehicular and pedestrian conflicts.

Photograph 2: Existing Tree on the Footpath (southern side of Wentworth Street)

Access to the park can be achieved by a raised pedestrian priority crossing at the Wentworth Park Road – Cowper Street intersection on the north-west corner of the site. Pedestrians crossing Wentworth Park Road from the site to travel to the tram stop are more likely to use the signalised pedestrian crossings on the Wentworth Park Road - Bay Street intersection bordering the north-east corner of the site as this crossing provides a more direct route.

As previously stated, a shared pedestrian and cyclist path is in place across Wentworth Park leading to a pedestrian bridge over Wattle Street, facilitating safe pedestrian movements towards the Sydney CBD and access to the light rail station. The pedestrian connection to existing public transport facilities and education institutions are shown in Figure 3.

Figure 3: Pedestrian Route to the existing Public Transport Facilities and Educational Institutions

2.5 Parking

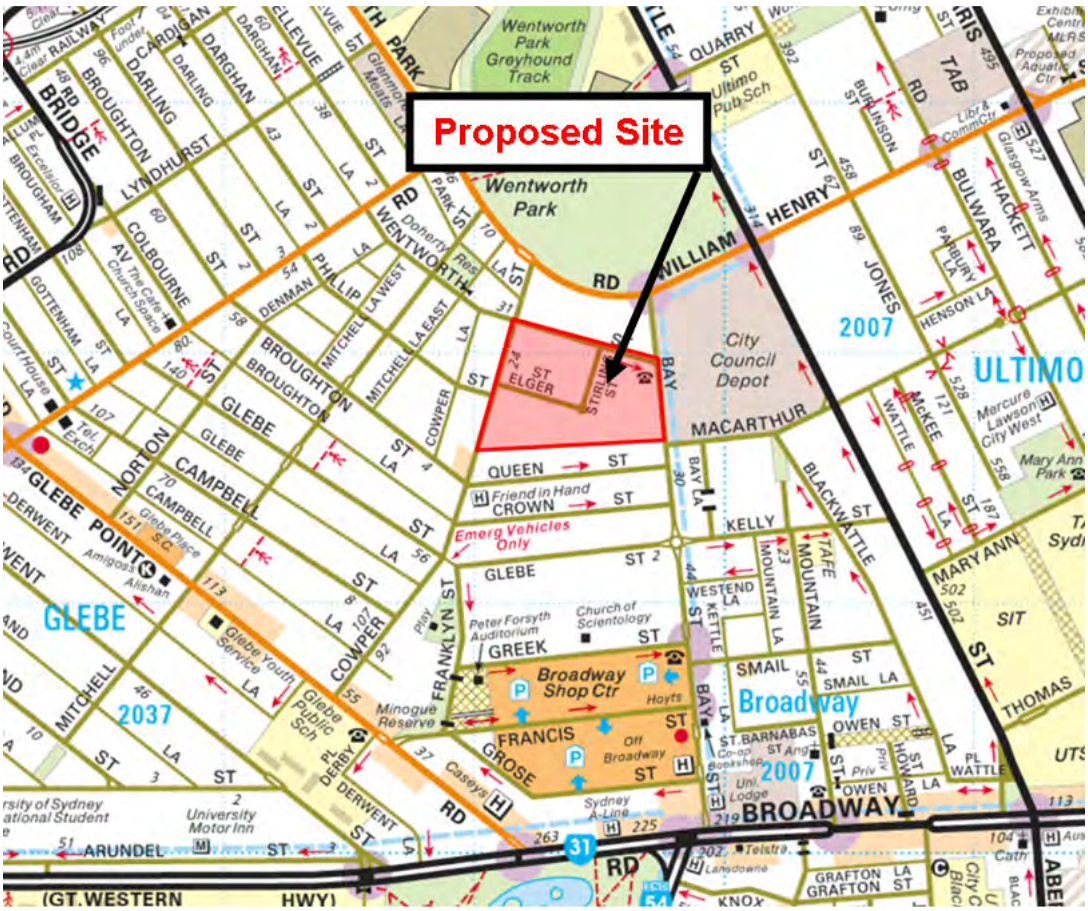
On street car parking is provided on all streets in the area surrounding the development site. Two hour parking exists on both sides of Wentworth Park Road. The western end of Wentworth Street contains two hour on-street parking, while there is unrestricted all-day parking at the eastern end.

The eastern end of Wentworth Street is a one way street (between Stirling Street and Bay Street). Cowper Street contains two hour on street parking on both sides of the street between 8am – 6pm. Elger Street allows unmetered two hour on street parking with parallel and 90 degree parking on either side between 8am and 6pm.Stirling Street permits unmetered two hour on street parking.

3 Proposed Housing NSW Development

The Housing NSW is currently undertaking a major new development in the vicinity. The site is located at 1 – 3 Elger Street, Glebe and is bounded by Bay Street, Wentworth Street and Cowper Street (refer to Figure 4). The site is currently occupied by 134 old style medium density housing with 30 - 35 off – street parking spaces.

Figure 4: Housing NSW Site Development



3.1 Housing NSW Proposal

The development proposal includes demolition of the existing dwellings and construction of approximately 153 social housing, 90 affordable housing, 250 private units with 151m^2 community facilities and 504m^2 of retail space as shown in Figure 5 and Figure 6. Arup prepared a number of traffic and transport assessment reports for the development.

Two vehicular accesses are proposed via Wentworth Street into building B and A (approximately 20m east and 40m west of Stirling Street). In addition, another vehicular access is proposed to building C along its southern boundary. There will be no vehicular access to building D which will be allocated for social housing.

Figure 5: Housing NSW Site Proposed Land Use

Figure 6: Breakdown of the Residential Component of the Housing NSW Development

	Studio	1 Bed	2 bed	3 bed	Totals
Market Housing					
Building A1 + A3		48	18		**66**
Building A2		55	25	6	**86**
Building C1+C2	9	51	34	4	**98**
Market Housing Total	9 4%	154 62%	77 31%	10 4%	**250**
Affordable Housing Buildings					
Building B1 + B2		25	41	24	**90**
Affordable Housing Total		25 28%	41 46%	24 27%	**90**
Social Housing					
Building B3		42	4		**46**
Building D1		43	17		**60**
Building D2		40	7		**47**
Social Housing Total		125 82%	28 18%		**153**
Total					**493**

In total 175 off – street parking spaces are proposed (145 spaces for private housing and 30 for affordable housing). Elger Street is proposed to be connected to Bay Street. Due to this new extension, non – site vehicles may turn left at Elger Street and then turn right at either Stirling Street or Cowper Street to proceed north – west via Wentworth Park Road, thereby avoiding traffic signals at Bay Street/ Wentworth Park Road intersection. To reduce any traffic intrusion, the proposed new Bay Street and Elger Street intersection is already proposed as a left – in/ left – out junction. To prevent westbound traffic intrusion, a number of traffic calming devices are proposed:

- Heavy vehicle restriction (three ton or over) in Elger Street and Stirling Street;
- Introduction of a 40 km/h speed limit on Elger Street and Stirling Street;

- 'No Right' turn from Elger Street to Cowper Street and giveway to Stirling Street vehicles at Elger Street to reduce any benefit to take short cut by the westbound vehicles avoiding the traffic signal at Bay Street and Wentworth Park Road;
- A zebra pedestrian crossing on Elger Street on the east approach of Elger Street and Stirling Street intersection to facilitate pedestrians crossing as well as discouraging traffic bypass via Elger Street; and
- A large raised threshold at the intersection of Elger Street and Stirling Street intersection to slow down vehicular speed, thus improving safety as shown in the example in Figure 7. However, this option may have some negative impact e.g. traffic noise.

Figure 7: Example of a Raised Threshold at the intersection of Dunmore St & Monomeeth St, Bexley

The above proposed traffic calming devices have been discussed with the RTA but no traffic calming treatment has been finalised yet.

The net traffic generation for the development is approximately 40 vehicle trips in the peak traffic hour. This is relatively a low increase of vehicular traffic and has not required a full Traffic Impact Assessment report.

4 Development Proposal

4.1 Description of the Development

The future subdivision at the site could potentially accommodate up to 157 private units, 25affordable housing, as well as approximately 1200 m^2 retail and 7000 m^2 commercial floorspace. The current proposal of the site plan is illustrated in Figure 8 below. The building alignment is proposed to be setback to 5 – 6m from the existing kerb line to allow boulevard tree planting.

Figure 8: Schematic view of the Proposal

Concept plan building envelope

Visualisation (looking south)

As shown in Figure 8, a public domain and pedestrian connection is proposed between Wentworth Street (south) and Wentworth Park Road (north) at Stirling

Street alignment. This proposed pedestrian access divides the site into two distinct blocks, e.g. Bay Street (east block) and Cowper Street (west block).

A breakdown of the proposed private housing component is tabulated below.

Table 1: Land use Component of the Proposed Development

Land Use	Units	GFA (m^2)
Studio Apartments	9	
1 Bed Apartments	57	
2 Bed Apartments	79	
3 Bed Apartments	12	
Residential Bay St Block		8,899
Residential Cowper St Block		5,880
Retail		1,190
Commercial		6,900
Total	**157**	**22,869**
Affordable Housing	25	1,551
Total	**182**	**24,420**

Note: Total GFA 24,420 m^2

4.2 Vehicular Access

A number of vehicular accesses are proposed at Wentworth Street and Cowper Street (refer to Figure 9). No vehicular access is proposed either in Wentworth Park Road or Bay Street. Compared to the existing situation, there will be net reduction of vehicular accesses in the proposed site.

Figure 9: Proposed Vehicular Accesses

4.3 Pedestrian Access

Each individual building will be served by footpaths from the surrounding roads, car parks and adjacent buildings. Pedestrian access to each building is shown in

Figure 10. As stated earlier, public domain and pedestrian thoroughfare are proposed between the two blocks.

Figure 10: Pedestrian Connection to the Proposed Site

4.4 Parking Provision

The proposal includes dwellings for the purposes of private ownership as well as affordable housing, and retail/commercial land uses. An assessment of the amount of car parking required to be provided has be undertaken in regard to the proposed land uses. City of Sydney Council desire is minimise car parking in the Local Government Area (LGA), which is demonstrated by new provisions being proposed in their draft Sydney Local Environmental Plan 2011 (Draft SLEP 2011). In accordance with clause 7.5 (1) (b) of the Draft SLEP 2011, the development falls under Category B (for residential) and F (for commercial and retail). The applicable parking rate under the Draft SLEP 2011 is provided in Table 2.

Table 2: Car Parking Requirements as per Sydney Local Environmental Plan 2011

Land Use	**No of Units/ GFA (m^2)**	**Maximum Parking Rate**	**Maximum no of Parking**
Studio	9	0.2	1.8
1 - bed	57	0.4	22.8
2 – bed	79	0.8	63.2
3 - bed	12	1.1	13.2
Visitor	157	*	13.35
Retail	1,190 m^2	1space/ 50 m^2 GFA (for retail space no more than 2,000m^2 GFA, FSR<3.5:1)	23.8
Commercial	6,900 m^2	**	30.67
Total number of Allowable Maximum Parking			168

*- Residential visitor parking rate: First 30 units – 0.167, next 40 units – 0.1 and remaining units – 0.05

**- For floor space ratio over 3.5:1, the maximum number of parking should be calculated as follows:

$M = (G \times A) \div (50 \times T) = (6900 \times 5427) / (50 \times 24{,}420) = 30.67$

where:

M – the maximum number of parking spaces;

G – GFA (m^2) of all office premises and business premises;

A – the site area in m^2, and

T – the total gross floor area of all buildings on the site in m^2.

The above table identifies that based on the provisions in the Draft SLEP 2011 for the proposed land uses, the proposal would require approximately 168 car spaces. The table above only allows car parking for the privately owned dwellings. The number of affordable housing dwellings have not been included in calculation (refer to section 4.4.1). Notwithstanding the findings of the calculation in the table above, it is proposed that the future development of the site is to provide approximately 220 car spaces. This is based on allowing one car space for every $50m^2$ of gross building area (GBA) of the total gross building floor area of the basement levels, which equate to approximately $11{,}000m^2$ GBA.

Assuming one car parking space for every 50 m^2 GFA, the concept plan of the development is proposing approximately 215 – 220 car parking spaces. Although the parking provision exceeds the maximum parking requirements as per City of Sydney LEP 2011 by approximately 31%, the final car parking provision will be subject to further analysis and assessment.

4.4.1 Parking Provision for Affordable Housing

Research shows that the car ownership in affordable housing is significantly lower especially if the development is located within close proximity of public transport fringe. There is no survey-based data available for the affordable housing developments in close proximity to CBD fringe (e.g. Redfern, Waterloo social and affordable housing). However, in the Affordable Housing Design Guidelines, Queensland Government Department of Housing (September 2004) the car parking rates in the planning schemes for one, two and three-bedroom dwellings are generally reduced by 25 percent where housing is within 400 metres of public transport (train, ferry, bus).

The subject development at Glebe, which is located on the western boundary of the Sydney CBD, do not warrant any off – street parking for affordable housing. No parking provision for affordable housing will ensure less congestion, pollution, decay and sprawl in the suburb of Glebe.

Another reason the affordable housing should have no parking provision is to reduce the capital cost of each unit. The cost of basement parking is significant due consideration of ventilation, water level, fire hydrant etc. It is estimated that basement parking costs within a range $40,000 - $60,000 per parking space. Affordable housing which are aimed to build for people with low income bracket, a parking space attached with the apartment will unnecessarily increase the overall cost of the apartment.

4.5 Service Vehicle Provision

Two vehicular accesses are proposed on Wentworth Park Road (refer to Figure 9). Loading bays, suitable for a Medium Rigid Vehicle (8.8m truck), will be adequate to for retail and commercial components of the development.

4.6 Bicycle Provision

The bicycle parking for the development will be provided based on Draft Sydney Development Control Plan 2010. The applicable bicycle parking rate under the current LEP is provided in Table 2.

Table 3: Bicycle Parking Requirements as per Draft Sydney DCP 2010

Land Use	**No of Units/ GFA (m^2)**	**Residents/ Employees Rate**	**Parking Required**	**Visitors/ Customers Rate**	**Parking Required**	**Total Parking Required**
Residential	182	1 per unit	182	1 per 10 units	18.2	200.2
Retail (shopping centre)	1,190 m^2	1 per 200 m^2 Sales area	5.95	1 per 300 m^2 sales area	3.97	9.92
Commercial	6,900 m^2	1 per 150 m^2	46	1 per 400 m^2	17.25	63.25
					Total	273

The development will provide sufficient bicycle parking as required by the Council DCP.

5 Preliminary Transport Impact Assessment

5.1 Site Location and Land Use Aspect

5.1.1 Development Location

Nearby community facilities are in place which will lower the requirement for residents to travel to facilities further afield. The proximity of the nearby parkland, playgrounds, schools and public libraries lowers the requirement for residents in this area to use vehicular transport to reach their destination and as a result lower vehicle trips will be expected from the development (refer to Photograph 3). Commuter trips are also less likely to be made by vehicle as a result of the nearby buses and light rail facilities and the proximity of Sydney CBD which is within 20 minutes walk from the development.

Photograph 3: Wentworth Park facilities

Wentworth Park pedestrian bridge

Wentworth Park shared cycle and footpath

5.1.2 Retail Aspects

The site allows for a portion of retail of 1,190m^2.This is likely to be used to provide locally accessible goods. The provision of local retail has potential to cater for future employees and future immediate residents on the site. Given the proximity to residential and employment and the size of the retail aspect of the development the majority of trips associated with the retail are expected to be by foot. As a result, the expected vehicular movements of the retail land uses are considered to be minimal. However, detailed investigations would be undertaken as part of future detailed development applications.

Future residents would also have an option to shop at Broadway Shopping Centre providing a potentially wider range of goods and services. The Broadway Shopping Centre is within 400 metres (5 minutes) walking distance.

5.2 Footpath

The proposals for the site include enhancement to the interconnectivity of the site via provision of pedestrian connections improvements and a public amenity area. The area is proposed opposite Stirling Street and is illustrated on Figure 11.

Figure 11: Public Area and Pedestrian Connectivity

Further improvements are proposed to Wentworth Street to improve public amenity and connectivity. These amendments include minor widening of the footpath, the formalisation of car parking and the provision of new trees along Wentworth Street to provide improved amenity to the site.

5.3 Traffic Impact Assessment

Based on the RTA rate[1] the development is likely to generate 38 residential trips (assuming 0.24 trips/ unit in the metropolitan regional CBD centres). There will be some additional retail and commercial trips based on the parking provision. The site will be subject to future development applications. It is anticipated that future traffic assessments will be undertaken as part of this separate process.

The provision of the safest possible vehicle access into the proposed development at Wentworth Street should ensure satisfactory sightlines as Wentworth Street is on a gradient.

As Wentworth Street is one way eastbound between Stirling Street to Bay Street, the exiting vehicles from the proposed eastern driveways on Wentworth Street will have to exit the site via Bay Street (refer to Photograph 4). The site vehicles turning right from Wentworth Street to Bay Street may experience longer delay during the peak traffic periods due to the high volume of traffic on Wentworth Street (refer to Photograph 4). Therefore 'DO NOT QUEUE ACROSS INTERSECTION' (G9–237) signs and its associated line marking may be required on Bay Street at Wentworth Street intersection to facilitate traffic entering from Wentworth Street to Bay Street.

[1] RTA Guide to Traffic Generating Developments; October 2002

Photograph 4: Wentworth Street from Bay Street

It is likely that there may be an increase in vehicle numbers on Wentworth Street due to the provision of the proposed vehicular access on this street. However the total volume of traffic on Wentworth Street should be at or near the RTA's recommended maximum environmental capacity (300 vehicles/h) as stated in Table 4.6 in RTA Guide[1].

6 Conclusions

This report has been prepared to assess potential transport and traffic issues that may occur as a result of the mixed use development at the 87 Bay Street, Glebe. The development concept for the site is to provide approximately 182 residential units (approximately 157 private and 25 affordable) with associated retail and commercial components.

The key issues of this report is summarised below:

- The site is well located for a mixed-use development based development due to the nearby facilities which will decrease the amount of vehicle based trips from the proposed development;
- The commercial aspect of the development will also lower the demand for vehicle based trips from the development and the directly surrounding area as a whole;
- The provision of a development with underground car parking may lower the existing demand for on street car parking;
- Wentworth Street is suitable for vehicular access. Final access arrangements and design to basement parking is to be undertaken as part of separate future development applications;
- A 'DO NOT QUEUE ACROSS INTERSECTION' (G9–237) signs and its associated line marking may be warranted on Bay Street at Wentworth Street intersection to facilitate traffic entering from Wentworth Street to Bay Street; and
- The traffic, transport and parking impact of the development may require a full scale TIA.

Appendix A

Tube Count Data

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One Page Summary

Count Number 7838 **Lat/Long : S33 52 45.1 / E151 11 36.1** **UBD 235 P-14**

Street **WENTWORTH PARK ROAD, GLEBE : Between BAY STREET & BRIDGE ROAD (bidirectional)**

Location Between Bay Street and Cowper Street, 10 Mtrs north of ELP LE 11416, on tree opposite Cowper Street

Start Date	18-SEP-11
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Speed Limit 60	SOUTH EAST	NONE	COMBINED
Weekly 50th Percentile Speed	**33**	**33**	**33**
Weekly 85th Percentile Speed	**39**	**39**	**39**
Five Day AADT	**7269**		**7269**
Seven Day AADT	**6859**		**6859**

	MON 19-SEP-11			TUE 20-SEP-11			WED 21-SEP-11			THU 22-SEP-11			FRI 23-SEP-11			SAT 24-SEP-11			SUN 18-SEP-11			SEVENDAY AVERAGE		
	SOUTH	NONE	BiDir	SOUTH	NONE	BiDir	SOUTH	NONE	BiDir	SOUTH	NONE	BiDir	SOUTH	NONE	BiDir	SOUTH	NONE	BiDir	SOUTH	NONE	BiDir	SOUTH	NONE	BiDir
85%ile	38.6		38.6	38.7		38.7	38.9		38.9	38.7		38.7	39.2		39.2	39.3		39.3	39.8		39.8	39.0		39.0
50%ile	32.5		32.5	32.4		32.4	32.9		32.9	32.4		32.4	33.3		33.3	33.7		33.7	34.5		34.5	33.1		33.1
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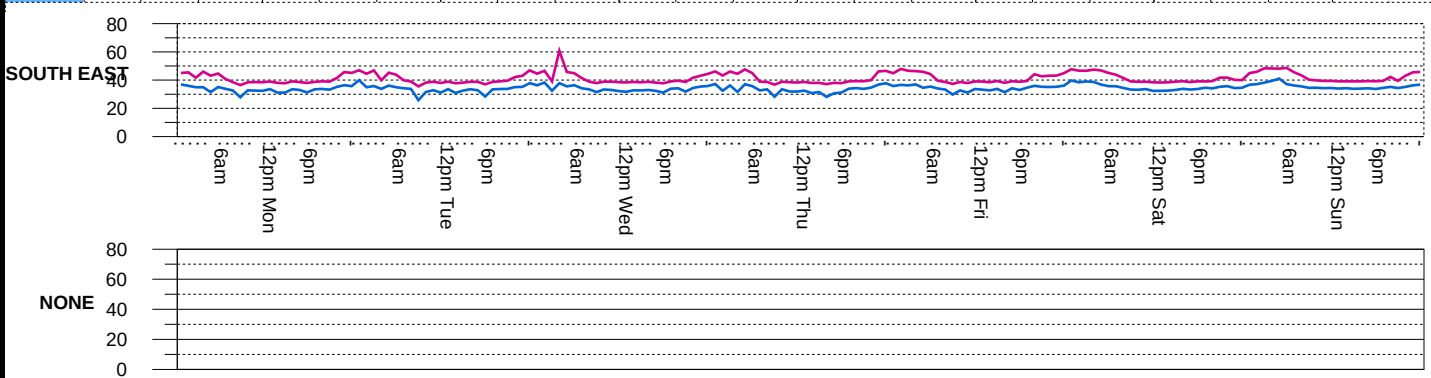

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Short %	96.4		96.4	96.4		96.4	96.3		96.3	96.3		96.3	96.4		96.4	98.2		98.2	98.3		98.3	96.8		96.8
Med %	3.2		3.2	3.3		3.3	3.4		3.4	3.3		3.3	3.4		3.4	1.6		1.6	1.5		1.5	2.9		2.9
Long %	.4		.4	.3		.3	.4		.4	.4		.4	.2		.2	.2		.2	.2		.2	.3		.3
AM Pk Vo	819		819	745		745	821		821	800		800	807		807	543		543	444		444	711		711
PM Pk Vo	497		497	488		488	511		511	557		557	512		512	610		610	496		496	524		524
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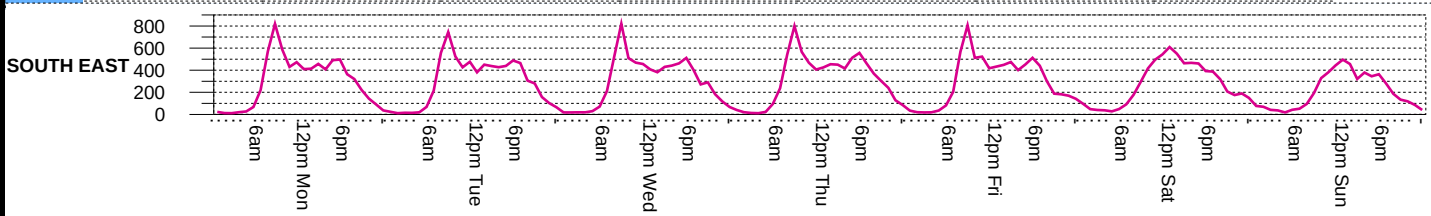
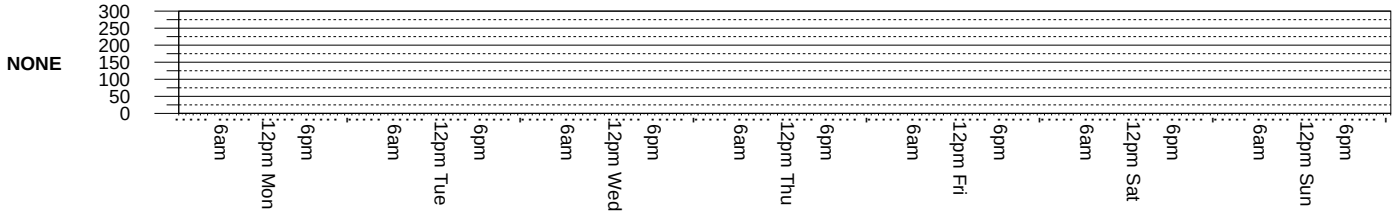
Class 0	113		113	85		85	133		133	110		110	99		99	59		59	63		63	95		95
Class 1	6731		6731	6748		6748	6713		6713	7210		7210	6997		6997	6497		6497	4833		4833	6533		6533
Class 2	14		14	12		12	13		13	17		17	20		20	12		12	4		4	13		13
Class 3	196		196	214		214	222		222	227		227	231		231	98		98	74		74	180		180
Class 4	25		25	16		16	18		18	20		20	16		16	9		9	2		2	15		15
Class 5	4		4	2		2	1		1	5		5	3		3	2		2	0		0	2		2
Class 6	5		5	9		9	7		7	9		9	4		4	3		3	3		3	6		6
Class 7	12		12	7		7	8		8	14		14	8		8	3		3	3		3	8		8
Class 8	6		6	2		2	1		1	1		1	1		1	0		0	1		1	2		2
Class 9	7		7	5		5	10		10	9		9	3		3	6		6	1		1	6		6
Class 10	0		0	0		0	0		0	0		0	0		0	0		0	0		0			
Class 11	0		0	0		0	0		0	0		0	0		0	0		0	0		0			
Class 12	0		0	0		0	0		0	0		0	0		0	0		0	0		0			
Class 13	0		0	0		0	0		0	0		0	0		0	0		0	0		0			





Data displayed has been compiled from pneumatic traffic count processes and is subject to the documented limitations

CfeIT bob.white@cfeit.com (02) 9740 8600

Traffic Count Summary Report

Count Number	**7212**	Ref : **ARUP**	**Lat/Long : S33 52 46.3 / E151 11 38.8** **UBD 235 P-14**
Street	**WENTWORTH PARK ROAD, GLEBE : From BAY STREET to BRIDGE ROAD : NORTH WEST**		
Location	Between Bay Street and Cowper Street, midsection		*Carriageway*

TOTAL COUNT MATRIX

Start Date	02-APR-11
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	35
Weekly 85th Percentile Speed	41
Five Day AADT	7843
Seven Day AADT	7489

	MON *4TH*	TUE *5TH*	WED *6TH*	THU *7TH*	FRI *8TH*	SAT *2ND*	SUN *3RD*	5 Dav Total	5 Dav Average	7 Dav Total	7 Dav Average
Midnight - 1am	93	78	113	113	105	122	119	**502**	**100**	**743**	**106**
1am - 2am	32	36	40	50	53	63	81	**211**	**42**	**355**	**51**
2am - 3am	17	21	22	13	38	70	71	**111**	**22**	**252**	**36**
3am - 4am	15	7	15	13	20	39	56	**70**	**14**	**165**	**24**
4am - 5am	11	11	17	18	21	22	31	**78**	**16**	**131**	**19**
5am - 6am	18	16	27	12	20	36	26	**93**	**19**	**155**	**22**
6am - 7am	42	45	43	44	39	61	30	**213**	**43**	**304**	**43**
7am - 8am	118	111	106	130	119	112	66	**584**	**117**	**762**	**109**
8am - 9am	222	220	245	216	236	245	96	**1139**	**228**	**1480**	**211**
9am - 10am	**408**	**389**	**425**	364	358	320	216	**1944**	**389**	**2480**	**354**
10am - 11am	346	361	356	**388**	382	397	320	**1833**	**367**	**2550**	**364**
11am - Midday	292	373	346	340	**398**	**478**	**406**	**1749**	**350**	**2633**	**376**
Midday - 1pm	343	392	381	390	429	622	482	**1935**	**387**	**3039**	**434**
1pm - 2pm	367	466	451	434	492	567	500	**2210**	**442**	**3277**	**468**
2pm - 3pm	445	487	523	439	579	570	255	**2473**	**495**	**3298**	**471**
3pm - 4pm	468	507	523	540	548	536	482	**2586**	**517**	**3604**	**515**
4pm - 5pm	600	618	663	598	686	**665**	**502**	**3165**	**633**	**4332**	**619**
5pm - 6pm	672	655	699	747	873	633	492	**3646**	**729**	**4771**	**682**
6pm - 7pm	**1049**	**983**	**1020**	**959**	**925**	476	458	**4936**	**987**	**5870**	**839**
7pm - 8pm	805	766	829	758	642	351	442	**3800**	**760**	**4593**	**656**
8pm - 9pm	436	462	460	492	403	268	276	**2253**	**451**	**2797**	**400**
9pm - 10pm	266	285	299	386	268	209	210	**1504**	**301**	**1923**	**275**
10pm - 11pm	208	257	253	336	229	228	195	**1283**	**257**	**1706**	**244**
11pm - Midnight	130	185	189	158	237	196	105	**899**	**180**	**1200**	**171**
Total	**7403**	**7731**	**8045**	**7938**	**8100**	**7286**	**5917**	**39217**	**7843**	**52420**	**7488**

