North Byron Parklands

# Technical Paper

# C1

## Traffic Impact Assessment

# North Byron Parklands - Traffic Impact Assessment

July 2010

## North Byron Parklands - A project of Billinudgel Property Pty Ltd (Billinudgel Property Trust)


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# Executive summary

This report has been prepared in respect of a concurrent Concept Plan and Project Application Environmental Assessment report (EA) for the North Byron Parklands (Parklands) project. This Traffic Impact Assessment (TIA) has been prepared on behalf of Billinudgel Property Trust (Billinudgel Property Pty. Ltd).

The project is to establish a world class sustainable cultural events site within an enhanced ecological setting approximately 25.5 kilometres north of Byron Bay. This report provides an assessment of the potential traffic and transport impacts of the site and proposes a package of mitigation measures. The Parklands is north of Brunswick Heads on the North Coast of NSW in Byron Shire. It is located adjacent to Tweed Valley Way and spans a section of Jones Road.

The road network surrounding the site has recently been upgraded as part of the Pacific Highway Upgrade project. The site has convenient access to the Yelgun Interchange on the Pacific Highway. The road network currently has spare capacity, even during the busiest times of the year, such as on the Easter long weekend and during the Christmas summer school holidays.

**Sustainable event transport objectives**

The site would potentially be used for future Splendour in the Grass (SITG) music festivals. This festival can be considered as representative of the larger types of events that would be held at the site. A survey in 2007 of SITG patrons (5,046 respondents) showed that they are mainly young adults, with a high proportion of students. They predominately originate from Brisbane and Sydney, as well as south-east Queensland and other parts of NSW. In the survey they indicated that they tend to travel by car or plane to the area, then change to the provided shuttle bus to get to the site. They travel in groups with high car occupancy – 3.2 people per vehicle. They stay in a range of accommodation options in the towns surrounding the site, and generally stay for the duration of the event or a little longer.

To build on the potential of this type of audience, a set of sustainable event transport objectives has been developed to minimise the traffic impact of the site. They include:

- move patrons in a safe and efficient manner to contribute to the successful operation of the event
- significantly increase the number of patrons who use public transport
- provide a balance of parking supply to reduce the reliance of the use of private vehicles to access the Parklands whilst also allowing access to the site for those unable to easily access public transport
- incorporate new event transport services and the appropriate support infrastructure in the most cost effective way
- ensure the cost, quality and convenience of public transport is competitive with the private vehicle
- be patron focussed and family friendly
- be operationally cost effective.

**Proposal details**

The proposal includes creating a site capable of staging cultural events of different sizes and nature, with different transport characteristics and traffic impacts. The internal site layout would be flexible to allow configurations to change to suit the requirements of the particular event. The site would be set-up to accommodate temporary camping during events. The Concept Plan application also includes the creation of a Cultural Centre, Conference Centre and associated accommodation. The types of events to be held at the site have been grouped into the four types shown in Table 1.

**Table 1 Event types**

| Event | Patrons | Campers | Day Patrons | No. days | Staff |
|---|---|---|---|---|---|
| Minor | 500 | 0 | 500 | 1 | 20 |
| Small | 3,000 | 1,500 | 1,500 | 1 | 100 |
| Moderate | 10,000 | 10,000 | 0 | 2 | 800 |
| 100% capacity | 50,000 | 25,000 | 25,000 | 4 | 3,000 |

The Minor and Small event types are forecast to have a small overall traffic impact, due to their size and short duration. The Moderate and 100% capacity event types have been assessed in more detail.

To test the effectiveness of the transport management arrangements proposed for the site, it is planned to hold events up to 70% of the full event capacity (35,000 patrons) during the first year of operation. The size of events is planned to gradually increase with the Department of Planning concurrence, up to 100% capacity (the full event size – 50,000 patrons) within five years.

Five access points are proposed into the site including two general accesses and one bus access from Tweed Valley Way, a service vehicle access from Jones Road and an emergency vehicle only access from Wooyung Road. A 35 m long right-turn lane for entry into the main site entrance on Tweed Valley Way is recommended.

The internal circulation within the site would be predominantly handled by a Spine Road, connecting Gate A to the northern part of the site. A bus and coach terminus in the centre of the site would provide a focal point for public transport, and would also provide convenient access to the main event entry. A cycle parking area and disabled drop-off would be provided nearby.

Campers would be allowed to enter the site and park adjacent to the camping place (the majority entering the site the day before the main event starts), or in separate parking areas. Day patrons would park in off-street parking, with the option of walking or catching an internal shuttle bus to the event entry. On-street parking would be prohibited through the application of special event clearways on Tweed Valley Way, Jones Road and Yelgun Road. An on-site speed limit of 30 km/h would be applied. A network of seven external shuttle bus routes are planned to collect patrons from their accommodation and bring them to the site.

Traffic management plans for the site during 70% and 100% capacity events would be implemented, including ticketing and vehicle inspection, temporary special event speed limit, temporary special event clearways on surrounding roads, facilitation of local traffic, the role and responsibilities of traffic controllers, and traffic contingency plans for dealing with unplanned scenarios.

Trip generation has been calculated based on the following:

- base traffic growth of 4.4% per annum
- arrival and departure profile based on information supplied by the event organisers (based on the outcome of previous events)

- two mode share scenarios, including a low (23%) public transport mode share scenario and a high (39%) public transport mode share scenario
- an average car occupancy, of either 2.5, 2.9 or 3.2 persons per vehicle
- set-up, service, management, staff and performer vehicle numbers based on information from the event organisers (based on the outcome of previous events)
- accommodation locations from surrounding areas.

Different assumptions were applied for campers and day patrons based on their different arrival patterns, departure patterns and travel mode characteristics.

**Traffic impact**

The capacity of the Yelgun Interchange is the limiting factor for how much traffic can be generated by the site and accommodated on the local road network. If the capacity of the Interchange is exceeded, queues of vehicles could block back from Tweed Valley Way, through the roundabout and affect the safety of vehicles using the Pacific Highway off-ramps. To reduce the likelihood of this occurring, limits on the amount of traffic generated by the site have been calculated. To stay within these limits, the following restrictions/targets would be required:

- 100% capacity event scenario: car occupancy of 3.2 people per car, high (39%) public transport mode share and a reduction in the number of day patrons from 25,000 to 20,500 (potentially offset by an increase in the number of campers to 29,000).
- 70% capacity event scenario: car occupancy of 2.9 people per car, high (39%) public transport mode share, no change in event numbers.
- Moderate event scenario: no change in traffic generation required to stay within acceptable traffic impacts, but transport measures to be introduced to improve car occupancy.

Traffic management measures have been proposed as a contingency should queues build up on the Pacific Highway ramps at Yelgun Interchange, including:

- temporarily holding the northbound through movement on Brunswick Valley Way
- temporarily holding the traffic on the northbound off-ramp
- temporarily closing the northbound off-ramp and detouring vehicles via the Brunswick North Interchange and Brunswick Valley Way.

An analysis of the capacity of Tweed Valley Way and the Pacific Highway has indicated that they have sufficient spare capacity to accommodate the forecast event traffic flows with the reductions/targets listed previously.

The splitting of site entry to two gates has reduced the length of queues of patron vehicles to enter. At the end of the performances, there would be large numbers of vehicles attempting to use the site exits. If wait times become too long inside the site, there is the opportunity to divert northbound traffic north along Tweed Valley Way, increasing the capacity of the site exits.

A number of strategies have been developed to reduce the impact of the events on other road users. Entry to Jones Road and Yelgun Road would be controlled at Tweed Valley Way during 70% and 100% capacity events, with residents and their guests, along with event service vehicles allowed to pass. Through traffic would be allowed to pass the queues of event vehicles by temporarily using the road shoulders at reduced speeds to extend the length of right-turn bays on Tweed Valley Way.

The increase in traffic on the road network around Easter and Christmas school holidays restricts the size of events that can be held on the site. Solutions include:

- 100% capacity event: Reducing the number of day-patrons for events held at Easter from 25,000 to 24,400, as well as implementing transport initiatives to achieve a car occupancy of 3.2 people per car and the high (39%) public transport mode share.
- 100% capacity event: For other busy times of the year (such as during Christmas holidays, end of university break and the NSW October long weekend), implement transport initiatives to achieving a car occupancy of 3.2 people per car and the 39% public transport mode share
- 70% capacity event: Implementing transport initiatives to achieving car occupancy of 2.9 people per car for an event held at Easter or busy times of the year such as during Christmas holidays, etc.
- Avoid holding 100% capacity events on the Easter long weekend from 2020.
- This analysis should be updated in the future once more information is collected about the actual traffic generation from the site.

Transport initiatives are proposed to assist in achieving the car occupancy and mode split targets, including:

- seven external shuttle bus routes connecting the main accommodation areas to the site (for events larger than the Moderate size)
- restricting the amount of parking on-site, charging a parking fee and releasing it on a first-come, first-served basis, introducing ‘Special Event Clearways’ on selected public roads
- packaging event tickets and bus tickets and offering discounts and premium camping locations to those arriving by bus, cycle or using a car-share scheme
- promotion of car-sharing including providing connections through the event website to online forums for car-share schemes
- providing facilities and information to encourage patrons to cycle to the site.

# 1. Introduction

This report has been prepared in respect of a concurrent Concept Plan and Project Application Environmental Assessment report (EA) for the North Byron Parklands (Parklands) project. This Traffic Impact Assessment (TIA) has been prepared on behalf of Billinudgel Property Trust (Billinudgel Property Pty. Ltd

The project is to establish a world class sustainable cultural events site within an enhanced ecological setting approximately 25.5 kilometres north of Byron Bay. The purpose of this Technical Paper is to provide an assessment of the potential traffic and transport impacts for the EA.

## 1.1 Background

The Byron area has attracted a number of music festivals, especially in recent times. These festivals and events contribute to the local economy and provide employment. However, as these events have grown in popularity, they have outgrown their original locations.
In addition, the leased site of one of the major events – 'Splendour in the Grass' was identified for residential use in the future.

Responding to a need for a purpose built, sustainable cultural arts and music event site, a trust was set up to purchase the subject property. The concept was to provide a purpose-built facility on the site, permanently managed by a team experienced in running events.

A Development Application (DA) approval under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) was granted to hold a test event on the site. The approved size was 15,000 day patrons plus 5,240 camping patrons. **This DA was not proceeded with due to legal reasons relating to zoning.**

## 1.2 Scope of report

The report covers the following parts of the assessment:

- existing transport situation – a review including road network, traffic conditions, public transport, plane travel options and active transport (Section 2)
- major event transport review – a review of transport-related information gathered at previous events in Byron Bay and a literature review of similar events held in Australia and internationally (Section 3)
- proposed project - details of the Project including the different types of events, size, duration, frequency and timing. This section also provides a summary of the transport arrangements for each type of event (Section 4)
- trip generation – calculation of the trip generation of the assessed events for patrons and support vehicles (Section 5)
- transport impacts – an assessment of the traffic and transport impacts of the Project on the surrounding road network and on nearby residents (Section 6)

- transport initiatives – a discussion of the potential transport initiatives proposed to reduce the impact of the Project through modification of travel behaviour (Section 7)
- transport management plans – details of the Transport measures to be used during event days to reduce the impact of the Project and to plan for incident management (Section 8)
- conclusions (Section 9).

## 1.3 Key issues

The key issues in terms of delivering successful events and limiting the traffic and transport impacts on the surrounding area are:

- meeting the transport demands of events of various sizes including 100% capacity events
- road capacity for to accommodate traffic from the Pacific Highway at the Yelgun Interchange and its associated connection to Tweed Valley Way
- the limited number of access points to the site
- the limited regular public transport access options to the site
- infrequent local bus services to meet the demands of events
- absence of active rail access to the site or adjacent townships
- low numbers of vehicles in the taxi and hire car network
- the remoteness of major townships to the site limits connections for pedestrians and cyclists
- the requirements for use of Tweed Valley Way and Jones Road for resident access.

These are challenges for the project which have been addressed to deliver a sustainable event transport plan. The developed solutions are both practical and achievable in the context of staging events on a regular basis.

# 2. Existing situation

This section provides information regarding the current road and transport situation for the area surrounding the site. Traffic accessing the site would need to use the road network, which already experiences seasonal peaks in traffic volumes. The site is served by some public transport services, with some event patrons arriving by plane at the nearby Gold Coast and Ballina airports, and then travelling to the site or their accommodation via a connecting bus service or by hire car. Facilities for cycling and walking to the site are limited. However, the site is within cycling distance of the surrounding townships.

## 2.1 Site location

The site is located north of Brunswick Heads on the North Coast of NSW in the north east corner of Byron Shire. The site is located adjacent to Tweed Valley Way and spans a section of Jones Road. A map showing the location of the site is provided in Figure 2.1. The regional context is shown in Figure 2.2.


**Figure 2.1 Site location**


**Figure 2.2 Regional context**

The site is located approximately 1.3 km from the Yelgun interchange of the Pacific Highway. Tweed Valley Way provides access to Murwillumbah to the north and Brunswick Valley Way provides access to Brunswick Heads to the south. The site is approximately 23 km north of the previous site of the Splendour in the Grass festival at Belongil Fields, Byron Bay.

The area surrounding the site has mainly rural uses, and includes the rural communities of Yelgun Valley and The Pocket. The site is also close to the coast and beaches, with proximity to the coastal villages of Ocean Shores, South Golden Beach and New Brighton. The village of Wooyung is located to the north and Billinudgel to the south.

The site is currently zoned as a mixture of rural and habit zones. The site is partially divided by a parcel of land reserved for a future road. With the completion of the Yelgun to Chinderah Freeway in 2002, this reservation is no longer required.

The total site area is approximately 256 Ha. However, the application covers only 155.91 Ha, including the land parcels shown in Table 2.1.

**Table 2.1 Application area – Lots/Areas**

| Lot/DP description | Area (ha.) |
|---|---|
| Lot 403 and Part Lots 402,404 DP 755687 | 104.71 |
| Lot 1 DP 1145020 | 2.47 |
| Part Lot 46 DP 755687 | 8.43 |
| Part Lot 10 DP 875112 | 4.29 |
| Part Lot 2 DP848618 | 8.9 |
| Part Lot 30 DP880376 | 9.89 |
| Part Lot 102 DP1001878 | 15.17 |
| Part Lot 12 DP848618 | 2.05 |
| **Total of application area** | **155.91** |

## 2.2 Road network

The road network around the site is predominantly formed around the Pacific Highway and the recently bypassed old alignment. Figure 2.3 shows the network surrounding the site.

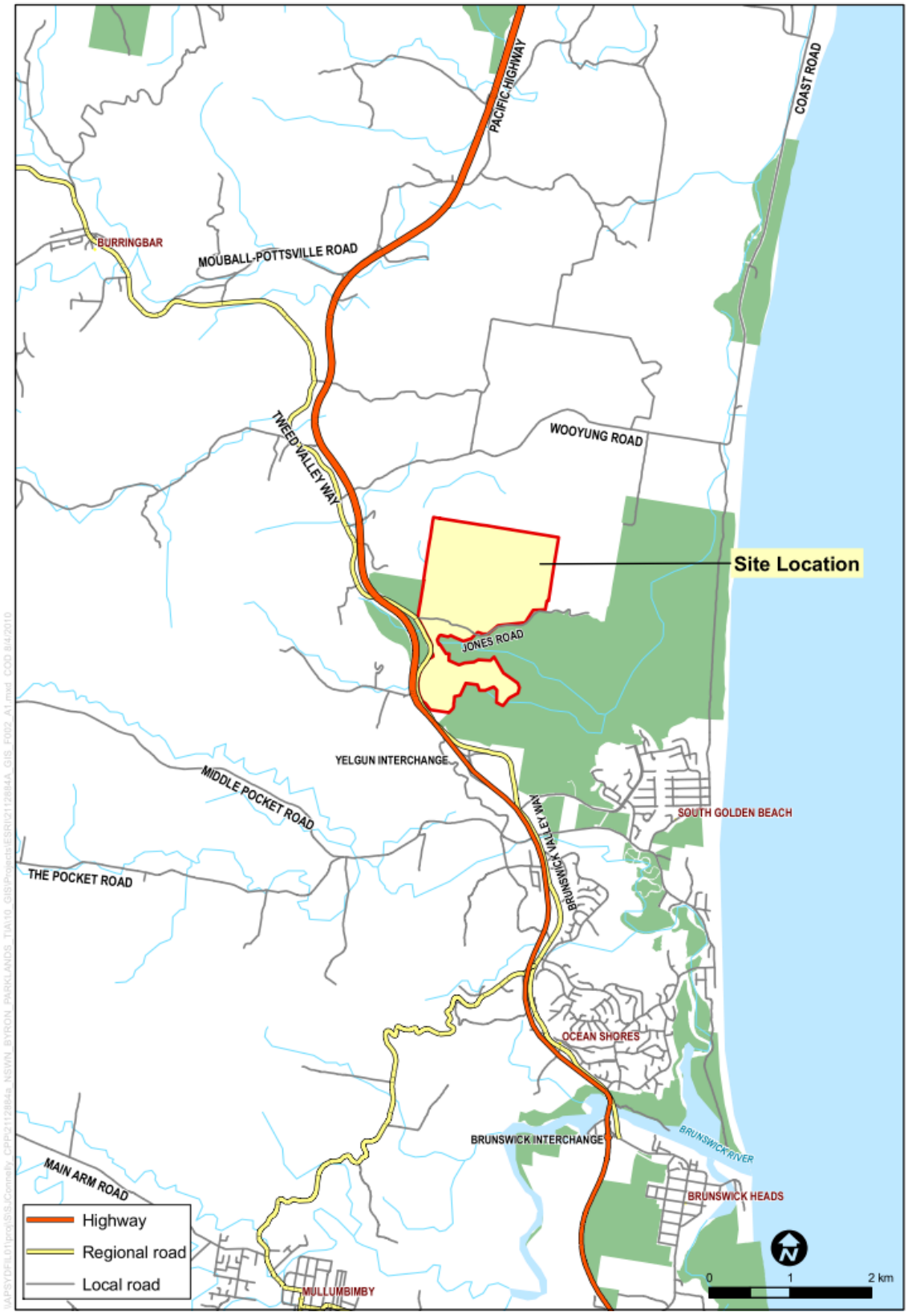



**Figure 2.3 Road network**

### Pacific Highway

Pacific Highway (State Highway 10, National Highway 1) is part of the AusLink national transport network. After recently being upgraded, it has a four-lane, two-way divided carriageway. The Pacific Highway connects Sydney and Brisbane via a coastal route. The posted speed limit on the Pacific Highway is 110 km/h.

Since 1996, the Pacific Highway has been undergoing an upgrading program funded by the Australian and NSW governments aimed at improving safety and transport efficiency. The upgrade mainly involves providing dual carriageways to separate opposing directions of traffic and provide overtaking opportunities, replacing winding sections with straight road, grade separating major junctions and bypassing townships. Within the vicinity of the site, three projects have recently been completed including

- Brunswick Heads bypass (opened 1998)
- Brunswick Heads to Yelgun (opened 2007)
- Yelgun-Chinderah Freeway (opened 2002).

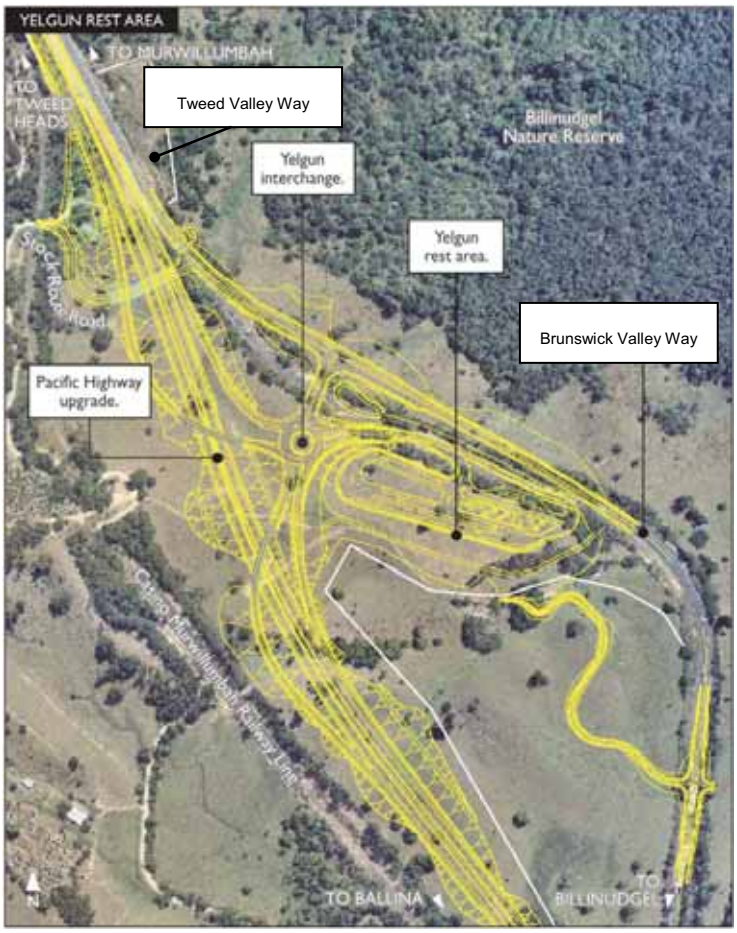
These projects were built on new alignments, with the old Pacific Highway being re-named and downgraded in terms of its position in the road hierarchy. The section between the Yelgun interchange and Chinderah was re-named as the Tweed Valley Way, and the section between Brunswick interchange and Yelgun interchange became known as the Brunswick Valley Way.

### Tweed Valley Way

Tweed Valley Way (MR679) is a two-lane, two-way road, which is a regional road under the NSW road classification. Tweed Valley Road connects between Pacific Highway at Yelgun Interchange and Pacific Highway at Oak Avenue Interchange at Chinderah. Tweed Valley Road also provides connection to adjacent villages such as Crabbes Creek, Mooball, Burringbar, Murwillumbah, Condong and Tumbulgum.

### Yelgun Interchange

Yelgun Interchange has entry and exit ramps in the northbound and southbound directions on the highway. All ramps connect to a roundabout on the eastern side of the Freeway. The roundabout is connected to Tweed Valley Way with a short Link Road. The interchange also provides access to a truck stop/rest area, south-east of the roundabout. A plan showing the Yelgun Interchange is shown in Figure 2.4.




Source: RTA, June 2006

**Figure 2.4 Yelgun Interchange**

### Brunswick Interchange

The Brunswick (north) Interchange connects the Brunswick Bypass to Riverside Crescent and the Old Pacific Highway. Due to its position on the southern bank of the Brunswick River, the interchange includes south-facing ramps only, i.e. it has a northbound off-ramp and a southbound on-ramp. The interchange includes two roundabouts on either side of the Pacific Highway. Traffic between Brunswick Heads and the north is required to use the Yelgun Interchange or the Brunswick South Interchange. The Old Pacific Highway provides access to Brunswick Heads.

### Brunswick Valley Way

Brunswick Valley Way (MR689) is a two-lane, two-way road, which is a regional road under the NSW road classification. Brunswick Valley Road connects the Pacific Highway, Wreckers Interchange south of Brunswick Heads and Pacific Highway, Yelgun Interchange. Brunswick Valley Way also provides connection to the nearby villages of Brunswick Heads, Ocean Shores and Billinudgel.

### Wooyung Road

Wooyung Road is a two-lane, two-way road. Wooyung Road connects Tweed Valley Road in the west and Tweed Coast Road in the east via overpass. Wooyung Road crosses the Yelgun to Chinderah Freeway via a recently constructed bridge. It also crosses a railway line via a single lane wooden bridge with a 14 tonne load limit. The typical speed limit on the Wooyung Road is 80 km/h.

### Jones Road

Jones Road is a two-way unsealed rural road. Jones Road is separated into two parts. The southern part of Jones Road adjoins at T-intersection with Tweed Valley Road, Yelgun. The northern part of Jones Road is connected to Wooyung Road.

### Mooball-Pottsville Road

Mooball-Pottsville Road is a two-lane, two-way road, which connects Tweed Valley Way, Mooball in the south and Tweed Coast Road, Pottsville in the north. It is also used as a connection to the Cudgera Creek Interchange on the Yelgun to Chinderah Highway.

## 2.3 Site access

Access(es) to the site would be provided directly from Tweed Valley Way. A secondary access would be provided from Jones Road (low traffic volume access for service vehicles on event days only). More details are provided in Section 4.3.

## 2.4 Road conditions

Tweed Valley Way in the vicinity of the site has lane widths of approximately 3.5 m in each direction, with sealed shoulders of approximately 0.5 m – 1.0 m on either side. The speed limit is 80 km/h between the Yelgun Interchange and a point approximately 250 m south of Jones Road, and 90 km/h north of this point. Overtaking is generally not permitted, apart from a two-lane northbound section near Jones Road.

**Photo 2.1 Tweed Valley Way, 300 m north of Yelgun Road**

Jones Road currently has an unsealed carriageway, as shown in Photo 2.2. The width is approximately 4.8 metres wide.

**Photo 2.2 Jones Road current configuration**

The intersection of Tweed Valley Way and Jones Road is a give-way controlled T-junction. The intersection of Tweed Valley Way and Yelgun Road is also give-way controlled, with right and left-turn bays provided from Tweed Valley Way.

Wooyung Road has lane widths of approximately 3.5 m in each direction, with sealed shoulders of approximately 0.5 m – 3.0 m on either side. The speed limit is 80 km/h.

**Photo 2.3 Wooyung Road near potential emergency vehicle only site entrance**

Wooyung Road crosses a rail line via a wooden one-lane bridge, as shown in Photo 2.4. The load limit is 14.7 tonnes. In its present state, it would prevent Wooyung Road from being used for site access other than for emergency vehicles.

**Photo 2.4 Wooyung Road wooden rail bridge**

## 2.5 Current and proposed road upgrades

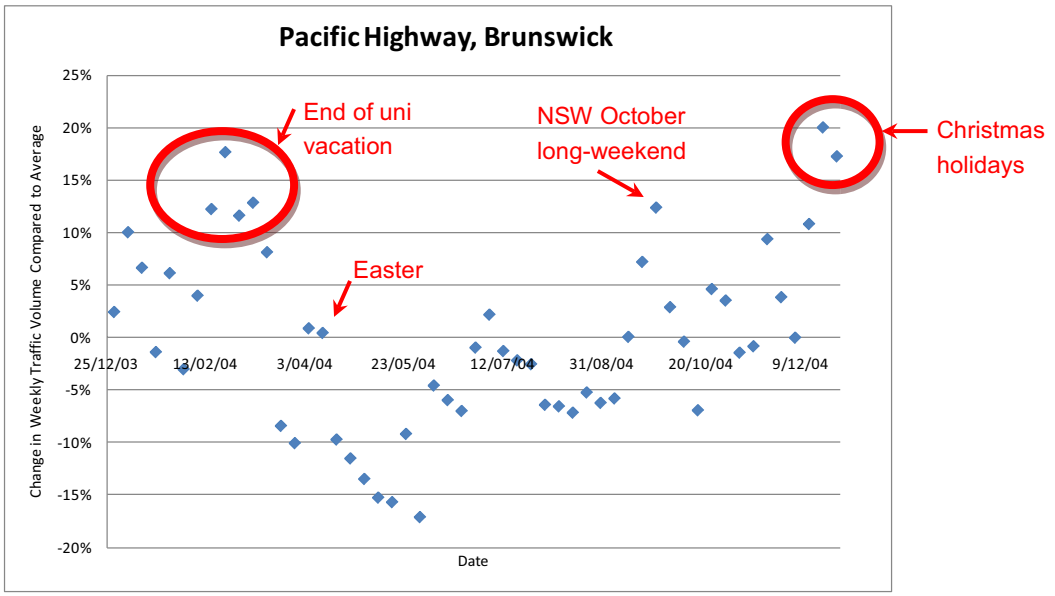
Pacific Highway was recently upgraded as described in Section 2.2. An upgrade of Jones Road between Tweed Valley Way and the site entrance is planned as part of the development. No other road upgrades are planned within the vicinity of the site by Byron Shire Council or the RTA.

## 2.6 Traffic volumes

Information on the amount of traffic on the roads surrounding the site has been collected from a number of sources. The RTA undertakes continuous counting of vehicles on the Pacific Highway, as well as collecting sample volumes on other roads in the regional network. Byron Shire Council also collects traffic volume information on the local road network. Supplementary traffic counts were commissioned for this study where suitable information was not available for roads important to the site.

### 2.6.1 Seasonal variation

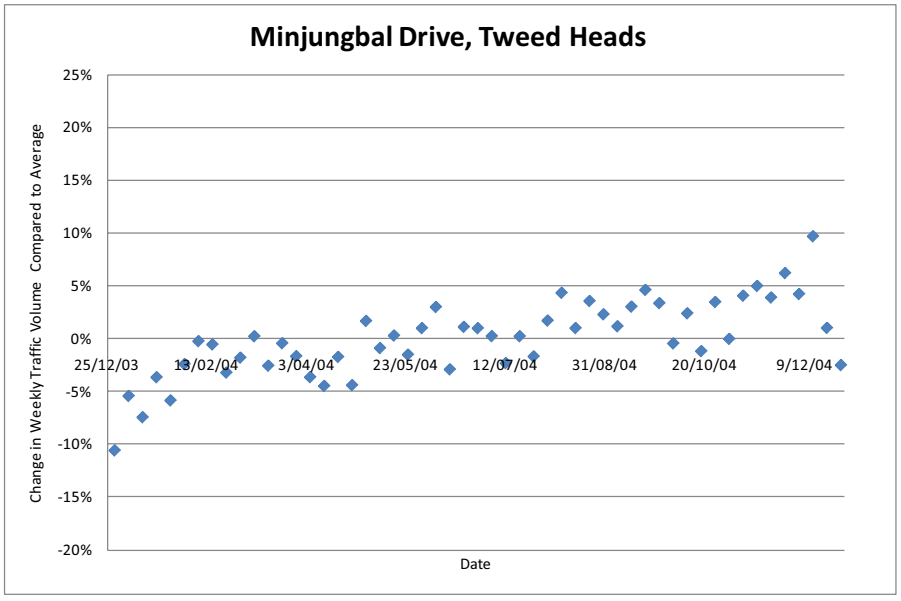
The Northern Rivers area of NSW experiences a large influx of tourists during summer months, school holidays and long weekends. The Pacific Highway traffic volumes change throughout the year due to this, as well as due to a surge of northbound traffic around the end of NSW university and high school exams, and a surge of southbound traffic before the start of the university lecturing year. Figure 2.5 shows the seasonal change in weekly traffic volumes compared to the average week on the Pacific Highway at Brunswick Heads.




Source: Roads & Traffic Authority 2005, *Traffic Volume Data for Hunter and Northern Regions 2004* site 04.273, Pacific Highway, south of Road to Brunswick Heads
Note: Easter volumes are the highest daily totals across the year, but are counteracted by lower volumes in opposite direction.

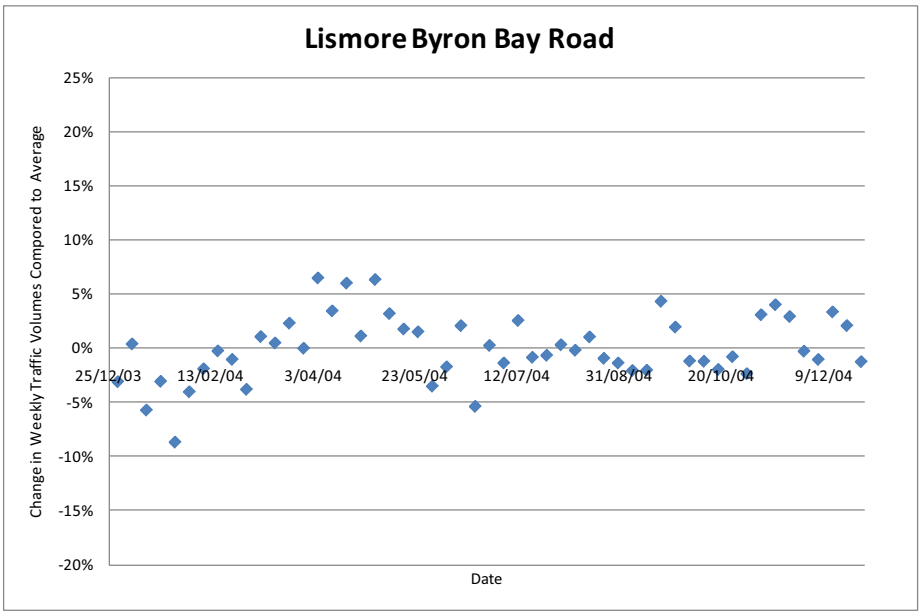
**Figure 2.5 Change in weekly traffic volume on the Pacific Highway, south of Brunswick Heads**

Local streets not near the main tourist areas experience a different pattern of change in traffic volume throughout the year. The pattern is not influenced as much by the movement of tourists. Two examples, where year-round data was available, are shown in Figures 2.6 and 2.7.




Source: Roads & Traffic Authority 2005, *Traffic Volume Data for Hunter and Northern Regions 2004* site 04.093, Minjungbal Drive (RR7733) Tweed Heads South, south of Kirkwood Road

**Figure 2.6 Change in weekly traffic volume on the Pacific Highway, south of Brunswick Heads**




Source: Roads and Traffic Authority 2005, *Traffic Volume Data for Hunter and Northern Regions 2004*) site 04.045 Lismore-Byron Bay Road (MR65) Bangalow, 6.4 km west of Pacific Highway

**Figure 2.7 Change in weekly traffic volume on Lismore-Byron Bay Road**

Anecdotal information indicates that Brunswick Heads and its surrounding beach-side suburbs experience an increase in traffic during the summer school holidays.

For the purposes of this report, the Minjungbal Drive yearly pattern has been adopted to convert traffic counts to AADT volumes. Due to its location on Tweed Valley Way north of the Yelgun Interchange, the site frontage is not located on the main tourist access to the Brunswick area.

### 2.6.2 Pacific Highway

Traffic volume information for the Pacific Highway was obtained from the RTA 'weigh-in-motion' count location at Brunswick Heads, 2.5 km north of the northern abutment of the Brunswick River Bridge. The weigh-in-motion equipment collects information on the axle configuration of the vehicle as well as its weight as it passes over the detectors and then classifies the vehicle according to the Austroads 13 vehicle classes. For the purposes of this study, classes 1 and 2 (motorcycles, cars or cars with trailers) are grouped as light vehicles, and the remaining vehicle classes are grouped as heavy vehicles.

The weigh-in-motion data was supplied for period between 24 March 2009 and 31 December 2009. Data was not available for the period before 24 March 2009 and at other times during the year. The missing periods have been filled in by estimating volumes using a complete 2004 survey for the Pacific Highway Brunswick Heads Bypass, south of Brunswick River Interchange (Roads and Traffic Authority 2004, *Traffic Volume Data for Hunter and Northern Regions* (RTA, 2005)).

Table 2.1 shows a summary of the average traffic volumes (in vehicles per day (vpd)) on the Pacific Highway, 2.5 km north of the Brunswick River. Heavy vehicles make up around 14% of the daily traffic volume on weekdays and 9% on weekends.

**Table 2.2 Pacific Highway, Brunswick, average daily traffic volume (vpd)**

| | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| | Light vehicles | Heavy vehicles | Total vehicles | Light vehicles | Heavy vehicles | Total vehicles |
| Weekday | 8,067 | 1,322 | 9,390 | 8,630 | 1,402 | 10,031 |
| Weekend | 8,541 | 831 | 9,371 | 8,635 | 837 | 9,472 |
| Weekly | 8,203 | 1,182 | 9,384 | 8,631 | 1,240 | 9,872 |

The profile of the average weekly traffic volume (measured in vehicles per hour) is shown in Figure 2.8. The pattern for each day across the week is roughly similar, with Friday afternoon and weekend morning volumes higher than for other days.

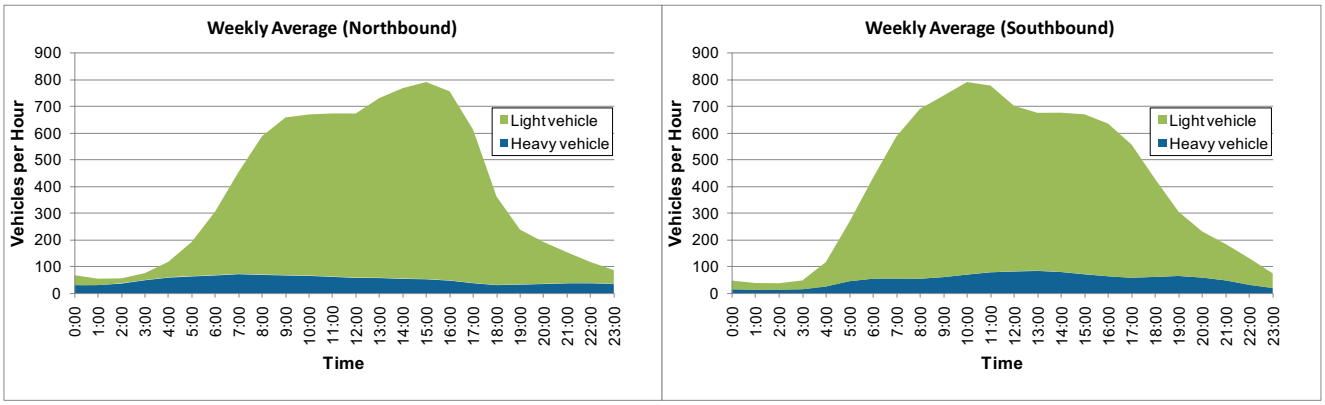



**Figure 2.8 Daily traffic pattern on the Pacific Highway, north of Brunswick River**

The total numbers of vehicles on each day is shown in Figure 2.9. They show a relatively flat profile, with volumes highest on the weekend. This reflects the higher level of recreational use of the Pacific Highway.

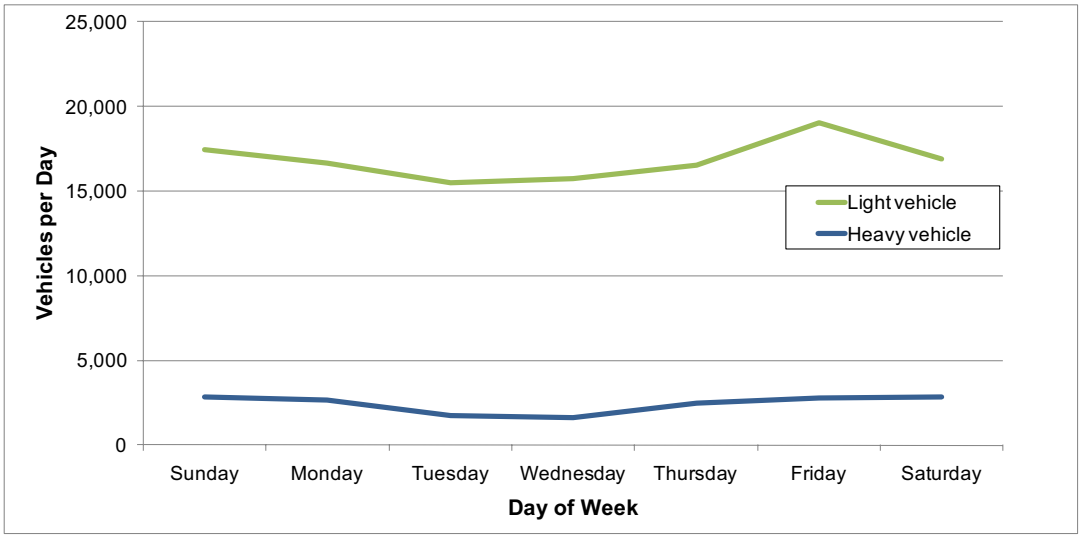



**Figure 2.9 Weekly traffic pattern on the Pacific Highway, north of Brunswick River**

Table 2.3 shows the peak hourly volumes during the times of highest traffic. The peak hours are approximately 8% of the total daily traffic.

**Table 2.3 Peak hourly volumes (vph) on Pacific Highway, Brunswick**

| | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| | Light vehicles | Heavy vehicles | Total vehicles | Light vehicles | Heavy vehicles | Total vehicles |
| Friday peak (1:00 pm – 2:00 pm) | 790 | 76 | 866 | 730 | 95 | 825 |
| Saturday peak (10:00 am – 11:00 am | 684 | 51 | 715 | 812 | 49 | 862 |
| Sunday peak (11:00 am – 12:00 pm) | 735 | 37 | 772 | 781 | 54 | 835 |
| Monday morning (10:00 am – 11:00 am) | 626 | 63 | 690 | 721 | 82 | 802 |

### 2.6.3 Tweed Valley Way

A traffic count was undertaken for the study to provide up-to-date traffic information adjacent to the site (north of Yelgun Road). The counts were undertaken for one week from Thursday 11 February to Wednesday 17 February 2010 using a pneumatic tube counter. These counts were converted to average annual daily traffic volumes by assuming the yearly pattern of Minjungbal Drive as described in Section 2.2.1. The proportion of heavy vehicles is lower than the Pacific Highway, making up around 8% of the daily traffic volume on weekdays and 4% on weekends.

**Table 2.4 Tweed Valley Way, north of Yelgun Road, average daily traffic volume (vpd)**

| | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| | Light vehicles | Heavy vehicles | Total vehicles | Light vehicles | Heavy vehicles | Total vehicles |
| Weekday | 1,628 | 133 | 1,761 | 1,729 | 151 | 1,880 |
| Weekend | 1,372 | 55 | 1,427 | 1,548 | 60 | 1,608 |
| Weekly | 1,547 | 105 | 1,652 | 1,666 | 120 | 1,786 |

The total numbers of vehicles on each day is shown in Figure 2.10. Heavy vehicles experience a dip on weekends, while light vehicles build across the week to a peak on Friday.

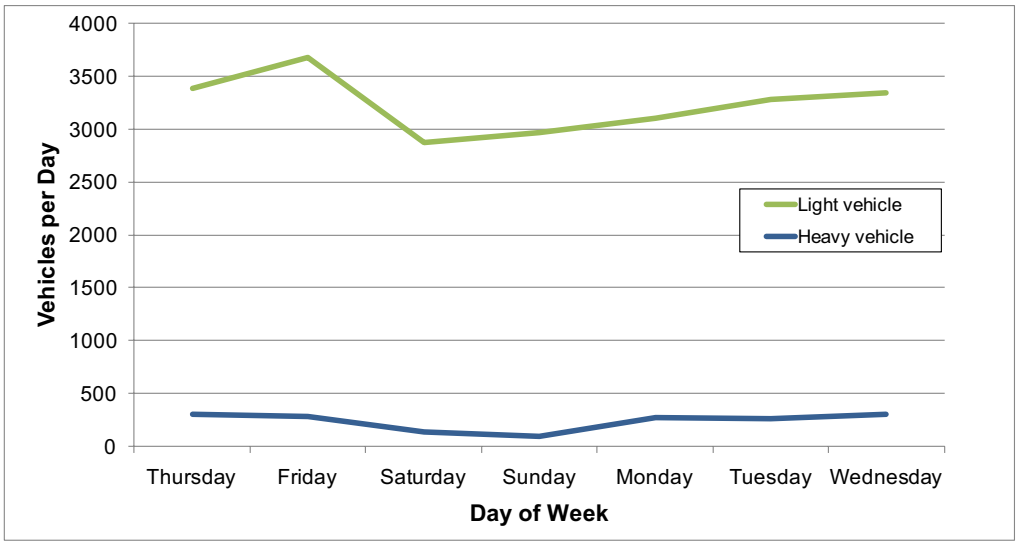



**Figure 2.10 Weekly traffic pattern on Tweed Valley Way, north of Yelgun Road**

The profiles of the average weekday and weekend traffic volume (measured in vehicles per hour) are shown in Figure 2.11. The pattern for weekdays and weekends are different, with weekdays experiencing morning and afternoon peaks, whilst weekends generally experience one midday peak.

