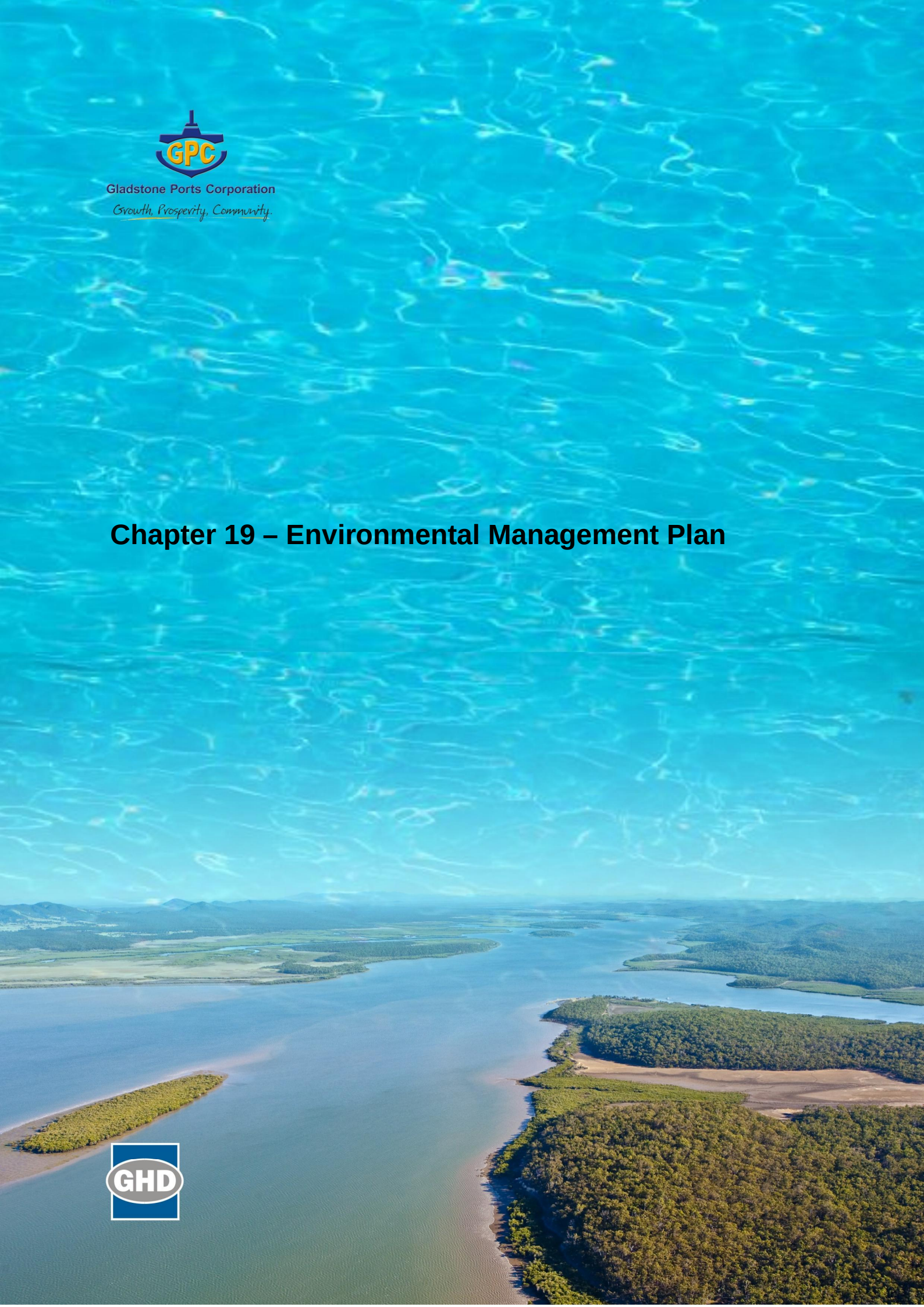

Chapter 19 – Environmental Management Plan

19. Environmental Management Plan

19.1 Introduction

This Environmental Management Plan (EMP) has been developed for the Western Basin Dredging and Disposal Project (the Project) as proposed by the Gladstone Ports Corporation (GPC). The EMP outlines GPC's commitments to environmental management of the Project for the construction and operation phases. The EMP brings together all measures to be adopted to address identified impacts, as set out in the preceding chapters of the Environmental Impact Statement (EIS) and associated technical reports. The EMP has been written so that it may be understood and implemented without reference to other parts of the EIS or associated reports and subsequently developed into a stand-alone report.

19.1.1 Objectives

The objectives of this EMP are to provide:

- Commitments to performance for each of the relevant environmental aspects;
- A practical and integrated framework for management and monitoring of impacts and risks identified in this EIS and those which may be identified at a later stage;
- A mechanism to assist managers, supervisors and construction crews to comply with environmental performance and statutory requirements;
- Corrective actions if monitoring indicates that the performance requirements have not been met;
- A framework for a Dredge Management Plan for submission to the administering authority;
- A single reference for Local, Queensland and Australian Government authorities for approvals conditions and compliance with policies and conditions; and
- A transparent statement of impacts and risks and associated commitments to management and monitoring which provide evidence of due diligence to all stakeholders including community.

19.1.2 Scope, Context and Structure

This EMP has drawn directly on the environmental values, risks, impacts and management measures described in the preceding chapters of this Environmental Impact Statement (EIS) and associated technical reports.

This EMP has been developed in accordance with; the terms of reference for this EIS as issued by the Coordinator General, relevant legislative requirements outlined in Section 19.1.4 and other relevant guidelines as referenced in the Environmental Management Schedules.

The Proponent (GPC) or their appointed Construction Supervisor will be responsible for preparation of a detailed construction phase EMP that must address the requirements set out in this EMP and any additional conditions as required by approval authorities. The EMP (Construction) will also take into consideration the specific construction methods proposed and tailor appropriate mechanisms, monitoring and reporting requirements to these methods.

The structure of this EMP has been is based on the principles of the Australian and International Standards AS/ NZS ISO 14001: 2004 Environmental Management Systems. The GPC Environmental

Management System (EMS) is certified to International Standard ISO14001. During the operational phase of the Project operational requirements outlined in this EMP will be incorporated into the GPC EMS as appropriate.

This EMP has been structured around the following three sections.

- **19.1 Introduction**

The Introduction section includes background information to provide the reader with an understanding of the Project and the requirements of this EMP.

- **19.2 Implementation Framework**

The Implementation Framework section outlines the essential elements that will enable the EMP to be effectively implemented and updated.

- **19.3 Environmental Management Schedules**

Environmental Management Schedules have been developed for each of the elements that require management consideration. The structure of the Schedules has been developed in accordance with the Terms of References for this EIS. They also include a brief description of potential impacts to provide a reference against which to assess/review the approach to management and monitoring. The content of the Schedules is described in more detail in Table 19-1 below.

Table 19-1 Structure of Environmental Management Schedules for Each Element

Element	The environmental aspect of construction or operation requiring management consideration.
Potential Impacts	Summary of potential impacts.
Policy	The guiding operational policy that applies to the element.
Implementation	The mechanisms and actions through which the policy will be achieved.
Performance requirement/s	The criteria by which the success of the implementation of the policy will be determined.
Monitoring	The process of measuring actual performance, or how well the policy has been achieved.
Auditing	Format, timing and responsibility for auditing.
Reporting	Format, timing and responsibility for reporting.
Corrective Action	The action to be implemented and by whom in the case where a performance requirement is not met.

The Environmental Management Schedules have drawn directly on the information contained within the technical reports and EIS chapters. Table 19-2 outlines which documents relate to each Schedule.

Table 19-2 Documents Informing the Environmental Management Schedules

Technical Report	EIS Chapter	Environmental Management Schedule
Climate and Climate Change Assessment	4 - Climate and Climate Change	Schedule 1 - Climate and Climate Change
Acid Sulphate Soils Assessment	5 - Land	Schedule 2 - Acid Sulphate Soils
Coastal Processes Assessment	7 - Coastal Environment	Schedule 3 - Coastal Processes
Water Quality Assessment		Schedule 4 - Water Quality
Sediment Quality Assessment		Schedule 5 - Sediment Quality
Groundwater Resources Assessment	8 - Water Resources	Schedule 6 – Hydrology and Stormwater
		Schedule 7 - Groundwater
Terrestrial Ecology Report	9 - Nature Conservation	Schedule 8 - Terrestrial Flora and Faunal
Marine Ecology Report		Schedule 9 - Marine Ecology
Marine Mega fauna Baseline Assessment		Schedule 10 - Marine Mega fauna
Greenhouse Gas Assessment	10 - Air Quality, Noise and Vibration	Schedule 11 - Air Quality
		Schedule 12 - Greenhouse Gases
Noise and Vibration Assessment		Schedule 13 - Noise and Vibration
	11 - Transport	Schedule 14 - Traffic and Transport
Historic Cultural Heritage Investigation	12 - Cultural Heritage	Schedule 15 - Cultural Heritage
Social Impact Assessment	13 - Social Impact	Schedule 16 - Social
	14 - Landscape and Visual Character	Schedule 17 - Landscape and visual
Economic Assessment	15 - Economic Impact	Schedule 18 - Economic
	16 - Health and Safety	Schedule 19 - Health and Safety
		Schedule 20 - Mosquito/Biting Midges
Hazard and Risk Assessment Risk Register	17 - Hazard and Risk	Schedule 21 - Emergency Response Plans (and others as high/medium risks identified are relevant)

Associated Management Plans

Assessments undertaken for this EIS, and in some cases statutory requirements, call for associated management plans to be developed for specific activities/aspects of the Project. These plans will build on the detail presented in this EMP. They will be developed in conjunction with the EMP (Construction) and include:

- Dredge Management Plan (refer Schedules 4, 9 and 10);
- Acid Sulphate Soils Management Plan and Groundwater Monitoring Plan (refer Schedule 2);
- Traffic Management Plan (refer Schedule 14);
- Construction Safety Management Plan (refer Schedule 19); and
- Emergency Response Plan/s for Oil Spills, Fire and Natural Hazards (refer Schedule 21).

The haulage contractor will be required to submit an EMP as a part of the separate Operational Works application for haulage of rock materials from the quarry to the Reclamation Area.

19.1.3 Project Description

The Project Area is situated in the Port of Gladstone, 10 kilometres (km) north of Gladstone City. Gladstone is located on the eastern seaboard of Australia, approximately 525 km north of Brisbane and 100 km south of Rockhampton on the Capricorn Coast of Central Queensland.

Approval for dredging and dredged material disposal is sought to support the progressive development of the harbour through provision of access to port facilities, which will be a key component of the import and export chain and will assist in developing industries, specifically the developing Liquefied Natural Gas (LNG) industry, to be located within the Gladstone region. In line with Draft Port of Gladstone Western Basin Master Plan (Coordinator General 2009), two areas of development are required for the long-term strategic development of the Port and are the subject of this EIS:

- The inner harbour dredging associated with deepening and widening of existing channels and swing basins, and the creation of new channels, swing basins and berth pockets; and
- The disposal of dredged material in the Western Basin Reclamation Area in the area adjacent to the existing Fisherman's Landing Reclamation and the proposed Fisherman's Landing Northern Expansion.

By encompassing all of the dredging and dredged material disposal that is envisaged to enable the development of industries in the Port of Gladstone, the Western Basin Dredging and Disposal Project seeks to provide a cumulative impact assessment of these activities, to a greater extent than would be possible should each individual development attempt this assessment independently.

Dredging Stages

The following summarises the proposed dredging stages for the Western Basin Dredging and Disposal Project. These were shown on Figure 1-1. Each dredging stage is required to either support various LNG proponents (Stages 1A, 1B and 2) or future import or export facilities for as yet unidentified proponents and/or GPC (Stages 3 and 4). The current EIS addresses all dredging stages and the overall development footprint to provide a cumulative assessment of potential impacts.

Table 19-3 Dredging Stages

Dredging Stage	Description	Volume
Stage 1A	North China Bay Industry Precinct	16 million m^3
Stage 1B	Fisherman's Landing LNG	6.1 million m^3
Stage 2	Laird Point	4.5 million m^3
Stage 3	Fisherman's Landing Development	5.5 million m^3
Stage 4	Hamilton Point	3.9 million m^3
	TOTAL	36 million m^3

Western Basin Reclamation Area

Material dredged during the development of the Western Basin of the Port of Gladstone is proposed to be placed into a bunded Reclamation Area. The proposed Western Basin Reclamation Area is 10 km north of Gladstone City immediately adjacent to the existing Fisherman's Landing Reclamation and the proposed Fisherman's Landing Northern Expansion, which is the subject of a separate EIS.

The reclamation areas and volumes are as follows:

Table 19-4 Reclamation Areas and Volumes

Reclamation Area	Footprint	Volume
Fisherman's Landing Northern Expansion (separate EIS)	173.5 ha	10 million m^3
Western Basin Reclamation Area	235 ha	45 million m^3
Total	408.5 ha	55 million m^3

The volume available in the reclamation makes allowance for a substantial volume of maintenance dredging material over the life of the project.

19.1.4 Environmental Risk Assessment

Environmental risk assessments were undertaken for elements of the Project with potentially significant risks including; Water Quality, Sediment Quality, Terrestrial Flora and Fauna, Marine Ecology and Marine Megafauna. In this section, the risk assessment process and method are described and each of the risk assessments is included.

The Risk Assessment Process

No international standard exists for risk management and as a result the risk assessment methodology employed for this EIS is based on the Australian Standard AS/NZS 4360: 1999 *Risk Management* (the Standard), HB 203: 2000 *Environmental Risk Management – Principles and Process* (the Guidelines), and the GPC Environment Procedure for Risk Assessment. The Standard and Guidelines set out a generic framework for establishing the context, identifying, analysing, evaluating, treating, monitoring and communicating risks. The Best Practice Environmental Management in Mining, Environmental Risk Assessment (EA, 1999) also adopts this standard though different definitions have been adopted by EA.

The GPC Environment Procedure for Risk Assessment provides a whole of business risk matrix to assist in calculating the level of consequence and likelihood for identified risks.

Risk Assessment Methodology

The objective of a risk assessment is to filter the minor acceptable risks from the major non-acceptable risks. It involves consideration of the sources of risk, the consequences and the likelihood that those consequences may occur.

Risk analysis may be undertaken to various degrees of refinement depending upon the risk information and data available. Analysis techniques include:

- Qualitative assessment;
- Semi-Quantitative assessment; and
- Quantitative assessment.

In practice, a qualitative analysis is often used to first obtain a general indication of the level of risk and then a more quantitative analysis is applied to refine the risk.

A quantitative risk assessment can be undertaken based on statistical analysis for various consequences and probabilities. In the absence of statistical data, an estimate may be made of the degree of the consequence and frequency (refer to Section 4.3 of the Standard).

The risk assessment methodology for this EIS uses a semi-quantitative process for determining risk. The semi-quantitative process estimates the degree of the consequence and probability and assigns a score to each. The assigned scores for consequence and probability are not linearly related to each other or to the level of environmental impact, but are weighted descriptors (refer to Section 4.3.4 of the Standard). The risk and impact assessment process used here to assess and weight potential project risks was undertaken using an Environmental Risk and Likely Impact ("ERLI") approach. For each possible impact aspect, two key areas were addressed:

Environmental Risk

This essentially considers the risk of irreversible change to natural ecological processes and community interaction. Assessment addresses:

- Conservation significance of environmental, social and cultural values and regional context of these values;
- Current level of integrity of natural ecosystem processes;
- Known sensitivity of ecosystem processes/natural values to human induced change;
- Natural change and resilience of relevant ecosystem processes/natural values;
- Potential for cumulative social and environmental impacts; and
- Level of scientific certainty of the above factors.

Likely Impact

This considered the likely impact of the project, as modified and undertaken in accordance with mitigation strategies (including any environmental management plans or conditions from licensing/approval agencies) and includes:

- Geographic extent of the activities;

- Duration of the activities;
- Magnitude of potential environmental change;
- Confidence in prediction of impact;
- Confidence in mitigation strategies to minimise ecological and social risks; and
- Ability to monitor the impacts and detect change before irreversible change to system processes occurs.

The approach considered direct and indirect impacts, short and long term, cumulative, temporary and irreversible, and adverse and beneficial impacts.

The relative importance of each impact was examined to provide context and an ability to justifiably determine the impact's significance. In particular, the duration of the impact (temporary vs. permanent) and reversibility were considered. The ability of natural systems (including population, communities and ecosystems) to accept or assimilate impacts was also considered.

The above approach is used to provide the essential information that is used in the formal Risk Assessment as based on the Australian/New Zealand Standard 4360:2004. This methodology is outlined below.

Stage 1: Identification of Risk

This included identification of all relevant risks, addresses all known activities and related environmental aspects of the Project.

Stage 2: Risk Analysis

An important feature is recognition of the fact that an event's consequence extends beyond the immediate impact. This methodology ensures that the full consequences of events are visible to risk owners and managers and that the effects on the Project are all understood and treated. Each class of consequence is rated a score of 1 - 5, where "1" is minor consequence to "5" is critical.

An analysis of each risk is undertaken to determine an environmental event's likelihood of occurrence and its consequences. A five-level qualitative description of the likelihood and consequences for each risk enables a semi-quantitative method to be used to calculate a 'score' for each risk.

Definitions and scales for Consequences that are in accordance with the GPC Environment Procedure for Risk Assessment are shown in Table 19-5 and definitions and scales for Likelihood are shown in Table 19-6.

Stage 3: Calculation of Risk Level

Two levels of risk are used:

The **Primary Risk Level (PRL)** is a conservative measure of risk, based on the most severe consequences across all the relevant criteria. PRL is calculated according to the equation:

Primary Risk Level (PRL) = Likelihood Rating X Maximum Consequence Rating

The **Secondary Risk Level (SRL)** is a less conservative measure of risk, which incorporates all relevant criteria, not just the most severe ones. SRL is calculated according to the equation:

Secondary Risk Level (SRL) = Likelihood Rating X Average Consequence Rating

In most circumstances PRL should be the preferred measure, as it is more conservative. Risk scores are banded into risk levels, which provides a "plain English" view of the risk. Scores will always be visible to enable prioritisation within bands.

Table 19-7 and Table 19-8 show the bands, their threshold values and indicative management action.

Stage 4: Determination of Options for Treatment of Risks

Following the analysis of a risk it is necessary to investigate the options available for risk treatment and then determine the option or options that provide the greatest cost benefit.

Risks may be treated in one or a combination of ways[1]:

- Avoiding a risk by preventing the activity that leads to the risk eventuating;
- Reducing the likelihood of the risk eventuating;
- Reducing the consequences if the risk does eventuate;
- Transfer the risk; and
- Retaining the risk.

