

# Traffic Solutions Pty Ltd



2 August 2011  
Reference No: 04.05.227

The General Manager  
Warringah Shire Council  
725 Pittwater Road  
Dee Why NSW 2099

**REFER TO AMENDMENTS UNDER Supplementary  
Traffic Parking Statement 04.05.227  
AND CONDITIONS OF CONSENT.**

Dear Sir

## **Traffic and Parking Statement – Covenant Christian School, Belrose**

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Traffic Solutions Pty Ltd has been requested by MCA Architects to review the revised proposal for Phase 2 of the improvements to the Covenant Christian School off Forest Way Belrose.

This assessment has been undertaken with reference to plans prepared by MCA Architects Job No. 2565.3, drawing numbers DA-01.2 and 2.2, revision 6 dated 20 August 2010.

Traffic Solutions prepared a Traffic and Parking Report in February 2007 (a copy of which is attached for Council's information) which assessed the traffic and parking impacts of the future expansion of the school up to 900 students including 80 year 12 students plus 72 staff. This report calculated that approximately 79 parking spaces would be required for the staff (1 for each staff member) and students. The current proposal provides a combined on street (Dell Street) and off street parking total of 97 spaces for 900 students and 80 staff. Which assuming the same number of year 12 students would result in a requirement of 87 spaces

Recently, Council approved and erected 'No Parking' restrictions in the cul-de-sac bulb of Dell Street. This restriction permits the dropping off and picking up of children which will reduce the demand on parking in Dell Street.

Considering the 'No Parking' zone and the length of on street kerbside parking available adjacent the school on Linden Avenue and Bundaleer Street the number of car parking spaces proposed is considered to be sufficient.

The revised proposal intends to continue the use of the existing school grounds for the school buses drop off and pick up for small buses only. This arrangement has been operating for some time and is considered to be satisfactory.

I have reviewed the proposed traffic arrangements and consider that as concluded in our report of February 2007 that the estimated potential increase in traffic generated by the 900 students proposed will have minimal impact upon the surrounding road system with critical intersections continuing to operate at a very good level of service.

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Our review of the area indicates that there is no reason why the conclusions of the 2007 report prepared by this firm would change with the phase 2 proposal.

Should you require any additional information or clarification of the contents of this letter please contact me on the numbers provided.

Yours sincerely

A handwritten signature in black ink, appearing to read 'C. Hazell'.

Craig Hazell  
Director

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# Traffic Solutions Pty Ltd



REFER TO AMENDMENTS UNDER Supplementary Traffic  
Parking Statement 04.05.227  
AND CONDITIONS OF CONSENT.

## PROPOSED EXTENSIONS TO COVENANT CHRISTIAN SCHOOL 212 FOREST WAY, BELROSE

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# TRAFFIC AND PARKING IMPACT ASSESSMENT

February 2007

Ref: 04.05.227A

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## **1. INTRODUCTION**

This report has been prepared to accompany a Development Application to Warringah Council for an expansion to the Covenant Christian School at 212 Forest Way, Belrose. (Figure 1). This report supersedes a previous report prepared by this firm dated September 2005 reference 04.05.227.

The proposed development involves an expansion of the school on a consolidated site to provide additional accommodation, playgrounds, car parking and improved on-site bus pick-up and set-down facilities. Parking for 71 cars is proposed at grade (including 1 disabled space) plus a drop off pick up zone which can cater for at least 4 cars. A separated indented bus bay is proposed on-site to stand approximately 5 buses on the Linden Avenue frontage.

The improvements will cater for up to at least 900 students (plus 72 staff) and improve the safety of arrivals and departures by separating the bus movements and parents dropping off and picking up.

This report examines the traffic implications of the proposed development and will assess the:

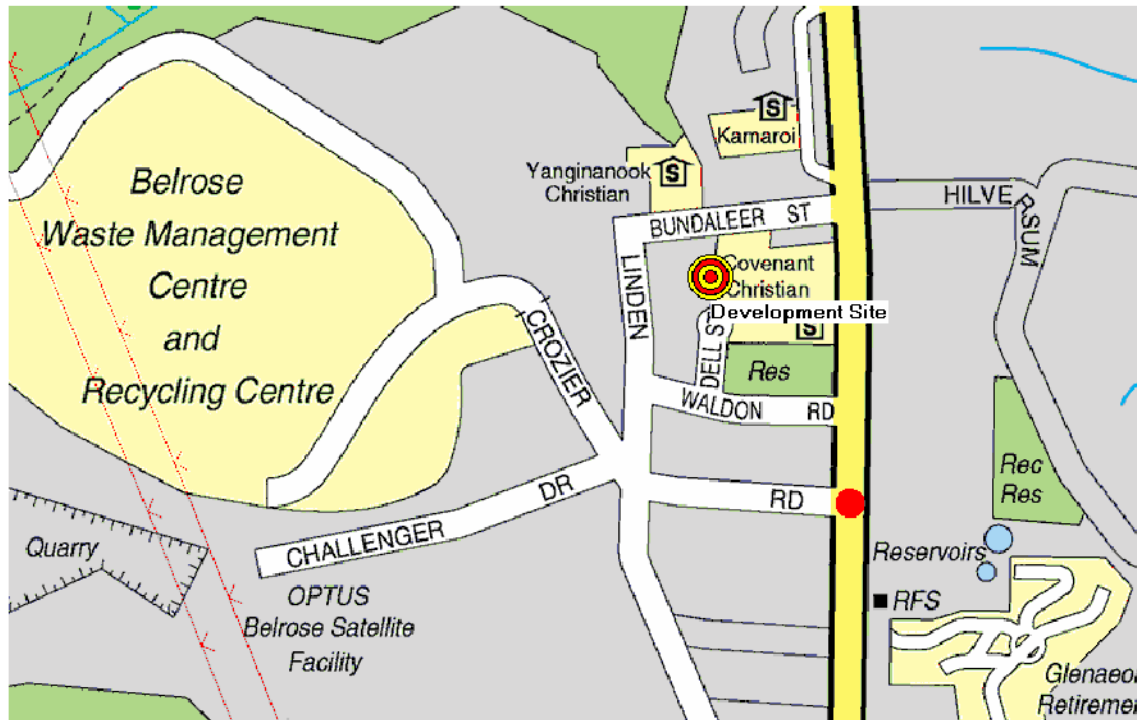
- The proposed access arrangements.
- Adequacy and suitability of the off-street parking provision.
- Estimated traffic generation of the proposal.
- Impacts of the revised traffic patterns on the existing road network as a result of the proposal.

Specifically, this report provides an assessment of the likely traffic impacts of a school population of 900 students. While the proposed development does not seek to increase school numbers, the Independent Hearing and Assessment Panel requested an assessment using higher school numbers. This number of students has been selected as it represents likely growth but this does not suggest that such numbers should be treated as a 'cap'. Rather, the number is the most likely scenario in the immediate future.

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# LOCATION

Fig 1

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## **2. PROPOSED DEVELOPMENT**

### **SITE**

The development site comprises the existing school site and the former Belrose Nursery site which previously occupied land at the junction of Linden Avenue and Bundaleer Street to the west of the school. The site is described as Lot 1852 in DP 752038 and Lot 2209 in DP 752038 and has an area of approximately 33,000m<sup>2</sup>.

Surrounding development comprises one and two storey dwelling homes on relatively large lots in a rural setting, Yaginanook School opposite and on the northern side of Bundaleer Street, Wakehurst Rugby Club playing fields on the western side of Forest Way and bounded by Waldon Road, Dell Street and Covenant Christian School.

### **DEVELOPMENT PROPOSAL**

The proposed development involves the construction of new buildings, additional playgrounds, parking for 71 cars, a disabled space and an indented bus bay off Linden Avenue to stand approximately 5 buses wholly within the site. Access to the car parking area is via the existing Dell Street and the bus facility is proposed off Linden Avenue. The car park modifications are primarily aimed at increasing safety by separating the bus loading/unloading area and car traffic (including teachers).

The development proposal is detailed on plans prepared by John van Breda Architects submitted with the development application.

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### 3. EXISTING TRAFFIC CONDITIONS

Forest Way is a classified 'State' road providing an important north/south connection between Mona Vale Road at Terrey Hills and Warringah Road at Frenchs Forest. Bundaleer Street, Linden Avenue, Dell Street and Waldon Road are 'Local' roads in Warringah Councils Road Hierarchy performing a local access function. Crozier Road provides the major point of access at Forest Way into this part of Belrose with direct access to the Belrose Waste Management Transfer Station, Optus Satellite Facility and Warringah Sand and Gravel Pty Ltd.

The main features of the road system serving the area and existing traffic controls in the vicinity of the site are:

- two lanes of traffic flow in each direction on Forest Way separated by a landscaped median, signposted 80km/h speed limit, painted indented bus bay on the west side between Bundaleer Street and Waldon Road adjacent to the school playing fields
- traffic control signals with pedestrian crossings at the Forest Way/Crozier Road 'T' junction
- A single lane roundabout at the Crozier Road/Linden Avenue/ Challenger Drive intersection.
- left turn only access on Forest Way at Bundaleer Street, Waldon Road and Linden Avenue
- 50km/h speed zones on all roads west of Forest Way, 40km/h School Zones on Bundaleer Street, Linden Avenue, Waldon Road and Dell Street in the immediate vicinity of Covenant Christian School
- 3 tonne load limit on Bundaleer Street, Linden Avenue and Waldon Road
- school time 'No Stopping' restrictions on north and south sides of Bundaleer Street at the access driveway to the school service road
- 'No Standing' restrictions around the bend at the junction of Bundaleer Street and Linden Avenue
- 'Give Way' signs giving priority to Crozier Road traffic at the Crozier Road/Linden Avenue/Challenger Drive intersection
- double separation centrelines in Waldon Road on approach to Linden Avenue
- 90° angle parking for 35 cars on the eastern side of Dell Street with a 2.0m wide concrete footpath and 'No Standing' restrictions in the northern turning circle
- 14 marked parallel parking spaces on the western side of Dell Street
- road/pavements widths varying from 6.5m in Linden Avenue, 7.8m in Bundaleer Street, 9.2m in Waldon Road and 9.4m in Dell Street

The 90° angle parking in Dell Street was provided by the school under a previous Council development consent condition.

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Data on the traffic movements at the Forest Way/Crozier Road and Dell Street/Waldon Road intersections and on-street parking utilisation in Bundaleer Street and Dell Street has been collected during the school morning and afternoon peak periods by Corner Counters on Wednesday 14 May 2003 as part of a previous study. Conditions on this day were described by the traffic counting firm as very wet with some localised flooding, however, traffic activity around the school was not considered to be unduly effected.

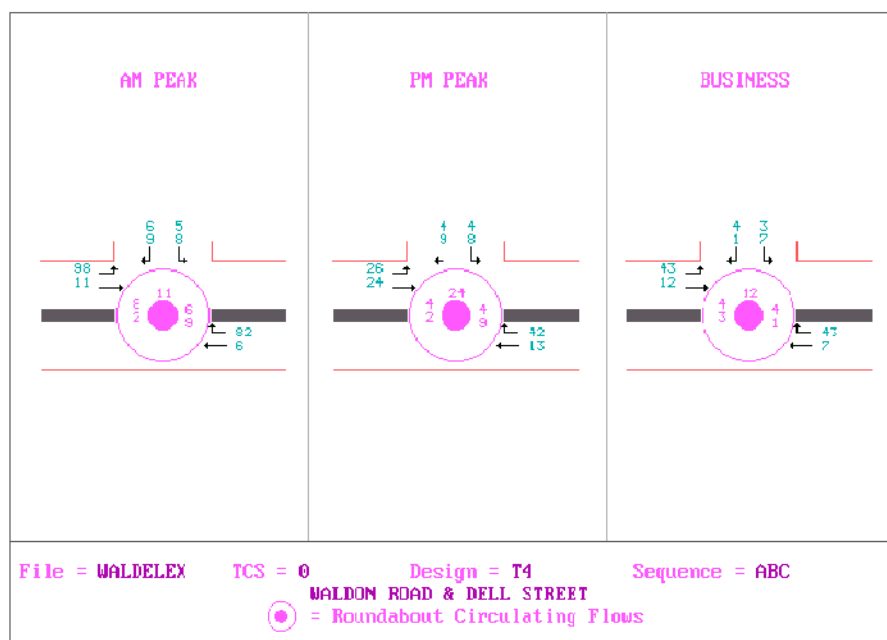
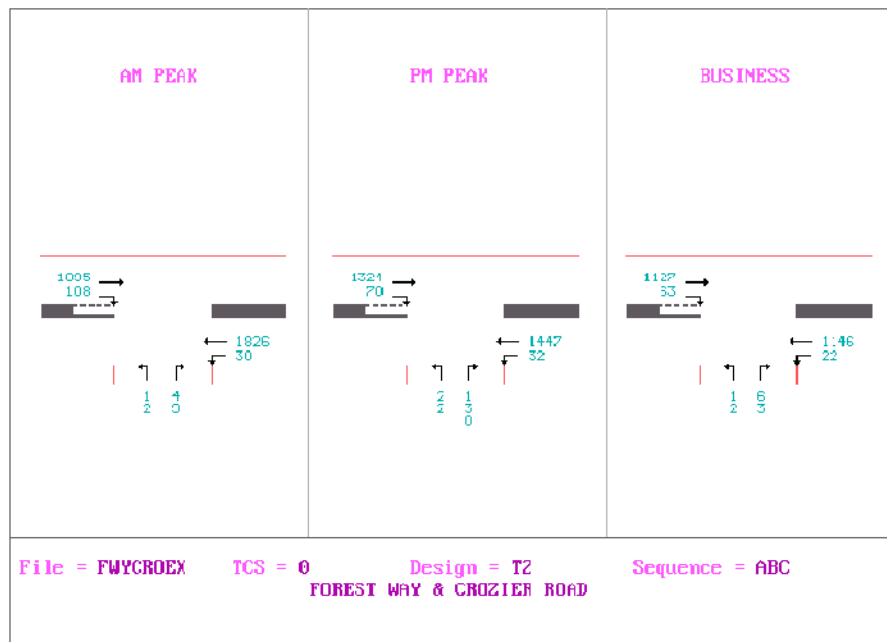
Traffic conditions in this area have not altered significantly since 2003 surveys and accordingly these results will be utilised in this assessment. At the time of the surveys 700 students were enrolled and 74 staff were employed at Covenant Christian School.

