

**TRAFFIC AND PARKING REPORT
FOR PROPOSED
MIXED USE DEVELOPMENT
STAGE 1-CENTRE (23-31 TREACY STREET)
AND ULTIMATE DEVELOPMENT
AT
21-35 TREACY STREET, HURSTVILLE**

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CONTENTS

1.0 INTRODUCTION

- 1.1 Background
- 1.2 Scope of Report

2.0 EXISTING TRAFFIC CONDITIONS

- 2.1 Existing Road Network
- 2.2 Road Inventory and Parking
- 2.3 Existing Peak Hour Traffic Volumes
- 2.4 Intersection Performance
- 2.5 Current Uses of Existing Site
- 2.6 Vehicle Driveway Access to Site
- 2.7 Public Transport
- 2.8 Bicycle Lanes in CBD

3.0 TRANSPORT AND TRAFFIC ISSUES TO BE ADDRESSED

- 3.1 Director General's Requirements
- 3.2 RTA's Requirements

4.0 TRAFFIC EFFECTS OF PROPOSED DEVELOPMENT-ULTIMATE

- 4.1 Floor Areas and Uses
- 4.2 Estimated Residential and Workforce Population
- 4.3 Car Parking Requirements and Provision
- 4.4 Bicycle Storage Facilities
- 4.5 Internal Parking Layout Design and Circulation
- 4.6 Estimated Traffic Generation
- 4.7 Intersection Performance
- 4.8 Delivery / Service Vehicles
- 4.9 Traffic Impacts During Construction

5.0 TRAFFIC EFFECTS OF PROPOSED DEVELOPMENT-STAGE 1

- 5.1 Floor Areas and Uses
- 5.2 Estimated Residential and Workforce Population
- 5.3 Car Parking Requirements and Provision
- 5.4 Bicycle Storage Facilities
- 5.5 Number of Accessible Parking Spaces and Parking Required for People with a Disability.
- 5.6 Internal Parking Layout Design and Circulation
- 5.7 Estimated Traffic Generation
- 5.8 Intersection Performance
- 5.9 Delivery / Service Vehicles
- 5.10 Traffic Impacts During Construction

APPENDICES

Appendix A

Stanisic Associates Drawings Revision B:-

Drawing No.	Title.
CD04	Basement 4A/4B
CD05	Basement 3A/3B
CD06	Basement 2A/2B
CD07	Basement 1A/1B
CD08	Basement 1C
CD09	Ground Floor
CD10	Upper Ground Floor

Appendix B: Not required.

Appendix C: Hurstville CBD Parking Map

Appendix D: Driveway to Basement 1A and Service Driveway - Plans and Longitudinal Sections

Drawing No.	Title.
1128-13-S1	Plan of Driveway to Basement 1A
1128-13-S2	Longitudinal Sections on Driveway to Basement 1A
1128-13-S3	Plan of Service Driveway
1128-13-S4	Longitudinal Sections on Service Driveway

Appendix E: Traffic Control Management Plans

1128-1-13-S1	Legend and Notes
1128-1-13-S2	Stage 1 TCP
1128-1-13 -S3	Stages 2-3 TCP

1.0 INTRODUCTION

1.1 Background

An application was made by Earljest Pty Ltd for approval of a concept plan for a mixed use development at 21 – 35 Treacy Street, Hurstville under Part 3A of the EP and A Act. A traffic report was prepared by this firm in support of this application, report No 31/11.

The concept plan was referred to the Planning and Assessment Commission for determination under delegation by the Minister of Planning and Infrastructure. The Concept Plan was approved on 1st July 2011.

A modified concept plan under S75W was prepared and submitted in May 2012 with Report No 14/12. The modification MP10_0101Mod 1 was approved under delegation by the Minister on 4th September 2012.

This traffic report No. 4/13 has been prepared in support of an application for approval of a second modification of the concept under Section 75W for Stage 1-Centre and the Ultimate Development which includes Stage East and Stage West

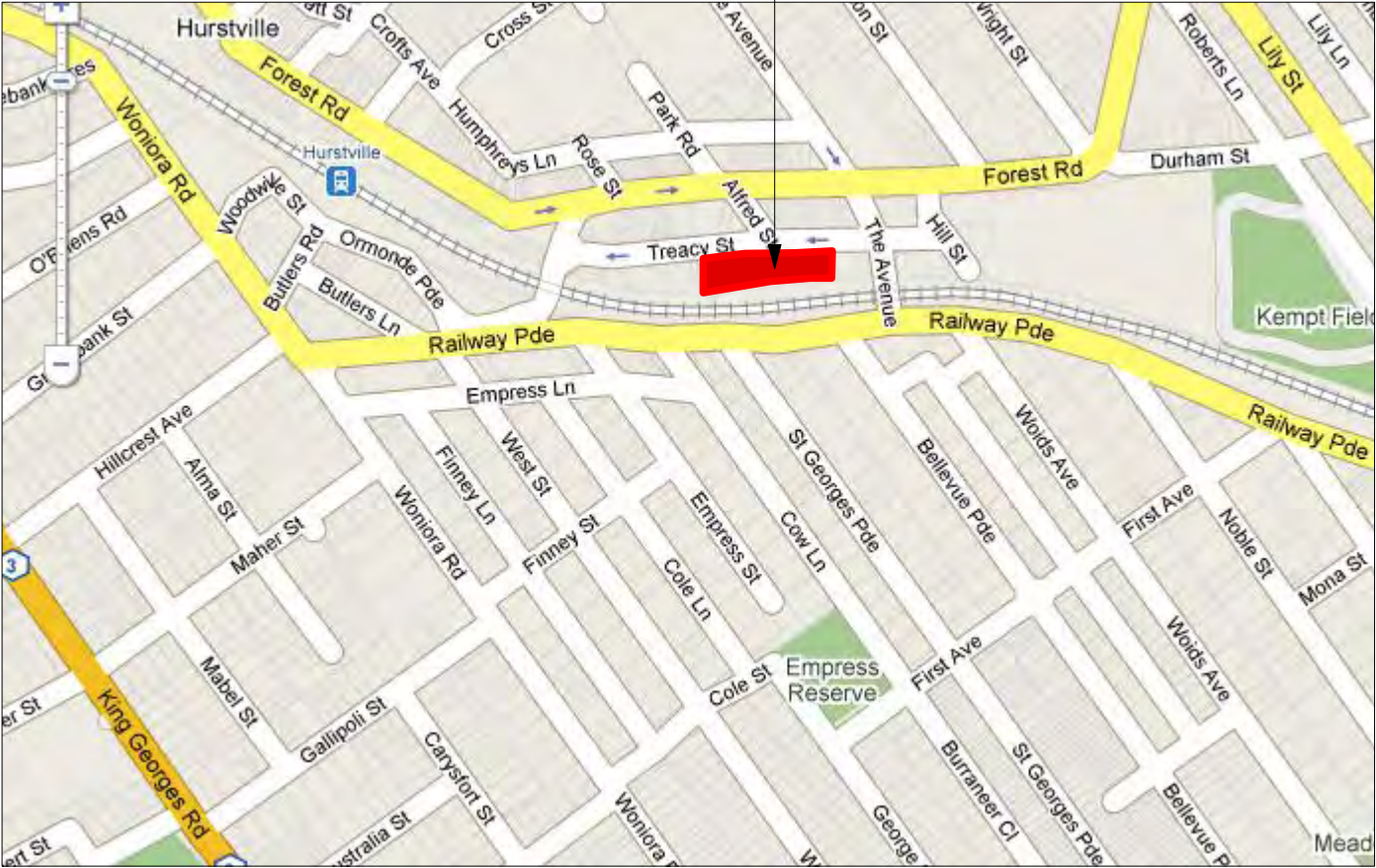
The site is shown in **Figure 1 Locality Plan**. The Lot numbers and D.P.'s are shown in **Figure 2**.

1.2 Scope of Report

This report addresses the traffic and parking issues arising from the Stage 1 and Ultimate Stages of the proposed development.

- Review of the parking provision for loading spaces for Stage 1 Centre and Ultimate Development.
- Review in detail, the car parking layout, aisle widths, car parking bay dimensions and access to the loading dock area and lower basement car parking levels. Also include future access provisions for Stage West and Stage East.
- Review access and egress entry points.
- Calculate the Traffic Generation from the Ultimate proposed development and assign the traffic generation to the road network. Analysis of the intersections using SIDRA for the Ultimate Development and Stage – 1 Centre.
- Traffic Control Plans for Construction – Stage 1-Centre have been prepared and included in the report.

