

APPENDIX A

Traffic Impact Assessment





The Covenant Christian School
Proposed Student Increase
Traffic Impact Assessment
March 2015

prepared for

The Covenant Christian School

prepared by

ARC Traffic + Transport

Introduction

The Covenant Christian School (the **School**), Forest Way Belrose (the **Site**), proposes a progressive increase in student numbers from the current 869 students (February 2015) to approximately 1,100 students (the **Proposal**). The Proposal does not provide for any significant new building works or the like at the School to accommodate the student increases, but rather would utilise existing spare [classroom] capacity.

This Traffic Impact Assessment (**TIA**) has been prepared by ARC Traffic + Transport (**ARC**) to examine the access, traffic and parking issues associated with the Proposal. In preparing this TIA, ARC has: -

- Observed conditions around the School during the AM arrival peak and PM departure peak periods
- Reviewed previous traffic reports relating to the School, and particularly reports prepared by Traffic Solutions between 2005 and 2010 in regard to previous upgrade works and bus travel planning
- In consultation with the School, prepared and assessed a student Travel Survey to determine student travel characteristics
- Commissioned traffic and parking surveys in the local area to quantify current demand, by which to assess the impacts of the Proposal at key locations
- Referenced appropriate safety and design guidelines

Details of the Proposal have been provided to ARC by the School and by GLN Planning. ARC would also acknowledge the assistance of Forest Coach Lines in regard to the existing and potential future operation of School buses.

1 The Existing School

1.1 Location

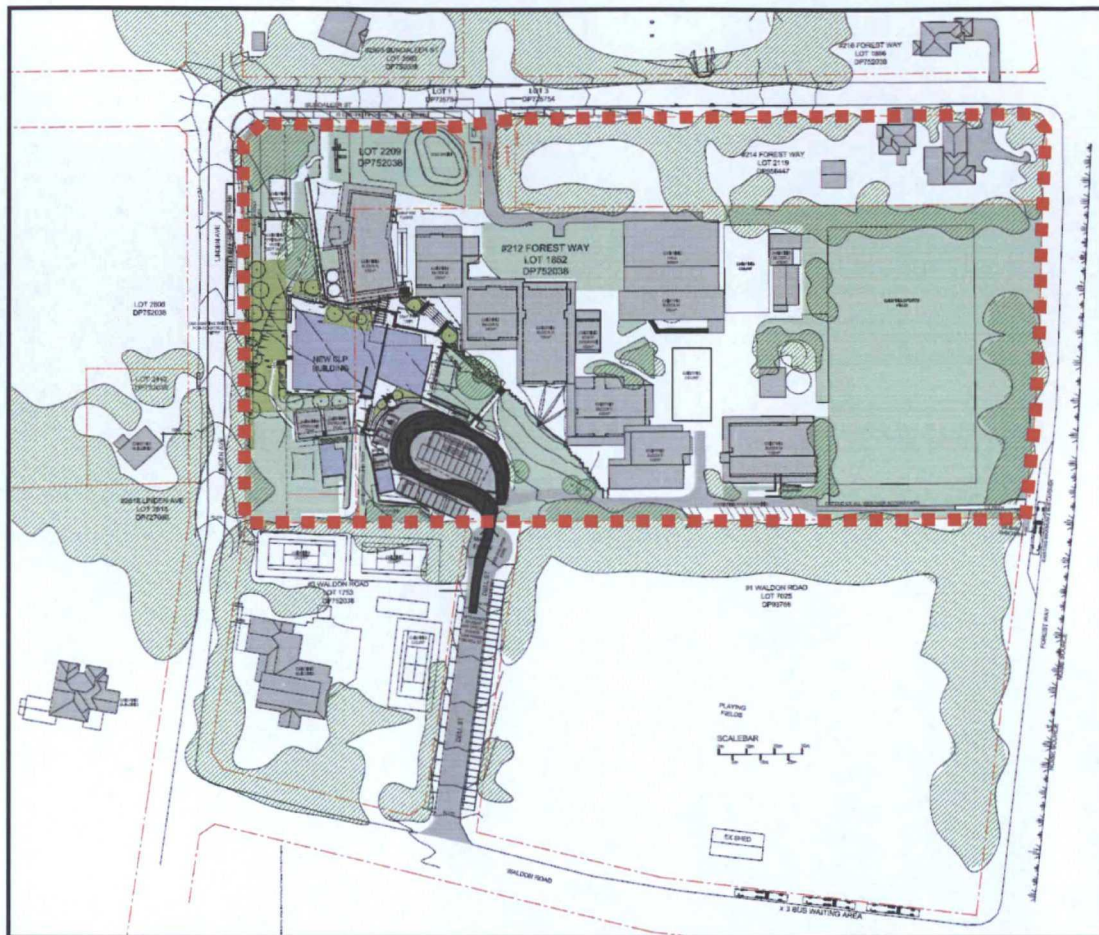
The School is located at 212 Forest Way, Belrose, and is generally bounded by Bundaleer Street to the north, Forest Way to the east, Waldon Road to the south and Linden Avenue to the west. More broadly, the School sits within a small mixed-use precinct (the **Precinct**) east of Forest Way, which includes pockets of residential, commercial and industrial development, as well as recreational facilities and the Belrose Resource Recovery Centre.

