trinity point

LAKE MACQUARIE

Traffic Impact Assessment

(Modification 5 to MP06-0309)

October 2014

Trinity Point Marina and Mixed Use Development

Traffic Impact Assessment (Modification 5 to MP06_0309)

Author: Sean Morgan

Client: Johnson Property Group

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Suite 10 265 King Street Newcastle NSW 2300
Ph (02) 4925 7795 Fax (02) 4925 2570
www.secasolution.com.au

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1 Executive Summary

1.1 Background

Seca Solution was commissioned by Johnson Property Group (JPG) to prepare a Traffic Impact Assessment to accompany a s75w modification application to MP 06_0309 (modification 5) for the proposed Trinity Point Marina and Mixed Use Development, Trinity Point (Morisset Park). Aspects of the approved development which remain largely unaltered from a broad traffic perspective includes:

- 188 berth marina and associated offices and club facilities
- Restaurant, café, function centre, shops, commercial facilities, business centre and day spa and ancillary uses.
- Parking landscape and boardwalk

From a traffic perspective, the key modification proposed is the change (increase) in the number of short stay and permanent residential accommodation units. The approval was for a maximum of 150 accommodation units, with a maximum of 50% (75) approved for permanent residential use. The proposed modification is for:

- an increase in total accommodation units (including hotel rooms) up to a maximum of 315 (ie doubling), with a maximum of 50% (157) able to be used for permanent residential use with the option for owners to also make them available for short stay accommodation.

Consistent with the Concept Approval, the permanent residential use is always to only ever represent a maximum of 50% of total short stay accommodation provided, up to a numerical maximum of 157. The Concept Approval is silent on the type of short stay accommodation units. The modification seeks two different forms of short stay accommodation, being 65 hotel rooms and the balance (93) as short stay serviced apartments. This report forms part of the supporting documentation for the proposed modification and provides advice on the current traffic issues associated with the proposed development.

The original concept was assessed by Better Transport Futures (BTF) in 2008 and it was this document that formed the basis of the concept approval which was updated by Seca Solution in August 2014 to comply with Condition C7 requirements for lodgement of the first DA. The traffic generation and parking requirements were assessed in detail in that report. This assessment however supersedes that August 2014 report, in that it has applied the current rates set down by Lake Macquarie City Council DCP 2014 and the RMS Guide to Traffic Generating Developments to both the approved and modified concept and the resulting generation and parking rates have been applied in this report. Where such rates have not been available then the BTF rates were applied for consistency, as these are the rates from the traffic assessment listed in the Concept Approval. This current assessment also draws from the more detailed traffic impact assessment work by Seca that has occurred since the August 2014 report relating to DA 1503/2014 (Stage 1 Marina) and DA 1731/2014 (Tourism and Hospitality),

The modification to the land use proposed in this earlier assessment, compared with this proposed modified development, is shown in Table 1-1 below. It is this resulting change in traffic generation that has been assessed in the context of the current situation, allowing for recent and planned road upgrades along the peninsula road corridor.

	Approved Concept	Proposed Concept
Marina	188 berth	188 berth
Hotel	-	65 rooms
Gym	50m^2	125m^2 (guest only)
Pool		522m^2 (guest only)
Beauty Salon	64m^2	29m^2 (guest only)

Day Spa		323m²
Business Centre		64m²
Café	90m² (30 patrons)	91m² (40 patrons)
Shops	130m²	152m²
Conference/Function Room	350m² (300 patrons)	843m² (300 patrons)
Restaurant	160m² (200 patrons)	676m² (200 patrons)
Restaurant (external)	Listed but numbers not specified	200m² (115 patrons)
Lawn Area	Not specified	100 patrons
Operations manager	40m²	Nil
Offices/commercial	100m²	60m² (sales centre)
Service area	450m²	Nil
Tourist units	75 (1/2/3/4 bedroom)	93 serviced apartments
Residential	30 x 3 bedroom	127 x 2 bedroom
	45 x 4 bedroom	13 x 3 bedroom 17 x 4 bedroom

Note: final split in bedroom numbers will be subject to refinement during future DAs

Table 1-1 Change to land use between Approved Concept and proposed modified development

This traffic impact assessment has been prepared in accordance with Austroads Guidelines and the "RTA Guide to Traffic Generating Developments" published by the Roads and Maritime Services (RMS). Advice from the RMS is that although this document has been withdrawn it is still to be used until a new version is released.

1.2 Scope of Report

This traffic impact assessment has been prepared to provide for the modifications to the land use and support a S75w application to the Department of Planning and Environment to modify the 2009 Concept Plan approval.

As such, the scope of the report is to document the traffic, access and parking impacts associated with the proposed development compared with that previously assessed under the approved concept. The report provides advice on road network capacity and access issues as well as documenting the parking requirements for the proposal.

On approval of this s75w modification, subsequent development applications for the various specific uses on site will draw from this assessment for consistency.

1.3 Issues and Objectives of the study

The issues relative to the proposal are:

- Determine the future traffic generation for the proposed development compared with the approved concept;
- Assess impact on the local road network due to the additional flows;
- Review the access arrangements for the proposed development compared with the approved concept;
- Assess any road upgrades required due to the proposed development compared with the approved concept.

The objective of the report is to document the impacts of the proposed development compared with the approved concept and provide advice on any infrastructure work required on the external road network as part of the future development.

1.4 Planning Context

In preparing this document, the following guides and publications were used:

- RTA Guide to Traffic Generating Developments, Version 2.2 Dated October 2002;
- RMS TDT 2013/04 "Update Traffic surveys August 2013".
- Australian / New Zealand Standard – Parking Facilities Part 5 : on-street car parking (AS2890.5:2004);
- Australian Standard – Guidelines for Design of Marinas (AS3962-2001)
- Lake Macquarie City Council (LMCC) DCP 2014
- Lake Macquarie City Council Section 94 Development Contributions Plan 2012- Morisset Contributions Catchment (S94 Plan)
- Traffic Impact Assessment – Fixed/Wet Berth Marina, Koolewong, TPK & Associates 2010
- Traffic Impact Assessment – Marmong Point Marina, Lake Macquarie, Mark Waugh Pty Ltd 2009
- Director-General's Report – Marmong Point Marina
- Traffic and Parking Assessment – Modifications to Double Bay, Marina Christopher Hallam & Associates Pty Ltd 2009 (Hallam 2009)
- Traffic and Parking Implications – Extensions to Rose Bay Marina, Marina Christopher Hallam & Associates Pty Ltd 2011 (Hallam 2011)
- Proposed Marina and Mixed Use Development, Trinity Point TIA (Mark Waugh Pty Ltd 2008)
- Trinity Point Approved Concept Traffic Impact Assessment (Seca Solution Pty Ltd September 2014)
- Trinity Point Marina Stage 1 Traffic Impact Assessment (Seca Solution Pty Ltd September 2014)
- Trinity Point Mixed Use Development (Tourism & Hospitality) Traffic Impact Assessment (Seca Solution Pty Ltd October 2014)

1.5 Assessment and Findings

1. The proposed development is for a mixed use development, comprising of marina with associated facilities, hotel accommodation, hospitality (restaurant, café and function centre) and accommodation (permanent and tourist), together with on-site parking. The site is currently vacant. The primary modifications proposed relate to an increase in on site accommodation (both permanent and tourist).

2. The site will have all vehicle access via Trinity Point Drive and/or Henry Road and Charles Avenue and then connect to the arterial road network (Macquarie Street) via Morisset Park Road and Fishery Point Road.

3. A number of road upgrades have been identified along this route and are being funded through S94 or VPA agreements, together with direct funding through development consent conditions. The key intersection upgrade is at Fishery Point Road / Macquarie Street with traffic signals to be constructed by others by, according to advice received from RMS, by 2019. Based upon the existing traffic demands the intersection is currently operating at capacity and with the approved development that is already occurring along this peninsula these traffic signals need to be constructed prior to this date.

4. The approved concept was assessed at generating 209vph in the morning peak and 253vph in the afternoon peak. By comparison, the proposed modified development, with its hotel and short-stay tourist accommodation and residential units, is expected to generate 245 vph in the morning and 412 vph in the afternoon during the absolute peak summer events, largely arising from the marina and hospitality uses and the seasonal peaks of those being updated due to

DA level assessment compared to what was assumed in the approved concept reporting. This is detailed in Section 4.1 Traffic Generation.

5. The cross use of facilities within the complex provides significant trip containment with up to 15% of all function and dining trip generation contained. These trips will not occur as they are generated by guests and residents within the mixed use development.
6. The additional flows are within the capacity of the local road network, based upon the road upgrades identified by Council being constructed in the locality. All of these road upgrades have funding identified to allow them to be implemented.
7. Accident data was provided by the RMS for the locality and shows that the overall road network operates in a safe and acceptable manner, and it is considered that this can continue to occur with the additional traffic movements associated with the proposed development. The road upgrades identified will improve road safety further in this location to accommodate these additional traffic movements.
8. Parking for the development will be accommodated on site. These will be in a mixture of at-grade and undercroft parking together with basement parking. The parking will be based upon the demands of the proposed development, taking into account the cross use of the facilities and various authority requirements. There will be no off-site parking impacts created by the proposed development. The parking demand has been calculated to be 622, which compares with the provision of 677 spaces.

When considering the parking demands for the overall proposed development, the following operational characteristics will occur:

- For the majority of the function centre operations, the patrons attending may be staying on site within the hotel or tourist accommodation. Given the anticipated cross use, the accommodation parking demands are satisfied by the parking provided for the hospitality uses. Patrons will walk between the different facilities.

- The proposed development provides for an integrated marina and tourist development providing extensive cross use of facilities. The relatively isolated location encourages the containment of guests within the site for their dining and general needs (hair salon, pool, gym, etc.).

- The restaurant and café dining would have similar patronage from the hotel guests when not engaged in the function centre, potentially reducing parking demands for these uses. Use of the dining facilities by marina users, either people on board vessels or those that have driven to the marina for daytime boat use, would also allow for a shared use of the facilities and a reduction in the total parking demand.

- The various uses on site do not all generate their parking demands at the same time. While the function centre and restaurant may be operating concurrently of an evening, the café and lawn area will only operate during the day when restaurant demands are potentially lower than of an evening. Similarly the various retail options, day spa and commercial spaces will not be staffed of an evening, creating opportunities for the shared use of this parking. Marina parking is also most likely to be used of a daytime with parking expected to be available in the marina carpark during the peak evening period.

- When the function centre is being patronised by guests external to the site (with no on-site accommodation) it is likely that the occupancy for the hotel and short stay tourist apartment accommodation and associated parking will be low, or those patrons will be using other facilities on site for which parking has been provided. Based upon the economic report prepared for the project by PWC, the occupancy would be 60% of the total short term

accommodation capacity (maximum of 158 units). This would allow for the use of 115 rooms (including 33 potential dual key suites in the hotel), leaving 76 vacant units and 76 corresponding vacant parking spaces. Based on a car occupancy rate of 2.5 per car for the function centre, this would be equal 190 people attending the function centre being able to park in available parking on site. The parking for the hotel and resort apartments will be managed on site by the staff.

The whole of site development provides for a range and scale of uses with associated traffic generation and parking demands. This report provides information on the nature and scale of traffic generation that could be generated by the proposal and how that may impact on the external road network. It has taken into account the current known status of road upgrades within the proximity of the subject site, both planned and developed (LMCC and RMS), since the earlier traffic assessment. It applies the current DCP 2014 and RMS rates to the scenario whilst future specific staged applications will assess the more specific access and parking arrangements within the site for the uses subject to those applications.

Allowing for the more detailed assessment available for the modified concept, the traffic generation and parking requirements have been able to be quantified with more certainty. Assumption made as part of the initial assessments (Mark Waugh 2008) have been able to be refined as the description of the proposed development, including patron numbers, becomes more certain. In applying the most current rates (both DCP and RMS) to the modified concept some demands have increased while others have decreased. In reassessing the impacts of the whole modified concept, the impacts of the proposed increases in the short-term accommodation and residential apartment supply have been offset by the refined trip generation and parking analysis for these elements. Across the whole of the development the impacts of the changes in traffic generation and parking demands have been able to be offset where appropriate by opportunities for trip containment and shared use within the site.

2 Existing Situation

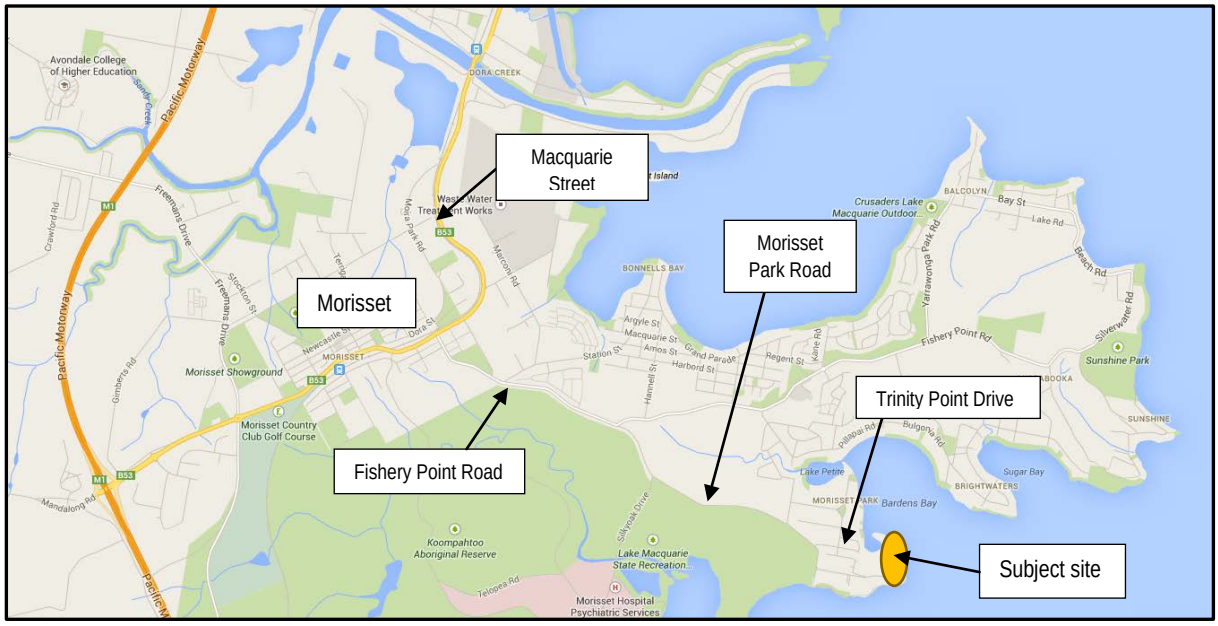
2.1 Site Description and Proposed Activity

2.1.1 Site Location and Access

The site is located within the general locality of Trinity Point (Morisset Park) on the western side of Lake Macquarie. It lies off the peninsula to the east of Morisset (Figure 2-1 below). All vehicle access will be provided via Fishery Point Road / Morisset Park Road that connects with Macquarie Street in Morisset which forms part of the regional road network.

The site is currently vacant.

The location of the site is shown below in Figure 2-1.



Source: Google maps

■ *Figure 2-1 - Site Location*

Existing land use adjacent to the site is residential. A range of subdivision approvals are in place for the adjoining Trinity Point residential subdivision, and are being progressively developed. These provide for the construction of a public road system that will provide legal access to the subject site. Stage 5 construction commenced in late September 2014.

2.1.2 Zoning

The subject site is primarily zoned SP3 (Tourist), RE1 (Open Space) and W1 (Natural Waterways) and Concept Approval MP06-0309 permits the proposed mixed use development on the site.

2.2 Existing Traffic Conditions

2.2.1 Road Hierarchy

The major road through the locality is Macquarie Street, which forms part of the regional road network and runs along the western side of Lake Macquarie. It provides a connection to the south to the M1 Motorway that provides a connection between Sydney and Newcastle. Macquarie Street continues to run north along the western side of Lake Macquarie, connecting through the major centres such as Toronto through the western suburbs of Newcastle. As a regional road (B53) any new works impacting upon this road will be reviewed by the RMS.

Macquarie Street generally provides a single lane of travel in both directions with additional lanes provided at key intersections to improve the operation of the intersections. There are a number of traffic signals along its length, generally within the urban centre of Morisset. Outside of the urban areas the intersections are priority controlled and roundabouts at major intersections.

Access to the subject site is provided via Fishery Point Road, a local road providing a single lane of travel in both directions. It connects with Macquarie Street via a 3-way give way controlled intersection which features additional turn lanes to reduce the delays and congestion for road users. This intersection has been identified for upgrade to signal control to allow for the continuing growth to occur on the peninsula accessed via Fishery Point Road. It is noted that Fishery Point Road is currently being reviewed by Council and the RMS and could become reclassified as a Regional Road (www.rms.nsw.gov.au)

Fishery Point Road connects with Morisset Park Road to allow for access to Morisset Park and Trinity Point. The intersection of these two roads is a simple give way control with the through traffic being the east-west movement between Morisset Park Road and Fishery Point Road. Morisset Park Road provides a single lane of travel in both directions and is a local road providing access to the existing residential development in the locality of the subject site.

Photo 1 Fishery Point Road looking east towards intersection of Morisset Park Road and Fishery Point Road (to the left)

Local streets adjacent to the site include Trinity Point Road, Henry Road and Charles Avenue. These are local residential streets providing access to the existing residential lots as well as the subject site.

Trinity Point Road will be extended and form Trinity Point Drive, running along the western boundary of the subject site and then loop around to connect with Henry Road and Charles Avenue.

2.2.2 Roadworks

There are currently no road works occurring within the general locality of the subject site. The intersection of Fishery Point Road and Station Street has been upgraded to traffic signal control (Refer 2 in Figure 2-2), as part of the residential development occurring on the northern-eastern corner of this intersection. JPG is separately progressing intersection works on Morisset Park Road and Charles Avenue (Refer 4 in Figure 2-2), as a condition of the adjoining residential estate (commencement anticipated 2015) and is also progressing construction and dedication of the public road system within the residential estate (Stage 5 including Celestial Drive and part of Trinity Point Drive commenced in late September 2014).

2.2.3 Traffic Management Works

The construction of the above traffic signals at Fishery Point Road and Station Street is the most recent upgrade in the area. It replaced the previous T intersection control and has improved the operation and safety of the road network as well as improving pedestrian and cyclist connections. The key intersection of Macquarie Street and Fishery Point Road (Refer 1 in Figure 2-2), has been identified to be upgraded to traffic signals, and discussion with the RMS indicates that this upgrade is scheduled for completion by 2019 under obligations from other developers.

It is noted that since approval of the Concept Plan, Lake Macquarie City Council has prepared the Section 94 Development Contributions Plan- Morisset Catchments Catchment (S94 Plan) to identify and fund other traffic management works in the locality including the upgrade of intersection of Fishery Point Road and Morisset Park Road (Refer 3 in Figure 2-2).