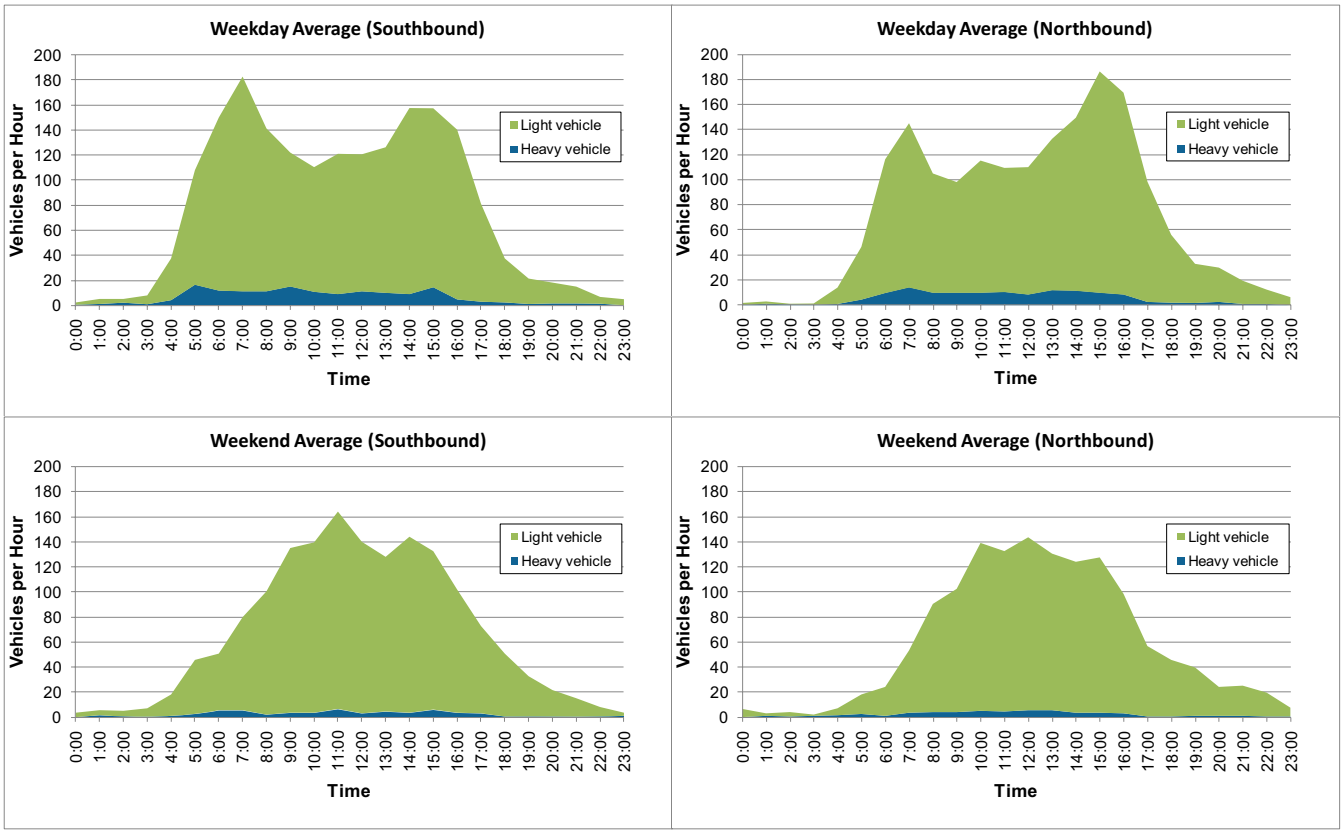



**Figure 2.11 Weekday and weekend daily traffic pattern on Tweed Valley Way, north of Yelgun Road**

Table 2.5 shows the peak hourly volumes during the times of highest traffic. The weekday afternoon peak hour represents approximately 9% of the total daily traffic.

**Table 2.5 Peak hourly volumes (vph) on Tweed Valley Way**

| | Northbound | | | Southbound | | |
|---|---|---|---|---|---|---|
| | Light vehicles | Heavy vehicles | Total vehicles | Light vehicles | Heavy vehicles | Total vehicles |
| Friday afternoon (3:00 pm – 4:00 pm) | 171 | 10 | 181 | 165 | 15 | 180 |
| Saturday peak (11:00 am – 12:00 pm | 122 | 7 | 129 | 142 | 5 | 147 |
| Sunday peak (11:00 am – 12:00 pm) | 135 | 2 | 137 | 174 | 8 | 182 |
| Monday morning (7:00 am – 8:00 am) | 123 | 14 | 137 | 149 | 5 | 154 |

Traffic volume data from Byron Shire Council was also available for Tweed Valley Way at two locations. These counts have been seasonally adjusted using the same method for the 2010 count.

- at Pacific Highway overbridge: 3,547 vpd (2009 count)
- north of Yelgun Road: 3,588 vpd (2009 count).

These volumes are roughly consistent with the counts undertaken in 2010.

### 2.6.4 Brunswick Valley Way

Traffic volume data from Byron Shire Council was available for Brunswick Valley Way at two locations. These counts have been seasonally adjusted using the same method for the 2010 count. However, it is noted that both were undertaken during a period including the Australia Day public holiday, and hence traffic patterns may be more variable.

- 100 m north of Shara Boulevard: 3,949 vpd (2007 count incl. Australia Day)
- 300 m north of Billinudgel Road: 3,230 vpd (2007 count incl. Australia Day).

The count north of Shara Boulevard is located between the Yelgun Interchange and the residential areas of New Brighton and Ocean Shores, and therefore includes vehicles travelling between the Pacific Highway and these areas.

### 2.6.5 Jones Road

Jones Road is a no–through road that provides access to a small number of residential properties. The traffic volume on Jones Road is low, with a total daily count of approximately 50 vpd in both directions combined.

### 2.6.6 Yelgun Interchange

Intersection counts of the Yelgun Interchange roundabout and the intersection with Tweed Valley Way were undertaken between:

- 8:00 am and 11:00 am, and between 2:00 pm and 6:00 pm on Friday 12 February 2010
- 9:00 am and 1:00 pm on Saturday 13 February 2010.

The intersection surveys occurred at the same time as the tube counts were being undertaken on Tweed Valley Way. These counts were seasonally adjusted using the same method for the Tweed Valley Way tube count. A diagrammatic representation of the results of the survey is shown in Appendix A.

The highest hourly total volume counted during the Friday AM count was between 8:00 am and 9:00 am. The results of the tube count in Tweed Valley Way indicated that the peak was between 7:00 am and 8:00 am. It is noted that the peak of the patron arrival (see Section 5.1) is likely to occur later in the day, and hence should not coincide with the higher peak.

The Friday PM peak (3:30 pm to 4:30 pm) and Saturday midday peak (11:00 am to 12:00 pm) were counted during the intersection surveys.

### 2.6.7 Intersection analysis

The performance of the intersections was simulated using the SIDRA intersection analysis computer program. SIDRA calculates intersection performance using measures such as:

- level of service (LoS)
- degree of saturation (DoS)
- average intersection delay
- queue length.

**Level of service**

Level of service (LoS) is one of the basic performance parameters used to describe the operation of an intersection. The levels of service range from A (indicating good intersection operation) to F (indicating over saturated conditions with long delays and queues).
At signalised and roundabout intersections, the LoS criteria are related to average intersection delay (seconds per vehicle). At priority-controlled intersections, the LoS is based on the average delay (seconds per vehicle) for the worst movement. The results from SIDRA can be compared to performance criteria set out in Table 2.6.

**Table 2.6 Level of Service Criteria for intersections**

| Level of Service | Average delay (seconds per vehicle) | Interpretation | |
|---|---|---|---|
| | | Traffic Signals, Roundabout | Give Way and Stop Signs |
| A | Less than 14 | Good operation | Good operation |
| B | 15 to 28 | Good with acceptable delays and spare capacity | Acceptable delays and spare capacity |
| C | 29 to 42 | Satisfactory | Satisfactory, but accident study required |
| D | 43 to 56 | Operating near capacity | Near capacity and 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 |
| F | Greater than 71 | Unsatisfactory with excessive queuing | Unsatisfactory with excessive queuing; requires other control mode |

Source: Roads and Traffic Authority 2002, *Guide to Traffic Generating Developments, Version 2*

### Degree of saturation

Degree of saturation (DoS) is defined as the ratio of demand flow to capacity, and therefore has no unit. As it approaches 1.0, extensive queues and delays could be expected. For a satisfactory situation, DoS should be less than the nominated practical degree of saturation, usually 0.9. The intersection DoS is based on the movement with the highest ratio for all types of intersection.

### Delay

Delay is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle. The delays include queued vehicles decelerating and accelerating to and/or from stop, as well as delays experienced by all vehicles negotiating the intersection. At signalised and roundabout intersections, the average intersection delay is usually reported and is taken as the weighted average delay by summing the product of the individual movement traffic volume and its corresponding calculated delays and dividing by the total traffic volume at the intersection. At priority controlled intersections, the average delay for the worse movement is usually reported.

### Queue length

Queue length reflects the number of vehicles waiting at the stop line and is usually quoted as the 95$^{th}$ percentile back of queue, which is the value below which 95% of all observed queue lengths fall. It is measured as the number of vehicles per traffic lane at the start of the green period, when traffic starts moving again after a red signal. The intersection queue length is usually taken from the movement with the longest queue length.

The results of the SIDRA modelling of the 2010 situation are shown in Table 2.7.

**Table 2.7 Existing Yelgun Interchange performance**

| | DoS | LoS | Ave. delay (s/veh) | 95% Back of queue (m) | Movement |
|---|---|---|---|---|---|
| Tweed Valley Way & Yelgun Interchange Link Road | | | | | |
| Friday 8:00 am – 9:00 am | 0.10 | A | 11.4 | 3.6 | Link Road right-turn |
| Friday 3:30 pm – 4:30 pm | 0.14 | A | 10.9 | 4.1 | Link Road right-turn |
| Saturday 11:00 am – 12:00 pm | 0.13 | A | 10.8 | 3.8 | Tweed Valley Way right turn |
| Yelgun Interchange Roundabout | | | | | |
| Friday 8:00 am – 9:00 am | 0.13 | A | 6.3 | 5 | Northbound off-ramp right-turn |
| Friday 3:30 pm – 4:30 pm | 0.10 | A | 6.4 | 3.4 | Northbound off-ramp right-turn |
| Saturday 11:00 am – 12:00 pm | 0.09 | A | 6.4 | 2.7 | Northbound off-ramp right-turn |

### 2.6.8 Traffic growth

RTA traffic data provides a useful measure of traffic growth as surveys are undertaken regularly at the same location. With the completion of various Pacific Highway upgrade projects, some of the counters have moved location, for example from the old alignment in town to the new bypass. For this reason, the count site at Brunswick Heads was only able to provide data from 1998 round of surveys onwards. Table 2.8 shows the AADT values for three surveyed years.

**Table 2.8 Growth in traffic on the Pacific Highway at Brunswick Heads**

| Year | AADT |
|---|---|
| 1998 | 14,134 |
| 2001 | 15,989 |
| 2004 | 22,998 |

Source: Roads & Traffic Authority 2005, *Traffic Volume Data for Hunter and Northern Regions 2004* site 04.273, Pacific Highway, south of Road to Brunswick Heads

It is noted from Table 2.8 that there was growth in traffic across between each of the years. Between 1998 and 2001, the annual growth was 4.4% (linear) per annum. From 2001 to 2004 it was 14.6% per annum (averaged over the three years). The growth between 2001 and 2004 was particularly strong and is considered to be not representative of the general trend in growth of traffic on the Pacific Highway, due to two factors:

- opening of several upgrades of the Pacific Highway, including the Yelgun to Chinderah Freeway in 2002, creating a safer and more pleasant drive
- the designation of the Pacific Highway as a B-Double route since the opening of the Yelgun to Chinderah section.

Whilst the remaining sections of the Pacific Highway will continue to be upgraded, their impact, in terms of a dramatic jump in traffic volumes may be lower. It is considered that the impact of these two events is not consistent with the general growth trend of traffic volumes along the Highway.

As one of the two main road links between Sydney and Brisbane, the Pacific Highway carries a large amount of interstate traffic between NSW and Queensland. The Federal Government's Bureau of Infrastructure, Transport and Regional Economics has produced strategic forecasts of traffic growth on the national highway network in Bureau of Infrastructure, Transport and Regional Economics 2009, *National road network intercity traffic projections to 2030, Working Paper 75*.

Table 3.8 of Working Paper 75 includes a forecast of traffic volumes on the Pacific Highway at various locations along its length. Table 2.9 shows the forecasts for the section from Ballina to the Queensland border.

**Table 2.9 Forecast traffic growth on the Pacific Highway between Ballina and the Queensland border**

| | 2005 | 2030 | Growth* |
|---|---|---|---|
| Light vehicles | 16,189 | 25,502 | 1.83% |
| Heavy vehicles | 2,041 | 2,697 | 1.12% |
| All vehicles | 18,230 | 28,199 | 1.76% |

Note: Traffic volumes shown are average daily vehicles. Growth rate is compound.
Source: Bureau of Infrastructure, Transport and Regional Economics 2009, *National road network intercity traffic projections to 2030, Working Paper 75*.

The growth rate quoted by BITRE is lower than the historic rate. The lower BITRE compound growth rate would not catch up to the higher linear rate for 40 years.

For the purposes of projecting future traffic volumes for this study, we have adopted the linear growth rate of 4.4% per annum calculated from RTA data.

## 2.7 Road safety

Traffic crash statistics for Yelgun Interchange and Tweed Valley Way (between Yelgun Interchange and Jones Road) were obtained from the RTA for the period from July 1, 2004 to June 30, 2009. During this five-year period, twelve crashes occurred at the Yelgun Interchange and five happened at Tweed Valley Way. A summary crashes are provided below.

### 2.7.1 Yelgun Interchange

Out of the twelve crashes on this section of road, seven resulted in injuries, with the remaining five crashes causing property damage only, and no fatal crashes. The most common types of crashes were reported as 'head on' and 'right turn' collisions between vehicles from opposing directions, as well as rear end collision between vehicles from the same direction. Further examination of the statistics resulted in the following observations:

- among total twelve crashes, four happened at dawn, seven took place in daylight and only one was at night

- more than 80% of traffic crashes (10 out of 12) occurred in fair weather on dry road surface, with the rest two taking place during raining weather
- most crashes (seven out of 12) involved collisions between car and other type of vehicles such as truck and 4WD. One collision involved a pedestrian
- clusters of crashes were noted in two places including Brunswick Valley Way and Link Road (the eastern and southern approaches of T-intersection with Tweed Valley Way).

### 2.7.2 Tweed Valley Way between the Yelgun Interchange and Jones Road

There were fewer crashes on this section of road than at the Interchange. Of the five crashes that did occur on this section, one injury crash was recorded involving a motorcycle, with excessive speed listed as a contributing factor. Most of the remaining collisions involved a car with a heavy vehicle. Three crashes were reported to take place in the afternoon and the rest two were in the morning. Rain or a wet road surface did not contribute to any of the collisions. The types of the crashes were head-on, rear end, lane side-swipe, as well as off road on curve crashes. No clusters of crashes were identified.

## 2.8 Public transport

This section provides information regarding the public transport services providing access to the site.

### 2.8.1 Local bus

Charter buses can be arranged from nearby airports (i.e. Ballina and Gold Coast) and from Byron Bay (for patrons arriving by CountryLink rail/bus or the interstate coach). There are no regularly timetabled bus services the service the site.

### 2.8.2 CityRail rail/bus

Patrons arriving by train have to terminate at the Casino train station and travel via a connecting coach to Byron Bay. Table 2.10 provides details on the number of trains/connecting coaches and the arrival times of these coaches at Byron Bay. As shown, there are a total of four coaches arriving from Sydney between 5:52 am and 9:20 pm. There are a total of three coaches arriving from Brisbane between 11:22 am and 8:37 pm.

**Table 2.10 Train (coach service connecting to train) travel options**

| Origin | Destination | Number of trains/connecting coaches | First arrival time | Last arrival time |
|---|---|---|---|---|
| Sydney | Byron Bay Station | 4 | 5:52 am | 9:20 pm |
| Brisbane | Byron Bay Station | 3 | 11:22 am | 8:37 pm |

Source: CountryLink Website, 18 February 2010

A disused rail line exists to the west of the Pacific Highway. Billinudgel Station (now also disused) is the closest station to the site. It is located on Wilfred Street, Billinudgel, 3.2 km south of the site.

### 2.8.3 Interstate coach

Interstate coach operations to Byron Bay are shown in Table 2.11. As shown, there are a total of nine coaches arriving from Sydney between 7:50 am and 9:55 pm, and a total of 13 coaches arriving from Brisbane between 1:10 am and 9:55 pm.

**Table 2.11 Coach travel options**

| Origin | Destination | Number of coaches | First arrival time | Last arrival time |
|---|---|---|---|---|
| Sydney | Byron Bay | 9 | 7:50 am | 9:55 pm |
| Brisbane | Byron Bay | 13 | 1:10 am | 9:55 pm |

Source: Greyhound, Premier Motor Service websites, 18 February 2010

### 2.8.4 Taxi

Information from the NSW Transport & Infrastructure web site indicates that there are currently 17 taxis servicing the Brunswick Heads & Byron Bay area. Other hire cars may become available for larger events. Ground transport services also operate from Gold Coast and Ballina Airports to Byron Bay.

## 2.9 Active transport

Facilities for cycling and walking to the site are limited. However, the site is within cycling distance of the surrounding townships.

### 2.9.1 Cycle network

The use of bicycles to access the site on event days would not be uncommon. The existing and potential cycle network providing access to the site from surrounding townships, and the associated cycling distances are provided in Table 2.12.

**Table 2.12 Cycle information**

| Cycle network |
|---|
| Mullumbimby – 9 km |
| Cycle network within and along primary routes into Mullumbimby comprises the following:<br>▪ existing on-road (bike lanes and advisory routes)<br>▪ existing off-road (shared cycleway and footpaths)<br>▪ potential on-road advisory routes<br>▪ potential off-road shared cycleway and footpaths.<br>This network connects towards the site via:<br>▪ potential off-road rail corridor<br>▪ potential on-road advisory route along Coolamon Scenic Drive. |
| Ocean Shores North, New Brighton, South Golden Beach – 4 km |
| Cycle network within and along primary routes into the towns comprises the following:<br>▪ existing off-road (shared cycle way and footpaths)<br>▪ potential on-road bike lanes<br>▪ potential on-road advisory routes<br>▪ potential off-road shared cycleway and footpaths.<br>This network connects towards the site via:<br>▪ existing on road (bike lane and advisory route) along Brunswick Valley Way<br>▪ potential on-road advisory route along Brunswick Valley Way. |
| Ocean Shores South – 5 km |
| Cycle network within and along primary routes into Ocean Shores South comprises the following:<br>▪ existing off-road (shared cycle way and footpaths)<br>▪ potential on-road advisory routes<br>▪ potential off-road shared cycleway and footpaths.<br>This network connects with the cycle network within Ocean Shores North, New Brighton and South Golden Beach.<br>This network connects towards the site via:<br>▪ existing on road (bike lane and advisory route) along Brunswick Valley Way<br>▪ potential on-road advisory route along Brunswick Valley Way. |
| Brunswick Heads North – 7.5 km |
| Cycle network within and along primary routes into Brunswick Heads North comprises the following:<br>▪ existing on-road (bike lanes and advisory routes)<br>▪ existing off-road (shared cycle way and footpaths)<br>▪ potential on-road advisory routes<br>▪ potential off-road shared cycleway and footpaths.<br>This network connects with the cycle network within Brunswick Heads South.<br>This network connects towards the site via the existing on road (bike lane and advisory route) along the Pacific Highway. |

| Cycle network |
|---|
| Brunswick Heads South – 10 km |
| Cycle network within and along primary routes into Brunswick Heads South comprises the following:<br>▪ existing off-road (shared cycle way and footpaths)<br>▪ potential on-road advisory routes<br>▪ potential off-road shared cycleway and footpaths.<br>This network connects with the cycle network within Brunswick Heads North.<br>This network connects towards the site via the existing on road (bike lane and advisory route) along the Pacific Highway. |
| Bangalow – 32 km |
| Cycle network within and along primary routes into Bangalow comprises the following:<br>▪ existing off-road (shared cycle way and footpaths)<br>▪ potential on-road advisory routes<br>▪ potential off-road shared cycleway and footpaths.<br>This network connects towards the site via the potential off-road rail corridor. |
| Ewingsdale – 17 km |
| Cycle network within and along primary routes into Ewingsdale comprises the following:<br>▪ existing off-road (shared cycle way and footpaths)<br>▪ potential on-road advisory routes<br>▪ potential off-road shared cycleway and footpaths.<br>This network connects with the cycle network within Byron Bay West.<br>This network connects towards the site via the existing on road (bike lane and advisory route) along the Pacific Highway. |
| Byron Bay West – 22 km |
| Cycle network within and along primary routes into Byron Bay West comprises the following:<br>▪ existing off-road (shared cycle way and footpaths)<br>▪ potential on-road advisory routes<br>▪ potential off-road shared cycleway and footpaths.<br>This network connects with the cycle network within Ewingsdale and Byron Bay East.<br>This network connects towards the site via the potential off-road rail corridor. |
| Byron Bay East – 25 km |
| Cycle network within and along primary routes into Byron Bay East comprises the following:<br>▪ existing on-road (bike lanes and advisory routes)<br>▪ existing off-road (shared cycle way and footpaths)<br>▪ potential on-road advisory routes<br>▪ potential off-road shared cycleway and footpaths.<br>This network connects with the cycle network within Byron Bay West and Byron Bay South.<br>This network connects towards the site via the potential off-road rail corridor. |

| Cycle network |
| --- |
| Byron Bay South – 27 km |
| Cycle network within and along primary routes into Byron Bay South comprises the following:<br>▪ existing on-road (bike lanes and advisory routes)<br>▪ existing off-road (shared cycle way and footpaths)<br>▪ potential on-road advisory routes.<br>This network connects with the cycle network within Byron Bay East and Suffolk Park.<br>This network connects towards the site via the potential off-road rail corridor. |
| Suffolk Park – 30 km |
| Cycle network within and along primary routes into Suffolk Park comprises the following:<br>▪ existing on-road (bike lanes and advisory routes)<br>▪ existing off-road (shared cycle way and footpaths)<br>▪ potential on-road advisory routes<br>▪ potential off-road shared cycleway and footpaths.<br>This network connects with the cycle network within Byron Bay South.<br>This network connects towards the site via the potential off-road rail corridor. |

### 2.9.2 Walking

The existing and potential pedestrian facilities within and along primary routes into the surrounding townships are provided in Table 2.12. However, there are no pedestrian facilities connecting these townships to the site. Walking would not be encouraged to the site due to the distance from nearby townships and the lack of pedestrian facilities in this rural environment.

## 2.10 Air travel

Some event patrons would arrive by plane at the nearby Gold Coast and Ballina Airports, and then travel to the site or their accommodation via a connecting bus service or by hire car. The travel time between Ballina Airport and the site is approximately 45 minutes. The travel time between the Gold Coast Airport and the site is approximately 35 minutes.

Table 2.13 provides details on the number of flights at the Ballina and Gold Coast Airports. As shown, there are a total of 24 flights arriving from Sydney to Gold Coast Airport and 16/17 from Melbourne. There are a total of five flights arriving from Sydney to Ballina Airport.

**Table 2.13 Plane travel options**

| Origin | Destination | Number of flights | |
|---|---|---|---|
| | | Weekday | Weekend |
| Sydney | Ballina Airport | 5 | 4 |
| Sydney | Gold Coast Airport | 24 | 24 |
| Newcastle | Gold Coast Airport | 2 | 2 |
| Melbourne | Gold Coast Airport | 16 | 17 |
| Adelaide | Gold Coast Airport | 3 | 3 |
| Canberra | Gold Coast Airport | 1 | 1 |
| Townsville | Gold Coast Airport | 1 | 1 |
| Mount Isa | Gold Coast Airport | 1* | |
| Cairns | Gold Coast Airport | 1 | 1 |

Note: Details as at 15 April 2010, Mount Isa flight available Thursday only.

## 2.11 Drive time

The drive time of regional centres and major cities has been estimated and is shown in Table 2.14. These are potential sources of patrons for the events to be held at the site.

**Table 2.14 Estimated driving time from major centres to the site**

| Origin | Driving time |
|---|---|
| Brisbane | 1 hour 33 mins |
| Gold Coast (Surfers Paradise) | 1 hour |
| Tweed Heads | 33 mins |
| Byron Bay | 21 mins |
| Ballina | 41 mins |
| Lismore | 51 mins |
| Casino | 1 hour 18 mins |
| Grafton | 2 hours 24 mins |
| Port Macquarie | 5 hours 25 mins |
| Sydney | 9 hours 25 mins |

Note: Estimated to Jones Road, Wooyung.
Source: Whereis.com (June, 2010)

## 2.12 Proposed developments

At the time of writing, there are no other developments currently planned that would have a significant influence on traffic conditions in the study area.

# 3. Major event transport review

To assist in the forecasting of the transport requirements of the events to be staged at the North Byron Parklands site, information on travel behaviour was sought for previous Splendour in the Grass events as well as similar music festivals in Australia and around the world.

## 3.1 Previous Splendour in the Grass events

The following information is summarised from the report - *Findings of online research conducted with the Splendour Subscriber Database* (Fresh Products, 31 August 2007).

The Splendour In The Grass is an annual music festival, previously held at Belongil Fields, Byron Bay. It began in 2001 as a one-day event and evolved into a two-day event the following year. The 2007 event had 17,500 event patrons (tickets were sold out), including 2,500 camping patrons. The 2007 festival was held on the weekend of the 4–5 August.

An online survey with Splendour patrons was conducted from 13–20 August 2007. Out of a total database of 33,921 member subscribers, 5,046 completed the surveys. As an incentive to complete the survey, a prize draw of the chance to win one of 12 double passes to the 2008 event was offered. The database included patrons of the 2007 event and those who had missed out on tickets as well as other non attendees. Of those who completed the survey 66% had attended the 2007 event, while 34% had missed out.

The following results provide a general indication of the travel behaviour of event patrons.

### 3.1.1 On-line survey results

Unless specified, percentages include a mixture of day patrons and campers.

Table 3.1 shows the mode of travel used to arrive in Bryon Bay. Car includes car driver and car passenger.

**Table 3.1 Mode split to Byron for the 2007 event**

| Mode | Share |
|---|---|
| Car | 71% |
| Plane | 16% |
| Train | 1% |
| Bus | 5% |
| Live locally – no travel | 5% |
| Other | 2% |

Source: Fresh Products 2007

Once arrived at their accommodation, patrons had a mode split shown in Table 3.2 to get from their accommodation to the site. This indicates that the majority of the patrons who chose to travel to Byron Bay by car changed mode to walking or shuttle bus to get to the Belongil Fields site.

**Table 3.2 Mode split to festival site for the 2007 event**

| Mode | Share |
|---|---|
| Walked | 31% |
| Car | 25% |
| Shuttle bus | 27% |
| Other type of bus | 4% |
| Taxi | 2% |
| Camped on site | 10% |
| Other | 2% |

Source: Fresh Products 2007

Where patrons did drive to the event, the survey indicated a high degree of car sharing, as shown in Table 3.3. The results indicate average car occupancy of 3.2 people per car.

**Table 3.3 Car occupancy for the 2007 event**

| Number of people in cars | Proportion |
|---|---|
| Driver only | 3% |
| 2 people | 16% |
| 3 people | 19% |
| 4 people | 28% |
| 5 people | 26% |
| More than 5 people | 8% |

Source: Fresh Products 2007

The survey results (shown in Table 3.4) indicate that patrons from Queensland and NSW make up the majority (around 90%) of all attendees.

**Table 3.4 Origins of attendees of the 2007 event**

| Location | Proportion |
|---|---|
| Byron Shire | 4% |
| Elsewhere in the Northern Rivers NSW | 5% |
| Sydney | 21% |
| Other NSW | 9% |
| Melbourne | 6% |
| Other Victoria | 1% |
| Brisbane | 34% |
| Gold Coast | 9% |
| Other Queensland | 6% |
| Adelaide | 2% |
| Perth | 1% |
| Canberra/ACT | 2% |

Source: Fresh Products 2007

The 2007 event was held over two days. Table 3.5 indicates that the majority of patrons stayed for the full event duration plus one extra night (either before or after). A number of patrons stayed for longer than just the event days.

**Table 3.5 Length of stay of 2007 attendees**

| Duration of stay | Proportion |
|---|---|
| Less than 1 day | 2% |
| 1 night only | 3% |
| 2 nights | 10% |
| 3 nights | 53% |
| 4 nights | 19% |
| 5 nights | 8% |
| More than 5 nights | 6% |

Source: Fresh Products 2007

Table 3.6 shows that patron used all types of accommodation, with the majority staying off-site, requiring them to travel to/from the site each day.

**Table 3.6 Accommodation type of 2007 attendees**

| Main accommodation | Proportion |
|---|---|
| Apartment/Holiday house | 21% |
| Camped at another location | 20% |
| Camped on site | 13% |
| Hotel/Motel/Resort | 13% |
| Stayed at friend's house | 11% |
| I live here | 6% |
| Backpackers | 5% |
| Caravan park | 5% |
| Bed & breakfast/Guest house | 2% |
| Other | 4% |

Source: Fresh Products 2007

Table 3.7 shows that the majority stayed in Byron Bay or close by.

**Table 3.7 Location of 2007 attendees' accommodation**

| Location | Proportion |
|---|---|
| In Byron Bay | 53% |
| Close to Byron Bay | 28% |
| More than 10-15 km away | 19% |

Source: Fresh Products 2007

Tables 3.8 and 3.9 show some demographic information about the people that completed the survey. From this information, the typical event patron is between 18 and 29 years of age. More females than males responded to the survey. The majority of patrons have full-time work, however around one third are students.

**Table 3.8 Age proportion of 2007 attendees**

| Age | Proportion |
|---|---|
| Under 18 years | 4% |
| 18 – 24 years | 60% |
| 25 – 29 years | 21% |
| 30 – 34 years | 8% |
| 35 – 39 years | 4% |
| 40 – 44 years | 2% |
| 45 – 49 years | 1% |

Source: Fresh Products 2007

**Table 3.9 Gender proportion of 2007 attendees**

| Gender | Proportion |
|---|---|
| Male | 37% |
| Female | 63% |

Source: Fresh Products 2007

**Table 3.10 Employment status of 2007 attendees**

| Employment status | Proportion |
|---|---|
| Working full time | 53% |
| Working part time | 6% |
| Working casual | 7% |
| Student | 33% |

Source: Fresh Products 2007

Tables 3.11, 3.12 and 3.13 show the results of predictive questions where respondents were asked to anticipate their future behaviour. Respondents were asked to consider their travel patterns should the event be held at the North Byron Parklands site. Comparing Table 3.11 to Table 3.2, a higher proportion of attendees are predicting that they would take advantage of shuttle buses to get to the new site. The increase seems to be made up of people who used to walk and some who used to travel by car.

**Table 3.11 Mode split to site for future event**

| Mode | Proportion |
|---|---|
| Festival organised shuttle bus | 73% |
| Other type of bus | 1% |
| Taxi | 1% |
| Car, designated driver and parked at site | 9% |
| Car, self drive | 6% |
| Car, drop off and pick up | 3% |
| Camping at site | 4% |
| Bicycle | 1% |
| Other | 2% |

Source: Fresh Products 2007

Table 3.12 indicates similar results to that of the current event (Table 3.4), with the majority of patrons coming from Queensland and NSW.

**Table 3.12 Origins of attendees of future event**

| Residential location | Proportion |
|---|---|
| New South Wales | |
| Byron Shire | 3% |
| Elsewhere in the Northern Rivers NSW | 5% |
| Sydney | 21% |
| Other NSW | 9% |
| Queensland | |
| Brisbane | 31% |
| Gold Coast | 8% |
| Other Queensland | 7% |
| Victoria | |
| Melbourne | 7% |
| Other Victoria | 1% |
| Other | |
| Adelaide | 2% |
| Perth | 1% |
| Canberra/ACT | 2% |
| Overseas | 1% |

Source: Fresh Products 2007

Of the respondents that live in the Northern Rivers area surrounding the site, Table 3.13 indicates their postcode and an example town in the postcode. The event is forecast to continue a strong patronage from the local area.

**Table 3.13 Resident postcode of local attendees for future event**

| Postcode | Including Town* | Proportion |
|---|---|---|
| 2479 | Bangalow | 9% |
| 2480 | Lismore | 7% |
| 2481 | Byron Bay | 46% |
| 2482 | Mullumbimby | 9% |
| 2483 | Local area | 17% |
| Other | | 12% |

Note: town shown is an indication only, respondent may live in a different town within the same postcode.
Source: Fresh Products 2007

The survey results give an indication of future travel behaviour, but actual travel behaviour at a future event may be different.

## 3.2 Sustainable transport planning review

Research on transport initiatives implemented at other similar events similar which were aimed at increasing the number of people ride-sharing or using other more sustainable modes of transport was conducted. This was primarily an internet-based research exercise through event websites etc.

The most common initiatives include:

- encouraging ride-share through links to rideshare sites or ride-share forums. In some instances these are supported by incentives such as food and/or drink vouchers, preferential camping allocation, and reduced parking rates
- shuttle bus services to/from town centres, and rail and bus stations
- express trains from cities
- combination coach and entry tickets (reduced price)
- cycling initiatives - storage facilities, priority at entry, riding groups etc
- parking restrictions - limited spaces and/or parking charges
- providing public transport information on websites etc.

A summary of international and local initiatives is provided below.

### 3.2.1 International events

The sustainable transport planning for festivals is well developed internationally with significant refinement of sustainable measures in the UK. Below is a summary of the latest measures implemented by event organisers.

#### 3.2.1.1 Ride-share

As part of Sunrise Celebration's (Somerset, UK) Sustainability Policy (2010), they aim to reduce the environmental impact caused by attendees and crew travelling to the site by promoting a number of ride-sharing forums: Viamerge Sunrise Lift-Share Site; Freewheelers Sunrise Lift-Share Site; Festival Weather Sunrise Lift-Share Site as well as working in partnership with local Council initiatives in Somerset.

The following festivals have a ride-share forum on their website for people with empty seats in their car or for people looking for a ride to the festival:

- OppiKoppi festival (South Africa)
- Burning Man Festival (Blackrock City, USA) - ride share community board.

Other festivals use either links on their website to ride-share sites (rather than forums) where people can register or have internal links for their own ride-share site:

- Beach Break Live (Pembrey County, Wales) - www.FestivalBUDi.com (in partnership with www.liftshare.com)

- Bestival (Isle of Wight, UK) - www.liftshare.com
- Shambala (Northamptonshire, UK) - www.viamerge.com
- Download Festival (Derby, USA) - www.FestivalBudi.com (in partnership with www.liftshare.com)
- Latitude Festival (Suffolk, UK)
- Vans Warped Tour (USA) - www.PickupPal.com.

OppiKoppi also offer incentives to ride-share by offering drinks vouchers or a Festival Kit - limited edition memorabilia, guides, etc.

Download Festival and Live Nation, (UK), also offer incentives for people to ride-share by offering the chance to win VIP passes for those who turn up to the festival with a full car.

Bestival and Latitude Festival also encourage use of ride-sharing by publishing statistics on benefits - e.g. CO2 reductions, cost savings etc.

#### 3.2.1.2 Shuttle buses

Many festivals provide shuttle buses to and from the site to nearby Town Centres or bus or trains stations. Others provide shuttle buses to and from campsites to the actual festival site when the distance is too far to walk. Another form of shuttle buses is those to and from park-and-ride locations which helps to alleviate the traffic congestion.

Examples of these are:

- Beach Break Live (Pembrey County, UK) Blues On The Farm (Chichester, UK)
- Burning Man Festival (Blackrock City, USA)
- Cambridge Folk (Cambridge, UK)
- Download Festival (Derby, UK)
- Festival Republic (Reading and Leads, UK)
- Glade Festival (Winchester, UK)
- Glastonbury Festival (Glastonbury, UK)
- Lowlands Festival (Netherlands)
- OppiKoppi (South Africa)
- Oxegen (Punchestown, Ireland)
- Pukkelpop (Belgium)
- Roskilde Festival (Roskilde, Denmark)
- Summerjam (Germany)

- Sunrise Celebration (Somerset, UK).

For many festivals, the shuttle bus is more than just a means of transport: e.g. a social experience where entertainment is provided. Some festivals provide these services for free while some charge a nominal fee. Different arrangements are made for ticketing - for example, at Beach Break Live, those using the free shuttle bus from the train station must show their train ticket to ensure people do not get dropped off at the train station by car and therefore increase traffic within the local area.

#### 3.2.1.3 Combo tickets

For a reduced cost, patrons at many festivals are offered combo tickets, i.e. travel tickets (train or coach) as well as entry to the festival.

Examples of these are:

- Beach Break Live (Pembrey County, UK) - coach network from 40 cities at a reduced price
- Festival Republic (Reading and Leads, UK) - specific allocation of combined coach and festival tickets which ensures a certain amount of people arrive via coach
- Glade Festival (Winchester, UK) - combination coach and weekend tickets
- Latitude Festival (Suffolk, UK) - train tickets or combo train and coach tickets are cheaper if booked in advance
- Shambala (Northamptonshire, UK) - subsidised coach travel from five major cities
- Sunrise Celebration (Somerset, UK) - link tickets to coach travel (discounted)
- V Festival (Chelmsford and Staffordshire, UK) - link tickets to coach travel (discounted).

#### 3.2.1.4 Cycling

Another initiative to reduce the number of people arriving to festivals via private car is to encourage people to cycle. The most common of these initiatives is to provide lock-up facilities. Examples are provided below:

- Cambridge Folk (Cambridge, UK) - covered bike racks
- Glastonbury Festival (Glastonbury, UK) - free bike and property lockups
- Latitude Festival (Suffolk, UK) - free bike racks
- Shambala (Northamptonshire, UK) - ride to Shambala holidays from five cities (in partnership with Sustrans)
- Summer Sundae (Leicester, UK) - ride to Shambala holidays from five cities (in partnership with Sustrans)
- Sunrise Celebration (Somerset, UK) - website provides transport information including cycle routes.

#### 3.2.1.5 Parking restrictions

As well as encouraging patrons to travel to events by modes other than private car through incentives and other means, another measure often used is to impose parking restrictions. This can be either through limiting the number of spaces available and/or imposing parking charges. Examples of festivals applying parking restrictions are given below:

- Beach Break Live (Pembrey County, UK) - Free parking for cars with one or less empty seats
- Download Festival (Derby, USA) - parking charges
- Glade Festival (Winchester, UK) - parking charges for cars with two or less people (free parking for three or more)
- Glastonbury Festival (Glastonbury, UK) – parking charges
- Oxegen(Punchestown, Ireland) - free car parking for cars with four or more
- Reading Festival (Reading, UK) - parking charges and parking is only available away from site
- Retrofest (Scotland) - restrict parking within walking distance and tiered ticketing for drivers, i.e. cheaper for groups
- Sunrise Celebration (Somerset, UK) - parking charges
- T in The Park Festival (Balarado, Kinross-Shire, Scotland) - parking charges and limited parking (advance tickets only).

#### 3.2.1.6 Public information

Most events now provide information on their websites regarding travel to and from the sites. This includes, depending on availability, trains, shuttle buses, local buses, ferries, flights, and ride-share facilities. Some websites provide links to the public transport providers' websites.

### 3.2.2 Australian events

Event planning for major festivals is quickly evolving in Australia with an acknowledgement from some promoters of the benefits of sustainable measures. The best examples are outlined below.

#### 3.2.2.1 Ride-share

Australian examples of festivals promoting ride-sharing include:

- The Falls Festival (Lorne, Victoria) - links to and promotion of ride-sharing website (www.myspareseat.com specifically set up for people going to Falls
- Peats Ridge Festival (Glenworth Valley, New South Wales) - ride-sharing forum on website
- Woodford Folk Festival (Woodford, Queensland) - links to and promotion of ride-sharing website (website also has a noticeboard for people looking to share).

#### 3.2.2.2 Shuttle buses

Australian examples of festivals providing shuttle bus services to and from the event location include:

- Splendour in the Grass (Byron Bay, New South Wales) - shuttle bus to and from Byron Bay
- Blues and Roots Festival (Tyagarah (near Byron Bay), New South Wales) - shuttle bus services (with a fee) to/from Byron Bay, Brunswick Heads and other surrounding locations
- The Falls Festival (Lorne, Victoria) - free shuttle buses from the campsite to the main festival site and a $10 (return) shuttle service from Lorne to the festival site with the timetable provided on the website
- The Falls Festival (Marion Bay, Tasmania) - shuttle service picking up from Hobart, Hobart Airport, Sorell, and from larger bus companies on regional routes
- Peats Ridge Festival (Glenworth Valley, New South Wales) - return bus services from bus interchange at Hornsby Station (1 hour south of festival site)
- Woodford Folk Festival (Woodford, Queensland) - shuttle bus service from train station to festival site ($8 each way from Caboolture Station).

#### 3.2.2.3 Cycling

The two Australian festivals with the most cycling initiatives are Peats Ridge Festival and Woodford Folk Festival. Their initiatives are listed below:

- Peats Ridge Festival (Glenworth Valley, New South Wales):
  - Bike Bus with support vehicle and ride guide (need to register first)
  - campsite specifically for cyclists (reduces pressure to make it in time to get a good position)
  - bicycle racks
  - free bicycle repair service
- Woodford Folk Festival (Woodford, Queensland):
  - website provided cycling information plus a guide - routes/maps (Rider Partner service information on cycle guide)
  - free luggage service from Brisbane and Nambour (cyclists then catch a train and then ride through scenic countryside to festival site)
  - cyclists receive priority at festival entrance (jump the queue)
  - cyclist-only camping site (quiet and car free with a marquee for secure bicycle parking and socialising and bicycle merchandise).

#### 3.2.2.4 Parking restrictions

To support the other initiatives, parking charges are applied at the following festivals:

- Peats Ridge Festival (Glenworth Valley, New South Wales) - profits being re-invested into public transport schemes such as shuttle buses
- Splendour in the Grass (Byron Bay, New South Wales).

#### 3.2.2.5 Public information

The following festivals provide public transport information and links on their websites:

- Blues and Roots Festival (Tyagarah (near Byron Bay), New South Wales)
- The Falls Festival (Lorne, Victoria)
- Woodford Folk Festival (Woodford, Queensland).

#### 3.2.2.6 Other

Other initiatives to reduce the number of cars driving to the festival sites include:

- Peats Ridge Festival (Glenworth Valley, New South Wales) - complimentary luggage pick-up and drop-off service for rail passengers from Central Station and Hawkesbury River Station (need to register first)
- Woodford Folk Festival (Woodford, Queensland) - Encourage use of public transport and/or cycling on their website: encouraging people to take their bike on the train (free).

## 3.3 Event transport planning objectives

The transport planning objectives for events staged at the North Byron Parklands are to:

- move patrons in a safe and efficient manner to contribute to the successful operation of the event
- significantly increase the number of patrons who use public transport
- provide a balance of parking supply to reduce the reliance of the use of private vehicles to access the Parklands whilst also allowing access to the site for those unable to easily access public transport
- incorporate new event transport services and the appropriate support infrastructure in the most cost effective way
- ensure the cost, quality and convenience of public transport is competitive with the private vehicle
- be patron focussed and family friendly
- be operationally cost effective.

The transport planning strategies that can deliver effective event operations include:

- a multi-modal approach (e.g. bus, charter coach, taxi, cycling and parking) to share the loads across different transport networks whilst also maximising the patronage potential of public transport
- providing adequate public transport facilities and services to allow it to compete with the use of private vehicles
- use buses to maximise the passenger catchment and utilise operational flexibility (e.g. the ability to substitute or supplement buses in a short space of time)
- separate (and prioritise) bus movements accessing the Parklands from the routes used by general traffic
- separate vehicle and pedestrian movements for safety and traffic management efficiency
- restrict parking in the venue to patrons who are prepared to pay a premium for the privilege
- restrict the supply of parking for day patrons to encourage use of event bus services
- restrict on-street parking in the vicinity of the Parklands to improve traffic circulation and reduce the impact on the adjacent community
- manage the extent of traffic management measures in the vicinity of the Parklands to minimise impact on the local community, regional traffic movements and operational costs
- Provide a range of effective communication channels to audience members covering public transport options, car pooling, parking and other means of travelling to the event.

# 4. Proposed development

The proposal includes creating a site capable of staging cultural events of different sizes and nature, with different transport characteristics and traffic impacts. The internal site layout would be flexible to allow configurations to change to suit the requirements of the particular event. The site would be set-up to accommodate temporary camping during events, providing an enhanced experience for patrons and reducing the external transport impacts.

The proposal also includes the creation of a Cultural Centre, Conference Centre and associated accommodation, administration building and gatehouse.