The School in its local context is shown in **Figure 1.1.1**, while a more detailed plan of the School including recent [approved] works is provided in **Figure 1.1.2**.

Figure 1.1.1 The School Location



Source: Google

Figure 1.1.2 The Covenant Christian School

1.2 School Population

The School has a current (February 2015) student population of some 869 students, including 81 Year 12 students, and employs up to 92 [full time equivalent] staff.

1.3 School Access

Primary vehicle and pedestrian access to the School is provided from Dell Street, where a two-way driveway leads into a recently upgraded parking and bus facility. Staff parking is provided in the middle of the facility, while buses are able to circulate around the facility to stand adjacent to a wide kerbside pedestrian path from where students are unloaded and loaded in the AM and PM peaks respectively (see also **Section 1.6**).

A turning head at the northern end of Dell Street (immediately adjacent to the School driveway) also provides a de facto Kiss & Drop facility further to Council recently installing 'No Standing' signage (within the turn head).

Having designed numerous Kiss & Drop facilities over 20 years, ARC notes that many of the key components which make for a safe and efficient Kiss & Drop are in evidence in Dell Street; specifically, the provision of a relatively small area for the actual drop-off and pick-up of students (rather than students exiting/entering vehicles over a broader area); the excellent supervision of that area and the broader facility by senior staff; and a road (Dell Street) capable of accommodating the Kiss & Drop queue length without impacting the local road network.

Dell Street also provides a wide footpath along its east side adjacent to on-street parking, and linking to additional on-street parking in Waldon Road.

In Bundaleer Street, a Right of Way provides pedestrian access via a new pedestrian gate from on-street parking (in Bundaleer Street) to the School, and more specifically to Primary School which has classrooms in proximity to Bundaleer Street.

A [staff] pedestrian access path – exclusively used by the Primary School staff via a security gate – links the Primary School buildings to Linden Avenue, and specifically to on-street parking used by Primary School staff in Linden Avenue directly adjacent to the School.

A final pedestrian access path is provided across the School playing fields to Forest Way to an access gate directly adjacent to the Forest Way bus bay.

1.4 School Travel Characteristics

1.4.1 Staff Travel

Almost all staff travel to and from the School by private vehicle, and there is no significant level of car sharing.

1.4.2 Student Travel Survey

In order to determine current School student travel characteristics – and specifically travel mode – ARC provided a Travel Survey to the School in late 2014 which was then circulated in all classes. The Travel Survey requested information in regard to normal mode of travel, and car occupancy for those travelling by car, and was also reviewed with reference to our on-site observations during both the AM and PM peaks.

It is noted that Year 12 classes had already concluded studies at the time of the Travel Survey, and as such there has been some extrapolation of the available survey data, and specifically reference has been made to the Year 11 travel data as in our opinion it provides an appropriate indicator of Year 12 travel. The exception to this is that some Year 12 students will drive to the School; these [travel mode] numbers have been based on the Year 12 parking demand estimate (1 space per 12.4 Year 12 students) detailed in previous Traffic Solutions reports for the School.

In addition, a small number of classes did not return the survey; in such instances, the reported travel mode of other classes in the same year have been adopted.

The broader results of the School student Travel Survey are provided in **Table 1.4** below.

Table 1.4 Student Travel Survey

Student Travel Mode	Car	Walk or Cycle	Bus	Car Driver	2015 Students
Pre 3	20				19
% Mode	105%	0%	0%		100%
Kindergarten	17		8		37
% Mode	46%	0%	22%		100%
Year 1	13.23		7.77		21
% Mode	63%	0%	37%		100%
Year 2	25.8		17.2		43
% Mode	60%	0%	40%		100%
Year 3	23		14		50
% Mode	46%	0%	28%		100%
Year 4	30		16		41
% Mode	73%	0%	39%		100%
Year 5	29		28		51
% Mode	57%	0%	55%		100%
Year 6	25		32		62
% Mode	40%	0%	52%		100%
Year 7	39	1	61		100
% Mode	39%	1%	61%		100%
Year 8	41	1	65		107
% Mode	39%	1%	61%		100%
Year 9	29	1	45		75
% Mode	39%	1%	61%		100%
Year 10	38	1	60		99
% Mode	39%	1%	61%		100%
Year 11	32	1	50		83
% Mode	39%	1%	61%		100%
Year 12	29	1	45	6.53	81
% Mode	36%	1%	56%	8%	100%
Mode	Car	Walk/Cycle	Bus	Car Driver	Total Students
Total #	392	4	449	7	869
% Mode	45.1%	0.4%	51.7%	0.8%	98%

1.4.3 Car Occupancy & Total Vehicle Trips

Our observations on-site, a review of the available student Travel Survey data, and reference to our previous school studies suggests a relatively high car occupancy at the School of approximately 1.7 students per vehicle, a not unusual figure given the significant potential for siblings (at a combined Primary and High School) to travel together; and given the distance of the School from many residential areas, which encourages higher use of car sharing.