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Traffic Count Summary Report

Count Number	**7838**	Ref : **ARUP**	**Lat/Long : S33 52 45.1 / E151 11 36.1** **UBD 235 P-14**
Street	**WENTWORTH PARK ROAD, GLEBE : From BAY STREET to BRIDGE ROAD : SOUTH EAST**		
Location	Between Bay Street and Cowper Street, 10 Mtrs north of ELP LE 11416, on tree opposite Cowper Street		*Carriageway*

TOTAL COUNT MATRIX

Start Date	18-SEP-11
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	33
Weekly 85th Percentile Speed	39
Five Day AADT	7269
Seven Day AADT	6859

	MON *19TH*	TUE *20TH*	WED *21ST*	THU *22ND*	FRI *23RD*	SAT *24TH*	SUN *18TH*	5 Dav Total	5 Dav Average	7 Dav Total	7 Dav Average
Midnight - 1am	23	24	18	40	34	96	77	**139**	**28**	**312**	**45**
1am - 2am	12	11	18	20	20	48	69	**81**	**16**	**198**	**28**
2am - 3am	11	15	19	13	18	40	41	**76**	**15**	**157**	**22**
3am - 4am	20	14	19	11	19	37	36	**83**	**17**	**156**	**22**
4am - 5am	27	19	30	23	35	28	18	**134**	**27**	**180**	**26**
5am - 6am	67	68	71	94	82	49	42	**382**	**76**	**473**	**68**
6am - 7am	220	215	211	236	204	91	52	**1086**	**217**	**1229**	**176**
7am - 8am	570	559	517	541	567	177	95	**2754**	**551**	**3026**	**432**
8am - 9am	**819**	**745**	**821**	**800**	**807**	296	193	**3992**	**798**	**4481**	**640**
9am - 10am	588	525	509	566	512	417	329	**2700**	**540**	**3446**	**492**
10am - 11am	430	427	469	468	523	496	381	**2317**	**463**	**3194**	**456**
11am - Midday	473	477	456	406	418	**543**	**444**	**2230**	**446**	**3217**	**460**
Midday - 1pm	410	381	408	425	433	**610**	**496**	**2057**	**411**	**3163**	**452**
1pm - 2pm	414	450	382	454	449	550	456	**2149**	**430**	**3155**	**451**
2pm - 3pm	458	438	430	451	475	463	321	**2252**	**450**	**3036**	**434**
3pm - 4pm	408	428	442	416	401	467	379	**2095**	**419**	**2941**	**420**
4pm - 5pm	491	439	462	512	452	461	345	**2356**	**471**	**3162**	**452**
5pm - 6pm	**497**	**488**	**511**	**557**	**512**	392	364	**2565**	**513**	**3321**	**474**
6pm - 7pm	363	465	404	462	441	388	281	**2135**	**427**	**2804**	**401**
7pm - 8pm	320	306	272	369	300	319	187	**1567**	**313**	**2073**	**296**
8pm - 9pm	222	281	290	304	188	207	134	**1285**	**257**	**1626**	**232**
9pm - 10pm	144	157	183	241	182	175	118	**907**	**181**	**1200**	**171**
10pm - 11pm	90	103	117	128	169	190	86	**607**	**121**	**883**	**126**
11pm - Midnight	36	65	67	85	141	149	40	**394**	**79**	**583**	**83**
Total	**7113**	**7100**	**7126**	**7622**	**7382**	**6689**	**4984**	**36343**	**7268**	**48016**	**6859**

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Hourly Classification Summary

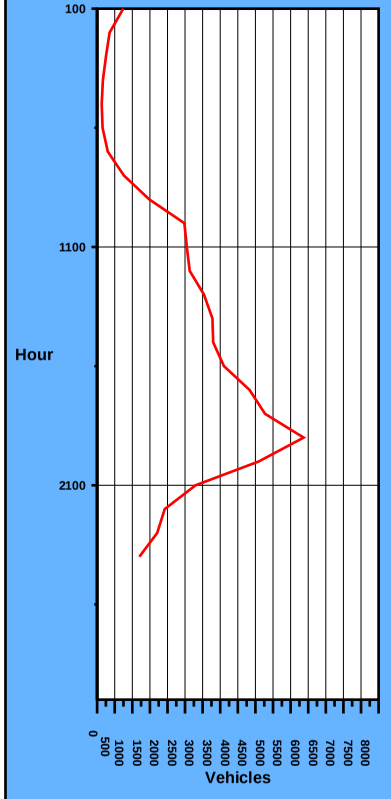
Count Number	**7212**	Ref : **ARUP**	**Lat/Long : S33 52 46.3 / E151 11 38.8** **UBD 235 P-14**
Street	**WENTWORTH PARK ROAD, GLEBE : From BAY STREET to BRIDGE ROAD : NORTH WEST**		
Location	Between Bay Street and Cowper Street, midsection		*Carriageway*

Start Date	02-APR-11
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	**35**
Weekly 85th Percentile Speed	**41**
Five Day AADT	**7843**
Seven Day AADT	**7489**

THE BODY OF THIS REPORT SHOWS : SEVENDAY TRAFFIC

Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	Total	Avg
Midnight - 1am	8	726	1	7	1	0	0	0	0	0	0	0	0	0	**743**	**106**
1am - 2am	2	350	0	3	0	0	0	0	0	0	0	0	0	0	**355**	**51**
2am - 3am	5	247	0	0	0	0	0	0	0	0	0	0	0	0	**252**	**36**
3am - 4am	1	160	0	3	1	0	0	0	0	0	0	0	0	0	**165**	**24**
4am - 5am	0	124	0	5	0	2	0	0	0	0	0	0	0	0	**131**	**19**
5am - 6am	0	146	0	9	0	0	0	0	0	0	0	0	0	0	**155**	**22**
6am - 7am	2	286	1	12	1	0	1	0	1	0	0	0	0	0	**304**	**43**
7am - 8am	5	694	0	48	11	1	2	1	0	0	0	0	0	0	**762**	**109**
8am - 9am	10	1370	1	74	8	7	6	2	0	2	0	0	0	0	**1480**	**211**
9am - 10am	30	2332	5	76	12	13	2	5	1	4	0	0	0	0	**2480**	**354**
10am - 11am	25	2401	4	89	16	14	1	0	0	0	0	0	0	0	**2550**	**364**
11am - Midday	15	2491	5	94	13	11	2	0	0	2	0	0	0	0	**2633**	**376**
Midday - 1pm	27	2883	5	96	13	9	3	2	0	1	0	0	0	0	**3039**	**434**
1pm - 2pm	25	3129	6	88	10	10	3	1	0	5	0	0	0	0	**3277**	**468**
2pm - 3pm	33	3129	4	100	13	12	4	2	1	0	0	0	0	0	**3298**	**471**
3pm - 4pm	28	3465	5	78	9	9	3	5	0	2	0	0	0	0	**3604**	**515**
4pm - 5pm	32	4207	4	65	9	9	2	3	0	1	0	0	0	0	**4332**	**619**
5pm - 6pm	39	4598	10	81	12	12	8	7	0	4	0	0	0	0	**4771**	**682**
6pm - 7pm	63	5680	8	77	14	6	7	9	1	5	0	0	0	0	**5870**	**839**
7pm - 8pm	56	4478	3	35	8	3	5	4	0	1	0	0	0	0	**4593**	**656**
8pm - 9pm	39	2718	1	30	3	3	1	1	0	1	0	0	0	0	**2797**	**400**
9pm - 10pm	22	1873	2	19	4	0	0	3	0	0	0	0	0	0	**1923**	**275**
10pm - 11pm	24	1669	3	6	4	0	0	0	0	0	0	0	0	0	**1706**	**244**
11pm - Midnigh	7	1186	1	4	1	0	0	1	0	0	0	0	0	0	**1200**	**171**
Total	498	50342	69	1099	163	121	50	46	4	28	0	0	0	0	**52420**	**7489**
% of Total	1	96		2												



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Daily Classification Summary

Count Number	**7838**	Ref : **ARUP**	**Lat/Long : S33 52 45.1 / E151 11 36.1**	**UBD 235 P-14**
Street	**WENTWORTH PARK ROAD, GLEBE : From BAY STREET to BRIDGE ROAD : SOUTH EAST**			
Location	Between Bay Street and Cowper Street, 10 Mtrs north of ELP LE 11416, on tree opposite Cowper Street			*Carriageway*

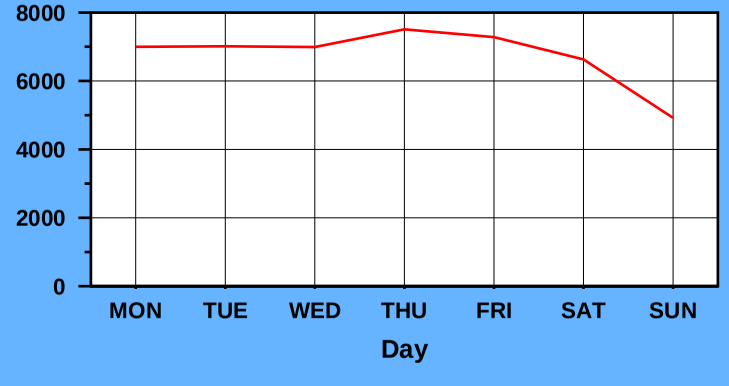
Start Date	18-SEP-11
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	**33**
Weekly 85th Percentile Speed	**39**
Five Day AADT	**7269**
Seven Day AADT	**6859**

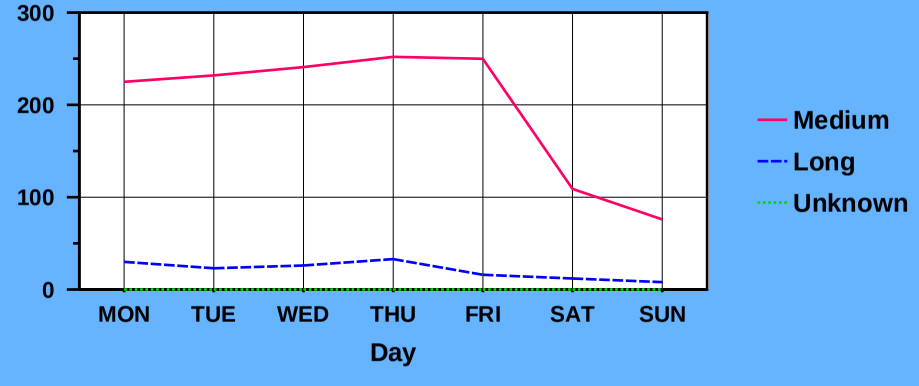
THE BODY OF THIS REPORT SHOWS : SEVENDAY TRAFFIC

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	Total
MONDAY	113	6731	14	196	25	4	5	12	6	7	0	0	0	0	**7113**
TUESDAY	85	6748	12	214	16	2	9	7	2	5	0	0	0	0	**7100**
WEDNESDAY	133	6713	13	222	18	1	7	8	1	10	0	0	0	0	**7126**
THURSDAY	110	7210	17	227	20	5	9	14	1	9	0	0	0	0	**7622**
FRIDAY	99	6997	20	231	16	3	4	8	1	3	0	0	0	0	**7382**
SATURDAY	59	6497	12	98	9	2	3	3	0	6	0	0	0	0	**6689**
SUNDAY	63	4833	4	74	2	0	3	3	1	1	0	0	0	0	**4984**
5 Dav Total	540	34399	76	1090	95	15	34	49	11	34	0	0	0	0	**36343**
5 Dav Pct	1	95		3											
7 Dav Total	662	45729	92	1262	106	17	40	55	12	41	0	0	0	0	**48016**
7 Dav Pct	1	95		3											

Volume



Class Volumes



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Traffic Count Summary Report

Count Number	**7213**	Ref : **ARUP**	**Lat/Long : S33 52 47.7 / E151 11 36.1**	**UBD 12 M-13**
Street	**WENTWORTH STREET, GLEBE : Between ST JOHNS ROAD & BAY STREET (bidirectional) :**			
Location	Between Cowper Street and Bay Street, 20m east of Cowper in factory driveway			*Carriageway*

TOTAL COUNT MATRIX

Start Date	23-MAR-11
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	23
Weekly 85th Percentile Speed	29
Five Day AADT	387
Seven Day AADT	316

	MON *28TH*	TUE *29TH*	WED *23RD*	THU *24TH*	FRI *25TH*	SAT *26TH*	SUN *27TH*	5 Dav Total	5 Dav Average	7 Dav Total	7 Dav Average
Midnight - 1am	3	5	3	3	2	4	2	**16**	**3**	**22**	**3**
1am - 2am	3	1	0	3	0	9	1	**7**	**1**	**17**	**2**
2am - 3am	0	0	1	0	0	0	0	**1**	**0**	**1**	**0**
3am - 4am	0	1	4	0	0	2	0	**5**	**1**	**7**	**1**
4am - 5am	0	0	0	0	1	0	0	**1**	**0**	**1**	**0**
5am - 6am	8	7	7	18	11	4	1	**51**	**10**	**56**	**8**
6am - 7am	7	22	16	18	19	3	2	**82**	**16**	**87**	**12**
7am - 8am	35	24	35	30	26	8	0	**150**	**30**	**158**	**23**
8am - 9am	**59**	**45**	**59**	**54**	**41**	6	3	**258**	**52**	**267**	**38**
9am - 10am	35	39	34	28	38	10	4	**174**	**35**	**188**	**27**
10am - 11am	23	29	24	25	17	**12**	**10**	**118**	**24**	**140**	**20**
11am - Midday	23	23	28	20	17	8	6	**111**	**22**	**125**	**18**
Midday - 1pm	**29**	27	22	22	13	13	**13**	**113**	**23**	**139**	**20**
1pm - 2pm	16	25	20	32	17	10	10	**110**	**22**	**130**	**19**
2pm - 3pm	21	**33**	31	33	14	**23**	12	**132**	**26**	**167**	**24**
3pm - 4pm	18	18	**46**	**35**	**22**	7	7	**139**	**28**	**153**	**22**
4pm - 5pm	19	27	23	21	20	4	7	**110**	**22**	**121**	**17**
5pm - 6pm	**29**	28	29	29	17	8	9	**132**	**26**	**149**	**21**
6pm - 7pm	19	8	15	18	16	9	9	**76**	**15**	**94**	**13**
7pm - 8pm	13	5	11	9	9	3	5	**47**	**9**	**55**	**8**
8pm - 9pm	6	7	10	6	7	3	7	**36**	**7**	**46**	**7**
9pm - 10pm	6	5	10	10	3	1	3	**34**	**7**	**38**	**5**
10pm - 11pm	4	1	3	5	4	0	4	**17**	**3**	**21**	**3**
11pm - Midnight	2	0	7	4	4	4	7	**17**	**3**	**28**	**4**
Total	**378**	**380**	**438**	**423**	**318**	**151**	**122**	**1937**	**387**	**2210**	**315**

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Hourly Classification Summary

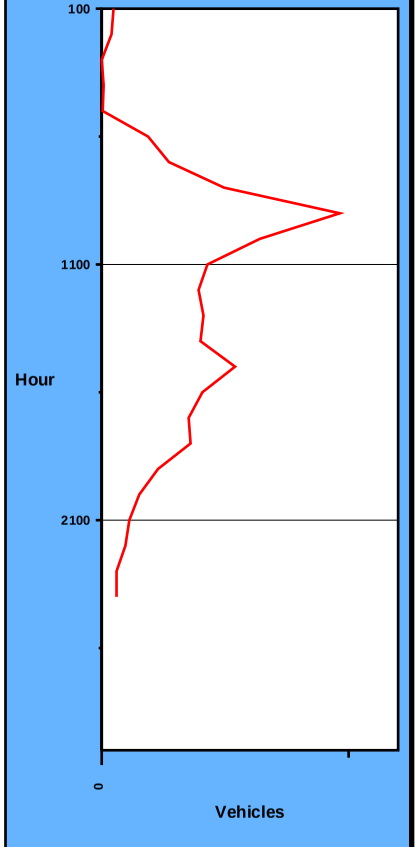
Count Number	**7213**	Ref : **ARUP**	**Lat/Long : S33 52 47.7 / E151 11 36.1**	**UBD 12 M-13**
Street	**WENTWORTH STREET, GLEBE : From ST JOHNS ROAD to BAY STREET : EAST BOUND**			
Location	Between Cowper Street and Bay Street, 20m east of Cowper in factory driveway			*Carriageway*

Start Date	23-MAR-11
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	**23**
Weekly 85th Percentile Speed	**29**
Five Day AADT	**293**
Seven Day AADT	**238**

THE BODY OF THIS REPORT SHOWS : SEVENDAY TRAFFIC

Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	Total	Avg
Midnight - 1am	0	12	0	0	0	0	0	0	0	0	0	0	0	0	**12**	**2**
1am - 2am	4	6	0	0	0	0	0	0	0	0	0	0	0	0	**10**	**1**
2am - 3am	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
3am - 4am	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**2**	
4am - 5am	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**	
5am - 6am	0	46	0	1	0	0	0	0	0	0	0	0	0	0	**47**	**7**
6am - 7am	5	63	0	0	0	0	0	0	0	0	0	0	0	0	**68**	**10**
7am - 8am	3	120	0	1	0	0	0	0	0	0	0	0	0	0	**124**	**18**
8am - 9am	13	219	0	9	0	0	0	0	0	0	0	0	0	0	**241**	**34**
9am - 10am	10	148	0	2	0	0	0	0	0	0	0	0	0	0	**160**	**23**
10am - 11am	3	94	0	10	0	0	0	0	0	0	0	0	0	0	**107**	**15**
11am - Midday	5	84	0	9	0	0	0	0	0	0	0	0	0	0	**98**	**14**
Midday - 1pm	3	97	0	3	0	0	0	0	0	0	0	0	0	0	**103**	**15**
1pm - 2pm	4	93	0	3	0	0	0	0	0	0	0	0	0	0	**100**	**14**
2pm - 3pm	6	124	0	5	0	0	0	0	0	0	0	0	0	0	**135**	**19**
3pm - 4pm	5	94	0	3	0	0	0	0	0	0	0	0	0	0	**102**	**15**
4pm - 5pm	2	81	0	4	1	0	0	0	0	0	0	0	0	0	**88**	**13**
5pm - 6pm	2	86	0	2	0	0	0	0	0	0	0	0	0	0	**90**	**13**
6pm - 7pm	6	49	0	2	0	0	0	0	0	0	0	0	0	0	**57**	**8**
7pm - 8pm	0	35	0	3	0	0	0	0	0	0	0	0	0	0	**38**	**5**
8pm - 9pm	1	27	0	0	0	0	0	0	0	0	0	0	0	0	**28**	**4**
9pm - 10pm	3	20	0	1	0	0	0	0	0	0	0	0	0	0	**24**	**3**
10pm - 11pm	1	14	0	0	0	0	0	0	0	0	0	0	0	0	**15**	**2**
11pm - Midnigh	3	11	0	1	0	0	0	0	0	0	0	0	0	0	**15**	**2**
Total	79	1526	0	59	1	0	0	0	0	0	0	0	0	0	**1665**	**238**
% of Total	5	92		4												



CfeIT bob.white@cfeit.com (02) 9740 8600

Hourly Classification Summary

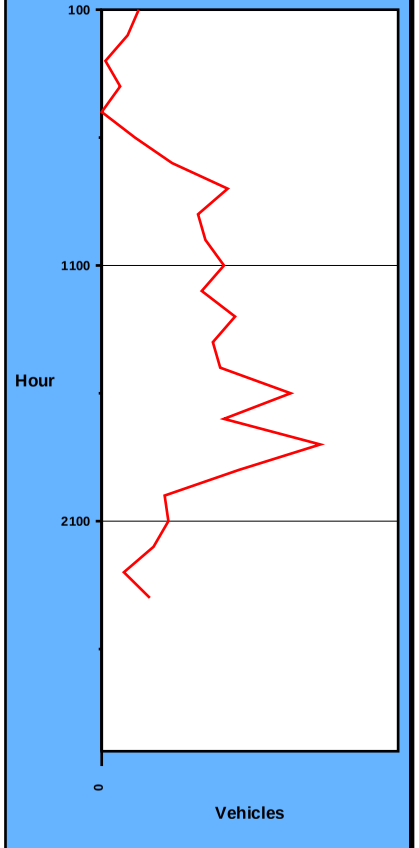
Count Number	**7213**	Ref : **ARUP**	**Lat/Long : S33 52 47.7 / E151 11 36.1**	**UBD 12 M-13**
Street	**WENTWORTH STREET, GLEBE : From BAY STREET to ST JOHNS ROAD : WEST BOUND**			
Location	Between Cowper Street and Bay Street, 20m east of Cowper in factory driveway			*Carriageway*

Start Date	23-MAR-11
Start Time	100
Duration	7 DAYS
Interval	1 HOUR

Weekly 50th Percentile Speed	**23**
Weekly 85th Percentile Speed	**29**
Five Day AADT	**94**
Seven Day AADT	**78**

THE BODY OF THIS REPORT SHOWS : SEVENDAY TRAFFIC

Time	00	01	02	03	04	05	06	07	08	09	10	11	12	13	Total	Avg
Midnight - 1am	2	8	0	0	0	0	0	0	0	0	0	0	0	0	**10**	**1**
1am - 2am	1	6	0	0	0	0	0	0	0	0	0	0	0	0	**7**	**1**
2am - 3am	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**	
3am - 4am	2	2	0	0	0	1	0	0	0	0	0	0	0	0	**5**	**1**
4am - 5am	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
5am - 6am	0	8	0	1	0	0	0	0	0	0	0	0	0	0	**9**	**1**
6am - 7am	1	18	0	0	0	0	0	0	0	0	0	0	0	0	**19**	**3**
7am - 8am	2	31	0	1	0	0	0	0	0	0	0	0	0	0	**34**	**5**
8am - 9am	4	21	0	1	0	0	0	0	0	0	0	0	0	0	**26**	**4**
9am - 10am	4	24	0	0	0	0	0	0	0	0	0	0	0	0	**28**	**4**
10am - 11am	4	27	0	0	2	0	0	0	0	0	0	0	0	0	**33**	**5**
11am - Midday	6	21	0	0	0	0	0	0	0	0	0	0	0	0	**27**	**4**
Midday - 1pm	10	26	0	0	0	0	0	0	0	0	0	0	0	0	**36**	**5**
1pm - 2pm	3	27	0	0	0	0	0	0	0	0	0	0	0	0	**30**	**4**
2pm - 3pm	3	29	0	0	0	0	0	0	0	0	0	0	0	0	**32**	**5**
3pm - 4pm	7	44	0	0	0	0	0	0	0	0	0	0	0	0	**51**	**7**
4pm - 5pm	3	30	0	0	0	0	0	0	0	0	0	0	0	0	**33**	**5**
5pm - 6pm	16	41	0	1	0	1	0	0	0	0	0	0	0	0	**59**	**8**
6pm - 7pm	7	30	0	0	0	0	0	0	0	0	0	0	0	0	**37**	**5**
7pm - 8pm	8	8	0	1	0	0	0	0	0	0	0	0	0	0	**17**	**2**
8pm - 9pm	7	10	0	1	0	0	0	0	0	0	0	0	0	0	**18**	**3**
9pm - 10pm	5	9	0	0	0	0	0	0	0	0	0	0	0	0	**14**	**2**
10pm - 11pm	2	4	0	0	0	0	0	0	0	0	0	0	0	0	**6**	**1**
11pm - Midnigh	6	7	0	0	0	0	0	0	0	0	0	0	0	0	**13**	**2**
Total	103	432	0	6	2	2	0	0	0	0	0	0	0	0	**545**	**78**
% of Total	19	79		1												



87 BAY STREET, GLEBE
TRAFFIC IMPACT ASSESSMENT

FOR

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DOCUMENT CONTROL SHEET

Issue History

Report File Name	Prepared by	Reviewed by	Issued by	Date	Issued to
P1082.001R 87 Bay Street TIA.doc	S.Read	A Finlay	A Finlay	14/09/2012	Anthony Elias Chase Property Investments
P1082.002R 87 Bay Street TIA.doc	S.Read	A Finlay	A Finlay	19/09/2012	Anthony Elias Chase Property Investments

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Appendices

1. INTRODUCTION

Bitzios Consulting has been commissioned by MT Management Pty Ltd to undertake a traffic impact assessment of the proposed mixed use development at 87 Bay Street, Glebe. This report presents findings of the study into traffic effects of the proposed development, including the results of the Paramics micro-simulation modelling of the local streets.

The proposal is for a mixed commercial office, residential and retail development. The residential dwelling units comprise a mix of studio, 1 bedroom, 2 bedroom and 3 bedroom apartments. Included in the residential development is 'affordable housing' which provides low cost housing for people on lower incomes. A small convenience type store is proposed to service the residential and commercial elements.

The report covers:

- Existing traffic conditions including, access, traffic volumes and parking;
- Proposed development including parking and access arrangements, and predicted traffic generation; and
- Traffic effects of the proposal as assessed by the Paramics micro-simulation traffic model.

1.1 PREVIOUS STUDIES

The site was the subject of a previous traffic impact assessment report by Arup in October 2011. That report was a preliminary assessment of the site and did not include any traffic analysis. Since that report was completed, the proposed development has changed somewhat in mix of use.

1.2 ADJACENT DEVELOPMENTS

The site is adjacent to a proposed Housing NSW development to the south. This Housing NSW development is proposed as a mix of market units, seniors living social housing and 'affordable' dwellings. The predicted traffic generation of the Housing NSW site has been taken into account in the preparation of this study.

2. EXISTING CONDITIONS

2.1 SITE LOCATION

The site is located at 87 Bay Street, Glebe and is bounded by Bay Street, Wentworth Park Road, Cowper Street and Wentworth St. (see Figure 2.1) The study area encompasses Wattle Street, Bay Street and Cowper Street.