The detailed survey results are attached as appendix A. The school peak hour flows at the two intersections are depicted in Figure 2 on the following page.

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## 2003 FLOWS

Fig 2

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#### 4. KEY ISSUES

##### ACCESS AND PARKING

Vehicle access to the new car park area will be via the existing double driveway off Dell Street. The bus bay is proposed to be segregated from car access and the entry is located approximately 55m north of Linden Avenue and is 8m wide at the boundary splaying to 15m at the new kerb. The exit from the bus bay is approximately 140m north of Linden Avenue and is approximately 13m wide. This section of Linden Avenue is constructed with a 6.5m wide pavement without kerb and gutter on a generally straight alignment with relatively flat grades affording excellent sight distances for buses entering and exiting the site from both directions in Linden Avenue. The access arrangements to the bus bay are further assessed in the following section of this report.

These access arrangements will provide for a logical and safe movement of cars and buses to and from the site significantly reducing the congestion and conflicts currently being experienced between cars, buses and pedestrians at the existing two-way access driveway in Dell Street. Overall the arrangements will provide a safer environment for the school community.

The geometric design requirements for car park layouts such as aisle/access driveway widths and parking bay dimensions are specified in the '*Australian/New Zealand Standard, Parking facilities Part 1: Off-street car parking AS 2890.1 – 2004*'. The standard classifies this development as a Class 2 off-street car parking facility. The table below provides information on the key requirements of AS/NZS 2890.1 applicable to the car park.

FEATURE	AS 2890.1 REQUIREMENT	PROPOSED	CONFORMS TO AS 2890.1
Parking Space dimensions	5.4m x 2.5m Standard 5.4m x 3.2m Disabled	5.5m x 2.5m Standard 5.4m x 3.2m Disabled	YES
Aisle widths	5.8m for 2.5m wide spaces.	6.6m	YES
Blind Aisle Extension	1.0m	N/A	N/A
Driveway width	Category 2 d/w = 6m – 9m Note: Driveways are normally combined, but if separate, both entry and exit widths should be 2.9m min.	8m combined	YES

Accordingly, the car parking and access arrangements meet or exceed the Australian Standard requirements.

Council's *WLEP 2000* utilises the Roads and Traffic Authority's '*Guide to Traffic*

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*Generating Developments, Section 5 - Parking Requirements for Specific Landuses* for determining parking rates, however the guide provides no advice on parking rates for schools. There are currently some 17 car parking spaces provided in the south western portion of the site to the west of the Dell Street driveway access, this area is also used by buses and parents for student pick up and set down. Some 9-12 cars park informally on a grassed section on the southern side of the service road running easterly along the southern boundary of the site from the Dell Street access. This parking does not comply with the design requirements in AS 2890.1-2004.

A review of Sydney Metropolitan Council Parking Codes<sup>1</sup> in respect of on-site parking requirements for secondary school developments has indicated the following requirements:

LGA	PARKING REQUIREMENTS	
	Year 12	Staff
Auburn	1/20	1/2
Bankstown	1/8	1/1
Baulkham Hills	1/8	1/1
Blacktown	Not stated	1/1
Kogarah	1/10	2/classroom
Hornsby	1/2	1/1
Ku-ring-gai	1/8	1/1
Randwick	1/10	1/1
Rockdale	1/20	1/2
Ryde	1/10	1/2
Waverley	1/20	1/2
Willoughby	1/20	1/2

It will be noted that for Year 12 or students of driving age the range of parking requirements is from 1 per 2 to 1 per 20 students. The average requirement from this sample is 1 per 12.4 students.

At the time of the car parking surveys, there were 57 Year 12 students enrolled in the school, based upon current anticipated ratios, this number could increase to around 80 for a school population of 900 students.

Application of the average parking rate of 1 per 12.4 for Year 12 students and 1 space per staff, which is considered appropriate having regard to the relatively isolated location of the school, calculates as:

<sup>1</sup> *The Sinclair Knight Parking Report 1992*



80 yr 12 students @ 1 space/6 students	=	6.5 spaces
72 staff @ 1 space/staff member	=	72 spaces
Total	=	79 spaces

As noted earlier, presently Dell Street and to a lesser extent Bundaleer Street, provide a significant proportion of the schools parking requirements. Dell Street currently has 49 existing on street parking spaces (35 x 90° spaces, 14 parallel) with the 90° degree spaces provided by the school as a previous condition of development consent.