Table 19-5 Threat Criteria and Consequence Scales

Category	Workplace Health & Safety	Environment	Financial Impact on Earnings before Interest and Tax	Community or Customer Reputation	Legal	Process Interruption
1 Minor	Near miss/no injury	On site release of pollutant contained without external assistance	Losses less than $100,000	Isolated complaint	Court action with small fine – less than $10,000	Less than 1 hour
2 Moderate	First Aid Treatment	On site release of pollutants contained with external assistance	Losses of $100,000 to $1 million	Multiple community or customer complaints	Court action with moderate fine - $10,000 to $75,000	1 hour to 1 shift
3 Significant	Medical treatment	Significant on or off site release and detrimental impacts	Losses of $1 million to $2.5 million	Community action with possible delays to project	Court action with significant fine - $75,000 to $250,000	1 shift to 1 day
4 Major	Serious injury/lost time injury	Major offsite release and detrimental impacts	Losses of $2.5 million to $5 million	Community action severely delays project	Court action with major fine - Greater than $250,000	1 day to 1 week

[1] After AS/NZS 4360:2004

Category	Workplace Health & Safety	Environment	Financial Impact on Earnings before Interest and Tax	Community or Customer Reputation	Legal	Process Interruption
5 Critical	Major extensive injury (permanent disablement) or fatality	EPA ordered shutdown of major part of process	Losses of greater than $5 million	Community or customer outrage prevents projects or results in severe damage to Corporate image which limits future options	Court action with jail sentence	More than 1 week

Table 19-6 Likelihood Rating

Likelihood	Rating	Likelihood Calculator
Rare	1	The risk may occur only in exceptional circumstances (The risk is not likely to occur in the next 25 years)
Unlikely	2	The risk could occur at some time (The risk is likely to occur once in the next 5-25 years)
Possible	3	The risk might occur at some time (This risk is likely to occur in the next 2-5 years)
Likely	4	The risk will probably occur in most circumstances (The risk is likely to occur in 1-2 years)
Almost Certain	5	The risk is expected to occur in most circumstances (The risk is likely to occur within the next 12 months)

Table 19-7 Risk Assessment Matrix

	Consequence				
Likelihood	**Critical (5)**	**Major (4)**	**Significant (3)**	**Moderate (2)**	**Minor (1)**
Almost Certain (5)	High	High	High	Medium	Medium
Likely (4)	High	High	Medium	Medium	Low
Possible (3)	High	Medium	Medium	Low	Low
Unlikely (2)	Medium	Medium	Low	Low	Very Low
Rare (1)	Medium	Low	Low	Very Low	Very Low

Table 19-8 Risk Levels and Management Action (example)

Risk Level (PRL or SRL)	Descriptor	Indicative Management Action
1-4	Low	Manage by routine procedures, unlikely to need specific application of resources
5-10	Medium	Manage by specific monitoring or response procedures, develop more detailed actions as resources allow
10-16	High	Senior management attention needed and management responsibilities specified for further action
17-25	Extreme	Immediate action required, senior management will be involved

Limitations

As with any model, the relevance and applicability of the risk model revolves around a number of basic assumptions and limitations. The application of the risk model has been based on subjective ranges of consequences and probabilities.

Limitations of the application of the risk methodology for this study include:

- The assessment is based on the professional judgement of a limited number of experienced GHD staff and does not incorporate the collective experience of all parties involved with the Project. The full range of risks and the most appropriate consequence and likelihood rating would be best completed in a workshop involving key stakeholders; and
- The assessment has been limited to a selected number of primary risks and the assessment of cumulative risk to the environment from multiple pollution sources or sources of environmental degradation has not been addressed. Cumulative risks are approached for this study in a qualitatively manner only.

Although a semi-quantitative methodology was used to conduct the risk assessment, the resultant risk estimation is purely relative. The risk estimations do not imply an absolute scale of risk that can be applied to any other situation or assessment.

Applying the Risk Assessment Process to Expected Impacts

The following Table 19-9, Table 19-10, Table 19-11, Table 19-12 and Table 19-13 contain the risk assessments undertaken for the Water Quality, Sediment Quality, Terrestrial Flora and Fauna, Marine Ecology and Marine Megafauna elements of the Project. It is intended that if/when aspects of the Project change, these risk assessments would be revisited, as part of the management review, to ensure significant risks are properly addressed.

Table 19-9 Water Quality Risk Assessment

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Construction Phase				
Construction of Bund	Impact upon hydrodynamic regime and slightly reduced flushing of the Project Area with potential for small increases to background water quality levels.	(1,5) Medium	No ability to control impact.	(1,5) Medium
	Impact upon turbidity of the Western Basin inter-tidal and sub-tidal area from the disturbance of soft seabed sediments will be limited to the first layer of rocks after which any additional rock will be dumped on rock and not the soft seabed sediments.	(1, 5) Medium	Little ability to control impact. Silt curtains inappropriate given high flow environment. Minimal impacts expected.	(1, 5) Medium
	Increased risk of remobilisation of disturbed sediments during elevated wind and wave conditions, or during spring tides. There will also be the potential for waves to erode core material during storm (cyclone) conditions that may arise over the course of construction.	(2, 3) Low	Small stockpile of armour material held at the quarry sufficient to cover any exposed core if a cyclone approaches. Construction technique likely to have armour layer only 20 to 30m behind core. Minimise exposed core to 50m.	(2, 2) Low
	There is the potential for spillage (either minor through drips or major through a leak/accident) of oils and fuels from construction equipment to impact on marine water quality.	(3, 5) High	No planned refuelling or maintenance of construction equipment to occur on site, nor equipment to be parked at the site for a significant time. Readily available spill kits for land and water to be kept on site with trained personnel. Emergency response procedures will be established. Adherence to waste management controls identified in the EMP for this Project.	(1, 5) Medium

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Filling of the Bund and Dredge Decant	Placement of geotextile fabric will minimise migration of fines through bund wall into surrounding waters. Once substantial amount of dredged material is beached against the inner wall this will act as an additional filter layer to prevent fine material migration through the bund wall into the receiving environment.	(3,4) Medium	No additional mitigation required.	(3,4) Medium
	Predicted TSS (and turbidity) from the decant results primarily in elevated levels along the northern boundary of the Reclamation Area, which is the likely region of impacts to seagrass beds.	(3,5) High	Appropriate design and construction of bund, including lining with geotextile fabric and installing internal bunding, to reduce potential for fines to be moved back into marine environment through the bund wall or via the decant waters. Monitor tailwater decant to meet conditions/objectives within pond and/or within approved mixing zone. Provision to modify internal bund structure or discharge weir arrangement if required.	(3,4) Medium
Remnant Channel to West of Reclaimed Area	Reduction in net circulation and flushing.	(1, 3) Low	Limited ability to control impact.	(1, 3) Low
CSD Dredging	Increased turbidity in vicinity of CSD.	(1, 5) Medium	Limited impact in comparison to TSHD, with DMP to be adopted. No additional measure proposed.	(1, 5) Medium
	Metals concentrations exceed trigger level due to CSD operation including release of sediment due to the activity of the cutter.	(1, 5) Medium	No ability to control impact, but likely extent and persistence minimal.	(1, 5) Medium

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
TSHD Dredging	Increased turbidity in vicinity of TSHD overflow. Primary impact will be on seagrass bed areas in the Western Basin.	(4,4) Medium	Monitoring and control of dredge regime to be in accordance with dredge management plan (DMP). Monitor turbidity levels against site specific objective within relevant sensitive ecosystem receptors and adjacent habitats and respond as required by DMP. Activity alteration may include reducing duration of dredging at particular locations during spring tide, relocating dredge to different areas in accordance with dredge program, planned increase in period between dredging activity at any one location. Use of a CSD has been nominated for areas closest to The Narrows and Graham Creek.	(4,3) Medium
	Increased turbidity and decreased light on seagrass beds in Western Basin owing to TSHD dumping, with reduced impact on areas such as The Narrows and Grahams Creek.	(4, 5) High	Program dredge activity to avoid, where practicable, use of TSHD in dump mode in northern extents of Western Basin during flood phase of large spring tides. Implement offset program in accordance with conditions.	(3, 5) High
	Increased turbidity and decreased light on seagrass beds other than the Western Basin because of TSHD dumping	(2, 4) Medium	Dumping and rehandling primarily affect remnant part of Western Basin immediately to north of reclamation. Recommendations as above.	(2, 3) Low
	Metals concentrations exceed trigger level due to TSHD operation including release of sediment due to the activity of the cutter	(2, 5) Medium	No ability to control impact, but perhaps relatively large extent and moderate persistence.	(2, 5) Medium
	Potential release of waste materials or pollutants associated with the dredger into the marine environment resulting in reduction in biodiversity.	(4, 3) Medium	Adherence to waste management controls for vessel operations.	(4, 2) Medium

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Operational Phase				
Water Quality Impacts	Impacts to marine water quality from alteration of stormwater input, including increased erosion or storm water run-off to adjacent marine environment during storm / flooding events. Potential to mobilise contaminants into the marine environment and reduce biodiversity.	(2, 3) Low	Implement appropriate topside waste and stormwater management system. Design stormwater drainage systems to avoid increased scouring potential at release points in adjacent marine environment or concentration of freshwater inputs at outflow points to reduce impacts at point of introduction.	(2, 2) Low
Maintenance Dredging	Maintenance dredge program will increase in keeping with extended network of channels. Turbidity will be generated accordingly, subject to the type of dredge used. Similar practices to those currently employed for maintenance dredging likely to be employed.	(2, 5) Medium	Sediment quality will be analysed prior to dredging and appropriate disposal locations identified based on the physical and chemical properties of the material to be dredged. GPC will obtain all required permits for maintenance dredging and will implement mitigation measures and monitoring programs to minimise impacts on the receiving environment, in particular water quality. Review and update DMP for maintenance dredging.	(2, 5) Medium

Table 19-10 Sediment Quality Risk Assessment

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Construction Phase				
Building of Bund	Sediment resuspension and subsequent contaminant resuspension and/or desorption and re-entry into the water column during placement of core material and rock armour into the reclamation area.	(3, 3) Medium	Disturbance of soft seabed sediments will be limited to first layer of rocks.	(2, 2) Low
Bottom Dumping and Rehandling of Dredged Material	Sediment resuspension and subsequent contaminant resuspension and/or desorption and re-entry into the water column during the deposition and rehandling of the dredged material.	(1, 5) Medium	Monitoring and control of dredge regime to be in accordance with dredge management plan (DMP). Program dredge activity to avoid, where practicable, use of TSHD in northern extents of Western Basin during flood phase of large spring tides. Monitor turbidity levels against site specific objective within relevant sensitive ecosystem receptors and adjacent habitats and respond as required by DMP. Activity alteration may include reducing duration of dredging at particular locations during spring tide, relocating dredge to different areas in accordance with dredge schedule, planned increase in period between dredging activity at any one location.	(1, 5) Medium
Dredging of Material	Spill from dredger during relocation to disposal area.	(2, 2) Low	Operate within safe weather conditions.	(2, 2) Low

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Reclamation of Land	Sediment resuspension and subsequent contaminant resuspension and/or desorption and re-entry into the water column during the placement of material into the reclamation.	(3, 3) Medium	Appropriate design and construction of bund, including lining with geotextile fabric and installing internal bunding, to reduce potential for fines to be moved back into marine environment through the bund wall or via the decant waters. Monitor tailwater decant to meet conditions/objectives within pond and/or within approved mixing zone. Provision to modify internal bund structure or discharge weir arrangement if required.	(3, 2) Low
	Alteration of water quality in habitats arising from run-off from the reclamation area resulting in increased sediment loads and potential desorption and re-entry of contaminants into the water column.	(3, 3) Medium	Potential acid sulphate soils will be treated or managed appropriately. Finished surface of reclamation to be capped. Stormwater management system designed to capture and treat runoff.	(3, 2) Low
	Alteration of sediment quality at the reclamation site by introduction of contaminants or potential acid sulphate soils from dredged marine sediments.	(3, 4) Medium	Sediments to be deposited in the reclamation area have been tested for contamination and were below the relevant Screening Level nominated in NAGD (where guidelines are available). The 95% UCL of the mean manganese concentration (479.8 mg/kg) within all of the dredging stages combined was below the QEPA EIL guideline of 500 mg/kg. The reclamation area to be constructed and managed to reduce/remove potential impacts from any contaminants, including potential acid sulphate soils. This includes development and implementation of an Acid Sulphate Soils Management Plan and lining of the bund with geotextile fabric.	(3, 3) Medium

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Operational Phase				
Reclamation of Land	Alteration of water quality in adjacent habitats from land run-off resulting from poor sediment quality. Potential reduction in biodiversity. Discharge from stormwater pond to be in accordance with water quality conditions. Limited impact potential.	(1, 2) Very Low	Sediments to be used for reclamation works have been tested for contamination and reclamation area to be constructed and managed to reduce/remove potential impacts from any contaminants, including potential acid sulphate soils. Appropriate design and construction of bund, including lining bund with geotextile fabric and installing internal bunding, to reduce potential for fines to be moved back into marine environment through the bund wall or via the decant waters. Manage stormwater pond discharge to maintain water quality to stated objectives.	(1, 1) Very Low

Table 19-11 Terrestrial Flora and Fauna Risk Assessment

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Construction Phase - Building of bund and reclamation	Disturbance to wildlife (mainly birds and bats) behaviour due to noise, light and vibration. Potential to disturb EPBC listed migratory shorebird species during critical phase of life-cycle, e.g. roosting, or limit access to food resources.	(3, 5) High	If possible, minimise construction of the northern bund wall during critical migratory bird visitation periods (March- April and September-October). Employ directional lighting pointed towards Project area and away from surrounding habitat. Use low wattage lights and glare guards in vicinity of the important shorebird habitat in the north-west of the Project area. Ensure plant and equipment are maintained. Monitor abundance and diversity of avifauna species for signs of impact to allow for adaptive management where possible.	(3, 1) Low
	Direct mortality of flora and fauna associated with vehicular traffic and deposition of large rock material.	(3, 1) Low	Educate employees of environmental responsibilities during inductions. Establish appropriate speed-limits to restrict incidence of wildlife road-kill. Refer to Marine Megafauna and Marine Ecology technical reports.	(2, 1) Low
	Indirect degradation of habitats due to pollution, weed and pest species, and acid sulphate soils.	(3, 4) Medium	Refer to Acid Sulphate Soils technical report. Install appropriate rubbish disposal facilities on site (including recycling option). Include a weed and pest management plan as part of the EMP for the Project. Management plan will include procedures for managing the spreading of weeds from construction vehicles.	Refer to Acid Sulphate Soils technical report.

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Operation Phase – Disposal of dredged material and general port activities	Direct loss of habitat in the footprint of the Project. The footprint will replace an area of intertidal flats considered foraging and roosting habitat for EPBC migratory shorebird species including the rare NC Act-listed *Numenius madagascariensis* (eastern curlew).	(2, 5) Medium	Implement offset program in accordance with conditions. No ability to control impact. Habitat and communities represented elsewhere in the region.	(2, 5) Medium
	Indirect degradation or change in adjacent and surrounding intertidal habitats as a result of changes in coastal processes. This includes potential for scour and/or sediment deposition changing suitability for existing benthic (fauna forage resource) and marine plant communities and reduction in tidal flushing within proposed channel.	(4, 3) Medium	Design of the Reclamation Area will need to consider widening of the entrance to the retained channel or other measures to guard against scour. Monitor the distribution and health of the intertidal habitats and report findings regularly. Develop a management plan to assess cause of impacts and potential mitigation measures.	(4, 3) Medium
	Indirect degradation or change in adjacent and surrounding intertidal habitats as a result of changes in water quality. This may change suitability for existing benthic (fauna forage resource) and marine plant communities.	(2, 3) Low	Use appropriate construction of bund and management of tailwater outputs to reduce potential for continuing negative water quality impacts to the adjacent area. Use geofabric in bund construction. Manage tailwater decant to maintain water quality within approved conditions, either within the decant pond and/or within an approved mixing zone.	(2, 2) Low
	Indirect degradation or change in dryland/terrestrial habitats as a result of groundwater dynamic changes. The reclaimed landmass has potential to impact upon groundwater conditions, flow paths and levels.	(1, 2) Very Low	Limited ability to control impact.	(1, 2) Very Low

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
	Indirect degradation of habitats due to pollution and weed and pest species.	(3, 1) Low	Install appropriate rubbish disposal facilities on site (including recycling option). Include a weed and pest management plan as part of the EMP for the Project. Management plan will include procedures for managing the spreading of weeds from construction vehicles.	(3, 1) Low
	Disturbance to wildlife (mainly birds and bats) behaviour due to noise, vibration and light. Potential to disturb EPBC listed migratory shorebird species during critical phase of life-cycle, e.g. roosting, or limit access to food resources.	(3, 3) Medium	Employ directional lighting pointed towards Project area and away from surrounding habitat. Use low wattage lights and glare guards in vicinity of the important shorebird habitat in the north-west of the Project Area. Ensure plant and equipment are maintained. Monitor abundance and diversity of avifauna species for signs of impact to allow for adaptive management where possible. The proposed mound will provide a partial sound barrier.	(2, 3) Low

Table 19-12 Marine Ecology Risk Assessment

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Construction Phase				
Building of Bund	Removal or damage to benthos. Seagrass species, algae, macrobenthos including fish and crab species. Reduction in biodiversity.	(2, 5) Medium	No ability to control impact. Habitat and communities represented elsewhere in region except for seagrass complex. Consider implementation of offsets.	(2, 5) Medium
	Water quality impacts (including from altered siltation/sedimentation regimes) that may have potential follow on effects for trophic groups including seagrasses and their associated species.	(1, 5) Medium	No ability to control impact. Silt curtains inappropriate given high flow environment. Habitat and communities represented elsewhere in region except for seagrass complex. Implement offsets for habitat losses. Expected to be minimal impacts. Monitor adjacent sensitive ecosystem receptors according to Dredge Management Program (DMP) and implement trigger levels for seagrass mortality on surrounding habitats.	(1, 5) Medium
	Alteration of benthic habitat from soft sediment to hard substrate. Altering environment from supporting soft to hard substrate species. Juvenile crab and fish habitat to be created. Seagrass habitat to be lost.	(1, 5) Medium	Not expected to be a net negative effect.	(1, 5) Medium
	Impacts to fauna trapped in bund when closed.	(4, 5) High	Manually remove marine fauna prior to reclamation works closing bund. Relocate species to adjacent open marine system. Adopt a strategy to decrease potential trapping of fauna during bund construction such as use of nets to deter entry into bunded area.	(4, 3) Medium

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
	Impact upon flushing regime and health of the marine ecosystem and potentially on the sedimentation/scouring of the benthic habitat (subtidal/intertidal) and mangroves associated with the channel.	(3,3) Medium	Design bund to reduce any long-term scouring potential. Monitor mangrove and benthic habitat for detrimental change in health and undertake remediation activities in accordance with EMP.	(3, 2) Low
	Noise and vibration effects associated with construction works. Displacement of marine fauna from immediate area.	(1, 4) Low	No ability to control impact. Fauna known to occur in area where there are existing port and in-water operations and impacts expected to be temporary.	(1, 4) Low
	Potential release of waste materials or pollutants associated with the construction of bund.	(4, 3) Medium	Adherence to waste management controls identified in the EMP for this Project.	(4, 2) Medium

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Dredging of Material	Removal or damage to benthos. Seagrass species, algae, macrobenthos and associated taxa.	(3, 5) High	Assessment of risk based on dredge footprint identified for the Project. Impact considered to be direct removal of species within dredge path. To minimise this impact dredge activities are to be restricted to agreed footprint of channel works to minimise impact to critical habitats. Where alteration of dredging footprint is desired, dredging activities should avoid highly sensitive ecological habitats including additional seagrass meadow impacts or fragmentation. Dredge activities to be managed under a Dredge Management Program (DMP). To minimise impacts to areas immediately adjacent to dredging works identified under this Project dredging activities should be programmed under the DMP (particularly for TSHD) such that wherever practicable, habitats are rested periodically. This might include one or more of the following: ◗ Periods of pumping from TSHD directly into reclamation. ◗ Where breaks in dredging are programmed (e.g. for maintenance, provisioning or crew change over), attempting to coordinate these with the flood phase of a large spring tide. This will increase opportunity for communities to be resilient within affected areas. Refer also to offset requirements for Project to address habitat losses.	(2, 5) Medium
	Noise and vibration effects associated with dredging works.	(1, 5) Medium	Dredgers already operate in this environment so taxa currently co-exist. Commence dredging operations when dredge head on sea bed to reduce turtle interactions. Impacts to be temporary and expected to be minimal.	(1, 4) Low