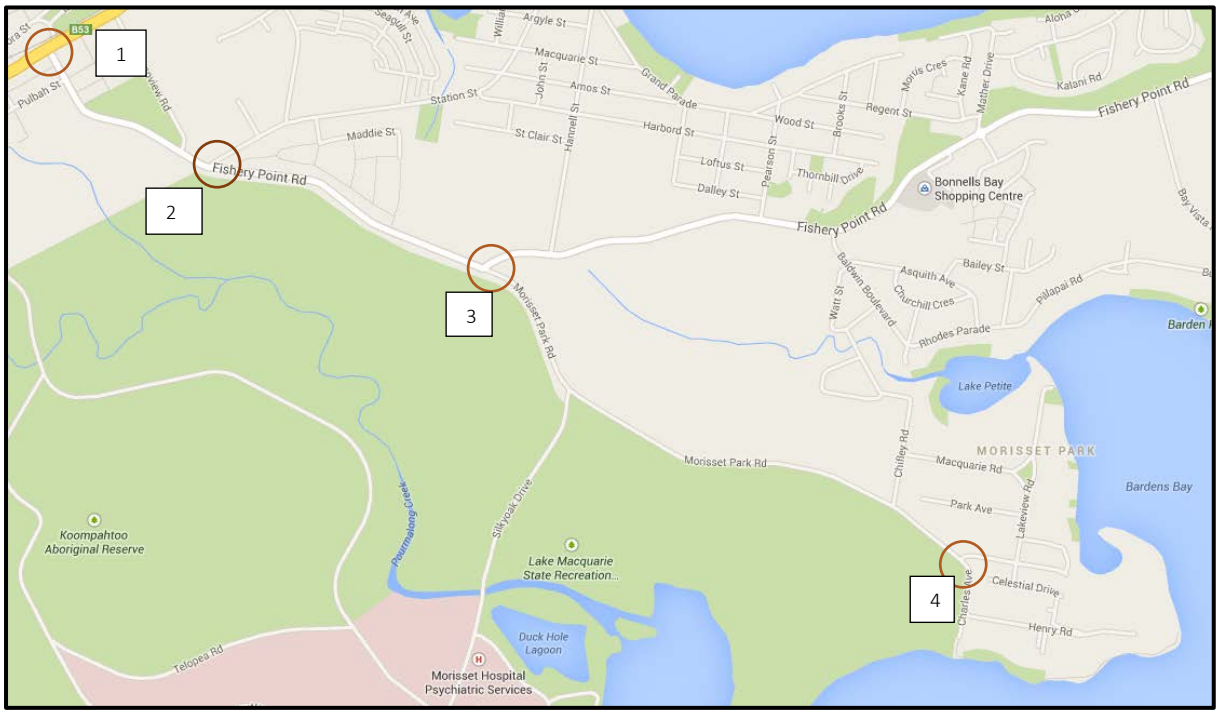


Figure 2-2 Planned Roadworks and Traffic Management Measures

2.2.4 Pedestrian and Cycling Facilities

Pedestrian facilities are limited within the general locality of the subject, reflective of the current low demands for pedestrians and cyclists in the locality and the low traffic flows along Morisset Park Road.

There are no footpaths along Morisset Park Road. There are no shoulders on the roads and cyclists currently cycle within the road pavement, which provides an overall sealed width of approximately 6.5 metres. The extension of Morisset Park Road into Trinity Point Drive does provide for a pedestrian pathway on the southern side of the road and the approved residential subdivision extends a pedestrian pathway system throughout the local road network.

From the intersection of Morisset Park Road and Fishery Point Road, there is an off road footway / cycleway that connects to the west of Station Street and nearly through to Macquarie Street.

The LMCC s94 Plan allows for the construction of a shared pathway between Bonnells Bay and Trinity Point (OS-039M Figure 2-3). Contributions towards the construction of this shared pathway will be paid for by the developer as required by Section 94 contributions imposed on future development consents.

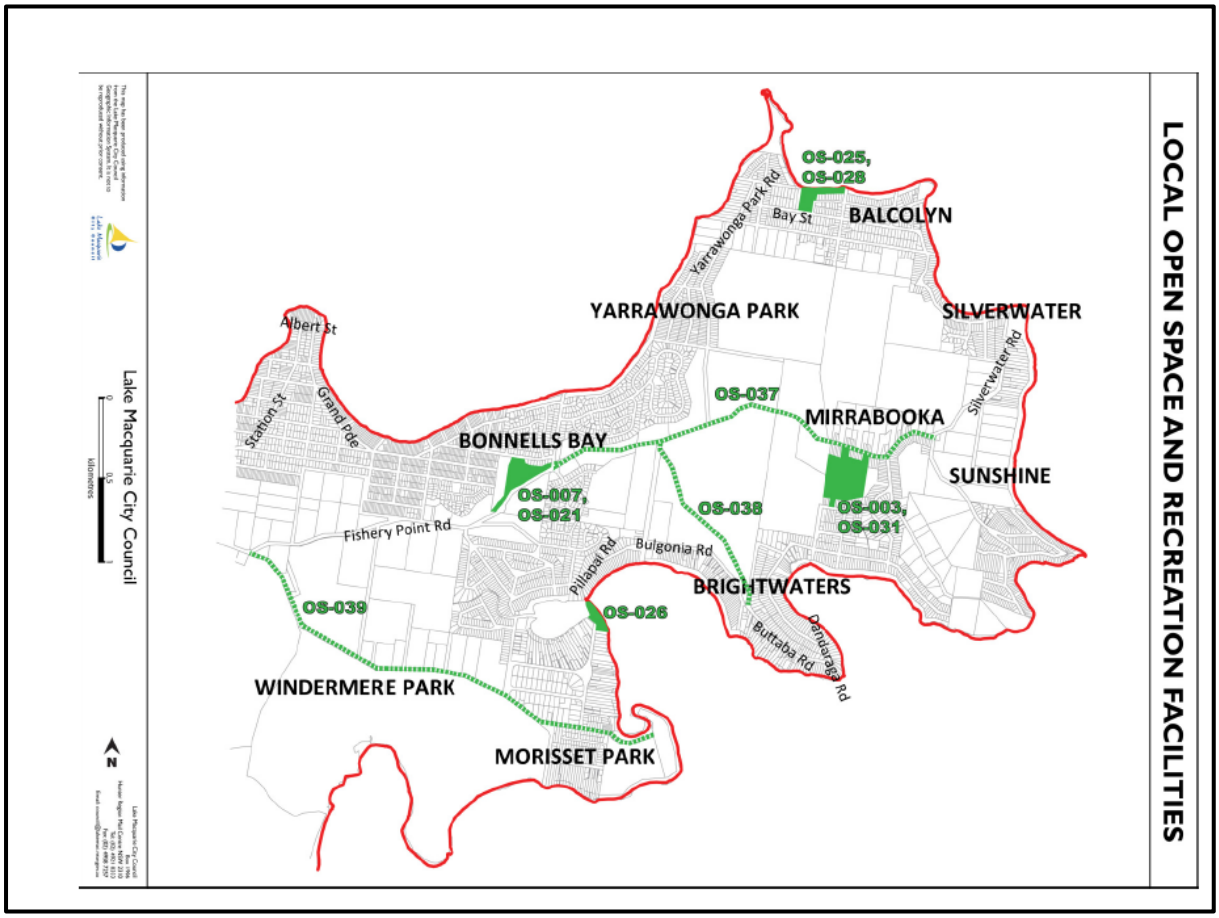


Figure 2-3 Extract from LMCC s94 Plan showing facilities provided within the plan

Additionally, whilst the s94 Plan does not identify the provision of pedestrian facilities at Trinity Point, it is noted that the site is bound by a Council foreshore reserve and discussions are underway on the delivery of pedestrian facilities in parts of the foreshore land as part of the ongoing developments of the residential subdivision and future development under the Concept Approval.

2.3 Traffic Flows

2.3.1 Peak Hour Flows

The proposed development is located on the eastern end of the peninsula accessed via Fishery Point Road, Morisset Park Road and Trinity Point Drive and as part of the study work, Seca Solution

completed traffic surveys at the 3-way intersection of Macquarie Street and Fishery Point Road as well as Fishery Point Road and Morisset Park Road. These surveys were completed during both the morning and afternoon peak periods on Thursday 17th July 2014. A summary of the two-way traffic flows on the key roads is provided below:

Table 2-1 Two-way traffic flows

Location	AM peak		PM peak	
Fishery Point Rd, east of Macquarie Street	675 westbound	311 eastbound	431 westbound	708 eastbound
Macquarie Street south of Fishery Point Rd	517 Northbound	1050 southbound	1004 northbound	765 southbound
Morisset Park Road east of Fishery Point Rd	132 westbound	104 eastbound	107 westbound	104 eastbound

The RTA Guide to Traffic Generating Developments provides the following guide for the hourly capacity of an urban road:

Level of Service	One lane (vehicles / hour)	Two lanes (vehicles per hour)
A	200	900
B	380	1400
C	600	1800
D	900	2200
E	1400	2800

Based upon the above table, it can be seen that currently the road network is operating within acceptable limits. However, it is noted that traffic movement on Macquarie Street, south of Fishery Point Road, southbound in the morning period and northbound in the afternoon is a little over 1,000 vehicles per hour, indicating a level of service of E. Level of service E is defined as:

This occurs when 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 a traffic-jam.

2.3.2 Daily Traffic Flows

Typically peak hour flows represent in the order of 8-10% of the daily flows and on this basis the daily traffic flows in the general vicinity of the site are:

- Fishery Point Rd, east of Macquarie St – 10,650
- Macquarie Street south of Fishery Point Rd – 16,700
- Morisset Park Road east of Fishery Point Rd – 2,300

The RMS publication "Network and Corridor Planning" provides advice on road attributes and capacity, based upon their function within the road hierarchy. Macquarie Street is an arterial road and under the

RMS publication would be classified as a 3U road, which is characterised by a single lane of travel in each direction. Typically these roads carry an *average* of 13,000 vehicles per day. Road network capacity is typically assessed for peak hour operation where there are defined limits for intersection and road capacity. It can be seen that Macquarie Street is currently operating towards the top of the capacity for this type of road.

Fishery Point Road at its western end would also be classified to the same level.

Morisset Park Road and Fishery Point Road to the east of Morisset Park Road intersection would both be classified as 2U roads, carrying an average of 5,000 vehicles per day. Morisset Park Road is currently carrying some 2,300 vehicles per day, well below the average of 5,000 per day typical of this road standard. Trinity Point Road currently carries very low traffic flows, providing access to around 60-70 residential dwellings, and allowing for 9 trips per dwelling per day the daily flow on Fishery Point Road could be in the order of 630 vehicles per day.

2.3.3 Daily Traffic Flow Distribution

The daily traffic volumes are reasonably balanced in both directions, with the above data indicating a bias in traffic movements westbound in the morning along Morisset Park Road / Fishery Point Road, reflective of commuter trips from the Peninsula with the majority then heading south towards Morisset and beyond. The reverse traffic movements then occur in the afternoon period. Similarly, in the morning period the dominant traffic movement on Macquarie Street is southbound whilst in the afternoon period the dominant movement is northbound.

2.3.4 Vehicle Speeds

No speed surveys were completed as part of the study work. From on-site observations, it is considered that drivers do not typically speed in this location due to its interaction with the various intersections as well as the road alignment. The alignment of Morisset Park Road does not encourage drivers to speed, due to the width and the various driveways etc. Fishery Point Road is wider and has a better alignment, allowing drivers to speed out of peak hours. During the peak hours the traffic volumes restrict traffic speeds.

2.3.5 Existing Site Flows

The site is currently vacant and therefore generates no traffic movements.

2.3.6 Heavy Vehicle Flows

Heavy vehicle movements in the vicinity of the subject site are very low, reflective of the road hierarchy and the lack of demand for heavy vehicle access in this locality. The majority of heavy vehicles would be associated with Council refuse collection vehicles, and the occasional delivery vehicles serving existing development in the locality of Morisset Park Road. The Bonnells Bay Shopping Village is regularly served by heavy vehicles, but these remain on Fishery Point Road. There are local bus services that service this area providing a school bus run for access to local schools in Morisset and beyond.

2.3.7 Current Road Network Operation

Observations on site during the peak periods show that overall the road network operates well, with minimal delays along the road network. However, it is noted that the key intersection of Macquarie Street and Fishery Point Road currently suffers from some delays and congestion, due to the heavy turn movements in and out of Fishery Point Road. During the afternoon period the right turn into Fishery Point Road off Macquarie Street is heavy and delays occur.

The intersection of Morisset Park Road and Fishery Point Road generally operates well, although there are some delay for the traffic turning right out of Fishery Point Road (northern leg), as this is the major movement from the side road.

Outside of the peak hours the traffic flows are much lower and there are minimal delays and congestion in the locality.

Council have prepared a S94 plan for the Morisset area and Appendix B of the S94 Contribution Plan shows the following road upgrades for this location:

- M13 – T-intersection upgrade – Fishery Point Road / Morisset Park Road , upgrade to T-intersection with provision of a sheltered right turn lane on Morisset Park Road approach
- M14 – New traffic signals at Fishery Point Road and Station Street (completed)

The intersection of Macquarie Street and Fishery Point Road has been identified for upgrade to traffic signals, to be funded solely through a Voluntary Planning Agreement (VPA) associated with the recent residential development along Bonnells Bay Road. Discussion with the RMS indicates that the construction of these traffic signals has not been timetabled but under the terms of the VPA they are to be in place by 2019.

Roadwork upgrades are also progressing in association with the JPG residential development adjacent to the subject site. These include intersection works in the form of a three leg roundabout on Morisset Park Road and Charles Avenue (commencement anticipated 2015) as well as progressing construction and dedication of the public road system within the residential estate (Stage 5 including Celestial Drive and part of Trinity Point Drive are anticipated to commence in 2014).

2.4 Traffic Safety and Accident History

Accident data has been provided by the RMS for the locality, from Trinity Point through to Macquarie Street. The accident data shows that the overall accident rate along Morisset Park Road / Fishery Point Road is very low, with a low number of accidents and the majority of the accidents occurring at intersections. The overall layout of Fishery Point Road is good, with a relatively straight alignment and adequate width of road pavement. There is a separate footway / cycleway along the majority of its length and there is street lighting provided. For Morisset Park Road, the accident data indicates that there has been just 2 accidents along its length over a 5 year timeframe, reflective of its acceptable alignment and the low traffic volumes. It is noted that there is no footway provision on Morisset Park Road and limited street lighting, reflective of its current low usage.

Overall it is considered that the current alignment of the roads allows for safe traffic movements, but that the provision of an off road footway / cycleway could enhance safety for more vulnerable road users. This has been recognised by LMCC who have incorporated works in their s94 Plan (Refer Figure 2-3).

2.5 Parking Supply and Demand

2.5.1 On-street Parking Provision

Parking is generally permitted along the majority of the local roads in the generally vicinity of the subject site, on the verges or shoulders with normal restrictions applying at intersections and driveways.

2.5.2 Off-Street Parking Provision

There is a limited amount of off-street parking in the locality, except within the various residential developments. The residential developments in this area all have off street parking available, with generally a combination of driveways and garages provided in all lots.

2.5.3 Parking Demand and Utilisation

There was very limited on-street parking noted along Fishery Point Road and Morisset Park Road during the site work (except during school hours surrounding Bonnells Bay Public School). It could be seen that the majority of parking demands are catered for within the various lots fronting these roads. Some on-street parking is noted along the new section of Trinity Point Drive, at its eastern end adjacent to the recent residential development that has occurred in this location.

2.5.4 Set down or pick up areas

There are no dedicated drop off zones in the locality of the subject site.

2.6 Public Transport

2.6.1 Rail Station Locations

The nearest railway station is in Morisset, approximately 5.8 kilometres from the subject site. Access to the railway station is via Morisset Park Road and Fishery Point Road and then south on Macquarie Street. Morisset station services the Newcastle Central Coast Line and allows for access to regular train services north towards Newcastle and beyond as well south through to Sydney. There are regular trains 7 days a week and Morisset is a major station which ensures the majority of trains stop at this station.

2.6.2 Bus Stops and Associated Facilities

Bus stops are located along the length of Morisset Park Road however there are only limited facilities with a bus shelter provided at the corner of Charles Avenue. This facility will be incorporated into the intersection works associated with the JPG Trinity Point Residential development adjacent to the subject site including improvements to the pedestrian facilities. Similarly a bus bay will be included in the detailed design of Trinity Point Drive in conjunction with the progressive construction of the public road system. The Lake Macquarie City Council S94 Contribution Plan provides for a bus shelter on Morisset Park Road near the intersection of Fishery Point Road, opposite Bonnells Bay Public School.

Photo 2 Bus shelter on Morisset Park Road at the intersection of Charles Avenue

2.7 Other Proposed Developments

Adjacent to the site is the JPG Trinity Point residential subdivision for which there are approximately 123 lots remaining to be developed / habited. The associated works for this site have been documented in this assessment. Separate to this there are no other major developments noted within the general locality. There are infill projects occurring, with some residential developments, both occurring and planned. There is on-going residential development occurring on the corner of Fishery Point Road and Station Street, with some 162 lots in total to be built on this land. These will be a mixture of 135 individual residential lots and 72 medium density residential lots.

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3 Proposed Development

3.1 The Development

The proposal allows for a mixed use comprising:

- 188 berth marina and associated offices and lounge facilities
- Up to 315 accommodation units consisting of 158 short stay tourist (across 65 hotel rooms and 93 serviced apartments) and 157 residential (with opportunity for these to also be used for short stay)
- Associated uses including day spa and two serviced meetings rooms, for on and off site patrons
- Restaurant with internal and external dining, café, function centre
- Shops (152m^2)
- Commercial facilities (sales centre 60m^2)
- Parking, landscape and boardwalk

All vehicle access will be via three driveways off Trinity Point Drive (approved and progressively being constructed as part of the adjoining residential development) allowing for light vehicle access as well as heavy vehicle access associated with servicing requirements. The proposed development (Refer Appendix A) provides for a main site roundabout entry on the corner of Trinity Point Drive, as well as additional access points along the longer boundary to Trinity Point Drive.

Additional intersection works at the main site entrance to Trinity Point Drive will provide a roundabout entry along with a partial public footpath along Trinity Point Drive (to western edge of Stage 5 residential estate roadworks), including dedication of additional road reserve to suit.

3.1.1 Phasing and Timing

The development will be constructed in a number of phases. For this assessment of the entire site, to support the S75w application, it has been assumed that the development will be constructed in a single stage and the traffic and parking impacts have allowed for the full, entire site development. This enables a snapshot of impacts of the total development to be identified, with subsequent development applications to consider impact assessment for each stage, providing more detail on access and parking and other development details.

3.1.2 Access and Circulation Requirements

All vehicle access will be via driveways off Trinity Point Drive which connects with Henry Road, Charles Avenue and Morisset Park Road. The entrances to the site will allow for delineation of the change from public road to driveway access, reflective of a lower speed zone and narrower pavement width indicative of a driveway design as opposed to a public road. The access driveways within the site allows for two way traffic movement and will cater for the expected traffic movements and mix associated with the proposed development.

There will be three separate access points off Trinity Point Drive allowing for separation between the vehicles for the tourist /hospitality / marina site, the short stay accommodation and the permanent

residential apartments. The access driveway to the tourist/hospitality precinct and marina will connect with the local road network through a proposed three leg roundabout with the internal roadway allowing for two way traffic movements. The width and alignment will allow for the larger service vehicles required for these elements of the overall development. This driveway allows for access to the marina and the parking area to the north of the overall site as well as the hotel accommodation and restaurant/function centre. The design of this driveway allows vehicles to turn around within the driveway or the surface car park and exit in a forward direction.

A second vehicle access is provided off Trinity Point Drive that allows for vehicle access to the predominantly short stay tourist apartments. This driveway will allow for two-way traffic movements and will operate under a low speed zone, allowing for shared use with pedestrians. This driveway will provide access to the basement car park for these short stay apartments.

A third vehicle access is provided off Trinity Point Drive that allow for vehicle access to the residential apartments. This driveway will allow for two-way traffic movements and will operate under a low speed zone, allowing for shared use with pedestrian movements. This driveway will provide access to the basement car park for these residential apartments.

3.2 Access

New driveways will be designed and constructed in accordance with Council requirements and using the Australian Standard AS2890.2. Driveways will allow for two-way traffic movements. The largest vehicle that will access the tourist / marina site on a regular basis is a 12.5 metre heavy rigid vehicle and the design will cater for the movement of this size of vehicle. There will be a reasonably low demand for this size of vehicle, associated with weekly fuel supplies and the collection of refuse. For general deliveries to the marina and the restaurant, café, function centre and shops / office the vehicles used will generally be much smaller e.g. Toyota HiAce vans which have similar circulating requirements to a large 4WD vehicle.

