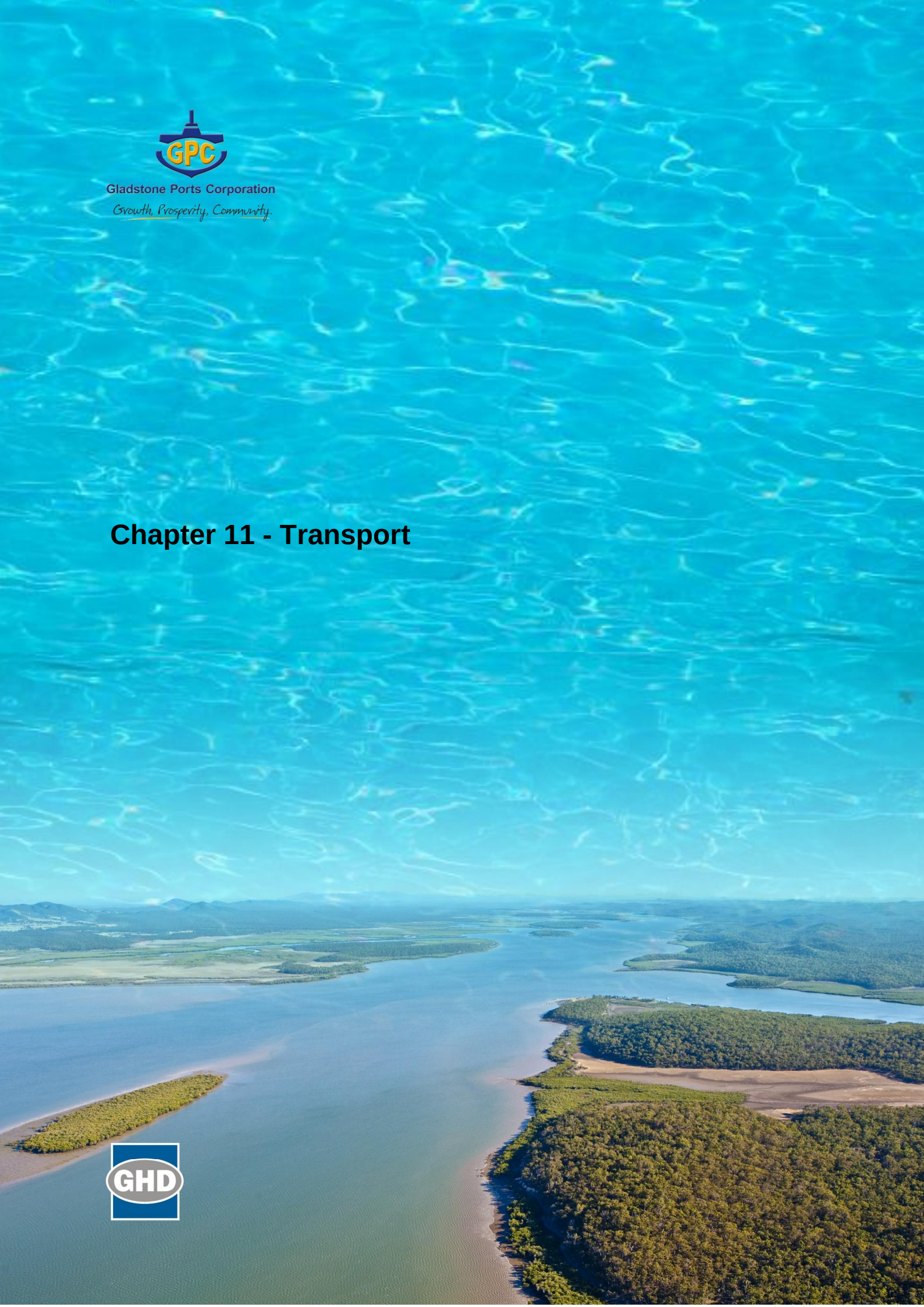
Gladstone Ports Corporation

Growth, Prosperity, Community.

# Chapter 11 - Transport



# 11. Transport

**Overview**

This chapter of the EIS describes the likely traffic and transport infrastructure impacts from the Project and addresses Section 3.2.6 Transport of the ToR (Appendix A). Both land based and marine transport aspects of the construction phase of the project are considered; specifically:

- Workforce/commuter traffic generated by the construction of the Western Basin Reclamation Area and dredging activities;
- Dredging vessels, shipping and port vessels and small craft during dredging.

The land based traffic section focuses on an intersection and pavement impact analysis for workforce traffic related to the construction of the Western Basin Reclamation Area and dredging crew changeovers. Potential impacts on rail and airports are also considered. The marine section refers to potential impacts on the port operations and the general public during dredging operations.

However, future developments establishing on the Reclamation Area and the future shipping traffic utilising the newly dredged channels and swing basins have not been included in this assessment. The transport impacts from these activities will be addressed through the appropriate approvals processes for future developments. In particular, shipping traffic and safety is addressed in the EISs for the LNG industry.

The ToR for transport request a description of the preferred haul route, as well as a description of any proposed new, or alterations to transport-related infrastructure required by the Project. The Haul Route Options Study (GHD 2009b) addresses the selection of the haul routes for construction materials required for the Reclamation Area, as well as truck tonnage, timing and duration. This process is subject to separate environmental assessment and approvals.

No new or alteration to transport-related infrastructure is required by the Project, so discussion of these issues has not been included in this section.

**Guidelines**

The relevant guidelines relating to transport are:

- *Transport Operations (Road Use Management – Dangerous Goods) Regulations* 2008;
- *Transport Infrastructure (Dangerous Goods by Rail) Regulations* 2008;
- *Transport Operations (Marine Safety) Act* 1994;
- *Transport Operations (Marine Pollution) Act* 1995; and
- Department of Transport Main Roads' *Road Planning and Design Manual* (2002).

## 11.1 Methods

### 11.1.1 Workforce Traffic

The assessment of the potential impacts on transport from the workforce traffic generated by the Project has been completed by using available traffic count information and predicted construction workforce traffic volumes to model the traffic movements. SIDRA Intersection 3.2 has been used to model the Gladstone – Mt Larcom Road/Landing Road intersection to show the predicted traffic impacts.

### 11.1.2 Haul Route Traffic

The pavement and traffic related impacts of the haul routes assessed for the transport of rock materials from the GPC owned quarry to the Western Basin Reclamation Area, were assessed in the Haul Route Options Study (GHD 2009b), which has been subject to a separate planning and environmental approvals process. The use of the haul routes and roads was modelled using Talpac software to predict the potential impacts from haul route traffic related to the Project. This assisted in determining the preferred haul route.

