TWYNAM MUNDAMIA PTY LIMITED

TRANSPORT REPORT FOR PROPOSED RESIDENTIAL SUBDIVISION, MUNDAMIA

MAY 2012

COLSTON BUDD HUNT & KAFES PTY LTD
ACN 002 334 296
Level 18 Tower A
Zenith Centre
821 Pacific Highway
CHATSWOOD NSW 2067

Telephone: (02) 9411 2411
Facsimile: (02) 9411 2422
Email: cbhk@cbhk.com.au

REF: 8351

TABLE OF CONTENTS

1. INTRODUCTION

1.1. Colston Budd Hunt & Kafes Pty Ltd has been commissioned by Twynam Mundamia Pty Limited to prepare a report examining the transport implications of a proposed residential subdivision at Mundamia in west Nowra. The site location is shown in Figures 1 and 2.

1.2. Mundamia has been identified for residential development in Council's Nowra Bomaderry Structure Plan. The plan identifies potential development of some 720 dwellings in detached and medium density housing. The area is currently being rezoned to provide for residential development.

1.3. The proposed development is for 312 residential lots plus one rural lot in part of the Mundamia area.

1.4. The Director – General's Environmental Assessment Requirements for the Project Application include:

5. Traffic and Access

5.1 Prepare a traffic impact study in accordance with Table 2.1 of the RTA's Guide to Traffic Generating Developments which addresses matters, including the following:

- *Connectivity to existing, surrounding developments, including West Nowra, Wollongong University and the Thompsons Point area;*
- *Provision for a future road reserve on both sides of George Evans Road to link to the west Bypass corridor and to the Nowra CBD; and*
- *Upgrade requirements for Yalwal/George Evans Roads and Yalwal/Albatross intersections.*

5.2 *Undertake intersection modelling using SIDRA for the key junctions in the area including the Yalwal Road and MR92 intersection, and consider:*

- *AM and PM peak volumes and holiday peak volumes;*
- *Existing traffic volumes with and without development; and*
- *10 year projected volumes with and without the proposal.*

1.5. This report has been prepared with reference to the RTA's "Guide to Traffic Generating Developments", and assesses the transport implications of the proposed development through the following chapters:

- Chapter 2 - describing the existing conditions; and
- Chapter 3 - assessing the transport implications of the proposed subdivision.

2. EXISTING CONDITIONS

Site Location and Road Network

2.1 The area identified for future residential development is in Mundamia, west of Nowra, as shown in Figures 1 and 2. The area is currently being rezoned to provide for residential development. The Shoalhaven River and Nowra Creek are north and east of the site respectively. The Shoalhaven campus of the University of Wollongong is located to the south. To the west there is bush and rural development.

2.2 The road network serving Mundamia includes Albatross Road, Yalwal Road, George Evans Road, Jonsson Road and Stonegarth Road. Albatross Road forms part of a route connecting Nowra with Braidwood (Main Road 92). It provides access to industrial areas as well as residential properties. It provides for one traffic lane in each direction clear of intersections.

2.3 Yalwal Road connects Albatross Road at West Nowra in the east with Burrier and Yalwal in the west. It provides for one traffic lane in each direction with sealed shoulders. It has a 100 kilometre per hour speed limit west of George Evans Road and a 60 kilometre per hour speed limit east of George Evans Road. The intersection of Yalwal Road with Albatross Road is an unsignalised t-intersection, with Albatross Road having priority. There are two southbound lanes marked in Albatross Road to provide for through traffic to pass a vehicle turning right into Yalwal Road.

2.4 George Evans Road runs north from Yalwal Road at an unsignalised t-intersection controlled by give way signs. There are two marked westbound lanes in Yalwal Road at the intersection to allow westbound through traffic to pass a vehicle turning right

into George Evans Road. George Evans Road provides for one traffic lane in each direction with sealed shoulders. It provides access to the University of Wollongong campus, via a roundabout. Beyond the university access, George Evans Road is unsealed.

2.5 Jonsson Road and Stonegarth Road are unsealed roads connecting to George Evans Road. Both roads provide access to rural properties.

Previous Work

2.6 Shoalhaven Council has prepared the Nowra Bomaderry Structure Plan which identifies a number of areas in Nowra and Bomaderry for future development.

2.7 Mundamia is one of seven areas identified in the plan. The Mundamia development area is some 53 hectares and a potential scale of development of some 720 dwellings is identified in detached and medium density housing. The strategy also identifies a future high school in the area. The other six areas in the plan provide a total of some 529 hectares and some 6,400 dwellings.

2.8 Section 6 of the plan outlines a transport strategy to accommodate future development in Nowra/Bomaderry, including Mundamia New Living Area No 5. It is understood that Council is preparing a Section 94 plan for New Living Area No 5.

Traffic Flows

2.9 Traffic generated by the proposed residential development will have its greatest effects during weekday morning and afternoon peak periods when it combines with commuter traffic. In order to gauge traffic conditions, counts were undertaken during weekday morning and afternoon peak periods at the following intersections:

- Albatross Road/Yalwal Road;
- Yalwal Road/George Evans Road; and
- George Evans Road/university access.

