



Gladstone Ports Corporation

*Growth, Prosperity, Community.*

## Appendix I – Traffic Analysis Report





CLIENTS | PEOPLE | PERFORMANCE

# **Gladstone Port Corporation**

Report for Western Basin  
Dredging and Disposal Project  
EIS

Traffic Analysis

March 2010



# Contents

1.	Introduction	1
1.1	Background	1
1.2	Objectives and Scope of this Study	2
1.3	Study Approach	3
1.4	Report Structure	4
2.	Existing and Future Traffic Volumes	6
2.1	Existing (2009) Peak Hour Traffic Volumes	6
2.2	Future (2011) Peak Hour Traffic Volumes (without workforce traffic)	6
2.3	Workforce Traffic Generation	7
2.4	Future (2011) Traffic Volumes (with workforce traffic)	8
3.	Intersection Analysis	10
4.	Conclusion and Recommendations	15
4.1	Conclusion	15
4.2	Recommendations	15

## Table Index

Table 1	RTA Levels of Service Criteria (All intersection Types)	4
Table 2	Existing Heavy Vehicle Percentages - 2009	11
Table 3	Mount Larcom – Gladstone Road / Landing Road Intersection Analysis Results – 2009	11
Table 4	Mt Larcom – Gladstone Road / Landing Road Intersection Analysis Results – 2011 (without workforce traffic)	13
Table 5	Mt Larcom – Gladstone Road / Landing Road Intersection Analysis Results – 2011 (with workforce traffic)	14

## Figure Index

Figure 1	Haul Route Options and Landing Road / Gladstone – Mt Larcom Road Intersection	5
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Figure 2	Landing Rd / Gladstone - Mount Larcom Road Intersection Volumes - 2009	6
Figure 3	Landing Rd / Gladstone – Mount Larcom Road Intersection Volumes- 2011 (without workforce traffic)	7
Figure 4	Estimated Workforce Traffic Generation – vehicles / hour	8
Figure 5	Landing Rd / Gladstone – Mount Larcom Road Intersection Volumes – 2011 (with workforce traffic)	9
Figure 6	Mt Larcom – Gladstone Road / Landing Road Intersection- Existing Layout	10

## Appendices

- A Traffic Count Data Provided by DTMR
- B SIDRA 4.0 Intersection Analysis Results



# 1. Introduction

## 1.1 Background

The Gladstone Ports Corporation (GPC) proposes to undertake dredging associated with the deepening and widening of existing channels and swing basins, and the creation of new channels, swing basins and berth pockets in the Western Basin. This is called the Western Basin Dredging and Disposal Project (WB).

Material dredged during the Western Basin development is proposed to be placed into a Reclamation Area to the north and immediately adjacent to the existing Fisherman's Landing reclamation area (shown on Figure 1). The extended Fisherman's Landing area will create a land reserve that will be used to service new port facilities (Fisherman's Landing Northern Expansion or FLNE).

The dredging of the Western Basin will occur in stages and the rate of both dredging and development will be controlled by the demands of industry locating in the Gladstone region and requiring access to port facilities.

An excerpt from the WB Environmental Impact Statement (EIS) (page 2-17) states that:

*The Western Basin Reclamation Area bund wall will be fully constructed prior to the commencement of dredging. Should the Fisherman's Landing Northern Expansion reclamation be approved under a separate EIS process that is currently being undertaken, construction of a portion of that reclamation may be undertaken prior to the approval and commencement of the Western Basin Reclamation Area. The Fisherman's Landing Northern Expansion reclamation will therefore have the potential to contain early works material from one or more of the LNG facilities proposed for Curtis Island and the Western Basin Reclamation can later be constructed around this initial portion of the Fisherman's Landing Northern Expansion.*

*To enable the construction of the complete bund wall in one year, it is proposed to construct the Western Basin Reclamation Area bund walls from three 'fronts'. Two of these fronts start from the existing Fisherman's Landing reclamation, and a third starts from part way along the western bund wall. The third 'front' will be from the end of the off-road haul route to a portion of the western bund wall, with an at-grade crossing of what will be the intertidal channel constructed to enable this access. The at-grade crossing will need to be designed to minimise disruption to water flows during tidal movements and will be removed upon completion of the bund wall construction.*

### 1.1.1 Project Activities

There will be two main construction activities associated with the Project - namely bund construction and dredging. The rock material for the bund wall will be sourced from the nearby Ticor Rock Quarry. The impact of heavy vehicle traffic generated by this activity on the existing road pavement and intersection (known as the haul road) is not addressed in this report and will be assessed under a separate approval process. However, heavy vehicle traffic is partly accounted in the growth in background traffic assumed for the analysis (see section 3.1.2 for more detail).



### 1.1.2 Haul Route

A high-level investigation was undertaken by GHD to determine the most suitable route for hauling rock to construct the bund from the Ticor Rock Quarry to the Reclamation Area (refer to the Haul Route Options Study extract appended to the Supplementary Information document). Five possible transport routes were identified from the proposed quarrying site to the Reclamation Area. The study was high level and details within the report have since changed however.

The five possible routes comprise three haul routes and two road routes that have been simulated using the TALPAC software. The haul routes correspond to the high rate production schedule whereas the road routes correspond to the low rate schedule as follows:

- ▶ 3,600,000 tonnes per annum for one year (high rate production schedule)
- ▶ 800,000 tonnes per annum for four and a half years (low rate production schedule)

The road and haul routes for both options are shown in Figure 1.

### 1.1.3 Study Area

As seen in Figure 1, the major road in the study area is the Mount Larcom – Gladstone Road, which is a State Controlled Road under the jurisdiction of the DTMR. Mount Larcom – Gladstone Road is a two-lane two-way road with a speed limit of 80 km/h in the vicinity of Landing Road. The Reclamation Area is located to the north-west of Gladstone, and is accessed via Landing Road. This is a two-lane two-way road under the Gladstone Regional Council with a speed limit of 80 km/h. The intersection of these two roads has been analysed to assess the effects of the additional traffic generated by the construction activities.

## 1.2 Objectives and Scope of this Study

GHD Pty Ltd (GHD) was commissioned by the Gladstone Ports Corporation (GPC) to undertake an EIS for the Western Basin Dredging and Disposal Project. This report has been prepared in response to a submission on the EIS by the Department of Transport and Main Roads (DTMR). It is an update of the traffic chapter (Chapter 10) of the Western Basin EIS with new traffic count data supplied by DTMR. This updated intersection analysis report will form part of the supporting documents submitted in conjunction with the Supplementary Information document.

Although the two projects (FLNE and WB) are different and subject to separate approvals processes, at a certain stage of the bund construction and reclamation, the two projects overlap and the traffic impacts of both were assessed together to consider the worst case traffic scenario. Only traffic generated by the bund construction and dredging workforce from the Western Basin Reclamation Area has been assessed, not the traffic generated from the workforce travelling to and from the marina. The impact of the quarry traffic will be assessed in a separate report.

The objective of this report is to examine the impact of traffic generated by the workforce due to the construction of the bund at Western Basin and the dredging of the channel. The scope of this assessment is limited to the Mount Larcom Gladstone Road / Landing Road intersection which provides the only road access to the Reclamation Area. Figure 1 shows the location of the study area and the WB and FLNE Reclamation Areas.



## 1.3 Study Approach

### 1.3.1 Key Tasks

The approach adopted for the traffic impact assessment comprises a series of task as follows:

- ▶ Determine the existing (2009) performance of the Gladstone - Mount Larcom Road / Landing Road intersection.
- ▶ Determine the growth in background traffic and estimate future (2011) background traffic volumes at the Gladstone - Mount Larcom Road / Landing Road intersection.
- ▶ Determine the traffic volume generated by the bund construction and dredging workforce.
- ▶ Determine the future (2011) performance of the Gladstone - Mount Larcom Road / Landing Road intersection – without the traffic generated by the bund construction and dredging workforce.
- ▶ Determine the future (2011) performance of the Gladstone - Mount Larcom Road / Landing Road intersection – with the traffic generated by the bund construction and dredging workforce.
- ▶ Recommend mitigative measures (upgrades) if required.

The intersection analysis was conducted using SIDRA 4.0 intersection analysis software and was conducted for the design horizon 2011 when both bund construction and dredging activities will be concurrent.

### 1.3.2 Data Collected and Reviewed

The following traffic count data was provided by the DTMR and has been reviewed and used as a basis for the traffic analysis:

- ▶ Intersection turning movement counts for Gladstone - Mount Larcom Road / Landing Road Intersection – 9 July 2009 (0600-1800).
- ▶ Weekly Volume Report (Site No: 60074) for Gladstone - Mount Larcom Road – 2008.
- ▶ AADT Segment Analysis Report (Site No: 60074) for Gladstone - Mount Larcom Road – 2008.
- ▶ AADT Segment Analysis Report (Site No: 60074) for Gladstone - Mount Larcom Road – 2007.

Copies of the above traffic data are attached in Appendix A of this report.

### 1.3.3 Intersection Performance Criteria

The performance of the study intersection was evaluated based on the following performance measures:

- ▶ **Degree of Saturation (DOS).** The DOS defines the ratio between the volume entering the intersection and the ultimate capacity. According to DTMR guidelines the desirable upper limits prescribed for each intersection type are as follows:
  - 0.80 for unsignalised (priority control) intersections
  - 0.85 for roundabouts
  - 0.90 for signalised intersections

The study intersection is an unsignalised priority intersection and as such a threshold DOS = 0.80 has been adopted for the analysis.



► **Level of Service (LOS)** based on Average Vehicle Delay

LOS is an index of the operation performance of the intersection based on the service measure such as delay, degree of saturation and density during a given flow period. LOS 'A' is the highest level with LOS 'F' occurring when traffic volumes are above capacity with drivers experiencing significant delays. Intersection LOS determined in SIDRA has been set in accordance with NSW Roads and Traffic Authority (RTA) delay criteria, which is based on average controlled delay per vehicle (seconds), shown in Table 1.

**Table 1 RTA Levels of Service Criteria (All intersection Types)**

LOS	Delay (Seconds)	Signals or Roundabout	Priority Control
A	$D \leq 14$	Good operation	Good operation
B	$15 < D \leq 28$	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	$29 < D \leq 42$	Satisfactory	Satisfactory, but accident study required
D	$43 < D \leq 56$	Operating near capacity	Near capacity & accident study required
E	$57 < D \leq 70$	At capacity; at signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	$70 < D$	Not Acceptable	Not Acceptable

Source: NSW Roads and Traffic Authority, Guide to Traffic Generating Developments, 2002

For the assessment, a threshold LOS D has been adopted as acceptable level of service for all movement at the intersection.