## 11.2 Description of Environmental Values

### 11.2.1 Land Based Traffic

***Construction Materials and Equipment***

An abandoned quarry situated at Guerassimoff Road, Yarwun is being re-established by GPC to provide a source for hard rock quarry materials for the construction of the Reclamation Area bund wall and other GPC projects, including maintenance of existing bund walls. This quarry is located approximately 4 km from the proposed Western Basin Reclamation Area. The operation of the quarry is subject to a separate planning and environmental approvals process, where the traffic impacts associated with the long term operation of the quarry have been assessed.

A Haul Route Options Study (GHD 2009b) has been completed, investigating various options for the route for hauling construction materials from the quarry to the Reclamation Area. This assessment has been subject to an approvals process separate to this EIS, however an overview of the assessment has been included in this EIS for completeness.

Equipment and plant for construction of the reclamation and small volumes of construction waste will be transported on the existing road network, accessing the Western Basin Reclamation Area along Landing Road. The trucks used to haul rock from the quarry to the reclamation will be based at the quarry. No hazardous material will be transported, except for fuel for the reclamation construction traffic, which will be provided by dedicated fuel trucks or at a licensed fuel storage facility at the quarry site.

***Existing Road Network***

The existing road network that is likely to be utilised by construction specific traffic is predominantly rural. The major road in the area is the Gladstone – Mt Larcom Road operated by the Department of Transport and Main Roads (DTMR) (Figure 11-1). The road itself is a two-lane bi-directional road with a speed limit of 60 km/hr in the vicinity of Landing Road. The Western Basin Reclamation Area is located to the north of Gladstone and is accessed via Landing Road, which is a two lane bi-directional road operated by the Gladstone Regional Council (GRC) with a speed limit of 60 km/hr. The intersection between these two

roads has been analysed to assess the effects caused by the additional traffic from the construction of the Reclamation Area.

***Preferred Haul Route***

There are two possible production schedules for the construction of the bund:

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

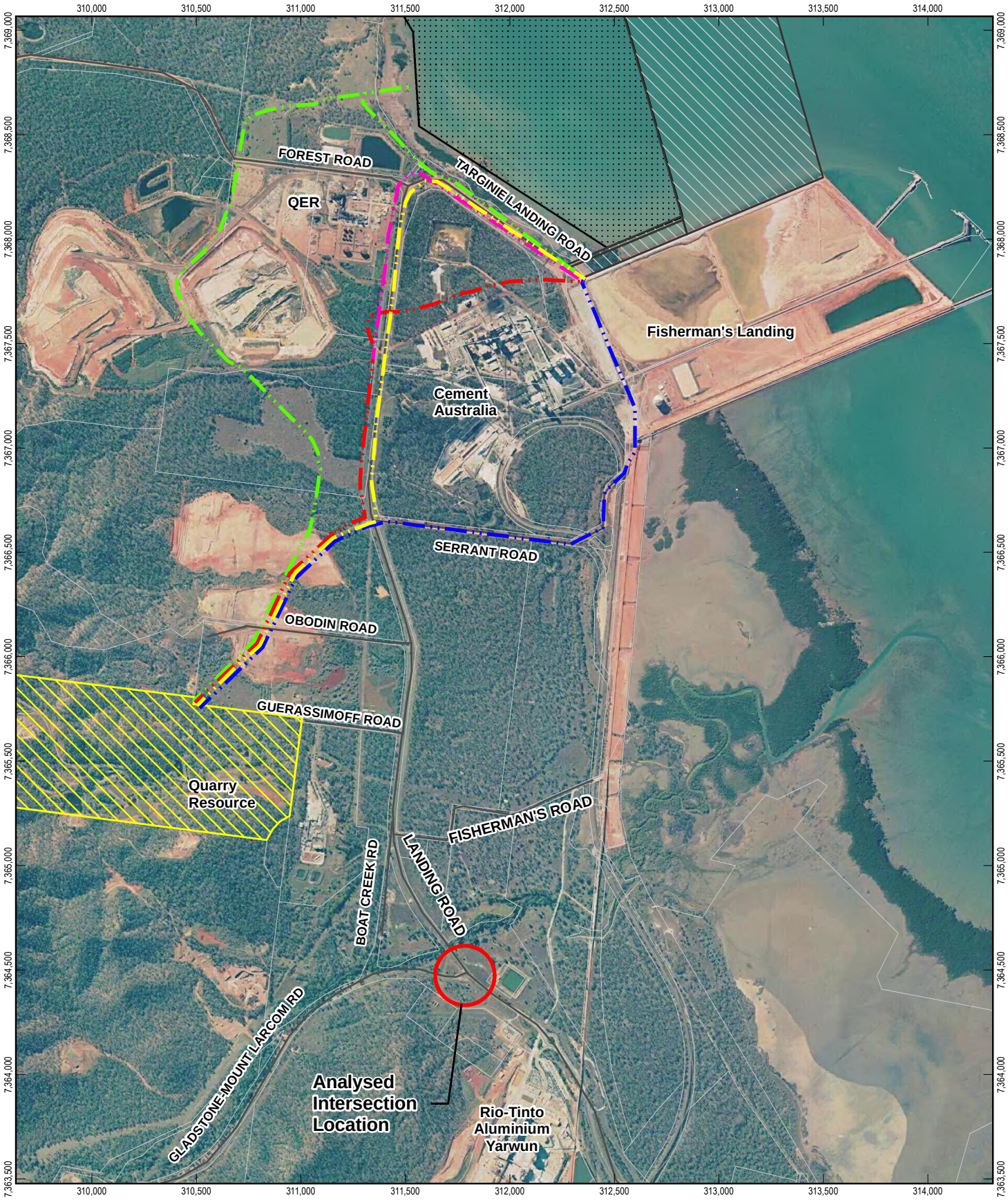
Based on these two possible production schedules, there are five possible transport routes from the proposed quarrying site to the Reclamation Area that have been assessed in the Haul Route Options Study. One option considered for the haul route utilises multi-combination vehicles including B-Doubles and Type 1 and Type 2 road trains. The Queensland Department of Transport and Main Roads (DTMR) has guidelines that determine the size of a vehicle allowed to operate on certain roads. Roads within the vicinity of the Reclamation Area where multi-combination 23 and 25 metre B-Double vehicles are permitted are shown in Figure 11-2 and include:

- Mt Larcom – Gladstone Road;
- Landing Road;
- Hanson Road; and
- Guerassimoff Road.

The only limitation in the area is within Gladstone City where movement of these vehicles is restricted between the hours of 8:30 AM to 9:00 AM and 3:00 PM to 3:30 PM on Monday to Friday.