Regular access for refuse collection vehicles will be required for the short stay apartments and the permanent resident apartments, and the design of the driveway allows for a refuse truck to enter the site, turn around at the end of the driveways and then exit the site in a forward direction. The short stay units will also requiring servicing e.g. linen etc. and this will be via Toyota HiAce type vehicles which can be accommodated within the driveways.

3.2.1 Driveway Location

The main site driveway is located at the eastern end of Trinity Point Drive and allows for good visibility for vehicles entering and exiting the site. The design of the access will ensure that drivers will be aware of entering the proposed development and recognise the change of speed limit within the site to reflect the driveway design standards of the internal road ways. The roundabout treatment provided at this location, will highlight the change of character whilst also creating a slow point to manage traffic speed. Provision of this roundabout at this location was discussed in consultation with Lake Macquarie City Council's engineers.

Two other driveways will be provided to the south, connecting onto Trinity Point Drive in the vicinity of Celestial Drive and to the south of this road (Refer Site Plan Appendix A). These driveways will allow for safe vehicle entry and exit and offer good visibility for drivers.

These driveways are located within the 50 km/h speed zone and AS2890 requires a sight distance of 45 metres minimum and 69 metres desirable for this speed zone. Given the alignment of the roads in this location the 69 metres will be achievable and will be confirmed as part of the detailed design stage of the project.

3.2.2 Service Vehicle Access

All service vehicles will be able to enter and exit the site in a forward direction primarily via the driveway off the eastern end of Trinity Point Drive. The largest service vehicle required on a regular basis is a 12.5 metre heavy rigid vehicle and the driveway will allow for the movement of these vehicles. The driveway design will reflect the very low demand for these size of vehicles with typically just one heavy rigid vehicle per day accessing the site.

An internal loading dock will cater for a heavy rigid delivery vehicle with a maximum length of 12.5 metres. This combined marina, hotel accommodation and hospitality loading bay and waste storage area will have access by a waste vehicle to the marina carpark area. The truck will then be able to exit the site in a forward direction to return to the public road.

Smaller delivery vehicles will be catered for via loading bays in the undercroft and basement carparks associated with the various buildings with their movements similar to a large 4WD.

3.2.3 Access to Public Transport

The site is not currently accessible by public transport, reflective of the minimal demands in this location however the ongoing development of the adjacent residential development and the associated extension of Trinity Point Drive allows for an extension to the existing bus route.

As part of the planning for the project, there is an opportunity to promote private coach travel as part of the on-going marketing for the proposed development. A tourist bus set down/pick up area will be provided in association with the layover being provided along Trinity Point Drive, suitable for use by patrons of the site.

Currently public buses travel along Morisset Park Road and then turn along Lakeview Road to head towards Sunshine before returning to Morisset. This route operates 7 days a week, but with a much lower frequency over a weekend.

Morisset railway station is located in Morisset approximately 5.8 kilometres from the site. Access is provided via the road link along Morisset Park Road, Fishery Point Road and Macquarie Street. Morisset railway station serves trains on the Newcastle Central Coast line northbound through to Newcastle and beyond as well as southbound through to Sydney and beyond, with a high frequency of service 7 days a week.

3.3 Circulation

3.3.1 Pattern of circulation

All vehicles will be able to enter and exit the site in a forward direction from the local road network. The internal design of the driveways and car parks is in accordance with AS2890 permitting vehicles to turn around within the site and exit in a forward direction.

3.3.2 Road width

The internal driveways providing access to the site will allow for two-way traffic movements and have been designed in accordance with AS2890.

3.3.3 Internal Bus Movements

The proposed development may cater for large groups which could access the site via coach travel. A tourist bus set down/pick-up area is available in conjunction with a layover that is being incorporated into the detailed design of Trinity Point Drive as part of the residential subdivision.

There will not be any regular bus services to the site however the adjacent residential development does provided bus facilities to cater for the future expansion of the existing bus route in this location.

3.3.4 Service Area Layout

An internal loading dock area will be provided within the tourist / marina element of the development and will cater for a heavy rigid vehicle with a maximum length of 12.5 metres. It is located adjacent to the waste collection area and will also allow for servicing of the marina facilities as well as the restaurant, function area, café and other commercial outlets within the site. The loading dock will allow for a truck to reverse into the dock for unloading and then pull out of the dock in a forward direction and complies with AS2890.2 Off-street commercial vehicle facilities.

A loading bay, suitable for smaller vehicles, will also be provided in the car park adjacent to the Function Centre/Restaurant lift core to cater for deliveries to the restaurant/café/function centre.

The movement of produce and waste will be managed within the site by a utility vehicle.

3.4 Parking

The parking for the proposed development will be provided within the subject site to cater for the requirements of the residential and tourist units, marina and the associated facilities. The parking layout has been designed in accordance with AS2890.

There will be a surface car park at the northern end of the site to cater for most of the marina development (addressed in Modification 2 to the Concept Approval currently under assessment) providing 47 parking spaces. It has been designed in accordance with AS2890 and allows for ease of circulation to access the parking spaces (this carpark is proposed in DA 1503/2014).

The remaining car parks are located in a combination of undercroft/podium and basement parking areas with access off the internal driveways. The undercroft parking area under the hotel / function centre / café area allows for staff and patron parking. There is stacked parking provided for staff (8 spaces) as well as stacked parking for hotel patrons (14 spaces) which will be managed with valet parking. This carpark is proposed in DA 1731/2014.

The proposed parking provision (concept) within car parks is shown below, based on plans produced by SQA to determine potential on site parking capacity as part of the concept approval process:

Table 3-1 –Parking Provision (Concept)

Car Park number	Number of spaces
At grade Car Park	47
Undercroft Car Park One	174
Basement Car Park Two	176
Basement Car Park Three	153
Basement Car Park Four	37
Basement Car Park Five	90
Total	677

Within the basement parking, there are accessible parking spaces provided in accordance with AS2890 Part 6.

The design of the carparks will be completed as part of the development application and detailed design stages of the project.

3.5 Pedestrian and Bicycle Facilities

The proposed development will provide an attractive facility for pedestrians and cyclists, linking between the existing developments in the locality to the site and allow for connection between the site and Morisset for schools, commuting and connections to the train station. There is currently an off road footway / cycleway connecting between Macquarie Street through to the intersection of Fishery Point Road and Morisset Park Road. The LMCC s94 Plan provides for a shared pathway between Bonnells Bay and Trinity Point (Figure 2-3).

Within the development there is a pathway along the eastern and southern boundaries of the site providing a leisure walking facility along the edge of the site which will allow for connection to the various facilities within the site.

Cyclists can be accommodated on the local roads and the off road pathway adjacent to Morisset Park Road / Fishery Point Road with bike parking to be made available within the site.

4 Transportation Analysis

4.1 Traffic Generation

Traffic associated with the proposed development will have an impact during the traditional morning and afternoon peak periods associated with the 157 residential apartments on the site (increased from 75 from the Concept Approval). The balance of the development will have a greater impact over the weekend (Friday through to Sunday), associated with arrivals and departures to the hotel and serviced apartments and weekend social use of the marina and restaurant / function centre.

Periods of high demand for the function centre will be mainly associated with conferences and weddings. The economic viability of this facility is based on a function centre with the capacity to host 300 patrons and the requirement to provide 121 – 134 rooms to support that, based on an occupancy rate of 2.2 to 2.5 delegates per room. (Financial/Economic Analysis PwC). When these facilities are being used to their maximum capacity it is anticipated that the majority of the attendees will be accommodated on site in the hotel and tourist units. This cross use of the facilities will have an impact on the overall traffic generation of the site (and parking demands). It is considered that the main period of use of this facility will be at weekends with reduced demand during the week. (Refer 4.1.1). This assessment however also considers traffic generations for external patrons to the function centre within its generation and parking analysis.

The restaurant and café also provide significant facilities for on-site patrons with the hotel providing no dining options and the majority of guests staying in the short-term apartments expected to use these dining facilities given that there are no other facilities within the immediate vicinity of the site. It is expected that these facilities would also be appealing to the residents of the residential units and within the walkable catchment.

Some of the facilities offered are associated with the hotel, tourist units and residences and are for the exclusive use of these patrons. This includes the beauty salon, pool and gym. These facilities will therefore not be generators of traffic in their own right.

The day spa, whilst open to the public, is expected to be generally frequented by hotel and apartment guests with 50% internal and 50% external use allowed.

Similarly there is a business centre which may provide meeting rooms for use by both on site and off site patrons. The four retail outlets within the hotel accommodation and marina building are also expected to primarily service the needs of guests, both tourist and marina as well as on site residents.

Based on these above assumptions and applying rates provided by the RMS Guide to Traffic Generating Developments, or where not available using those calculated for the original concept (BTF 2008) and reassessed in the C7 report, a summary of the future traffic generation associated with the proposed development is shown below in Table 4-1. This table also provides the peak hour traffic generated by the approved concept as a point of comparison.

Table 4-1 – Predicated peak hour traffic volumes associated with the proposed development

Element	Approved Concept	Proposed Development	Generation Rate		Traffic Flows for Approved 2009 Concept Seasonal peak		Traffic Flows for Proposed Development Seasonal peak	
			AM	PM	AM	PM	AM	PM
Marina	188 berth	188 berth	0.067 v/berth (1)	0.25 v/berth (1)	13	47	13	47
Hotel		65 rooms		0.4 per room (2)				26
Business Centre		64m^2	2 per 100m^2	2 per 100m^2			2	2
Gym (exclusive use of guests – trips associated with staff only)	50m^2	125m^2	1 per 25m^2	1 per 25m^2 (2)	2	2	2	2
Pool (exclusive use of guests – staff only)		522m^2					1	1
Hair Salon (exclusive use of guests – trips associated with staff)	64m^2	29m^2	1 per staff	1 per staff	2	2	2	2
Day Spa – staff during peak hour		177m^2	1 per staff	1 per staff			2	2
Dining –Café	90m^2	91m^2	Staff	5 per 100m^2 (2)	5	5	5	5
Shops - staff arriving/departing in peak hour	130m^2	152m^2	1 per staff	1 per staff	4	4	4	4
Commercial (Boat sales)		60 m^2		2 per 100m^2 (2)			2	2
Marina Lounge (Ancillary to marina)		78.5 m^2						
Conference/ Function Room	350m^2	843m^2	2.5 people per vehicle	2.5 people per vehicle	45	45	120	120
Dining – internal restaurant	160m^2	676m^2	Staff only	5 per 100m^2 (2)	10	20	2	34
Dining – outside restaurant		200m^2	Staff only	5 per 100m^2 (2)			2	10
Lawn		100 patrons	Assumed 2.5 patrons per vehicle					40
Operations manager	40m^2		1 per staff	1 per staff	2	2	2	2
Offices	100m^2		2 per 100m^2 (2)	2 per 100m^2 (2)	2	2	2	2
Service area (marina)	450m^2		1 per staff	1 per staff	5	5	5	5
Tourist units	75 (1/2/3/4 bedroom)		1 per unit	1 per unit	75	75	-	-
		93 (1/2/3) bedroom)		0.4 per unit (2)			10	37
Residential		127 x 2 bedroom	0.4 per unit	0.4 per unit (2)			51	51
	30 x 3 bedroom	13 x 3 bedroom	0.5 per unit	0.5 per unit (2)	15	15	7	7
	45 x 4 bedroom	17 x 4 bedroom	.65 per unit	0.65 per unit (2)	29	29	11	11
TOTAL					209	253	245	412

Notes: (1) Approved Concept rate (2) RMS Rate

The residential element will generate outbound trips in the morning peak (69 vehicles) whilst the balance of the proposed development will generate inbound trips in the morning peak. The reverse pattern will occur in the afternoon peak period with inbound residential trips being some 69 vehicles, whilst there will be a mixture of inbound and outbound for the remaining users i.e. staff and patrons leaving the function centre and site whilst other visitors will be entering the site for evening attractions or arriving at the hotel. This compares with the traffic generation for the approved concept of 44 peak hour trips in the AM and PM. This is an increase of 57% compared with a quantum increase in residential units of 109%. This shift reflects the change in apartment size for the modified concept and the application of a lower peak hour trip rate as outlined by the RMS for the smaller apartments.

The trip generation rate applied for the approved concept allowed one trip per tourist unit for 75 units. The application of the RMS rate of 0.4 trips in the PM for the hotel and short stay accommodation refines this calculation. Although there is an increase in the short stay accommodation from 75 to 158 units, including the hotel (65 rooms), the change in the peak hour trip generation is a net reduction of 16% or 12 trips in the PM.

For the support elements such as the restaurant, function centre etc. it has been assumed that some staff will arrive in the morning period to commence preparation work for the functions etc. Patrons will then arrive and depart throughout the day with the significant number of these staying on site within the accommodation. During mid-week daytime functions, patrons may arrive to the site during the AM peak.

The above values are considered a worst case scenario, reflective of a peak demand over a summer day and allowing for limited cross use of the function centre and dining options. The values for the marina reflect maximum use of the marina berths and a full function with people arriving during the afternoon peak period. The value of 120 vehicles associated with the function centre would equate to 300 people arriving in 120 cars (allowing for average car occupancy of 2.5 people per car) all arriving on site between 5-6.00 PM for a 6.00 PM function or having arrived in the AM peak for a daytime function then leaving at the end of the day. This is a worse case depiction, with arrivals potentially spreading outside the peak or associated with accommodation arrivals spread outside peaks, but is provided to be conservative.

For a week day with no function, the afternoon peak flows could be some 292 vehicles per hour when there is no major function to generate afternoon peak flows to or from the site. For corporate functions it is considered that the inbound trips would occur in the morning for a 9.30 AM start, and as such could impact upon the morning peak periods. These corporate functions could extend into the evening and not impact upon the afternoon peak period. Similarly if there is no daytime conference activity in the main function room the AM peak trips would reduce by 120 trips to 125 vph in the AM.

4.1.1 Trip Containment

The above rates makes no allowance for the cross use of facilities within this site. It does recognise those uses which are for the exclusive use of the guests however does not allow for the use by patrons and residents within the development to use the various dining and function facilities within the development and the resulting trip containment. The table below demonstrates the potential reduction in traffic movements due to trip containment within the site.

Table 4-2 Potential trip containment due to cross use of facilities

Accommodation type	On-site containment	Number of vehicle movements
Hotel (65 rooms)	80% of patrons attending restaurant or function centre (104 people)	Minus 104 trips
Resort accommodation (93)	80% of patrons attending restaurant or function centre (186 people)	Minus 148 trips
Residential units	10% of residents attending the restaurant or café	Minus 30 trips
Total potential containment		282 trips

The above table shows that of a peak summer evening, when the function centre and dining options could be at their peak capacity a significant number of patrons of the function and restaurant facilities could be on site and potentially decrease the external traffic demands (two-way) by 282 vehicles inbound and outbound.

This would mean that in the afternoon / evening peak, the traffic generated by the site would be 271 vehicles (412-141vph).

4.1.2 Daily and Seasonal Factors

The nature of the proposed development will lead to typical morning and evening peak hour traffic generation associated with the residential part of the development and daily flows will vary between Monday to Thursday and Friday through to Sunday.

The balance of the development would be expected to generate traffic out of the traditional peak periods.

It is further considered that the proposed development will have a high patronage for the marina, leisure and hospitality facilities over the summer period due to the warmer weather encouraging marina and tourist use. This could be further increased over the Christmas / New Year periods associated with holiday use and party events.

Detailed data collected for the Rose Bay and Point Piper marinas (Hallam 2009) show the usage of boats daily for the period July 2006 – January 2007. This data (Appendix D) provides a seasonal profile of usage based on occupied berths and moorings (52 in total), not providing any allowance for unused berths, with the following seasonal and peak usage patterns determined.

	July	August	September	October	November	December	January
Mean	6.2 out of 52	5.7 out of 52	6.9 out of 52	6.9 out of 52	5.8 out of 52	11.6 out of 52	9.2 out of 52

The report notes that "there is no strong trend towards increasing boat usage as summer approaches, but the December and January usages clearly stand out as the peak months of the year."

The peak days were:

- 8 July 2006 26 boats used
- 7 October 2006 24 boats used
- 31 December 2006 24 boats used
- 9 July 2006 23 boats used
- 2 December 2006 23 boats used

• 26 December 2006 23 boats use

An analysis of the seasonal usage by day and by month provides a pattern of seasonal usage which shows:

Period	Average Usage	Application
Peak	24 of 52 craft	10 days per year including Easter
Summer weekend	15 of 52 craft	December - March
Summer Mid-Week	9 of 52 craft	December - March
Other weekend	11 of 52 craft	April – November
Other mid-week	4 of 52 craft	April - November

This seasonal variation in use of the marina element of the project is important to note, as the absolute peak flows determined for the project will only be realised in a limited number of days i.e. 10 days only and at other times the flows are less than half this amount.

The tourist and hospitality facilities would be subject to seasonal variations with higher demands during the summer and lower demands during the winter. To assess the demands of the various hospitality uses the following (Table 4-3) has been assumed. This makes no allowance for the impact on weather during the summer but assumes 100% usage for the lawn and outdoor dining areas.

Table 4-3 Seasonal use of hospitality facilities

Element	Summer weekend	Spring / Autumn weekend	Winter weekend	Mid-week function
Function centre	100 % used	100 % used	100 % used	100% used
Restaurant	100 % used	100 % used	50% used	50% used
Lawn area	100 % used	100 % used	0% used	0 % used
Outdoor dining	100 % used	50% used	0% used	0 % used

The trip generation outlined in Table 4.1 is based on full use of the function centre however mid-week, on days when the function centre is not fully utilised and the accommodation facilities are at their lower occupancy levels (60%) the traffic generated by the modified concept would be further reduced. Table 4-4 below shows the combined impact of these seasonal (Table 4-3) and lower occupancy factors to the peak hour trip generation.

Table 4-4 Impact of seasonal uses and lower occupancy on peak hour traffic

Element	AM Peak Hour	PM Peak Hour
Peak hour trip generation	245	412
Minimal use of function centre (assume 100 patrons)	-120	-120
60% of hotel and short-stay apartment occupancy	-25	-25
Restaurant (50%)	-	-14
Outdoor dining (0%)	-	-10
Lower trip generation range	100	243

4.1.3 Sight Distances

The internal driveways will operate under a low speed limit. Signage will advise drivers of the lower speed limit with a suggested speed limit of 20km/h for the internal driveways. These driveways have been designed in accordance with AS2890 which ensures sight lines are suitable for this posted speed limit. The access to the site is provided off the end of Trinity Point Drive and will operate as a roundabout. At this location, the road is straight, offering good visibility for drivers approaching the intersection from all directions. Trinity Point Drive operates under the posted speed limit of 50 km/h and from the RTA Road Design Guide requires a sight distance of 80 metres. This sight distance can be achieved at the site access point.

4.1.4 Queuing at entrance to site

There are no vehicle queues expected at the main site entry / exit point. Given the traffic demands associated with the proposed development and the low traffic flows at the eastern end of Trinity Point Drive it is considered that drivers will experience minimal delays. Traffic entering the site will have priority and will not queue on Trinity Point Drive. Any delays for traffic exiting the site will be contained within the site.

4.1.5 Comparison with existing site access

The site is currently vacant and as such there is no existing site access.

4.1.6 Pedestrian Movements

The proposed development is expected to attract a significant number of pedestrian movements, generally associated with internal pedestrian movements around the site. There is a pathway along the eastern and southern sides of the development allowing for a connection between the various elements.

It is considered that there will be some external pedestrian movements associated with local residents who could visit the site to use the leisure facilities such as the café and restaurant etc. Pedestrian connectivity will be provided between the site and Trinity Point Drive.