This section describes the types of events envisaged for the site, notional internal site layouts and parking provision. It also provides details of the potential Cultural Centre and Conference Centre.

## 4.1 Event details

The following details were considered during the preparation of this traffic assessment. Events outside the ranges indicated here may be considered and would be the subject of a separate assessment.

### 4.1.1 Type

The site has the flexibility to stage cultural events of many different types from one-off concerts to music festivals spread over several days. The inaugural event would be a rock/dance festival including local, national and international music artists and performers on a number of stages within a designated event area. It would also include a number of other performance spaces, food stalls, bars and market stalls within the event area for use by patrons.

The largest events would be targeted at a young demographic, similar to those surveyed in Section 3.1. This demographic are the most likely to adopt the transport initiatives, reducing the maximum traffic generation of the site. Other events, aimed at a different/older demographic may have a higher traffic generation rate per person, but would have a much smaller size. This study has assessed the types of events likely to produce the largest traffic and transport impact.

### 4.1.2 Size

The Project would have the capacity to accommodate events of different sizes. The size of the event (measured in the number of patrons) has been grouped into four categories, as shown in Table 4.1.

**Table 4.1 Event size categories**

| Event | Total patrons |
|---|---|
| Minor | 500 |
| Small | 3,000 |
| Moderate | 10,000 |
| 100% capacity | 50,000 |

### 4.1.3 Duration

Moderate and 100% capacity events would typically have a longer duration than smaller events. The durations envisaged include:

- smaller events could run for one day or one evening
- medium sized events could run for one or two days, with or without an element of overnight camping by patrons
- larger sized events could run for two to four days, typically with an element of camping on site by patrons.

The longer events may start with a day of less intensity to spread the arrival of camper and regular day patron arrivals, reducing the peak demand on the road network.

For larger events, set-up activities would commence approximately three weeks before the event, with the site vacated by the event approximately one week after the final day.

### 4.1.4 Frequency

The frequency of the different event sizes is yet to be determined. However, as a guide, the long term use of the site for events would be limited to:

- 100% Capacity Events– no more than 12 event days one per annum
- Moderate Events – no more than four event days per annum
- Small Events – no more than four days per annum
- Minor Events – no daily limits are proposed.

The Cultural Centre, Conference Centre and associated accommodations would operate as required with full time usage envisaged.

### 4.1.5 Timing

The timing of the events will be considered in relation to the background traffic levels on the road network, as well as other considerations. Please refer to Section 6.7 for more details.

### 4.1.6 Staging

To test the effectiveness of the transport management arrangements proposed for the site, it is planned to initially hold events up to 70% of the full event capacity (35,000 patrons) during the first year of operation. The size of events is planned to gradually increase with the Department of Planning concurrence, up to the 100% capacity event size (50,000 patrons) within five years of the commencement of operation (should the demand for this sized event arise).

This gradual increase in event size would allow refinement of the traffic management arrangements (if required) and the collection of data such as car occupancy, mode share and arrival profile.

### 4.1.7 Emergency vehicles

The following provisions would be made for emergency vehicles at all events:

- Dedicated access via Wooyung Road.
- Emergency vehicles would be given access to all site entrances.
- Emergency vehicles would be permitted to bypass any queue of vehicles waiting to enter the site by the use of traffic controllers to extend the length of right-turn bays by making use of the road shoulder of Tweed Valley Way.
- Traffic controllers would be given instructions to stop general traffic to assist emergency vehicles to pass, if required.
- The site includes a helipad in the northern part of the site solely for emergency use.

### 4.1.8 Resident access

Access to Jones Road and Yelgun Road would be controlled by traffic controllers to prevent unauthorised access to the site, and to prevent unwanted parking on Jones Road. Residents would be provided with resident access passes to enable them to pass through the checkpoints on Jones Road and Yelgun Road at their Tweed Valley Way entrance.

### 4.1.9 Through traffic

Through traffic on Tweed Valley Way would be permitted to bypass any queue of vehicles waiting to enter the site by the use of traffic management to extend the length of right-turn bays by making use of the road shoulder of Tweed Valley Way. A similar treatment would be employed at the junction of Tweed Valley Way and the Yelgun Interchange Link Road during event bump-out to bypass any queue of patrons' vehicles waiting to turn right to get to the Interchange.

## 4.2 Assessed event scenarios

A number of different event configurations have been devised to suit events with different requirements. For assessment in this report, events of the similar size and impact have been grouped together. The five event categories assessed are shown in Table 4.2.

**Table 4.2 Event scenarios**

| Event | Patrons | Campers | Day patrons | No. days | Staff |
|---|---|---|---|---|---|
| Minor | 500 | 0 | 500 | 1 | 20 |
| Small | 3,000 | 1,500 | 1,500 | 1 | 100 |
| Moderate | 10,000 | 10,000 | 0 | 2 | 800 |
| 70% capacity | 35,000 | 17,500 | 17,500 | 4 | 2,200 |
| 100% capacity | 50,000 | 25,000 | 25,000 | 4 | 3,000 |

Note: staff includes staff, performers, guests and associated personnel

Tables showing calculations of parking, bus, cycle, taxi and drop-off numbers are provided in Appendix F.

For comparison, the previously submitted trial event included 15,000 day patrons and 5,240 campers and was to be held over two days, with gates opened the day before to allow early camper access.

## 4.3 Access

The following site access points are proposed as part of the development:

- Gate A – Main site entrance, off Tweed Valley Way, 320 m north of Yelgun Road
- Gate B – Public transport access, off Tweed Valley Way, 200 m north of Gate A
- Gate C – Peak-only site entrance, off Tweed Valley Way, opposite Yelgun Road
- Gate S – Service vehicle access(event days only), off Jones Road, 260 m east of Tweed Valley Way
- Gate E – Emergency vehicle only access, off Wooyung Road.

These accesses are shown in Figure 4.1.

## Access

Gate A – Main Gate (Cars, Taxis, Bicycles, Drop-off)
Gate B – Bus entry and exit only
Gate C – Secondary exit only
Gate S – Service vehicles only
Gate E – Emergency vehicles only

## Transport Facilities

1. Main camping area with parking
2. Parking Area 1 – Staff & camping overflow
3. Parking Area 2 – Day Patrons
4. Bus hub – Day patrons
5. Charter Coach parking
6. Internal shuttle bus stop
7. Bicycle parking compound
8. Pedestrian path
9. Drop-off zone
10. Taxi Rank
11. Spine Road
12. Jones Road
13. Tweed Valley Way

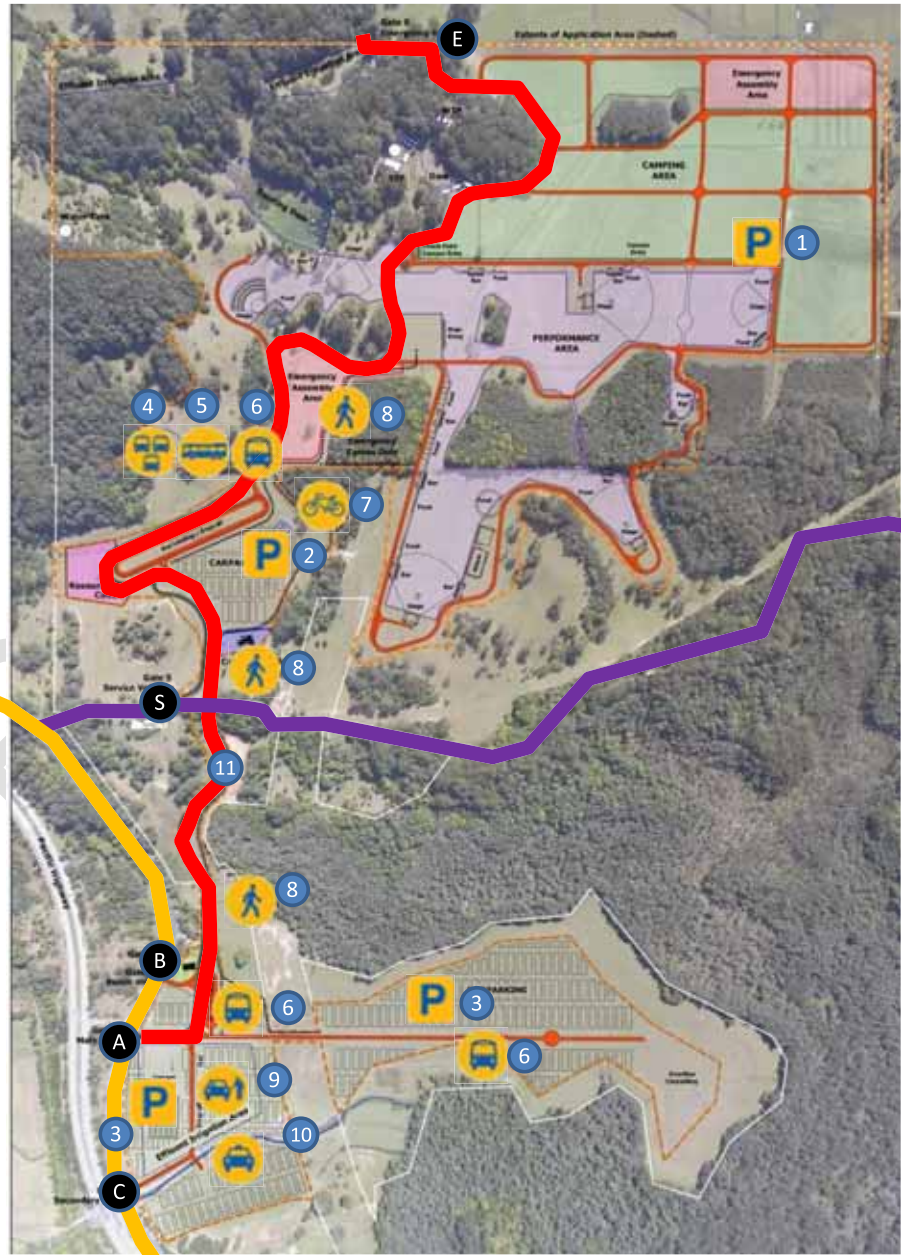



**Figure 4.1 Typical site plan including access locations**

### 4.3.1 Tweed Valley Way - Gate A

Gate A would be the main vehicle entrance and exit to the site. It is located approximately 320 m north of Yelgun Road on the eastern side of Tweed Valley Way. A sketch of Gate A is shown in Figure 4.2.

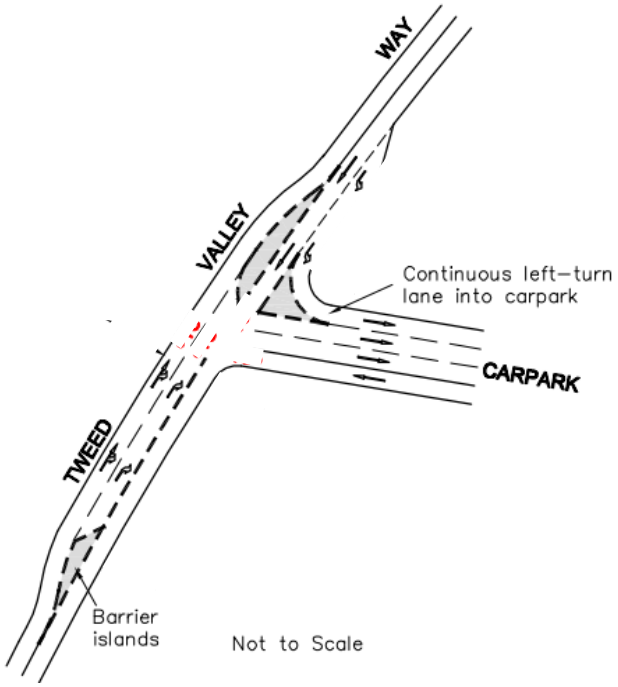



**Figure 4.2 Gate A configuration**

During Moderate and 100% capacity events, the intersection would be managed with traffic controllers. Traffic cones would be used to extend the length of the right-turn lane, requiring the use of the shoulder for through traffic.

On non-event days, this entrance would be used for all site access, by management, staff, service vehicles, conference centre, cultural centre, and set-up and pack-up vehicles.

During event days, this entrance would be used for patron entry only, with the other types of vehicles moved to other entrances to minimise their delay.

During the departure of patrons from the 70% and 100% capacity events, vehicles travelling north along Tweed Valley Way would use this exit. During the departure of patrons from smaller events, this exit would be used for vehicles travelling north and south.

### 4.3.2 Tweed Valley Way – Gate B bus access

During 70% and 100% capacity event days, this entrance would open for use by public transport vehicles access to the site. It would be closed during smaller events and non-event days. Exiting the site at this location would allow them to bypass any queues of vehicles entering and exiting via Gates A and B. Traffic controllers would stop southbound traffic on Tweed Valley Way to manage the queue of buses. It would also be made available to emergency vehicles if required.

When open, the access would consist of one lane in and one lane out of the site, with a width suitable for the turning requirements of 12.5 m long buses.

### 4.3.3 Tweed Valley Way – Gate C

This entrance would connect to the intersection of Yelgun Road and Tweed Valley Way. It would be closed apart from during 70% and 100% capacity events, when it would be opened for:

- emergency vehicle access
- a second site entry for northbound patron vehicles during arrival to minimise queue lengths on Tweed Valley Way
- a second site exit for patrons vehicles heading southbound only.

During 70% and 100% capacity events, the intersection would be managed with traffic controllers. Traffic cones would be used to create a right-turn bay and allow through vehicles to pass the queue of right-turning vehicles. When open, the access would consist of one lane in and one lane out of the site.

### 4.3.4 Jones Road – Gate S service vehicle access

A new entrance would be created on the northern side of Jones Road, approximately 260 m east of Tweed Valley Way. It would consist of one lane in and one lane out of the site. As a service vehicle entry, it would be designed to accommodate 17.0 m long articulated trucks.

This entrance would be opened for each event day and as an emergency vehicle entrance, and would be managed by traffic controllers at all times when open. At other times the gates would be closed. During 70% and 100% capacity event days, this entrance would also be used by management, staff, service vehicles and performers.

Jones Road would be upgraded to a minimum width of 6.0 metres width and sealed between Tweed Valley Way and a point approximately 340 metres east of Tweed Valley Way.

### 4.3.5 Wooyung Road – Gate E emergency vehicle access

All entrances would be made available for emergency vehicles. As a back-up to the site accesses on Tweed Valley Way, and to assist emergency vehicles gain access to the northern part of the site without travelling through the internal site roads, an additional site entrance would be created via a local road connecting to Wooyung Road approximately 2 km east of Tweed Valley Way. This emergency access (connecting to the Spine Road with managed access) is intended to be used during events in an emergency if required. It would not be used for any other site access.

## 4.4 Internal circulation

Please refer to Figure 4.1 for the internal site layout. The internal site vehicle movement system would have the following main features:

- Spine Road – one lane in each direction with pedestrian path on eastern side. It would be between 6 and 9 m wide with two-way travel. It would either pass under Jones Road via a underpass or intersect at an at-grade intersection (with the Spine Road giving way to Jones Road under normal traffic conditions) to be constructed as part of the site works. On non-event days it would provide access to the conference centre and cultural centre, as well as enabling set-up (bump-in) and pack-up (bump-out) vehicles to access all areas of the site. During the bump-in and bump-out of camping patrons, it would provide access between the main site entrance and the parking camping areas. During 70% and 100% capacity event days, access north of the southern parking area (near Gates A and C) would be restricted to internal site shuttle buses, security and emergency vehicles, cyclists and pedestrians. Buses and coaches would join the Spine Road at Gate B and would use it to get to the Bus Terminus. The shoulder of the Spine Road would be used as temporary bus and coach parking during events. The Spine Road would enable the movement of goods and the collection of waste from around the site

- event laneways– would connect to the Spine Road to facilitate the movement of vehicles to/from the parking areas. Event laneways would be a mixture of one-way and two-way, with a typical width of 6 m. The event laneway leading from Gate A may also be used for temporary bus and coach parking during 70% and 100% capacity events (with appropriate widening)

- vehicle processing area – before being allowed to use the Spine Road to get to the northern part of the site, campers' vehicles, and for smaller events day patron's vehicles, would first be required to pass through a processing area. The vehicle processing area is located within the site alongside Tweed Valley Way, between Gates A and C. At this processing area, tickets would be checked and vehicles would be inspected for alcohol and banned substances. This area would consist of five lanes with three inspection bays per lane, with approximately 150 m queuing space for each lane. If all five queues were to become full, site marshals would direct any overflow through the event laneways to begin a new queue within the site. On 70% and 100% capacity event days, the area would be converted for parking use.

**Speed limit**

The speed limit on the Spine Road and event laneways would be 30 km/h unless designated as a shared pedestrian/vehicle event laneway. During event days, other event laneways may be designated with slower speed limits.

**Movement around the site**

Once parked on the site, or after alighting from buses coaches, taxis, etc, patrons would move towards the main event entry, where their tickets would be checked before gaining entry into the event areas. Campers may be given a separate entry to enable them to move more conveniently between the event and camping areas.

Pedestrian paths would be provided from parking areas and the bus and coach terminus to the main event entry. Pedestrians requiring at-grade accessible crossings would be managed by traffic controllers.

Patrons parking in the southern parking area of the site would be given two options to get to/from the event areas. A walking path would be provided on the eastern side of the Spine Road. Alternatively, patrons could catch a free internal shuttle bus operating from the internal shuttle bus pick-up stop adjacent to the vehicle processing area, which would drop them at the bus and coach terminus.

Vehicles dropping mobility impaired patrons would be permitted to drive along the Spine Road to an accessible drop-off zone near the main event entry.

During 70% and 100% capacity event days, buses and coaches would enter and leave the site via the Gate B public transport entry. For smaller events, they would use the Gate A main site entry. They would travel via the Spine Road to the bus and coach terminus. On departure, buses and coaches would use the Spine Road to the public transport egress.

Vehicles dropping off-passengers (including taxis) would enter the site via Gate A, use the event laneways to get to a passenger set-down/pick-up area in the southern parking area, and then exit via Gate C. Passengers could then use the pedestrian paths or internal shuttle bus.

Event bump-in and bump-out would occur in the days before and after the event, reducing the need for large vehicle access to the site during patron bump-in and bump-out.

## 4.5 Parking

### 4.5.1 Off street parking

The provision of off street parking is an important aspect of the Parklands design, operation and business plan in terms of meeting patron's needs. The provision of a balanced supply of parking would meet both the needs of the Parkland's tenants and the sustainable transport policies of both state and local government.

The supply of off-street car parking for the North Byron Parklands has considered the following issues:

- the capacities of the event venue
- the location of permanent and temporary event activity areas within the Parklands
- the geographical spread of event patrons in relation to public transport services
- the demographics of event patrons in terms of their propensity to change their travel behaviour towards sustainable transport options
- the likely impacts on background traffic flows on Tweed Valley Way and the Yelgun Interchange with the Pacific Highway
- the limitations of site constraints in terms of habitats.

The off street parking capacities have been determined based on the design team's investigations and are as shown in Table 4 3 and Figures 4 3, 4 4 and 4.5. The parking numbers have been based on an assumed rate of:

- Regular: one parking space per 30 square metres
- Disabled: one parking space per 36 square metres
- Camping: one parking and camping space per 60 square metres
- Camper van: one parking space per 40 square metres.

**Table 4.3 Off-street parking provision**

| | Parking area | Parking spaces |
|---|---|---|
| Northern | | 3,708 |
| N1 – Camping (cars) | 20.07 Ha | 3,333 |
| N2 – Camping (campervans) | | 375 |
| Central | | 1,038 |
| C1 – Car parking | 3.13 Ha | 1,012 |
| C2 – Disabled parking | | 26 |
| Coach bays | - | 84 coaches |
| Bus bays | - | 10 buses |
| Southern | | 7,155 (7,882 incl. overflow) |
| S1 – Car parking | 1.00 Ha | 333 |
| S2 – Disabled parking | 0.63 Ha | 175 |
| S3 – Car parking | 2.85 Ha | 950 |
| S4 – Car parking | 3.15 Ha | 1,050 |
| S5 – Car parking | 3.27 Ha | 1,090 |
| S6 – Car parking | 7.53 Ha | 2,510 |
| S7 – Car parking | 1.32 Ha | 440 |
| S8 – Car parking | 1.82 Ha | 607 |
| Southern overflow parking | 2.18 Ha | 727 |
| Taxis | - | 5 spaces |
| Passenger drop-off | - | 18 spaces |

It is possible not all of the off street parking locations identified would be utilised for events however a higher proportion may be used in the short term until patrons travel behaviour changes over time. It should be noted that all off street car parking would be controlled through pre-allocation of spaces to staff, campers and day patrons and circulation for a car space would not be tolerated.

Off street parking would not be promoted to the general public and information would be restricted to those allocated a space only. This is a similar operational procedure that occurs at other entertainment venues with limited parking supplies such as stadiums.

Maps showing the northern, central and southern parking areas using the 70% capacity example layout arrangement are provided in Figures 4.3, 4.4 and 4.5 respectively.

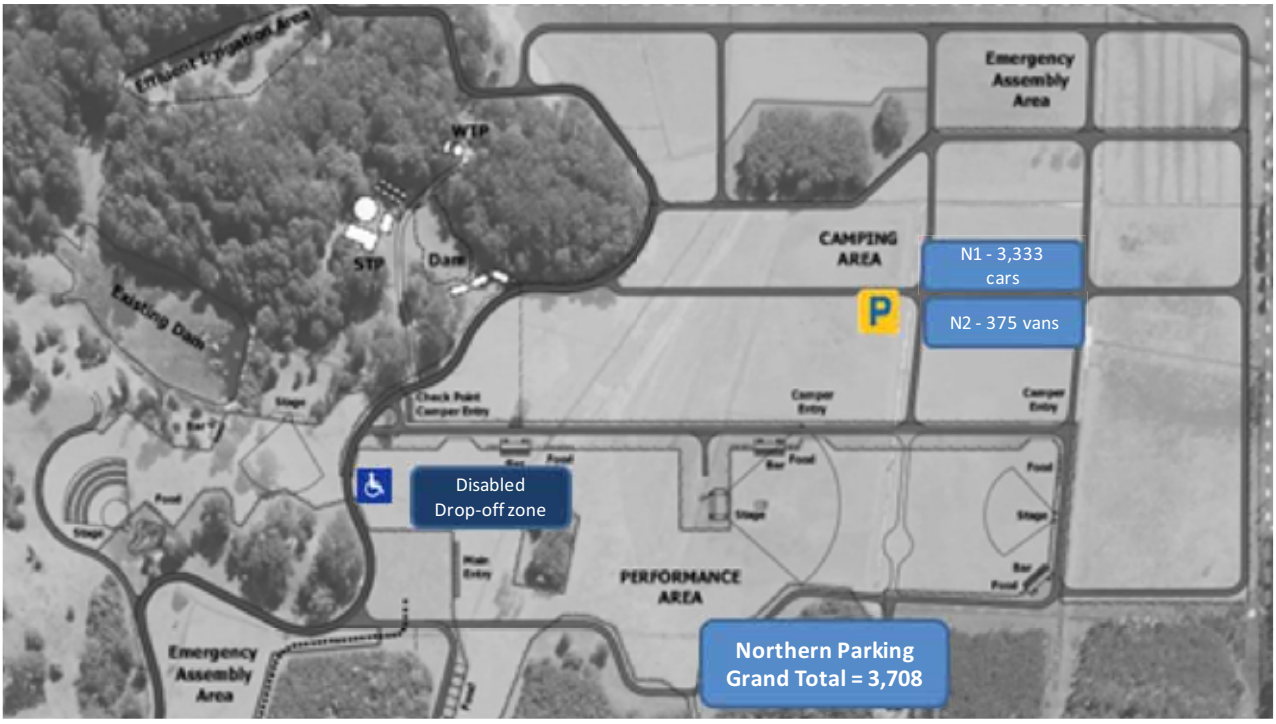



**Figure 4.3 Northern parking areas**

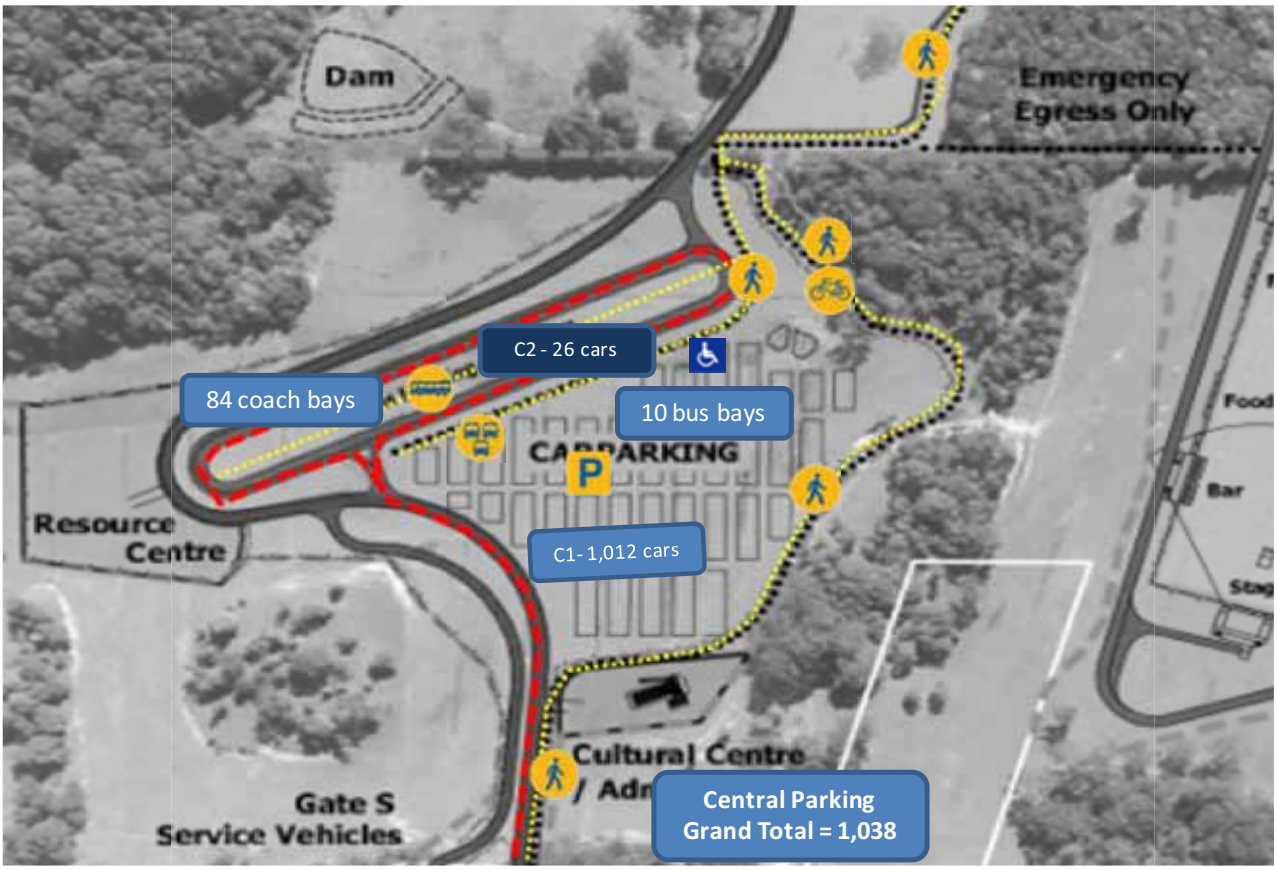



**Figure 4.4 Central parking areas**

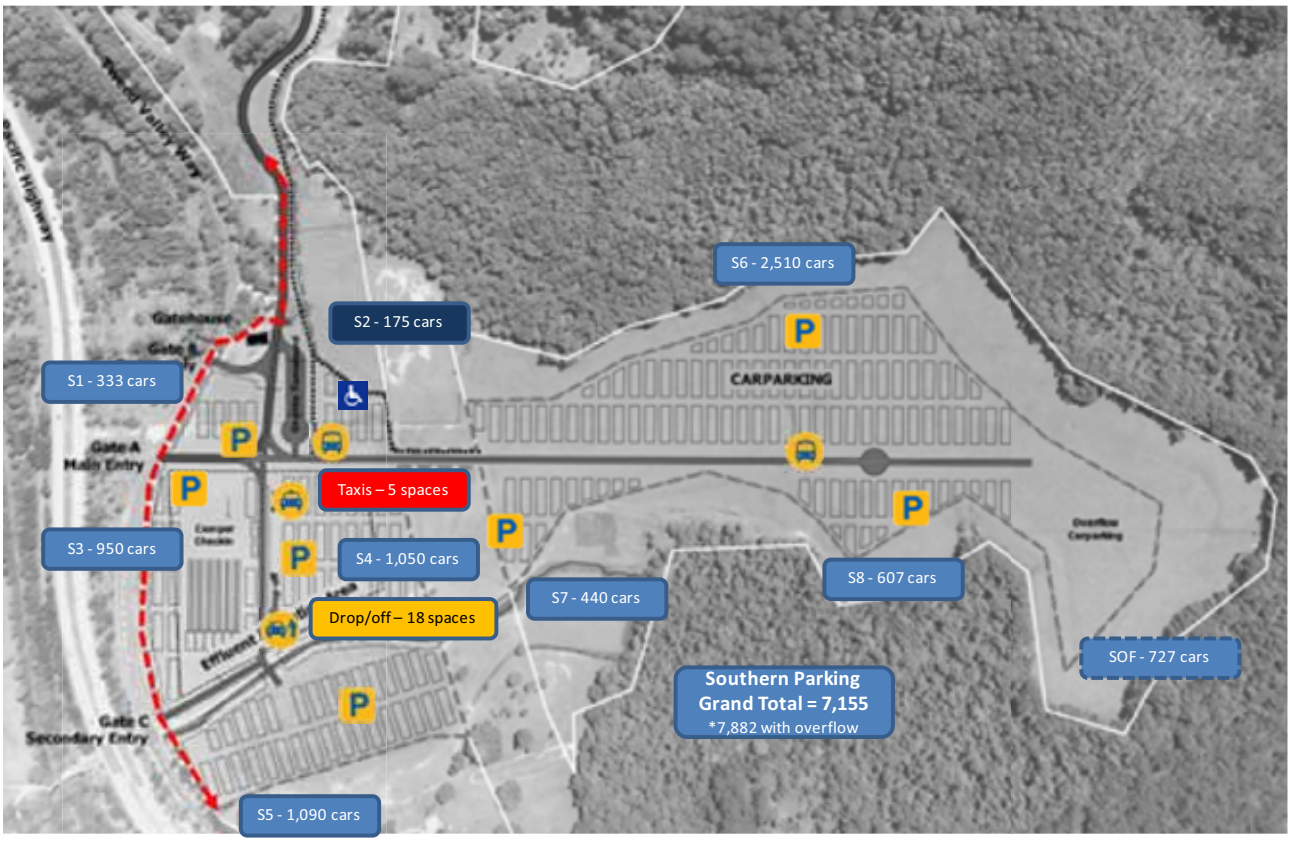



**Figure 4.5 Southern parking areas**

Parking areas would be configured to the particular needs of the event, i.e. only the amount of parking required for the event size would be made available. Parking restraint, through parking fees would be applied for larger events to encourage the use of public transport. On-site traffic marshals would direct patrons to the parking area.

For 70% and 100% capacity events, gates would open from 7:00 am the day before the first full day of event activities to allow campers to arrive and park in special camping parking grounds within walking distance of the camping areas. Campers arriving on the full-event days would be required to park in the day-patron parking area in the southern part of the site and walk or use the internal shuttle bus to get to the camping area. This would be done to encourage campers to arrive early, spreading the arrival of traffic and reducing the peak demand on the surrounding road system. On-site food venues and some entertainment would be organised as an added incentive for campers to arrive early. This has been a successful initiative at the previous Splendour in the Grass site with approximately 90% of campers arriving on the day before and departing the day after.

Disabled parking areas would be provided for each event in an area convenient to the shuttle bus stop or event entry with suitable gradients. Disabled parking would be provided at 3% of total parking based on Byron Shire Council's Development Control Plan 2002 – Part G2 – Vehicle Circulation and Parking.

Staff would be provided with a combined camping and parking area, and would be given access to shuttle buses.

Parking for buses and coaches would be provided on-site. During 70% and 100% capacity events, this may be done along one side of the Spine Road and the event laneway leading from Gate A (still allowing two-way travel). At smaller events, a dedicated bus and coach parking area would be provided.

### 4.5.2 On street parking

Event parking schemes are put in place around venues to protect on street parking for the use by local residents and businesses when demand for parking is greater than supply due to the staging of events. Event parking schemes are usually implemented through the distribution of parking permits and applying time restrictions on parking. Due to the rural nature of the site, residential permits would be used to gain access through traffic management points rather than facilitate on-street parking.

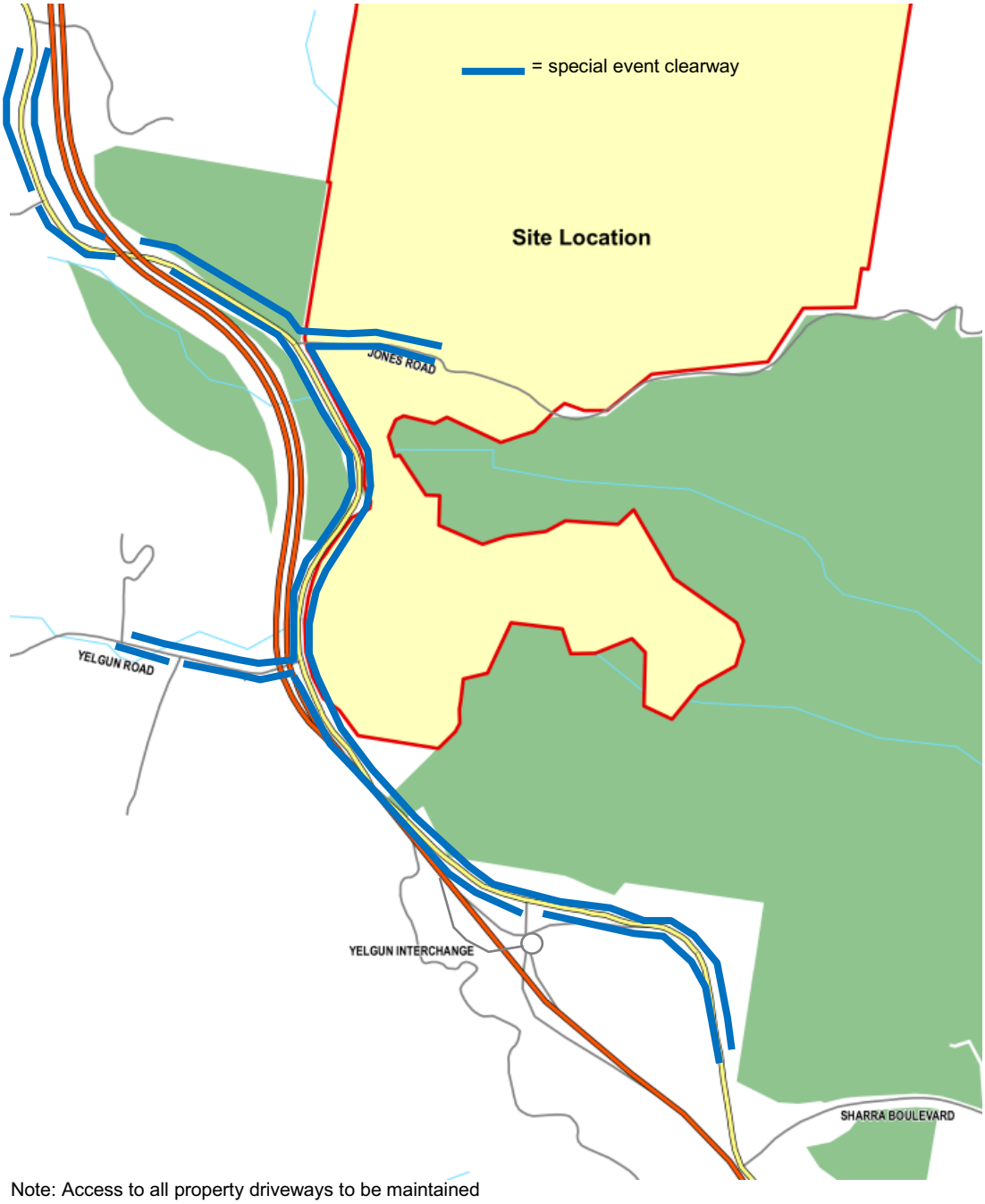
The specific objectives of an event parking scheme should be to:

- minimise impacts of uncontrolled parking on local residents and through traffic
- reduce congestion on approach roads to the Parklands
- support the operation and management of precinct parking areas
- disperse parking to an area beyond 2 km to reduce impacts
- encourage the use of public transport.

It is recommended that parking restrictions (special event clearway) be introduced from the first event and be actively enforced. Where parking in rural areas is dispersed due to significant walking distances, it is recommended that it be monitored to ensure that impacts on residents are minimised.

Management mechanisms for precinct parking can include variable pricing, pre-booked tickets only, directional signage and public information campaign. Preventing uncontrolled parking in the surrounding streets is consistent with and supports these measures. Additionally, minimising parking in surrounding streets enhances access for patrons who have parking within the venue.

The proposed on street parking restrictions to support the Draft Transport Management Plan are outlined in Figure 4.6.




Note: Access to all property driveways to be maintained

**Figure 4.6 On street parking restrictions**

### 4.5.3 Drop-off/Pick-up zone

To reduce the desire to park illegally outside the venue and prevent car park circulation issues, a drop-off zone has been established inside the site to actively manage this demand.

## 4.6 Taxis

The benefit of the proposed taxi rank location (see Figure 4.1) is as follows:

- easier to control on the edge of the Parklands
- provides easy direct road access from all directions
- provides taxi storage on the rank
- allows easy exit to the south.

Security presence and active management of vehicles and passengers would be required at the rank both before and after events.

## 4.7 Event shuttle buses

Specially organised buses would operate between the site and the main accommodation areas as an incentive to reduce the number of patron's cars attempting to access the site. These services would be organised for Moderate, 70% and 100% capacity events. Due to the smaller size of the event, dedicated shuttle buses may or may not be provided for Small and Minor events, depending on the nature and requirements of the specific event. If they are provided, they would be in the form of charter services to the main centres such as Byron Bay and Brunswick Heads.

A range of seven bus routes have been developed depending on the accommodation requirements of the event. The routes are listed in Table 4.4. More details are provided in Appendix C.

**Table 4.4 Event bus routes**

| Route | Length (km) | Trip time (minutes) |
|---|---|---|
| Route 1 – Byron Bay to site via Ewingsdale | 26.9 | 54 |
| Route 2 – Ballina to site via Ballina Airport and Bangalow | 56.2 | 114 |
| Route 3 – Ballina to site via Lennox Head, Suffolk Park and Bangalow | 66.3 | 159 |
| Route 4 – Mullumbimby - Yelgun via Billinudgel | 13.3 | 32 |
| Route 5 – Brunswick Heads to site via Ocean Shores, New Brighton and South Golden Beach | 16.3 | 38 |
| Route 6 – Kingscliff to site via Casuarina, Hastings Point and Wooyung | 32.8 | 79 |
| Route 7 – Varsity Lakes Station and Coolangatta to site via Chinderah, Duranbah and Cudgera Creek | 63.8 | 127 |

Note: Bus trip times based on an average speed of 25 km/h for routes substantially on local and regional roads (routes 3,4,5 and 6) and 30 km/h for routes with long sections on the Pacific Highway (routes 1,2 and 7).

These routes would connect the main accommodation areas and transport gateways to the site. The routes could be used as required, with the number of trips matched to requirements.

The site would include a bus and coach terminus to provide a high-quality facility to ensure smooth operation, as shown in Figure 4.7. The terminus would have the following features:

- one-way clockwise loop travel to reduce conflicts between vehicles and to improve pedestrian safety
- bus hub on the outside with 10 bus bays parallel to enable quicker operation for internal shuttle buses and day-patron buses
- charter coach area in the centre with 84 saw-tooth bays for coaches with longer dwell times
- pedestrians follow the yellow paths to get from the bus area to the event entry
- located closer to the event entry than car parking to give priority to public transport passengers.

The bus and coach terminus has been designed to accommodate the turning and manoeuvring requirements of buses and coaches.


**Figure 4.7 Bus and coach terminus**

## 4.8 Cycling

Cyclists would travel to the site in the general traffic lanes (with the reduced 40 km/h event speed limit), and would enter the site via Gate A. They would be directed to use the Spine Road to a secure bicycle parking area adjacent to the bus and coach terminus, and close to the event entry. The bicycle parking area would cater for 300 bicycles for a 100% capacity event.

## 4.9 Cultural Centre and Conference facility

The Concept Plan Application includes a cultural centre, conference centre and associated accommodation. These would potentially operate during non-event times. It is currently envisaged that these facilities would not be built initially, but could be operational by five years after opening.

Exact details of these facilities are not currently known. However, they could potentially have the following size and staff numbers:

- Cultural centre: 110 sq.m, two full-time equivalent and 12 part-time staff
- Conference centre: 510 sq.m, eight full-time equivalent and 10 part-time staff
- Accommodation: 1,000 sq.m, including 10 twin rooms and 18 motel style rooms

It is anticipated that the conference centre could cater for around 180 people and the cultural centre for around 50 people.

The potential accommodation would be associated with the conference centre and would be limited to a maximum of 60 guests.

It is envisaged that 300 on-site parking spaces would be provided for the conference centre and cultural centre combined

## 4.10 Non-event activity

The Administration centre would remain open for most of the year. During non-event times there would be a small number of permanent staff. Details of the permanent buildings are provided below.

- Administration centre: 175 sq.m
- Gatehouse: 100 sq.m.

During non-event times the site may also be used for farming, with the Spine Road used by farm vehicles.

# 5. Trip generation

A number of factors have been considered in estimating the likely traffic generation of the site. Calculations have assumed that all tickets would be sold, resulting in full attendance for each event. Where possible, assumptions have been based on information from previous Splendour in the Grass events, the results of the on-line survey or experience from similar events held elsewhere in the country or overseas. As mentioned previously, the gradual increase in event size offers the opportunity to collect data at the site with transport initiatives in place, in order to check the assumptions before the maximum event size is attempted.

## 5.1 Existing site use

The total site contains 256 ha of land, of which approximately 67% is pasture land used for grazing while the remaining 33% is identified within Council mapping as High Conservation Vegetation. The total application area is 155.91 Ha. For the purposes of this study, the existing traffic generation is assumed to be small and hence its impact negligible.

## 5.2 Base traffic growth

Using the traffic growth rate of 4.4% per annum adopted from historic traffic data for the Pacific Highway (as described in Section 2.6), future base traffic volumes have been forecast by factoring the seasonally adjusted 2010 intersection turn volumes. The forecast years adopted (and their relative factors are):

- 2011: 104.4% (anticipated first year of operation)
- 2015: 122.0% (full event capacity)
- 2030: 188.0% (future sustainability).

2015 was used as the main modelling scenario. 2030 was assessed to determine whether the traffic generation could be sustained or whether additional transport management initiatives would be required to maintain the overall traffic demand on the network at acceptable levels.

## 5.3 Arrival/departure profile

The arrival and departure profile of the events would be affected by a number of factors including:

- duration of the event
- gate opening period
- staggering of performance start & finish times
- incentives for arriving early

- different drive times from destination
- different departure times e.g. early morning, after work, etc.
- anticipated congestion and prior warning
- patrons getting up later after late night event finish the day before.

Based on the experience of previous Splendour in the Grass events, the event organisers have provided information about the arrival and departure of support vehicles, campers and day patrons. An hourly break-down is provided in Appendix B.

## 5.4 Mode share

Mode share information was gathered using the on-line patron survey. The results shown in Table 3.10 indicate a high mode split for non-car modes. While this would achieve a very positive outcome for reducing the car traffic generation by the site, to be conservative in case this anticipated mode share is not achieved, a lower non-car mode split has been assumed for the impact analysis.

Two mode share scenarios have been developed. Different rates are provided for campers and day patrons, as campers were considered more likely to arrive by car due to their additional equipment. Locals and non-locals were assumed to have different mode shares, as locals have greater opportunity to getting a lift to the site or cycling, while non-locals travelling to the area by plane are more likely to take up the offer of the shuttle buses.