As part of the options assessment, the use of three haul routes and two road routes was simulated using Talpac software (GHD 2009b). The haul routes correspond to the high rate production schedule (3,600,000 tonnes per annum for one year) whereas the road routes correspond to the low rate production schedule (800,000 tonnes per annum for four and a half years). A representative plan view of the roads for both options is shown in Figure 11-1.

The Haul Route Options Study (GHD 2009b) suggests that Haul Route 3 would be the preferred option on the basis of minimum total cost required to reach overall production. Primarily, this is due to access not being given for the Haul Routes 1 and 2 by land holders. Haul Route 2 was deemed too expensive due to a grade separation requirement where the route crosses Landing Road. A combination of Road Routes 1 and 2 has been used as the preferred option if haulage is to be by road. Loaded vehicles will journey via Road Route 1 and return unloaded via Road Route 2. This hybrid route has been created to reduce the impact on Landing Road.




**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

1:25,000 (at A4)

0 100 200 300 400 500

Metres

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

N

Port of Gladstone
Western Basin Dredging and Disposal Project

Job Number 42-15386
Revision A
Date 01 Sept 2009

Haul Route Options and Landing Road / Gladstone - Mt Larcom Road Intersection

Figure 11-1

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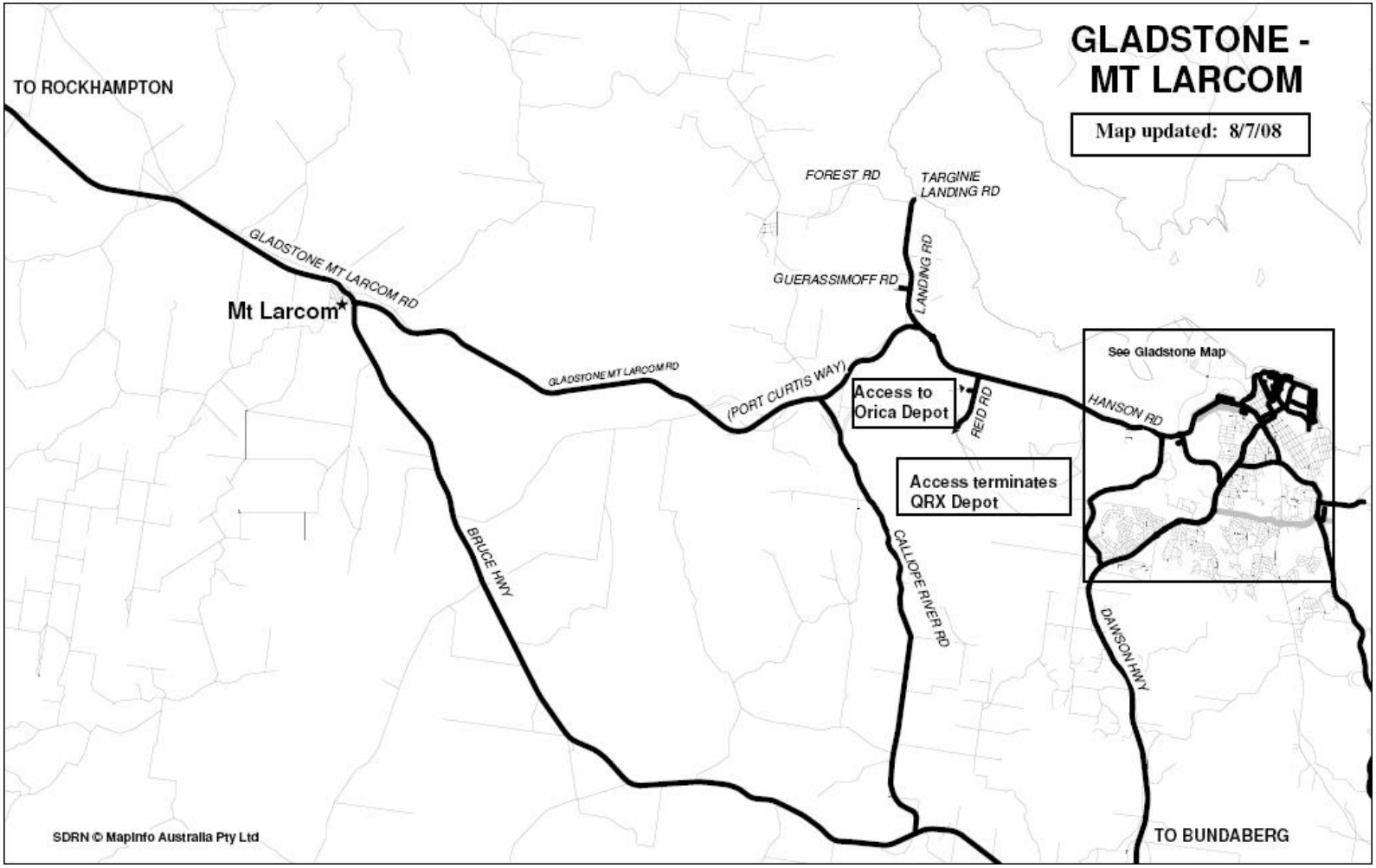
Level 4 201 Charlotte Street Brisbane QLD 4000 Australia T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com




Sourced from Queensland Department of Transport and Main Roads website.

**Figure 11-2 Approved Routes 23 and 25 metre B-Double Combinations**

### 11.2.2 Marine Traffic

Waterborne traffic within the Port may be classified as:

- Shipping - vessels which visit the port from remote locations. The movement of shipping within the port is restricted to the declared navigation channels;
- Port Vessels and Small Craft – This class of vessels refers to:
  - Tugs, barges, pilot boats and the like which move throughout the port waters – each vessels reliant on the masters understanding and knowledge of the water depths, currents and tidal streams within the port waters; and
  - Recreational vessels – including cruisers and fishing dinghies.

The movement of all ships within the Port is monitored by Maritime Safety Queensland's (MSQ's) Vessel Tracking System (VTS).

The Port of Gladstone is Queensland's largest multi-commodity port, housing the world's fourth largest coal export terminal. Each year more than 1,400 commercial vessels visit the Port of Gladstone. The bulk of shipping movements are at the RG Tanna Coal Terminal, at the southern end of the Stage 1A dredging area. The QAL and Boyne Smelter wharves are outside the Project Area. Alumina, bulk liquids and cement exports and bauxite and caustic imports occurring at the existing Fisherman's Landing berths, but shipping volumes are not high in this area.

The proposed Project Area is located in an area that is currently used for various recreational activities. Common recreational activities include fishing, jet skiing and boating. Non-fishing boating activity includes smaller vessels and yachts that use the adjacent channel to access in and out of the Narrows.