PROPOSED DEVELOPMENT
SITE 21-35 TREACY STREET



IN & OUT CHILDRE
& COMMUNITY
PARKING & SMALL
LOADING BAY

AERIAL LOCALITY MAP

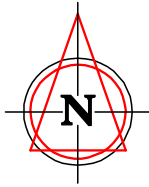


FIGURE 1: LOCALITY PLAN

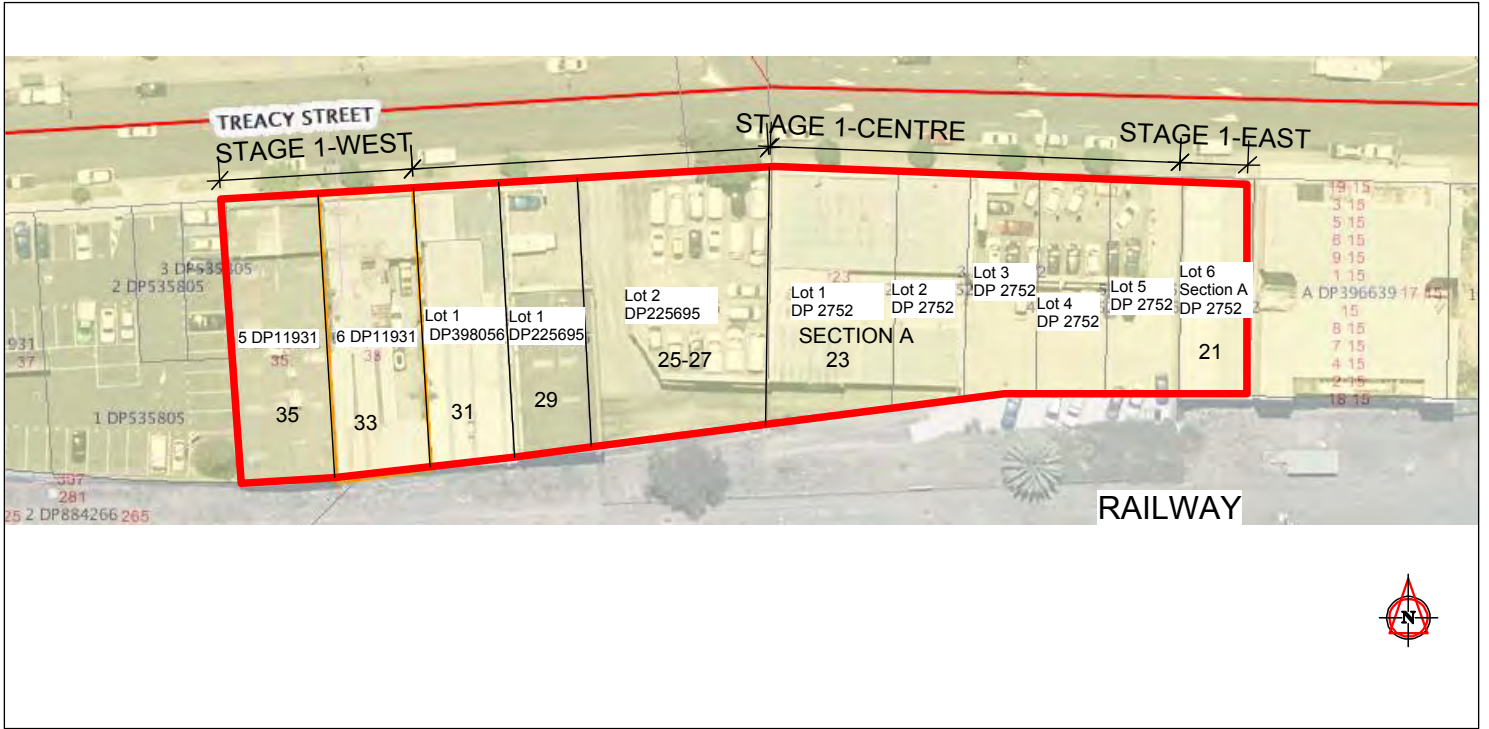


FIGURE 2: CADASTRAL PLAN

1.2 (Continued)

In preparing this report we have reviewed the following documents:-

- Commissions Determination Report dated 1st July 2011
- Better Transport and Livable Cities. NSW State Plan 2010.
- Annual Performance Report 2010 NSW State Plan
- NSW Government's Metropolitan Strategy – South West Sub-region November 2007.
- Hurstville Council's DCP No 2
- Minister's approval of modification MP10_0101MOD1 dated 4/9/2012.

2.0 EXISTING TRAFFIC CONDITIONS

2.1 Existing Road Network

The site has a frontage of approximately **132** metres to Treacy Street and backs onto the Illawarra Railway Line. The site is located in the Hurstville CBD and is approximately **400** metres from Hurstville Railway Station.

Forest Road and Treacy Street are the main east-west access roads and are classified as local roads. The north-south access roads are The Avenue which intersects with Forest Road and Treacy Street and passes under the Illawarra Railway Line to Railway Parade in Kogarah and Park Road. Forest Road south of Queens Road is one way south. Treacy Street at its western end connects to Forest Road and passes over the railway line and connects to Railway Parade.

The Avenue is one-way south and Park Road is one-way north forming a one-way pair. PJ Road and Treacy Street is one-way west and forms a one-way pair with Forest Road. Forest Road carries two-way traffic between PJ Road and Park Road. Half hour short stay parking is signposted in Treacy Street and Forest Road from **8:30am** to **6:00pm** Monday to Friday except for Forest Road eastbound between Park Road and The Avenue where parking is banned from **6:00am** to **10:00am** and from **3:00pm** to **7:00pm** Monday to Friday. 'No Stopping' is signposted in Alfred Street and The Avenue between Forest Road and Treacy Street.

The intersection of PJ Road and Treacy Street is controlled by "Give Way" signs. The intersections at Treacy Street / The Avenue, Forest Road / Park Road and Forest Road / The Avenue are controlled by traffic signals. The tee intersection of Treacy Street and Forest Road is controlled by stop signs on the Treacy Street approach. Pedestrian movements at the signalized intersections are signalized.

The road inventory and number of traffic lanes are illustrated in **Figure 3**.

2.2 Road Inventory and Parking

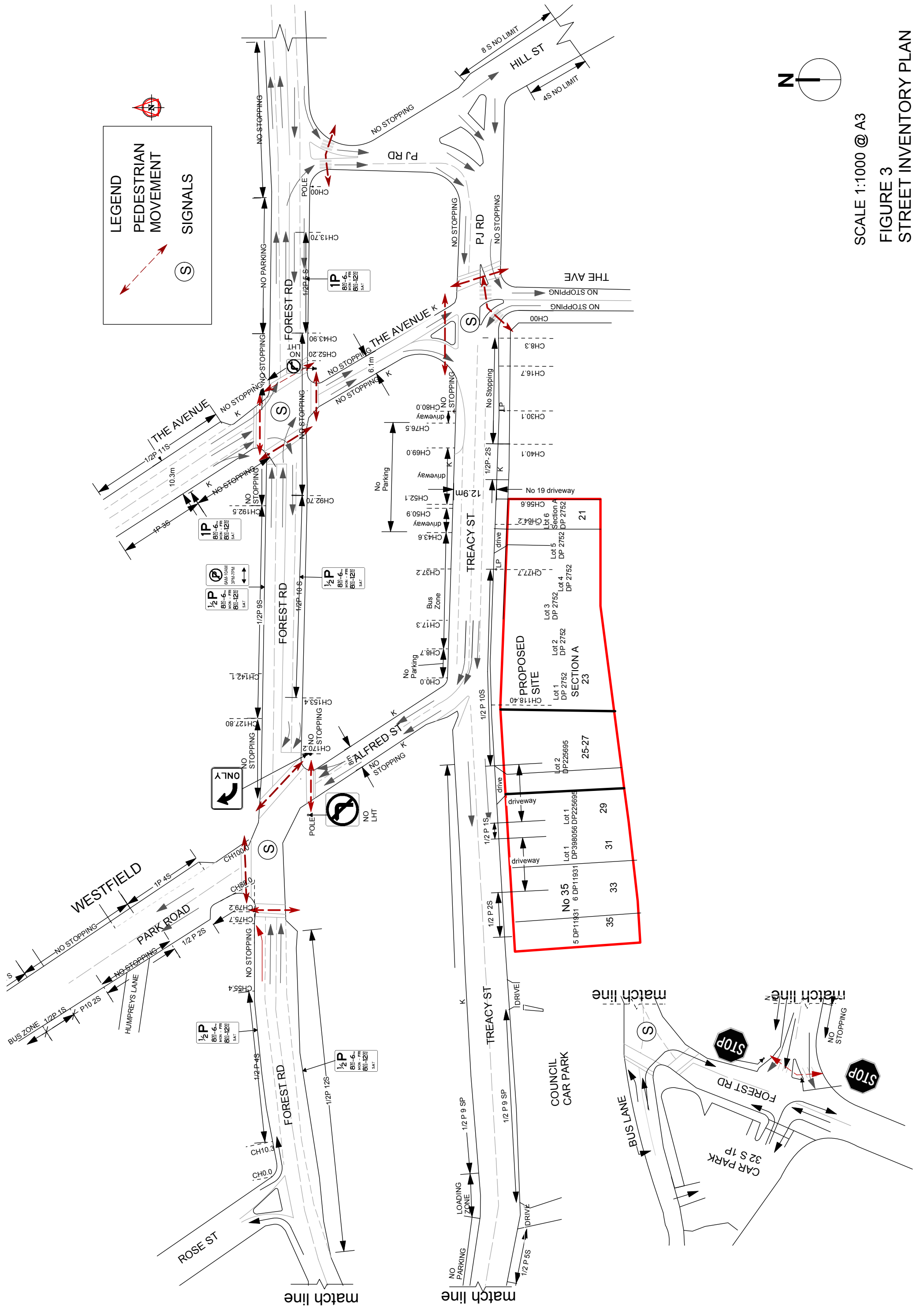
There are some **3461** off-street car parking spaces in the Hurstville CBD bounded by Cross Street / The Avenue / Treacy Street and Forest Road. All spaces are approximately within **400** metres of the subject site. These off-street spaces are shown in the map "*Hurstville CBD Parking*" prepared by Hurstville City Council. This map is included in **Appendix C**.

