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Additional Traffic Analysis for Response to Submissions

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North Byron Parklands
Additional Traffic Analysis for Response to Submissions

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1 INTRODUCTION

In December 2017, Billinudgel Property lodged a State Significant Development application for the permanent use of the North Byron Parklands site. Following the exhibition of the Environmental Impact Statement and supporting documents (including the *North Byron Parklands Traffic and Transport Assessment*, prepared by WSP Australia in November 2017), submissions were received from agencies and the community. Comments related to the traffic and transport issues were made by the following agencies:

1. Department of Planning and Environment
2. Roads and Maritime Services
3. Tweed Shire Council
4. Byron Shire Council
5. NSW Police.

This report contains additional analysis that forms part of the response to the issues raised, as outlined in Table 1.1.

Table 1.1 List of issues addressed in this report

Agency	Issue	Response
Roads and Maritime Services	Information is required to better understand the trips generated by the construction of an Administration building and erection of a conference facility.	Additional information based on a preliminary assessment of construction activities is presented in section 3. Additional details of the likely trips generated from the cultural centre, conference centre and accommodation are provided in section 4.
	More information is required to clarify the modelling assumptions, sensitivity testing for variations in transport modes, and effectiveness of the traffic management measures.	Information on modelling assumptions was provided in the *Traffic and Transport Assessment*, and has been outlined in section 2. Sensitivity tests were run on internal intersections to confirm that they can cope with higher traffic volumes – to ensure they would not be a bottleneck that could affect the external road network. Other sensitivity tests were done on a traffic generation basis but without additional modelling in SIDRA. However, it is noted that the network is already finely balanced and parts of the network may experience congestion issues. Additional sensitivity tests including future-year 2037 with 50,000 event assuming 5% lower bus mode share and existing bus mode share for drop-off, and an event with 25,000 campers and 25,000-day patrons, are compared in section 5.

Agency	Issue	Response
	Previously Gate E Wooyung Road has been used under the direction of NSW Police getting vehicles off the site during bump-out. This is proposed to become a camper and day patron entry and exit for parking only for vehicles arriving from the Tweed Coast Road. Clarification is required for the works proposed at Wooyung Road intersection and its use for parking.	Gate E on Wooyung Road is proposed to be used for patron arrival by vehicles from the north. This could include camper and day patron arrival via the Tweed Coast Road or camper arrival from the Tweed Coast Road and the Pacific Motorway (via Cudgera Creek Interchange). Use of this Gate by either of these vehicle sources would result in less traffic along Tweed Valley Way, especially in front of the site. The assessment in the Traffic and Transport Assessment was based on campers and day patrons from the Tweed Coast Road. Additional SIDRA Intersection analysis of Gate E and Wooyung Road with camper arrivals from Tweed Coast Road traffic and further north (e.g. Brisbane) has been undertaken with results shown in section 6.
Department of Planning and Environment	As per TSC's submission, please clarify the proposed use of the Wooyung Road access point and the potential impacts associated with the road upgrade.	
Tweed Shire Council	The proposed use of Gate E was considered by the Traffic Assessment to be less than when the access was used as an emergency access road for previous events under police direction. The methodology used to estimate traffic generation (by postcode) is not accepted by Tweed Shire Council as providing a realistic estimate of the potential traffic volume utilising Gate E for access/egress purposes. Event patrons from Brisbane could use the Gate should queue lengths at other gates become excessive and there is no guarantee that camping spaces will be allocated to Patrons from the Tweed Coast area.	