2.10 The results of the surveys are shown in Figures 3 and 4, and summarised in Table 2.1.

Table 2.1: Two-way (sum of both directions) peak hour traffic flows

Road	Location	AM peak hour	PM peak hour
Albatross Road	North of Yalwal Road	1,050	1,130
	South of Yalwal Road	595	710
Yalwal Road	West of Albatross Road	605	630
	East of George Evans Road	275	280
	West of George Evans Road	175	155
George Evans Road	North of Yalwal Road	120	145
	North of university access	15	15
University access	West of George Evans Road	105	130

2.11 Table 2.1 shows that traffic flows on Albatross Road, north of Yalwal Road, were some 1,050 to 1,150 vehicles per hour two-way during the morning and afternoon peak hours. Yalwal Road near Albatross Road and Albatross Road south of Yalwal Road carried lower flows of some 600 to 700 vehicles per hour two-way.

2.12 Further west on Yalwal Road, traffic flows were some 150 to 300 vehicles per hour two-way. George Evans Road near Yalwal Road, and the access to the university, carried some 100 to 150 vehicles per hour two-way. North of the university access, flows on George Evans Road were less than 100 vehicles per hour two-way during the surveyed peak periods.

Intersections Operations

2.13 The capacity of the road network is largely determined by the capacity of its intersections to cater for peak period traffic flows. The surveyed intersections shown in Figures 3 and 4 have been analysed using the SIDRA program.

2.14 SIDRA simulates the operations of intersections to provide a number of performance measures. The most useful measure provided is average delay per vehicle expressed in seconds per vehicle.

2.15 Based on average delay per vehicle, SIDRA estimates the following levels of service (LOS):

- For traffic signals, the average delay per vehicle in seconds is calculated as delay/(all vehicles), for roundabouts the average delay per vehicle in seconds is selected for the movement with the highest average delay per vehicle, equivalent to the following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Good with minimal delays and spare capacity
29 to 42	=	"C"	Satisfactory with spare capacity
43 to 56	=	"D"	Operating near capacity
57 to 70	=	"E"	At capacity and incidents will cause excessive delays. Roundabouts require other control mode
>70	=	"F"	Unsatisfactory and requires additional capacity

- For give way and stop signs, the average delay per vehicle in seconds is selected from the movement with the highest average delay per vehicle, equivalent to following LOS:

0 to 14	=	"A"	Good
15 to 28	=	"B"	Acceptable delays and spare capacity
29 to 42	=	"C"	Satisfactory but accident study required
43 to 56	=	"D"	Near capacity and accident study required
57 to 70	=	"E"	At capacity and requires other control mode
>70	=	"F"	Unsatisfactory and requires other control mode

2.16 It should be noted that for roundabouts, give way and stop signs, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle should also be taken into account. Thus, for example, an intersection where all movements are operating at a level of service A, except one which is at level of service E, may not necessarily define the intersection level of service as E if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.

2.17 The SIDRA analysis found that the unsignalised intersections of Yalwal Road with Albatross Road and George Evans Road, and the roundabout controlled intersection of George Evans Road with the university access, operate with average delays for all movements of less than 15 seconds per vehicle during the morning and afternoon peak periods. This represents level of service A/B, a good level of service.

Public Transport

2.18 Local bus services are provided by Nowra Coaches. Buses currently use Yalwal Road and George Evans Road to service the university campus. Route 724 connects Bomaderry Railway Station with the town centre, university campus and other services and facilities in Nowra. Three services are provided on weekday mornings.

2.19 The structure plan identifies opportunities to extend bus services into the Mundamia development area.

3. IMPLICATIONS OF PROPOSED DEVELOPMENT

3.1 It is proposed to develop a residential subdivision comprising 312 residential lots plus one rural lot in part of the Mundamia area. Vehicular access is proposed to be provided from George Evans Road, which would be realigned and extended north. A layout of the proposed subdivision is shown in Figure 5.

3.2 Parking will be provided in accordance with Council's requirements and be finalised at the time of applications for individual dwellings. This chapter examines the implications of the proposed subdivision through the following sections:

- public transport;
- access and internal layout;
- traffic generation and effects;
- Director – General's requirements; and
- summary.

Public Transport

3.3 As previously discussed in Chapter 2, buses currently use Yalwal Road and George Evans Road to service the university campus. The structure plan identifies opportunities to extend bus services into the Mundamia development area.

3.4 The collector road within the new development will be provided to accommodate buses. The site will therefore be accessible by future bus services through the area.

3.5 The proposed subdivision, with its increase in residential population, will strengthen demand for public transport services.

Access and Internal Layout

3.6 Vehicular access is proposed to be provided from George Evans Road, which would be realigned and extended north. The realigned part of George Evans Road will commence just south of the site. A new roundabout is proposed to be provided in this location, near the entrance to the proposed subdivision.

3.7 It is proposed that the new roundabout also provide access to the university to the west and other properties to the north west. To the east, the proposed roundabout could provide access to the future school site, as well as to West Nowra.

3.8 With traffic from the proposed residential development, the proposed new roundabout would operate with average delays of less than 15 seconds per vehicle during peak periods. This represents level of service A/B, a good level of service.

