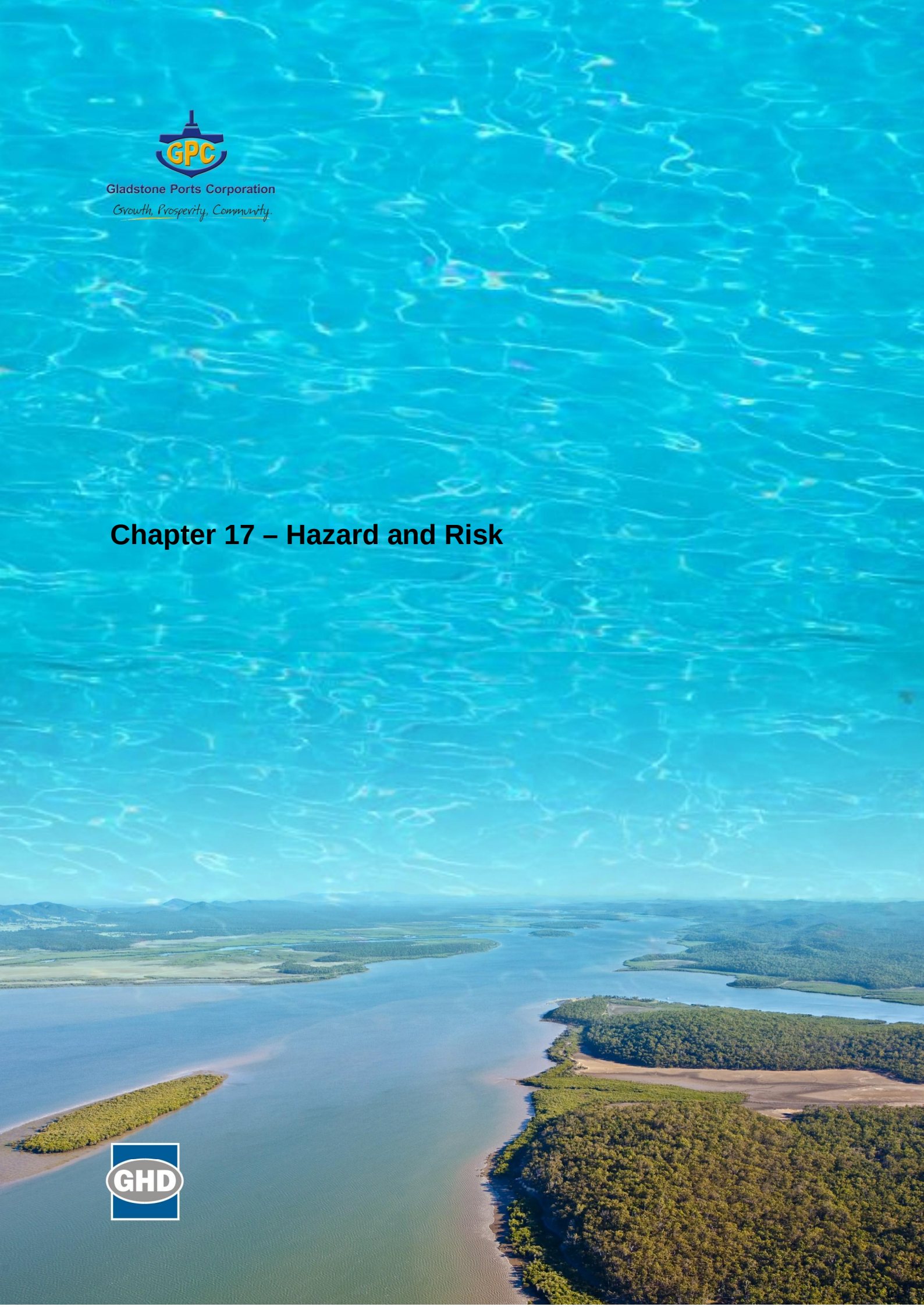
Gladstone Ports Corporation

Growth, Prosperity, Community.

Chapter 17 – Hazard and Risk



17. Hazard and Risk

Overview

This chapter was prepared in accordance with Section 6 Hazard and Risk of the ToR for the Project (Appendix A). The objective of this Hazard and Risk assessment is to provide a qualitative risk investigation of potential hazards and risks associated with the project and to identify actions for mitigating or reducing these hazards and risks.

The scope of this assessment includes identification of the major hazards and risks from the construction and operation phase of the Project. The activity of quarrying and transportation of the quarried material is excluded from the scope as it is being addressed under a separate approvals process. The installation of services to the reclamation is also excluded from this assessment as other proponents will undertake this as part of their operations.