2 MODELLING ASSUMPTIONS

The following assumptions were made for the purposes of assessing the potential impacts of the events

- Traffic volumes were surveyed before and during the 2017 Splendour in the Grass (SITG) event. The impact of the event was taken to be the difference between the during and pre-event traffic surveys.
- Traffic growth was applied to the base surveys based on historic trends on the Pacific Motorway and Old Pacific Highway to forecast +10 and +30-year volumes. These include:
  - 3.7 per cent p.a. (linear from 2017) for the Pacific Motorway mainline volumes and
  - 2.7 per cent p.a. (linear from 2017) for all ramp and local road volumes.
- No change in timing of larger events (based on information from promoters).
- Traffic for a 50,000-patron event was estimated using the traffic volumes for the 2017 SITG event (35,000 patrons) and factoring individual elements up by the proportional increase. For example, camper, day patron, worker, guest and service vehicle volumes were estimated from the 2017 counts such that 100 per cent of the traffic volume for the event was attributed to these categories.
- Mode share changes assumed for the 50,000 patron events includes:
  - Campers' bus patronage assumed to increase from 2 per cent to 3 per cent up to 5 per cent based on an increase in bus service frequency. Corresponding decrease in car mode share.
  - Day patrons' bus patronage assumed to increase by 10 per cent based on an increased percentage of day patrons from outside the local area – i.e. an increase in patrons who are more likely to use the bus service. A corresponding decrease in the car and taxi/ride share/drop-off percentage.
- Mode share changes assumed for the 42,500 patron events includes:
  - Campers' bus patronage assumed to increase from 2 per cent to 3 per cent up to 4 per cent based on an increase in bus service frequency. Corresponding decrease in car mode share.
  - No change to day patrons from the numbers surveyed for the SITG 2017 event.
- Car occupancy has been assumed to not change from the most recent data from the SITG and Falls Festival. However, the continued promotion of multi-person vehicle discounts is broadly expected to increase the number of people per vehicle for larger events.
- Traffic from performers, press, VIPs, etc. was assumed to be capped at current levels.
- Traffic not associated with the entry/exit of patrons, official guests etc. and the servicing of the site fill reduce by 55 per cent between 12.00 pm and 5.00 pm. This will require event organisers for the large events to actively manage gate access during these hours on the Friday, Saturday and Sunday to reduce demand on the surrounding road network. Unrestricted travel at other times is proposed to allow these trips to be re-timed to non-peak times. In practice, this could be implemented by charging a fee to enter the site without a valid pass. This would require increased patrols of nearby roads to prevent attempts to park and walk to the site.
- Trip directions were assumed to be represented by the surveyed patterns during the SITG 2017 event.
- Medium single day events were based on the transport behaviour of the day patrons for the SITG event
- Medium multi-day events were based on the transport behaviour of the Falls Festival patrons with a small change to the mode share of campers based on the strategies applied for the large events.
- Small events were based on the SITG day patron transport behaviour with a simplified bus network tailored to the needs of the event.

- Minor events were based on the assumption that all patrons will arrive by car.
- Event timings were tested by adding an additional 30 per cent onto the base traffic volumes to simulate the high-range traffic increases around the Christmas/New Year period. It is noted that these high volumes have not coincided with the event days of the Falls Festival in the past and information from the event promoters that these event days are unlikely to change suggests that this is a conservatively high assumption.
- The timing analysis indicated that the mid-year 50,000 patron event resulted in larger traffic demands on the surrounding road network than the New Year 35,000 event. The impacts of the 50,000-patron event were therefore taken as the maximum impact of the site.
- On the Pacific Motorway, the impact of the Falls Festival on the background traffic volumes on the Motorway is small (2 per cent to 5 per cent). As noted above, the peak volumes on the Pacific Motorway haven't coincided with the event days of the Falls Festival in past years.

Additional information can be supplied on these individual assumptions if required.

Sensitivity tests were run for the site intersections to ensure that a surge of traffic from the road network would not cause the access intersections to become congested, affecting non-event traffic.

3 CONSTRUCTION TRIPS

This section describes the construction traffic details of the proposed works, including the administration building and conference centre. The following preliminary information has been provided by North Byron Parklands. They are based on the scope of road works outlined in Section 4.1 of the *Traffic and Transport Assessment*. These details may change as detailed designs are developed and following appointment of a construction contractor. They are based on information available at the time of preparation.