Accordingly, it is concluded that the proposal to provide 71 on site car parking spaces will result in a theoretical shortfall of some 8 spaces required by the school for the 900 student number scenario. These spaces can be easily and conveniently catered for in Dell Street as presently occurs and which has capacity for 49 cars resulting in less demand for parking in Bundaleer Street and Waldon Road.

It should be noted that the above assessment is considered to be very 'robust' as it assumes all teachers would be at the school at the same time and does not have regard to 'casual' and 'specialist' teachers whom would be in attendance on as required basis and therefore the full complement of teachers would only be on site on infrequent occasions. Similarly, it does not account for parent parking which would generally be for relatively short periods.

## BUS BAY PROPOSAL

The proposed bus bay is to be provided totally within the school grounds on the eastern side of Linden Avenue. Accordingly, as all existing buses that service this school approach and depart the school to/from the south it is proposed to construct the road to facilitate all buses to undertake a U-turn into the bus bay from Linden Avenue.

This section of Linden Avenue is constructed with a 6.5m wide pavement without kerb and gutter on a generally straight alignment with relatively flat grades affording excellent sight distances for buses entering and exiting the site from both directions in Linden Avenue.

The proposed arrangements are considered to be a significant improvement on the existing bus parking and access operations.

The bus bay proposal has been examined and presented to Forest Coach lines who have endorsed the bus bay arrangement. The proposal will reduce bus travel distances/time and removes current conflict of cars manoeuvring along Dell Street which are currently delaying buses.

These access arrangements will provide for a logical and safe movement of cars and

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buses to and from the site significantly reducing the congestion and conflicts currently being experienced between cars, buses and pedestrians at the existing two-way access driveway in Dell Street. Overall the arrangements will provide a safer environment for the school community.

## REVISED TRAFFIC ROUTES AND IMPACT

The Roads and Traffic Authority's '*Guide to Traffic Generating Developments, Section 3 - Landuse Traffic Generation*' of October 2002 provides no information on traffic generation rates for schools.

Based on the traffic volume surveys undertaken it is estimated that at the time of the surveys the school generated the following traffic movements in the am and pm peak periods (when 700 students were enrolled and 74 staff were employed):

### 2003 TRAFFIC MOVEMENTS

Peak Period	to School	from School	Total
8.00am-9.00am	211	145	356
2.45pm-3.45pm	100	137	237

To ascertain the likely traffic movements to and from the school of a scenario where around 900 children the existing volumes have been increased by 29% (which is the percentage increase from 700 to 900 students) to enable a 'robust' assessment of the impact on the intersections of Dell Street/Waldon Road and Forest Way/Crozier Road indicating the following traffic movements:

### ULTIMATE TRAFFIC MOVEMENTS

Peak Period	to School	from School	Total
8.0am-9.00am	272	187	459
2.45pm-3.45pm	129	177	306

To assess a worst case scenario turning volumes at the Forest Way/Crozier Road and Dell Street/Waldon Road intersections have been increased by 29% to provide an assessment of 'before' and 'after' intersection performance.

A comparison of intersection performance between the existing and projected traffic demands during the morning and evening peak hours upon the intersections of Forest Way/Crozier Road and Waldon Road/Dell Street has been assessed using the

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INTANAL intersection modelling program. Tabled below are the modelling results for each intersection comparing the pre and post development scenarios. The criteria for interpreting the INTANAL results are reproduced on the following page.

	<b>Forest Way/Crozier Road, Belrose – Traffic Signals</b>			
	<b>Existing</b>		<b>Post Development</b>	
	<b>AM</b>	<b>PM</b>	<b>AM</b>	<b>PM</b>
<b>Level of Service</b>	A	A	A	A
<b>Degree of Saturation</b>	0.68	0.66	0.74	0.70
<b>Average Vehicle Delay (sec/veh)</b>	9.7	12.0	11.6	13.8

	<b>Waldon Road/Dell Street, Belrose – Give Way control</b>			
	<b>Existing</b>		<b>Post Development</b>	
	<b>AM</b>	<b>PM</b>	<b>AM</b>	<b>PM</b>
<b>Level of Service</b>	A	A	A	A
<b>Degree of Saturation</b>	0.10	0.07	0.13	0.10
<b>Average Vehicle Delay (sec/veh)</b>	2.2	2.3	2.3	2.4

The results of the INTANAL analysis reveal that each intersection will continue to operate at the very good Level of Service ‘A’ with minimal delays and spare capacity.

Similarly, when translated to the surrounding road system the additional traffic is unlikely to be noticeable and will have minimal impact.

The proposal to relocate the buses away from Dell Street will have a positive impact upon the operation of the intersection of Waldon Road and Dell Street and will reduce congestion along Dell Street.