- Low public transport mode share scenario (see Table 5.1) is designed to reflect the minimum public transport mode share reasonable, based on the results of the survey of behaviour at past Splendour in the Grass events.
- High public transport mode share scenario (see Table 5.2) shows the anticipated effect of the transport initiatives such as the frequent shuttle bus service, parking charges and other initiatives. As discussed in Section 7, it is considered that due to the type of patrons attracted to the type of events to be staged on the site, they would be more willing to adopt the initiatives than a typical music festival audience.

**Table 5.1 Low public transport mode share scenario**

| | Bus | Car | Lift/Taxi | Bicycle/others | Total |
|---|---|---|---|---|---|
| Campers | | | | | |
| Live locally (nearby area including Northern Rivers NSW) | 6.5% | 31.5% | 50.0% | 12.0% | 100.0% |
| Non-local | 6.5% | 93.5% | 0.0% | 0.0% | 100.0% |
| **Camper mode split** | **6.5%** | **88.4%** | **4.1%** | **1.0%** | **100.0%** |
| Day patrons | | | | | |
| Live locally (nearby area including Northern Rivers NSW) | 20.0% | 21.0% | 47.0% | 12.0% | 100.0% |
| Non-local | 41.85% | 58.0% | 0.15% | 0.0% | 100.0% |
| **Day patron mode split** | **40.1%** | **55.0%** | **4.0%** | **1.0%** | **100.0%** |
| **Overall mode split** | **23.3%** | **71.7%** | **4.0%** | **1.0%** | **100.0%** |

**Table 5.2 High public transport mode share scenario**

| | Bus | Car | Lift/Taxi | Bicycle/others | Total |
|---|---|---|---|---|---|
| Campers | | | | | |
| Live locally (nearby area including Northern Rivers NSW) | 19.0% | 20.0% | 49.0% | 12.0% | 100.0% |
| Non-local | 22.0% | 78.0% | 0.0% | 0.0% | 100.0% |
| **Camper mode split** | **21.8%** | **73.3%** | **4.0%** | **1.0%** | **100.0%** |
| Day patrons | | | | | |
| Live locally (nearby area including Northern Rivers NSW) | 30.0% | 11.0% | 47.0% | 12.0% | 100.0% |
| Non-local | 58.55% | 41.30% | 0.15% | 0.0% | 100.0% |
| **Day patron mode split** | **56.2%** | **38.8%** | **4.0%** | **1.0%** | **100.0%** |
| **Overall mode split** | **39.0%** | **56.0%** | **4.0%** | **1.0%** | **100.0%** |

Analysis will be presented for both the low and high public transport mode share scenarios to provide an indication of the range of results. However, it is considered that the high public transport scenario is the most likely.

## 5.5 Car occupancy

Car occupancy can have a large impact on the total number of vehicles generated by the site. Music festivals typically attract higher car occupancy than regular travel for the following reasons:

- patrons enjoy a shared experience of travelling
- music festivals are attended by groups of friends, with the ability to pre-arrange car-pooling
- travelling in groups allows passengers to have alcohol, with a designated driver doing the driving
- having a younger demographic (with a high proportion of students) and potentially lower income, groups can share the costs of travel
- being located away from major cities, travel distances are higher
- anticipation of pre and post event congestion encourages car-pooling.

As sited in the report by Ardill Payne & Partners June 2007, *Splendour in the Grass Traffic Impact Study* 'observations from previous 'Splendour in the Grass' and 'Blues Festival' events at Byron Bay indicate that bus patronage ranges from 33%–40% and 2–4 people arrive per car. At the 'Woodford Folk Festival', there is no organised bus service, and 87.1% of patrons arrive by private car, with 2.7 people per car'.

PB's experience at music and sporting events at stadiums indicates car occupancy of 2.9 is readily achievable. As mentioned in Section 3.1.1, a survey of Splendour in the Grass patrons indicated average car occupancy of 3.2 persons per car.

Three car occupancies (including driver) have been analysed for the event scenarios assessed, to give an indication of the range of potential results.

- conservative 2.5 persons per car
- PB previous experience 2.9 persons per car
- patron survey 3.2 persons per car.

The 2.9 persons per car occupancy rate is recommended as the most likely, due to the following reasons:

- site is further away from the major towns than previous events, increasing the tendency to car-pool rather than walk
- the demographic of patron attending the festivals are younger with more students, meaning more groups of friends and more students sharing the cost of travel
- designated driver allowing alcohol consumption by passengers.

For patrons getting a lift or catching a taxi, average car occupancies of the above three rates minus one (for the driver not attending the event) were used. Higher car occupancy rates are possible, but may require additional initiatives to be achieved.

## 5.6 Accommodation and distribution

The supply of accommodation is a contributing factor to the distribution of trips generated by day patrons. With large numbers of patrons arriving from large distances, there would be a large demand for accommodation in surrounding towns, especially along the coast. Some patrons would be able to stay with friends and family living nearby.

Information on the location of accommodation was provided by North Byron Parklands and is shown in Table 5.3.

**Table 5.3 Location of off-site accommodation**

| Accommodation | Beds | Proportion | Comments |
|---|---|---|---|
| Brunswick Heads | 1,000 | 4% | 10 minutes from site - comprises caravan/camping grounds, two motels and holiday accommodation |
| Ocean Shores/ New Brighton/ South Golden Beach | 200 | 1% | 10 minutes from site - comprises holiday accommodation |
| Byron Bay/Suffolk Park | 8,000 | 34% | 15/20 minutes from site |
| Tweed Coast/Hinterland | 9,000 | 17% | 15/20 minutes from site - varied and large source of beds |
| Coolangatta/Gold Coast | 10,000 | 43% | 25 minutes from site - varied and large source of beds |
| **Total** | **28,200** | | |

Day patron trips to/from the site have been allocated on the basis of the information above.

Trips by day patrons who are local residents are assumed to occur based on the proportions coming from the postcodes shown in Table 3.13.

Arrival of patrons to their accommodation on the site or at the locations shown in Table 5.3 was assumed based on the proportions shown in Table 3.12. These results were not used in the calculation of the traffic impacts of day patrons, but were used for the distribution of trips of campers arriving directly at the on-site camping area. They origins were amalgamated to five categories, as shown in Table 5.4.

**Table 5.4 Origin of patron trips**

| Origin | Percentage |
|---|---|
| Live locally or nearby area | 8% |
| Brisbane, Gold Coast & other Queensland | 47% |
| Sydney and other NSW, ACT | 33% |
| Melbourne & other Victoria | 8% |
| Adelaide, Perth, Overseas | 4% |

## 5.7 Path options

The path of arrival to the site was split based on the origin of the trip and the following assumptions.

- Trips from Queensland and Tweed Coast arrive via the Pacific Highway Yelgun to Chinderah Freeway, using the southbound off-ramp at the Yelgun Interchange and travelling to the site via Tweed Valley Way.
- Trips from Byron Bay, Sydney, the rest of NSW, the Australian Capital Territory and Victoria arrive via the Pacific Highway Brunswick to Yelgun, using the northbound off-ramp at the Yelgun Interchange and travelling to the site via Tweed Valley Way.
- Trips from Brunswick Heads, Ocean Shores, New Brighton and South Golden Beach arrive via Brunswick Valley Way and Tweed Valley Way.
- Departure trips occur in the reverse direction.

## 5.8 Support vehicles

Information on the generation of support vehicles, including set-up and pack-up vehicles, service vehicles and vehicles associated with management, staff and performers was provided by the Splendour in the Grass event organiser for an anticipated trial event of 22,500 patrons. Vehicle numbers were scaled based on the ratio of the number of patrons, i.e. 70% capacity and 100% capacity events had increased numbers of support vehicles than the previous event. The numbers of support vehicles by type by day are shown in Table 5.5.

**Table 5.5 Support vehicle numbers**

| | Wed | Thu | Fri | Sat | Sun | Mon |
|---|---|---|---|---|---|---|
| **100% capacity event** | | | | | | |
| Set-up vehicles | 284 | 0 | 0 | 0 | 7 | 462 |
| Service vehicles | 84 | 289 | 367 | 367 | 378 | 120 |
| Management | 491 | 413 | 551 | 551 | 371 | 1,147 |
| Performers | 0 | 33 | 507 | 507 | 540 | 258 |
| **70% capacity event** | | | | | | |
| Set-up vehicles | 199 | 0 | 0 | 0 | 5 | 324 |
| Service vehicles | 59 | 202 | 257 | 257 | 264 | 84 |
| Management | 344 | 289 | 386 | 386 | 260 | 803 |
| Performers | 0 | 23 | 355 | 355 | 378 | 180 |
| **Moderate event** | | | | | | |
| Set-up vehicles | 0 | 57 | 0 | 0 | 1 | 92 |
| Service vehicles | 0 | 17 | 58 | 73 | 76 | 24 |
| Management | 0 | 98 | 83 | 110 | 74 | 229 |
| Performers | 0 | 0 | 7 | 101 | 108 | 52 |

Based on information from North Byron Parklands, assumptions were made on the proportion of support vehicles that stayed on the site during the event. The assumptions were:

- set-up vehicles 50%
- service vehicles 20%
- management 30%
- performers 0%.

## 5.9 Buses and coaches

The numbers of patrons forecast to arrive by bus or coach were converted into a number of bus trips assuming an average of 50 passengers per bus, which is less that the seated plus standing capacity of a standard bus. In addition, it was assumed that 50% of the buses/coaches would remain on the site during the event performances, and would therefore be ready to depart as soon as there was demand for bump-out services.

## 5.10 Vehicle type

Vehicle generation was split into light and heavy vehicles based on the assumptions shown in Table 5.6.

**Table 5.6 Vehicle type assumptions**

| Type | Light | Heavy |
|---|---|---|
| Set-up | 0% | 100% |
| Service vehicles | 10% | 90% |
| Management/Staff | 90% | 10% |
| Performers | 100% | 0% |
| Shuttle buses | 0% | 100% |
| Campers | 90% | 10% |
| Day patrons | 100% | 0% |

Note: campervans were included as heavy vehicles.

## 5.11 Campers

As described in the arrival and departure profiles in Appendix B, for a two-day weekend event, 90% of campers are assumed to arrive on the Friday before the event, with the remaining 10% arriving on the morning of the event. For the four-day events, campers would start to arrive on Wednesday, with the majority arriving on Thursday, and small numbers arriving on Friday and Saturday.

The number of trips estimated for each of the three assessment scenarios are shown in Table 5.7.

**Table 5.7 Camper trip numbers**

| Origin | Bus/ Coach | Car/ Campervan | Lift/Taxi | Bicycle/ other | Total |
|---|---|---|---|---|---|
| **100% capacity event** | | | | | |
| Live locally, nearby area including Northern Rivers NSW | 133 | 643 | 1,020 | 245 | **2,041** |
| Brisbane, Gold Coast & other Queensland | 763 | 10,972 | 0 | 0 | **11,735** |
| Sydney and other NSW, ACT | 531 | 7,633 | 0 | 0 | **8,163** |
| Melbourne & other Victoria | 133 | 1,908 | 0 | 0 | **2,041** |
| Adelaide, Perth, Overseas | 66 | 954 | 0 | 0 | **1,020** |
| **Total** | **1,625** | **22,110** | **1,020** | **245** | **25,000** |
| **70% capacity event** | | | | | |
| Live locally, nearby area including Northern Rivers NSW | 93 | 450 | 714 | 171 | **1,429** |
| Brisbane, Gold Coast & other Queensland | 534 | 7,680 | 0 | 0 | **8,214** |
| Sydney and other NSW, ACT | 371 | 5,343 | 0 | 0 | **5,714** |
| Melbourne & other Victoria | 93 | 1,336 | 0 | 0 | **1,429** |
| Adelaide, Perth, Overseas | 46 | 668 | 0 | 0 | **714** |
| **Total** | **1,138** | **15,477** | **714** | **171** | **17,500** |
| **Moderate event** | | | | | |
| Live locally, nearby area including Northern Rivers NSW | 53 | 257 | 408 | 98 | **816** |
| Brisbane, Gold Coast & other Queensland | 305 | 4,389 | 0 | 0 | **4,694** |
| Sydney and other NSW, ACT | 212 | 3,053 | 0 | 0 | **3,265** |
| Melbourne & other Victoria | 53 | 763 | 0 | 0 | **816** |
| Adelaide, Perth, Overseas | 27 | 382 | 0 | 0 | **408** |
| **Total** | **650** | **8,844** | **408** | **98** | **10,000** |

## 5.12 Day patrons

Information from the event organisers on the arrival and departure of day patrons (see Appendix B) indicates that for the four–day events, a small number of day patrons would travel to the site for the Thursday evening food and performances. For each of the three full event days, day patrons are expected to usually arrive between 10:00 am and 6:00 pm and depart again between 8:00 pm and 3:00 am.

The number of trips estimated for both the 70% and 100% capacity event scenarios are shown in Table 5.8.

**Table 5.8 Day patron trip numbers – single day**

| Origin | Bus/ Coach | Car/ Campervan | Lift/Taxi | Bicycle/ other | Total |
|---|---|---|---|---|---|
| **100% capacity event** | | | | | |
| Live locally, nearby area including Northern Rivers NSW | 408 | 429 | 959 | 245 | **2,041** |
| Brisbane, Gold Coast & other Queensland | 370 | 513 | 1 | 0 | **885** |
| Brunswick Heads, Ocean Shores/New Brighton/South Golden Beach | 478 | 662 | 2 | 0 | **1,142** |
| Byron Bay/Suffolk Park | 3,186 | 4,415 | 11 | 0 | **7,612** |
| Tweed Coast, Coolangatta | 5,575 | 7,726 | 20 | 0 | **13,321** |
| **Total** | **10,017** | **13,745** | **994** | **245** | **25,000** |
| **70% capacity event** | | | | | |
| Live locally, nearby area including Northern Rivers NSW | 286 | 300 | 671 | 171 | **1,429** |
| Brisbane, Gold Coast & other Queensland | 259 | 359 | 1 | 0 | **619** |
| Brunswick Heads, Ocean Shores/New Brighton/South Golden Beach | 334 | 464 | 1 | 0 | **799** |
| Byron Bay/Suffolk Park | 2,230 | 3,090 | 8 | 0 | **5,328** |
| Tweed Coast, Coolangatta | 3,902 | 5,408 | 14 | 0 | **9,324** |
| **Total** | **7,012** | **9,621** | **696** | **171** | **17,500** |

The peak bump-out of day patrons would occur at around midnight, when performances finish. This scenario has been assessed due to the small traffic volumes on the road network.

## 5.13 Estimated turn volumes

Using the assumptions documented in this section and combining the camper and day patrons trips with the support vehicle numbers, the peak hourly traffic volumes have been assigned to the road network and added to the forecast 2011 and 2015 base traffic.

Traffic volumes are reported for the movements shown in Figure 5.1.


**Figure 5.1 Reported traffic movements**

Blue arrows represent flows into and towards the site, while red arrows represent movements away from the site. The movements have been labelled with letter, which correspond to the reported turn volumes in Tables 5.9, 5.10 and 5.11.

The traffic volumes presented relate to the scenario with a low public transport, average car occupancy of 2.5 people per car and 100% of patrons. Tables 5.9, 5.10 and 5.11 present the forecast volumes for the Moderate, 70% capacity and 100% capacity events respectively. Volumes are separated into light vehicles (car) and heavy vehicles (buses and trucks).

**Table 5.9 Moderate event forecast traffic volumes**

| Turn movement (vehicles per hour) | Friday arrival peak 4:00 pm – 5:00 pm | | Monday departure peak 10:00 am – 11:00 am | |
|---|---|---|---|---|
| | Light | Heavy | Light | Heavy |
| **Inbound** | | | | |
| A - Pacific Highway southbound off-ramp | 159 | 20 | 9 | 4 |
| B - Pacific Highway northbound off-ramp | 188 | 20 | 63 | 4 |
| C - Yelgun Interchange Link Road left-turn | 347 | 40 | 72 | 7 |
| D - Brunswick Valley Way northbound through | 0 | 0 | 0 | 0 |
| F - Gate A right-turn into site | 346 | 37 | 54 | 0 |
| H - Tweed Valley Way right-turn into Jones Road | 1 | 4 | 17 | 7 |
| **Outbound** | | | | |
| I - Jones Road left-turn into Tweed Valley Way | 0 | 3 | 0 | 19 |
| K - Gate A left-turn out of site | 27 | 0 | 691 | 73 |
| M - Tweed Valley Way southbound through | 0 | 0 | 0 | 0 |
| N - Tweed Valley Way right-turn into Yelgun Interchange Link Road | 27 | 3 | 691 | 93 |
| O - Pacific Highway southbound on-ramp | 27 | 1 | 375 | 47 |
| P - Pacific Highway northbound on-ramp | 0 | 1 | 316 | 46 |

**Table 5.10 70% capacity event forecast traffic volumes**

| Turn movement (vehicles per hour) | Friday arrival peak 1:00 pm – 2:00 pm | | Saturday arrival peak 9:00 am – 10:00 am | | Monday departure peak 10:00 am – 11:00 am | |
|---|---|---|---|---|---|---|
| | Light | Heavy | Light | Heavy | Light | Heavy |
| **Inbound** | | | | | | |
| A - Pacific Highway southbound off-ramp | 388 | 61 | 456 | 68 | 30 | 12 |
| B - Pacific Highway northbound off-ramp | 316 | 39 | 373 | 43 | 125 | 12 |
| C - Yelgun Interchange Link Road left-turn | 703 | 100 | 829 | 111 | 155 | 25 |
| D - Brunswick Valley Way northbound through | 29 | 4 | 34 | 5 | 0 | 0 |
| E - Gate C right-turn into site | 344 | 0 | 393 | 0 | 0 | 0 |
| F - Gate A right-turn into site | 344 | 0 | 393 | 0 | 95 | 0 |
| G - Gate B right-turn into site | 0 | 92 | 0 | 105 | 0 | 0 |
| H - Tweed Valley Way right-turn into Jones Road | 45 | 13 | 77 | 11 | 60 | 25 |
| **Outbound** | | | | | | |
| I - Jones Road left-turn into Tweed Valley Way | 1 | 9 | 2 | 14 | 0 | 69 |
| J - Gate B left-turn out of site | 0 | 12 | 0 | 14 | 0 | 5 |
| K - Gate A left-turn out of site | 0 | 0 | 0 | 0 | 1,210 | 128 |
| L - Gate C left-turn out of site | 81 | 0 | 93 | 0 | 0 | 0 |
| M - Tweed Valley Way southbound through | 0 | 1 | 0 | 1 | 0 | 0 |
| N - Tweed Valley Way right-turn into Yelgun Interchange Link Road | 82 | 21 | 94 | 28 | 1,210 | 197 |
| O - Pacific Highway southbound on-ramp | 80 | 9 | 91 | 12 | 657 | 99 |
| P - Pacific Highway northbound on-ramp | 2 | 12 | 3 | 15 | 553 | 98 |

**Table 5.11 100% capacity event forecast traffic volumes**

| Turn movement (vehicles per hour) | Friday arrival peak 1:00 pm – 2:00 pm | | Saturday arrival peak 9:00 am – 10:00 am | | Monday departure peak 10:00 am – 11:00 am | |
|---|---|---|---|---|---|---|
| | Light | Heavy | Light | Heavy | Light | Heavy |
| **Inbound** | | | | | | |
| A - Pacific Highway southbound off-ramp | 554 | 87 | 651 | 98 | 43 | 18 |
| B - Pacific Highway northbound off-ramp | 451 | 55 | 533 | 61 | 179 | 18 |
| C - Yelgun Interchange Link Road left-turn | 1,005 | 143 | 1,184 | 159 | 222 | 35 |
| D - Brunswick Valley Way northbound through | 42 | 6 | 48 | 7 | 0 | 0 |
| E - Gate C right-turn into site | 491 | 0 | 561 | 0 | 0 | 0 |
| F - Gate A right-turn into site | 491 | 0 | 561 | 0 | 136 | 0 |
| G - Gate B right-turn into site | 0 | 131 | 0 | 150 | 0 | 0 |
| H - Tweed Valley Way right-turn into Jones Road | 65 | 18 | 110 | 16 | 86 | 35 |
| **Outbound** | | | | | | |
| I - Jones Road left-turn into Tweed Valley Way | 1 | 13 | 2 | 20 | 1 | 98 |
| J - Gate B left-turn out of site | 0 | 18 | 0 | 20 | 0 | 7 |
| K - Gate A left-turn out of site | 0 | 0 | 0 | 0 | 0 | 0 |
| L - Gate C left-turn out of site | 116 | 0 | 132 | 0 | 1,728 | 183 |
| M - Tweed Valley Way southbound through | 0 | 1 | 0 | 1 | 0 | 0 |
| N - Tweed Valley Way right-turn into Yelgun Interchange Link Road | 117 | 30 | 135 | 39 | 1,729 | 281 |
| O - Pacific Highway southbound on-ramp | 114 | 13 | 131 | 17 | 938 | 141 |
| P - Pacific Highway northbound on-ramp | 3 | 17 | 4 | 22 | 790 | 140 |

It is noted that the forecast departure volume for the 100% capacity event is approaching the theoretical capacity of a left-turn lane. The practical capacity of the site exits will be discussed in Section 6 and addressed through the sensitivity tests described in Section 5.14.

## 5.14 Sensitivity analysis

The various combinations of different car occupancy rates and mode share scenarios have been assessed to determine their impact on traffic generation. Using the low public transport mode share and 2.5 people per vehicle car occupancy as a base, the traffic generated by the other combinations has been compared to determine their impact. The results are shown in Table 5.12.

**Table 5.12 Impact on traffic generation**

| Car occupancy | Low public transport mode share | High public transport mode share |
|---|---|---|
| **70% and 100% capacity events** | | |
| Conservative - 2.5 | 100% | 78% |
| PB Experience - 2.9 | 87% | 68% |
| Survey - 3.2 | 80% | 63% |
| **Moderate events** | | |
| Conservative - 2.5 | 100% | 85% |
| PB Experience - 2.9 | 86% | 74% |
| Survey - 3.2 | 78% | 67% |

Due to the numerous permutations of car occupancies, mode shares, as well as changes in event sizes, the following set of sensitivity tests have been assessed, where required. The results of a particular scenario can be interpolated between these tests. Where the full traffic generated by the site exceeds capacity, the results of the sensitivity tests will be used to estimate the range of measures that would need to be employed to achieve an acceptable solution.

- base plus 100% event traffic
- base plus 90% event traffic
- base plus 80% event traffic
- base plus 70% event traffic
- base plus 60% event traffic.

To simulate the impacts of 2030 base traffic, the following scenario has been assessed:

- 200% base plus event traffic.

To simulate the impacts of the yearly peak traffic occurring at Easter, the following scenario has been assessed:

- 150% base plus event traffic.

To simulate the impacts of the yearly peak traffic occurring other busy times of the year such as the Christmas holidays, end of university break and the October long weekend (NSW), the following scenario has been assessed:

- 130% base plus event traffic.

# 6. Traffic impacts

The traffic impacts of the site have been considered in terms of its impact on road network capacity and road safety. Several locations on the network have been assessed including the Tweed Valley Way, Yelgun Interchange and Pacific Highway. Other aspects assessed include the impact on other road users (including residents) and the impact on public transport.

## 6.1 Road network capacity

The road network capacity has been checked at key locations, including:

- Tweed Valley Way, between the site and the Yelgun Interchange
- Yelgun Interchange and intersection with Tweed Valley Way
- Pacific Highway, Yelgun Interchange on-ramps
- Pacific Highway, between Yelgun Interchange and Brunswick North Interchange.

### 6.1.1 Tweed Valley Way

Tweed Valley Way is a one-lane each way road, and therefore, the capacity of the lane is the limiting factor for traffic and leaving the site.

An assessment of the capacity of the road was completed using the method specified by the Transport Research Board, 2000, *Highway Capacity Manual 2000*, *Chapter 20: Two-Lane Highways*. This method is also specified by Austroads 2009, *Guide to Traffic Management Part 3: Traffic Studies and Analysis*. The Austroads description of the Level of Service for roads is provided below.

Level of Service is a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.

In general, there are six levels of service, designated A to F, with Level of Service A representing the best operating condition (i.e. free flow) and Level of Service F the worst (i.e. forced or breakdown flow).

| | |
|---|---|
| Level of Service A | A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent. |
| Level of Service B | In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with Level of Service A. |

| | |
|---|---|
| Level of Service C | Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level. |
| Level of Service D | Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems. |
| Level of Service E | Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown. |
| Level of Service F | In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result. |

For events which are temporary in nature, there is a certain expectation of people attending the event that, for the benefit of attending the event, they are willing to put up with a certain restriction in freedom of movement. This is the same for sporting, entertainment and cultural events. Other road-users not associated with the event may not be willing to put up with the same restriction of freedom of movement. However, if they are informed of the reason for the delay and given guidance on alternative routes to avoid the congestion, they would, in general, be more understanding.

The results indicate the following:

- Tweed Valley Way is forecast to operate at a Level of Service (LoS) C in 2015 and 2030 with no event traffic.
- With additional traffic from a Moderate event, the Level of Service would still remain at LoS C for 2015 and increase to LoS D for 2030.
- For a 70% capacity event (2.5 car occupancy and low public transport mode share, the Level of Service would reduce to a LoS D in 2015 and LoS E for 2030.
- Reducing the peak traffic generation to 80% of the above scenario would improve the Level of Service to LoS D in 2030. This could be achieved by improving the car occupancy to 3.2 or by achieving the high public transport mode share.
- For a 100%capacity event, the capacity of Tweed Valley Way would be exceeded for the 2.5 car occupancy and low public transport mode share scenario.
- Reducing the peak traffic generation to 70% of the above scenario would improve the Level of Service to LoS D in 2015. This could be achieved by improving the car occupancy to 2.9 and achieving the high public transport mode share. In 2030, reducing peak traffic generation by 56% would improve the Level of Service to LoS D.

- Given that the highest event traffic will only be experienced on a small number of days per year and for a few hours per day, it is proposed that Tweed Valley Way could sustain Levels of Service slightly higher than LoS D for short periods of time, say up to three hours duration.

### 6.1.2 Pacific Highway on-ramps

During bump-out of day patrons and campers, the event-generated traffic would need to merge into the traffic on the Pacific Highway. The bump-out of the day-patrons at the end of each day's performance would occur before and after midnight, when volumes on the Pacific Highway are at their lowest. The bump-out of the campers would occur during the morning of the day after the event, when volumes on the Pacific Highway are much higher.

An assessment of the absorption capacity of the Pacific Highway at the Yelgun Interchange ramps was completed using the method specified by the Transport Research Board 2000, *Highway Capacity Manual 2000*, *and Chapter 25: Ramps and Ramp Junctions*. The 2015 results indicate that all merge areas would operate with a LoS B, apart from the southbound on-ramp merge for the 100% capacity event scenario, which would operate with a LoS C. In 2030, it is forecast that all merge areas would operate with a LoS C, apart from the northbound on-ramp merge for the Moderate event scenario, which would remain at LoS B. Hence, the capacity of the merge areas at the end of the Yelgun Interchange on-ramps is not considered to be a constraint.

### 6.1.3 Pacific Highway

The Pacific Highway would be the main route for patrons to the site. The peak traffic impacts are anticipated during the arrival of day-patrons for the 100% capacity event scenario when volumes on the Pacific Highway would also be high.

The capacity of the Pacific Highway was completed using the method specified by the (Transport Research Board 2000, *Highway Capacity Manual 2000*, *and Chapter 23: Basic Freeway Segments*. The results indicate that the Pacific Highway would operate at LoS B/C for all event scenarios (2.5 car occupancy, low public transport mode share) in 2015 and LoS C for all event scenarios in 2030.

## 6.2 Interchange operation

The operation of the Yelgun Interchange is likely to be the critical point in the road network for traffic access to the site. Given that the Pacific Highway is forecast to have sufficient capacity to accommodate the event traffic, the Yelgun Interchange will determine how many event vehicles can get onto Tweed Valley Way.

The forecast traffic volumes for the event scenarios and sensitivity tests were assessed using the SIDRA Intersection modelling software. The results were evaluated against the performance criteria set out in Section 2.6.7 and Table 2.6.

In addition, particular attention was paid to the queuing and its impact on the safe operation of the Pacific Highway and its ramps. The two issues of safety and operation are closely linked. The impact on operation of the two intersections is reported in this section. The issue of queuing and its impact on safety is discussed in Section 6.4.4.

A summary of the results is provided in Appendix D, divided up into results for the Friday arrival peak, Sunday arrival peak and Monday departure peak.

The most significant issues identified by the intersection analysis include:

- Friday peak traffic conditions show adequate capacity, apart from the 100% capacity event scenario, where the queue of vehicles turning left onto Tweed Valley Road blocks the Yelgun Roundabout. This queue would be fast-moving, as average delays for this movement are only 35 seconds.
- During the Sunday arrival peak, the interchange would not have sufficient capacity to accommodate the 100% capacity event traffic in 2015 for all but the 60% traffic scenario. This would still involve traffic banking back through the Yelgun Interchange Roundabout. Once again, the queue would be relatively fast-moving, with overall delays of around 30 seconds.
- For the 70% capacity event scenario, forecasts for 2015 indicate that the queue of left-turning vehicles would just extend beyond the 75 m gap between intersections for the 80% traffic scenario and would not reach the roundabout for the 70% traffic scenario. Delays would be around 25 seconds.
- The results for the 2030 scenarios indicate that the 2030 with 60% event traffic for the 70% capacity event scenario would not have the queue of left-turning vehicles reach the roundabout.

The above percentage reductions can be achieved by increasing the average car occupancy or improving to a high public transport mode share, as discussed in Section 5.14.

## 6.3 Other road users

During events, the road network would be in demand from both event and non-event related traffic. The events would use traffic management measures to limit the impact on local residents and other road users, as shown in Table 6.1.

**Table 6.1 Strategies to minimise delays for other road users**

| Strategies |
|---|
| Notification |
| ▪ Long-term notification of other road users of the event and likely traffic impacts through newspaper advertisements, and notices on Byron Shire Council and RTA websites. |
| ▪ Real-time notification of drivers. Variable Message Signs would be placed on the Pacific Highway north and south of the Yelgun Interchange, and on Tweed Valley Way and Brunswick Valley Way. The messages would warn drivers of potential traffic delays at Yelgun due to the event. |
| Deterrence |
| ▪ The newspaper advertisements would recommend that traffic intending to use the Yelgun interchange and Tweed Valley Way in the vicinity of the site should consider delaying their journey or using an alternative route to avoid the area. This would serve to reduce the non-event traffic and reduce potential delays. |
| ▪ Recommendations would be made for Ocean Shores, New Brighton, South Golden Beach and Billinudgel traffic to use the Brunswick North Interchange if possible to minimise their delay. |

| Strategies |
| --- |
| Special arrangements |
| ▪ Arrangements would be made, where possible, for non-event traffic to bypass the queues of event traffic. |
| ▪ Locations include:<br>‣ Tweed Valley Way northbound at Gate C (Yelgun Road)<br>‣ Tweed Valley Way, northbound at Gate A<br>‣ Tweed Valley Way, northbound at Gate B<br>‣ Tweed Valley Way southbound at the T-junction with the Yelgun Interchange. |
| ▪ Traffic management plans include the creation of extended–length right-turn lanes, using temporary delineation, by utilising the road shoulder as part of a through-lane if required. These treatments may reduce the lane widths to a minimum of 3.0 m on Tweed Valley Way. |
| ▪ At the Yelgun Interchange, the following arrangements would be made to separate non-event traffic. This would also have the benefit of reducing the length of any queue on these ramps.<br>‣ southbound off-ramp – Ocean Shores, Billinudgel, New Brighton and South Golden Beach traffic would be encouraged to use the through/right-turn lane, which would become a second left-turn lane for traffic going to these directions<br>‣ a similar arrangement would be used for the northbound off-ramp. |
| Local access |
| ▪ To avoid unauthorised parking in local streets, security checkpoints would be established at the entrances to Jones Road and Yelgun Road off Tweed Valley Way. Residents and their guests would be issued passes to allow them to pass through the checkpoint. |
| ▪ Property entrances would not be obstructed. Parking patrols would be regularly undertaken to remove/infringe illegally parked vehicles. |

### 6.3.1 Residents

Residents of Jones Road and Yelgun Road would need to pass through the area affected by the event traffic. At the Yelgun Interchange they would be included in the queue of event traffic, experiencing delays of around 30 seconds, based on SIDRA modelling. They would be protected from additional delay from any queues at the site entrance gates by the permanent and temporary right-turn bays enabling through traffic to bypass the queue.

It is proposed that during the larger events, Jones Road and Yelgun Road would be closed to all but authorised and resident traffic. The residents would be given resident passes to enable them to pass through the traffic control points.

### 6.3.2 Tweed Valley Way road users

The special event speed limit would increase travel times along Tweed Valley Way, but is necessary to slow traffic during a period of non-standard traffic conditions, and to improve the safety of traffic controllers, cyclists and event patrons.

Non-event through traffic would be provided with a bypass lane at the locations listed in Table 6.1 to avoid the queue of traffic arriving at or leaving the site.

The sections of Tweed Valley Way shown on Figure 4.6 would be temporarily signposted as special event clearways to maintain traffic flow.

### 6.3.3 Pacific Highway road users

Pacific Highway road users would experience higher traffic volumes during the arrival and departure times of the events. However, the Highway is forecast to have sufficient capacity to accommodate the increased flow.

Highway road users would be warned in advance of potential delays around the Yelgun Interchange.

### 6.3.4 Local town roads

The patrons may increase traffic within local towns such as Brunswick Heads, Ocean Shores and South Golden Beach. It is understood that the area is a popular tourist destination during the summer school holidays, with traffic inside the towns and parking demand along beach-side roads increasing.

It is likely that event patrons would stay in these locations, although, as described in Table 5.3, patrons would be spread-out around the region, with most staying in Byron Bay, Tweed Coast and Coolangatta. From the on-line survey, approximately one-third of patrons stayed an extra day or longer during their visit. These people would generate additional trips while they enjoy the attractions of the surrounding area. They would also generate trade for local businesses, assisting the income and employment of the local area.

The timing of events would also need to consider the availability of accommodation for the event patrons.

## 6.4 Road safety

### 6.4.1 Speed limit

The proposed temporary special event speed zone of 40 km/h during 70% and 100% capacity event days would be reinforced with signs, traffic control personnel and traffic delineation including traffic cones. The temporary speed limit would reduce the chance of read-end crashes caused by unexpected stopping and would potentially reduce the severity of any crashes that did occur. This would improve safety for cyclists and any pedestrians, as well as for traffic control staff. During peak event arrival and departure, congestion due to event traffic would naturally limit speeds to around this speed.

### 6.4.2 Sight distance at entrances

The sight distances at the five entrances have been assessed based on the Austroads 2008, *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*, which requires the following (assuming a reaction time of 2.0 seconds):

- 73 m of Safe Intersection Sight Distance (SISD) and 40 m of Approach Sight Distance (ASD) are desirable for a 40 km/h design speed
- 123 m of SISD and 73 m of ASD are desirable for an 60 km/h design speed
- 181 m of SISD and 114 m of ASD are desirable for an 80 km/h design speed

- 214 m of SISD and 139 m of ASD are desirable for a 90 km/h design speed.

**Gate A**

The existing sight distance available at the access location is as follows:

- looking north along Tweed Valley Way – 225 m of SISD and ASD
- looking south along Tweed Valley Way – 300 m of SISD (if shrubs along western site boundary are cleared or shortened) and 110 m of ASD.

The speed limit on Tweed Valley Way (in the vicinity of the access location) is 80 km/h on non-event days and would be temporarily reduced to 40 km/h on event days. The available ASD to the south is expected to increase when the access is constructed and the shrubs along the western site boundary are cleared or shortened. Traffic controllers would supervise heavy vehicle movements during set up and bump-out phases. Traffic controllers would be provided on all approaches on event days. The available sight distance at the access location is considered to be adequate for event and non-event days.

**Recommendation:**
- trim or remove shrubs on the western boundary south of Gate A.

**Gate C**

The existing sight distance available at the access location is as follows:

- looking north along Tweed Valley Way – 200 m of SISD (if shrubs along western site boundary are cleared or shortened) and 100 m of ASD
- looking south along Tweed Valley Way – 80 m of SISD and ASD.

The speed limit on Tweed Valley Way (in the vicinity of the access location) is 80 km/h on non-event days and would be temporarily reduced to 40 km/h on event days. There is no need for vehicles to enter or exit the site via this location on non-event days and this access would be gated and closed on non-event days. This gate would be used for left-turn outbound movements only, and hence the sight distance to the south is not critical. The available sight distance at the access location is considered to be adequate as the access would be operating under traffic control and in a reduced speed environment of 40 km/h on event days.

**Recommendation:**
- Gate C to be operated under traffic control when open.

**Gate B Public transport access**

The existing sight distance available at the gate location is as follows:

- looking north along Tweed Valley Way – 180 m of SISD and ASD
- looking south along Tweed Valley Way – 220 m of SISD and ASD.

The speed limit on Tweed Valley Way (in the vicinity of the exit driveway location) is 80 km/h on non-event days and would be temporarily reduced to 40 km/h on event days. The available SISD to the north is expected to increase when the exit driveway is constructed. Traffic controllers would be provided on all approaches on event days. The available sight distance at the exit driveway location is considered to be adequate for event and non-event days.

**Gate S Service vehicle access**

Gate S on Jones Road would be used during large event days under traffic control, with a 40 km/h temporary speed limit. Under this arrangement, the traffic controller would be responsible for ensuring that traffic on Jones Road is stopped to allow a vehicle exiting the site to leave Gate S. During non-event days, the gate would be closed and site access would be via Gate A (Tweed Valley Way).

At the intersection of Jones Road and Tweed Valley Way (which provides access to Gate S for service vehicles under traffic control during large event days only), the existing sight distance is as follows:

- looking north along Tweed Valley Way – 240 m of SISD and 230 m of ASD
- looking south along Tweed Valley Way – 400 m of SISD and ASD.

The speed limit on Tweed Valley Way in the vicinity of Jones Road is 90 km/h on non-event days and would be temporarily reduced to 40 km/h under traffic control on large event days. The available sight distance at the intersection is considered to be adequate.

**Gate E Emergency vehicle access**

At the intersection of the private road and Wooyung Road (which provides access to Gate E for emergency vehicles only), the existing sight distance is as follows:

- looking east along Wooyung Road – 220 m of SISD and ASD
- looking west along Wooyung Road – 210 m of SISD and ASD.

The speed limit on Wooyung Road in the vicinity of the private road is 80 km/h. The available sight distance at the exit driveway location is considered to be adequate for event and non-event days.

### 6.4.3 Crash history

Based on the analysis of the crash history at the Yelgun Interchange and Tweed Valley Way provided in Section 2.7, the only issue that could affect the additional traffic generated by the site traffic was rear-end collisions on the Link Road between the Yelgun Interchange and Tweed Valley Way. This could be addressed by the recommendations provided below.

**Recommendation:**

- Install Variable Message Signs on the Pacific Highway approaching the Yelgun Interchange warning of special event traffic and to watch for queues on the off-ramps.
- Temporary special event 40 km/h speed limit to cover the Link Road between the Yelgun Interchange roundabout and Tweed Valley Way.

### 6.4.4 Yelgun Interchange

The RTA has expressed concern about the possibility that the event-generated traffic would queue back from the Tweed Valley Way intersection with the Yelgun Interchange through the roundabout, back onto the Pacific Highway off-ramps. Their concern is that this would adversely affect road safety by either:

- blocking back onto the motorway increasing the risk of a rear-end collision, or lane changing collision if a vehicle swerved to avoid the unexpected queue of vehicles; or
- queue-back far enough to leave insufficient stopping distance for a car using the off-ramp to stop in time to avoid colliding with the vehicle at the back of the queue.

If the queue of vehicles is kept short enough to provide sufficient stopping distance for an exiting vehicle, both of the concerns mentioned would be avoided. The proposed development would address this using the following methods:

1. Propose an appropriate maximum event size and traffic generation such that the forecast queue length does not exceed the safe length.
2. Use variable message signs (VMS) on the approach to the off-ramp to warn drivers of the additional event traffic and potential queues on the ramp. This would potentially improve the driver's reaction time, reducing the required stopping distance and reducing the risk of a rear-end collision.
3. Should the queue from Tweed Valley Way reach the roundabout, use traffic controllers to manage the queue of vehicles on the northbound and southbound off-ramps.
4. As a contingency should the queue grow beyond the safe limit on either ramp, temporarily close the northbound off-ramp, requiring exiting vehicles to exit at the Brunswick North Interchange and complete their trip using Brunswick Valley Way.

Details of these traffic management measures are provided in Section 8.

The calculation of the required stopping distance for an exiting vehicle is based on the requirements of Austroads 2008, *Guide to Road Design Part 3 Geometric Design*. The speed limit on the Pacific Motorway is 110 km/hr. The speed limit on the off-ramp is 60 km/hr. The length of the southbound off ramp is 450 m long and the northbound off ramp is 600 m.

Vehicles accessing the off ramp would be travelling between 60 km/h (lower limit) and 110 km/h (upper limit) and slowing down to almost zero at the give way point. The applicable Stopping Sight Distance (SSD) requirements are shown in Table 6.2.

**Table 6.2 Stopping sight distance**

| Vehicle speed | Desirable sight distance for highways and freeways | Grade correction for assumed 2% upgrade | Adjusted desirable sight distance |
|---|---|---|---|
| 60 km/h | 81 m | -2 m | 79 m |
| 110 km/h | 260 m | -7 m | 253 m |

Note: Assumes driver reaction time of 2.5sec.

Assuming that the vehicle is travelling at 110 km/h at the point of exiting, the SSD requirement is 253 m. As an added margin of safety, an additional buffer distance of 100 m has been added to the SSD. This means that should the queues be larger than anticipated, or should there be an incident (such as a vehicle break-down), vehicles could queue in the additional gap without affecting the safety of the Pacific Highway or ramps.

This means that the maximum allowable queue length on the ramps is as follows:

- southbound off-ramp: 97 m
- northbound off-ramp: 247 m.

The relevant stopping distances are shown graphically on Figure 6.1.

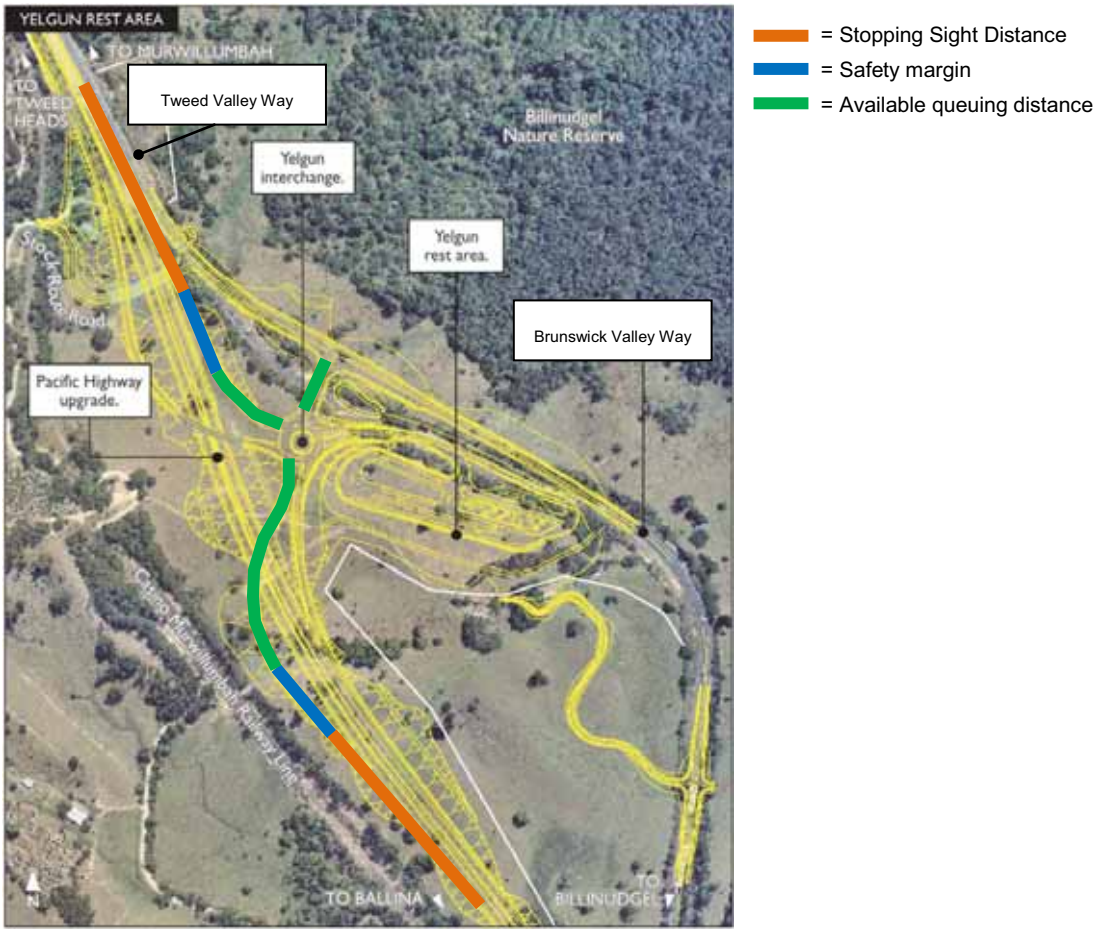



**Figure 6.1 Interchange stopping and queue distances**

Queues on the Link Road in excess of 75 m gap between the Yelgun Interchange roundabout and Tweed Valley Way would impact on the operation of the roundabout or T-junction. These lengths of queue are anticipated during the height of the peak, as shown in Figure 6.2 and described below.