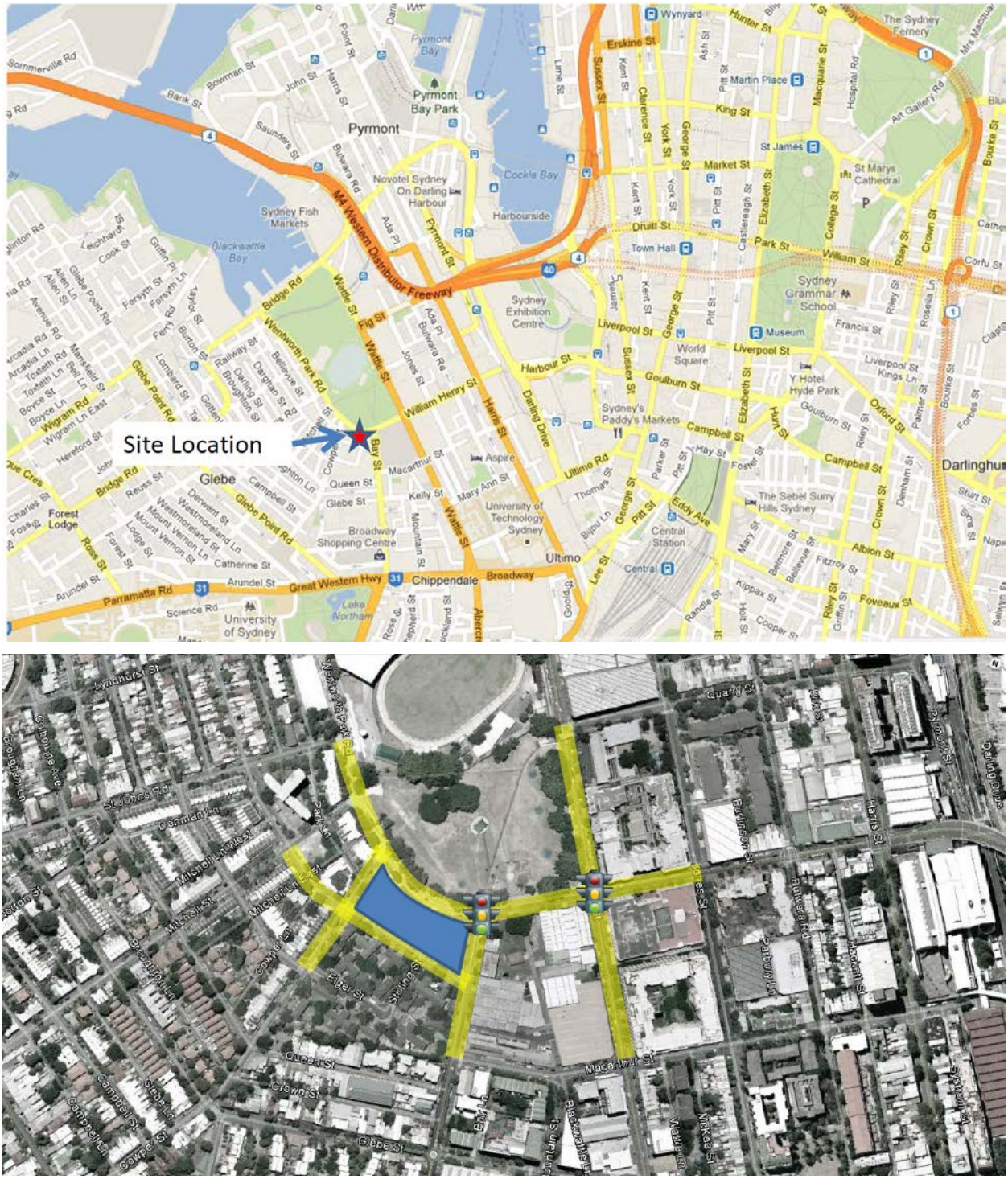


Figure 2.1 Site Location and Study Area

2.2 LOCAL ROAD NETWORK

The local road network has a 50km/h area speed zone. Wattle Street is the main northbound route through the area. Local traffic generators in the area include the Broadway Shopping Centre, Sydney CBD and the Fish Markets.

Wattle Street is a one-way street that functions as an arterial connector linking Broadway to the Sydney Harbour Bridge, Anzac Bridge and the city north. It operates effectively as a one-way pair with Harris Street southbound. Traffic can access the Sydney Harbour Bridge via Fig Street, and the Anzac Bridge via Pyrmont Bridge Road. Wattle Street is four lanes wide although on-street parking is permitted on some sections.

Wentworth Park Road / William Henry Street is a collector road that connects Pyrmont Bridge Road to the southern CBD via Pier Street and Goulburn Street. Within the study area it is generally 4 lanes wide with parking in the kerb side lanes.

Bay Street is a local collector street that runs north-south. It connects Broadway to William Henry Street. In general it is a typical 12.8m road with parking in the kerb side lanes and allows a single lane in each direction. At its southern end (outside the study area) there is a vehicular access to the Broadway Shopping Centre which is a major traffic generator in this area.

Wentworth Street is a local street that is some 8m wide and has parking on either side. The eastern end of Wentworth Street is one-way eastbound.

Cowper Street is a local street connecting Glebe Point Road to Wentworth Park Road. It is some 10m wide and allows for traffic in both directions.

2.3 EXISTING TRAFFIC VOLUMES

Traffic surveys were undertaken on 30 August by Traffic Data & Control at key intersections:

- Cowper Street / Wentworth Park Road
- Cowper Street / Wentworth Street
- William Henry Street / Wattle Street
- Bay Street / William Henry Street
- Bay Street / Wentworth Street

These traffic counts are presented in Appendix A of this Report.

The key mid-block volumes are shown in Tables 2.1 and 2.2. They show that there is tidal traffic flow behaviour along William Henry Street and Bay Street toward the city in the morning and away from the city in the afternoon. Wattle Street traffic volumes remain consistent in both peaks.

Table 2.1 AM Peak Mid-Block Traffic Volumes (8:00am – 9:00am)

Mid - Block	Northbound or Eastbound	Southbound or Westbound
William Henry Street (Bay Street – Wattle Street)	612	396
William Henry Street (Cowper Street – Bay Street)	817	397
Cowper Street (Wentworth Street – Wentworth Park Road)	31	118
Bay Street (Wentworth Street – William Henry Street)	289	493
Wattle Street (before William Henry Street)	1922	-

Table 2.2 PM Peak Mid-Block Traffic Volumes (5:00pm – 6:00pm)

Mid - Block	Northbound or Eastbound	Southbound or Westbound
William Henry Street (Bay Street – Wattle Street)	495	697
William Henry Street (Cowper Street – Bay Street)	574	932
Cowper Street (Wentworth Street – Wentworth Park Road)	27	101
Bay Street (Wentworth Street – William Henry Street)	619	463
Wattle Street (before William Henry Street)	2006	-

2.4 PUBLIC TRANSPORT

A trunk bus route is located on Parramatta Road some 500m walk to the south of the site. Buses from here connect to the CBD and to the inner-west. Bus stops are also located on Harris Street near Quarry Street, also about 500m from the proposed development.

A tram stop is located 1km from the site at the Fish Markets light rail station, with access available via walking.

2.5 CYCLING

The site is located adjacent to a bicycle route with access to the greater City of Sydney bicycle network. A shared path traverses Wentworth Park with connections to the CBD and to Anzac Bridge shared path.

2.6 WALKING

The area has excellent pedestrian connections with signalised crossings and footpaths. A grade separated crossing of Wattle Street near Quarry Street exists which has good connections to the Sydney CBD via Darling Harbour. Sydney Town Hall is within 1.6km (15 minute) walk from the site.

2.7 EXISTING DEVELOPMENTS

The site is currently used by a variety of commercial offices and a tertiary college of which the major tenant is the Australasian College. Other tenants on the site include a construction and project management company and an equipment hire shop. These existing developments have off-street parking with access from various driveways distributed around the block. The main driveways are located on Wentworth Park Road and Cowper Street.

2.8 EXISTING PARKING

On-street parking on Wentworth Park Road and Cowper Street is 2 hours (8am-6pm) while in Bay Street, and Wentworth Street there are no parking restrictions.

There are 67 designated off-street car spaces in the existing developments across five separate car-parking areas. Many of the spaces in the lower basement of Building 5 are tandem parking bays. Table 2.3 presents the allocation of the existing parking spaces.

Table 2.3 Existing Off-Street Car Parking

Building	1	6	5 (Upper Basement)	5 (Lower Basement)	4a	Total
Car Spaces	3	20	11	32	1	67

2.9 EXISTING TRAFFIC GENERATION

The existing site is assumed to generate 64 trips per hour in the peak hour based on the RTA Guide to Traffic Generating Development rates for commercial offices.

The majority of the site is used by a private college. The RTA Guide to Traffic Generating Developments provides no guidelines for traffic generation for similar developments. However a significant proportion of the college is the administration and office. Similarly the majority of the other businesses are commercial offices. The construction company have a high turnover of vehicles as project managers travel to and from sites. Therefore the traffic generation for the site is based on the RTA Guide to Traffic Generating Developments recommendation for offices of 2 trips per 100m^2.

At this rate for a total leasable floor area of 3200m^2 the traffic generation would be 64 trips per hour. These trips are assumed to be split 80% in and 20% out in the morning peak and vice versa in the afternoon peak. That is, 51 trips to the site and 13 trips from the site in the morning peak, and 13 trips to the site and 51 trips from the site in the afternoon peak.

2.10 ADJACENT DEVELOPMENTS

At the time of this study the Housing NSW site to the south of the proposed development (see Figure 2.2) had been cleared and was not generating any traffic. However this study has taken into account that the site will become developed with a mix of market based apartments, seniors living social housing apartments and 'affordable' housing.

Figure 2.2 Housing NSW Site Location

3. THE PROPOSAL

3.1 PROPOSAL

The proposal is for a mixed use development with residential, commercial and retail components. The site is to be divided into two separate structures with separated car parks and access arrangements.

The two sections are called Bay Street (East) Block and Cowper Street (West) Block. The mix of residential units is indicated in Table 3.1 below.

Table 3.1 Residential Unit Mix

	Studio	1 Bed	2 Bed	3 Bed	Total
Bay Street (East) Block	6	22	44	8	80
Cowper Street (West) Block	9	33	67	11	120
Total	15	55	111	19	200

A commercial office component will be included on the lower levels. The floor areas (GFA) for each block are:

- Bay Street Block 780m^2
- Cowper Street Block 1220m^2
- Total 2000m^2

A small retail area (100m^2) will be provided on the ground floor of the Bay Street Block suitable for a café or small convenience store to service the development.

3.2 VEHICULAR ACCESS

The proposed access locations are on Cowper Street and Wentworth Street (see Figure 3.1). Separate service vehicle access will be provided.

Figure 3.1 Access locations

3.3 TRAFFIC GENERATION

Based on the RTA Guide to Traffic Generating Developments the following generation rates were assumed:

- 0.29 Trips per apartment (high density residential)
- 2 Trips per 100m^2 of commercial office

The residential traffic generation of 0.29 was more conservative than the 0.24 rate applicable for CBD areas. We have assumed that the retail area would only serve the building and would not attract any additional vehicle trips to the site. In the AM Peak it is assumed that the residential trips are split 10% - 90% to and from the site, while the commercial trips are 80% - 20%. In the afternoon peak, the splits would be reversed. The estimated traffic generation for the site is shown in Tables 3.2 and 3.3.

Table 3.2 AM Peak Traffic Generation (8:00am – 9:00am)

	Apartments	Commercial GFA (m^2)	Vehicle Trips Generated		
			To Site	From Site	Total
Bay Street (East) Block	80	880	16	24	41
Cowper Street (West) Block	120	1220	23	36	59
Total	200	2100	39	61	100

Table 3.3 PM Peak Traffic Generation (5:00pm – 6:00pm)

	Apartments	Commercial GFA (m^2)	Vehicle Trips Generated		
			To Site	From Site	Total
Bay Street (East) Block	80	880	24	16	41
Cowper Street (West) Block	120	1220	36	23	59
Total	200	2100	61	39	100

For the purpose of modelling the traffic effects, the existing traffic generation was subtracted from the proposed traffic generation. The net traffic generation is shown in Table 3.4. The negative trips to the site were subtracted from the base traffic flows in the model. The PM peak would be the same, except in the reverse direction.

Table 3.4 AM Peak Net Traffic Generation

	Existing	Proposed	Net Traffic Generation
To Site	51	39	-12
From Site	13	61	48
Total	64	100	36

To assess the combination of this development and proposed Housing NSW development adjacent to the site, traffic generation was developed for that site. The 0.29 per dwelling rate for traffic generation was adopted here and it was assumed that the 'social housing' generates no vehicular traffic. The AM and PM peak traffic generation for the Housing NSW Site are shown in Tables 3.5 and 3.6.

Table 3.5 AM Peak Traffic Generation Housing NSW Site (8:00am – 9:00am)

		Vehicle Trips Generated		
	Units	Into Site	Out of Site	Total
Market Units	250	7	65	73
Affordable Housing	90	3	23	26
Social Aged Housing	153	-	-	-
Total	493	10	89	99

Table 3.6 PM Peak Traffic Generation Housing NSW Site (5:00pm – 6:00pm)

		Vehicle Trips Generated		
	Units	Into Site	Out of Site	Total
Market Units	250	65	7	73
Affordable Housing	90	23	3	26
Social Aged Housing	153	-	-	-
Total	493	89	10	99

3.4 TRAFFIC DISTRIBUTION

Traffic was assumed to be distributed from the site relatively evenly to the major streets. The traffic distribution assumptions are shown in Table 3.7 below.

Table 3.7 Traffic Distribution

	To Site	From Site
Wentworth Park Road	30%	30%
Wattle Street (south)	20%	-
William Henry Street	30%	20%
Bay Street	20%	20%
Wattle Street (north)	-	30%

The traffic routes to and from the site are indicated in Figures 3.2 and 3.3. It can be seen that some of the traffic routes for the Housing NSW site are beyond the scope of the model. For example, trips from the north would access via Bay Street and Edgar Street.

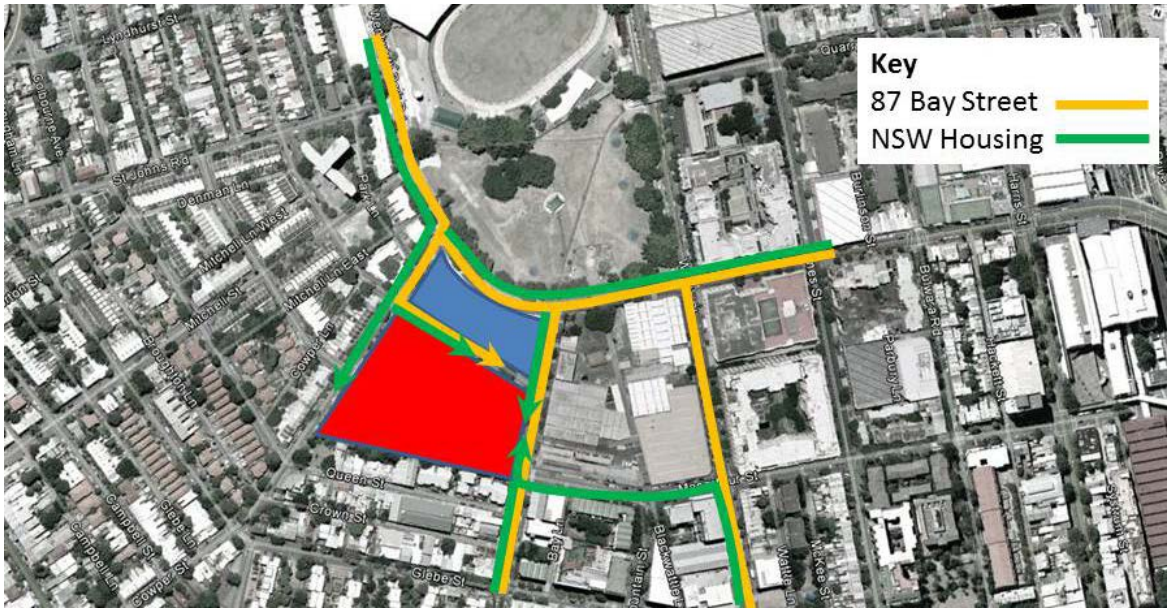


Figure 3.2 Traffic Assignment to the Site

Figure 3.3 Traffic Assignment from the Site

3.5 PARKING

A total of 162 car parking spaces are to be provided. This is equal to the maximum number of car spaces allowable under the City of Sydney Draft LEP (2011) for land in Category B, which would be 162 car spaces (see Table 3.8). The car-park will be designed in accordance with the Australian Standard AS2890.1 for off-street parking.

The consolidation of driveways on the site may also increase the potential number of on-street parking spaces along Wentworth Park Road frontage.

Table 3.8 Parking Provision

	Provided	Maximum
Residential	135	135
Visitor Residential	16	16
Commercial Office	11	11
Total	162	162

The following describes how the maximum number of car spaces was derived from the City of Sydney Draft LEP (2011). The maximum residential parking is calculated in Table 3.9.

Table 3.9 Maximum Residential Parking

	Studio	1 Bed	2 Bed	3 Bed	Total
Units	15	55	111	19	200
Rate	0.2	0.4	0.8	1.1	-
Maximum Parking Provision	3	22	89	21	135

A further 16 car spaces may be allocated to visitor parking based on the equation:

Visitor spaces = (first 30 units x 0.167) + (next 40 x 0.1) + (any additional x 0.05)

= (30 x 0.167) + (40 x 0.1) + (130 x 0.05)

= 16

The commercial office maximum parking is calculated below:

M = (G x A) / (50 x T)

= (2100 x 5427) / (50 x 20,892)

= 11

Where:

- M is the maximum number of parking spaces;
- G is the gross floor area of all office premises and business premises in square metres;
- A is the site area in square metres; and
- T is the total gross floor area of all buildings on the site in square metres.

3.6 BICYCLE PROVISION

Proposed provision is storage of 239 bicycles within the site, which is equal to the 239 stipulated in the City of Sydney 2010 Draft DCP.

The amount of bicycle storage stipulated in the 2010 Draft DCP is shown in Table 3.10.

Table 3.10 Bicycle Storage

	rate	Unit	Bicycle Storage
Residential	1 per dwelling	200 units	200
Residential visitors	1 per 10 dwellings	200 units	20
Commercial	1 per 150sqm GFA	2100sqm	14
Commercial visitors	1 per 400sqm GFA	2100sqm	5
Total			239

Showers will be provided for the commercial offices in order to encourage the use of cycling to work.

3.7 PEDESTRIAN ACCESS

The site will be able to be accessed from the footpath by pedestrians and further the layout of the buildings is such that pedestrians will be able to walk through the site (see Figure 3.4)

Figure 3.4 Pedestrian Access

4. TRAFFIC EFFECTS

4.1 PARAMICS MODEL BACKGROUND

A Paramics micro-simulation traffic model was developed to test the traffic effects of the proposed development, taking into account the adjacent developments. Micro-simulation models model the behaviour of individual vehicles as they travel through a network using a complex set of acceleration, vehicle following and gap acceptance rules. The models are graphical in nature and can be used to illustrate traffic congestion in a way that is readily understandable for both the traffic engineer and lay person. The models can also be used to collect a number of statistics about the network performance including intersection delay and travel times.

Figure 4.1 Paramics Model Screen Shot

The models cover the weekday AM Peak hour from 8am-9am and the PM Peak hour from 5pm-6pm and have been calibrated based on traffic counts undertaken in late August 2012. The calibration of the models has been undertaken to meet the requirements of the Roads and Maritime Service (RMS) in terms of traffic volumes and travel times. Further, the unusual queuing behaviour and lane utilisation on Wattle Street has been simulated. Detailed discussion and presentation of the calibration criteria is presented a Technical Note in Appendix B of this report.

The models have made use of the Ceejazz plug-ins for recording intersection delay and travel times as well as adding additional functionality to the models in terms of lane discipline.

4.2 METHODOLOGY

The following steps were followed in the modelling methodology:

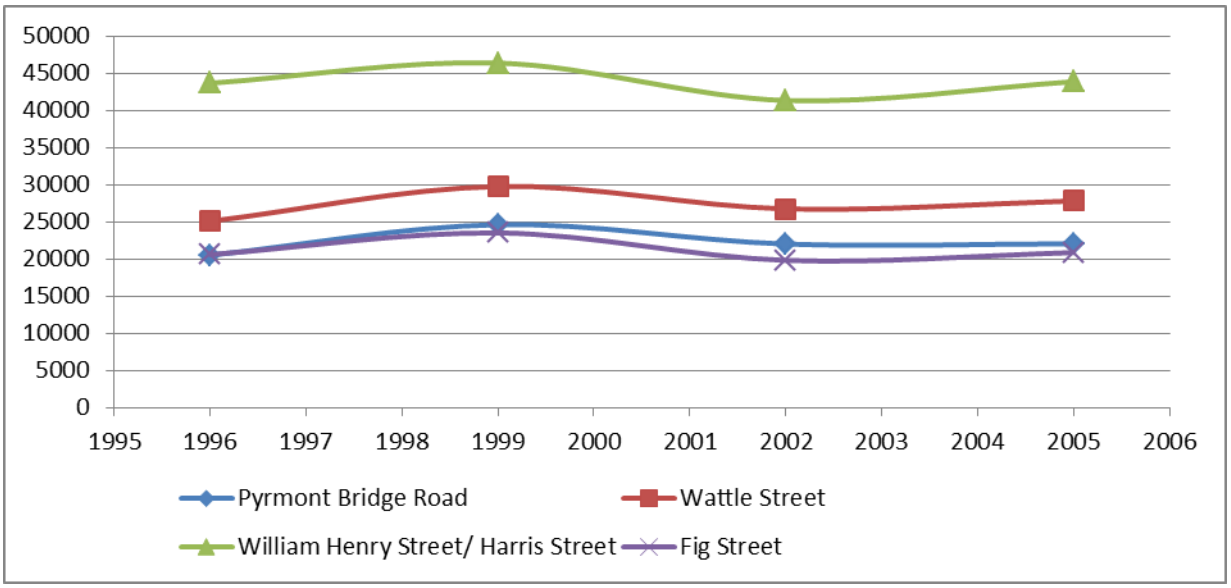
- Base Model calibration;
- Testing of traffic generation;
- Adding a 2022 design year growth in background traffic; and
- Reporting of the model results.

The base models were setup for the purpose of comparing the effects of the development on the road network. From this base model the additional traffic generated by the site is added to the network and in this case additional traffic from the Housing NSW site was also added to the network so that the combined effects could be analysed.

Background traffic growth was established based on historical data and applied to the network. The models were again tested for the effects with and without the developments.

4.3 BACKGROUND TRAFFIC GROWTH

From published traffic data the historical traffic volumes have been plotted (see Figure 4.2). Average dailytraffic volumes appear to spike in 1999 but when comparing the 10 year difference it can be seen that volumes on Fig Street have remained relatively flat. The William Henry Street / Harris Street intersection has also been flat between 1996 and 2005. Wattle Street, however, has grown by some 10% in this time period.



Source: RMS Traffic Volume Data

Figure 4.2 Historical Traffic (AADT) Volumes

Based on this data, a linear growth rate of 1% per year has been applied to Wattle Street to obtain the 2022 traffic volumes. It is assumed that background growth on William Henry Street would be negligible. In many ways the traffic volumes in this are capacity-constrained by the Fish Markets intersection, Broadway / Wattle Street intersection and the ability of traffic to leave the CBD. Increases in AADT may in part be due to 'peak spreading' – the tendency for the duration of the peak period to increase.

4.4 MODELLING RESULTS

4.4.1 Intersection Level of Service

Intersection performance in terms of average delay per vehicle was recorded using the Ceejazz Level of Service Plugin. Level of service (LoS) is ranked from "A" to "F" with "A" indicating free flow conditions while "F" is slow congested conditions, where vehicles typically take more than one cycle to pass through a set of traffic signals (see Table 4.1). The models have random variation which is why they are run for five (5) different seed values. The results presented below are based on the median of five random seed runs.

Table 4.1 Average Delay Level of Service Criteria

Level of Service	Average Delay per vehicle (sec)	
	From	To
A	0	14
B	14.	28
C	28	42
D	42	56
E	56	70
F	70	>

Source: RTA Guide to Traffic Generating Developments

It should be noted that Paramics is a network model with random variability and will produce results that are different from single intersection analytical models such as SIDRA. A Paramics model therefore may produce results with better levels of service downstream of congestion due to starving effects and likewise record higher congestion downstream due to increased capacity. As queues can propagate beyond the previous intersection an increase in average delay may only appear at intersections ahead of the congestion point rather than at the intersection itself.

The Level of Service results for the AM Peak are shown in Table 4.2. The model results indicate that in the AM Peak there is little change in the intersection performance at Bay Street and Cowper Street. The average delay increases by some 7 seconds at Wattle Street but in the 2022 scenario there was no increase.

Table 4.2 AM Peak Level of Service

Intersection	AM Base		AM 2012 with Development		AM 2022 Do Nothing		AM 2022 with Development	
	Ave. Delay	LoS	Ave. Delay	LoS	Ave. Delay	LoS	Ave. Delay	LoS
Wattle Street – William Henry Street	34	C	41	C	48	D	48	D
Bay Street – William Henry Street	25	B	26	B	25	B	26	B
William Henry Street - Cowper Street*	9	A	7	A	8	A	8	A

*Delay of the worst movement is reported only

The PM Peak results are shown in Table 4.3. The model predicts that there would be very little change in average delay at intersections, with all results within the model variability.

Table 4.3 PM Peak Level of Service

Intersection	PM Base		PM 2012 with Development		PM 2022 Do Nothing		PM 2022 with Development	
	Ave. Delay	LoS	Ave. Delay	LoS	Ave. Delay	LoS	Ave. Delay	LoS
Wattle Street – William Henry Street	45	D	47	D	49	D	49	D
Bay Street – William Henry Street	30	C	27	B	29	C	27	B
William Henry Street - Cowper Street*	7	A	8	A	9	A	9	A

4.4.2 Travel Times

The average travel times recorded in the model along William Henry Street and Wentworth Park Road from Cowper Street to Wattle Street are presented in Tables 4.4 and 4.5.

Table 4.4 AM Peak Travel Time – Cowper Street to Wattle Street

Scenario	Eastbound	Westbound
AM 2012 Base	1:15	0:34
AM 2012 with Development	1:23	0:35
AM 2022 Do Nothing	1:14	0:35
AM 2022 with Development	1:14	0:34

In the AM Peak the model indicates that the increase in travel times would be within model variation. The 2012 with development scenario indicates an increase of 8 seconds eastbound but this is considered an outlier in terms of the general trends of the model.

Table 4.5 PM Peak Travel Time – Cowper Street to Wattle Street

Scenario	Eastbound	Westbound
AM 2012 Base	1:20	0:35
AM 2012 with Development	1:20	0:40
AM 2022 Do Nothing	1:19	0:39
AM 2022 with Development	1:16	0:39

In the PM Peak the model predicts no significant increases in travel times.

4.5 MODEL SCREEN SHOTS

The following Figures 4.3 to 4.6 are screenshots comparing the models at the middle of the peak hour. In each case the screenshot was taken immediately after the traffic signal for William Henry Street at Wattle Street turned green in order to illustrate the maximum queue length in William Henry Street. The background traffic is coloured red, 87 Bay Street traffic is light green and the Housing NSW site traffic is light blue.

2012 Without Development Traffic (8:30am)

2012 With Development Traffic (8:30am)

Figure 4.3 2012 AM Peak

2022 Without Development Traffic (8:30am)

2022 With Development Traffic (8:30am)

Figure 4.4 2022 AM Peak

2012 Without Development Traffic (5:30pm)

2012 With Development Traffic (5:30pm)

Figure 4.5 2012 PM Peak

2022 Without Development Traffic (5:30pm)

2022 With Development Traffic (5:30pm)

Figure 4.6 2022 PM Peak

4.6 CONCLUSION

Bitzios Consulting has undertaken a traffic impact assessment for the proposed development of 87 Bay Street, Glebe. The proposed development is a mixed used of residential, commercial office and a small retail space to service the building. The study has taken into consideration the total traffic effects of this development and the adjacent Housing NSW site.

The study has included the development of Paramics Traffic models to assess the effects of the proposed development on the road network operation and found:

- The proposed development is estimated to generate in the order of 100 vehicle trips spread between the two car park access driveways;
- After discounting existing generated traffic, the net traffic generated was estimated to be 36 trips;
- The models indicate that the average delay at Cowper Street / Wentworth Park Road, Bay Street/ William Henry Street and Wattle Street / William Henry Street will have minimal changes as a result of the development traffic;
- The models predict that travel times will remain consistent along William Henry Street with the existing situation.
- Screen shots of the models with development traffic show that queues remain relatively similar compared to the 'no development' traffic scenarios;
- The number of car parking spaces provided will meet the maximum allowable.

It should be noted that the development traffic model scenarios include trips generated by the proposed Housing NSW site. The base models were developed during a period when that site was vacant and not generating any traffic.

The modelling indicates that the traffic effects of the combined developments would not cause undue congestion on the immediate road network.