3.9 Internal circulation roads within the proposed residential subdivision will be designed in accordance with the principles in Council's Subdivision Code (DCP 100). The collector road through the subdivision will have a 20 metre reserve, with a nine metre carriageway (to accommodate buses) and 5.5 metre verges on both sides. Local streets (as identified in the subdivision code) will be provided with 18 metre reserves, 4.5 metre verges and nine metre carriageways. Access streets will have 16 metre reserves with four metre verges and eight metre carriageways. Access places will have 13 metre reserves with four metre verges on both sides.

3.10 Roundabouts are proposed at a number of the four-way junctions within the site. Other intersections would be priority controlled.

3.11 The principles in the subdivision code have been developed from AMCORD. Within residential precincts, the subdivision code/AMCORD distinguishes two levels of streets, local streets and collector streets.

3.12 On local streets the residential environment dominates. Traffic speeds and volumes are low and pedestrian/cycle movements encouraged. Vehicle speeds should, as far as possible, be controlled by street length, parked cars, landscaping design, built form and activity along the frontage. Bicycles are generally provided for on-street.

3.13 Collector streets collect traffic from access streets and generally carry higher traffic flows. A good level of residential amenity and safety is maintained by restricting traffic volumes and vehicle speeds. Vehicle speeds on collector streets should be controlled by street alignment, parked cars, street length, intersection design and built form.

3.14 The adoption of the subdivision code/AMCORD guidelines provides an appropriate framework for the promotion of alternative travel modes to the private car, in particular, improved pedestrian and cyclist facilities.

Traffic Generation and Effects

3.15 Traffic generated by the proposed development will have its greatest effects during the morning and afternoon peak periods. Surveys undertaken by the RTA indicate that residential subdivisions generate 0.85 vehicles per hour per lot two-way during peak hours. Council's subdivision code indicates a traffic generation of 10 vehicles per day two-way which is equivalent to one vehicle per hour during peak hours and is higher than the RTA's rate. We have adopted Council's rate in assessing the traffic effects of the proposed development.

3.16 A number of the lots in the subdivision would have the potential to accommodate medium density development (21 lots with 45 dwellings) or dual occupancies (seven lots with 14 dwellings). The RTA guidelines indicate a traffic generation rate of 0.4 to 0.65 vehicles per hour per dwelling (two-way) at peak times for medium density development.

3.17 The proposed development will therefore generate some 310 to 330 vehicles per hour two-way during the morning and afternoon peak periods.

3.18 During the morning peak hour, some 70 per cent of residential traffic would be outbound. The reverse would apply in the afternoon.

3.19 The additional traffic has been assigned to the existing road network. Existing traffic flows plus the additional traffic from the proposed development are shown in Figures 3 and 4. A summary is provided in Table 3.1.

Table 3.1: Existing two-way peak hour traffic flows plus development traffic

Road	**Location**	**AM peak hour**		**PM peak hour**	
		Existing	Plus development	Existing	Plus development
Albatross Road	North of Yalwal Road	1,050	+245	1,130	+245
	South of Yalwal Road	595	+45	710	+45
Yalwal Road	West of Albatross Road	605	+290	630	+290
	East of George Evans Road	275	+290	280	+290
	West of George Evans Road	175	+15	155	+15
George Evans Road	North of Yalwal Road	120	+305	145	+305
	North of university access	15	+330	15	+330
University access	West of George Evans Road	105	+25	130	+25

3.20 Table 3.1 shows that traffic increases on Albatross Road (north of Yalwal Road), Yalwal Road (east of George Evans Road) and George Evans Road would be some 245 to 330 vehicles per hour two-way during peak hours. Increases on Albatross Road (south of Yalwal Road), Yalwal Road (west of George Evans Road) and the university access would be lower at less than 50 vehicles per hour two-way.

3.21 With the exception of the collector road, roads within the subdivision would generally carry traffic flows less than 100 vehicles per hour two-way. This level of traffic would not be unexpected for these roads.

3.22 The intersections previously analysed in Chapter 2 have been reanalysed with SIDRA for the additional development traffic flows shown in Figures 3 and 4. The analysis found that the unsignalised intersections of Yalwal Road with Albatross Road and George Evans Road, and the roundabout controlled intersection of George Evans Road with the university access, would operate with average delays for all movements of less than 20 seconds per vehicle during morning and afternoon peak periods. This represents level of service B, a reasonable or better level of service.

3.23 Therefore, the existing road network will be able to cater for the additional traffic from the proposed development.

3.24 We have also considered 10 year future traffic flows as requested by the Department of Planning. We have assessed a 10 year growth scenario for traffic flows at the intersection of Albatross Road and Yalwal Road. The analysis we have undertaken is considered conservative because the proposed development would be a proportion of the growth over the next 10 years. Nevertheless, we have increased traffic at this intersection by two per cent compound for 10 years and added the proposed development traffic on top of this growth.

3.25 We have also considered holiday traffic as requested by DoP. Based on traffic counts commissioned by ourselves on Princes Highway south of Nowra over a four week period (including the Easter long weekend), two-way traffic flows during weekday afternoon peak hours are up to some 30 per cent higher than non-holiday periods. During morning peak hours, holiday flows are lower than non-holiday periods and therefore we have not considered this scenario further.