- during day patron arrival on Friday, Saturday and Sunday around midday
- during day patron departure during the night of Friday, Saturday and Sunday
- during camper departure during the morning of Monday.

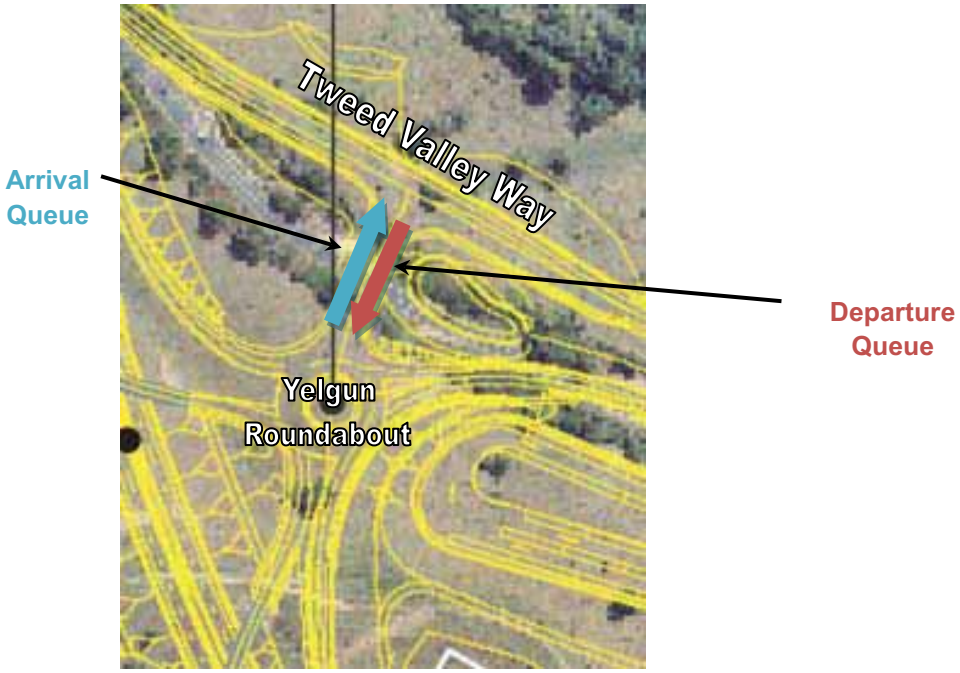



**Figure 6.2 Anticipated Yelgun Interchange queues**

During arrival, the queue extending back from Tweed Valley Way could affect the operation of the Yelgun Interchange roundabout. Due to the priority arrangement at the roundabout, the southbound off-ramp traffic may lose the opportunity to pass through the roundabout because of the queue of vehicles.

Due to the complex interaction between traffic when the queue from one intersection affects the performance of another intersection, it is difficult to forecast the combined interaction. SIDRA analyses the intersections in isolation. The forecast queue lengths for each of the affected movements have been checked. To simulate the combined impact of the two intersections, the following method has been used.

- Where the queue of left-turning vehicles on the Link Road exceeds 75 m, the excess queue (forecast queue minus 75 m) has been added to the off-ramp queues.
- In the first instance, it is added to the forecast southbound off-ramp queue.
- Traffic management would stop traffic on the northbound off-ramp when the queue on the southbound off-ramp gets too big, so that it can take advantage of the gaps when the left-turn queue moves.
- To check the northbound off-ramp a similar process has been done.
- In effect the excess queue is added twice. This is done to check a worst-case where the entire excess queue could affect one ramp. In reality the excess queue would be 'shared' between the ramps, producing shorter queues that those described in this section.

#### 6.4.4.1 Friday arrival peak

The Friday arrival peak for 70% and 100% capacity events experiences less traffic delay than the Sunday arrival peak due to around 15% less event traffic caused by different arrival rates (different event program), as well as less base traffic on the road network during a Friday midday compared to a Sunday midday.

For the Moderate event scenario, the Friday 4:00 pm – 5:00 pm peak is the highest traffic generation time and also coincides with the afternoon peak on the base road network. Despite this, the queue length on the Link Road is not forecast to exceed the 75 m distance between the T-junction and the roundabout, and the queuing on each of the off-ramps is not forecast to exceed 20 metres.

**Recommendation:**

- Traffic generated by the Moderate event scenario can be accommodated on the road network, even with low car occupancy of 2.5 and a low public transport mode share.

#### 6.4.4.2 Sunday arrival peak

Queues on the off-ramps for the Sunday arrival peak have been estimated using the SIDRA results using the method described previously. The highest traffic generation is forecast to occur during the Sunday arrival peak. The results are shown in Table 6.3.

**Table 6.3 Sunday 2:00 pm – 3:00 pm peak queue length at Yelgun Interchange**

| | Southbound off-ramp | | Northbound off-ramp | |
|---|---|---|---|---|
| Percentage traffic generation | 2015 | 2030 | 2015 | 2030 |
| **100% capacity event** | | | | |
| 100% | Longer than the ramp | Longer than the ramp | Longer than the ramp | Longer than the ramp |
| 90% | Longer than the ramp | Longer than the ramp* | Longer than the ramp | Longer than the ramp* |
| 80% | 385 m | Longer than the ramp* | 325 m | 576 m* |
| 70% | 152 m | 347 m* | 120 m | 256 m* |
| 60% | 58 m | 172 m | 41 m | 132 m |
| 50% | 23 m | 58 m | 14 m | 41 m |
| **70% capacity event** | | | | |
| 100% | 152 m | Longer than the ramp | 120 m | 405 m |
| 90% | 80 m | 235 m* | 59 m | 186 m* |
| 80% | 34 m | 42 m* | 20 m | 29 m* |
| 70% | 22 m | 16 m* | 14 m | 16 m* |
| 60% | 18 m | 15 m | 12 m | 16 m |

* Note: For 2030, only 100%, 60% and 50% (if required) modelled in SIDRA. Results for other percentages obtained by interpolation using the 2015 results.

After comparing to the acceptable queue lengths of 97 m for the southbound off-ramp and 247 m for the northbound off-ramp, it was found that the southbound off-ramp is the most critical for traffic impacts.

**100% capacity event**

The results indicate that, for the 100% capacity event, the acceptable level of traffic is somewhere between 70% and 60% for 2015 and between 60% and 50% for 2030. Using interpolation, the necessary reductions in traffic are 64% for 2015 and 53% for 2030.

As mentioned in Table 5.9, a reduction to 63% traffic generation could be achieved by achieving car occupancy of 3.2 people per vehicle and a high public transport mode share. For 2030, an even greater reduction is required. Unless a higher car occupancy or lower car mode share can be achieved, this would require fewer of the day-patrons generating the peak demand. Taking the ratio of 53% and 64%, the interchange analysis indicates that a reduction to 20,500 would produce an acceptable queue length with a margin of safety.

To achieve car occupancy of 3.2 people per car, additional incentives may be required. This is discussed in Section 7.

**70% capacity event**

For the 70% capacity event, the results indicate that the acceptable traffic level is somewhere between 100% and 90% for 2015 and between 90% and 80% for 2030. Using interpolation, the necessary reductions in traffic are 92% for 2015 and 83% for 2030.

As mentioned in Table 5.9, a reduction to 78% traffic generation could be achieved by achieving a high public transport mode share, irrespective of the car occupancy. PB believes that car occupancy of 2.9 and a higher public transport mode share are both achievable with the package of initiatives proposed. Therefore, it is considered that the traffic generated by the 70% capacity event scenario would be able to be accommodated by the road network in 2015 and 2030.

**Recommendation:**

- Traffic generated by the 70% capacity event scenario can be accommodated on the road network provided peak traffic generation can be reduced by increasing the mode share of public transport, or through a combination of this and an increase in the average car occupancy of patrons.

#### 6.4.4.3 Thursday camper peak/Friday day patron peak

The arrival of campers on the Wednesday and Thursday is more spread-out, and hence creates a lower traffic impact. In terms of the capacity of the road network and in particular the Yelgun Interchange, it would be possible to increase the number of campers to compensate for the reduction in day patrons for the 100% capacity event scenario. There are other factors to be considered before an increase in the number of campers could be considered.

There is capacity to increase the number of campers up to 17% assuming average car occupancy of 2.9 could be achieved. Thus, the number of campers could increase to 29,000 without adverse impacts on the operation of the Yelgun Interchange.

**Recommendation:**

- Reduce the long-term future planned number of day-patrons for the 100% capacity event scenario from 25,000 to 20,500.
- Increase the long-term future planned number of campers for the 100% capacity event scenario from 25,000 to 29,000.

- Total number of patrons for the 100% capacity event scenario in 2030 reduces to 49,500.
- Monitor car occupancy, mode share and traffic impacts and revise patron limits when more information is available.
- These recommendations are subject to further analysis based on experience gained through operation of events.

#### 6.4.4.4 Monday departure

The departure of day patrons at the end of the day's performances and of campers on the Monday after the event would result in queuing at the Yelgun Interchange. However, these queues would affect the right-turn from Tweed Valley Way into the Interchange, and would not therefore result in excess queuing on the Pacific Highway ramps. Tweed Valley Way would be still operating under the 40 km/h special event speed zone. It is therefore considered to be a capacity issue, not a road safety issue.

## 6.5 Closing the northbound off-ramp

One traffic management measure described in Section 6.5.4 was the potential closure of the northbound off-ramp if queues build up to the stopping sight distance on either of the ramps. This traffic management measure would only be employed if required. It would have its own traffic impacts including:

- additional traffic using the Brunswick North Interchange
- additional traffic on Brunswick Valley Way through Ocean Shores and Billinudgel
- additional through traffic at the intersection of Tweed Valley Way and the Yelgun Interchange Link Road.

As this is a contingency measure only, the following analysis has been undertaken of this scenario.

### 6.5.1 Brunswick Valley Way capacity

The capacity of Brunswick Valley Way was checked using the traffic counts from Byron Shire Council presented in Section 2.6.4, the traffic profile from the 2010 Tweed Valley Way count data and the Transport Research Board, 2000, *Highway Capacity Manual 2000*, *Chapter 20: Two-Lane Highways* method.

The results indicate that Brunswick Valley Way would be operating at a Level of Service of C with no event traffic. If the northbound off-ramp at the Yelgun Interchange was closed, the Level of Service would drop to LoS D for both the 70% and 100% capacity event traffic. However, if the traffic generation reductions discussed in Section 6.4.4 were applied for the event as a whole, the Level of Service would remain at LoS C.

### 6.5.2 Yelgun Interchange capacity

Closing the northbound off-ramp would remove traffic from the Yelgun Interchange, but it would put it back on Brunswick Valley Way as through traffic at the T-junction with the Yelgun Interchange Link Road. This additional through traffic would block the remaining traffic still using the Interchange. This scenario has been modelled in SIDRA, and the results indicate that capacity and queuing would still be an issue. However, providing that the overall traffic generation is reduced by at least 68% of the 100% capacity event traffic generation, the queue should not exceed the safe distances. For the 70% capacity event scenario, the forecast queues with the northbound ramp closed and 100% traffic generation produced queues that are within the acceptable distances.

## 6.6 Event timing

Two other sensitivity tests have been undertaken for the 2015 70% and 100% capacity event scenarios to determine whether there are any time-of-year constraints. The preceding analysis is based on yearly average traffic volumes on the road network. Traffic in the area increases during peak tourist times, especially at Easter and during the Christmas/summer school holidays.

### 6.6.1 Yelgun Interchange

The traffic on Tweed Valley Way between the Yelgun Interchange and the site is protected from the largest seasonal increases as it is not directly on the main tourist route. To simulate the impacts of the yearly traffic peaks, the following scenario has been assessed:

- 150% base plus event traffic Easter
- 130% base plus event traffic: Christmas holidays, end of university break, etc.

The SIDRA models were re-run for the 2015 100% traffic scenario (2.5 car occupancy, low public transport mode split) and compared to the previous modelling results.

**Table 6.4 Percentage increase in queue length with seasonal traffic changes**

| | Southbound off-ramp | Northbound off-ramp |
|---|---|---|
| **100% capacity event** | | |
| 150% base plus event traffic | 134% | 124% |
| 130% base plus event traffic | 113% | 109% |
| **70% capacity event** | | |
| 150% base plus event traffic | 134% | 124% |
| 130% base plus event traffic | 113% | 109% |

Converting these to queue lengths based on the results in Table 6.3, the acceptable queue length is anticipated to be reached at 62% for the Easter 100% capacity event scenario and 63% for the Christmas holidays 100% capacity event scenario. For the Christmas holidays, the 63% reduction is within the reduction in traffic achieved by increasing the car occupancy to 3.2 people per car combined with the higher public transport mode share. For the Easter event, a further reduction would need to be achieved. It is recommended that this be done by reducing the number of day patrons to 24,400.

For the 70% capacity event scenario, the required reductions are 87% for the Easter timing and 91% for the Christmas event timing. Both of these reductions are within the reductions achieved by improving the car occupancy to 2.9 people per car.

### 6.6.2 Pacific Highway

Using the same analysis method described in Section 6.1.3, the traffic volume on the Pacific Highway at Brunswick has been re-assessed for an Easter event.

In 2015, if a Moderate or 70% capacity event (2.5 car occupancy, low public transport mode share) were to be held at Easter, the Pacific Highway would still experience a LoS C. If a 100% capacity event were to be held at Easter, the Pacific Highway would experience a LoS D. If a higher car occupancy or lower car mode share were experienced, this impact would be reduced.

At Easter in 2030, the background (non-event) traffic alone would operate at a LoS D. With the event traffic (2.5 car occupancy, low public transport mode share), the Moderate scenario could still operate with a LoS D. The 70% and 100% capacity events would increase the Level of Service from LoS D to LoS E. There would need to be substantial reduction in the event traffic generation for the Level of Service to return to LoS D.

**Recommendation:**

- Reduce the number of day-patrons for a 100% capacity event held at Easter in 2015 from 25,000 to 24,400, as well as implementing transport initiatives to achieve a car occupancy of 3.2 people per car and the higher public transport mode share.
- Implementing transport initiatives to achieving a car occupancy of 3.2 people per car and the higher public transport mode share for a 100% capacity event held at busy times of the year such as during Christmas holidays, end of university break and the October long weekend (NSW).
- Implementing transport initiatives to achieving car occupancy of 2.9 people per car for a 70% capacity event held at Easter or busy times of the year such as during Christmas holidays, end of university break and the October long weekend (NSW).
- Avoid holding 70% or 100% capacity events on the Easter long weekend from 2020.
- Monitor car occupancy, mode share and traffic impacts and revise patron limits when more information is available.
- These recommendations are subject to further analysis based on experience gained through operation of events.

## 6.7 Site access and internal circulation

The entry into the site for general car traffic has been split between Gates A and C. The relatively low traffic volumes on Tweed Valley Way result in short delays and queuing for vehicles to enter the site. Assuming a 100% capacity event scenario, 50%/50% traffic split between the two entrances, a car occupancy of 2.5 and a low public transport mode share, the forecast 2015 queue length is around 25 m for the 95%ile back of queue. If one entrance had to be closed, for example for an incident, 100% of the traffic using one entrance would result in an entering traffic queue length of 270 m.

For a 2030 scenario, the forecast 95%ile back of queue is around 35 m with both entrances operating and a 50/50 of entering traffic between them. If only one entrance were operating, the queue would be around 410 m.

The forecast queue length for a Moderate event using the same assumptions as above, but with only one entrance operating, is 15 m for 2015 and 20 m for 2030.

Traffic management plans for 70% and 100% capacity events would delineate longer right-turn lanes and through-lanes to allow non-event traffic, emergency vehicles and buses to bypass any queues.

When the site is not in event-mode, traffic would still be generated by the conference centre and cultural centre. In the weeks leading up to an event, set-up vehicles would regularly enter the site. Gate A would be the permanent entry to the site. It is recommended that a permanent right-turn lane into the site at Gate A be created. The length of the right-turn lane should accommodate the regular traffic and traffic from Minor, Small and Moderate events.

**Recommendation:**

- Install a northbound right-turn entry lane into the site at Gate A of 35 m length.

The demand for southbound traffic entering the site would be significantly lower due to the bias in flow created by the location of the Yelgun Interchange to the south. During 70% and 100% capacity events, a temporary special event speed limit of 40 km/h would reduce the chance of a rear-end accident due to a vehicle turning left into the site. It is therefore proposed that an only a short-length temporary left-turn slip lane be provided at Gate A.

### 6.7.1 Monday and night-time departure

The capacity of the site gates would be the first constraint point for patrons and campers departing the site. Vehicles would leave in a single queue for southbound vehicles and one queue for northbound vehicles. The Monday departure peak for campers leaving the site is expected to generate queues of vehicles within the site, as well as at the right-turn from Tweed Valley Way into the Yelgun Interchange Link Road. Right-turn Queue lengths of around 250 metres are anticipated on Tweed Valley Way. However, the queue would be fast-moving, with delays of around 30 seconds.

The departure profile for the 100% capacity event shown in Appendix B results in more traffic than the site Gates can accommodate during the day-patron departure from midnight until 1am if northbound and southbound vehicles attempt to use the Yelgun Interchange. It is therefore proposed that during the height of the day-patron departure after the days performances have finished (between midnight and 1:00 am):

- vehicles travelling north use Gate A and turn right onto Tweed Valley Way

- vehicles travelling south use Gate C and turn left onto Tweed Valley Way, then the Yelgun Interchange.

This effectively doubles the site exit capacity and reduces the delay for vehicles waiting to exit the site. This would add additional drive time for northbound patrons, but would cut their time spent waiting in a queue within the site.

This would put additional traffic on Tweed Valley Way during the middle of the night. However, due to the small volume of traffic on the road at this time, there would be little impact on road capacity.

**Recommendation:**

- Northbound vehicles be directed to turn right onto Tweed Valley Way when exiting the site at the height of the departure of day-patrons from the 100% capacity event between midnight and 1:00 am.

### 6.7.2 Internal circulation

The Spine Road would be the focus of internal circulation on the site. It would see the greatest use during set-up and pack-up and during the arrival and departure of campers. On event days, when the largest numbers of people are arriving at the site, day patrons would be directed to park within the southern end of the site. They would be restricted from using the Spine Road, which would instead be reserved for emergency vehicles buses, coaches, service vehicles, staff, security, management, performers and VIPs.

The largest arrival demand occurs during the Thursday arrival of campers, around 500 vehicles per hour. The peak departure demand occurs during the Monday morning peak, when a volume of around 1,350 vehicles per hour is anticipated.

This has been assessed using the Transport Research Board, 2000, *Highway Capacity Manual 2000*, *Chapter 20: Two-Lane Highways* method. The results indicate that this represents a Level of Service on the internal Spine Road of LoS E, indicating that the road is operating at capacity.

There are 4,746 parking spaces planned in the central and northern parts of the site. This exit flow represents around 28% of the total parking departing in one hour. Base on this, it is estimated that it would take approximately three hours to empty the northern and central parts of the site.

## 6.8 Parking

The event scenarios would generate the demands for off-street parking shown in Table 6.5.

**Table 6.5 Off-street parking demand**

| Event | Low public transport scenario | | | High public transport scenario | | |
|---|---|---|---|---|---|---|
| | Car occupancy (persons per car) | | | | | |
| | 2.5 | 2.9 | 3.2 | 2.5 | 2.9 | 3.2 |
| Minor | 176 | 152 | 138 | 146 | 126 | 114 |
| Small | 858 | 740 | 670 | 672 | 579 | 525 |
| Moderate | 3,520 | 3,034 | 2,750 | 2,920 | 2,517 | 2,281 |
| 70% capacity | 10,010 | 8,629 | 7,820 | 7,840 | 6,759 | 6,125 |
| 100% capacity | 14,300 | 12,328 | 11,172 | 11,200 | 9,655 | 8,750 |

As described in Table 4.3, the supply of parking includes:

- northern section: 3,708 spaces
- central section: 1,038 spaces
- southern section: 7,155 spaces excluding overflow (7,882 including overflow)
- total 11,901 spaces (12,628 including overflow).

Therefore, for the low public transport scenario, the on-site parking can satisfy all event scenarios apart from the 100% capacity scenario for the 2.5 and 2.9 car occupancy scenarios. For the 2.9 car occupancy scenario, the overflow parking could be used to make up the short-fall. Limiting the availability of on-site parking would be a natural way of encouraging higher car occupancies, reducing the traffic impact on the road network.

For the high public transport scenario, the parking requirements of all event and car occupancy scenarios can be accommodated.

Parking availability would be capped at the requirements of the site, as well as the car occupancy and mode share target. Parking would be booked at the time of ticket purchase and would be on a first-come first serve basis.

## 6.9 Public transport

The 70% and 100% capacity event sizes would require a number of buses to accommodate the number of passengers required to be moved.

The seven bus routes are planned to collect day patrons from the main accommodation and regional areas. The details of the routes are summarised in Table 4.4, and are provided in Appendix C. The number of bus trips required (assuming 50 passengers per trip) is provided in Table 6.6. This represents a large number of services in a relatively short period of time.

**Table 6.6 Bus trip numbers**

| Event | Low public transport scenario | High public transport scenario |
|---|---|---|
| Minor | 2 | 3 |
| Small | 15 | 24 |
| Moderate | 15 | 45 |
| 70% capacity | 165 | 273 |
| 100% capacity | 236 | 390 |

This number of bus trips is likely to require buses to be chartered from the surrounding area, and possibly from bus companies in the Gold Coast. Appendix C also includes a summary of calculations for the number of buses required to service this number of bus trips.

## 6.10 Monitoring

Travel and traffic information, including arrival and departure time, car occupancy, mode share, would be gathered at the events staged. This data would be used to refine the traffic and transport assumptions to enable transport plans to be improved. Traffic impacts would also be monitored, with transport plans and traffic arrangements adjusted if necessary before the next event.

In addition to this report, the accompanying document entitled ‘Environmental, Health and Safety Management Manual’ (EHSMM) forms an integral component of the application as it provides the operational management system parameters for event usage of the site. The EHSMM, compliant with AS/NZS ISO 14001 - Environmental Management Systems, establishes the principles of action for protecting the environment, human health and safety. The EHSMM sets forth clearly articulated objectives and measurable targets along with specific environmental management plans to manage the significant environmental, health and safety aspects associated with North Byron Parkland's activities and services.

The EHSMM provides a robust framework of monitoring, measurement, auditing and management review to accurately determine the effectiveness of the organisation's policies, procedures, work instructions, training, emergency response and non-conformance and corrective action processes. The EHSMM shall be the primary vehicle for maintaining North Byron Parklands on a path of continuous improvement.

# 7. Transport initiatives

The event objectives identified in Section 3.3, and the results of the interchange capacity analysis highlight the need to encourage the use of public transport to access the site and discourage the use of the private vehicle. This modification of travel behaviour is necessary to reduce the impact of the site on the road network. Section 3.2 provided some examples from overseas and in Australia of initiatives event organisers have implemented to achieve such aims.

Many of these initiatives are applicable for the larger events proposed for the Parklands site. Through PB's experience in event transport management, a review of measures used at other festivals and keeping the Project objectives in mind, a set of transport initiatives for implementation at North Byron Parklands have been developed and are summarised below.

## 7.1 Shuttle buses

A network of seven bus routes is planned to link the main accommodation areas to the site. The bus routes would continue to operate in the hours leading up to the start of performances each day, and buses would be waiting to take day patrons home at night. Selected routes would also operate at a reduced frequency on the days before and day after the event to encourage any campers wishing to use the service.

Details of the bus routes and their timetable would be provided on the event website.

## 7.2 Coaches

Travel via privately organised coaches would be encouraged with the use of the conveniently located bus and coach terminal, and on-site parking for coaches. This would include minibuses to maximise the take-up of this option.

## 7.3 Ticketing

Special reduced ticket prices could be offered for those travelling by public transport, cycling or car-sharing schemes. Accommodation and public transport packages could also be offered.

Positive travel behaviour would be encouraged at the time of purchasing tickets through the offering of combination tickets including bus travel and event entry (total is cheaper than separately buying). The cost of bus travel would be offered at a heavily subsidised rate, partly funded by the charge on parking (see Section 7.5).

## 7.4 Cycling

Cycling would be encouraged for patrons living in the surrounding area, as well as for day patrons staying in the surrounding towns. To encourage cycling, the following would be offered:

- free luggage transfer from towns
- bicycle lock-up facilities
- route information on website
- campsite specifically for cyclists
- free bike repair service
- bike 'tours' from town to site.

The approximate distance to cycle from Byron Bay Town Centre to the event site is 26 km, which is comparable to the cycle distances to other festivals such as the Woodford Folk Festival in Queensland and Peats Ridge Festival in NSW.

The recommended route would avoid the Pacific Highway, focussing instead on the bypassed sections of highway such as Tweed Valley Way and Brunswick Valley Way.

## 7.5 Parking restriction

Parking supply (availability) and cost are methods of encouraging positive travel behaviour. Parking would be restricted to the car occupancy and public transport mode share target for the event size. Parking charges would apply, with payment at the time of ticket booking.

## 7.6 Ride-sharing

In order to achieve the high car occupancy of 3.2 people per vehicle, further innovation is required to encourage more people to car-share. Methods proposed for the larger events (that have been successful at other festivals) include:

- higher parking charges to vehicles with less than three people in the car
- entry into a prize draw for a chance to win VIP access passes, drink/food vouchers and festival kits (merchandise etc) for people who arrive in a car with more than four people
- hosted forum on the event website for people looking for a lift or to fill their car
- links to car-sharing websites on the event website
- statistics on the benefits of ride-sharing - e.g. $CO_2$ reductions, cost savings etc. to be provided along with the event information.

It is anticipated that, given the young demographic for patrons of the event at the site, the acceptance of these measures would be higher than other local festivals.

# 8. Transport management plan

This section presents proposals for traffic management for a generic event of 70% or 100% capacity events. These proposals would need to be reviewed and adapted to the specific requirements of the subject events when required.

Smaller events such as the Minor, Small and Moderate events would require less traffic control, as the event activity would be located well within the site, and the smaller number of patrons would mean smaller impacts on the road network and therefore less risk of the capacity of the Yelgun Interchange or other parts of the network being reached.

The traffic management proposals should be read in conjunction with the drawings (6883-TMP1 to TMP5) provided in Appendix E, prepared by Tony Cromack Ardill Payne and Partners. Tony is an RTA accredited Certifier for Traffic Control Plans (Certificate No. 7142004186).

A Traffic Management Plan (TMP) for the site has already been prepared for the Splendour in the Grass test event (Ardill Payne and Partners June 2007, *Splendour in the Grass Traffic Management Plan*). The Ardill Payne and Partners TMP sets out the construction requirements of the Jones Road underpass or at-grade intersection, and has been used as the starting point for the following recommendations.

## 8.1 Ticketing and vehicle inspection

### 8.1.1 Campers

Campers would be directed to a vehicle inspection area within the site between Gates A and C. Should the queue of campers' vehicles extend beyond the allocated waiting area, the queue of vehicles would be directed to move further inside the site and wait for processing. Tickets would be briefly inspected, with a final inspection occurring at the event entry.

### 8.1.2 Day patrons

Day patrons (plus any campers arriving on the event day) would be directed to park their vehicle in the southern area and make their way to the event entry for bag and ticket inspection either by foot via the marked pedestrian paths, or by the internal shuttle bus. No checking of day patrons' cars or tickets would occur on arrival at the site.

Parking fees would be charged for patrons parking on-site. Parking vouchers would be purchased with the event ticket.

## 8.2 Temporary special event speed limit

Application would be made for a temporary special event speed limit of 40 km/h on Tweed Valley Way from the Pacific Highway overbridge (north-west of Jones Road) to 100 m east of the intersection of Tweed Valley Way and the Yelgun Interchange Link Road. The temporary speed zone would operate from the first day of arrival of campers to 6:00 pm the day after the end of the event.

## 8.3 Temporary special event clearways

Application would also be sought for temporary special event clearways on Tweed Valley Way, Jones Road and Yelgun Road, as shown in Figure 4.6. These would apply from midnight of the day before the event starts and continue until midnight of the day after the event ends. Special Event Clearways allow illegally parked vehicles to be towed away to enable traffic to keep flowing in a safe manner, under section 76 of the Road Transport (Safety and Traffic Management) Act 1999 and the Major Events Act 2009 No 73.

## 8.4 Traffic controllers

RTA accredited Traffic Controllers would be used to coordinate traffic movements at the site. Traffic Controllers would be located as shown on Drawings 6883-TMP1 to TMP5, and commence work at 7:00 am each day of the event to control early service vehicle access. Two or three shifts would be required, with relief for breaks. Finish times would vary depending on event times and traffic flows, but could extend up to 3:00 am in the nights when performances end around midnight.

The tasks of the Traffic Controllers would include:

- ensure the safe and efficient movement of emergency vehicles and buses
- ensure that disruption to through traffic and local traffic is minimised
- control heavy vehicle movements at the site during the set-up and shut-down phases
- coordinate vehicle movements into and out of Jones Road and Yelgun Road, and minimise the disruption to these residents
- ensure a smooth flow of traffic at the Yelgun Interchange, and prevent traffic from queuing onto the Pacific Highway
- ensure a smooth flow of traffic at Gates A and C to minimise queuing on Tweed Valley Way.

Traffic controllers would control only one lane of traffic each. Where multiple controllers are required, they would be protected from traffic by the appropriate placement of safety barriers.

## 8.5 Pedestrians and cyclists

Low numbers of pedestrians are anticipated due to the current low levels and the distance of the site from large towns. Near site entry gates and at the Yelgun Interchange, the road shoulder would be used in certain locations to provide space for extended right-turn bays.

Pedestrian access to the site would be discouraged, with strict on-street parking controls and alternative access provided by local event shuttle buses.

The residents of Jones Road, including school children, currently access bus services on Tweed Valley Way. Provision would be made for bus pick-up and set-down areas on Jones Road during events. Typically, events would be held around the weekend, and hence event times coinciding with school bus times would be minimised. Residents would be advised of traffic movements and management measures prior to the event and with the issuing of resident permits.

## 8.6 Controlled access roads

Both Jones Road and Yelgun Road would have controlled access provided to stop unauthorised parking. Residents and their guests would be provided with permit passes to enable them to enter and leave these roads. Traffic Controllers would check passes at the entrance to both roads from Tweed Valley Way, and redirect and event patrons trying to use these roads. Traffic Controllers would also direct service vehicles using Jones Road into Gate S, and check resident permits to ensure that only residents use Jones Road east of the site entry.

## 8.7 Signage and barriers

Signage and barriers erected for the event should be in accordance with the attached Drawings 6883-TMP1 to TMP5. Changes are not permitted, except during emergencies, without the approval of the Traffic Engineer or an RTA accredited Council officer.

## 8.8 Traffic contingency plans

### 8.8.1 Yelgun Interchange

The following levels of traffic control would be undertaken to avoid the queue of vehicles at the Yelgun Interchange building to within the stopping sight distance for vehicles exiting the Pacific Highway:

1. Should the queue on the southbound off-ramp reach a point 147 m past the yield line at the roundabout, traffic controllers would hold northbound traffic on Tweed Valley Way for up to two minutes or until the queue on the southbound off ramp has dissipated to less than 97 m from the yield line at the roundabout.

2. Should the queue on the southbound off-ramp remain at around the point 147 m past the yield line at the roundabout, traffic controllers would hold traffic on the northbound off-ramp until the queue on the southbound off ramp has dissipated to less than 97 m from the yield line at the roundabout.

3. Should the above conditions continue and the queue on the northbound off-ramp reach a point 297 m past the yield line at the roundabout, traffic controllers would arrange the closing of the northbound and the activation of Variable Message Signs on the northbound approach to the Brunswick North Interchange that the Yelgun northbound off-ramp is closed and for Ocean Shores, Yelgun and event traffic to detour via the Brunswick North Interchange instead.

### 8.8.2 Intersection of Tweed Valley Way and Yelgun Interchange Link Road

Should the queue of vehicles departing the event and turning right from Tweed Valley Way into the Link Road extend beyond 250 metres, traffic controllers would hold northbound traffic on Tweed Valley Way for up to two minute, or until the queue of right-turning vehicles has substantially dissipated.

### 8.8.3 Gate B

Should the queue of buses and coaches waiting to exit the site at Gate B extend beyond ten (10) buses, traffic controllers would hold southbound traffic on Tweed Valley Way until the queue of buses has dissipated.

### 8.8.4 Gates C and A

Should the queue of vehicles waiting to exit the site grow such that delays of up to 30 minutes are estimated, traffic controllers would hold southbound traffic on Tweed Valley Way for up to two minutes, or until the queue has dissipated.

Should the queue of vehicles waiting to exit the site grow such that delays of up to 30 minutes are estimated, traffic controllers would direct northbound traffic to use Gate A and then turn right onto Tweed Valley Way.

## 8.9 Emergency contacts and responsibilities

The Traffic Control Services provider and parking marshals would be provided with the contact details of an appropriately trained person to contact in the event of an accident or emergency on the site or associated with the development. The traffic controllers would also be provided with the contact details of the breakdown service stationed on the site.

Emergency breakdown vehicles and tow trucks would be stationed in the southern car parking area and on Brunswick Valley Way south of the Yelgun Interchange. A designated breakdown area for the storage of vehicles would be created near the taxi rank and drop-off/pick-up area inside the site.

The event organisers are responsible for implementing the Traffic Management Plan and for ensuring that it is properly maintained. The event organisers would notify the Traffic Engineer of any inadequacies. Additionally they would be responsible for ensuring that all sub-contractors and suppliers are aware of the requirements of the Traffic Management Plan and adhere to these requirements.

A notice would be placed in local newspapers to advise of the event dates and arrangements, and of possible disruptions to traffic and pedestrian conditions.

# 9. Conclusions

The assessment of the traffic impacts of the proposed cultural event site in Yelgun has been reviewed in accordance with the RTA's Guide to Traffic Generating Developments.

The type of event crowd for the largest events was revealed in the on-line survey of their membership. They are typically young and travel from Sydney or Brisbane. The high proportion of students is matched by high indicated average car occupancy. The type of audience is likely to embrace the transport initiatives that have proved successful at similar events internationally and in Australia. These include ride-sharing, cycling, shuttle buses, combination entry and public transport tickets and restricted parking. Smaller events may attract a different type of clientele, but would have a lower overall traffic generation.

**Travel behaviour**

Based on previous experience and based on the type of person expected at the events, average car occupancy of 2.9 persons per car is expected. Additional transport initiatives promoting ride-sharing can raise this to the surveyed car occupancy of 3.2 persons per car. A range of transport initiatives are planned including bus routes and incentives for using bus, cycle and car-sharing. These should result in a high public transport mode share (39%) being achieved.

**Traffic impacts**

An analysis of the traffic impacts of the development has shown that the smaller events planned for the site would not have a significant impact on the surrounding road network. For the 70% and 100% capacity event scenarios, higher car occupancies and public transport mode shares are required to reduce their traffic impacts to within acceptable levels. In order to reduce the traffic impacts of the events at the Yelgun Interchange to acceptable levels, the following recommendations are made for travel targets and patron numbers:

- Moderate event scenario: no change in traffic generation required to stay within acceptable traffic impacts, but transport measures to be introduced to improve car occupancy.
- 70% capacity event scenario: car occupancy of 2.9 people per car, high (39%) public transport mode share, no change in event numbers.
- 100% capacity event scenario: car occupancy of 3.2 people per car, high (39%) public transport mode share, a reduction in the number of day patrons from 25,000 to 20,500 and an increase in the number of campers to 29,000.

Traffic management measures are proposed to monitor and manage queues at the Yelgun Interchange.

The capacity analysis of Tweed Valley Way and the Pacific Highway has shown that they are not as critical constraints as the Yelgun Interchange. However, the capacity of the Pacific Highway at Easter time in 2030 would be a constraint. The following recommendations are made regarding the timing of the larger sized events:

- Reduce the number of day-patrons for a 100% capacity event held at Easter in 2015 from 25,000 to 24,400, as well as implementing transport initiatives to achieve a car occupancy of 3.2 people per car and the higher public transport mode share.

- Implementing transport initiatives to achieving a car occupancy of 3.2 people per car and the higher public transport mode share for a 100% capacity event held at busy times of the year such as during Christmas holidays, end of university break and the October long weekend (NSW).
- Implementing transport initiatives to achieving car occupancy of 2.9 people per car for a 70% capacity event held at Easter or busy times of the year such as during Christmas holidays, etc.
- Avoid holding 70% or 100% capacity events on the Easter long weekend from 2020.
- This analysis should be updated in the future once more information is available about the actual traffic generation from the site.

**Road safety**

Provided the recommendations of travel targets are achieved and event sizes are adopted, the concerns about queuing affecting the safety of the Pacific Highway Yelgun Interchange off-ramps, the development is not expected to result in any significant safety impacts. The sight distance has been reviewed at each site entrance and has been found to be adequate.

**Proposed road upgrades**

Five site entrances are proposed with different usage and functions. Works proposed to improve the site entrances include:

- creation of a right-turn bay on Tweed Valley Way, approximately 320 m north of Yelgun Road for vehicles turning into the site at Gate A
- creation of a new entrance on the northern side of Jones Road, approximately 260 m east of Tweed Valley Way
- widening of Jones Road to a minimum of 6.0 m between Tweed Valley Way and a point 340 m east of Tweed Valley Way.

**Impact on other road users**

The range of measures proposed to limit the impact on non-event road users should minimise their delay from the arrival and departure of event patrons. Restricted access to Yelgun Road and Jones Road should prevent event patrons using these roads for parking. Residents and their guests would be provided with permits to allow them to enter.

Residents of the surrounding villages would experience some traffic delays during peak event times. However, public notes about the events would highlight this impact and suggest that trips be made during other times to avoid delays. The largest impacts would only be experienced for a few days per year. The peak times are likely to occur at different times to the regular traffic peaks, and are unlikely to have a significant impact during before and after school times. Traffic management arrangements would seek to minimise the impact on non-event related traffic by allowing it to bypass the traffic queues.

**Parking**

There is sufficient parking planned on-site to accommodate the demand for a 100% capacity event, but only if an average car occupancy of 2.9 is achieved. The supply of parking would be matched to the event size and the car occupancy and mode split targets for the event, with allocation based on a first-in first served basis. Fees would be charged for parking. This parking restraint would be one of the measures used to encourage positive travel behaviour.

**Public transport**

The network of seven shuttle bus routes would enable patrons to travel from their accommodation to the site without requiring the use of a car. The bus and coach terminus planned in the centre of the site would be able to provide a mixture of efficiently-operating parallel bus bays and saw-tooth bays for coaches staying for a longer duration.

## 9.1 List of recommendations

### 9.1.1 Road safety

- install a northbound right-turn entry lane into the site at Gate A of 35 m length
- trim or remove shrubs on the western boundary south of Gate A.

### 9.1.2 Traffic management

- Northbound vehicles be directed to turn right onto Tweed Valley Way when exiting the site at the height of the departure of day-patrons from the 100% capacity event between midnight and 1:00 am.
- Gate C to be operated under traffic control when open.
- Install Variable Message Signs on the Pacific Highway approaching the Yelgun Interchange warning of special event traffic and to watch for queues on the off-ramps.
- Temporary special event 40 km/h speed limit to cover the Link Road between the Yelgun Interchange roundabout and Tweed Valley Way.

### 9.1.3 Traffic generation/event size

- Traffic generated by the Moderate event scenario can be accommodated on the road network, even with low car occupancy of 2.5 and a low public transport mode share.
- Traffic generated by the 70% capacity event scenario can be accommodated on the road network provided peak traffic generation can be reduced by increasing the mode share of public transport, or through a combination of this and an increase in the average car occupancy of patrons.
- Reduce the long-term future planned number of day-patrons for the 100% capacity event scenario from 25,000 to 20,500.

- Increase the long-term future planned number of campers for the 100% capacity event scenario from 25,000 to 29,000.
- Total number of patrons for the 100% capacity event scenario in 2030 reduces to 49,500.
- Monitor car occupancy, mode share and traffic impacts and revise patron limits when more information is available.

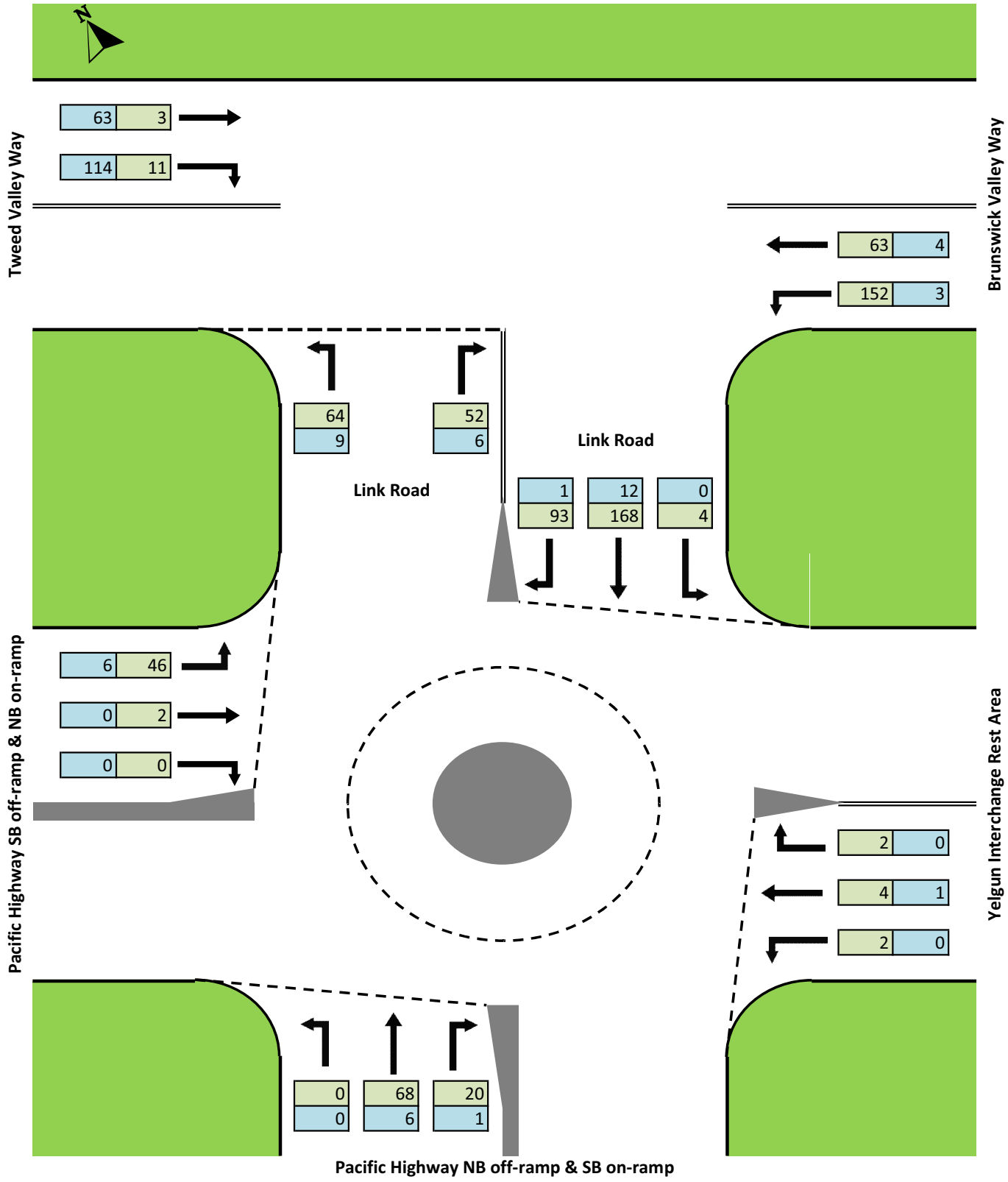
### 9.1.4 Event timing

- Reduce the number of day-patrons for a 100% capacity event held at Easter in 2015 from 25,000 to 24,400, as well as implementing transport initiatives to achieve a car occupancy of 3.2 people per car and the higher public transport mode share.
- Implementing transport initiatives to achieving a car occupancy of 3.2 people per car and the higher public transport mode share for a 100% capacity event held at busy times of the year such as during Christmas holidays, end of university break and the October long weekend (NSW).
- Implementing transport initiatives to achieving car occupancy of 2.9 people per car for a 70% capacity event held at Easter or busy times of the year such as during Christmas holidays, end of university break and the October long weekend (NSW).
- Avoid holding 70% or 100% capacity events on the Easter long weekend from 2020.
- Monitor car occupancy, mode share and traffic impacts and revise patron limits when more information is available.