## 11.3 Potential Impacts and Mitigation Measures

### 11.3.1 Potential Land based Traffic Impacts and Mitigation Measures

This section discusses the potential impacts of the dredging workforce traffic on the Landing Road / Gladstone – Mt Larcom Road intersection and potential pavement impacts.

***Traffic Volumes during Construction***

Based on the project description provided in Chapter 2, it is expected that a total workforce of 225 people will be used during the peak dredging period when it is likely that four dredgers will be in operation simultaneously.

The workforce during the construction of the Reclamation Area will be substantially lower than during dredging operations, with a workforce of 30 – 40 people anticipated. Although the construction of the Reclamation Area bund wall will be largely complete before dredging commences, for the purpose of this impact assessment the traffic analysis has been performed using the workforce commuting to the Western Basin Reclamation Area as this is considered to represent the worst case scenario for workforce traffic for this project.

The dredging workforce is anticipated to be broken into two separate shifts with changes between shifts occurring at 6:00 AM and 6:00 PM. The majority of the workforce will commute directly to the Western Basin Reclamation Area to transfer onto the dredgers. The remainder of the workforce will commute to the Gladstone Marina and travel to the dredgers via ferry or boat. Table 11-1 shows the estimated

number of people travelling to the Western Basin Reclamation Area and Gladstone Marina. Table 11-2 shows the break down of people and vehicular volumes journeying to the Western Basin Reclamation Area from Gladstone City. Vehicle volumes are based on an average occupancy rate of 1.5 people per vehicle.

**Table 11-1 Workforce Movement**

| Peak Hour | Destination | | Departing | |
|---|---|---|---|---|
| | Western Basin Reclamation Area | Gladstone Marina | Western Basin Reclamation Area | Gladstone Marina |
| Morning Peak | 93 | 27 | 78 | 27 |
| Evening Peak | 78 | 27 | 93 | 27 |

**Table 11-2 Workforce Directional Volumes**

| Peak Hour | Towards Western Basin Reclamation Area | | Towards Gladstone City | |
|---|---|---|---|---|
| | People | Vehicles | People | Vehicles |
| Morning Peak | 93 | 62 | 78 | 52 |
| Evening Peak | 78 | 52 | 93 | 62 |

### Landing Road

A high level analysis has been undertaken with regards to the capacity of Landing Road compared to its current volume of vehicles. There are approximately 1680 vehicles per day using Landing Road based on a GRC traffic count from 2008. According to the DTMR's *Road Planning and Design Manual* (RPDM) Appendix 13D, Part 14, the highest hourly volume for rural roads is 15%. Based on this, there would be a maximum of 250 vehicles in the most trafficked hour, or approximately 4 per minute. This would allow time for a vehicle making a right turn from a side road into Landing Road. This movement has the highest gap acceptance required of 5 seconds (RPDM, chapter 13-59).

### Gladstone – Mt Larcom Road

The current flow of vehicles on Gladstone – Mt Larcom Road is approximately 9,000 vehicles per day based on a traffic count undertaken in 2008, with a peak traffic flow from the Landing Road intersection counts of 160 vehicles per hour per lane. When compared to a saturation flow of 1800 – 2000 vehicles per hour per lane, the Gladstone – Mt Larcom Road has adequate spare capacity for the additional vehicles on the segment between Landing Road and Gladstone City.

The intersection of Gladstone – Mt Larcom Road and Landing Road is perceived as the most critical intersection to be affected by the construction traffic due to the high volume of vehicles on the right turn movement from the western approach to the intersection.

### Landing Road Intersection

Traffic volumes used for the analysis of the Landing Road / Gladstone – Mt Larcom Road intersection were based on a 12 hour traffic count from 6:00 AM to 6:00 PM undertaken on Tuesday, 12 June 2007. Figure 11-3 shows the observed traffic volumes for the two peak hours. As the change in shifts occur around 6:00 AM and 6:00 PM, volumes from the traffic count were taken from the hours ending at 7:00 AM and 6:00 PM to represent 5:30 AM to 6:30 AM, for the morning peak, and 5:30 PM to 6:30 PM, for the evening peak.

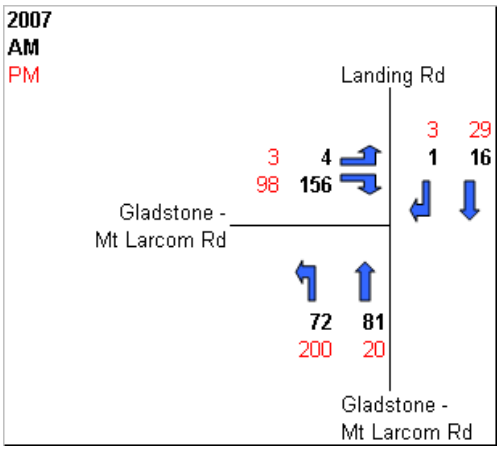



**Figure 11-3 Landing Rd / Gladstone – Mt Larcom 2007 Observed Intersection Volumes**

#### *Intersection Analysis*

The rural setting of the area and low demand produced by the surrounding land uses means that the road network currently carries a relatively low volume of vehicles. The Landing Road intersection has been analysed using SIDRA Intersection 3.2. Three scenarios were modelled to assess the possible impact of the traffic from the construction of the Reclamation Area on the intersection from the two production schedules (high rate production and low rate production):

- Existing traffic (2009);
- Future traffic (2011) without construction traffic; and
- Future traffic (2012) with construction traffic.

These follow the planning guidelines stipulated in Section 13.4.4 of the DTMR *Road Planning and Design Manual*. It is anticipated that the construction activities will be most intensive in 2011 and thus, have the greatest impact on the road network.

Historical traffic count data was not available to calculate the growth rate for the area. A growth rate of 5% was used to factor the observed volumes from 2007 to 2009 and 2011 as per the Department of Transport and Main Roads' RPDM, Appendix 13D. The resultant vehicular volumes for 2009 are shown in Figure 11-4. Figure 11-5 and Figure 11-6 show the volumes without and with construction traffic as projected in 2011 using the 5% growth rate factor.