3.1 CONSTRUCTION DETAILS

The following typical construction work hours have been assumed:

- Monday to Friday 7.00 am to 6.00 pm
- Saturday 8.00 am to 3.00 pm
- No work will be undertaken on Sundays and public holidays.

Out of hours construction on weekends and at night may be required, but would be subject to a separate application.

The timeframe for the construction is approximately six months. It is estimated that at its peak, the construction period would be between one and three months when demolition and site clearances, site grading and material stockpiling works occurs.

The majority of construction activities will occur within the site during non-event times. Works potentially including traffic control of public roads include:

- Completion of Gate A works to improve public transport accessibility; and
- Construction of intersection works on Wooyung Road.

Any works requiring traffic management would be the subject of a separate Road Occupancy Licence applications made when further details of the construction activities are available.

During the works, Gate C will be the primary access point. However, works on Gate E at Wooyung Road may require temporary access changes on Wooyung Road.

3.2 CONSTRUCTION TRAFFIC GENERATION AND DISTRIBUTION

Preliminary information from North Byron Parklands is that during the peak of construction, it is anticipated that the site would generate up to 40 car/van/utility vehicle movements (for construction staff and tradespeople) and up to 10 truck movements per day. It is estimated that there would be approximately 25 construction staff on-site at the peak time. There is adequate parking for construction staff on-site.

Construction vehicles would mainly include: tipper trucks, semi-trailers and ready-mix trucks. In addition, truck and dog will be used for delivering construction plant and equipment. It is anticipated that the use of low loaders and vehicles carrying wide loads will be required for the delivery and collection of some equipment and material. It will be the responsibility of the contractor to arrange for Road Occupancy Licences (ROL) for these movements.

3.3 CONSTRUCTION VEHICLE ROUTES

Construction vehicles routes will be developed to minimise the impacts on local roads. The selection of these construction vehicle routes will be confirmed by the contractor in agreements during detailed site planning. It is anticipated that the major construction route would be via Tweed Valley Way between Gate C and the Yelgun Interchange, where construction vehicles could then travel north or south.

4 CONFERENCE CENTRE TRIPS

The original Concept Plan Application includes a cultural centre, conference centre and associated accommodation. The conference centre and associated accommodation forms part of the subject application. The cultural centre hasn't been constructed to date, however, the concept plan retains the potential inclusion of this facility (subject to separate approval).

The facilities are estimated to have the following size and staff numbers:

- Cultural centre: 110 m^2, two full-time equivalent and 12 part-time staff
- Conference centre: 510 m^2, eight full-time equivalent and 10 part-time staff
- Accommodation: 1,000 m^2, including 30 on-site cabins.

The conference centre would cater for up to 180 people and the cultural centre for around 50 people.

The accommodation would be associated with the conference centre and would be limited to a maximum of 120 guests. Seventy on-site parking spaces would be provided for the conference centre and associated accommodation.

The key assumptions and associated trip generation of these facilities is summarised in Table 4.1.

Table 4.1 Cultural centre, conference centre and accommodation trip generation

Facility	People	Assumptions	Daily Generation
Cultural centre	— 50 patrons — 2 full-time staff — 12 part-time staff	— Up to three times the patron numbers as visitors — One shift of part-time staff — All movements by car — Car occupancy of 2.5 per car for patrons and 1.2 for staff	143
Conference centre	— 180 patrons — 8 full-time staff — 10 part-time staff	— Maximum 2 conferences per day, non-concurrent — Two shifts of part-time staff — Car occupancy of 1.8 per car for patrons and 1.2 for staff	447
Accommodation	— 120 guests — 2 full-time staff — 6 part-time staff	— Two entry and exit movements per guest — Two shifts of part-time staff — Car occupancy of 1.8 per car for guests and 1.2 for staff	290
Servicing	— 10 deliveries	— Two movements per delivery	20
		Total	**900**

Notes Assumptions based on understanding of potential use of facilities. Accommodation guests may also be conference centre patrons, reducing the overall traffic generation. For the purposes of this assessment, they have been counted separately.