# Appendix A

Yelgun Interchange intersection turn movement count summary

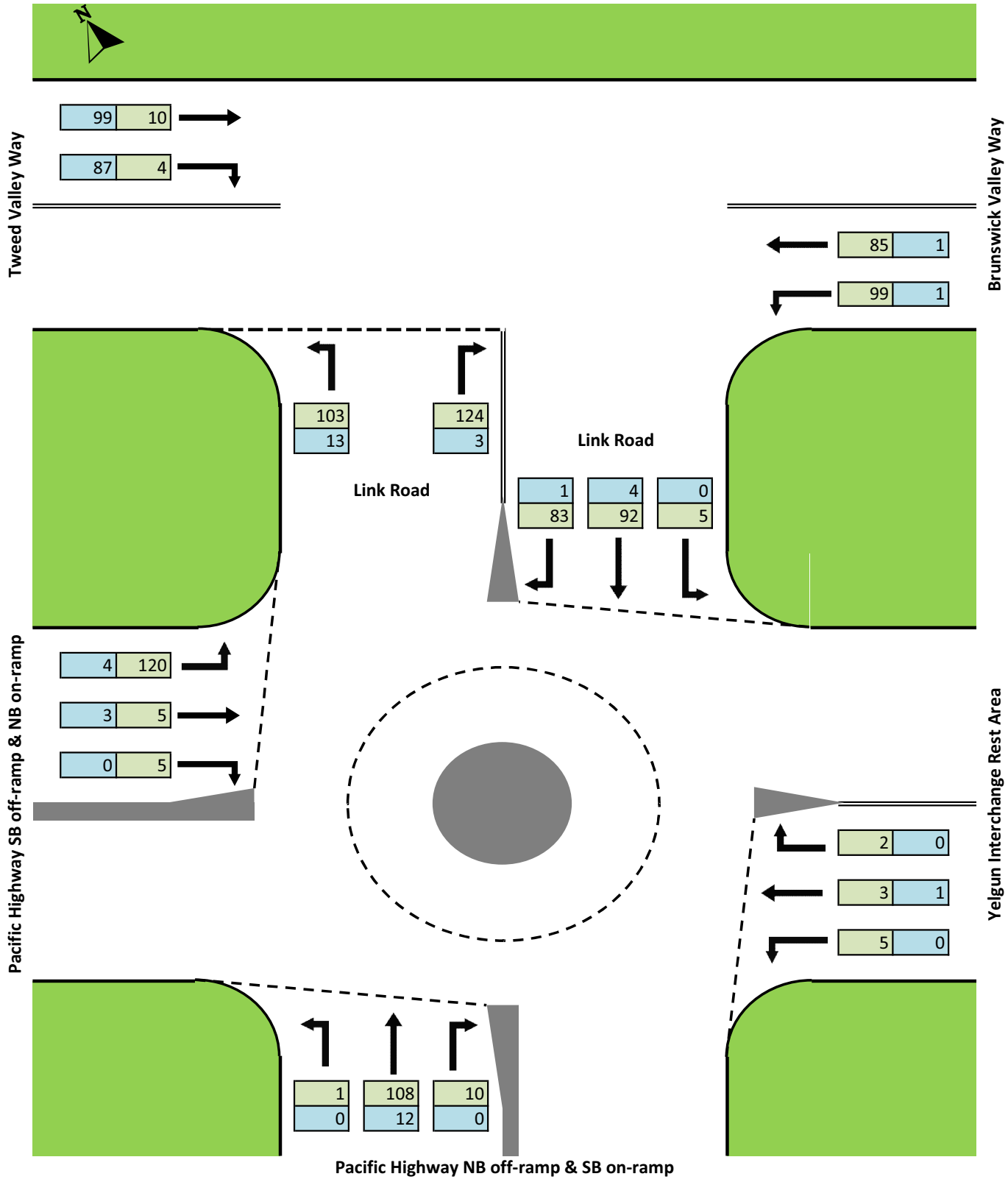
**Intersection Movement Count, Yelgun Interchange Friday 12th February 2010 AM Peak 8:00am - 9:00am**




= Light vehicle hourly volume
= Heavy vehicle hourly volume

Note: traffic volumes seasonally adjusted using factor of 101%

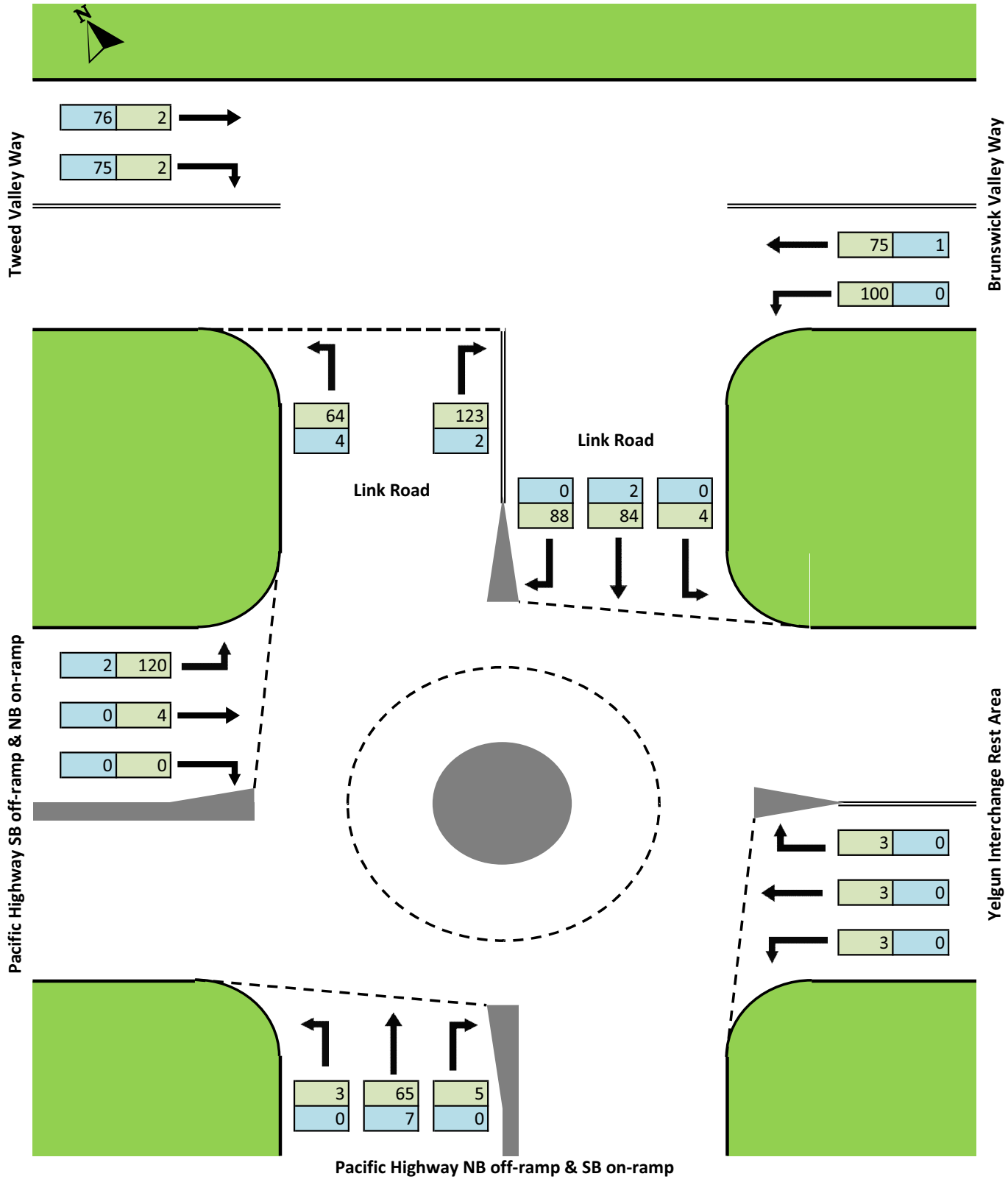
**Intersection Movement Count, Yelgun Interchange Friday 12th February 2010 PM Peak 3:30pm - 4:30pm**




= Light vehicle hourly volume
= Heavy vehicle hourly volume

Note: traffic volumes seasonally adjusted using factor of 101%

**Intersection Movement Count, Yelgun Interchange Saturday 13th February 2010 Midday Peak 11:00am - 12:00pm**




= Light vehicle hourly volume
= Heavy vehicle hourly volume

Note: traffic volumes seasonally adjusted using factor of 101%

# Appendix B

Arrival and departure profile

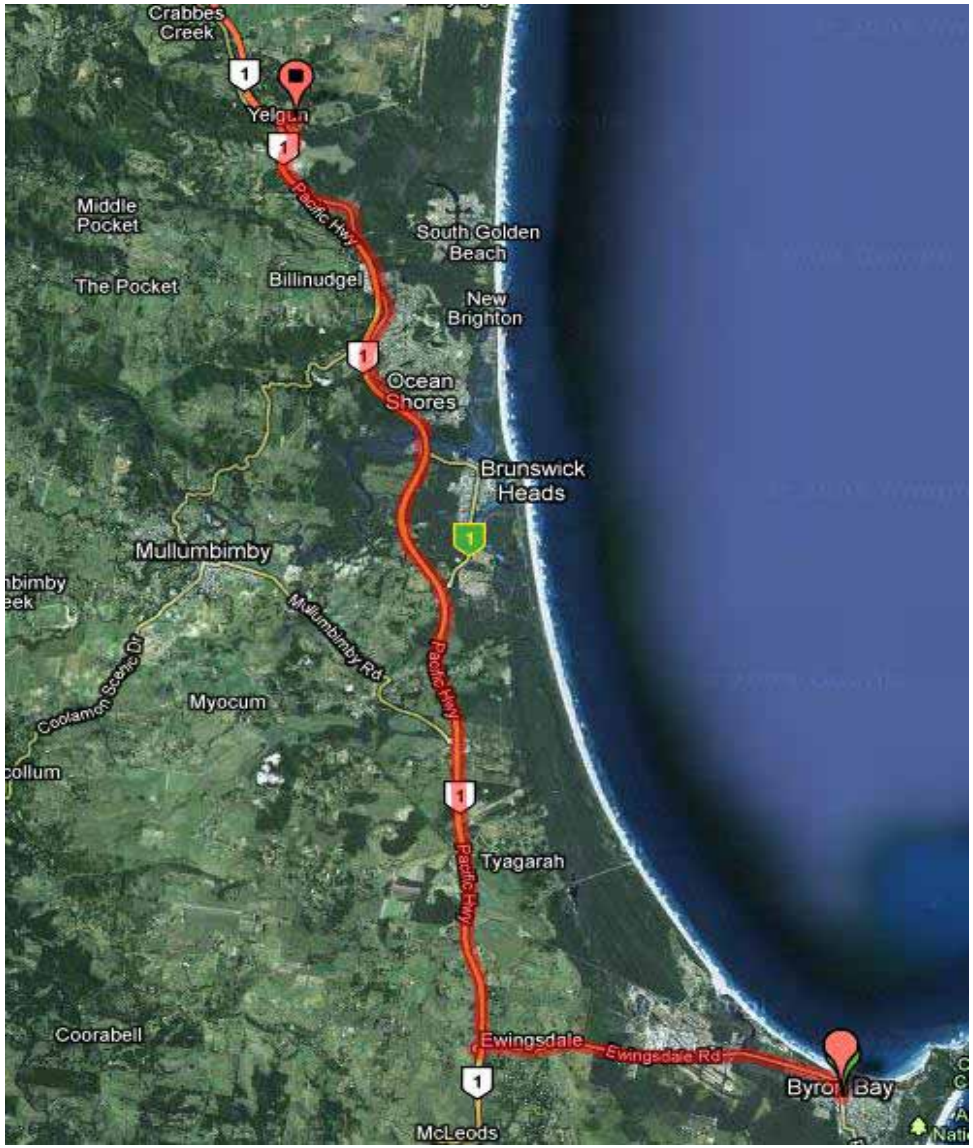
**Appendix B: Event arrival and departure profile**

| | Support | | | | | | | | | Campers | | | | | | Day Patrons | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Arrival | | | | Departure | | | | | Arrival | | | | Departure | | Arrival | | | | | Departure | | | | |
| Daily Profile | Bump-in | Service vehicles in | Management + Staff In | Performers In | Bump-out | Service vehicles out | Management + Staff out | Performers out | Pre-event day | Wednesday | Thursday | Friday | Saturday | Sunday | Monday | Wednesday | Thursday | Friday | Saturday | Sunday | Thursday Night | Friday | Saturday | Sunday | Monday Morning |
| 0:00 | | | | | | 3.0% | 20.0% | 15.0% | | | | | | | 10.0% | | | | | | | 1.0% | 30.0% | 30.0% | 30.0% |
| 1:00 | | | | | | | 10.0% | 5.0% | | | | | | | | | | | | | | | 20.0% | 20.0% | 20.0% |
| 2:00 | | | | | | | 5.0% | 5.0% | | | | | | | | | | | | | | | 10.0% | 10.0% | 10.0% |
| 3:00 | | | | | | | | 5.0% | | | | | | | | | | | | | | | | | |
| 4:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5:00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6:00 | 10.0% | 5.0% | 10.0% | | | | | | | | | 2.0% | | | | | | | | | | | | | |
| 7:00 | 30.0% | 5.0% | 30.0% | | 10.0% | 5.0% | | | | | 1.0% | 2.0% | 1.0% | | 5.0% | | | | | | | | | | |
| 8:00 | 30.0% | 5.0% | 30.0% | | 30.0% | 5.0% | | | | | 2.0% | 3.0% | 1.0% | | 10.0% | | | | | | | | | | |
| 9:00 | 20.0% | 5.0% | 15.0% | 5.0% | 30.0% | 5.0% | | | | | 2.0% | 3.0% | 1.0% | | 15.0% | | | | | | | | | | |
| 10:00 | 10.0% | 5.0% | 10.0% | 5.0% | 20.0% | 5.0% | | | 5.0% | | 3.0% | 3.0% | | | 20.0% | | | 5.0% | 2.0% | 2.0% | | | | | |
| 11:00 | | 5.0% | 2.5% | 5.0% | 10.0% | 5.0% | | | 5.0% | | 3.0% | 2.0% | | | 10.0% | | | 15.0% | 10.0% | 10.0% | | | | | |
| 12:00 | | 5.0% | 2.5% | 10.0% | | 5.0% | | | 5.0% | 1.0% | 4.0% | | | | 5.0% | | | 17.5% | 15.0% | 15.0% | | | | | |
| 13:00 | | 6.0% | | 10.0% | | 5.0% | | | 10.0% | 2.0% | 4.0% | | | | 1.0% | | | 17.5% | 15.0% | 20.0% | | | | | |
| 14:00 | | 6.0% | | 20.0% | | 6.0% | | | 10.0% | 3.0% | 5.0% | | | | 1.0% | | | 15.0% | 17.5% | 20.0% | | | | | |
| 15:00 | | 6.0% | | 20.0% | | 6.0% | | | 20.0% | 3.0% | 5.0% | | | | 1.0% | | | 10.0% | 17.5% | 15.0% | | | | | |
| 16:00 | | 7.0% | | 10.0% | | 6.0% | | | 20.0% | 3.0% | 6.0% | | | | 1.0% | | 0.5% | 7.0% | 10.0% | 10.0% | | | | | |
| 17:00 | | 7.0% | | 10.0% | | 7.0% | | 5.0% | 10.0% | 1.0% | 7.0% | | | | 1.0% | | 0.5% | 5.0% | 7.0% | 8.0% | | | | | |
| 18:00 | | 8.0% | | 5.0% | | 7.0% | 5.0% | 5.0% | 10.0% | 1.0% | 7.0% | | | | | | 1.0% | 5.0% | 5.0% | | | | | | |
| 19:00 | | 8.0% | | | | 8.0% | 5.0% | 5.0% | 5.0% | 1.0% | 7.0% | | | | | | 1.0% | 2.0% | 1.0% | | | | | | |
| 20:00 | | 7.0% | | | | 8.0% | 5.0% | 10.0% | | 1.0% | 4.0% | | | | | | 1.0% | 1.0% | | | 1.0% | 5.0% | 5.0% | 5.0% | |
| 21:00 | | 4.0% | | | | 7.0% | 10.0% | 15.0% | | 1.0% | 3.0% | | | 5.0% | | | 1.0% | | | | 1.0% | 5.0% | 5.0% | 5.0% | |
| 22:00 | | 3.0% | | | | 4.0% | 20.0% | 15.0% | | | 2.0% | | | 5.0% | | | | | | | 1.0% | 10.0% | 10.0% | 10.0% | |
| 23:00 | | 3.0% | | | | 3.0% | 20.0% | 15.0% | | | | | | 10.0% | | | | | | | 1.0% | 20.0% | 20.0% | 20.0% | |
| | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 17.0% | 65.0% | 15.0% | 3.0% | 20.0% | 80.0% | 0.0% | 5.0% | 100.0% | 100.0% | 100.0% | 4.0% | 41.0% | 100.0% | 100.0% | 60.0% |

# Appendix C

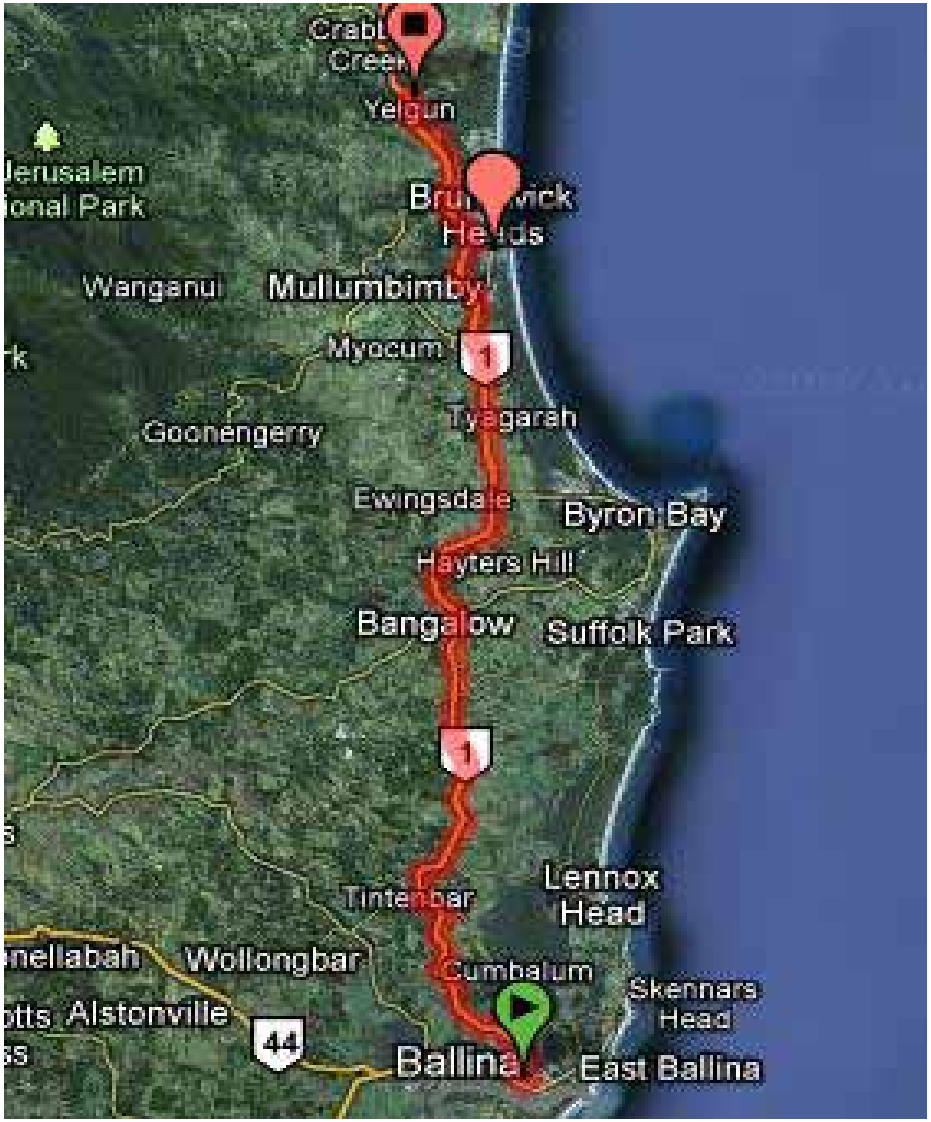
Event bus routes

# Bus Route 1 - Byron Bay Transport Hub - Yelgun via Ewingsdale



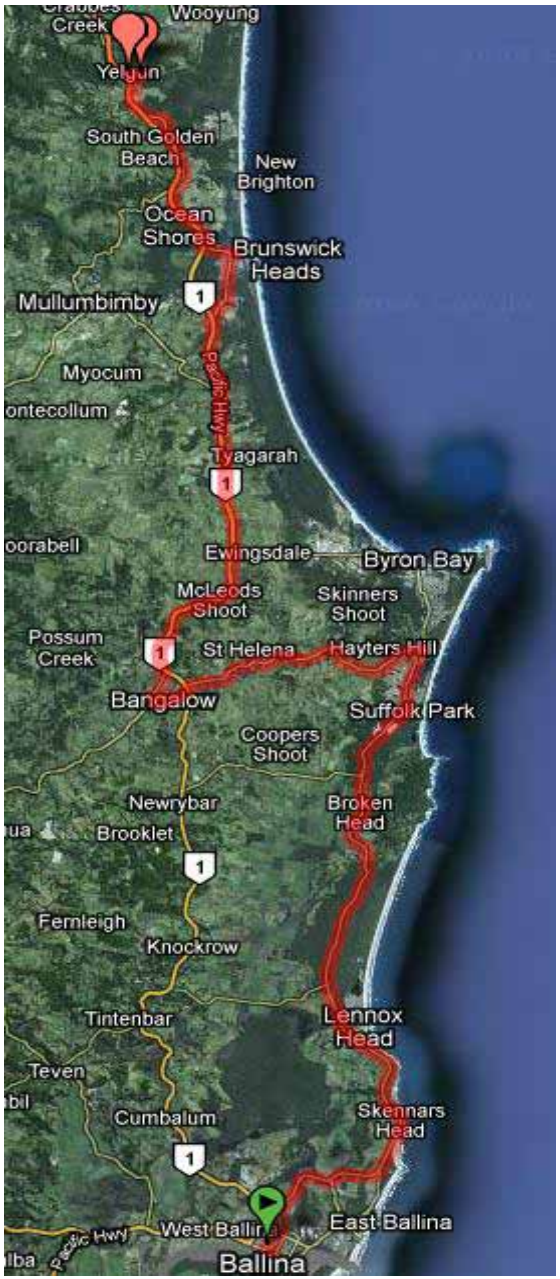

| | Route segment (km) | Route segment (cumulative km) | Travel time (mins) | Travel time (cumulative mins) |
|---|---|---|---|---|
| Byron Bay - Ewingsdale | 5.8 | 5.8 | 11.6 | 11.6 |
| Ewingsdale-Midjimbi Creek | 13.1 | 18.9 | 26 | 37.6 |
| Midjimbi Creek-Yelgun | 8 | 26.9 | 16 | 53.6 |
| **Total** | **26.9** | | **53.6** | |

## Bus Route 2 - Ballina - Yelgun via Ballina Airport



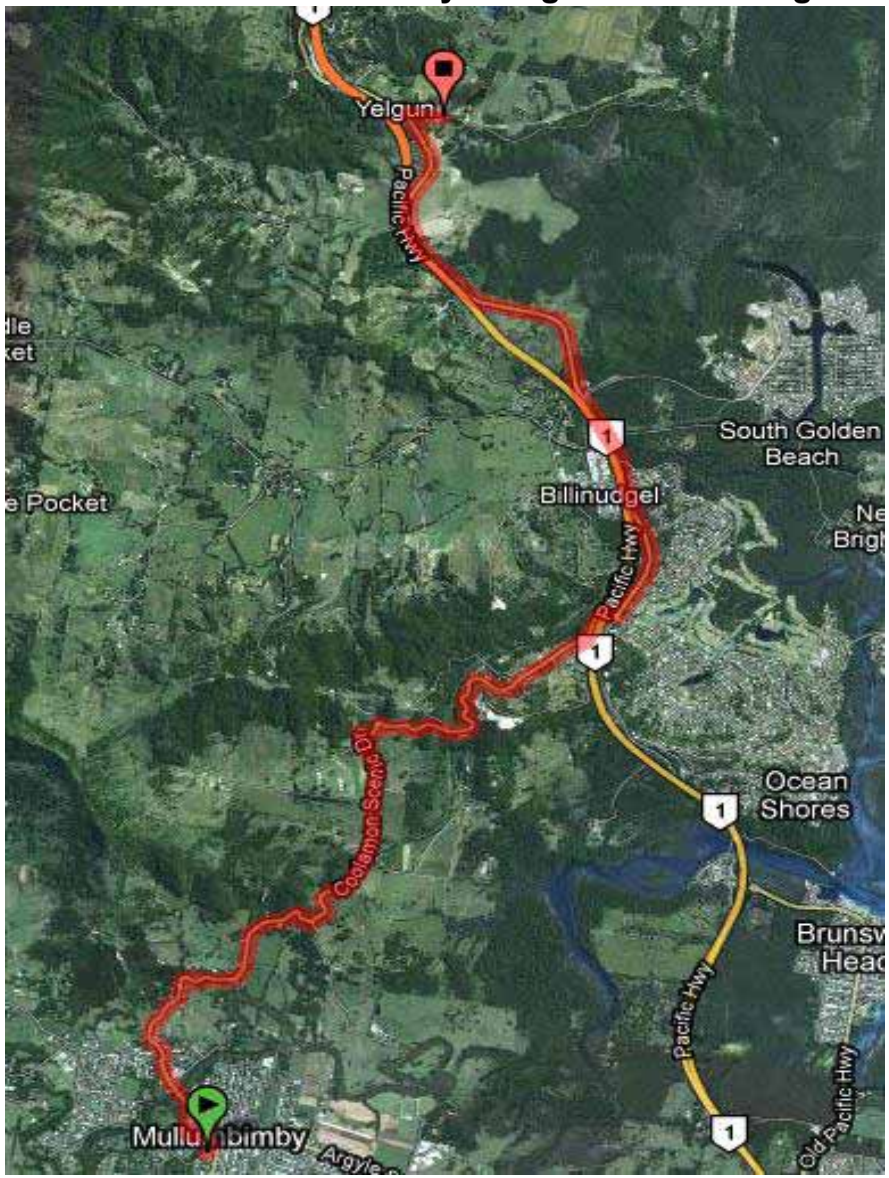

| | Route segment (km) | Route segment (cumulative km) | Travel time (mins) | Travel time (cumulative mins) |
|---|---|---|---|---|
| Ballina - Bangalow | 30.6 | 30.6 | 61 | 61 |
| Bangalow - Brunswick Heads interchange | 17.7 | 48.3 | 35 | 96 |
| Brunswick Heads interchange - Yelgun | 7.9 | 56.2 | 16 | 112 |
| **Total** | **56.2** | | **112** | |

# Bus Route 3 - Ballina to Yelgun via Lennox Head, Suffolk Park and Bangalow



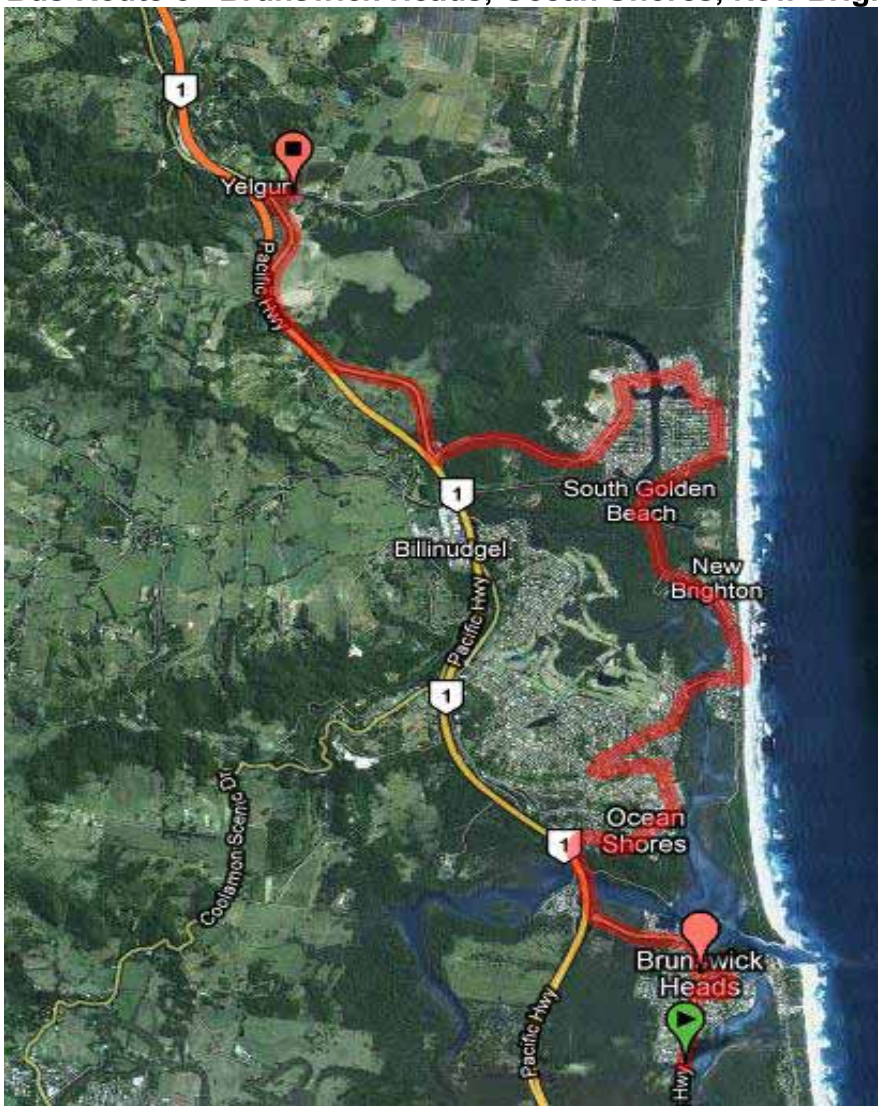

| | Route segment (km) | Route segment (cumulative km) | Travel time (mins) | Travel time (cumulative mins) |
|---|---|---|---|---|
| Ballina - Lennox Head | 12 | 12 | 29 | 29 |
| Lennox Head - Suffolk Park | 13.9 | 25.9 | 33 | 62 |
| Suffolk Park - Bangalow | 12.1 | 38 | 29 | 91 |
| Bangalow - Yelgun | 28.3 | 66.3 | 68 | 159 |
| **Total km** | **66.3** | | **159** | |

# Bus Route 4 - Mullumbimby - Yelgun via Billinudgel



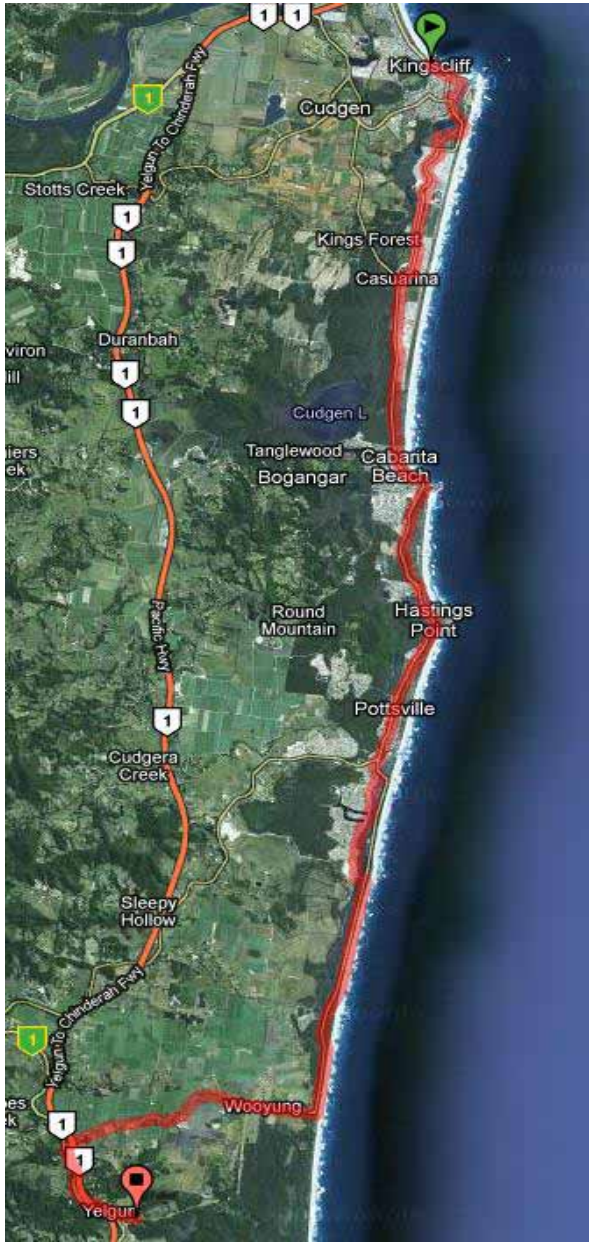

| | Route segment (km) | Route segment (cumulative km) | Travel time (mins) | Travel time (cumulative mins) |
|---|---|---|---|---|
| Mullumbimby - Billinudgel | 9.14 | 9.14 | 22 | 22 |
| Billinudgel - Yelgun | 4.16 | 13.3 | 10 | 32 |
| **Total** | **13.3** | | **32** | |

# Bus Route 5 - Brunswick Heads, Ocean Shores, New Brighton, South Golden Beach, Yelgun



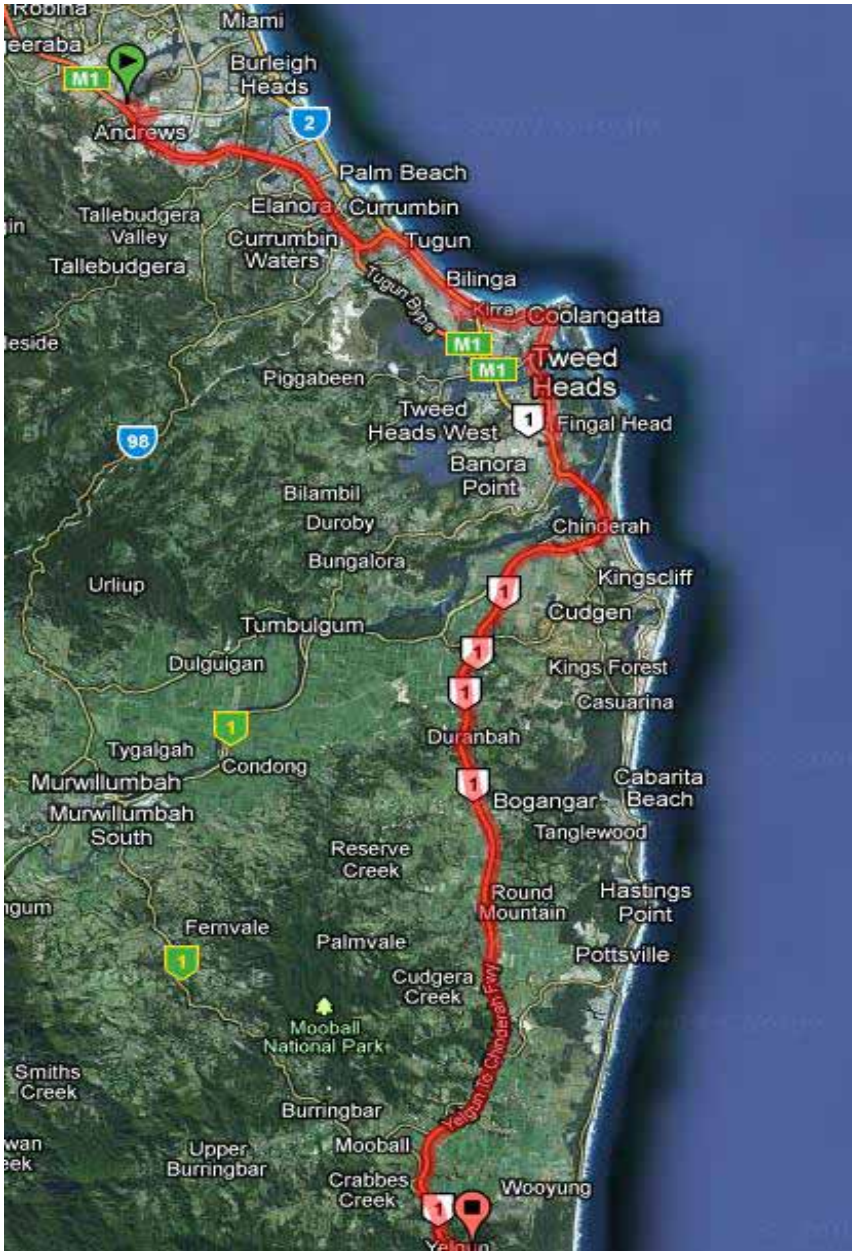

| | Route segment (km) | Route segment (cumulative km) | Travel time (mins) | Travel time (cumulative mins) |
|---|---|---|---|---|
| Brunswick Heads - Ocean Shores | 5.5 | 5.5 | 13 | 13 |
| Ocean Shores - South Golden Beach | 3.8 | 9.6 | 9 | 22 |
| South Golden Beach - Yelgun | 6.7 | 16.3 | 16 | 38 |
| **Total** | **16.3** | | **38** | |

# Bus Route 6 - Kingscliff - Casuarina - Hastings Point - Wooyung - Yelgun




| | Route segment (km) | Route segment (cumulative km) | Travel time (mins) | Travel time (cumulative mins) |
|---|---|---|---|---|
| Kingscliff - Casuarina | 5.9 | 5.9 | 14.2 | 14.2 |
| Casuarina - Cabarita Beach | 4 | 9.9 | 9.6 | 23.8 |
| Cabarita Beach - Hastings Point | 3.9 | 13.8 | 9.4 | 33.2 |
| Hastings Point - Hardy Park | 4 | 17.8 | 9.6 | 42.8 |
| Hardy Park - Wooyung | 8.3 | 26.1 | 19.9 | 62.7 |
| Wooyung - Yelgun | 6.7 | 32.8 | 16 | 78.7 |
| **Total** | **32.8** | | **78.7** | |

# Bus Route 7 - Varsity Lakes - Coolangatta - Chinderah - Duranbah - Cudgera Creek - Yelgun




| | Route segment (km) | Route segment (cumulative km) | Travel time (mins) | Travel time (cumulative mins) |
|---|---|---|---|---|
| Varsity Lakes - Coolangatta | 16.74 | 16.74 | 33 | 33 |
| Coolangatta - Tweed Heads South | 7.5 | 24.24 | 15 | 48 |
| Tweed Heads South - Chinderah | 5.1 | 29.34 | 10.2 | 58.2 |
| Chinderah - Duranbah | 10.4 | 39.74 | 20.8 | 79 |
| Duranbah - Cudgera Creek | 9.4 | 49.14 | 18.8 | 97.8 |
| Cudgera Creek -Yelgun | 14.7 | 63.84 | 29.4 | 127.2 |
| **Total** | **63.84** | | **127.2** | |

# Appendix D

SIDRA Intersection model summary

# SIDRA Intersection Model Results - Friday Arrival Peak

## Intersection of Link Road with Tweed Valley Way*

| Year | Time period | Event | Intersection | | | | Worst delay | | | Movement queue distance | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Degree of saturation | Average delay | Level of service | Queue distance | Approach | Turn | Average delay | Link Road left-turn | Tweed Valley Way right-turn |
| 2011 | 1pm - 2pm | Base | 0.09 | 7.2 | A | 2.6 | West-Tweed Valley Way | right | 10.2 | 2.1 | 1.2 |
| | 4pm - 5pm | Moderate | 0.36 | 8.4 | A | 16.7 | South-Link Road | right | 10.5 | 16.7 | 2.5 |
| | 1pm - 2pm | Large | 0.69 | 9.8 | A | 73.1 | South-Link Road | left | 11.3 | 73.1 | 5 |
| | 1pm - 2pm | Major | 0.97 | 20.7 | B | 406.3 | South-Link Road | left | 26.5 | 406.3 | 6.8 |
| 2015 | 1pm - 2pm | Base | 0.11 | 7.3 | A | 3.2 | West-Tweed Valley Way | right | 10.3 | 2.4 | 1.4 |
| | 4pm - 5pm | Moderate | 0.38 | 8.4 | A | 17.8 | South-Link Road | right | 10.8 | 17.8 | 2.9 |
| | 1pm - 2pm | Large | 0.70 | 10.1 | A | 83 | South-Link Road | left | 11.8 | 83 | 5.3 |
| | 1pm - 2pm | Major | 0.99 | 26 | C | 475.9 | South-Link Road | left | 34.7 | 475.9 | 7.2 |

## Yelgun Interchange Roundabout*

| Year | Time period | Event | Intersection | | | | Worst delay | | | Movement queue distance | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Degree of saturation | Average delay | Level of service | Queue distance | Approach | Turn | Average delay | Southbound off-ramp left-turn | Northbound off-ramp through |
| 2011 | 1pm - 2pm | Base | 0.08 | 5.7 | A | 2.6 | Southbound off-ramp | right | 12.7 | 1.6 | 2.6 |
| | 4pm - 5pm | Moderate | 0.25 | 6 | A | 9.5 | Southbound off-ramp | right | 14.2 | 8.3 | 9.5 |
| | 1pm - 2pm | Large | 0.52 | 6.6 | A | 27.1 | Southbound off-ramp | right | 14.2 | 27.1 | 15.8 |
| | 1pm - 2pm | Major | 0.80 | 9.7 | A | 84.3 | Southbound off-ramp | right | 15 | 84.3 | 25 |
| 2015 | 1pm - 2pm | Base | 0.09 | 5.7 | A | 2.9 | Southbound off-ramp | right | 12.8 | 1.9 | 2.9 |
| | 4pm - 5pm | Moderate | 0.26 | 6.1 | A | 10.4 | Southbound off-ramp | right | 14.3 | 9.2 | 10.4 |
| | 1pm - 2pm | Large | 0.54 | 6.7 | A | 29.5 | Southbound off-ramp | right | 14.3 | 29.5 | 16.7 |
| | 1pm - 2pm | Major | 0.84 | 10.7 | A | 99.6 | Southbound off-ramp | left | 16.4 | 99.6 | 26.2 |

* Note: queue length shown for each intersection considered in isolation. Queue lengths at one intersection may affect the other.