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
	Potential release of waste materials or pollutants associated with the dredger into the marine environment resulting in reduction in biodiversity.	(4, 3) Medium	Adherence to waste management controls for vessel operations.	(4, 2) Medium
	Introduction of marine pests to port and or GBRMP on construction equipment, flow on effects to native marine communities/impact on fishing industries, financial loss, time delay.	(5, 3) High	Adhere to Commonwealth and State biofouling and ballast water management requirements. Vessels, particularly dredgers, to be of low risk of introducing marine pest to area via construction works. This may require a pre-entry inspection of vessel, particularly dredger, to demonstrate not carrying pest species.	(5, 2) Medium
	Creation of habitat by changing seabed surface structure to a deeper surface. Possibly change of type of sediment (eg fine silts to coarse material) which will effect re-colonisation of the area.	Positive Benefit	Not considered to be net negative impact given that deeper water likely to provide opportunities for different taxa to colonise, including sponge gardens. Seagrasses able to persist in deeper waters as well.	Positive Benefit
Dredging of Material – cutter suction dredger or backhoe dredger - clays / hard sediments	Water quality impacts at dredge head (including increased sediment loads) that may have potential follow on effects for trophic groups including seagrasses and their associated species.	(1, 3) Low	Where possible, target appropriate sediments with appropriate dredger to reduce release of fine material from dredge head. Expected to be minor impacts.	(1, 2) Very Low
	Spill from dredger during relocation to disposal ground. Relates to backhoe dredger if used. Cutter suction dredger will pump sediments into reclamation and this impact not applicable.	(2, 3) Low	Operate within safe weather conditions.	(2, 2) Low

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
	Potential harm or interaction from dredging process with marine fauna	(4, 2) Medium	Fauna spotting to reduce likelihood of impact prior to deployment of dredge head. Do not commence dredging if fauna within 50m of dredge head. Wait until fauna moves away from dredge head.	(4, 2) Medium
Dredging of Material – trailer suction hopper dredger - soft sediments	Water quality impacts at dredge head (including increased sediment loads) that may have potential follow on effects for trophic groups including seagrasses and their associated species.	(4, 4) High	Monitoring and control of dredge regime to be in accordance with DMP. Monitor water quality turbidity levels against site specific objectives within relevant sensitive ecosystem receptors and adjacent habitats and respond as required by DMP. Objectives and monitoring sites to be determined during development of DMP. Processes to respond to exceedance of trigger levels to be defined and should include potential options for alteration of dredging program.	(4, 3) Medium
	Spill from dredger during relocation to disposal ground.	(2, 2) Low	Operate within safe weather conditions.	(2, 2) Low

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
	Water quality impacts from overflow (including increased sediment loads leading to overburial of benthic communities) that may have potential follow on effects for trophic groups including seagrasses and their associated species.	(4, 4) High	Adopt appropriate overflow management for dredge to reduce water quality impacts in identified sensitive areas, if trigger values exceeded. Management provisions to be documented in DMP. Monitoring and control of dredge regime to be in accordance with DMP. Program dredge activity to avoid or minimise, where practicable, use of TSHD with rehandling in northern extents of dredging footprint during flood phase of large spring tides. Monitor water quality turbidity levels against site specific objectives within relevant sensitive ecosystem receptors and adjacent habitats and respond as required by DMP. Objectives and monitoring sites to be determined during development of DMP. Processes to respond to trigger level exceedance to be defined in DMP and may include options for alteration of dredging program, temporary alternative to rehandling, or programmed movement of dredge between areas, in order to minimise sustained plume creation at any one area. Dredge activity alteration under DMP may include reducing duration of dredging at particular locations during spring tide, relocating dredge to different areas in accordance with dredge program, planned increase in period between dredging activity at any one location to reduce seabed impacts at that site.	(4, 3) Medium
	Direct impacts by dredge plant on marine megafauna leading to capture / reduction in diversity.	(4, 4) High	Use a tickler chain or deflector head to avoid interaction with turtles resting on seabed. Maintain a fauna spotter and manage dredging operations to minimise interaction with megafauna. Do not commence dredging if megafauna noted within 50m of dredge head. Wait until megafauna moves out of immediate area.	(4, 2) Medium

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Reclamation of Land	Removal or damage to benthos. Seagrass species, algae, macrobenthos including fish and crab species. Reduction in biodiversity. Both within the reclamation and within the dredge material rehandling area.	(3, 5) High	No ability to control impact. Habitat and communities represented elsewhere in region except for seagrass complex. Offsets to be implemented.	(3, 5) High
	Alteration of water quality arising from decant might generate in increase in sediment load. Potential reduction in biodiversity could result. Potential alteration of water quality arising from stormwater run-off and potential follow on reduction in biodiversity.	(3, 3) Medium	Appropriate design and construction of bund, including lining bund with geotextile fabric and installing internal bunding, to reduce potential for fines to be moved back into marine environment through the bund wall or via the decant waters. Consider use of floating booms within internal bunds to reduce potential for wind disturbance within retention ponds stirring up settling material. Manage movement of decant waters between bunds through installation of adjustable weir boxes and control rate of flow to increase sedimentation potential and reduce carriage of fines back to marine environment. Adjust decant regime if turbidity within sensitive ecosystem receptors exceed trigger levels defined under DMP. Capping and revegetation of finished land surface to minimise erosion and sedimentation for management of stormwater run-off. Design stormwater management system to manage quality of water entering marine environment from run-off. Manage stormwater pond discharge to maintain water quality to stated objectives.	(3, 2) Low

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
	Land use change resulting in increased potential for fuel, hydrocarbon, etc spill during construction activities leading to degradation of water quality and loss of biodiversity.	(3, 4) Medium	Identify hazardous material handling requirements and implement waste management and emergency response procedures. Adhere to waste management requirements for the Project under the EMP.	(3, 2) Low
	Alteration of sediment quality at the reclamation site by introduction of contaminants or PASS from dredged marine sediments leading to loss of biodiversity.	(3, 4) Medium	Sediments to be used for reclamation works to be tested for contamination and Reclamation Area to be constructed to reduce/remove potential impacts from any contaminants, including PASS. Flow on effects to future land use opportunities to be assessed and appropriate management to mitigate any contamination concerns to be implemented.	(3, 3) Medium
Pile Driving	Noise and vibration effects associated with pile driving works leading to avoidance of area by marine fauna. Likely to be temporary impact. Small risk of direct injury to fauna.	(4, 4) High	Use warning strikes or similar prior to commencement of pile driving (if found to be effective). Avoid activity if breeding of megafauna noted in Project Area. Use a megafauna spotter on vessel to manage conduct of activity to avoid interaction with megafauna when animals within close (50 m) proximity to vessel.	(4, 3) Medium
	Increased sediment loads in water column at base of piles being driven leading to decreased water quality. Very limited impact expected that will decay rapidly in space and time having little effect.	(1, 2) Very Low	No management measure possible - impact expected to be greater in softer sediments but expected to decay rapidly and have very localised effect. No mitigation measure deemed required.	(1, 2) Very Low
Other	Light spill from construction works leading to disorientation of marine fauna leading to inappropriate clustering of fauna at the site and potential reduction in biodiversity.	(1, 1) Very Low	No night time bund construction. Marine fauna currently co-exist with extensive lighting of construction and operational sites within Gladstone with no detrimental effects noted.	(1, 1) Very Low

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
	Increased vessel traffic - potential strike of marine fauna leading to death or maiming.	(4, 3) Medium	Use speed restriction areas for construction works to minimise risk of strike. Educate construction workforce regarding risks to marine megafauna and requirement to avoid interaction with those species.	(4, 2) Medium
	Interruption of recreational and other vessel traffic movement patterns.		Addressed under social impact assessment and through discussion with harbour master. Refer relevant sections of the EIS.	
Operational Phase				
Water Quality Impacts	Change in water quality in habitats adjacent to decant pond arising from increased sediment loads. Potential reduction in biodiversity. Decant waters expected to be managed in accordance with water quality conditions. Limited impact potential. Potential alteration of water quality in adjacent habitats from land run-off and potential follow on reduction in biodiversity.	(1, 2) Very Low	Appropriate design of bund, including lining bund with geotextile fabric to reduce potential for fines to be moved back into marine environment through the bund wall. Capping and revegetation of finished land surface to minimise erosion and sedimentation for management of stormwater run-off. Design stormwater management system to manage quality of water entering marine environment from run-off. Manage stormwater pond discharge to maintain water quality to stated objectives.	(1, 1) Very Low

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
	Impacts to marine water quality from alteration of stormwater runoff characteristics, including increased potential for erosion during storm events. Potential to mobilise contaminants into the marine environment and reduce biodiversity.	(2, 3) Low	Implement appropriate topside waste and stormwater management. Design stormwater drainage systems to avoid increased scouring potential at release points in adjacent marine environment. Capping and revegetation of finished land surface to minimise erosion and sedimentation. Design stormwater management system to manage quality of water entering marine environment from run-off. Manage stormwater pond discharge to maintain water quality to stated objectives.	(2, 2) Low
Light Spill from Western Basin Facilities	Light spill from channel markers and reclamation lighting leading to disorientation of marine fauna leading to inappropriate clustering of fauna at the site and potential reduction in biodiversity.	(1, 1) Very Low	No management measure considered necessary. Marine fauna currently co-exist with extensive lighting of construction and operational sites within Gladstone with no detrimental effects noted. If any detrimental impacts detected management measures appropriate to mitigate impacts to be assessed in consultation and implemented.	(1, 1) Very Low
Land Use Change	Introduction of pests (both terrestrial and marine) to Project Area via increased vector visitation and increased habitat for potential colonisation. Flow on effects to native communities reducing biodiversity.	(5, 3) High	Western Basin area not established as first port of call for quarantine clearance of incoming vessels. Adhere to Commonwealth and State biofouling and ballast water management requirements. Terrestrial vehicles traversing reclaimed land to adhere to processes to minimise translocation of a terrestrial weed/pest species including wash down of at risk vehicles.	(5, 2) Medium
	Land use change - potential provision of public access facilities within or adjacent to the Reclamation Area	Positive Benefit	Provides opportunity to increase public access to coast.	Positive Benefit

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Habitat Creation	Creation of interstitial habitat and provision of additional hard substrate.	Positive Benefit	Provides benthic habitat that can be recolonised by taxa. Counteracts removal of existing rocky shore area that bounds Fisherman's Landing. Provides niche habitat for juvenile fishery species protection.	Positive Benefit

Table 19-13 Marine Megafauna Risk Assessment

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Construction Phase				
Building of Bund	Removal or damage to high conservation value megafauna habitat. Seagrass species, algae, and soft sediment invertebrates.	(4,5) High	No ability to control impact. Habitat is identified as high conservation value to dugong and recorded as important habitat for marine turtles and dolphins also. Offsets to be implemented for habitat losses. Consider implementation of 'like for like' offsets given importance as a foraging habitat.	(4, 5) High
	Water quality impacts (including from altered hydrology and siltation/sedimentation regimes) that may have potential flow on effects for trophic groups including seagrasses and fauna associated with this habitat i.e. marine turtles, dugong, dolphins.	(1, 5) Medium	No ability to control impact. Silt curtains inappropriate given high flow environment. Habitat and communities represented elsewhere in region except for seagrass complex. Implement offsets for habitat losses. Expected to be minimal impacts. Monitor adjacent sensitive ecosystem receptors according to Dredge Management Program (DMP) and implement trigger levels for seagrass mortality on surrounding habitats. Consider bund construction approach under DMP water quality trigger levels exceeded.	(1, 5) Medium
	Alteration of intertidal benthic habitat from soft sediment to hard substrate altering the resources available for marine megafauna.	(3, 5) High	Will remove available seagrass foraging habitat and associated community structure at the local level potentially alienating dugong from future use of this area. Marine turtles and dolphins will likely be supported by algae, invertebrates and fish communities that will colonise the bund wall.	(3, 5) High
	Entrapment of megafauna when bund closed.	(4, 5) High	Manually remove marine fauna prior to reclamation works from closed bund. Relocate megafauna species to adjacent open marine system. Adopt a strategy to decrease potential trapping of fauna during bund construction such as use of coarse netting to deter entry into bunded area.	(4, 3) Medium

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
	Noise and vibration effects associated with construction works. Displacement of marine megafauna from immediate area.	(1, 4) Low	No ability to control impact. Megafauna known to occur in area presently co-exist with port and in-water operations. Impacts expected to be temporary.	(1, 4) Low
Dredging of Material	Removal or damage to seagrass and, soft sediment habitats.	(3, 5) High	Where possible, avoid areas identified to be of high conservation value supporting critical / listed species. Dredge activities to be restricted to agreed footprint of channel works. Provide a dredging timescale to enable communities to be resilient and re-establish affected areas. Consider marine turtle nesting (Nov – Feb) and inter-nesting behaviours in dredge timing.	(2, 5) Medium
	Noise and vibration effects associated with dredging works.	(1, 5) Medium	Dredgers already operate in this environment so megafauna currently co-exist. Commence dredging operations when dredge head on sea bed to reduce turtle interactions. Impacts to be temporary and expected to be minimal.	(1, 4) Low
	Creation of habitat by changing bathymetry to a deeper habitat. Dredged channels are used by resting turtles.	Positive Benefit	Positive influence given that deeper water may provide opportunities for turtle refuge and provide alternative habitat sources, including sponge gardens. Seagrasses able to persist in deeper waters as well.	Positive Benefit
Dredging of Material - cutter suction dredger or backhoe dredger - clays / hard sediments	Potential harm or interaction from dredging process with marine fauna.	(4, 2) Medium	Fauna spotting to reduce likelihood of impact prior to deployment of dredge head. Do not commence dredging if fauna within 50 m of dredge head.	(4, 2) Medium

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Dredging of Material – trailer suction hopper dredger - soft sediments	Direct impacts by dredge plant on marine megafauna leading to capture / reduction in diversity.	(4, 4) High	Use a tickler chain or turtle deflector head to avoid interaction with turtles resting on seabed. Maintain a fauna spotter and manage dredging operations to avoid interaction with megafauna.	(4, 2) Medium
Water Quality Impacts	Indirect impacts to surrounding foraging habitats leading to reduction in available food resources and displacement from local area	(4,5) High	Monitor water quality turbidity levels against site specific objectives within relevant sensitive ecosystem receptors and adjacent habitats and respond as required by DMP. Objectives and monitoring sites to be determined during development of DMP. Processes to respond to trigger level exceedance to be defined in DMP and may include options for alteration of dredging program, temporary alternative to rehandling, or programmed movement of dredge between areas, in order to minimise sustained plume creation at any one area. Dredge activity alteration under DMP may include reducing duration of dredging at particular locations during spring tide, relocating dredge to different areas in accordance with dredge program, planned increase in period between dredging activity at any one location to reduce seabed impacts at that site.	(4, 2) Medium
Reclamation of Land	Removal or damage to megafauna foraging habitat. Seagrass, algae, and soft sediment invertebrates.	(4,5) High	No ability to control impact. Habitat is identified as high conservation value to dugong and recorded as important habitat for marine turtles and dolphins also. Offsets to be implemented for habitat losses. Consider implementation of 'like for like' offsets given importance as a foraging habitat.	(4, 5) High

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Pile Driving	Noise and vibration effects associated with pile driving works leading to avoidance of area by marine megafauna. Likely to be temporary impact. Small risk of direct injury to megafauna.	(4, 4) High	Use warning strikes or similar prior to commencement of pile driving (if found to be effective). Implement soft starts where possible to allow megafauna opportunity to leave area of impact. Avoid activity if breeding of megafauna noted in project area. Consider use of a megafauna spotter on vessel to manage conduct of activity to avoid interaction with megafauna when animals within close proximity to vessel.	(4, 3) Medium
Other	Light spill from construction works leading to disorientation of marine fauna leading to inappropriate clustering of fauna at the site.	(1, 1) Very Low	Where possible implement lighting solutions to reduce potential attraction to site. Marine fauna currently co-exist with extensive lighting of construction and operational sites within Gladstone. Project site not within sight of adjacent nesting habitats.	(1, 1) Very Low
	Increased vessel traffic - potential strike of marine fauna leading to death or injury.	(4, 3) Medium	Implement speed restriction areas and for construction works and Project area. Educate construction workforce regarding risks to marine megafauna and requirement to avoid interaction with those species.	(4, 2) Medium

Activity Description	Potential Impacts and their Consequences	Preliminary Risk Assessment (C, L) Score	Additional Control Strategy	Residual Risk with Control Strategies Adopted (C, L) Score
Operational Phase				
Water Quality Impacts	Impacts to marine water quality from alteration of stormwater input, including increased erosion or storm water run-off to adjacent marine environment during storm / flooding events. Potential to mobilise contaminants into the marine environment and reduce habitat and impact biodiversity.	(2, 3) Low	Implement appropriate topside waste and stormwater management. Design stormwater drainage systems to avoid increased scouring potential at release points in adjacent marine environment. Appropriate design of bund, including lining bund with geotextile fabric to reduce potential for fines to be moved back into marine environment through the bund wall. Capping and revegetation of finished land surface to minimise erosion and sedimentation. Design stormwater management system and manage stormwater pond discharge to maintain water quality to stated objectives.	(2, 2) Low
Light Spill from Western Basin Facilities	Light spill from channel markers and reclamation lighting leading to disorientation of marine fauna leading to inappropriate clustering of fauna at the site.	(1, 1) Very Low	Where possible implement lighting solutions to reduce potential attraction to site. Marine fauna currently co-exist with extensive lighting of construction and operational sites within Gladstone. Project site not within sight of adjacent nesting habitats.	(1, 1) Very Low

19.1.5 Legal Requirements

Acts, State Policies and Local Government Planning Instruments of Relevance to the Project

- *Great Barrier Reef Marine Park Act 1975* - The Project is excluded from the GBRMP. However if any development should be within the boundaries of the GBRMP, the GBRMP Act will apply.
- *Native Title Act 1993* - There are a number of traditional owner groups in the Port Curtis area. Through the EIS process, all claimants will be formally notified and invited to be part of a Cultural Heritage Management Plan process under the *Aboriginal Cultural Heritage Act 2003*.
- *State Development and Public Works Organisation Act 1971* - The Project was declared a significant project under the SDPWO Act, requiring an EIS.
- *Integrated Planning Act 1997* - For the proposal under consideration no Material Change of Use is applicable. The land, when reclaimed, will not be included in the GPC *Land Use Plan 1999* until such time that it is included in accordance with the provisions of the *Transport Infrastructure Act 1994.*

  Approval is required for the dredging and disposal of solid waste material in tidal water. The application for tidal work must be lodged with GPC as Assessment Manager pursuant to the provisions of the IPA.
- *Land Act 1994* - In its current state, the land that is the subject of the proposed development may be given to the GPC under lease only.

  Prior to application being made for Resource Allocation, application must be made to lease the unallocated State land.

  Once the land is reclaimed, the GPC can apply for ownership of the land.
- *Environmental Protection Act 1994* - The dredging operation associated with the development is classified as ERA 16.

  In accordance with changes to the ERA legislation (in force as of 1 January 2009), port authorities are no longer exempt from requiring approval to undertake dredging. GPC will be required to make an application for ERA 16 for the dredging of any material that is to be placed in the proposed reclamation.
- *Marine Parks Act 2004* – Permits are required for activities occurring within the Great Barrier Reef Coast Marine Park.