3.26 Existing peak hour traffic flows plus 10 years growth plus development traffic at the intersection of Albatross Road and Yalwal Road are shown in Figures 6 and 7 for the morning and afternoon peak hours respectively. Existing afternoon peak hour traffic flows increased by 30 per cent (to reflect afternoon peak hours during holiday periods), plus development traffic, are shown in Figure 8.

3.27 The intersection of Albatross Road with Yalwal Road has been re-analysed with SIDRA for the traffic flows shown in Figures 6 to 8. The analysis found that with future traffic growth, the intersection would benefit from the provision of separate left and right turn lanes marked from Yalwal Road into Albatross Road.

3.28 With this treatment, the analysis found that with future 10 year flows and the additional development traffic (Figures 6 and 7), the intersection of Albatross Road with Yalwal Road would operate with average delays of less than 25 seconds per vehicle during morning and afternoon peak periods. This represents levels of service B, a reasonable level of service.

3.29 With holiday traffic volumes and the additional development traffic (Figure 8), the intersection of Albatross Road with Yalwal Road would operate with average delays of some 28 seconds per vehicle or less during afternoon peak periods. This represents levels of service B, a reasonable level of service.

3.30 Therefore, with separate left and right turn lanes marked from Yalwal Road into Albatross Road, the road network will be able to accommodate traffic from the proposed development, future growth in the area and traffic flows during holiday periods.

Director – General's Requirements

Prepare a traffic impact study in accordance with Table 2.1 of the RTA's Guide to Traffic Generating Developments which addresses matters, including the following:

- *Connectivity to existing, surrounding developments, including West Nowra, Wollongong University and the Thompsons Point area;*

3.31 Access to West Nowra and the university is addressed in 3.6 and 3.7. Access to the Thompsons Point recreational area will continue to be provided from Jonsson Road north of the site.

- *Provision for a future road reserve on both sides of George Evans Road to link to the west Bypass corridor and to the Nowra CBD; and*

3.32 The proposed roundabout at the site access includes provision for future connections to the east (to West Nowra and the Nowra CBD) and west (to the university and future bypass).

- *Upgrade requirements for Yalwal/George Evans Roads and Yalwal/Albatross intersections.*

3.33 These matters are addressed in paragraphs 3.22 to 3.30.

Undertake intersection modelling using SIDRA for the key junctions in the area including the Yalwal Road and MR92 intersection, and consider:

- *AM and PM peak volumes and holiday peak volumes;*
- *Existing traffic volumes with and without development; and*
- *10 year projected volumes with and without the proposal.*

3.34 These maters are addressed in paragraphs 2.13 to 2.17 and 3.15 to 3.30.

Summary

3.35 In summary, the main points relating to the proposed development in Mundamia are:

(i) the proposed development comprises 312 residential lots plus one rural lot;

(ii) vehicular access to the proposed development will be via a realigned George Evans Road;

(iii) internal roads will be provided in accordance with the principles in Council's Subdivision Code and AMCORD;

(iv) the existing road network will be able to cater for traffic from the proposed development;

(v) with separate left and right turn lanes marked from Yalwal Road into Albatross Road, the road network will be able to accommodate traffic from the proposed development, future growth in the area and traffic flows during holiday periods; and

(vi) the Director – General's requirements are addressed in paragraphs 3.31 to 3.34.

Regional Plan

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_jk Ref: 8351 14 December 2011