For external links, the S94 plan provides for an off road path to link between the subject site and the Fishery Point Road / Morisset Park Road intersection. This will then allow for pedestrian and cycling connection to the shops at Bonnells Bay as well as connection through to Morisset if required.

However, given the distance between the subject site and Morisset / Bonnells Bay it is considered that the external pedestrian demands will be relatively low.

4.2 Traffic Distribution and Assignments

The site is located at the eastern end of Trinity Point Drive on the peninsula incorporating the suburbs of Bonnells Bay, Windermere Park, Morisset Park and Sunshine . As such, all traffic will access the site via the Trinity Point Drive, Morisset Park Road and Fishery Point Road corridor. Fishery Point Road then connects with the greater road network at its intersection with Macquarie Drive at the western end of the peninsula.

For the purposes of this assessment, it is expected that some 90% of the total trips generated by the development would have an origin / destination from Macquarie Street with the balance (10%) having an origin / destination within the peninsula.

This allows for use by local residents within the peninsula whilst local trips to Trinity Point from Morisset, Dora Creek, Cooranbong etc are included as being part of the 90% of trips that will access Trinity Point via Macquarie Drive. This enables a robust assessment of the local road network.

4.2.1 Origin / destinations assignment

The inbound and outbound traffic will travel along the Fishery Point Road / Morisset Park Road and Trinity Point Drive corridor. They will then turn left or right onto Macquarie Street. It is considered that once at this point 80% of the traffic would have an origin / destination from the south and 20% from the north, based upon the preference of existing traffic surveyed at this location.

4.3 Impact of Generated Traffic

4.3.1 Impact on daily Traffic Flows

To determine the daily impact of the development, the potential daily traffic flows associated with the proposed development have been determined using standard rates from the RMS or assuming daily rates are 10 times the peak rates, which is applicable to a number of development types.

Table 4-5 below provides a summary of the daily flows associated with the tourist/hospitality/residential components and shows that the daily 2-way flow could be in the order of 1866 vehicles per day. This is based however upon the weekend use, when the function centre / restaurant is fully utilised. During the week, the flows are expected to be much lower, as Monday to Thursday typically the tourist facilities could be reasonably vacant. Assuming these could generate 60% of the flows during the week (based on the PWC report), this would reduce the daily flows by 295 movements to 1,571 vehicles per day.

Table 4-5 Daily traffic flows based on land use-assumed absolute peak rates for daytime and weekend summer peak

Element	Daily rates	Size (Approved Concept)	Size (Proposed Development)	Daily flows (Approved Concept)	Daily Flows (Proposed Development)	Notes
Hotel	3 trips per room		65 rooms		195	RMS standard rates
Gym	4	50m^2	125m^2	4	2	Staff only, for internal use only
Hair Salon	Staff only	64m^2	29m^2	4	4	Staff movements only, internal use
Day Spa			323m^2 GFA		20	50% internal
Café (80 patrons)	60 per 100m^2	90m^2	91m^2	50	128	Assumes 2.5 people per car, 2 sittings
Shops (majority internal)	5 times peak	130m^2	151.5m^2	20	20	Primarily internal use with some external
Function Rooms (300 patrons)	Assumed arrival AM and departure PM	350m^2	843m^2	210	240	Assumes 2.5 people per car

Restaurant (200 patrons)	Staff AM, patrons PM	160m²	676m²	96	320	Assumes 2.5 people per car, 2 sittings
Outdoor eating (75 seats)			200 m²		120	Assumes 2.5 people per car, 2 sittings
Lawn			100 patrons		80	Based on 2.5 people per car
Operations manager	Peak use only	40m²		4		Support Staff only
Offices/ commercial (sales centre)	10 per 100 m²	100m²	60m²	10	6	Staff only
Business Centre	10 per 100 m²		64m² GFA		7	Some external use
Service area	10 per 100 m²	450m²		45	-	
Tourist units	3 per unit	75 (1/2/3/4 bedroom)	93 (1/2/3 bedroom)	225	279	RMS rate
Residential	5 per day		127 x 2 bedroom		635	RMS rate
	6.5 per day		13 x 3 bedroom		85	RMS rate
	6.5 per day		17 x 4 bedroom		111	
	7.4 per day	30 x 3 bedroom		222		
	7.4 per day	45 x 4 bedroom		333		
Sub-total				1,259	2252	
Reduction due to trip containment					-253	
TOTAL					1999	

The daily flows associated with the marina have been derived from the RMS rate of 2.7 trips per berth for the peak summer weekend use. The RTA Guide acknowledges that these rates can vary significantly based on the season, type of berth and size of vessel. Applying the seasonal profile outlined in Section 4.1.1 and allowing for the RMS rate to represent the peak usage the following daily trip rates are derived.

Period	Trip Generation	Application
Peak	2.7 trips per day	10 days per year inc Easter
Summer weekend	1.7 trips per day	December - March
Summer Mid-Week	1 trip per day	December - March
Other weekend	1.2 trips per day	April – November
Other mid-week	0.5 trips per day	April – November

Element	Mid-Week Low Patronage Daily Trips	Winter Weekend/Mid-Week Function	Shoulder
Daily trip generation	2252	2252	2252
Minimal use of function centre (assume 100 patrons)	--160	Fully Utilised	Fully Utilised
No Lawn Area	-80	-80	Fully Utilised
60% of hotel and short-stay apartment occupancy	-126 (-40%)	Fully Utilised	Fully Utilised
Restaurant	-160 (-50%)	-160 (50%)	Fully Utilised
Outdoor dining	-120 (-100%)	-120 (no use)	-120 (50%)
Containment	-152	-253	-253
Lower trip generation range	1454	1639	1879

Table 4-6 Daily traffic flows based on land use-adjusted for seasonal factors

	Mid-week Other (0.5 trip/berth)	Mid-week Summer (1 trip/berth)	Weekend – Other (1.2 trips/berth)	Weekend - Summer (1.7 trips/berth)	Peak (2.7 trips/ berth)
Marina – 188 berth	94	188	226	320	508
Balance of Development	1454 - 1,639	1639	1639-1879	1,999	1,999
Total Daily Traffic	1548-1733	1,827	1,865-2105	2,319	2,507

The above table shows that the development could typically generate some 1,733-1827 vehicle movements per day midweek with less (1548vpd) during quieter winter periods with low occupancy and smaller functions. The typical peak summer daily demand is calculated as 1827-2,319 vehicles per day. The potential absolute peak of 2,507 trips would only occur on 10 days per year typically. Note that the trips rates above represent two way flows, showing for example that the typical mid-week flow would be 866-914 vehicles inbound and 866-914 vehicles outbound per day.

The increases in tourist and residential accommodation has been able to be quantified in conjunction with other changes (eg hospitality) to provide more certainty in the traffic generation for the development. In applying the most current rates to the modified concept some demands have increased while others have decreased. In reassessing the impacts of the whole modified concept, the impacts of the proposed increases in the short-term accommodation and residential apartment supply have been offset by the refined trip generation and parking analysis for the various elements. Across the whole of the development the changes in traffic generation and parking demands have been able to be offset by the opportunity for trip containment and shared use within the site as well as the

operational characteristics for the facility. This is reflected in the range of daily traffic flows for the modified concept.

The adjacent residential development, with approximately 123 lots to be developed / habited will generate some 1,107 vehicle movements per day.

The current traffic flows on the local roads in the immediate vicinity of the subject site are low, with the current flows on Morisset Park Road being in the order of 2,300 vehicles per day to the immediate east of Fishery Point Road. These flows are typical of mid-week traffic flows and would be less during the weekend due to lack of commuting and school trips which represent a high proportion of daily traffic flows.

Table 4-7 Impact on daily traffic flows on local road network

Road	Morisset Park Road	Fishery Point Road	Trinity Point Drive
Existing daily	2,300	10,650	540
Development flows	1,548-2319	1,548-2319	1,548-2319
Adjacent residential flows	1,107	1,107	630
Total flows	4955 - 5,726	13,305-14076	2718 - 3489
Classification capacity (*average*)	5,000	13,000	5,000

The above values for the predicted traffic movements represent the worst case scenario for total flows, for although the summer weekend traffic movement is approximately 492 more than the mid-week, normally the background weekend traffic flows would be lower than the weekday traffic flow, which would coincide with the peak demands (weekends) associated with the marina. Conversely, when the peak flows on the local road network occur during the week (Monday to Friday) the marina and tourist development would generate lower traffic movements and hence the overall flows would be lower (Table 4-6).

The periods of absolute peak usage of the marina and tourist facilities generally coincide with holiday periods and school holidays when the flows on the surrounding road network are considered to be lower than the school term. Similarly, for the period outside of the summer the mid-week flows from the development are expected to be lower (1,548-1827 vehicles per day)., increasing the daily flows on this road to 4955 – 5234 including the adjacent development.

It can be seen that the average traffic flows associated with the development fall well within the advice provided by the RMS guidelines.

4.3.2 Peak Hour Impacts on Intersections

The key intersections that will be impacted by the proposed development are:

- Intersection of Trinity Point Drive/ Morisset Park Road and Charles Avenue
- Intersection of Morisset Park Road and Fishery Point Road
- Intersection of Station Street and Fishery Point Road
- Intersection of Fishery Point Road and Macquarie Street

The following is noted for these intersections:

- The intersection of Fishery Point Road and Macquarie Street has been identified for upgrade to traffic signals by other developers with no timeframe for the construction, but noted by the RMS to be completed by 2019
- The intersection of Fishery Point Road and Station Street has been upgraded to signals through S94 contribution
- The intersection of Fishery Point Road and Morisset Park Road has been identified for upgrade with sheltered right turn lane on Morisset Park Road approach with funding through S94 contributions

For the intersection of Morisset Park Road/ Trinity Point Drive and Charles Avenue, it can be seen that the current intersection layout will need to be altered, to cater for the increase in traffic movements in and out of Trinity Point Drive. The following options have been considered:

- Change priority to provide priority for the through movements along Trinity Point Drive
- Provide a 3-way roundabout control

With the current peak hour flows along Morisset Park Road in this location being in the order of 200 in the morning and afternoon peak periods, the current layout of this intersection is considered adequate. However, with the full development of the proposed development and adjacent residential development this intersection will need to be upgraded. The provision of a 3-way roundabout at this location as per the conditions of consent for the adjacent residential development is supported, to enhance the sense of arrival at the location and to act as a speed control device. This upgrade has been determined and approved by Council taking into account the various developments including Trinity Point within the locality.

This intersection upgrade has already been recognised and approved by Council, as part of the development for the Stage 6 of the adjoining residential subdivision (DA 2293 / 2006). This roundabout upgrade is being funded wholly by the residential development together with the provision of kerb and gutter along the southern side of Morisset Park Road from the new roundabout to the existing kerb, expected to start 2015.

For the intersection of Morisset Park Road and Fishery Point Road, the traffic associated with the proposed development will have a minimal impact upon the overall operation of the intersection, as the vast majority of the traffic movements will be straight through with very little right turning traffic. The upgrade identified in the S94 plan allows for the upgrade of the intersection to provide a sheltered right turn lane on the Morisset Park Road approach, to improve the road safety associated with traffic turning right into Fishery Point Road off Morisset Park Road.

The existing intersection operation at this location has been assessed with Sidra and the results of the analysis are presented below:

Table 4-8 – Sidra analysis, 2014 base flows Morisset Park Road and Fishery Point Road

Approach	Level of service	Delay (seconds)	Queue (metres)
Morisset Park Road	A / A	0.8 / 2.2	0.4 / 0.9
Fishery Point Road (Bonnells Bay)	A / A	10.3 / 10.8	43.3 / 17.7
Fishery Point Road (Morisset)	A / A	4.0 / 4.7	0.0 / 0.0

Note: AM / PM flows

The intersection was then analysed with the additional traffic movements associated with the proposed development. The results of this analysis are presented below:

Table 4-9 – Sidra analysis, 2014 base flows plus full development flows, Morisset Park Road and Fishery Point Road

Approach	Level of service	Delay (seconds)	Queue (metres)
Morisset Park Road	A / A	0.7 / 0.7	0.6 / 1.5
Fishery Point Road (Bonnells Bay)	B / B	20.1 / 24.6	80.0 / 38.2
Fishery Point Road (Morisset)	A / A	2.4 / 4.4	0.0 / 0.0

Note : AM / PM flows

The above Sidra analysis demonstrates that whilst the additional traffic associated with the proposed development will increase the delays and queues for the Fishery Point Road approach from Bonnells Bay, the operation of the intersection will remain well within acceptable limits.

It is considered that this intersection does not need to be upgraded as a direct result of the proposed development, but can be upgraded in accordance with the S94 plan as on-going development, beyond the proposed development occurs.

The other major intersection that could be impacted upon by the proposed development is the intersection of Macquarie Street and Fishery Point Road. This has been identified for upgrade to traffic signals but this will not occur until 2019. The operation of the intersection has been assessed for the current flows and the results are provided below:

Table 4-10 – Sidra analysis, 2014 base flows Macquarie Street and Fishery Point Road

Approach	Level of service	Delay (seconds)	Queue (metres)
Macquarie St south	A / A	4.7 / 9.0	12.2 / 69.8
Fishery Point Road	B / A	15.4 / 10.6 (27.7 right turn out)	77.3 / 21.8
Macquarie St north	A / A	0.6 / 1.1	0.0 / 0.0

Note: AM / PM flows

The analysis above confirms the site observations which show that overall the intersection operates well, but the delay for the right turn out of Fishery Point Road can be high during the critical afternoon peak period.

The intersection was then analysed with the additional traffic movements associated with the proposed development and the results are presented below:

Table 4-11 – Sidra analysis, 2014 plus proposed development flows Macquarie Street and Fishery Point Road

Approach	Level of service	Delay (seconds)	Queue (metres)
Macquarie St south	A / A	6.8 / 10.8	26.7 / 92.1
Fishery Point Road	B / B (D right turn out)	18.1 / 19.8 (47.3 right turn out)	102.2 / 103.7
Macquarie St north	A / A	0.9 / 1.2	0.0 / 0.0

Note : AM / PM flows

The above results indicate that the intersection will continue to operate to an acceptable level of service and delays, but the queues will extend beyond the length of the existing sheltered right hand turn lane on Macquarie Street. The existing sheltered right hand turn bay is approximately 75 metres

long and the predicted queue is some 92 metres, an increase of 19 metres over the existing situation. The modelled results for the existing situation can be accommodated within the existing right hand turn lane, although it can be seen that there is no spare capacity for increased right hand turn queues.

The Sidra analysis above supports the approved upgrade of the intersection of Macquarie Street and Fishery Point Road to traffic signal control. This is required to accommodate the existing traffic flows which are close to the capacity of the existing intersection layout and to accommodate the additional traffic movements associated with the approved development along the peninsula at Station Street and other approved developments. The VPA signed by the developer for the development at Station Street and Fishery Point Road provides the funding mechanisms for the installation of traffic signals at this location.

The operation of the intersection allowing for signal control, has been assessed with Sidra and the results of the analysis are presented below. Whilst no plans are available for the upgrade, the following layout has been assessed at this stage to determine the potential impact of the development, allowing for an intersection layout in accordance with normal RMS design requirements for traffic signal controlled intersection:

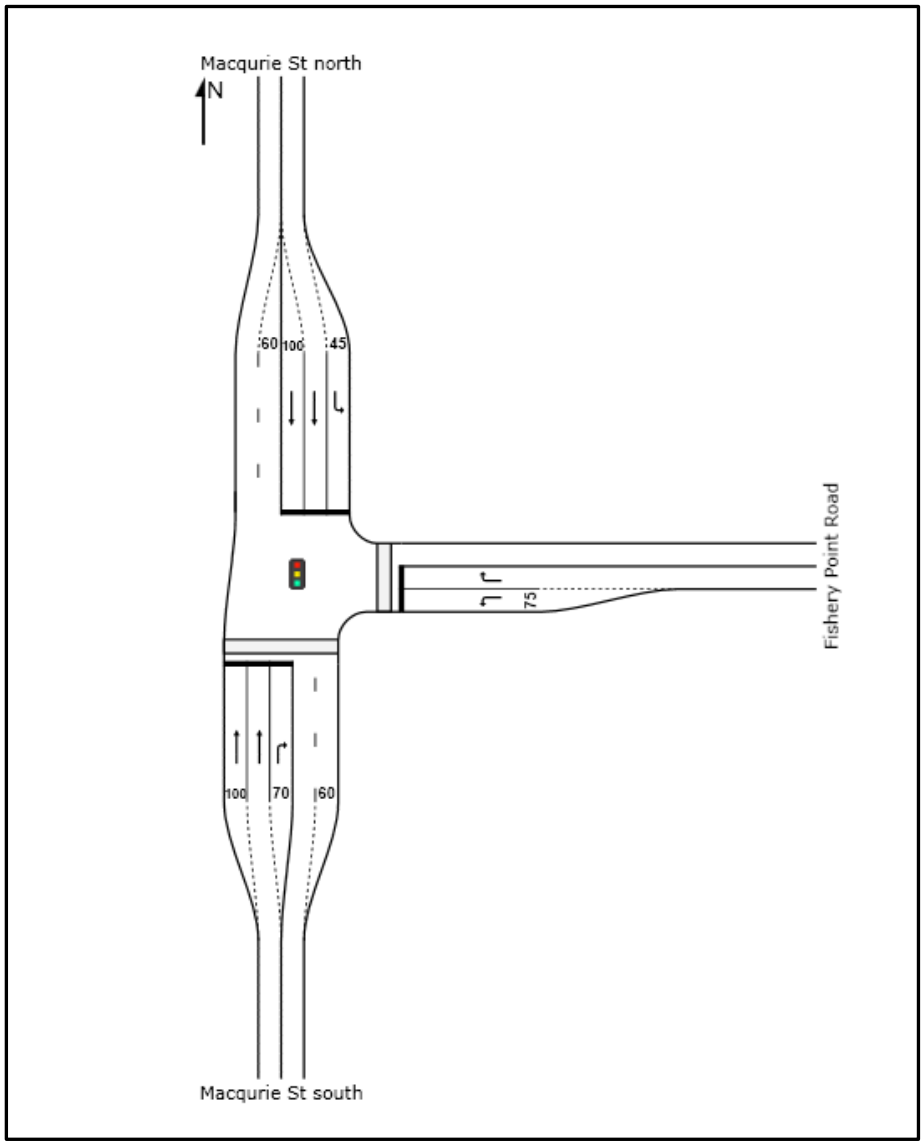


Figure 4-1 – Indicative layout, intersection of Fishery Point Road and Macquarie Street, allowing for traffic signal control

Table 4-12 - Sidra analysis, 2014 plus proposed development flows Macquarie Street and Fishery Point Road (signal control)

Approach	Level of service	Delay (seconds)	Queue (metres)
Macquarie St south	B / C	27.0 / 28.9	114.4 / 254.6
Fishery Point Road	B / B	15.0 / 16.6	103.9 / 126.0
Macquarie St north	C / D	31.3 / 44.9	93.5 / 114.1

Note : AM / PM flows

The above indicative Sidra analysis indicates that the proposed signal control at the intersection of Fishery Point Road and Macquarie Street will operate to an overall satisfactory level of service and associated delays / congestion. Further detailed assessment will be completed at the time of the design of this intersection (by others) and will allow for improved layout and operation of this intersection, over and above that allowed above.

4.3.3 Background traffic and other developments

There are a limited number of approved developments occurring along the peninsula and these have been taken into account as part of the S94 planning in this location. The Section 94 plan has identified these approved developments and has determined the road upgrade requirements. This assessment has allowed for these approved developments and has demonstrated that the upgrade of the intersection of Macquarie Street and Fishery Point Road to signal control needs to be completed.