APPENDIX A

INTERSECTION TRAFFIC COUNTS

TDC
Traffic Data & Control

INFO

Location	Glebe, Sydney NSW
Date	Thursday, 30th August 2012
Weather	Fine
Survey Periods	7:00am - 9:00am & 2:00pm - 6:00pm

SITES		PEAK	AM	PM
1	Wentworth Park Rd & Cowper St		9:00	18:00
2	Wentworth St & Cowper St		9:00	17:45
3	William Henry St & Bay St		9:00	18:00
4	Wentworth St & Bay St		9:00	18:00
5	William Henry St & Wattle St		8:45	17:45

GOLD COAST OFFICE
Suite 26, 58 Riverwalk Ave Robina
QLD 4226 Phone: 07
5575 8041

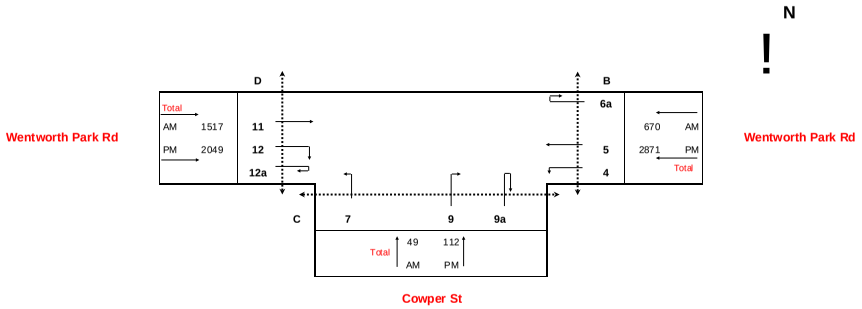
www.trafficdc.com.au

TDC

Traffic Data & Control

Site ID: 1
Location: Wentworth Park Rd & Cowper St
Weather: Fine
Suburb: Glebe
Duration: 7:00am - 9:00am & 2:00pm - 6:00pm
Day/Date: Thursday, 30 August 2012
AM Peak 09:00 (hour ending)
PM Peak 18:00 (hour ending)
Traffic Control: Signals

HOME

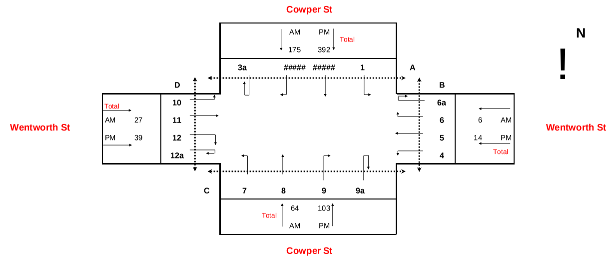


TIME	Wentworth Park Rd (Westbound)												Cowper St (Northbound)												Wentworth Park Rd (Eastbound)												Pedestrians		
	Movement 4 (Left Turn)				Movement 5 (Through)								Movement 6a (U Turn)				Movement 7 (Left Turn)								Movement 9 (Right Turn)				Movement 9a (U Turn)								Movement 11 (Through)				Movement 12 (Right Turn)				Movement 12a (U Turn)					B	C	D
15 MINUTE PERIOD ENDING	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists		East	South	West
1 7:15 AM	3	0	0	0	44	3	0	1					0	0	0	0	1	0	0	0					0	0	0	0	0	0	0	0					98	5	2	2	4	1	0	0	0	0	0	0		0	4	2
2 7:30 AM	10	0	0	0	41	1	0	2					0	0	0	0	2	0	0	0					6	0	0	0	0	0	0	0					134	3	1	6	11	0	0	1	0	0	0	0		0	7	11
3 7:45 AM	14	1	0	0	69	3	0	2					0	0	0	0	1	0	0	0					1	0	0	0	0	0	0	0					138	2	2	7	4	0	0	0	0	0	0	0		0	8	6
4 8:00 AM	10	1	0	0	44	4	0	0					0	0	0	0	4	0	0	0					3	0	0	0	0	0	0	0					176	3	3	8	7	1	0	1	0	0	0	0		0	2	4
5 8:15 AM	11	1	0	0	73	3	0	3					0	0	0	0	2	1	0	0					3	0	0	0	0	0	0	0					164	3	3	3	6	0	0	0	0	0	0	0		0	9	3
6 8:30 AM	19	0	0	0	85	2	0	1					0	0	0	0	3	0	0	0					3	0	0	0	0	0	0	0					223	9	2	10	12	0	0	0	0	0	0	0		0	13	3
7 8:45 AM	20	0	0	0	93	2	0	1					0	0	0	0	6	0	0	0					5	0	0	0	0	0	0	0					198	5	0	5	10	0	0	0	1	0	0	0		0	11	10
8 9:00 AM	22	1	0	0	75	5	0	0					0	0	0	0	2	0	0	0					6	0	0	0	0	0	0	0					206	7	3	11	16	0	0	0	0	0	0	0		1	15	8
2HR Total	109	4	0	0	524	23	0	10					0	0	0	0	21	1	0	0					27	0	0	0	0	0	0	0					1337	37	16	52	70	2	0	2	1	0	0	0		1	69	47
Peak Hour Total	72	2	0	0	326	12	0	5					0	0	0	0	13	1	0	0					17	0	0	0	0	0	0	0					791	24	8	29	44	0	0	0	1	0	0	0		1	48	24

TIME	Wentworth Park Rd (Westbound)												Cowper St (Northbound)												Wentworth Park Rd (Eastbound)												Pedestrians		
	Movement 4 (Left Turn)				Movement 5 (Through)								Movement 6a (U Turn)				Movement 7 (Left Turn)								Movement 9 (Right Turn)				Movement 9a (U Turn)								Movement 11 (Through)				Movement 12 (Right Turn)				Movement 12a (U Turn)					B	C	D
15 MINUTE PERIOD ENDING	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists		East	North	West
1 2:15 PM	15	0	0	0	115	2	0	0					0	0	0	0	3	0	0	0					6	0	0	0	0	0	0	0					99	1	0	2	4	0	0	0	0	0	0	0		0	5	1
2 2:30 PM	10	0	0	0	101	3	0	3					1	0	0	0	0	0	0	0					2	1	0	0	0	0	0	0					84	1	0	5	6	0	0	0	0	0	0	0		0	15	7
3 2:45 PM	14	0	0	0	126	2	1	0					1	0	0	0	1	0	0	0					4	0	0	0	0	0	0	0					118	3	0	4	14	0	0	0	0	0	0	0		0	11	4
4 3:00 PM	20	0	0	1	107	2	0	3					0	0	0	0	2	0	0	1					5	1	0	0	0	0	0	0					133	0	0	2	4	0	0	0	0	0	0	0		1	11	8
5 3:15 PM	20	0	0	0	130	1	1	5					0	0	0	0	2	0	0	0					2	0	0	0	0	0	0	0					123	2	1	1	8	0	0	2	0	0	0	0		0	11	10
6 3:30 PM	13	0	0	0	142	2	2	6					0	0	0	0	3	0	0	0					5	0	0	1	0	0	0	0					87	1	0	3	5	0	0	0	0	0	0	0		0	12	7
7 3:45 PM	14	0	0	1	145	3	0	3					1	0	0	0	2	0	0	0					5	0	0	0	0	0	0	0					107	1	1	3	5	0	0	0	0	0	0	0		0	10	6
8 4:00 PM	20	0	0	0	117	1	1	4					1	0	0	0	6	0	0	0					5	0	0	0	0	0	0	0					104	1	1	3	7	0	0	0	0	0	0	0		0	7	2
9 4:15 PM	17	0	0	0	157	4	0	5					0	0	0	0	4	0	0	0					4	0	0	0	0	0	0	0					109	3	0	3	7	0	0	1	1	0	0	0		0	12	2
10 4:30 PM	10	1	0	0	144	2	0	4					3	0	0	0	1	0	0	0					4	1	0	0	0	0	0	0					114	2	2	1	11	1	0	1	0	0	0	0		0	9	2
11 4:45 PM	18	0	0	1	168	2	0	5					0	0	0	0	0	0	0	0					5	0	0	0	0	0	0	0					121	0	1	2	13	0	0	0	0	0	0	0		0	1	5
12 5:00 PM	27	1	0	1	168	1	0	6					2	0	0	0	2	0	0	0					5	0	0	0	0	0	0	0					107	0	0	3	8	0	0	0	0	0	0	0		0	10	4
13 5:15 PM	17	1	0	0	198	0	0	8					0	0	0	0	4	0	0	1					2	0	0	0	0	0	0	0					134	0	0	4	7	0	0	0	0	0	0	0		0	12	3
14 5:30 PM	14	0	0	0	212	0	0	10					0	0	0	0	4	0	0	0					4	0	0	0	0	0	0	0					139	1	1	5	6	0	0	0	0	0	0	0		0	3	3
15 5:45 PM	27	0	0	1	216	0	2	13					0	0	0	0	3	0	0	0					0	0	0	0	0	0	0	0					159	2	1	6	4	0	0	2	0	0	0	0		0	6	3
16 6:00 PM	22	0	0	0	216	1	0	6					0	0	0	0	3	0	0	0					7	0	0	0	0	0	0	0					113	0	2	3	3	0	0	0	0	0	0	0		0	5	5
4HR Total	278	3	0	5	2462	26	7	81					9	0	0	0	40	0	0	1					65	3	0	3	0	0	0	0					1851	18	10	50	112	1	0	6	1	0	0	0		1	140	72
Peak Hour Total	#####	#####	#####	#####	#####	#####	#####	#####					#####	#####	#####	#####	#####	#####	#####	#####					#####	#####	#####	#####	#####	#####	#####	#####					#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####		#####	#####	#####

Traffic Data & Control

Site ID: 2
Location: Wentworth St & Cowper St
Weather: Fine
Suburb: Glebe
Duration: 7:00am - 9:00am & 2:00pm - 6:00pm
Day/Date: Thursday, 30 August 2012
AM Peak 09:00 (hour ending)
PM Peak 17:45 (hour ending)
Traffic Control: Give-Way
HOME



AM (7:00am - 9:00am) — Cowper St (Southbound)

#	15 Minute Period Ending	Movement 1 (Left Turn)				Movement 2 (Through)				Movement 3 (Right Turn)				Movement 3a (U Turn)			
		Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists
1	7:15 AM	3	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0
2	7:30 AM	6	0	0	0	13	0	0	1	2	0	0	0	0	0	0	0
3	7:45 AM	4	0	0	0	10	1	0	0	1	0	0	0	0	0	0	0
4	8:00 AM	4	0	0	0	15	2	0	1	0	0	0	0	0	0	0	0
5	8:15 AM	2	0	0	0	11	1	0	0	2	0	0	0	0	0	0	0
6	8:30 AM	3	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0
7	8:45 AM	2	0	0	0	20	0	0	0	1	0	0	0	0	0	0	0
8	9:00 AM	6	1	0	0	28	0	0	0	2	0	0	0	1	0	0	0
2HR Total		30	1	0	0	128	5	0	2	8	0	0	0	1	0	0	0
Peak Hour Total		13	1	0	0	86	1	0	0	5	0	0	0	1	0	0	0

AM — Wentworth St (Westbound)

#	15 Minute Period Ending	Movement 4 (Left Turn)				Movement 5 (Through)				Movement 6 (Right Turn)				Movement 6a (U Turn)			
		Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists
1	7:15 AM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2	7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	7:45 AM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4	8:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
5	8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	8:30 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7	8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	9:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2HR Total		1	0	0	0	3	0	0	1	1	0	0	0	0	0	0	0
Peak Hour Total		0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0

AM — Cowper St (Northbound)

#	15 Minute Period Ending	Movement 7 (Left Turn)				Movement 8 (Through)				Movement 9 (Right Turn)				Movement 9a (U Turn)			
		Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists
1	7:15 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
2	7:30 AM	0	0	0	0	5	0	0	0	1	0	0	0	0	0	0	0
3	7:45 AM	0	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0
4	8:00 AM	2	0	0	0	6	0	0	1	0	0	0	0	0	0	0	0
5	8:15 AM	2	0	0	0	6	1	0	1	1	0	0	0	0	0	0	0
6	8:30 AM	2	0	0	0	3	0	0	0	4	0	0	0	0	0	0	0
7	8:45 AM	1	0	0	0	8	0	0	0	4	0	0	0	0	0	0	0
8	9:00 AM	1	0	0	0	7	0	0	0	1	0	0	0	0	0	0	0
2HR Total		8	0	0	0	40	1	0	2	12	0	0	0	0	1	0	0
Peak Hour Total		6	0	0	0	24	1	0	1	10	0	0	0	0	0	0	0

AM — Wentworth St (Eastbound)

#	15 Minute Period Ending	Movement 10 (Left Turn)				Movement 11 (Through)				Movement 12 (Right Turn)				Movement 12a (U Turn)			
		Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists
1	7:15 AM	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
2	7:30 AM	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
3	7:45 AM	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0
4	8:00 AM	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0
5	8:15 AM	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0
6	8:30 AM	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
7	8:45 AM	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0
8	9:00 AM	1	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0
2HR Total		4	0	0	1	12	1	0	0	8	0	0	0	1	0	0	0
Peak Hour Total		2	0	0	1	4	1	0	0	5	0	0	0	1	0	0	0

AM — Pedestrians

#	15 Minute Period Ending	A North	B East	C South	D West
1	7:15 AM	3	0	1	1
2	7:30 AM	1	1	2	1
3	7:45 AM	2	0	2	3
4	8:00 AM	1	0	3	2
5	8:15 AM	8	2	2	2
6	8:30 AM	5	5	6	4
7	8:45 AM	11	7	5	3
8	9:00 AM	5	13	3	4
2HR Total		36	28	24	20
Peak Hour Total		29	27	16	13

PM (2:00pm - 6:00pm) — Cowper St (Southbound)

#	15 Minute Period Ending	Movement 1 (Left Turn)				Movement 2 (Through)				Movement 3 (Right Turn)				Movement 3a (U Turn)			
		Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists
1	2:15 PM	3	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0
2	2:30 PM	4	0	0	0	10	0	0	0	0	0	0	0	2	0	0	0
3	2:45 PM	6	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0
4	3:00 PM	3	0	0	0	20	0	0	1	0	0	0	0	0	0	0	0
5	3:15 PM	2	0	0	1	20	0	0	1	1	0	0	0	0	0	0	0
6	3:30 PM	1	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0
7	3:45 PM	6	0	0	0	15	0	0	1	0	0	0	0	1	0	0	0
8	4:00 PM	2	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0
9	4:15 PM	2	0	0	0	13	0	0	1	1	0	0	0	0	0	0	0
10	4:30 PM	1	0	0	0	17	1	0	2	1	0	0	0	0	0	0	0
11	4:45 PM	4	0	0	0	24	1	0	0	1	0	0	1	0	0	0	0
12	5:00 PM	4	0	0	0	30	0	1	1	0	0	0	0	0	0	0	0
13	5:15 PM	1	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0
14	5:30 PM	4	0	0	1	18	1	0	0	0	0	0	0	0	0	0	0
15	5:45 PM	3	0	0	0	30	0	0	3	0	0	0	0	0	0	0	0
16	6:00 PM	1	0	0	0	22	0	0	1	2	0	0	0	0	0	0	0
4HR Total		47	0	0	2	318	3	1	11	6	0	0	1	3	0	0	0
Peak Hour Total		####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####

PM — Wentworth St (Westbound)

#	15 Minute Period Ending	Movement 4 (Left Turn)				Movement 5 (Through)				Movement 6 (Right Turn)				Movement 6a (U Turn)			
		Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists
1	2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	3:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
5	3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	3:30 PM	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
7	3:45 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
8	4:00 PM	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
9	4:15 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	4:30 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
11	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	5:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	5:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
15	5:45 PM	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
16	6:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4HR Total		3	0	0	0	5	0	0	2	3	0	0	1	0	0	0	0
Peak Hour Total		####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####

PM — Cowper St (Northbound)

#	15 Minute Period Ending	Movement 7 (Left Turn)				Movement 8 (Through)				Movement 9 (Right Turn)				Movement 9a (U Turn)			
		Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists
1	2:15 PM	1	0	0	0	5	0	0	1	0	0	0	0	0	0	0	0
2	2:30 PM	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0
3	2:45 PM	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0
4	3:00 PM	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0
5	3:15 PM	0	0	0	0	4	0	0	0	2	0	0	0	2	0	0	0
6	3:30 PM	2	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0
7	3:45 PM	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
8	4:00 PM	0	0	0	0	7	0	0	1	0	0	0	0	0	0	0	0
9	4:15 PM	0	0	0	0	4	0	0	0	2	0	0	0	0	0	0	0
10	4:30 PM	0	0	0	0	5	1	0	2	0	0	0	0	0	0	0	0
11	4:45 PM	2	0	0	0	5	0	0	2	0	0	0	0	0	0	0	0
12	5:00 PM	1	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0
13	5:15 PM	0	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0
14	5:30 PM	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
15	5:45 PM	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
16	6:00 PM	3	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
4HR Total		12	0	0	0	72	3	0	8	6	0	0	0	2	0	0	0
Peak Hour Total		####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####

PM — Wentworth St (Eastbound)

#	15 Minute Period Ending	Movement 10 (Left Turn)				Movement 11 (Through)				Movement 12 (Right Turn)				Movement 12a (U Turn)			
		Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists
1	2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	2:45 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
4	3:00 PM	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
5	3:15 PM	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
6	3:30 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7	3:45 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
8	4:00 PM	2	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0
9	4:15 PM	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0
10	4:30 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	4:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	5:00 PM	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
13	5:15 PM	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
14	5:30 PM	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0
15	5:45 PM	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0
16	6:00 PM	1	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0
4HR Total		7	0	0	0	13	0	0	3	15	1	0	0	0	0	0	0
Peak Hour Total		####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####

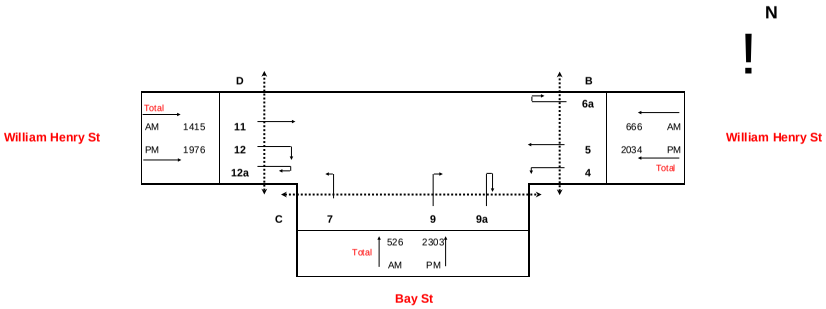
PM — Pedestrians

#	15 Minute Period Ending	A South	B East	C North	D West
1	2:15 PM	4	2	1	0
2	2:30 PM	3	2	4	3
3	2:45 PM	4	2	1	0
4	3:00 PM	5	5	1	1
5	3:15 PM	4	6	8	4
6	3:30 PM	3	1	3	3
7	3:45 PM	8	2	3	1
8	4:00 PM	8	1	0	7
9	4:15 PM	10	4	3	4
10	4:30 PM	3	0	4	4
11	4:45 PM	5	3	3	5
12	5:00 PM	6	2	0	2
13	5:15 PM	5	1	11	7
14	5:30 PM	4	4	6	2
15	5:45 PM	3	3	6	3
16	6:00 PM	3	2	3	5
4HR Total		78	40	57	51
Peak Hour Total		####	####	####	####

TDC

Traffic Data & Control

Site ID: 3
Location: William Henry St & Bay St
Weather: Fine
Suburb: Glebe
Duration: 7:00am - 9:00am & 2:00pm - 6:00pm
Day/Date: Thursday, 30 August 2012
AM Peak 09:00 (hour ending)
PM Peak 18:00 (hour ending)
Traffic Control: Signals
HOME



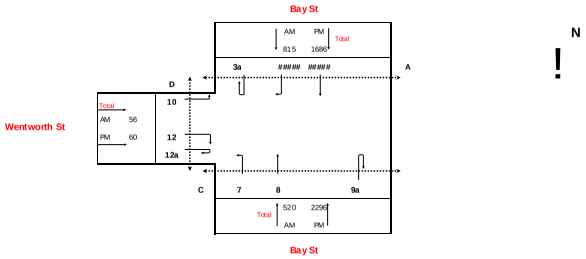
TIME	William Henry St (Westbound)																Bay St (Northbound)																William Henry St (Eastbound)																Pedestrians		
	Movement 4 (Left Turn)				Movement 5 (Through)								Movement 6a (U Turn)				Movement 7 (Left Turn)								Movement 9 (Right Turn)				Movement 9a (U Turn)								Movement 11 (Through)				Movement 12 (Right Turn)				Movement 12a (U Turn)				B	C	D
15 MINUTE PERIOD ENDING	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	East	South	West
1 7:15 AM	11	1	0	0	24	0	0	1					0	0	0	0	21	1	0	0					18	1	0	2	0	0	0	0					62	2	0	2	20	3	2	0	0	0	0	0	2	3	2
2 7:30 AM	26	3	0	0	41	2	0	1					0	0	0	0	19	3	0	0					25	1	0	0	0	0	0	0					86	2	0	4	47	2	1	3	0	0	0	0	4	3	6
3 7:45 AM	18	1	0	1	40	1	0	1					0	0	0	0	33	4	0	1					32	4	0	0	0	0	0	0					92	1	0	3	54	1	2	3	0	0	0	0	9	5	3
4 8:00 AM	32	3	0	1	44	3	0	1					0	0	0	0	20	3	0	1					41	2	0	0	0	0	0	0					111	1	0	4	53	1	3	2	0	0	0	0	8	3	12
5 8:15 AM	36	2	0	1	44	3	0	2					0	0	0	0	31	2	0	0					33	4	1	1	0	0	0	0					103	1	0	2	70	3	2	1	0	0	0	0	10	6	12
6 8:30 AM	34	3	0	1	60	0	0	0					0	0	0	0	38	1	0	0					27	1	0	1	0	0	0	0					120	2	0	8	84	4	3	0	0	0	0	0	14	3	15
7 8:45 AM	42	0	0	0	64	0	0	1					0	0	0	0	56	0	0	0					35	2	0	1	0	0	0	0					124	4	0	3	75	4	0	3	0	0	0	0	31	12	26
8 9:00 AM	43	1	0	5	62	4	0	2					0	0	0	0	30	5	0	0					22	1	0	2	0	0	0	0					136	0	1	6	79	5	2	3	0	0	0	0	25	8	24
2HR Total	242	14	0	9	379	13	0	9					0	0	0	0	248	19	0	2					233	16	1	7	0	0	0	0					834	13	1	32	482	23	15	15	0	0	0	0	103	43	100
Peak Hour Total	155	6	0	7	230	7	0	5					0	0	0	0	155	8	0	0					117	8	1	5	0	0	0	0					483	7	1	19	308	16	7	7	0	0	0	0	80	29	77

TIME	William Henry St (Westbound)																Bay St (Northbound)																William Henry St (Eastbound)																Pedestrians		
	Movement 4 (Left Turn)				Movement 5 (Through)								Movement 6a (U Turn)				Movement 7 (Left Turn)								Movement 9 (Right Turn)				Movement 9a (U Turn)								Movement 11 (Through)				Movement 12 (Right Turn)				Movement 12a (U Turn)				B	C	D
15 MINUTE PERIOD ENDING	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	East	North	West
1 2:15 PM	34	3	0	0	48	2	0	2					0	0	0	0	65	2	0	0					47	0	1	0	0	0	0	0					47	0	0	0	55	1	0	1	0	0	0	0	13	3	13
2 2:30 PM	29	2	0	0	66	2	0	2					0	0	0	0	57	2	0	1					56	3	0	0	0	0	0	0					40	2	1	1	50	0	0	3	0	0	0	0	7	2	24
3 2:45 PM	35	5	0	0	56	2	0	0					0	0	0	0	77	1	0	0					48	1	0	0	0	0	0	0					50	2	0	0	66	0	0	2	0	0	0	0	4	2	19
4 3:00 PM	25	2	0	2	57	3	0	3					0	0	0	0	76	0	0	1					39	1	0	0	0	0	0	0					58	1	0	0	80	1	0	1	0	0	0	0	7	8	24
5 3:15 PM	31	1	0	0	61	1	0	1					0	0	0	0	81	0	1	2					52	0	0	0	0	0	0	0					50	1	1	1	66	0	0	0	0	0	0	0	109	6	25
6 3:30 PM	28	1	0	0	60	0	1	3					0	0	0	0	92	1	0	1					62	0	0	0	0	0	0	0					48	0	1	1	54	1	0	2	0	0	0	0	19	7	23
7 3:45 PM	33	0	0	1	68	3	0	4					0	0	0	0	93	0	0	2					54	2	1	0	0	0	0	0					48	1	0	1	67	0	1	1	0	0	0	0	7	3	19
8 4:00 PM	35	1	0	1	74	3	0	2					0	0	0	0	75	1	0	2					54	1	0	4	0	0	0	0					55	0	0	4	65	1	1	2	0	0	0	0	12	3	19
9 4:15 PM	29	0	0	1	82	3	0	3					0	0	0	0	88	1	0	1					68	1	0	0	0	0	0	0					52	0	0	1	56	1	0	2	0	0	0	0	6	2	27
10 4:30 PM	37	0	0	1	76	2	0	1					0	0	0	0	77	1	0	4					67	0	0	0	0	0	0	0					52	0	3	0	68	2	0	2	0	0	0	0	11	10	19
11 4:45 PM	38	1	0	0	82	1	0	4					0	0	0	0	90	0	0	2					63	0	0	2	0	0	0	0					51	0	1	1	77	0	1	0	0	0	0	0	24	5	22
12 5:00 PM	36	0	0	2	109	3	0	3					0	0	0	0	85	0	0	1					62	0	0	1	0	0	0	0					66	0	0	2	45	0	0	0	0	0	0	0	17	7	23
13 5:15 PM	27	0	0	1	102	0	0	6					0	0	0	0	97	0	0	4					64	0	0	1	0	0	0	0					66	0	1	1	73	0	0	2	0	0	0	0	12	11	22
14 5:30 PM	48	0	0	2	135	1	0	7					0	0	0	0	96	0	0	2					55	1	0	0	0	0	0	0					67	0	1	1	65	0	0	4	0	0	0	0	19	9	23
15 5:45 PM	49	0	0	2	150	1	0	12					0	0	0	0	106	1	0	1					40	0	0	0	0	0	0	0					47	0	0	1	85	2	0	8	0	0	0	0	8	11	23
16 6:00 PM	43	1	0	4	130	1	0	5					0	0	0	0	103	0	0	2					55	1	0	1	0	0	0	0					62	0	1	0	70	0	0	1	0	0	0	0	28	6	31
4HR Total	557	17	0	17	1356	28	1	58					0	0	0	0	1358	10	1	26					886	11	2	9	0	0	0	0					859	7	10	15	1042	9	3	31	0	0	0	0	303	95	356
Peak Hour Total	#####	#####	#####	#####	#####	#####	#####	#####					#####	#####	#####	#####	#####	#####	#####	#####					#####	#####	#####	#####	#####	#####	#####	#####					#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####

TDC

Traffic Data & Control

Site ID: 4
Location: Wentworth St & Bay St
Weather: Fine
Suburb: Glebe
Duration: 7:00am - 9:00am & 2:00pm - 6:00pm
Day/Date: Thursday, 30 August 2012
AM Peak 09:00 (hour ending)
PM Peak 18:00 (hour ending)
Traffic Control: Give-Way
HOME

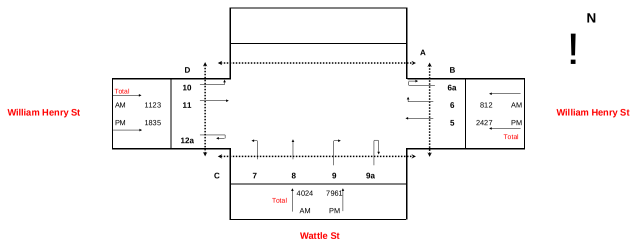


TIME	Bay St (Southbound)																Bay St (Northbound)																Wentworth St (Eastbound)																Pedestrians			
					Movement 2 (Through)				Movement 3 (Right Turn)				Movement 3a (U Turn)				Movement 7 (Left Turn)				Movement 8 (Through)				Movement 9a Turn)				(U	Movement 10 (Left Turn)								Movement 12 (Right Turn)				Movement 12a Turn)				(U	A		C	D
15 MINUTE PERIOD ENDING			Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists		Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists		North		South	West
1	7:15 AM		35	4	2	0	0	0	0	0	0	0	0	0	1	0	0	0	36	3	0	3					2	0	0	0					2	0	0	0	0	0	0	0		0		3	0
2	7:30 AM		67	4	1	6	0	0	0	0	0	0	0	0	0	0	0	0	48	5	0	1					1	0	0	0					5	0	0	0	0	0	0	0		0		1	10
3	7:45 AM		73	1	2	4	0	0	0	0	0	0	0	0	1	0	0	0	64	7	0	2					1	0	0	0					3	0	0	0	0	0	0	0		1		2	10
4	8:00 AM		88	4	4	5	0	0	0	0	0	0	0	0	0	0	0	1	54	3	0	0					0	0	0	0					4	0	0	0	0	0	0	0		0		4	14
5	8:15 AM		106	5	1	2	0	0	0	0	0	0	0	0	0	0	0	0	59	6	1	3					0	0	0	0					4	0	0	0	0	1	0	0		1		0	17
6	8:30 AM		113	9	1	1	1	0	0	0	0	0	0	0	0	0	0	0	66	2	0	2					1	0	0	0					5	0	0	0	0	0	0	0		0		1	24
7	8:45 AM		122	4	0	9	0	0	0	0	0	0	0	0	0	0	0	0	83	2	0	2					0	0	0	0					6	0	0	0	0	0	0	0		1		3	43
8	9:00 AM		124	6	2	8	1	0	0	0	0	0	0	0	2	0	0	0	55	5	0	2					0	0	0	0					3	1	0	0	7	0	0	1		0		2	39
2HR Total			729	37	13	35	2	0	0	0	0	0	0	0	2	0	0	1	465	33	1	15					3	0	0	0					32	1	0	0	21	1	0	1		3		16	169
Peak Hour Total			465	24	4	20	2	0	0	0	0	0	0	0	0	0	0	0	263	15	1	9					1	0	0	0					18	1	0	0	9	1	0	1		2		6	123

