



GLNG PLANT PROJECT

SHIPPING ACTIVITY MANAGEMENT PLAN

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ABBREVIATIONS

Abbreviations, Acronyms and Phrases	Definitions
DAFF - Biosecurity	Department of Agriculture, Fisheries & Forestry - Biosecurity
CEMP	Construction Environmental Management Plan
DPA	Dugong Protection Area
EHP	Department of Environment and Heritage Protection
EIS	Environmental Impact Statement
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
GLNG	Gladstone Liquefied Natural Gas
GPC	Gladstone Ports Corporation
LO-LO	Load on Load off
LNG	Liquefied Natural Gas
MSQ	Maritime Safety Queensland
MOF	Materials Offloading Facility
PCIMP	Port Curtis Integrated Monitoring Program
QMP	Quarantine Management Plan
RO-RO	Roll on Roll off
SAMP	Shipping Activity Management Plan



DEFINITIONS

Term	Definition
Charter vessel	International vessels that are hired for the conveyance of goods on a specified voyage, or for a defined period of time. Generally operating under the direction of the shipper.
Dumb barge	Barges used specifically for the carriage of bulk cargo.
Landing barge	Barges equipped with a bow ramp for roll on / roll off loading of trucks and equipment which requires the use of a tug.
Landing craft	Self-propelled vessels equipped with a bow ramp for back on / roll off loading of trucks and vehicles. These vessels are also capable of making beach landings in shallow water.
Module barge	Flat deck barge used for the transportation of fabricated modules from the Philippines.
Environmental Impact Statement (EIS)	The process of identifying, evaluating and mitigating the biophysical, social and other relevant effects of development proposals prior to major decisions and commitments been made.
Mitigation	Measures taken to reduce adverse impacts on the environment.
Monitoring	Activity involving repeated observation, according to a pre-determined schedule, of one or more elements of the environment to detect their characteristics (status and trends).
Passenger Ferry	Vessels used solely for the purpose of transporting passengers to and from the GLNG facility.
Ropax vessel	Self-propelled vessels equipped with bow and stern ramps for roll on / roll off loading of trucks and vehicles.



1 INTRODUCTION

1.1 Project Background

The Gladstone Liquefied Natural Gas (GLNG) Project involves the extraction of coal seam gas from gas fields in eastern Queensland and transmission by pipeline to a new Liquefied Natural Gas (LNG) facility on Curtis Island near Gladstone. The LNG will be loaded onto ships and exported.

1.2 Purpose of the Shipping Activity Management Plan

The construction and subsequent operation of the GLNG facility on Curtis Island will result in an increase in shipping activity within Port Curtis. This Shipping Activity Management Plan (SAMP) has been prepared to meet the requirements of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* referral for the construction of marine facilities including a jetty, materials offloading facility and channel dredging (Referral No. 2008/4058).

Condition 13 of the EPBC referral requires a SAMP to be prepared for shipping undertaken by or under the control of GLNG, which includes:

- (a) provision for the protection of Dugongs (*Dugong dugon*); Green Turtles (*Chelonia mydas*); Loggerhead Turtles (*Caretta caretta*); Flatback Turtles (*Natator depressus*); and Water Mouse, (*Xeromys myoides*) and the seagrass species *Halodule uninervis*, *Halophila ovalis*, *Halophila decipens*, *Halophila minor*, *Halophila spinulosa*, and *Zostera capricorni*;
- (b) identification of the habitats, activities, and environmental tolerances in relation to the shipping activity associated with the referral for the species specified in (a);
- (c) to minimise environmental disturbance to the species mentioned in (a):
 - (i) limits on vessel speeds, including speeds for particular vessel types;
 - (ii) limits on vessel movements, including the use of thrusters; and
 - (iii) limits on vessel light and sound;
- (d) a comprehensive outline of mitigation measures and controls for each of the types of shipping activities to minimise their impact on the species mentioned in (a), including actions to:



- (i) prevent and respond to the impact of accidental fuel, oil or chemical spills;
 - (ii) minimise the impact of marine discharges, including those associated with vessel cleaning, anti-fouling and waste disposal;
 - (iii) minimise disturbance to the seagrass species mentioned in (a);
 - (iv) minimise the impact of bow-wash on Water Mouse (*Xeromys myoides*) nesting sites; and
 - (v) proposed remedial action in the event of any impacts directly attributable to the proponent's shipping activities on the species specified in (a), and the habitats identified in (b), including a feasible and beneficial offsets strategy.
- (e) a comprehensive outline of monitoring arrangements to determine the impact of shipping activity on the species specified in (a), which includes:
- (i) recommendations on the timing and frequency of species surveys;
 - (ii) proposed monitoring arrangements; and
 - (iii) the nature and frequency of proposed reporting arrangements.

1.3 Objective

The objective of this SAMP is to specify measures to minimise potential environmental impacts resulting from shipping activity associated with the initial construction works at the GLNG facility, to fulfil Condition 13 of the EPBC Referral No. 2008/4058.

1.4 Structure

The SAMP is divided into four main sections:

- Section 1 is an introduction and overview;
- Section 2 outlines the proposed shipping activity associated with this SAMP;
- Section 3 identifies the sensitive environmental receptors and outlines conservation status, background information and potential impacts from shipping activity; and
- Section 4 describes the proposed mitigation and monitoring measures relating to shipping activity.



1.5 Scope

For the purposes of this SAMP, 'shipping activity' refers to all types of vessel activity associated with the construction of the Materials Offloading Facility (MOF) and the activities associated with the construction of the GLNG facility. For the purposes of this SAMP, construction related shipping activities can be divided into three phases:

- Phase I includes shipping activities operating from Gladstone Marina and Fisherman's Landing, from commencement of works until the project's mainland marine facilities at Port Central and RG Tanna are fully operational;
- Phase II includes shipping activities from the RG Tanna and Port Central mainland facilities to Curtis Island; and
- Phase III adds international charter vessels and module barges to the ongoing Phase II shipping.

Revisions to this SAMP will be prepared and submitted as the project continues to develop and as more detailed information becomes available.

Further revisions of this SAMP will be prepared at a later date to address the operational phase of the GLNG facility.

2 SHIPPING ACTIVITY

2.1 Introduction

During Phase I (as defined above) the project workforce, construction materials and equipment were transported from the mainland to the project site on Curtis Island from existing and additional temporary port facilities at the Gladstone Marina and Fisherman's Landing. During this period, purpose-built facilities were constructed at RG Tanna and Port Central which will ultimately replace the facilities at Fisherman's Landing and Gladstone Marina. Figure 2-1 shows the locations of the mainland facilities and the voyage routes in relation to the GLNG Marine Offloading Facility (MOF) on Curtis Island.

Each of the phases is described in further detail below.