With reference to **Table 1.4.2** above, this occupancy suggests the generation of some 230 one-way student vehicle trips (generally in both the AM and PM peaks).

Importantly, this estimate can be validated with reference to the total trip generation to/from the Precinct, which can be determined with reference to the recently undertaken traffic surveys (reported in detail in **Section 2** below). Specifically: -

- The traffic surveys show a total of some 300 vehicles entering the Precinct via Crozier Road, Waldon Road and Bundaleer Street in the hour 8:15 to 9:15am. In the same period, the traffic surveys report a total of some 260 vehicles departing the Precinct.

- Given the potential for some students and some staff to arrive prior to 8:15am – and the fact that there is very moderate other inbound Precinct generation in the AM peak hour – the inbound School trip estimate of some 300 vtp (i.e. student and staff trips) correlates well with the surveyed inbound Precinct trips.
- Given the potential for some parents to depart after 9:15am – and again the fact that there is very moderate other outbound Precinct generation in the AM peak hour – the outbound School trip estimate of some 230 vtp (i.e. departing parents/carers only) correlates well with the surveyed outbound Precinct trips.

The PM surveys indicate an even lower School generation (based on the same methodology discussed above); based on our past experience this is generally the result of a number of factors, including after-school sport, music lessons etc; and students arriving by car (for example being dropped on the way to a parents' place of work) and then departing by bus.

1.5 Parking

1.5.1 Parking Demand

The School parking demand can be calculated with reference to the Appendix 1 of the Warringah Council DCP 2011 (DCP 2011) which provides the following for *Educational Establishments*: -

- *1 space per staff member in attendance, plus as relevant, adequate pickup/setdown area on site, plus*
 - *adequate provision of bicycle racks, plus*
 - *adequate provision for student parking, plus*
 - *provision of bus standing and turning area*

In regard to an 'adequate' provision of student parking, and specifically parking for Year 12 students, the Traffic Solutions reports accompanying previously approved School development proposals estimated a demand for 1 space per 12.4 Year 12 students. Based on 92 staff (92 spaces), and the previously accepted Year 12 student parking rate estimate (7 spaces) a total of 99 parking spaces are currently required with reference to DCP 2011.

1.5.2 Parking Provision

The School provides a total of 46 staff parking spaces on-site, located within the 'upper' car park accessed from Dell Street (34 spaces), and off a lower on-site lane east of Dell Street (12 spaces).

As part of an earlier development approval for the School, 35 90° angle park spaces were also provided on the eastern side of Dell Street opposite 13 parallel spaces on the western side of Dell Street. These spaces are [all but exclusively] used by School staff, parents/carers and students.

The combination of on-site and Dell Street parking spaces provides a total of 94 spaces; again, it is acknowledged that the parallel spaces in Dell Street are not somehow 'designated' for the School's use (nor indeed are the angled spaces) but it is a simple reality that there is no demand other than that of the School for those spaces.

While further details in regard to on-street parking are examined in **Section 2.2**, it is noted that the Dell Street parking generally retains capacity throughout the AM and PM peaks as Primary School staff use on-street parking in Linden Avenue adjacent to the staff pedestrian access to the Primary School. Our observations suggest that approximately 15 Primary School staff park in Linden Avenue adjacent to the School.

1.6 Bus Operations

Further to recent upgrades of on and off site bus facilities – and specifically upgrades further to consultation with both Council and Forest Lines Coaches - the School provides in our opinion excellent bus accessibility.

1.6.1 On-Site Bus Facility

As part of a recent development approval to provide for School buses departing to the south, the School's upper car park was expanded so as to provide for the swept path of buses (including articulated buses) around the central staff parking area, allowing them to queue on-site and load/unload students from a designated footpath immediately adjacent to the main pedestrian entrance. These buses, generally arriving from, but exclusively departing to, the south, travel to/from the intersection of Forest Way & Crozier Road via Linden Avenue and Dell Street.

Staff monitor students at all times through the broader facility until all buses have departed, and in addition staff supervising the Dell Street Kiss & Drop then supervise the movement of these buses through the School driveway entrance to Dell Street.