# SIDRA Intersection Model Results - Sunday Arrival Peak

## Intersection of Link Road with Tweed Valley Way*

| Year | Time period | Event | Scenario | Intersection | | | | Worst delay | | | Movement queue distance | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Degree of saturation | Average delay | Level of service | Queue distance | Approach | Turn | Average delay | Link Road left-turn | Tweed Vally Way right-turn |
| 2011 | Sunday 2pm - 3pm | Base | 100% | 0.15 | 7.3 | A | 4.5 | South-Link Road | right | 10.7 | 1.9 | 2.2 |
| | | Large | 100% | 0.83 | 12.0 | B | 152.4 | South-Link Road | left | 15.2 | 152.4 | 7.3 |
| | | Major | 100% | 1.18 | 119.5 | F | 1223.8 | South-Link Road | left | 178.6 | 1223.8 | 10 |
| 2015 | Sunday 2pm - 3pm | Base | 100% | 0.19 | 7.4 | A | 5.8 | South-Link Road | right | 11.1 | 2.2 | 2.7 |
| | | Large | 100% | 0.86 | 12.8 | B | 174.3 | South-Link Road | left | 16.8 | 174.3 | 8 |
| | | | 90% | 0.78 | 11.2 | B | 116.1 | South-Link Road | left | 14.2 | 116.1 | 7.5 |
| | | | 80% | 0.70 | 10.2 | A | 79.5 | South-Link Road | left | 12.7 | 79.5 | 6.9 |
| | | | 70% | 0.62 | 9.6 | A | 55.1 | South-Link Road | right | 11.9 | 55.1 | 6.3 |
| | | | 60% | 0.54 | 9.1 | A | 37.1 | South-Link Road | right | 11.8 | 37.1 | 5.7 |
| | | | Base x 150% | 0.92 | 15.5 | B | 236.3 | South-Link Road | left | 22.3 | 236.3 | 9.6 |
| | | | Base x 130% | 0.89 | 13.7 | B | 195.1 | South-Link Road | left | 18.5 | 195.1 | 8.7 |
| | | | Closed NB Ramp | 0.85 | 12.2 | B | 94.6 | South-Link Road | left | 23 | 94.6 | 14.1 |
| | | Major | 100% | 1.22 | 138.6 | F | 1383.8 | South-Link Road | left | 215.2 | 1383.8 | 10.8 |
| | | | 90% | 1.10 | 70.6 | F | 811.7 | South-Link Road | left | 110.2 | 811.7 | 9.8 |
| | | | 80% | 0.99 | 22.1 | C | 375.6 | South-Link Road | left | 32 | 375.6 | 8.9 |
| | | | 70% | 0.86 | 12.8 | B | 174.3 | South-Link Road | left | 16.8 | 174.3 | 8 |
| | | | 60% | 0.74 | 10.7 | A | 98.6 | South-Link Road | left | 13.5 | 98.6 | 7.2 |
| | | | 50% | 0.63 | 10.1 | A | 58.4 | South-Link Road | left | 12.4 | 58.4 | 6.3 |
| | | | Base x 150% | 1.30 | 173.3 | F | 1694.4 | South-Link Road | left | 287.6 | 1694.4 | 12.6 |
| | | | Base x 130% | 1.25 | 151.9 | F | 1501.7 | South-Link Road | left | 242.5 | 1501.7 | 11.5 |
| | | | Closed NB Ramp | 1.53 | 190.4 | F | 1391.9 | South-Link Road | left | 501.8 | 1391.9 | 29.4 |
| 2030 | Sunday 2pm - 3pm | Large | 100% | 1.03 | 33.8 | E | 452.1 | South-Link Road | left | 60.9 | 452.1 | 12.2 |
| | | | 60% | 0.66 | 10.6 | B | 63.0 | South-Link Road | right | 16.4 | 63 | 9.2 |
| | | Major | 100% | 1.44 | 227.0 | F | 2187.0 | South-Link Road | left | 412.1 | 2187 | 18.3 |
| | | | 60% | 0.90 | 14.4 | B | 183.8 | South-Link Road | left | 21.1 | 183.8 | 11.1 |
| | | | 50% | 0.77 | 11.9 | B | 96.5 | South-Link Road | right | 16.9 | 96.5 | 10 |

## Yelgun Interchange Roundabout*

| Year | Time period | Event | Scenario | Intersection | | | | Worst delay | | | Movement queue distance | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Degree of saturation | Average delay | Level of service | Queue distance | Approach | Turn | Average delay | Southbound off-ramp left-turn | Northbound off-ramp through |
| 2011 | Sunday 2pm - 3pm | Base | 100% | 0.10 | 6.3 | A | 3.2 | Northbound off-ramp | right | 12.9 | 2.4 | 2.2 |
| | | Large | 100% | 0.66 | 7.6 | A | 46.8 | Northbound off-ramp | right | 13.6 | 46.8 | 19.1 |
| | | Major | 100% | 1.05 | 39.5 | C | 390.9 | Southbound off-ramp | left | 80 | 390.9 | 31.6 |
| 2015 | Sunday 2pm - 3pm | Base | 100% | 0.12 | 6.3 | A | 3.8 | Northbound off-ramp | right | 12.9 | 3 | 2.7 |
| | | Large | 100% | 0.69 | 7.9 | A | 52.5 | Northbound off-ramp | right | 13.7 | 52.5 | 20.3 |
| | | | 90% | 0.61 | 7.3 | A | 39.2 | Northbound off-ramp | right | 13.6 | 39.2 | 17.9 |
| | | | 80% | 0.54 | 6.9 | A | 29.3 | Northbound off-ramp | right | 13.5 | 29.3 | 15.7 |
| | | | 70% | 0.48 | 6.5 | A | 21.8 | Northbound off-ramp | right | 13.4 | 21.8 | 13.6 |
| | | | 60% | 0.42 | 6.4 | A | 17.5 | Northbound off-ramp | right | 13.3 | 17.5 | 11.7 |
| | | | Base x 150% | 0.75 | 8.7 | A | 67.5 | Northbound off-ramp | right | 14.1 | 67.5 | 22.9 |
| | | | Base x 130% | 0.71 | 8.2 | A | 57.5 | Northbound off-ramp | right | 13.8 | 57.5 | 21.2 |
| | | | Closed NB Ramp | 0.47 | 6.1 | A | 16.2 | Northbound off-ramp | right | 11.8 | 16.2 | 0 |
| | | Major | 100% | 1.12 | 62.8 | E | 587.6 | Southbound off-ramp | left | 132.6 | 587.6 | 34.5 |
| | | | 90% | 0.95 | 16.7 | B | 182.1 | Southbound off-ramp | left | 29.6 | 182.1 | 28.7 |
| | | | 80% | 0.81 | 9.6 | A | 84.4 | Northbound off-ramp | right | 13.9 | 84.4 | 24.2 |
| | | | 70% | 0.69 | 7.9 | A | 52.5 | Northbound off-ramp | right | 13.7 | 52.5 | 20.3 |
| | | | 60% | 0.58 | 7.1 | A | 34.6 | Northbound off-ramp | right | 13.5 | 34.6 | 16.9 |
| | | | 50% | 0.49 | 7.3 | A | 22.8 | Northbound off-ramp | tight | 13.4 | 22.8 | 13.9 |
| | | | Base x 150% | 1.23 | 103.5 | F | 923.9 | Southbound off-ramp | left | 227.9 | 923.9 | 41.9 |
| | | | Base x 130% | 1.16 | 77.9 | F | 713.4 | Southbound off-ramp | left | 167.4 | 713.4 | 37.3 |
| | | | Closed NB Ramp | 0.62 | 6.1 | A | 27.3 | Northbound off-ramp | right | 12 | 27.3 | 0 |
| 2030 | Sunday 2pm - 3pm | Large | 100% | 0.87 | 11.0 | A | 108.6 | Southbound off-ramp | left | 17.1 | 108.6 | 27.5 |
| | | | 60% | 0.54 | 7.0 | A | 29.2 | Northbound off-ramp | right | 13.9 | 29.2 | 16.6 |
| | | Major | 100% | 1.46 | 182.1 | F | 226.1 | Southbound off-ramp | left | 418.4 | 1513.8 | 56 |
| | | | 60% | 0.74 | 8.5 | A | 62.7 | Northbound off-ramp | right | 14.2 | 62.7 | 23.2 |
| | | | 50% | 0.59 | 7.9 | A | 36.4 | Northbound off-ramp | right | 14 | 36.4 | 19.4 |

* Note: queue length shown for each intersection considered in isolation. Queue lengths at one intersection may affect the other.

# SIDRA Intersection Model Results - Monday Departure Peak

## Intersection of Link Road with Tweed Valley Way*

| Year | Time period | Event | Scenario | Intersection | | | | Worst delay | | | Movement queue distance | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Degree of saturation | Average delay | Level of service | Queue distance | Approach | Turn | Average dealy | Link Road left-turn | Tweed Vally Way right-turn |
| 2011 | Monday 10am - 11am | Base | 100% | 0.05 | 6.6 | A | 1.7 | South-Link Road | R | 10 | 1.1 | 1.7 |
| | | Moderate | 100% | 0.60 | 9.8 | B | 45.9 | South-Link Road | R | 16.8 | 3.1 | 45.9 |
| | | Large | 100% | 1.06 | 61.4 | F | 864.3 | West-Tweed Vally Way | R | 77.2 | 6.6 | 864.3 |
| | | Major | 100% | 1.50 | 368.1 | F | 3454.3 | West-Tweed Vally Way | R | 459.6 | 9.5 | 3454.3 |
| 2015 | Monday 10am - 11am | Base | 100% | 0.06 | 6.6 | A | 2 | South-Link Road | R | 10.2 | 1.3 | 2 |
| | | Moderate | 100% | 0.62 | 10.1 | B | 57.7 | South-Link Road | R | 17.4 | 3.4 | 57.7 |
| | | Large | 100% | 1.09 | 80.1 | F | 977.3 | West-Tweed Valley Way | R | 103.7 | 7 | 977.3 |
| | | | 90% | 0.99 | 27.5 | C | 519.3 | West-Tweed Valley Way | R | 33.9 | 6.3 | 519.3 |
| | | | 80% | 0.88 | 14.9 | B | 248.9 | South-Link Road | R | 26.7 | 5.7 | 248.9 |
| | | Major | 100% | 1.54 | 391.3 | F | 3598.8 | West-Tweed Valley Way | R | 496.6 | 9.8 | 3598.8 |
| | | | 70% | 1.09 | 80.1 | F | 977.3 | West-Tweed Valley Way | R | 103.7 | 7 | 977.3 |
| | | | 60% | 0.94 | 19.2 | C | 371.1 | South-Link Road | R | 30.3 | 6 | 371.1 |

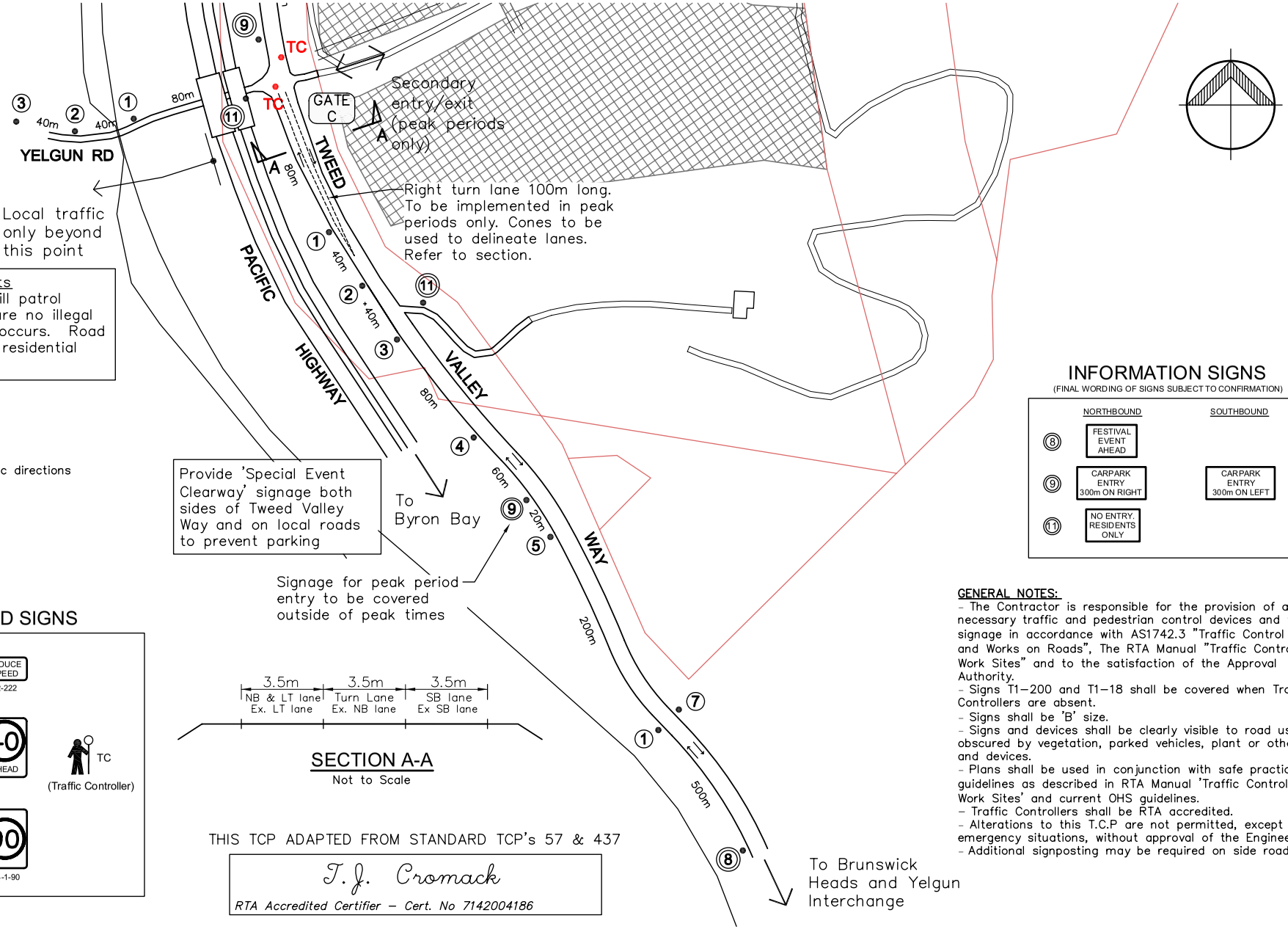
## Yelgun Interchange Roundabout*

| Year | Time period | Event | Scenario | Intersection | | | | Worst delay | | | Movement queue distance | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Degree of saturation | Average delay | Level of service | Queue distance | Approach | Turn | Average dealy | Southbound off-ramp left-turn | Northbound off-ramp through | Link Road Through | Link Road right-turn |
| 2011 | Monday 10am - 11am | Base | 100% | 0.065 | 6 | A | 2.3 | Northbound off-ramp | R | 13.1 | 0.7 | 1 | 2.3 | 2.3 |
| | | Moderate | 100% | 0.42 | 6.5 | A | 23.9 | Northbound off-ramp | R | 14.9 | 1.2 | 4.2 | 23.9 | 23.9 |
| | | Large | 100% | 0.713 | 6.9 | A | 74.7 | Northbound off-ramp | R | 18.6 | 2.6 | 12.6 | 74.7 | 74.7 |
| | | Major | 100% | 0.989 | 18.6 | B | 1332.5 | Northbound off-ramp | R | 101 | 3.8 | 120.4 | 1332.5 | 1332.5 |
| 2015 | Monday 10am - 11am | Base | 100% | 0.075 | 6 | A | 2.7 | Northbound off-ramp | R | 13.2 | 0.8 | 1.2 | 2.7 | 2.7 |
| | | Moderate | 100% | 0.432 | 6.5 | A | 24.8 | Northbound off-ramp | R | 15 | 1.4 | 4.6 | 24.8 | 24.8 |
| | | Large | 100% | 0.724 | 6.9 | A | 76.9 | Northbound off-ramp | R | 18.7 | 2.8 | 13.3 | 76.9 | 76.9 |
| | | | 90% | 0.659 | 6.8 | A | 58.6 | Northbound off-ramp | R | 17.6 | 2.5 | 10.7 | 58.6 | 58.6 |
| | | | 80% | 0.595 | 6.7 | A | 46 | Northbound off-ramp | R | 16.7 | 2.3 | 8.8 | 46 | 46 |
| | | Major | 100% | 1.053 | 206.6 | F | 1416.6 | Link Road | R | 317.7 | 4.1 | 147.5 | 1416.6 | 1416.6 |
| | | | 70% | 0.724 | 6.9 | A | 76.9 | Northbound off-ramp | R | 18.7 | 2.8 | 13.3 | 76.9 | 76.9 |
| | | | 60% | 0.638 | 6.8 | A | 52.8 | Northbound off-ramp | R | 17.2 | 2.5 | 10.1 | 52.8 | 52.8 |

* Note: queue length shown for each intersection considered in isolation. Queue lengths at one intersection may affect the other.

# Appendix E

Traffic control plans

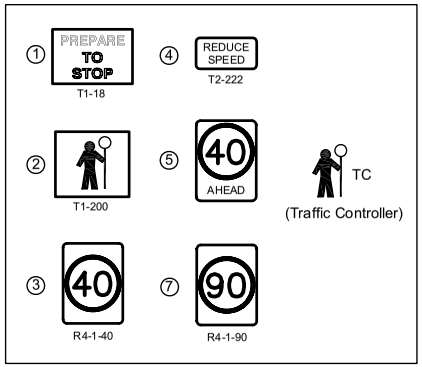



## INFORMATION SIGNS

(FINAL WORDING OF SIGNS SUBJECT TO CONFIRMATION)

| | NORTHBOUND | SOUTHBOUND |
|---|---|---|
| ⑧ | FESTIVAL EVENT AHEAD | |
| ⑨ | CARPARK ENTRY 300m ON RIGHT | CARPARK ENTRY 300m ON LEFT |
| ⑪ | NO ENTRY, RESIDENTS ONLY | |

## STANDARD SIGNS







SECTION A-A
Not to Scale

THIS TCP ADAPTED FROM STANDARD TCP's 57 & 437

T. J. Cromack
*RTA Accredited Certifier – Cert. No 7142004186*

**GENERAL NOTES:**

- The Contractor is responsible for the provision of all necessary traffic and pedestrian control devices and warning signage in accordance with AS1742.3 "Traffic Control Devices and Works on Roads", The RTA Manual "Traffic Control at Work Sites" and to the satisfaction of the Approval Authority.
- Signs T1–200 and T1–18 shall be covered when Traffic Controllers are absent.
- Signs shall be 'B' size.
- Signs and devices shall be clearly visible to road users, not obscured by vegetation, parked vehicles, plant or other signs and devices.
- Plans shall be used in conjunction with safe practices and guidelines as described in RTA Manual 'Traffic Control at Work Sites' and current OHS guidelines.
- Traffic Controllers shall be RTA accredited.
- Alterations to this T.C.P are not permitted, except in emergency situations, without approval of the Engineer.
- Additional signposting may be required on side roads.

Project:
NORTH BYRON PARKLANDS
TWEED VALLEY WAY & JONES ROAD
WOOYUNG

Client:
BILLINUDGEL PROPERTY TRUST

Title:
TRAFFIC CONTROL PLAN: SHEET 1



**ARDILL PAYNE & PARTNERS**
Consulting Civil & Structural Engineers Project Managers
Town Planners & Surveyors
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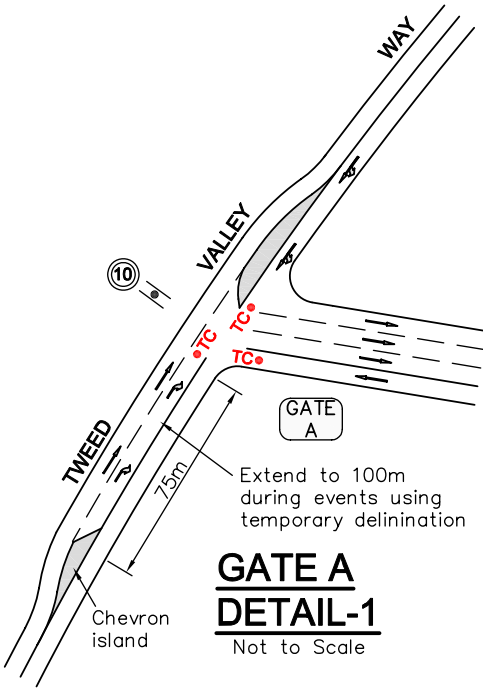
| | | | |
|---|---|---|---|
| Design | TJC | Scale at A3 | 1: 2500 |
| Drawn | TJC | Datum | - |
| Date | May 2010 | Filename | 6883-TMP |
| Checked | | Approved | |
| Job No. | 6883 | Dwg. No. | TMP.1 |
| | | Issue | D |

198




## GATE A DETAIL-1

Not to Scale

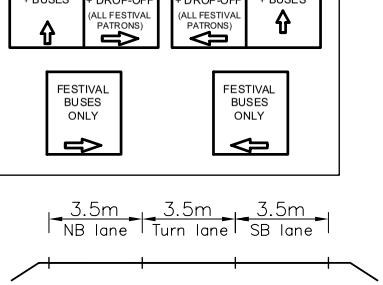
LEGEND

→ → Traffic directions

## INFORMATION SIGNS

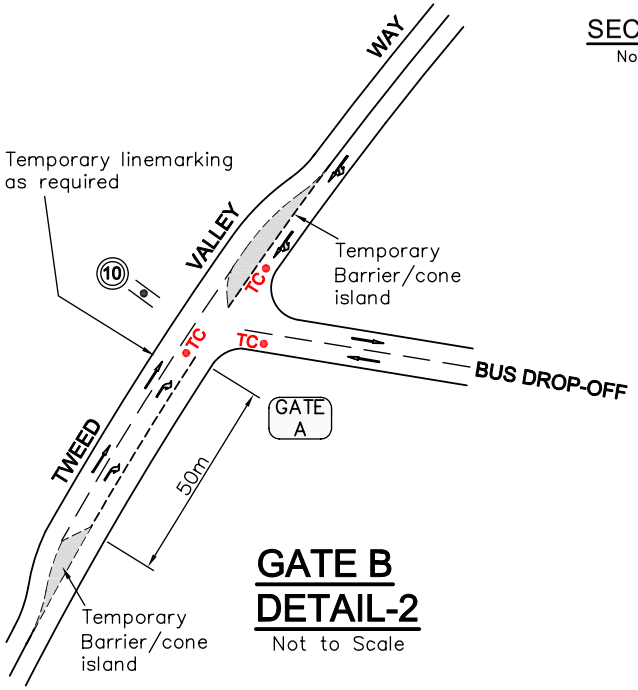
(FINAL WORDING OF SIGNS SUBJECT TO CONFIRMATION)

| | NORTHBOUND | | SOUTHBOUND | |
|---|---|---|---|---|
| 9 | CARPARK ENTRY 300m ON RIGHT | | CARPARK ENTRY 300m ON LEFT | |
| 10 | LOCAL TRAFFIC + BUSES ⇧ | CARPARK ENTRY + DROP-OFF (ALL FESTIVAL PATRONS) ⇨ | CARPARK ENTRY + DROP-OFF (ALL FESTIVAL PATRONS) ⇦ | LOCAL TRAFFIC + BUSES ⇧ |
| 16 | FESTIVAL BUSES ONLY ⇨ | | FESTIVAL BUSES ONLY ⇦ | |




## SECTION A-A

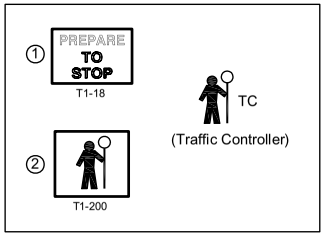
Not to Scale

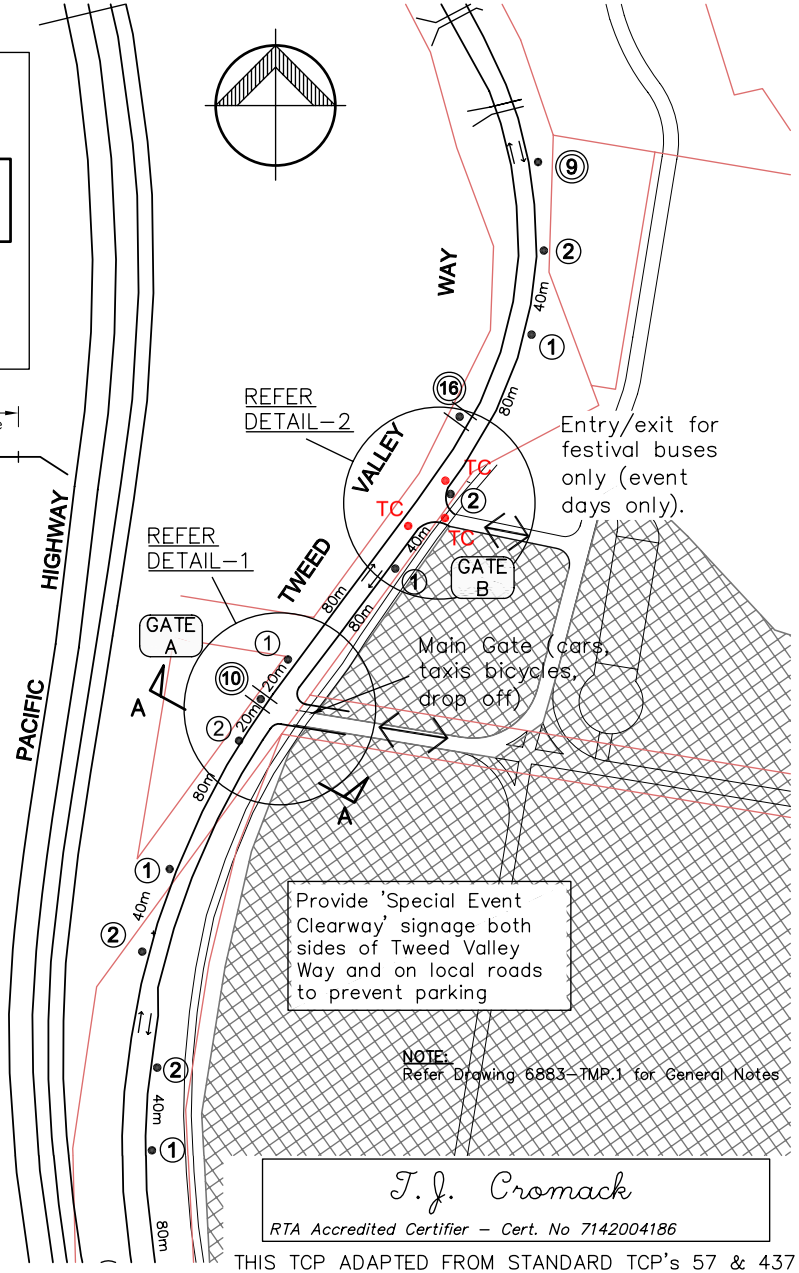



## GATE B DETAIL-2

Not to Scale

## STANDARD SIGNS




NOTE:
Refer Drawing 6883–TMP.1 for General Notes

T. J. Cromack

RTA Accredited Certifier – Cert. No 7142004186

THIS TCP ADAPTED FROM STANDARD TCP's 57 & 437

Project:
NORTH BYRON PARKLANDS
TWEED VALLEY WAY & JONES ROAD
WOOYUNG

Client:
BILLINUDGEL PROPERTY TRUST

Title:
TRAFFIC CONTROL PLAN: SHEET 2



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Website: www.ardillpayne.com.au

| | | | |
|---|---|---|---|
| Design | TJC | Scale at A3 | 1: 2500 |
| Drawn | TJC | Datum | - |
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| Checked | | Approved | |
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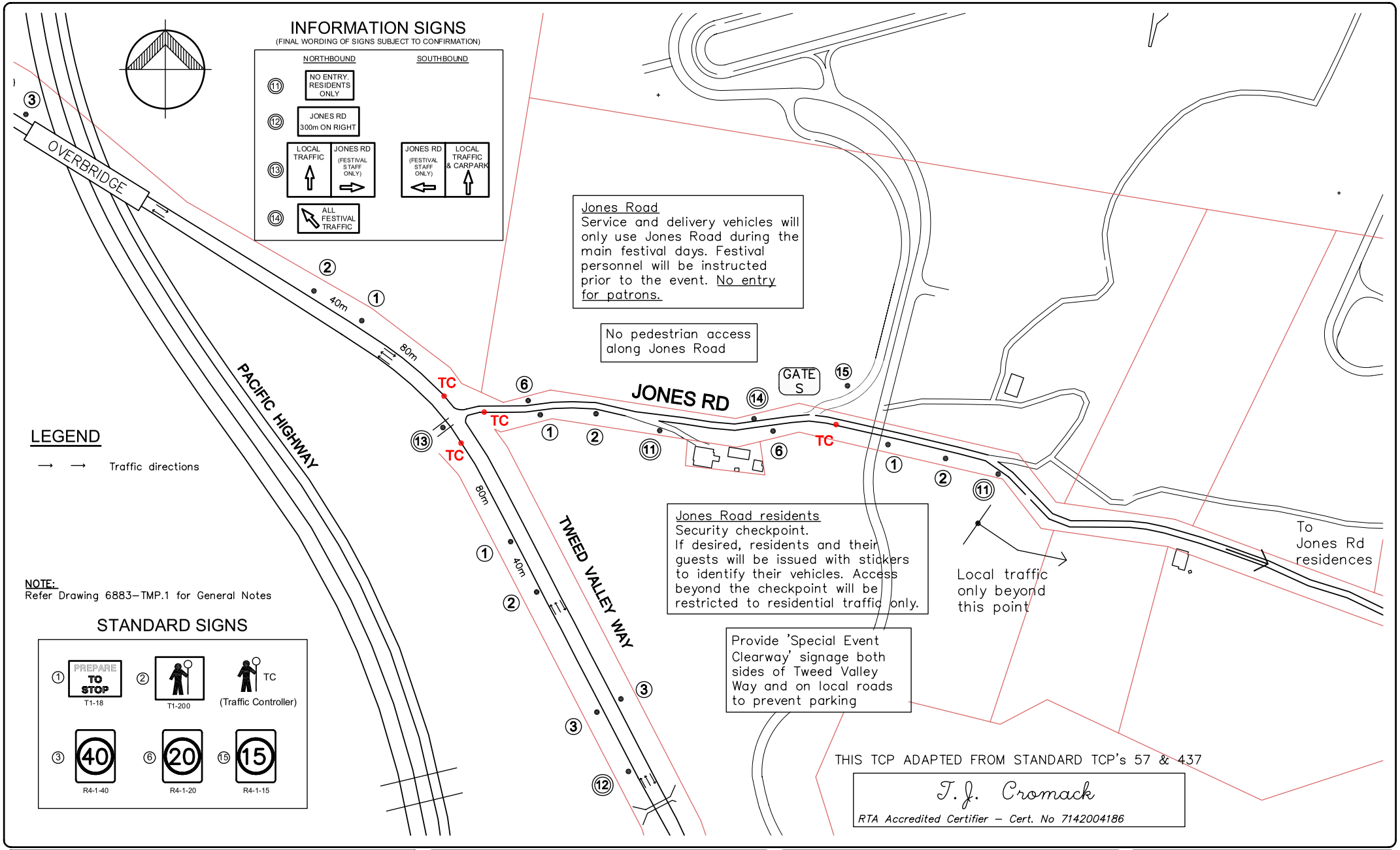
| | | Issue | D |




| | |
|---|---|
| Project: | NORTH BYRON PARKLANDS<br>TWEED VALLEY WAY & JONES ROAD<br>WOOYUNG |
| Client: | BILLINUDGEL PROPERTY TRUST |
| Title: | TRAFFIC CONTROL PLAN:<br>SHEET 3 |



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Website: www.ardillpayne.com.au

| | | | |
|---|---|---|---|
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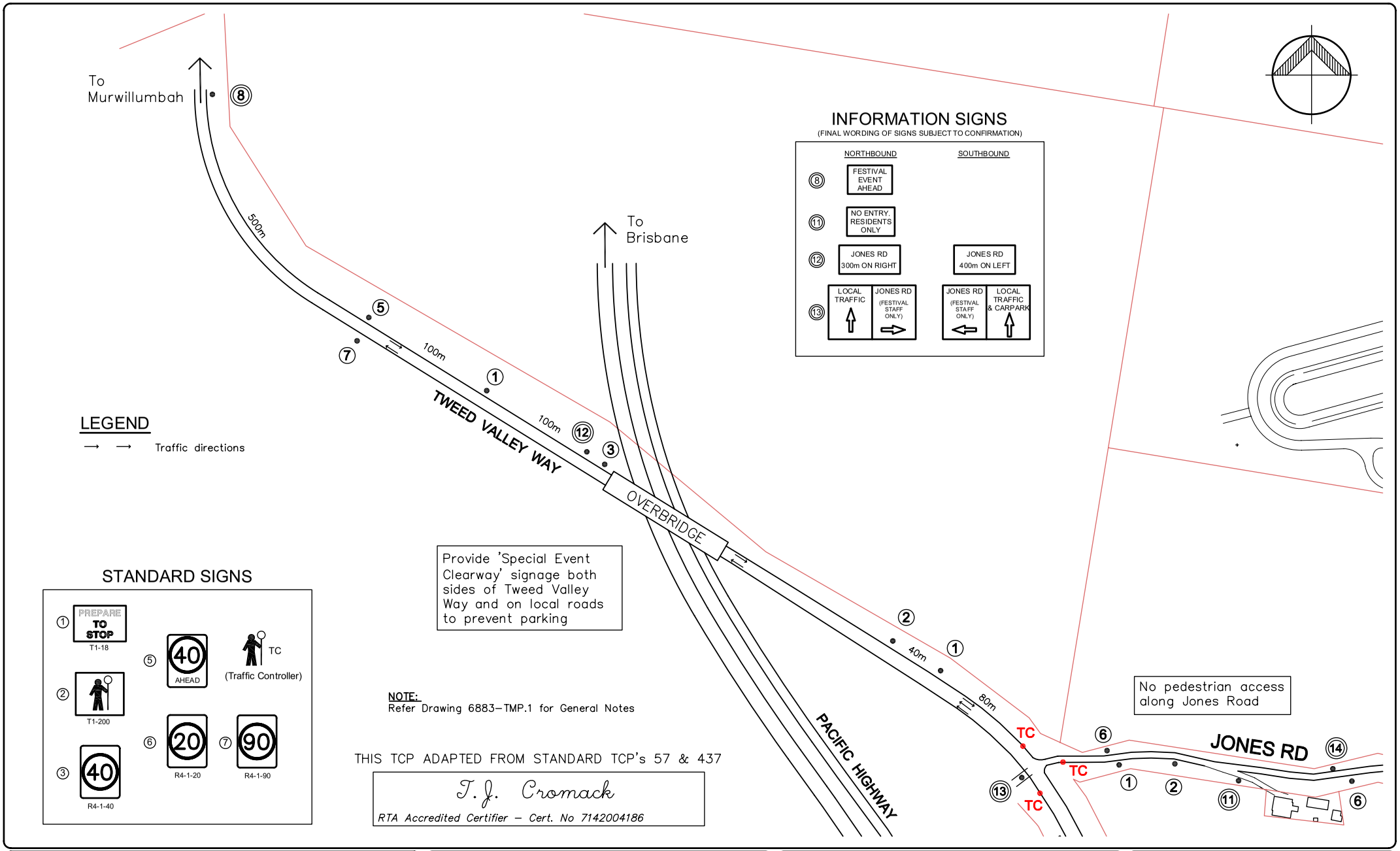


Project:
NORTH BYRON PARKLANDS
TWEED VALLEY WAY & JONES ROAD
WOOYUNG

Do not scale drawing. Use written dimensions only


Client:
BILLINUDGEL PROPERTY TRUST

Title:
TRAFFIC CONTROL PLAN: SHEET 4

ARDILL PAYNE & PARTNERS
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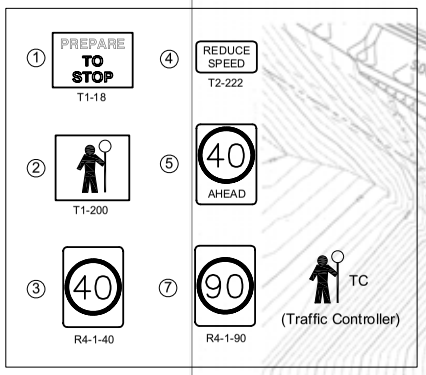
Facsimile: 02 6686 7920
Email: info@ardillpayne.com.au
Website: www.ardillpayne.com.au

| | | | |
|---|---|---|---|
| Design | TJC | Scale at A3 | 1: 2500 |
| Drawn | TJC | Datum | - |
| Date | May 2010 | Filename | 6883-TMP |
| Checked | | Approved | |
| Job No. | 6883 | Dwg. No. | TMP.4 |
| | | Issue | D |

201

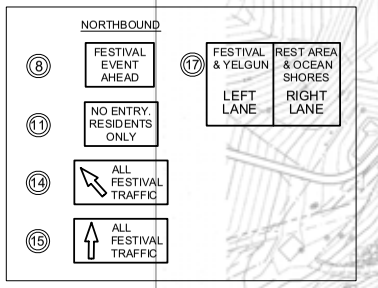
THIS TCP ADAPTED FROM STANDARD TCP's 57 & 437

## STANDARD SIGNS




## INFORMATION SIGNS

(FINAL WORDING OF SIGNS SUBJECT TO CONFIRMATION)




T. J. Cromack

*RTA Accredited Certifier – Cert. No 7142004186*

NOTE:
Refer Drawing 6883–TMP.1 for General Notes




INFORMATION DOCUMENT

31576-ID-050603-PL-YELG2-GD

S.H.10 BRUNSWICK HEADS TO YELGUN UPGRADE

YELGUN INTERCHANGE AND REST AREA DETAIL PLAN AT 03 JUNE 2005

SMEC AUSTRALIA PTY LTD

Project:
NORTH BYRON PARKLANDS
TWEED VALLEY WAY & JONES ROAD
WOOYUNG

Client:
BILLINUDGEL PROPERTY TRUST

Title:
TRAFFIC CONTROL PLAN:
SHEET 5 - YELGUN INTERCHANGE



ARDILL PAYNE & PARTNERS
Consulting Civil & Structural Engineers Project Managers
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Telephone: 02 6686 3280
Facsimile: 02 6686 7920
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Website: www.ardillpayne.com.au

| | | | |
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| Drawn | TJC | Datum | - |
| Date | May 10 | Filename | 6883-TMP5 |
| Checked | | Approved | |
| Job No. | 6883 | Dwg. No. | TMP.5 |
| | | Issue | C |

# Appendix F

Site capacity calculations

## North Byron Parklands - Site capacity transport mode share analysis - @ 2.5 persons/vehicle

| Mode | Event | MINOR | | | | SMALL | | | | MODERATE | | | MAJOR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Scenario | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | D1 | E1 | E2 | E3 | E5 | E6 | E7 | F1 | F2 | F3 |
| | Duration | Multi | Multi | Single | Multi | Multi | Single | Multi | Multi | Multi | Multi | Multi | Single | Multi | Single | Multi | Multi | Multi | Multi | Multi | Multi | Single |
| | Patrons | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| | | 300 | 300 | 0 | 300 | 3000 | 0 | 2000 | 1500 | 10000 | 10000 | 10000 | 0 | 20000 | 0 | 10000 | 17500 | 20000 | 25000 | 25000 | 25000 | |
| | % Bus/Coach | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% |
| | # by Bus/Coach | 21 | 21 | 0 | 21 | 210 | 0 | 140 | 105 | 700 | 700 | 700 | 0 | 1400 | 0 | 700 | 1225 | 1400 | 1750 | 1750 | 1750 | 0 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Campers | # by Bicycle/Other | 3 | 3 | 0 | 3 | 30 | 0 | 20 | 15 | 100 | 100 | 100 | 0 | 200 | 0 | 100 | 175 | 200 | 250 | 250 | 250 | 0 |
| | % Car | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% |
| | # by Car | 264 | 264 | 0 | 264 | 2640 | 0 | 1760 | 1320 | 8800 | 8800 | 8800 | 0 | 17600 | 0 | 8800 | 15400 | 17600 | 22000 | 22000 | 22000 | 0 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 12 | 12 | 0 | 12 | 120 | 0 | 80 | 60 | 400 | 400 | 400 | 0 | 800 | 0 | 400 | 700 | 800 | 1000 | 1000 | 1000 | 0 |
| | | 0 | 0 | 300 | 0 | 0 | 3000 | 1000 | 1500 | 0 | 0 | 0 | 15000 | 0 | 20000 | 10000 | 17500 | 20000 | 20000 | 25000 | 25000 | 50000 |
| | % Bus/Coach | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% |
| | # by Bus/Coach | 0 | 0 | 120 | 0 | 0 | 1200 | 400 | 600 | 0 | 0 | 0 | 6000 | 0 | 8000 | 4000 | 7000 | 8000 | 8000 | 10000 | 10000 | 20000 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Day Patrons | # by Bicycle/Other | 0 | 0 | 3 | 0 | 0 | 30 | 10 | 15 | 0 | 0 | 0 | 150 | 0 | 200 | 100 | 175 | 200 | 200 | 250 | 250 | 500 |
| | % Car | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% |
| | # by Car | 0 | 0 | 165 | 0 | 0 | 1650 | 550 | 825 | 0 | 0 | 0 | 8250 | 0 | 11000 | 5500 | 9625 | 11000 | 11000 | 13750 | 13750 | 27500 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 0 | 0 | 12 | 0 | 0 | 120 | 40 | 60 | 0 | 0 | 0 | 600 | 0 | 800 | 400 | 700 | 800 | 800 | 1000 | 1000 | 2000 |
| | # by Bus/Coach | 21 | 21 | 120 | 21 | 210 | 1200 | 540 | 705 | 700 | 700 | 700 | 6000 | 1400 | 8000 | 4700 | 8225 | 9400 | 9750 | 11750 | 11750 | 20000 |
| Total | # by Bicycle/Other | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| | # by Car | 264 | 264 | 165 | 264 | 2640 | 1650 | 2310 | 2145 | 8800 | 8800 | 8800 | 8250 | 17600 | 11000 | 14300 | 25025 | 28600 | 33000 | 35750 | 35750 | 27500 |
| | # by Taxi/Lift | 12 | 12 | 12 | 12 | 120 | 120 | 120 | 120 | 400 | 400 | 400 | 600 | 800 | 800 | 800 | 1400 | 1600 | 1800 | 2000 | 2000 | 2000 |
| Sustainable Modes | % | ***8%*** | ***8%*** | ***41%*** | ***8%*** | ***8%*** | ***41%*** | ***19%*** | ***25%*** | ***8%*** | ***8%*** | ***8%*** | ***41%*** | ***8%*** | ***41%*** | ***25%*** | ***25%*** | ***25%*** | ***23%*** | ***25%*** | ***25%*** | ***41%*** |
| | Number | ***24*** | ***24*** | ***123*** | ***24*** | ***240*** | ***1230*** | ***570*** | ***735*** | ***800*** | ***800*** | ***800*** | ***6150*** | ***1600*** | ***8200*** | ***4900*** | ***8575*** | ***9800*** | ***10200*** | ***12250*** | ***12250*** | ***20500*** |
| | % | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% |
| Bus | passengers | 15 | 15 | 84 | 15 | 147 | 840 | 378 | 494 | 490 | 490 | 490 | 4200 | 980 | 5600 | 3290 | 5758 | 6580 | 6825 | 8225 | 8225 | 14000 |
| | Inbound trips | 0 | 0 | 2 | 0 | 3 | 17 | 8 | 10 | 10 | 10 | 10 | 84 | 20 | 112 | 66 | 115 | 132 | 137 | 165 | 165 | 280 |
| | % | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% |
| Coach | passengers | 6 | 6 | 36 | 6 | 63 | 360 | 162 | 212 | 210 | 210 | 210 | 1800 | 420 | 2400 | 1410 | 2468 | 2820 | 2925 | 3525 | 3525 | 6000 |
| | Vehicles | 1 | 1 | 1 | 1 | 2 | 8 | 4 | 5 | 5 | 5 | 5 | 36 | 9 | 48 | 29 | 50 | 57 | 59 | 71 | 71 | 120 |
| | % | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| Cycle | passengers | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Walk | passengers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 88% | 88% | 55% | 88% | 88% | 55% | 77% | 72% | 88% | 88% | 88% | 55% | 88% | 55% | 72% | 72% | 72% | 73% | 72% | 72% | 55% |
| Car | passengers | 264 | 264 | 165 | 264 | 2640 | 1650 | 2310 | 2145 | 8800 | 8800 | 8800 | 8250 | 17600 | 11000 | 14300 | 25025 | 28600 | 33000 | 35750 | 35750 | 27500 |
| | Vehicles | 105.6 | 105.6 | 66 | 105.6 | 1056 | 660 | 924 | 858 | 3520 | 3520 | 3520 | 3300 | 7040 | 4400 | 5720 | 10010 | 11440 | 13200 | 14300 | 14300 | 11000 |
| | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Taxi | passengers | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 5 | 15 | 15 | 15 | 22.5 | 30 | 30 | 30 | 52.5 | 60 | 67.5 | 75 | 75 | 75 |
| | Vehicles | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 6 | 6 | 6 | 9 | 12 | 12 | 12 | 21 | 24 | 27 | 30 | 30 | 30 |
| | % | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| Drop Off | passengers | 12 | 12 | 12 | 12 | 116 | 116 | 116 | 116 | 385 | 385 | 385 | 577.5 | 770 | 770 | 770 | 1347.5 | 1540 | 1732.5 | 1925 | 1925 | 1925 |
| | Vehicles | 5 | 5 | 5 | 5 | 47 | 47 | 47 | 47 | 154 | 154 | 154 | 231 | 308 | 308 | 308 | 539 | 616 | 693 | 770 | 770 | 770 |
| **Grand Total** | | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| Cars | (Parked on site) | 106 | 106 | 66 | 106 | 1056 | 660 | 924 | 858 | 3520 | 3520 | 3520 | 3300 | 7040 | 4400 | 5720 | 10010 | 11440 | 13200 | 14300 | 14300 | 11000 |
| Car based traffic | (drop-off, taxi) | 6 | 6 | 6 | 6 | 49 | 49 | 49 | 49 | 160 | 160 | 160 | 240 | 320 | 320 | 320 | 560 | 640 | 720 | 800 | 800 | 800 |
| PT Traffic | (Bus, coach) | 1 | 1 | 3 | 1 | 5 | 25 | 12 | 15 | 15 | 15 | 15 | 120 | 29 | 160 | 95 | 165 | 189 | 196 | 236 | 236 | 400 |
| **Total traffic** | | **113** | **113** | **75** | **113** | **1110** | **734** | **985** | **922** | **3695** | **3695** | **3695** | **3660** | **7389** | **4880** | **6135** | **10735** | **12269** | **14116** | **15336** | **15336** | **12200** |

