

## CHAPTER 9

# Traffic and Transport



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## 9 Traffic and Transport

This chapter assesses the impact of vehicles accessing the Lake Macdonald Dam upgrade project via Lake Macdonald Drive and Sivyers / Gumboil / Collwood Road during the construction period.

### 9.1 Background

As per the Department of Transport and Main Roads Guide to Traffic Impact Assessment (TIA), the impacts that the expected additional traffic generated during the Project construction period are likely to have on state controlled road and intersection operation are assessed.

This chapter identifies:

- Existing conditions at intersections
- Traffic generation at the Project area and the likely impacts on the local road network during the peak construction period
- Conclusions on the impacts with respect to traffic operational standards on local roads and, if required, any mitigation measures.

The Project is on the northern section of Lake Macdonald, approximately 4.5 km north of Cooroy. Road access to the Project area is via Lake Macdonald Drive (west of the lake) to the main Seqwater access road and via Gumboil Road (east of the lake) to Collwood Road.

The chapter is structured as follows:

- Section 9.2 provides an assessment of the roads surrounding Lake Macdonald that will have direct impact from the additional traffic generated during construction and existing traffic volumes at the intersections
- Section 9.3 discusses the proposed traffic generated during construction and presents a summary of the traffic generation of vehicles during the peak construction period
- Section 9.4 provides the findings of the capacity analysis of the intersections within the surrounding road network for base case and during peak construction period case scenarios during the AM and PM peak periods
- Section 9.5 presents the summary and conclusions.

### 9.2 Existing Conditions

#### 9.2.1 Site Location

The Project is within the shire of Noosa, as shown in Figure 1-1. The main access roads are shown in Figure 9-1.

Lake Macdonald Drive connects the Project area directly to Cooroy township and continues north to Forest Acres, a low density residential area in a mostly bushland area. There are no formed roads that link the local roads on the western and eastern sides of Lake Macdonald. Seqwater has freehold land with frontage to both Lake Macdonald Drive, west of the Project area, and Collwood Road, east of the Project site. Lake Macdonald Drive provides direct access to the Project area via the Seqwater access road (visible in Figure 9-3).

Collwood Road ends at Seqwater's property frontage, as the road reserve connecting Collwood Road with Lake Macdonald Drive is currently unformed. Collwood Road continues east from the Project area before linking to Gumboil Road, which skirts around Lake Macdonald to the east of the Project site and links to Sivyers Road (local arterial) before intersecting with Cooroy-Noosa Road, which provides access to both Noosa and Cooroy.



FIGURE 9-1: MAIN ACCESS ROADS TO PROJECT AREA



<p><b>PROJECT NO:</b> 30041832</p> <p><b>CREATED BY / DATE:</b> BM14706, 18/01/2019</p> <p><b>VERSION:</b> DRAFT D</p> <p><b>PAGE SIZE:</b> A4</p> <p><b>DISCLAIMER:</b> © SMEC Australia Pty Ltd 2017. All Rights Reserved. While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources - no warranty is given that the information contained on this is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of all information prior to using it. This map is not a design document.</p>	<p>0 450 900 Metres</p> <p><b>SOURCES:</b> 1. Localities, Roads, LGA, Waterways, Waterbody, Protected Areas © QLD Spatial Catalogue, State of Queensland (Department of Natural Resources, Mines and Energy) 2018 2. Basemap © Nearmap, 2018</p> <p> <b>seqwater</b> WATER FOR LIFE</p>	<p><b>OVERVIEW NOOSA SHIRE</b></p>  <p>0 5 10 km</p>
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### 9.2.2 State Controlled Road Network

This section discusses the major roads in the vicinity of the Project area at Lake Macdonald as shown in Figure 9-2.

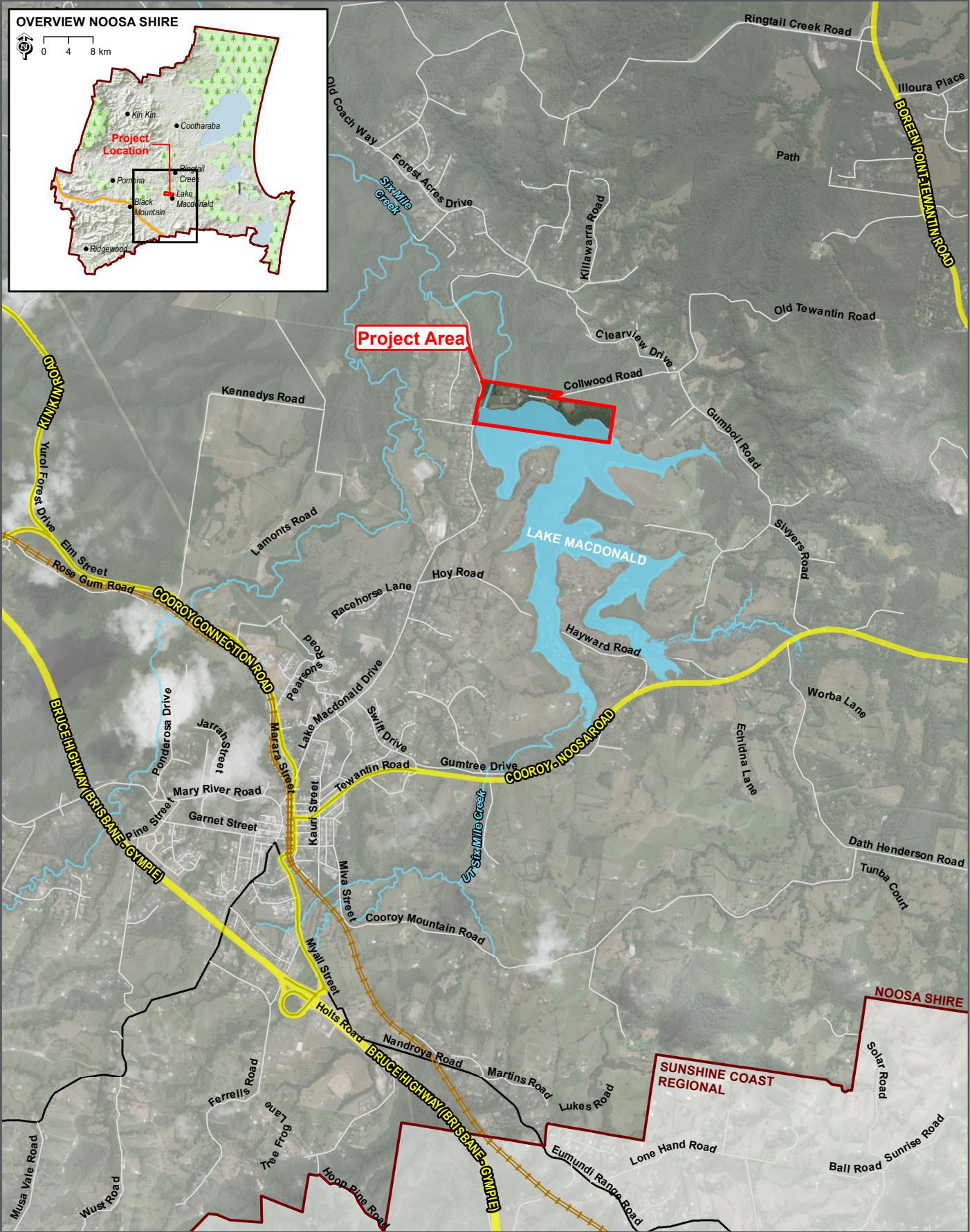
The scope of this TIA with respect to State controlled roads extends to the Cooroy-Noosa Road and Cooroy Connection Road (Elm Street) network surrounding Cooroy. These roads were selected to assess the potential impact of heavy vehicles accessing Lake Macdonald from the Bruce Highway on the basis that they form the heavy construction vehicle route between the Project area and examples of raw material suppliers, such as the Boral Quarry in Moy Pocket, and another raw material supplier at Reserve Street, Pomona. Note that suppliers of raw materials for the Project will be determined in the construction planning phase, but are assumed to originate from the Bruce Highway.

