MERITON APARTMENTS
PROPOSED RESIDENTIAL BASED MIXED USE DEVELOPMENT
330 CHURCH STREET, PARRAMATTA

Assessment of Traffic and Parking Implications

May 2011

Reference 11022

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

1. INTRODUCTION

This report has been prepared on behalf of Meriton Apartments to accompany a Project Application to the Department of Planning for a mixed use development with residential/serviced apartments, retail and child care elements within the Riverbank Precinct on Church Street, Parramatta (Figure 1).

Regional centres in the metropolitan area, particularly those which have good access to public transport and retail/commercial and entertainment facilities, are undergoing revitalisation involving high density residential apartments and ancillary retail uses as part of the urban consolidation process. A Part 3A Application was submitted to the Department of Planning involving:

* 2 tower buildings over a single-level podium
* residential apartments
* retail floorspace
* child care centre
* basement carparking.

The Director General's Requirements specified in part:

*"7. **Impacts (Construction and Operational)***
Prepare a traffic impact study in accordance with the RTA;s Guide to Traffic Generating Developments considering traffic generation and required road/intersection upgrades, access, loading docks(s) and carparking arrangements, measures to promote public transport usage and pedestrian and bicycle linkages.

The assessment should also address the implications of the proposed development for non-car travel modes (including all types of public transport, walking and cycling), addressing the importance of bus access and circulation in meeting travel needs in the area, likely associated costs of additional infrastructure or services where not proposed as part of the project, and also identify measures to mitigate potential impacts on public/private transport, pedestrians and cyclists during the construction stage of the project.

8. Carparking

The EA must demonstrate the adequate provision of on-site carparking for the proposal having regard to local EPI controls and the RTA;s Guide to Traffic Generating Developments, as well as the site's high accessibility to public transport. (NOTE: the Department supports reduced carparking rates in areas well served by public transport).

The purpose of this report is to:

* describe the site, its context and the proposed development scheme

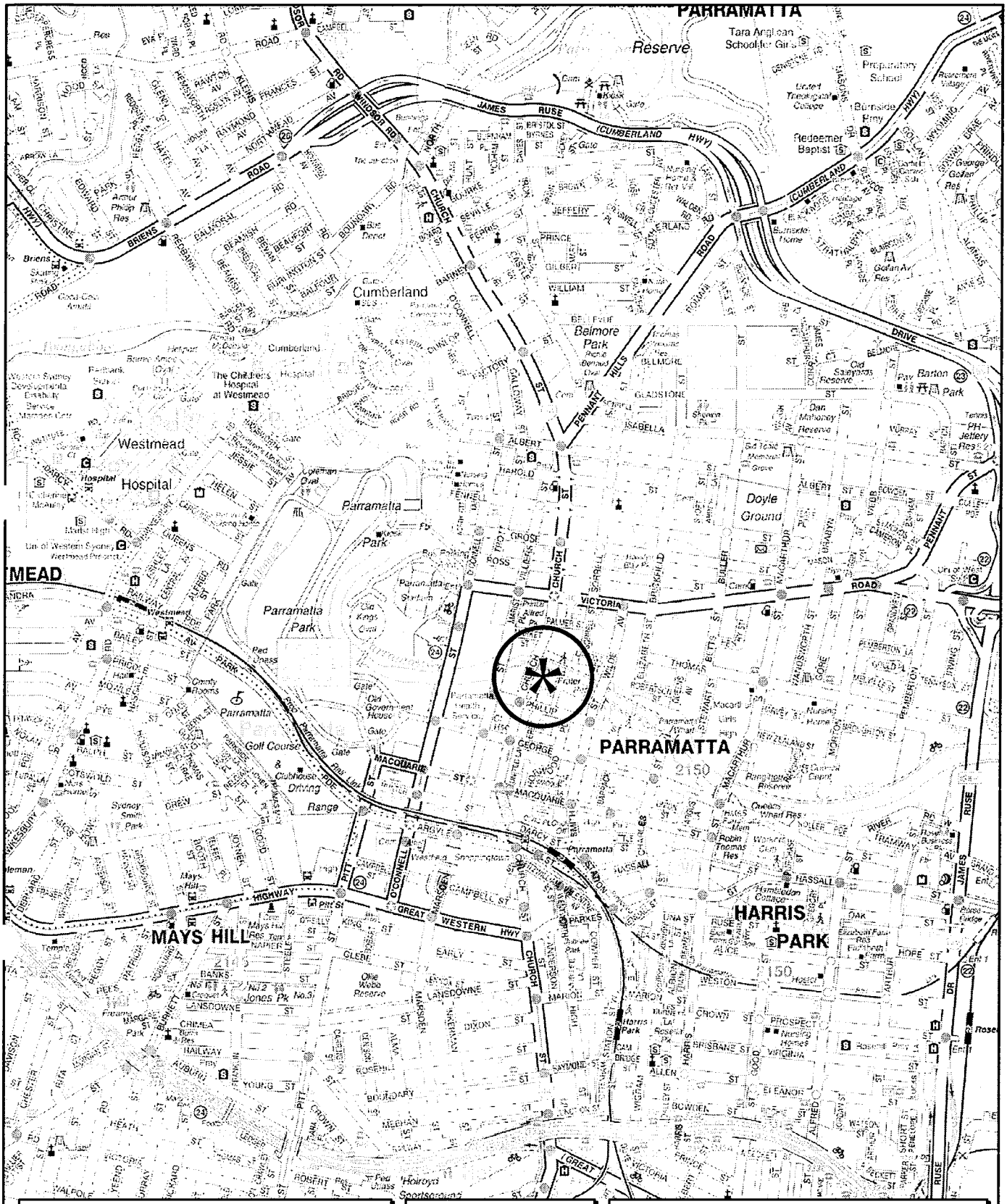
* describe the road network serving the site and the prevailing traffic conditions and transport services in the area

* assess the adequacy of the proposed parking provision

* assess the potential traffic implications

* assess the availability and suitability of public transport services and measures to provide public transport usage and pedestrian/bicycle linkages

* assess the suitability of the proposed vehicle access, internal circulation and servicing arrangements.


PARRAMATTA
Reserve
Tara Anglican School for Girls
Preparatory School
JAMES RUSE (CUMBERLAND HWY)
Redeemer Baptist
CUMBERLAND ROAD
BRIENS ROAD
Cumberland
Belmore Park
Westmead
Hospital
The Children's Hospital at Westmead
Parramatta Park
Doyle Ground
PENNANT HILLS ROAD
VICTORIA ROAD
MACQUARIE ST
PARRAMATTA
2150
Golf Course & Clubhouse Driving Range
MAYS HILL
HIGHWAY
GREAT WESTERN HWY
HARRIS PARK
2150
LEGEND
N
LOCATION
FIG 1

2. PROPOSED DEVELOPMENT SCHEME

2.1 SITE, CONTEXT AND EXISTING/FORMER USE

The development site (Figure 2) is a consolidation of 3 lots being an irregular shaped area of some 6,759m^2 which has frontages to Church Street and Lane № 11 which connects to Phillip Street. The site, which was previously occupied by the David Jones Department Store and more recently by Brandsmart, is bounded by the Parramatta River to the north, a multi-deck carpark to the east and commercial buildings to the south.

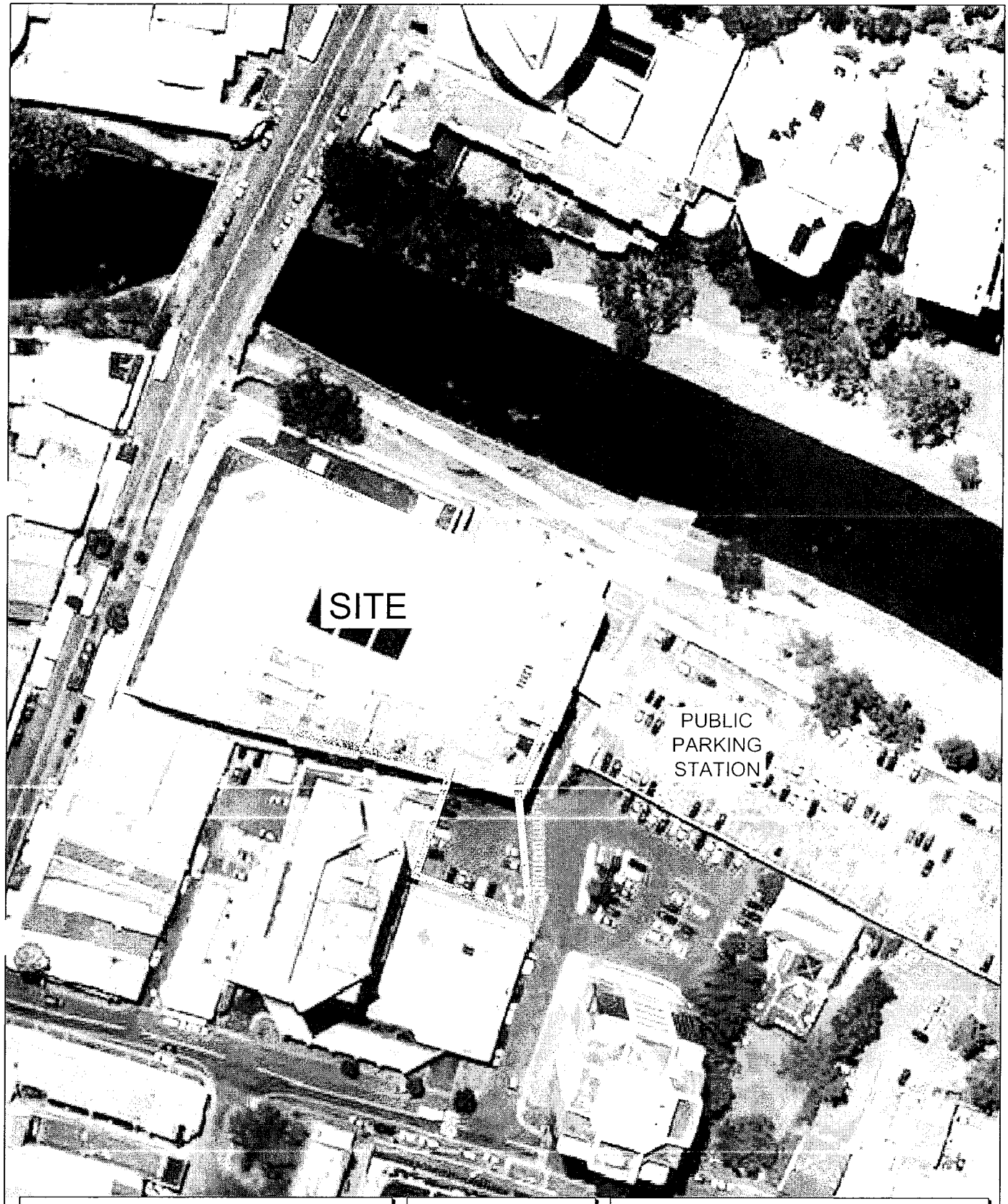
The site is located on the northern edge of the CBD and benefits by the open space reserves along the river and the large Parramatta Park just to the west. The retail component of the building is currently vacant, however 2 professional services companies (including Landcom) and 2 restaurants occupy parts of the building. The adjacent decked carpark is owned by Council, but leased by Meriton, and operates as a public parking station with 535 spaces.

The principal public transport services in the vicinity of the site include:

* Parramatta Railway Station and bus interchange which is located approximately 700 metres to the south of the site

* numerous bus services which operate along Church Street and other nearby roads

* Parramatta Wharf a short distance to the east and the shared pedestrian and cycle path running along the river.