► **95<sup>th</sup> percentile Back of Queue**

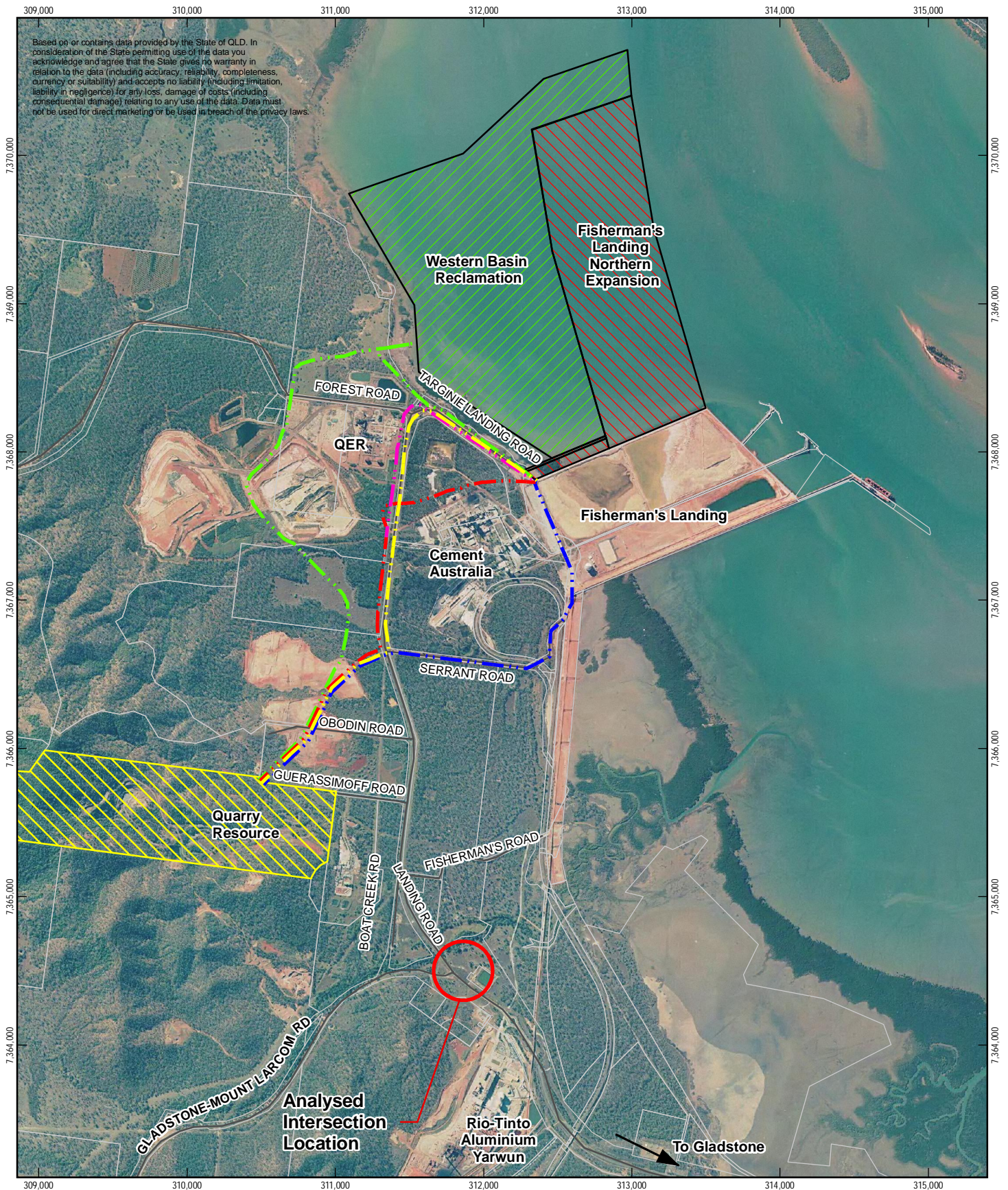
The Back of Queue defines the number of vehicles that are queued (in metres) at the start of a red phase plus the arrivals at the back of queue during the green time. The 95<sup>th</sup> percentile queue length is the value which 95% of all observed cycle queue lengths fall. Any queue at the intersection should be checked to ensure that it can be fully contained within any short lanes and that any potential queuing does not impact adversely on the operation of adjacent intersections and does not substantially hinder property access.

## 1.4 Report Structure

This report is structured into the following sections:

- **Section 2** discusses the workforce traffic generation and estimated future traffic volumes which have been used for the intersection analysis.
- **Section 3** presents the analysis of the existing intersection performance and future intersection performance with and without the traffic generated by the bund construction and dredging activities.
- **Section 4** presents the conclusions and recommendations of the study.





**LEGEND**

- - - Haul Route 1 (HR1)
- - - Haul Route 2 (HR2)
- - - Haul Route 3 (HR3) (Preferred)
- - - Road Route 1 (RR1)
- - - Road Route 2 (RR2)
- - - Road Route 3 (RR3) (RR1 Loaded & RR2 Unloaded) (Preferred)
- Quarry Lot Boundary
- Western Basin Reclamation Area
- Fisherman's Landing Northern Expansion
- Cadastre

1:35,000 (at A4)

0 200 400 600 800 1,000

Metres

Map Projection: Universal Transverse Mercator  
Horizontal Datum: Geocentric Datum of Australia 1994  
Grid: Map Grid of Australia, Zone 56



Port of Gladstone  
Western Basin Supplementary EIS

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Date | 25 March 2010

**Haul Route Options and Landing Road /  
Gladstone - Mt Larcum Road Intersection**

**Figure 1**



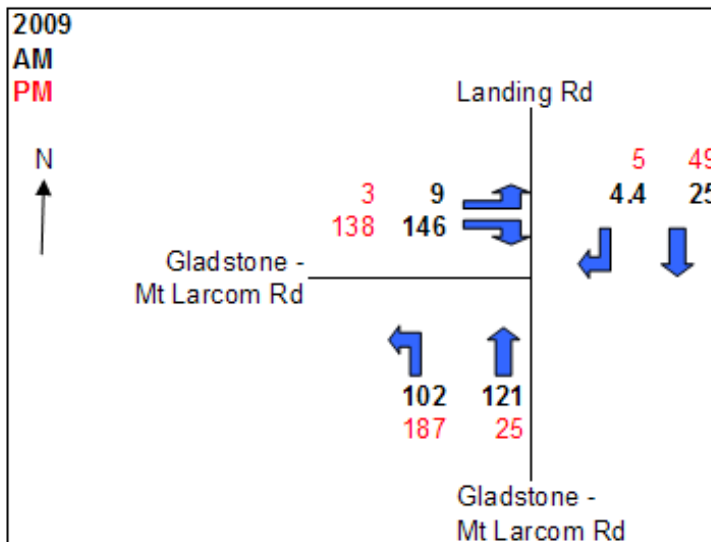
## 2. Existing and Future Traffic Volumes

Assessment of 12-hour classified traffic count data on the Gladstone – Mount Larcom Road indicates the peak hours to be 6.00 – 7.00am in the morning and 5.00 – 6.00pm in the evening. As such, the AM and PM peak hours assumed for the study are 6.00 – 7.00 am and 5.00 – 6.00 pm respectively. These times also represent the shift changeover times for both the bund construction and the dredging activities workforce. The shift changeover for both activities occurs at approximately 6.00 am and 6.00 pm.

### 2.1 Existing (2009) Peak Hour Traffic Volumes

The existing AM and PM peak hour traffic volumes for the study intersection is shown in Figure 2 below.

**Figure 2 Landing Rd / Gladstone - Mount Larcom Road Intersection Volumes - 2009**

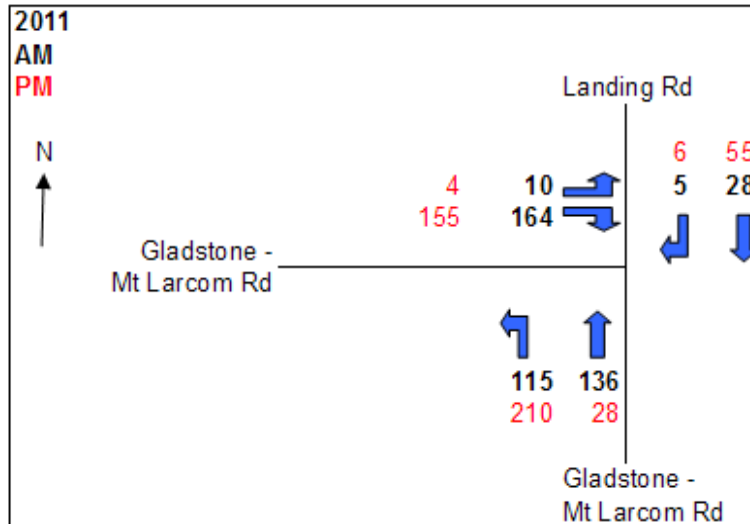


### 2.2 Future (2011) Peak Hour Traffic Volumes (without workforce traffic)

Historical traffic count data (1997 – 2007) on the Gladstone – Mount Larcom Road was used to calculate the traffic growth rates for the study intersection. A 6% per annum growth rate was used to factor the observed peak hour traffic volumes from 2009 to 2011. The resultant peak hour traffic volumes (without workforce traffic) for 2011 are shown in Figure 3 below.



**Figure 3 Landing Rd / Gladstone – Mount Larcom Road Intersection Volumes- 2011 (without workforce traffic)**



### 2.3 Workforce Traffic Generation

The following section presents the bund construction and dredging activity assumptions (provided by GPC) that have been used for the assessment:

- ▶ Bund construction period: September 2010 – September 2011
- ▶ Start dredging operation: April 2011
- ▶ Construction operation: 24 hours, 7 days a week
- ▶ Workers shift change-over: 6.00 am and 6.00 pm (bund construction)  
6.00 am (dredging activities)
- ▶ Bund construction workforce : 23 workers start at 6.00 am, 16 workers start at 6.00 pm  
(2 shifts / day) 23 workers finish at 6.00 pm, 16 workers finish at 6.00 am
- ▶ Dredging workforce: 20 workers start at 6.00 am, 20 workers finish at 6.00 am  
(1 shift every 1-2 weeks)

The bund construction workforce is broken into two separate shifts with changes between shifts occurring daily at 6 am and 6 pm and commute directly to the Reclamation Area. The dredging workforce only change shift once every 1 – 2 weeks however it has been assumed that both activities will have the same shift time change over as a worst case scenario. The above information has been used as a basis for deriving workforce traffic volumes and impact evaluation.

The calculated peak traffic generation and attraction for the bund construction and dredging workforce is as follows:



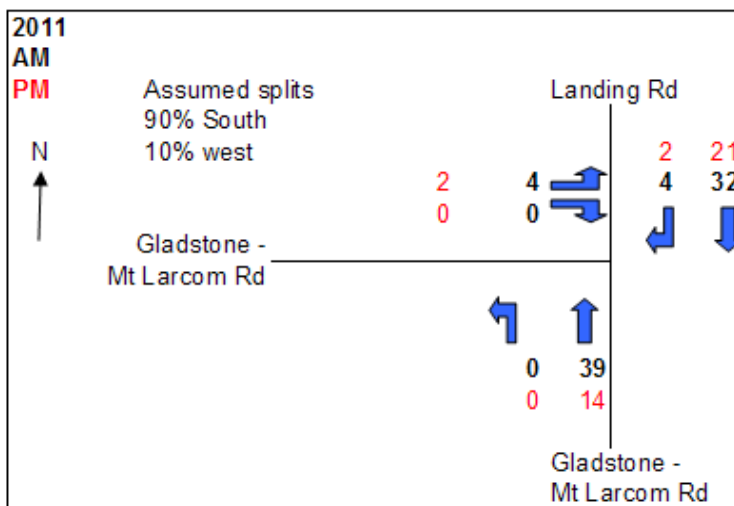
Peak Period	Attraction (veh in)	Generation (veh out)
AM Peak	43	36
PM Peak	16	23

Note: A vehicle occupancy of 1 trip per worker has been assumed for the traffic generation as a conservative assumption

### 2.3.1 Distribution of Workforce Traffic

It is assumed that 90% of workers will come from the Gladstone area where most of the population is located, with 10% coming from the Mount Larcom area. Figure 4 below shows the distribution of generated traffic.

Figure 4 Estimated Workforce Traffic Generation – vehicles / hour

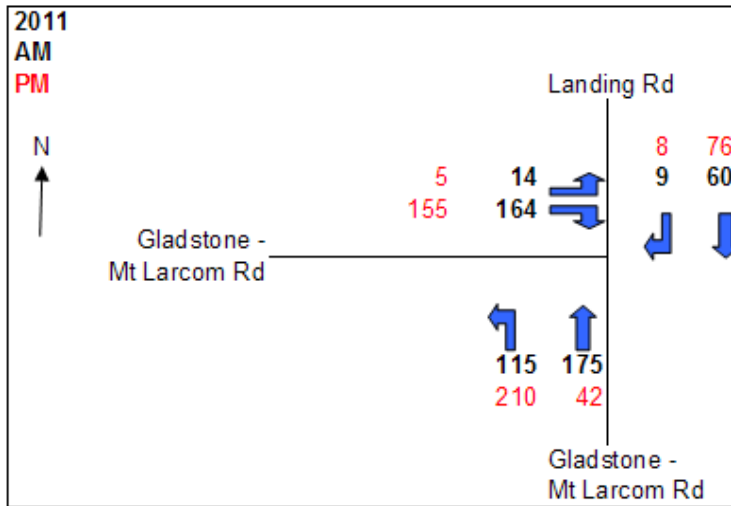


### 2.4 Future (2011) Traffic Volumes (with workforce traffic)

Figure 5 below shows the estimated traffic for 2011 with the workforce traffic generation from the Reclamation Area.