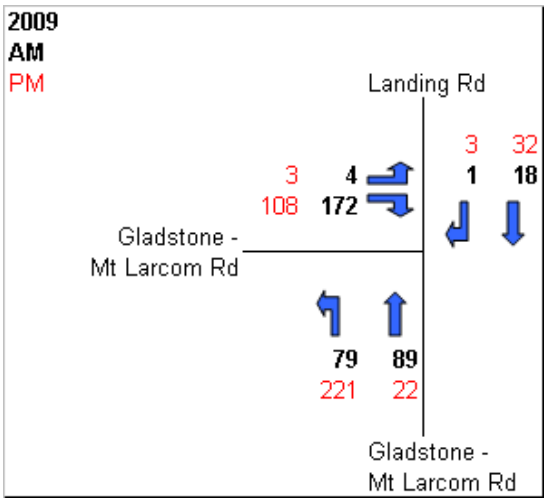



**Figure 11-4 Landing Rd / Gladstone – Mt Larcom Rd 2009 Calculated Intersection Volumes**

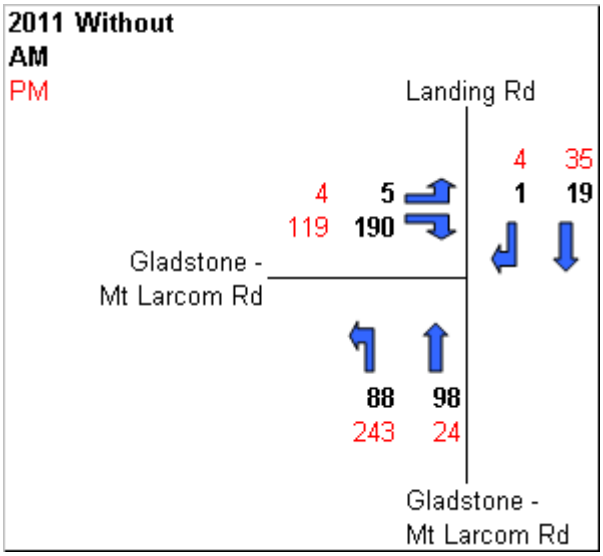



**Figure 11-5 Landing Rd / Gladstone – Mt Larcom Rd 2011 Calculated Intersection Volumes without Construction Traffic**

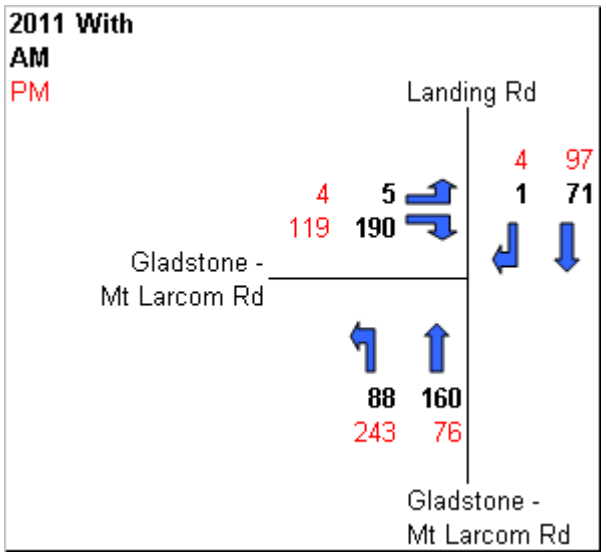



**Figure 11-6 Landing Rd / Gladstone – Mt Larcom Rd 2011 Calculated Intersection Volumes with Construction Traffic**

***Intersection Performance Criteria***

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

- Degree of Saturation (DOS);
  - 0.80 for unsignalised (priority control) intersections;
  - 0.85 for roundabouts; and
  - 0.90 for signalised intersections.
- Level of Service (LOS) based on Average Vehicle Delay (sec); and
- 95$^{th}$ Percentile Queue Lengths (m).

Level of Service (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 at or close to 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, shown in Table 11-3.

**Table 11-3 RTA Levels of Service Criteria (All intersection Types)**

| Level of Service | Controlled Delay per Vehicle (secs) |
|---|---|
| A | D ≤ 14.5 |
| B | 14.5 < D ≤ 28.5 |
| C | 28.5 < D ≤ 42.5 |
| D | 42.5 < D ≤ 56.5 |
| E | 56.5 < D ≤ 70.5 |
| F | 70.5 < D |

The “back of queue” defines the number or length of vehicles that are queued depending on their arrival pattern. The 95$^{th}$ percentile queue length is the value which 95% of all observed cycle queue lengths fall. Queue build-ups at the intersection should be checked to ensure that they can be fully contained within any short lanes and that potential queue does not adversely affect the operation of adjacent intersections and does not substantially hinder property access.

A number of figures indicating the traffic movement at the intersections impacted are illustrated in the following sections. The numbers indicated at the end of the auxiliary lanes indicate the available storage in metres.

The intersection between Mt Larcom – Gladstone Road and Landing Road is a three leg, give way priority intersection with the major movements on the north and south approaches. The majority of traffic flows on the Mt Larcom – Gladstone Road legs, the west and south approaches. The layout used for the analysis for all existing and future scenarios is shown below in Figure 11-7.

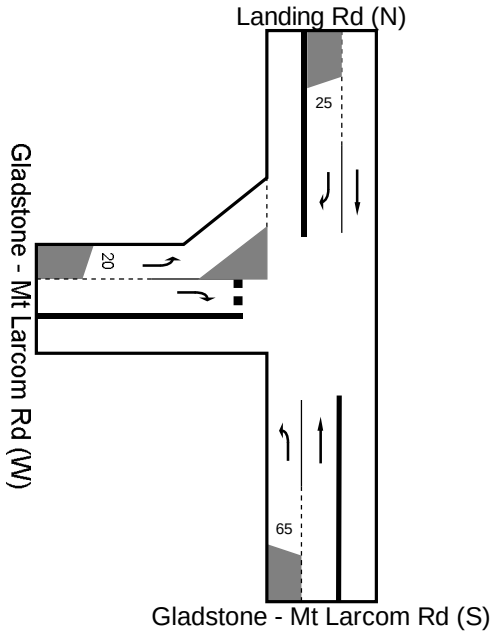



**Figure 11-7 Mt Larcom – Gladstone Road / Landing Road Intersection Layout**

### Existing Traffic 2009

The results from the analysis of the 2009 existing traffic scenario are presented in Table 11-4. The results indicate the following:

- An overall minimum LOS A (highest LOS) is achieved under peak traffic conditions for all movements;
- The degree of saturation is far below the practical absorption capacity of 0.8 for unsignalised intersections for all movements, which suggests spare capacity for future traffic;
- Queue lengths are minimal on all approaches and do not encroach on neighbouring intersections or accesses; and
- Average delays are less than 12 seconds for all movements in both peaks.