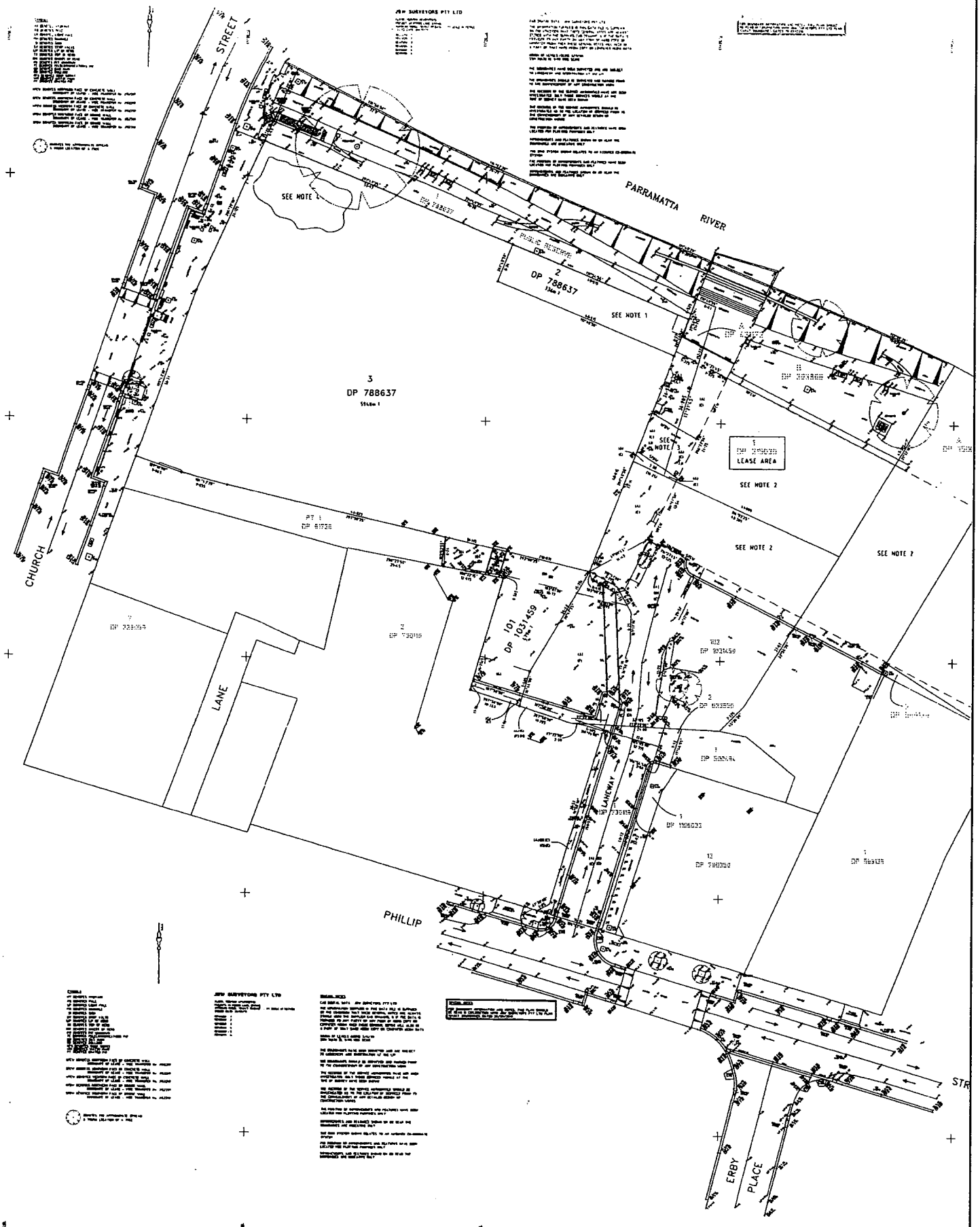


LEGEND

N

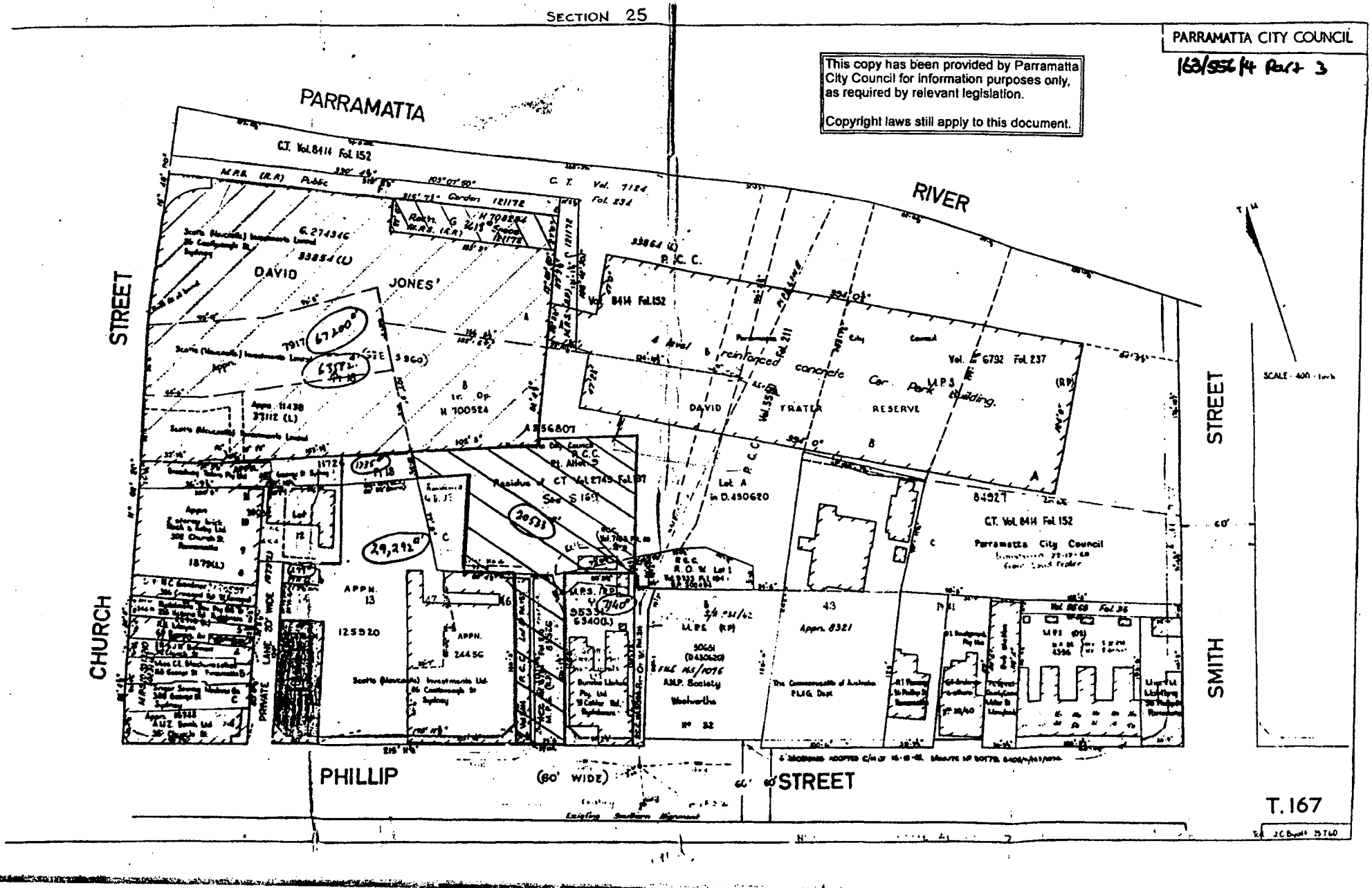
SITE

FIG 2



JBW Surveyors Pty Ltd

CLIENT MERITON APARTMENTS


SECTION 25
PARRAMATTA CITY COUNCIL
163/556 14 Part 3
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PARRAMATTA
RIVER
CHURCH STREET
SMITH STREET
PHILLIP STREET (80' WIDE)
DAVID JONES'
DAVID FRATER RESERVE
Car Park Building
reinforced concrete
C.T. Vol. 8414 Fol. 152
Parramatta City Council
Vol. 6732 Fol. 237
Vol. 8414 Fol. 152
Lot A in D.430620
APPN. 13
APPN. 2445G
PRIVATE LANE 20' WIDE
SCALE - 40ft - 1 inch
T. 167

2.2 PRECINCT PLANNING

The site comprises a pre-eminent part of the Parramatta Riverbank Precinct which is bounded by Church Street, Phillip Street, Wilde Street and the Parramatta River. Planning criteria for development of the precinct are contained in:

* Parramatta Riverbank Urban Design Strategy – April 2009
* Parramatta City Council Preliminary Draft Riverbank Design Guidelines – 2010.

Details of the envisaged development outcome including vehicle access, pedestrian network and future new 'Civic Space' are provided on the extracts reproduced overleaf.

2.3 PROPOSED DEVELOPMENT

It is proposed to demolish the existing buildings and structures and excavate the site for basement carparking. The new building complex will involve:

* podium level
* 2 tower buildings
* 4 basement levels of carparking.

The proposed development will comprise:

Residential Apartments		31 x one-bedroom apartments	
		173 x two-bedroom apartments	
		16 x three-bedroom apartments	
Serviced Apartments		110 x one-bedroom apartments	
		60 x two-bedroom apartments	
	Total	**390 apartments**	
Retail		Supermarket	1,928m^2
		Specialty shops	2,425m^2
Child Care Centre		68 children	
Ancillary		Library 182m^2 and gym 265m^2	

Riverbank – Pedestrian Amenity: Public Domain Plan

1. Foreshore park in 25m setback may include stage to nothern bank and changed river's edge.
2. Terraces and steps connect public domain edge at RL 6.4 to Forshore Park and Civic Space (to flood requirements).
3. Public domain edge (min. 5m wide) at RL 6.4 for riverfront activiation. (RL = 1 in 100 year flood + 400mm freeboard)
4. Civic Link