Figure 2-1 Marine facilities and vessel routes for Phase I Construction

2.2 Vessel Activity during Phase I

2.2.1 Ferry Services

Initial transportation of the workforce commenced in March 2011 from the Gladstone Ports Corporation (GPC) ferry terminal within the Gladstone Marina. All ferries operate in accordance with the protocols developed for the GPC ferry terminal. The project initially utilized one (1) x 150 capacity passenger ferry to provide the cross harbour services from the Gladstone Marina to the disembarkation area established on Curtis Island. As the workforce numbers increased, additional 150 capacity passenger ferries were introduced into the cross harbour transportation program. By October 2011, the project transported approximately six hundred and fifty passengers daily to/from Curtis Island. To accommodate this need the first 400 capacity passenger ferries were introduced during 4Q 2011 to replace two of the 150 capacity ferries. By January 2012, the project introduced the second 400 passenger ferry.

Ferries operate one trip from the mainland to Curtis Island each morning at about 6.00am, returning to the mainland to await the end of the work day. They will then return to Curtis Island in the afternoon to pick up workers at about 5:30pm and return them to the mainland. One (1) x 150 passenger ferry operates as a “water taxi” service throughout the day, making approximately one round trip every two hours.

Figure 2-2 references the estimated personnel movements for the Phase I construction schedule. By August 2011, approximately four hundred (400) project personnel were required to be ferried to Curtis Island from the mainland during dayshift operations, and approximately seventy (70) during a night shift operation. By July 2012, the ferry

operations transferred from the Gladstone Marina to the GLNG mainland ferry terminal referred to as Port Central.

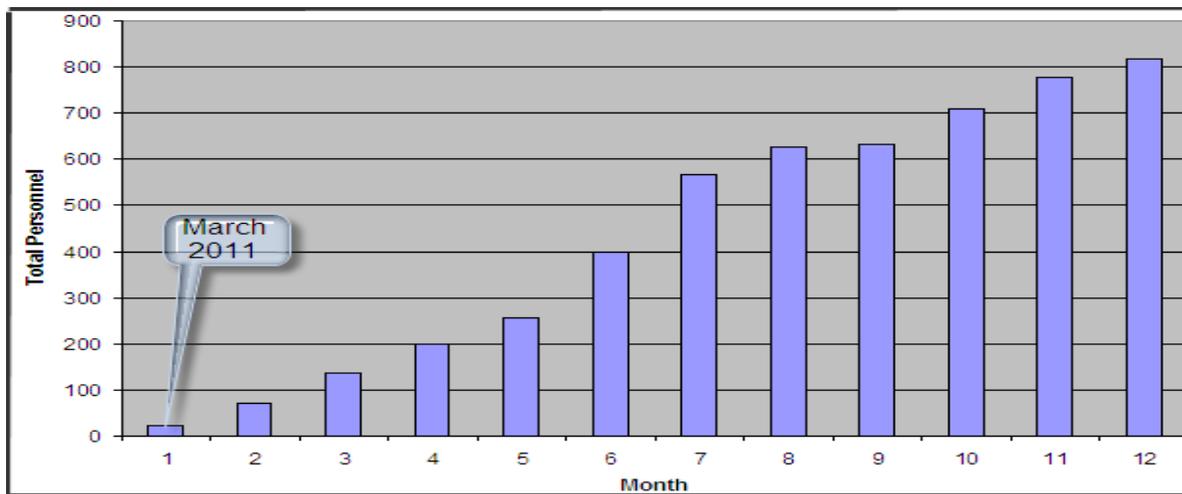


Figure 2-2 Estimated personnel movements for the GLNG Project

2.2.2 Transportation of Construction Materials and Equipment

Transportation of bulk materials and equipment during Phase I occurred from facilities at Fisherman’s Landing and the Gladstone Marina.

Fisherman’s Landing Barge Facility:

Two (2) spud barges were installed adjacent to the existing barge berth at Fisherman’s Landing, which provided exclusive access for the GLNG Plant Project barges. Load out operations from this facility will take place on a twenty four (24) hour basis to enable the most use of the tidal cycles.

Dumb barges (with assist tugs) were the predominant vessel types used to transfer bulk materials and equipment to the GLNG facility on Curtis Island. Additional information with regards to the size and type of marine equipment can be found in the attached specification sheets. Figure 2-3 reflects the average number of trips (per month) along with the execution strategy and vessel types from the Fisherman’s Landing facility on a daily basis.



Subcontractor Barge Schedules from Fisherman's Landing			
The data shown in this schedule represents the proposed return barge trips per month			
Subcontractor >	Site Civil	MOF	Mainland Facilities
Equipment >	1 x Landing Barge 2 x Support Tugs 1 x Water Barge	1 x 1500 Ton Bulk Barge 1 x Small Supply Barge 1 x Pile Barge 2 x Support Tugs	2 x Support Tugs 2 x Spud Barges
Execution Strategy >	2 trips per day Operations will be 24 hours	1 x 1500 Ton bulk barge will make 1 trip per day 1 x supply barge will make several trips per day 1 x pile barge will make 1 trip per day	Initial facility set up only Spud barges will be delivered and set up as temporary structures
Apr-2011	0	0	14
May-2011	0	0	28
Jun-2011	0	36	0
Jul-2011	0	52	0
Aug-2011	24	52	0
Sep-2011	52	104	0
Oct-2011	52	104	0
Nov-2011	52	104	0
Dec-2011	52	104	0
Jan-2012	52	104	0
Feb-2012	52	104	0
Mar-2012	52	52	0
Apr-2012	52	52	0
May-2012	52	52	20
Remaining schedule>	Operations will move to RG Tanna	Operations will move to RG Tanna	Initial facility set up and demob only
Basis & Assumptions			
Site Civil Subcontractor voyages for March 2011 are based on half month of activity only			
Subcontractor voyages are based on 24 hour per day schedule due to tidal restrictions at Fisherman's Landing Berth			
Each barge will have support tug in attendance at all times			
Delays resulting from the GPC or Harbor Master have not been included in the above projected voyages			
The projected number of voyages listed above is subject to change			
Operations at Fisherman's Landing will cease upon completion of RG Tanna and Port Central facilities			

Figure 2-3 Monthly return voyages from Fisherman's Landing

Gladstone Marina:

Trucks and equipment began loading in March 2011 from the existing barge ramp in the Gladstone Marina. Two (2) x 35 metre landing craft were utilised from March 1st 2011 to April 30th 2011. These landing craft make up to two (2) trips each per 12 hour work day.

On May 1st 2011, the project began using two (2) x 50 meter landing craft until July 31st 2012. These larger landing craft make four (4) to six (6) trips each per 24 hour work day. Construction equipment and concrete batch plant trucks and materials will make the majority of loads being transported from the marina facility during this period.

2.2.3 Vessel Speeds

All vessels are required to travel at safe speeds. Slower speeds will be enforced depending upon weather and harbour conditions at the time of the voyage. Within 30 metres of a jetty, wharf, boat ramp, pontoon or ship at anchor or made fast to the shore, a speed limit of six (6) knots applies per the *Transport Operations (Marine Safety) Regulation 2004 (Qld)*. Additionally, speed restrictions will apply as per condition 31 EPBC No 2008/4058 which specifies a maximum speed limit of six (6) knots within the shallow water sections of the shipping routes, defined as waters with a five (5) metre depth contour or less. The map shown below as figure 2-4 depicts the areas along the vessel routes that may be considered shallow water sections. These areas will be checked regularly with vessel sonars as changing conditions will be present.