The peak traffic generation has been assumed to be if the peak usage of the cultural site coincided with the start/finish of a conference. This would equate to approximately 140 vehicle trips per hour – or approximately one movement every 25 seconds.

The total traffic generation of 900 vehicles per day is considered to be a conservatively high estimate based on the assumptions about separate calculations of staff and guests. In practice, traffic generation is likely to be concentrated at the start and finish of conference centre events.

5 COMPARISON OF TRIP GENERATION OF ADDITIONAL SCENARIOS

The range and magnitude of events can create very different types and durations of impacts on the surrounding road network. Figure 5.6 in the *Traffic and Transport Assessment* illustrated the relative magnitudes of people and vehicle movements estimated for each event size. To test the impact of varying the mix of campers/day patrons and the assumed changes in bus patronage (based on increased frequency and capacity of the shuttle bus service), additional scenarios have been tested. The additional tests include:

1. 25,000 Campers and 25,000-day patrons (instead of 20,000 campers and 30,000-day patrons)
2. 50,000 Patron Event With 68 per cent Bus Mode Share (versus proposed 73 per cent)
3. 50,000 Patron Event With 63 per cent Bus Mode Share (versus proposed 73 per cent)

The results are shown in Figure 5.1 on the following page.

The results of the sensitivity tests indicate that:

- Changing the mix of campers and day patrons would increase the impact on the road network during the Wednesday, Thursday and Friday camper arrival (less critical). However, there would be an increased volume of traffic leaving the site on the event Monday. With traffic volumes capped on departure, this would prolong the duration of the departure by two to three hours.
- Reducing the bus mode share by 5 per cent would result in an increase in car traffic of approximately 18 per cent. The impacts of this increase have been tested using the SIDRA Intersection model for the Yelgun Interchange. It resulted in a deterioration in performance of the Yelgun Interchange roundabout from LoS A to D, along with an increase of queue length on the southbound off-ramp from 42 m to 129 m, which is within the Safe Stopping Sight Distance for this ramp, and therefore undesirable. These results indicate that the tolerance for reductions in bus mode share is small at 1 to 2 per cent. Conversely, they indicate that the tolerance for increasing car trip numbers is approximately 5 per cent before alternative management techniques are required.
- Reducing the bus mode share to the existing 63 per cent would result in a 35 per cent increase in car traffic, which would exceed the capacity of the Yelgun Interchange. This indicates that achieving the increased bus mode share is critical to the increase to 50,000 patrons.