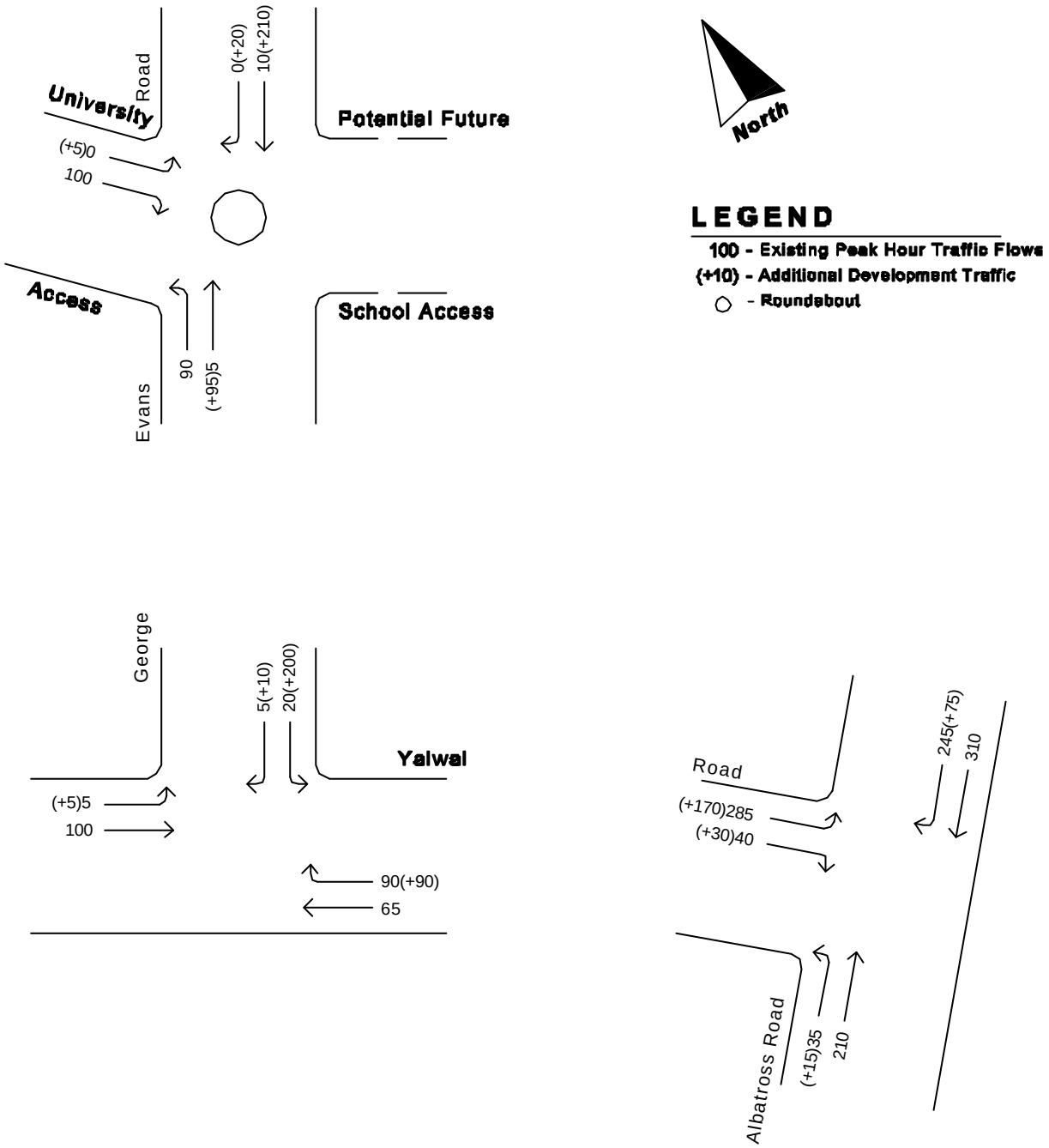
Figure 1

Location Plan

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_jk Ref: 8351 14 December 2011