Cooroy-Noosa Road is a two-lane two-way arterial road with a posted speed limit of 100 km/h along the section of road past Sivyers Road.

Elm Street (Cooroy Connection Road) is classified as a major road with a posted speed limit of 60 km/h along the section of road past Lake Macdonald Drive. It is noted that the section of road reduced to 40 km/h during the school peak period, 7am to 9am and 2pm to 4pm. It is a two-lane two-way road with Auxiliary Left Turn and short Channelised Right Turn turning lanes at the intersection with Lake Macdonald Drive.



FIGURE 9-2: STATE CONTROLLED ROADS  
IN THE VICINITY OF THE PROJECT AREA



PROJECT NO: 30041832  
CREATED BY / DATE: BM14706, 30/11/2018  
VERSION: DRAFT A  
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SOURCES:  
1. Localities, Roads, LGA, Waterways, Protected Areas ©State of QLD (DNRME) 2018  
2. Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

LEGEND  
State Controlled Roads (surveyed centerline)  
Secondary Road  
Local Roads  
North Coast Railway Line  
Six Mile Creek and Upper Tributary  
Lake Macdonald

Project Area  
Local Governmental Area



### 9.2.3 Local Road Network

The western approach to the Project area is via an existing driveway intersection with Lake Macdonald Drive (Figure 9-3), a two lane two-way arterial road with a posted speed limit on the northern approach to the intersection of 80 km/h and 60 km/h on the southern approach to the intersection.



Figure 9-3: Aerial View of the Lake Macdonald Drive / Seqwater Access Road Intersection

(Photo courtesy of Marc Raffaele Photography)

The posted speed on Lake Macdonald Drive increases from 60 km/h to 80 km/h just before the road passes Lake Ridge Court from the north, and reduces back to 60 km/h at the northern approach to the Lake Macdonald Drive / Wilgee Court / Dianella Court intersection, where it remains until the road ends at the Elm Road intersection.

Lake Macdonald Drive briefly expands from one lane to two lanes to accommodate right hand turns into Swift Drive and Blue Wren Place in Auxiliary Right Turn configurations.

Sivyers Road is a two-lane two-way local access road with a posted speed limit of 70 km/h. Sivyers Road links the Cooroy-Noosa Road to Collwood Road, via Gumboil Road east of Lake Macdonald.

To the east of the Project site, Collwood Road is a one lane two-way access road that narrows to 4 m pavement width approximately 1 km from Lake Macdonald. Any vehicles approaching from opposite directions would need to give way and drive off the formed carriageway to safely pass.

Gumboil Road is two-lane two-way access road that is approximately 5 m wide. Similar to Collwood Road, vehicles approaching from opposite directions would need to give way and drive off the formed carriageway to safely pass as the road narrows to 1.5 lane widths in some sections.

The Cooroy-Noosa Road / Sivyers Road intersection is a two-lane two-way road with an Auxiliary Left Turn and an approximately 200 m auxiliary lane (probably previously an Auxiliary Right Turn) in the westbound direction (Figure 9-4).



Figure 9-4: Cooroy-Noosa Road / Sivyers Road Intersection

#### 9.2.4 School Bus Routes

There is currently one school bus route that runs along Lake Macdonald Drive, Route S731, operated by Graeme Schlumpf. The bus operates twice a day and travels along Lake Macdonald Drive between 7.20am and 8.05am, and between 3.05pm and 3.40pm. On Lake Macdonald Drive the bus stops at:

- The Lake Macdonald boat ramp
- Hamilton Road
- The corner of Lake Macdonald Drive and Forest Acres Drive.

There is no longer a school bus service on Sivyers Road, as confirmed by Mr. Schlumpf.

#### 9.2.5 Impact Mitigation and Management

Traffic surveys were undertaken at the following intersections:

- Elm Street / Lake Macdonald Drive – Tuesday 27 March 2018 and Wednesday 18 April 2018
- Lake Macdonald / Seqwater Access Road – Tuesday 27 March 2018
- Cooroy Noosa Road / Sivyers Road – Wednesday 18 April 2018.

The peak period for each intersection has been adopted for this report so that a robust and valid approach is undertaken. A summary of the AM and PM peak traffic volumes is presented below in Figure 9-5. The peak periods for the intersections are:

- Cooroy Noosa Road / Sivyers Road
  - AM Peak 7:30am to 8:30am
  - PM Peak 4:00pm to 5:00pm
- Elm Street / Lake MacDonald Drive
  - AM Peak 7:45am to 8:45am
  - PM Peak 4:00pm to 5:00pm
- Lake MacDonald Dr / Access Road
  - AM Peak 7:30am to 8:30am
  - PM Peak 4:30pm to 5:30pm.