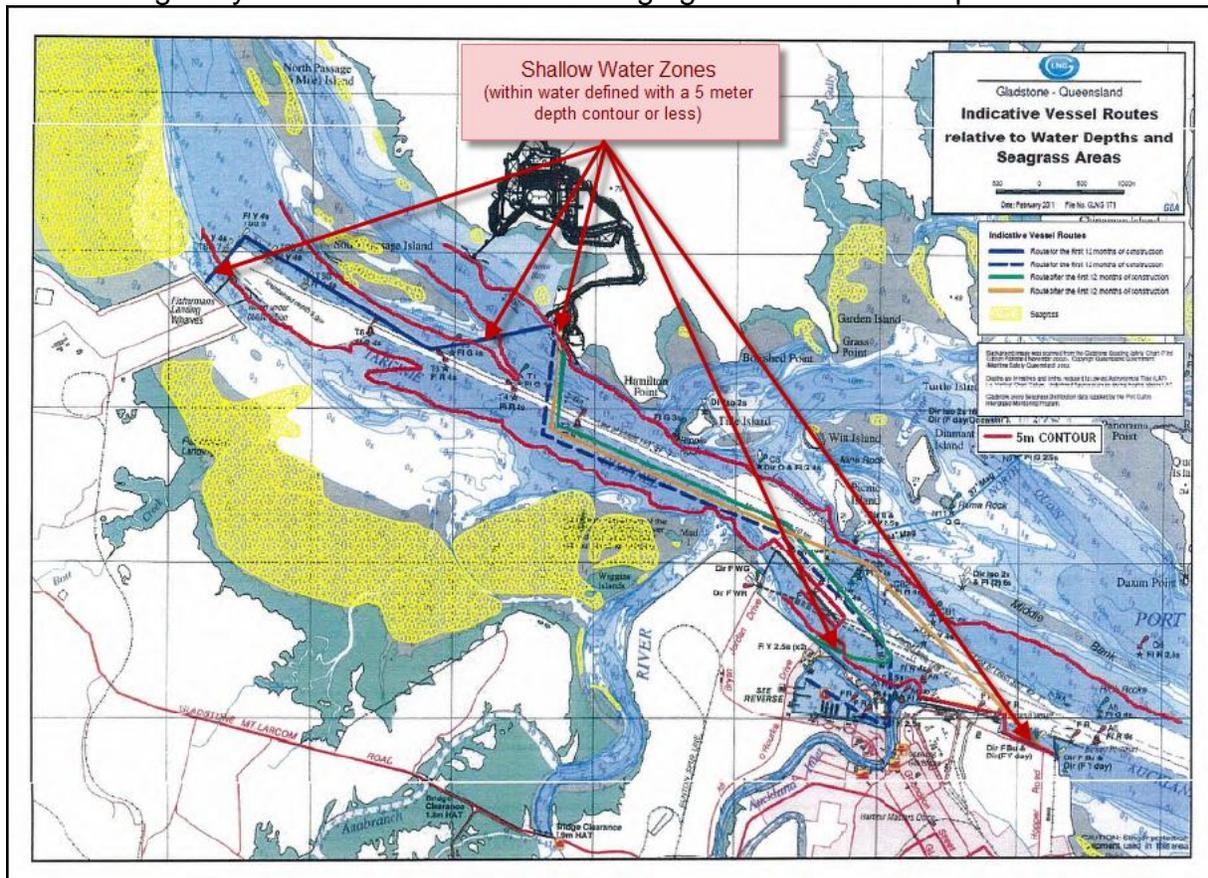


Figure 2-4 Shallow Water Zones (within water defined with a 5 meter depth contour or less) (Subject to change)



All passenger ferries will operate at a maximum speed not to exceed 25 knots in open water. Barges towed by tugs will typically operate at lower speeds of ten (10) knots or less.

The speed limits noted in this SAMP are based on the Transport Operations (Marine Safety) Regulation – 2004 which specifies section 127 – speed limits in proximity to structures, and section 128 – speed limit for ships if wash can cause marine incident or shoreline damage. The General Manager has the power to fix speed limits for ships as noted in section 206A of the Transport Operations (Marine Safety) Act 1994. Additionally, the MSQ Standard for “Standard for Marine Construction Activities within the Gladstone Harbour (Version 1.12, November 2012)”, Section 3.2.3 which specifies the maximum speed of 25 knots for passenger transfer vessels.

2.3 Vessel Activity during Phase II

2.3.1 Ferry Services

Mainland ferry operations were transferred from the Gladstone Marina to Port Central. All ferries operate in accordance with the protocols developed for the Port Central ferry terminal. It is expected that the project will utilize up to four (4) 400 capacity ferries and up to two (2) 150 capacity passenger ferries to provide cross harbour services from the Port Central facility to the permanent passenger terminal established on Curtis Island. However, as the Project reaches peak workforce numbers it is anticipated that additional ferries may be required to cater for the Project requirements.

At peak times the 400 capacity passenger ferries will collectively make approximately six (6) return trips daily both in the morning and the evening. The 150 capacity passenger ferries will operate throughout the day, collectively making approximately 13 return trips daily. The ferry schedule is subject to change dependent upon workforce demand.

The operational hours for the ferry are 24 hours a day Monday to Saturday, with the majority of the transits generally occurring between 4:40am and 9:00pm. Ferry services also operate on Sundays as required to suit the construction schedule.

Several purpose built ferries have engineered design such as water jet propulsion systems, shallow draughts and have forward looking infra-red cameras installed to minimise the potential impact of the ferries on sensitive environmental receptors (see Section 3 for further details). However additional passenger ferries may be required to provide further support to the Project for short periods of time which do not have engineered designed controls. Circumstances which may require the use of additional ferries which are not purpose built for the Project include the replacement of a vessel requiring repairs and maintenance, and during peak construction times when greater numbers of Gladstone residents are employed for the Project.



2.3.2 Transportation of Construction Materials and Equipment

Ropax vessels have been contracted for the cross harbour services needed in the Gladstone Harbour. The vessels are complete with bow thrusters for added control and increased manoeuvrability in the strong currents. The Ropax vessels have bow and stern ramps to facilitate a safe and effective roll-on and roll-off operation.

Port Central Mainland Facility

A roll-on / roll-off vessel berth will be constructed at the Port Central facility. One of the Ropax vessels will operate daily from the Port Central facility to transport materials and equipment from the mainland to Curtis Island. This vessel may make up to five (5) round trips per sixteen (16) hour work day.

RG Tanna Mainland Facility

A dual use berth will be constructed at the RG Tanna facility which could support the loading of Ropax vessels, bulk and deck barges. The dual use berth will have a ramp for roll-on / roll-off operations. In addition, the same berth will support side loading lift-on / lift-off operations for loading barges with bulk materials and piles.