  A permit is not required, as this project will not occur within the GBRMCP boundary.
- *Coastal Protection and Management Act 1995: -*
  - *Tidal Works* - As the subject site is identified as '*strategic port land tidal area',* the proposed works will be assessed against the relevant provisions of the GPC Land Use Plan by the GPC as Assessment Manager. An application to undertake tidal work will be assessed by the GPC in accordance with the relevant procedural requirements of the IDAS.
  - *State and Regional Coastal Management Plans* - Project lies within the Curtis Coast Regional Coastal Management District and is therefore subject to the provisions of the Curtis Coast Regional Coastal Management Plan.

  - *Dredging* - A quarry material allocation notice or a dredge management plan will be required for the Project under Chapter 2, Part 5 of the Coastal Act. This will also be required for any specific dredging projects that nominate the Project as the area for disposal of material.
  - *Land reclamation* - The DERM will assess the proposed disposal of dredge spoil against the provisions of the Coastal Plan.
  - *Impact on Stuart Oil Shale Deposits* - Liaison with a representative from the DEEDI for the Fishermans Landing Expansion EIS highlighted that the proposed development will sterilise a part of the Stuart Oil Shale Deposit for future mining. In accordance with advice from the DEEDI the proposed development will be referred to the DEEDI by the DERM for advice.

- *Transport Infrastructure Act 1994* - Once the land for the Project has been reclaimed, the GPC Land Use Plan has to be amended (in accordance with Section 285 of the *Transport Infrastructure Act 1994*) to include the reclaimed area in the plan. Failing to do so will, as stated, result in all development on the reclaimed land to be exempt development.
- *Aboriginal Cultural Heritage Act 2003* – The development requires an EIS and therefore a Cultural Heritage Management Plan will be developed in accordance with Section 87 of the Act.
- *Fisheries Act 1994* - The development will result in the disturbance of marine plants and therefore requires assessment against the *Fisheries Act 1994*. Therefore, when the application for tidal works is lodged, the proposal will be referred to the DEEDI as a referral agency.
- *Mineral Resources Act 1989* and *Petroleum and Gas (Production and Safety) Act 2004* - The impact of the Mineral Development License (MDL 225) and Exploration Permit for Minerals (EPM 3215) on the development has to be investigated.
- *Water Act 2000* - This Act will not apply as there are no works proposed within a watercourse as defined under the Act.
- *Vegetation Management Act 1999* - Some remnant vegetation clearing may be required as part of the construction of any road or access way. DERM would assess any clearing required for the proposed works against the relevant Regional Ongoing Clearing Code.
- *Nature Conservation Act 1994* - The effect of the project on endangered, vulnerable, or rare wildlife, or the habitat on which that wildlife depends will be of interest to the DERM in regard to their obligations under section 73 of the Act.
- *State Coastal Management Plan and the Curtis Coast Regional Management Plan* - It is considered that the development is consistent with the intent of the State Coastal Plan and Curtis Coastal Plan as it is partially located in an "Approved Reclamation Area" and is consistent with the outcomes of the key coastal sites.
- *SPP 2/02 – Planning and Managing Development involving Acid Sulphate Soils* - Based on the requirements of the SPP 2/02[2], under the IPA the proposed development requires a detailed ASS assessment because more than 500 m^3 of fill, to an average depth of more than 0.5 m, will be placed on land below 5 m AHD[3]. These appropriate measures will ensure that potential disturbance of ASS is minimised and that the Project will comply with this SPP.

[2] SPP 2/02 has effect in Local Government Areas typically located along the coast of Queensland.

[3] Dear SE, Moore NG, Watling KM, Fahl D and Dobos SK (2004) Legislation and Policy Guide. *Queensland Acid Sulphate Soil Technical Manual.* Department of Natural Resources and Mines, Indooroopilly, Queensland Australia.

- *SPP 1/02 - Development in the Vicinity of Certain Airports and Aviation Facilities* - The subject site is affected by the Kangaroo Island Obstacle Limitation Surface. While the reclamation area is under the flight path of the proposed Kangaroo Island airport it is not envisaged that development will project into the flight plane and it is considered the Project complies with the SPP. Airports in the Project area will be consulted as part of the EIS
- *SPP 1/03 – Mitigating the Adverse Impacts of Flood, Bushfire and Landslide* - The site is not likely to include natural hazard management areas.
- *SPP 2/07 – Protection of Extractive Resources* - The proposed development has to be assessed against the outcomes of SPP2/07 due to the potential impact on the Stuart Oil Shale Deposits.
- *Gladstone Port Strategic Plan 1997 – 2047* - It is considered that the development is consistent with the intent of the Gladstone Port Strategic Plan.
- *Gladstone Port Authority Land Use Plan, 1999* - It is considered that the development is consistent with the intent of the Port Land Use Plan. For the proposal under consideration (reclamation of land) no Material Change of Use is applicable until such time that the GPC Land Use Plan has been amended to incorporate the land.
- *Calliope Shire Planning Scheme 2007* - The development is not assessable against the provisions of the Calliope Shire Planning Scheme as the land is unallocated state land.
- *Development Scheme for the Gladstone State Development Area, 2008* - Whilst the proposed reclamation is not included in the GSDA, the Port is connected to the GSDA via the MTSC, which is in itself part of the GSDA. The assessment manager may refer the proposed development to the Coordinator-General (DIP). It is therefore considered appropriate that the proposed development be assessed against the objectives of the GSDA It is considered that the development is consistent with the objectives of the GSDA Development Scheme.
- *Central Queensland Regional Growth Management Framework 2002* - It is considered that the development is consistent with the objectives of the CQRGMF.
- *Gladstone Integrated Regional Transport Plan 2001-2030* - It is considered that the development is consistent with the objectives of the GIRTP.

Approvals Required for the Project

The approvals required and the act regulating the approval is listed in Table 19-14. For the proposal under consideration no Material Change of Use is applicable.

Table 19-14 Approvals Required for the Project

Legislation	Administering Authority	Trigger	Project Response
Native Title Act 1993	Department of Environment and Resource Management	Native Title Notification	The Assessment Manager is responsible for undertaking Native Title Notification. Notification is done at the time when an application for a development permit (in this case application for tidal works) is lodged. The process runs concurrently with the IDAS process.

Legislation	Administering Authority	Trigger	Project Response
Integrated Planning Act 1997	Department of Infrastructure and Planning	Tidal Works	The Assessment Manager for an application for Tidal Works is Gladstone Ports Corporation. The application will cover the work for dredging as well as the disposal of material in tidal water. The application will require referral to the following agencies: DERM as concurrence agency. DEEDI as concurrence agency. DIP as advice agency.
Land Act 1994	Department of Environment and Resource Management	Tenure	Prior to application being made for Resource Allocation, application must be made to lease the unallocated State land. Once the land is reclaimed, the GPC can apply for ownership of the land. However, in terms of section 127(3), if the reclaimed land is held under lease, that lease must be surrendered before a deed of grant can be issued.
Environmental Protection Act 1994	Department of Environment and Resource Management	Possible noise, air and water pollution and waste management	Approval for ERA 16 will be required. When considering the development, the DERM will also assess the proposal against the relevant policies under the Act. These policies would include noise, air, water and waste management.
Coastal Protection and Management Act 1995	Department of Environment and Resource Management	Land Reclamation Impact on Stuart Oil Shale Deposits	If the DERM is not the assessment manager for the proposed development, the proposed development will be referred to the agency as a concurrence agency. The DERM will assess the proposed dredging and disposal of dredge spoil against the provisions of the Coastal Plan. The DERM will refer the development to the Department of Employment, Economic Development and Innovation for advice.
Transport Infrastructure Act 1994	Queensland Transport	Creation of land (land reclamation)	The GPC Land Use Plan has to be amended to include the reclaimed area in the plan in order to make development on the reclaimed land assessable development. This process can only be started after completion of the reclamation.
Aboriginal Cultural Heritage Act 2003	Department of Environment and Resource Management	Fact that development requires an EIS	A Cultural Heritage Management Plan will be developed for the Project.
Vegetation Management Act 1999	Department of Environment and Resource Management	Possible vegetation clearing	Authorisation to clear vegetation (if required) will be acquired as part of the referral and assessment process.

Legislation	Administering Authority	Trigger	Project Response
Fisheries Act 1994	Department of Efficiency, Economic Development and Innovation	Marine plant clearing	Authorisation to clear marine plants will be acquired during the referral and assessment process.
Nature Conservation Act 1994	Department of Environment and Resource Management	Possible effect of project on endangered, vulnerable, or rare wildlife, or the habitat on which that wildlife depends	Will be assessed as part of the referral and assessment process.

EPBC Act Controlling Provisions

This Project has been determined to be a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBCA). In this regard, the Australian Government has accredited the Queensland EIS process for the purposes of the Australian Government assessment under Part 8 of the EPBCA. When a State EIS process has been accredited, it is necessary to address potential impacts on the Matters of National Environmental Significance (MNES) that have been identified in the 'controlling provisions' for the project. In this case the matters are as follows:

- World Heritage Area (sections 12 and 15A);
- National Heritage Places (sections 15B and 15C);
- Listed threatened species and communities (sections 18 and 18A); and
- Listed migratory species (sections 20 and 20A).

A stand-alone report addressing the matters of national environmental significance is provided, as Appendix G to this EIS. This document exclusively and fully addresses the issues relevant to the controlling provisions.

19.2 Implementation Framework

This section of the EMP establishes a framework for implementation including the following elements:

- Management Responsibilities
- Training and Awareness
- Communication
- Document Control
- Monitoring
- Auditing and Site Inspections
- Reporting
- Corrective Actions
- Management Review

19.2.1 Management Responsibilities

A number of parties have responsibilities in relation to the implementation of the EMP. All project staff have a responsibility under the General Duty of Care of the *Environmental Protection Act 1994* and must adhere to the requirements of the EMP at all times.

The Proponent will be responsible for ensuring that all employees, officers, subcontractors and agents associated with the project are familiar with the elements of the approved EMP and the relevant permits, and comply with these, the requirements of environmental legislation and are committed to ensuring environmentally sound practices are implemented during all activities.

Specific management responsibilities are summarised in Table 19-15.

Table 19-15 Management Responsibilities

Role	Responsibilities
Principal – the Proponent (GPC)	◗ Implementation and monitoring of the EMP. ◗ Ensure all supervisory and management staff are aware of and understand their responsibilities under this EMP. ◗ Ensure that appropriate and adequate resources are allocated to allow for the effective implementation and maintenance of the EMP. ◗ Ensure periodic reviews of environmental performance are conducted. ◗ Report any major environmental incidents that may have a significant impact on the surrounding environment to the relevant authorities. ◗ Ensure that its employees and contractors receive the relevant environmental instruction in relation to the EMP and be made aware of and understand their obligations and duties. ◗ Incorporate appropriate requirements into GPC's EMS.
Construction Supervisor and/or Environmental Representative	◗ Be aware of and understand the contents of and the reason for implementing the elements of the EMP and ensure all personnel including subcontractors adhere to these requirements. ◗ Incorporating appropriate requirements into a Construction EMP. ◗ Ensure that personnel involved in the project, including subcontractors and visitors, have received any environmental training required to ensure they are aware and understand their responsibilities under the EMP and environmental approvals adhere to the strategies outlined in the EMP. ◗ Carry out all work in accordance with the procedures outlined in the EMP.

Role	Responsibilities
	◗ Make sure that all environmental safeguards and precautions are in place and adhered to at all times at the site and activity. ◗ Regularly inspect and monitor all activities for adherence to proper environmental safeguards, at a minimum in accordance with the monitoring requirements outlined in the EMP. ◗ Ensure that all equipment used is properly serviced and that all precautions are in place to prevent the likelihood of an environmental incident occurring. ◗ Report all environmental incidents to the Port Project Engineer as soon as practicable, but within 24 hours.
Port Project Engineer (Principal's Representative) All employees and sub-contractors	◗ Be aware of and understand the contents of and the reason for implementing the elements of the EMP. ◗ Exercise environmental due diligence and achieve compliance with the EMP. ◗ Report all environmental incidents to the Principal as soon as practicable, but within 24 hours of them occurring.

19.2.2 Training and Awareness

All project personnel will be required to attend an induction session to inform them of their responsibilities under the EMP. Some project personnel may also require specific qualifications, project specific environmental training and refreshers to ensure they have the necessary competency levels to meet their responsibilities. The EMP (Construction) will include a training and awareness procedure and associated registers/checklists which will:

- Specify those responsible for developing and delivering the training sessions and maintaining the associated registers/checklists;
- Specify the qualifications, competency levels, project specific environmental training courses, refreshers and induction requirements required for different activities/groups of personnel/locations; and
- Include registers/checklists that will enable tracking of relevant qualifications held and completion of induction/training/refreshers sessions.

The responsibilities for training and awareness should align with those previously outlined in Table 19-15 and shown below:

- The Construction Supervisor is responsible for ensuring that personnel involved in the project, including subcontractors and visitors have received any environmental training required to ensure they are aware and understand their responsibilities under the EMP and environmental approvals adhere to the strategies outlined in the EMP; and
- The Principal (GPC) is responsible for ensuring all supervisory and management staff are aware of and understand their responsibilities under this EMP.

19.2.3 Communication

The EMP (Construction) will include protocols for internal and external communications. This will outline agreed communication methods and appropriate lines of communication. A plan for communication and consultation with stakeholders including community will also be developed. A central point of contact will be identified for all community questions and complaints.

19.2.4 Document Control

The EMP (Construction) will be a live document subject to continuous improvement via management review as outlined in section 19.2.9 below. For this reason strict version control will be required and procedures put in place to ensure that all project personnel are advised of updates when they occur.

The EMP (Construction) will include a system for document control of the EMP and all associated documents. This will include protocols for review, sign-off, record keeping and archiving. All communications, records and documents associated with the EMP including minutes of meetings, reports, audit reports, site inspections, records of incidents, non-conformances, complaints and corrective actions, must be maintained such that they are readily retrievable.

19.2.5 Monitoring

The primary responsibility for monitoring the potential impacts of the project will be with the Proponent. The proponent may contract a third party (e.g. a consultant) to undertake sampling and analysis and other monitoring works. Monitoring will be undertaken before construction begins to establish baseline conditions where necessary, during construction and after construction.

Specific performance and monitoring requirements are included in the Schedules.

19.2.6 Auditing and Site Inspections

Audits

Compliance with the EMP will be audited soon after construction begins (to ensure that EMP implementation systems are in place) and then periodically during the construction and operation phases. The Proponent may audit compliance with the EMP at any time. The purpose of auditing is to ensure that:

- The general requirements of the EMP are being implemented effectively.
- The specific requirements contained in the Schedules are being implemented effectively.
- The performance requirements as specified in the Schedules are being met and there are no adverse or unexpected impacts to the environment.
- Compliance with regulatory and project-specific requirements.
- Any non-conformances are recorded and appropriate corrective actions and/or preventative measures are put in place.

Site Inspections

The EMP (Construction) will include site inspection checklists for different activities/locations. Site inspections will be carried out on a regular (in some cases daily) basis to check that environmental

controls are in place. The date and time of inspections will be recorded as well as comments on non-compliance with the EMP and remedial action taken.

19.2.7 Reporting

The EMP (Construction) will include a procedure and a standard form/s for recording and reporting incidents, non-conformances and public complaints. Project personnel will be made aware of this procedure and standard forms made available to them. The procedure and standard form/s will specify who to report to within what timeframe. Generally this will depend on who is reporting and the significance of the event. Significant events should be reported immediately. Reporting channels should align with those previously outlined in Table 19-15 and shown below:

- All employees and subcontractors should report to the Construction Supervisor or Port Project Engineer.
- The Port Project Engineer should report to the Principal.
- The Principal (GPC) may be required to report to the relevant authorities.

The details of all incidents, non-conformances and public complaints recorded and reported and the associated corrective and preventative actions planned or implemented should be included as a standard item in regular reports as required by the Principal and relevant government authorities.

19.2.8 Corrective Actions

Corrective actions required for specific environmental incidents or non-conformances are described in the relevant Environmental Management Schedules of this EMP. The form for recording and reporting incidents, non-conformances and public complaints will also include a section to record corrective actions implemented. These forms will be reviewed by management who will consider any updates that might be required to the EMP to prevent such incidents and non-conformances occurring (refer section 19.2.9 below).

19.2.9 Management Review

The overarching principle of continuous improvement applies to this EMP. Throughout the construction and operation phases of the Project, the information gathered via site inspections, auditing, monitoring. Reporting, incidents, non-conformances and complaints should be reviewed by management periodically (or in response to any significant incidents/non-conformances) to consider if preventative measures need to be implemented and updates to the EMP made. If there are any updates to relevant legislation, best practice guidelines etc. these should also be reviewed to check compliance.

19.3 Environmental Management Schedules

The Environmental Management Schedules presented in this section of the EMP are structured around each of the environmental elements of construction or operation requiring management consideration. As outlined earlier in section 19.2.1, the structure of the Schedules has been developed in accordance with the Terms of References for this EIS. They also include a brief description of potential impacts to provide a reference against which to assess/review the approach to management and monitoring. The content of the Schedules is described in more detail in Table 19-16.

Table 19-16 Structure of Environmental Management Schedules for Each Element

Element	The environmental aspect of construction or operation requiring management consideration.
Potential Impacts	Summary of potential impacts.
Policy	The guiding operational policy that applies to the element.
Implementation	The mechanisms and actions through which the policy will be achieved.
Performance requirement/s	The criteria by which the success of the implementation of the policy will be determined.
Monitoring	The process of measuring actual performance, or how well the policy has been achieved.
Auditing	Format, timing and responsibility for auditing.
Reporting	Format, timing and responsibility for reporting.
Corrective Action	The action to be implemented and by whom in the case where a performance requirement is not met.

19.3.1 Schedule 1 - Climate and Climate Change

Element	Climate and Climate Change
Potential impacts	Air temperature - Minor/possible increased corrosion rates of construction materials Sea level - Changing statistics will affect determination of design criteria, possible effect on design, structures that don't take into account the potential effects of climate change may be less efficient during operation phase. Tropical Cyclone/ Storm Surge (Wind and Wave Climate) - Changing statistics will affect determination of design criteria, possible changes to marginal probability of failure for structures, structures that don't take into account the potential effects of climate change may need retrofitting or upgrade.
Policy	To minimise the vulnerability of the Project to the predicted impacts of climate change.
Implementation	<u>Air Temperature</u> Any road surfacing used on the bunds may need to take into account higher future temperatures to reduce any ongoing maintenance costs associated with increases in ambient temperatures on the concrete and/or bitumen. Concrete - Adequate allowance for predicted thermal movements during the design stage. This could be the inclusion of more joints in the pavement to relieve stresses and reduce the risk of damage Bitumen - Evaluate different bitumen formulation to suit projected climate conditions. This might include higher penetration grade bitumen, alternate mix designs or the use of polymer modified bitumen. <u>Sea Level</u>

Element	Climate and Climate Change
	Sea level rise has been included to determine the design wave heights in the design of the rock armour. The sea level rise adopted for the design of the rock armour is as recommended by the EPA Building and Engineering Standards for Tidal Works and corresponds with the approximate 'high level' mean sea level rise projections for 2050. Tropical Cyclone/ Storm Surge (Wind and Wave Climate) The rock armour protection that is likely to be adopted at the reclamation area is based on a dynamic design. The rock armour, therefore, will move to create a stable profile over its lifetime. It is recognised that during the lifetime of the structure a design event or even bigger may occur. These events will not lead to catastrophic failure, but may require some maintenance and possibly replenishment of the rock armour in places. GPC recognise this and is committed to carrying out this maintenance to allow the structure to be operationally stable for the design life of the reclamation. The rock armour has been designed for cyclonic winds associated with an average return interval of 50 years. This is equivalent to a 2% annual exceedance probability based on historic data for the Gladstone region. Due to the dynamic design of the rock armour that is proposed, the maintenance regime in place would potentially be able to adapt the overall volume of the rock armour to maintain 2% annual exceedance probability design specifications if required.
Performance requirement/s	None specific to this element.
Monitoring	None specific to this element. Requirements as specified in the Implementation Framework apply.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	None specific to this element. Requirements as specified in the Implementation Framework apply.