The Hazard and Risk assessment identified the nature and scale of hazards for this project. The study identified a total of 41 hazards that resulted in 16 high risks, 22 medium risks, two low and one very low risk hazards before the implementation of mitigation measures. After mitigation measures, it resulted in no high risks, 28 medium risks, eight low risks and five very low risks hazards. A number of risk reduction recommendations have been developed. The risk assessment carried out in this study assumed that the assessment process will continue throughout the project life to refine and update the outcome of the development approval/ environmental risk process.

17.1 Description of Environmental Values

17.1.1 Dangerous Goods

The Project will use a number of substances listed in the Australian Dangerous Goods Codes. Table 17-1 provides an indicative list of substances by chemical name, dangerous goods classification, raw and storage concentrations, UN number, packaging group and use of this substance.

Table 17-1 Indicative Lists of Hazardous Substances and Stated Dangerous Goods

Chemical Name (Shipping Name)	Raw conc. %wt	Storage conc. %wt	D.G. Class	Hazchem Code	UN Number	Packaging group	Purpose/ Use
Diesel (Diesel)	N/A	N/A	3 (Class C1)*	3[Z]	1202	III	Fuel for marine and heavy vehicle operations
Oils (Lubrication/ Hydraulic Oils)	N/A	N/A	3 (Class C2)**	N/A	N/A	N/A	Lubricate plant and equipment and replenish hydraulic systems.

* Class C1 – a combustible liquid that has a flashpoint of 150°C or less
**Class C2 – a combustible liquid that has a flashpoint exceeding 150°C
N/A: None allocated

Diesel

Diesel is a combustible liquid and will be used as a fuel for heavy vehicles (i.e., trucks and dredgers). It has a flash point of > 61.5^{o}C, specific gravity 0.85 at 15^{o}C and vapour pressure < 1 mm Hg at 25^{o}C. Contact with eyes and skin will cause irritation and inhalation in high concentrations will result in headaches, dizziness, nausea, vomiting, drowsiness or narcosis. Time Weighted Average (TWA) National Occupational Health and Safety Commission (NOHSC) exposure standard for oil mist is 5 mg/m^{3}.

Diesel is insoluble in water and incompatible with strong oxidising agents. Spillages on land if any, will be from the fuel stored in tanks of vehicles operating at the Reclamation Area and will be prevented from entering water courses. Inert absorbent material such as vermiculite, sand or dirt will be placed on the spillages and the contaminated material will be collected and placed in a labelled container for proper disposal by a licensed contractor to a licensed facility.

Spillages at sea from the dredgers, if any, will be contained using appropriate spill control equipment such as floating booms. Qualified staff from GPC or the construction / dredging contractor will respond to the spill incidents.

Appropriate personal protective equipment (PPE) will be used for all fuel handling and containment work and will conform to relevant Australian Standards.

Due to the properties of diesel, there is no risk of violent explosion with a diesel fire.

Oils (Lubrication and Hydraulic)

Oils are typically clear green viscous liquids with specific gravity of 1.01 to 1.03 and a boiling point of 100 – 105^{o}C. They are an irritant to eyes and skin after prolonged exposure.

Spillages on land will be prevented from entering drains or water courses. Absorbent material will be placed on the spillages, which will be collected for disposal. Hand gloves and goggles will be used while handling the product. All PPE will conform to relevant Australian Standards.

Spillages from the dredgers will be contained using appropriate spill control equipment such as floating booms. Qualified staff from GPC or the construction / dredging contractor will respond to the oil spill incidents.

17.1.2 Natural Hazards

A natural hazard is a naturally occurring situation or condition with the potential for loss or harm to the community or environment (SPP 1/03 2003). Natural hazards are also described in Chapter 4.

Cyclones and Flooding

Australia's tropical cyclone season is usually from November to April inclusive and affects most of the Queensland coast. The Tropical Cyclone Warning Centre of the Bureau of Meteorology issues a tropical cyclone warning when a cyclone or developing cyclone is likely to affect coastal or inland communities. Consequences of a cyclone can include a combination of flood, storm tide inundation and strong winds.

Selections of tropical cyclones occurring in the last 100 years in the region of Gladstone (Source: www.bom.gov.au) are as follows:

- On 2 – 3 March 1949, a tropical cyclone made landfall passing over Gladstone and Rockhampton. Widespread damage was reported to 15 towns in the region and 4 deaths. The maximum wind gust

on the anemometer was 161 km/hr (Category 3). In Rockhampton 1000 houses were damaged, 500 were wrecked and 2 men were killed. There were severe floods in central Queensland with three drowning incidents.