Potential building site

Council land

Heritage building

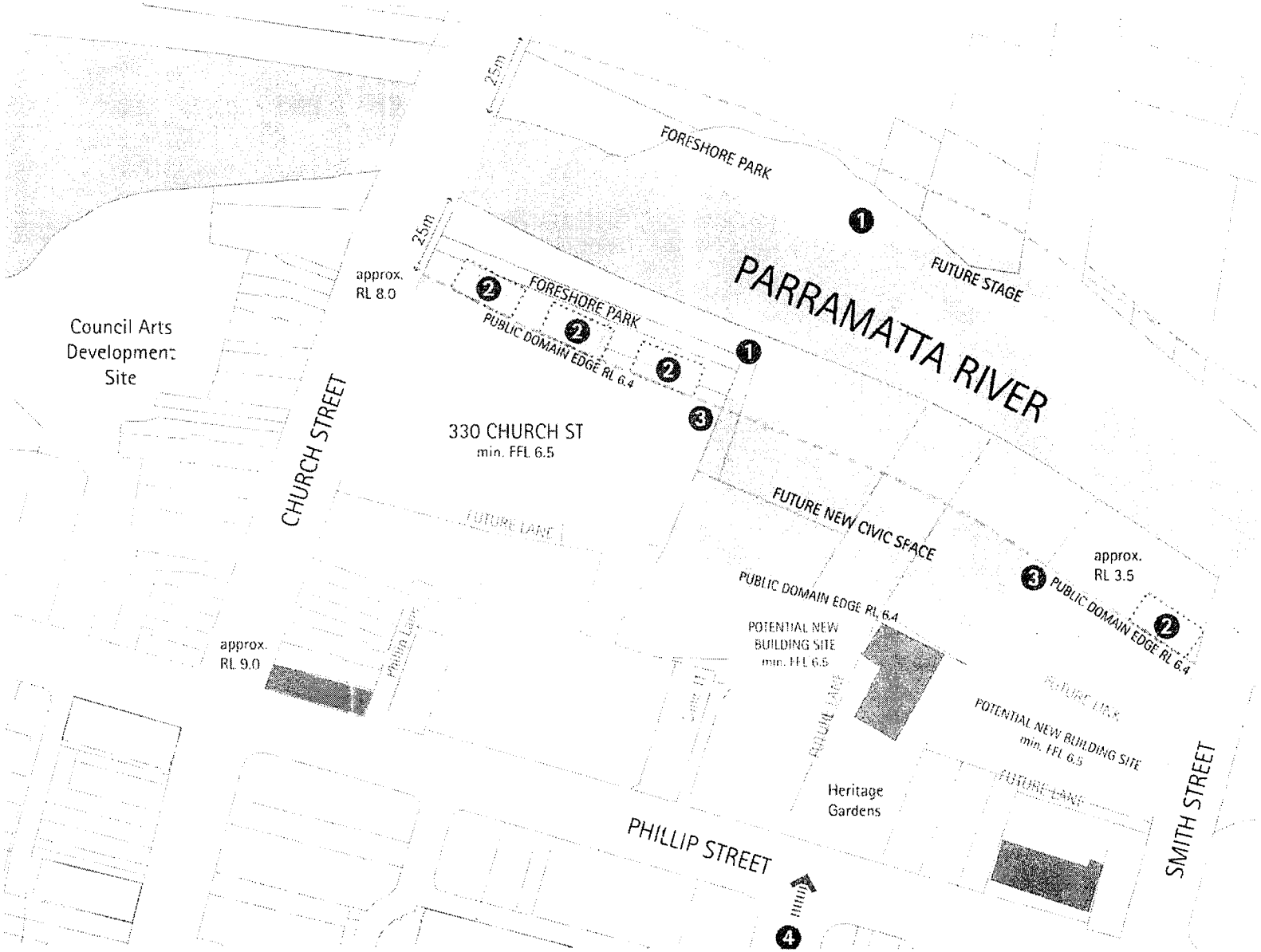
Open space

Fine grain pedestrian network to Lanes Strategy 2010

25m setback from river's edge to Flood Mitigation Policy

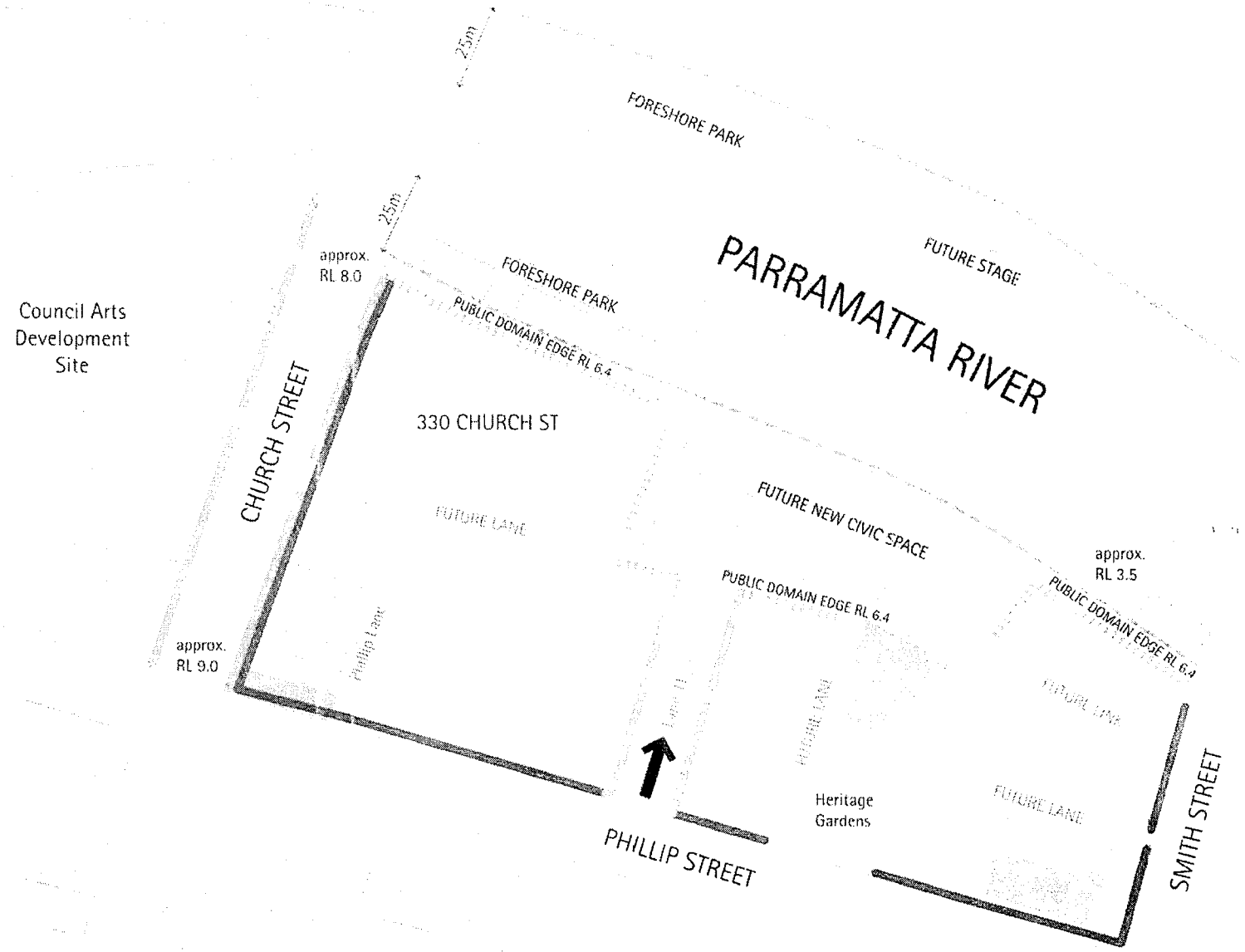
N

0 25 50



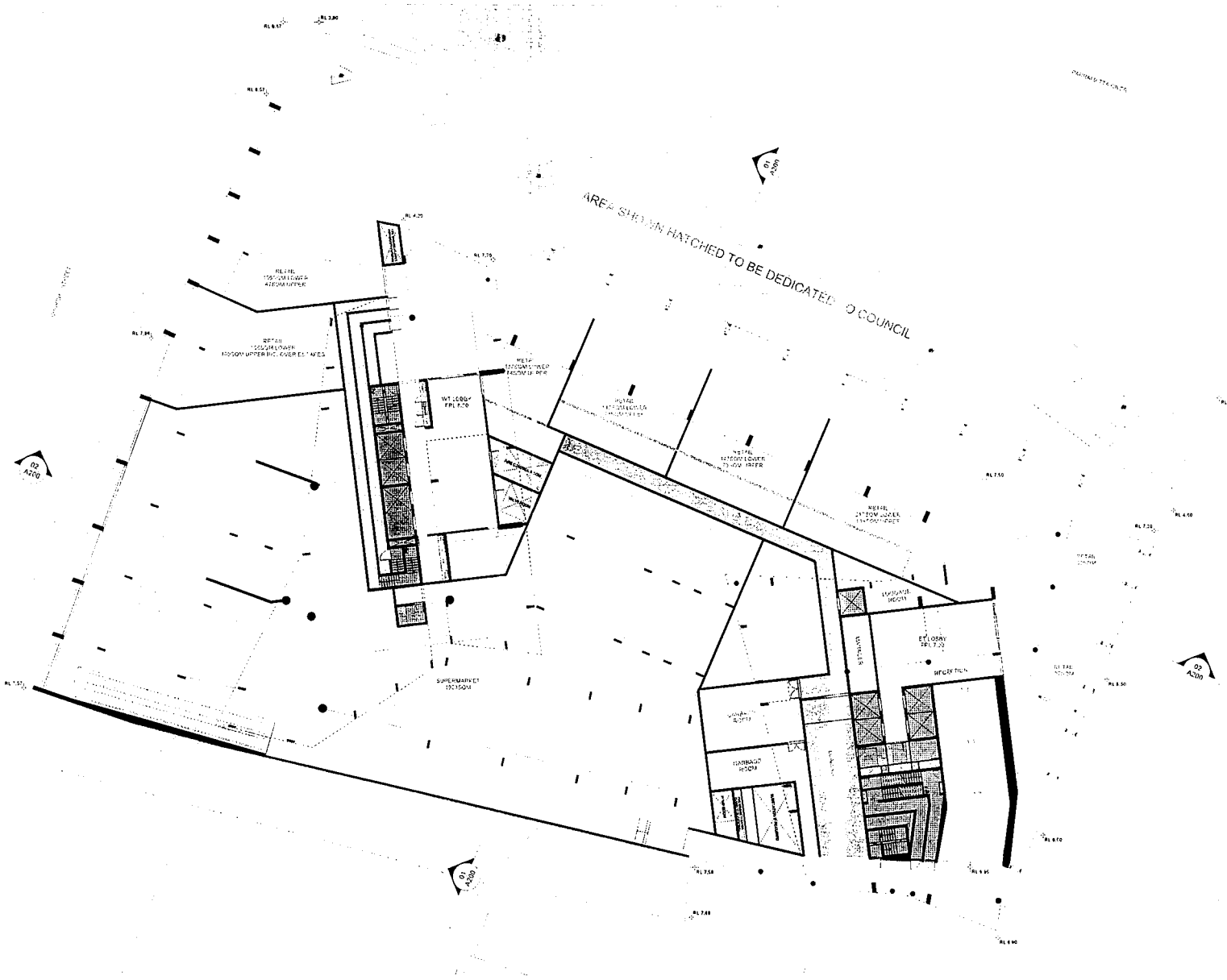
Riverbank – Pedestrian Amenity: Shelter + Car Access

- Continuous awnings required
- Continuous weather protection for pedestrians encouraged
- Additional vehicular entries prohibited
- Vehicular access from here
- Council Land
- Heritage item
- Open Space
- Fine grain pedestrian network
- 25m setback from river's edge for flood mitigation



A total of 597 parking spaces will be provided in the basement levels with car and service vehicle access being provided by connection to Lane № 11 and Phillip Street.

Details of the proposed development are provided in the architectural drawings prepared by Tony Caro Architecture which accompany the Development Application and are reproduced in part overleaf.



01 PLAN - LEVEL 00 (RETAIL)
1:200 @ A1

MERITON
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REFERENCE SCALE 1:200
0 2 4 6 8 10

RIVERFRONT APARTMENTS
329 CHURCH STREET
PARRAMATTA NSW

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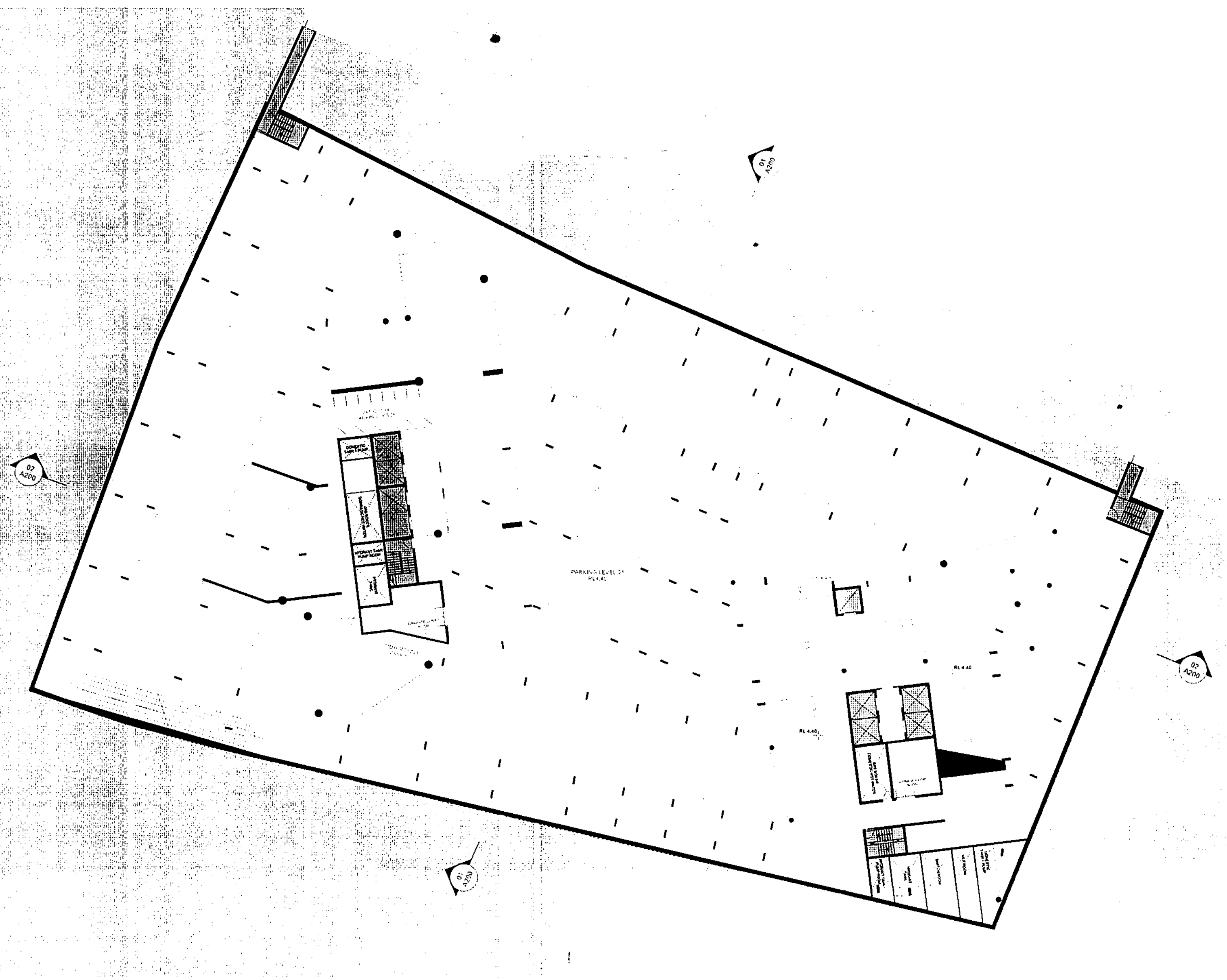
MAR 2011	JF	TC	
DRAFT			

Plan_Level 00 Retail A100



01 PLAN - PARKING LEVEL 01
1:200 @ A1

STORAGE SCHEDULE

LEVEL	STORAGE NO.	STORAGE (m³)
PARKING LEVEL	-	-
PARKING LEVEL	121	[illegible]
PARKING LEVEL	144	[illegible]
PARKING LEVEL	142	[illegible]
TOTAL	[illegible]	[illegible]

PARKING SCHEDULE

LEVEL	RESIDENT PARKING	ADAPTABLE PARKING	DISABLED PARKING	RETAIL VISITORS PARKING	TOTAL
PARKING LEVEL 1	-	-	4	[illegible]	144
PARKING LEVEL 2	[illegible]	[illegible]	0	0	[illegible]
PARKING LEVEL 3	[illegible]	[illegible]	0	[illegible]	[illegible]
PARKING LEVEL 4	142	[illegible]	0	0	[illegible]
TOTAL	414	[illegible]	4	[illegible]	[illegible]

TONYCAROARCHITECTURE

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330 CHURCH STREET
PARRAMATTA NSW

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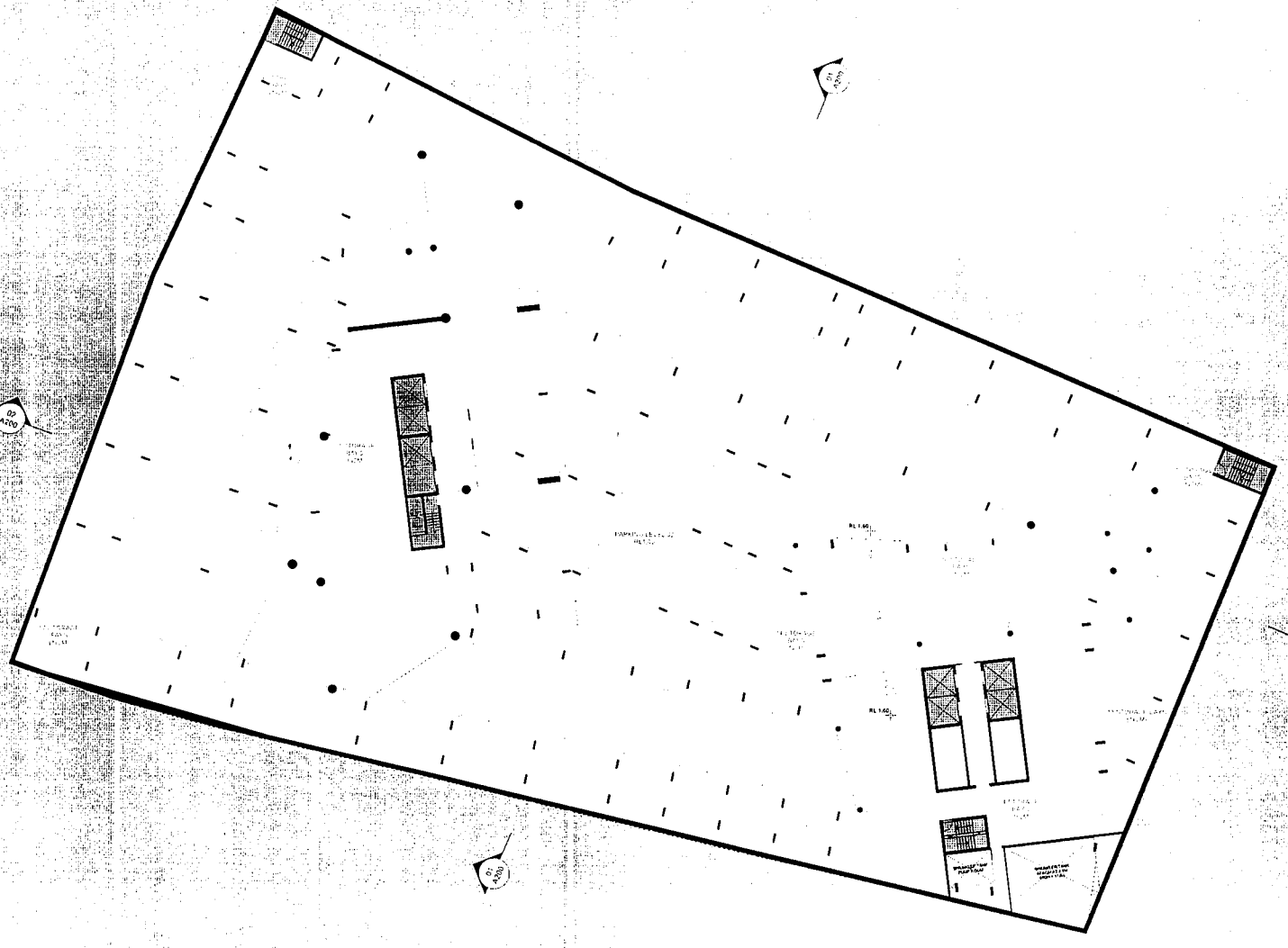
MAR 2011

Plan_Parking Level 01

A099



01 PLAN - PARKING LEVEL 02
1:200 @ A1

STORAGE SCHEDULE

LEVEL	STORAGE (M²)	STORAGE (#)
PARKING LEVEL 1	-	-
PARKING LEVEL 2	121	10
PARKING LEVEL 3	144	12
PARKING LEVEL 4	149	12
TOTAL	414	34

PARKING SCHEDULE

LEVEL	RESIDENT PARKING	APARTMENT PARKING (VISITOR)	DISABLED PARKING	CAR WASHING PARKING	TOTAL
PARKING LEVEL 1	-	-	4	140	144
PARKING LEVEL 2	137	11	0	0	148
PARKING LEVEL 3	137	11	0	0	148
PARKING LEVEL 4	140	11	0	0	151
TOTAL	414	33	4	140	591

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336 CHURCH STREET
PARRAMATTA NSW

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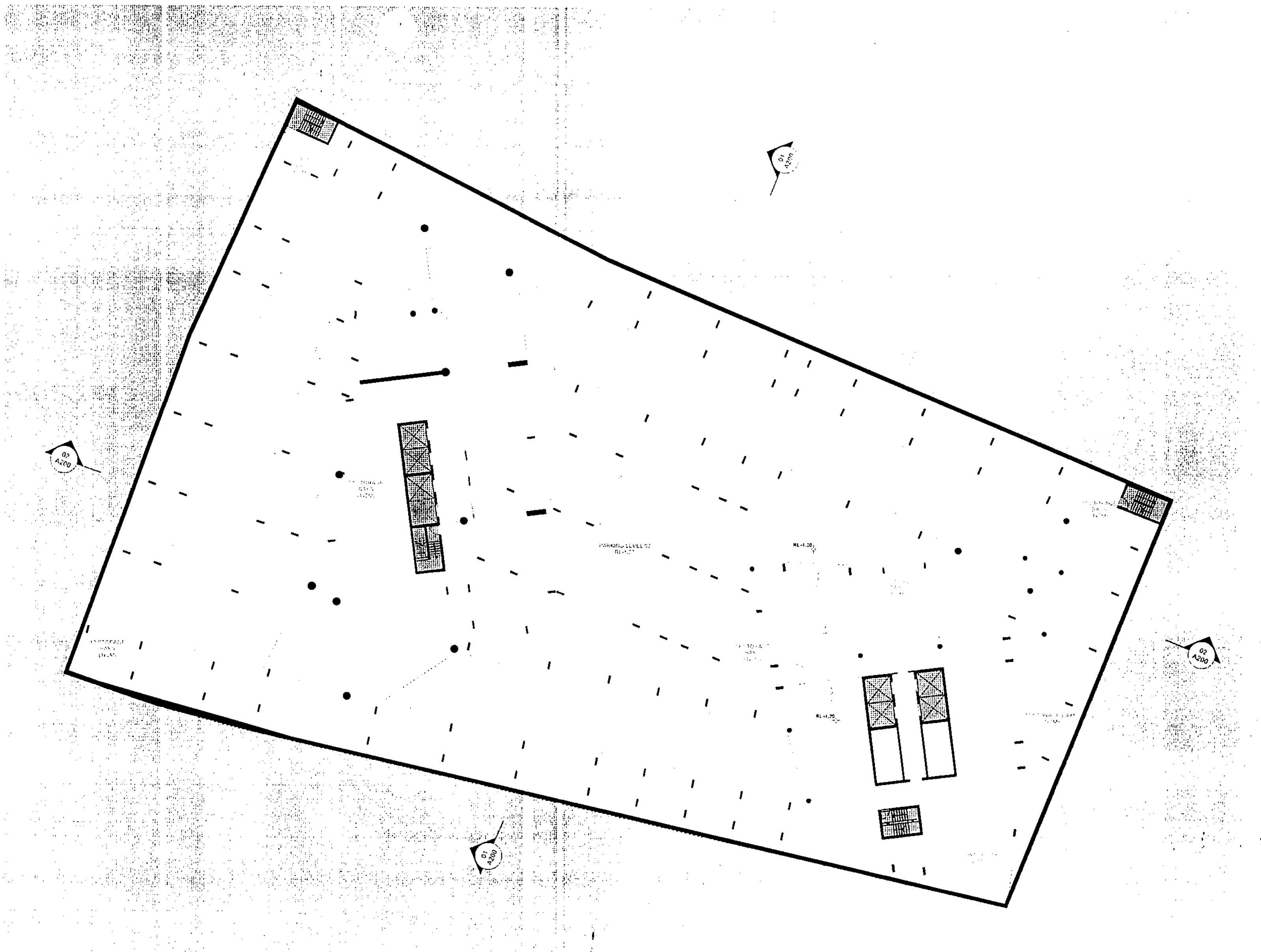
MAR 2011		JF	TC
16/5/11			