**Figure 5 Landing Rd / Gladstone – Mount Larcom Road Intersection Volumes – 2011 (with workforce traffic)**



### 3. Intersection Analysis

#### 3.1.1 Introduction

The study intersection was analysed under three scenarios using SIDRA Intersection 4.0:

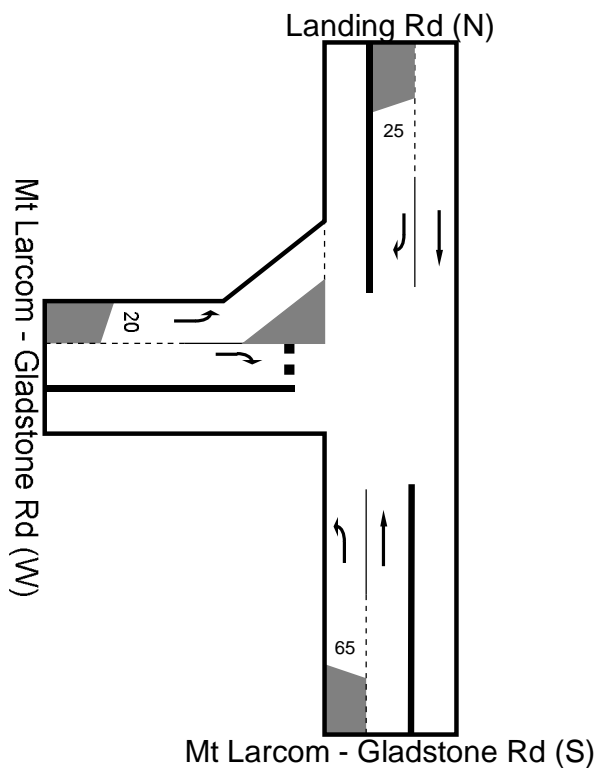
- ▶ Existing traffic (2009)
- ▶ Future traffic (2011) without construction traffic
- ▶ Future traffic (2011) with construction traffic

The results of the intersection analysis are described below:

#### 3.1.2 Gladstone - Mount Larcom Road / Landing Road

The intersection between Mount Larcom – Gladstone Road and Landing Road is a three- leg priority intersection with the major movements on the north and south approaches. The major traffic movement are on the Mount Larcom – Gladstone Road legs, i.e. on the west and south approaches of the intersection. The layout used for the analysis for all existing and future scenarios is shown in Figure 6.

**Figure 6 Mt Larcom – Gladstone Road / Landing Road Intersection- Existing Layout**



The percentage of heavy vehicles has been calculated for 2009 count and applied to all future traffic. A summary of this is shown in Table 2.



**Table 2 Existing Heavy Vehicle Percentages - 2009**

Movement		AM Heavy Vehicle %	PM Heavy Vehicle %
Landing Road (North)	Through	40%	1%
	Right	25%	0%
Mount Larcom – Gladstone Road (South)	Through	23%	26%
	Left	25%	12%
Mount Larcom – Gladstone Road (West)	Left	30%	0%
	Right	17%	14%

**3.1.3 Existing (2009) Peak hour Intersection Performance**

The existing intersection performance is presented in Table 3. The results indicate the following:

- ▶ The intersection is expected to perform at LOS A in both peaks and is satisfactory.
- ▶ The calculated degree of saturation is 0.180 in the AM peak and 0.115 in the PM peak which is satisfactory.
- ▶ Calculated 95% percentile queue lengths are minimal and do not encroach on neighbouring intersections or accesses.

**Table 3 Mount Larcom – Gladstone Road / Landing Road Intersection Analysis Results – 2009**

AM Peak					
Movement	Demand Flow (veh/hr)	DoS (V/C)	Ave Delay (secs)	LOS	95% Back of Queue (m)
<b>Gladstone - Mt Larcom Rd (South)</b>					
Left	102	0.064	6.3	LOS A	0.0
Through	121	0.072	0.0	LOS A	0.0
<b>Approach Total</b>	<b>223</b>	<b>0.072</b>	<b>2.9</b>	<b>LOS A</b>	<b>0.0</b>
<b>Landing Rd (North)</b>					
Through	25	0.016	0.0	LOS A	0.0
Right	4	0.005	7.3	LOS A	0.2
<b>Approach Total</b>	<b>29</b>	<b>0.016</b>	<b>1.0</b>	<b>LOS A</b>	<b>0.2</b>
<b>Gladstone - Mt Larcom (West)</b>					
Left	9	0.015	6.8	LOS A	0.5
Right	146	0.180	8.6	LOS A	7.2
<b>Approach Total</b>	<b>155</b>	<b>0.180</b>	<b>8.5</b>	<b>LOS A</b>	<b>7.2</b>
<b>All Vehicles</b>	<b>407</b>	<b>0.180</b>	<b>4.9</b>	<b>LOS A</b>	<b>7.2</b>



PM Peak					
Movement	Demand Flow (veh/hr)	DoS (V/C)	Ave Delay (secs)	LOS	95% Back of Queue (m)
<b>Gladstone - Mt Larcom Rd (South)</b>					
Left	187	0.119	9.1	LOS A	0.0
Through	25	0.014	0.0	LOS A	0.0
<b>Approach Total</b>	<b>212</b>	<b>0.119</b>	<b>8.1</b>	<b>LOS A</b>	<b>0.0</b>
<b>Landing Rd (North)</b>					
Through	49	0.025	0.0	LOS A	0.0
Right	5	0.004	9.0	LOS A	0.1
<b>Approach Total</b>	<b>54</b>	<b>0.025</b>	<b>0.8</b>	<b>LOS A</b>	<b>0.1</b>
<b>Gladstone - Mt Larcom (West)</b>					
Left	3	0.003	8.2	LOS A	0.1
Right	138	0.155	10.1	LOS A	6.0
<b>Approach Total</b>	<b>141</b>	<b>0.115</b>	<b>10.0</b>	<b>LOS A</b>	<b>6.0</b>
<b>All Vehicles</b>	<b>407</b>	<b>0.115</b>	<b>7.8</b>	<b>LOS A</b>	<b>6.0</b>

### 3.1.4 Future (2011) Peak hour Intersection Performance (without workforce traffic)

The intersection analysis results without the workforce traffic in 2011 are presented in Table 4 and indicate the following:

- ▶ The intersection is expected to perform at LOS A in both peaks and is satisfactory.
- ▶ The calculated degree of saturation is 0.210 in the AM peak and 0.179 in the PM peak which is satisfactory.
- ▶ Calculated 95% percentile queue lengths are minimal and do not encroach on neighbouring intersections or accesses.

The results of the analysis for the future scenario without the workforce traffic suggest that the intersection will continue to operate satisfactorily in 2011.





**Table 4 Mt Larcom – Gladstone Road / Landing Road Intersection Analysis Results – 2011 (without workforce traffic)**

<b>AM Peak</b>					
<b>Movement</b>	<b>Demand Flow (veh/hr)</b>	<b>DoS (V/C)</b>	<b>Ave Delay (secs)</b>	<b>LOS</b>	<b>95% Back of Queue (m)</b>
<b>Gladstone - Mt Larcom Rd (South)</b>					
Left	115	0.072	9	LOS A	0.0
Through	136	0.081	0.0	LOS A	0.0
<b>Approach Total</b>	<b>251</b>	<b>0.081</b>	<b>4.1</b>	<b>LOS A</b>	<b>0.0</b>
<b>Landing Rd (North)</b>					
Through	28	0.018	0.0	LOS A	0.0
Right	4	0.005	10.5	LOS B	0.2
<b>Approach Total</b>	<b>32</b>	<b>0.018</b>	<b>1.3</b>	<b>LOS B</b>	<b>0.2</b>
<b>Gladstone - Mt Larcom (West)</b>					
Left	10	0.016	10.1	LOS B	0.2
Right	164	0.210	11	LOS B	8.5
<b>Approach Total</b>	<b>174</b>	<b>0.210</b>	<b>10.9</b>	<b>LOS B</b>	<b>8.5</b>
<b>All Vehicles</b>	<b>457</b>	<b>0.210</b>	<b>6.5</b>	<b>LOS A</b>	<b>8.5</b>

<b>PM Peak</b>					
<b>Movement</b>	<b>Demand Flow (veh/hr)</b>	<b>DoS (V/C)</b>	<b>Ave Delay (secs)</b>	<b>LOS</b>	<b>95% Back of Queue (m)</b>
<b>Gladstone - Mt Larcom Rd (South)</b>					
Left	210	0.134	9.1	LOS A	0.0
Through	28	0.015	0.0	LOS A	0.0
<b>Approach Total</b>	<b>238</b>	<b>0.134</b>	<b>8.1</b>	<b>LOS A</b>	<b>0.0</b>
<b>Landing Rd (North)</b>					
Through	55	0.028	0.0	LOS A	0.0
Right	6	0.005	9.1	LOS A	0.2
<b>Approach Total</b>	<b>61</b>	<b>0.028</b>	<b>0.9</b>	<b>LOS A</b>	<b>0.2</b>
<b>Gladstone - Mt Larcom (West)</b>					
Left	3	0.004	8.2	LOS A	0.1
Right	155	0.179	10.3	LOS B	7.0
<b>Approach Total</b>	<b>158</b>	<b>0.179</b>	<b>10.2</b>	<b>LOS B</b>	<b>7.0</b>
<b>All Vehicles</b>	<b>458</b>	<b>0.179</b>	<b>7.9</b>	<b>LOS A</b>	<b>7.0</b>

**3.1.5 Future (2011) Peak hour Intersection Performance (with workforce traffic)**

The intersection analysis results with the workforce traffic in 2011 are presented in Table 5 and indicate the following:

- ▶ The intersection is expected to perform at LOS A in both peaks and is satisfactory.



- ▶ The calculated degree of saturation is 0.236 in the AM peak and 0.187 in the PM peak which is satisfactory.
- ▶ Calculated 95% percentile queue lengths are minimal and do not encroach on neighbouring intersections or accesses.

The results of the analysis for the future scenario with construction traffic scenario suggest that the intersection will continue to operate satisfactorily in 2011.