- On 27 – 28 February 1950, tropical cyclone recurved over Gladstone and Hervey Bay. This resulted in sea water flooding at Hervey Bay and adjoining areas.
- On 28 – 30 January 1967, tropical cyclone Dinah developed in the central Coral Sea and tracked southwest before recurving just off the Queensland coast between Gladstone and Bundaberg. The system caused severe damage at Heron Island initially from inundation from large NE swells and then a day later from winds. As it passed over Sandy Cape, high water rose to 10 m above normal levels. Although the system remained off the coast, winds caused damage along the coast between Rockhampton and Grafton. Huge seas and storm surges caused severe erosion at Emu Park, Yeppoon and in the Maryborough to Bundaberg area.
- On 2 April 1972, cyclone Emily crossed the coast just to the SE of Gladstone while rapidly weakening. Wind damage was confined to trees and sheds. The cyclone had been very severe and generated huge seas. It claimed the lives of eight seamen in three separate incidents off the southern and central Queensland coasts.
- On 4 February 2003, tropical cyclone Beni threatened the coastline between Mackay and the Town of 1770. The cyclone was downgraded to a rain depression on 5 February 2003. Over the period 5-7 February 2003 significant rainfall was received across Central Queensland impacting on roads and infrastructure.
- With winds near 130 knots, tropical cyclone Hamish was a powerful storm as it paralleled the Queensland coast at the end of the first week of March 2009. Initial predictions were that the storm would weaken and come ashore just north of Brisbane on March 9, but instead, the storm veered more east than south, drawing the eye of the still-powerful storm away from land.

Tropical cyclone severe wind risk is greatest in the following Gladstone suburbs (in alphabetical order): Barney Point, Boyne Island, New Auckland, Tannum Sands and West Gladstone (Geoscience 2001). Tropical cyclones are also described in Chapter 4.

Storm tide risk is predicted to vary greatly between coastal centres. Taking the +0.5 m to +1.0 m above HAT level as a typical lowest-built-level range for permanent habitation or infrastructure, Gladstone is susceptible to inundation at or above the +1 m level with a return period of between 100 and 500 years and at or above the +0.5 m level with a return period between 0 and 50 years (Harper 1998). The areas at greatest risk from storm tide inundation are Callemondah, Barney Point port and Boyne Island (Geoscience 2001).

Earthquakes

Earthquakes range in strength from slight tremors to great shocks lasting from a few seconds to a few minutes. In the last 80 years there have been 17 earthquakes in Australia registering 6 or more on the Richter scale. Australia's rate of earthquakes is about one every five years, compared to a world average of about 140 per year (Geoscience Australia 2009).

Earthquakes with a magnitude of 5 or greater recorded in the Gladstone region over the last 100 years (Geoscience Australia 2009) are summarised as follows:

- Earthquake of magnitude 5.1 was recorded at 6:15 pm on 5th June 1918 at Lat -23.5 and Long 152.5, which is approximately 160 km east of Fisherman's Landing. The earthquake was centred at sea.
- Earthquake of magnitude 6.0 was recorded at 6:14 pm on 6th June 1918 at Lat -23.5 and Long 152.5, which is approximately 160 km east of Fisherman's Landing. The earthquake was centred at sea.
- Earthquake of magnitude 5.5 was recorded at 1:32 am on 12th April 1935 at Lat -25.5 and Long 151.67, which is approximately 100 km east of Fisherman's Landing. The earthquake was centred at sea.
- Earthquake of magnitude 5.2 was recorded at 5:33 pm on 28th November 1978 at Lat -23.55 and Long 152.14, which is approximately 233 km south-south-east of Fisherman's Landing.

The earthquake hazard for Gladstone, is relatively high, as read from a national map (Geoscience Australia 2009).

Design considerations will adequately address bund construction earthquake risks by adhering to relevant Australian Standards.

17.2 Potential Impacts and Mitigation Measures

17.2.1 Preliminary Hazard Analysis

This section presents the assessment methodology and results for the hazards and risks associated with the dredging and disposal through the use of a Preliminary Hazard Analysis (PHA).

The following regulations, standards and guidelines are applicable:

- Australian Risk Management Standard AS 4360:2004;
- Australian Code for Transport of Dangerous Goods by Road and Rails (ADG Code);
- HB 203 2006: Environmental Risk Management – Principles and processes;
- *Dangerous Goods Safety Management Act 2001*;
- NSW Department of Planning's Hazardous Industry Planning Advisory Paper (HIPAP) no 6 Guidelines for Hazard Analysis; and
- State Planning Policy 1/03, Mitigating the Adverse Impacts of Floods, Bushfire and Landslide.