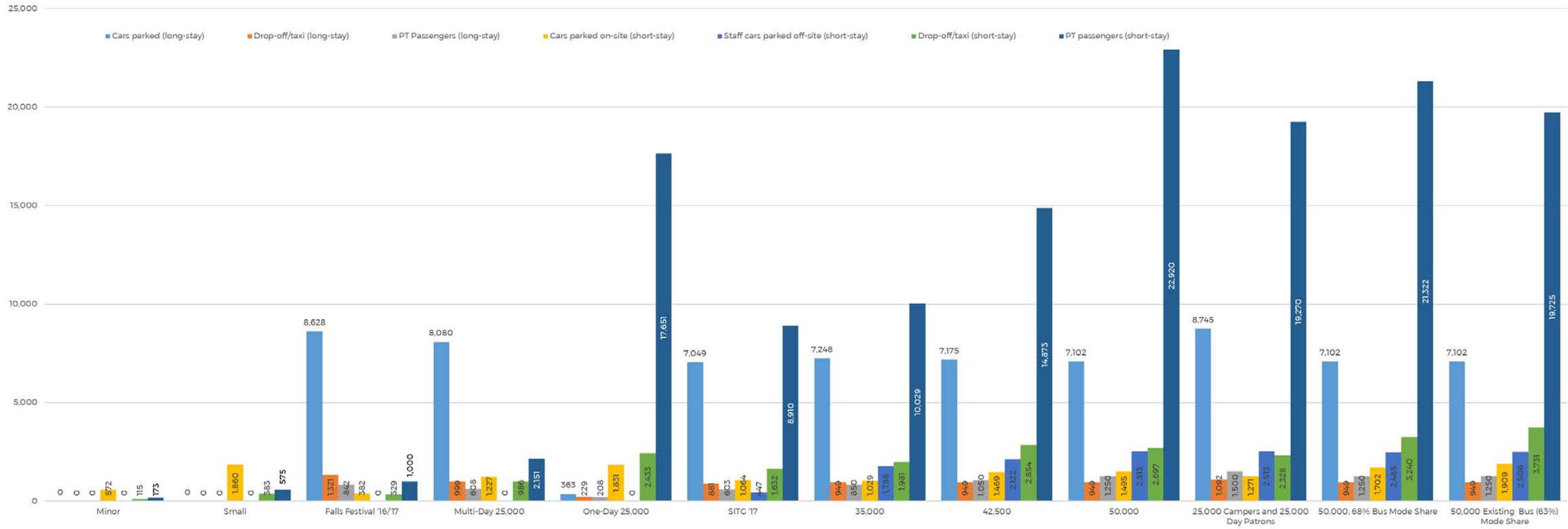

Figure 5.1 Comparison of relative trip generation for different event sizes and comparison to 2017 Falls Festival and SITG

The trip numbers for the sensitivity tests are compared to those for the originally proposed 50,000 patron event in Table 5.1.

Table 5.1 Comparison of sensitivity tests with 50,000 event

Trip Type		50,000 Patron Event (Previously Assessed)		50,000 Patron Event With 25,000 Campers And 25,000 Day Patrons		50,000 Patron Event With 68% Bus Mode Share (Versus 73%)		50,000 Patron Event With 63% Bus Mode Share (Versus 73%)	
		Trips	Percentage of 50,000 Patron Event	Trips	Percentage of 50,000 Patron Event	Trips	Percentage of 50,000 Patron Event	Trips	Percentage of 50,000 Patron Event
Long-Stay (camper)	Cars parked	7,102	100%	**8,745**	**123%**	7,102	100%	7,102	100%
	Drop-off/taxi	949	100%	**1,092**	**115%**	949	100%	949	100%
	Bus Passengers	1,250	100%	1,500	120%	1,250	100%	1,250	100%
Short-Stay (Day patron)	Cars parked on-site	1,495	100%	1,271	85%	**1,702**	**114%**	**1,909**	**128%**
	Staff cars parked off-site	2,513	100%	2,513	100%	2,485	99%	2,506	100%
	Drop-off/taxi	2,697	100%	2,328	86%	**3,240**	**120%**	**3,731**	**138%**
	Bus passengers	22,920	100%	19,270	84%	21,322	93%	19,725	86%

6 USE OF GATE E ON WOOYUNG ROAD

As discussed earlier, the use of Gate E on Wooyung Road could be for camper and day patron traffic to from Tweed Coast Road or all camper traffic from the north (Tweed Coast Road and Pacific Motorway via Cudgera Creek Interchange).

The former was tested in the *Traffic and Transport Assessment*, with no issues raised. To complete the assessment, Gate E has been tested for the second scenario with the following assumptions:

- Friday camper entry:
  - Tweed Coast Road traffic via Wooyung Road left turn into Gate E
  - Pacific Motorway traffic via Mooball-Pottsville Road, Tweed Valley Way and Wooyung Road, right into Gate E
- Monday camper departure:
  - Tweed Coast Road traffic turn right out of Gate E to Wooyung Road
  - Pacific Motorway traffic turn right out of Gate E to Wooyung Road then travel via Tweed Coast Road, Coronation Avenue, Pottsville Road and Cudgera Creek Road.