As stated, the on-site bus facility has been designed specifically to accommodate not only standard buses, but also articulated buses, which are used on a number of routes where additional student carrying capacity is required. Based on our observations, the facility is able to accommodate 5 buses including an articulated bus and a double-decker bus, and still retain queuing room on-site for an additional bus.

The approved and constructed on-site School bus facility is shown in **Figure 1.6.1** below.

1.7 General Observations

Based on our observations of the School during the AM and PM peaks, it is appropriate to state in our opinion that the key drop-off and pick-up periods at the School (and the immediately adjacent road network) operate at a very high level of safety and efficiency. Moreover, traffic impacts – such as queuing and intersection delays – that can often briefly occur in a broader school environment were simply not in evidence during our visits. This is largely due to the following factors: -

- The distribution of arrival and departure trips to both Dell Street and Bundaleer Street, with additional overflow capacity in Waldon Street if required (though little used during our visits)
- The separation of School departure (i.e. end of school day) times by 8 – 10 minutes between the Primary School and the High School
- The use of on-street parking in the broader local area by parents and carers rather than the exclusive use of the Kiss & Drop
- The supervision of the Kiss & Drop by senior staff
- The supervision of bus operations both on-site and in Forest Way by senior staff
- The significant percentage of students travelling to and from the School by bus

A more detailed review of the potential School impacts on the local traffic and parking environment is provided in **Section 2** below.

2 Local Traffic & Parking Environment

2.1 Local Road Network

2.1.1 Forest Way

All access to the broader Precinct and the School is provided by Forest Way, a State Road which provides a sub-regional connection between Mona Vale Road at Terrey Hills, and Warringah Road at Frenchs Forest. In the vicinity of the School, Forest Way provides a two lane dual carriageway separated by a wide median strip, with additional turning infrastructure (right turn) at the intersection with Crozier Road. Forest Way has a posted speed limit of 80km/h, as well as 40km/h School Zone operating between Waldon Road and Bundaleer Street for northbound traffic.

As discussed in **Section 1.6** above, an indented bus bay is located on the western side of Forest Way immediately adjacent to the School playing fields.

2.1.2 Local Streets

Within the Precinct, local roads include Crozier Road, Linden Avenue, Dell Street, Waldon Road and Bundaleer Street, all of which essentially simply provide local access. Crozier Road is perhaps the most important of these local roads, as it provides access to the signalised intersection with Forest Way, the only Precinct intersection that provides for right turns (to and from Forest Way).

As detailed in previous Traffic Solution reports relating to the School, other features of the Precinct traffic environment include: -

- A single lane roundabout at the intersection of Crozier Road & Linden Avenue & Challenger Drive
- Left in/left out only access from/to Forest Way at Bundaleer Street, Waldon Road and Linden Avenue
- Simple priority control at all other local intersections
- 50km/h local road speed limits in all roads west of Forest Way, and 40km/h School Zone limits in Bundaleer Street, Linden Avenue, Waldon Road and Dell Street
- 'No Standing' and 'No Stopping' restrictions in the turning head at the northern end of Dell Street (immediately adjacent to the School driveway) providing for the Kiss & Drop operations

2.1.3 Key Intersection – Forest Way & Crozier Road

Based on our observations at the Site, the only location with a significant focus of traffic – such that could impact broader traffic operations – is the intersection of Forest Way & Crozier Road.

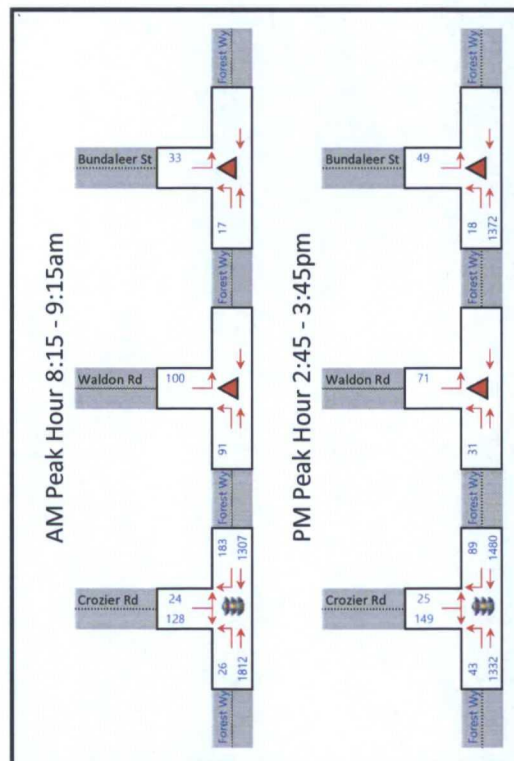
It is acknowledged that there is moderate traffic and queuing during the short School arrival and departure peaks at the intersection of Waldon Road & Dell Street, but this relates almost entirely to School trips, and has little impact on other local trips, nor (based on our observations) generates queues such as would impact the operation of broader intersections. Traffic flows in our opinion would need to be at least doubled to report anything other than a Level of Service "A" at these local intersections.