There is limited other traffic growth occurring in this area and the growth along Macquarie Street is limited in this location. It is not impacted upon by the development at Cooranbong.

4.3.4 Impact of Construction Traffic

The majority of construction work will be contained within the site so there will be minimal impact upon the external road network, other than construction traffic accessing the site via the road network. There will be a requirement for construction machinery to access the site and traffic associated with workers. A Traffic Management Plan will be required for work on site and access controls. This will be completed as part of the design process by the contractor on site. All works on site will be governed by the requirements of Lake Macquarie City Council as stipulated within any development consent granted including hours of work.

An important element for the construction work will be managing the vehicles associated with the construction staff. Construction staff can be directed to park within the site and the overall area of the site will allow for this to happen.

4.4 Impact on Road Safety

The additional traffic flows associated with the development of the subject site will have a relatively low impact upon the overall road safety in this location. The site access is located on a straight section of Trinity Point Drive offering good visibility for drivers entering and exiting the subject site. The driveway is located in a 50 km/h speed zone.

The major impact could occur at the intersection of Macquarie Street and Fishery Point Road. The increase in delays and queues could increase driver frustration and encourage drivers to take shorter gaps in traffic, potentially leading to accidents at the T-intersection. Accidents at T-intersections normally create more damage and injuries, as vehicles collide at right angles and at speed. The provision of traffic signals at this intersection is documented and described in the S94 plan, even though it is not funded by the s94 plan but rather is funded by an existing VPA. It is therefore supported on a road safety basis, for both the current situation and with the additional traffic movements associated with the proposed development.

4.5 Parking Analysis

The Trinity Point Marina and Mixed Use development will provide for an integrated tourist, hospitality and accommodation precinct with a high level of trip containment on site. There is an opportunity for a significant amount of cross use between the various elements enabling a review of the overall parking demand.

There are a series of facilities offered which are for the exclusive use of guests and so create no patron parking demand. Staffing requirements for these facilities are generally managed through the staff associated with the hotel accommodation with a provision allowed for nominal extra staff based on the DCP rate of 1 space per 2 staff. These include the office space, pool and gym which are related directly to the marina and tourist facility.(1) The hair salon, again for the exclusive use of guests, has had a provision made for staff parking consistent with the DCP rate of 1 space per 2 staff. (2)

The day spa and business centre are associated with the tourist and marina uses on site with a high rate of patronage expected from these guests, or cross patronage with other facilities also on site. Advice from the study team is that is anticipated to be 50% with an associated discount to the parking demand of 50%. The balance of 50% of those visiting these services will therefore be external to the site with the relevant parking provided. (3) The small retail outlets would cater primarily for on-site guests or cross patronage with other facilities, including the residential elements, on site with minimal external demand. Parking has been provided for staff at the DCP rate of 1 space per 2 staff. (4)

The café and restaurant provide the only on-site dining option for the hotel guests and as such the parking for these guests has been discounted as their parking has already been allowed for on-site. This calculation has been based on a conservative approach with an allowance for 80% of hotel guests to be dining in either the restaurant, café or associated with an event in the function centre e.g. hotel patrons would have breakfast on site before attending a wedding in the function centre later in the day. Similarly the patrons of the serviced apartments would also be expected to be using the on site function or dining facilities. This equates to a discount of 131 spaces for these shared uses. (5)

Residents in the units on site would also be expected to be patrons of the restaurant and café, as would people on board boating craft, further reducing the overall parking demand however no discount has been allowed for this.

The parking for the proposed development is based upon the end user demands, the location of the site and the parking requirements of the Council DCP 2014 together with the RTA Guide to Traffic Generating Developments. However, it can be seen that the proposed development is unique in nature and the Council DCP 2014 and the RTA Guide do not provide a full breakdown in terms of the parking requirement for each element.

The following DCP parking rates (DCP2014 Part 6 – Development in Recreation and Tourist Zones) have been applied to the various uses on site:

Hotel or motel accommodation

Where providing accommodation 1 space per short-stay room, plus 1 space per 2 staff.

Neighbourhood Shops

Where the total area is less than 5000m² GFA

1 space per 25m² GFA

Business and office premises

1 space per 40m² GFA.

Restaurant or café

1 spaces per 10m²

Serviced apartments

1 space per unit, plus 1 space per 50m² GFA for any dining room provided as part of the development

DCP2014 Part 6 – Residential flat buildings, multi dwelling housing and shop top housing. Including, as a component of mixed use developments.

Dwelling Unit Size/No. of Bedrooms	Avg. Vehicle Spaces Per Dwelling
Small (<75m²) or 1 bedroom	0.75
Medium (75-100m²) or 2 Bedrooms	1.0
Large (>100m²) or 3 bedrooms	1.5
Plus: Visitor parking per dwelling –residential flat buildings	0.25

The LMCC DCP does not provide a rate for a function centre and as a separately defined use requires justification of comparable uses. A review of alternate DCP's for function centres provides the following comparisons:

Kempsey DCP 2013 Parking, Access and Traffic

1 per 2 employees plus 1 per 10m2

Ku-Ring-Gai Council – where a public restaurant or function room is included with a motel, non-licensed hotels, guest houses and bed and breakfast houses.

1 space per 3 seats

Fairfield City Wide Development Control Plan Chapter 12 – Car Parking, Vehicle and Access Management Amendment No. 6A

1 space per 5m² gross leasable area restaurant/function room.

When determining the extent of parking required for the project, the following factors must be taken into account:

- External patrons for the function centre and restaurant will arrive in shared vehicles, with a car occupancy rate of 2.5 people per car
- The hotel and serviced apartments would be expected to be fully occupied during major events in the function centre e.g. large weddings and conferences. At other times it could have an occupancy rate of only 60% (PwC Economics Report).
- The tourist and hospitality facility would be subject to seasonal variations with higher demands during the summer and lower demands during the winter. To assess the demands of the various hospitality uses the following has been assumed:

Element	Summer weekend	Spring / Autumn weekend	Winter weekend	Mid-week function
Function centre	100 % used	100 % used	100 % used	100% used
Restaurant	100 % used	100 % used	50% used	50% used

Lawn area	100 % used	100 % used	0% used	0 % used
Outdoor dining	100 % used	50% used	0% used	0 % used

The 'worst case' parking requirements have been assessed applying the DCP rates where available and allowing for the concessions as outlined above (refer Table 4-13 below). This would result in a total parking demand for the development ranging between 507 spaces during the winter and a summer weekend peak of 601 spaces. However that assumes that all uses are fully operational and each at maximum capacity all at the same time and with no cross use, other than the concessions outlined above. This is unlikely, based on different operating hours and patron patterns for various uses. This is provided simply as an analysis starting point.

Table 4-13 - DCP based parking analysis, assuming all full operational at maximum capacity at any one time (concessions as above)

Land Use		Parking Rate Applied	Winter Parking Demand	Mid Week Parking Demand	Shoulder Weekend (Spring/Autumn) Parking Demand	Summer Parking Demand
Marina	188 berth	0.3 per berth	56 spaces	56 spaces	56 spaces	56 spaces
Marina Staff	5	1 per 2 staff	2 spaces	2 spaces	2 spaces	2 spaces
Hotel	65 rooms	1 space per room	65 spaces	65 spaces	65 spaces	65 spaces
Hotel staff	4 staff	1 space per 2 staff	2 spaces	2 spaces	2 spaces	2 spaces
Business centre 50% internal use (3)	64 m^2 GFA	1 space per 40m^2	2 spaces	2 spaces	2 spaces	2 spaces
Hair salon (exclusive use of guests) (2)	29 m^2 GFA	1 space per 2 staff	1 spaces	1 spaces	1 spaces	1 spaces
Day Spa – staff below, balance discounted for 50% internal use (3)	323 m^2 GFA	1 space per 25m^2	6 spaces	6 spaces	6 spaces	6 spaces
Day Spa – staff		1 space per staff	1 spaces	1 spaces	1 spaces	1 spaces
Pool (exclusive use of guests) (1)	522m^2 GFA	Ancillary to the site Site patrons only	Nil	Nil	Nil	nil
Gym (exclusive use of guests) (1)	125m^2 GFA	Ancillary to the site Site patrons only	Nil	Nil	Nil	nil
Shops (4)	152m^2 GFA	1 space per 2 staff	2 spaces	2 spaces	2 spaces	2 spaces
Commercial (sales centre)	60m^2	1 space	2 spaces	2 spaces	2 spaces	2 spaces

	GFA	per 40m²				
Marina Lounge Ancillary to marina (1)	79m² GFA	Ancillary to the marina	nil	Nil	Nil	nil
Dining – internal restaurant	676m² GFA	1 space per 10m²	34 spaces	34 spaces	68 spaces	68 spaces
Dining – outdoor eating	200m² GFA	1 space per 10m²	nil	10 spaces	10 spaces	20 spaces
Dining – café	91m² GFA	1 space per 10m²	9 spaces	9 spaces	9 spaces	9 spaces
Conference facilities – function centre	843m² GFA	1 space per 5m²	169 spaces	169 spaces	169 spaces	169 spaces
Conference facilities – lawn area	200m²	1 space per 5m²	nil	Nil	40 spaces	40 spaces
Tourist units	93(1/2/3/ 4 bedroom)	1 per unit	93 spaces	93 spaces	93 spaces	93 spaces
	33 potential dual key	I per unit	33 spaces	33 spaces	33 spaces	33 spaces
Residential	127 x 2 bedroom	1 per dwelling	127 spaces	127 spaces	127 spaces	127 spaces
	13 x 3 bedroom	1.5 per dwelling	20 spaces	20 spaces	20 spaces	20 spaces
	17 x 4 bedroom	1.5 per dwelling	26 spaces	26 spaces	26 spaces	26 spaces
Residential visitor	157 units	0.25 per dwelling	40 spaces	40 spaces	40 spaces	40spaces
Less Discount for hotel/serviced apartment guests (5)			-153 spaces	-153 spaces	-153 spaces	-153 spaces
			537 spaces	547 spaces	621 spaces	631 spaces

The parking demands for the hospitality uses on site have also been calculated from first principles on the basis of patronage. This takes into consideration the scale of this development with extensive back of house and kitchen facilities and a generosity in space per patron as the design choice of the Architect, all which are included in the GFA for the uses in the tables above. Allowing for a car occupancy rate of 2.5 patrons per vehicle the parking demands for the function centre and dining options on basis of patronage are as outlined below (again, assuming all fully operational at maximum capacity at any one time - other than concessions as listed earlier):

Table 4-14 Patronage based parking analysis, assuming all full operational at maximum capacity at any one time (concessions as above)

Land Use		Parking Rate Applied	Winter Parking Demand	Mid Week Parking Demand	Shoulder Weekend (Spring/Autumn) Parking Demand	Summer Parking Demand
Dining – internal restaurant	200 patrons	1 space per 2.5 patrons	40 spaces	40 spaces	80 spaces	80 spaces
Dining – outdoor eating	115 patrons	1 space per 2.5 patrons	nil	23 spaces	23 spaces	46 spaces
Dining – café	40	1 space per	16 spaces	16 spaces	16 spaces	16 spaces

	patrons	2.5 patrons				
Conference facilities – function centre	300 patrons	1 space per 2.5 patrons	120 spaces	120 spaces	120 spaces	120 spaces
Conference facilities – lawn area	100 patrons	1 space per 2.5 patrons	nil	Nil	40 spaces	40 spaces
Hospitality Total			176 spaces	199 spaces	279 spaces	302 spaces
Tourist, marina and accommodation (from Table A)			483 spaces	483 spaces	483 spaces	483 spaces
Sub Total			659 spaces	682 spaces	762 spaces	785 spaces
Adjustment for hotel guests			-153	-153	-153	-153
Total			506 spaces	529 spaces	599 spaces	622 spaces

As the car occupancy rate for external attendees is 2.5 patrons per vehicle, and the hotel occupancy is 2 people per room the difference in the parking requirements when based on a patronage model can be a variance of 10 car spaces.

This results in a similar range of parking requirements whether calculated by patron numbers from first principles or by applying the DCP rates. Given the design choice of the Architect, and for the reasons detailed above, it is believed that assessing the parking demands based on patronage provides the most appropriate approach, reflective of the use of the spaces as a whole. On this basis the ongoing parking analysis is therefore based on the patronage demands outlined in Table 4-14 above.

As the above calculations show, the seasonal range in the parking demand could be 126 spaces with a minimum number of 506 spaces and an upper range of 622 spaces. However, this again needs to be analysed against operational characteristics.

The upper range peak use on site is depended upon all uses being fully operational and at maximum capacity. As the café and lawn area is limited to daytime use this peak could occur should there be a function running with external guests during the weekend daytime with a crossover of restaurant patrons as well as café patrons attending. Although the calculation has allowed for hotel patrons to be using the dining options, it does not provide for residents, marina and boating community guests dining but rather assumes the balance is external to the site. As lunchtime guests leave the site this peak will wane, with the evening peak for the restaurant and function centre being less than the predicted daytime peak without the café and lawn patrons attending and with various retail, day spa and other uses not staffed of an evening and facilities such as the outdoor dining subject to weather conditions.

The current proposed parking supply (concept) provides for:

Car Park number	Number of spaces
Marina At Grade	47
Car Park One	174
Car Park Two	176
Car Park Three	153
Car Park Four	37
Car Park Five	90
Total	677

There are 47 surface car parking spaces in the marina area, providing a total of 677 spaces, which exceeds the upper predicated demand of 622 spaces. This will ensure that there will be no external parking impacts created by the proposed development, and can be further refined through development application processes.

4.5.1 Parking Management Strategy

As part of the development a parking management strategy will be developed to provide for the control and promotion of effective parking. This parking could include:

- Valet control of some parking
- Controlled parking including members passes for secure parking areas
- Controls for residential parking including barriers
- Security parking controls and monitoring
- Parking controls on-site to ensure safe and secure parking for the general public, including pedestrian connection and wayfinding, between the venues and the carparks
- Provision of suitable disabled access in accordance with AS2890.6

For a major event at the function centre, the lead in time for organising the event and enrolling participants will allow sufficient time to determine that a Special Event Management Plan is required and to implement this plan.

4.6 Public Transport

4.6.1 Options for improving services

Active Transport Measures

The limited access to public transport within the vicinity of the site reduces the opportunity to promote active transport as a viable option for staff. However, the proposed development will be marketed to allow for coach travel to the site, for special functions e.g. weddings as well as work conferences. For example, a conference for a Sydney based firm could be packaged up to allow delegates to travel together in a coach (40 plus seats) which would potentially replace some 40 individual vehicle trips. This could also be arranged for wedding functions, etc.

There is also the opportunity to promote group travel to the train station at Morisset and then allow for coach / taxi travel between the site and the train station, which would eliminate private motor vehicle use.

The site is well located within the local area to allow for leisure trips to the site for local residents to walk or cycle to the site. The provision under the S94 Plan of the off road footway / cycleway along the Fishery Point Road / Morisset Park Road corridor which extends to Trinity Point encourages this active transport option.

The following provides a summary of the various measures that could be considered to increase active transport:

- Promote active transport to all staff
- Promote shared travel arrangements to all staff
- Provide end of trip facilities to staff who cycle or walk to work
- Promote cycling as a connection to public transport
- Promote groups to travel to the site by coach or train / bus

4.6.2 Pedestrian Access to Bus Stops

There are currently no regular bus stops within the general vicinity of the subject site however the construction of Trinity Point Drive, in association with the adjacent residential development, will provide for a bus stop which will be able to be accessed from the subject site. This will maximise the convenience for patrons and keep walk distances to a minimum.

5 Improvement Analysis

5.1 Improvements to Accommodate Existing Traffic

The analysis above, for the intersection of Macquarie Street and Fishery Point Road, shows that the intersection is currently operating close to capacity, with the queue length for the critical right turn into Fishery Point Road filling the current sheltered right turn lane at this location. With the current development on the peninsula the timeframe for providing the upgrade of this intersection to traffic signal control should be brought forward. It is understood, this upgrade is due to be completed by 2019.

All other intersections in the general vicinity of the subject site currently operate in a satisfactory manner.

5.2 Improvements to Accommodate Background Traffic

The subject site, together with other development within the peninsula, will be the only drivers for increases in the base traffic movements. As a peninsula there is very limited background growth, as there are no through movements along Fishery Point Road / Morisset Park Road.

It can be seen that any increases in traffic movements along Macquarie Street will further increase delays and congestion at its intersection with Fishery Point Road.

5.3 Additional Improvements to Accommodate Development Traffic

There are no specific road upgrades required as a direct consequence of the proposed development.

There are a number of road upgrades required, but these relate to the subject site as well as other development along the peninsula and the existing flows on the road network. The road works required in the area are:

- Traffic signals at the intersection of Fishery Point Road and Macquarie Street (approved and funded through VPA and due for installation by 2019)
- Traffic signals at the intersection of Station Street and Fishery Point Road (approved and funded through VPA and constructed)
- Upgrade of intersection of Fishery Point Road and Morisset Park Road (approved and funded through S94 plan)
- Upgrade to roundabout control the intersection of Morisset Park Road and Charles Avenue (funded through approved residential development (DA 2293 / 2006)).

5.4 Alternative Improvements

It is considered that the proposed works will not have any impact on the adjacent development in the general locality of the subject site.