TIME	Bay St (Southbound)																Bay St (Northbound)																Wentworth St (Eastbound)																Pedestrians			
					Movement 2 (Through)				Movement 3 (Right Turn)				Movement 3a (U Turn)				Movement 7 (Left Turn)				Movement 8 (Through)				Movement 9a Turn)				(U	Movement 10 (Left Turn)								Movement 12 (Right Turn)				Movement 12a Turn)				(U	A		C	D
15 MINUTE PERIOD ENDING			Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists		Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists					Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists		South		North	West
1	2:15 PM		90	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	123	2	1	0					0	0	0	0					1	0	0	0	0	0	0	0		0		0	19
2	2:30 PM		79	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	107	8	0	1					0	0	0	0					1	0	0	0	0	0	0	0		1		0	31
3	2:45 PM		100	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	122	2	0	0					0	0	0	0					3	0	0	0	1	0	0	0		0		2	32
4	3:00 PM		108	3	0	4	1	0	0	0	0	0	0	0	0	0	0	1	112	1	0	0					0	0	0	0					1	0	0	0	0	0	0	0		0		0	32
5	3:15 PM		93	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	134	1	0	2					1	0	0	0					4	0	0	0	0	0	0	1		0		5	39
6	3:30 PM		78	2	0	2	0	0	0	0	1	0	0	0	1	0	0	1	150	2	0	2					0	0	0	0					1	0	0	0	0	0	0	0		0		4	31
7	3:45 PM		106	0	1	3	0	0	0	0	0	0	0	0	0	0	0	1	135	1	1	2					0	0	0	0					2	0	0	0	0	0	0	0		0		0	33
8	4:00 PM		100	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	129	2	0	7					0	0	0	0					1	0	0	0	0	0	0	1		1		2	35
9	4:15 PM		83	1	0	3	0	0	0	0	1	0	0	0	1	0	0	0	154	2	0	1					0	0	0	0					3	0	0	0	0	0	0	0		0		0	43
10	4:30 PM		107	2	0	4	0	0	0	0	0	0	0	0	2	0	0	0	149	1	0	5					0	0	0	0					1	0	0	0	0	0	0	0		1		0	42
11	4:45 PM		114	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	157	0	0	4					0	0	0	0					1	0	0	0	0	0	0	0		0		1	27
12	5:00 PM		83	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	127	0	0	2					1	0	0	0					3	0	0	0	0	0	0	0		0		3	41
13	5:15 PM		98	0	0	4	0	0	0	0	1	0	0	0	0	0	0	0	159	0	0	6					0	0	0	0					2	0	0	0	0	0	0	0		0		4	34
14	5:30 PM		119	0	0	8	0	0	0	0	1	0	0	0	1	0	0	0	150	1	0	2					0	0	0	0					5	0	0	0	0	0	0	0		1		1	42
15	5:45 PM		132	3	0	8	0	0	0	0	0	0	0	0	1	0	0	1	162	1	0	3					0	0	0	0					2	0	0	0	0	0	0	0		1		3	35
16	6:00 PM		110	1	0	5	0	0	0	0	0	0	0	0	0	0	0	0	146	1	0	3					0	0	0	0					2	0	0	0	0	0	0	0		3		1	51
4HR Total			1600	26	3	52	1	0	0	0	4	0	0	0	6	0	0	4	2216	25	2	40					3	0	0	0					32	0	0	0	26	0	0	2		11		26	567
Peak Hour Total			####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####					####	####	####	####					####	####	####	####	####	####	####	####		####		####	####

TDC
Traffic Data & Control

Site ID: 5
Location: William Henry St & Wattle St
Weather: Fine
Suburb: Glebe
Duration: 7:00am - 9:00am & 2:00pm - 6:00pm
Day/Date: Thursday, 30 August 2012
AM Peak 08:45 (hour ending)
PM Peak 17:45 (hour ending)
Traffic Control: Signals
HOME



AM (7:00am - 9:00am)

(Southbound): no data printed.

TIME / 15 MINUTE PERIOD ENDING	William Henry St (Westbound) Movement 5 (Through) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 6 (Right Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 6a (U Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Wattle St (Northbound) Movement 7 (Left Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 8 (Through) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 9 (Right Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 9a (U Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists
1 7:15 AM	34	1	0	2	16	1	0	1	0	0	0	0	8	0	0	0	398	26	2	13	43	0	0	3	0	0	0	0
2 7:30 AM	46	2	1	0	18	1	0	0	0	0	0	0	14	0	0	0	392	6	4	15	64	1	0	0	0	0	0	0
3 7:45 AM	47	0	0	1	21	0	0	1	0	0	0	0	13	0	0	0	385	14	6	10	79	2	0	2	0	0	0	0
4 8:00 AM	70	5	0	1	27	3	1	0	0	0	0	0	13	0	0	0	373	15	3	13	85	2	0	2	0	0	0	0
5 8:15 AM	67	3	0	4	33	4	0	0	0	0	0	0	8	2	0	0	407	11	0	16	137	2	0	2	0	0	0	0
6 8:30 AM	82	2	0	1	39	0	0	1	0	0	0	0	13	0	0	0	355	9	2	18	108	3	0	3	0	0	0	0
7 8:45 AM	88	1	0	1	38	1	0	0	0	0	0	0	18	0	0	1	298	13	2	25	83	3	0	4	0	0	0	0
8 9:00 AM	91	3	0	6	41	4	0	2	0	0	0	0	17	1	0	0	318	16	3	24	93	0	0	3	0	0	0	0
2HR Total	525	17	1	16	233	14	1	5	0	0	0	0	104	3	0	1	2926	110	22	134	692	13	0	19	0	0	0	0
Peak Hour Total	307	11	0	7	137	8	1	1	0	0	0	0	52	2	0	1	1433	48	7	72	413	10	0	11	0	0	0	0

TIME / 15 MINUTE PERIOD ENDING	William Henry St (Eastbound) Movement 10 (Left Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 11 (Through) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 12a (U Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Pedestrians A North	B East	C South	D West
1 7:15 AM	22	0	0	1	52	3	0	3	0	0	0	0	5	0	2	3
2 7:30 AM	32	1	0	0	81	2	0	4	0	0	0	0	8	6	5	5
3 7:45 AM	34	2	0	1	89	3	0	1	0	0	0	0	5	4	9	9
4 8:00 AM	39	1	0	1	114	3	0	3	0	0	0	0	8	3	6	15
5 8:15 AM	39	2	0	0	99	3	1	2	0	0	0	0	10	0	13	16
6 8:30 AM	31	1	0	2	114	1	0	5	0	0	0	0	14	4	22	27
7 8:45 AM	46	2	0	1	122	3	2	3	0	0	0	0	12	8	28	47
8 9:00 AM	34	0	0	1	110	1	1	5	0	0	0	0	15	8	18	47
2HR Total	277	9	0	7	781	19	4	26	0	0	0	0	77	33	103	169
Peak Hour Total	155	6	0	4	449	10	3	13	0	0	0	0	44	15	69	105

PM (2:00pm - 6:00pm)

(Southbound) and the unnamed William Henry St (Westbound) columns:

TIME	(Southbound)																(Westbound)			
4HR Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peak Hour Total	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####

TIME / 15 MINUTE PERIOD ENDING	William Henry St (Westbound) Movement 5 (Through) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 6 (Right Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 6a (U Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Wattle St (Northbound) Movement 7 (Left Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 8 (Through) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 9 (Right Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 9a (U Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists
1 2:15 PM	68	5	0	2	38	1	0	0	0	0	0	0	14	0	0	0	351	23	4	6	48	0	0	0	0	0	0	0
2 2:30 PM	74	3	0	0	58	3	0	1	0	0	0	0	20	1	0	2	300	16	1	4	45	2	0	0	0	0	0	0
3 2:45 PM	78	6	0	0	61	6	0	0	0	0	0	0	18	0	0	0	346	5	2	11	60	1	0	3	0	0	0	0
4 3:00 PM	61	2	0	2	62	4	2	2	0	0	0	0	23	2	0	3	349	13	1	5	48	2	0	0	0	0	0	0
5 3:15 PM	69	3	0	1	48	0	0	0	0	0	0	0	27	0	0	1	406	11	3	13	47	0	0	1	0	0	0	0
6 3:30 PM	63	2	0	1	38	1	0	0	0	0	0	0	16	0	1	1	429	10	2	11	61	2	0	0	0	0	0	0
7 3:45 PM	83	2	0	3	41	2	0	0	0	0	0	0	24	1	0	1	392	9	2	4	54	0	0	0	0	0	0	0
8 4:00 PM	72	2	0	2	32	0	0	0	0	0	0	0	28	1	0	1	414	13	2	11	53	3	0	0	0	0	0	0
9 4:15 PM	83	1	0	2	51	3	0	2	0	0	0	0	36	2	0	0	392	8	2	14	53	0	0	1	0	0	0	0
10 4:30 PM	77	2	0	2	50	2	0	1	0	0	0	0	32	0	0	0	490	8	1	10	65	1	0	2	0	0	0	0
11 4:45 PM	95	1	0	3	59	0	0	1	0	0	0	0	24	1	0	0	383	6	2	9	67	0	0	0	0	0	0	0
12 5:00 PM	119	3	0	7	56	3	0	0	0	0	0	0	32	0	0	0	383	4	0	12	67	0	0	3	0	0	0	0
13 5:15 PM	108	1	0	4	39	1	0	2	0	0	0	0	29	0	0	1	427	5	1	14	72	1	0	3	0	0	0	0
14 5:30 PM	154	0	0	6	46	1	0	0	0	0	0	0	29	0	0	3	350	4	0	10	71	0	0	1	0	0	0	0
15 5:45 PM	154	1	0	10	54	0	0	1	0	0	0	0	34	0	0	1	433	1	1	10	83	0	0	0	0	0	0	0
16 6:00 PM	156	4	0	5	52	0	0	1	0	0	0	0	27	0	0	2	367	4	0	13	67	0	0	3	0	0	0	0
4HR Total	1514	38	0	50	785	27	2	11	0	0	0	0	413	8	1	16	6212	140	24	157	961	12	0	17	0	0	0	0
Peak Hour Total	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####

TIME / 15 MINUTE PERIOD ENDING	William Henry St (Eastbound) Movement 10 (Left Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 11 (Through) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Movement 12a (U Turn) Cars, Utilities & Motorcycles	Trucks & Buses	Articulated	Cyclists	Pedestrians A South	B East	C North	D West
1 2:15 PM	44	0	1	0	45	0	0	2	0	0	0	0	17	3	7	17
2 2:30 PM	59	4	0	0	46	5	0	1	0	0	0	0	19	2	9	8
3 2:45 PM	43	1	0	0	45	2	0	0	0	0	0	0	18	3	4	6
4 3:00 PM	55	0	0	1	44	1	1	0	0	0	0	0	12	2	14	20
5 3:15 PM	44	0	0	0	57	1	1	1	0	0	0	0	13	4	4	13
6 3:30 PM	65	0	0	0	45	1	0	1	0	0	0	0	13	6	15	18
7 3:45 PM	55	3	0	0	55	0	1	2	0	0	0	0	22	11	4	12
8 4:00 PM	47	0	0	2	54	1	0	3	0	0	0	0	22	7	3	20
9 4:15 PM	70	1	0	1	51	0	0	0	0	0	0	0	14	10	12	19
10 4:30 PM	42	1	1	0	65	0	0	0	0	0	0	0	17	4	20	28
11 4:45 PM	53	1	1	1	62	0	0	2	0	0	0	0	20	4	24	23
12 5:00 PM	67	0	0	0	75	0	0	1	0	0	0	0	24	4	15	19
13 5:15 PM	58	0	1	1	62	0	0	1	0	0	0	0	28	4	18	27
14 5:30 PM	54	1	1	0	78	0	0	1	0	0	0	0	30	7	18	32
15 5:45 PM	42	0	0	1	79	0	0	0	0	0	0	0	23	8	15	27
16 6:00 PM	47	0	1	1	70	1	0	1	0	0	0	0	32	5	16	24
4HR Total	845	12	6	8	933	12	3	16	0	0	0	0	324	84	198	313
Peak Hour Total	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####	####

APPENDIX B

MODEL CALIBRATION AND VALIDATION

Issue History

File Name	Prepared by	Reviewed by	Issued by	Date	Issued to
P1082.001T 87 Bay St Paramics Modelling – Calibration and Validation.doc	S.Read	A.Finlay	A.Finlay	14/09/2012	Anthony Elias Chase Property Investments

87 Bay Street, Glebe Paramics Modelling – Validation and Calibration

1. INTRODUCTION

1.1 BACKGROUND

Bitzios Consulting was commissioned by Chase Property Investments to develop a Paramics microsimulation model to assist in the assessment of traffic impacts as a result of the proposed re-development of 87 Bay Street, Glebe. The model will also be used to identify potential improvements that could be implemented in the corridor to mitigate the effects of future development in the area.

The purpose of this Model Calibration and Validation Technical Note is to demonstrate the base model validity in accordance with RMS guidelines. Many of the roads in the network surrounding the development are under state control.

1.2 METHODOLOGY

The Paramics modelling was undertaken in accordance with the RMS's Paramics Microsimulation Modelling Manual. The processes involved in validating and calibrating the 87 Bay Street Paramics model included:

- data collection and analysis for the AM and PM peak period;
- model traffic network coding;
- estimation of traffic demands; and
- model calibration and validation.

This technical note describes the processes used and results achieved in developing the base model.

1.3 STUDY AREA

The study area shown in Figure 1.1 shows the location of the 87 Bay Street development site and the extent of the Paramics model for assessment of potential traffic impacts and needs. The model boundary has been defined by the City of Sydney and includes two signalised intersections at Wattle Street / William Henry Street and Bay Street / William Henry Street.

Source: Google Maps Australia

Figure 1.1: Study Area and Paramics Model Extents

2. DATA COLLECTION AND ANALYSIS

A variety of data sets have been collected on site including:

- Intersection turning volume counts;
- Travel times;
- Queue length estimations; and
- Intersection signal timings.

Intersection counts were undertaken on 30 August 2012 at five locations:

- Wattle Street / William Henry Street;
- Bay Street / William Henry Street;
- Cowper Street / Wentworth Park Road;
- Cowper Street / Wentworth Street;
- Bay Street / Wentworth Street;

The intersection counts used in the traffic demands estimation and turning counts validation processes are provided in Attachment A.

3. NETWORK CODING

3.1 LINK CATEGORIES AND SPEEDS

The link categories used in the base model coding are taken from RMS's standard category file. Link categories have been created for links with a higher number of lanes than those included in RMS's standard file.

All roads within the study area are in a 50km/h speed zone.

3.2 ZONE SYSTEM

The zone system used for the base model is detailed in Figure 3.2 below. Zone 10 was added to control the queuing behaviour observed as vehicles approach Fig Street to access the Sydney CBD and Sydney Harbour Bridge.

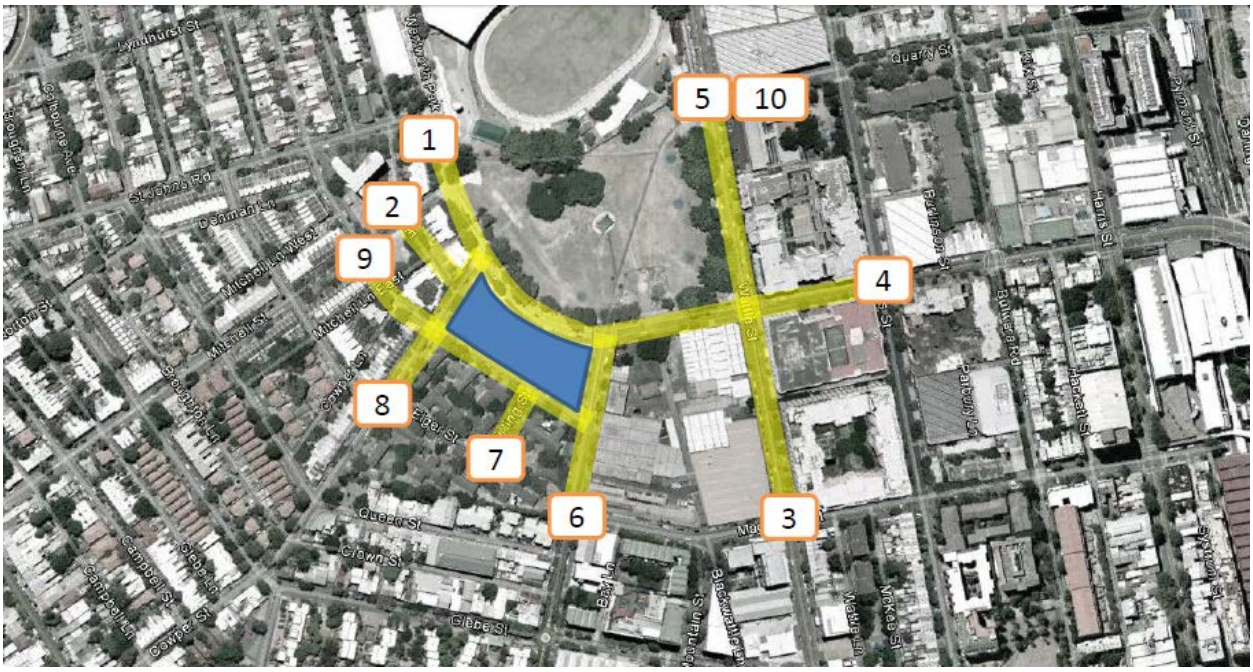


Figure 3.1: Zone System

3.3 TRAFFIC SIGNALS AND KEY ASSUMPTIONS

Traffic signal timing was based on on-site observation on 30 August 2012. The two traffic signals in the model were found to be in co-ordination east-west along William Henry Street with the A phase at Bay Street ending some 8 seconds before the A Phase on Wattle Street begins.

Due to the high pedestrian activity it was assumed that pedestrians would delay turning vehicles at all crossings and that the full pedestrian protection would be called every cycle on applicable phases. The delay caused by pedestrian crossings was coded as a 'dummy' phase that represents the start of a phase. At the T-intersection at Bay Street an all red phase was coded to represent the pedestrian protection of the crossings parallel to Bay Street.

3.4 BUS ROUTES AND STOPS

There were no bus routes within the study area.

4. TRAFFIC DEMANDS AND ASSIGNMENT METHODOLOGIES

4.1 PATTERN MATRIX AND DEVELOPMENT

As the model is relatively small with minimal route choice, Paramics Estimator was not required to be used in the development of the demand matrix. The demand matrix was developed using the count data and assumptions for the expected distribution of vehicles within the network, considering the relative volume of entering and exiting traffic at each location. An iterative process was used to check that the demands, when assigned to the network and represented as turning volumes at intersections, were appropriately validated to the intersection count volumes.

4.2 "WARM-UP" AND "COOL-DOWN" PERIODS

The model has been developed for an 8-9am and 5-6pm peak hour period including a 1 hour warm up and 1 hour cool down period before and after the peak hour. The warm up and cool down demands are 90% of the peak hour demands.

4.3 DEMAND PROFILES AND VEHICLE CATEGORIES

The intersection count data was used to derive a profile in the morning and afternoon peaks based on the 15minute counts. Individual profiles were applied to Bay Street, Wattle Street, Wentworth Park Road and William Henry Street.

The classified traffic counts were also used to refine the standard vehicles files. The counts showed very few articulated vehicles and lower number of heavy vehicles than in the standard file. The vehicle mix was therefore adjusted to match the data collected on site.

4.4 TRAFFIC ASSIGNMENT METHOD

As the model is simplistic with minimal route choice available, an "all-or-nothing" traffic assignment methodology has been used.

5. MODEL CALIBRATION AND VALIDATION

5.1 CALIBRATION AND VALIDATION PROCESSES

The base model validation process involved comparisons between the following observed and modelled attributes:

- traffic volume turning movement data;
- queue lengths; and
- travel time.

The comparison between the modelled and observed traffic count data was undertaken using the commonly used GEH statistic, which measures the degree of divergence of the modelled value from the observed value whilst accounting for the relative scale of each movement volume (i.e. the higher volume movements are more important to match than the lower volume movements). GEH results less than 5 indicated acceptable comparisons between observed and modelled counts. GEH statistics were used to assist in validating traffic volumes for each of the RMS seed value model runs.

The models were then validated to queue lengths and travel times. Comparing the modelled travel times to the travel time surveys and the queuing behaviour to the observed queuing behaviour.

5.2 MODEL ROBUSTNESS

In accordance with RMS modelling guidelines, the base models were run with five different seed values to demonstrate the robustness of the model under slight variations of vehicle release rates. More specifically, the seed values used were:

- Seed = 560;
- Seed = 28;
- Seed = 7771;
- Seed = 86524; and
- Seed = 2849.

5.3 TRAFFIC VOLUMES AND GEH STATISTIC

To compare the modelled traffic volumes to observed volumes the GEH statistic is typically used. The formula for GEH is shown below where M is the modelled traffic volume and C is the observed traffic volume. As the modelled value approaches the observed volume the GEH becomes smaller.

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

The advantage of GEH is that it can deal with a range of traffic volumes typically observed on a road network that a simple percentage may skew. For example an observed count of 100 vehicles could be different by 50% increasing the total by 50 vehicles. This may not be as critical as a difference of 50% on an observed count of 1000 vehicles which would be an increase of 500 vehicles.

RMS has adopted the UK's Design Manual for Roads and Bridges (DMRB) Volume 12 method; which specifies that 85% of the modelled counts should have a GEH of less than 5 and no counts should be greater than 10.

The comparison of the modelled to the observed traffic counts for the AM and PM peak models is indicated in Tables 5.1 and 5.2. This is based on 35 observations. More detailed GEH tables are attached in Attachment B.

Table 5.1 AM Peak (8-9am) GEH Statistic

Seed	<2		<5		<10		>10	
560	32	91%	35	100%	35	100%	0	0%
28	29	83%	35	100%	35	100%	0	0%
2849	29	83%	35	100%	35	100%	0	0%
86524	30	86%	35	100%	35	100%	0	0%
7771	32	91%	35	100%	35	100%	0	0%

In the AM Peak (see Table 5.1) the all turn counts modelled had a GEH of less than 5 indicating an excellent correlation between modelled and observed traffic counts.

Table 5.2 PM Peak (5-6pm) GEH Statistic

Seed	<2		<5		<10		>10	
560	32	91%	35	100%	35	100%	0	0%
28	32	91%	35	100%	35	100%	0	0%
2849	28	80%	35	100%	35	100%	0	0%
86524	29	83%	35	100%	35	100%	0	0%
7771	34	97%	35	100%	35	100%	0	0%

In the PM Peak (see Table 5.1) the all turn counts modelled had a GEH of less than 5 as well indicating an excellent correlation between modelled and observed traffic counts in the PM Peak.

5.4 QUEUE LENGTHS

5.4.1 AM Peak

Queue lengths were observed on site and the patterns were replicated in the model (see Figure 5.1)

William Henry Street - eastbound the maximum queue often extended back from Wattle Street nearly to Bay Street. This pattern was replicated in the model.

Wattle Street – northbound the queue mainly forms in the third lane which was replicated by adding zone 10 to represent traffic going to Fig Street and the queuing behaviour this causes.

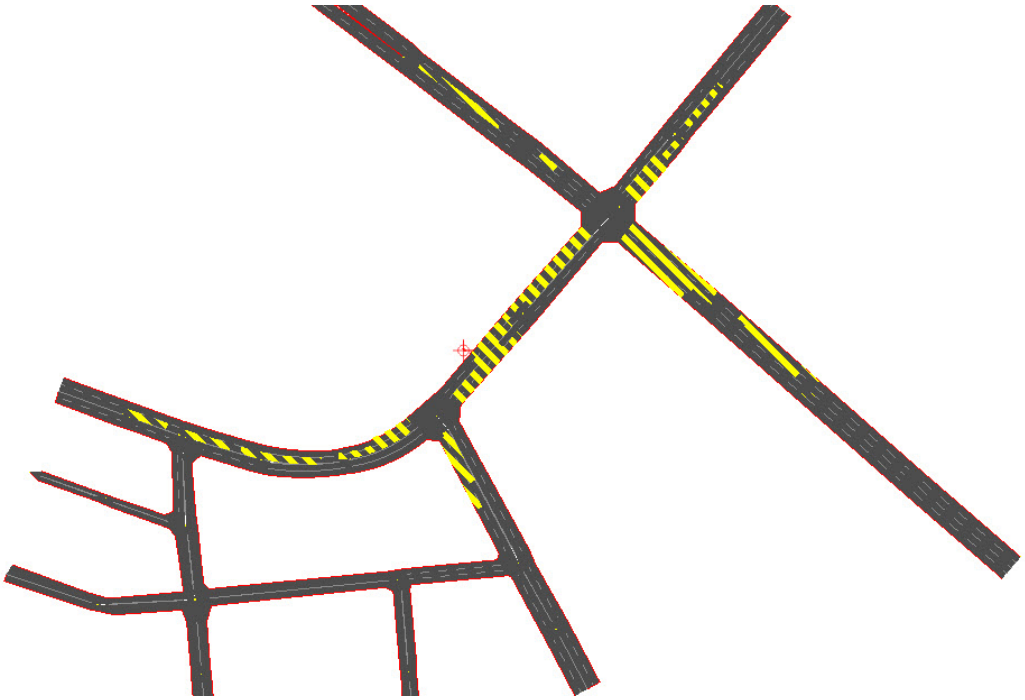


Figure 5.1 AM Peak 95th Percentile Queues Modelled

5.4.2 PM Peak

In the PM peak the queues are similar to the morning peak (see Figure 5.2). The eastbound queues on William Henry Street are generally less, while the queues northbound on Wattle Street are generally longer. The models generally show a good correlation to the queues observed. On Bay Street the observed queues were longer than in the AM Peak, extending past Wentworth Street.

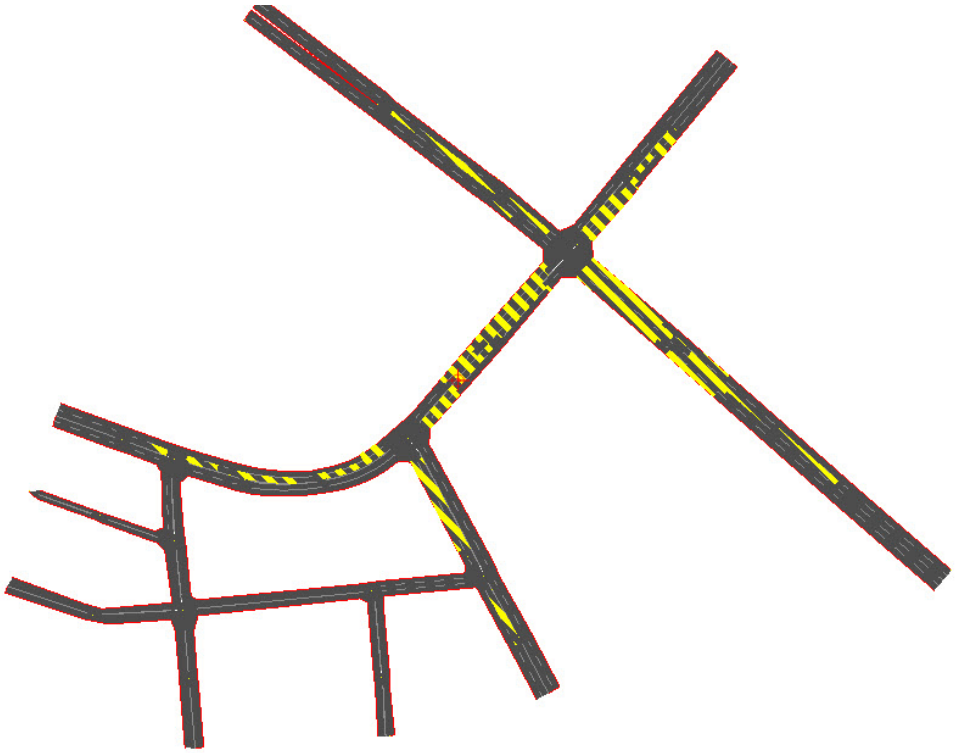


Figure 5.2 PM Peak 95th Percentile Queues Modelled

5.5 TRAVEL TIMES

Travel time surveys were undertaken at the same time as the traffic counts. The survey route was along William Henry Street and Wentworth Park Road between Cowper Street and Wattle Street.