Notwithstanding, surveys were also conducted at the intersection of Forest Way & Waldon Road and Forest Way & Bundaleer Street to further inform the assessment of School trip distribution (as discussed in **Section 1.4.3**).

2.1.4 Traffic Survey

Traffic surveys of the intersections of Forest Way with Crozier Road, Waldon Road and Bundaleer Street were undertaken by Skyhigh Traffic Surveys in November and December 2014 during school term. The surveys covered the peak AM arrival period (8:15am – 9:15am) and peak PM departure period (2:45pm – 3:45pm). A summary of the survey results is provided below.

Figure 2.1.4 School Peak Traffic Surveys



Source: Skyhigh Traffic Surveys

2.1.5 Intersection Operations

In order to determine the current levels of service provided at the local intersections, the SIDRA intersection model been utilised to determine current intersection operations. The SIDRA inputs includes peak hour traffic flows and speed profiles, intersection geometry and operational controls, and in turn SIDRA reports the following key performance measures: -

- **Level of Service**

Level of Service (**LoS**) is a basic performance indicator assigned to an intersection based on average delay. For signalised and roundabout intersections, LoS is based on the average delay to all vehicles, while at priority controlled intersections LoS is based on the worst approach delay. The RMS LoS criteria, which have been used in the assessment, are provided below: -

Level of Service (RMS)	Control delay per vehicle in seconds (d) (including geometric delay)		
	Signals and Roundabouts	Rating	Stop and Give Way / Yield Signs
A	$d < 14.5$	Good	$d < 14.5$
B	$14.5 < d < 28.5$	Good with acceptable delay	$14.5 < d < 28.5$
C	$28.5 < d < 42.5$	Satisfactory	$28.5 < d < 42.5$
D	$42.5 < d < 56.5$	Near capacity	$42.5 < d < 56.5$
E	$56.5 < d < 70.5$	At capacity	$56.5 < d < 70.5$
F	$70.5 < d$	Over capacity	$70.5 < d$

- **Delay**

Delay represents the difference between interrupted and uninterrupted travel times through an intersection, and is measured in seconds per vehicle in this assessment. Delays include queued vehicles accelerating and decelerating from/to the intersection stop, as well as general delays to all vehicles travelling through the intersection. With reference to the LoS criteria above, the average intersection delay for signals and roundabouts represents an average of delays to all vehicles on all approaches, while for priority intersections the average delay for the worst approach is used.

- **Degree of Saturation**

Degree of Saturation (**DoS**) is defined as the ratio of demand (arrival) flow to capacity. DoS above 1.0 represent over-saturated conditions (demand flows exceed capacity) and degrees of saturation below 1.0 represent under-saturated conditions (demand flows are below capacity). The capacity of the movement with the highest DoS is reported.

In regard to the intersection of Forest Way & Crozier Road, pedestrian movements have not been included in the modelling as the survey data indicates virtually no pedestrian movements in the peak periods, which allows the intersection to operate more efficiently than would be the case if the pedestrian phases were actually utilised.

The SIDRA analysis provides the following results: -

Table 2.3.2 2014 Intersection Performance

2014 Intersection Performance	Level of Service		Average Delay (s)		Degree of Saturation		Queue Length (m)	
	AM	PM	AM	PM	AM	PM	AM	PM
Forest Way & Crozier Street	A	A	11.8	9.3	0.79	0.60	169.9	91.1
Forest Way & Waldon Road	A	A	10.5	7.5	0.47	0.40	5.6	2.9
Forest Way & Bundaleer Street	A	A	11.2	7.8	0.47	0.40	1.9	2

As shown in **Table 2.3.2**, all intersections currently operate at a good LoS in both the AM and PM peak. Peak turn queue lengths in Forest Way are accommodated by the available auxiliary right turn bay, and in Crozier Road the queue does not nearly approach the roundabout intersection of Crozier Road & Linden Avenue & Challenger Drive. The intersections of Forest Way & Waldon Road, and Forest Road & Bundaleer Street, both operate at a high level of service with spare capacity and minimal queue lengths.

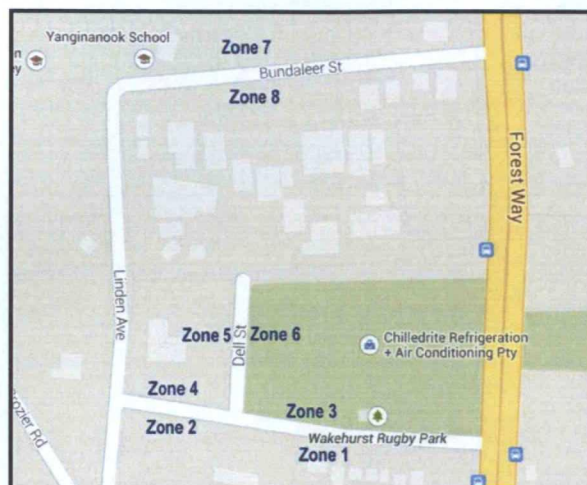
2.2 On-Street Parking

As discussed in **Section 1.5**, the School has per previous development applications provided new on-street parking in Dell Street immediately adjacent to the School; 35 90° angled spaces are provided, and an additional 13 parallel are available immediately opposite in Dell Street.