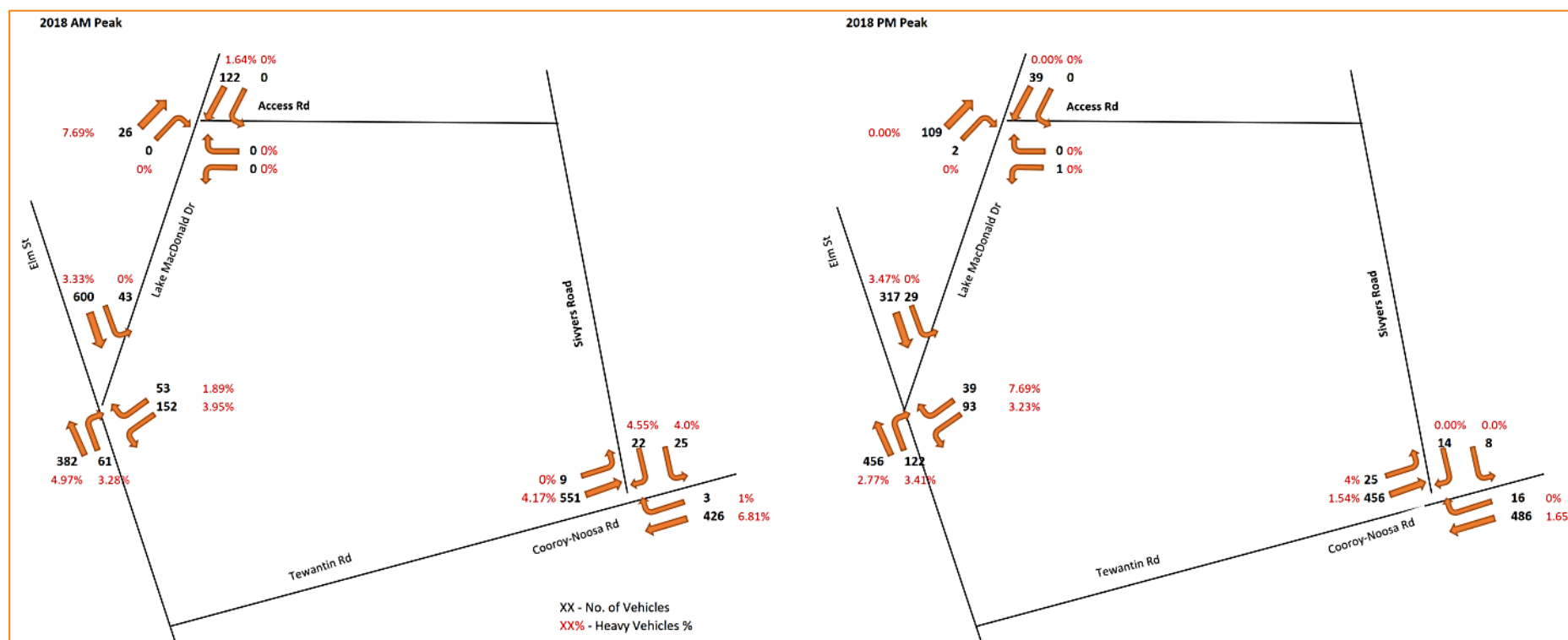


Figure 9-5 : 2018 AM and PM peak traffic volume

### 9.2.6 Crash History Assessment

The available crash data was obtained from the Queensland Government data website<sup>1</sup> for both the Elm Street / Lake Macdonald Drive and Cooroy-Noosa Road / Sivyers Road intersections. The data incorporated the period from 01 January 2001 to 30 April 2017.

There was an intersection crash (no. 247699 Hospitalisation) in 2012 at the Elm Street / Lake Macdonald Drive intersection. It is shown slightly to the south in Qld Globe. The intersection is also in a school zone.

There were six crashes recorded at the Noosa-Cooroy Road / Sivyers Road intersection:

- 2004 - 85752 Hospitalisation, 2 cars rear end
- 2006 - 131289 Minor Injury, 2 cars right rear
- 2008 - 178243 Hospitalisation, 4 cars right rear
- 2015 - 280058 Hospitalisation, 2 cars sideswipe through right
- 2016 - 299073 Hospitalisation, 2 cars rear end
- 2016 - 292401 Hospitalisation, 2 cars rear end.

This intersection is considered an old auxiliary Right Turn type and needs to be remarked as a Channelised Right Turn (short) to reduce the rear end crash rate. It should be blackspot eligible as it has more than three casualty crashes within the last five years.

## 9.3 Proposed Work

Construction is proposed to commence in August 2020 and conclude by December 2022.

### 9.3.1 Construction Vehicle Routes

In general, vehicles will travel to the site from the direction of the Bruce Highway. Heavy vehicles in particular are expected to largely access the local area from the Bruce Highway. A proportion of light vehicles and incidental commercial deliveries are likely to come from the direction of Noosa, but this is not anticipated to be significant.

Direct access to the Project site will be via public roads, specifically the western access road (Lake Macdonald Drive) and eastern access roads (via Cooroy Noosa Road, Sivyers Road, Gumboil Road, and Collwood Road).

Two main options exist for heavy vehicle routing to and from the Project site:

- Single access route from western access road with incidental usage of the eastern access roads
- One-way loop using both western and eastern access roads, with vehicles entering from one road and exiting via the other road.

The one-way loop configuration is potentially the most effective considering haulage efficiency through the Project site and community impact on the western access road (Lake Macdonald Drive). Nevertheless, sections of the eastern access roads narrow to a one-lane, two-way configuration and pose issues regarding safety and haulage efficiency that require consideration. Traffic management is likely to be required on sections of the eastern access road to facilitate ongoing usage.

The two main access route options will be considered by the construction contractor during the construction planning phase of the project (refer to Figure 9-1) and the preferred usage of transport routes will be determined at that time. Selection of the preferred route will consider many factors, including safety, efficiency, road capacity, and impact on the community. Appropriate temporary traffic controls will then be planned to cater for the preferred access route and usage.

It should be noted that access to the Project site from the east (Collwood Road) will be necessary at times, regardless of the preferred regular transport route.

<sup>1</sup> Queensland Government data – Crash data from Queensland roads: <https://data.qld.gov.au/dataset?q=crash+data>



Road widening works are not proposed, and road resurfacing will occur as required. Some road surface treatment of Collwood Road may be undertaken, but will be determined by the construction contractor.

Traffic management to facilitate works, both directly adjacent to the Project site to accommodate works and on narrow roads, will be carried out under an approved Project traffic management plan<sup>2</sup> approved by either Noosa Shire Council or Department of Transport and Main Roads, depending on the road ownership in each instance.

### 9.3.2 Construction Traffic

Assessment is undertaken to assess the impact of vehicles during the Project at the following intersections:

- Elm Street / Lake Macdonald Drive
- Lake Macdonald / Seqwater Access Road
- Cooroy Noosa Road / Sivyers Road.

The Project information provided to SMEC shows that there will be a maximum peak of 110 people at the site during the construction period. For the purposes of a worst-case assessment, it is assumed that all 110 staff will be driving into the site in the peak hour and 25% of the vehicles will be heavy vehicles.

It is also assumed that during the peak construction months an additional 10 heavy vehicles (e.g. concrete trucks) will be generated during the peak hour.

This equates to approximately 120 vehicle movements per peak period during the peak construction period.

The traffic generated to and from the site has been distributed based on the existing traffic survey data (Figure 9-5). The traffic generated to / from the site is presented in Figure 9-6.

The construction traffic values (Figure 9-6) could be considered highly conservative as most of the staff and construction vehicles are likely to be generated just before the on-road AM and PM peak period and it is unlikely that all construction staff will drive individually to the site<sup>3</sup>. In addition, the above traffic volumes are expected to be the maximum for only a three-month period. The traffic for the remaining construction period is expected to be lower.

Outside of the peak construction period, the average number of staff on site is approximately 49. This equates to approximately 49 staff vehicle movements and two heavy vehicles.

The average traffic generation of vehicles during construction is presented in Figure 9-7.

<sup>2</sup> Traffic management controls are proposed to be relevant for all construction activities.

<sup>3</sup> It is anticipated that tradesman would commence work between 6:30am and 7:30am in the AM Peak, with travel before that time, and leave the work site between 3:30pm to 4:30pm in the PM peak.