The impact of the proposal upon the intersection of Forest Way and Crozier Road will be remain the same as the altered bus routes are unchanged at this intersection.

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## Criteria for Interpreting Results of INTANAL Analysis

### 1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'	<i>Good</i>	<i>Good</i>
'B'	<i>Good with acceptable delays and spare capacity</i>	<i>Acceptable delays and spare capacity</i>
'C'	<i>Satisfactory</i>	<i>Satisfactory but accident study required</i>
'D'	<i>Operating near capacity</i>	<i>Near capacity and accident study required</i>
'E'	<i>At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode</i>	<i>At capacity and requires other control mode</i>
'F'	<i>Unsatisfactory and requires additional capacity</i>	<i>Unsatisfactory and requires other control mode</i>

### 2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (ie inner city conditions) and on some roads (ie minor side street intersecting with a major arterial route).

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

### 3. Degree of Saturation (DS)

The DS is another measure of the operational performance of individual intersections. For intersections controlled by **traffic signals**<sup>1</sup> both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a **roundabout or GIVE WAY or STOP signs**, a DS of 0.8 or less indicates satisfactory intersection operation.

<sup>1</sup> the values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs



## 5. CONCLUSIONS

REFER TO AMENDMENTS UNDER Supplementary Traffic  
Parking Statement 04.05.227  
AND CONDITIONS OF CONSENT.

1. The proposed expansion of the Covenant Christian School provides additional accommodation and facilities to the adjacent site.
2. The revised access arrangements will provide for a logical and safe movement of cars and buses to/from the site resulting in reduced conflict between vehicles and pedestrians on site and in Dell Street therefore providing safety improvements over the existing situation.
3. The provision of 71 on-site car parking spaces will moderate the demand for parking in Dell Street and Bundaleer Street, particularly for longer term parking.
4. The provision for approximately 5 buses to stand on-site for pick-up and set-down of school pupils and to enter and leave the site from a separated indented bus bay arrangement will assist bus safety and timetable operations.
5. The access arrangements and car parking layout meet or exceed the requirements in AS 2890.1-2004 and the bus bay concept permits the AS 2890.2, 12.5m heavy rigid vehicle to circulate adequately.
6. Critical intersections in the area will continue to operate at very good Levels of Service with the estimated additional traffic generation of a school population of 900 students and beyond.
7. Translated to the surrounding road system the additional traffic will have minimal impact on residents of this predominately rural area.
8. There will be no adverse environmental impact resulting from the proposed development.

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## APPENDIX A – Traffic Surveys

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# Corner Counters

A Division of Joray Enterprises Pty Ltd  
ACN 061 513 933

Telephone and Fax: (02) 9621 1221  
1 Ajax Place, Blacktown, NSW 2148

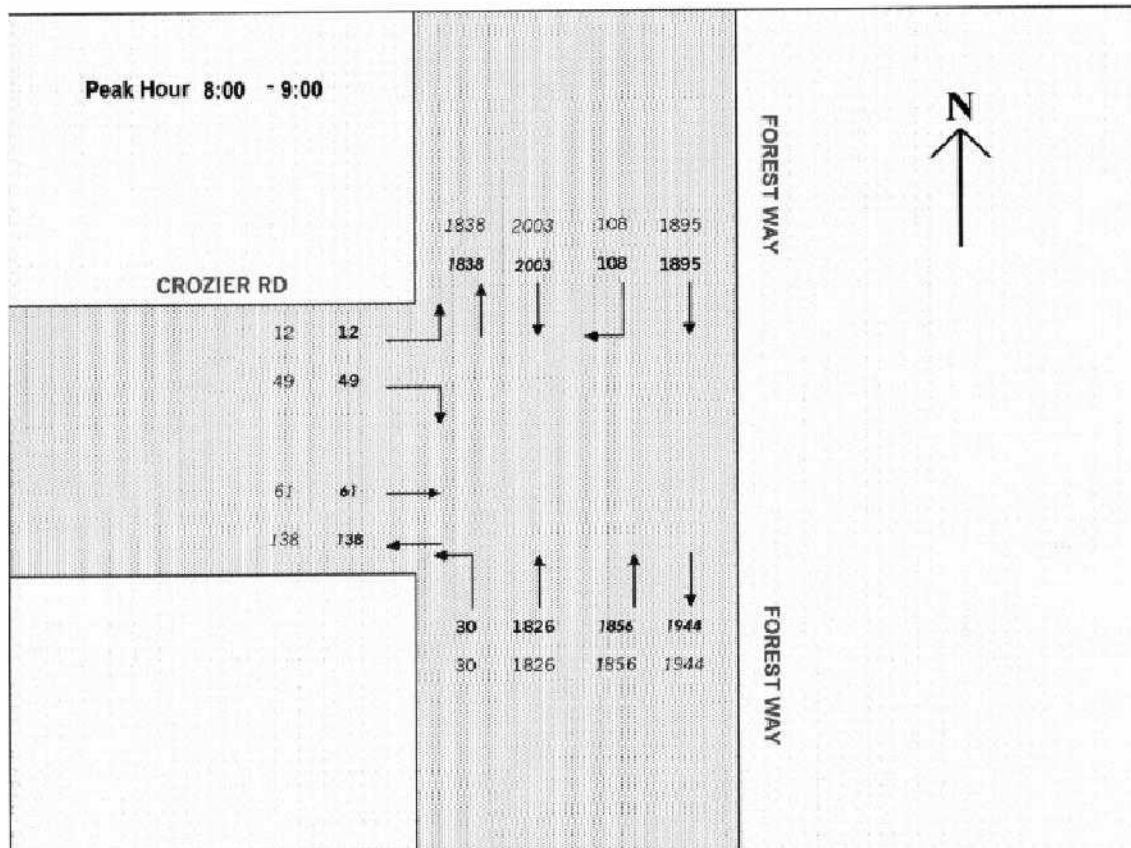
All Traffic Surveys  
and  
Traffic Supplies