An alternative for Pacific Motorway traffic on the Monday departure would be to turn left onto Wooyung Road then right onto Tweed Valley Way. However, this would require the camper traffic to pass over the one-lane bridge on Wooyung Road immediately east of Tweed Valley Way. Given that the volume involved would be approximately 454 light vehicles per hour, there are concerns that the queue of vehicles turning right onto Tweed Valley Way would block the bridge. A temporary traffic signal arrangement would be required, which would impact traffic on Tweed Valley Way. The volume on the Friday camper arrival (approximately 100 vph) is much smaller and is not expected to impact the safety or operation of the Wooyung Road bridge.

The impact of the above arrangement has been tested in SIDRA for the Friday and Monday time periods. Based on previous comments from stakeholders that the use of Wooyung Road in the past has caused queuing at the roundabout at the intersection of Tweed Coast Road and Coronation Avenue in Pottsville, this intersection has been modelled as well.

No intersection surveys were undertaken at this intersection, so classified tube counts on the approach and departure (provided by Tweed Shire Council) were used to synthesise a set of 2017 intersection turn volumes. These were then factored up by 2.7 per cent per annum to obtain 2037 volumes.

The results for Gate E are summarised in Table 6.1, while the impact at the roundabout in Pottsville are shown in Table 6.2.

Table 6.1 Intersection of Gate E and Wooyung Road – 2037 with 50,000 event

Gate E Use Scenario	Day	Volume (veh/h)	Degree of Saturation	Average Delay (sec/veh)	95% Queue (m)	Level of Service
Tweed Coast Road only	Friday	886	0.27	10	< 1 m	A
	Monday	722	0.22	13	2	A
All campers from north	Friday	1,019	0.34	12	13 (right turn into Gate E)	A
	Monday	1,207	0.85	20	68 (right turn out of Gate E)	B

Notes Average Delay and Queue length for most delayed movement

Even with the increase in right-turn vehicles, the Gate E intersection still performs well with some minor queuing. This change would relieve the queues at Gate C, providing an improvement in traffic conditions on Tweed Valley Way north of the site.

Table 6.2 Intersection of Tweed Coast Road and Coronation Avenue - Monday

Scenario	Volume (veh/h)	Degree of Saturation	Average Delay (sec/veh)	95% Queue (m)	Level of Service
2017 Base	692	0.22	9	10 (Pottsville Road) 4 (Tweed Coast Road south)	A
2037 Base	1,064	0.34	10	19 (Pottsville Road) 7 (Tweed Coast Road south)	A
2037 with 50,000 Event	1,549	0.63	11	20 (Pottsville Road) 45 (Tweed Coast Road south)	A

Notes Traffic volumes synthesised from classified tube counts
Average Delay and Queue length are shown for most delayed movement

The diversion of the northbound-camper traffic along the Tweed Coast Road and through Pottsville would have a small impact for this one day of approximately a 40-m increase in queue length. However, the average delays on the southern approach to the roundabout would only increase by approximately two seconds per vehicle, indicating that the queue would remain moving. Impacts at other intersections are likely to be in this order of magnitude.

7 TIME OF YEAR ANALYSIS

Section 5.3 of the *Traffic and Transport Assessment* contained an analysis of the seasonal variation of traffic on the Pacific Motorway. Traffic data was obtained for permanent counts sites (continuously counting) on the Pacific Motorway. The locations available with sufficient data for the years that the North Byron Parklands site has been operating were both located north of the site (Tweed Heads South and West Ballina. The data is illustrated in Figure 7.1 and Figure 7.2 respectively.