In Waldon Road, a mix of semi-formal and informal parking spaces are available on the northern and southern side of the road, generally being 90° angled informal spaces on the northern side, and general kerbside parallel spaces on the southern side. The northern parking verge of Waldon Road immediately east of Dell Street provides a sealed bitumen surface (which appears to have been recently installed). Notwithstanding the additional informal parking in Waldon Road further to the east of this section, and the parallel parking opposite, this recently sealed section alone provides capacity for an estimated 40+ parking spaces (over approximately 100m) immediately accessible to the School.

In Bundaleer Street, kerbside parallel spaces are also available on both sides of the road east and west of the School [Right of Way] entrance; it is noted that during the parking survey (detailed below) construction workers vehicles were parked in Bundaleer Street through both the AM and PM peaks, reducing on-street parking availability below normal levels. It is also noted that the construction work – on a new child care centre in Bundaleer Street north of the School – includes the provision of on-site basement parking such that the future children care centre would not impact the parking availability in Bundaleer Street.

In order to determine the level of parking available in the local area during the School peaks periods, Skyhigh conducted a parking survey in December 2014, the results of which are provided below.

Figure 2.2 School Parking Survey Zones**Table 2.2.1 AM Peak Parking Utilisation**

Time	Parking Zone								Total	% Capacity
	1	2	3	4	5	6	7	8		
8:00	3	0	2	0	5	11	4	6	31	18%
8:15	4	0	7	1	8	22	7	8	57	33%
8:30	5	1	11	0	9	28	10	10	74	43%
8:45	5	1	7	0	13	34	12	12	84	49%
9:00	3	0	10	0	13	34	11	15	86	50%
9:15	3	1	11	1	12	34	11	15	88	51%
Capacity	20	8	40	8	13	35	25	22	171	

Table 2.2.2 PM Peak Parking Utilisation

Time	Parking Zone								Total	% Capacity
	1	2	3	4	5	6	7	8		
14:00	0	0	4	0	5	26	11	11	57	33%
14:15	0	0	4	0	7	27	11	14	63	37%
14:30	1	0	5	0	9	26	14	17	72	42%
14:45	2	0	11	0	13	35	15	20	96	56%
15:00	7	0	18	3	13	35	25	22	123	72%
15:15	3	1	10	1	6	23	17	15	76	44%
Capacity	20	8	40	8	13	35	25	22	171	

In summary, the parking surveys show that there is significant available capacity within the immediately vicinity of the School in both the AM and PM peak periods. ARC notes that in Linden Avenue there is no demand for parking other than that of Primary School staff, a demand that is generally for some 15 parking spaces, and a demand which still leaves significant spare parking capacity in Linden Avenue (though again there is no other demand for that spare parking capacity).

3 The Proposal

3.1 Proposed Student Increases

The School proposes an increase in student numbers to approximately 1,100 students; there would be a minor increase in staff numbers also, estimated to be some 6 additional staff once student numbers reach 1,100.

Importantly [from the perspective of potential traffic and parking demands] the increases would not be proportional across all classes; rather, the major growth is expected in Year 5 and Year 6 of the Primary School, and then across the High School. The forecast student number by school year are shown in **Table 3.1** below.

Table 3.1 Future Student Numbers

Covenant School Class Year	2015 Students	Future Students
Pre-School	19	20
Kindergarten	37	44
Year 1	21	48
Year 2	43	52
Year 3	50	56
Year 4	41	56
Year 5	51	84
Year 6	62	84
Year 7	100	105
Year 8	107	105
Year 9	75	105
Year 10	99	105
Year 11	83	105
Year 12	81	105
TOTAL	869	1074

It is estimated that these increases could occur over approximately 5 – 10 years.

3.2 Access

No changes to either pedestrian or vehicle access are provided for under the Proposal; as such: -

- General vehicle access (parents and carers) would continue to be to/from the Dell Street Kiss & Drop, and to/from off-site parking in Dell Street, Waldon Road and Bundaleer Street
- General staff vehicle access would continue to be to/from the on-site car park off Dell Street, and on-street parking in Dell Street
- Most Primary School staff access would continue to be to/from Linden Avenue on-street parking
- Bus access would continue to be the on-site bus facility, and to/from the Forest Way bus bay

3.3 Trip Generation

In order to determine the additional trip generation of the Proposal, the forecast student numbers in **Table 3.1** have been factored with reference to the Travel Survey mode percentages for each school year. The results of this analysis are provided in **Table 3.3** below.