The results of the traffic surveys have been compared to the modelled travel times (see Table 5.3 and Table 5.4). In both peaks the model showed a strong correlation between the observed travel times with differences of less than 5 seconds for all observations.

Table 5.3 AM Peak Travel Time Comparison

Direction		Average	Lower Quartile	Upper Quartile
Eastbound	Observed	1:19	0:28	2:07
	Modelled	1:15	0:43	1:45
Westbound	Observed	0:38	0:25	0:31
	Modelled	0:34	0:19	0:53

Table 5.4 PM Peak Travel Time Comparison

Direction		Average	Lower Quartile	Upper Quartile
Eastbound	Observed	1:18	0:40	1:50
	Modelled	1:20	0:56	1:40
Westbound	Observed	0:33	0:26	0:35
	Modelled	0:35	0:20	0:54

5.6 MODEL CALIBRATION DECLARATION

The Paramics model for the AM and PM peak hour period has been validated and calibrated to meet the requirements as per the RMS's Microsimulation Modelling Manual.

ATTACHMENT A

INTERSECTION VOLUMES

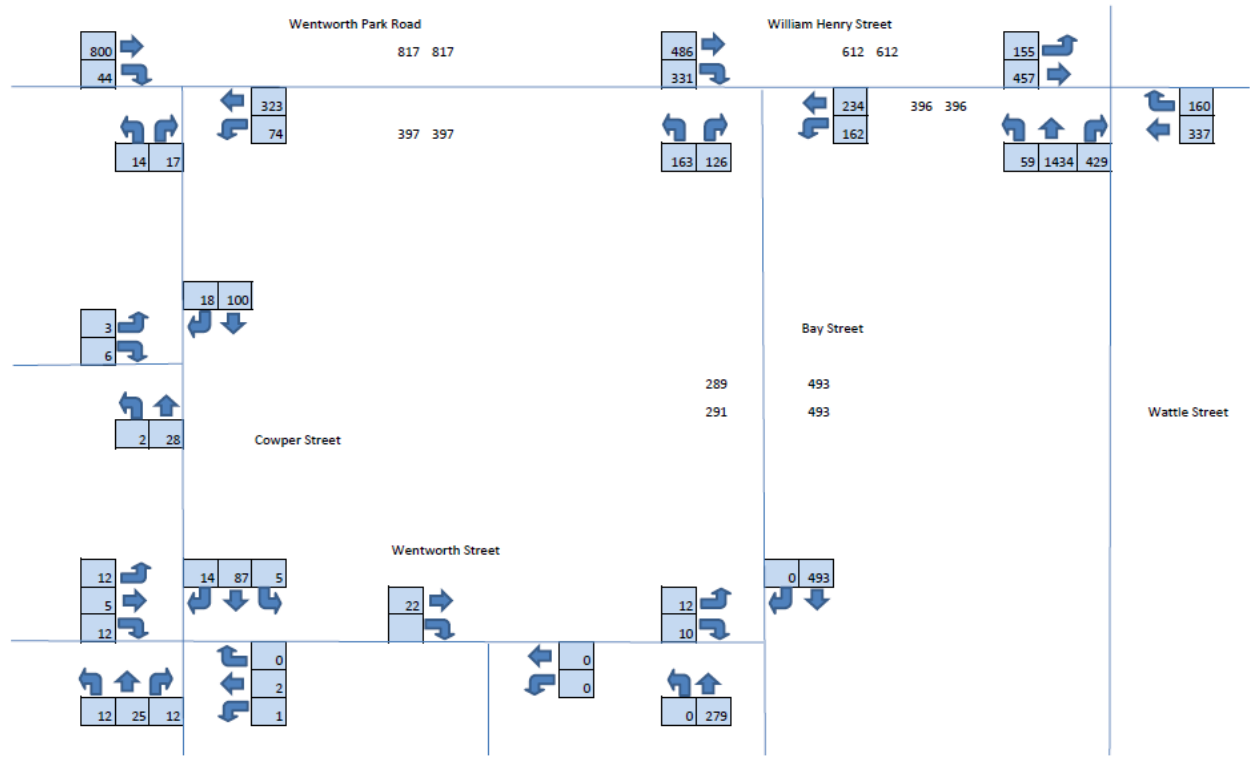


Figure A.1 AM PEAK – 8:00am – 9:00am

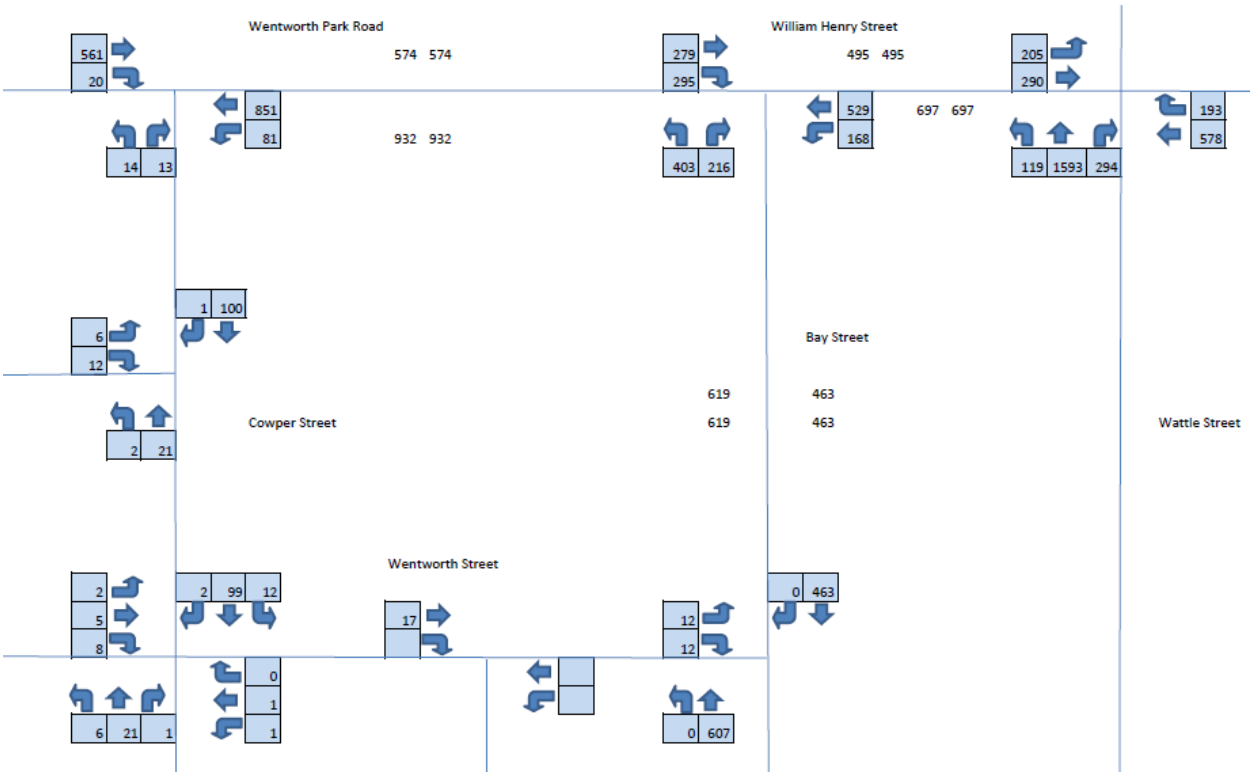


Figure A.2 PM PEAK 5:00pm – 6:00pm

ATTACHMENT B

GEH CALIBRATION TABLE

TABLE B.1 AM Peak GEH Table

Intersection	Approach	Turn	Observed	Modelled 560		
			Volume	Volume	Difference	GEH
Wattle St / William Henry St	South	Left	59	45	14	1.94
Wattle St / William Henry St	South	Through	1434	1421	13	0.34
Wattle St / William Henry St	South	Right	429	425	4	0.19
Wattle St / William Henry St	East	Through	337	363	-26	1.39
Wattle St / William Henry St	East	Right	160	181	-21	1.61
Wattle St / William Henry St	West	Left	155	151	4	0.32
Wattle St / William Henry St	West	Through	457	484	-27	1.24
William Henry St / Bay St	East	Left	162	188	-26	1.97
William Henry St / Bay St	East	Through	234	222	12	0.79
William Henry St / Bay St	South	Left	163	163	0	0
William Henry St / Bay St	South	Right	126	134	-8	0.7
William Henry St / Bay St	West	Through	486	507	-21	0.94
William Henry St / Bay St	West	Right	331	340	-9	0.49
Wentworth Park Rd / Cowper St	East	Left	74	72	2	0.23
Wentworth Park Rd / Cowper St	East	Through	323	313	10	0.56
Wentworth Park Rd / Cowper St	South	Left	14	20	-6	1.46
Wentworth Park Rd / Cowper St	South	Right	17	18	-1	0.24
Wentworth Park Rd / Cowper St	West	Through	800	839	-39	1.36
Wentworth Park Rd / Cowper St	West	Right	44	31	13	2.12
Cowper St / Wentworth St	South	Left	12	11	1	0.29
Cowper St / Wentworth St	South	Through	25	17	8	1.75
Cowper St / Wentworth St	South	Right	12	12	0	0
Cowper St / Wentworth St	East	Left	1	0	1	1.41
Cowper St / Wentworth St	East	Through	2	0	2	2
Cowper St / Wentworth St	East	Right	0	0	0	0
Cowper St / Wentworth St	West	Left	12	16	-4	1.07
Cowper St / Wentworth St	West	Through	5	0	5	3.16
Cowper St / Wentworth St	West	Right	12	9	3	0.93
Cowper St / Wentworth St	North	Left	5	3	2	1
Cowper St / Wentworth St	North	Through	87	83	4	0.43
Cowper St / Wentworth St	North	Right	14	17	-3	0.76
Bay St / Wentworth St	South	Through	279	282	-3	0.18
Bay St / Wentworth St	West	Left	12	14	-2	0.55
Bay St / Wentworth St	West	Right	10	13	-3	0.88
Bay St / Wentworth St	North	Through	493	528	-35	1.55

Table B.2 PM Peak GEH Table

Intersection	Approach	Turn	Observed	Modelled 560		
			Volume	Volume	Difference	GEH
Wattle St / William Henry St	South	Left	59	45	14	1.94
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Cowper St / Wentworth St	West	Left	12	16	-4	1.07
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Bay St / Wentworth St	South	Through	279	282	-3	0.18
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Bay St / Wentworth St	West	Right	10	13	-3	0.88
Bay St / Wentworth St	North	Through	493	528	-35	1.55

Appendix 4:
Affordable Housing Study

duane LOCATION

87 Bay Street, Glebe

Affordable Housing Study

Prepared for Chase Property Investments Pty Ltd

November 2011

TABLE OF CONTENTS

INTRODUCTION

This report presents an independent assessment of the level of demand and need for affordable housing at 87 Bay Street in Glebe. Glebe is an inner western suburb of Sydney located within the City of Sydney Local Government Area (LGA).

The report has been prepared in accordance with instructions received from Chase Property Investments Pty Ltd who own a site in Glebe and now propose that the site be developed for residential accommodation. As part of the development, a provision of affordable housing is planned to be provided.

The report is structured and presented in three sections as follows:

- **Section 1** reviews the regional and local context of the Glebe site and provides an overview of the planned development scheme.
- **Section 2** summarises the Glebe and Sydney West Statistical Local Area (SLA) resident and worker populations. An overview of the current and projected population levels over the period to 2026 and a review of the socio-economic profile of the surrounding population is also provided.
- **Section 3** summarises the definitions of affordable housing and outlines the key findings from this assessment of the potential for affordable housing to be provided at the Glebe site. This includes a review of the affordable housing contribution rates for development at other locations including Pyrmont/Ultimo, Green Square Urban Renewal Area, Willoughby, Harold Park and Barangaroo.

EXECUTIVE SUMMARY

The key points of this report, regarding the potential for affordable housing at 87 Bay Street in Glebe, include:

- The suburb of Glebe is situated 3 km by road to the south-west of the Sydney CBD. Glebe is a popular residential location given its proximity to the Sydney CBD, transport links to the broader Sydney region as well as its close location to higher education facilities.

- Chase Property Investments Pty Ltd own a site at 87 Bay Street in Glebe that is situated on the southern side of Wentworth Park Road, to the immediate west of Bay Street. The site is bounded by Wentworth Street to the south and Cowper Street to the west and totals 5,454 sq.m.

- Chase Property Investments Pty Ltd now propose a rezoning of the 87 Bay Street site to allow a mixed use development that would incorporate a provision of residential dwellings and a small retail/commercial component on the ground level.

- As part of the planned development, a provision of affordable housing to provide a public benefit is proposed. The provision of affordable housing at the site will further add to the capacity within the City of Sydney to meet the needs of all residents as well as providing the opportunity for lower income residents to live close to their place of work, particularly those employed in key industries such as health (nurses), education, police and ambulance and fire services.

- The ultimate number of affordable housing units to be provided at the site will depend on the Floor Space Ratio (FSR) that is applicable for the site. The site is currently permitted an FSR of 1.5 : 1 with Chase Property Investments proposing a maximum FSR of 4.5 : 1. A FSR larger than 1.5 : 1 for the site would result in additional affordable housing opportunities. At an FSR of 4.5 : 1, above the FSR of 1.5 : 1 for the site, some 10% of GFA would be provided for affordable housing units, well above the contribution rate of development in other areas of the City of Sydney.

- The socio-economic profile of the Glebe population reflects an inner city population comprising students and professionals who need to live within close proximity of the CBD. Although the Glebe population is generally an affluent population, there is a significant proportion of lower income households, with 59.3% defined as being low or moderate income households. This would indicate demand for affordable housing opportunities to be provided.

- Smaller household sizes are more prevalent in this part of Sydney. More than 53% of households in Glebe comprise a single person or couples without children. For medium and high density developments in the City of Sydney, one bed and two bed units comprise 67% of the total dwelling stock, well above the Sydney Metropolitan average of around 16%. There is a clear preference for smaller units within the inner suburbs of Sydney.

- Data sourced from PriceFinder shows that the median sale price in Glebe was around $300,000 in 1996 and has increased by 227% to $975,000, representing an average annual increase of 16% over the period. The significant increase in property prices and the income levels of the population combine to generate a significant need for affordable housing.

- There is a significant focus on increasing housing affordability within the City of Sydney as a result of the housing affordability crisis. A mix of housing to ensure all people across various ethnic backgrounds, employment and income levels can be accommodated within the inner city areas of Sydney is paramount to the success of a vibrant and successful city.

- Research undertaken for the Sustainable Sydney 2030 identified social housing and affordable housing as a key future area of growth. Currently, this type of housing accounts for less than 1% of all dwellings with a target of 7.5% of all dwellings likely to result in greater affordability.

- The proposed provision of affordable housing to be provided as part of the 87 Bay Street Glebe project will be higher than the contribution rate for development across a number of Sydney areas. At a FSR of 4.5 : 1, above the FSR of 1.5 : 1 for the site,

the GFA of affordable housing units at the Glebe site will be around 10%, well above Pyrmont (0.8%), Harold Park (3.8%), Green Square Urban Renewal Area (3%) and Willoughby Council (4%).

- Overall, it is our opinion that a provision of affordable housing would be suitable for the 87 Bay Street site in Glebe. The proposed site fulfills a number of characteristics for affordable housing and is to have future affordable housing developments to the immediate south and east. Reflecting the socio-economic profile of the Glebe and surrounding population, smaller sized studio and one bedroom units would be demanded by the population.

1 SITE LOCATION AND BACKGROUND

This section reviews the regional and local context of the proposed Glebe site and provides an overview of the planned development.

1.1 Regional Context

i. The City of Sydney Local Government Area (LGA) encompasses approximately 26.72 sq.km including the Sydney Central Business District (CBD) and the inner eastern, southern and western suburbs.

ii. A total of 32 suburbs make up the City of Sydney LGA, namely:

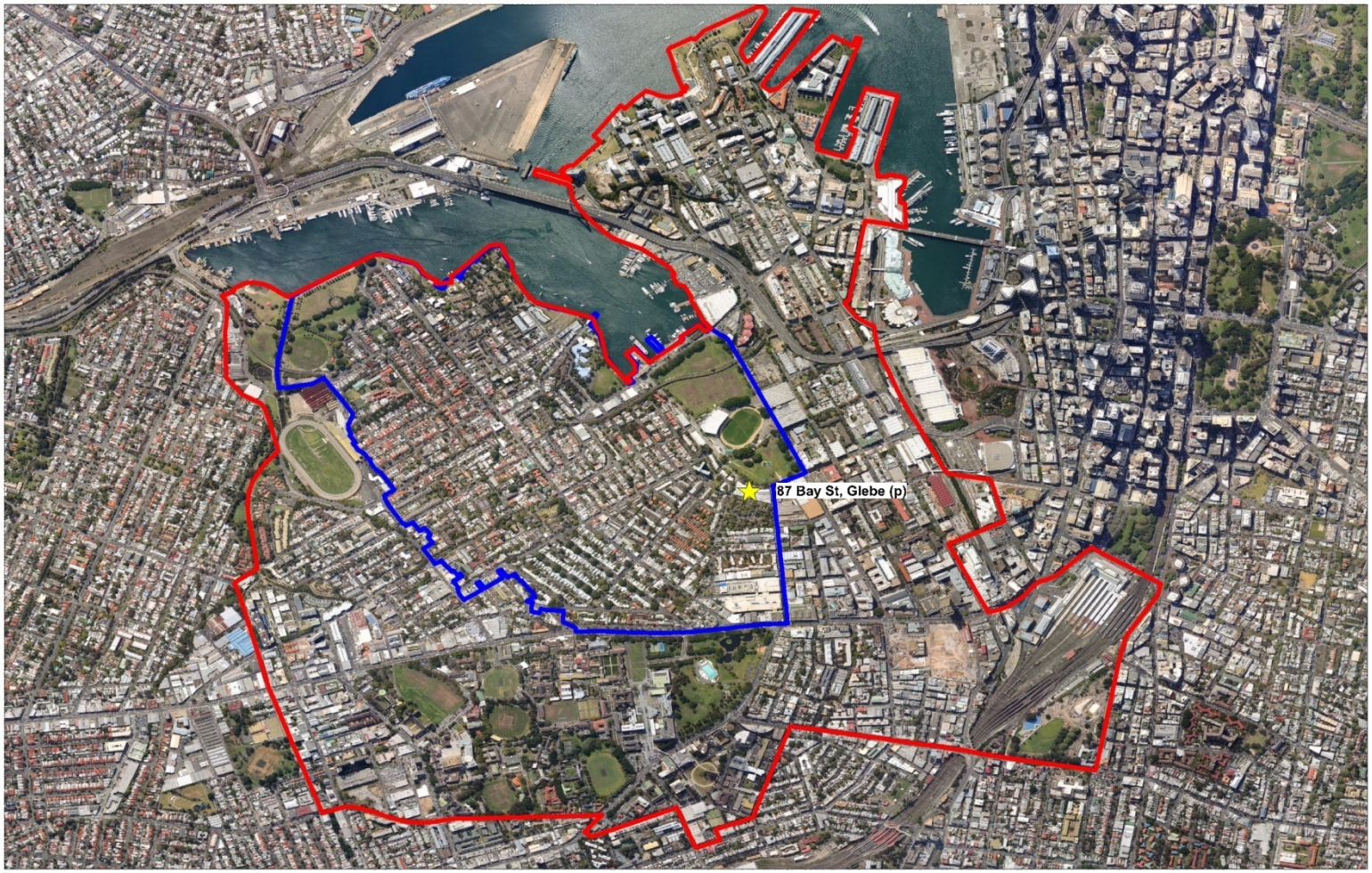
- Alexandria
- Annandale
- Barangaroo
- Beaconsfield
- Camperdown
- Centennial Park
- Chippendale
- Darlinghurst
- Darlington
- Dawes Point
- Elizabeth Bay
- Erskineville
- Eveleigh
- Forest Lodge
- Glebe
- Haymarket
- Millers Point
- Moore Park
- Newtown
- Paddington
- Potts Point
- Pyrmont
- Redfern
- Rosebery
- Rushcutters Bay
- Surry Hills
- Sydney CBD
- The Rocks
- Ultimo
- Waterloo
- Zetland
- Woolloomooloo

iii. The suburb of Glebe is situated 3 km by road to the south-west of the Sydney CBD. Glebe is bounded to the north by Blackwattle Bay, to the east by Ultimo, to the south by Parramatta Road and to the west by Annandale and Forest Lodge (refer Map 1.1).

iv. Glebe is an established residential area with some older industrial/commercial properties also provided. Glebe is a popular location given its proximity to the Sydney CBD, transport links to the broader Sydney region as well as its close location to higher education facilities.

v. Glebe is located within the Sydney – West Statistical Local Area (SLA) which incorporates 5.69 sq.km (refer Map 1.1). This is defined as the broader relevant area to be considered for an assessment of affordable housing in Glebe as undertaken in the following section of this report.

MAP 1.1 – 87 BAY STREET GLEBE



Map produced by Duane Location IQ using MapInfo Pro Australia Pty Ltd and related data sets. Photo map by NearMap.com.

1.2 Local Context

i. Chase Property Investments Pty Ltd own a site at 87 Bay Street in Glebe that is situated on the southern side of Wentworth Park Road to the immediate west of Bay Street. The site is bounded by Wentworth Street to the south and Cowper Street to the west.

ii. The site totals 5,454 sq.m and currently accommodates older style low density industrial and commercial uses. Access to the property is provided predominantly via Bay Street and Wentworth Park Road.

iii. Map 1.2 illustrates the location of the 87 Bay Street site in Glebe, with key points to note including the following:

- Wentworth Park is provided to the immediate north of the site. This park incorporates the Wentworth Park Greyhound Racing Track and a large public open space.
- To the immediate south of the site is the New South Wales Department of Housing site that currently includes a provision of social housing units. This site is approved for redevelopment to include new social housing opportunities as well as affordable and private housing.
- To the east of Bay Street is the Sydney City Council Depot. This site was previously coupled with the New South Wales Department of Housing site for a joint development, however, due to a number of issues that will need to be resolved including flooding and the current site usage, the site is now to be considered for housing as part of a separate future development.
- The Broadway Shopping Centre is located at the southern end of Bay Street, less than 500 m to the south of the site.
- A range of higher education facilities are provided to the south-east and south-west of the site, namely UTS and TAFE New South Wales and The University of Sydney.

- The Prince Alfred Hospital is also to the south-west of the site adjoining The University of Sydney.
- The Blackwattle Bay foreshore is located around 500 m to the north of the site.

iv. In addition to being easily accessible via private transport, the site is also close to public transport.

v. Parramatta Road is some 400 m to the south of the site, with a number of bus services travelling along Parramatta Road in both directions on a regular basis (refer Figure 1.1). Buses also travel routes that run along Glebe Point Road, which is approximately 350 metres to the south-west of the site, including bus routes 370, 432, 433, 434 and 470.

vi. The metro light rail stations are also within less than 1 km of the site. Travel time between Glebe station and Central station is in the order of 20 minutes (refer Figure 1.2).

vii. Heavy railway stations are provided at Central and Redfern. Central station would be the main station used by Glebe residents and is situated around 1.5 km to the south-east.

MAP 1.2 – 87 BAY STREET GLEBE LOCAL CONTEXT

FIGURE 1.1 – 87 BAY STREET GLEBE, PARRAMATTA ROAD BUS ROUTES

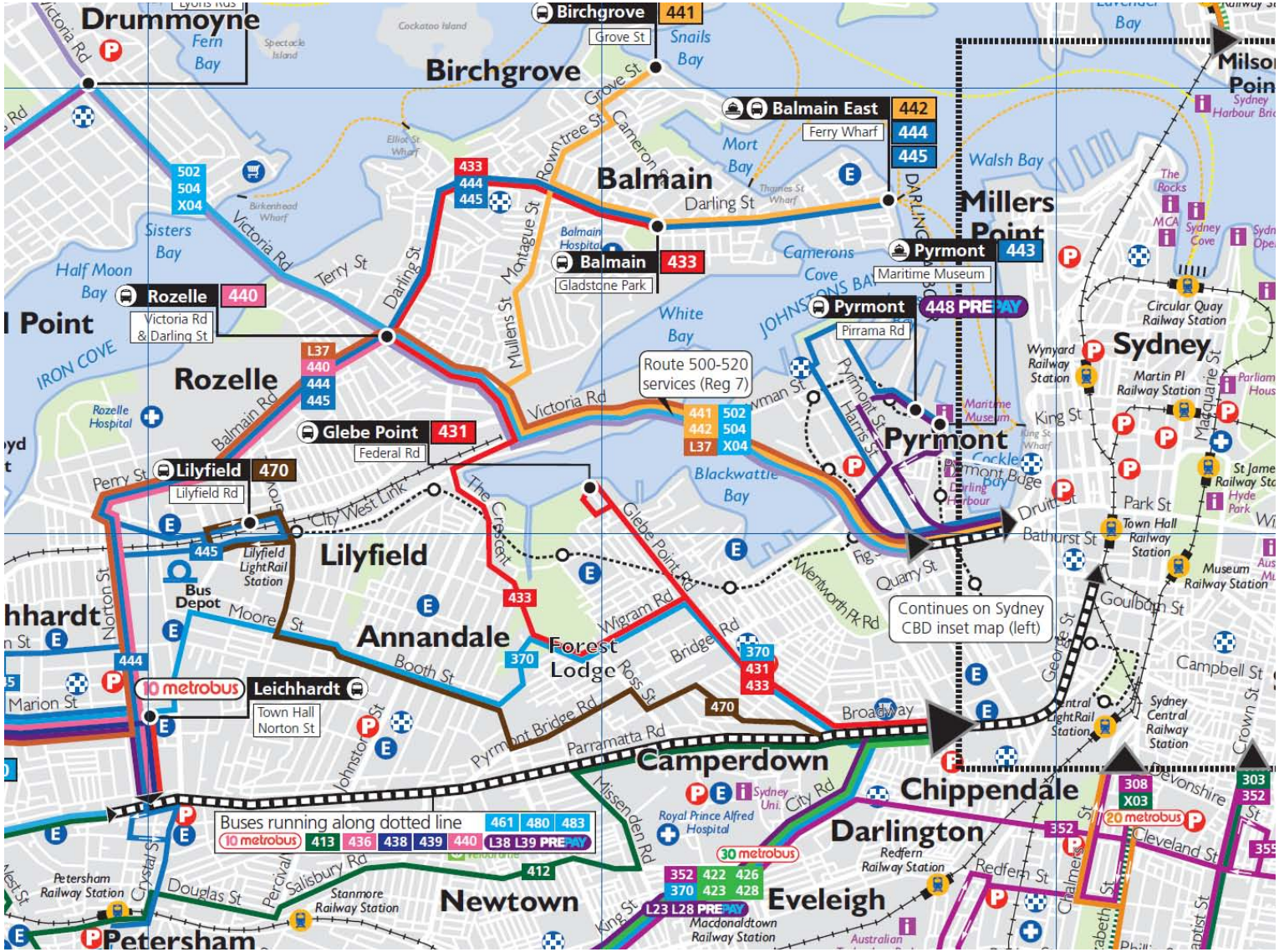
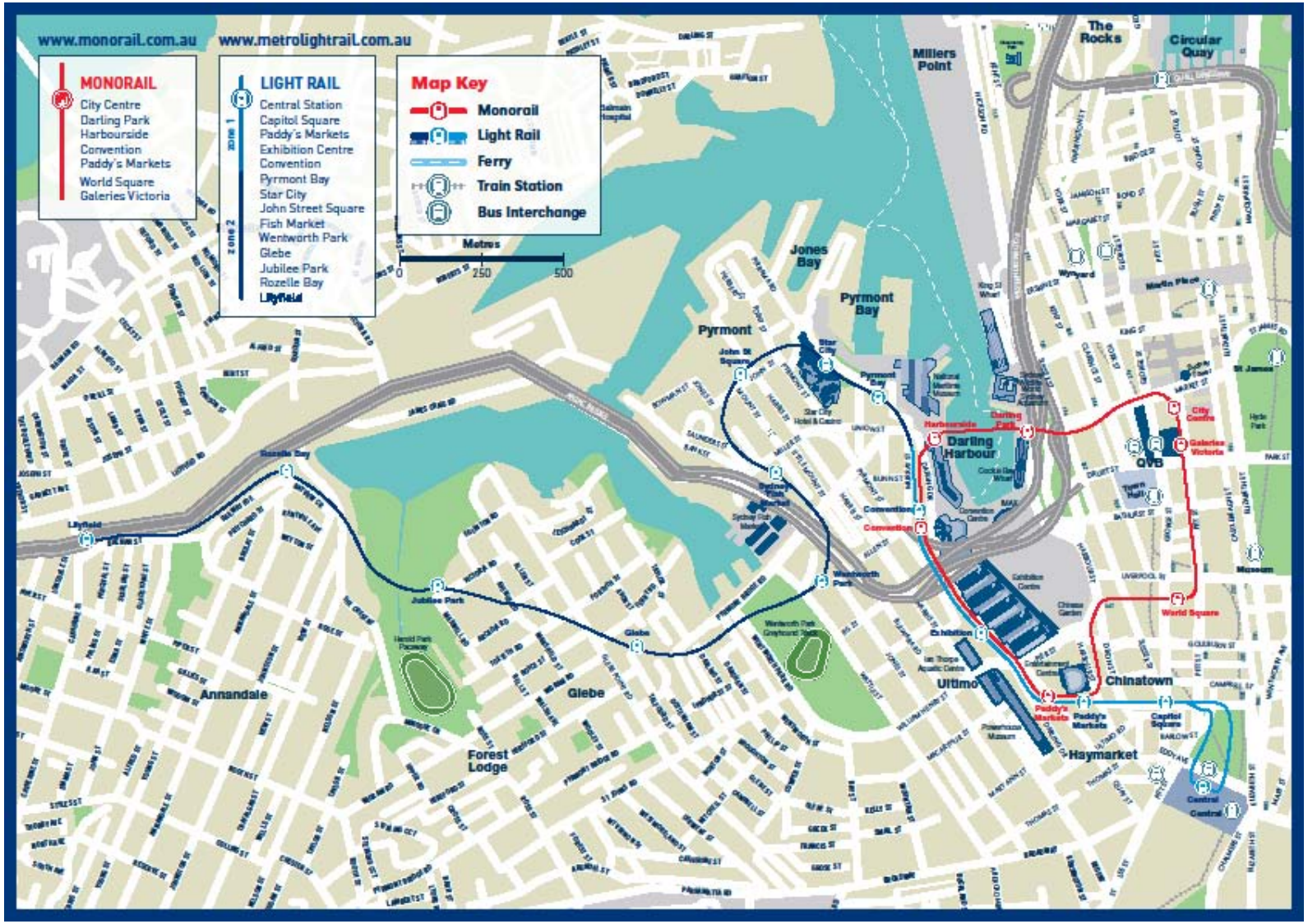