Count Number	B3-56	Client	TRAFFIC SOLUTIONS	Count Date	Wednesday 14 May 2003
Location	FOREST WAY / CROZIER RD	Suburb	BELROSE		
Weather	Showers				

	NORTH		SOUTH		WEST		
	FOREST WAY		FOREST WAY		CROZIER RD		
VEHICLES	T	R	L	T	L	R	Total
All Vehicles	1895	108	30	1826	12	49	3920
Total	1895	108	30	1826	12	49	3920

PEDESTRIAN	FOREST WAY	FOREST WAY	CROZIER RD	Total
All Pedestrians	0	0	0	0
Total	0	0	0	0



Comments Flooding in surrounding areas. Roads closed

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A Division of Joray Enterprises Pty Ltd  
ACN 061 513 933

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1 Ajax Place, Blacktown, NSW 2148

All Traffic Surveys  
and  
Traffic Supplies



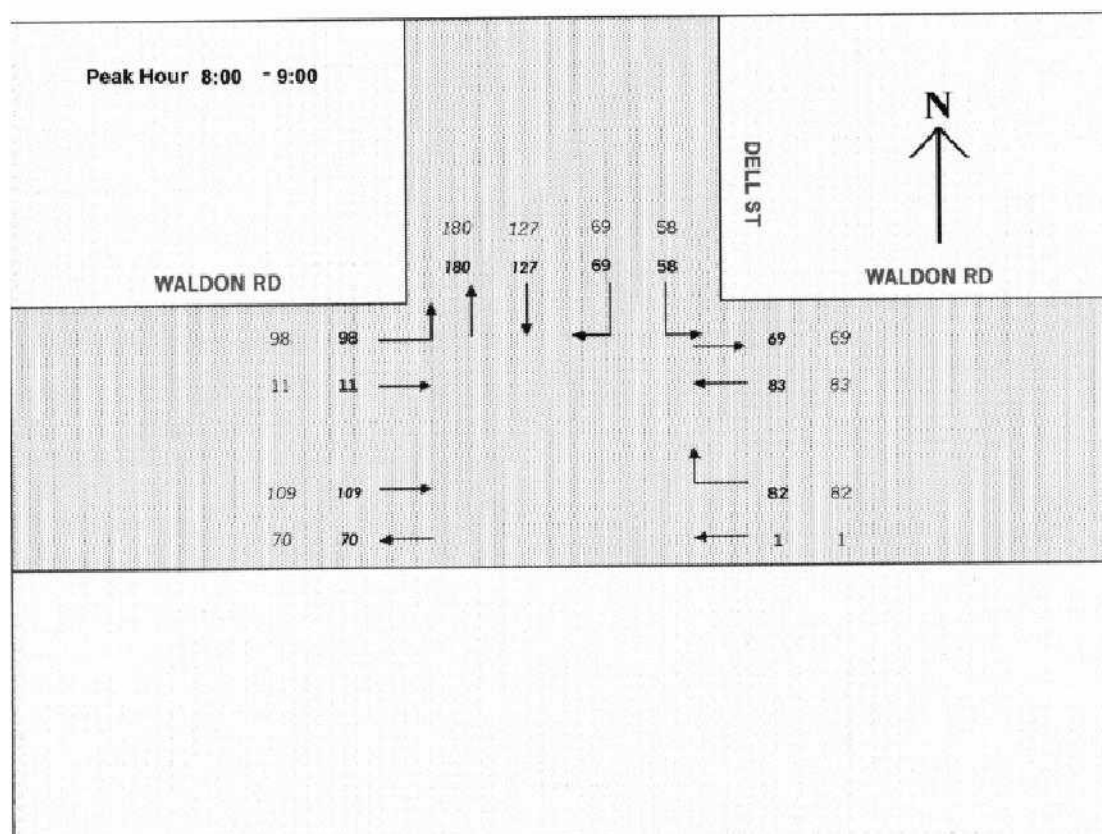
Count Number B3-57 Client TRAFFIC SOLUTIONS  
Location WALDON RD / DELL ST  
Weather Showers