Plan_Parking Level 02

A098



01 PLAN - PARKING LEVEL 03
1:200 @ A1

STORAGE SCHEDULE

LEVEL	STORAGE	STORAGE
PARKING LEVEL	-	-
PARKING LEVEL	[illegible]	[illegible]
PARKING LEVEL	144	[illegible]
PARKING LEVEL	142	[illegible]
TOTAL	[illegible]	[illegible]

PARKING SCHEDULE

LEVEL	RESIDENT PARKING	ADAPTABLE PARKING	DISABLED PARKING	RETAIL PARKING	TOTAL
PARKING LEVEL 1	-	-	4	[illegible]	[illegible]
PARKING LEVEL 2	[illegible]	13	0	0	[illegible]
PARKING LEVEL 3	[illegible]	13	0	0	[illegible]
PARKING LEVEL 4	[illegible]	[illegible]	0	0	[illegible]
TOTAL	[illegible]	[illegible]	4	[illegible]	[illegible]

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MERITON

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528 KENT STREET SYDNEY

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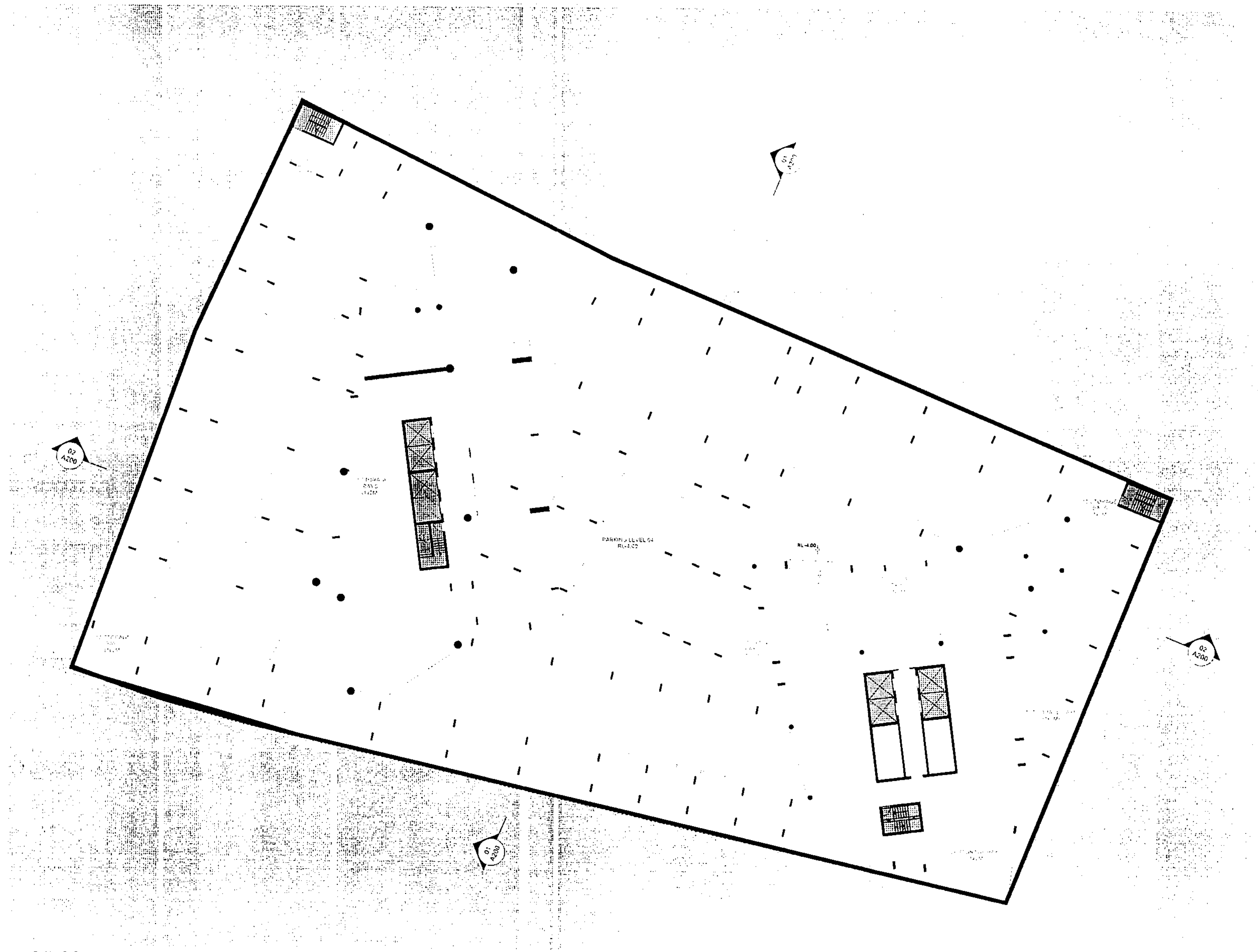

01 PLAN - PARKING LEVEL 04
1:200 @ A1

STORAGE SCHEDULE

LEVEL	STORAGE NO.	STORAGE UNIT
PARKING LEVEL 1	-	-
PARKING LEVEL 2	121	[illegible]
PARKING LEVEL 3	144	[illegible]
PARKING LEVEL 4	142	[illegible]
TOTAL	[illegible]	[illegible]

PARKING SCHEDULE

LEVEL	RESIDENT PARKING	ADAPTABLE PARKING SPACES	DISABLED PARKING	RETAIL VISITOR PARKING	TOTAL
PARKING LEVEL 1	-	-	4	[illegible]	144
PARKING LEVEL 2	[illegible]	[illegible]	0	0	[illegible]
PARKING LEVEL 3	[illegible]	[illegible]	0	0	[illegible]
PARKING LEVEL 4	142	[illegible]	0	0	[illegible]
TOTAL	414	[illegible]	4	[illegible]	[illegible]

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PARRAMATTA NSW

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Plan_Parking Level 04

A096

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3. ROAD NETWORK AND TRAFFIC CONDITIONS

3.1 ROAD NETWORK

The road network which facilitates access to and from the development site (Figure 3) comprises:

* *M4 Motorway and Great Western Highway* – State Roads and arterial routes connecting between the City and Penrith

* *Windsor Road/Church Street (North)* – a State Road and arterial route which connects between Parramatta and Windsor

* *James Ruse Drive* – a State Road and arterial route which connects between Great Western Highway/M4 and Old Windsor Road

* *Pennant Hills Road* – a State Road and arterial route which connects between Parramatta and the F3 Motorway at Wahroonga

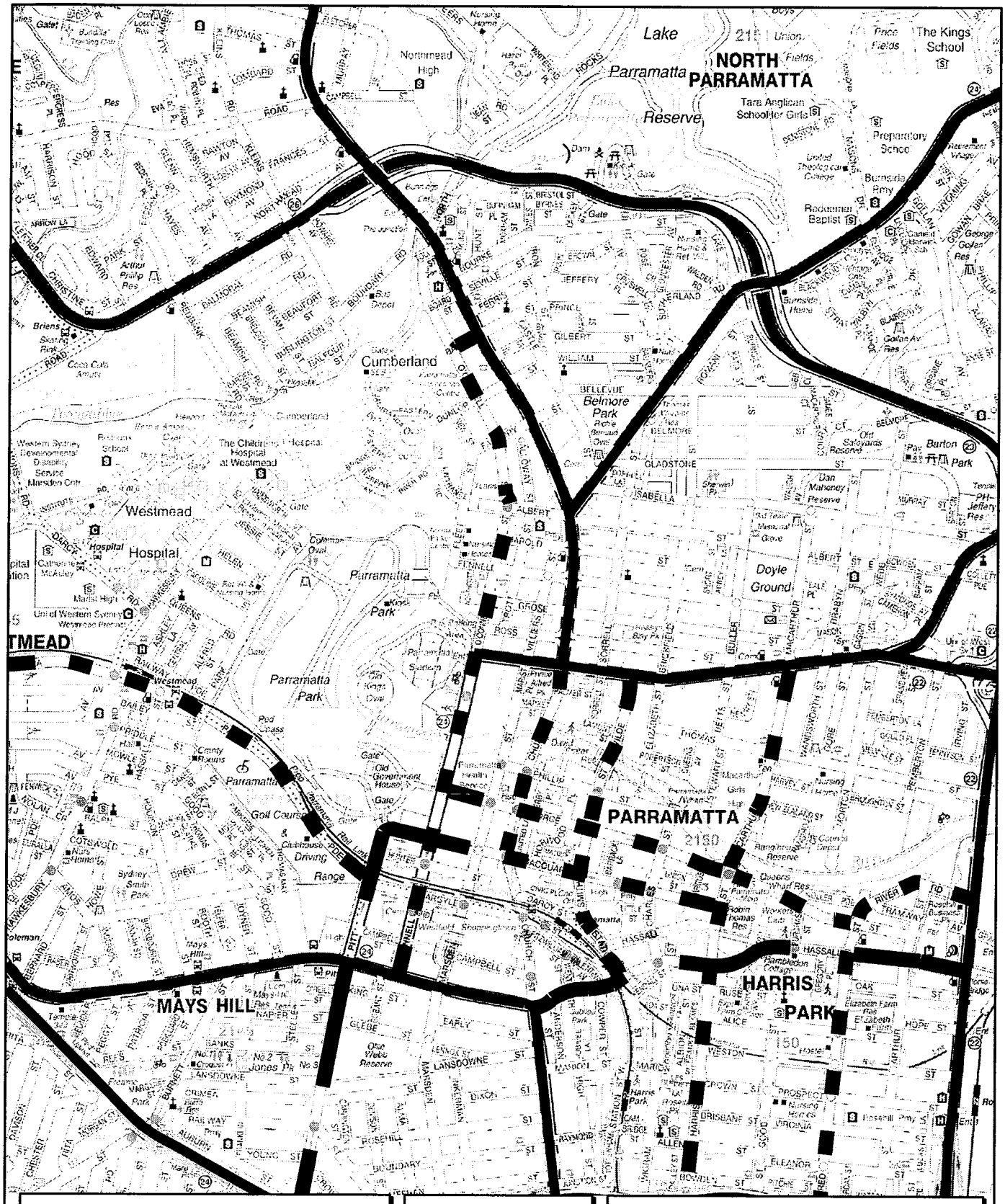
* *Victoria Road* – a State Road and east/west arterial route which connects between the City and Parramatta

* *George Street and Macquarie Street* – east-west collector routes running through the CBD

* *Smith Street and O'Connell Street* – north-south collector routes running through the CBD

* *Phillip Street* – a minor collector route running along the northern side of the CBD.

Barriers to the road system are presented by Parramatta River, the railway line and the closure of Church Street between Macquarie Street and Darcy Street.



LEGEND

- ARTERIAL
- SUB-ARTERIAL
- COLLECTOR

N

ROAD NETWORK

FIG 3

3.2 TRAFFIC CONTROLS

The existing traffic controls which have been applied to the road system in the vicinity of the site (Figure 4) include:

* the traffic control signals along Church Street including the Phillip Street, George Street and Macquarie Street intersections

* the traffic control signals at the Marsden Street/Phillip Street and Phillip Street/Smith Street intersections

* the one-way easterly traffic flows along George Street through the traffic control signals at the intersections of:

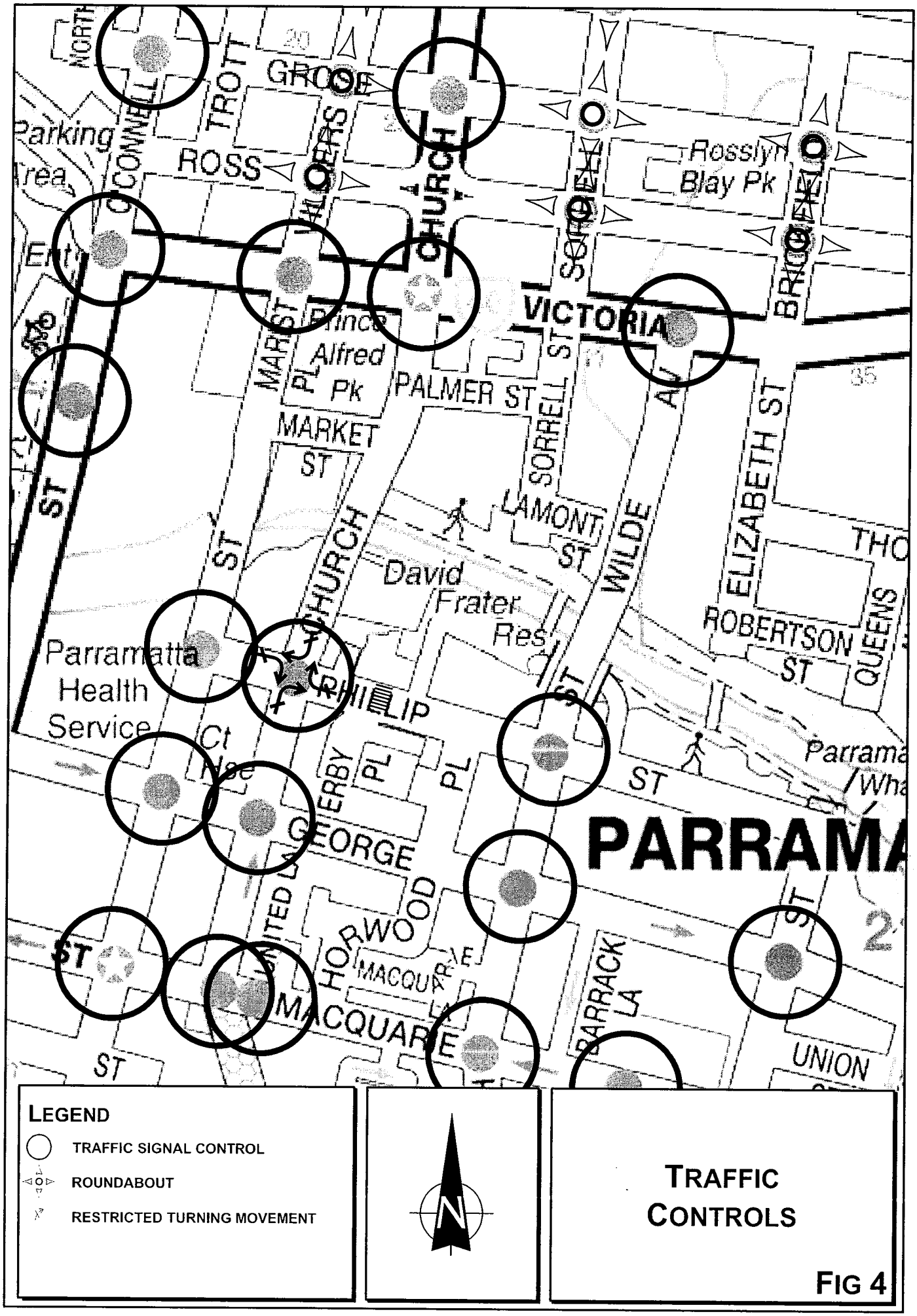
  - Factory Street and Church Street (Windsor Road)
  - Marsden Street
  - Smith Street

* the one-way westerly traffic flow along Macquarie Street through the traffic signals at the intersection of:

  - Factory Street and Church Street (Windsor Road)
  - Marsden Street
  - Smith Street

* the NO RIGHT TURN restrictions at the Church Street/Phillip Street intersections

* the marked footcrossing across Phillip Street on the western side of Lane № 11.