6 Summary and Recommendations

6.1 Summary

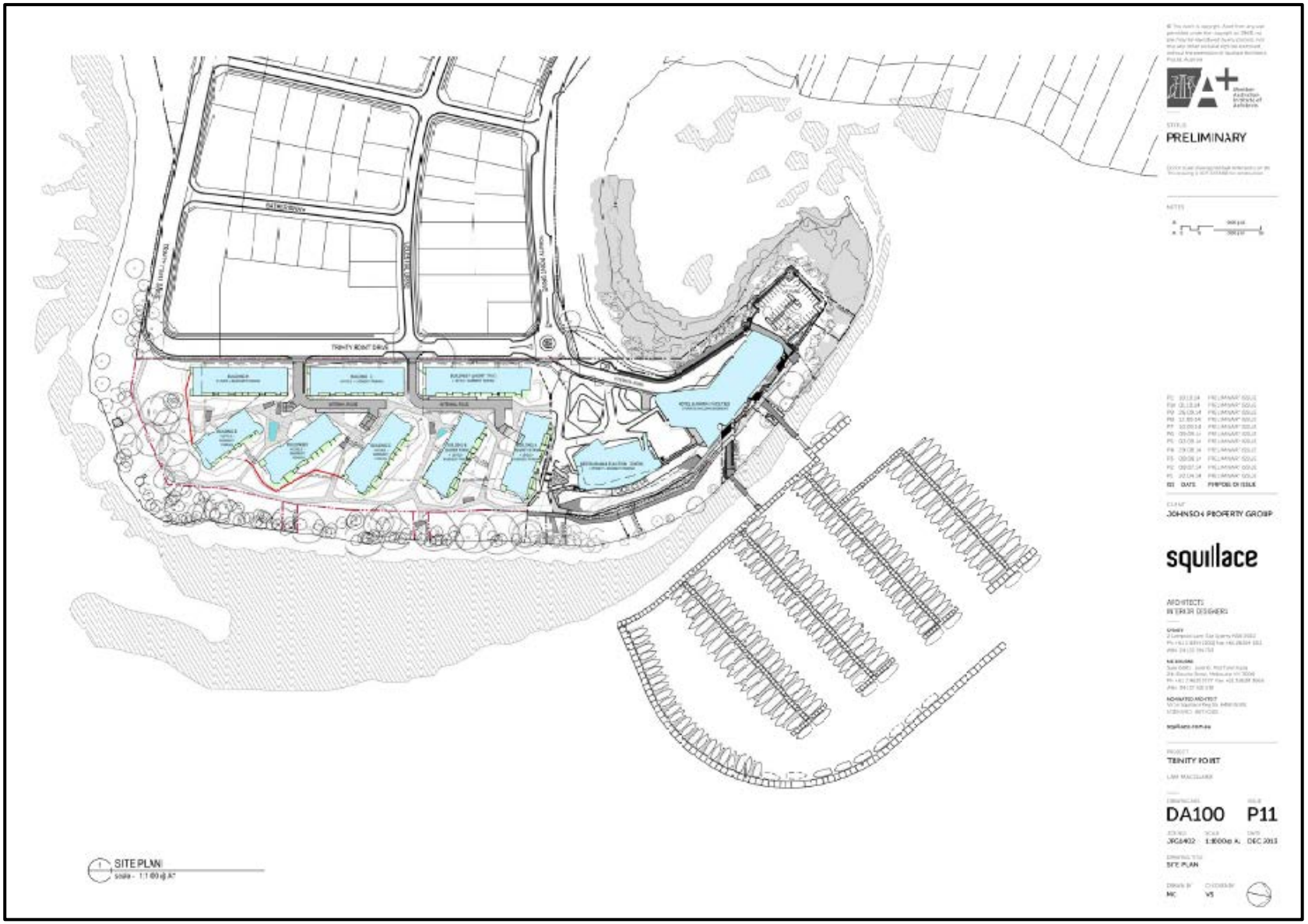
The following conclusions are drawn from the investigations into the proposed Trinity Point Marina and Mixed Use Development off Trinity Point Drive, Trinity Point:

1. The proposed development is for a mixed use, comprising of marina with associated facilities, hotel, restaurant, function centre and accommodation (permanent and resort style), together with on-site parking. The site is currently vacant.
2. The site will have all vehicle access via Trinity Point Drive and then connect to the arterial road network via Morisset Park Road and Fishery Point Road.
3. A number of road upgrades have been identified along this route and are being funded through S94 or VPA agreements, together with direct funding through development consent conditions. The key intersection upgrade is at Fishery Point Road / Macquarie Street with traffic signals to be constructed by 2019. .
4. The proposed development could generate some 245 vehicle movements during the morning peak and 412 during the afternoon peak hours during the week. Daily traffic flows would be in the order of 1,827over a weekday in the summer. The 10 days per annum where the development may generate absolute peak flows of 2,507 generally coincide with school holiday and long weekends when background traffic movements are lower. These additional flows are well within the capacity of the local road network, based upon the road upgrades identified by Council being constructed in the locality. All of these road upgrades have funding identified to allow them to be implemented.
5. Accident data was provided by the RMS and shows that the overall road network operates in a safe and acceptable manner, and it is considered that this can continue to occur with the additional traffic movements associated with the proposed development. The road upgrades identified will improve road safety further in this location to accommodate these additional traffic movements.
6. Parking for the development will be accommodated on site in a mixture of at-grade and basement parking. The parking will be based upon the demands of the proposed development, taking into account the cross use of the facilities and various authority requirements. There will be no off-site parking impacts created by the proposed development.

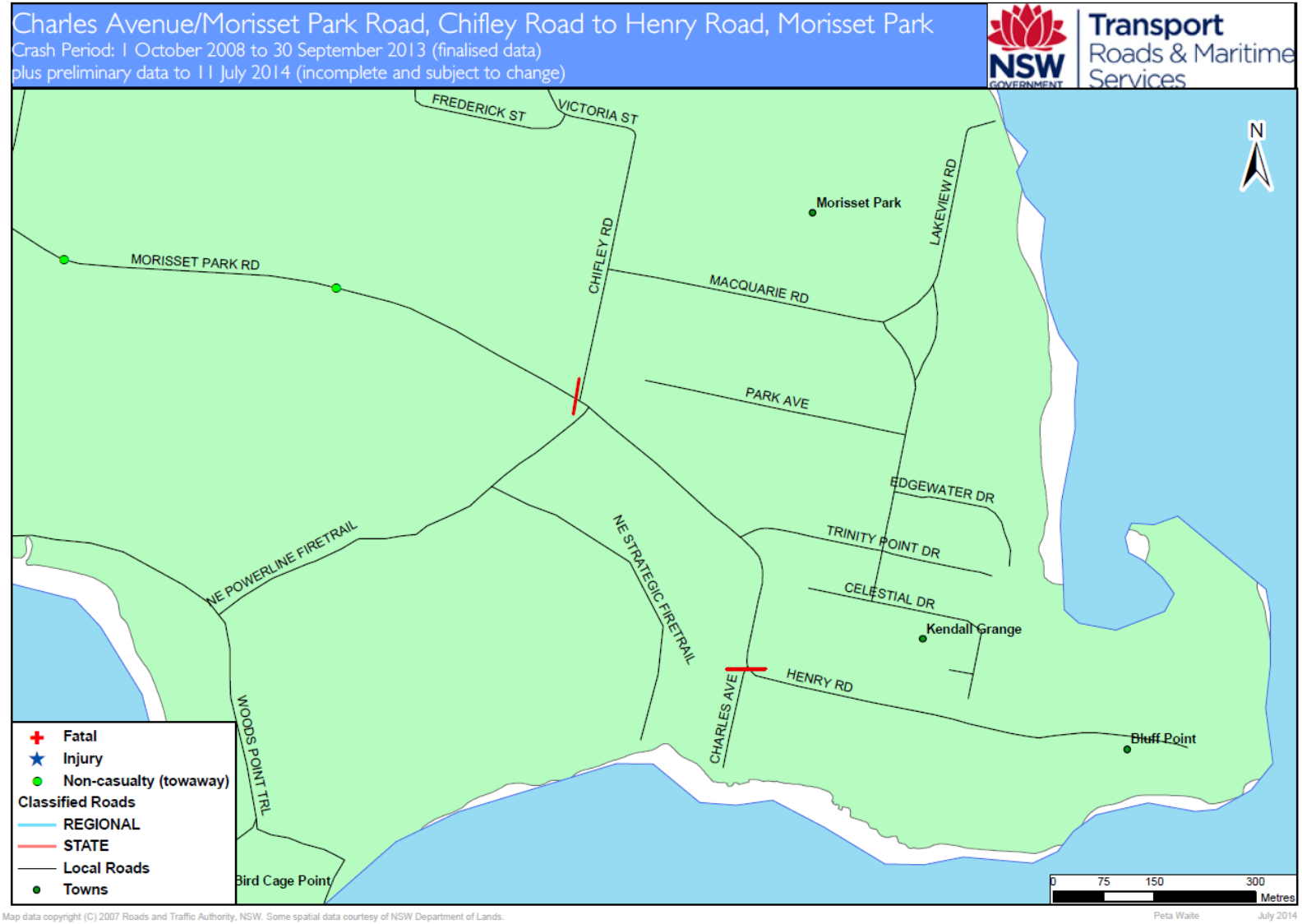
The proposed development provides for a range and scale of uses with associated traffic generation and parking demands. This report provides information on the nature and scale of traffic generation that could be expected by the proposed development and how that may impact on the external road network. It has taken into account the current known status of road upgrades within the proximity of the subject site, both planned and developed by LMCC and the RMS.

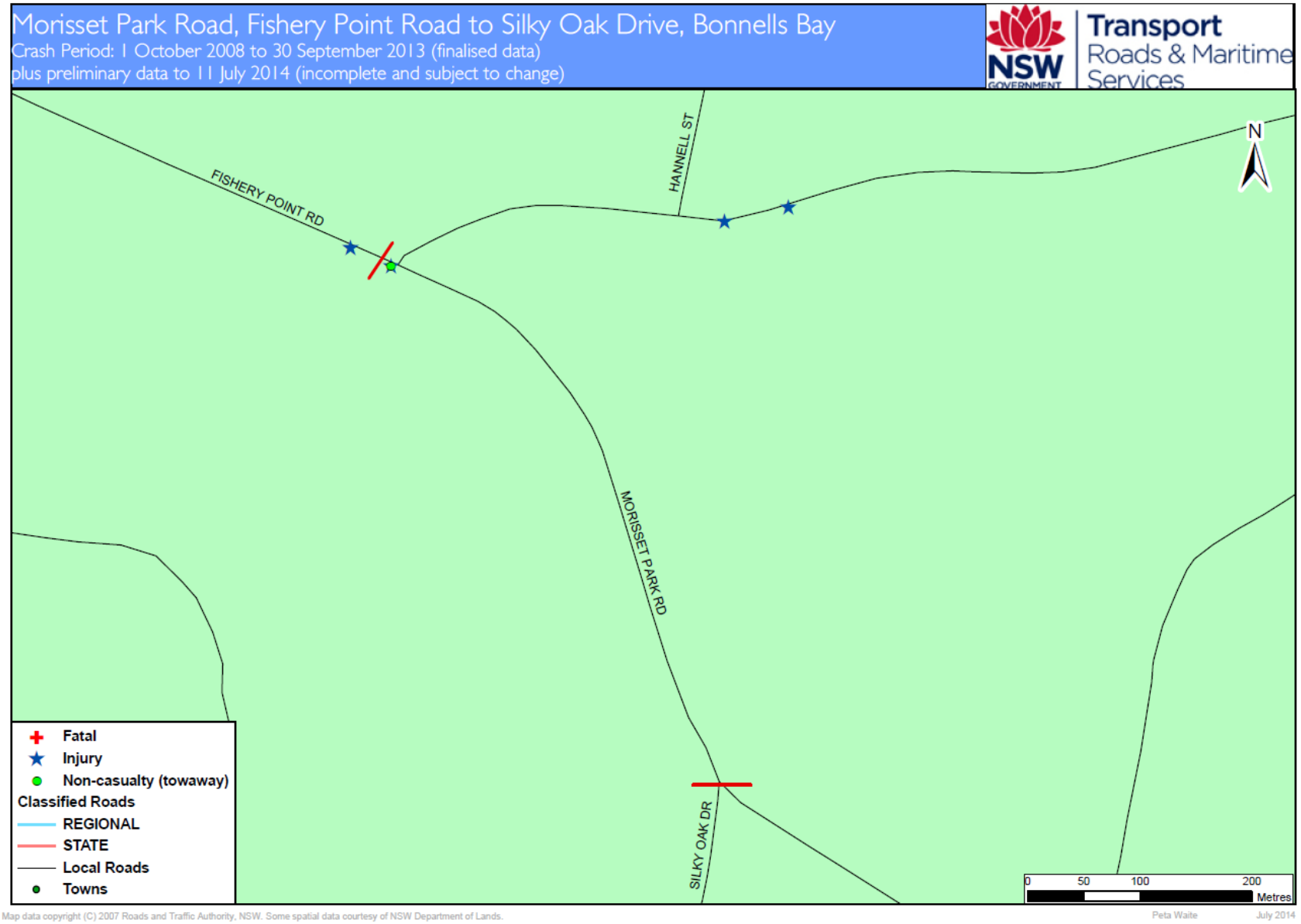
The overall conclusion for the project is that the traffic impacts will be acceptable upon the road network, subject to the identified road upgrades being completed and that the parking can be managed on site, with no impact upon the local road network.

Appendix A Site Plan



Appendix B Accident Data




Morisset Park Road, Fishery Point Road to Silky Oak Drive, Bonnells Bay
Crash Period: 1 October 2008 to 30 September 2013 (finalised data)
plus preliminary data to 11 July 2014 (incomplete and subject to change)
NSW GOVERNMENT
Transport
Roads & Maritime
Services
FISHERY POINT RD
HANNELL ST
MORISSET PARK RD
SILKY OAK DR
N
Fatal
Injury
Non-casualty (towaway)
Classified Roads
REGIONAL
STATE
Local Roads
Towns
0
50
100
200
Metres
Map data copyright (C) 2007 Roads and Traffic Authority, NSW. Some spatial data courtesy of NSW Department of Lands.
Peta Waite
July 2014

Detailed Crash Report - sorted

Transport for NSW — Centre for Road Safety

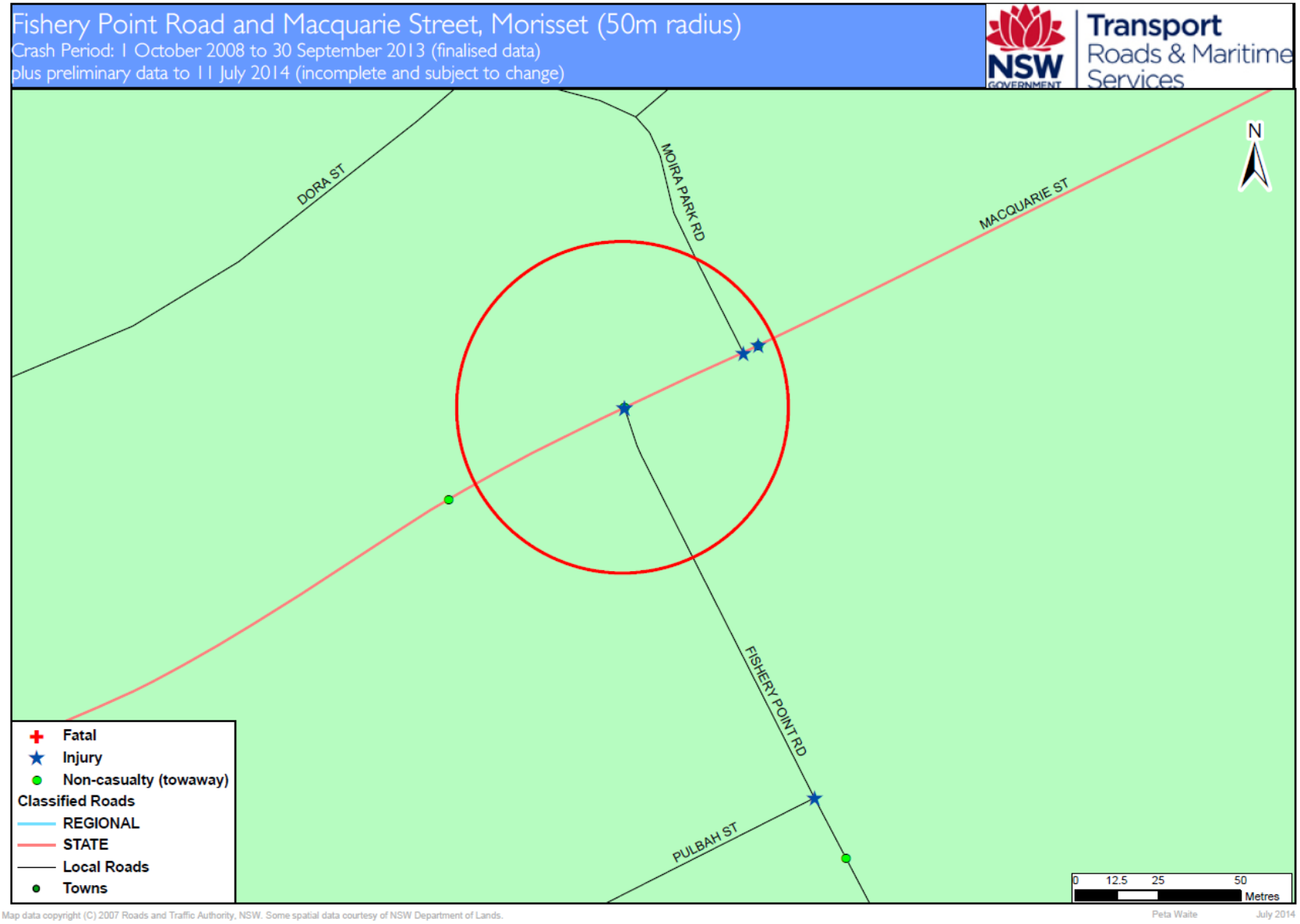
Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
					Natural Lighting															S F
Hunter Region					Lake Macquarie LGA				Bonnells Bay					Fishery Pt Rd						
702820	19/02/2010	Fri	15:20	at	MORISSET PARK RD	TJN	STR	Overcast	Wet	40	1	M/C	M29	N in FISHERY PT RD	Unk Proceeding in lane		I	0	1	
E40112006					Daylight	DCA :	705	Out of control on cway												
Hunter Region					Lake Macquarie LGA				Bonnells Bay					Fishery Pt Rd						
703229	21/03/2010	Sun	13:30	at	MORISSET PARK RD	TJN	STR	Fine	Dry	50	1	CAR	M19	S in FISHERY PT RD	50 Turning right		N	0	0	S
E40154036					Daylight	DCA :	707	L Right turn				Utility pole								

Report Totals: Total Crashes: 2 Fatal Crashes: 0 Injury Crashes: 1 Killed: 0 Injured: 1

Crashid dataset 01/10/08-30/09/13 plus preliminary data to 11/07/14 Morisset Park Road, Fishery Point Road to Silky Oak Drive, Bonnells Bay

Note: Ordered by: Crash Date,Crash Time,Crash No. Data for the 9 month period prior to the generated date of this report are incomplete and are subject to change.

Rep ID: DCR02 **Office:** Hunter **User ID:** waitep Page 1 of 1 Generated: 11/07/2014 10:34


Fishery Point Road and Macquarie Street, Morisset (50m radius)
Crash Period: 1 October 2008 to 30 September 2013 (finalised data)
plus preliminary data to 11 July 2014 (incomplete and subject to change)
Transport
Roads & Maritime
Services
NSW
GOVERNMENT
N
DORA ST
MOIRA PARK RD
MACQUARIE ST
FISHERY POINT RD
PULBAH ST
Fatal
Injury
Non-casualty (towaway)
Classified Roads
REGIONAL
STATE
Local Roads
Towns
0 12.5 25 50
Metres
Map data copyright (C) 2007 Roads and Traffic Authority, NSW. Some spatial data courtesy of NSW Department of Lands.
Peta Waite
July 2014

Detailed Crash Report - sorted

Transport for NSW — Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
					Natural Lighting															**S F**
Hunter Region					**Lake Macquarie LGA**		**Morisset**							**Macquarie St**						
680582	11/06/2009	Thu	18:40		at FISHERY PT RD	TJN	STR	Fine	Dry	60	1	OMV	F24	E in MACQUARIE ST	Unk	Proceeding in lane	N	0	0	
E37707145					Darkness	DCA : 701	Off carriageway to left													
Hunter Region					**Lake Macquarie LGA**		**Morisset**							**Macquarie St**						
697537	02/12/2009	Wed	18:54		at SCARBOROUGH ST	TJN	STR	Fine	Dry	60	1	CAR	M85	E in MACQUARIE ST	20	Turning right	I	0	1	S
E39387304					Daylight	DCA : 707 L	Right turn					Fence (prior to 2014)								
Hunter Region					**Lake Macquarie LGA**		**Morisset**							**Macquarie St**						
725151	15/09/2010	Wed	12:15	5 m	E MOIRA PARK RD	TJN	STR	Fine	Dry	80	2	4WD	F38	W in MACQUARIE ST	70	Proceeding in lane	N	0	0	
E42071056					Daylight	DCA : 303	Same - Rear right					CAR	M17	W in MACQUARIE ST	0	Wait turn right				
Hunter Region					**Lake Macquarie LGA**		**Morisset**							**Macquarie St**						
766995	09/09/2011	Fri	15:00		at MOIRA PARK RD	TJN	CRV	Overcast	Wet	60	3	CAR	M20	W in MACQUARIE ST	20	Turning right	I	0	1	
E45829019					Daylight	DCA : 202	Opp - Right-thru					CAR	F30	E in MACQUARIE ST	45	Proceeding in lane				
												OMV	M U	W in MACQUARIE ST	Unk	Proceeding in lane				
Hunter Region					**Lake Macquarie LGA**		**Morisset**							**Macquarie St**						
791098	02/04/2012	Mon	15:40	5 m	E MOIRA PARK RD	TJN	STR	Fine	Dry	60	2	M/C	M18	W in MACQUARIE ST	60	Proceeding in lane	I	0	1	
E47320075					Daylight	DCA : 303	Same - Rear right					CAR	F73	W in MACQUARIE ST	0	Wait turn right				
Hunter Region					**Lake Macquarie LGA**		**Morisset**							**Macquarie St**						
800912	19/06/2012	Tue	07:10		at FISHERY PT RD	TJN	STR	Fine	Dry	60	2	TRK	M42	E in MACQUARIE ST	5	Turning right	N	0	0	
E48355703					Daylight	DCA : 202	Opp - Right-thru					TRK	M41	W in MACQUARIE ST	55	Proceeding in lane				
Hunter Region					**Lake Macquarie LGA**		**Morisset**							**Macquarie St**						
827018	14/02/2013	Thu	08:10		at FISHERY PT RD	TJN	STR	Fine	Dry	60	2	CAR	F34	N in FISHERY PT RD	10	Turning right	N	0	0	
E50165025					Daylight	DCA : 104	Adj - Right-thru from right					CAR	F20	W in MACQUARIE ST	Unk	Proceeding in lane				
Hunter Region					**Lake Macquarie LGA**		**Morisset**							**Macquarie St**						
854399	04/10/2013	Fri	16:00		at FISHERY PT RD	TJN	STR	Fine	Dry	60	2	CAR	M30	N in FISHERY PT RD	Unk	Turning right	N	0	0	
E52397024					Daylight	DCA : 104	Adj - Right-thru from right					CAR	U U	W in MACQUARIE ST	Unk	Proceeding in lane				
Hunter Region					**Lake Macquarie LGA**		**Morisset**							**Macquarie St**						
1014331	12/03/2014	Wed	07:40		at FISHERY POINT RD	TJN	STR	Fine	Dry	60	2	CAR	M22	W in FISHERY POINT RD	20	Turning right	I	0	1	
E54990841					Daylight	DCA : 104	Adj - Right-thru from right					WAG	F61	S in MACQUARIE ST	60	Proceeding in lane				

Report Totals: Total Crashes: 9 Fatal Crashes: 0 Injury Crashes: 4 Killed: 0 Injured: 4

Rep ID: DCR02 **Office:** Hunter **User ID:** waitep

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Appendix C Criteria for interpreting results of SIDRA

1-Level of Service (LoS)

LoS	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Good	Good
B	Good, with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	Satisfactory	Satisfactory, but requires accident study
D	Operating near capacity	Near capacity and requires accident study
E	At capacity, excessive delay: roundabout requires other control method	At capacity, requires other control mode
F	Unsatisfactory, requires other control mode or additional capacity	Unsatisfactory, requires other control mode

2-Average Vehicle Delay (AVD)

The AVD is a measure of operational performance of an intersection relating to its LoS. The average delay should be taken as a guide only for an average intersection. Longer delays may be tolerated at some intersections where delays are expected by motorists (e.g. those in inner city areas or major arterial roads).