FIGURE 1.2 – 87 BAY STREET GLEBE, LIGHT RAIL ROUTE



1.3 Planned Development

i. Chase Property Investments Pty Ltd now propose a rezoning of the 87 Bay Street site to allow a mixed use development that would incorporate a provision of residential dwellings and a small retail/commercial component on the ground level.

ii. The rezoning of the site would be consistent with the surrounding uses in the area, including the boundaries on all sides of the property where residential dwellings are provided or planned with the exception of on the northern side of Wentworth Park Road, which is a public park.

iii. As part of the planned development, a provision of affordable housing to provide a public benefit is being considered. The provision of affordable housing at the site will further add to the capacity within the City of Sydney to meet the needs of all residents as well as providing the opportunity for lower income residents to live close to their place of work, particularly those employed in key industries such as health (nurses), education, police and ambulance and fire services.

iv. The ultimate number of affordable housing units to be provided at the site will depend on the Floor Space Ratio (FSR) that is applicable for the site. The site is currently permitted an FSR of 1.5 : 1 with Chase Property Investments proposing a maximum FSR of 4.5 : 1. An FSR of more than 1.5 : 1 for the site would result in additional affordable housing opportunities.

v. Table 1.1 provides a summary of the composition of affordable housing at the site under the assumptions of the applicable FSR. As shown, at an FSR of 4.5 : 1, above the FSR of 1.5 : 1 for the site, some 10% of GFA would be provided for affordable housing units, well above the contribution rate for development at other areas of the City of Sydney. The provision of affordable housing in other areas of the City of Sydney is reviewed in Section Three of this report.

vi. An FSR of 4.5 : 1, above the FSR of 1.5 : 1 for the site, would equate to 10% of GFA being provided to affordable housing. The planned composition and size of the units

at the site will result in around 14% of total units to be provided being for affordable housing. This is higher than the share of GFA.

vii. The majority of floorspace in the proposed development below FSR 1.5 : 1 will be used for commercial purposes.

viii. In total, a provision of some 182 residential units is proposed on the Chase Property Investments Pty Ltd site. In addition, a provision of retail/commercial floorspace is also planned on the ground floor to serve the convenience needs of the local population.

TABLE 1.1 – PROPOSED COMPOSITION OF AFFORDABLE HOSUING UNITS

Total Units for FSR Range					
at 2.5%	61				
at 3.5%	122				
at 4.5%	182				
Site Area	5,427				
Total FSR	24,422				
FSR Above 1.5:1	16,281				
FSR Range		**1.5 - 2.5**	**2.5 - 3.5**	**3.5 - 4.5**	
Affordable Housing % Offered For FSR Range		3.0%	7.0%	20.0%	
Total Additional FSR above 1.5:1 (sq.m)		5,247	5,427	5,427	
Affordable Housing % Of Total		0.7%	1.6%	4.4%	
GFA Contributed per FSR Range (sq.m)		**162.81**	**379.89**	**1,085.40**	
Gross Floor Area Cumulative		***162.81***	***542.70***	***1,628.10***	
% of FSR Offered		1.0%	3.3%	10.0%	
Affordable Housing Units		**1.5 - 2.5**	**2.5 - 3.5**	**3.5 - 4.5**	**Total**
Studio		2	2	11	15
One Bedroom		1	3	2	6
Two Bedroom		0	1	3	4
Total Affordable Housing Units		**3**	**6**	**16**	**25**
% of Total Unit Numbers Offered if only FSR range achieved		***4.9%***	***4.9%***	***8.8%***	***13.7%***
% of Total Unit Numbers Offered if max achieved		***1.6%***	***3.3%***	***8.7%***	***13.7%***

Source: M&T Management

ix. As mentioned previously, the City of Sydney has recently approved a large affordable housing based development scheme to the immediate south of the proposed 87 Bay Street site in Glebe. In total, some 153 new public housing dwellings are proposed in addition to 83 affordable housing units and 250 privately owned dwellings. Around

17% of dwellings (and GFA) in this project will be for affordable housing as reviewed in Section 3. The mix of affordable housing units will be studios (10%), one bed units (45%), two bed units (35%) and three bed units (105).

x. To the east of Bay Street is the Sydney City Council Depot. This site was previously coupled with the New South Wales Department of Housing site for a joint development, however due to a number of issues that will need to be resolved including flooding and the current site usage, the site is now to be considered for housing as part of a separate future development.

xi. Map 1.3 illustrates the location of the 87 Bay Street site relative to the Housing New South Wales and the City of Sydney sites. The proposed Chase Property Investments Pty Ltd development would be consistent with future surrounding land uses and would further increase the provision of affordable housing available within the inner city area.

MAP 1.3 – 87 BAY STREET GLEBE SURROUNDING SITE CONTEXT

Map produced by Duane Location IQ using MapInfo Pro Australia Pty Ltd and related data sets. Photo map by NearMap.com.

2 RESIDENT AND WORKER POPULATION TRENDS

This section of the report provides a review of the population and employment trends within the Sydney – West Statistical Local Area (SLA) and the suburb of Glebe. This information is sourced from the Australian Bureau of Statistics (ABS). In general, the findings in this section show the following:

- The socio-economic profile of the Glebe population reflects an inner city population comprising students and professionals who need to live within close proximity of the CBD. Some 42% of the Glebe population is aged 20 – 40 years which is higher than the Sydney average of around 30%.
- The average household size is substantially smaller than the Sydney metropolitan benchmarks at 2 persons as compared with 2.7 persons. Smaller household sizes are more prevalent in this part of Sydney. More than 53% of households in Glebe comprise a single person or couples without children.
- Although the Glebe population is generally an affluent population, there is a significant proportion of lower income households, with 59.3% defined as being low or moderate income households (i.e. household with a gross income that is less than 120 per cent of the median household income).
- The median residential property sale price for Glebe was around $300,000 in 1996 and has increased by 227% to $975,000 in 2011, representing an average annual increase of 16% over the period.
- The significant increase in property prices and the income levels of the population combine to generate a significant need for affordable housing.

2.1 Resident Population Trends

i. Table 2.1 summarises the current and projected population levels for the suburb of Glebe and the Sydney – West SLA over the period from 2006 – 2026. This information is based on the following:

- The 2006 Census of Population and Housing undertaken by the Australian Bureau of Statistics (ABS).
- Population projections prepared by the New South Wales Department of Planning 2010 Release Version 1.0.
- New dwelling approvals sourced from the ABS over the period from 2007/08 to 2010/11.
- The Residential Monitor prepared by the City of Sydney.
- Investigations by this office into new residential developments in the region.

ii. The suburb of Glebe population is currently estimated at 11,470 with 43,360 in the Sydney –West SLA. The Glebe population is projected to increase by 150 persons each year, or around 1.2%. The Sydney–West SLA population is projected to increase at an average of 560 persons each year over the period to 2026.

iii. The Draft Sydney City Subregional Strategy targets 55,000 additional residential dwellings over the period to 2031, representing a 15% increase in the current dwelling stock.

TABLE 2.1 – GLEBE AND SYDNEY – WEST SLA POPULATION, 2006 - 2026

Locality	Estimated Resident Population 2006	2010	2013	Forecast Population 2016	2021	2026
• Glebe	11,270	11,470	11,620	12,520	13,270	13,770
• Sydney - West SLA	40,360	43,360	45,160	47,410	49,910	51,910
			Average Annual Change (No.)			
		2006-2010	2010-2013	2013-2016	2016-2021	2021-2026
• Glebe		50	50	300	150	100
• Sydney - West SLA		750	600	750	500	400
			Average Annual Change (%)			
		2006-2010	2010-2013	2013-2016	2016-2021	2021-2026
• Glebe		0.4%	0.4%	2.5%	1.2%	0.7%
• Sydney - West SLA		1.8%	1.4%	1.6%	1.0%	0.8%

**as at June*
Sources : ABS; City of Sydney; Planning NSW

2.2 Resident Population Socio-economic Profile

i. Table 2.2 reviews the socio-economic characteristics of the Glebe and Sydney – West SLA populations compared to the Sydney metropolitan benchmarks. This information is based on the 2006 Census of Population and Housing produced by the Australian Bureau of Statistics (ABS). The results of Census 2011 will be available in around mid-2012 at the earliest.

ii. Key points to note regarding the population of **Glebe** include:

- The Glebe population earn average income levels on a per capita and average household basis which are above the Sydney metropolitan benchmark but below the averages for the Sydney – West SLA as a whole.
- The average household size is substantially smaller than the Sydney metropolitan benchmarks at 2 persons as compared with 2.7 persons.
- The average age of the Glebe population (38.0 years) is older than the Sydney – West SLA and Sydney metropolitan benchmarks. Some 42% of the Glebe population is aged 20 – 40 years which is higher than the Sydney average of

around 30%. In the Sydney – West SLA, some 55% of the population are aged 20 – 40 years.

- Rental levels are well above the Sydney metropolitan benchmarks, with 66% of households in Glebe being rented.

- A review of the household structure of the Glebe population indicates a very high proportion of households consisting of couples without children and a lone person, similar to the profile for the Sydney – West SLA as a whole.

iii. The socio-economic profile of the Glebe population reflects an inner city population comprising a large number of students and professionals who need to live within close proximity of the CBD. The average household size is well below the Sydney average and some 42% of the Glebe population is aged 20 – 40 years. There is also an established, elderly population accommodated in the suburb.

iv. It is important to provide a range of housing opportunities for the population to meet the diverse housing needs, including a provision of affordable housing. More than 53% of households in Glebe comprise a single person or couples without children. There is a clear need and demand for smaller dwellings in this inner part of Sydney, namely studio and one bedroom units.

v. A review of the number of single person dwellings within the Sydney - West SLA over the Census period from 1996 to 2006 indicates that the percentage of the population accommodated within this type of dwelling structure decreased from almost 39% to 36.6%. This is still well above the Sydney metropolitan average of around 23%, slightly higher than the 1996 figure of 22%. In 2006, some 40% of households in the suburb of Alexandria consisted of a single person only. This would indicate a preference for studio and one bedroom units in the area.

vi. Figure 2.1 illustrates the share of dwelling type within the City of Sydney and the Sydney Metropolitan area as sourced from the City of Sydney Affordable Housing Research Paper – September 2008. As shown, for medium and high density

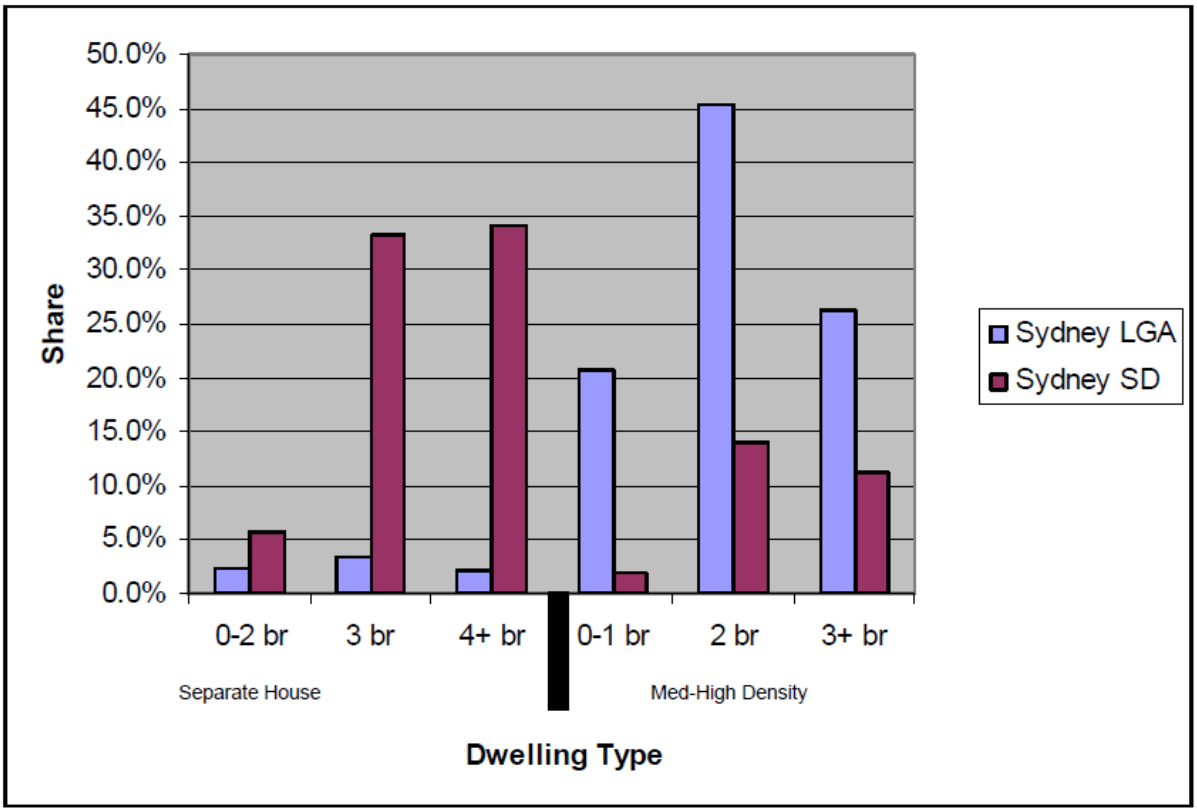
developments in the City of Sydney, one bed and two bed units comprise 67% of the total dwelling stock, well above the Sydney Metropolitan average of around 16%.

TABLE 2.2 – GLEBE AND SYDNEY – WEST SLA SOCIO-ECONOMIC PROFILE, 2006 CENSUS

Characteristics	Locality		Syd Metro Average
	Glebe	Sydney - West SLA	
Average Per Capita Income	$42,012	$44,717	$30,938
Per Capita Income Variation	35.8%	44.5%	n.a.
Average Household Income	$84,268	$90,340	$82,316
Household Income Variation	2.4%	9.7%	n.a.
Average Household Size	2.0	2.0	2.7
Age Distribution (% of Pop'n)			
Aged 0-14	9.0%	7.1%	18.2%
Aged 15-19	6.4%	6.1%	7.9%
Aged 20-29	23.1%	33.9%	14.6%
Aged 30-39	19.1%	21.8%	15.6%
Aged 40-49	13.3%	11.5%	14.7%
Aged 50-59	13.7%	9.9%	12.2%
Aged 60+	15.3%	9.8%	16.7%
Average Age	38.0	34.4	36.6
Housing Status (% of H'holds)			
Owner/Purchaser	34.1%	33.8%	67.5%
Renter	65.9%	66.2%	32.5%
Birthplace (% of Pop'n)			
Australian Born	65.5%	54.3%	65.6%
Overseas Born	34.5%	45.7%	34.4%
• Asia	11.2%	23.1%	13.0%
• Europe	13.3%	12.7%	11.6%
• Other	10.0%	10.0%	9.8%
Family Type (% of Pop'n)			
Couple with dep't children	23.2%	21.3%	47.9%
Couple with non-dep't child.	4.2%	3.6%	9.5%
Couple without children	28.7%	36.0%	19.7%
Single with dep't child.	11.4%	7.4%	8.5%
Single with non-dep't child.	4.8%	3.3%	3.7%
Other family	2.9%	4.1%	1.2%
Lone person	24.7%	24.4%	9.4%

Sources : ABS Census of Population and Housing 2006

FIGURE 2.1 – SHARE OF DWELLING TYPE, 2006 CENSUS



Note: Medium to High Density Dwellings includes semi-detached, row or terrace houses as well as flats, units and apartments

2.3 Resident Population Income Analysis

i. Based on the ABS 2006 Census results, Table 2.3 provides a summary of the weekly per capita and weekly household income levels for the Glebe, Sydney – West SLA and the Sydney metropolitan populations.

ii. As shown, the Glebe population earn higher median gross individual and household income levels compared with the Sydney metropolitan averages at $592 and $1,068 per week, respectively. This reflects the high number of people in the workforce at Glebe and the prevalence of young households.

iii. The New South Wales Government State Environmental Planning Policy (Affordable Rental Housing) 2009 defines a household as being very low incomes, low income or moderate income if the household has a gross income that is less than 120 per cent

of the median household income for the time being for the Sydney Statistical Division (according to the Australian Bureau of Statistics).

iv. Taking the above definition into account, as at 2006, 120% of the median household income for the Sydney Statistical Division was $1,385 per week (i.e. $1,154 per week multiplied by 120%). Some 59.3% of the Glebe households fall into this category (i.e. 2,404 households out of 4,056 households in Glebe).

v. Although the Glebe population is generally an affluent population, there is a significant proportion of lower income households, with 59.3% defined as being low or moderate income households. This would indicate demand for affordable housing opportunities to be provided.

vi. For the Sydney-West SLA, some 53.0% of households fall below the 120% of the median household income for the Sydney Statistical Division. Affordable housing needs to be provided for this population.

vii. As shown in Table 2.4, the proportion of households in higher income brackets has increased substantially in the past 10 years. Gross household incomes throughout Sydney-West SLA have increased by 60% over the ten year period, or an average of 6% per annum. This is likely to have resulted in significant upwards pressure on house prices and rent in the area. The proportion of households with a gross weekly income of more than $1,700 has increased from 8.3% in 1996 to 29.4% in 2006.

viii. Figure 2.2 illustrates the median sales price for residential dwellings in the suburb of Glebe over the period from 1996 to 2011. This data is sourced from PriceFinder. As shown, the median sale price was around $300,000 in 1996 and has increased by 227% to $975,000, representing an average annual increase of 16% over the period.

TABLE 2.3 – GROSS INDIVIDUAL AND GROSS HOUSEHOLD INCOMES, 2006 CENSUS

	Glebe	Sydney West SLA	Metro. Sydney
Gross Individual Income ($/Weekly)			
Negative/Nil income	6.7%	10.4%	9.6%
$1-$149	6.1%	5.6%	7.2%
$150-$249	15.0%	11.1%	13.3%
$250-$399	12.0%	9.7%	12.0%
$400-$599	10.5%	9.8%	13.3%
$600-$799	9.6%	9.9%	11.3%
$800-$999	8.4%	9.3%	9.0%
$1,000-$1,299	10.1%	10.8%	9.1%
$1,300-$1,599	6.6%	7.6%	5.7%
$1,600-$1,999	4.5%	5.5%	3.6%
$2,000 or more	10.4%	10.4%	5.9%
Median Gross Individual Income	**$592**	**$667**	**$518**
Gross Household Incomes ($/Weekly)			
Negative/Nil income	1.5%	4.2%	1.5%
$1-$149	2.2%	2.1%	1.6%
$150-$249	10.0%	6.3%	4.9%
$250-$349	8.5%	5.8%	6.4%
$350-$499	3.8%	2.4%	4.4%
$500-$649	8.2%	7.0%	9.4%
$650-$799	6.2%	5.6%	6.3%
$800-$999	6.3%	6.5%	7.1%
$1,000-$1,199	9.3%	9.4%	10.8%
$1,200-$1,399	3.2%	3.6%	5.6%
$1,400-$1,699	6.6%	7.8%	8.6%
$1,700-$1,999	6.0%	7.3%	7.4%
$2,000-$2,499	5.6%	7.1%	7.9%
$2,500 -$2,999	10.0%	11.8%	8.7%
$3,000 or more	12.5%	13.2%	9.3%
Median Gross Household Income	**$1,068**	**$1,237**	**$1,154**

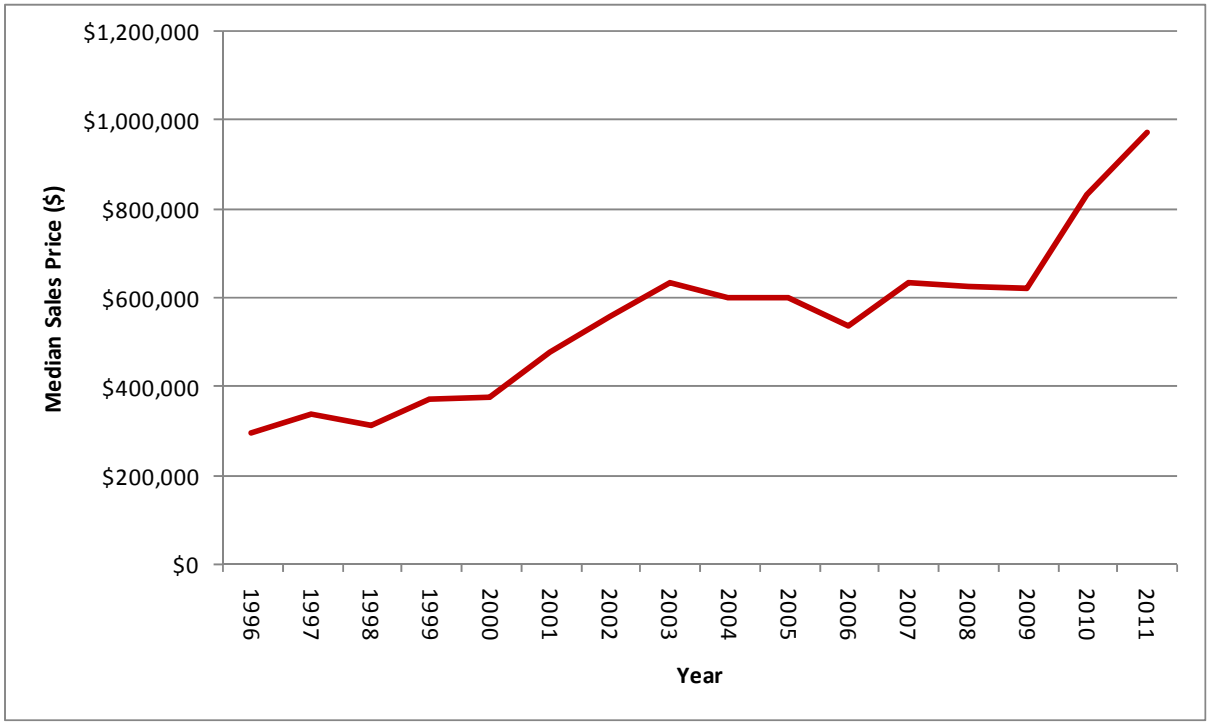
Source: ABS Cat. No. 2001.0

TABLE 2.4 – GROSS HOUSEHOLD INCOMES BY CENSUS YEAR

	Census Year		
	1996	2001	2006
Gross Household Incomes ($/Weekly)			
Negative/Nil income	2.6%	2.4%	4.6%
$1-$149	5.4%	0.7%	2.1%
$150-$249	14.8%	13.0%	7.0%
$250-$349	2.9%	4.6%	6.1%
$350-$499	12.9%	6.5%	2.7%
$500-$649	10.4%	5.0%	7.0%
$650-$799	8.1%	7.9%	5.4%
$800-$999	7.6%	7.5%	6.1%
$1,000-$1,199	8.0%	8.3%	8.8%
$1,200-$1,399	3.4%	3.4%	3.6%
$1,400-$1,699	5.8%	6.5%	6.6%
$1,700-$1,999	4.3%	9.2%	6.1%
$2,000-$2,499	2.8%	6.3%	6.6%
$2,500-$2,999	1.2%	4.5%	8.5%
$3,000 or more	1.0%	2.8%	8.0%
Median Gross Household Income	**$671**	**$1,039**	**$1,237**

Source: ABS Cat. No. 2001.0

FIGURE 2.2 – GLEBE RESIDENTIAL MEDIAN SALE PRICE, 1996 – 2011



2.4 Rent and Mortgage Repayment Analysis

i. Based on the results of the 2006 Census of Population and Housing undertaken by the ABS (i.e. data is for the year 2006), Table 2.5 provides a summary of the weekly rent for the suburb of Glebe compared with the Sydney – West SLA and Sydney metropolitan averages. Key points to note include:

   – Only 70.4% of the Glebe population pay less than $350 per week in rent compared to the Sydney metropolitan average of 77.2%.

   – Some 29.6% of the Glebe population pay more than $350 per week in rent which is significantly higher than the Sydney metropolitan average (22.8%).

ii. It is also important to note that the average household size in Glebe is smaller than the Sydney metropolitan average and so renters in the area are paying a lot more for less space.

iii. Table 2.6 details the change in the average weekly rent for the Sydney – West SLA over the period from 1996 – 2006. This data is not available at the Glebe suburb level. As shown, the median rent over this period has increased by around 65%, or an average of 6.5% per annum.

iv. The proportion of persons with a median rent less than $350 per week has decreased from 85.3% in 1996 to 52.3% in 2006 which has created significant housing affordability stress in the area.

v. A review of housing loan repayments (refer Table 2.7) shows that the median monthly housing loan repayment for Glebe is $2,178, some 0.5% higher than the comparable figure for the Sydney – West SLA and 21.0% higher than the figure for Sydney.