**Table 5 Mt Larcom – Gladstone Road / Landing Road Intersection Analysis Results – 2011 (with workforce traffic)**

AM Peak					
Movement	Demand Flow (veh/hr)	DoS (V/C)	Ave Delay (secs)	LOS	95% Back of Queue (m)
<b>Gladstone - Mt Larcom Rd (South)</b>					
Left	115	0.072	9	LOS A	0.0
Through	175	0.104	0.0	LOS A	0.0
<b>Approach Total</b>	<b>290</b>	<b>0.104</b>	<b>3.6</b>	<b>LOS A</b>	<b>0.0</b>
<b>Landing Rd (North)</b>					
Through	60	0.039	0.0	LOS A	0.0
Right	8	0.010	10.8	LOS B	0.4
<b>Approach Total</b>	<b>68</b>	<b>0.039</b>	<b>1.3</b>	<b>LOS B</b>	<b>0.4</b>
<b>Gladstone - Mt Larcom (West)</b>					
Left	14	0.024	10.5	LOS B	0.9
Right	164	0.236	11.9	LOS B	9.5
<b>Approach Total</b>	<b>178</b>	<b>0.230</b>	<b>11.8</b>	<b>LOS B</b>	<b>9.5</b>
<b>All Vehicles</b>	<b>536</b>	<b>0.236</b>	<b>6.0</b>	<b>LOS A</b>	<b>9.5</b>

PM Peak					
Movement	Demand Flow (veh/hr)	DoS (V/C)	Ave Delay (secs)	LOS	95% Back of Queue (m)
<b>Gladstone - Mt Larcom Rd (South)</b>					
Left	210	0.134	9.1	LOS A	0.0
Through	42	0.023	0.0	LOS A	0.0
<b>Approach Total</b>	<b>252</b>	<b>0.134</b>	<b>7.6</b>	<b>LOS A</b>	<b>0.0</b>
<b>Landing Rd (North)</b>					
Through	76	0.039	0.0	LOS A	0.0
Right	8	0.007	9.2	LOS A	0.2
<b>Approach Total</b>	<b>84</b>	<b>0.039</b>	<b>0.9</b>	<b>LOS A</b>	<b>0.2</b>
<b>Gladstone - Mt Larcom (West)</b>					
Left	5	0.005	8.3	LOS A	0.2
Right	155	0.187	10.6	LOS B	7.3
<b>Approach Total</b>	<b>160</b>	<b>0.187</b>	<b>10.5</b>	<b>LOS B</b>	<b>7.3</b>
<b>All Vehicles</b>	<b>496</b>	<b>0.187</b>	<b>7.4</b>	<b>LOS A</b>	<b>7.3</b>



## 4. Conclusion and Recommendations

### 4.1 Conclusion

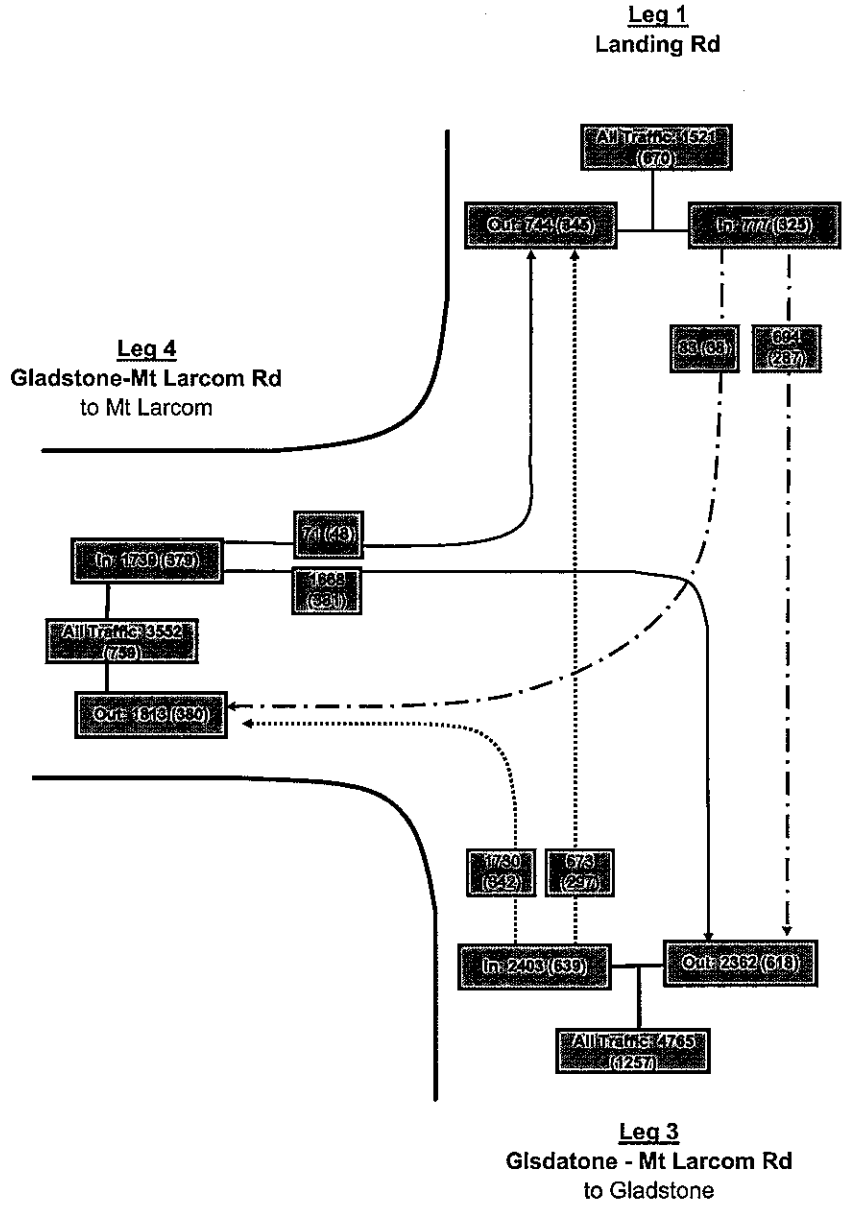
- ▶ The study has examined the impact of workforce traffic that will be generated by the Reclamation Area bund construction and dredging activities on the Mount Larcom – Gladstone Road / Landing Road intersection.
- ▶ It is estimated that in 2011 (when both the bund construction and dredging activities occur concurrently) 43 trips/hour will be attracted and 36 trips/hour generated in the AM peak. While in the PM peak, 16 trips/hour will be attracted and 23 trips/hour generated by the proposed activities.
- ▶ The analysis indicated that the traffic generated by the bund construction and dredging workforce activities will not significantly impact the performance of the existing Mount Larcom – Gladstone Road / Landing Road intersection. With the workforce traffic, the study intersection is expected to perform satisfactorily with DOS = 0.225 and LOS A (all movements).
- ▶ In 2011, it is estimated that the volume of peak hour traffic (two-way) on the Mount Larcom – Gladstone Road (south of Landing Road) will be 442 vehicles/hour in the AM peak and 447 vehicles/hour without workforce traffic. This predicted volume of traffic is well within capacity limits.
- ▶ The proposed bund construction and workforce traffic is expected to generate 72 vehicles/hour in the AM peak and 35 vehicles/hour in the PM peak which represents a relatively small proportion of traffic on the Mount Larcom – Gladstone Road i.e. 16% in the AM and 7.8% in the PM. The impact of generated traffic on the capacity of the Mount Larcom – Gladstone Road is expected to be minimal.
- ▶ Further assessment of the quarry activities vehicle impact on the intersection and surrounding road network will be required as part of a separate approvals process.

### 4.2 Recommendations

The existing Mount Larcom – Gladstone Road/ Landing Road intersection do not require any upgrading as a result of workforce traffic generated from the proposed Western Basin Dredging and Disposal Project activities.



Appendix A  
Traffic Count Data Provided by DTMR



## Count Tally Sheet With Totals and Peak Flows.



LOCATION: Intersection of Gladstone - Mt Larcom Rd & Landing Rd  
ROAD No: 181 (Int. 1997 @ Tdist 12.292km)  
DATE: Thu, 09/07/09  
TIME: 06:00 - 18:00

Time	Leg 1						Leg 3						Leg 4					
	Thru		Right		U-turn	Leg Total	Left		Thru		U-turn	Leg Total	Left		Right		U-turn	Leg Total
	Light	Heavy	Light	Heavy	All		Light	Heavy	Light	Heavy	All		Light	Heavy	Light	Heavy	All	
6:00 - 6:15	6	4	1	0	0	11	25	13	31	6	0	75	0	1	35	8	0	44
6:15 - 6:30	5	1	1	0	0	7	19	3	19	7	0	48	3	0	19	6	0	28
6:30 - 6:45	1	2	1	0	0	4	16	1	16	12	0	45	2	1	43	3	0	49
6:45 - 7:00	3	3	0	1	0	7	18	7	25	5	0	55	1	1	24	8	0	34
7:00 - 7:15	6	4	1	0	0	11	27	18	14	12	0	71	0	0	21	10	0	31
7:15 - 7:30	7	9	1	0	0	17	18	11	12	5	0	46	0	2	23	3	0	28
7:30 - 7:45	0	5	0	1	0	6	28	4	10	9	0	51	0	1	27	3	0	31
7:45 - 8:00	2	6	1	3	0	12	26	4	8	9	0	47	0	1	30	6	0	37
8:00 - 8:15	2	8	0	0	0	10	37	11	2	6	0	56	1	2	29	4	0	36
8:15 - 8:30	9	4	0	1	0	14	21	7	7	17	0	52	0	1	36	4	0	41
8:30 - 8:45	4	14	1	0	0	19	26	10	8	5	0	49	1	1	41	14	0	57
8:45 - 9:00	8	7	0	7	0	22	26	10	12	12	0	60	3	2	44	14	0	63
9:00 - 9:15	11	8	0	0	0	19	30	5	6	8	0	49	0	5	37	10	0	52
9:15 - 9:30	6	2	0	2	0	10	20	7	4	5	0	36	1	2	27	5	0	35
9:30 - 9:45	5	5	0	0	0	10	26	11	4	4	0	45	0	0	45	5	0	50
9:45 - 10:00	3	5	0	1	0	9	24	4	6	6	0	40	0	1	28	7	0	36
10:00 - 10:15	9	8	0	0	0	17	21	5	3	5	0	34	0	0	33	10	0	43
10:15 - 10:30	4	5	0	0	0	9	26	5	5	12	0	48	1	1	31	3	0	36
10:30 - 10:45	0	14	1	0	0	15	26	5	4	2	0	37	1	2	27	6	0	36
10:45 - 11:00	7	5	1	0	0	13	13	10	11	8	0	42	0	1	23	8	0	32
11:00 - 11:15	3	10	0	2	0	15	16	4	6	5	0	31	0	0	27	7	0	34
11:15 - 11:30	6	6	2	0	0	14	19	10	9	8	0	46	2	1	21	7	0	31
11:30 - 11:45	11	7	1	0	0	19	25	4	11	11	0	51	0	0	17	6	0	23
11:45 - 12:00	9	9	1	1	0	20	27	10	10	6	0	53	1	1	18	6	0	26

## Count Tally Sheet With Totals and Peak Flows.



LOCATION: Intersection of Gladstone - Mt Larcom Rd & Landing Rd  
ROAD No: 181 (Int. 1997 @ Tdist 12.292km)  
DATE: Thu, 09/07/09  
TIME: 06:00 - 18:00

Time	Leg 1						Leg 3						Leg 4					
	Thru		Right		U-turn	Leg Total	Left		Thru		U-turn	Leg Total	Left		Right		U-turn	Leg Total
	Light	Heavy	Light	Heavy	All		Light	Heavy	Light	Heavy	All		Light	Heavy	Light	Heavy	All	
12:00 - 12:15	10	5	0	1	0	16	27	4	6	9	0	46	0	1	30	9	0	40
12:15 - 12:30	5	9	2	0	0	16	37	8	7	6	0	58	0	4	20	2	0	26
12:30 - 12:45	4	7	3	1	0	15	25	6	4	6	0	41	0	1	31	6	0	38
12:45 - 13:00	7	10	1	4	0	22	25	5	8	6	0	44	0	4	29	9	0	42
13:00 - 13:15	14	7	0	0	0	21	30	2	7	5	0	44	0	0	22	6	0	28
13:15 - 13:30	6	3	1	1	0	11	21	7	3	2	0	33	0	0	18	5	0	23
13:30 - 13:45	10	2	0	1	0	13	38	16	7	1	0	62	0	2	20	9	0	31
13:45 - 14:00	8	7	2	0	0	17	40	5	4	4	0	53	0	1	22	9	0	32
14:00 - 14:15	14	10	0	1	0	25	34	5	5	4	0	48	0	2	17	8	0	27
14:15 - 14:30	2	3	0	2	0	7	28	9	8	14	0	59	1	0	32	12	0	45
14:30 - 14:45	8	13	1	1	0	23	26	7	4	6	0	43	0	0	24	8	0	32
14:45 - 15:00	4	3	0	0	0	7	28	9	7	5	0	49	0	1	25	7	0	33
15:00 - 15:15	14	9	1	1	0	25	29	8	8	10	0	55	0	0	26	5	0	31
15:15 - 15:30	8	5	1	2	0	16	31	7	6	5	0	49	0	1	20	15	0	36
15:30 - 15:45	12	9	2	1	0	24	45	10	4	10	0	69	1	1	27	5	0	34
15:45 - 16:00	12	8	1	0	0	21	28	6	9	1	0	44	0	1	28	8	0	37
16:00 - 16:15	6	3	0	2	0	11	51	8	2	11	0	72	0	1	22	3	0	26
16:15 - 16:30	18	9	1	0	0	28	38	11	6	0	0	55	0	0	32	11	0	43
16:30 - 16:45	47	5	6	1	0	59	36	1	4	0	0	41	1	1	27	6	0	35
16:45 - 17:00	24	7	5	0	0	36	46	7	3	3	0	59	0	0	40	6	0	46
17:00 - 17:15	18	2	0	0	0	20	63	11	7	1	0	82	1	0	37	2	0	40
17:15 - 17:30	7	0	1	0	0	8	50	2	4	0	0	56	2	0	39	7	0	48
17:30 - 17:45	14	0	2	0	0	16	29	2	3	2	0	36	0	0	21	5	0	26
17:45 - 18:00	8	0	2	0	0	10	23	7	7	1	0	38	0	0	22	5	0	27
Total:	407	287	45	38	0	777	1388	342	376	297	0	2403	23	48	1337	331	0	1739
Peak Count:	107	35	12	9	0	143	195	40	91	42	0	240	6	10	158	43	0	213
Peak Hour:	16:15 to 17:15	10:30 to 11:30	16:00 to 17:00	08:30 to 09:30	06:00 to 07:00	16:15 to 17:15	16:30 to 17:30	06:45 to 07:45	06:00 to 07:00	08:15 to 09:15	06:00 to 07:00	15:30 to 16:30	06:30 to 07:00	08:30 to 09:30	08:15 to 09:15	08:30 to 09:30	06:00 to 07:00	08:15 to 09:15