19.3.2 Schedule 2 - Acid Sulphate Soils

Element	Acid Sulphate Soils
Potential Impacts	The potential impacts on the environment from Acid Sulphate Soil have been identified as: ◗ The release of acidic runoff into the marine environment with the potential for heavy metals to be transported during the placement of the bund materials; ◗ Redistribution of potential acid sulphate soils into new areas of the harbour from the rehandling of dredged material; ◗ Generation of acid from dredged material if it is not saturated at all times throughout the dredging process; ◗ Release of potential acid sulphate soils during dredging activities from overflow from the dredge vessels; ◗ The migration of acidic groundwater from the Reclamation Area into the harbour; and ◗ Iron staining of the ground surface within the Reclamation Area due to potential acid sulphate soils drying out and oxidising, generating acid and mobilising iron from within the sediments, resulting in the precipitation of iron.
Policy	To avoid, minimise and manage the potential impacts of acid sulphate soils.
Implementation	<u>Bund Wall Construction</u> *Mud Wave* ◗ Excavation of unconsolidated materials forming the 'mud wave' above the mean high water neap level, ensuring that the remaining material is inundated for every tidal cycle; – Neutralisation treatment and validation of these materials as required; or – Placement of 'mud wave' material permanently under water within the bunded area, for material compliant with the ASSMAC stockpiling guideline limits in Dear *et al.* (2002). Any unconsolidated material in the 'mud wave' below the mean high water neap level will be managed passively through the natural inundation of water each tidal cycle. *Trapped Soft Unconsolidated Material within the Bunded Area and on the Western Side of the reclamation* ◗ Re-distribution of any material trapped within the bunded area so that it remains permanently under water, within the bunded area. The material is to be re-distributed in compliance with the guidelines for stockpiling of ASS; ◗ Excavation of disturbed, trapped, unconsolidated materials from the western side of the Reclamation Area which are no longer inundated by the mean high water neap tide. Placement of this excavated material permanently below the water table within the bunded area subject to compliance with the ASSMAC ASS material stockpiling guidelines in Dear et al. (2002), or placement in the bunded area following treatment with lime and validation sampling.

Element	Acid Sulphate Soils
	Other Excavation Activities (if required) ◗ Neutralisation treatment and validation of excavated materials; ◗ Collection and treatment and appropriate disposal of any potential contaminated leachate from other such excavations; and ◗ Lime dusting of excavation surfaces prior to back filling. <u>Dredging</u> ◗ Bottom dumping outside the reclamation area is not to occur when dredged material has Titratable Peroxide Acidity (TPA), Titratable Sulfidic Acidity (TSA) or Titratable Actual Acidity (TAA) concentrations above the ASSMAC guidelines without appropriate turbidity/siltation control; and ◗ During dredging, dredged material is to be kept in a saturated state to reduce the potential impact of oxidising PASS.
Implementation (continued)	<u>Placement of Dredged Material</u> To mitigate the above potential impacts, management during placement of the dredged material will be required. A detailed Acid Sulphate Soils Management Plan (ASSMP) will be required outlining the recommended strategy during placement, after completion and to provide guidance to future proponents that may construct facilities on the reclamation. The ASSMP could include the following activities in more detail: ◗ Strategic placement of dredged material. Dredging of the following areas within the early stages of the project to allow strategic placement of sediments identified as having high sulphur levels (refer Acid Sulphate Soil Assessment for the preliminary areas that have been classified as 'Hot spots'). These materials should be placed under the permanent watertable within the reclamation area. ◗ Dewatering and lowering of the water table within the reclamation area should be avoided where possible, to allow the maximum volume of sediment stay in a saturated state. ◗ Preparation of a water management strategy for the reclamation area, to mitigate the potential impacts of contaminated leachate and runoff entering the receiving environment. The strategy should include: – Collection of any runoff and any water pumped from excavations; – Testing and treatment of any contained water prior to release into the harbour. Any water should be validated to ensure it is of similar or better quality than that of the receiving environment; and – Testing and treatment of the decant pond water prior to release into the harbour. All decant water is to be validated prior to release to ensure it is of similar or better quality than that of the receiving environment. ◗ Lime dosing of dredged sediments (as required) as they are pumped into the reclaim area to ensure sufficient neutralising agent is available and negate the effect of beaching which may cause the sediments natural buffering capacity to be separated from the pyritic material within reclamation. ◗ Validation testing of the sediments after placement to confirm sediments have sufficient buffering capacity. If samples located above the permanent water table fail the validation testing then additional sampling will be conducted and the management options will be assessed on a case by case basis.

Element	Acid Sulphate Soils
	◗ Placement of a capping layer of at least 2 m of clean sand or the like over untreated PASS that has been placed up to the mean high water neap level (i.e. is inundated at least once per tide cycle) to ensure materials stay near their optimum moisture content and do not dry out over time.
Implementation (continued)	Maintenance Dredging There is an increased likelihood of the oxidation of PASS as the maintenance dredged material is unlikely to be placed below the permanent water table. To mitigate the potential impacts, an ASS investigation of the areas to be dredged should be conducted prior to commencement of the dredging, but no more than 6 months before the proposed start date. Materials identified as PASS or AASS should be dredged in a way to ensure material is not oxidised during the dredging process and any overflow from the dredge is kept to a minimum. Once the materials are ready to be placed within the reclamation area, the same management process used for the capital dredging is to be adopted.
Performance requirement/s	Titratable Peroxide Acidity (TPA), Titratable Sulfidic Acidity (TSA) or Titratable Actual Acidity (TAA) concentrations to be below Acid Sulfate Soil Management Advisory Committee (ASSMAC) guideline trigger levels. The State Planning Policy 2002 identifies action criteria based on oxidisable sulfur levels constituting significant environmental risk as outlined in the table below:

Action Criteria Based on ASS Analysis for Three Broad Texture Categories

Soil Texture	Clay Content %	< 1,000 Tonnes Disturbed		> 1,000 Tonnes Disturbed	
		S_{CR} %	H^+ mol/tonne	S_{CR} %	H^+ mol/tonne
Coarse (sands – gravels)	< 5	0.03	18	0.03	18
Medium (sandy loam – light clay)	5 – 40	0.06	36		
Fine (medium to heavy clays, silty clays)	> 40	0.10	62		

Materials containing acid (H^+) or sulfur (S_{CR}) levels in excess of the values presented in the above table are deemed to be soils that require treatment, if the volume of disturbance is > 100 tonnes or where fill with a thickness of 0.5 m or greater (with a total volume > 500 m^3) is applied to the site.

Other analytical measure of importance:

- TAA – Titratable Actual Acidity;
- pH_{KCL} – pH of the soil before oxidation (the pH of the soil before TAA is measured in a 1:40 1 M KCl suspension);
- S_{Cr} – Chromium-reducible sulfur (provides an estimate of the un-oxidized inorganic sulfur); and
- ANC – Acid Neutralising Capacity.

Element	Acid Sulphate Soils
Monitoring	The Groundwater Monitoring Program as recommended in Schedule 7 should include: ◗ Installation of groundwater monitoring bores to allow early detection of any contamination plumes, fluctuations in groundwater levels and degradation of groundwater quality as a result of oxidation of PASS; and ◗ The Groundwater Monitoring Program should be developed (or updated) once stage 1 (filling to RL7m) of the reclamation is completed, to provide a framework for routine monitoring and data analysis and special event monitoring.
Auditing	The Groundwater Monitoring Program will provide a framework for due diligence auditing.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	The Groundwater Monitoring Program will provide a framework for corrective actions to be taken in the event of non-compliance.

19.3.3 Schedule 3 - Coastal Processes

Element	Coastal Processes
Potential impacts	From a physical coastal processes viewpoint, the potential impacts of the proposed development are summarised as follows: ◗ The physical presence of the reclamation within the footprint of the reclamation area; ◗ The changes in flow and water level conditions adjacent to the reclamation to the north and west, particularly the changes to the rate at which the ebb tide level drops reducing the time that the tidal flats are dry during the lower parts of the tidal cycle; ◗ The scour of fine silts from the north-eastern corner of the reclamation; ◗ An increase in maintenance dredging of sand sized sediment in the new dredged channels and swing basins that is commensurate with the existing maintenance commitment; and ◗ Potentially a large increase in maintenance dredging to remove fine silts from the new channels and swing basins adjacent to the Western Basin Reclamation and in the turning basins adjacent to Curtis Island. It is not necessary to mitigate the changes to the tidal flows and water levels in themselves as the changes are within the normal bounds of the processes that occur in the natural system as a result of the inherent variability of coastal and estuarine environments in a macro tidal area. However it may be necessary to mitigate against some of the effects that these changes bring about. The effects that appear to have the most impact are: ◗ The reduction in the length of time that areas to the north and west of the reclamation are dry around the time of low water; ◗ The increased potential for fine silt deposition in the newly dredged channels; and ◗ The increased potential for sand sized deposition into the existing channels downstream of the Western Basin.
Policy	To minimise adverse effects caused by changes to coastal processes.

Element	Coastal Processes
Implementation	It is not necessary to mitigate the changes to the tidal flows and water levels in themselves as the changes are within the normal bounds of the processes that occur in the natural system (representing the inherent variability of coastal and estuarine environments in a macro tidal area). The need for mitigation of the reduced drying time in the areas near the Reclamation Area will depend on considerations dealt elsewhere in the EIS, such as Chapter 9 (Marine Ecology). The main response would be to allow the ebb tide to drain from this area more efficiently, which should result in increased drying time in those areas that currently experience a substantial drying period around low water. The most practical mitigation measure for the increased potential for sedimentation in the dredged channels is to monitor the actual deposition rates and devise a maintenance dredging plan to arrange its removal to the reclamation so that there is no interruption to future ship movements. This rate of siltation of fine silts could be accommodated by an over-dredging allowance to extend the time between maintenance dredging campaigns. With an over-dredging allowance of 0.3m maintenance dredging of the fine silt material may only be required every 3 to 4 years should the rate of silt deposition reach its full potential.
Performance requirement/s	None specific to this element.
Monitoring	None specific to this element. Requirements as specified in the Implementation Framework apply.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	None specific to this element. Requirements as specified in the Implementation Framework apply.

19.3.4 Schedule 4 - Water Quality

Element	Water Quality
Potential impacts	<u>Construction of Bund Wall</u> ◗ The disturbance of soft seabed sediments will be limited to the first layer of rocks, after which subsequent rock for that section will be placed on rock and not the soft seabed sediments. ◗ There will be an increased risk of remobilisation of the mud wave during elevated wind and wave conditions, or during spring tides. There will also be the potential for waves to erode core material during storm (cyclone) conditions that may arise over the course of construction. ◗ There is the potential for spillage (either minor through drips or major through a leak/accident) of oils and fuels from construction equipment to impact on marine water quality. ◗ Small reduction in flushing because of loss of intertidal storage and small changes to currents, water levels and tide phases. ◗ Generation of turbid plumes through the introduction of fines from the rocks. <u>Filling of Bund Wall and Reclamation Decant</u> ◗ Placement of geotextile fabric will act to minimise the migration of fines through the bund wall and surrounding waters. Once a significant amount of dredged material is beached against the inner wall, this will also act as a filter layer to assist in preventing the migration of fine material through the bund wall into the receiving environment. ◗ TSS (and turbidity) from the decant is within the natural range and variability that has been measured within the Western Basin intertidal and subtidal regions of the Project Area with elevated levels primarily along the northern boundary of the reclamation, which is likely to the region of impacts to seagrass beds. <u>Channel Dredging</u> ◗ Increased turbidity in vicinity of CSD, TSHD overflow and TSHD rehandling. ◗ Development of turbid plumes that impact seagrass beds in Western Basin (primarily during flood tides because of TSHD dumping), but less so for those in Narrows and Wiggins Island. ◗ Decrease in the light climate experienced by seagrass beds in shallow waters. ◗ Slight reductions in net circulation patterns and flushing.
	<u>Cumulative impacts</u> Potential cumulative impacts from concurrent projects in the Project Area are expected to result in some degradation of water quality and have been identified to include: ◗ Declines in water and sediment quality (including increased pollution) associated with construction events such as bund construction, bund filling and capital dredging works; and ◗ The flow on effects to the benthic habitats and the communities, particularly with increased turbidity on seagrass beds; and ◗ Declines in water and sediment quality associated with larger maintenance dredging requirements relative to those currently.

Element	Water Quality
Policy	To minimise the generation and migration of turbid plumes and the introduction of contaminants in the marine environment during dredging and construction of the reclamation area.
Implementation	<u>Construction of Bund Wall</u> Generation of turbid plumes during rock placement to be visually monitored and photographed daily during initial construction stages. Difficult to mitigate this plume as the large tidal range and strong tidal currents limit the practicality of silt curtains in this environment. The rock will be extracted and screened at the quarry site, including scalping of the fine fraction (<20 mm) to reduce the potential for generation of turbid plumes through the introduction of fines into the harbour. The potential for acid production from the rock when it is placed in the marine environment will be tested prior to the commencement of construction, however it is not considered to be a significant concern considering that the quarry consists of bluestone material. If any of the analysis results suggest uncertainty (i.e. potential for production of acid), then additional sampling would be undertaken and management or mitigation measures considered as appropriate. The erosion of core material by waves during potential storm conditions will be managed by placement of armour material to the exposed face of the core material closely behind the core work face. A stockpile of armour material will be held at the quarry, sufficient to cover any exposed core if a cyclone were to approach. Contingency planning for a storm will require the placement of the stockpiled armour material to cover exposed faces of the core material. A maximum of 50 m of unarmoured length of wall will be maintained during construction. No planned refuelling or maintenance of construction equipment will occur on the site, nor will equipment be parked at the site for a significant time, reducing the potential for significant spills of oils and fuels to occur. All construction equipment will undergo regular maintenance and pre-start inspections will be undertaken on a daily basis to identify any leaks. Spill kits for land and water based spills will be kept at the site and personnel trained in their use. Emergency response procedures will be established (refer Emergency Response Plans Schedule).

Element	Water Quality
Implementation (continued)	<u>Filling of Bund Wall and Reclamation Decant</u> The bund design includes the placement of geotextile fabric on the inner face of the bund before commencement of filling operations. This will act to minimise the migration of fines through the bund wall and into the surrounding waters from the differential pressures created on either side of the wall by the rise and fall of the tide. Once a significant amount of dredged material is beached against the inner wall, this will also act as a filter layer to assist in preventing the migration of fine material through the bund wall into the receiving environment. Therefore, minimal impacts to water quality are expected from the filling of the bund with dredged material and no further mitigation measures are recommended. Multiple cells within the reclamation will allow finer materials to settle out of suspension via weir boxes with adjustable gates so that water can be retained for longer periods if needed where the final weir box at the outfall can be completely closed if water quality objective is exceeded. Floating booms will also be available on site and will be deployed into the reclamation cells should wind conditions result in waves stirring up deposited sediments within the reclamation cells.
	<u>Channel Dredging</u> Monitoring of water quality during dredging and comparison of results to site specific water quality objectives for turbidity. Sediment sampling undertaken for the EIS determined dredged material is suitable for reclamation material, therefore the risk of contaminants being mobilised into the water column is considered low. Where possible, reduce occurrence of TSHD dumping during selected periods (such as flood phase of large spring tides) through programming, as this is when much of the dredge plume material will be transported into the Western Basin seagrass beds, and to a lesser extent, beyond these beds. No mitigation for changes to circulation patterns and flushing.
Performance requirement/s	<u>Site Specific Turbidity Objectives</u> (taken from Table 6-4 in Appendix K) Prior to each dredging program, once the dredger, volume, production rate and time frame of the particular program is known, calculations will allow design of the number of reclamation cells and the area required to achieve the water quality objectives.

Applicability	Turbidity (NTU)		TSS (mg/L)		Dredge Plume TSS (mg/L)
	Median	95th Percentile	Median	95th Percentile	Threshold
Decant receiving environment	9	30	15	92	77
Western Basin seagrass beds	9	55	15	184	169
Wiggins Island, South FL seagrass beds	9	91	15	317	302
Deep channel waters	4.5	20	5	56	51

Monitoring	Development of a Dredge Management Plan including daily monitoring of sites within the final reclamation cell, at the outfall and at the northern Western Basin seagrass bed that commences two weeks prior to dredging, and continues during decant discharge. ◗ Monitoring of water quality during dredging and comparison of results to site specific water quality objectives for turbidity.

Element	Water Quality
	◗ As for the recent Berth 1 dredging at Fisherman's Landing, daily monitoring of sites adjacent to the dredge, within the final reclamation cell, at the outfall and at the northern Western Basin, Fisherman's Landing and Wiggins Island seagrass beds. Monitoring will commence two weeks prior to dredging and will continue during decant discharge. ◗ Monitoring and management of any material that is displaced above Lowest Astronomical Tide (LAT) levels or its current elevation in accordance with the Acid Sulphate Soils Management Plan (ASSMP) for the Project.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	The control measures will be re-assessed if the turbidity exceeds 100 NTU in the final reclamation cell or 30 NTU in the receiving environment adjacent to the outfall or if the visible plume extends beyond the spatial extent predicted by the modelling.

19.3.5 Schedule 5 - Sediment Quality

Element	Sediment Quality
Potential Impacts	A comprehensive sediment sampling undertaken for the Western Basin Dredging and Disposal Project has demonstrated the presence of minor concentrations of anthropogenic contaminants and naturally occurring compounds in individual samples across the areas to be dredged. The analysis of a large number of sediment samples from each of the dredge stages for an extensive suite of potential contaminants has revealed that the overall quality of the sediments in the Project Area are compliant to the NAGD (2009) and the QEPA EILs. The only exception to the compliance of the sediment quality with the adopted guideline values are the elevated manganese concentrations observed within the Stage 1B area. The occurrence of the three highest manganese concentrations within the Stage 1B area was within the upper 1 mBSB of sediment. However, across all the sediments to be dredged, the manganese concentration is compliant to the QEPA EIL. Due to the comprehensive nature of the sediment sampling and analysis program, the results are considered representative of the sediments to be dredged for the proposed Western Basin Dredging and Disposal Project. It is therefore considered that the sediments proposed to be dredged are suitable for placement within the proposed Western Basin Reclamation Area, without the requirement for further sampling and analysis and no significant impacts relating to sediment quality are anticipated for the proposed dredging.
Policy	To minimise and manage adverse environmental outcomes if contaminants are present within sediments.
Implementation	Operate within safe weather conditions to prevent spills from dredgers during relocation to the Reclamation Area. Line the bund with geotextile fabric to reduce potential for fines to be moved back into marine environment through wall following placement. Monitoring and control of dredge regime to be in accordance with dredge management plan (DMP). Program dredge activity to avoid, where practicable, use of TSHD in northern extents of Western Basin during flood phase of large spring tides. Monitor turbidity levels against site specific objective within relevant sensitive ecosystem receptors and adjacent habitats and respond as required by DMP. Activity alteration may include reducing duration of dredging at particular locations during spring tide, relocating dredge to different areas in accordance with dredge schedule, planned increase in period between dredging activity at any one location. Sediments to be used for reclamation works to be tested for contamination and reclamation area to be constructed and managed to reduce/remove potential impacts from any contaminants, including PASS.
Performance requirement/s	In summary, the adopted guidelines for sediment quality are: ◗ National Assessment Guidelines for Dredging 2009 – Interim Sediment Quality Guidelines - Maximum level (ISQG – High) – Interim Sediment Quality Guidelines - Screening level (ISQG – Trigger Value); and ◗ EPA Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland 1998 - Environmental Investigation Levels (EIL).