**Table 11-4 Gladstone – Mt Larcom Road /Landing Road Intersection Results – Existing Traffic 2009**

| AM Peak | | | | | |
|---|---|---|---|---|---|
| **Movement** | **Demand Flow (veh/hr)** | **DoS (V/C)** | **Ave Delay (secs)** | **LOS** | **95% Back of Queue (m)** |
| **Gladstone - Mt Larcom Rd (South)** | | | | | |
| Left | 79 | 0.048 | 8.8 | LOS A | 0 |
| Through | 89 | 0.049 | 0.0 | LOS A | 0 |
| Approach Total | 168 | 0.049 | 4.1 | LOS A | 0 |
| **Landing Rd (North)** | | | | | |
| Through | 18 | 0.011 | 0.0 | LOS A | 0 |
| Right | 1 | 0.001 | 8.8 | LOS A | 0 |
| Approach Total | 19 | 0.011 | 0.5 | LOS A | 0 |
| **Gladstone - Mt Larcom (West)** | | | | | |
| Left | 4 | 0.006 | 9.1 | LOS A | 0 |
| Right | 172 | 0.192 | 10.1 | LOS A | 8 |
| Approach Total | 176 | 0.192 | 10.1 | LOS A | 8 |
| *All Vehicles* | *363* | *0.192* | *6.8* | *N/A* | *8* |
| **PM Peak** | | | | | |
| **Movement** | **Demand Flow (veh/hr)** | **DoS (V/C)** | **Ave Delay (secs)** | **LOS** | **95% Back of Queue (m)** |
| **Gladstone - Mt Larcom Rd (South)** | | | | | |
| Left | 221 | 0.141 | 9.1 | LOS A | 0 |
| Through | 22 | 0.012 | 0.0 | LOS A | 0 |
| Approach Total | 243 | 0.141 | 8.3 | LOS A | 0 |
| **Landing Rd (North)** | | | | | |
| Through | 32 | 0.020 | 0.0 | LOS A | 0 |
| Right | 3 | 0.004 | 11.0 | LOS A | 0 |
| Approach Total | 35 | 0.020 | 0.9 | LOS A | 0 |
| **Gladstone - Mt Larcom (West)** | | | | | |
| Left | 3 | 0.007 | 11.3 | LOS A | 0 |
| Right | 108 | 0.119 | 9.9 | LOS A | 4 |
| Approach Total | 111 | 0.119 | 9.9 | LOS A | 4 |
| *All Vehicles* | *389* | *0.141* | *8.1* | *N/A* | *4* |

### Future Traffic (2011) without Construction Traffic

The results of the analysis for 2011 without construction traffic scenario suggest that the intersection will continue to operate with uncongested movements. The results of the analysis are presented in Table 11-5 and indicate the following:

- The intersection is expected to achieve an overall minimum LOS A under peak traffic conditions;
- The degree of saturation is below the practical absorption capacity of 0.8 for unsignalised intersections for all movements;
- Expected queue lengths are minimal and should not encroach on neighbouring intersections or accesses; and
- Average delays are less than 12 seconds for all movements in both peaks.

**Table 11-5 Gladstone – Mt Larcom Road / Landing Road Intersection Results – Future Traffic 2011 without Construction Traffic**

| AM Peak | | | | | |
|---|---|---|---|---|---|
| **Movement** | **Demand Flow (veh/hr)** | **DoS (V/C)** | **Ave Delay (secs)** | **LOS** | **95% Back of Queue (m)** |
| **Gladstone - Mt Larcom Rd (South)** | | | | | |
| Left | 88 | 0.053 | 8.8 | LOS A | 0 |
| Through | 98 | 0.054 | 0.0 | LOS A | 0 |
| Approach Total | 186 | 0.054 | 4.2 | LOS A | 0 |
| **Landing Rd (North)** | | | | | |
| Through | 19 | 0.012 | 0.0 | LOS A | 0 |
| Right | 1 | 0.001 | 8.8 | LOS A | 0 |
| Approach Total | 20 | 0.012 | 0.4 | LOS A | 0 |
| **Gladstone - Mt Larcom (West)** | | | | | |
| Left | 5 | 0.007 | 9.1 | LOS A | 0 |
| Right | 190 | 0.216 | 10.2 | LOS A | 9 |
| Approach Total | 195 | 0.216 | 10.2 | LOS A | 9 |
| *All Vehicles* | *401* | *0.216* | *6.9* | *N/A* | *9* |
| **PM Peak** | | | | | |
| **Movement** | **Demand Flow (veh/hr)** | **DoS (V/C)** | **Ave Delay (secs)** | **LOS** | **95% Back of Queue (m)** |
| **Gladstone - Mt Larcom Rd (South)** | | | | | |
| Left | 243 | 0.155 | 9.1 | LOS A | 0 |
| Through | 24 | 0.014 | 0.0 | LOS A | 0 |
| Approach Total | 267 | 0.155 | 8.3 | LOS A | 0 |

| | | | | | |
|---|---|---|---|---|---|
| **Landing Rd (North)** | | | | | |
| Through | 35 | 0.022 | 0.0 | LOS A | 0 |
| Right | 4 | 0.005 | 11.0 | LOS A | 0 |
| Approach Total | 39 | 0.022 | 1.1 | LOS A | 0 |
| **Gladstone - Mt Larcom (West)** | | | | | |
| Left | 4 | 0.011 | 11.7 | LOS A | 0 |
| Right | 119 | 0.134 | 10.1 | LOS A | 5 |
| Approach Total | 123 | 0.134 | 10.1 | LOS A | 5 |
| *All Vehicles* | *429* | *0.155* | *8.2* | *N/A* | *5* |

**Future Traffic (2011) with Construction Traffic**

The results of the analysis for the 2011 with construction traffic scenario suggest that the operating conditions for the intersection between Gladstone – Mt Larcom Road and Landing Road will be acceptable as a give way priority intersection. Detailed movement summary results are presented in Table 11-6 and indicate the following:

- A minimum LOS A is achieved for all movements under peak conditions;
- The degree of saturation is predicted to be below the practical absorption capacity of 0.8 for unsignalised intersections;
- Queue lengths are minimal and will not interfere with neighbouring intersections or accesses; and
- Average delays are expected to be less than 13 seconds for all movements in both peaks.