GROSE
TROTT
CONNELL
ROSS
CHURCH
GEORGE
SORRELL
VICTORIA
BRIDGE
Rosslyn Blay Pk
Prince Alfred Pk
PALMER ST
MARKET ST
LAMONT ST
WILDE
ELIZABETH ST
ROBERTSON ST
QUEENS
David Frater Res
Parramatta Health Service
PHILLIP
HORWOOD
MACQUARIE
BARRACK LA
UNION
PARRAMA
LEGEND
TRAFFIC SIGNAL CONTROL
ROUNDABOUT
RESTRICTED TURNING MOVEMENT
N
TRAFFIC CONTROLS
FIG 4

3.3 TRAFFIC CONDITIONS

An indication of the existing traffic conditions in the vicinity of the site is provided by data published by the RTA[1] and surveys undertaken as part of this assessment. The RTA data is expressed in terms of Annual Average Daily Traffic (AADT) and the most recently available data is summarised in the following:

	AADT
O'Connell Street	
At Bridge over Parramatta River	27,549
Church Street	
South of Albert Street	27,403

Traffic movement surveys were carried out during the morning and afternoon peak periods at the intersections of Church Street/Phillip Street, Phillip Street/Smith Street and Phillip Street/Lane № 11. The results of these surveys are provided in Appendix A and summarised in the following:

		AM	PM
Church Street	NB	130	230
	RT	2	-
	LT	18	34
	SB	144	150
	RT	-	-
	LT	124	104
Phillip Street	EB	146	74
	RT	2	-
	LT	24	44
	WB	90	198
	RT	-	-
	LT	20	16

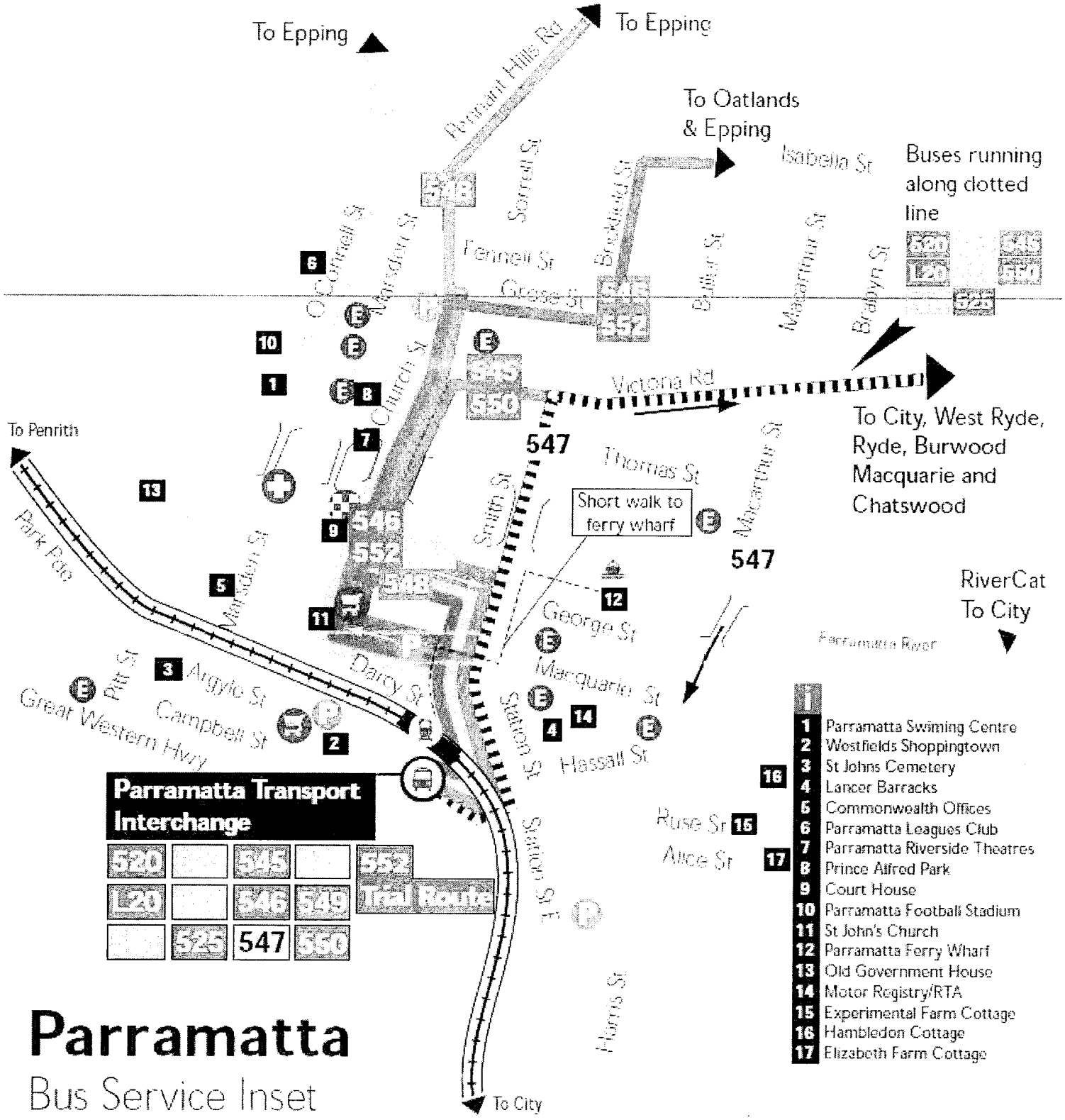
[1] *Traffic Volume Data Sydney Region*
Roads and Traffic Authority

		AM	PM
Smith Street	NB	182	408
	RT	40	24
	LT	74	62
	SB	494	264
	RT	172	52
	LT	266	100
Phillip Street	EB	104	88
	RT	28	54
	LT	62	140
	WB	114	100
	RT	64	310
	LT	24	36
Phillip Street	EB	169	253
	LT	81	8
	WB	185	205
	RT	106	25
Lane	RT	17	21
	LT	12	43

The operation of the intersections in the area in relatively satisfactory for a CBD environment with access and control being facilitated by the traffic signal controlled intersections with attendant one-way and NO RIGHT TURN restrictions. In previous years when the David Jones Department store operated on the site, there were significant traffic movements to/from the multi-deck carpark through Lane № 11. However, that former circumstance no longer occurs with the total access movements along Lane № 11 being less than 100 vph during the recent weekday afternoon survey.

3.4 PUBLIC TRANSPORT SERVICES

The site is conveniently located in relation to bus, rail and ferry services. Numerous frequent and high capacity bus services operate past the site as shown on the diagram overleaf while the railway station is easily accessed by walking or by bus.



1 Parramatta Swimming Centre
2 Westfields Shoppingtown
3 St Johns Cemetery
4 Lancer Barracks
5 Commonwealth Offices
6 Parramatta Leagues Club
7 Parramatta Riverside Theatres
8 Prince Alfred Park
9 Court House
10 Parramatta Football Stadium
11 St John's Church
12 Parramatta Ferry Wharf
13 Old Government House
14 Motor Registry/RTA
15 Experimental Farm Cottage
16 Hambledon Cottage
17 Elizabeth Farm Cottage

Parramatta

Bus Service Inset

4. PARKING

Parramatta City Council's LEP 2007 specifies the following carparking criteria:

Multi Dwelling Housing (one, two and three-bedrooms)	
	1 space per dwelling
	1 space per 5 dwellings for visitors
Shops	1 space per $30m^2$ GFA
Child Care Centre	1 space per 4 children

Application of this criteria to the proposed development scheme would indicate the following provision:

Residential/Serviced		
390 apartments		390 spaces
Visitors		78 spaces
Retail	$4,353m^2$	145 spaces
Child Care	68 children	17 spaces

It is normal practice in mixed retail/residential apartment developments to 'pool' the residential visitor and retail spaces due to the differing peak demand characteristics and the resultant flexibility. It is also the practice to allow child care centre spaces to be used as part of the pool during the period when the centre is not operating (eg Broadway Centre). Thus, the proposed provision/availability of parking spaces will be as follows:

	Normal	Non CCC hours
Residential/serviced apartments	390	390
Retail and resident visitors	190	207
Child Care Centre	17	-
Total	**597**	**597**

Residents in the apartments will represent a significant element of the retail customers and users of the Child Care Centre. The proposed quantum of carparking is slightly less than the 'compound' elements of the LEP criteria, however this provision is assessed as being quite adequate and appropriate given the 'dual and complementary' nature of the parking demands/uses.

A total of 39 accessible spaces will be provided for residents and 4 designated and suitable spaces for disabled drivers, 24 bicycle and 5 motorbike spaces will be provided for visitor retail and child care centre while residents will be able to locate bicycles in their storage areas.

The proposed parking provision represents a relatively constrained contemporary arrangement which has regard for:

* the convenient proximity of public transport services
* the convenience and amenity of walking and cycling
* the retail, entertainment, employment and services which will be available in walking distance.

5. TRAFFIC

An indication of the potential traffic generated by the proposed development can be established by reference to the RTA is 'Guide to Traffic Generating Developments' which specifies the following peak generation rates:

High Density Residential (Regional Centre)

0.24 vehicle trips per hour per dwelling

Child Care Centre

0.7 – 0.8 vehicle trips per child

The 'industry' accepted traffic generation rate for serviced apartments is 0.20 vtph due to the generally lower level of car usage (ie than residential apartments).

The RTA criteria for 'retail' use is very outdated and also essentially relates large regional shopping centres. A widely accepted contemporary rate for retail floorspace with good accessibility to public transport services, high density residential and employment is 4.0 vtph per $100m^2$ (20% in AM). Application of these factors to the proposed development would indicate the following:

220 apartments @ 0.24	-	53 vtph
170 serviced apartments @ 0.20	-	31 vtph
CCC 68 children	-	54 vtph AM 48 vtph PM
Retail	-	35 vtph AM 174 vtph PM
Total	-	**176 vtph AM 309 vtph PM**

These trips would be distributed IN and OUT movements as follows:

	AM		PM	
	IN	**OUT**	**IN**	**OUT**
	14	73	73	14
	27	27	24	24
	30	5	87	87
Total	**71**	**105**	**184**	**125**

This traffic generation will be very similar to that which occurred when David Jones was operating on the site and the decked carpark was heavily utilised. It is apparent that the proposed development is consistent with that envisaged in the planning for the precinct and that there will not be any unsatisfactory traffic implications.

6. ACCESS, INTERNAL CIRCULATION AND SERVICING

Access

The proposed vehicle access arrangements comprise:

* a 6.0 metre wide combined ingress/egress for the basement carpark connecting through Lot 101 to Lane № 11

* a connection for the loading dock through Lot 101 to Lane № 11.

These accesses will comply with the design requirement of AS 2890.1 and 2 and will accommodate the movement of all vehicles requiring to access the site.

Internal Circulation

The design of the carparking areas and their access connections will comply with the AS 2890.1 criteria with suitable and appropriate ramps, aisles, bays etc. Resident parking spaces will be segregated and secured while the Child Care Centre spaces will be located in a convenient area and signposted for child care centre use during its hours of operation.

Servicing

A loading dock accommodating a HRV vehicle is provided in the south-eastern corner of the building adjacent to the carpark access and refuse will also be removed at this dock. Three bays are provided on Basement Level 1 for small service/ delivery vehicles while service personnel etc will be able to use the retail/visitor parking spaces.

Details of the turning path assessment for these vehicles indicating satisfactory provision are shown on the diagrams in Appendix B.

7. PEDESTRIANS, CYCLISTS AND PUBLIC TRANSPORT

Pedestrians

The proposed development will comply with and facilitate the pedestrian amenity for the Riverside Precinct which includes:

* the future 'Civic Link' along Horwood Place and through the centre of the precinct

* the future lane running along the southern side of the site from Church Street

* the 'public domain edge' running along the northern and eastern side of the proposed building

* the continuous awning running along the western side of the site

* dedication of a strip of land along the northern edge of the site to Council for enhancement of the foreshore park.

Cyclists

Provision will be made on-site for bicycle storage/parking and this will have easy access to Council's bicycle network.

Public Transport

The proposed pedestrian linkages and site access will facilitate use of the existing bus services past the site. The provision of an awning along the western side of the site will provide shelter for the Church Street bus stop while the future implementation of the Civic Link will facilitate access to/from the railway station.

8. CONSTRUCTION

During the construction process B Class hoardings will be erected along the street frontages to maintain these pedestrian movements in a safe and sheltered environment and maintain the existing bus stop activity. The principal vehicle access into the site during the construction process will be along Lane № 11 where traffic controllers will be employed to supervise any vehicle and pedestrian conflicts.

A detailed Construction Traffic Management Plan will be prepared and submitted for approval as part of the Construction Certificate documentation while Traffic Control Plans and appropriate applications will be submitted for hoarding erection and mobile crane use etc.

9. CONCLUSION

This assessment report has examined the traffic, transport and parking implications associated with the proposed construction of a mixed use retail/residential apartment development on part of the Riverside Precinct at Parramatta. The assessment has established that:

* the proposed parking provision will be adequate for the needs of the development and appropriate to the desired constraint on undue traffic generation particularly in a CBD environment where there are excellent public transport services

* the traffic generated by the proposed development will not have any adverse impact on the surrounding road network

* the internal access, parking and servicing provisions have been designed in accordance with all relevant planning controls and standards.