Ropax vessels may operate daily from the RG Tanna facility transporting trucks and trailers loaded with equipment and materials to Curtis Island. At peak, each Ropax vessel may make up to five (5) round trip voyages per sixteen (16) hour work day.

Figure 2-5 outlines the total expected Ropax voyages from each facility for the duration of the construction period.



Schedule Month - Year	RG Tanna Facility			Port Central Facility		
	Total Ropax Vessels	Estimated Ropax Voyages per Month	Estimated Ropax Voyages per Day	Total Ropax Vessels	Estimated Ropax Voyages per Month	Estimated Ropax Voyages per Day
Feb 12	1	2	5	0	0	0
Mar 12	1	98	5	0	0	0
Apr 12	1	93	5	0	0	0
May 12	1	103	5	0	0	0
Jun 12	1	103	6	1	98	4
Jul 12	1	106	5	1	93	4
Aug 12	1	117	5	1	103	4
Sep 12	1	126	5	1	103	4
Oct 12	1	121	5	1	106	5
Nov 12	1	115	5	1	117	5
Dec 12	1	130	5	1	126	5
Jan 13	1	122	5	1	121	5
Feb 13	1	123	5	1	115	5
Mar 13	1	125	6	1	130	6
Apr 13	1	124	5	1	122	5
May 13	1	126	5	1	123	5
Jun 13	1	125	5	1	125	5
Jul 13	1	121	5	1	124	5
Aug 13	1	124	5	1	126	5
Sep 13	1	118	5	1	125	5
Oct 13	1	108	5	1	121	5
Nov 13	1	113	5	1	124	5
Dec 13	1	111	5	1	118	5
Jan 14	1	104	5	1	108	5
Feb 14	1	94	5	1	113	5
Mar 14	1	98	5	1	111	5
Apr 14	1	83	5	1	104	5
May 14	1	73	4	1	94	4
Jun 14	1	79	3	1	98	4
Jul 14	1	79	3	1	83	4
Aug 14	1	39	2	1	73	3
Sep 14	1	36	2	1	63	3
Oct 14	1	27	1	1	52	2
Nov 14	1	14	1	1	45	2
Dec 14	1	14	1	1	40	2
Jan 15	1	7	1	1	41	2
Feb 15				1	41	2
Mar 15				1	41	2
Apr 15				1	41	2
May 15				1	41	1
Jun 15				1	41	1
Jul 15				1	41	1
Aug 15				1	41	1
Sept 15				1	30	1
Oct 15				1	30	1
Nov 15				1	30	1
Dec 15				1	30	1
Jan 16				1	30	1
Feb 16				1	30	1
Mar 16				1	30	1
Apr 16				1	30	1
May 16				1	30	1
Jun 16				1	30	1
Jul 16						

Figure 2-5 Expected Ropax vessel voyages for Phase II Construction (Subject to change)

Some marine operations will require the use of the lift-on / lift-off berth at the RG Tanna facility for loading bulk materials and piles. Most of these loads will take place during the night shift operation, however from time to time they will need to load during the day.

Several flat deck pile barges will be required for delivery and installation of the piles to develop our marine facilities. The pile barges will load steel piles from a 275 metric tonne shore crane (or similar). Each of the pile barges will require support tugs in attendance.

Support tugs will be working in conjunction with the projects barges to ensure maritime safety is maintained during all operations in Gladstone Harbour.

2.3.3 Vessel Speeds

All vessels are required to travel at safe speeds. Slower speeds will be enforced depending upon weather and harbour conditions at the time of the voyage. Within 30 metres of a jetty, wharf, boat ramp, pontoon or ship at anchor or made fast to the shore, a speed limit of six (6) knots applies as per section 127 of the *Transport Operations (Marine Safety) Regulation 2004 (Qld)*. The MSQ Standard for “Standard for Marine Construction Activities within the Gladstone Harbour (Version 1.12, November 2012)”, Section 3.2.3 which specifies the maximum speed of 25 knots for passenger transfer vessels. Additionally, speed restrictions will apply as per condition 31 EPBC No 2008/4058 which specifies a maximum speed limit of six (6) knots within the shallow water sections of the shipping routes, defined as waters with a five (5) metre depth contour or less. The map shown above as figure 2-4 depicts the areas along the vessel routes that may be considered shallow water sections. These areas will be checked regularly with vessel sonars as changing conditions will be present.

The normal operating speed of the Ropax vessels will be 12 knots, depending on the weather and conditions present at the time of the voyage. Fully loaded, these vessels have a draft of only 2.6 meters. Figure 2-6 outlines the marine facilities and vessel routes for Phase II of the construction program.



Figure 2-6 Marine facilities and vessel routes for Phase II Construction



2.4 Vessel Activity during Phase III

The following information indicates the scale and nature of Phase III shipping. Phase III shipping includes the arrival of international vessels directly to the GLNG Plant Project. These activities are additional to Phase II shipping activities (Section 2.3) which are ongoing during this period.

2.4.1 International Charter Vessels

Most of the project charter vessels will berth at the Gladstone Port (AP4 terminal) for initial discharge of all general cargo weighing less than 50 metric tons. A dedicated Lo-Lo discharging facility on Curtis Island will be developed to accommodate the offloading of all cargo in excess of 50 metric tons arriving on international charter vessels. Arrival of all charter vessels will be scheduled with the Maritime Safety Queensland (MSQ) and no vessels will enter the Gladstone Harbour without proper authorization. In most cases an MSQ marine pilot and assist tugs will be required unless otherwise authorized by the Regional Harbour Master.

To accommodate major equipment deliveries prior to the completion of the Material Offloading Facility (MOF) the project will discharge major equipment at the Gladstone Port to a barge using the ships cranes. The barge will deliver this cargo to the bulk aggregate berth adjacent to the Marine Offloading Facility (MOF) for offloading with a shore crane.

Direct charter shipments may be subject to Customs inspections, and arrangements will be made for accommodating Customs inspections on Curtis Island when required.

A DAFF Biosecurity approved quarantine facility and wash down bay has been constructed for receiving international shipments on Curtis Island. All international cargo arriving to the MOF directly will be offloaded (as per DAFF direction) and moved into the quarantine facility until a quarantine inspector releases the materials for final transport to the jobsite.

Figure 2.7 below outlines the expected International Charter shipments for Phase III of the construction program.