The risk assessment carried out in this study assumed that the safety assessment process will continue throughout the life cycle of the project to refine the outcome of the development approval / environmental risk process.

The PHA includes:

- All relevant hazards, both natural and technological;
- The possible frequency of potential hazards, accidents, spillages and abnormal events occurring;
- Life of any identified hazards;
- Effects of hazardous substances to be used, stored and handled at site;
- The rate of usage of substances; and
- The type of machinery and equipment used.

The key components of PHA are as follows:

Stage 1: Hazard Identification

This stage consists of a review of potential hazards associated with the Project at Gladstone. The hazard identification stage includes a comprehensive identification of possible causes for potential incidents and their consequences to the environment, workers and public safety. It also includes an outline of the proposed operational and organisational safety controls required to mitigate against the consequences of the hazardous events occurring.

A desktop review of all available relevant data and information was conducted. A workshop was organised on 21 July 2009 to highlight specific areas of potential concern with a focus on environment, health and safety. Hazards were then carried forward for consequence and effect analysis.

Stage 2: Consequences and Effect Analysis

The consequences of identified hazards were assessed using the GPC Risk Management Guidelines, which have been developed using current techniques for risk assessment. Well established and recognised correlations between exposure and effect on people and the environment were used to calculate impacts.

Stage 3: Frequency Analysis

The objective of the frequency analysis was to determine the frequency of each of the hazardous events. A frequency analysis is conducted to determine the magnitude of the risk associated with the potential hazard. In this step, the roles of controls in reducing the likelihood of the hazards are considered qualitatively. The risk is the combination of the consequence and frequency assessment of the potential hazard.

Stage 4: Risk Reduction

Where possible, the risk reduction measures were identified throughout the course of the study in the form of control measures.

The Risk Management Process is depicted schematically in Figure 17-1.