Element	Sediment Quality

Performance requirement/s (continued)

Sediment Quality Guidelines adopted for Western Basin Dredging and Disposal

Parameter	Draft Contaminated Land Qld (1998) – EILs	NAGD (2009) – Screening Level	NAGD (2009) – SQG-high
Metals and Metalloids (mg/kg)			
Arsenic	20	20	70
Antimony	20	2	25
Cadmium	3	1.5	10
Chromium (III +IV)		80	370
Copper	60	65	270
Lead	300	50	220
Manganese	500		
Mercury	1	0.15	1
Nickel	60	21	52
Silver		1	3.7
Zinc	200	200	410
Total Petroleum Hydrocarbons (mg/kg) (TPHs)			
C 6 – C9 Fraction	100		
C 10 – C14 Fraction	100		
C 15 – C28 Fraction	1,000		
C 29 – C36 Fraction	1,000		
Total TPHs		550	
Polycyclic Aromatic Hydrocarbons (µg/kg) (PAHs)			
Benz(a)pyrene			
PAHs (Sum of total)		10,000	50,000
Polychlorinated Biphenyls (µg/kg) (PCBs)			
PCBs (sum of total)	1,000	23	
Organochlorine Pesticides (µg/kg) (OCPs)			
4,4-DDE		2.2	27
Aldrin + Dieldrin	200		

Element	Sediment Quality			
Performance requirement/s (continued)	**Parameter**	**Draft Contaminated Land Qld (1998) – EILs**	**NAGD (2009) – Screening Level**	**NAGD (2009) – SQG-high**
	Chlordane		0.5	6.0
	DDD		2.0	20
	DDT		1.6	46
	DDT+DDE+DDD	200		
	Dieldrin		280	270 / 620
	Endrin		10	120 / 220
	g-BHC (Lindane)		0.32	1.0
	Organotins (µg Sn/kg)			
	Tributyltin (TBT)		9 µg Sn/kg	70 µg Sn/kg
	There are no guidelines for nutrients, herbicides or insecticides in sediments in the guidelines adopted for this program.			
Monitoring	Monitoring and control of dredge regime to be in accordance with dredge management plan (DMP). Monitor turbidity levels against site specific objective within relevant sensitive ecosystem receptors and adjacent habitats and respond as required by DMP.			
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.			
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.			
Corrective Action	None specific to this element. Requirements as specified in the Implementation Framework apply.			

19.3.6 Schedule 6 - Hydrology and Stormwater Management

Element	Hydrology and Stormwater Management
Policy	To avoid and minimise erosion and adverse effects to water quality as a result of stormwater run-off.
Potential impacts	<u>Flood Hydrology</u> Afflux resulting from stormwater conveyance within the intertidal channel, under Highest Astronomical Tide (HAT) conditions, is negligible. Therefore, the effect on Creek A is considered negligible. Furthermore, the stormwater outlets of the two industrial developments should not be adversely affected. Predicted velocities resulting from stormwater conveyance within the intertidal channel were calculated for Lowest Astronomical Tide (LAT) and Highest Astronomical Tide (HAT). Predicted velocities within portions of the intertidal channel, under LAT conditions, could be sufficiently high (approximately 0.7 m/s) to result in the resuspension of benthic sediments, thus increasing turbidity and potentially causing scour adjacent the proposed bund wall. Furthermore, predicted velocities at the outlet of the intertidal channel are considered high (>1.5 m/s). It should be noted that the invert of the intertidal channel undulates (-0.24 m to 0.00 m AHD). Therefore, it is possible that the intertidal channel will seek to recreate a natural equilibrium through the scour of “ridges” and deposition in “valleys”. The proposed temporary at-grade construction access road that is to traverse the intertidal channel in order to gain access to construct the western bund wall, has not been modelled. However, impacts are considered negligible provided that the road does not impinge upon the intertidal channel either vertically or horizontally. <u>Stormwater Quality</u> Following completion of the filling of the Reclamation Area, the final surface will be capped with suitable material. There is the potential for sediments to be entrained in the stormwater runoff and released to the harbour. This stormwater is unlikely to be contaminated with nutrients, organics, hydrocarbons or metals as there will be no activities occurring on the undeveloped Reclamation Area that would result in the introduction of contaminants into the stormwater runoff. Typically, rainfall events up to the 3 month ARI will generate approximately 90% of the annual volumetric runoff. Therefore, these events tend to carry pollutant loads that could be associated with the long-term degradation of downstream receiving waters. However, the average number of days per annum with rainfall greater than 1 mm is only 66 (Gladstone Radar). Given that the intertidal channel is subject to daily flushing within the boundaries of the normal tidal range, it was concluded that tidal flushing is the primary hydraulic transport regime with respect to water quality.
Implementation	<u>Study Area - Surface Water Flooding</u> ◗ The outlet of the intertidal channel is rock armoured and potentially widened locally to reduce the risk of scour. ◗ Routine monitoring is undertaken to determine if scour is occurring in the intertidal channel and that in the event that such scour is occurring, the effects on turbidity and stability of the bund wall are reassessed and the bed stabilised where necessary.

Element	Hydrology and Stormwater Management
	◗ The proposed temporary at-grade construction access road does not impinge upon the intertidal channel either vertically or horizontally. ◗ The proposed temporary at-grade construction access road is removed in its entirety at the earliest opportunity practicable and the intertidal channel is rehabilitated. <u>Reclamation Area – Stormwater Drainage and Treatment</u> Grass lined channels have been recommended as these represent a best compromise between hydraulic efficiency and cost efficacy. The conceptual design of the stormwater management system (stormwater drainage system and stormwater treatment measures) for the proposed Reclamation Area has been developed in order to demonstrate that a functional stormwater management system is practicable (refer Chapter 2 for a more detailed description). The focus of the conceptual stormwater design is for the final reclamation surface. The management of water quality during filling of the Reclamation Area is covered in Schedules (2 & 4). The final design may differ from the conceptual design, but performance requirements must still be met. The conceptual design of the stormwater management system comprises Type D wet sediment basins consisting of a settling pond, a decant system, and a high-flow emergency spillway. Basins require decant when the water level reaches the top of the sediment storage zone, which could be after every moderate rainfall event. Stormwater runoff is likely to be saline, which will aide in the flocculation of suspended particles. However, it is possible that chemical flocculation may be required to ensure the water quality objectives are met. It is also noted that the reclamation will be progressively capped, reducing the silt and clay content of the reclamation surface. To limit soil erosion and loss at source, it is recommended that: ◗ All exposed surfaces on the proposed Reclamation Area be appropriately vegetated as soon as is practicable; ◗ Sediments to be capped as soon as practical to limit sediment erosion and resuspension; and ◗ Structural source control systems, such as sediment fences, are employed. Future proponents will need to address the quantity and quality of stormwater discharge from any facilities constructed on the Reclamation Area, including the separation of clean stormwater from potentially contaminated stormwater. This will be licensed when these proponents apply for development approvals under the relevant legislation.
Performance requirement/s	In accordance with Table B18 of International Erosion Control Association, Best Practice Erosion and Sediment Control Guidelines, 2008, it is recommended that the discharge limit for de-watering operations be 90% of Total Suspended Solids, but not exceeding 50 mg/L. This represents an achievable water quality objective, based on current sediment basin design techniques. However, sediment basin design techniques are constantly being refined. Given that the sediment basins will only be constructed in the medium term, after the proposed Reclamation Area has been filled to RL 7.0m AHD, it is recommended that reference then be made to best practice guidelines for soil erosion and sediment control.

Element	Hydrology and Stormwater Management
Monitoring	Routine monitoring should be undertaken to determine if scour is occurring in the intertidal channel. The proposed reclamation area, and in particular the mound, could be subject to differential settlement. In order to mitigate the associated risks, a stringent monitoring program has been recommended, as follows: ◗ All drainage elements be visually inspected after all significant rainfall events (>2 year ARI) by a registered professional engineer; ◗ All drainage elements on the mound be surveyed on an annual basis to determine if significant differential settlement or siltation is occurring; and ◗ All drainage elements where excessive erosion, differential settlement, siltation or other forms of damage has occurred are remediated with immediate effect.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	In the event that scour is occurring in the intertidal channel, the effects on turbidity and stability of the bund wall should be reassessed and the bed stabilised where necessary. All drainage elements where excessive erosion, differential settlement, siltation or other forms of damage has occurred are to be remediated with immediate effect.

19.3.7 Schedule 7 - Groundwater

Element	Groundwater
Potential impacts	Construction Potential for degradation of groundwater quality adjacent to the project area as a result of any leaks and spills originating from construction activities on the landward side of the proposed development area. Construction and Operation Groundwater modelling results indicate that groundwater levels in the coastal strip adjacent to the Reclamation Area may increase by up to 0.8 m due to revised groundwater flow patterns post development. However, model predictions also suggest that for the most part groundwater levels will remain more than 1m below surface and hence risks of water logging and/or soil salinisation will only be increased in isolated areas totalling around 0.175 km^2. Potential for the acidification and degradation in quality of the surrounding sea water if any acid sulphate soil material used in the reclamation is not managed appropriately. This could lead to the mobilisation of metals in the fill material, such as aluminium and iron, and subsequent discharge to the sea. Cumulative Impacts Whilst no significant impacts on groundwater resources and/or groundwater quality are anticipated, this is based on adoption of the mitigation strategies outlined below. The groundwater flow model, pre and post construction monitoring of groundwater levels and groundwater quality is required to provide a more extensive baseline data set than is currently available and to confirm the impacts of the development.
Policy	To avoid and minimise adverse impacts on groundwater resources and quality.
Implementation	Storage areas for vehicles, machinery, equipment, chemicals etc. whether on land or within the reclaim area during construction should have appropriate facilities to contain spills, leaks and surface water runoff to reduce the potential for contamination of groundwater through infiltration. The installation of inlets and/or drainage channels at sea level within the proposed Reclamation Area, thereby minimising groundwater level mounding within the area itself and hence, reducing the potential for increased groundwater levels in onshore areas.
Performance requirement/s	Monitoring of groundwater prior to construction (part of the groundwater monitoring program outlined below) to establish baseline conditions, will confirm key groundwater quality and level performance requirements against which to monitor conditions during construction.
Monitoring	Develop and implement a groundwater monitoring program to monitor groundwater levels and quality in the alluvial/colluvial deposits and fill material adjacent to the proposed development area to confirm any groundwater impacts during the construction phase. This program should be agreed with the relevant authorities prior to commencement and include: ◗ Maintenance of regular groundwater monitoring (levels and quality), for a minimum 12 month period, prior to the start of construction to establish baseline groundwater conditions adjacent to the site and hence confirm key

Element	Groundwater
	groundwater quality and level action criteria against which to monitor conditions during construction; ◗ Regular assessment of groundwater monitoring results against baseline groundwater conditions during construction; ◗ Include installation of groundwater monitoring bores to allow early detection of any contamination plumes, fluctuations in groundwater levels and degradation of groundwater quality as a result of oxidation of PASS; and ◗ Be updated once stage 1 (filling to RL7m) of the reclamation is completed, to provide a framework for routine monitoring and data analysis and special event monitoring. ◗ Be updated once construction of the Reclamation Area is completed, to provide a framework for routine monitoring and data analysis and special event monitoring during the operational phase. ◗ Be developed and conducted by a suitably qualified and experienced professional in accordance with the AS/NZS 5667.11:1998 *Australian/New Zealand Standard for water quality – sampling Part 11; guidance on sampling of groundwater's.*
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	If impacts on groundwater levels are identified an assessment of potential mitigation measures will be conducted, which will include the use of the groundwater flow model to help assess the effectiveness of proposed mitigation measures.

19.3.8 Schedule 8 - Terrestrial Flora and Fauna

Element	Terrestrial Flora and Fauna
Potential impacts	Construction and operation of the Project has the potential to cause a number of direct and indirect impacts on a range of flora, fauna and associated habitats, including listed EPBC Act migratory bird species including: ◗ Disruption to wildlife behaviour as a result of light, noise and vibration disturbances from construction activities; ◗ Direct mortality of flora and fauna during construction; ◗ Indirect degradation of habitats due to pollution and acid sulphate soil disturbance; and ◗ Creation of new habitat on/within the reclamation formation.
Policy	To ensure minimal impact on terrestrial flora and fauna from the dredging and construction of the reclamation area.
Implementation	If possible, minimise construction of the northern bund wall during critical migratory bird visitation periods (March-April and September-October). Employ directional lighting pointed towards the Project Area and away from surrounding habitat. Use low wattage lights and glare guards in vicinity of the important shorebird habitat in the north-west of the Project area. Ensure plant and equipment are well maintained. Educate employees of environmental responsibilities during inductions. Establish appropriate speed-limits within the Project Area to restrict incidence of wildlife road-kill. Install appropriate rubbish disposal facilities on site (including recycling option) and ensure that food waste is disposed of in contained bins. Vehicle hygiene measures will be implemented to prevent introduction of weeds and pathogens to the Reclamation Area and the marine environment. This will include regular wash-down of trucks off-site. Products brought on site, including quarry material and straw bales (if used), should be free of weeds, seeds and pathogens. Any weed infestations should be controlled. If herbicides need to be used, a marine ecologist should be consulted and only approved herbicides used at approved application rates. No domestic animals are to be brought on site. If pest animals are detected, pest control programs should be developed and implemented.
Performance requirement/s	None specific to this element. Requirements as specified in the Implementation Framework apply.

Element	Terrestrial Flora and Fauna
Monitoring	Monitor the distribution and health of the intertidal habitats and report findings regularly. Monitor abundance and diversity of avifauna species for signs of impact to allow for adaptive management where possible. Monitoring should consider the need for permanent sound barriers on the north-west bind wall as ongoing protection of important shorebird habitat.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	If impacts to the intertidal habitats do occur, develop a management plan to assess cause of impacts and potential mitigation measures.

19.3.9 Schedule 9 - Marine Ecology including Megafauna

Element	Marine Ecology including Megafauna
Potential Impacts	◗ Direct impacts (both potential and probable): – Removal or damage to the benthos and individual organisms from bund construction, dredging and pile driving works, including smothering of taxa; – Removal of foraging and/or inter-nesting habitat for marine turtle species, dugong and coastal dolphins; – Alteration of benthic habitat type from soft sediment to coarse/clay/hard substrate; – Alteration of benthic habitat type from intertidal to subtidal substrate; – Damage to individual organisms from direct contact related to construction activities, including trapping within bund when bund is closed; – Impact to fauna by boat strike from dredge and/or construction vessels; – Disturbance and displacement of marine fauna from increased noise and/or activity during construction and dredging on the local area; – Decreases in water quality from dredging, construction, spills of fuel or other hydrocarbons or other pollutants (animal wastes, paints, solvents and cleaners, etc.); – Increased rubbish that may be ingested or entangle marine fauna; – Introduction of marine pests to the Port and/or adjacent marine environment, including the GBRMP; – Alteration of sediment and water quality at the reclamation site by the introduction of contaminants or PASS; – Land use change resulting in loss of benthic primary producer habitat and fisheries resources; and – Interruption of recreational and other vessel traffic movement patterns. ◗ Indirect impacts (both potential and probable): – Decreased water quality from altered siltation/sedimentation regimes, alteration of stormwater input, and tailwater management, and an increase in pollutants as a result of construction waste or land use changes; – Conflict between commercial and recreational activities as a result of land use change leading to additive pressures on the adjacent marine systems; – Impact on subtidal and intertidal benthos (including mangrove communities) from changes in the hydrodynamic regime resulting in sedimentation, scouring, longer durations of wetting, increased/decreased flow rates; and – Noise, vibration and light impacts to marine reptiles and mammals from in-water construction or ongoing operational activities.
Policy	To minimise impact on marine ecology including marine megafauna from the dredging and construction of the Reclamation Area.

Element	Marine Ecology including Megafauna
Implementation	◗ Offsets to be implemented for habitat losses. Consider implementation of 'like for like' offsets given importance as a foraging habitat. ◗ Manually remove marine fauna prior to reclamation works closing bund. Relocate species to adjacent open marine system. Adopt a strategy to decrease potential trapping of fauna during bund construction such as use of nets to deter entry into bunded area. ◗ Design bund to reduce any long-term scouring potential. Monitor mangrove and benthic habitat for detrimental change in health and undertake remediation activities in accordance with EMP. ◗ Adherence to waste management controls identified in the EMP for this Project. ◗ Dredge activities are to be restricted to agreed footprint of channel works to minimise impact to critical habitats. ◗ Where alteration of dredging footprint is desired, dredging activities should avoid highly sensitive ecological habitats including additional seagrass meadow impacts or fragmentation. ◗ Adopt appropriate overflow management for dredge to reduce water quality impacts in identified sensitive areas, if trigger values exceeded. Management provisions to be documented in DMP. ◗ Monitoring and control of dredge regime to be in accordance with DMP. ◗ Program dredge activity to avoid or minimise, where practicable, use of TSHD with rehandling in northern extents of dredging footprint during flood phase of large spring tides. ◗ Dredge activity alteration under DMP may include reducing duration of dredging at particular locations during spring tide, relocating dredge to different areas in accordance with dredge program, planned increase in period between dredging activity at any one location to reduce seabed impacts at that site. ◗ Adhere to Commonwealth and State biofouling and ballast water management requirements. ◗ Fauna spotting to reduce likelihood of impact prior to deployment of dredge head. Do not commence dredging if fauna within 50m of dredge head. ◗ Use a tickler chain or deflector head to avoid interaction with turtles resting on seabed. Maintain a fauna spotter and manage dredging operations to minimise interaction with megafauna. Do not commence dredging if megafauna noted within 50m of dredge head. Wait until megafauna moves out of immediate area. ◗ Appropriate design and construction of bund, including lining bund with geotextile fabric and installing internal bunding, to reduce potential for fines to be moved back into marine environment through the bund wall or via the decant waters. Consider use of floating booms within internal bunds to reduce potential for wind disturbance within retention ponds stirring up settling material. ◗ Manage movement of decant waters between bunds through installation of adjustable weir boxes and control rate of flow to increase sedimentation potential and reduce carriage of fines back to marine environment. Adjust decant regime if turbidity within sensitive ecosystem receptors exceed trigger

Element	Marine Ecology including Megafauna
	levels defined under DMP. ◗ Capping and revegetation of finished land surface to minimise erosion and sedimentation for management of stormwater run-off. ◗ Design stormwater management system to manage quality of water entering marine environment from run-off. Manage stormwater pond discharge to maintain water quality to stated objectives. ◗ Use warning strikes or similar prior to commencement of pile driving (if found to be effective). Implement soft starts and/or underwater warning noises prior to activity commencement where possible to allow megafauna opportunity to leave area of impact. Avoid activity if breeding of megafauna noted in immediate area. Use a megafauna spotter on vessel to manage conduct of activity to avoid interaction with megafauna when animals within close (50m) proximity to piling vessel. ◗ Use speed restriction areas for construction works to minimise risk of strike. Educate construction workforce regarding risks to marine megafauna and requirement to avoid interaction with those species.
Performance requirement/s	Trigger levels are to be established for water quality parameters, based on research of the shading tolerance limits for seagrass at this site.
Monitoring	Dredge activities to be managed under a Dredge Management Program (DMP). Monitor water quality turbidity levels against site specific objectives within relevant sensitive ecosystem receptors and adjacent habitats and respond as required by DMP. Objectives and monitoring sites to be determined during development of DMP. Processes to respond to trigger level exceedance to be defined in DMP and may include options for alteration of dredging program, temporary alternative to rehandling, or programmed movement of dredge between areas, in order to minimise sustained plume creation at any one area. Monitor the incidence of Toxoplasmosis gondii in stranded animals and investigate potential sources to determine areas of high risk associated with *Toxoplasmosis gondii* infection.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	Management responses are to be developed and implemented in the instance that trigger levels are exceeded.