The signposted parking restrictions 'No Parking' and 'No Stopping' restrictions are shown in **Figure 3**. Within the area bounded by Cross Street / The Avenue / Forest Road / PJ Road / Hill Street/ Treacy Street / Forest Road there are some 2/P10, 100/½ hour, 19/1 hour and 12 unrestricted parking spaces on-street.

LEGEND

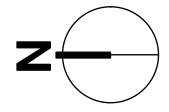
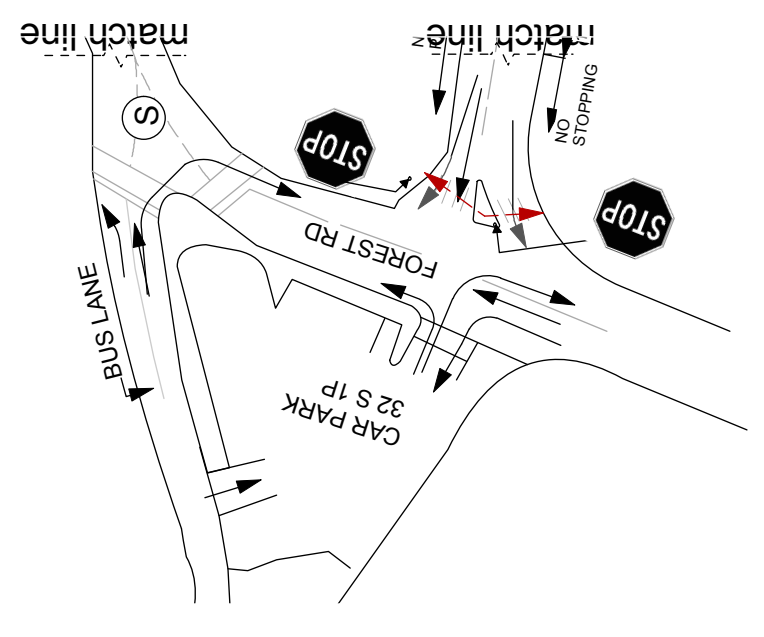
PEDESTRIAN MOVEMENT

SIGNALS



PROPOSED SITE SECTION A

Lot 1	DP 2752	Lot 4	DP 2752	21
Lot 2	DP 2752	Lot 5	DP 2752	
Lot 3	DP 2752	Lot 6	DP 2752	23
Lot 2	DP 225695	Lot 2	DP 225695	
Lot 1	DP 98056	Lot 1	DP 98056	29
Lot 1	DP 11931	Lot 1	DP 11931	
5 DP 11931	6 DP 11931	6 DP 11931	6 DP 11931	31
5 DP 11931	6 DP 11931	6 DP 11931	6 DP 11931	
5 DP 11931	6 DP 11931	6 DP 11931	6 DP 11931	33
5 DP 11931	6 DP 11931	6 DP 11931	6 DP 11931	
5 DP 11931	6 DP 11931	6 DP 11931	6 DP 11931	35
5 DP 11931	6 DP 11931	6 DP 11931	6 DP 11931	



SCALE 1:1000 @ A3
 FIGURE 3
 STREET INVENTORY PLAN

2.2 (Continued)

The pavement widths kerb to kerb, marked pedestrian crossings and traffic flow directions are marked up on **Figure 3**.

2.3 Existing Peak Hour Traffic Volumes

Traffic counts were made at the following intersections in *15 minute intervals* on **Thursday 28/3/13** from **7:00am** to **9:00am** and on **Wednesday 27/3/13** **4:00pm** to **6:00pm** to correspond with the commuter peak hours:-

Counts were made at the intersection at Forest Road / Park Road / Alfred Street over the same periods on Thursday 4/4/2013.

The **am** peak hour was **8:00am – 9:00am** and the **pm** peak hour at all intersections was **5:00 – 6:00pm**.

A survey was conducted on Tuesday 23/11/10 of all traffic movements into and out from the premises from No 21 to No 35 from 7am to 9am and from 4pm to 6pm. The traffic movements were as follows:-

TIME INTERVAL	IN	OUT	TOTAL
7-8am	10	2	12
8-9am	19	8	27
4-5pm	11	16	27
5-6pm	2	5	7

The above premises are now closed except for numbers 35 and 35A.

At Forest Road / PJ Road and Forest Road / The Avenue intersections, the counts made on Friday 19/11/10 have been used and adjusted to reflect minor changes in traffic patterns.

The **am** and **pm** peak hour traffic volumes and pedestrian counts are illustrated in **Figures 4** and **5** respectively.

2.4 Intersection Performance

All **5** intersections have been analysed using SIDRA Version 2011

The network performance is determined by the Level of Service (**LoS**) Average Vehicle Delay (**AVD**), Degree of Saturation (**DoS**) and maximum delay on the critical movement at the intersections during peak hours. The Level of Service criteria for intersections are explained in **Table 4.2** taken from the *RTA Guide to Traffic Engineering Developments*.

2.4 (Continued)

Table 4.2 (RTA Guide To Traffic Generating Developments)
Level of Service criteria for intersections.

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	< 14	Good operation	Good operation
B	15 TO 28	Good with acceptable delays spare capacity	Acceptable delays & spare capacity
C	29 TO 42	Satisfactory	Satisfactory, but accident study required
D	43 TO 56	Operating near capacity	Near capacity & accident study required
E	57 TO 70	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode

The results of the analysis are set out in **Table 2.4**.

Table 2.4 Intersection Performance

Intersection	Peak Hour	Degree of Saturation ⁽¹⁾	Average Delay ⁽²⁾ (sec/vehicle)	Level of Service ⁽³⁾	Control Type
EXISTING CONDITION					
Forest Rd/PJ Rd	AM	0.35	4.3 (11.9)	A (Worst: A)	Giveway / Yield
Forest Rd/PJ Rd	PM	0.38	6.6 (17.7)	A (Worst: B)	Giveway / Yield
Treacy St/The Avenue	AM	0.29	13.6 (25)	A (Worst: B)	Signals
Treacy St/The Avenue	PM	0.49	16.3 (31.4)	A (Worst C)	Signals
Forest Rd/Park Rd/Alfred Rd	AM	1.00	23.7 (55.1)	B (Worst: D)	Signals
Forest Rd/Park Rd/Alfred Rd	PM	1.00	27.2 (62)	B (Worst: E)	Signals
Forest Rd/The Avenue	AM	0.50	19.5 (38.2)	B (Worst: C)	Signals
Forest Rd/The Avenue	PM	0.69	27.2 (41.3)	B (Worst: C)	Signals
Forest Rd/Treacy St	AM	0.40	3.0 (28.9)	A (Worst: C)	Stop
Forest Rd/Treacy St	PM	0.34	5.4 (15.1)	A (Worst: B)	Stop

- (1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
- (2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
- (3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

Note: S Analysed using SIDRA 5.1

All intersections are operating satisfactorily. However at the Forest Road / Park Road / Alfred Road intersection the worst movement in the am peak is close to capacity and the worst movement in the pm peak is at capacity.