Shipments to Curtis Island Lo-Lo Berth / Gladstone Port		
Schedule for Delivery	Vessel Description	Number of Vessel Voyages
4th Qtr / 2012	Direct Charter Vessels	3
1st Qtr / 2013	Direct Charter Vessels	8
2nd Qtr / 2013	Direct Charter Vessels	8
3rd Qtr / 2013	Direct Charter Vessels	6
4th Qtr / 2013	Direct Charter Vessels	5
1st Qtr / 2014	Direct Charter Vessels	5
2nd Qtr / 2014	Direct Charter Vessels	5
3rd Qtr / 2014	Direct Charter Vessels	6
4th Qtr / 2014	Direct Charter Vessels	6
1st Qtr / 2015	Direct Charter Vessels	6
2nd Qtr / 2015	Direct Charter Vessels	6
3rd Qtr / 2015	Direct Charter Vessels	6
4th Qtr / 2015	Direct Charter Vessels	6
1st Qtr / 2016	Direct Charter Vessels	6

Figure 2-7 Expected International Charter shipments for Phase III Construction (Subject to change)

2.4.2 International Module Barge Shipments

Flat top deck barges will be the primary method for module transportation from the Philippines to Curtis Island. A dedicated Ro-Ro discharging facility on Curtis Island will be developed to accommodate the offloading of international module barges arriving directly to the Material Offloading Facility (MOF) on Curtis Island.

Direct module shipments may be subject to Customs inspections, therefore special arrangements will be made for accommodating Customs inspections on Curtis Island. In most cases, Customs will clear the cargo prior to the discharge operation. Additionally, the approved quarantine facility and wash down bay will be designed to accommodate a module, should module quarantine be required. A quarantine inspector will release the modules for final transport to the jobsite.

Figure 2-8 outlines the expected module shipments for Phase III of the construction program, while Figure 2-9 shows the proposed international vessels routes within the Port of Gladstone.

Shipments to Curtis Island Ro-Ro Berth		
Schedule for Delivery	Vessel Description	Number of Vessel Voyages
2nd Qtr / 2013	Modules	2
3rd Qtr / 2013	Modules	6
4th Qtr / 2013	Modules	7
1st Qtr / 2014	Modules	6
2nd Qtr / 2014	Modules	4
3rd Qtr / 2014	Modules	6

Figure 2-8 Module Shipments to MOF in Phase III (Subject to change)

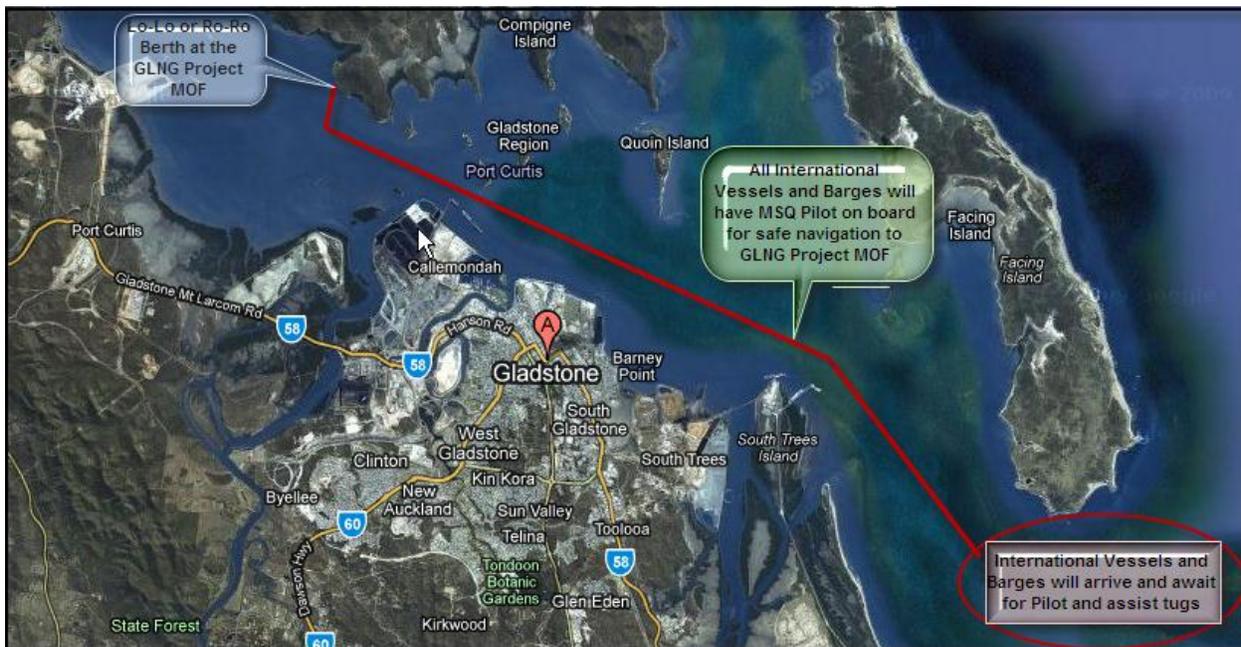


Figure 2-9 Proposed marine facilities and International vessel routes for Phase III

Revisions and updates of this SAMP have been made prior to the introduction of international vessels to the MOF on Curtis Island. A detailed Biosecurity Management Plan (BMP) has been developed in collaboration with DAFF and has been subsequently approved by the Minister. The MOF has been approved by Australian Customs and Border Security to operate under a Section 58 notification process.



3 SENSITIVE ENVIRONMENTAL RECEPTORS AND POTENTIAL IMPACTS

The purpose of this SAMP is to manage environmental impacts to the following sensitive environmental receptors from shipping activity during the construction of the GLNG facility:

- Dugongs (*Dugong dugon*);
- Green Turtles (*Chelonia mydas*);
- Loggerhead Turtles (*Caretta caretta*);
- Flatback Turtles (*Natator depressus*);
- Water Mouse, (*Xeromys myoides*); and
- Seagrass species (*Halodule uninervis*, *Halophila ovalis*, *Halophila decipens*, *Halophila minor*, *Halophila spinulosa*, and *Zostera capricorni*).
- Whales; and
- Dolphins and other cetaceans

Although not specifically required under the EPBC approval (Referral No. 2008/4058), in the interests of producing a comprehensive plan this SAMP also considers the potential impacts of shipping activity on whales, dolphins and other cetaceans.

This section outlines the conservation status, background information and potential impacts from shipping activity for each of these sensitive environmental receptors.

3.1 Dugongs

The dugong (*Dugong dugon*), which is listed as Vulnerable under the Nature Conservation (Wildlife) Regulation 2006 and Migratory under the EPBC Act, is recorded to occur within the GLNG Plant Project area. Dugongs prefer shallow and sheltered areas where their primary food source, seagrass, occurs. The project area is located within the Rodds Bay Dugong Sanctuary, which is a Zone B (restricted use) Dugong Protected Area (DPA) declared under the *Fisheries Act 1994*. The Gladstone coastline and the Rodds Bay DPA are recognised as important habitat for dugong populations despite being closely associated with commercial port activities.

A survey conducted in 2005 (Marsh and Lawler 2006) estimated that there were 183 (\pm 66) dugongs in the Port of Gladstone area, with dugong feeding activity observed on the majority of intertidal seagrass meadows surveyed during a study of benthic habitats in the port. However, Grech and Marsh (2007) classed the area around Gladstone as low to medium conservation status on the basis of relative density of dugongs estimated from spatial modelling and frequency analysis taken from time series data over nineteen (19) years of aerial surveys.