19.3.10 Schedule 10 - Air Quality

Element	Air Quality
Potential impacts	Potential sources of air emissions during the construction phase of the Project include: ◗ Dust emissions from mechanical disturbance during the placement of rock in the bund once it is above the high water mark; ◗ Vehicle exhaust emissions from construction traffic, including trucks delivering quarry material and the movement and operation of construction machinery on the bund wall; ◗ Dust emissions from mechanical disturbance during the placement of capping material on the final reclamation surface; and ◗ Exhaust emissions from dredge vessels. The potential impact from the operation phase of the Project is: ◗ Dust from the surface of the completed reclamation area from wind erosion.
Policy	To minimise potential effects on the natural airshed during dredging and construction of the reclamation area.
Implementation	◗ Dust suppression trucks to be used on the reclamation area as required; ◗ All construction vehicles including dredging vessels to be properly maintained and standard emission reduction devices are to remain on vehicles; and ◗ Appropriate revegetation of the reclamation area once construction is complete.
Performance requirement/s	No visible dust emissions from final reclamation surface.
Monitoring	None specific to this element. Requirements as specified in the Implementation Framework apply.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	None specific to this element. Requirements as specified in the Implementation Framework apply.

19.3.11 Schedule 11 - Greenhouse Gases

Element	Greenhouse Gases
Potential impacts	The main sources of Greenhouse Gas (GHG) emissions identified for the Project are: ◗ Transportation of the bund armour and core material from the quarry to the reclamation area site; ◗ Embodied emissions from the manufacturing of the geotextile material; ◗ Diesel fuel consumption of the on-site machinery; and ◗ Fuel required for capital dredging programs that will fill the bund with dredged material. The main sources of GHG emissions potentially generated during the construction phase of the Project are expected to be approximately 300,500 tCO_2-e or 0.17% of Queensland's annual emissions.
Policy	◗ Avoid: Identify where and how GHG emissions associated with the proposal can be avoided. ◗ Reduce: Identify where behaviour or processes can be modified to achieve GHG emission reductions. ◗ Switch: Identify where fuel and energy source switching can be used to reduce GHG emissions.
Implementation	<u>Transportation Mitigation Options</u> The source of the core and rock armour material is very close to the site and therefore the potential GHG emissions from this phase of the construction have already been minimised. In terms of defining the haulage route from the quarry to the reclamation area site, choosing the most direct route possible will result in further reductions in GHG emissions through reduced fuel usage. For example, even reducing the length of the haul road by half a kilometre has the potential to reduce GHG emissions from this phase of the project by around 5%. The driving methods employed by the drivers operating the trucks will also impact on the amount of fuel used and therefore reduce the GHG emissions associated with the transportation of the quarried materials to the site. Studies have shown that implementing smoother driving practices can result in fuel savings of between 5 and 10% (OECD 2001). A 10% savings in fuel used for transport during the construction phase of this project could equate to around 88,000 Litres, or 255 tCO_2-e. Options to reduce any possible congestion associated with the filling and emptying of the trucks at the quarry and Reclamation Area should also be implemented to avoid trucks spending more time on each trip than is necessary. Measures that could be implemented on the quarry and Reclamation Area include single direction loop roads in and out of the sites that allow trucks to enter and leave without unnecessary manoeuvring, and procedures to encourage drivers to turn off engines when any significant delays are experienced along the route. Investigating the potential to switch to the use of bio-fuels for the transport vehicles.

Element	Greenhouse Gases
	Embodied Emissions of Construction Materials Mitigation Options Investigate sourcing polyester geotextile manufactured from recycled PET to reduce the amount of embodied emissions in the geotextile material used for the Reclamation Area. On-site Mitigation Options Choosing the most suitable site equipment that can carry out the required tasks with the most efficient fuel consumption rates will result in reduced GHG emissions from on-site equipment fuel use. Implementing fuel saving initiatives on site such as efficient driving practices. Investigating the potential to switch to the use of bio-fuels for the onsite machinery.
Implementation (cont.)	Dredging Mitigation Options The dredging programs that will be carried out to fill the Western Basin Reclamation are required for various capital works and navigational projects in the surrounding area. These dredging projects will be required regardless of the presence of the Western Basin reclamation area. Therefore, the presence of the reclamation area for the disposal of the dredge material may reduce the need for dredgers to travel further distances. This would reduce the fuel use and possible GHG emissions as a result of the dredging activities. By designing the dredging operation to reduce overall fuel use, the GHG emissions from the dredging and transportation of the dredge material will be minimised. By scheduling the dredging programs so that the same dredgers can be used on each operation, fuel use associated with the potential mobilisation of the dredgers will also be reduced. Selecting newer dredges with more efficient engines if possible will also result in significant reductions in GHG emissions through fuel savings. Other Mitigation Options Some actions that are proposed to protect vegetation on and around the site will also contribute towards offsetting greenhouse gas emissions. For example: ◗ Setting the Reclamation Area back from the foreshore to allow for maintenance of the mangrove communities and maintaining the final decant pond as a wetland; and ◗ Options to vegetate the Reclamation Area (as also recommended elsewhere). Carrying out any additional fuel and energy savings measures identified in the Gladstone Port Corporation Energy Efficiency Opportunity assessments, such as the implementation of a system for analysing energy usage, as well as working to ensure that energy efficiency clauses are included in all equipment tender specifications will also contribute to reducing the potential GHG emissions associated with this project.
Performance requirement/s	Compliance with any Gladstone Port Corporation Energy Efficiency Opportunity assessments.
Monitoring	None specific to this element. Requirements as specified in the Implementation Framework apply.

Element	Greenhouse Gases
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	None specific to this element. Requirements as specified in the Implementation Framework apply.

19.3.12 Schedule 12 - Noise and Vibration

Element	Noise and Vibration
Potential impacts	Noise emissions from the construction of the Reclamation Area and from dredging activities have the potential to impact upon sensitive receivers surrounding the Project Area. Potential noise sources are: ◗ Construction of the Reclamation Area, including tip trucks, earthmoving machinery, vibratory rollers and other smaller construction vehicles; ◗ Dredging activities including the operation of: – Large trailing suction hopper dredger; – Medium trailing suction hopper dredger; – Large cutter suction dredger; – Medium cutter suction dredger; – Backhoe dredger; and – Workboats, survey boats and tug boats. ◗ Pile driving for the 19 beacons and channel markers to be installed. Worst case scenario noise modelling indicates that there is potential for project noise goals to be exceeded at some of the identified sensitive receivers during noise enhancing weather conditions. <u>Vibration</u> It is possible that the sensitive receivers identified surrounding the Project Area will observe vibrations from construction activities at times, however the level of annoyance will depend on individuals. The nearest sensitive receivers for the Project are located further than 500m from construction activities. Due to this distance from construction activities there is a very low likelihood that there will be any impacts from vibrations on the sensitive receivers.
Policy	To reduce or minimise the impact of noise associated with the dredging and construction of the reclamation area on aquatic and terrestrial receptors.
Implementation	<u>Reclamation Area</u> ◗ All combustion engine plant, such as generators and compressors should be checked to ensure they produce minimal noise; ◗ Vehicles and boats should be kept properly serviced and fitted with appropriate mufflers; ◗ Where practical, all vehicular movements to and from the dredging site should only be made during normal working hours; ◗ Where practical, machines should be operated at low speed or power and will be switched off when not being used rather than left idling for prolonged periods; ◗ Activities that cause excessive noise such as pile driving should be limited to Saturdays or business days between 6:30 am and 6:30 pm; and

Element	Noise and Vibration

- Machines found to produce excessive noise compared to industry best practice should be removed from the site or stood down until repairs or modifications can be made.

Dredging and piling

- Active community consultation with noise sensitive receivers prior to works commencing;
- Where possible, avoid dredging in close proximity to noise sensitive receivers during the night time period;
- Boats, dredgers and tugs should be kept properly serviced and fitted with appropriate mufflers;

Low-noise piling methods should be adopted where feasible. Use warning strikes or similar prior to commencement of pile driving. Implement soft starts between long breaks in activity, where the piling energy is gradually increased over a 5-10 minute time period to allow megafauna opportunity to leave the area of impact. Avoid activity if breeding of megafauna noted in project area.

Other possible mitigation measures to reduce the impacts of underwater noise on megafauna include the use of:

- Bubble curtains which reduce the sources level of the piling noise;
- Acoustic deterrents which 'scare' marine species from the immediate vicinity of construction activity; and
- Acoustic and human observation techniques to ensure that species are not in the area during pile driving activities
- Undertake piling at low tide, where possible; and
- Where a marine mammal is observed within the vicinity of pile driving activities, piling should be halted until the mammal has departed.

Element	Noise and Vibration

Performance requirement/s

Noise

Guidance on the assessment of operational noise impacts is provided within the QLD Environment Protection Agency (EPA) *Planning for Noise Control* (PNC) guideline, 2004.

Receiver No / Location (Type)		Construction Activity	Time Period Noise Goals dB(A)		
			Day (7am to 6pm)	Evening (6pm to 10pm)	Night (10pm to 7am)
R01	Mt Larcom Gladstone Road (Residential)	Reclamation	41	29	23
R02	Mt Larcom Gladstone Road (Residential)	Reclamation	45	45	47
R03	Fisherman's Road (Residential)	Reclamation	48	43	38
R04	Tide Island (Residential)	Dredging	48	43	38
R05	Witt Island (Residential)	Dredging	48	43	38
R06	Compigne Island (Residential)	Dredging	48	43	38
R07	Turtle Island (Residential)	Dredging	48	43	38
R08	Quoin Island (Residential)	Dredging	48	43	38
R09	Endeavour Parade, Flinders Parade, Aukland Street, Oaka Lane – Gladstone (Residential)	Dredging	48	43	38
R10	Between Friend Point and Laird Point (Protected Area)	Dredging	48	43	38

Vibration

In the absence of specific QLD guideline addressing vibration issues, the following standards are typically adopted by industry in Australia for the assessment of construction and operational vibration impacts:

- NSW Department of Environment and Climate Change (DECC) Assessing Vibration: A Technical Guideline, 2006;
- British Standard BS6472:1992 Guide to evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz); and
- British Standard BS7385-2:1993 Evaluation and Measurement for Vibration in Buildings, Part 2 - Guide to damage levels from ground borne vibration.

Monitoring

None specific to this element. Requirements as specified in the Implementation Framework apply.

Auditing

None specific to this element. Requirements as specified in the Implementation Framework apply.

Reporting

None specific to this element. Requirements as specified in the Implementation Framework apply.

Corrective Action

None specific to this element. Requirements as specified in the Implementation Framework apply.

19.3.13 Schedule 13 - Traffic and Transport

NOTE: This EIS does not include an assessment of the traffic and transport issues associated with transport of quarry material for the construction of the Reclamation Area. Once the haul route is confirmed the earthworks operator will be required to submit an EMP to the Council as a part of the operational works application. Some measures to manage impacts associated with this aspect have been identified in this EMP, such as vehicle hygiene (refer Schedule 8), product spill (refer this Schedule) and general vehicle maintenance (refer Schedule 4 &12). Other potential measures include those to prevent wind and water born erosion and picking up of materials from the wheels of haul vehicles with shaker grids and rubble pavements.

Element	Traffic and Transport
Potential impacts	Traffic generated by the construction workforce and trucks transporting construction materials (excluding transport of quarry material) to/from the Reclamation Area, is not predicted to impact on the roads and existing traffic in the area and will have a minimal impact on the pavement of the roads used. It is possible that up to four dredgers and associated support craft will be operating concurrently within the harbour, which may impact on recreational vessels as well as commercial shipping. Depending on the final haul route, existing signage at rail crossings may not be adequate. There is potential for product spill, including oils and fuels from construction equipment, vehicles and vessels leading to contamination of land/water.
Policy	To maintain functionality of the internal and external road network. To prevent the access of unauthorised vessels too close to the dredge area and bund wall construction site. To ensure that dredging operations do not unduly interfere with vessel movements in the Port. To prevent and provide contingency measures for spills.
Implementation	<u>Waterborne Traffic – General</u> 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. All dredgers will be marked with daymarks and lighting to conform to the International Association of Lighthouse Authorities (IALA). To prevent collisions, implement site specific training and traffic control, dredging contractor to have well defined procedures and trained crew, communication between vessels. GPC to increase public awareness on activities proposed. <u>Waterborne Traffic – Shipping</u> 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 schedule 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.

Element	Traffic and Transport

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 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.

Waterborne Traffic - Port Vessels and Small Craft

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 to the reclamation 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.

Implementation (cont.)

Waterborne Traffic - Material Discharge Area

Options for the discharge of materials from TSHD's or hopper barges may involve the dumping of the material on the seabed. 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.

Waterborne Traffic – Operation Phase

Education of vessel operators to minimise impact on marine fauna and benthic disturbances, enforcement of speed limits.

Rail Network

A rail line runs along the MTSC and into Cement Australia. There are two level crossings along Serrant Road that cross the rail loop.

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.

Element	Traffic and Transport
	Oil and Fuel Spills Undertake maintenance and servicing of vehicles at off-site facilities. All plant and machinery (particularly hydraulic hoses, fuel lines, etc) will be inspected daily and any defaults or signs of wear and tear reported to the Construction Supervisor for repair as part of a preventative maintenance program. Spill kits including containment and treatment equipment and materials will be provided at the site, near where equipment is being used.
Performance requirement/s	None specific to this element. Requirements as specified in the Implementation Framework apply.
Monitoring	In the case of a spill or other accident, monitoring of the receiving environment will be undertaken by an experienced professional.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	In the case of environmental nuisance or harm cause by oil/fuel spill, Construction Supervisor will report the incident to DERM and GRC.
Corrective Action	Product Spill Contingency Measures *Land* ◗ 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 product spillages will be immediately cleaned up with appropriate absorbent materials along with remediation of the area if required. The absorbent will be kept in an appropriate container marked 'regulated waste' for a waste contractor licensed to receive such waste. ◗ In the case of a spill to ground, clean up will be initiated immediately along with advice from a qualified professional to minimise the risk of groundwater contamination. *Water* ◗ Should a spill of dredged material occur through the rupture of a dredge pipeline, the dredger will be shut down and where practical, materials recovered. ◗ Petroleum products stored by the on shore haulage contractor will also be the subject of the Environmental Management Plan associated with the haulage contract. Fuel storage areas should be adequately bunded and spill kits should be readily available on site should an incident occur. ◗ Dredgers are required to carry a spill response kit should fuel be spilt. ◗ GPC 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. ◗ With regards to oil spills refer Schedule 20 for more detail.

19.3.14 Schedule 14 - Cultural Heritage

Element	Cultural Heritage
Potential impacts	Indigenous Cultural Heritage Assessment of potential Project impacts on Aboriginal cultural heritage will be carried out as part of the Cultural Heritage Management Plan (CHMP) development and implementation process, which as yet has not been finalised. Protection, management and mitigation measures will be discussed by the parties following the completion of the assessment program incorporating cultural heritage surveys and related consultation The results of this process will then be developed into a specific Management Plan required under the processes outlined in the CHMP. Non-indigenous Cultural Heritage No sites or places of Historic Heritage Significance were found to exist within the Project Area. Seven places of Historic Interest were located that may potentially be impacted by the Project. These sites are not considered significant, and therefore do not warrant specific mitigation measures. There remains some potential for further places of historic interest to exist within the Project Area. Such areas and objects are considered most likely to be associated with pastoral and informal recreational use of the Project Area dating back to the early period of Gladstone's settlement. Other potential places of Historic Interest may include fence lines and further artefacts associated with informal camping and recreational use such as old tins, porcelain and bottles. This Schedule provides only general recommendations for managing potential impact on unknown sites of Historic Heritage significance and places of Historic Interest located or potentially located within the Project Area.
Policy	To avoid and minimise impacts on cultural heritage values.
Implementation	Places of Historic Interest Although Historic Interest places do not contain suitable levels of cultural heritage significance to warrant specific mitigation strategies, it is recommended that where possible they are retained. In the case of this Project, impact may not always be avoidable. If avoidance is not possible, then the Historic Interest places can be cleared and disposed of in a manner suitable to the Project. Unexpected Finds of Cultural Heritage Sites During construction, if an item or object that may be considered to be historic heritage appears, then the following applies: ◗ All work at the location of the potential find must cease and the Construction Supervisor should be notified. They will then notify the Historical Archaeologist appointed to the Project; and ◗ The Historical Archaeologist will provide a management recommendation to the Site Manager and will undertake appropriate actions A variety of management initiatives are required in order to mitigate potential impact to unexpected cultural heritage material or sites found during the construction and pre-clearing activities during operations of the Project including: ◗ Provide all new employees with suitable training to provide them with the skills to identify cultural heritage sites or objects and report the find to the Site Environmental Officer;

Element	Cultural Heritage
	◗ Inform all employees of their obligations to notify the Construction Supervisor of any cultural heritage finds; ◗ Implement a procedure that requires a permit before any relevant employees are able to undertake any clearing or excavations activities; ◗ Develop cultural heritage policies for management of potential cultural heritage sites or finds (if required); ◗ Inform the Construction Supervisor of their obligations to notify the Department of Environment and Resource Management (DERM) of any relevant finds; and ◗ Undertake regular cultural heritage educational sessions and distribute educational material. This material should inform the employees of what cultural heritage material may look like, and give them clear instructions on what to do if they find anything.
Performance requirement/s	None specific to this element. Requirements as specified in the Implementation Framework apply.
Monitoring	None specific to this element. Requirements as specified in the Implementation Framework apply.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	Notify the Department of Environment and Resource Management (DERM) of any relevant finds
Corrective Action	None specific to this element. Requirements as specified in the Implementation Framework apply.

19.3.15 Schedule 15 - Social

Element	Social
Potential impacts	The most significant negative impacts identified relate to the loss of recreational and natural areas, the reduced viability of commercial fishing, and the potential health and safety hazards caused by the Project. Significant positive impacts include employment and increased local business opportunities related to the construction phase of the project. The change processes that have been identified for the Project which may cause social impacts are: ◗ Presence of construction workforce; ◗ Presence of construction activities on land and sea; and ◗ Biophysical changes including land reclamation and dredged channels.
Policy	To minimise adverse social impacts and maximise social benefits of the Project.
Implementation	<u>Health and Social Wellbeing</u> *Impact: Reduced Safety on Land* ◗ GPC and contractor OH&S procedures. ◗ Implement appropriate signage near project site, quarry and along haul route. ◗ Communicate updates to bund construction activities through GPC communication channels and local media. *Impact: Reduced Marine Safety* ◗ GPC and contractor OH&S procedures. ◗ Establishment of appropriate marine exclusion zones, and other measures such as navigational markers. ◗ Erect signage with project information at Auckland Creek and Calliope river boat ramps. ◗ Communicate update to dredging activities through GPC communication channels and local media, with particular attention to notification of mariners.
Implementation	<u>Economic Impacts and Material Wellbeing</u> *Impact: Employment* ◗ Prioritise local employment in recruitment where possible. ◗ Include appropriate levels of local recruitment as a condition for engaging contractors, where possible. *Impact: Business Opportunities* Provide a higher rating for contractors who commit to higher local spend when engaging contractors. *Impact: Commercial Fishing* Should monitoring undertaken by Queensland Primary Industries and fisheries, establish a loss of fish catch directly linked to the Project, then GPC will participate in a collaborative and coordinated review of direct and cumulative impacts with other stakeholders.