**Table 11-6 Gladstone – Mt Larcom Road / Landing Road Intersection Results – Future Traffic 2011 with Construction Traffic**

| AM Peak | | | | | |
|---|---|---|---|---|---|
| **Movement** | **Demand Flow (veh/hr)** | **DoS (V/C)** | **Ave Delay (secs)** | **LOS** | **95% Back of Queue (m)** |
| **Gladstone - Mt Larcom Rd (South)** | | | | | |
| Left | 88 | 0.053 | 8.8 | LOS A | 0 |
| Through | 160 | 0.087 | 0.0 | LOS A | 0 |
| Approach Total | 248 | 0.087 | 3.1 | LOS A | 0 |
| **Landing Rd (North)** | | | | | |
| Through | 71 | 0.044 | 0.0 | LOS A | 0 |
| Right | 1 | 0.001 | 9.0 | LOS A | 0 |
| Approach Total | 72 | 0.044 | 0.1 | LOS A | 0 |
| **Gladstone - Mt Larcom (West)** | | | | | |
| Left | 5 | 0.007 | 9.6 | LOS A | 0 |
| Right | 190 | 0.253 | 11.4 | LOS A | 11 |
| Approach Total | 195 | 0.253 | 11.3 | LOS A | 11 |
| *All Vehicles* | *515* | *0.253* | *5.8* | *N/A* | *11* |
| **PM Peak** | | | | | |
| **Movement** | **Demand Flow (veh/hr)** | **DoS (V/C)** | **Ave Delay (secs)** | **LOS** | **95% Back of Queue (m)** |
| **Gladstone - Mt Larcom Rd (South)** | | | | | |
| Left | 243 | 0.155 | 9.1 | LOS A | 0 |
| Through | 76 | 0.043 | 0.0 | LOS A | 0 |
| Approach Total | 319 | 0.155 | 7.0 | LOS A | 0 |
| **Landing Rd (North)** | | | | | |
| Through | 97 | 0.062 | 0.0 | LOS A | 0 |
| Right | 4 | 0.005 | 11.3 | LOS A | 0 |
| Approach Total | 101 | 0.062 | 0.4 | LOS A | 0 |
| **Gladstone - Mt Larcom (West)** | | | | | |
| Left | 4 | 0.011 | 12.7 | LOS A | 0 |
| Right | 119 | 0.157 | 11.1 | LOS A | 6 |
| Approach Total | 123 | 0.157 | 11.2 | LOS A | 6 |
| *All Vehicles* | *543* | *0.157* | *6.7* | *N/A* | *6* |

**Summary of Traffic Impacts**

The performance of the intersection between Gladstone – Mt Larcom Road and Landing Road remains at a LOS A (highest level of service) for all traffic movements for the peak workforce scenario. Therefore, the intersection can be considered adequate for both future year scenarios. The intersection has spare capacity and will not require any upgrades. Detailed movement summaries for all three scenarios are shown in Appendix U.

As the Landing Road / Gladstone – Mt Larcom Road intersection operates at a LOS A with a key right turn movement without right of way, other intersections along the Gladstone – Mt Larcom Road should be operating at similar levels of service with the predicted traffic levels.

***Pavement Impacts***

The majority of vehicles used by workers to commute to and from the Western Basin Reclamation Area along Gladstone – Mt Larcom Road during construction of the Reclamation Area and dredging will be cars and light trucks that will have a minimal impact on the pavement of the roads used.

The impacts of the preferred transport routes for the haulage of rock from the quarry at Guerassimoff Road to the reclamation were assessed in the Haul Route Options Study (GHD 2009b) and separate approvals process. Some repairs may be required to Landing Road and maintenance will be required to be undertaken on Serrant Road at the completion of haulage. GRC and GPC will agree these conditions prior to the approval of the road based haul route, if this is utilised.

***Impacts on the Rail Network***

There is a rail line that runs along the MTSC and into Cement Australia. This rail line delivers raw materials to the Cement Australia plant. There are two level crossings along Serrant Road that cross the rail loop.

Commuter traffic for the construction of the Reclamation Area will be instructed to use the route consisting of Landing Road to the end curving around onto the Strategic Port Land. This will not impact on the local rail infrastructure.

The high haulage rate scenario will utilise off-road vehicles and will not impact the rail line into Cement Australia. The low haul rate will use Serrant Road for haulage using the Ports own fleet of vehicles. The haul route along Serrant Road and the MTSC will traverse the Cement Australia rail loop. This route has been used previously to haul materials to the existing Fisherman's Landing reclamation. Adequate signage has been provided at the rail crossings to minimise potential collisions between haulage vehicles and trains, though a review will need to occur of the signage when the final haulage arrangements are confirmed.

***Impacts on Airports***

The closest operational Airport to the Project Area and quarry is the Gladstone Airport. According to the Airport Overlay Code map in the "Gladstone Plan", the Obstacle Limitation Surface (OLS) for the Gladstone Airport is located between the heights of 165m AHD south of the existing Fisherman's Landing Wharves and 400m AHD at Grahams Creek. The construction of the Western Basin Reclamation Area will not adversely impact the operation of the Gladstone Airport.

The Gladstone Calliope Aerodrome Board had a long-term proposal to construct a future Airport on the Kangaroo Island Reserve in the Narrows that had been set-aside for the purpose. The *Calliope Shire*

*Council Planning Scheme 2007* contains an "Airport Facilities Overlay Map" indicating the possible buffer distances and the Object Limitation Surface.

The annexure of the Kangaroo Island Reserve into the Gladstone State Development Area as a "Restricted Development Precinct" is likely to preclude the use of the island for use as an airport. Schedule 8 of the GSDA Development Scheme below outlines the development controls on the Kangaroo Island "Restricted Development Precinct".

**Table 11-7 Schedule 8 – Restricted Development Precinct**

| Column 1 | Column 2 | | |
|---|---|---|---|
| | Land use that the Coordinator-General may approve | | |
| | Column 2a | Column 2b | Column 2c |
| | Uses that are considered highly likely to meet the purpose of the land use designation | Uses that may meet the purpose of the land use designation | Uses that are considered likely to compromise the purpose of the land use designation |
| Restricted Development Precinct | Local infrastructure<br>Materials transport infrastructure<br>Special use | Infrastructure facility | All other uses not specified in Column 2a or 2b. |

To further assess the implication of the above Schedule, the definition of "Infrastructure" from the Development Scheme is as follows:

> *"infrastructure" means those facilities, services and utilities that, in the opinion of the Coordinator-General, are required by or associated with development of the Gladstone State Development Area. This infrastructure may include local infrastructure.*

This would give the Coordinator General the right of veto to preclude an airport on Kangaroo Island should it not be required for development within the GSDA, and it has been generally indicated to the Gladstone community that the Airport would not proceed on Kangaroo Island.

The Gladstone Airport is currently in the process of being upgraded to strengthen the pavement and lengthen the runway to 1915m, catering for larger aircraft. According to the 2008 Gladstone Airport Development Plan, this upgrading will give the airport adequate capacity to "cater for long term air travel growth in the Gladstone region at an appropriate level of service and continued convenience to the travelling public beyond a 2027/28 horizon". As the Gladstone Airport upgrade will provide adequate service beyond the 2027/28 horizon, it is considered unlikely that the Airport will proceed on the Kangaroo Island site. It is therefore concluded that the proposed Western Basin Dredging and Disposal Project will not have an impact on the use of the Kangaroo Island site as an airport.