Traffic Analysis and Reporting System  
Weekly Volume Report

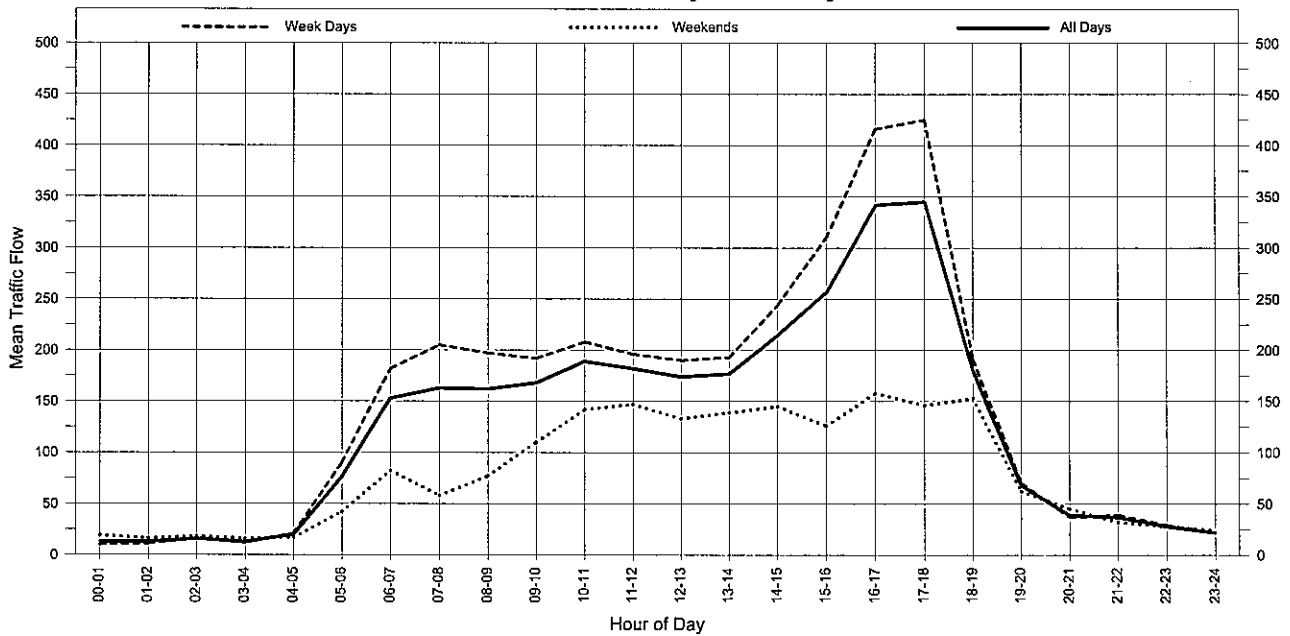
District 6 - Central District  
 Road Section 181 - Gladstone - Mt Larcom Road  
 Site 60074 - G'stone-Mt Larcom Rd1km N Calliope River  
 Thru Dist 6.27  
 Type C - Coverage  
 Stream TA - Thru traffic -against gazetta  
 Traffic Class 00 - All Vehicles  
 Date Range Monday 30-Jun-2008 - Sunday 13-Jul-2008

GP

Data Profile

	Mondays	Tuesdays	Wednesdays	Thursdays	Fridays	Saturdays	Sundays
Days in Date Range	2	2	2	2	2	2	2
Days Included	2	2	2	2	2	2	2
Calendar Events	0	0	0	0	0	0	0

Mean Traffic Flow by Hour of Day



Notes.

- 12-hour time periods extend from 07:00 to 19:00. 16-hour time periods extend from 06:00 to 22:00. 18-hour time periods extend from 06:00 to 24:00. 24-hour time periods extend from 00:00 to 24:00.
- Days for which traffic counters did not operate for the entire day are excluded from the calculations. This is the only cause of differences between "Days in Date Range" and "Days Included". Days classified as Calendar Events are included in the calculations.
- Calendar Events include public holidays, local show holidays etc. Averages derived for such Calendar Event days will generally be different from the usual averages.



Traffic Analysis and Reporting System  
Weekly Volume Report

Hour	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Average Week Day		Average Weekend Day		Average Day	
00-01	13	0.4%	10	0.3%	13	0.4%	10	0.3%	5	0.1%	21	1.0%	17	1.0%	10	0.3%	19	1.0%	13	0.4%
01-02	9	0.3%	13	0.4%	8	0.2%	12	0.3%	14	0.4%	14	0.7%	18	1.0%	11	0.3%	16	0.8%	13	0.4%
02-03	12	0.4%	18	0.5%	13	0.4%	18	0.5%	18	0.5%	20	1.0%	16	0.9%	16	0.5%	18	0.9%	16	0.5%
03-04	8	0.2%	15	0.4%	16	0.5%	8	0.2%	12	0.3%	18	0.9%	13	0.7%	12	0.3%	16	0.8%	13	0.4%
04-05	23	0.7%	21	0.6%	20	0.6%	23	0.6%	18	0.5%	21	1.0%	13	0.7%	21	0.6%	17	0.9%	20	0.7%
05-06	111	3.3%	88	2.6%	88	2.5%	82	2.2%	83	2.4%	52	2.5%	31	1.8%	90	2.6%	42	2.2%	76	2.5%
06-07	190	5.6%	182	5.4%	172	4.9%	191	5.1%	174	5.0%	87	4.2%	77	4.4%	182	5.2%	82	4.2%	153	5.0%
07-08	256	7.6%	196	5.8%	199	5.7%	204	5.4%	172	4.9%	72	3.4%	43	2.4%	205	5.8%	58	3.0%	163	5.3%
08-09	205	6.1%	195	5.8%	209	5.9%	206	5.5%	169	4.8%	98	4.7%	55	3.1%	197	5.6%	77	4.0%	162	5.3%
09-10	188	5.6%	182	5.4%	187	5.3%	203	5.4%	198	5.7%	132	6.3%	87	4.9%	192	5.5%	110	5.7%	168	5.5%
10-11	197	5.8%	230	6.8%	192	5.5%	220	5.8%	199	5.7%	168	8.0%	115	6.5%	208	5.9%	142	7.3%	189	6.2%
11-12	175	5.2%	188	5.6%	193	5.5%	201	5.3%	224	6.4%	138	6.6%	156	8.8%	196	5.6%	147	7.6%	182	6.0%
12-13	182	5.4%	172	5.1%	177	5.0%	193	5.1%	225	6.4%	134	6.4%	132	7.5%	190	5.4%	133	6.9%	174	5.7%
13-14	196	5.8%	187	5.6%	159	4.5%	203	5.4%	219	6.3%	150	7.2%	128	7.3%	193	5.5%	139	7.2%	177	5.8%
14-15	206	6.1%	218	6.5%	228	6.5%	272	7.2%	295	8.4%	160	7.6%	129	7.3%	244	7.0%	145	7.5%	215	7.0%
15-16	286	8.5%	288	8.6%	312	8.9%	300	7.9%	364	10.4%	131	6.3%	121	6.9%	310	8.8%	126	6.5%	257	8.4%
16-17	401	11.9%	416	12.4%	463	13.2%	471	12.5%	330	9.4%	168	8.0%	147	8.3%	416	11.9%	158	8.2%	342	11.2%
17-18	373	11.0%	391	11.6%	509	14.5%	499	13.2%	353	10.1%	151	7.2%	140	7.9%	425	12.1%	146	7.5%	345	11.3%
18-19	174	5.2%	190	5.7%	196	5.6%	193	5.1%	200	5.7%	155	7.4%	151	8.6%	191	5.4%	153	7.9%	180	5.9%
19-20	70	2.1%	55	1.6%	68	1.9%	80	2.1%	77	2.2%	63	3.0%	60	3.4%	70	2.0%	62	3.2%	68	2.2%
20-21	34	1.0%	37	1.1%	30	0.9%	40	1.1%	46	1.3%	44	2.1%	45	2.6%	37	1.1%	45	2.3%	39	1.3%
21-22	30	0.9%	28	0.8%	25	0.7%	67	1.8%	47	1.3%	35	1.7%	29	1.6%	39	1.1%	32	1.7%	37	1.2%
22-23	20	0.6%	24	0.7%	19	0.5%	53	1.4%	28	0.8%	30	1.4%	25	1.4%	29	0.8%	28	1.4%	28	0.9%
23-24	18	0.5%	16	0.5%	21	0.6%	25	0.7%	28	0.8%	32	1.5%	15	0.9%	22	0.6%	24	1.2%	22	0.7%

Peaks	Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count	
AM	08:00	256	11:00	230	09:00	209	11:00	220	12:00	224	11:00	168	12:00	156	11:00	208	12:00	147	11:00	188
PM	17:00	401	17:00	416	18:00	509	18:00	499	16:00	364	17:00	168	19:00	151	18:00	425	17:00	157	18:00	345
12-Hour	2,839	84.1%	2,853	84.9%	3,024	86.0%	3,165	83.9%	2,948	84.3%	1,657	79.1%	1,404	79.6%	2,967	84.6%	1,534	79.3%	2,554	83.7%
16-Hour	3,163	93.7%	3,155	93.9%	3,319	94.4%	3,543	93.9%	3,292	94.1%	1,886	90.1%	1,615	91.6%	3,295	94.0%	1,755	90.7%	2,851	93.4%
18-Hour	3,201	94.8%	3,195	95.1%	3,359	95.5%	3,621	95.9%	3,348	95.7%	1,948	93.0%	1,655	93.9%	3,346	95.4%	1,807	93.4%	2,901	95.1%
24-Hour	3,377	100.0%	3,360	100.0%	3,517	100.0%	3,774	100.0%	3,498	100.0%	2,094	100.0%	1,763	100.0%	3,506	100.0%	1,935	100.0%	3,052	100.0%
Avg Week Day	96.3%		95.8%		100.3%		107.6%		99.8%				100.0%		55.2%		87.1%			
Avg Weekend Day											108.2%		91.1%		181.2%		100.0%		157.7%	
Avg Day	110.6%		110.1%		115.2%		123.7%		114.6%		68.6%		57.8%		114.9%		63.4%		100.0%	