Element	Social
	Quality of the Living Environment *Impact: Noise, dust and vibration* ◗ Establishment of appropriate exclusion zones. *Impact: Visual amenity/aesthetic quality* ◗ Landscaping and planting of Reclamation Area and mound. *Impact: Loss of natural and recreational areas* ◗ Provide access points for safe recreation areas during the construction and communicate the location of these access points and areas to user groups and potential visitors. This could be through signage at public access points. Signage should also describe the project, project timeline and what the reclamation site will look like after construction. ◗ GPC may consider measures that help to offset/minimise impacts on recreational fishers based on the likely loss of recreational fishing sites associated with the Project. This would require a coordinated approach involving local recreational fishers, representative bodies and relevant State Government agencies; and may consider broader cumulative recreational fishing impacts. GPC will participate in any future negotiations lead by the Queensland State Government as part of the management of recreational fishing impacts in the Western Basin of the Port.
Implementation	*Impact: Increased demand for services* ◗ Communicate workforce numbers to GRC and service providers in advance. Cultural Impacts *Impact: Reduced access to culturally important areas and landscapes* ◗ Identify areas culturally important and work in conjunction with the PCCC and individuals to maintain or develop alternatives access where possible. ◗ Proponent to continue to develop their relationship with the PCCC and explore opportunities to further build the capacity and role of this group. *Impact: community values and aspirations* ◗ Implement an appropriate public information program describing the project and highlighting proposed benefits. ◗ Identify areas that can be used for environmental education in collaboration with local environmental groups. (These measures should address environmental values and communicate the purpose and benefits of the project, to help improve the public perception of the project). Institutional, legal, political and equity impacts *Impact: Formation of opinions and attitudes about the project* ◗ Communicate project updates regularly to general community. ◗ Keep the GPC Community Working Group updated.
Performance requirement/s	None specific to this element. Requirements as specified in the Implementation Framework apply.
Monitoring	Monitor change processes that cause social impacts as follows:

Element	Social
	Construction activities OH&S reporting to monitor safety incidents - Number and severity of incidents, Lost Time Injuries (LTI) Complaints monitoring - Number of complaints Financial reporting - Total spend on local services, local spend as percentage of total spend Construction workforce Payroll data - Size of workforce per month/quarter, total workforce pay per month/quarter, number and percentage of workforce recruited (locally, regionally, nationally/internationally) Workforce Surveys - Number and percentage of workers: living in their place of usual residence; accessing local rental accommodation; lodged on vessels; using other accommodation; and commuting short/long distances.
Monitoring (cont.)	Biophysical Changes Refer other schedules of this EMP. Monitoring of fish catches by Queensland Primary Industries. Cumulative Impacts Monitoring cumulative social impacts should be a collaborative effort involving all relevant project proponents and community representatives. It is suggested that two groups be established; 1) an expert group or panel and 2) a community or representative stakeholder group. These groups together would identify potential cumulative impacts. The stakeholder group would provide access to local knowledge and gauge public opinion. The expert group would identify impacts that require further investigation or information. Key components of this approach include the consideration of other social planning initiatives that may be occurring and the ability for the broader community to see where their input has lead to increased benefit or effective impact management and mitigation. A cumulative social impacts monitoring framework should be developed in collaboration with other project proponents, service providers and key stakeholders.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	None specific to this element. Requirements as specified in the Implementation Framework apply.

19.3.16 Schedule 16 - Landscape and Visual Character

Element	Landscape and Visual Character
Potential impacts	Foremost amongst residual impacts are the creation of a new land area within Port Curtis and the creation of a large mound in the reclamation area which will be visible from many locations including areas within Gladstone up to 12 kilometres from the site. These features will be the primary impact on the landscape and visual amenity of the area. Potential visual impacts of this project may also arise from the visibility of the activities being undertaken within the dredging channels and construction of the reclamation area.
Policy	To reduce and/or manage adverse visual impacts of construction on landscape and visual amenity; and To achieve a balance between the revetment design and use requirements, and achieving a visual outcome that minimises the detrimental effects on the landscape and visual character.
Implementation	<u>Construction Phase</u> ◗ Avoid loss or damage to landscape features including minimising the clearance of mangroves. ◗ Where possible, protect trees prior to construction and/or trim vegetation to avoid total removal. ◗ Minimise light spillage through design to ensure the site is not over-lit and to minimise spread and light off the site. ◗ Temporary hoardings, barriers, traffic management and signage to be removed when no longer required. ◗ Materials and machinery to be stored tidily during the works. ◗ Roads providing access to the site and work areas to be maintained free of dust and mud as far as reasonably practicable.
Implementation (cont.)	<u>Operation Phase</u> To stabilise the reclamation mound and improve the visual outcome: ◗ Undertake progressive planting of native vegetation, including trees, shrubs and groundcovers on the mound created from dredging and reclamation activities; and ◗ Minimise light spillage through designing the lighting to ensure the site is not over-lit and to minimise spread and light off the site including sensitive placement and specification of lighting to minimise any potential increase in light pollution in the natural environment
Performance requirement/s	None specific to this element. Requirements as specified in the Implementation Framework apply.
Monitoring	None specific to this element. Requirements as specified in the Implementation Framework apply.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.

Element	Landscape and Visual Character
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	None specific to this element. Requirements as specified in the Implementation Framework apply.

19.3.17 Schedule 18 - Health and Safety

Element	Health and Safety
Potential impacts	◗ The main community values for public health and safety that may be affected by the dredging and disposal at the WBD Project are air quality (primarily dust) and noise levels. ◗ There are a range of health and safety risks relevant to the construction workforce. These have been addressed in some detail in this Schedule.
Policy	To provide a healthy and safe workplace for employees, clients, contractors and visitors.
Implementation	Implement a Hazard and Operability Study (HAZOP) system before construction of the dangerous goods storage area at the temporary on site workshop (during dredging) to identify all potential causes of leakage and spillage or hazards to workers and ensure that appropriate protective systems are implemented. Prepare and implement a Safety Management System to address hazards associated with construction and specify safe working procedures. Ensure contractors working on-site adhere to the Safety Management System, Construction Safety Management Plan and complete JSAs as appropriate. Maintain site security systems. Construction safety studies will be carried out before the commencement of the construction (dredging and disposal) and will include the following key elements: ◗ Familiarisation with proposed operations and review of construction program; ◗ Identification of hazards specific to construction operations and assessment of associated safeguards. Assessment of operational safeguards for the construction period; ◗ Review of safety assurance system; ◗ Finalisation of construction programs; and ◗ Review of procedures for management of change during construction. GPC will conduct a separate Construction Safety Study before the actual construction phase after identification of the construction contractor.
Implementation (continued)	A Construction Safety Management Plan will be prepared by the contractor and will remain onsite at all times. This plan will include following: ◗ Location details for the project and contractor details (name, address and ABN); ◗ Composition of the Workplace Health and Safety (WH&S) Committee and/or officer for the workplace; ◗ When the construction work is expected to start at the workplace and expected duration for the proposed construction; ◗ Type of construction work to be done at the workplace; ◗ Hazards and risk controls for the construction work;

Element	Health and Safety
	◗ How the contractor proposes to ensure the control measures are used and how the effectiveness of the proposed control measures will be monitored and reviewed; ◗ Site rules; ◗ Emergency procedures; ◗ How the contractor proposes to discharge his obligation to persons using areas adjacent to the place where the construction work is being performed; ◗ Arrangements for managing risks to the environment; and ◗ Other completed legal documents as required for the construction activity. Specific risks to be considered by GPC in the selection of contractors and by the Contractor in development of the Construction Safety Management Plan include: ◗ Bund –personnel being hit by equipment. ◗ Bund – collisions between mobile equipments. ◗ Dredging operations – collisions between project and third party vessels. ◗ Bund – slips trips, falls and other workplace related issues. ◗ Discharge of pumping (dredged) material. ◗ Dredging operations – third party recreational vessels and small commercial vessels (i.e., fishing vessels) hitting pipe line. ◗ Dredging operations – falling into water. ◗ Dredging operations – machine/plant/personnel falling into water during construction. ◗ Bund – machine/plant/personnel swept into water. ◗ Bund – Injury/falling over board during relocation of animals. ◗ Dredging and bund – extreme weather conditions (cyclones) during outdoor work for site personnel. ◗ Dredging and bund – extreme weather conditions (cyclones) for on-site plant and equipment.
Implementation (continued)	◗ Dredging & bund - extreme weather conditions (heat) during outdoor work. ◗ Dredging & bund - potential for construction noise/vibrations to impact site personnel. ◗ Bund - injury/drowning due to incoming tide.
	Responsibilities of the Construction Contractor will be as follows: ◗ Keep the plan update with construction workplace details. Sign and date the plan including revisions. ◗ Ensure persons working at site are qualified, experienced and trained to undertake the task. ◗ Maintain induction record for workers and visitors. ◗ Ensure the Plan is understood by all persons working at the site.

Element	Health and Safety
	◗ Complete the project tasks and risk assessment checklist and action the identified issues. ◗ Complete the work schedule program. ◗ Update the emergency contact information and the emergency procedure for the project including the evacuation plan. ◗ Conduct regular drills for various emergencies. ◗ Develop and implement appropriate Environmental Management Plans. ◗ Perform regular workplace inspections. Hazards identified must be addressed immediately, or as soon as reasonably possible. ◗ Complete the hazardous substances register for substances used on site. ◗ Complete the plant and equipment register for items used or planned to be used on site. ◗ Monitor the site to identify and control hazards. ◗ Monitor the workplace to ensure adherence to the Plan. ◗ Complete other forms as required e.g. hot work permit, working at heights, confined space as applicable. ◗ Develop required Work Method Statements. ◗ At the end of the job provide a copy of the Plan to the GPC for record keeping. Retain the file as required.
Performance requirements	Adhere to applicable Australian and other recognised standards, applicable code of practises and relevant statutory provisions, especially the Dangerous Goods Safety Management Act, 2004 and Workplace Health and Safety Act, 1995 Implementation of Construction Safety Management Plan. Implementation of Safety Management System. Implementation of Emergency Response Plan. Preparation of JSAs to manage workplace risks.
Monitoring	Maintain a training register for all staff and contractors. Undertake regular monitoring of the performance of staff and contractors in terms of compliance with Safety Management System and Construction Safety Management Plan.
Reporting	Daily or weekly reports (as appropriate) will be completed on-site and reviewed by each Supervisor and / or Superintendent. Immediately notify Superintendent and Queensland DERM in the event of an uncontained spillage. Report all incidents and investigate. Incident or non-compliance corrective action shall be closed out by senior management according to an agreed responsibility and timescale. Workplace Health and Safety representative will be responsible for enforcing all occupational and public health directives and keeping all related records and communications.

Element	Health and Safety
Corrective Action	The Construction Supervisor is to be notified in the event of non-compliance. Redesign control measure if inadequate. The following constitute incidents or failure to comply with occupational and public health policies: ◗ Directives and procedures contained in the site safety system are not being followed; ◗ Directives and procedures contained in the site safety system are not being enforced; ◗ Site safety system does not encompass all required topics and situations; ◗ High rate of work-related injury and illness; or ◗ The emergency response plan is not prepared or implemented. In the event of an incident or failure to comply, a selection of the following actions will be undertaken as appropriate: ◗ Investigate why the incident occurred and investigate and implement mitigating measures; ◗ Ensure safety information provided is adequate and up-to-date and revise regularly as appropriate; ◗ Ensure employees, contractors and visitors to the site are familiar with the procedures and policies relevant to their positions; and ◗ Ensure safety directives and procedures are enforced; and ensure safety documents are readily available to everyone on the site.

19.3.18 Schedule 19 - Mosquito/Biting Midge

Elements	Mosquito/Biting Midge
Potential impacts	Mosquitos and bitting midges have health implications Polluted waters, freshwater swamps, brackish waters, construction ground sites, water storage tanks and drains are breeding sites for mosquitos and are expected to occur at the reclamation area. Gladstone area has many species of mosquitoes which are potential carriers of Ross River Virus, Barmah Forest Virus and Dengue Fever (Gladstone Council, website accessed on 23 March 2009). Biting midges do not currently transmit human disease in Australia but can be a severe pest if adults are in abundance, they can impact on humans due to irritable bites and skin reaction from their saliva. Blisters and weeping serum may occur from the site of bite.
Policy	To prevent the occurrence of potential mosquito/biting midge breeding sites and the presence of adult mosquitoes/ biting midge.
Implementation	Depressions (natural or manmade) in the ground surface will be filled to prevent the ponding of water. Pools of stagnant water will be drained and/or the areas filled. Storage containers capable of ponding water will be either discarded after use or stored in an inverted position (care will be taken to ensure that ponding does not occur in rubbish storage areas). Removal of all vegetation in the zone of water fluctuation in the stormwater disposal pond. Provide straight margins through cutting, deepening and filling of the final decant pond which will be retained as a wetland to which the stormwater will be discharged during operational phase. Provision of paths and other means of access to the water storage areas for pesticide applications. Repair of open channels (if any) that collect and convey waters. Consider avoiding creation of favourable habitats for biting midge species. All ponds and on-site excavations filled with water will be inspected for the presence of mosquito larvae on a weekly basis by the Environmental Representative. Erosion and wash down practices will be controlled to prevent sediment and debris forming standing water pools.
Performance requirement/s	None specific to this element.
Monitoring	The Construction Supervisor will inspect any potential mosquito breeding areas following rain to monitor the presence of mosquito larvae. The representative will also monitor the frequency of mosquito bites on the site to identify where mitigation measures are not currently successful and to see whether adult eradication programs should be implemented. The Construction Supervisor will inspect any potential biting Midges breeding sites including boulder covered foreshores where boulders lie on a mud-sand-shell base and wave action is moderate in a band near high tide levels, clean

Elements	Mosquito/Biting Midge
	sandy sores subject to moderate tidal actions, sandy shores in canal estate developments, muddy sand to pure mud areas and subterranean tunnels. The Construction Supervisor will record when and where any larvae or mature mosquitoes are found on-site, as well as when and where any incidences of bites may occur.
Reporting	None specific to this element. Requirements as specified in the Implementation Framework apply.
Corrective Action	◗ Should a large number of larvae or bites be experienced, contact the Regional Council for advice on appropriate remedial measures; and/or ◗ If larvae are detected in large numbers, contact Queensland Health for assistance in choosing a suitable treatment method. Treatment could either be aerial, ground or adulticiding (fogging).

19.3.19 Schedule 20 - Emergency Response Plan/s

Element	Emergency Response Plan/s
Potential impacts	An Emergency Response Plan or Plans will be developed to prepare for: ◗ Oil Spills; ◗ Fire; and ◗ Natural Hazards (cyclones, earthquakes etc).
Policy	To identify and reduce the potential for an environmental incident before it occurs so as to ensure a prompt and effective response in the event of an emergency or environmental incident and prevent damage to the surrounding marine environment and the public.
Implementation	The Emergency Response Plan/s will be prepared in conjunction with local authorities and emergency services prior to the commencement of construction to guide those responding to a variety of potential emergency situations. It will be necessary to provide personnel involved in Emergency Response, including spill response, with appropriate training. This schedule outlines what the plan/s should include.
Implementation (cont.)	<u>Oil Spill Emergency Response</u> Once the oil spill has been reported to the Gladstone Harbour Control it will be assessed to identify the type of oil, location of the spill source, the quantity of oil spilled and the environment, marine life, community, health and safety impacts. The Controller will undertake immediate steps to spill containment/control, recovery of spill material, waste management, and for community communications and media management. Recovery operations are then commenced which includes provision of welfare, reconstruction/clean up and replenishment of material stocks. The objective of the management plan will be to minimise contamination due to spilled oils. The following will be adhered to: ◗ MSDS will be kept on the vessel and administration office such that it is readily accessible to all concerned. ◗ Undertaking of maintenance and servicing of vehicles at offsite facilities. ◗ Petroleum products spillages will be immediately cleaned up with appropriate absorbent materials along with remediation of the area if required with advice from a qualified professional. The absorbent will be kept in an appropriate container marked 'regulated waste' for a waste contractor licensed to receive such waste. ◗ In the case of a spill to ground clean up will be initiated immediately along with advice from a qualified professional to minimise the risk of contamination. ◗ People will be provided with appropriate PPE and trained provided on how to use them. ◗ In the case of a spill or other accident, monitoring of the receiving environment will be undertaken by an experienced professional.

Element	Emergency Response Plan/s
Implementation (cont.)	Fire Emergency Response The plan for emergency response to a fire will include immediate actions of raising alarms and taking life saving actions. An assessment will be made of the situation including the environmental impact. Planning will then be initiated for a containment plan, plan for dealing with casualties and a survey for effects on the environment. The emergency will then be responded to for issues including fire management and containment, rescue, casualty management, and environmental impact actions. Recovery operations will then be initiated which include, provision of welfare, clean up and replenishment of stocks consumed during the emergency response. For incidents on dredger, the emergency response plan for the dredger will be activated and Gladstone Harbour Control will be informed. Natural Hazard Emergency Response The Project Area is in known cyclone area. An Emergency Response procedure will be developed to ensure the maximum protection of people and assets against the effects of tropical cyclones. The strategy adopted will include: ◗ Responsible housekeeping and appropriate preparation before commencement of the cyclone season; ◗ Timely assessments of a developing cyclonic event; and ◗ Effective responses. This procedure will detail the preparatory steps to be taken by employees at site to ensure readiness in the event of a cyclone; the actions to be taken when a cyclone threatens the project area and the recovery activities necessary to resume normal operations as soon as possible after the cyclonic event has passed. The worst case scenario could be spillage of hydrocarbons in the water from the dredger in which case the Oil Spill Management Plan will be activated. Closeout to emergency response will involve required clean ups, repair of damaged equipment and repair of infrastructure. GPC will prepare an Emergency Response Plan for natural hazard emergencies before commencement of construction and after appointment of a contractor.
	Emergency Services GPC will provide regular training to staff members on first aid, other safety courses and conduct seminars. For any major incident, additional support will be obtained from the local government services such as; Queensland Fire and Rescue Services (QFRS) and Queensland Ambulance Service (QAS). ◗ Gladstone is covered under the central region of the QFRS. A permanent station is located on the Charles Street in Gladstone. They have a total of nine fire stations in Gladstone which are permanent, auxiliary or composite (QFRS Website accessed on 20 Mar 09). ◗ Gladstone is covered under the Central region of QAS. Central Queensland ambulance provides coverage to the people of Central Region through 61 permanent and honorary ambulance stations based throughout the region

Element	Emergency Response Plan/s
	(QAS Website accessed on 20 Mar 09). ◗ A Police Station is also located close to the proposed Project Area at Yarroon Street (QPS Website accessed on 20 Mar 09).
Performance requirement/s	None specific to this element.
Monitoring	None specific to this element. Requirements as specified in the Implementation Framework apply.
Auditing	None specific to this element. Requirements as specified in the Implementation Framework apply.
Reporting	<u>Oil Spill:</u> Emergency responses will include reporting of the oil spill to the Gladstone Harbour Control (Telephone: +61 7 4973 1208, VHF Radio: VHF 13 and 16). In the case of environmental nuisance or harm, Construction Supervisor will report the incident to Department of Environment and Resource Management (DERM). A report detailing reasons for spills and corrective action will be prepared.
Corrective Action	<u>Oil Spill:</u> Investigations/corrective actions undertaken will be documented. Corrective actions will be closed out by senior management according to an agreed responsibility and timescale.