APPENDIX A

TRAFFIC SURVEYS

R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.9415-3971, Fax 9403-5338, Mob.0418-239019

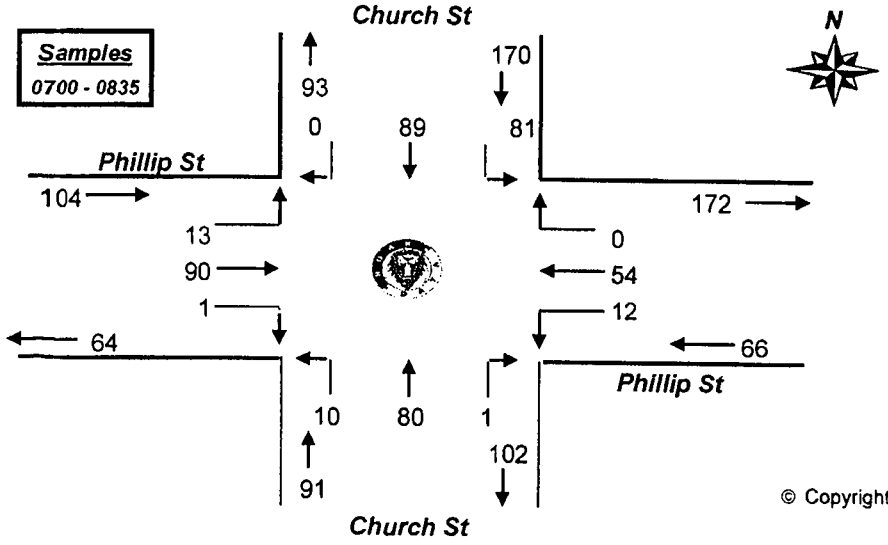
Client : T.T.P.A.
Job No/Name : 3583 PARRAMATTA Phillip St Counts
Day/Date : Friday 6th May 2011

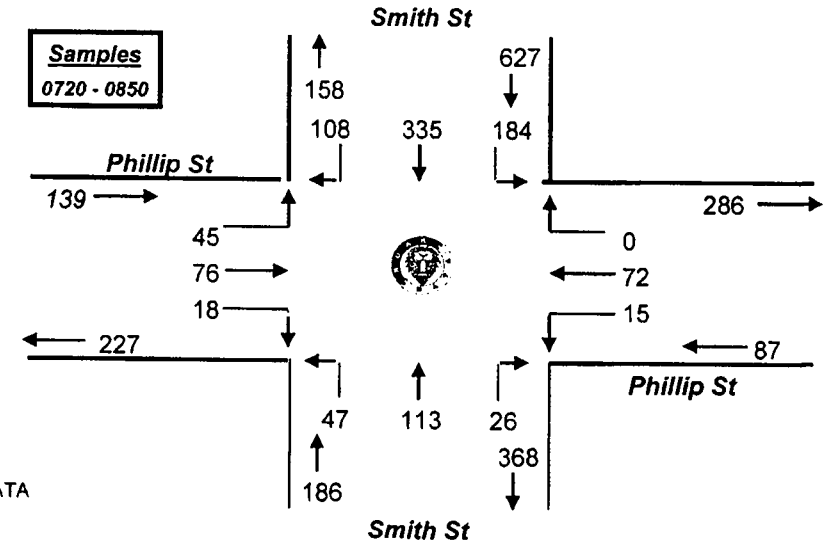
All Vehicles	NORTH Church St			WEST Phillip St			SOUTH Church St			EAST Phillip St			Church St
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0700 - 0715	19	17	0	1	17	0	1	15	0	2	9	0	81
0740 - 0755	31	37	0	6	33	0	2	30	0	5	16	0	160
0820 - 0835	31	35	0	6	40	1	7	35	1	5	29	0	190
Period End	81	89	0	13	90	1	10	80	1	12	54	0	431

All Vehicles	NORTH Smith St			WEST Phillip St			SOUTH Smith St			EAST Phillip St			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
0720 - 0735	51	88	22	14	24	4	10	22	6	3	15	11	270
0800 - 0815	63	136	34	18	25	6	19	41	11	7	31	11	402
0840 - 0855	70	111	52	13	27	8	18	50	9	5	26	21	410
Period End	184	335	108	45	76	18	47	113	26	15	72	43	1082

	NORTH Church St			WEST Phillip St			SOUTH Church St			EAST Phillip St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
Samples	81	89	0	13	90	1	10	80	1	12	54	0	431
PEAK HOUR	81	89	0	13	90	1	10	80	1	12	54	0	431

	NORTH Smith St			WEST Phillip St			SOUTH Smith St			EAST Phillip St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
Samples	184	335	108	45	76	18	47	113	26	15	72	0	1039
PEAK HOUR	184	335	108	45	76	18	47	113	26	15	72	0	1039





R.O.A.R. DATA
Reliable, Original & Authentic Results
Ph.9415-3971, Fax 9403-5338, Mob.0418-239019

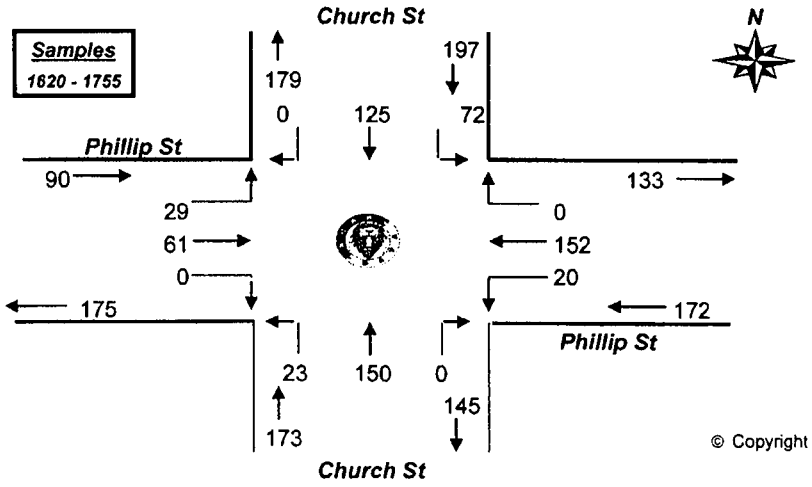
Client : T.T.P.A.
Job No/Name : 3583 PARRAMATTA Phillip St Counts
Day/Date : Friday 6th May 2011

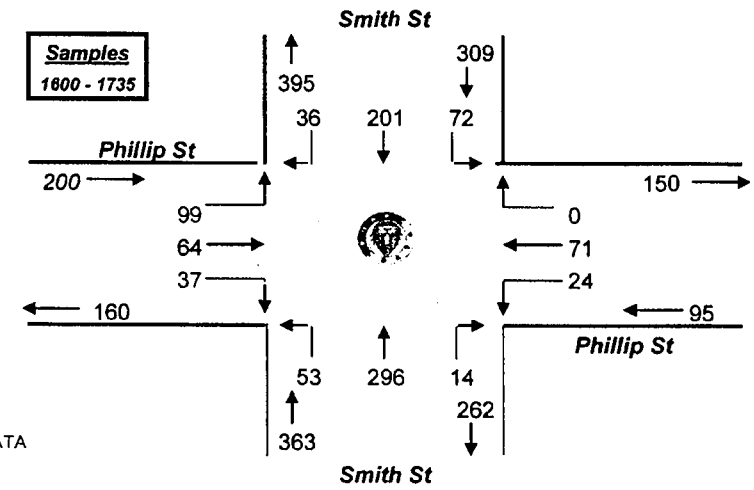
All Vehicles	NORTH Church St			WEST Phillip St			SOUTH Church St			EAST Phillip St			Church St
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1620 - 1635	20	50	0	7	24	0	6	35	0	12	54	0	208
1700 - 1715	22	40	0	13	22	0	8	55	0	4	49	0	213
1740 - 1755	30	35	0	9	15	0	9	60	0	4	49	0	211
Period End	72	125	0	29	61	0	23	150	0	20	152	0	632

All Vehicles	NORTH Smith St			WEST Phillip St			SOUTH Smith St			EAST Phillip St			
Time Per	L	T	R	L	T	R	L	T	R	L	T	R	TOT
1600 - 1615	22	69	10	29	20	10	22	92	2	6	21	42	345
1640 - 1655	21	72	13	27	21	11	14	108	1	8	23	40	359
1720 - 1735	29	60	13	43	23	16	17	96	11	10	27	65	410
Period End	72	201	36	99	64	37	53	296	14	24	71	147	1114

	NORTH Church St			WEST Phillip St			SOUTH Church St			EAST Phillip St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
Samples	72	125	0	29	61	0	23	150	0	20	152	0	632
PEAK HOUR	72	125	0	29	61	0	23	150	0	20	152	0	632

	NORTH Smith St			WEST Phillip St			SOUTH Smith St			EAST Phillip St			
Peak Time	L	T	R	L	T	R	L	T	R	L	T	R	TOT
Samples	72	201	36	99	64	37	53	296	14	24	71	0	967
PEAK HOUR	72	201	36	99	64	37	53	296	14	24	71	0	967





R.O.A.R DATA
Reliable, Original & Authentic Results
Ph.9415 3971, Fax 9403 5338, Mob. 0418 239019

Client : T.T.P.A.
Job No/Name : 3583 PARRAMATTA Phillip St Counts
Day/Date : Friday 6th May 2011

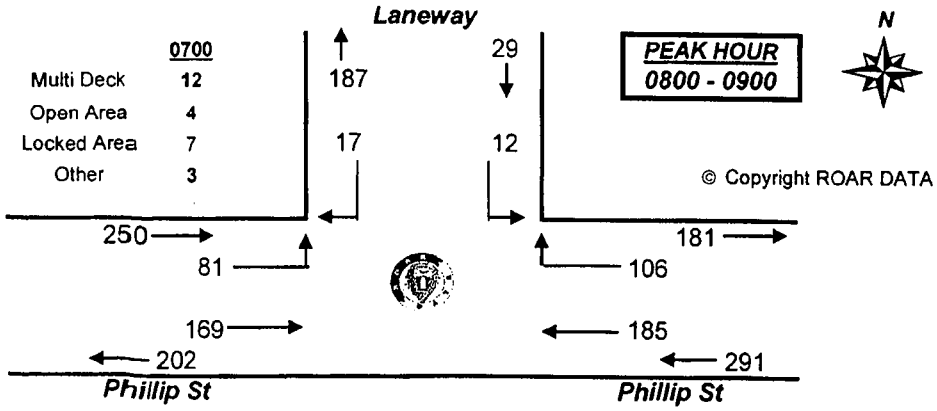
Reliable, Original & Authentic Results
Ph.88196847, Fax 88196849, Mob.0418-239019

Job No/Name : 3583 PARRAMATTA Phillip St Counts
Day/Date : Friday 6th May 2011

All Vehicles

	WEST		NORTH		EAST		
	Phillip St		*Laneway*		*Phillip St*		
Time Per	**L**	**T**	**R**	**L**	**T**	**R**	**TOTAL**
0700 - 0715	8	29	2	2	19	10	**70**
0715 - 0730	16	40	2	5	24	14	**101**
0730 - 0745	14	41	4	1	35	15	**110**
0745 - 0800	17	42	2	6	37	19	**123**
0800 - 0815	16	35	4	3	47	20	**125**
0815 - 0830	24	47	4	3	42	26	**146**
0830 - 0845	23	32	6	2	48	31	**142**
0845 - 0900	18	55	3	4	48	29	**157**
Period End	**136**	**321**	**27**	**26**	**300**	**164**	**974**

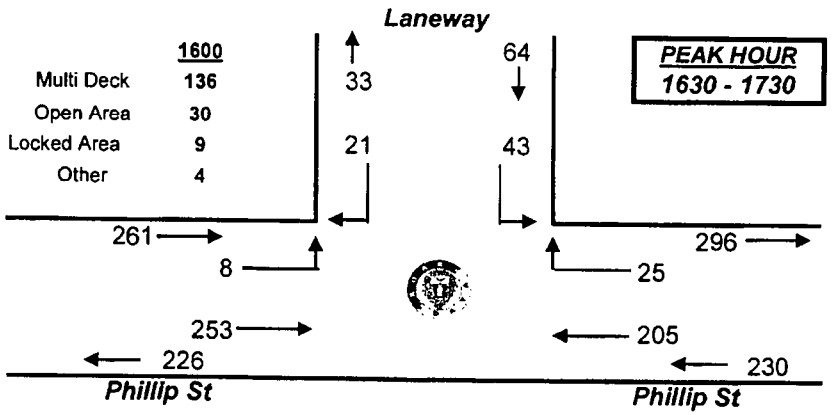
	WEST		NORTH		EAST		
	Phillip St		*Laneway*		*Phillip St*		
Peak Per	**L**	**T**	**R**	**L**	**T**	**R**	**TOTAL**
0700 - 0800	55	152	10	14	115	58	**404**
0715 - 0815	63	158	12	15	143	68	**459**
0730 - 0830	71	165	14	13	161	80	**504**
0745 - 0845	80	156	16	14	174	96	**536**
0800 - 0900	81	169	17	12	185	106	**570**
PEAK HR	**81**	**169**	**17**	**12**	**185**	**106**	**570**



All Vehicles

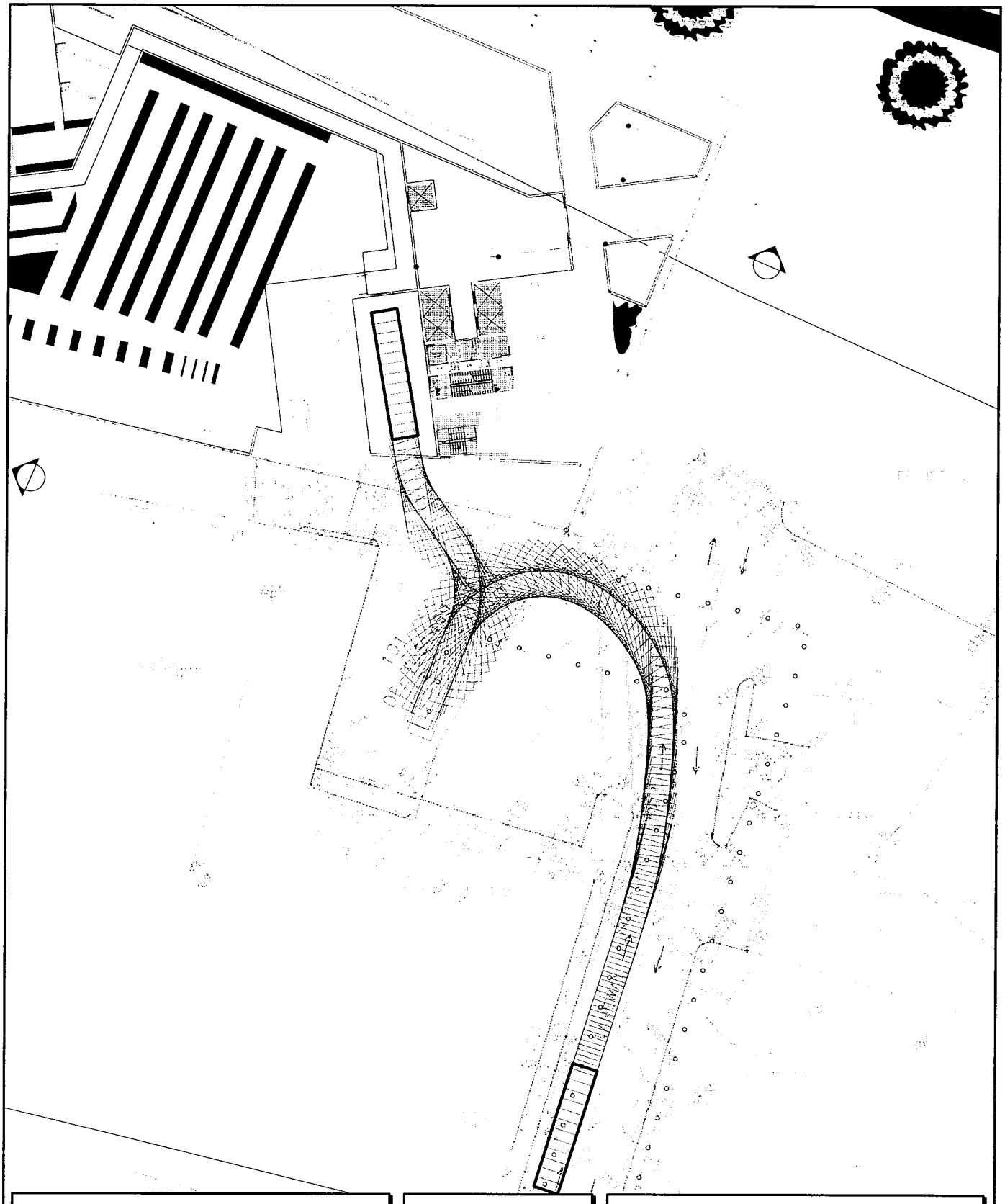
	WEST		NORTH		EAST		
	Phillip St		*Laneway*		*Phillip St*		
Time Per	**L**	**T**	**R**	**L**	**T**	**R**	**TOTAL**
1600 - 1615	56	3	7	8	48	3	**125**
1615 - 1630	5	61	3	10	49	2	**130**
1630 - 1645	4	55	4	15	57	7	**142**
1645 - 1700	4	39	9	8	39	5	**104**
1700 - 1715	0	81	5	14	59	7	**166**
1715 - 1730	0	78	3	6	50	6	**143**
1730 - 1745	8	63	4	7	31	5	**118**
1745 - 1800	11	49	5	8	39	4	**116**
Period End	**88**	**429**	**40**	**76**	**372**	**39**	**1044**