Figure 2

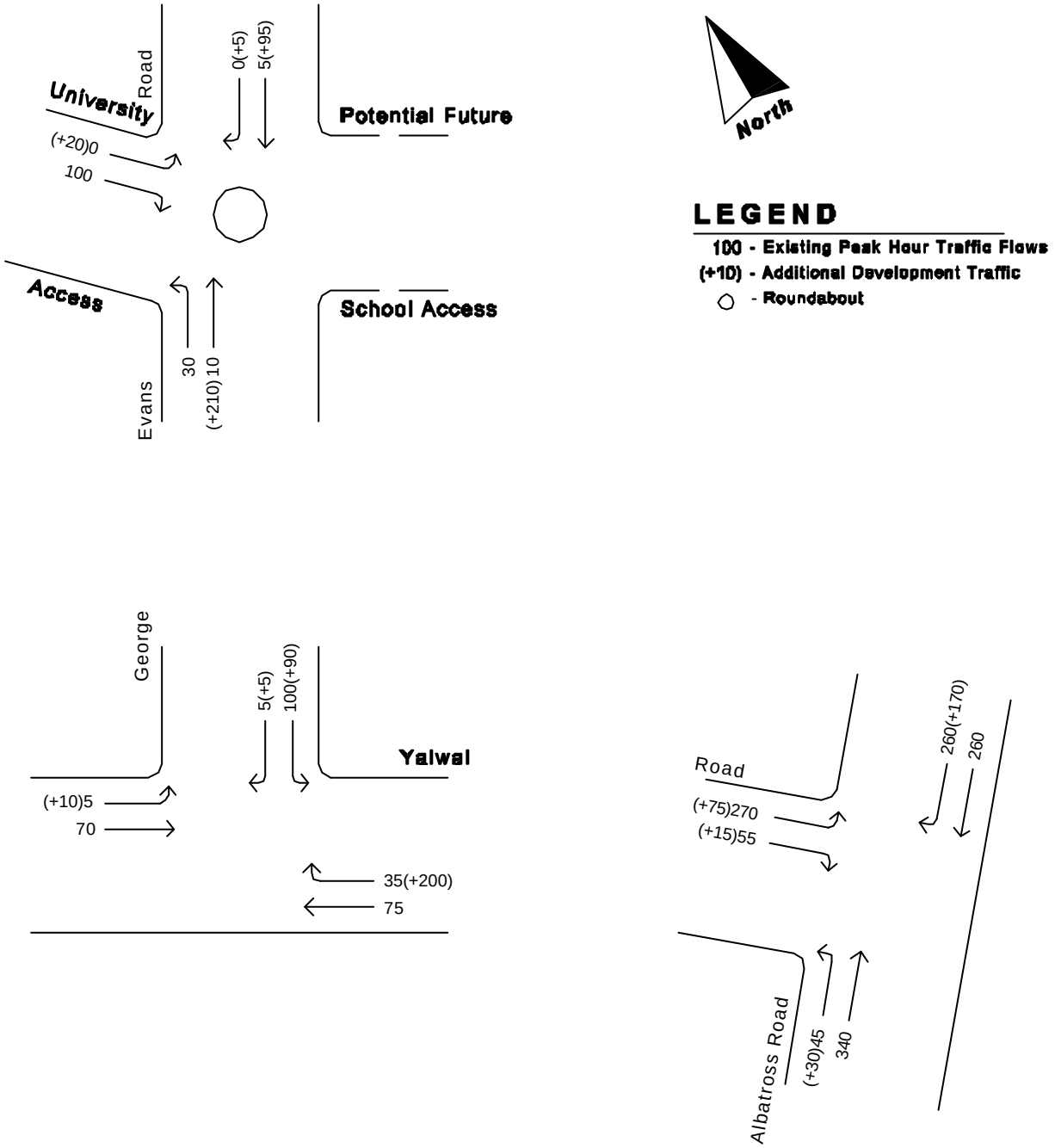


Existing weekday morning peak hour traffic flows plus development traffic

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_jk Ref: 8351 14 December 2011

Figure 3

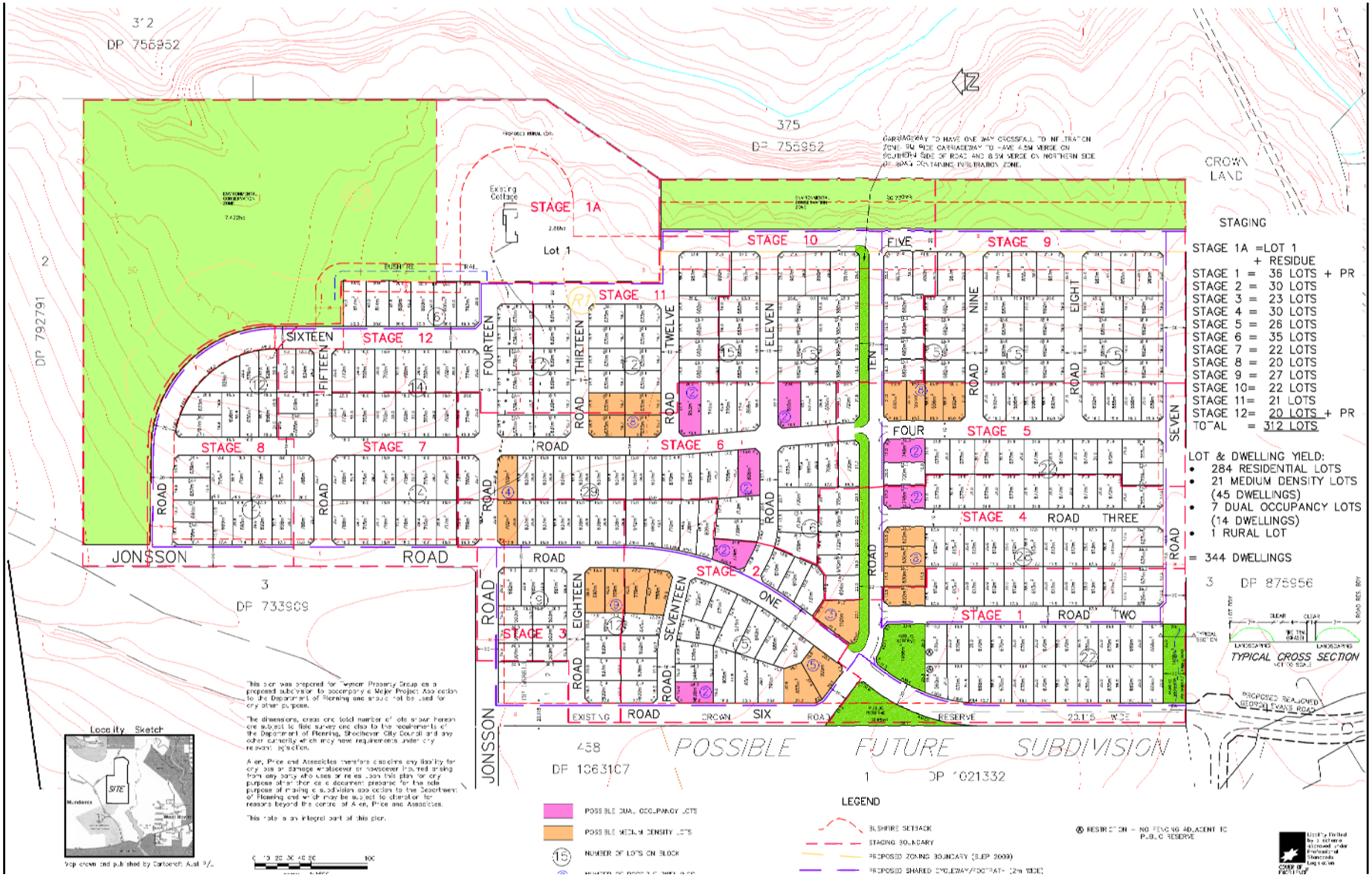


Existing weekday afternoon peak hour traffic flows plus development traffic

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_jk Ref: 8351 14 December 2011