## Traffic Analysis and Reporting System Weekly Volume Report

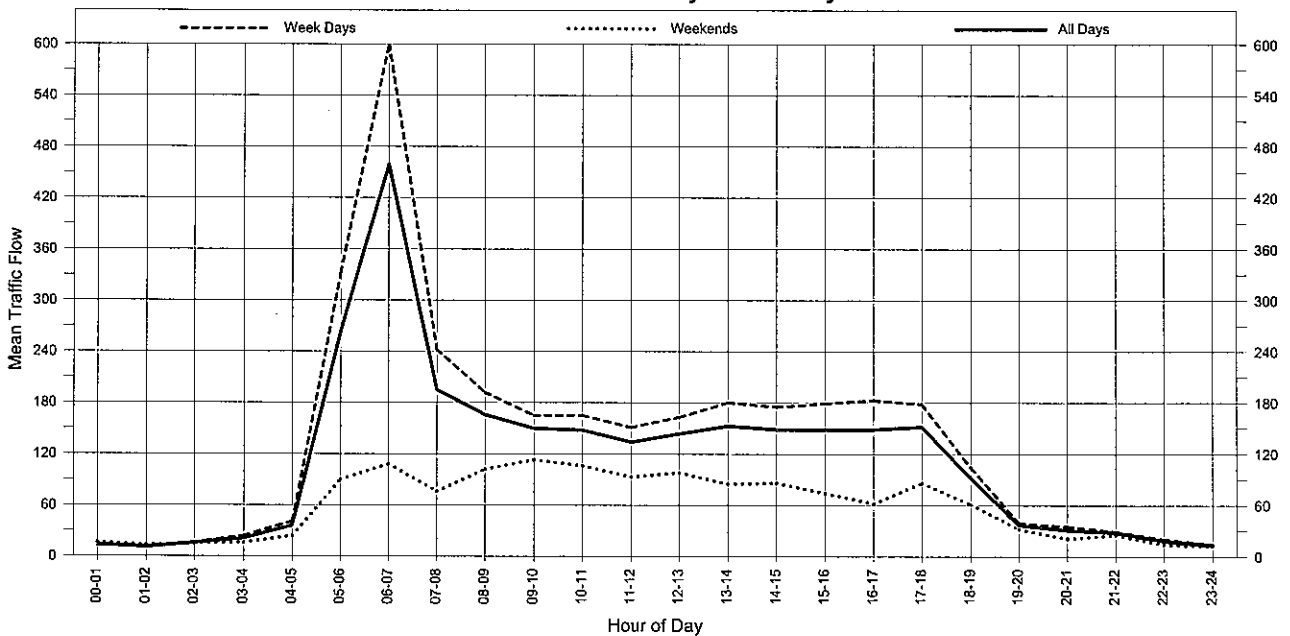
District : 6 - Central District  
 Road Section : 181 - Gladstone - Mt Larcom Road  
 Site : 60074 - G'stone-Mt Larcom Rd 1km N Calliope River  
 Thru Dist : 6.27  
 Type : C - Coverage  
 Stream : TG - Thru traffic -in gazettal dirn  
 Traffic Class : 00 - All Vehicles  
 Date Range : Monday 30-Jun-2008 - Sunday 13-Jul-2008

GP

### Data Profile

	Mondays	Tuesdays	Wednesdays	Thursdays	Fridays	Saturdays	Sundays
Days in Date Range	2	2	2	2	2	2	2
Days Included	2	2	2	2	2	2	2
Calendar Events	0	0	0	0	0	0	0

### Mean Traffic Flow by Hour of Day



**Notes.**

- 12-hour time periods extend from 07:00 to 19:00. 16-hour time periods extend from 06:00 to 22:00. 18-hour time periods extend from 06:00 to 24:00. 24-hour time periods extend from 00:00 to 24:00.
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- Calendar Events include public holidays, local show holidays etc. Averages derived for such Calendar Event days will generally be different from the usual averages.

Traffic Analysis and Reporting System  
Weekly Volume Report



Hour	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Average Week Day		Average Weekend Day		Average Day	
00-01	11	0.3%	13	0.4%	14	0.4%	13	0.4%	13	0.5%	19	1.2%	13	1.0%	13	0.4%	16	1.1%	14	0.5%
01-02	13	0.4%	10	0.3%	8	0.2%	14	0.4%	9	0.3%	15	0.9%	11	0.9%	11	0.3%	13	0.9%	11	0.4%
02-03	17	0.5%	12	0.4%	11	0.3%	25	0.8%	15	0.5%	17	1.1%	12	1.0%	16	0.5%	15	1.1%	16	0.6%
03-04	20	0.6%	23	0.7%	23	0.7%	28	0.9%	25	0.9%	18	1.1%	13	1.0%	24	0.7%	16	1.1%	21	0.8%
04-05	42	1.2%	44	1.3%	44	1.2%	47	1.4%	30	1.1%	29	1.8%	19	1.5%	41	1.3%	24	1.7%	36	1.3%
05-06	338	10.1%	367	11.1%	355	10.1%	358	11.0%	243	8.7%	115	7.2%	65	5.2%	332	10.2%	90	6.3%	263	9.6%
06-07	613	18.2%	635	19.2%	644	18.3%	635	19.5%	471	16.9%	137	8.6%	78	6.2%	600	18.5%	108	7.6%	459	16.8%
07-08	242	7.2%	250	7.5%	258	7.3%	271	8.3%	190	6.8%	84	5.3%	68	5.4%	242	7.4%	76	5.3%	195	7.1%
08-09	200	5.9%	184	5.6%	203	5.8%	207	6.4%	165	5.9%	117	7.3%	86	6.9%	192	5.9%	102	7.1%	166	6.1%
09-10	165	4.9%	162	4.9%	196	5.6%	156	4.8%	145	5.2%	130	8.2%	96	7.6%	165	5.1%	113	7.9%	150	5.5%
10-11	175	5.2%	174	5.3%	175	5.0%	142	4.4%	158	5.7%	114	7.2%	97	7.7%	165	5.1%	106	7.4%	148	5.4%
11-12	156	4.6%	154	4.6%	168	4.8%	136	4.2%	139	5.0%	103	6.5%	83	6.6%	151	4.6%	93	6.5%	134	4.9%
12-13	199	5.9%	167	5.0%	162	4.6%	141	4.3%	145	5.2%	107	6.7%	89	7.1%	163	5.0%	98	6.9%	144	5.3%
13-14	199	5.9%	184	5.6%	187	5.3%	173	5.3%	157	5.6%	98	6.2%	72	5.7%	180	5.5%	85	6.0%	153	5.6%
14-15	180	5.4%	162	4.9%	195	5.5%	176	5.4%	161	5.8%	98	6.2%	74	5.9%	175	5.4%	86	6.0%	149	5.5%
15-16	182	5.4%	184	5.6%	219	6.2%	153	4.7%	158	5.7%	74	4.6%	73	5.8%	179	5.5%	74	5.2%	149	5.5%
16-17	205	6.1%	183	5.5%	210	6.0%	152	4.7%	166	5.9%	64	4.0%	60	4.8%	183	5.6%	62	4.3%	149	5.5%
17-18	184	5.5%	183	5.5%	216	6.1%	154	4.7%	152	5.4%	91	5.7%	81	6.5%	178	5.5%	86	6.0%	152	5.6%
18-19	99	2.9%	102	3.1%	122	3.5%	96	2.9%	103	3.7%	60	3.8%	61	4.9%	104	3.2%	61	4.3%	92	3.4%
19-20	40	1.2%	40	1.2%	34	1.0%	37	1.1%	43	1.5%	30	1.9%	34	2.7%	39	1.2%	32	2.2%	37	1.4%
20-21	31	0.9%	27	0.8%	26	0.7%	56	1.7%	34	1.2%	21	1.3%	20	1.6%	35	1.1%	21	1.5%	31	1.1%
21-22	17	0.5%	25	0.8%	17	0.5%	54	1.7%	31	1.1%	23	1.4%	27	2.2%	29	0.9%	25	1.8%	28	1.0%
22-23	18	0.5%	18	0.5%	22	0.6%	20	0.6%	22	0.8%	17	1.1%	11	0.9%	20	0.6%	14	1.0%	18	0.7%
23-24	17	0.5%	10	0.3%	11	0.3%	13	0.4%	17	0.6%	12	0.8%	12	1.0%	14	0.4%	12	0.8%	13	0.5%
Peaks	Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count	
AM	07:00	613	07:00	635	07:00	644	07:00	635	07:00	471	07:00	137	11:00	97	07:00	600	10:00	113	07:00	459
PM	17:00	205	14:00	184	16:00	219	15:00	176	17:00	166	13:00	107	13:00	89	17:00	183	13:00	98	14:00	152
12-Hour	2,186	65.0%	2,089	63.1%	2,311	65.7%	1,957	60.1%	1,839	65.9%	1,140	71.6%	940	74.9%	2,077	63.9%	1,042	73.0%	1,781	65.3%
16-Hour	2,887	85.8%	2,816	85.0%	3,032	86.1%	2,739	84.1%	2,418	86.6%	1,351	84.8%	1,099	87.6%	2,780	85.5%	1,228	86.0%	2,336	85.6%
18-Hour	2,922	86.9%	2,844	85.8%	3,065	87.1%	2,772	85.1%	2,457	88.0%	1,380	86.6%	1,122	89.4%	2,814	86.6%	1,254	87.8%	2,367	86.8%
24-Hour	3,363	100.0%	3,313	100.0%	3,520	100.0%	3,257	100.0%	2,792	100.0%	1,593	100.0%	1,255	100.0%	3,251	100.0%	1,428	100.0%	2,728	100.0%
Avg Week Day	103.4%		101.9%		108.3%		100.2%		85.9%						100.0%		43.9%		83.9%	
Avg Weekend Day										111.6%		87.9%		227.7%		100.0%		191.0%		
Avg Day	123.3%		121.4%		129.0%		119.4%		102.3%		58.4%		46.0%		119.2%		52.3%		100.0%	

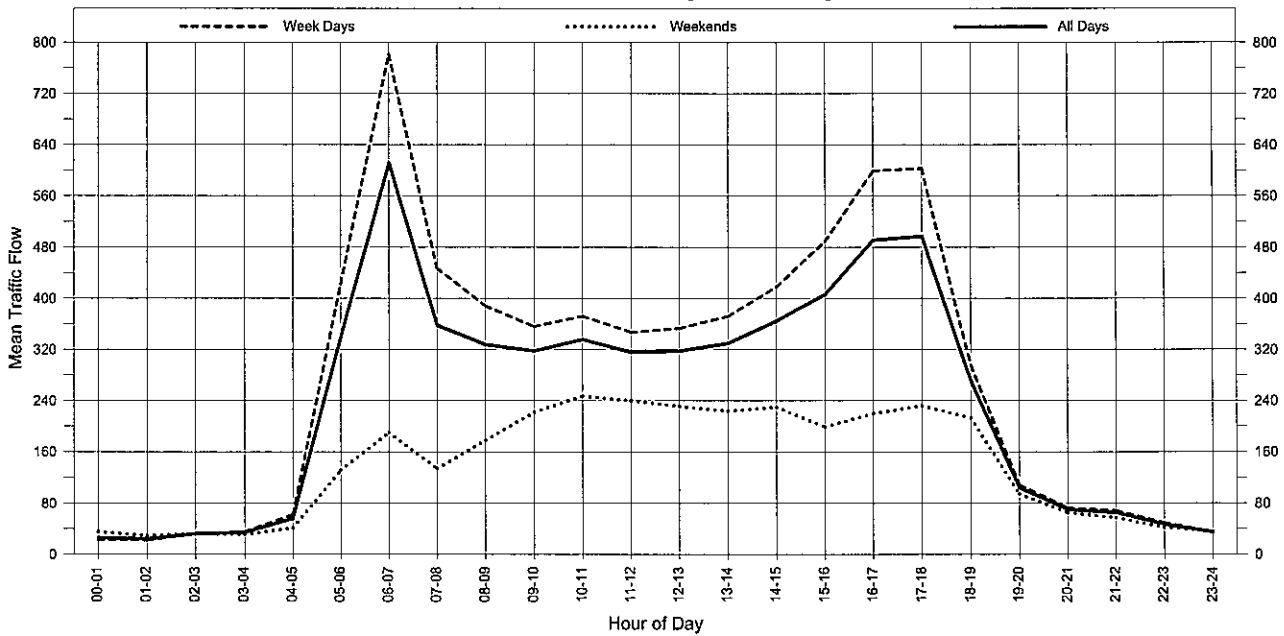
GP

District 6 - Central District  
Road Section 181 - Gladstone - Mt Larcom Road  
Site 60074 - G'stone-Mt Larcom Rd1km N Calliope River  
Thru Dist 6.27  
Type C - Coverage  
Stream TB - Bi-directional traffic flow  
Traffic Class 00 - All Vehicles  
Date Range Monday 30-Jun-2008 - Sunday 13-Jul-2008