2.5 Current Uses of Existing Site

The site is now vacant except for No. 35A and No. 35.

The current uses on 23/11/2010 were as follows:-

No. 21	Huber Mechanics – 3 hoists plus 3 car spaces.
No. 23	Fergusons Toyota – Two storey office building and open Car Sales Yard for 16 cars, open car park at rear for 19 cars, covered workshop with 3 hoists plus 5 car spaces.
No 25 to 27	Fergusons Toyota – Open Car Sales Yard for 18 cars and single storey sales office. Workshop at basement level with 4 hoists plus 8 car spaces.
No. 29	Fergusons Car Sales. Open Car Yard at front for 6 cars plus covered showroom for 8 cars and 2 wash-bays at basement level.
No. 31	Unknown
No. 33	Unknown
No. 35A	Health Therapist ground floor
No. 35	Dance Studio at first floor+

Summary:

Workshops	10 Hoists
	2 Wash Bays.
	16 car spaces.
Car Sales Spaces	48 spaces.
Parking at Rear	19 spaces.

The buildings and driveways along the complete Treacy Street frontage are shown in **photographs P1 to P8**.

2.6 Vehicle Driveway Access to Site

There are single driveways to No. 21, single lane entry driveway to car park and workshops at the rear of Nos. 23 to 27, single driveway to car yard at front of No. 23, single driveway to car sales at front of Nos. 25-27, single lane exit driveway from rear of No. 23 to 29, single lane entry driveway to car sales yard at front of No. 29, single lane driveway access to roller shutter doors at Nos. 31, 33 and 35 Treacy Street. There are **9** driveway crossings in total. There are a total of 13 / ½ P parking spaces along the site frontage.

2.7 Public Transport

The site is well served by public transport services. The Hurstville railway station on the Illawarra line has regular *7 day services* and is approximately **400** metres from the site.

There are **4** bus companies that have regular *7 day services* within walking distance of the site. The services and service providers are:-



PHOTO P1 No. 21.

Driveway Entrance
To Workshops.

No. 23 Car Sales



PHOTO P2 No. 23 Car Sales and Office Building.



PHOTO P3 No. 23 Office Building



PHOTO P4 No. 25 and 27 Car Sales



PHOTO P5 Driveway Exit from Workshops No. 29 Car Sales.



PHOTO P6 No. 31.



PHOTO P7 No. 33



PHOTO P8 No. 35A and No. 35.

2.7 (Continued)

Table 2.7 Bus Routes

Pioneer Coaches	Treacy St / Forest Rd	Route 452	Beverley - Rockdale
		Route 453	Hurstville - Rockdale
Sydney Buses	Forest Road	Route 499	Hurstville - Drummoyne
Southtrans	Forest Road	Route 947	Hurstville - Dolls Point - Kogarah
		Route 948	Hurstville- Bankstown via Peakhurst
Punchbowl Bus Co.	Forest Road- Park Rd	Route 450	Hurstville- Strathfield.
		Route 943	Hurstville – Lugarno.
		Route 940	Hurstville – Bankstown via Riverwood.
		Route 941	Hurstville – Bankstown via Greenacre.

2.8 Bicycle Lanes in CBD

The CBD is well served by on-road cycle lanes.

In the vicinity of the site there are marked on-road cycle lanes in The Avenue / Forest Road / PJ Road / Treacy Street / Alfred Street and Park Road. The cycle network is shown on a Concept Master Plan for Hurstville City Centre.

3.0 TRANSPORT AND TRAFFIC ISSUES TO BE ADDRESSED

3.1 Director General's Requirements

The key issues relating to *traffic and parking* were stated in a letter dated 8th October 2010 from the Director, Metropolitan Projects, Department of Planning to the Director Economia PDS Pty Ltd and as follows:-

7. Traffic Impacts (Construction and Operational)

Prepare a traffic impact study in accordance with the RTA's Guide to Traffic Generating Developments considering traffic generation any required road / intersection upgrades, access, loading dock(s) and car parking arrangements, measures to promote public transport usage and pedestrian and bicycle linkages.

8. Parking

The EA must demonstrate the adequate provision of on site car parking for the proposal having regard to local EPI controls and RTA guidelines. (**Note:** the Department supports reduced car parking rates in areas well-served by public transport).

3.2 RTA's Requirements

The RTA's requirements were stated in a letter dated 2nd November 2010 from Transport Planning, Sydney Region to the Director, Metropolitan Projects, NSW Department of Planning in reference to the proposed Concept Plan for a residential /retail development at 21-35 Treacy Street, Hurstville. The requirements relevant to the Concept Plan are as follows:-

"The RTA would like the following issues to be included in the transport and traffic impact assessment of the proposed development:

1. It is noted that the Metropolitan Strategy has designated Hurstville as a Major Centre and a focal point for regional transport connections and jobs growth. It is important that the development of the proposed retail and residential development takes into consideration and contributes to the achievement of, transport objectives contained in this and other high level NSW Government strategies.

These strategies include the NSW State Plan and draft South West Sub- regional Strategy. These policies share the aims of increasing the use of walking, cycling and public transport; appropriately co-locating new urban development with existing and improved transport services; and improving the efficiency of the road network.

By addressing both the supply of transport services and measures to manage demand for car use, the EA report should demonstrate how users of the proposed retail and residential development, will be able to make travel choices that support the achievement of relevant State Plan targets.

3.2 (Continued)

2. Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections and the need / associated funding for upgrading or road improvement works (if required).
3. Details of the proposed accesses and the parking provisions associated with the proposed development including compliance with the requirements of the relevant Australian Standards (ie: turn paths, sight distance requirements, aisle widths, etc).
4. Proposed number of car parking spaces and compliance with the appropriate Parking Codes.
5. Details of service vehicle movements (including vehicle type and likely arrival and departure times).
6. The RTA requires the EA report to assess the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling); the potential for implementing a location –specific sustainable travel plan (eg ‘Travelsmart’ or other travel behaviour change initiative); and the provision of facilities to increase the non-car mode share for travel to and from the site. This will entail an assessment of the accessibility of the development site by public transport.

Note: The current proposal now provides car parking in full compliance with *Council’s Parking Code DCP No. 2 for Block 29* in the *CBD* for the *retail, residential, childcare* and *community centre* uses. It is understood that RMS requirement No. 6 for a green travel plan is not relevant and not required to be provided for.

4.0 TRAFFIC EFFECTS OF ULTIMATE DEVELOPMENT

4.1 Floor Areas and Uses

The gross floor areas for the retail, child care centre, community centre and residential components and the gross leasable floor areas have been calculated by Stanisic Associates. These areas and the number and type of each residential unit on each level are contained in **Table 4.1**.

Table 4.1 Schedule Of Floor Areas

USE	LEVEL	Gross Floor Area M ²	Gross Leasable Floor Area M ²			
RETAIL and other COMPONENTS						
Child Care Centre	Ground Level	1018	1018			
Community Centre	Ground Level	200	200			
Retail Shops	Ground Level*	495	496			
Child Care Centre	Upper Ground	133	133			
Retail Shops	Level 1	192	192			
Sub Total		2038	2038			
RESIDENTIAL COMPONENT				1BR	2BR	3BR
	LEVEL					
	Ground Floor	449	0			
	1	1640	1418	2	14	2
	2	2168	1898	3	23	1
	3	2109	1887	3	14	2
	4	1774	1546	4	16	0
	5	1774	1546	4	16	0
	6	1774	1546	4	16	0
	7	1727	1448	3	13	2
	8	1691	1471	3	13	2
	9	1691	1471	3	13	2
	10	1770	1484	4	14	1
	11	1733	1507	4	14	1
	12	1733	1507	4	14	1
	13	1468	1231	2	13	1
	14	1460	1232	2	12	2
	15	1460	1232	2	12	2
	16	1346	1120	2	12	1
	17	1346	1120	2	12	1
	18	1346	1120	2	12	1
Sub Total		30459	25784	53	253	22
TOTAL		32497	27822			

Total Number of residential units is 328. There is an increase in the number of 2 bedroom units by **36** units, an increase in the number of 1 bedroom units by **6** and an increase in the number of 3 bedroom units by **3**.

The total gross leasable floor area of the residential component is **25784m²**. The *minimum* parking requirement for residential apartments in accordance with *Hurstville Council's DCP No 2, Section 4.2b* Built Form Controls for Specific Sites states the parking rate is **1 space per 100m² GLFA** plus **1 visitor space per 4 units**. This rate is required under the *Approval Conditions Schedule 1 Condition A8*.