Seagrass meadows found within the Port Curtis area serve as a primary feeding source for dugongs in the port. The degradation and/or destruction of such seagrass meadows may reduce feeding opportunities of dugongs within Port Curtis but are not expected to impact the population size.

Potential impacts of shipping activity on dugongs include mortality, injury and/or behavioural changes (e.g. avoidance of preferred feeding grounds) resulting from:

- Boat strike;
- Noise and vibration from vessels;
- Light from vessels.

Due to the presence of seagrass beds, there is potential for dugongs to forage near the GLNG Plant Project area; however it is expected that dugongs will avoid areas of intensive shipping activity. Controlled vessel speeds, maintaining regular watch and adhering to reporting requirements will be implemented to reduce any potential interactions.

Hodgson (2004) showed that dugongs were particularly susceptible to interactions with large high-speed vessels due to a delayed avoidance response displayed by dugongs. As described in Section 2.2.3, passenger ferries will have a maximum operating speed of 25 knots in open water, and barges towed by tugs will typically operate at ten (10) knots or less.

Figure 3-1 illustrates the indicative vessel routes in relation to water depths and known seagrass areas (Port Curtis Integrated Monitoring Program integrated coastal monitoring data, 2009). Except when in close proximity to terminals/barge facilities, all vessels will be operating in deep water. The proposed vessel routes do not traverse seagrass areas.

When vessels are operating in shallower water and potentially close to seagrass beds (i.e. within 30 metres of a jetty, wharf, boat ramp, pontoon), a speed limit of six (6) knots applies. Vessels moving at these speeds, in combination with the environmentally sensitive design of the passenger ferries (see Section 2.2.3), are unlikely to result in increased risk of boat strikes to dugongs.

The issue of boat strike is recognised to be much broader than the GLNG Plant Project alone, given that most boat strikes occur from faster boats, e.g., smaller fishing vessels within Port Curtis.

The Port of Gladstone is a busy operational waterway. Vessels associated with the construction of the GLNG facility will be operating in an environment that is subject to regular disturbance from vessel activity. It is likely that dugongs will therefore be

habituated to noise, vibration and light from a wide variety of vessel types, and as such the additional vessel movements resulting from the construction of the GLNG facility are not anticipated to have significant adverse impacts on dugongs. As stated above, vessels operating in shallow waters potentially close to seagrass beds (i.e. within 30 metres of a jetty, wharf, boat ramp, pontoon) will be limited to a speed of six (6) knots, which will reduce noise and vibration emanating from vessels in areas where dugongs may be foraging.

Lighting requirements on vessels will be designed where possible to minimise excessive spill into the water during hours of darkness. However, for safety reasons all vessels will be required to comply with the relevant regulations and MSQ requirements with regards to lighting.

No long term impacts on the distribution of dugongs within the area are predicted (GHD 2009). Mitigation and monitoring measures to minimise temporary impacts of shipping activity on dugongs are described in Section 4.

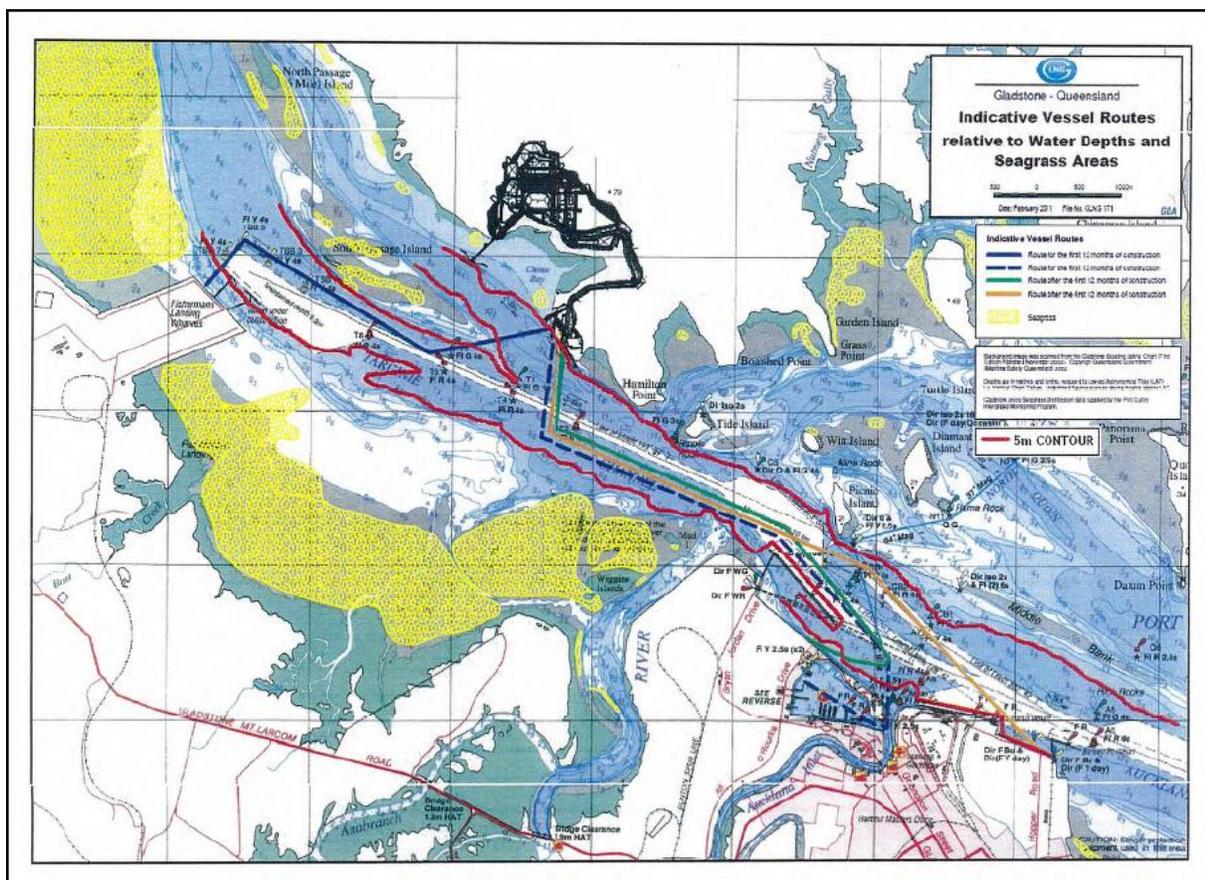


Figure 3-1 Indicative Vessel Routes relative to Water Depth & Seagrass Areas



3.2 Turtles

Marine turtles are recognised internationally as species of conservation concern and are listed in the 2000 IUCN (World Conservation Union) Red List of Threatened Animals. All marine turtle species occurring in Australian waters are listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora. In addition, all marine turtles occurring in the Indo-Pacific region are a priority for conservation under the Convention on the Conservation of Migratory Species of Wild Animals. Australia recognises these agreements in the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999*.