Table 3.3 Future Travel Modes

Student Travel Mode	Car	Walk or Cycle	Bus	Car Driver	Future Students
Pre-School	20	0	0		20
% Mode	100%	0%	0%		100%
Kindergarten	29.92	0	14.08		44
% Mode	68%	0%	32%		100%
Year 1	30.24	0	17.76		48
% Mode	63%	0%	37%		100%
Year 2	31.2	0	20.8		52
% Mode	60%	0%	40%		100%
Year 3	35	0	21		56
% Mode	62%	0%	38%		100%
Year 4	37	0	19		56
% Mode	65%	0%	35%		100%
Year 5	43	0	41		84
% Mode	51%	0%	49%		100%
Year 6	37	0	47		84
% Mode	44%	0%	56%		100%
Year 7	41	1	64		105
% Mode	39%	1%	61%		100%
Year 8	41	1	64		105
% Mode	39%	1%	61%		100%
Year 9	41	1	64		105
% Mode	39%	1%	61%		100%
Year 10	41	1	64		105
% Mode	39%	1%	61%		100%
Year 11	41	1	64		105
% Mode	39%	1%	61%		100%
Year 12	37	1	58	8	105
% Mode	36%	1%	56%	8%	100%
Mode	Car	Walk/Cycle	Bus	Car Driver	Total Students
Total #	503	4	558	8	1074
% Mode	46.8%	0.4%	52.0%	0.8%	100%

With reference to **Table 3.3**, it is estimated that the Proposal will result in the following additional trips: -

- Approximately 60 additional student drop-off/pick-up trips in the AM and PM respectively
- Approximately 6 additional staff arrival/departure trips over the broader AM and PM respectively
- Approximately 1 additional Year 12 student arrival trips in the AM, and departure trips in the PM
- Approximately 112 additional student bus passengers

3.4 Parking

With reference to DCP 2011, the Proposal would require the provision of 6 additional staff parking spaces, and 1 additional Year 12 student parking spaces, to a total (once student numbers reach 1,074 per **Table 3.1**) of some 106 parking spaces. As the Proposal does not provide for additional on-site parking, the ability of the local on-street parking environment to accommodate this additional requirement is examined in **Section 4**.

4 Impacts of the Proposal

4.1 Upper Car Park Operations

As stated, the upper car park will continue to provide for staff and visitor parking, and for the movement of buses through the on-site bus facility

With reference to **Table 3.3**, the potential exists for an additional bus or buses to be required at some time in the future to provide for the increase in students using buses to travel to and from the School. Again further to our discussions with Forest Coach Lines, a determination in this regard is generally made early in the school year when student numbers are known, and appropriate bus numbers (and types) can be assigned

The on-site bus facility has some additional queuing capacity immediately off Dell Street, which could accommodate an additional standard bus or, if required, the provision of perhaps one or two articulated buses to replace current standard buses

Notwithstanding, if it were the case that the on-site bus facility was operating at capacity (perhaps once students numbers reach peak levels), ARC would recommend that the School – in consultation with Forest Coach Lines and potentially Council – examine the potential for buses to queue off-site (away from Dell Street) or to have a staggered arrival time to the Precinct so as to maintain safe and efficient operations. Essentially, ARC is of the opinion that a similar system to that employed for the Forest Way buses to queue in Waldon Road (so as to prevent overspill from the Forest Way bus stop) could equally be employed for the southbound buses using the on-site bus facility

Moreover, ARC would recommend that the School continue to implement on a daily basis the School's Traffic Management Policy, adherence to which provides what is in our opinion a very safe and efficient on-site environment

4.2 Local Streets

4.2.1 Dell Street

Our observations on-site suggest that the Dell Street Kiss & Drop could accommodate the additional trip generation without significant impacts, specifically, observed queues in Dell Street (to the Kiss & Drop) do not nearly approach Waldon Road, such that a proportional allocation of additional trips suggests little likelihood of vehicles queuing back to Waldon Road in either the AM or PM peak periods. More broadly, ARC would again recommend that the School continue to implement on a daily basis the School's Traffic Management Policy, adherence to which provides what is in our opinion a very safe and efficient Kiss & Drop and general parking environment in Dell Street

4.2.2 Waldon Road

The Proposal is likely to lead to increases in the use of the available on-street parking in Waldon Road, and specifically in the section of Waldon Road immediately east of Dell Street. However, the additional trips generated to these parking spaces (and to the western end of Waldon Street by these trips and other trips generated to and from Dell Street) would in our opinion have no impact of the environmental or general amenity of Waldon Road (see also **Section 4.4** below).