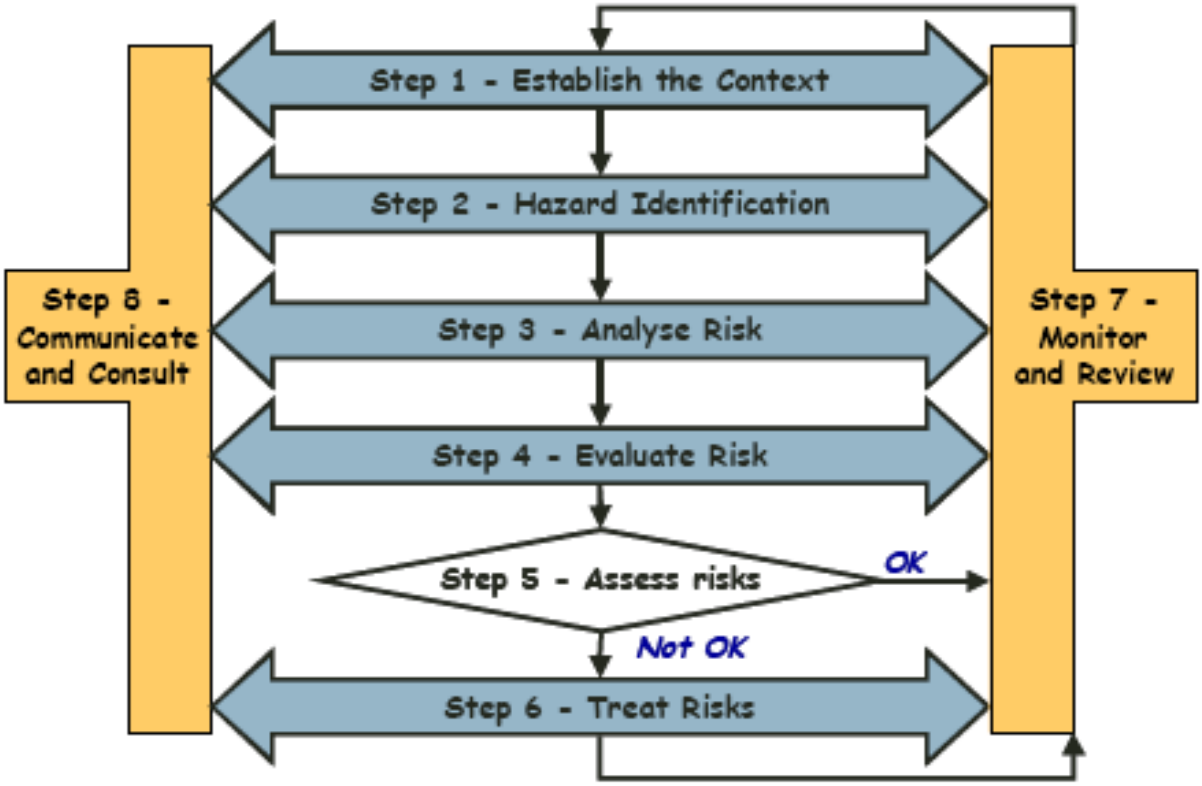


Figure 17-1 Risk Assessment Process

17.2.2 Workshop Methodology

A PHA workshop based study was carried out by a multidisciplinary team of personnel. The procedure aimed to systematically generate questions about the hazards of the particular system under review.

The study aimed to search a design or procedure to identify every conceivable deviation from normal operation. The approach used a set of guidewords that were carefully chosen to promote creative thought about all possible hazards.

For each guideword, the team considered whether there were realistic causes for that guideword and whether the consequences were significant. The team then considered whether the existing safeguards are adequate and made recommendations for corrective action or further study, as appropriate.

The best method for dealing with hazards is not always obvious. In this study, a simple risk analysis and hazard ranking exercise was used to highlight the level of attention each hazard required. Each hazard was assigned a frequency of occurrence and a consequence severity. Using these frequency and severity rankings, the qualitative risk was determined on a simple matrix, and a risk level of Very Low, Low, Medium or High assigned.

17.2.3 Risk Matrix

The Gladstone Ports Corporation Risk Matrix was used to rank each of the hazards and the interpretations of each frequency and severity increment located in Table 17-2, Table 17-3 and Table 17-4.

Table 17-2 GPC Consequence Table

Category	Rating	Workplace Health & Safety	Environment	Financial Impact on Earnings before Interest and Tax	Community or Customer Reputation	Legal	Process Interruption
Minor	1	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 hr
Moderate	2	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 hr to 1 shift
Significant	3	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
Major	4	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
Critical	5	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 17-3 GPC Likelihood Table

Rare	1	The risk may occur only in exceptional circumstances (The risk is not likely to occur in 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 (The 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 17-4 Gladstone Ports Corporation Risk Matrix

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

17.2.4 Workshop Participants

The GHD team that attended the workshop in July 2009 is listed in the Table 17-5 below.

Table 17-5 List of Workshop Participants

	Name	Organisation	Position and Role
1	Theodorus Gerritsen	GHD Pty Ltd	Reclamation Design
2	Trevor Shield	GHD Pty Ltd	Dredging Design
3	Anna Boden	GHD Pty Ltd	Marine Ecologist
4	Prashant Joshi	GHD Pty Ltd	Facilitator

17.2.5 Hazard Register

Although all of the guidewords were considered during the course of the workshop, it is an accepted practice to record "by exception" and only record the discussions where:

- The consequences of a hazard are significant and the existing controls are noted to ensure recognition of the causes and the controls inherent in the process;
- The existing controls are found to be inadequate and recommendations are made for additions / changes to these controls or for further study of the issue; or
- The workshop team wishes to record that the issue was discussed and that the existing controls are considered acceptable.

The benefit of this approach in comparison to "full recording" is a considerable reduction in the duration of the study and the quantity of minutes generated.

The study identified a number of control strategies or areas for further study and / or investigation. The risk register is provided in Appendix AA. The outcomes of the matrix risk assessment of the 41 hazards is summarised in Table 17-6 for both before and after the implementation of control and mitigation measures.

Table 17-6 Summary of Risks Identified Before and After Additional Mitigation Measures

Project Phase	Risks Categories			
	High	Medium	Low	Very Low
Before	16	22	2	1
After	0	28	8	5

Key risks identified are summarised in Table 17-7. Item numbers in Table 17-7 correspond to items in the Risk Register in Appendix AA. The controls are shown in Table 17-8 and Table 17-9. These correspond to the identified control strategy, which resulted in ranking of risk after implementation of additional control strategies. The item number corresponds to the item for which the control strategy was generated (Refer Risk Register in Appendix AA).