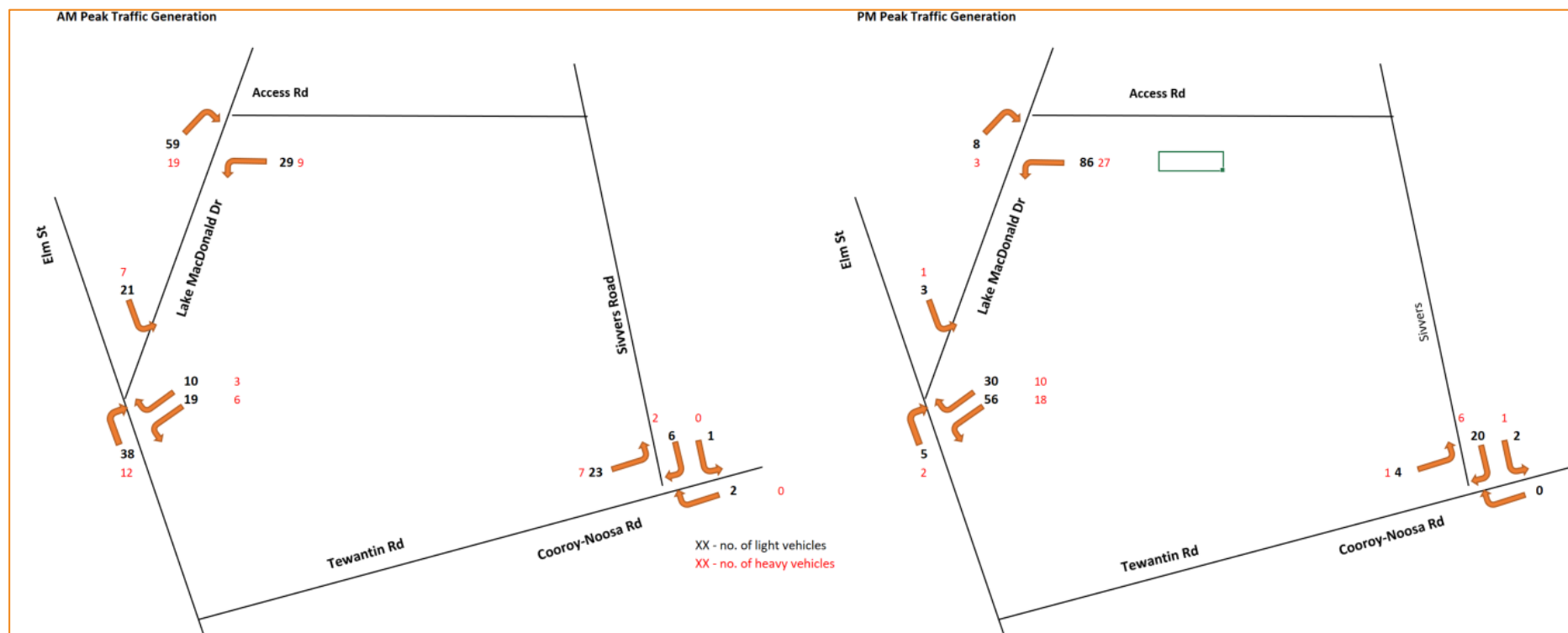


Figure 9-6: Maximum traffic generation of vehicles during the peak construction period



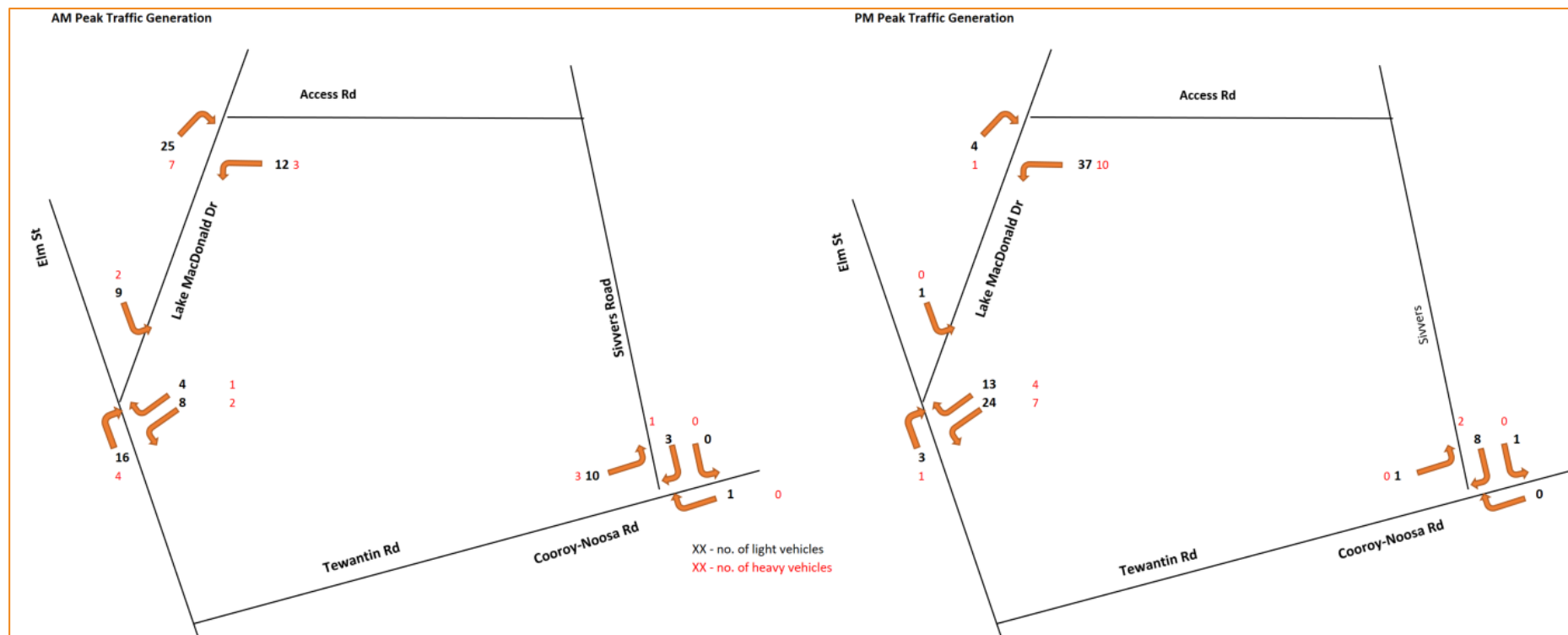


Figure 9-7: Average traffic generation of vehicles during the peak construction period

## 9.4 Traffic Impact

### 9.4.1 Traffic Operation Assessment

The peak construction period will notionally be between August 2021 and October 2021. Initial scheduling for the Project indicated that the peak construction period would be from August 2019 to October 2019, therefore analysis was undertaken for this period. However, the difference in traffic predictions for the same months in 2019 and 2021 is considered minimal, and as such is appropriate for this assessment.

Traffic impact for the following intersections was undertaken:

- Elm Street / Lake Macdonald Drive
- Lake Macdonald / Seqwater Access Road
- Cooroy-Noosa Road / Sivyers Road.