	WEST		NORTH		EAST		
	Phillip St		*Laneway*		*Phillip St*		
Peak Per	**L**	**T**	**R**	**L**	**T**	**R**	**TOTAL**
1600 - 1700	69	158	23	41	193	17	**501**
1615 - 1715	13	236	21	47	204	21	**542**
1630 - 1730	8	253	21	43	205	25	**555**
1645 - 1745	12	261	21	35	179	23	**531**
1700 - 1800	19	271	17	35	179	22	**543**
PEAK HOUR	**8**	**253**	**21**	**43**	**205**	**25**	**555**



APPENDIX B

SWEPT PATH ANALYSIS



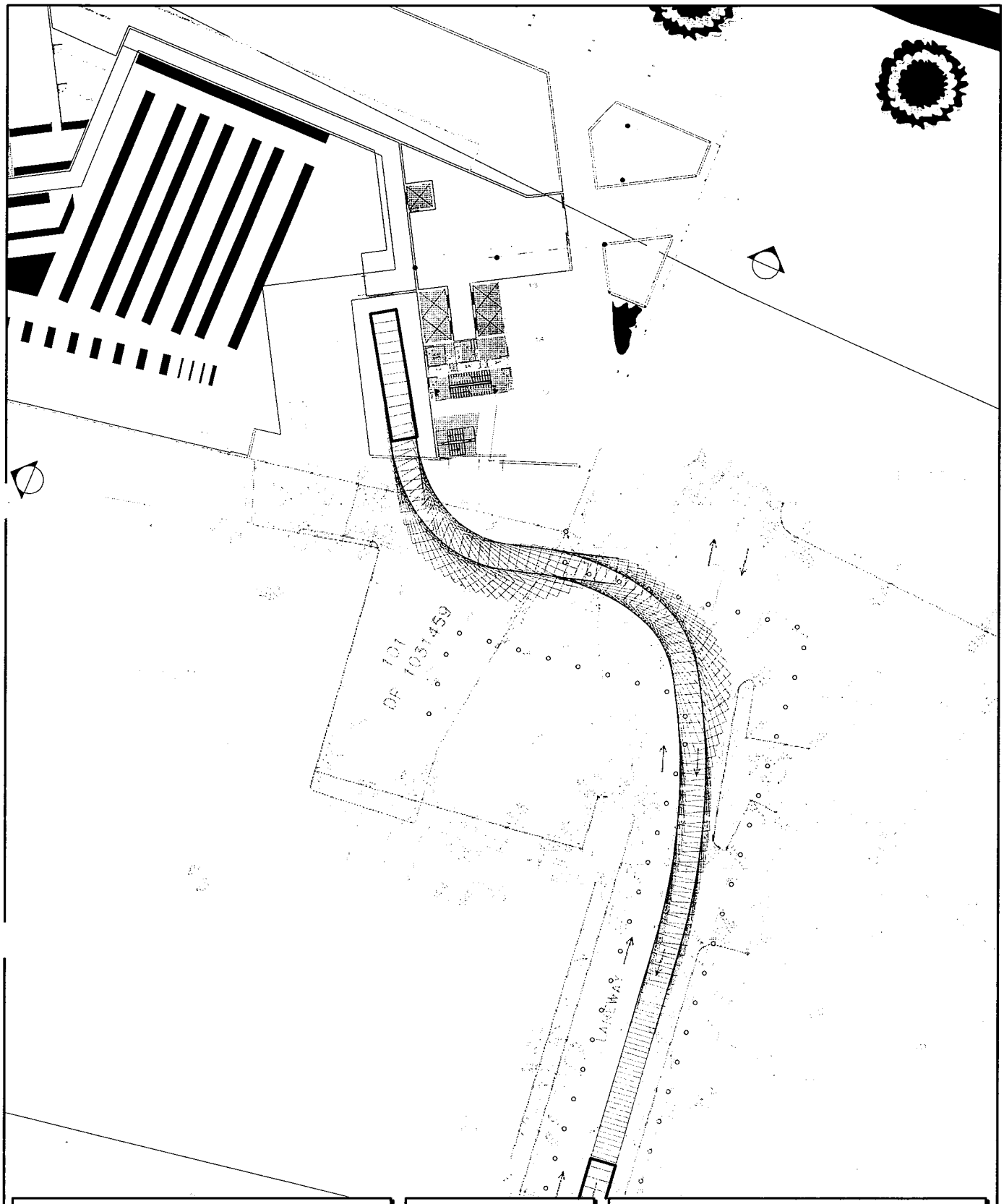
LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2000. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.

N

SWEPT PATH ANALYSIS OF A 12.5m RIGID VEHICLE ENTERING THE SITE

SP 1



LEGEND

This drawing has been prepared using vehicle modelling computer software AutoTrack V5.00a in conjunction with AutoCAD 2000. The vehicle used is based upon vehicle data provided by Austroads and incorporates a reasonable degree of tolerance. However, it is not possible to account for all vehicle types/characteristics and/or driver ability.

N

SWEPT PATH ANALYSIS OF A 12.5m RIGID VEHICLE EXITING THE SITE

SP 2

TRANSPORT AND TRAFFIC PLANNING ASSOCIATES

A division of Monvale Pty Ltd ACN 060 653 125
ABN 44 060 653 125

25 July 2011
Ref: 11022

Mr Tom Hutchinson
Senior Development Planner
Meriton Apartments

Email: tomh@meriton.com.au

Dear Tom

Proposed Development
330 Church Street, Parramatta

I have considered the traffic issues raised in the Department of Planning and Infrastructure letter of 12.7.11 relating to:

- Traffic impact during construction
- Traffic impact on the nearby road network on completion of the development

Construction Traffic

The projected traffic generation of the development on completion and occupation is 176 vtph in the morning peak and 309 vtph in the afternoon peak. Thus the traffic generation during the construction process will be substantially less than the building after completion.

There will be some concentration of truck movements during the excavation process and during major concretes pours. However, there will be a Construction Traffic Management Plan in place to ensure the orderly arrival and departure of trucks and these activities will only occur for relatively short periods of time.

Construction workers who need to drive will inevitably park in the adjacent decked car park and will represent part of the existing traffic generation of that car park (replacing

Suite 502 Level 5 282 Victoria Avenue PO Box 1160 Chatswood NSW 2067 ph (02) 9411 5660 Fax (02) 9904 6622
Email ttpa@ttpa.com.au

that of workers etc involved with the existing uses on the site). The excavation movements will be spread throughout the day and even with allowance for the size of the trucks involved the traffic impact will be less than that of the completed development. The Construction Traffic Management Plan (subject to approval) will nominate the route/s to be taken by trucks and these will avoid unnecessary circulation on the CBD road system (eg Church Street left to Phillip Street into rite/out of rite and Phillip Street left to Wilde Street then Victoria Road).

Development Traffic

The proposed development replaces the earlier David Jones Department Store occupancy of the site and the Riverbank Master plan incorporates removal of the existing 535 space decked car park with a Civic Square (ie the existing traffic generation of the car park will be replaced by the generation of the proposed development albeit that there is apparently no timeframe identified for removal of the car park).

The projected traffic generation as indicated in the Traffic Report will be as follows:

	AM		PM	
	IN	OUT	IN	OUT
	71	105	184	125

The existing uses on the site are two professional services companies (including Landcom) and 2 restaurants (the remainder is now currently vacant). The assessed traffic generation of the existing uses is as follows:

	AM		PM	
	IN	OUT	IN	OUT
	45	5	15	45
Thus Additional	26	100	169	80

The projected distribution of these additional generated movements is as follows:

	IN	OUT
George Street West	20%	-
Marsden Street South	10%	30%
Marsden Street North	-	20%
Church Street North	20%	-
Wilde Street North	20%	20%
Phillip Street East	20%	20%
Smith Street South	10%	10%
	100%	100%

The additional generated movements have been distributed onto the road system and the intersections modelled using SIDRA. The results of the operational performance assessment for the morning and afternoon peak periods are summarised in the following:

	AM		PM	
	LOS	AVD	LOS	AVD
Marsden/Phillip	A	13.6	A	13.9
Church/Phillip	B	26.8	C	30.1
Smith/Phillip	C	30.5	C	37.0
Marsden/George	B	17.9	B	14.9
Church/George	C	34.4	C	35.6
Smith/George	C	40.5	C	37.1

Details of the intersection arrangements and the SIDRA results are appended and the results indicate that a satisfactory operational performance will be maintained at these intersections with the completed development.

Yours faithfully

Ross Nettle
Director
Transport and Traffic Planning Associates

Appendix A

SIDRA ANALYSIS

MOVEMENT SUMMARY

Site: Phillip and Marsden AM

Phillip and Marsden AM
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Marsden Street south											
2	T	518	2.0	0.459	7.7	LOS A	10.4	73.7	0.61	0.54	40.7
3	R	123	2.0	0.251	17.8	LOS B	3.4	24.0	0.75	0.76	34.2
Approach		641	2.0	0.459	9.6	LOS A	10.4	73.7	0.64	0.58	39.3
East: Phillip Street east											
4	L	114	2.0	0.152	17.2	LOS B	3.1	21.7	0.65	0.72	30.6
6	R	61	2.0	0.292	33.5	LOS C	2.6	18.5	0.95	0.75	24.6
Approach		175	2.0	0.292	22.9	LOS B	3.1	21.7	0.76	0.73	28.2
North: Marsden Street north											
7	L	64	2.0	0.215	18.7	LOS B	1.9	13.3	0.67	0.71	33.6
8	T	351	2.0	0.481	15.3	LOS B	9.6	68.5	0.80	0.69	35.0
Approach		415	2.0	0.481	15.9	LOS B	9.6	68.5	0.78	0.69	34.8
All Vehicles		1231	2.0	0.481	13.6	LOS A	10.4	73.7	0.70	0.64	35.7

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	63	24.3	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	63	16.1	LOS B	0.1	0.1	0.73	0.73
P5	Across N approach	63	24.3	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		189	21.6				0.84	0.84

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Phillip and Marsden PM

Phillip and Marsden AM
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Marsden Street south											
2	T	640	2.0	0.567	8.4	LOS A	13.3	94.5	0.67	0.60	39.9
3	R	123	2.0	0.231	17.7	LOS B	3.4	23.9	0.75	0.75	34.2
Approach		763	2.0	0.567	9.9	LOS A	13.3	94.5	0.68	0.62	38.9
East: Phillip Street east											
4	L	256	2.0	0.316	16.9	LOS B	6.4	45.7	0.68	0.75	30.7
6	R	60	2.0	0.287	33.4	LOS C	2.6	18.2	0.95	0.74	24.6
Approach		316	2.0	0.316	20.0	LOS B	6.4	45.7	0.73	0.75	29.3
North: Marsden Street north											
7	L	39	2.0	0.136	19.9	LOS B	1.2	8.5	0.70	0.70	33.0
8	T	324	2.0	0.487	16.8	LOS B	9.3	66.3	0.83	0.71	34.1
Approach		363	2.0	0.487	17.2	LOS B	9.3	66.3	0.82	0.71	34.0
All Vehicles		1442	2.0	0.567	13.9	LOS A	13.3	94.5	0.73	0.67	35.1

Level of Service (Aver. Int. Delay): LOS A. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	63	24.3	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	63	17.6	LOS B	0.1	0.1	0.77	0.77
P5	Across N approach	63	24.3	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		189	22.1				0.86	0.86

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Phillip and Church AM

Phillip and Church
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church Street south											
1	L	19	2.0	0.344	25.8	LOS B	5.4	38.1	0.88	0.79	26.8
2	T	137	2.0	0.344	21.3	LOS B	5.4	38.1	0.88	0.71	27.0
Approach		156	2.0	0.344	21.9	LOS B	5.4	38.1	0.88	0.72	27.0
East: Phillip Street east											
4	L	21	2.0	0.652	33.6	LOS C	6.7	47.7	1.00	0.86	24.4
5	T	147	2.0	0.654	29.1	LOS C	6.7	47.7	1.00	0.86	24.3
Approach		168	2.0	0.654	29.7	LOS C	6.7	47.7	1.00	0.86	24.3
North: Church Street north											
7	L	136	2.0	0.655	28.4	LOS B	9.8	69.7	0.96	0.86	25.8
8	T	152	2.0	0.656	23.9	LOS B	9.8	69.7	0.96	0.84	25.8
Approach		287	2.0	0.655	26.0	LOS B	9.8	69.7	0.96	0.85	25.8
West: Phillip Street west											
10	L	25	2.0	0.106	30.4	LOS C	1.1	7.6	0.91	0.70	24.8
11	T	162	2.0	0.652	29.2	LOS C	6.5	46.2	1.00	0.86	24.4
Approach		187	2.0	0.652	29.3	LOS C	6.5	46.2	0.98	0.84	24.4
All Vehicles		799	2.0	0.655	26.8	LOS B	9.8	69.7	0.96	0.82	25.4

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P5	Across N approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P7	Across W approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		212	24.3				0.90	0.90

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Phillip and Church PM

Phillip and Church
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church Street south											
1	L	36	2.0	0.716	31.2	LOS C	10.0	71.2	0.99	0.92	25.1
2	T	242	2.0	0.715	26.7	LOS B	10.0	71.2	0.99	0.91	25.1
Approach		278	2.0	0.716	27.3	LOS B	10.0	71.2	0.99	0.91	25.1
East: Phillip Street east											
4	L	17	2.0	0.849	37.7	LOS C	11.0	78.0	1.00	1.09	23.2
5	T	257	2.0	0.847	33.2	LOS C	11.0	78.0	1.00	1.09	23.2
Approach		274	2.0	0.847	33.5	LOS C	11.0	78.0	1.00	1.09	23.2
North: Church Street north											
7	L	145	2.0	0.807	34.4	LOS C	11.4	81.4	1.00	1.02	23.9
8	T	158	2.0	0.806	29.9	LOS C	11.4	81.4	1.00	1.02	23.9
Approach		303	2.0	0.807	32.0	LOS C	11.4	81.4	1.00	1.02	23.9
West: Phillip Street west											
10	L	46	2.0	0.155	28.6	LOS C	1.8	13.1	0.89	0.72	25.4
11	T	131	2.0	0.420	25.4	LOS B	5.0	35.4	0.94	0.74	25.6
Approach		177	2.0	0.420	26.2	LOS B	5.0	35.4	0.93	0.74	25.6
All Vehicles		1032	2.0	0.847	30.1	LOS C	11.4	81.4	0.98	0.96	24.3