Table 17-7 Key Risks Identified for the Project

Item Number	Potential Hazardous Event Description
	High Risks
4	Bund –personnel being hit by equipment
5	Bund - collisions between mobile equipment
6	Dredging operations - collisions between project and third party vessels
7	Dredging operations - collision between multi project vessels
9	Bund –slips, trips, falls and other workplace related issue
10	Bund - potential for trapping/injury to animals
11	Bund - potential for trapping/injury to animals (protected species)
17	Piling associated with channel markers - potential noise/vibrations to impact fauna
20	Dredging operations – capturing marine fauna into dredging equipment
23	Dredging operations - silt plumes and damage to fauna/benthic communities
26	Dredging operations - potential to introduce marine pests
27	Operational phase - potential to introduce marine pests
28	During construction phase of bund and dredging-removal of sea grass meadows/habitat and fish habitat area
29	During construction phase of bund and dredging-removal of mangroves
34	Discharge of pumping (dredged) material
37	Dredging operations -third party recreational vessels and small commercial vessels (i.e., fishing vessels) hitting pipe line
	Medium Risks
1	Dredging operations – machine/plant/personnel falling into water
2	Dredging operations -machine/plant/personnel falling into water during construction
3	Bund - machine/plant/personnel swept into water
8	Dredging operations - collision between project vessels and mega fauna
12	Bund - injury/falling over board during relocation of animals (e.g., turtles)
13	Dredging and bund - extreme weather conditions (cyclones) during outdoor work for site personnel

Item Number	Potential Hazardous Event Description
14	Dredging and bund - extreme weather conditions (cyclones) for on-site plant equipment/structures
15	Dredging and bund - extreme weather conditions (heat) during outdoor work
16	Dredging and bund – potential for construction noise/vibrations to impact fauna
18	Dredging and bund - potential for construction noise/vibrations to impact site personnel
19	Dredging operations - potential to impact benthic community due to pipeline (750-900 mm diameter, steel)
21	Bund - silt plumes and damage to fauna/benthic communities
22	Bund - injury/drowning due to incoming tide
25	Dredging operations - oil spills
30	Indirect impact on sea grass meadows and mangrove via changes to the hydrodynamic regime
32	Dredging operations - potential for contaminants in dredging material
33	Dredging operations - potential for ASS in dredging material
36	Pipeline breaking and leaking dredge material
38	Possible impact from vandalism of plant equipment
39	Operational phase - increased vessel traffic
40	Operational phase - light spill from Western Basin facilities

Table 17-8 Summary of Mitigation Measures Identified for High Risks

Item	Additional Control Strategy
4	Project specific workplace health and safety training, stricter regulation implementation. To include in Construction Safety Management Plan (CSMP).
5	Implement site specific training and traffic control. To include in CSMP.
6	Reputable dredging contractor who will have well defined procedures and trained crew, communication between vessels, GPC to increase public awareness on activities proposed. To include in Dredging Environmental Management Plan (EMP) and CSMP.
7	Vessels maintained, communication between vessels, reputable dredging contractor. To include in Dredging EMP.
9	Project specific training (all reasonable steps have been adopted). To include in CSMP.
10 and 11	Removal of animals trapped in the bund once it is closed by a suitably trained person. To include in Construction EMP.
17	Adapt piling around fauna movements or adapt piling methodology warning shots (This is a common feature of many seismic surveys, and has been endorsed by DEC). To include in Construction EMP.
20	Maintain fauna spotters and manage dredging operations to avoid fauna. Standard controls listed in Dredging EMP.
23	Monitoring of silt plumes due to dredging over sensitive habitats with set trigger levels, separate studies in progress on hydrodynamic modelling and base line water quality. To include in Dredging EMP.
26	Marine pest assessment / review of assessment immediately before dredging operations commence marine pest assessment of dredging vessels, reputable contractor. To include in Dredging EMP.
27	Western Basin area not established as first port of call for quarantine clearance of incoming vessels. Vessels to be of low risk before entering Western Basin area.
28	Offsetting- consider remediation/rehabilitating degraded environs (seagrass meadows/habitats).
29	Offsetting- consider remediation/rehabilitating degraded environs (mangroves).
34	Site specific training to work in areas near dredging material discharge pipeline.
37	Increase public awareness on dredged material pipeline alignment, appoint a reputable dredging contractor. Install navigational marks on pipeline.