## North Byron Parklands - Site capacity transport mode share analysis - @ 2.9 persons/vehicle

| Mode | Event | MINOR | | | | SMALL | | | | MODERATE | | | MAJOR | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Scenario | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | D1 | E1 | E2 | E3 | E5 | E6 | E7 | F1 | F2 | F3 |
| | Duration | Multi | Multi | Single | Multi | Multi | Single | Multi | Multi | Multi | Multi | Multi | Single | Multi | Single | Multi | Multi | Multi | Multi | Multi | Multi | Single |
| | Patrons | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| Campers | | 300 | 300 | 0 | 300 | 3000 | 0 | 2000 | 1500 | 10000 | 10000 | 10000 | 0 | 20000 | 0 | 10000 | 17500 | 20000 | 25000 | 25000 | 25000 | |
| | % Bus/Coach | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% |
| | # by Bus/Coach | 21 | 21 | 0 | 21 | 210 | 0 | 140 | 105 | 700 | 700 | 700 | 0 | 1400 | 0 | 700 | 1225 | 1400 | 1750 | 1750 | 1750 | 0 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | # by Bicycle/Other | 3 | 3 | 0 | 3 | 30 | 0 | 20 | 15 | 100 | 100 | 100 | 0 | 200 | 0 | 100 | 175 | 200 | 250 | 250 | 250 | 0 |
| | % Car | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% |
| | # by Car | 264 | 264 | 0 | 264 | 2640 | 0 | 1760 | 1320 | 8800 | 8800 | 8800 | 0 | 17600 | 0 | 8800 | 15400 | 17600 | 22000 | 22000 | 22000 | 0 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 12 | 12 | 0 | 12 | 120 | 0 | 80 | 60 | 400 | 400 | 400 | 0 | 800 | 0 | 400 | 700 | 800 | 1000 | 1000 | 1000 | 0 |
| Day Patrons | | 0 | 0 | 300 | 0 | 0 | 3000 | 1000 | 1500 | 0 | 0 | 0 | 15000 | 0 | 20000 | 10000 | 17500 | 20000 | 20000 | 25000 | 25000 | 50000 |
| | % Bus/Coach | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% |
| | # by Bus/Coach | 0 | 0 | 120 | 0 | 0 | 1200 | 400 | 600 | 0 | 0 | 0 | 6000 | 0 | 8000 | 4000 | 7000 | 8000 | 8000 | 10000 | 10000 | 20000 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | # by Bicycle/Other | 0 | 0 | 3 | 0 | 0 | 30 | 10 | 15 | 0 | 0 | 0 | 150 | 0 | 200 | 100 | 175 | 200 | 200 | 250 | 250 | 500 |
| | % Car | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% |
| | # by Car | 0 | 0 | 165 | 0 | 0 | 1650 | 550 | 825 | 0 | 0 | 0 | 8250 | 0 | 11000 | 5500 | 9625 | 11000 | 11000 | 13750 | 13750 | 27500 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 0 | 0 | 12 | 0 | 0 | 120 | 40 | 60 | 0 | 0 | 0 | 600 | 0 | 800 | 400 | 700 | 800 | 800 | 1000 | 1000 | 2000 |
| Total | # by Bus/Coach | 21 | 21 | 120 | 21 | 210 | 1200 | 540 | 705 | 700 | 700 | 700 | 6000 | 1400 | 8000 | 4700 | 8225 | 9400 | 9750 | 11750 | 11750 | 20000 |
| | # by Bicycle/Other | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| | # by Car | 264 | 264 | 165 | 264 | 2640 | 1650 | 2310 | 2145 | 8800 | 8800 | 8800 | 8250 | 17600 | 11000 | 14300 | 25025 | 28600 | 33000 | 35750 | 35750 | 27500 |
| | # by Taxi/Lift | 12 | 12 | 12 | 12 | 120 | 120 | 120 | 120 | 400 | 400 | 400 | 600 | 800 | 800 | 800 | 1400 | 1600 | 1800 | 2000 | 2000 | 2000 |
| Sustainable Modes | % | ***8%*** | ***8%*** | ***41%*** | ***8%*** | ***8%*** | ***41%*** | ***19%*** | ***25%*** | ***8%*** | ***8%*** | ***8%*** | ***41%*** | ***8%*** | ***41%*** | ***25%*** | ***25%*** | ***25%*** | ***23%*** | ***25%*** | ***25%*** | ***41%*** |
| | Number | ***24*** | ***24*** | ***123*** | ***24*** | ***240*** | ***1230*** | ***570*** | ***735*** | ***800*** | ***800*** | ***800*** | ***6150*** | ***1600*** | ***8200*** | ***4900*** | ***8575*** | ***9800*** | ***10200*** | ***12250*** | ***12250*** | ***20500*** |
| Bus | % | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% |
| | passengers | 15 | 15 | 84 | 15 | 147 | 840 | 378 | 494 | 490 | 490 | 490 | 4200 | 980 | 5600 | 3290 | 5758 | 6580 | 6825 | 8225 | 8225 | 14000 |
| | Inbound trips | 0 | 0 | 2 | 0 | 3 | 17 | 8 | 10 | 10 | 10 | 10 | 84 | 20 | 112 | 66 | 115 | 132 | 137 | 165 | 165 | 280 |
| Coach | % | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% |
| | passengers | 6 | 6 | 36 | 6 | 63 | 360 | 162 | 212 | 210 | 210 | 210 | 1800 | 420 | 2400 | 1410 | 2468 | 2820 | 2925 | 3525 | 3525 | 6000 |
| | Vehicles | 1 | 1 | 1 | 1 | 2 | 8 | 4 | 5 | 5 | 5 | 5 | 36 | 9 | 48 | 29 | 50 | 57 | 59 | 71 | 71 | 120 |
| Cycle | % | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | passengers | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| Walk | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| | passengers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Car | % | 88% | 88% | 55% | 88% | 88% | 55% | 77% | 72% | 88% | 88% | 88% | 55% | 88% | 55% | 72% | 72% | 72% | 73% | 72% | 72% | 55% |
| | passengers | 264 | 264 | 165 | 264 | 2640 | 1650 | 2310 | 2145 | 8800 | 8800 | 8800 | 8250 | 17600 | 11000 | 14300 | 25025 | 28600 | 33000 | 35750 | 35750 | 27500 |
| | Vehicles | 91 | 91 | 57 | 91 | 910 | 569 | 797 | 740 | 3034 | 3034 | 3034 | 2845 | 6069 | 3793 | 4931 | 8629 | 9862 | 11379 | 12328 | 12328 | 9483 |
| Taxi | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| | passengers | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 5 | 15 | 15 | 15 | 22.5 | 30 | 30 | 30 | 52.5 | 60 | 67.5 | 75 | 75 | 75 |
| | Vehicles | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 6 | 6 | 6 | 8 | 11 | 11 | 11 | 19 | 21 | 24 | 26 | 26 | 26 |
| Drop Off | % | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | passengers | 12 | 12 | 12 | 12 | 116 | 116 | 116 | 116 | 385 | 385 | 385 | 577.5 | 770 | 770 | 770 | 1347.5 | 1540 | 1732.5 | 1925 | 1925 | 1925 |
| | Vehicles | 4 | 4 | 4 | 4 | 40 | 40 | 40 | 40 | 133 | 133 | 133 | 200 | 266 | 266 | 266 | 465 | 532 | 598 | 664 | 664 | 664 |
| **Grand Total** | | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| Cars | (Parked on site) | 91 | 91 | 57 | 91 | 910 | 569 | 797 | 740 | 3034 | 3034 | 3034 | 2845 | 6069 | 3793 | 4931 | 8629 | 9862 | 11379 | 12328 | 12328 | 9483 |
| Car based traffic | (drop-off, taxi) | 5 | 5 | 5 | 5 | 42 | 42 | 42 | 42 | 139 | 139 | 139 | 208 | 277 | 277 | 277 | 484 | 553 | 622 | 690 | 690 | 690 |
| PT Traffic | (Bus, coach) | 1 | 1 | 3 | 1 | 5 | 25 | 12 | 15 | 15 | 15 | 15 | 120 | 29 | 160 | 95 | 165 | 189 | 196 | 236 | 236 | 400 |
| **Total traffic** | | **97** | **97** | **65** | **97** | **957** | **636** | **851** | **797** | **3188** | **3188** | **3188** | **3173** | **6375** | **4230** | **5303** | **9278** | **10604** | **12197** | **13254** | **13254** | **10573** |

## North Byron Parklands - Site capacity transport mode share analysis - @ 3.2 persons/vehicle

| Mode | Event | MINOR | | | | SMALL | | | | MODERATE | | | MAJOR | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Scenario | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | D1 | E1 | E2 | E3 | E5 | E6 | E7 | F1 | F2 | F3 |
| | Duration | Multi | Multi | Single | Multi | Multi | Single | Multi | Multi | Multi | Multi | Multi | Single | Multi | Single | Multi | Multi | Multi | Multi | Multi | Multi | Single |
| | Patrons | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| Campers | | 300 | 300 | 0 | 300 | 3000 | 0 | 2000 | 1500 | 10000 | 10000 | 10000 | 0 | 20000 | 0 | 10000 | 17500 | 20000 | 25000 | 25000 | 25000 | |
| | % Bus/Coach | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% | 7% |
| | # by Bus/Coach | 21 | 21 | 0 | 21 | 210 | 0 | 140 | 105 | 700 | 700 | 700 | 0 | 1400 | 0 | 700 | 1225 | 1400 | 1750 | 1750 | 1750 | 0 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | # by Bicycle/Other | 3 | 3 | 0 | 3 | 30 | 0 | 20 | 15 | 100 | 100 | 100 | 0 | 200 | 0 | 100 | 175 | 200 | 250 | 250 | 250 | 0 |
| | % Car | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% | 88% |
| | # by Car | 264 | 264 | 0 | 264 | 2640 | 0 | 1760 | 1320 | 8800 | 8800 | 8800 | 0 | 17600 | 0 | 8800 | 15400 | 17600 | 22000 | 22000 | 22000 | 0 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 12 | 12 | 0 | 12 | 120 | 0 | 80 | 60 | 400 | 400 | 400 | 0 | 800 | 0 | 400 | 700 | 800 | 1000 | 1000 | 1000 | 0 |
| Day Patrons | | 0 | 0 | 300 | 0 | 0 | 3000 | 1000 | 1500 | 0 | 0 | 0 | 15000 | 0 | 20000 | 10000 | 17500 | 20000 | 20000 | 25000 | 25000 | 50000 |
| | % Bus/Coach | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% |
| | # by Bus/Coach | 0 | 0 | 120 | 0 | 0 | 1200 | 400 | 600 | 0 | 0 | 0 | 6000 | 0 | 8000 | 4000 | 7000 | 8000 | 8000 | 10000 | 10000 | 20000 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | # by Bicycle/Other | 0 | 0 | 3 | 0 | 0 | 30 | 10 | 15 | 0 | 0 | 0 | 150 | 0 | 200 | 100 | 175 | 200 | 200 | 250 | 250 | 500 |
| | % Car | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% | 55% |
| | # by Car | 0 | 0 | 165 | 0 | 0 | 1650 | 550 | 825 | 0 | 0 | 0 | 8250 | 0 | 11000 | 5500 | 9625 | 11000 | 11000 | 13750 | 13750 | 27500 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 0 | 0 | 12 | 0 | 0 | 120 | 40 | 60 | 0 | 0 | 0 | 600 | 0 | 800 | 400 | 700 | 800 | 800 | 1000 | 1000 | 2000 |
| Total | # by Bus/Coach | 21 | 21 | 120 | 21 | 210 | 1200 | 540 | 705 | 700 | 700 | 700 | 6000 | 1400 | 8000 | 4700 | 8225 | 9400 | 9750 | 11750 | 11750 | 20000 |
| | # by Bicycle/Other | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| | # by Car | 264 | 264 | 165 | 264 | 2640 | 1650 | 2310 | 2145 | 8800 | 8800 | 8800 | 8250 | 17600 | 11000 | 14300 | 25025 | 28600 | 33000 | 35750 | 35750 | 27500 |
| | # by Taxi/Lift | 12 | 12 | 12 | 12 | 120 | 120 | 120 | 120 | 400 | 400 | 400 | 600 | 800 | 800 | 800 | 1400 | 1600 | 1800 | 2000 | 2000 | 2000 |
| Sustainable Modes | % | ***8%*** | ***8%*** | ***41%*** | ***8%*** | ***8%*** | ***41%*** | ***19%*** | ***25%*** | ***8%*** | ***8%*** | ***8%*** | ***41%*** | ***8%*** | ***41%*** | ***25%*** | ***25%*** | ***25%*** | ***23%*** | ***25%*** | ***25%*** | ***41%*** |
| | Number | ***24*** | ***24*** | ***123*** | ***24*** | ***240*** | ***1230*** | ***570*** | ***735*** | ***800*** | ***800*** | ***800*** | ***6150*** | ***1600*** | ***8200*** | ***4900*** | ***8575*** | ***9800*** | ***10200*** | ***12250*** | ***12250*** | ***20500*** |
| Bus | % | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% |
| | passengers | 15 | 15 | 84 | 15 | 147 | 840 | 378 | 494 | 490 | 490 | 490 | 4200 | 980 | 5600 | 3290 | 5758 | 6580 | 6825 | 8225 | 8225 | 14000 |
| | Inbound trips | 0 | 0 | 2 | 0 | 3 | 17 | 8 | 10 | 10 | 10 | 10 | 84 | 20 | 112 | 66 | 115 | 132 | 137 | 165 | 165 | 280 |
| Coach | % | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% |
| | passengers | 6 | 6 | 36 | 6 | 63 | 360 | 162 | 212 | 210 | 210 | 210 | 1800 | 420 | 2400 | 1410 | 2468 | 2820 | 2925 | 3525 | 3525 | 6000 |
| | Vehicles | 1 | 1 | 1 | 1 | 2 | 8 | 4 | 5 | 5 | 5 | 5 | 36 | 9 | 48 | 29 | 50 | 57 | 59 | 71 | 71 | 120 |
| Cycle | % | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | passengers | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| Walk | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| | passengers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Car | % | 88% | 88% | 55% | 88% | 88% | 55% | 77% | 72% | 88% | 88% | 88% | 55% | 88% | 55% | 72% | 72% | 72% | 73% | 72% | 72% | 55% |
| | passengers | 264 | 264 | 165 | 264 | 2640 | 1650 | 2310 | 2145 | 8800 | 8800 | 8800 | 8250 | 17600 | 11000 | 14300 | 25025 | 28600 | 33000 | 35750 | 35750 | 27500 |
| | Vehicles | 83 | 83 | 52 | 83 | 825 | 516 | 722 | 670 | 2750 | 2750 | 2750 | 2578 | 5500 | 3438 | 4469 | 7820 | 8938 | 10313 | 11172 | 11172 | 8594 |
| Taxi | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| | passengers | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 5 | 15 | 15 | 15 | 22.5 | 30 | 30 | 30 | 52.5 | 60 | 67.5 | 75 | 75 | 75 |
| | Vehicles | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 5 | 5 | 5 | 8 | 10 | 10 | 10 | 17 | 19 | 22 | 24 | 24 | 24 |
| Drop Off | % | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | passengers | 12 | 12 | 12 | 12 | 116 | 116 | 116 | 116 | 385 | 385 | 385 | 577.5 | 770 | 770 | 770 | 1347.5 | 1540 | 1732.5 | 1925 | 1925 | 1925 |
| | Vehicles | 4 | 4 | 4 | 4 | 37 | 37 | 37 | 37 | 121 | 121 | 121 | 181 | 241 | 241 | 241 | 422 | 482 | 542 | 602 | 602 | 602 |
| **Grand Total** | | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| Cars | (Parked on site) | 83 | 83 | 52 | 83 | 825 | 516 | 722 | 670 | 2750 | 2750 | 2750 | 2578 | 5500 | 3438 | 4469 | 7820 | 8938 | 10313 | 11172 | 11172 | 8594 |
| Car based traffic | (drop-off, taxi) | 5 | 5 | 5 | 5 | 39 | 39 | 39 | 39 | 126 | 126 | 126 | 189 | 251 | 251 | 251 | 439 | 501 | 564 | 626 | 626 | 626 |
| PT Traffic | (Bus, coach) | 1 | 1 | 3 | 1 | 5 | 25 | 12 | 15 | 15 | 15 | 15 | 120 | 29 | 160 | 95 | 165 | 189 | 196 | 236 | 236 | 400 |
| **Total traffic** | | **89** | **89** | **60** | **89** | **869** | **580** | **773** | **724** | **2891** | **2891** | **2891** | **2887** | **5780** | **3849** | **4815** | **8424** | **9628** | **11073** | **12034** | **12034** | **9620** |

## North Byron Parklands - Site capacity transport mode share analysis - @ 2.5 persons/vehicle & 55% Non-Car

| Mode | Event | MINOR | | | | SMALL | | | | MODERATE | | | MAJOR | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Scenario | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | D1 | E1 | E2 | E3 | E5 | E6 | E7 | F1 | F2 | F3 |
| | Duration | Multi | Multi | Single | Multi | Multi | Single | Multi | Multi | Multi | Multi | Multi | Single | Multi | Single | Multi | Multi | Multi | Multi | Multi | Multi | Single |
| | Patrons | 300 | 300 | 300 | 300 | 3000 | 3000 | 3000 | 3000 | 10000 | 10000 | 10000 | 15000 | 20000 | 20000 | 20000 | 35000 | 40000 | 45000 | 50000 | 50000 | 50000 |
| Campers | | 300 | 300 | 0 | 300 | 3000 | 0 | 2000 | 1500 | 10000 | 10000 | 10000 | 0 | 20000 | 0 | 10000 | 17500 | 20000 | 25000 | 25000 | 25000 | |
| | % Bus/Coach | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% |
| | # by Bus/Coach | 66 | 66 | 0 | 66 | 660 | 0 | 440 | 330 | 2200 | 2200 | 2200 | 0 | 4400 | 0 | 2200 | 3850 | 4400 | 5500 | 5500 | 5500 | 0 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | # by Bicycle/Other | 3 | 3 | 0 | 3 | 30 | 0 | 20 | 15 | 100 | 100 | 100 | 0 | 200 | 0 | 100 | 175 | 200 | 250 | 250 | 250 | 0 |
| | % Car | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% |
| | # by Car | 219 | 219 | 0 | 219 | 2190 | 0 | 1460 | 1095 | 7300 | 7300 | 7300 | 0 | 14600 | 0 | 7300 | 12775 | 14600 | 18250 | 18250 | 18250 | 0 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 12 | 12 | 0 | 12 | 120 | 0 | 80 | 60 | 400 | 400 | 400 | 0 | 800 | 0 | 400 | 700 | 800 | 1000 | 1000 | 1000 | 0 |
| Day Patrons | | 0 | 0 | 300 | 0 | 0 | 3000 | 1000 | 1500 | 0 | 0 | 0 | 15000 | 0 | 20000 | 10000 | 17500 | 20000 | 20000 | 25000 | 25000 | 50000 |
| | % Bus/Coach | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% |
| | # by Bus/Coach | 0 | 0 | 168 | 0 | 0 | 1680 | 560 | 840 | 0 | 0 | 0 | 8400 | 0 | 11200 | 5600 | 9800 | 11200 | 11200 | 14000 | 14000 | 28000 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | # by Bicycle/Other | 0 | 0 | 3 | 0 | 0 | 30 | 10 | 15 | 0 | 0 | 0 | 150 | 0 | 200 | 100 | 175 | 200 | 200 | 250 | 250 | 500 |
| | % Car | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% |
| | # by Car | 0 | 0 | 117 | 0 | 0 | 1170 | 390 | 585 | 0 | 0 | 0 | 5850 | 0 | 7800 | 3900 | 6825 | 7800 | 7800 | 9750 | 9750 | 19500 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 0 | 0 | 12 | 0 | 0 | 120 | 40 | 60 | 0 | 0 | 0 | 600 | 0 | 800 | 400 | 700 | 800 | 800 | 1000 | 1000 | 2000 |
| Total | # by Bus/Coach | 66 | 66 | 168 | 66 | 660 | 1680 | 1000 | 1170 | 2200 | 2200 | 2200 | 8400 | 4400 | 11200 | 7800 | 13650 | 15600 | 16700 | 19500 | 19500 | 28000 |
| | # by Bicycle/Other | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| | # by Car | 219 | 219 | 117 | 219 | 2190 | 1170 | 1850 | 1680 | 7300 | 7300 | 7300 | 5850 | 14600 | 7800 | 11200 | 19600 | 22400 | 26050 | 28000 | 28000 | 19500 |
| | # by Taxi/Lift | 12 | 12 | 12 | 12 | 120 | 120 | 120 | 120 | 400 | 400 | 400 | 600 | 800 | 800 | 800 | 1400 | 1600 | 1800 | 2000 | 2000 | 2000 |
| Sustainable Modes | % | ***23%*** | ***23%*** | ***57%*** | ***23%*** | ***23%*** | ***57%*** | ***34%*** | ***40%*** | ***23%*** | ***23%*** | ***23%*** | ***57%*** | ***23%*** | ***57%*** | ***40%*** | ***40%*** | ***40%*** | ***38%*** | ***40%*** | ***40%*** | ***57%*** |
| | Number | ***69*** | ***69*** | ***171*** | ***69*** | ***690*** | ***1710*** | ***1030*** | ***1200*** | ***2300*** | ***2300*** | ***2300*** | ***8550*** | ***4600*** | ***11400*** | ***8000*** | ***14000*** | ***16000*** | ***17150*** | ***20000*** | ***20000*** | ***28500*** |
| Bus | % | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% |
| | passengers | 46 | 46 | 118 | 46 | 462 | 1176 | 700 | 819 | 1540 | 1540 | 1540 | 5880 | 3080 | 7840 | 5460 | 9555 | 10920 | 11690 | 13650 | 13650 | 19600 |
| | Inbound trips | 1 | 1 | 2 | 1 | 9 | 24 | 14 | 16 | 31 | 31 | 31 | 118 | 62 | 157 | 109 | 191 | 218 | 234 | 273 | 273 | 392 |
| Coach | % | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% |
| | passengers | 20 | 20 | 50 | 20 | 198 | 504 | 300 | 351 | 660 | 660 | 660 | 2520 | 1320 | 3360 | 2340 | 4095 | 4680 | 5010 | 5850 | 5850 | 8400 |
| | Vehicles | 1 | 1 | 2 | 1 | 4 | 11 | 6 | 8 | 14 | 14 | 14 | 51 | 27 | 68 | 47 | 82 | 94 | 101 | 117 | 117 | 168 |
| Cycle | % | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | passengers | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| Walk | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| | passengers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Car | % | 73% | 73% | 39% | 73% | 73% | 39% | 62% | 56% | 73% | 73% | 73% | 39% | 73% | 39% | 56% | 56% | 56% | 58% | 56% | 56% | 39% |
| | passengers | 219 | 219 | 117 | 219 | 2190 | 1170 | 1850 | 1680 | 7300 | 7300 | 7300 | 5850 | 14600 | 7800 | 11200 | 19600 | 22400 | 26050 | 28000 | 28000 | 19500 |
| | Vehicles | 87.6 | 87.6 | 46.8 | 87.6 | 876 | 468 | 740 | 672 | 2920 | 2920 | 2920 | 2340 | 5840 | 3120 | 4480 | 7840 | 8960 | 10420 | 11200 | 11200 | 7800 |
| Taxi | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| | passengers | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 5 | 15 | 15 | 15 | 22.5 | 30 | 30 | 30 | 52.5 | 60 | 67.5 | 75 | 75 | 75 |
| | Vehicles | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 6 | 6 | 6 | 9 | 12 | 12 | 12 | 21 | 24 | 27 | 30 | 30 | 30 |
| Drop Off | % | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | passengers | 12 | 12 | 12 | 12 | 116 | 116 | 116 | 116 | 385 | 385 | 385 | 577.5 | 770 | 770 | 770 | 1347.5 | 1540 | 1732.5 | 1925 | 1925 | 1925 |
| | Vehicles | 5 | 5 | 5 | 5 | 47 | 47 | 47 | 47 | 154 | 154 | 154 | 231 | 308 | 308 | 308 | 539 | 616 | 693 | 770 | 770 | 770 |
| **Grand Total** | | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| Cars | (Parked on site) | 88 | 88 | 47 | 88 | 876 | 468 | 740 | 672 | 2920 | 2920 | 2920 | 2340 | 5840 | 3120 | 4480 | 7840 | 8960 | 10420 | 11200 | 11200 | 7800 |
| Car based traffic | (drop-off, taxi) | 6 | 6 | 6 | 6 | 49 | 49 | 49 | 49 | 160 | 160 | 160 | 240 | 320 | 320 | 320 | 560 | 640 | 720 | 800 | 800 | 800 |
| PT Traffic | (Bus, coach) | 2 | 2 | 4 | 2 | 13 | 35 | 20 | 24 | 45 | 45 | 45 | 169 | 89 | 225 | 156 | 273 | 312 | 335 | 390 | 390 | 560 |
| **Total traffic** | | **96** | **96** | **57** | **96** | **938** | **552** | **809** | **745** | **3125** | **3125** | **3125** | **2749** | **6249** | **3665** | **4956** | **8673** | **9912** | **11475** | **12390** | **12390** | **9160** |

## North Byron Parklands - Site capacity transport mode share analysis - @ 2.9 persons/vehicle & 55% Non-Car

| Mode | Event | MINOR | | | | SMALL | | | | MODERATE | | | MAJOR | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Scenario | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | D1 | E1 | E2 | E3 | E5 | E6 | E7 | F1 | F2 | F3 |
| | Duration | Multi | Multi | Single | Multi | Multi | Single | Multi | Multi | Multi | Multi | Multi | Single | Multi | Single | Multi | Multi | Multi | Multi | Multi | Multi | Single |
| | Patrons | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| Campers | | 300 | 300 | 0 | 300 | 3000 | 0 | 2000 | 1500 | 10000 | 10000 | 10000 | 0 | 20000 | 0 | 10000 | 17500 | 20000 | 25000 | 25000 | 25000 | |
| | % Bus/Coach | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% |
| | # by Bus/Coach | 66 | 66 | 0 | 66 | 660 | 0 | 440 | 330 | 2200 | 2200 | 2200 | 0 | 4400 | 0 | 2200 | 3850 | 4400 | 5500 | 5500 | 5500 | 0 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | # by Bicycle/Other | 3 | 3 | 0 | 3 | 30 | 0 | 20 | 15 | 100 | 100 | 100 | 0 | 200 | 0 | 100 | 175 | 200 | 250 | 250 | 250 | 0 |
| | % Car | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% |
| | # by Car | 219 | 219 | 0 | 219 | 2190 | 0 | 1460 | 1095 | 7300 | 7300 | 7300 | 0 | 14600 | 0 | 7300 | 12775 | 14600 | 18250 | 18250 | 18250 | 0 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 12 | 12 | 0 | 12 | 120 | 0 | 80 | 60 | 400 | 400 | 400 | 0 | 800 | 0 | 400 | 700 | 800 | 1000 | 1000 | 1000 | 0 |
| Day Patrons | | 0 | 0 | 300 | 0 | 0 | 3000 | 1000 | 1500 | 0 | 0 | 0 | 15000 | 0 | 20000 | 10000 | 17500 | 20000 | 20000 | 25000 | 25000 | 50000 |
| | % Bus/Coach | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% |
| | # by Bus/Coach | 0 | 0 | 168 | 0 | 0 | 1680 | 560 | 840 | 0 | 0 | 0 | 8400 | 0 | 11200 | 5600 | 9800 | 11200 | 11200 | 14000 | 14000 | 28000 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | # by Bicycle/Other | 0 | 0 | 3 | 0 | 0 | 30 | 10 | 15 | 0 | 0 | 0 | 150 | 0 | 200 | 100 | 175 | 200 | 200 | 250 | 250 | 500 |
| | % Car | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% |
| | # by Car | 0 | 0 | 117 | 0 | 0 | 1170 | 390 | 585 | 0 | 0 | 0 | 5850 | 0 | 7800 | 3900 | 6825 | 7800 | 7800 | 9750 | 9750 | 19500 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 0 | 0 | 12 | 0 | 0 | 120 | 40 | 60 | 0 | 0 | 0 | 600 | 0 | 800 | 400 | 700 | 800 | 800 | 1000 | 1000 | 2000 |
| Total | # by Bus/Coach | 66 | 66 | 168 | 66 | 660 | 1680 | 1000 | 1170 | 2200 | 2200 | 2200 | 8400 | 4400 | 11200 | 7800 | 13650 | 15600 | 16700 | 19500 | 19500 | 28000 |
| | # by Bicycle/Other | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| | # by Car | 219 | 219 | 117 | 219 | 2190 | 1170 | 1850 | 1680 | 7300 | 7300 | 7300 | 5850 | 14600 | 7800 | 11200 | 19600 | 22400 | 26050 | 28000 | 28000 | 19500 |
| | # by Taxi/Lift | 12 | 12 | 12 | 12 | 120 | 120 | 120 | 120 | 400 | 400 | 400 | 600 | 800 | 800 | 800 | 1400 | 1600 | 1800 | 2000 | 2000 | 2000 |
| Sustainable Modes | % | ***23%*** | ***23%*** | ***57%*** | ***23%*** | ***23%*** | ***57%*** | ***34%*** | ***40%*** | ***23%*** | ***23%*** | ***23%*** | ***57%*** | ***23%*** | ***57%*** | ***40%*** | ***40%*** | ***40%*** | ***38%*** | ***40%*** | ***40%*** | ***57%*** |
| | Number | ***69*** | ***69*** | ***171*** | ***69*** | ***690*** | ***1710*** | ***1030*** | ***1200*** | ***2300*** | ***2300*** | ***2300*** | ***8550*** | ***4600*** | ***11400*** | ***8000*** | ***14000*** | ***16000*** | ***17150*** | ***20000*** | ***20000*** | ***28500*** |
| Bus | % | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% |
| | passengers | 46 | 46 | 118 | 46 | 462 | 1176 | 700 | 819 | 1540 | 1540 | 1540 | 5880 | 3080 | 7840 | 5460 | 9555 | 10920 | 11690 | 13650 | 13650 | 19600 |
| | Inbound trips | 1 | 1 | 2 | 1 | 9 | 24 | 14 | 16 | 31 | 31 | 31 | 118 | 62 | 157 | 109 | 191 | 218 | 234 | 273 | 273 | 392 |
| Coach | % | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% |
| | passengers | 20 | 20 | 50 | 20 | 198 | 504 | 300 | 351 | 660 | 660 | 660 | 2520 | 1320 | 3360 | 2340 | 4095 | 4680 | 5010 | 5850 | 5850 | 8400 |
| | Vehicles | 1 | 1 | 2 | 1 | 4 | 11 | 6 | 8 | 14 | 14 | 14 | 51 | 27 | 68 | 47 | 82 | 94 | 101 | 117 | 117 | 168 |
| Cycle | % | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | passengers | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| Walk | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| | passengers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Car | % | 73% | 73% | 39% | 73% | 73% | 39% | 62% | 56% | 73% | 73% | 73% | 39% | 73% | 39% | 56% | 56% | 56% | 58% | 56% | 56% | 39% |
| | passengers | 219 | 219 | 117 | 219 | 2190 | 1170 | 1850 | 1680 | 7300 | 7300 | 7300 | 5850 | 14600 | 7800 | 11200 | 19600 | 22400 | 26050 | 28000 | 28000 | 19500 |
| | Vehicles | 76 | 76 | 40 | 76 | 755 | 403 | 638 | 579 | 2517 | 2517 | 2517 | 2017 | 5034 | 2690 | 3862 | 6759 | 7724 | 8983 | 9655 | 9655 | 6724 |
| Taxi | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| | passengers | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 5 | 15 | 15 | 15 | 22.5 | 30 | 30 | 30 | 52.5 | 60 | 67.5 | 75 | 75 | 75 |
| | Vehicles | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 6 | 6 | 6 | 8 | 11 | 11 | 11 | 19 | 21 | 24 | 26 | 26 | 26 |
| Drop Off | % | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | passengers | 12 | 12 | 12 | 12 | 116 | 116 | 116 | 116 | 385 | 385 | 385 | 577.5 | 770 | 770 | 770 | 1347.5 | 1540 | 1732.5 | 1925 | 1925 | 1925 |
| | Vehicles | 4 | 4 | 4 | 4 | 40 | 40 | 40 | 40 | 133 | 133 | 133 | 200 | 266 | 266 | 266 | 465 | 532 | 598 | 664 | 664 | 664 |
| **Grand Total** | | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| Cars | (Parked on site) | 76 | 76 | 40 | 76 | 755 | 403 | 638 | 579 | 2517 | 2517 | 2517 | 2017 | 5034 | 2690 | 3862 | 6759 | 7724 | 8983 | 9655 | 9655 | 6724 |
| Car based traffic | (drop-off, taxi) | 5 | 5 | 5 | 5 | 42 | 42 | 42 | 42 | 139 | 139 | 139 | 208 | 277 | 277 | 277 | 484 | 553 | 622 | 690 | 690 | 690 |
| PT Traffic | (Bus, coach) | 2 | 2 | 4 | 2 | 13 | 35 | 20 | 24 | 45 | 45 | 45 | 169 | 89 | 225 | 156 | 273 | 312 | 335 | 390 | 390 | 560 |
| **Total traffic** | | **83** | **83** | **49** | **83** | **810** | **480** | **700** | **645** | **2701** | **2701** | **2701** | **2394** | **5400** | **3192** | **4295** | **7516** | **8589** | **9940** | **10735** | **10735** | **7974** |

## North Byron Parklands - Site capacity transport mode share analysis - @ 3.2 persons/vehicle & 55% Non-Car

| Mode | Event | MINOR | | | | SMALL | | | | MODERATE | | | MAJOR | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Scenario | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | D1 | E1 | E2 | E3 | E5 | E6 | E7 | F1 | F2 | F3 |
| | Duration | Multi | Multi | Single | Multi | Multi | Single | Multi | Multi | Multi | Multi | Multi | Single | Multi | Single | Multi | Multi | Multi | Multi | Multi | Multi | Single |
| | Patrons | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| Campers | | 300 | 300 | 0 | 300 | 3000 | 0 | 2000 | 1500 | 10000 | 10000 | 10000 | 0 | 20000 | 0 | 10000 | 17500 | 20000 | 25000 | 25000 | 25000 | |
| | % Bus/Coach | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% | 22% |
| | # by Bus/Coach | 66 | 66 | 0 | 66 | 660 | 0 | 440 | 330 | 2200 | 2200 | 2200 | 0 | 4400 | 0 | 2200 | 3850 | 4400 | 5500 | 5500 | 5500 | 0 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | # by Bicycle/Other | 3 | 3 | 0 | 3 | 30 | 0 | 20 | 15 | 100 | 100 | 100 | 0 | 200 | 0 | 100 | 175 | 200 | 250 | 250 | 250 | 0 |
| | % Car | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% | 73% |
| | # by Car | 219 | 219 | 0 | 219 | 2190 | 0 | 1460 | 1095 | 7300 | 7300 | 7300 | 0 | 14600 | 0 | 7300 | 12775 | 14600 | 18250 | 18250 | 18250 | 0 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 12 | 12 | 0 | 12 | 120 | 0 | 80 | 60 | 400 | 400 | 400 | 0 | 800 | 0 | 400 | 700 | 800 | 1000 | 1000 | 1000 | 0 |
| Day Patrons | | 0 | 0 | 300 | 0 | 0 | 3000 | 1000 | 1500 | 0 | 0 | 0 | 15000 | 0 | 20000 | 10000 | 17500 | 20000 | 20000 | 25000 | 25000 | 50000 |
| | % Bus/Coach | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% | 56% |
| | # by Bus/Coach | 0 | 0 | 168 | 0 | 0 | 1680 | 560 | 840 | 0 | 0 | 0 | 8400 | 0 | 11200 | 5600 | 9800 | 11200 | 11200 | 14000 | 14000 | 28000 |
| | % Bicycle/Other | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | # by Bicycle/Other | 0 | 0 | 3 | 0 | 0 | 30 | 10 | 15 | 0 | 0 | 0 | 150 | 0 | 200 | 100 | 175 | 200 | 200 | 250 | 250 | 500 |
| | % Car | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% | 39% |
| | # by Car | 0 | 0 | 117 | 0 | 0 | 1170 | 390 | 585 | 0 | 0 | 0 | 5850 | 0 | 7800 | 3900 | 6825 | 7800 | 7800 | 9750 | 9750 | 19500 |
| | % Taxi/Lift | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | # by Taxi/Lift | 0 | 0 | 12 | 0 | 0 | 120 | 40 | 60 | 0 | 0 | 0 | 600 | 0 | 800 | 400 | 700 | 800 | 800 | 1000 | 1000 | 2000 |
| Total | # by Bus/Coach | 66 | 66 | 168 | 66 | 660 | 1680 | 1000 | 1170 | 2200 | 2200 | 2200 | 8400 | 4400 | 11200 | 7800 | 13650 | 15600 | 16700 | 19500 | 19500 | 28000 |
| | # by Bicycle/Other | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| | # by Car | 219 | 219 | 117 | 219 | 2190 | 1170 | 1850 | 1680 | 7300 | 7300 | 7300 | 5850 | 14600 | 7800 | 11200 | 19600 | 22400 | 26050 | 28000 | 28000 | 19500 |
| | # by Taxi/Lift | 12 | 12 | 12 | 12 | 120 | 120 | 120 | 120 | 400 | 400 | 400 | 600 | 800 | 800 | 800 | 1400 | 1600 | 1800 | 2000 | 2000 | 2000 |
| Sustainable Modes | % | ***23%*** | ***23%*** | ***57%*** | ***23%*** | ***23%*** | ***57%*** | ***34%*** | ***40%*** | ***23%*** | ***23%*** | ***23%*** | ***57%*** | ***23%*** | ***57%*** | ***40%*** | ***40%*** | ***40%*** | ***38%*** | ***40%*** | ***40%*** | ***57%*** |
| | Number | ***69*** | ***69*** | ***171*** | ***69*** | ***690*** | ***1710*** | ***1030*** | ***1200*** | ***2300*** | ***2300*** | ***2300*** | ***8550*** | ***4600*** | ***11400*** | ***8000*** | ***14000*** | ***16000*** | ***17150*** | ***20000*** | ***20000*** | ***28500*** |
| Bus | % | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% | 70% |
| | passengers | 46 | 46 | 118 | 46 | 462 | 1176 | 700 | 819 | 1540 | 1540 | 1540 | 5880 | 3080 | 7840 | 5460 | 9555 | 10920 | 11690 | 13650 | 13650 | 19600 |
| | Inbound trips | 1 | 1 | 2 | 1 | 9 | 24 | 14 | 16 | 31 | 31 | 31 | 118 | 62 | 157 | 109 | 191 | 218 | 234 | 273 | 273 | 392 |
| Coach | % | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% |
| | passengers | 20 | 20 | 50 | 20 | 198 | 504 | 300 | 351 | 660 | 660 | 660 | 2520 | 1320 | 3360 | 2340 | 4095 | 4680 | 5010 | 5850 | 5850 | 8400 |
| | Vehicles | 1 | 1 | 2 | 1 | 4 | 11 | 6 | 8 | 14 | 14 | 14 | 51 | 27 | 68 | 47 | 82 | 94 | 101 | 117 | 117 | 168 |
| Cycle | % | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% | 1% |
| | passengers | 3 | 3 | 3 | 3 | 30 | 30 | 30 | 30 | 100 | 100 | 100 | 150 | 200 | 200 | 200 | 350 | 400 | 450 | 500 | 500 | 500 |
| Walk | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| | passengers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Car | % | 73% | 73% | 39% | 73% | 73% | 39% | 62% | 56% | 73% | 73% | 73% | 39% | 73% | 39% | 56% | 56% | 56% | 58% | 56% | 56% | 39% |
| | passengers | 219 | 219 | 117 | 219 | 2190 | 1170 | 1850 | 1680 | 7300 | 7300 | 7300 | 5850 | 14600 | 7800 | 11200 | 19600 | 22400 | 26050 | 28000 | 28000 | 19500 |
| | Vehicles | 68 | 68 | 37 | 68 | 684 | 366 | 578 | 525 | 2281 | 2281 | 2281 | 1828 | 4563 | 2438 | 3500 | 6125 | 7000 | 8141 | 8750 | 8750 | 6094 |
| Taxi | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| | passengers | 0 | 0 | 0 | 0 | 5 | 5 | 5 | 5 | 15 | 15 | 15 | 22.5 | 30 | 30 | 30 | 52.5 | 60 | 67.5 | 75 | 75 | 75 |
| | Vehicles | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 5 | 5 | 5 | 8 | 10 | 10 | 10 | 17 | 19 | 22 | 24 | 24 | 24 |
| Drop Off | % | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% | 4% |
| | passengers | 12 | 12 | 12 | 12 | 116 | 116 | 116 | 116 | 385 | 385 | 385 | 577.5 | 770 | 770 | 770 | 1347.5 | 1540 | 1732.5 | 1925 | 1925 | 1925 |
| | Vehicles | 4 | 4 | 4 | 4 | 37 | 37 | 37 | 37 | 121 | 121 | 121 | 181 | 241 | 241 | 241 | 422 | 482 | 542 | 602 | 602 | 602 |
| **Grand Total** | | **300** | **300** | **300** | **300** | **3000** | **3000** | **3000** | **3000** | **10000** | **10000** | **10000** | **15000** | **20000** | **20000** | **20000** | **35000** | **40000** | **45000** | **50000** | **50000** | **50000** |
| Cars | (Parked on site) | 68 | 68 | 37 | 68 | 684 | 366 | 578 | 525 | 2281 | 2281 | 2281 | 1828 | 4563 | 2438 | 3500 | 6125 | 7000 | 8141 | 8750 | 8750 | 6094 |
| Car based traffic | (drop-off, taxi) | 5 | 5 | 5 | 5 | 39 | 39 | 39 | 39 | 126 | 126 | 126 | 189 | 251 | 251 | 251 | 439 | 501 | 564 | 626 | 626 | 626 |
| PT Traffic | (Bus, coach) | 2 | 2 | 4 | 2 | 13 | 35 | 20 | 24 | 45 | 45 | 45 | 169 | 89 | 225 | 156 | 273 | 312 | 335 | 390 | 390 | 560 |
| **Total traffic** | | **75** | **75** | **46** | **75** | **736** | **440** | **637** | **588** | **2452** | **2452** | **2452** | **2186** | **4903** | **2914** | **3907** | **6837** | **7813** | **9040** | **9766** | **9766** | **7280** |