Loggerhead turtles (*Caretta caretta*) and green turtles (*Chelonia mydas*) have occasionally nested on the ocean side of southern Curtis Island and Facing Island (Limpus, 1999). According to a study conducted by QDEH and GPA (1994), the loggerhead turtle and flatback turtle (*Natator depressus*) utilise habitats in the outer harbour and occasionally move northward through Port Curtis into The Narrows.

There are no recognised marine turtle nesting beaches inside Port Curtis, with the closest sites being used by flatback (and occasionally green) turtles at North Cliff Beach (Facing Island) and the main beach at South End (Curtis Island), which support important intermediate breeding populations (QDEH and GPA 1994; Limpus 2007).

Potential impacts of shipping activity on turtles include mortality, injury and/or behavioural changes (e.g., avoidance of preferred feeding grounds) resulting from:

- Boat strike;
- Noise and vibration from vessels; and
- Light from vessels.

There is potential for marine turtles to be present in and around the GLNG Plant Project area; however it is expected that turtles will avoid areas of intensive shipping activity. Controlled vessel speeds, maintaining regular watch and adhering to reporting requirements will be implemented to reduce any potential interactions. Impacts on marine turtle behaviours and breeding are not likely to be significant as the nearest recorded turtle nesting location is approximately six (6) km to the west on Facing Island (URS 2009).

As described in Section 3.1, except when in close proximity to terminals/barge facilities, vessels will be operating in deep water and will not traverse seagrass areas. When vessels are operating in shallower water where turtles are most likely to be present, a speed limit of six (6) knots applies. Vessels moving at these speeds, in combination with the environmentally sensitive design of the passenger ferries (see Section 2.2.3), are unlikely to result in increased risk of boat strikes to turtles.



As described in Section 3.1, the Port of Gladstone is a busy operational waterway, so it is likely that turtles will be habituated to noise, vibration and light from a wide variety of vessel types. As such the additional vessel movements resulting from the construction of the GLNG facility are not anticipated to have significant adverse impacts on turtles. As stated above, vessels operating in shallow waters (i.e. within 30 metres of a jetty, wharf, boat ramp, pontoon) will be limited to a speed of six (6) knots, which will reduce noise and vibration emanating from vessels in areas where turtles may be present.

Lighting requirements on vessels will be designed to minimise excessive spill into the water during hours of darkness. However, for safety reasons all vessels will be required to comply with the relevant regulations and MSQ requirements with regards to lighting.

A separate long term Marine Turtle Management Plan is being developed in consultation with the wider ports community within the Port of Gladstone to protect and monitor impacts on turtles during the construction and operation of the GLNG facility.

Mitigation and monitoring measures to minimise impacts of shipping activity on turtles are described in Section 4.

3.3 Water Mouse

The Water Mouse occurs in mangroves, saltmarsh, sledged lakes near foredunes and coastal freshwater swamps. They require relatively large areas of intertidal flats over which to forage, together with suitable adjacent areas for nest sites.

Recent habitat mapping indicates that Water Mouse is considered likely to occur throughout the Gladstone region (DEWHA 2009). However, during a recent survey the species was not found in the region (Taylor & Abbott, 2010). The nearest WildNet records are from the Rodds Bay area located approximately fifty (50) km south of Gladstone (Taylor & Abbott, 2010). Although the occurrence of Water Mouse in the GLNG project area cannot be discounted completely, the available habitat is likely to be marginal at best for this species.

Potential impacts of shipping activity on Water Mouse include destruction or degradation of Water Mouse habitat resulting from vessel wash. As described in Section 3.1, except when in close proximity to terminals/barge facilities, vessels will be operating in deep water. When vessels are operating in shallower water in the vicinity of potential Water Mouse habitat, a speed limit of six (6) knots applies. At this speed vessels will generate minimal wash and as such there are no predicted adverse impacts on Water Mouse habitat. Marine infrastructure has been deliberately sited away from potential Water Mouse habitat areas.



A separate Water Mouse Management Plan is being developed to protect the species during the construction of the GLNG facility.

Mitigation and monitoring measures to minimise impacts of shipping activity on Water Mouse are described in Section 4.

3.4 Seagrass

Seagrass meadows in Queensland are known to provide an important food resource for dugong and green turtles with both these species observed within Port Curtis (Rasheed et al. 2003).

Annual seagrass monitoring of the Port Curtis area has been ongoing since 2004 under the Port Curtis Integrated Monitoring Program (PCIMP) which was established in 2001 with the aim of managing a coordinated and integrated monitoring program for management of the ecosystem health of Port Curtis. The baseline survey conducted in 2002 (Rasheed et al. 2003) reported 13,578 ha of seagrass within the Port Curtis and Rodds Bay with the communities appearing healthy and often in close proximity to existing port infrastructure and activities.

As outlined in the Recovery Plan for Marine Turtles in Australia (Environment Australia 2003), seagrass communities are recognised as essential habitat for marine turtles as they provide important feeding and foraging habitats for green, flatback and loggerhead turtles.

Potential impacts of shipping activity on seagrass include destruction or degradation resulting from:

- Vessel wash;
- Vessels grounding or anchoring in seagrass areas; and
- Pollution from vessels.

As described in Section 3.1, except when in close proximity to terminals/barge facilities, vessels will be operating in deep water and will not traverse seagrass areas. When vessels are operating in shallower water and potentially close to seagrass beds, a speed limit of six (6) knots applies. At this speed vessels will generate minimal wash and as such there are no predicted adverse impacts on seagrass.

In order to minimise the impact of anchoring in seagrass areas, anchoring of vessels will be restricted to designated anchorages specified by Gladstone Ports Corporation. To minimise the risk of vessels grounding within seagrass areas, wherever possible vessels will use existing deepwater channels. The indicative vessel routes (see Figure 3-1) do not traverse seagrass beds.



Mitigation and monitoring measures to minimise impacts of shipping activity on seagrass are described in Section 4.

3.5 Whales

Humpback whales (*Megaptera novaengliae*) (listed as Vulnerable and Migratory under the EPBC Act) generally occur in offshore areas and have been observed off Curtis Island. One whale species was observed during field surveys conducted for the Western Basin Project EIS (GHD 2009), near the northern tip of Curtis Island in relatively shallow waters. It was considered most likely to be the Melon-headed whale (*Peponocephala electra*).

Given the Port of Gladstone is a busy operational waterway and is in relatively shallow near-shore waters, whale species are considered unlikely to inhabit or traverse the area in which shipping activity for the MOF will occur. As such there are no anticipated impacts on whale species.

3.6 Dolphins and Other Cetaceans

The following listed dolphin species have been identified as likely or possibly occurring in the GLNG project area (GHD, 2009):

- Australian snubfin dolphin (*Orcaella heinsohni*) – Least Concern under the Nature Conservation Act 1992 (NC Act) and Migratory under the EPBC Act;
- Indian bottlenose dolphin (*Tursiops aduncus*) – Least Concern under the NC Act and Migratory under the EPBC Act; and
- Indo-Pacific humpback dolphin (*Sousa chinensis*) – Least Concern under the NC Act and Migratory under the EPBC Act.