Table 17-9 Summary of Mitigation Measures Identified for Medium Risks

Item	Control Strategy
1	Project specific training, no staff working during extreme weather conditions. To include in Dredging EMP and Construction Safety Management Plan (CSMP).
2	Reputable dredging contractor. To include in Dredging EMP and CSMP.
3	Project specific training, no staff working during extreme weather conditions. To include in CSMP.
8	Investigate local fauna movement patterns and plan dredging accordingly. To include in Dredging EMP.
12	Site specific workplace health and safety training. To include in CSMP.
13	No site work during extreme weather conditions. To include in CSMP.
14	Include actions to be taken / responses to cyclones in Construction and Dredging EMP and in CSMP.
15	Site specific training to work during hot weather. To include in CSMP.
16	Adapt dredging around fauna movements or adapt construction methodology. To include in Construction and Dredging EMP.
18	Site specific training to workers on noise reduction measures.
19	Avoid, where possible, sensitive marine ecological habitats when establishing alignment of cutter suction dredge pipeline along the seabed to not impact upon benthic marine communities. To include in Dredging EMP.
21	Management of tail water from reclamation which results in silt plumes To include in Construction EMP.
22	Restrict access to areas for the duration during which they are likely to be affected by high tides. To include in CSMP.
25	Management of works by a reputable contractor. To notify Emergency Controller, Gladstone Ports Corporation. To include in Spill Management Plan.
30	Hydrodynamic modelling. Implement mitigation measures based on the findings of this study.
32	Undertake environmental investigations before commencing dredging to determine potential for contamination from dredging. To include in Dredging EMP.
33	Undertake environmental investigations before commencing dredging. To prepare ASS Plan based on findings of the investigations.

Item	Control Strategy
36	Reputable Dredging contractor. Regular routine maintenance and inspection of pipeline. Route pipeline in consultation with ecological advice.
38	Security measures for controlling access to the site, preventing vandalism. Increase public awareness, community consultation and education.
39	Education of vessel operators to minimise impact on marine fauna and benthic disturbances and enforcement of speed limits.
40	Install lighting that reduces light spill, use marine fauna wattage lights (where safe), install motion sensors on lights and minimise lighting adjacent to the water.

17.2.6 Risk Management Plan

A risk assessment and management approach at the EIS stage has a major advantage. These studies can be used in a complementary way for the initial planning of the project. It is fundamental to safety planning that all hazards are identified and appropriate safeguards employed to address them during different stages of the project. The risks, hazards and primary control strategies have been identified in Table 17-7 to Table 17-9. The components for which risk management plans are required are discussed in the following sections. A management structure will be developed for safe operations at the Project location.

- High risks identified for the project relate to the following:
- Noise during dredging and piling, introduction of marine pests;
- Marine fauna getting struck by vessels or getting trapped in the bund during construction; and
- Destruction of seagrass and mangroves and construction workplace accidents.

A separate Dredging Management Plan will be prepared to address impacts associated with dredging. A Construction EMP will be prepared before commencement of dredging and reclamation activities to address associated impacts. A Construction Safety Management Plan (CSMP) will be prepared before commencement of the construction by the contractor to address issues relating to workplace health and safety. In addition, suitable management plans will be prepared based on the findings of the hydrodynamic modelling studies.

Medium risks identified relate to oil spills and include the following:

- Workplace accidents;
- Exposure of workers to extreme weather conditions;
- Impact on marine fauna communities during operations;
- Changes to the hydrodynamic regime impacting on the benthic community;
- Pipeline breakage;
- Vandalism;
- Operational phase - benthic disturbances;
- Impact on marine fauna; and

- disorientation of marine fauna due to light spills.

GPC will develop suitable Construction and Dredging Environmental Management Plans to address issues associated with impact on marine communities and benthic disturbances. A suitable Oil Spill Management Plan will be developed utilising resources available at the GPC to address spills on land and in marine waters and a suitable CSMP will be developed. Control strategies identified in the risk management plan will be implemented by GPC.

17.2.7 Emergency Response

A number of Emergency Response Plans will be prepared to guide those responding to a variety of potential emergency situations. These plans are discussed below and will be reviewed before the construction starts. GPC has an Emergency Response Team which is adequately trained and equipped and can respond in the event of an emergency. The team is trained in the following aspects:

- Fire fighting for potential on-site incidents;
- Oil spills;
- Response to natural events such as cyclones and storm tides;
- Utility failure;
- Rescue situations such as personnel falling into the water;
- Use of air lines and self contained breathing apparatus;
- Confined space rescue; and
- First aid.

The dredgers will have a Safety Management Plan. A documented procedure will be available to address situations such as personnel falling into the water, smoke or fire detection and in the event of the need to abandon ship.

Oil Spill Emergency Response Plan

Shipping Incidents in Gladstone Region from 1985 (Harper 1998) are listed as follows:

- Loading / Discharge: 6 incidents;
- Close quarters: 1 incident;
- Bunkering: 1 incident; and
- Collision: 1 incident.