Data Profile

	Mondays	Tuesdays	Wednesdays	Thursdays	Fridays	Saturdays	Sundays
Days in Date Range	2	2	2	2	2	2	2
Days Included	2	2	2	2	2	2	2
Calendar Events	0	0	0	0	0	0	0

Mean Traffic Flow by Hour of Day

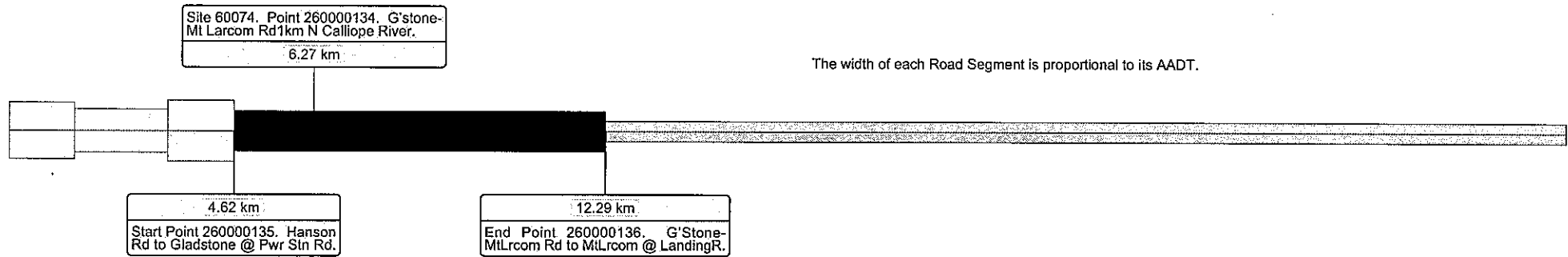


Notes.

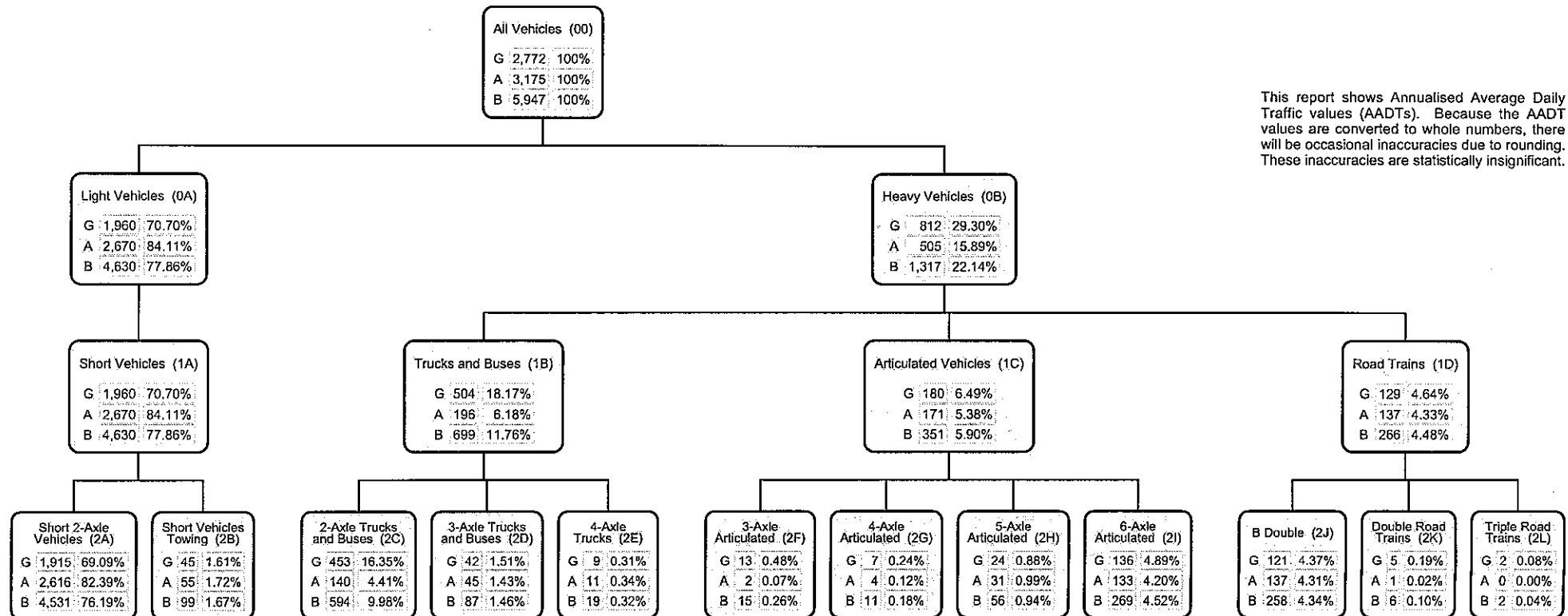
- 12-hour time periods extend from 07:00 to 19:00. 16-hour time periods extend from 06:00 to 22:00. 18-hour time periods extend from 06:00 to 24:00. 24-hour time periods extend from 00:00 to 24:00.
- Days for which traffic counters did not operate for the entire day are excluded from the calculations. This is the only cause of differences between "Days in Date Range" and "Days Included". Days classified as Calendar Events are included in the calculations.
- Calendar Events include public holidays, local show holidays etc. Averages derived for such Calendar Event days will generally be different from the usual averages.

Traffic Analysis and Reporting System  
Weekly Volume Report

Hour	Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday		Average Week Day		Average Weekend Day		Average Day	
00-01	24	0.4%	23	0.3%	27	0.4%	23	0.3%	18	0.3%	39	1.1%	30	1.0%	23	0.3%	35	1.0%	26	0.4%
01-02	22	0.3%	23	0.3%	16	0.2%	25	0.4%	22	0.4%	29	0.8%	29	1.0%	22	0.3%	29	0.9%	24	0.4%
02-03	29	0.4%	30	0.4%	24	0.3%	43	0.6%	33	0.5%	36	1.0%	28	0.9%	32	0.5%	32	1.0%	32	0.6%
03-04	28	0.4%	38	0.6%	39	0.6%	36	0.5%	36	0.6%	35	1.0%	26	0.9%	35	0.5%	31	0.9%	34	0.6%
04-05	65	1.0%	65	1.0%	64	0.9%	69	1.0%	48	0.8%	50	1.4%	31	1.0%	62	0.9%	41	1.2%	56	1.0%
05-06	449	6.7%	455	6.8%	442	6.3%	440	6.3%	325	5.2%	167	4.5%	95	3.2%	422	6.3%	131	3.9%	339	5.9%
06-07	803	11.9%	816	12.2%	815	11.6%	825	11.7%	644	10.2%	224	6.1%	155	5.1%	781	11.6%	190	5.7%	612	10.6%
07-08	497	7.4%	446	6.7%	457	6.5%	475	6.8%	362	5.8%	156	4.2%	111	3.7%	447	6.6%	134	4.0%	358	6.2%
08-09	405	6.0%	379	5.7%	412	5.9%	412	5.9%	334	5.3%	215	5.8%	141	4.7%	388	5.7%	178	5.3%	328	5.7%
09-10	353	5.2%	344	5.2%	382	5.4%	358	5.1%	343	5.5%	261	7.1%	182	6.0%	356	5.3%	222	6.6%	318	5.5%
10-11	371	5.5%	404	6.1%	366	5.2%	362	5.2%	357	5.7%	282	7.7%	212	7.0%	372	5.5%	247	7.4%	336	5.8%
11-12	331	4.9%	341	5.1%	361	5.1%	337	4.8%	363	5.8%	241	6.6%	239	7.9%	347	5.1%	240	7.2%	316	5.5%
12-13	381	5.7%	339	5.1%	339	4.8%	334	4.8%	370	5.9%	241	6.6%	221	7.3%	353	5.2%	231	6.9%	318	5.5%
13-14	394	5.9%	371	5.6%	346	4.9%	375	5.3%	376	6.0%	247	6.7%	200	6.6%	372	5.5%	224	6.7%	330	5.7%
14-15	386	5.7%	380	5.7%	423	6.0%	447	6.4%	456	7.3%	258	7.0%	202	6.7%	418	6.2%	230	6.9%	365	6.3%
15-16	468	6.9%	472	7.1%	531	7.6%	453	6.5%	522	8.3%	204	5.5%	193	6.4%	489	7.2%	199	5.9%	406	7.0%
16-17	606	9.0%	599	9.0%	673	9.6%	623	8.9%	495	7.9%	232	6.3%	207	6.9%	599	8.9%	220	6.6%	491	8.5%
17-18	556	8.3%	574	8.6%	725	10.3%	653	9.3%	505	8.0%	242	6.6%	221	7.3%	603	8.9%	232	6.9%	497	8.6%
18-19	273	4.1%	292	4.4%	318	4.5%	289	4.1%	302	4.8%	214	5.8%	212	7.0%	295	4.4%	213	6.4%	271	4.7%
19-20	110	1.6%	94	1.4%	101	1.4%	116	1.7%	120	1.9%	93	2.5%	94	3.1%	108	1.6%	94	2.8%	104	1.8%
20-21	65	1.0%	64	1.0%	56	0.8%	96	1.4%	80	1.3%	64	1.7%	65	2.2%	72	1.1%	65	1.9%	70	1.2%
21-22	46	0.7%	53	0.8%	42	0.6%	121	1.7%	77	1.2%	58	1.6%	56	1.9%	68	1.0%	57	1.7%	65	1.1%
22-23	38	0.6%	42	0.6%	41	0.6%	73	1.0%	50	0.8%	47	1.3%	36	1.2%	49	0.7%	42	1.3%	47	0.8%
23-24	35	0.5%	26	0.4%	31	0.4%	38	0.5%	45	0.7%	44	1.2%	27	0.9%	35	0.5%	36	1.1%	35	0.6%
Peaks	Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count		Hour End & Count	
AM	07:00	803	07:00	816	07:00	815	07:00	825	07:00	644	11:00	282	12:00	239	07:00	781	11:00	247	07:00	611
PM	17:00	606	17:00	599	18:00	725	18:00	653	16:00	522	15:00	258	13:00	221	18:00	603	13:00	231	18:00	496
12-Hour	5,021	74.6%	4,941	74.1%	5,333	75.8%	5,118	72.9%	4,785	76.2%	2,793	75.9%	2,341	77.7%	5,039	74.7%	2,570	76.6%	4,334	75.0%
16-Hour	6,045	89.8%	5,968	89.5%	6,347	90.3%	6,276	89.4%	5,706	90.8%	3,232	87.8%	2,711	90.0%	6,068	89.9%	2,976	88.8%	5,185	89.7%
18-Hour	6,118	90.8%	6,036	90.5%	6,419	91.3%	6,387	90.9%	5,801	92.3%	3,323	90.3%	2,774	92.1%	6,152	91.2%	3,054	91.1%	5,267	91.2%
24-Hour	6,735	100.0%	6,670	100.0%	7,031	100.0%	7,023	100.0%	6,283	100.0%	3,679	100.0%	3,013	100.0%	6,748	100.0%	3,353	100.0%	5,778	100.0%
Avg Week Day	99.8%		98.8%		104.2%		104.1%		93.1%				100.0%		49.7%		85.6%			
Avg Weekend Day											109.7%		89.9%		201.3%		172.3%			
Avg Day	116.6%		115.4%		121.7%		121.5%		108.7%		63.7%		52.1%		116.8%		100.0%			

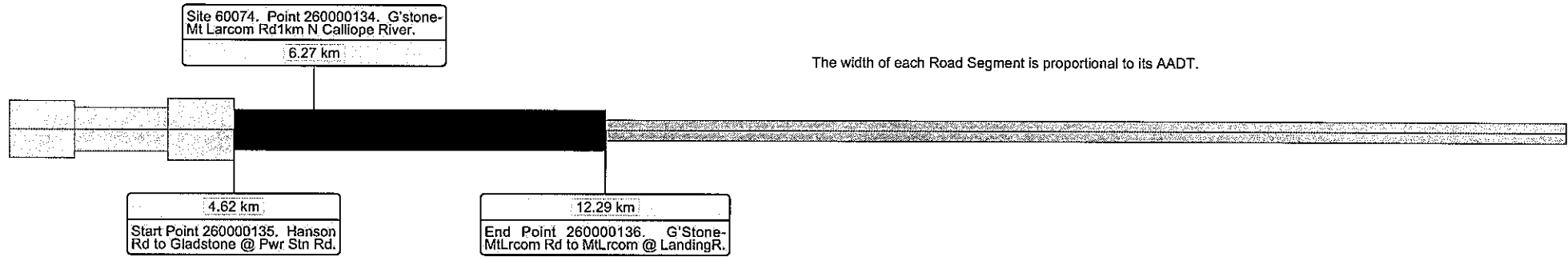


The width of each Road Segment is proportional to its AADT.