A traffic growth of 2.0% per annum (compound) was adopted to determine the 2019 traffic volumes (as shown in Figure 9-5).

A summary of the 2019 traffic volumes without construction traffic at the above mentioned intersections, is presented in Figure 9-8.

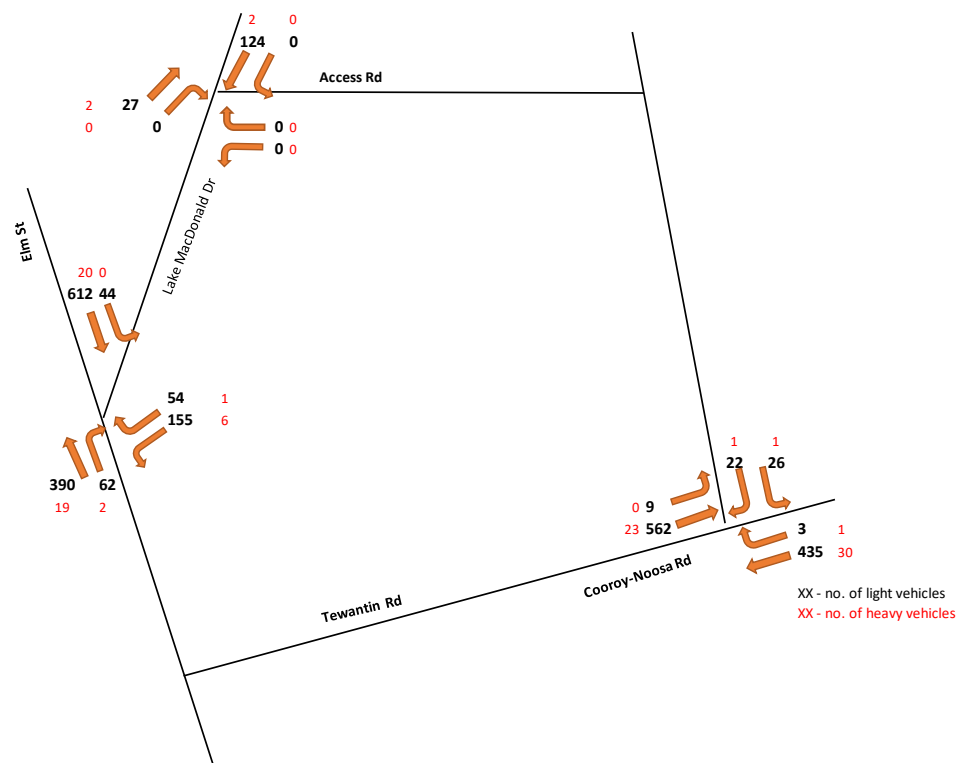
The traffic generated by construction traffic (Figure 9-6) was added to the base 2019 traffic volumes above (Figure 9-8) to determine the impact of the construction traffic at the at the following intersections:

- Elm Street / Lake Macdonald Drive
- Lake Macdonald / Seqwater Access Road
- Cooroy-Noosa Road / Sivyers Road.

The total traffic volumes at the intersections are shown in Figure 9-9.