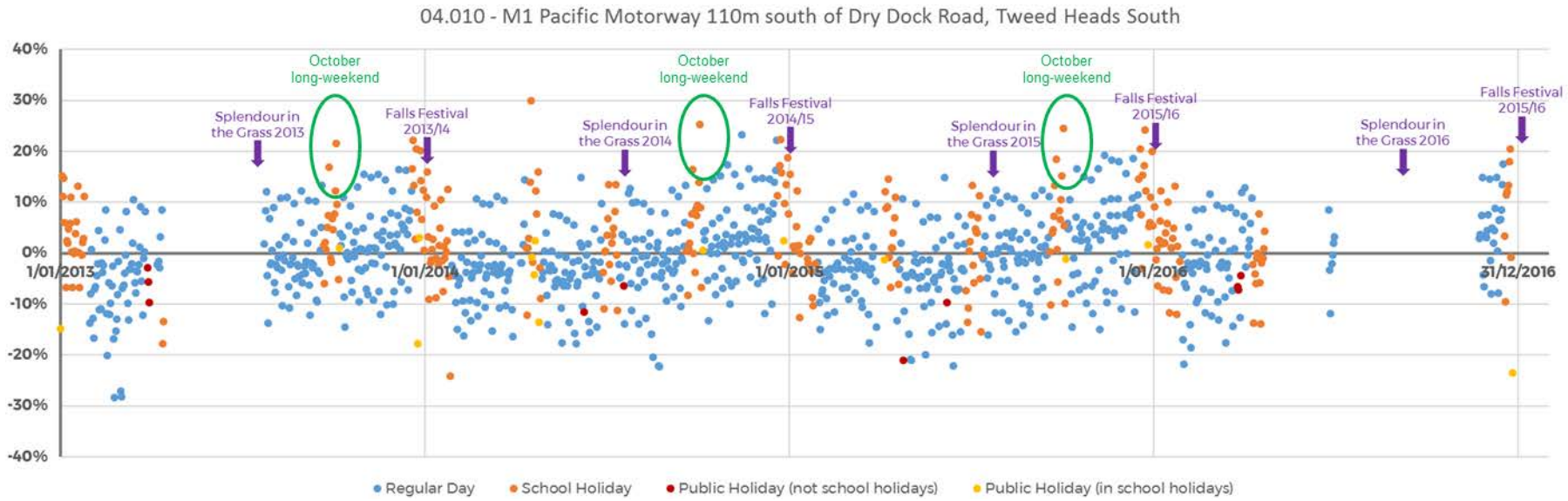

Figure 7.1 Daily traffic volumes (both directions combined) on the Pacific Motorway at Tweed Heads South as a percentage of the average daily volume for that year