4.2 Estimated Residential and Workforce Population

The residential population has been estimated assuming that there will be **1.5** persons in each 1 BR unit, **2.0** persons in each 2 BR unit and **2.5** persons in each 3BR unit. The total population is **641** and the average persons per dwelling of **1.95** compared with **2.78** for Hurstville from the 1996 Census.

The workforce population has been estimated from **Table 5.11** Employees per **m²** for retail and commercial uses in the *Hurstville Section 94 Contributions Plan No. 1* Traffic Management and Car Parking as follows:-

Retail Use	Employee per m ² GFA	GFA m ²	Number of Employees
Retail Shops	1 per 20.3	687	34

We have extracted the travel modes from home origin in the Hurstville CBD core to work destinations elsewhere from the 2006 Census Journey to Work data. The car driver rate is **71.2%** of the car driver travel mode for Hurstville LGA. In our opinion the car driver travel mode to and from the CBD has fallen due to the construction of high density residential flat buildings in the CBD area since the 2006 census.

4.3 Car Parking Requirements and Provision

4.3.1 Residential Parking

The site is located in Blocks **29B, C, D** and **E** in Treacy Street as stated in *Section 4.2 in DCP No. 2*. The residential parking rate for these blocks is **1** space per **100m² GLFA** plus **1** visitor space per **4** units. The total residential gross leasable floor area is **25784m²** and the minimum *residential parking requirement* is **258** spaces. The parking requirement for visitors is **82** spaces. Refer to Table 4.3.1 for calculation of residential parking spaces. The current scheme provides for **431** residential car spaces which is in excess of the minimum requirement.

This site is located within 400 metres of Hurstville Railway Station and has frequent 7 day bus services. A new bus/rail interchange is currently under construction on the eastern side of Hurstville Railway Station.

4.3 (Continued)

Table 4.3.1 Residential Parking Provision

			Parking Rates Per Hurstville DCP No 2	
Location	AREA GLFA	No Of Units	1 space /100sqm	Visitors 1 per 4 units
Level 1	1418	18	14.18	4.5
Level 2	1898	27	18.98	6.75
Level 3	1887	19	18.87	4.75
Level 4	1546	20	15.46	5
Level 5	1546	20	15.46	5
Level 6	1546	20	15.46	5
Level 7	1448	18	14.48	4.5
Level 8	1471	18	14.71	4.5
Level 9	1471	18	14.71	4.5
Level 10	1484	19	14.84	4.75
Level 11	1507	19	15.07	4.75
Level 12	1507	19	15.07	4.75
Level 13	1231	16	12.31	4
Level 14	1232	16	12.32	4
Level 15	1232	16	12.32	4
Level 16	1120	15	11.2	3.75
Level 17	1120	15	11.2	3.75
Level 18	1120	15	11.2	3.75
Total		328	258	82

The HDCP No. 2 parking required for the residential component is **340** spaces.

4.3.2 Retail Parking

The parking requirement for retail shops is specified in **Section 4.2 DCP No. 2** for Blocks **29B, C, D** and **E** as **1 space per 25m² GLA** with a minimum of **70%** on site.

The car parking requirement is **20 spaces** including **1 space** for people with a disability

LEVEL	FACILITY	Parking Rate Hurstville Council DCP	Gross Floor Area	Gross Leasable Area	Only 70% of spaces required for retail.	No Of Required Parking Spaces with 70% concession Section 4 of DCP No 2	Total Car parking required
Ground Floor	Retail Shops	1 space per 25m ²	495m ²	495m ²	.7 x 19.8	13.9	13.9
Level 1	Retail Shops	1 space per 25m ²	192	192	.7 x 7.7	5.4	5.4
					TOTAL	19.3	20 (Rounded)
Disabled	2% of total number of spaces						1

4.3 (Continued)

4.3.3 Child Care Centre

The Child Care Centre has a total gross leasable floor area of **1151m²** and will accommodate a maximum of **60** children. The estimated staff requirement is **11**.

Parking has been provided in accordance with *DCP No. 2 Section 8.3.10.1 (a) Staff Parking at 1 per 2 staff and (a) Parent Parking at 1 per 10 children*. A total of **12 spaces** have been provided including **1 space** for persons with a disability.

4.3.4 Community Centre

The Community Centre has a gross leasable floor area of **200m²**. There is no specific parking requirement for a community centre in DCP No. 2. Parking has been provided at **1 space per 25m²** and rounded to **8 spaces**. *All community parking and all child care spaces are located at Upper Ground Floor level*. The space for persons with a disability is available for either use.

4.3.5 Parking Space Allocation

Level	Residential	Adaptable Units		Community Centre	Childcare Centre	Retail	Visitor	Total Spaces
		Accessible	Disabled					
4A	40							40
4B	65	4	2					71
3A	40							40
3B	64	3	4					71
2A	31						6	37
2B	59	5	5				1 Dis.	70
1A						6	29	35
1B	0	1				14+1Dis.	46	62
1C	17	7	2					26
UG				8	11+1Dis.			20
Total	316	20	13	8	12	21	82	472

4.3.6 Number of Accessible Parking Spaces and Parking Spaces Required for People with a Disability

The number of accessible parking spaces required has been calculated in accordance with **Table 6.3.2.1 in DCP No. 2**.

Number of Car Spaces	Accessible Car Parking Rate	Number of spaces required
First 50	1 per 20 for First 50	2.5
For Every additional 50 car parking spaces to 476	2% over 50	8.5
	TOTAL ROUNDED	11

The number of parking spaces required in *Section 6.1.2.1 (7) for people with a disability* is the same as the number of accessible parking spaces and is **11 spaces**. As shown in the *Table in Section 4.3.5*, **20** accessible spaces and **16 spaces** for people with a disability have been provided.

4.4 Bicycle Storage Facilities

In order to encourage the use of bicycles by residents and workforce it is proposed to provide bicycle storage racks/rails within the basement car park to encourage commuter and recreational cycling.

Hurstville City Council has no requirement for bicycle facilities in its Transport and Parking DCP's. It is considered appropriate to adopt the standards adopted by Willoughby Council in DCP No. 2 as Chatswood and Hurstville are regional centres in relatively flat terrain and both Councils have a network of bicycle lanes on roads. The suggested storage facilities are provided as a guide for the proposed development

		Bicycle rail/racks
Residential	328 units	1 per 12 units
Retail	687m ²	1 per 150m ²

Suggested Bicycle Parking:

	Racks
Residential	27
Retail	5

4.5 Internal Parking Layout Design and Circulation

i) Entry/Exit Ramp to Basement B1

The two way (combined) driveway is shown on Drawings CD07 and CD09 and extends from ground level RL60.28 to Basement B1 A at RL56.50. As the number of car spaces is 452 and greater than 300, a category 3 driveway with separate entry and exit crossings would be required for User Class 1A as stated in Table 3.1 in AS/NZS 2890.1. As 432 spaces are for residential use, the class of parking is predominantly 1A residential car parking. Traffic movements are left turn entry and exit only and as Treacy Street is a local road, a combined driveway is considered satisfactory. The driveway width is 7.12 metres and the pavement width between kerbs is 6.368 metres. At the 90 degree bend the driveway width permits a B99 vehicle to pass a B85 vehicle.

The driveway gradients have been checked and comply with Clause 2.5.3 b) ii) in AS/NZS 2890.1-2004. The two ramps at 1 in 5 with transitions at the top and bottom over 2 metres of 1 in 10 are stepped with a flatter gradient between the two 1 in 5 sections to reach RL 56.50. The minimum headroom requirement is 2.2 metres to comply with Section 2.4 Headroom in AS/NZS 2890.6 – 2009 Parking Facilities Part 6: Off Street parking for people with disabilities.

4.5 (Continued)

ii) Parking Layout

The parking bay dimensions in Centre Stage are 2.5 by 5.4 for the residential User Class 1A and the aisle width is 5.8 metres minimum. The parking bay dimensions required in the retail car park in Stage West are 2.7 by 5.4 metres to comply with User Class 3A in Figure 2.2 in AS/NZS 2890.1. The aisle width is 5.8 metres. The column locations have not been determined so the parking lay out is conceptual and all dimensions need to be confirmed in the detail design. All 20 retail parking spaces are on the basement B1 Level.

iii) Internal Ramps

The car park in Centre Stage is a split level car park with 2 way ramps 7.2 metres wide with a transition of 1 in 8 over 2 metres, then 1 in 5 over 5 metres and then another transition grade of 1 in 8 over 2 metres. The gradients are compliant with AS2890.1:2004 Clause 2.5.3(e). Swept paths of a B85 and B99 turning concurrently at the top and bottom of the standard ramp design at the western ramp in Centre Stage are shown on all basement levels. Swept paths of two B85 vehicles turning concurrently at the eastern ramp in Centre Stage are also shown on all basement levels. Circulation is clockwise down from Lower Ground Floor Level to basements B1 to B4. The residential car spaces are predominantly on levels B2, B3 and B4. The long dead end aisle on Levels B2, B3 and B4 is considered satisfactory for allocated residential parking spaces.