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P3	Across E approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P5	Across N approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
P7	Across W approach	53	24.3	LOS C	0.1	0.1	0.90	0.90
All Pedestrians		212	24.3				0.90	0.90

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Phillip and Smith AM

Phillip, Smith and Wilde
Signals - Fixed Time Cycle Time = 90 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Smith Street											
1	L	81	2.0	0.438	42.5	LOS D	6.4	45.4	0.89	0.79	24.3
2	T	192	2.0	0.437	36.6	LOS C	7.3	52.2	0.90	0.72	25.5
3	R	42	2.0	0.165	25.9	LOS B	1.6	11.7	0.81	0.71	30.0
Approach		315	2.0	0.437	36.7	LOS C	7.3	52.2	0.88	0.74	25.7
East: Phillip Street east											
4	L	25	2.0	0.320	39.2	LOS C	6.1	43.6	0.90	0.79	23.4
5	T	125	2.0	0.321	34.5	LOS C	6.1	43.6	0.90	0.72	22.8
6	R	67	2.0	0.321	41.7	LOS C	5.3	37.9	0.92	0.77	22.6
Approach		218	2.0	0.321	37.3	LOS C	6.1	43.6	0.91	0.74	22.8
North: Wilde Avenue											
7	L	280	2.0	0.701	25.9	LOS B	13.0	92.3	0.91	0.90	30.4
8	T	520	2.0	0.701	28.4	LOS B	17.2	122.5	0.94	0.83	28.3
9	R	186	2.0	0.522	24.4	LOS B	6.9	49.5	0.82	0.77	30.7
Approach		986	2.0	0.701	26.9	LOS B	17.2	122.5	0.91	0.84	29.3
West: Phillip Street west											
10	L	86	2.0	0.428	24.6	LOS B	4.4	31.7	0.93	0.78	27.8
11	T	131	2.0	0.428	30.8	LOS C	6.4	45.3	0.95	0.75	23.7
12	R	40	2.0	0.427	44.3	LOS D	6.4	45.3	0.96	0.78	22.1
Approach		257	2.0	0.428	30.8	LOS C	6.4	45.3	0.94	0.77	24.7
All Vehicles		1776	2.0	0.701	30.5	LOS C	17.2	122.5	0.91	0.80	26.9

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	105	39.2	LOS D	0.3	0.3	0.93	0.93
P3	Across E approach	105	29.6	LOS C	0.2	0.2	0.81	0.81
P5	Across N approach	105	39.2	LOS D	0.3	0.3	0.93	0.93
P7	Across W approach	105	39.2	LOS D	0.3	0.3	0.93	0.93
All Pedestrians		420	36.8				0.90	0.90

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Phillip and Smith PM

Phillip, Smith and Wilde
Signals - Fixed Time Cycle Time = 100 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Smith Street											
1	L	82	2.0	0.737	49.4	LOS D	13.1	93.5	0.97	0.88	22.7
2	T	429	2.0	0.738	43.5	LOS D	14.0	100.0	0.97	0.86	23.4
3	R	25	2.0	0.107	26.8	LOS B	1.1	7.7	0.71	0.67	29.6
Approach		537	2.0	0.738	43.6	LOS D	14.0	100.0	0.96	0.86	23.5
East: Phillip Street east											
4	L	38	2.0	0.340	36.4	LOS C	8.7	61.9	0.84	0.80	24.1
5	T	141	2.0	0.340	31.0	LOS C	8.7	61.9	0.84	0.69	23.8
6	R	326	2.0	0.746	45.5	LOS D	16.8	119.5	0.98	0.89	21.6
Approach		505	2.0	0.746	40.8	LOS C	16.8	119.5	0.93	0.83	22.4
North: Wilde Avenue											
7	L	105	2.0	0.344	21.6	LOS B	6.1	43.7	0.80	0.80	32.7
8	T	278	2.0	0.344	25.6	LOS B	9.2	65.8	0.82	0.68	29.6
9	R	91	2.0	0.280	27.2	LOS B	3.9	28.0	0.84	0.75	29.4
Approach		474	2.0	0.344	25.0	LOS B	9.2	65.8	0.82	0.72	30.2
West: Phillip Street west											
10	L	168	2.0	0.702	29.2	LOS C	7.3	52.0	0.99	0.85	26.1
11	T	109	2.0	0.702	39.9	LOS C	8.3	59.4	1.00	0.86	21.3
12	R	65	2.0	0.703	55.8	LOS D	8.3	59.4	1.00	0.87	19.7
Approach		343	2.0	0.702	37.7	LOS C	8.3	59.4	1.00	0.86	23.0
All Vehicles		1859	2.0	0.746	37.0	LOS C	16.8	119.5	0.92	0.81	24.4

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	105	35.3	LOS D	0.3	0.3	0.84	0.84
P3	Across E approach	105	32.0	LOS D	0.2	0.2	0.80	0.80
P5	Across N approach	105	35.3	LOS D	0.3	0.3	0.84	0.84
P7	Across W approach	105	41.4	LOS E	0.3	0.3	0.91	0.91
All Pedestrians		420	36.0				0.85	0.85

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: George and Marsden AM

George and Marsden Streets
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Marsden Street south											
2	T	422	2.0	0.385	5.1	LOS A	5.8	41.0	0.37	0.32	43.5
3	R	222	2.0	0.521	22.1	LOS B	6.2	44.0	0.80	0.81	32.6
Approach		644	2.0	0.521	10.9	LOS A	6.2	44.0	0.52	0.49	39.0
North: Marsden Street north											
7	L	47	2.0	0.088	19.1	LOS B	1.2	8.3	0.56	0.70	34.3
8	T	426	2.0	0.604	15.8	LOS B	10.9	77.8	0.77	0.67	34.8
Approach		474	2.0	0.604	16.1	LOS B	10.9	77.8	0.75	0.67	34.7
West: George Street west											
10	L	206	2.0	0.605	30.1	LOS C	7.4	52.7	0.94	0.83	29.0
11	T	581	2.0	0.472	22.2	LOS B	7.1	50.9	0.91	0.75	31.1
12	R	39	2.0	0.472	28.9	LOS C	6.8	48.5	0.91	0.83	30.5
Approach		826	2.0	0.605	24.5	LOS B	7.4	52.7	0.92	0.77	30.5
All Vehicles		1944	2.0	0.605	17.9	LOS B	10.9	77.8	0.75	0.65	34.0

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	105	23.4	LOS C	0.2	0.2	0.88	0.88
P3	Across E approach	105	19.2	LOS B	0.1	0.1	0.80	0.80
P5	Across N approach	105	23.4	LOS C	0.2	0.2	0.88	0.88
P7	Across W approach	105	10.8	LOS B	0.1	0.1	0.60	0.60
All Pedestrians		420	19.2				0.79	0.79

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: George and Marsden PM

George and Marsden Streets
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Marsden Street south											
2	T	719	2.0	0.637	5.5	LOS A	11.0	78.4	0.47	0.43	42.8
3	R	191	2.0	0.426	21.5	LOS B	5.2	36.8	0.76	0.79	32.9
Approach		909	2.0	0.637	8.9	LOS A	11.0	78.4	0.53	0.50	40.3
North: Marsden Street north											
7	L	37	2.0	0.068	19.0	LOS B	0.9	6.4	0.55	0.69	34.3
8	T	447	2.0	0.634	16.0	LOS B	11.6	82.4	0.79	0.68	34.6
Approach		484	2.0	0.634	16.2	LOS B	11.6	82.4	0.77	0.68	34.6
West: George Street west											
10	L	106	2.0	0.336	29.0	LOS C	3.9	28.0	0.89	0.77	29.5
11	T	299	2.0	0.329	22.2	LOS B	4.8	34.4	0.89	0.71	31.1
12	R	84	2.0	0.329	29.1	LOS C	4.1	28.8	0.88	0.78	29.6
Approach		489	2.0	0.336	24.8	LOS B	4.8	34.4	0.89	0.73	30.5
All Vehicles		1883	2.0	0.637	14.9	LOS B	11.6	82.4	0.69	0.61	35.8

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	105	24.3	LOS C	0.2	0.2	0.90	0.90
P3	Across E approach	105	19.2	LOS B	0.1	0.1	0.80	0.80
P5	Across N approach	105	24.3	LOS C	0.2	0.2	0.90	0.90
P7	Across W approach	105	10.2	LOS B	0.1	0.1	0.58	0.58
All Pedestrians		420	19.5				0.80	0.80

Level of Service (Aver. Int. Delay): LOS B. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: George and Church AM

George and Church Streets
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church Street south											
2	T	67	2.0	0.400	35.1	LOS C	3.4	24.1	0.98	0.74	22.7
3	R	37	2.0	0.230	40.7	LOS C	1.9	13.6	0.97	0.72	22.6
Approach		104	2.0	0.400	37.1	LOS C	3.4	24.1	0.98	0.74	22.7
North: Church Street north											
7	L	118	2.0	0.751	43.9	LOS D	6.0	42.4	1.00	0.92	21.9
Approach		118	2.0	0.751	43.9	LOS D	6.0	42.4	1.00	0.92	21.9
West: George Street west											
10	L	87	2.0	0.166	17.3	LOS B	2.1	14.7	0.69	0.71	34.5
11	T	643	2.0	0.840	34.5	LOS C	13.5	95.8	1.00	0.99	26.2
Approach		731	2.0	0.840	32.5	LOS C	13.5	95.8	0.96	0.95	27.0
All Vehicles		953	2.0	0.840	34.4	LOS C	13.5	95.8	0.97	0.93	25.7

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	105	29.3	LOS C	0.2	0.2	0.91	0.91
P3	Across E approach	105	29.3	LOS C	0.2	0.2	0.91	0.91
P5	Across N approach	105	29.3	LOS C	0.2	0.2	0.91	0.91
P7	Across W approach	105	29.3	LOS C	0.2	0.2	0.91	0.91
All Pedestrians		420	29.3				0.91	0.91

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: George and Church PM

George and Church Streets
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Church Street south											
2	T	106	2.0	0.631	36.6	LOS C	5.3	37.4	1.00	0.83	22.3
3	R	39	2.0	0.243	40.8	LOS C	2.0	14.3	0.97	0.73	22.6
Approach		145	2.0	0.631	37.7	LOS C	5.3	37.4	0.99	0.80	22.4
North: Church Street north											
7	L	214	2.0	0.817	42.8	LOS D	9.9	70.2	1.00	1.00	22.2
Approach		214	2.0	0.817	42.8	LOS D	9.9	70.2	1.00	1.00	22.2
West: George Street west											
10	L	96	2.0	0.182	17.1	LOS B	2.2	15.6	0.70	0.72	34.6
11	T	435	2.0	0.795	35.5	LOS C	9.7	68.8	1.00	0.93	25.9
Approach		531	2.0	0.795	32.2	LOS C	9.7	68.8	0.95	0.89	27.1
All Vehicles		889	2.0	0.817	35.6	LOS C	9.9	70.2	0.97	0.90	24.9

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	105	29.3	LOS C	0.2	0.2	0.91	0.91
P3	Across E approach	105	29.3	LOS C	0.2	0.2	0.91	0.91
P5	Across N approach	105	29.3	LOS C	0.2	0.2	0.91	0.91
P7	Across W approach	105	29.3	LOS C	0.2	0.2	0.91	0.91
All Pedestrians		420	29.3				0.91	0.91

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS C. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: George and Smith AM

George and Smith Streets
Signals - Fixed Time Cycle Time = 90 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Smith Street south											
2	T	142	2.0	0.157	18.8	LOS B	3.8	26.8	0.57	0.45	33.4
3	R	177	2.0	0.769	49.1	LOS D	9.4	66.8	1.00	0.97	22.9
Approach		319	2.0	0.770	35.6	LOS C	9.4	66.8	0.81	0.74	26.6
North: Smith Street north											
7	L	205	2.0	0.748	43.2	LOS D	15.0	106.5	0.95	0.88	24.8
8	T	449	2.0	0.748	36.7	LOS C	15.1	107.4	0.95	0.86	25.4
Approach		655	2.0	0.748	38.8	LOS C	15.1	107.4	0.95	0.86	25.2
West: George Street west											
10	L	82	2.0	0.268	42.6	LOS D	4.5	32.1	0.91	0.76	24.7
11	T	455	2.0	0.746	41.8	LOS C	12.2	86.9	1.00	0.91	23.9
12	R	244	2.0	0.746	48.5	LOS D	12.2	86.7	1.00	0.89	23.1
Approach		781	2.0	0.746	44.0	LOS D	12.2	86.9	0.99	0.89	23.7
All Vehicles		1755	2.0	0.770	40.5	LOS C	15.1	107.4	0.94	0.85	24.8

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	105	39.2	LOS D	0.3	0.3	0.93	0.93
P3	Across E approach	105	39.2	LOS D	0.3	0.3	0.93	0.93
P5	Across N approach	105	39.2	LOS D	0.3	0.3	0.93	0.93
P7	Across W approach	105	39.2	LOS D	0.3	0.3	0.93	0.93
All Pedestrians		420	39.2				0.93	0.93

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: George and Smith PM

George and Smith Streets
Signals - Fixed Time Cycle Time = 80 seconds (Practical Cycle Time)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Smith Street south											
2	T	407	2.0	0.508	22.3	LOS B	10.7	75.9	0.74	0.62	31.4
3	R	202	2.0	0.758	43.7	LOS D	9.3	66.1	0.99	0.98	24.4
Approach		609	2.0	0.758	29.4	LOS C	10.7	75.9	0.82	0.74	28.6
North: Smith Street north											
7	L	118	2.0	0.731	43.5	LOS D	10.4	73.9	0.98	0.88	24.8
8	T	328	2.0	0.731	37.1	LOS C	10.4	74.2	0.98	0.87	25.2
Approach		446	2.0	0.731	38.8	LOS C	10.4	74.2	0.98	0.87	25.1
West: George Street west											
10	L	146	2.0	0.530	41.8	LOS C	7.1	50.8	0.97	0.80	24.9
11	T	433	2.0	0.778	39.8	LOS C	10.9	77.4	1.00	0.94	24.5
12	R	224	2.0	0.778	46.5	LOS D	10.9	77.3	1.00	0.92	23.6
Approach		803	2.0	0.778	42.0	LOS C	10.9	77.4	0.99	0.91	24.3
All Vehicles		1859	2.0	0.778	37.1	LOS C	10.9	77.4	0.94	0.84	25.8

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS D. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	105	34.2	LOS D	0.2	0.2	0.93	0.93
P3	Across E approach	105	34.2	LOS D	0.2	0.2	0.93	0.93
P5	Across N approach	105	34.2	LOS D	0.2	0.2	0.93	0.93
P7	Across W approach	105	34.2	LOS D	0.2	0.2	0.93	0.93
All Pedestrians		420	34.2				0.93	0.93

Level of Service (Aver. Int. Delay): LOS D. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS D. LOS Method for individual pedestrian movements: Delay (HCM).