LoS	Average Delay / Vehicle (secs)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Less than 15	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	28 to 42	Satisfactory	Satisfactory but accident study required
D	42 to 56	Operating near capacity	Near capacity, accident study required
E	56 to 70	At capacity, excessive delays: roundabout requires other control mode	At capacity; requires other control mode
F	Exceeding 70	Unsatisfactory, requires additional capacity	Unsatisfactory, requires other control mode

3-Degree of Saturation (D/S)

The D/S of an intersection is usually taken as the highest ratio of traffic volumes on an approach to an intersection compared with the theoretical capacity, and is a measure of the utilisation of available green time. For intersections controlled by traffic signals, both queues and delays increase rapidly as DS approaches 1.0. An intersection operates satisfactorily when its D/S is kept below 0.75. When D/S exceeds 0.9, queues are expected.

INTERSECTION SUMMARY

Site: 2014 AM Fishery and Morisset

Fishery Point Road and Morisset Park Road AM peak 2014
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values				
Performance Measure	Vehicles		Persons	
Travel Speed (Average)	52.3	km/h	52.3	km/h
Travel Distance (Total)	939.2	veh-km/h	1127.0	pers-km/h
Travel Time (Total)	17.9	veh-h/h	21.5	pers-h/h
Demand Flows (Total)	928	veh/h	1114	pers/h
Percent Heavy Vehicles (Demand)	0.0	%		
Degree of Saturation	0.609			
Practical Spare Capacity	31.4	%		
Effective Intersection Capacity	1524	veh/h		
Control Delay (Total)	1.85	veh-h/h	2.22	pers-h/h
Control Delay (Average)	7.2	sec	7.2	sec
Control Delay (Worst Lane)	10.3	sec		
Control Delay (Worst Movement)	10.3	sec	10.3	sec
Geometric Delay (Average)	4.4	sec		
Stop-Line Delay (Average)	2.8	sec		
Idling Time (Average)	0.8	sec		
Intersection Level of Service (LOS)	NA			
95% Back of Queue - Vehicles (Worst Lane)	6.2	veh		
95% Back of Queue - Distance (Worst Lane)	43.3	m		
Queue Storage Ratio (Worst Lane)	0.03			
Total Effective Stops	565	veh/h	678	pers/h
Effective Stop Rate	0.61	per veh	0.61	per pers
Proportion Queued	0.33		0.33	
Performance Index	25.6		25.6	
Cost (Total)	448.97	$/h	448.97	$/h
Fuel Consumption (Total)	72.9	L/h		
Carbon Dioxide (Total)	171.3	kg/h		
Hydrocarbons (Total)	0.014	kg/h		
Carbon Monoxide (Total)	0.206	kg/h		
NOx (Total)	0.050	kg/h		

Level of Service (LOS) Method: Delay (RTA NSW).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 2014 AM Fishery and Morisset

Fishery Point Road and Morisset Park Road AM peak 2014
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Morisset Park Road											
5	T1	122	0.0	0.013	0.0	LOS A	0.1	0.4	0.01	0.01	59.9
6	R2	17	0.0	0.013	6.2	LOS A	0.1	0.4	0.34	0.50	52.7
Approach		139	0.0	0.061	0.8	NA	0.1	0.4	0.05	0.07	58.9
North: Fishery Point Road											
7	L2	41	0.0	0.609	10.3	LOS A	6.2	43.3	0.55	0.83	50.1
9	R2	498	0.0	0.609	10.2	LOS A	6.2	43.3	0.55	0.83	49.7
Approach		539	0.0	0.609	10.3	LOS A	6.2	43.3	0.55	0.83	49.7
West: Fishery Point Road											
10	L2	182	0.0	0.133	5.6	LOS A	0.0	0.0	0.00	0.43	54.8
11	T1	68	0.0	0.133	0.0	LOS A	0.0	0.0	0.00	0.43	56.3
Approach		251	0.0	0.133	4.0	NA	0.0	0.0	0.00	0.43	55.2
All Vehicles		928	0.0	0.609	7.2	NA	6.2	43.3	0.33	0.61	52.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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8002653, 6019222, SECA SOLUTION, NETWORK / 1PC

INTERSECTION SUMMARY

Site: 2014 PM Fishery and Morisset

Fishery Point Road and Morisset Park Road PM peak 2014
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values				
Performance Measure	Vehicles		Persons	
Travel Speed (Average)	53.2	km/h	53.2	km/h
Travel Distance (Total)	1065.4	veh-km/h	1278.5	pers-km/h
Travel Time (Total)	20.0	veh-h/h	24.0	pers-h/h
Demand Flows (Total)	1052	veh/h	1262	pers/h
Percent Heavy Vehicles (Demand)	0.0	%		
Degree of Saturation	0.428			
Practical Spare Capacity	87.1	%		
Effective Intersection Capacity	2460	veh/h		
Control Delay (Total)	1.80	veh-h/h	2.16	pers-h/h
Control Delay (Average)	6.2	sec	6.2	sec
Control Delay (Worst Lane)	10.8	sec		
Control Delay (Worst Movement)	10.9	sec	10.9	sec
Geometric Delay (Average)	4.6	sec		
Stop-Line Delay (Average)	1.6	sec		
Idling Time (Average)	0.6	sec		
Intersection Level of Service (LOS)	NA			
95% Back of Queue - Vehicles (Worst Lane)	2.5	veh		
95% Back of Queue - Distance (Worst Lane)	17.7	m		
Queue Storage Ratio (Worst Lane)	0.01			
Total Effective Stops	602	veh/h	723	pers/h
Effective Stop Rate	0.57	per veh	0.57	per pers
Proportion Queued	0.18		0.18	
Performance Index	24.9		24.9	
Cost (Total)	494.88	$/h	494.88	$/h
Fuel Consumption (Total)	82.1	L/h		
Carbon Dioxide (Total)	192.9	kg/h		
Hydrocarbons (Total)	0.016	kg/h		
Carbon Monoxide (Total)	0.233	kg/h		
NOx (Total)	0.057	kg/h		

Level of Service (LOS) Method: Delay (RTA NSW).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 2014 PM Fishery and Morisset

Fishery Point Road and Morisset Park Road PM peak 2014
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Morisset Park Road											
5	T1	82	0.0	0.042	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	31	0.0	0.035	8.3	LOS A	0.1	0.9	0.56	0.72	51.0
Approach		113	0.0	0.042	2.2	NA	0.1	0.9	0.15	0.19	57.3
North: Fishery Point Road											
7	L2	12	0.0	0.428	10.9	LOS A	2.5	17.7	0.59	0.90	49.7
9	R2	278	0.0	0.428	10.8	LOS A	2.5	17.7	0.59	0.90	49.3
Approach		289	0.0	0.428	10.8	LOS A	2.5	17.7	0.59	0.90	49.3
West: Fishery Point Road											
10	L2	552	0.0	0.347	5.6	LOS A	0.0	0.0	0.00	0.49	54.2
11	T1	98	0.0	0.347	0.0	LOS A	0.0	0.0	0.00	0.49	55.6
Approach		649	0.0	0.347	4.7	NA	0.0	0.0	0.00	0.49	54.4
All Vehicles		1052	0.0	0.428	6.2	NA	2.5	17.7	0.18	0.57	53.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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INTERSECTION SUMMARY

Site: 2014 AM Macquarie and Fishery

2014 AM Macquarie Street and Fishery Point Road
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values				
Performance Measure	Vehicles		Persons	
Travel Speed (Average)	52.3	km/h	52.3	km/h
Travel Distance (Total)	1771.2	veh-km/h	2125.4	pers-km/h
Travel Time (Total)	33.9	veh-h/h	40.7	pers-h/h
Demand Flows (Total)	1746	veh/h	2096	pers/h
Percent Heavy Vehicles (Demand)	2.8	%		
Degree of Saturation	0.816			
Practical Spare Capacity	-2.0	%		
Effective Intersection Capacity	2139	veh/h		
Control Delay (Total)	3.82	veh-h/h	4.58	pers-h/h
Control Delay (Average)	7.9	sec	7.9	sec
Control Delay (Worst Lane)	15.4	sec		
Control Delay (Worst Movement)	15.4	sec	15.4	sec
Geometric Delay (Average)	3.3	sec		
Stop-Line Delay (Average)	4.6	sec		
Idling Time (Average)	0.3	sec		
Intersection Level of Service (LOS)	NA			
95% Back of Queue - Vehicles (Worst Lane)	10.9	veh		
95% Back of Queue - Distance (Worst Lane)	77.3	m		
Queue Storage Ratio (Worst Lane)	0.00			
Total Effective Stops	1198	veh/h	1437	pers/h
Effective Stop Rate	0.69	per veh	0.69	per pers
Proportion Queued	0.42		0.42	
Performance Index	49.1		49.1	
Cost (Total)	840.45	$/h	840.45	$/h
Fuel Consumption (Total)	146.3	L/h		
Carbon Dioxide (Total)	346.4	kg/h		
Hydrocarbons (Total)	0.028	kg/h		
Carbon Monoxide (Total)	0.399	kg/h		
NOx (Total)	0.425	kg/h		

Level of Service (LOS) Method: Delay (RTA NSW).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 2014 AM Macquarie and Fishery

2014 AM Macquarie Street and Fishery Point Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Macquarie St south											
2	T1	265	4.0	0.140	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R2	279	2.0	0.338	9.1	LOS A	1.7	12.2	0.58	0.84	50.6
Approach		544	3.0	0.338	4.7	NA	1.7	12.2	0.30	0.43	54.8
East: Fishery Point Road											
4	L2	662	2.0	0.816	15.4	LOS B	10.9	77.3	0.81	1.35	46.8
6	R2	48	2.0	0.145	14.3	LOS A	0.4	3.1	0.72	0.89	47.3
Approach		711	2.0	0.816	15.4	LOS B	10.9	77.3	0.80	1.31	46.8
North: Macquarie St north											
7	L2	48	2.0	0.026	5.6	LOS A	0.0	0.0	0.00	0.58	53.5
8	T1	443	4.0	0.233	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		492	3.8	0.233	0.6	NA	0.0	0.0	0.00	0.06	59.2
All Vehicles		1746	2.8	0.816	7.9	NA	10.9	77.3	0.42	0.69	52.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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INTERSECTION SUMMARY

Site: 2014 PM Macquarie and Fishery

2014 PM Macquarie Street and Fishery Point Road
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values				
Performance Measure	Vehicles		Persons	
Travel Speed (Average)	52.5	km/h	52.5	km/h
Travel Distance (Total)	2014.9	veh-km/h	2417.9	pers-km/h
Travel Time (Total)	38.4	veh-h/h	46.0	pers-h/h
Demand Flows (Total)	1987	veh/h	2385	pers/h
Percent Heavy Vehicles (Demand)	2.8	%		
Degree of Saturation	0.770			
Practical Spare Capacity	27.2	%		
Effective Intersection Capacity	2579	veh/h		
Control Delay (Total)	4.12	veh-h/h	4.94	pers-h/h
Control Delay (Average)	7.5	sec	7.5	sec
Control Delay (Worst Lane)	27.7	sec		
Control Delay (Worst Movement)	27.7	sec	27.7	sec
Geometric Delay (Average)	3.3	sec		
Stop-Line Delay (Average)	4.1	sec		
Idling Time (Average)	0.3	sec		
Intersection Level of Service (LOS)	NA			
95% Back of Queue - Vehicles (Worst Lane)	9.8	veh		
95% Back of Queue - Distance (Worst Lane)	69.8	m		
Queue Storage Ratio (Worst Lane)	0.00			
Total Effective Stops	1288	veh/h	1545	pers/h
Effective Stop Rate	0.65	per veh	0.65	per pers
Proportion Queued	0.40		0.40	
Performance Index	47.8		47.8	
Cost (Total)	949.29	$/h	949.29	$/h
Fuel Consumption (Total)	166.1	L/h		
Carbon Dioxide (Total)	393.5	kg/h		
Hydrocarbons (Total)	0.032	kg/h		
Carbon Monoxide (Total)	0.453	kg/h		
NOx (Total)	0.482	kg/h		

Level of Service (LOS) Method: Delay (RTA NSW).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 2014 PM Macquarie and Fishery

2014 PM Macquarie Street and Fishery Point Road
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Macquarie St south											
2	T1	404	4.0	0.213	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R2	653	2.0	0.770	14.6	LOS B	9.8	69.8	0.80	1.28	47.1
Approach		1057	2.8	0.770	9.0	NA	9.8	69.8	0.49	0.79	51.3
East: Fishery Point Road											
4	L2	421	2.0	0.481	9.2	LOS A	3.1	21.8	0.57	0.87	50.8
6	R2	33	2.0	0.209	27.7	LOS B	0.6	4.3	0.88	0.96	40.3
Approach		454	2.0	0.481	10.6	LOS A	3.1	21.8	0.59	0.87	49.9
North: Macquarie St north											
7	L2	93	2.0	0.051	5.6	LOS A	0.0	0.0	0.00	0.58	53.5
8	T1	384	4.0	0.202	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		477	3.6	0.202	1.1	NA	0.0	0.0	0.00	0.11	58.6
All Vehicles		1987	2.8	0.770	7.5	NA	9.8	69.8	0.40	0.65	52.5

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Project: C:\Sidra folders\JPG Trinity Point.sip6
8002653, 6019222, SECA SOLUTION, NETWORK / 1PC

INTERSECTION SUMMARY

Site: 2014 AM Fishery and Morisset+dev

Fishery Point Road and Morisset Park Road AM peak 2014
Plus full development traffic
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values				
Performance Measure	Vehicles		Persons	
Travel Speed (Average)	50.3	km/h	50.3	km/h
Travel Distance (Total)	1173.1	veh-km/h	1407.7	pers-km/h
Travel Time (Total)	23.3	veh-h/h	28.0	pers-h/h
Demand Flows (Total)	1160	veh/h	1392	pers/h
Percent Heavy Vehicles (Demand)	0.3	%		
Degree of Saturation	0.825			
Practical Spare Capacity	-3.1	%		
Effective Intersection Capacity	1405	veh/h		
Control Delay (Total)	3.33	veh-h/h	3.99	pers-h/h
Control Delay (Average)	10.3	sec	10.3	sec
Control Delay (Worst Lane)	20.1	sec		
Control Delay (Worst Movement)	20.2	sec	20.2	sec
Geometric Delay (Average)	3.5	sec		
Stop-Line Delay (Average)	6.8	sec		
Idling Time (Average)	1.6	sec		
Intersection Level of Service (LOS)	NA			
95% Back of Queue - Vehicles (Worst Lane)	11.4	veh		
95% Back of Queue - Distance (Worst Lane)	80.0	m		
Queue Storage Ratio (Worst Lane)	0.06			
Total Effective Stops	879	veh/h	1055	pers/h
Effective Stop Rate	0.76	per veh	0.76	per pers
Proportion Queued	0.40		0.40	
Performance Index	37.0		37.0	
Cost (Total)	572.77	$/h	572.77	$/h
Fuel Consumption (Total)	89.8	L/h		
Carbon Dioxide (Total)	211.3	kg/h		
Hydrocarbons (Total)	0.018	kg/h		
Carbon Monoxide (Total)	0.253	kg/h		
NOx (Total)	0.076	kg/h		

Level of Service (LOS) Method: Delay (RTA NSW).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 2014 AM Fishery and Morisset+dev

Fishery Point Road and Morisset Park Road AM peak 2014
Plus full development traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Morisset Park Road											
5	T1	178	2.0	0.019	0.1	LOS A	0.1	0.6	0.02	0.02	59.7
6	R2	17	0.0	0.019	6.9	LOS A	0.1	0.6	0.45	0.41	53.2
Approach		195	1.8	0.088	0.7	NA	0.1	0.6	0.06	0.05	59.1
North: Fishery Point Road											
7	L2	41	0.0	0.825	20.2	LOS B	11.4	80.0	0.83	1.41	44.1
9	R2	498	0.0	0.825	20.1	LOS B	11.4	80.0	0.83	1.41	43.8
Approach		539	0.0	0.825	20.1	LOS B	11.4	80.0	0.83	1.41	43.8
West: Fishery Point Road											
10	L2	182	0.0	0.223	5.6	LOS A	0.0	0.0	0.00	0.25	56.2
11	T1	244	0.0	0.223	0.0	LOS A	0.0	0.0	0.00	0.25	57.7
Approach		426	0.0	0.223	2.4	NA	0.0	0.0	0.00	0.25	57.1
All Vehicles		1160	0.3	0.825	10.3	NA	11.4	80.0	0.40	0.76	50.3

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Project: C:\Sidra folders\JPG Trinity Point.sip6
8002653, 6019222, SECA SOLUTION, NETWORK / 1PC