(iv) Entry /Exit Ramp to Upper Ground Floor

The two-way (combined) driveway is shown on **Drawing DC10** and extends from ground level **RL60.65** to the upper ground floor car park **RL64.00**. There are **20 spaces** allocated to the community centre and child care centre and **1** unloading space for a small delivery vehicle.

The maximum driveway gradient on the inside edge is **9.88%** over **6 metres** and the maximum change of grade is **7.4%** and complies with **Table 3.2** in **AS 2890.2** for a **SRV** vehicle and smaller.

The driveway is **7.12** metres wide kerb to kerb and the aisle is **6.2** metres wide. At the *90 degree* bend a **B85** vehicle can pass a **B99** vehicle with ample clearance.

All car spaces are **2.7 metres** wide by **5.4 metres** long and comply with **User Class 3A** for short term high turnover *parent parking for pick-up and drop-off* to the child care centre.

The unloading bay is suitable for vans, small flat tray trucks and utilities etc., that are smaller than a 4 tonne SRV. A loading zone for *vehicles up to and including an MRV vehicle* is proposed at the kerb in Treacy Street.

4.6 Estimated Traffic Generation

The proposed building is a high density residential flat building in a regional centre. Based upon the traffic generation rates in the RTA Guide to Traffic Generating Developments the **328** units are each expected to generate 0.24 vehicle trips in the peak hours. Based upon surveys conducted by this firm, the directional distribution for the residential traffic is 75% out and 25% in in the am peak hour and 67% in and 33% out in the pm peak hour.

For the retail shops the RTA traffic generation rates in the peak period 4.30pm – 5.30pm on Thursday and Friday show that for this retail mix the traffic generation on Friday is marginally higher than Thursday.

In the **am** peak hour the traffic generation by the retail shops will be mainly due to staff arriving for work. The number of retail employees is estimated to be 34 as shown in Section 4.2. The GLFA for the retail shops is 687m² as shown in Table 4.1. A further allowance of 10% of the pm peak generation has been allowed for shoppers in the am peak. The directional distribution assigned for retail shopper trips is 50% in and out. Traffic generation by the proposed child care centre is based on the RMS Report No. 21 “Traffic Generation Surveys and Analysis Child Care Centres.” The estimated traffic generation is shown in Table 4.6.

Table 4.6 Peak Hour Traffic Generation by Proposed Mixed Use Development.

Use	Peak Hour	Generation Rate/Unit	No.of Units	Traffic Generation		
				IN	OUT	TOTAL
Residential Units	8.00-9.00am	0.24 trips/hr	328	20	59	79
	4.00-5.00pm	“	“	53	26	79
Child Care Centre	8.00-9.00am	0.78 trips/child	60	23	23	46
	5.00-6.00pm	0.64 trips/child	60	19	19	38
Community Centre	8.00-9.00am	9 A (OM)	200 m ²	1.8	0	1.8
	5.00-6.00pm	9 A (OM)		0	1.8	1.8
Retail		Rate per 1000m²	GLFA m²			
Small shops	8.00-9.00am	56A (SS) 10%	687	1.9	1.9	3.8
Retail employees	8.00-9.00am		34	24	0	24
Small shops	4.00-5.00pm	56 A (SS)	687	19	19	38
Total am peak hour				71	84	155
West driveway				25	23	48
East driveway				46	61	107
Total pm peak hour				91	66	157
West Driveway				19	21	40
East Driveway				72	45	117

Note: A (SS) Gross Leasable Area of small shops
Employee Car Driver and Truck Driver Travel Mode 71.2%
A (OM) Gross Leasable Area Offices

4.7 Intersection Performance

The traffic generation for the proposed modified development is higher than the approved development. There is minimal existing development traffic as all establishments except No. 35A and 35 are vacant. The total traffic generation in the AM peak hour is **155** vehicles per hour and in the PM peak hour it is **157** vehicles. The additional traffic volumes in the am and pm peak hours have been assigned to the road network. For assigned volumes for the ultimate development refer to **Figures 6 and 7** in this report.

All **5 intersections** have been analysed using SIDRA Version 2011. The results of the analysis are set out in **Table 4.7**

4.8 Delivery / Service Vehicles

i) Loading Bay Assessment

The proposed development has a gross retail floor area of **687m²** and **328** residential units.

Based upon *Table 5.1 in the RTA Guide to Traffic Generating Developments* the minimum number of unloading bays for the retail shops is 5 plus 1 space per 1000m² over 2000m² GFA. The requirement for the residential units is 4 plus 1 per 100 units over 200. The total requirement is 10 bays.

Based upon a paper prepared by J B Watters for a M Eng Sc thesis in 1972 the arrival rates in Sydney suburbs from surveys were:-

Mixed small shops – 3.5 arrivals per 929m² GLFA (λ)

The average service rate where the driver unloads the truck only was **8.5** to **10.5** vehicles per hour (μ).

The estimated arrival rate for the shops **687m² GLA** is **2.6**

The total arrival rate 2.6 divided by the service rate of 10 vehicles per hour (μ) is **0.26**. Based upon a 5% probability that all bays will be full and no waiting bays the number of bays required is 1 for the retail and 1 for residential units. There are 2 service bays provided, 1 for residential and 1 for retail.

The MRV delivery bay is located in Treacy Street as shown on Drawing **CD09** and occupies **2** parking spaces. There are currently **15¹/₂ P** parking spaces on the southern side of Treacy Street, as shown in **Figure 3**. When the proposed development is completed there will only be **2** driveway crossings. After allowing **2** spaces for the loading bay there will be **20 parking spaces**, an increase of **5 spaces**.