Count Date Wednesday 14 May 2003  
Suburb BELROSE

	DELL ST		WALDON RD		WALDON RD		
VEHICLES	L	R	T	R	L	R	Total
All Vehicles	58	69	1	82	98	11	319
Total	58	69	1	82	98	11	319

PEDESTRIAN	DELL ST	WALDON RD	WALDON RD	Total
All Pedestrians	3	0	0	3
Total	3	0	0	3



Comments Flooding in surrounding areas. Roads closed

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ACN 061 513 933

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1 Ajax Place, Blacktown, NSW 2148

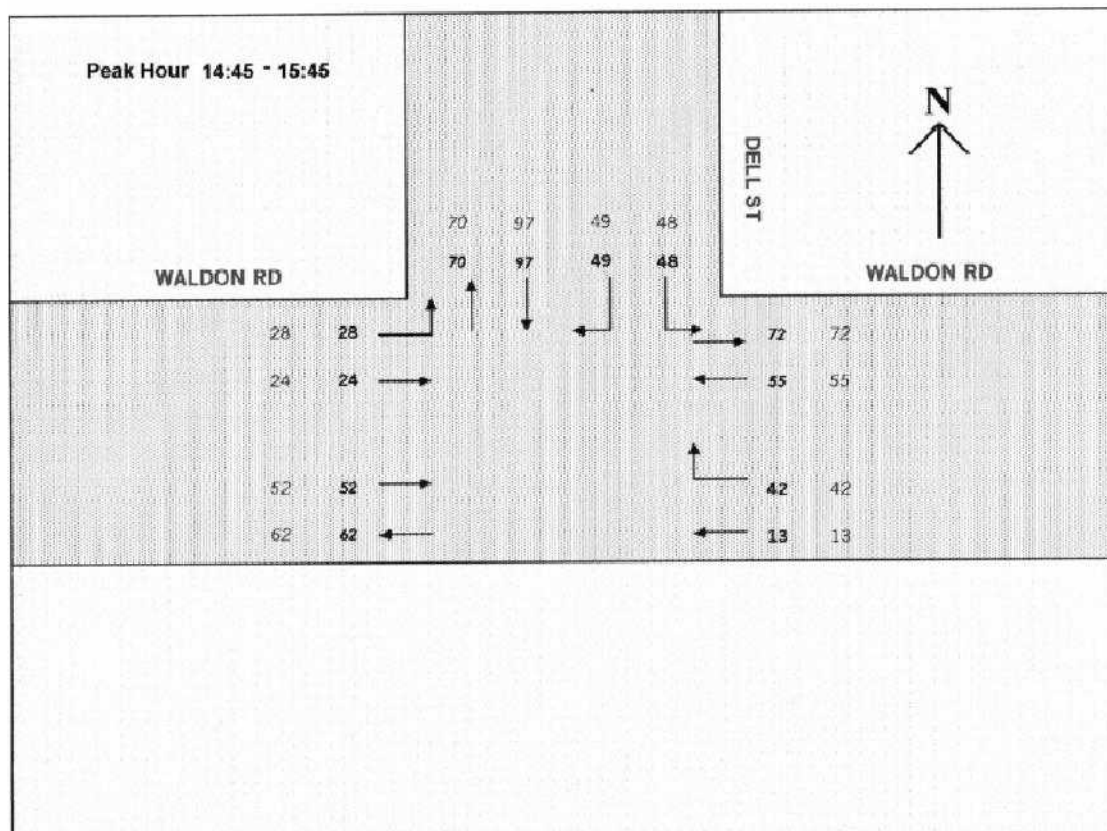
All Traffic Surveys  
and  
Traffic Supplies



Count Number	B3-57	Client	TRAFFIC SOLUTIONS	Count Date	Wednesday 14 May 2003
Location	WALDON RD / DELL ST	Suburb	BELROSE		
Weather	Showers				

	DELL ST		WALDON RD		WALDON RD		
VEHICLES	L	R	T	R	L	R	Total
All Vehicles	48	49	13	42	28	24	204
Total	48	49	13	42	28	24	204

PEDESTRIAN	DELL ST	WALDON RD	WALDON RD	Total
All Pedestrians	9	13	13	35
Total	9	13	13	35



Comments Flooding in surrounding areas. Roads closed

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