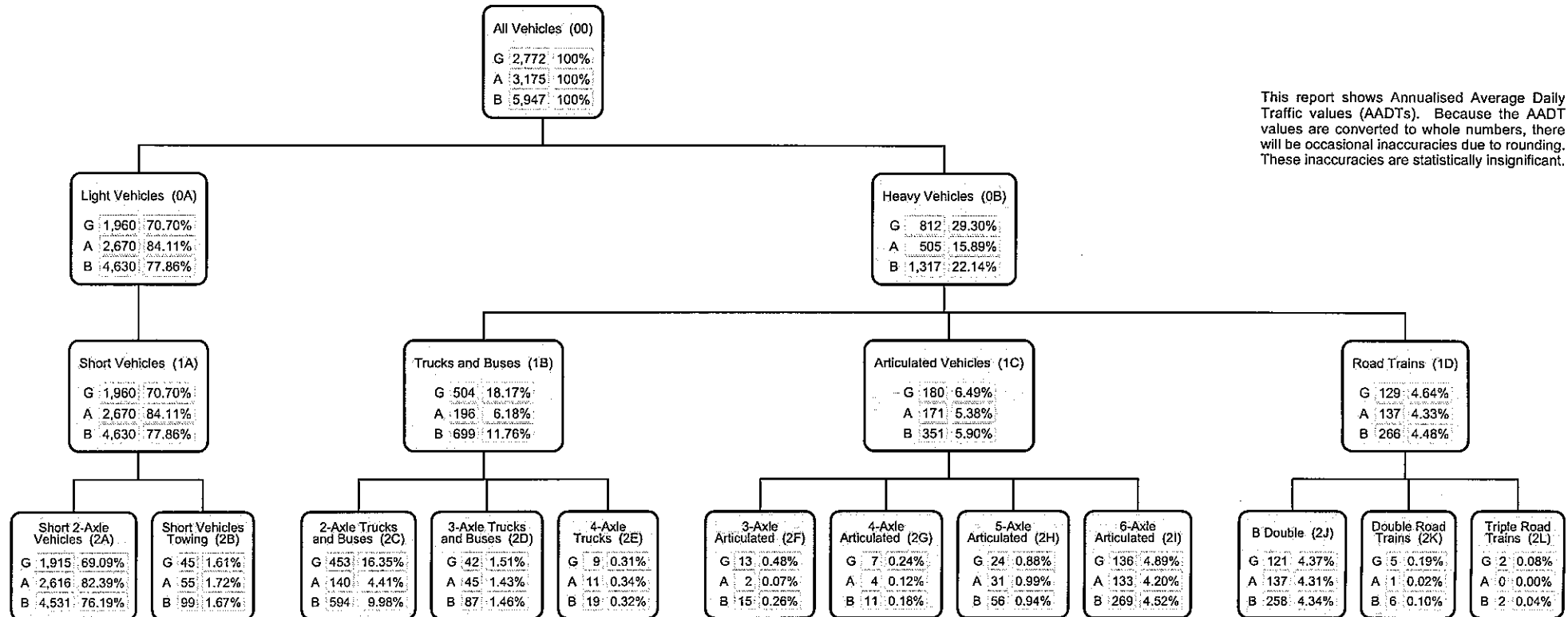


This report shows Annualised Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

GP



The width of each Road Segment is proportional to its AADT.



This report shows Annualised Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

GP



Appendix B  
**SIDRA 4.0 Intersection Analysis Results**



# MOVEMENT SUMMARY

Site: Mt Larcom - Gladstone /  
Landing 2009 AM

Mt Larcom - Gladstone Road / Landing Road  
2009 AM Peak  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South		Gladstone - Mt Larcom Rd (S)									
1	L	102	23.0	0.064	6.3	LOS A	0.0	0.0	0.00	0.40	49.0
2	T	121	25.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		223	24.1	0.072	2.9	LOS A	0.0	0.0	0.00	0.19	54.2
North		Landing Rd (N)									
8	T	25	40.0	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	4	25.0	0.005	7.3	LOS A	0.0	0.2	0.38	0.42	47.2
Approach		29	37.9	0.016	1.0	LOS A	0.0	0.2	0.05	0.06	57.7
West		Gladstone - Mt Larcom Rd (W)									
10	L	9	30.0	0.015	6.8	LOS A	0.1	0.5	0.43	0.38	47.5
12	R	146	17.0	0.180	8.6	LOS A	0.9	7.2	0.39	0.58	47.0
Approach		155	17.8	0.180	8.5	LOS A	0.9	7.2	0.39	0.57	47.0
All Vehicles		407	22.7	0.180	4.9	NA	0.9	7.2	0.15	0.32	51.3

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS A. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

# MOVEMENT SUMMARY

Site: Mt Larcom - Gladstone /  
Landing 2009 PM

Mt Larcom - Gladstone Road / Landing Road  
2009 PM Peak  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South		Gladstone - Mt Larcom Rd Rd (S)									
1	L	187	26.0	0.119	9.1	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	25	12.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		212	24.3	0.119	8.1	LOS A	0.0	0.0	0.00	0.59	50.0
North		Landing Rd (N)									
8	T	49	1.0	0.025	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	5	0.0	0.004	9.0	LOS A	0.0	0.1	0.33	0.60	47.4
Approach		54	0.9	0.025	0.8	LOS A	0.0	0.1	0.03	0.06	58.6
West		Gladstone - Mt Larcom Rd Rd (W)									
10	L	3	0.0	0.003	8.2	LOS A	0.0	0.1	0.31	0.51	48.1
12	R	138	14.0	0.155	10.1	LOS B	0.8	6.0	0.33	0.68	47.4
Approach		141	13.7	0.155	10.0	LOS B	0.8	6.0	0.33	0.67	47.4
All Vehicles		407	17.6	0.155	7.8	NA	0.8	6.0	0.12	0.55	50.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

# MOVEMENT SUMMARY

Site: Mt Larcom - Gladstone /  
Landing 2011 AM Without

Mt Larcom - Gladstone Road / Landing Road  
2011 AM Peak Without Construction Traffic  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South		Gladstone - Mt Larcom Rd (S)									
1	L	115	23.0	0.072	9.0	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	136	25.0	0.081	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		251	24.1	0.081	4.1	LOS A	0.0	0.0	0.00	0.31	54.4
North		Landing Rd (N)									
8	T	28	40.0	0.018	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	4	25.0	0.005	10.5	LOS B	0.0	0.2	0.40	0.61	47.2
Approach		32	38.1	0.018	1.3	LOS B	0.0	0.2	0.05	0.08	58.0
West		Gladstone - Mt Larcom Rd (W)									
10	L	10	30.0	0.016	10.1	LOS B	0.1	0.6	0.46	0.55	47.4
12	R	164	17.0	0.210	11.0	LOS B	1.1	8.5	0.42	0.73	46.7
Approach		174	17.7	0.210	10.9	LOS B	1.1	8.5	0.42	0.72	46.7
All Vehicles		457	22.7	0.210	6.5	NA	1.1	8.5	0.16	0.45	51.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

# MOVEMENT SUMMARY

Site: Mt Larcom - Gladstone /  
Landing 2011 PM Without

Mt Larcom - Gladstone Road / Landing Road  
2011 PM Peak Without Construction Traffic  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South		Gladstone - Mt Larcom Rd (S)									
1	L	210	26.0	0.134	9.1	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	28	12.0	0.015	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		238	24.4	0.134	8.1	LOS A	0.0	0.0	0.00	0.59	50.0
North		Landing Rd (N)									
8	T	55	1.0	0.028	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	6	0.0	0.005	9.1	LOS A	0.0	0.2	0.35	0.60	47.3
Approach		61	0.9	0.028	0.9	LOS A	0.0	0.2	0.03	0.06	58.5
West		Gladstone - Mt Larcom Rd (W)									
10	L	4	0.0	0.004	8.2	LOS A	0.0	0.1	0.33	0.52	48.0
12	R	155	14.0	0.179	10.3	LOS B	0.9	7.0	0.36	0.69	47.3
Approach		159	13.6	0.179	10.2	LOS B	0.9	7.0	0.36	0.69	47.3
All Vehicles		458	17.5	0.179	7.9	NA	0.9	7.0	0.13	0.55	50.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

# MOVEMENT SUMMARY

Site: Mt Larcom - Gladstone /  
Landing 2011 AM With

Mt Larcom - Gladstone Road / Landing Road  
2011 AM Peak With Construction Traffic  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South		Gladstone - Mt Larcom Rd (S)									
1	L	115	23.0	0.072	9.0	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	175	25.0	0.104	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		290	24.2	0.104	3.6	LOS A	0.0	0.0	0.00	0.27	55.1
North		Landing Rd (N)									
8	T	60	40.0	0.039	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	8	25.0	0.010	10.8	LOS B	0.0	0.4	0.43	0.63	47.0
Approach		68	38.2	0.039	1.3	LOS B	0.0	0.4	0.05	0.07	58.1
West		Gladstone - Mt Larcom Rd (W)									
10	L	14	30.0	0.024	10.5	LOS B	0.1	0.9	0.50	0.57	47.1
12	R	164	17.0	0.236	11.9	LOS B	1.2	9.5	0.49	0.78	45.8
Approach		178	18.0	0.236	11.8	LOS B	1.2	9.5	0.49	0.77	45.9
All Vehicles		536	23.9	0.236	6.0	NA	1.2	9.5	0.17	0.41	52.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.

# MOVEMENT SUMMARY

Site: Mt Larcom - Gladstone /  
Landing 2011 PM With

Mt Larcom - Gladstone Road / Landing Road  
2011 PM Peak With Construction Traffic  
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South		Gladstone - Mt Larcom Rd (S)									
1	L	210	26.0	0.134	9.1	LOS A	0.0	0.0	0.00	0.67	49.0
2	T	42	12.0	0.023	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		252	23.7	0.134	7.6	LOS A	0.0	0.0	0.00	0.56	50.5
North		Landing Rd (N)									
8	T	76	1.0	0.039	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R	8	0.0	0.007	9.2	LOS A	0.0	0.2	0.36	0.61	47.3
Approach		84	0.9	0.039	0.9	LOS A	0.0	0.2	0.03	0.06	58.5
West		Gladstone - Mt Larcom Rd (W)									
10	L	5	0.0	0.005	8.3	LOS A	0.0	0.2	0.35	0.52	47.9
12	R	155	14.0	0.187	10.6	LOS B	0.9	7.3	0.39	0.71	47.0
Approach		160	13.6	0.187	10.5	LOS B	0.9	7.3	0.39	0.70	47.0
All Vehicles		496	16.6	0.187	7.4	NA	0.9	7.3	0.13	0.52	50.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.

Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (HCM).

Approach LOS values are based on the worst delay for any vehicle movement.