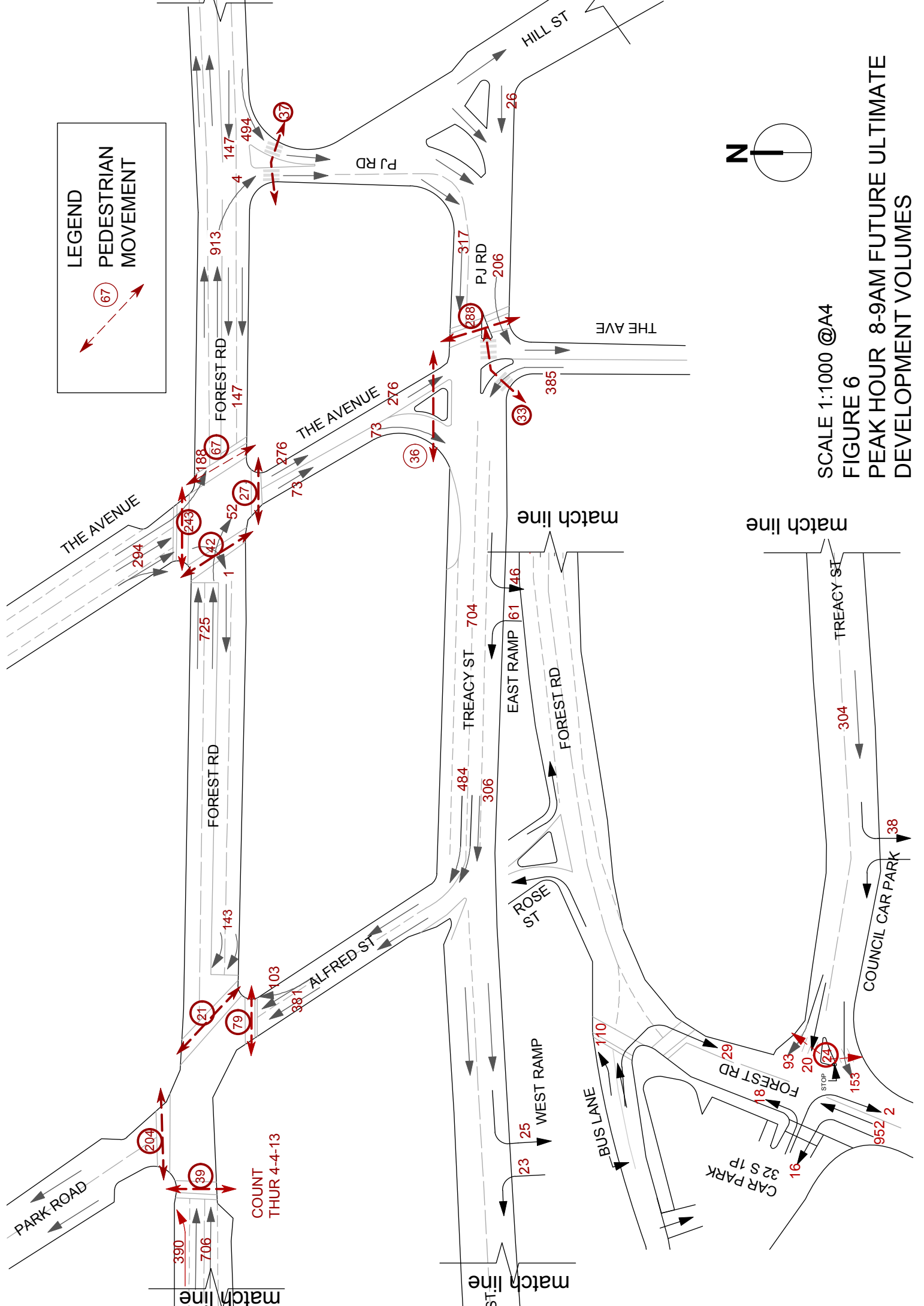
**TABLE 4.7 FUTURE INTERSECTION PERFORMANCES
(SIDRA INTERSECTION 5.1)**

Intersection	Peak Hour	Degree of Saturation ⁽¹⁾	Average Delay ⁽²⁾ (sec/vehicle)	Level of Service ⁽³⁾	Control Type
Forest Rd/PJ Rd	AM	0.35	4.6 (12.4)	A (Worst A)	Giveaway / Yield
Forest Rd/PJ Rd	PM	0.41	7.0 (18.8)	A (Worst B)	Giveaway / Yield
Treacy St / The Avenue	AM	0.29	13.5 (25)	A (Worst B)	Signals
Treacy St / The Avenue	PM	0.49	16.4 (31.4)	A (Worst C)	Signals
Forest Rd / Park Rd / Alfred Rd	AM	1.00	24.0 (55.1)	B (Worst D)	Signals
Forest Rd / Park Rd / Alfred Rd	PM	1.00	27.2 (62)	B (Worst E)	Signals
Forest Rd / The Avenue	AM	0.51	19.6 (39.3)	B (Worst C)	Signals
Forest Rd / The Avenue	PM	0.70	27.6 (41.3)	B (Worst C)	Signals
Forest Rd / Treacy St	AM	0.48	3.6 (31.0)	A (Worst C)	Stop
Forest Rd / Treacy St	PM	0.37	5.5 (15.4)	A (Worst B)	Stop

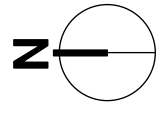
NOTES:

- (1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
- (2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
- (3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.

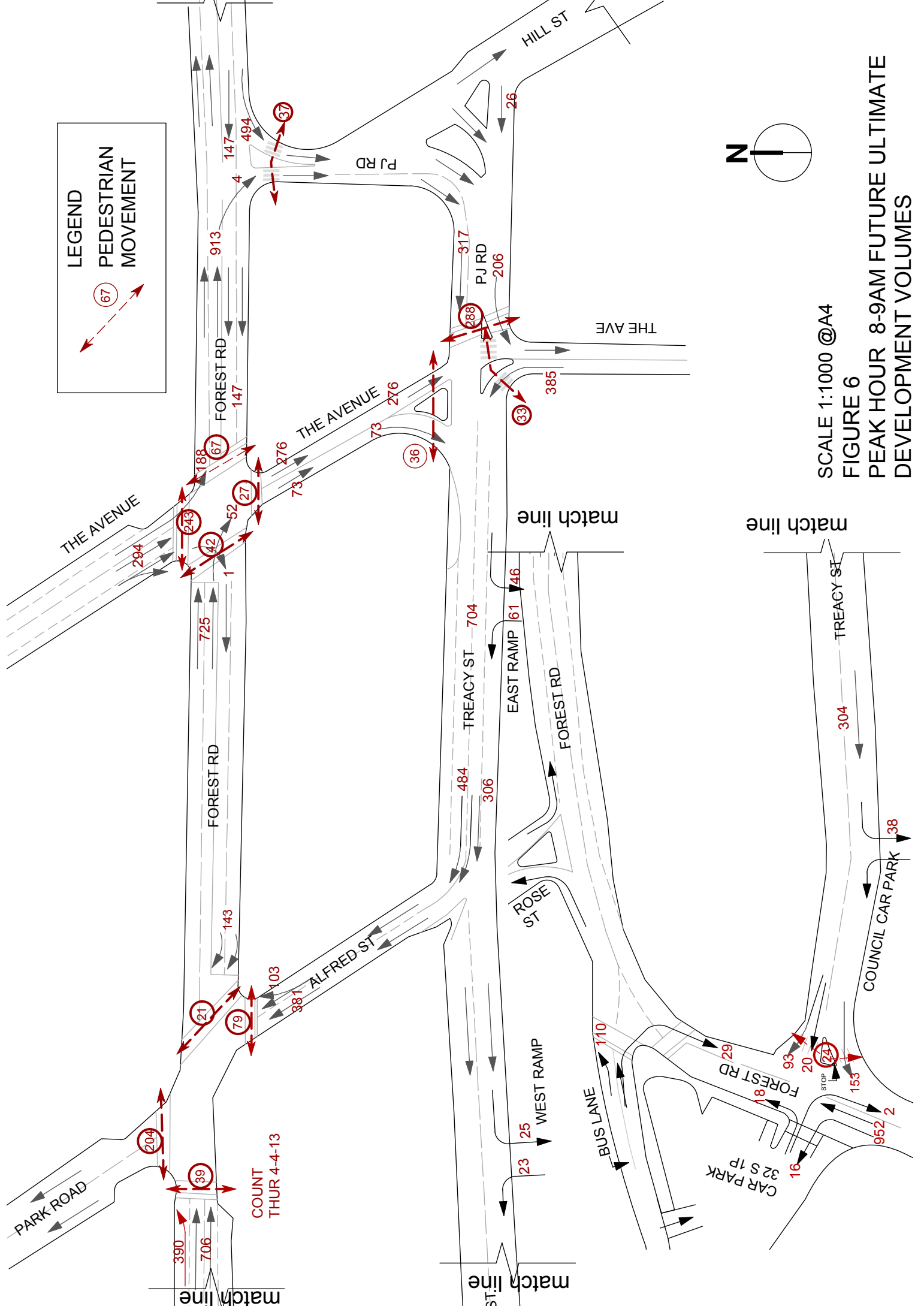
Comparison with the Levels of Service under existing traffic volumes in Table 2.4 shows that there is no change to the Levels of Service under future traffic conditions that includes traffic generation by the proposed ultimate development of this site.



LEGEND
PEDESTRIAN MOVEMENT



SCALE 1:1000 @A4
FIGURE 6
PEAK HOUR 8-9AM FUTURE ULTIMATE DEVELOPMENT VOLUMES



4.8 (Continued)

The swept path diagram showing the small delivery van or flat top truck entering a loading bay and a similar vehicle exiting concurrently from a loading bay are shown on **Drawing CD10** in **Appendix A**.

ii) Driveway Design

The driveway gradients to the upper ground floor level parking and loading space for a small van comply with *Table 3.2 in AS 2890.2 Part 2 Off Street commercial vehicle facilities for SRV and smaller vehicles*. The rate of change of gradients is **less** than **8.3%**. Detailed design of the ramp into the loading dock is shown in **Sheet 3 of Drawing No 1128-13** located in **Appendix D**.

4.9 Traffic Impacts During Construction

The traffic impacts during construction will be assessed in more detail for the Project Application when the construction staging, construction period, truck movements and truck sizes are considered.

Treacy Street has *two* traffic lanes and *one* kerbside *parking lane* along the site frontage. An Application will be made for a 'Construction Zone' along the site frontage of approximately **130 metres** in the *kerbside parking lane*. Trucks *approaching* the site will be expected to approach from the east along Forest Road or along Railway Parade, The Avenue and turn left into Treacy Street. Trucks approaching from the south and *west* will be expected to use King Georges Road Railway Parade, The Avenue and left into Treacy Street.

Trucks *departing* from the site will be expected to travel *west* along Treacy Street, *cross* the railway overbridge and *turn right* into Railway Parade. These routes will avoid the busy retail shopping precinct in forest Road west of The Avenue.