INTERSECTION SUMMARY

Site: 2014 PM Fishery and Morisset+dev

Fishery Point Road and Morisset Park Road PM peak 2014
Plus development traffic
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values				
Performance Measure	Vehicles		Persons	
Travel Speed (Average)	52.6	km/h	52.6	km/h
Travel Distance (Total)	1453.5	veh-km/h	1744.2	pers-km/h
Travel Time (Total)	27.6	veh-h/h	33.2	pers-h/h
Demand Flows (Total)	1436	veh/h	1723	pers/h
Percent Heavy Vehicles (Demand)	0.8	%		
Degree of Saturation	0.735			
Practical Spare Capacity	8.8	%		
Effective Intersection Capacity	1952	veh/h		
Control Delay (Total)	2.93	veh-h/h	3.51	pers-h/h
Control Delay (Average)	7.3	sec	7.3	sec
Control Delay (Worst Lane)	24.6	sec		
Control Delay (Worst Movement)	24.7	sec	24.7	sec
Geometric Delay (Average)	3.3	sec		
Stop-Line Delay (Average)	4.0	sec		
Idling Time (Average)	2.2	sec		
Intersection Level of Service (LOS)	NA			
95% Back of Queue - Vehicles (Worst Lane)	5.5	veh		
95% Back of Queue - Distance (Worst Lane)	38.2	m		
Queue Storage Ratio (Worst Lane)	0.03			
Total Effective Stops	701	veh/h	841	pers/h
Effective Stop Rate	0.49	per veh	0.49	per pers
Proportion Queued	0.19		0.19	
Performance Index	35.4		35.4	
Cost (Total)	659.93	$/h	659.93	$/h
Fuel Consumption (Total)	108.6	L/h		
Carbon Dioxide (Total)	255.8	kg/h		
Hydrocarbons (Total)	0.021	kg/h		
Carbon Monoxide (Total)	0.307	kg/h		
NOx (Total)	0.123	kg/h		

Level of Service (LOS) Method: Delay (RTA NSW).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 2014 PM Fishery and Morisset+dev

Fishery Point Road and Morisset Park Road PM peak 2014
Plus development traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Morisset Park Road											
5	T1	411	2.0	0.044	0.1	LOS A	0.2	1.5	0.02	0.02	59.7
6	R2	31	0.0	0.044	8.8	LOS A	0.2	1.5	0.59	0.52	51.9
Approach		441	1.9	0.206	0.7	NA	0.2	1.5	0.06	0.05	59.1
North: Fishery Point Road											
7	L2	12	0.0	0.735	24.7	LOS B	5.5	38.2	0.85	1.23	41.8
9	R2	278	0.0	0.735	24.6	LOS B	5.5	38.2	0.85	1.23	41.5
Approach		289	0.0	0.735	24.6	LOS B	5.5	38.2	0.85	1.23	41.5
West: Fishery Point Road											
10	L2	552	0.0	0.377	5.6	LOS A	0.0	0.0	0.00	0.46	54.5
11	T1	154	2.0	0.377	0.1	LOS A	0.0	0.0	0.00	0.46	55.9
Approach		705	0.4	0.377	4.4	NA	0.0	0.0	0.00	0.46	54.8
All Vehicles		1436	0.8	0.735	7.3	NA	5.5	38.2	0.19	0.49	52.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

Project: C:\Sidra folders\JPG Trinity Point.sip6
8002653, 6019222, SECA SOLUTION, NETWORK / 1PC

INTERSECTION SUMMARY

Site: 2014 AM Macquarie and Fishery+dev

2014 AM Macqurie Street and Fishery Point Road
Plus development traffic
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values				
Performance Measure	Vehicles		Persons	
Travel Speed (Average)	50.9	km/h	50.9	km/h
Travel Distance (Total)	2006.0	veh-km/h	2407.2	pers-km/h
Travel Time (Total)	39.4	veh-h/h	47.3	pers-h/h
Demand Flows (Total)	1978	veh/h	2373	pers/h
Percent Heavy Vehicles (Demand)	2.7	%		
Degree of Saturation	0.871			
Practical Spare Capacity	-8.1	%		
Effective Intersection Capacity	2271	veh/h		
Control Delay (Total)	5.29	veh-h/h	6.35	pers-h/h
Control Delay (Average)	9.6	sec	9.6	sec
Control Delay (Worst Lane)	18.1	sec		
Control Delay (Worst Movement)	18.1	sec	18.1	sec
Geometric Delay (Average)	3.6	sec		
Stop-Line Delay (Average)	6.1	sec		
Idling Time (Average)	0.4	sec		
Intersection Level of Service (LOS)	NA			
95% Back of Queue - Vehicles (Worst Lane)	14.4	veh		
95% Back of Queue - Distance (Worst Lane)	102.2	m		
Queue Storage Ratio (Worst Lane)	0.00			
Total Effective Stops	1605	veh/h	1926	pers/h
Effective Stop Rate	0.81	per veh	0.81	per pers
Proportion Queued	0.47		0.47	
Performance Index	59.8		59.8	
Cost (Total)	996.13	$/h	996.13	$/h
Fuel Consumption (Total)	169.8	L/h		
Carbon Dioxide (Total)	401.9	kg/h		
Hydrocarbons (Total)	0.033	kg/h		
Carbon Monoxide (Total)	0.460	kg/h		
NOx (Total)	0.489	kg/h		

Level of Service (LOS) Method: Delay (RTA NSW).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 2014 AM Macquarie and Fishery+dev

2014 AM Macqurie Street and Fishery Point Road
Plus development traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Macqurie St south											
2	T1	265	4.0	0.140	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R2	420	2.0	0.531	11.1	LOS A	3.7	26.7	0.67	0.99	49.3
Approach		685	2.8	0.531	6.8	NA	3.7	26.7	0.41	0.61	52.9
East: Fishery Point Road											
4	L2	706	2.0	0.871	18.1	LOS B	14.4	102.2	0.86	1.53	45.2
6	R2	60	2.0	0.223	17.9	LOS B	0.7	5.0	0.80	0.93	45.1
Approach		766	2.0	0.871	18.1	LOS B	14.4	102.2	0.85	1.49	45.2
North: Macqurie St north											
7	L2	83	2.0	0.045	5.6	LOS A	0.0	0.0	0.00	0.58	53.5
8	T1	443	4.0	0.233	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		526	3.7	0.233	0.9	NA	0.0	0.0	0.00	0.09	58.8
All Vehicles		1978	2.7	0.871	9.6	NA	14.4	102.2	0.47	0.81	50.9

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SIDRA INTERSECTION 6

Project: C:\Sidra folders\JPG Trinity Point.sip6
8002653, 6019222, SECA SOLUTION, NETWORK / 1PC

INTERSECTION SUMMARY

Site: 2014 PM Macquarie and Fishery+dev

2014 PM Macqurie Street and Fishery Point Road
Plus development traffic
Giveway / Yield (Two-Way)

Intersection Performance - Hourly Values				
Performance Measure	Vehicles		Persons	
Travel Speed (Average)	49.2	km/h	49.2	km/h
Travel Distance (Total)	2471.2	veh-km/h	2965.4	pers-km/h
Travel Time (Total)	50.2	veh-h/h	60.3	pers-h/h
Demand Flows (Total)	2437	veh/h	2924	pers/h
Percent Heavy Vehicles (Demand)	2.6	%		
Degree of Saturation	0.856			
Practical Spare Capacity	-6.5	%		
Effective Intersection Capacity	2848	veh/h		
Control Delay (Total)	8.15	veh-h/h	9.78	pers-h/h
Control Delay (Average)	12.0	sec	12.0	sec
Control Delay (Worst Lane)	47.3	sec		
Control Delay (Worst Movement)	47.3	sec	47.3	sec
Geometric Delay (Average)	3.8	sec		
Stop-Line Delay (Average)	8.3	sec		
Idling Time (Average)	1.4	sec		
Intersection Level of Service (LOS)	NA			
95% Back of Queue - Vehicles (Worst Lane)	14.6	veh		
95% Back of Queue - Distance (Worst Lane)	103.7	m		
Queue Storage Ratio (Worst Lane)	0.02			
Total Effective Stops	2269	veh/h	2723	pers/h
Effective Stop Rate	0.93	per veh	0.93	per pers
Proportion Queued	0.54		0.54	
Performance Index	75.8		75.8	
Cost (Total)	1291.90	$/h	1291.90	$/h
Fuel Consumption (Total)	214.2	L/h		
Carbon Dioxide (Total)	507.0	kg/h		
Hydrocarbons (Total)	0.042	kg/h		
Carbon Monoxide (Total)	0.576	kg/h		
NOx (Total)	0.613	kg/h		

Level of Service (LOS) Method: Delay (RTA NSW).
NA: Intersection LOS for Vehicles is Not Applicable for two-way sign control since the average intersection delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 2014 PM Macquarie and Fishery+dev

2014 PM Macqurie Street and Fishery Point Road
Plus development traffic
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Macqurie St south											
2	T1	404	4.0	0.213	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
3	R2	697	2.0	0.834	17.1	LOS B	12.9	92.1	0.85	1.46	45.6
Approach		1101	2.7	0.834	10.8	NA	12.9	92.1	0.54	0.92	50.0
East: Fishery Point Road											
4	L2	749	2.0	0.856	16.3	LOS B	14.6	103.7	0.84	1.45	46.3
6	R2	98	2.0	0.697	47.3	LOS D	2.7	18.9	0.96	1.13	33.1
Approach		847	2.0	0.856	19.8	LOS B	14.6	103.7	0.86	1.41	44.3
North: Macqurie St north											
7	L2	104	2.0	0.057	5.6	LOS A	0.0	0.0	0.00	0.58	53.5
8	T1	384	4.0	0.202	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		488	3.6	0.202	1.2	NA	0.0	0.0	0.00	0.12	58.5
All Vehicles		2437	2.6	0.856	12.0	NA	14.6	103.7	0.54	0.93	49.2

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Project: C:\Sidra folders\JPG Trinity Point.sip6
8002653, 6019222, SECA SOLUTION, NETWORK / 1PC

INTERSECTION SUMMARY

Site: 2014 AM Macquarie and Fishery+dev

2014 AM Macqurie Street and Fishery Point Road
Plus development traffic
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)Variable Sequence Analysis applied. The results are given for the selected output sequence.

Intersection Performance - Hourly Values						
Performance Measure	Vehicles		Pedestrians		Persons	
Travel Speed (Average)	42.7	km/h	2.3	km/h	42.2	km/h
Travel Distance (Total)	2007.2	veh-km/h	1.5	ped-km/h	2410.1	pers-km/h
Travel Time (Total)	47.0	veh-h/h	0.7	ped-h/h	57.0	pers-h/h
Demand Flows (Total)	1978	veh/h	42	ped/h	2373	pers/h
Percent Heavy Vehicles (Demand)	2.7	%				
Degree of Saturation	0.861		0.020			
Practical Spare Capacity	4.6	%				
Effective Intersection Capacity	2298	veh/h				
Control Delay (Total)	12.91	veh-h/h	0.34	ped-h/h	15.83	pers-h/h
Control Delay (Average)	23.5	sec	28.8	sec	24.0	sec
Control Delay (Worst Lane)	39.0	sec				
Control Delay (Worst Movement)	39.0	sec	29.3	sec	39.0	sec
Geometric Delay (Average)	3.6	sec				
Stop-Line Delay (Average)	19.9	sec				
Idling Time (Average)	15.9	sec				
Intersection Level of Service (LOS)	LOS B		LOS C			
95% Back of Queue - Vehicles (Worst Lane)	16.1	veh				
95% Back of Queue - Distance (Worst Lane)	114.4	m				
Queue Storage Ratio (Worst Lane)	0.03					
Total Effective Stops	1599	veh/h	38	ped/h	1957	pers/h
Effective Stop Rate	0.81	per veh	0.91	per ped	0.82	per pers
Proportion Queued	0.78		0.91		0.79	
Performance Index	112.5		0.9		113.3	
Cost (Total)	1315.88	$/h	14.91	$/h	1330.79	$/h
Fuel Consumption (Total)	196.5	L/h				
Carbon Dioxide (Total)	465.0	kg/h				
Hydrocarbons (Total)	0.040	kg/h				
Carbon Monoxide (Total)	0.515	kg/h				
NOx (Total)	0.625	kg/h				

Level of Service (LOS) Method: Delay (RTA NSW).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 2014 AM Macquarie and Fishery+dev

2014 AM Macqurie Street and Fishery Point Road
Plus development traffic
Signals - Fixed Time Cycle Time = 70 seconds (Practical Cycle Time)Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Macqurie St south											
2	T1	265	4.0	0.185	8.0	LOS A	3.3	23.8	0.51	0.42	53.0
3	R2	420	2.0	0.845	39.0	LOS C	16.1	114.4	1.00	0.97	35.9
Approach		685	2.8	0.845	27.0	LOS B	16.1	114.4	0.81	0.76	41.0
East: Fishery Point Road											
4	L2	706	2.0	0.614	14.0	LOS A	14.6	103.9	0.65	0.79	47.6
6	R2	60	2.0	0.121	26.5	LOS B	1.6	11.1	0.79	0.73	41.0
Approach		766	2.0	0.614	15.0	LOS B	14.6	103.9	0.66	0.79	47.0
North: Macqurie St north											
7	L2	83	2.0	0.082	13.2	LOS A	1.3	9.3	0.49	0.68	48.1
8	T1	443	4.0	0.861	34.7	LOS C	12.9	93.5	0.97	0.95	38.2
Approach		526	3.7	0.861	31.3	LOS C	12.9	93.5	0.90	0.91	39.5
All Vehicles		1978	2.7	0.861	23.5	LOS B	16.1	114.4	0.78	0.81	42.7

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	South Full Crossing	21	29.3	LOS C	0.0	0.0	0.92	0.92
P2	East Full Crossing	21	28.4	LOS C	0.0	0.0	0.90	0.90
All Pedestrians		42	28.8	LOS C			0.91	0.91

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Processed: Friday, 31 October 2014 3:34:41 PM
SIDRA INTERSECTION 6.0.24.4877

SIDRA INTERSECTION 6

Project: C:\Sidra folders\JPG Trinity Point.sip6
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INTERSECTION SUMMARY

Site: 2014 PM Macquarie and Fishery+dev

2014 AM Macqurie Street and Fishery Point Road
Plus development traffic
Signals - Fixed Time Cycle Time = 100 seconds (Practical Cycle Time)Variable Sequence Analysis applied.
The results are given for the selected output sequence.

Intersection Performance - Hourly Values						
Performance Measure	Vehicles		Pedestrians		Persons	
Travel Speed (Average)	40.6	km/h	1.8	km/h	40.2	km/h
Travel Distance (Total)	2473.1	veh-km/h	1.5	ped-km/h	2969.2	pers-km/h
Travel Time (Total)	60.9	veh-h/h	0.8	ped-h/h	73.9	pers-h/h
Demand Flows (Total)	2437	veh/h	42	ped/h	2924	pers/h
Percent Heavy Vehicles (Demand)	2.6	%				
Degree of Saturation	0.884		0.029			
Practical Spare Capacity	1.9	%				
Effective Intersection Capacity	2758	veh/h				
Control Delay (Total)	18.84	veh-h/h	0.50	ped-h/h	23.11	pers-h/h
Control Delay (Average)	27.8	sec	42.4	sec	28.4	sec
Control Delay (Worst Lane)	54.2	sec				
Control Delay (Worst Movement)	50.5	sec	44.2	sec	50.5	sec
Geometric Delay (Average)	3.8	sec				
Stop-Line Delay (Average)	24.1	sec				
Idling Time (Average)	20.8	sec				
Intersection Level of Service (LOS)	LOS B		LOS E			
95% Back of Queue - Vehicles (Worst Lane)	35.8	veh				
95% Back of Queue - Distance (Worst Lane)	254.6	m				
Queue Storage Ratio (Worst Lane)	0.04					
Total Effective Stops	1880	veh/h	39	ped/h	2295	pers/h
Effective Stop Rate	0.77	per veh	0.92	per ped	0.78	per pers
Proportion Queued	0.71		0.92		0.73	
Performance Index	165.8		1.0		166.9	
Cost (Total)	1706.84	$/h	18.52	$/h	1725.36	$/h
Fuel Consumption (Total)	242.5	L/h				
Carbon Dioxide (Total)	573.8	kg/h				
Hydrocarbons (Total)	0.050	kg/h				
Carbon Monoxide (Total)	0.633	kg/h				
NOx (Total)	0.737	kg/h				

Level of Service (LOS) Method: Delay (RTA NSW).
Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

MOVEMENT SUMMARY

Site: 2014 PM Macquarie and Fishery+dev

2014 AM Macqurie Street and Fishery Point Road
Plus development traffic
Signals - Fixed Time Cycle Time = 100 seconds (Practical Cycle Time)Variable Sequence Analysis applied.
The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Macqurie St south											
2	T1	404	4.0	0.228	5.8	LOS A	5.2	38.0	0.38	0.33	54.7
3	R2	697	2.0	0.884	42.2	LOS C	35.8	254.6	0.94	0.96	34.8
Approach		1101	2.7	0.884	28.9	LOS C	35.8	254.6	0.74	0.72	40.2
East: Fishery Point Road											
4	L2	749	2.0	0.577	13.1	LOS A	17.7	126.0	0.53	0.76	48.2
6	R2	98	2.0	0.281	43.6	LOS D	4.2	29.6	0.90	0.77	34.4
Approach		847	2.0	0.577	16.6	LOS B	17.7	126.0	0.57	0.76	46.1
North: Macqurie St north											
7	L2	104	2.0	0.136	24.6	LOS B	3.1	22.0	0.65	0.72	41.9
8	T1	384	4.0	0.878	50.5	LOS D	15.8	114.1	0.98	0.95	32.8
Approach		488	3.6	0.878	44.9	LOS D	15.8	114.1	0.91	0.90	34.4
All Vehicles		2437	2.6	0.884	27.8	LOS B	35.8	254.6	0.71	0.77	40.6

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	South Full Crossing	21	44.2	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	21	40.5	LOS E	0.1	0.1	0.90	0.90
All Pedestrians		42	42.4	LOS E			0.92	0.92

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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8002653, 6019222, SECA SOLUTION, NETWORK / 1PC

Appendix D - Marina Usage Surveys – Christopher Hallam & Associates Pty Ltd 2009

TABLE 2.18 BOAT USAGE AT POINT PIPER & ROSE BAY MARINAS (TOTAL BOATS USED PER DAY)

Date	July	August	September	October	November	December	January
1	15	4	4	8	5	7	17
2	8	4	4	9	6	23	13
3	3	4	12	5	3	3	11
4	0	4	5	4	12	4	13
5	1	7	6	6	7	8	17
6	4	6	4	12	4	6	17
7	4	2	3	24	4	8	14
8	26	3	6	8	4	14	15
9	23	7	11	5	3	14	6
10	3	5	7	3	5	17	9
11	1	3	2	4	13	2	8
12	7	3	3	4	10	4	4
13	3	9	3	4	6	4	4
14	2	4	3	8	5	4	20
15	2	3	2	8	5	9	9
16	6	5	14	4	4	11	6
17	3	5	10	2	6	20	7
18	3	5	4	3	8	13	6
19	5	15	8	4	4	13	6
20	2	12	7	4	5	17	8
21	4	5	9	10	4	10	5
22	7	5	12	14	6	16	3
23	17	6	16	2	4	16	5
24	3	6	9	7	5	13	3
25	2	5	8	3	8	0	5
26	1	11	8	2	9	23	9
27	4	11	6	6	6	9	13
28	3	4	7	11	5	7	12
29	9	5	7	14	5	14	8
30	17	4	6	4	2	12	6
31	4	3		4		24	6
Mean	6.2	5.7	6.9	6.9	5.8	11.6	9.2

It is interesting to note that there is no strong trend towards increasing boat usage as Summer approaches, but the December and January usages clearly stand out as the peak months of the year. However there can still be days in other months where usage can be high, for various reasons. The peak days were:

- 8 July 2006 26 boats used
- 7 October 2006 24
- 31 December 2006 24
- 9 July 2006 23
- 2 December 2006 23
- 26 December 2006 23

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