The environmental vulnerability to oil spills for the Project Area is low while areas east of Curtis Island and Facing Island are medium. The navigational hazard for the Project Area is high, while in areas east of Curtis Island and Facing Island it is low (Harper 1998).

Oil spill risk based on navigational hazard and environmental vulnerability is considered to be a medium risk for the project area (Harper 1998). In addition, marine oil spill equipment is located at Gladstone which can be mobilised in case of emergencies.

The plan for oil spill emergency responses will include reporting of the oil spill to the Gladstone Harbour Control. The oil spill will be assessed to identify the type of oil, location of the spill source, the quantity of oil spilled and the surrounding environment, marine life, community, health and safety impacts. The

Controller will undertake immediate steps to contain / control the spill, recover the spill material, manage waste and undertake community communications and media management. Recovery operations will then commence which may include 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:

- Material Safety Data Sheets (MSDS) will be kept on the vessels and in the administration office such that they are readily accessible to all concerned;
- Any dangerous goods required during construction activities will be contained within construction, dredging and site vehicles and will not be stored on site;
- The dredger will be refuelled at a bunkering facility;
- Maintenance and servicing of road vehicles will be carried out at the quarry site or at GPC workshops in town;
- Petroleum product 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 material 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 personal protective equipment (PPE) and training 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;
- In the case of environmental nuisance or harm, an environmental representative will report the incident to the Department of Environment and Resource Management (DERM). A report detailing reasons for the spill(s) and corrective action will be prepared; and
- Investigations / corrective actions undertaken will be documented. Corrective actions will be closed out by senior management according to an agreed responsibility and timescale.

Fire Emergency Response Plan

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 a dredger, the emergency response plan for the dredger will be activated and Gladstone Harbour Control will be informed.

Natural Hazard Emergency Response Plan

The Project area is in a known cyclone area. Emergency response procedures will be developed to ensure the maximum protection of people and assets against the effects of tropical cyclones. The strategy adopted will be in:

- 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 the Project 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.

Close-out 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.

17.2.8 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 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 in Charles Street in Gladstone and QFRS have a total of nine fire stations in Gladstone which are permanent, auxiliary or composite (QFRS Website 2009).

Gladstone is covered under the Central region of QAS. Central Queensland ambulance provides coverage to the people of Central Region with 61 permanent and honorary ambulance stations based throughout the region (QAS Website 2009).

A Police Station is also located near to the vicinity of the proposed Project Area at Yarroon Street, Gladstone (QPS Website 2009).

17.2.9 Construction Safety

The construction phase of a development is critical to overall safety since the hazards which arise in the construction process can result in significant levels of risk to surrounding land uses and health and safety (Chapter 16). Construction safety studies will be carried out before the commencement of the dredging and disposal activities 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.

The objectives of the Construction Safety Study will be to:

- Identify all of the hazardous events associated with the reclamation activity;
- Assess the level of risk posed to the site, the surrounding community and the environment by these hazardous events; and
- Document the existing control measures in place to prevent or mitigate the risks posed by these hazardous events, with the focus being on potential incidents with impacts.

GPC will conduct a separate Construction Safety Study before the actual construction phase after identification of the construction contractor.

A CSMP will be prepared by the contractor and will remain onsite at all times. This plan will include the 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;
- The type of construction work to be done at the workplace;
- The hazards and risk controls for the construction work;
- 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;
- The site rules;
- The 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.

Responsibilities of the Construction Contractor will be as follows:

- Keep the plan updated with construction workplace details. Sign and date the plan including revisions;
- Ensure persons working at the site are qualified, experienced and trained to undertake the task;
- Maintain induction records for workers and visitors;
- Ensure the CSMP is understood by all persons working at the site;
- 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; and
- At the end of the job, provide a copy of the CSMP to the GPC for record keeping. Retain the file as required.

17.2.10 Conclusion

The Hazard and Risk assessment has identified the nature and scale of hazards that might occur during the Project. The study identified a total of 41 hazards that resulted in 16 high risks, 22 medium risks and two low and one very low risk hazards. After additional mitigation measures, it resulted in no high risks, 28 medium risks, eight low risks and five very low risks hazards. The proposed Project will not significantly impact on the amenity of sensitive receptors, providing appropriate management procedures are implemented as identified in the assessment studies. The controls identified, when in place, will adequately safeguard against safety, asset and environmental consequences from hazards associated with the project. GPC will continue the assessment of hazards and risks throughout the project life to refine and update the outcome of the development approval / environmental risk process.