TABLE 2.5 – WEEKLY RENT BY LOCATION, 2006 CENSUS

Weekly Rent ($)	Glebe	Sydney West SLA	Metro. Sydney
$0-$49	2.9%	2.4%	3.2%
$50-$99	18.7%	10.3%	8.6%
$100-$139	8.7%	4.3%	5.7%
$140-$179	6.6%	3.8%	7.6%
$180-$224	10.7%	6.4%	16.0%
$225-$274	10.0%	8.3%	18.3%
$275-$349	12.9%	18.5%	17.8%
$350-$449	14.2%	24.1%	12.6%
$450-$549	6.5%	11.7%	5.0%
$550 and over	8.8%	10.3%	5.2%
Median Rent	**$230**	**$330**	**$250**

Source: ABS Cat. No. 2001.0

TABLE 2.6 – SYDNEY – WEST SLA WEEKLY RENT, 1996 - 2006 CENSUS

Weekly Rent ($)	Census Year 1996	2001	2006
$0-$49	14.1%	9.9%	2.4%
$50-$99	11.3%	8.6%	9.8%
$100-$139	8.4%	4.1%	4.1%
$140-$179	8.9%	5.1%	3.7%
$180-$224	10.9%	7.2%	6.2%
$225-$274	15.9%	8.2%	8.3%
$275-$349	15.9%	19.0%	17.8%
$350-$449	8.7%	19.9%	23.4%
$450-$549	2.1%	8.4%	11.2%
$550 and over	1.0%	5.6%	10.2%
Median Rent	**$200**	**$300**	**$330**

Source: ABS Cat. No. 2001.0

TABLE 2.7 – MONTHLY HOUSING LOAN REPAYMENT BY LOCATION, 2006 CENSUS

Monthly ($)	Glebe	Sydney West SLA	Metro. Sydney
$1-$249	1.1%	1.1%	1.7%
$250-$399	1.5%	0.9%	1.5%
$400-$549	1.7%	1.9%	3.1%
$550-$749	2.4%	2.0%	4.1%
$750-$949	4.4%	3.5%	5.8%
$950-$1,199	9.9%	6.5%	8.8%
$1,200-$1,399	5.5%	5.3%	8.4%
$1,400-$1,599	5.8%	6.4%	7.7%
$1,600-$1,999	9.3%	13.6%	15.2%
$2,000-$2,999	24.0%	30.0%	26.6%
$3,000 and over	34.3%	28.8%	17.0%
Median Repayment	**$2,178**	**$2,167**	**$1,800**

Source: ABS Cat. No. 2001.0

2.5 Worker Trends

i. Figure 2.3 illustrates the industry of employment for residents of the Sydney – West SLA and the Sydney metropolitan area based on information sourced from the 1996 - 2006 Census.

ii. As shown, residents are mainly employed within the professional, scientific and technical services; accommodation and food services; education and training and health care and social assistance industries. Around 42% of the Sydney – West SLA population is employed within these industries, compared with the Sydney metropolitan average of around 32%. Many of these industries are low paying white collar employment.

iii. Table 2.8 details the occupation of residents of the suburb of Glebe as compared to the Sydney – West SLA and the Sydney metropolitan area. This information is sourced from the 2006 Census. Key results include:

- 85.3% of the Glebe population are employed within white collar jobs which is similar to the Sydney – West SLA average and higher than the Sydney (71.2%) average.

- 12.7% of the Glebe population are employed within blue collar jobs less than half the Sydney (26.7%) average.
- Of the blue collar employers, the majority are technicians and trades people who operate small scale industrial facilities such as auto-repairs, painting etc and not large warehousing facilities.

iv. Table 2.9 confirms the decreasing trend in blue collar employment within the Sydney-West SLA and an increased number of persons employed in white collar jobs. Consequently, the need for industrial land in the Sydney-West SLA to provide blue collar jobs locally is becoming less important overtime with the need to provide a range of housing for white collar workers becoming more and more prevalent.

v. Taking the above into account, together with the increasing rental rates in the area, a provision of affordable housing is important to ensure a diverse range of persons can be accommodated within the area, particularly those in key workforce positions who earn lower income levels.

FIGURE 2.3 – SYDNEY – WEST SLA INDUSTRY OF EMPLOYMENT, 1996 – 2006

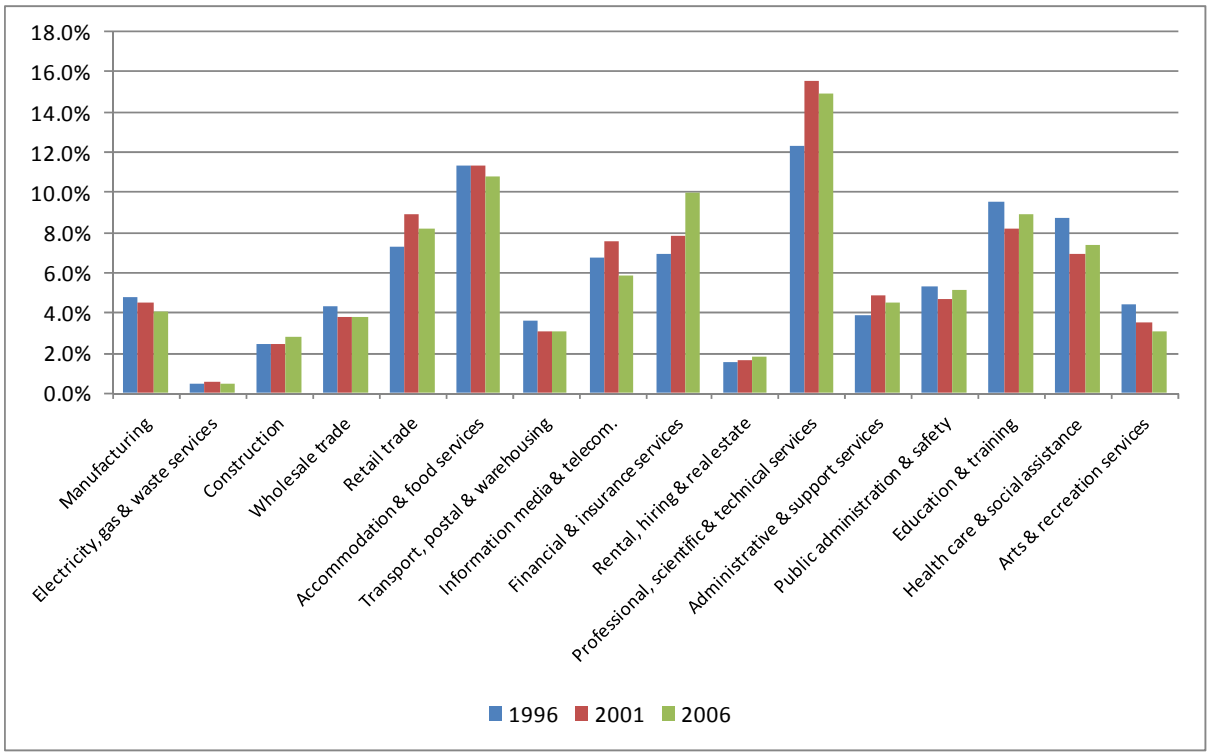


TABLE 2.8 – OCCUPATION BY LOCAL, 2006 CENSUS

Occupation	Glebe	Sydney West SLA	Metro. Sydney
White Collar			
Managers	14.4%	15.6%	13.2%
Professionals	39.5%	38.0%	23.8%
Community & Personal Service	8.1%	9.2%	8.0%
Clerical & Administrative	15.3%	14.7%	16.7%
Sales	8.1%	8.5%	9.5%
Total White Collar	**85.3%**	**86.1%**	**71.2%**
Blue Collar			
Technicians & Trades	6.5%	6.6%	12.7%
Machinery Operators	2.0%	1.6%	6.0%
Labourers	4.1%	3.9%	8.1%
Total Blue Collar	**12.7%**	**12.1%**	**26.7%**
n.a.	2.1%	1.9%	2.1%
Total	**100.0%**	**100.0%**	**100.0%**

Source: ABS Cat. No. 2001.0

TABLE 2.9 – SYDNEY – WEST SLA OCCUPATION BY CENSUS YEAR, 1996 - 2006

Occupation	Census Year 1996	2001	2006
White Collar			
Managers	13.5%	14.6%	15.6%
Professionals	32.4%	35.1%	38.0%
Community & Personal Service	11.0%	9.9%	9.2%
Clerical & Administrative	15.5%	15.2%	14.7%
Sales	8.2%	9.4%	8.5%
Total White Collar	**80.6%**	**84.1%**	**86.1%**
Blue Collar			
Technicians & Trades	8.4%	7.8%	6.6%
Machinery Operators	2.8%	2.4%	1.6%
Labourers	6.2%	4.2%	3.9%
Total Blue Collar	**17.4%**	**14.4%**	**12.1%**
n.a.	2.0%	1.5%	1.9%
Total	**100.0%**	**100.0%**	**100.0%**

Source: ABS Cat. No. 2003.0

2.6 Summary

i. In summary, there has been a significant increase in the resident population within the inner suburbs of Sydney. This has been a result of the significant investment in inner city developments and particularly the rezoning of former industrial lands to allow for residential projects.

ii. The socio-economic profile of the Glebe population reflects an inner city population comprising students and professionals who need to live within close proximity of the CBD. The average household size is well below the Sydney average and some 42% of the Glebe population is aged 20 – 40 years. An established elderly population is also accommodated in the suburb.

iii. Gross household incomes throughout Sydney-West SLA have increased by 60% over the ten year period, or an average of 6% per annum. This is likely to have resulted in significant upwards pressure on house prices and rent in the area.

iv. Data sourced from PriceFinder shows that the median sale price in Glebe was around $300,000 in 1996 and has increased by 227% to $975,000, representing an average annual increase of 16% over the period.

v. For medium and high density developments in the City of Sydney, one bed and two bed units comprise 67% of the total dwelling stock, well above the Sydney Metropolitan average of around 16%. There is a clear preference for smaller units within the inner suburbs of Sydney.

vii. It is important to provide a range of housing opportunities for the population to meet the diverse housing needs, including a provision of affordable housing. A review of the number of single person dwellings within the Sydney - West SLA over the Census period from 1996 to 2006 indicates that the percentage of the population accommodated within this type of dwelling structure decreased from almost 39% to 36.6%. This is still well above the Sydney metropolitan average of around 23%, slightly higher than the 1996 figure of 22%.

viii. In 2006, some 53% of households in the suburb of Glebe consisted of a single person only or couples without children who would require smaller studio or single bedroom units.

3 AFFORDABLE HOUSING ANALYSIS

This section of the report reviews the potential to provide affordable housing at the Bay Street site in Glebe which would ultimately benefit the public.

3.1 Affordable Housing Definition

i. Affordable housing is defined by the Australian Housing and Urban Research Institute (AHURI) Sydney Research Centre as

> *housing that is adequate and appropriate for low and moderate income households and priced within their capacity to pay (so that they are not forced to go without other basic necessities).*

ii. Affordable housing is primarily targeted at increasing the supply of housing for low and moderate income households. Low and moderate income households are defined by the Australian Bureau of Statistics as *the proportion of households in the bottom two income quintiles.* Households in rental stress are defined as those households spending more than 30% of household income on rent.

iii. Affordable housing is subsidised to meet the needs of individuals and families on low and moderate incomes including essential workers such as nurses, police, cleaners and retail staff who work shift hours and therefore need to live near their work.

iv. Housing affordability is on the national agenda as a major policy concern. Industry associations together with public and private housing providers have proclaimed a national housing affordability and supply crisis as follows:

- The Commonwealth of Australian Governments (COAG) has identified housing affordability as a *"pressing issue for Australians."*
- The *New South Wales State Plan – Investing in a Better Future for New South Wales (Priority Item E6)* outlines the State's response to Housing Affordability. *The New South Wales Government is focused on improving housing affordability for low and moderate income households and for vulnerable households.* The Plan recognises that one of the key elements affecting affordability is housing supply.

Further, it is identified that there is a need to ensure there is competitive tension in the supply of land so that there is a continuing flow of new properties onto the market.

- A report published by the Urban Development Institute of Australia (UDIA) titled *An Industry report into affordable home ownership in Australia*, reviews the change in housing affordability of 70 designated population centres in Australia from 2001 to 2006. The review found that in 2001 96% of the centres were considered affordable with the comparable figure in 2006 being only 39% of centres.

v. In the UDIA report, it is stated that

> *Sydney has the unenviable status as Australia's least affordable city with mortgage repayments 40 per cent higher than the national median and rents 31 per cent more, while incomes in the city are only 12 per cent higher than the national median.*

vi. The New South Wales State Environmental Planning Policy (Affordable Rental Housing) 2009, or AHSEPP, was introduced on 31 July 2009 to increase the supply and diversity of affordable rental and social housing in New South Wales.

vii. Clause 6 of AHSEPP defines affordable housing as follows:

> *affordable housing means housing for very low income households, low income households or moderate income households, being such households as are prescribed by the regulations or as are provided for in an environmental planning instrument.*
>
> *(1) In this Policy, a household is taken to be a very low income household, low income household or moderate income household if the household:*
>
> > *(a) has a gross income that is less than 120 per cent of the median household income for the time being for the Sydney Statistical Division*

(according to the Australian Bureau of Statistics) and pays no more than 30 per cent of that gross income in rent, or

(b) is eligible to occupy rental accommodation under the National Rental Affordability Scheme and pays no more rent than that which would be charged if the household were to occupy rental accommodation under that scheme.

(2) In this Policy, residential development is taken to be for the purposes of affordable housing if the development is on land owned by the Land and Housing Corporation.

3.2 Affordable Housing Contribution Rates for Development Review

i. A review of the affordable housing contribution rates for development throughout key areas of Sydney is provided in this sub-section. Table 3.1 provides an overall summary of the projects reviewed, the contribution mechanism and the percentage of Gross Floor Area (GFA) and the in lieu monetary contribution where applicable.

ii. It should be noted that only three areas in Sydney have been enabled by State Environmental Planning Policy No. 70: Affordable Housing (Revised Schemes) (SEPP 70) and the relevant LEP's to enable contributions to be made.

This SEPP identifies a need for affordable housing in a limited number of local government areas (Willoughby, and parts of the City of Sydney) and amends relevant local and regional environmental planning instruments to enable levying of development contributions to provide for affordable housing. If these provisions were to be extended to other areas of New South Wales, an amendment to the SEPP would be required.

iii. The three identified areas are Pyrmont/Ultimo, the Green Square Urban Renewal Area and Willoughby Local Government Area.

TABLE 3.1 – AFFORDABLE HOUSING CONTRIBUTION RATES

Area/Development	Contribution/Mechanism	Contribution Rates for Development* GFA (%)	Contribution Rates for Development* Monetary ($ per sq.m)
Pyrmont/Ultimo	Sydney LEP 2005 Chapter 3 Part 8	0.8%	$30.0
Green Square Urban Renewal Project	South Sydney LEP 1998 Part 4 Division 3 Clause 27P	3.0%	$138.4
Willoughby	Draft WLEP 2011 & Affordable Housing Program	4.0%	Refer Note 1
Glebe	City of Sydney Glebe Affordable Housing Project LEP & DCP 2011.	18.3%	Refer Note 2
Harold Park	Voluntary Planning Agreement	3.8%	n.a.
Green Square Town Centre	Zoning deferred pending agreement on infrastructure requirement. South Sydney LEP 1998 Part 4 Division 3 Clause 27P will apply when un-deferred.	Refer Note 3	Refer Note 3
Barangaroo	Barangaroo Delivery Act 2009 & Australian Affordable Housing Partnership	2.3%	Refer Note 4

** Based on a residential development. Non-residential based developments have different contribution rates.*
Note 1: The contribution amount payable is calculated as follows: 4% multiplied by the number of dwellings multiplied by the median price as in the NSW Rent and Sales Report (latest version).
Note 2: The GFA contribution is indicative only based on 90 units at an average of 77.61 sq.m (the overall average unit size for the proposal).
Note 3: The South Sydney LEP 1998 Part 4 Division 3 Clause 27P will appply once undeferred.
Note 4: City of Sydney submission is for 10% GFA to apply.

Pyrmont/Ultimo

- The redevelopment of the Pyrmont/Ultimo peninsula from an important port and industrial precinct to an increasingly popular residential and commercial location has allowed for the development of a significant provision of affordable housing units.
- The relevant affordable housing contributions mechanism for the Pyrmont/Ultimo peninsula is the Sydney LEP 2005 Chapter 3 Part 8.
- The City West Affordable Housing Program has the aim to ensure that households with low to moderate income continue to live and work in Ultimo-Pyrmont.
- The Revised City West Affordable Housing Program (June 2010) states the following:

  Affordable housing may be provided within each proposed development. However, alternative arrangements may be made, where an in lieu monetary contribution may be provided so that affordable housing can be provided elsewhere within the City of Sydney. The amount of the in lieu contribution is calculated as equivalent to the total floor area that would otherwise be required to be dedicated for use for affordable housing.

  1.1% of residential or business floorspace within the Ultimo-Pyrmont area should be made of affordable housing.

  *To further encourage residential development within the area, the contribution towards affordable housing from residential development is discounted by 30%. This provides that **0.8%** of every residential development should be made of affordable housing.*

- The in lieu contribution by residential development for the provision of affordable housing is indexed annually and is currently approximately **$30 per sq.m**.

- The provision of affordable housing in Pyrmont/Ultimo as a percentage of GFA at 0.8% is well below the provision of affordable housing planned for the Glebe site at around 10%, assuming an FSR of 4.5 : 1.

- It is anticipated that the total number of dwellings new (private market, affordable and public housing) within the precinct over the project life will be in the order of 7,500 - 9,000. City West target 600 units of affordable housing units, representing approximately 6-7% of total stock.

- As taken from the City West annual report, as at June 2010, the company had completed some 446 affordable housing units, or almost 75% of the targeted 600 units.

Green Square Urban Renewal Project

- For the wider Green Square Urban Redevelopment Area, **3% of GFA** is to be provided for affordable housing dwellings as defined in the South Sydney LEP 1998 Part 4 Division 3 Clause 27P.

- The in lieu monetary contribution is currently **$138.40 per sq.m**, with this value indexed on an annual basis.

- The Green Square Affordable Housing Scheme aims to provide some 330 affordable housing rental units for low to moderate income households over the 15-20 year period of the project. The Green Square Affordable Housing DCP 2002 establishes requirements for the provision of Affordable Housing throughout Green Square.

- City West Housing recently announced the opening of 57 affordable housing dwellings at a site in Zetland with the same company having acquired part of the former South Sydney Hospital site also in Zetland for the future development of 100 new affordable housing units.

- According to information sourced from City West Housing, the company has targeted some 216 affordable housing units within the Green Square precinct

over the longer term. Currently, 102 units have been completed, or 47.2% of the target.

Willoughby

- On the North Shore of Sydney, the Willoughby Council is seeking State Government approval to apply its Willoughby Local Housing provisions for affordable housing to land being rezoned for residential purposes or to a higher residential density by Draft WLEP 2011.
- The Willoughby Local Housing provisions will require **4% of GFA** of new developments to be provided as affordable housing.
- Discussions with Council indicate that the calculation of the **in lieu monetary contribution is 4%** of the value of the total number of dwellings (one bedroom, two bedroom, three bedroom etc) based on the prevailing median price as reported in the New South Wales Rent and Sales Report (latest version). This condition is in accordance with the Affordable Housing Program.

iv. The following projects/areas are not enabled by SEPP70 for affordable housing contribution rates for development. A provision of affordable housing is to be provided/is planned for each project.

Glebe Affordable Housing Project

- The City of Sydney has recently approved a major residential project immediately to the south of the Bay Street site in Glebe (refer Map 1.3). The project will include new social and affordable housing.
- The Glebe Affordable Housing Project is a joint initiative with the City of Sydney Sustainable Sydney 2030. After consultation with the City of Sydney and the Department of Planning, a standalone LEP and DCP which removes the site from the Leichhardt LEP 2000 was introduced.
- The City of Sydney Glebe Affordable Housing Project LEP and DCP have been designed so that they can be integrated into Council's City Plan. This site specific

LEP was exhibited by Council between 15 November 2010 and 13 December 2010 and was gazetted on 1 July 2011.

- The existing 134 older style public housing units will be redeveloped into 153 new public housing dwellings, 83 affordable housing units and some 250 privately owned dwellings. It is understood that the new public housing units are almost all one-bedrooms, while the existing stock was mostly two to three bedrooms.

- The whole development will comprise of the following four unit blocks:

    - Block A – comprises buildings A1 and A2 (116 private housing), A3 (23 Affordable housing) and 113 sq.m of ground level retail and 55 basement car parking spaces.

    - Block B – comprises buildings B1 and B2 (97 private housing), B3 (37 affordable housing) and 216 sq.m retail and 73 basement car parking spaces.

    - Block C – comprises buildings C1 (23 affordable housing) and C2 (93 social housing) and 50 sq.m community facilities with building C2, and

    - Block D – comprises buildings D1 (60 social housing and 101 sq.m community facilities) and D2 (37 private housing and 175 sq.m retail space) and 16 basement car parking spaces.

- The mix of affordable housing units will be studios (10%), one bed units (45%), two bed units (35%) and three bed units (105).

- The proposed development at the site has an indicated Gross Floor Area (GFA) of 38,260 sq.m, based on a total of 493 apartments. Assuming 83 affordable housing units are provided at the site with an approximate GFA for each unit of around 80 sq.m (the average dwelling size across the entire development taking into account the proposed mix), this would indicate that the contribution of affordable housing as part of the project will be in the order of **17.5% of GFA**. It

should be noted that this site is specifically designated to provide social and affordable housing units with the provision of privately owned dwellings to help fund the development of the remainder of the site. On this basis, the higher contribution rate for affordable housing would be expected to apply for this project.

- The Glebe Affordable Housing has been identified as one of the 10 major project ideas in the City of Sydney Sustainable Sydney 2030 vision. The City of Sydney vision also targets to achieve 80% of city workers commuting on public transport and 80% of work trips by city residents in non private vehicles. The reduced parking provision for the development will align with this philosophy.

- There is clearly an emphasis on providing additional affordable housing opportunities in the immediate Glebe precinct as evidenced by the significant undertaking by the State Government and the Local Government to provide new opportunities at the indicated sites.

- At the City of Sydney Council Depot site to the east of the Bay Street site in Glebe, planning is also underway for this site to provide a provision of residential dwellings. This site was to be developed together with the New South Wales Department of Housing site, however, a number of issues including flooding and the existing site usages have delayed the planning process.

- The proposed Chase Property Investments Pty Ltd development will complement the recently approved Glebe developments.

Harold Park

- The last ever harness race at Harold Park occurred in late 2010. A major redevelopment project is now proposed of this land which would provide an indicative total of 1,200 residential dwellings with at least 50 affordable housing units (or 4.2% of the total dwellings).

- The affordable housing contribution is in place as a result of a Voluntary Planning Agreement (VPA). In total, some 50 affordable housing units encompassing a GFA

of approximately 5,000 sq.m will be provided as per the VPA. This would account for **3.8% of the 132,900 sq.m (GFA)** of the Planning Proposal which includes heritage items. The provision of affordable housing at the Bay Street site in Glebe would be higher than this proposal.

- Some 35% of the site would be designated open space and parklands.
- Commercial and retail floorspace will possibly also be provided. Development plans are currently on exhibition with this project potentially to start in 2012 and be completed over five or more years.

Green Square Town Centre

- The Green Square Town Centre forms a key component of the larger Green Square Urban Renewal Project. In total, the Green Square Town Centre is expected to accommodate some 5,500 future residents and in-excess of 7,000 workers.
- The zoning for the Green Square Town Centre has been deferred pending agreement on infrastructure requirements. South Sydney LEP 1998 Part 4 Division 3 Clause 27P will apply when un-deferred which provides a contribution of **3.0% of GFA** and an **in lieu monetary contribution of $138.40**.
- Mirvac and Leighton Properties have recently submitted the planning proposal for the Green Square Town Centre. As part of their proposal, affordable housing is identified. The Town Centre LEP permitted some 1,630 residential dwellings on the site. The current Planning Proposals seeks to increase this target to around 1,855 dwellings.
- As part of the planning for the Town Centre, a provision of affordable housing will be provided. A formal statement of the future number of affordable housing opportunities in the Green Square Town Centre is not specifically mentioned in the Planning Proposal.

- It is stated that a commitment is made by the developers to provide future affordable housing opportunities. The target of 7.5% of all housing for social/affordable housing has been identified, which would indicate in the order of 135 units being provided across the total development.

Barangaroo

- The Barangaroo site is located to the north-west of the Sydney CBD city centre and incorporates some 22 hectares in total. The site will progressively be redeveloped to include commercial, retail and residential floorspace.

- The Barangaroo Delivery Authority has the role of managing the city waterfront development at Barangaroo and to deliver world class benchmarks in urban design, public domain and sustainability.

- The developer agreement with Lend Lease has allocated funding for key worker / affordable housing fixed at **2.3% of residential GFA** within Barangaroo South. Lend Lease propose to deliver accommodation for essential and key workers for sale and rent via the Australian Affordable Housing Partnership (AAHP), between Lend Lease and the public, private and community sectors.

- Based on a residential GFA of 99,763 sq.m, the Lend Lease plan will deliver some 775 – 800 units as part of Stage One (Barangaroo South). Based on the commitment of 'up to' 2.3% of residential GFA, this would translate to approximately 18 units.

- The City of Sydney has provided a submission to the Minster for Planning as response to the planned development scheme for Barangaroo. The City of Sydney seeks to achieve a greater contribution to affordable housing from the redevelopment of 22 hectare site, to encourage diversity and opportunity. The City of Sydney would like to achieve a target of at least 10% of the residential component to be affordable housing dwellings with a preference for 20%.

Summary

- There is a significant focus on increasing housing affordability within the City of Sydney as a result of the housing affordability crisis.
- A mix of housing to ensure all people across various ethnic backgrounds, employment and income levels can be accommodated within the inner city areas of Sydney is paramount to the success of a vibrant and successful city.
- Research undertaken for the Sustainable Sydney 2030 identified social housing and affordable housing as a key future area of growth. Currently, this type of housing accounts for less than 1% of all dwellings with a target of 7.5% of all dwellings likely to result in greater affordability.
- A number of projects are already underway to increase the provision of affordable housing dwellings within the inner Sydney urban area and the proposed 87 Bay Street Glebe project will further provide impetus for affordable housing in the region.
- The proposed provision of affordable housing to be provided as part of the 87 Bay Street Glebe project will be higher than the contribution rate for development across a number of Sydney areas. At a maximum of 4.5 : 1 for the Bay Street site in Glebe, the GFA of affordable housing units will be around 10%, well above the affordable housing contribution rate for development of Pyrmont (0.8%), Harold Park (3.8%), Green Square (3%) and Willoughby Council (4%).

3.3 Affordable Housing Potential

i. The City of Sydney Affordable Rental Housing Strategy indicates that some 8,000 new affordable homes for key workers and social housing, comprising 15% all City dwellings are needed to meet future demand.

ii. Taking all of the above into account, the potential for affordable housing at the 87 Bay Street site in Glebe includes:

- The site is surrounded by existing residential uses. The proposal would be consistent with surrounding uses including the redevelopment of the Housing New South Wales site and the City of Sydney site as well as the further afield sites of Harold Park and Green Square.

- The socio-economic profile of the Glebe population reflects an inner city population comprising students and professionals who need to live within close proximity of the CBD. Some 42% of the Glebe population is aged 20 – 40 years which is higher than the Sydney average of around 30%.

- The average household size is substantially smaller than the Sydney metropolitan benchmarks at 2 persons as compared with 2.7 persons. Smaller household sizes are more prevalent in this part of Sydney. More than 53% of households in Glebe comprise a single person or couples without children.

- For medium and high density developments in the City of Sydney, one bed and two bed units comprise 67% of the total dwelling stock, well above the Sydney Metropolitan average of around 16%. There is a clear preference for smaller units within the inner suburbs of Sydney.

- Although the Glebe population is generally an affluent population, there is a significant proportion of lower income households, with 59.3% defined as being low or moderate income households (i.e. household with a gross income that is less than 120 per cent of the median household income).

- The median residential property sale price for Glebe was around $300,000 in 1996 and has increased by 227% to $975,000 in 2011, representing an average annual increase of 16% over the period.

- The significant increase in property prices and the income levels of the population combine to generate a significant need for affordable housing.

- In terms of employment, future residents will demand affordable housing within close proximity of their place of work, particularly those in key service jobs including nurses, police and the like.

- Affordable housing at the site would fulfill a growing community requirement and allow a diverse mix of residents to remain within close proximity of the city.
- Glebe has been identified as an area of high demand for affordable housing with many people on low to moderate incomes being priced out of the local private rental market.
- The proposed site is easily accessible by private and public transport with a number of bus routes and the light rail within relatively close proximity.
- A number of key employment industries are also provided in the immediate proximity, including higher education, retail and service industries.

iii. Overall, it is our opinion that a provision of affordable housing would be suitable for the 87 Bay Street site in Glebe. The proposed site fulfills a number of characteristics for affordable housing and is to have future affordable housing developments to the immediate south and east. Reflecting the socio-economic profile of the Glebe and surrounding population, smaller sized studio and one bedroom units would be demanded by the population.

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