2019 Base AM Peak



2019 PM Peak

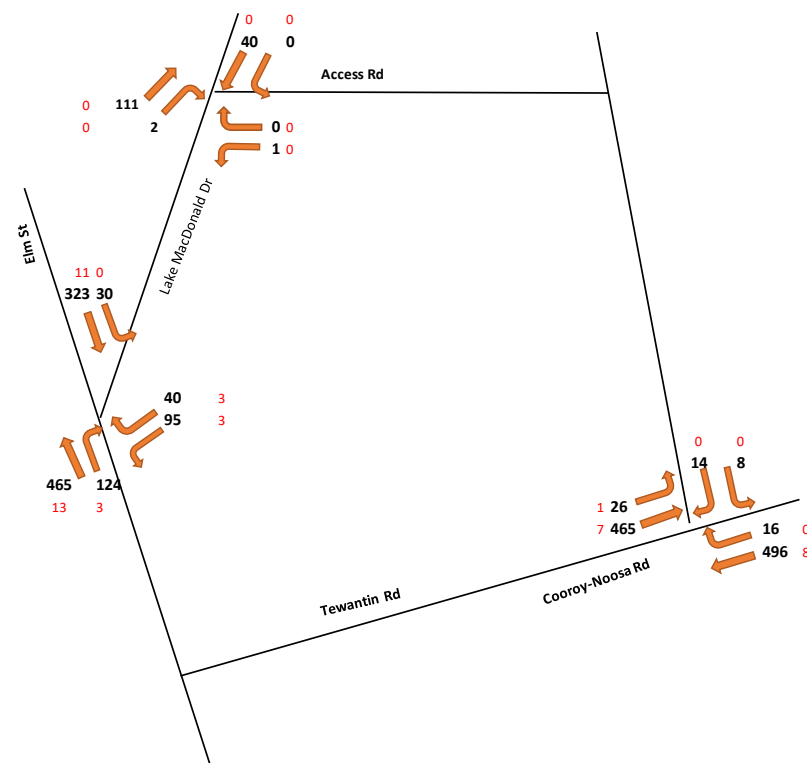


Figure 9-8: 2019 AM and PM peak traffic volumes without construction traffic

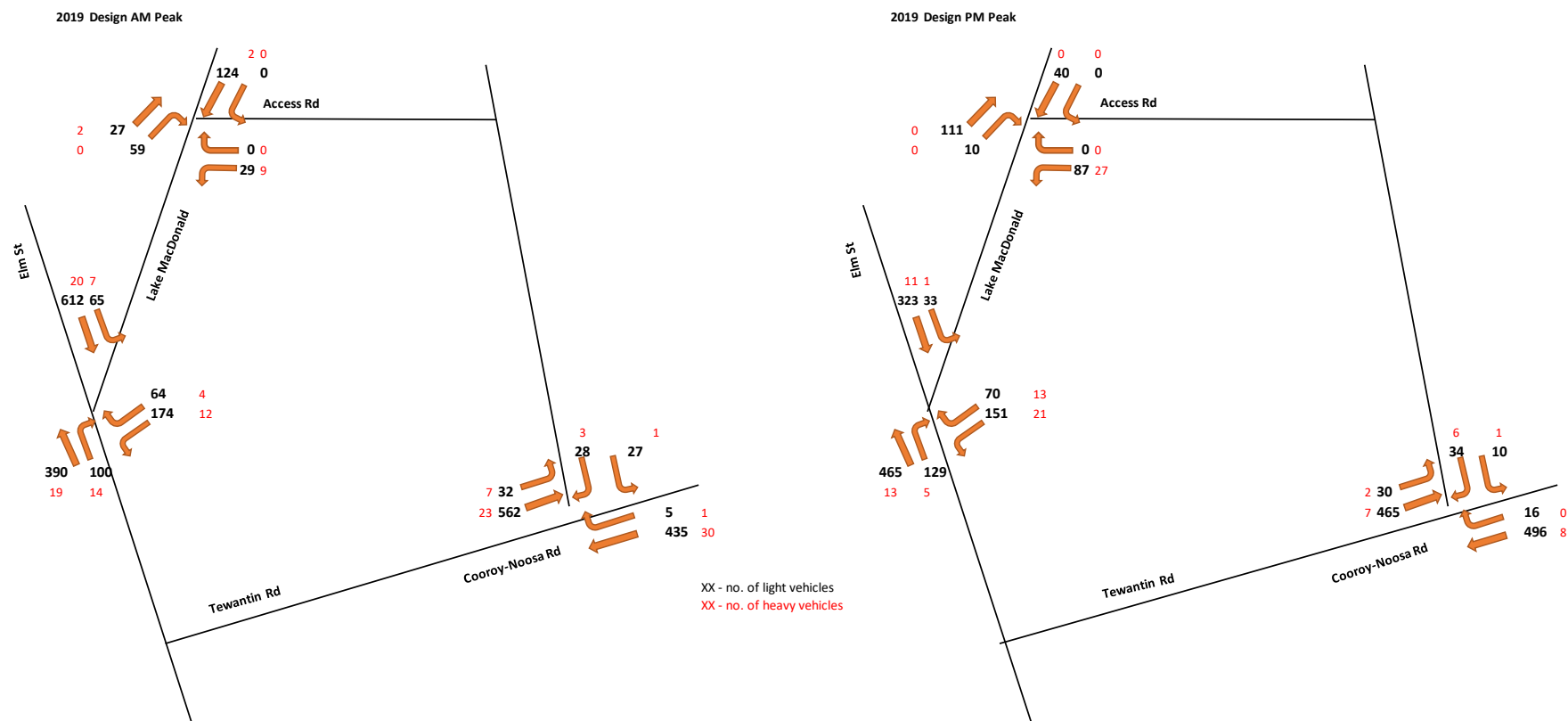


Figure 9-9: 2019 AM and PM peak traffic volumes with construction traffic



### 9.4.2 SIDRA Parameters and Performance Criteria

#### SIDRA Parameters

The key parameters that were used in the SIDRA intersection analysis are provided in Table 9-1.

Table 9-1: SIDRA parameters

PARAMETER	VALUE	PARAMETER	VALUE
Unit Time for Volumes	60 min	Peak Flow Period	30min
Basic Saturation Flow	1950 tcu/h	Peak Flow Factor	95%
Gap Acceptance	SIDRA Gap acceptance values		

#### SIDRA Performance Criteria

To determine whether performance is acceptable at an intersection or not, the following criteria have been used:

- The level of service (LOS), based on average delay, must be D or better at an intersection approach level, and E or better at a movement level for the worst performing movements
- All queues must be accommodated within the intersection geometry
- The degree of saturation (DOS) must be less than or equal to 0.80 for un-signalised intersection.

#### Elm Street / Lake Macdonald Drive Intersection

The existing intersection layout for the Elm Street / Lake Macdonald Drive intersection is shown in Figure 9-10.

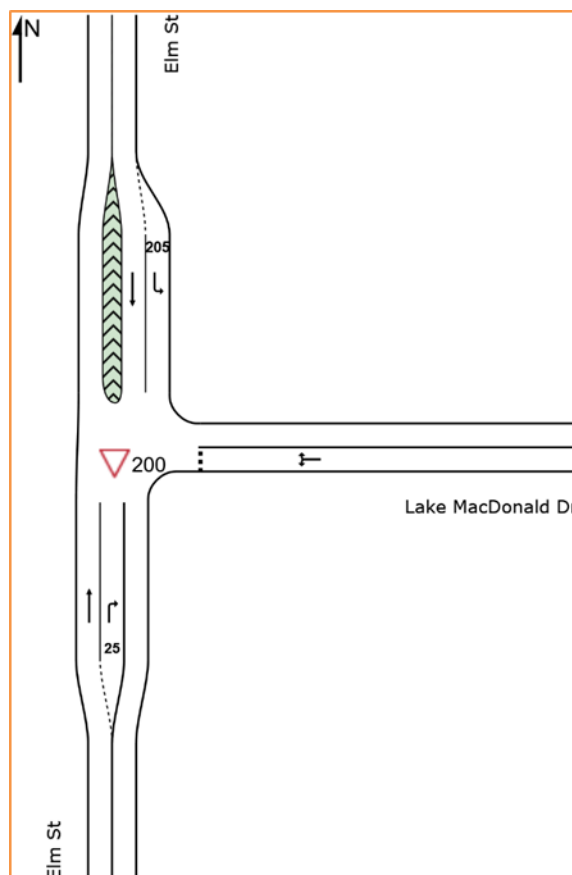


Figure 9-10: Elm Street / Lake Macdonald Drive intersection layout

Operational performance of the intersection for the base 2019 and 2019 with construction traffic in the AM and PM peak was undertaken using SIDRA. The SIDRA output is shown in Table 9-2 and Table 9-3.

Table 9-2 indicates that the intersection is expected to perform at all movements at a LOS B or better in 2019 (without construction traffic). All DOS ratios are well below 0.80, with a maximum of 0.53. There does not appear to be significant queuing. This intersection is currently operating satisfactorily in all scenarios.

Table 9-3 shows that the intersection will operate within acceptable limits in both the AM and PM peak hour periods with the additional construction traffic. The additional traffic has minimal impact in both periods, with minimal increase in queuing and average delay in both the AM and PM peak periods.

Table 9-2: Elm Street / Lake Macdonald Drive - Base 2019 AM and PM Peaks SIDRA results

APPROACH	2019 AM PEAK				2019 PM PEAK			
	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)
South: Elm St	0.22	1	NA	3	0.26	2	NA	4
East: Lake Macdonald Dr	0.53	18	C	2	0.25	11	B	7
North: Elm St	0.33	0	NA	0	0.18	1	NA	0
<b>All vehicles</b>	<b>0.53</b>	<b>4</b>	<b>NA</b>	<b>2</b>	<b>0.26</b>	<b>2</b>	<b>NA</b>	<b>7</b>

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.

Table 9-3: Elm Street / Lake Macdonald Drive – 2019 AM and PM Peaks SIDRA results (with construction traffic)

APPROACH	2019 AM PEAK				2019 PM PEAK			
	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)
South: Elm St	0.22	2	NA	6	0.26	2	NA	4
East: Lake Macdonald Dr	0.67	23	C	31	0.47	15	C	21
North: Elm St	0.33	0	NA	0	0.18	0	NA	0
<b>All vehicles</b>	<b>0.67</b>	<b>5</b>	<b>NA</b>	<b>31</b>	<b>0.47</b>	<b>4</b>	<b>NA</b>	<b>21</b>

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.

### Lake Macdonald Drive/ Seqwater Access Road Intersection

The existing intersection layout for the Lake Macdonald Drive / Seqwater Access Road intersection is presented in Figure 9-11.

Operational performance of the intersection for the base 2019 and 2019 with construction traffic in the AM and PM peak was undertaken using SIDRA. The SIDRA output is shown in Table 9-4 and Table 9-5.