### *Dust and Erosion*

Environmental impacts from the high rate haulage activities such as erosion and sediment control will be addressed by the requirement for the earthworks operator to submit an Environmental Management Plan to the Council as a part of the Operational Works application. Where applicable, measures will be put in

place to prevent wind and water born erosion, such as water trucks, as well as the picking up of materials from the wheels of haul vehicles with shaker grids and rubble pavements.

***Spill Contingency Plans***

Due to the density (weight) of the rock material loaded into the trucks using the haul road, the trucks will generally not be loaded to a point where the load will have the potential to spill over the confines of the body of the vehicle. Should a spill occur on the road, construction equipment such as loaders and backhoes will be available from the quarry or construction activities at either end of the haul route to remove spilt material from the roadway. Where material is spilt on the bitumen surface and it is deemed to be a hazard to motorists, road sweepers may be mobilised on hire to remove the product from the road.

Petroleum products stored by the haulage contractor will also be the subject of the Environmental Management Plan associated with the haulage contract. The storage area is likely to be at the quarry site. Fuel storage areas will be adequately bunded and spill kits will be available on site should an incident occur. Alternatively, a mobile fuel truck may be contracted to undertake refuelling of the construction vehicles. An Emergency Management Plan will also be developed for the Project and will include measures for response to fuel spills. This is discussed in detail in Chapter 17.

### 11.3.2 Marine Traffic Impacts and Mitigation Measures

This section discusses the potential impacts and mitigation measures for impacts of dredging on shipping and small craft within the port, including traffic, safety and pollution.

***Reclamation Construction***

The proposed Western Basin Reclamation Area is west of the current port facilities, therefore no impacts to the existing commercial shipping traffic and facilities are anticipated during construction of the reclamation.

There may be an exclusion zone around the bund wall itself, which may place restrictions on recreational and commercial fishing activities in this area. These impacts are discussed in detail in Chapter 13.

***Additional Shipping Traffic***

The impacts of additional shipping traffic utilising the dredged channels and swing basins is considered in the approvals processes for the individual facilities that are seeking to establish at the port (e.g. the LNG industry).

***Dredging Traffic***

Details regarding the type and size of dredging vessels to be used for the project have been included in Chapter 2. It is possible that up to four dredgers and associated support craft will be operating concurrently within the harbour to meet the anticipated construction schedule for development of the various LNG facilities. The dredging works will be undertaken with reference to the requirements of the *Transport Operations (Marine Safety) Act* 1994 and *Transport Operations (Marine Pollution) Act* 1995.

***Interruptions to Shipping and Small Craft and Shipping Safety***

Prior to the commencement of dredging operations, it will be necessary to inform the Regional Harbour Master of the specifics of the works and the locations in which dredgers will be operating. International practice is for the Regional Harbour Master to issue a “Notice to Mariners” as the means of advising the

masters of all vessels using the port of the specifics of the works. For an extended dredging campaign, such as that proposed for Gladstone, the Regional Harbour Master will update “Notice to Mariners” throughout the progress of the works.

All dredgers will be marked with daymarks and lighting to conform to the International Association of Lighthouse Authorities (IALA).

The conditions of contract for dredging works typically require that dredging contractors avoid any interruption to shipping movements within the Port. The following conditions will be applied:

1. Trailer Suction Hopper Dredgers (TSHD’s) dredging within the existing declared channels liaise with Port Control and adjust their cycle of dredging and material discharge to accommodate the scheduled movements of shipping in the channel. If necessary, from time to time, the dredgers may even cease operations and stand clear of the channel to permit the shipping movements.
2. Stationary dredgers such as Cutter Suction Dredgers (CSD’s) or Grab Dredgers will, under the terms of the contract, be required to suspend operations and pull aside from the channel ahead of the shipping movement being committed to sailing the channel reach. Clearing the channel will require that all pipelines and anchors are clear of the channel. At the time of bidding for the works, the dredging contractors will need to confirm with the Regional Harbour Master as to whether it will be acceptable to slacken mooring lines – leaving them on the channel bed as the ship transits the channel.

All dredgers will be equipped with radio to facilitate communication between the dredge, shipping and port control through the transit of the vessels.

If a Master of a ship has not completed the requisite transits to or from the port, it will be necessary for a pilot to be taken on-board for the ship’s transit. Pilots will be familiar with the on-going dredging operations and their location. Similarly, if the Master has the requisite transits to be granted an “exemption” certificate, the Master will also be familiar with the on-going dredging operations and their location.

In regards to port vessels and small craft, they are not necessarily restricted to movement in the shipping channels and have many more options to sail around dredging plant working within the port. The conditions of contract for dredging works will require that dredging operations minimise interruptions to Port Vessels and small craft. In the immediate vicinity of the dredge, vessels will need to adhere to standard navigation rules in terms of speed restrictions and passing clearances.

In the case of the Cutter Suction Dredger, pipelines will extend from the dredge to the area where the material is to be relocated. A floating pipeline will trail immediately behind the dredge. It is anticipated that Contractors will opt for a sunken pipeline for substantial extents of the pipeline route.

The floating pipeline will be high visibility and marked with lights at night. The sunken pipeline routes will be selected to facilitate reasonably free movement of vessels and to avoid crossing of declared shipping channels. Any “Notice to Mariners” issued by the Regional Harbour Master will identify the location of dredge operations and pipeline routes and any draft restrictions which may be caused by the presence of the pipeline.

Options for the discharge of materials from TSHDs or hopper barges may involve the dumping of the material on the seabed adjacent to the proposed Western Basin Reclamation Area. The discharge area will be in approximately 7 metres of water approximately 200 to 300 metres from the eastern revetment

of the reclamation area. This area will be marked with buoys and lights. The movement of port vessels and small craft through this area will excluded.

***Marine Pollution***

Should a spill of dredged material occur through the rupture of a dredge pipeline, the dredger will be shut down and the materials recovered, where practical. The dredging contractor will be required to provide details of contingency plans for such an event.

Dredgers will be required to carry a spill response kit in case fuel is spilt. GPC also has a contingency plan in place for petroleum spills associated with shipping operations within the Port that will be implemented should a major incident occur. This is discussed in detail in Chapter 17.

Dredgers and other support vessels will also be required to operate under the requirements of the *Transport Operations (Marine Pollution) Act 1995* with respect to the management of ships waste.