Other cetaceans known to frequent the waters of Port Curtis include the Irrawaddy dolphin (*Orcaella brevirostris*), Southern right whale (*Eubalaena australis*) and false killer whale (*Pseudorca crassidens*).

Potential impacts of shipping activity on dolphins and other cetaceans will be similar to those on dugongs and turtles (see Sections 3.1 and 3.2). Mitigation and monitoring measures to minimise the impacts of shipping activity on dolphins and other cetaceans are described in Section 4.

3.7 Summary of Potential Impacts

The following aspects of shipping activity have the potential to result in adverse impacts on sensitive environmental receptors:

- Boat strike;
- Noise, vibration and light from vessels;
- Vessel wash;
- Vessels grounding or anchoring in seagrass areas;
- Pollution from vessels.

These aspects have been assessed in this section and no significant adverse environmental impacts of shipping activity are predicted during the construction of the GLNG facility. A programme of mitigation and monitoring measures will be implemented in order to further minimise the risk of environmental impacts, and these are described in Section 4.

4 MITIGATION AND MONITORING MEASURES

This section describes the mitigation and monitoring measures that will be in place to minimise the impacts of shipping activity on the sensitive environmental receptors identified in Section 3.

4.1 Boat Strike

4.1.1 Mitigation Measures

- All GLNG Plant Project related vessels and their crew will remain within the approved navigation passage, abide by the Port of Gladstone published speed restrictions and exclusion zones set out by all relevant authorities at all times, and will contribute to any process to assess improvements to speed management of vessels in Gladstone Harbour;
- Vessel speeds operating in shallow water (i.e. within 30 metres of a jetty, wharf, boat ramp, pontoon, or within waters defined with a five (5) meter depth contour or less) will adhere to a speed limit of six (6) knots;
- All vessels will have a trained crew member on board at all times who will be able to identify and avoid interaction with large aquatic fauna whilst transiting Port Curtis, including dugongs, turtles, marine mammals and other large fish;



- Any incident that involves the injury or mortality of a turtle or dugong will be reported immediately to the EHP Hotline (1300 130 372 – Option 3 (marine strandings or deaths));
- Any recovered remains will be retained for species identification purposes, if advised by EHP;
- Any incident that involves the injury to, or mortality of, an EPBC Act listed threatened or migratory species will be reported by way of formal notification to the Minister for the Department of the Environment within one (1) business day; and
- An incident report will be completed by the vessel master and submitted to Contractor within one (1) business day. All incident reports will be monitored and reviewed to identify migratory patterns and re-address the mitigation measures to prevent future injuries or mortalities.

4.2 Pollution from Vessels

4.2.1 Mitigation Measures

- A Spill Prevention, Control and Countermeasures Plan has been developed as Attachment N of the Construction Environmental Management Plan (CEMP) for the GLNG Plant Project. Individual vessel operators are required to have spill avoidance and response plans for operating in Gladstone Harbour and all spill plans are subject to review and approval by the Gladstone Ports Corporation;
- An effective program for the safe removal and disposal of sewage will be implemented. No vessels will discharge treated or untreated sewage into the water;
- The project will employ best practices for all marine based maintenance programs. Where possible, water based paints, solvents, and adhesives will be utilized;
- A marine pollution control checklist will be completed for all top side deck cleaning and in-shore hull cleaning activities;
- A preventative maintenance program will be in place to minimise oil drips and spills to the vessel deck. Vehicle inspections will be conducted at the project logistics centre on a regular basis. Those vehicles that do not meet or exceed the standards set will not be permitted access to the vessel;and



- Anchoring of vessels will be restricted to designated anchorages specified by Gladstone Ports Corporation.

4.3 Light from Vessels

4.3.1 Mitigation Measures

- Lighting requirements on vessels will be designed to minimise excessive spill into the water during hours of darkness where possible. For safety reasons all vessels will be required to comply with relevant regulations and MSQ requirements with regards to lighting.

4.4 Marine Pests from Ballast Water

During Phases I and II of construction covered in this SAMP, shipping activity is limited to local cross-harbour marine traffic only; as such the introduction of marine pests from ballast water is not a risk factor so no mitigation measures are proposed.

During Phase III of construction, shipping activity will include vessels coming from international waters and as such there is a risk of introduction of marine pests from ballast water. All foreign vessels coming from international waters therefore shall comply with Australia's ballast water management requirements enforced under the *Quarantine Act 1908*.

4.5 Underwater Noise

4.5.1 Mitigation Measures

- Wherever possible, fewer, larger craft will be used, rather than many smaller craft to minimise the extent of vessel disturbance and noise;
- Wherever possible, vessels will use existing deep water channels; and
- All vessels will adhere to operational requirements imposed by Gladstone Ports Corporation and Maritime Safety Queensland.



4.6 Monitoring Arrangements

GLNG is making a significant financial contribution to the comprehensive monitoring program associated with the GPC Western Basin Dredging and Disposal Project. This program includes monitoring of marine megafauna (dugongs, turtles, whales, dolphins and other cetaceans), migratory shorebirds, seagrass and water quality and will be implemented for a minimum period of ten years.

Although the purpose of this program is to monitor the potential impacts from the Western Basin Dredging Project, it encompasses the GLNG Plant Project area, so the results can be used to identify any impacts of shipping activity on the species identified in Section 3. The aspects of the GPC monitoring program that are relevant to monitoring the impacts of shipping activity are summarised in Table 4-1.

<i>Sensitive receptor</i>	<i>Summary of monitoring measures</i>	<i>Proposed survey timing and frequency</i>	<i>Reporting arrangements</i>
<i>Marine megafauna</i>	<i>Determine baseline population characteristics (e.g. densities, reproductive capacity, age-class structure) and habitat utilisation, and select appropriate indicators to monitor potential impacts. Determine the carrying capacity of suitable habitats for marine megafauna within the Western Basin project area</i>	<i>Two surveys in the first year. Results will be used to develop scope and program for future monitoring events.</i>	<i>A written report will be produced within 20 working days of each survey.</i>
<i>Seagrass</i>	<i>Annual long term monitoring surveys of seagrass distribution and abundance in the Western Basin project area. Monitoring survival and recovery of seagrass and other marine communities in the Western Basin project area</i>	<i>Quarterly surveys of seagrass beds throughout the Port of Gladstone.</i>	<i>A written report will be produced within 20 working days of each survey.</i>

Table 4-1: Summary of GPC Western Basin Dredging and Disposal Project monitoring program relevant to shipping activity

This SAMP does not propose any monitoring measures specific to the impact of shipping activity on whales or Water Mouse as there are no predicted mechanisms for impact on these species (see Sections 3.3 and 3.5).



GLNG has developed an extensive offsets program to compensate for potential impacts to sensitive environmental receptors. This includes the acquisition of an area of land containing areas of mangrove forests; small patches of *Halophila* seagrass; intertidal sand, gravel and mud banks; and rock bars.

There is a total ban on fishing and crabbing activities by any person employed or contracted by GLNG whilst on the LNG site or associated project areas.

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