Traffic Control Plans are required for traffic management in Treacy Street for *each stage* of the construction period. Traffic Control plans for the construction of Stage 1- Centre, construction stages 1,2 and 3 have been prepared and are included in **Appendix E** of this report. Provision for construction of the Stage East and Stage West will be provided when the development application is made. Construction zones outside the site frontage will be required as indicated on the TCP plans.

5.0 TRAFFIC EFFECTS OF STAGE 1 (CENTRE STAGE) DEVELOPMENT

5.1 Floor Areas and Uses-Stage 1 (Centre Stage)

The gross floor areas for the child care centre, community centre and residential components and the gross leasable floor areas have been calculated by Stanisic Associates. These areas and the number and type of each residential unit on each level are contained in **Table 5.1**.

Table 5.1 Schedule of Floor Areas

USE	LEVEL	Gross Floor Area M ²	Gross Leasable Floor Area M ²			
RETAIL and other COMPONENT						
Child Care Centre	Ground Level	1018	1018			
Community Centre	Ground Level	200	200			
Child Care Centre	Upper Ground	133	133			
Sub Total		1351	1351			
RESIDENTIAL COMPONENT				1BR.	2BR.	3BR
	LEVEL					
	Ground Floor	397	0			
	1	1526	1306	2	14	1
	2	1676	1440	2	20	0
	3	1617	1429	2	11	1
	4	1396	1200	3	13	0
	5	1396	1200	3	13	0
	6	1396	1200	3	13	0
	7	1235	990	2	10	1
	8	1199	1013	2	10	1
	9	1199	1013	2	10	1
	10	1278	1026	3	11	0
	11	1241	1049	3	11	0
	12	1241	1049	3	11	0
	13	1354	1119	2	13	0
	14	1346	1120	2	12	1
	15	1346	1120	2	12	1
	16	1346	1120	2	12	1
	17	1346	1120	2	12	1
	18	1346	1120	2	12	1
Sub Total		24881	20634			
TOTAL		26232	21985	42	220	10

Note the community centre of 200m² is included in the area for retail on the ground floor.*

Total Number of residential units is 272

Stage 1 is the centre area development and has a reduced number of 1 bedroom , 2 bedroom units and 3 bedroom units compared with the **Ultimate** development.

5.2 Estimated Residential and Workforce Population

The residential population has been estimated assuming that there will be **1.5** persons in each 1 BR unit, **2.0** persons in each 2 BR unit and **2.5** persons in each 3BR unit. The total population is **528** and the average persons per dwelling of **1.94** compared with **2.78** for Hurstville from the 1996 Census.

5.3 Car Parking Requirements and Provision

5.3.1 Residential Parking

The site is located in Blocks **29B, C, D** and **E** in Treacy Street as stated in *Section 4.2 in DCP No. 2*. The residential parking rate for these blocks is **1 space per 100m² GLFA plus 1 visitor space per 4 units**. The total residential gross leasable floor area is **20634m²** and the total residential parking requirement is **206** spaces. The parking requirement for visitors is **68** spaces. Refer to *Table 5.3.1 for calculation of residential parking spaces*.

Table 5.3.1 Residential Parking Provision

Location	AREA GLFA	No Of Units	Parking Rates Per Hurstville DCP No 2	
			1 space /100sqm	Visitors 1 per 4 units
Level 1	1306	17	13.06	4.25
Level 2	1440	22	14.4	5.5
Level 3	1429	14	14.29	3.5
Level 4	1200	16	12.0	4
Level 5	1200	16	12.0	4
Level 6	1200	16	12.0	4
Level 7	990	13	9.90	3.25
Level 8	1013	13	10.13	3.25
Level 9	1013	13	10.13	3.25
Level 10	1026	14	10.26	3.5
Level 11	1049	14	10.49	3.5
Level 12	1049	14	10.49	3.5
Level 13	1119	15	11.19	3.75
Level 14	1120	15	11.2	3.75
Level 15	1120	15	11.2	3.75
Level 16	1120	15	11.2	3.75
Level 17	1120	15	11.2	3.75
Level 18	1120	15	11.2	3.75
Total	20634	272	206.34	68

*The total parking required for the residential component is **206** spaces.*

5.3 (Continued)

5.3.2 Child Care Centre

The parking requirement is the same as in Section 4.3.3. A total of **12** spaces have been provided including **1** space for persons with a disability.

5.3.3 Community Centre

The parking provision is the same as in Section 4.3.4. Parking has been provided at **1 space per 25m²** and rounded to **8 spaces**.

5.3.4 Parking Space Allocation

Level	Residential	Adaptable Units		Community Centre	Childcare Centre	Retail	Visitor	Total Spaces
		Accessible	Disabled					
4A	28							28
4B	50	3	2					55
3A	28							28
3B	50	3	2					55
2A	25						0	25
2B	47	3	4					54
1A	1						22	23
1B		1					46	47
1C	17	7	2					26
UG				8	11+1Dis.			20
Total	246	17	10	8	12	0	68	361

5.4 Bicycle Storage Facilities

In order to encourage the use of bicycles by residents and workforce it is proposed to provide bicycle storage racks/rails within the basement car park to encourage commuter and recreational cycling.

Hurstville City Council has no requirement for bicycle facilities in its Transport and Parking DCP's. It is considered appropriate to adopt the standards adopted by Willoughby Council in DCP No. 2 as Chatswood and Hurstville are regional centres in relatively flat terrain and both Councils have a network of bicycle lanes on roads. The suggested storage facilities are provided as a guide for the proposed development

		Bicycle rail/racks
Residential	272	1 per 12 units

Suggested Bicycle Parking:

Residential	Racks	23
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5.5 Number of Accessible Parking Spaces and Parking Spaces Required for People with a Disability

The number of accessible parking spaces required has been calculated in accordance with Table 6.3.2.1 in DCP No. 2.

Total Number of Car Spaces	Number of Accessible Car Parking Spaces	Number of spaces required
First 50	1 per 20 for first 50	2.5
For Every additional 50 car parking spaces to 364	2% over 50	6.3
TOTAL ROUNDED		9

5.6 Internal Parking Layout and Circulation

The entry / exit ramp to **B1**, parking layout on all levels in Centre Stage, internal ramps and entry / exit ramp to the upper ground floor are as *described in Section 4.5*.

5.7 Estimated Traffic Generation

The proposed building is a high density residential flat building in a regional centre. Based upon the traffic generation rates in the RTA Guide to Traffic Generating Developments the **272** units are each expected to generate **0.24 vehicle trips in the peak hours**. As stated in *Section 4.6*, the directional distribution for the residential traffic is **75% out** and **25% in** in the **am** peak hour and **67% in** and **33% out** in the **pm** peak hour.

Table 5.7 Peak Hour Traffic Generation by Proposed Mixed Use Development.

Use	Peak Hour	Generation Rate/Unit	No. of Units	Traffic Generation		
				IN	OUT	TOTAL
Residential Units	8.00-9.00am	0.24 trips/hr	272	16	49	65
	4.00-5.00pm	0.24 trips/hr	272	44	21	65
Child Care Centre	8.00-9.00am	0.78 trips/child	60	23	23	46
	4.00-5.00pm	0.64 trips/child	60	19	19	38
Community Centre	8.00-9.00am	9 A (OM)	200m ²	1.8	0	1.8
	4.00-5.00pm	9 A (OM)		0	1.8	1.8
Total am peak hour				41	72	113
West Driveway				25	23	48
East Driveway				16	49	65
Total pm peak hour				63	42	105
West Driveway				19	21	40
East Driveway				44	21	65

Note: A (OM) Gross Leasable Area Offices

5.8 Intersection Performance

The traffic generation for the modified Stage 1 development is less than the Ultimate development. The total traffic generation in the **AM** peak hour is **113 vehicles per hour** and in the **PM** peak hour it is **105 vehicles**. The Ultimate development had a *total traffic generation* of **155 vehicles** in the **AM peak hour** and **157 vehicles** in the **PM peak hour**. The additional traffic volumes in the am and pm peak hours have not been assigned again to the road network as these volumes are less than the ultimate development and the improvement in intersection performance would be marginal and not change the Level of Service. For assigned volumes for the ultimate development refer to **Figures 6** and **7** in this report.

5.9 Delivery / Service Vehicles

The proposed ultimate development has a gross leasable floor area of **1151m²** for the child care centre and **200m²** for the community centre and **272** residential units. The number of loading bays has been discussed in *Section 4.8* of this report.

5.10 Traffic Impacts During Construction

The traffic impacts during construction of Stage 1-Centre are shown in the Traffic Control Plans provided in **Appendix E** of this report. The traffic impacts during construction of Stage East and Stage West will be assessed when the development application is made.

APPENDICIES