4.2.3 Bundaleer Street

The Proposal does not provide for significant increases in the lower Primary School student numbers, i.e. the number of parents/carers using Bundaleer Street to access the School is unlikely to significantly increase in the future. Notwithstanding, and as for Waldon Road, the total traffic flows in Bundaleer Street remain very minor and would in our opinion in no way be impacted by the Proposal.

4.2.4 Linden Avenue

The Proposal has the potential to generate perhaps 1 – 2 additional parking trips to Linden Street (in the vicinity of the staff access to the Primary School) but again traffic flows remain very minor and would in no way be impacted by the Proposal.

4.3 Intersection Operations

The additional trip generation further to the Proposal has been proportionally assigned to each of the key movements at the intersections of Forest Way with Crozier Street, Waldon Road and Bundaleer Street.

Revised SIDRA analysis has then been undertaken further to these increases, the results of this analysis are provided in **Table 4.3** below.

Table 4.3 Future Intersection Performance

Future Intersection Performance	Level of Service		Average Delay (s)		Degree of Saturation		Queue Length (m)	
	AM	PM	AM	PM	AM	PM	AM	PM
Forest Way & Crozier Street	A	A	12.7	10.3	0.79	0.63	169.9	91.1
Forest Way & Waldon Road	A	A	10.6	7.5	0.48	0.40	6.5	3.5
Forest Way & Bundaleer Street	A	A	11.2	7.8	0.48	0.40	2.8	2.6

The SIDRA results in **Table 4 3** indicate that the intersection of Forest Way & Crozier Street will continue to operate at a good LoS into the future, with primary delays appropriately constrained to the minor movements. ARC notes that RMS historic AADT data suggests only very minor average growth in Forest Way, and as such the additional generation of the School would not in our opinion impact, or be impacted by, minor growth in Forest Way over time.

The minor intersections of Forest Way with Waldon Road and with Bundaleer continue to operate with significant spare capacity and very minimal queues.

4 4 Parking

As discussed in **Section 3 4**, the Proposal would require a total of 106 parking spaces with reference to DCP 2011, as the Proposal does not provide for any additional on-site parking, these spaces will need to be provided on-street in the immediate vicinity of the School.

The parking survey in **Section 2 2** shows the availability and use of parking spaces in Waldon Road immediately east of Dell Street. It is important to note that the use of these parking spaces during the School peaks (and indeed across the day when considering potential staff parking in some of these spaces) in no way conflicts with other local demands, and specifically with the use of the Waldon Road playing fields on weekends.

4 5 Bus Operations

As discussed in **Section 4 1**, the potential exists for additional buses to be required in the future so as to accommodate the additional student bus passenger demand.

In regard to the Forest Way bus stop, the management plans already in place to ensure queued buses do not impact Forest Way through movements would equally provide for additional bus requirements, and again the excellent supervision of bus operations by senior staff, means that the safety and efficiency of the bus stop would not be compromised by the Proposal.

As such, ARC would recommend that the School continue to implement on a daily basis the School's Traffic Management Policy, adherence to which provides what is in our opinion very safe and efficient operations at the Forest Way bus stop.

5 Conclusions & Recommendations

5.1 Conclusions

Further to a detailed analysis of Proposal to increase student numbers from some 869 to some 1,100, ARC has concluded that the Proposal would have no significant access, traffic or parking impacts on the local traffic and parking environment. Specifically, ARC has determined that -

- The key activity areas during the School peak periods – the on-site bus facility and Dell Street – operate at a high level of safety and efficiency, a product of good design, excellent supervision and what are relatively moderate drop-off and pick-up demands. The moderate additional vehicle trip generation of the Proposal would not compromise these current operations, while any additional demand for the on-site bus facility could be appropriately managed further to consultation with Forest Coach Lines and Council.
- Traffic flows in the local road network peak during School peaks, but even then the total flows on most roads are very moderate, such that all local roads operate – and will operate further to the Proposal – well within RMS environmental capacity limits.
- The key intersections to Forest Way – at Crozier Road, Waldon Road and Bundaleer Street – all operate at a good level of service, and would be barely impacted by the additional trip generation of the Proposal.
- A significant amount of spare parking is available in the immediately vicinity of the School such as can meet (and exceed) peak demands further to the Proposal.
- The Forest Way bus stop operates safely and efficiently under the supervision of senior staff, while the existing management plans which prevent bus queues impacting Forest Way through traffic could equally be applied should additional buses be required in the future further to the Proposal.

5.2 Recommendations

Further to the conclusions outlined above, ARC provides the following recommendations -

- That the School's Traffic Management Policy continue to be implemented daily, and updated regularly (at least yearly).
- That further to the identification of a student bus demand in excess of current capacity, the School enter into consultation with Forest Coach Lines to initially determine the potential for the use of larger buses, or if required means of safely and efficiently moving additional buses through both the on-site bus facility and the Forest Way bus stop.