Figure 4

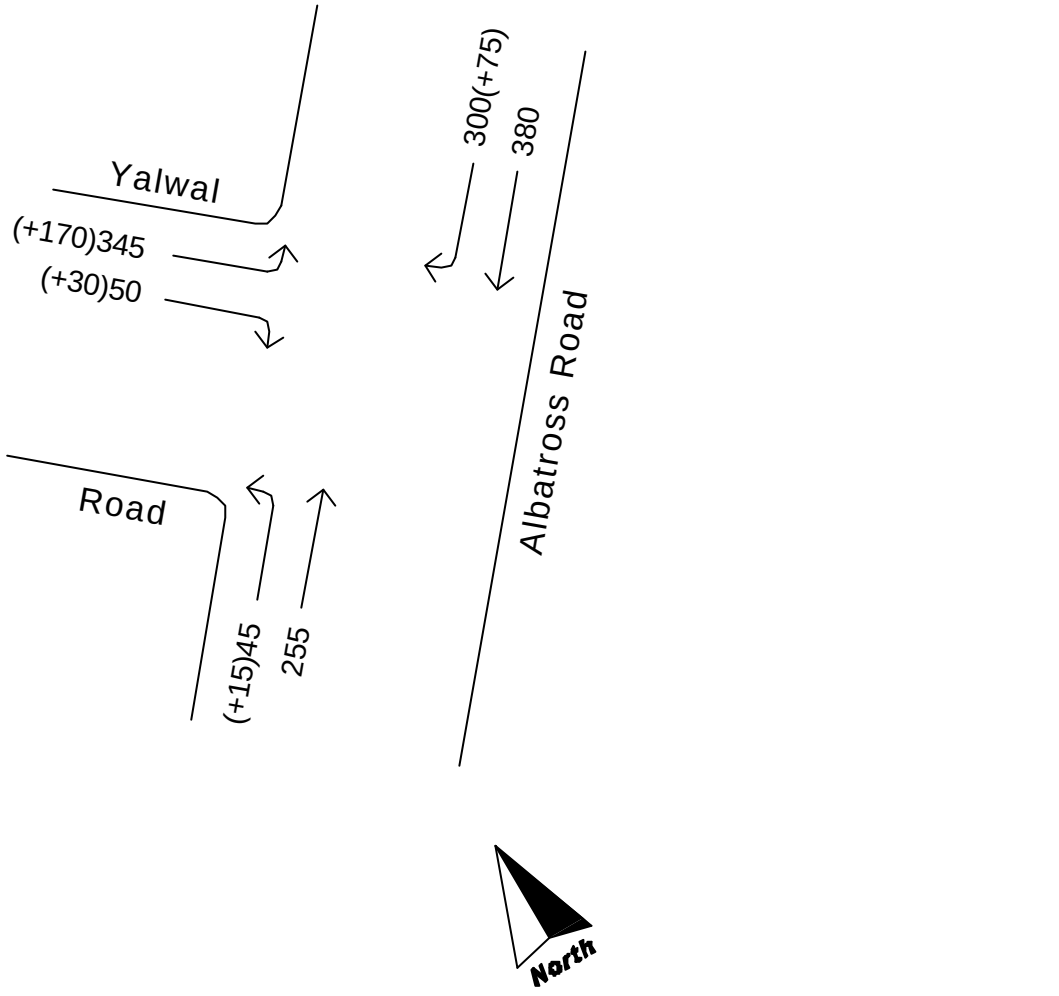


Proposed Subdivision Layout

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_jk Ref: 8351 29 May 2012

Figure 5

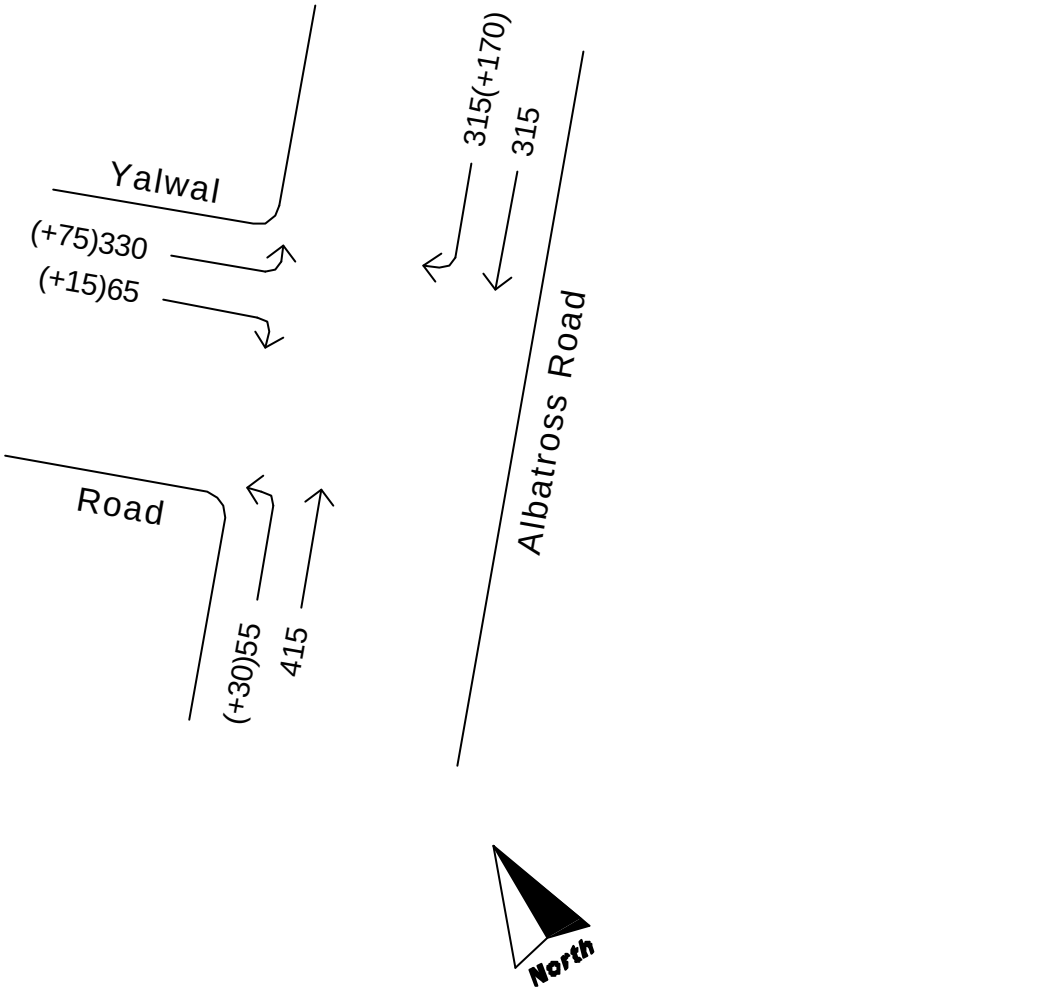


Existing weekday morning peak hour traffic flows plus 10 years growth plus development traffic

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_jk Ref: 8351 14 December 2011

Figure 6

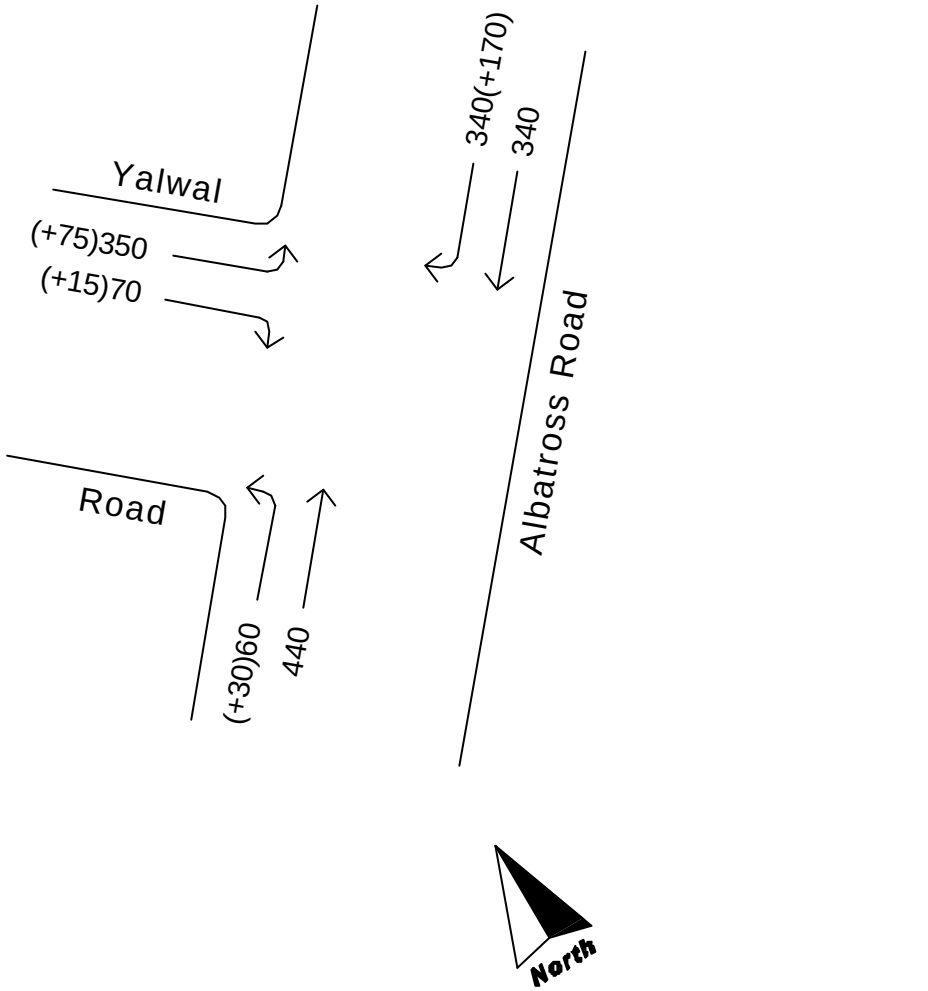


Existing weekday afternoon peak hour traffic flows plus 10 years growth plus development traffic

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_jk Ref: 8351 14 December 2011

Figure 7



LEGEND

100 - Existing Peak Hour Flows Plus 30% (to reflect holiday periods)
(+10) - Additional Development Traffic

Existing weekday afternoon peak hour traffic flows plus 30 % plus development traffic

Figure 8

Colston Budd Hunt & Kafes Pty Ltd

DRAWN BY CBHK Pty Ltd_jk Ref: 8351 14 December 2011