The SIDRA results in Table 9-4 indicate that all approaches are at a LOS C or better with a maximum DOS of 0.31 in the AM peak. The results in Table 9-5 indicate that the intersection will operate within acceptable limits in both the AM and PM peak hour periods with the additional traffic from the construction. The additional traffic has minimal impact in both periods, with no significant increase in queuing.

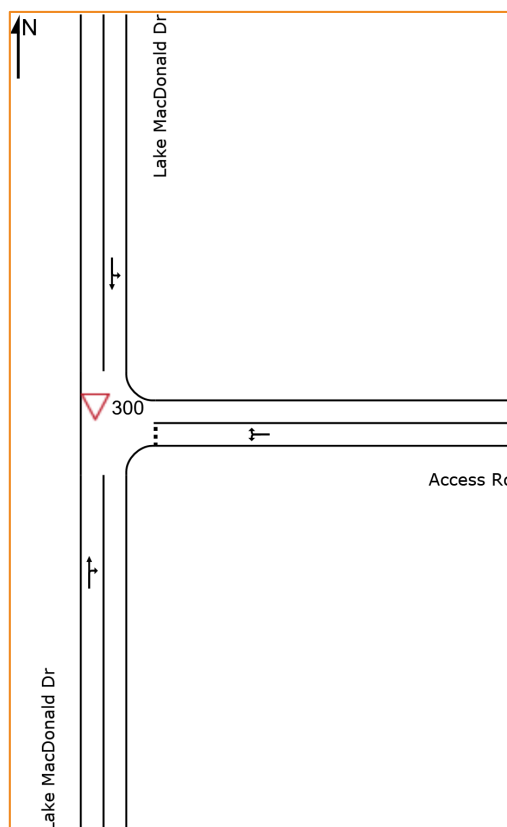


Figure 9-11: Lake Macdonald Drive / Seqwater Access Road Intersection Layout

Table 9-4: Lake Macdonald Drive / Seqwater Access Road - Base 2019 AM and PM Peaks SIDRA results

APPROACH	2019 AM PEAK				2019 PM PEAK			
	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)
South: Lake Macdonald Dr	0.02	0	NA	0	0.06	0	NA	0
East: Access Rd	0.00	6	A	0	0.00	6	A	0
North: Lake Macdonald Dr	0.07	0	NA	0	0.02	0	NA	0
<b>All vehicles</b>	<b>0.07</b>	<b>0</b>	<b>NA</b>	<b>0</b>	<b>0.06</b>	<b>0</b>	<b>NA</b>	<b>0</b>

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.



Table 9-5: Lake Macdonald Drive / Seqwater Access Road - 2019 AM and PM Peaks SIDRA results (with construction traffic)

APPROACH	2019 AM PEAK				2019 PM PEAK			
	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)
South: Lake Macdonald Dr	0.06	6	NA	3	0.07	1	NA	1
East: Access Rd	0.03	6	A	0	0.07	6	A	3
North: Lake Macdonald Dr	0.07	0	NA	0	0.02	0	NA	0
<b>All vehicles</b>	<b>0.07</b>	<b>3</b>	<b>NA</b>	<b>3</b>	<b>0.07</b>	<b>3</b>	<b>NA</b>	<b>3</b>

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.

### Cooroy – Noosa Road / Sivyers Road Intersection

The existing intersection layout for the Cooroy – Noosa Road / Sivyers Road intersection is shown in Figure 9-12.

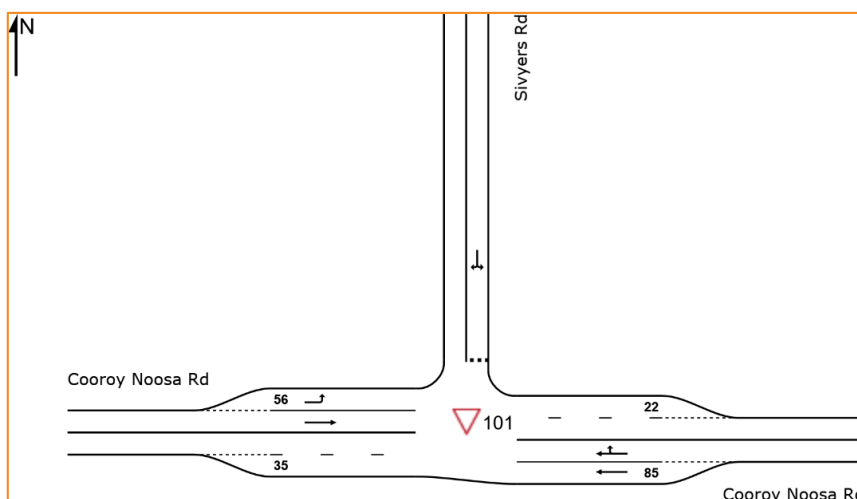


Figure 9-12: Cooroy – Noosa Road / Sivyers Road Intersection Layout

Operational performance of the intersection for the base 2019 and 2019 with construction traffic in the AM and PM peak was undertaken using SIDRA. The SIDRA output is shown in Table 9-6 and Table 9-7.

The SIDRA results in Table 9-6 indicate that all approaches are at a LOS C or better with a maximum DOS of 0.31 in the AM peak.

The results in Table 9-7 illustrate that the intersection will operate within acceptable limits in both the AM and PM peak hour periods with the additional traffic from the construction. The additional traffic has minimal impact in both periods, with no significant increase in queuing.

Table 9-6: Cooroy-Noosa Road / Sivyers Road - Base 2019 AM and PM Peaks SIDRA results

APPROACH	2019 AM PEAK				2019 PM PEAK			
	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)
East: Cooroy-Noosa Road	0.20	0	NA	0	0.23	1	NA	2
North: Sivyers Road	0.16	17	C	4	0.08	17	C	2
West: Cooroy-Noosa Road	0.31	0	NA	0	0.25	0	NA	0
<b>All vehicles</b>	<b>0.31</b>	<b>1</b>	<b>NA</b>	<b>4</b>	<b>0.25</b>	<b>1</b>	<b>NA</b>	<b>2</b>

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.

Table 9-7: Cooroy-Noosa Road / Sivyers Road - 2019 AM and PM Peaks SIDRA results (with construction traffic)

APPROACH	2019 AM PEAK				2019 PM PEAK			
	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)	D.O.S	Average Delay(sec)	L.O.S	95%ile Queue (m)
East: Cooroy-Noosa Road	0.20	0	NA	1	0.23	1	NA	2
North: Sivyers Road	0.22	20	C	6	0.21	24	C	6
West: Cooroy-Noosa Road	0.31	0	NA	0	0.25	1	NA	0
<b>All vehicles</b>	<b>0.31</b>	<b>1</b>	<b>NA</b>	<b>6</b>	<b>0.25</b>	<b>2</b>	<b>NA</b>	<b>6</b>

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.

#### 9.4.3 Risk Assessment and Recommendations

A risk assessment was undertaken to determine if there will be any likely change to the level of road safety risk on state controlled roads during construction (Table 9-8). The risk assessment was undertaken based on TMR's Guide to Traffic Impact Assessment<sup>4</sup> Section 9.3.2.