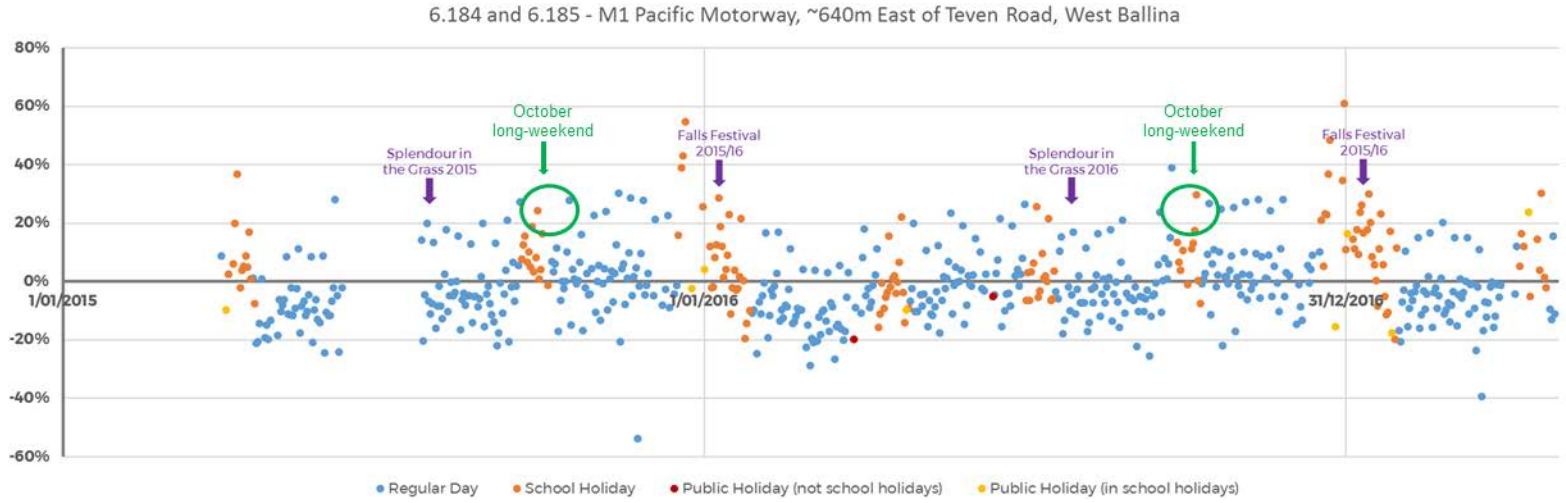

Figure 7.2 Daily traffic volumes (both directions combined) on the Pacific Motorway at West Ballina, as a percentage of the average daily volume for that year

The analysis previously concluded that at these locations, the traffic on the days that the Splendour in the Grass Festival and the Falls Festival were held was up to 15 per cent to 20 per cent higher than the average daily volume for that year. For the West Ballina site, the volumes are between 20 per cent and 30 per cent of a smaller daily volume. The Falls Festival days were observed to not coincide with the peak traffic days, which occurred in the period before Christmas to before New Year. These traffic volumes include traffic generated by these two festivals.

Considering the data in more detail, there are days throughout the year that exceed the daily average by 10 per cent to 30 per cent. One potential time for a new medium event could be the October long-weekend. The traffic percentages corresponding to these weekends are highlighted in green in Figure 7.1 and Figure 7.2. The show that traffic on this weekend peaks at generally 25 per cent to 30 per cent higher than the average.

Figures 5.7 and 5.8 in the *Traffic and Transport Assessment* showed that a 30 per cent increase of Pacific Motorway traffic was significantly larger than the impact of the music festivals on the total volume. The base volume with an additional 30 per cent New Year traffic increase and a 35,000-patron event had a higher volume than the mid-year time with the 50,000 event. However, Figure 5.9 shows that traffic volumes on Tweed Valley Way are more significantly influenced by the volume of traffic generated by the event than the seasonal traffic changes.

Figure 5.1 shows that the traffic generated by a medium (25,000 patron) event (one-day or multi-day) would be less than the traffic generated by the 35,000-patron event assessed in the future with the 30 per cent increase in traffic volumes.

Table 7.1 Comparison of sensitivity tests with 50,000 event

Trip Type	2016/17 Falls Festival		Medium (25,000) Multi-Day Event		Medium (25,000) One-Day Event		35,000 Patron Event	
	Trips	Percentage of 35,000 Patron Event	Trips	Percentage of 35,000 Patron Event	Trips	Percentage of 35,000 Patron Event	Trips	Percentage of 35,000 Patron Event
Long-Stay (camper)								
Cars parked	8,628	119%	8,080	111%	363	5%	7,248	100%
Drop-off/taxi	1,321	139%	999	105%	229	24%	949	100%
Bus Passengers	842	99%	608	72%	208	24%	850	100%
Short-Stay (Day patron)								
Cars parked on-site	382	37%	1,227	119%	1,831	178%	1,029	100%
Staff cars parked off-site	0	0%	0	0%	0	0%	1,758	100%
Drop-off/taxi	329	17%	986	50%	2,433	123%	1,981	100%
Bus passengers	1,000	10%	2,151	21%	17,651	176%	10,029	100%

The potential to hold a medium event on the October long-weekend would have less impact than holding a 35,000-large event in the New Year period.