As outlined in section 9.2.6, the Elm Street / Lake Macdonald Drive intersection had one crash recorded between January 2001 to April 2017. The increase in number of vehicles at the intersection should be considered to have minimal impact on the intersection. The Department of Transport and Main Roads have previously (2012) reduced the length of storage at this intersection as part of the installation of cycle lanes; queuing space is available on the extended painted median. The intersection is also located in a 40 km/hr school speed zone during peak traffic demand, which reduces both the risk and the consequences of crashes.

<sup>4</sup> Guide to Traffic Impact Assessment, Department of Transport and Main Roads, 2017

SIDRA analysis shows that there are sufficient gaps for vehicles to turn into and out of Lake Macdonald Drive from the Seqwater access road. However, current sight distance at this intersection to the north is approximately 160 m. This is insufficient to provide Safe Intersection Sight Distance for a posted speed of 80 km/hr on the approach (Vdes 90 km/hr) and the speed limit should be reduced to 60 km/hr on the approach (Vdes 70 km/hr) to provide Safe Intersection Sight Distance by relocating the speed change to north of the curve. The sight distance is greater than Safe Stopping Distance so intersection warning signs are not warranted. The curve radius is also approximately 200 m so the curve design speed in wet conditions should be no more than 70 km/hr. Due to changes in the traffic conditions, additional signage should also be provided warning of truck movements.

The Noosa-Cooroy Road / Sivyers Road intersection has six crashes recorded. As mentioned, the existing auxiliary Right Turn intersection layout needs to be updated as a Channelised Right Turn (short) to reduce the rear end crash rate. The intersection should be blackspot eligible as it has more than three casualty crashes within the last five years.

The following recommendations are proposed:

- Upgrade lane markings at the Noosa-Cooroy Road / Sivyers Road intersection to Channelised Right Turn (short)
- Temporary trucks turning sign (T2-25) at the intersection of Lake Macdonald Drive and the Seqwater access road for the duration of heavy vehicle operations
- Relocate 80 / 60 speed zone change on Lake Macdonald Drive at the intersection with the Seqwater access road into the Project area, 200 m to north around curve
- Additional warning signs regarding heavy vehicles at one-lane two-way roads (e.g. Collwood Road), traffic controllers to manage traffic along the stretch of road. Further assessments and refinements to traffic management during construction will be undertaken as the Project planning progresses.

More general risks associated with Project construction include:

- Increased traffic on local roads
- Construction activities impacting on local road network (e.g. partial road closures)
- Workers' vehicles parking on local roads in the vicinity of the Project.

Management measures to minimise the potential impacts of these general risks include:

- Controlling working hours and avoiding truck haulage during peak traffic times and school pick-up and drop-off periods
- Providing traffic control measures for the safe movement of vehicles, cyclists, and pedestrians accessing residential properties near the Project
- Notifying local communities about proposed changes to local traffic due to the Project and providing clear signage of changed traffic conditions
- Maintaining at least one open lane on local roads at all times for traffic near the Project site.
- Providing adequate on-site parking to accommodate worker's vehicles and/or provide buses to transport workers
- Implementing a traffic management plan.



Table 9-8: Risk Assessment Table

Risk Item	Without Construction Traffic			With Construction Traffic			Mitigation measures	With Construction Traffic and Mitigation		
	Likelihood	Consequence	Risk Score	Likelihood	Consequence	Risk Score		Likelihood	Consequence	Risk Score
Increased left turning traffic at intersections causing rear end crashes	1	1	L	1	1	L	No action	1	1	L
Elm Street / Lake Macdonald Drive Increased right turning traffic at intersections causing intersection crashes (existing Channelised Right Turn (short))	1	2	L	2	2	L	No action	2	2	L
Noosa-Cooroy Road / Sivyers Road. Increased right turning traffic at intersections causing intersection crashes	4	4	H	4	4	H	Amend/update line marking to Channelised Right Turn (short) at Noosa-Cooroy Road approach with Sivyers Road intersection	2	3	M
Lake Macdonald Drive / Seqwater Access Road Increased right turning traffic at intersections causing intersection crashes	1	4	M	3	4	M	Install trucks turning signs on intersection approaches (T-25), move speed limit change 80/60 200m around curve to north	1	3	L

## 9.5 Summary

As per the Department of Transport and Main Roads Guide to Traffic Impact Assessment, this chapter assessed the impacts additional traffic generated during the construction period is likely to have on the operation of state controlled roads and key intersections.

Available crash data for the Elm St / Lake Macdonald Dr and Cooroy-Noosa Road/ Sivyers Road intersections shows there was an intersection crash in 2012 at the Elm St / Lake Macdonald Drive intersection and six crashes were recorded at the Noosa - Cooroy Road / Sivyers Road intersection. This intersection is considered an old Auxiliary Right Turn type and needs to be remarked as a Channelised Right Turn (short) to reduce the rear end crash rate. It should also be blackspot eligible as it has more than three casualty crashes within the last five years.

The peak construction period for the Project is expected to occur over three months (notionally between August and October 2020), with a maximum of 110 staff on site. It was assumed that all 110 staff will be driving into the site in the peak hour and that 25% of the vehicles will be heavy vehicles. It was also assumed that there would be an additional 10 heavy vehicles (e.g. concrete trucks) during the peak hour in peak construction months. This equates to approximately 120 vehicle movements. The average number of staff on site is approximately 49 for the duration of the Project construction; this equates to approximately 49 staff vehicle movements and two heavy vehicles. These assumptions could be considered highly conservative as majority of the manpower and construction vehicles are likely to be generated just before the on-road AM and PM peak periods.

The analysis showed that the additional construction vehicles will have minimal impact upon the operation of the three study intersections (Elm Street / Lake Macdonald Drive, Lake Macdonald / Seqwater Access Road, Cooroy Noosa Road / Sivyers Road). The SIDRA analysis indicates that the intersections will operate satisfactorily in terms of degree of saturation, queue length, level of service and delay during the peak constructions months.

It is concluded that the intersection performance is acceptable with the anticipated additional traffic in 2019. Furthermore, as the difference in anticipated traffic between 2019 and 2021 is considered minimal, it is concluded that the intersection performance will also be acceptable in 2021.

General risks associated with Project construction include increased traffic on local roads, construction activities impacting on local road network (e.g. partial road closures), and workers' vehicles parking on local roads near the Project.

The following recommendations are proposed:

- Upgrade lane markings at Noosa-Cooroy Road / Sivyers Road intersection to Channelised Right Turn (short)
- Temporary trucks turning sign (T2-25) at the intersection of Lake Macdonald Drive and the Seqwater access road for the duration of heavy vehicle operations
- Relocate 80 / 60 speed zone change on Lake Macdonald Drive near the Seqwater access road intersection 200 m to north around the curve
- Additional warning signs regarding heavy vehicles at one-lane two road (e.g. Collwood Road, Gumboil Road), traffic controllers to manage traffic along the stretch of road
- Implement a traffic management plan that incorporates the mitigation measures and recommendations identified in this chapter.