Hazards, Health and Safety

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Chapter 27 - Table of Contents

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27 Hazards, Health and Safety

27.1 Introduction

The management of risk is a fundamental part of the proposed Lindeman Great Barrier Reef Resort Project. This hazard and risk assessment aims to identify key Environmental, Health and Safety (EHS) hazards and risks associated with the design, construction and operational phases of the project. The chapter covers the lifecycle of the project and ensures that hazards and risk to people and property is systematically managed to a level that is as low as reasonably practicable. This assessment does not consider commercial impacts to finance, business, legal, commercial which might be exposed as a result of undertaking the project. The scope for this assessment is to:

- Identify hazards – find out what could cause harm;
- Assess risks if necessary – understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening;
- Control risks – implement the most effective control measure that is reasonably practicable in the circumstances; and
- Review control measures to ensure that they are working as planned.

Addendum: *This EIS was initially prepared assuming that the safe harbour was to be part of the Lindeman Great Barrier Reef Resort Project. With the commencement of the Great Barrier Reef Marine Park Authority's (GBRMPA) Dredging Coral Reef Habitat Policy (2016), further impacts on Great Barrier Reef coral reef habitats from yet more bleaching, and the recent impacts from Tropical Cyclone Debbie, the proponent no longer seeks assessment and approval to construct a safe harbour at Lindeman Island. Instead the proponent seeks assessment and approval for upgrades to the existing jetty and additional moorings in sheltered locations around the island to enable the resort's marine craft to obtain safe shelter under a range of wind and wave conditions. Accordingly, remaining references to, and images of, a safe harbour on various figures and maps in the EIS are no longer current.*

27.2 Purpose

The purpose of the assessment is to evaluate unplanned or accidental impacts that could be reasonably associated with the Project based on known and identified environmental, ecological, economic, cultural and social impacts. Identified impacts may include:

- Major spills or leakages of hazardous materials including spills from marine vessels onto the Great Barrier Reef;
- Fire and abnormal events;
- Potential wildlife hazards;
- Natural hazards such as cyclones, storm tide inundation, flooding bushfire, landslide, shoreline erosions and implications related to climate change;
- Failure of environmental protection control devices or treatment plant;
- Impacts from increased visitation and use of the natural environment; and
- Major spills or leakages of hazardous material.

27.3 Stakeholder Consultation

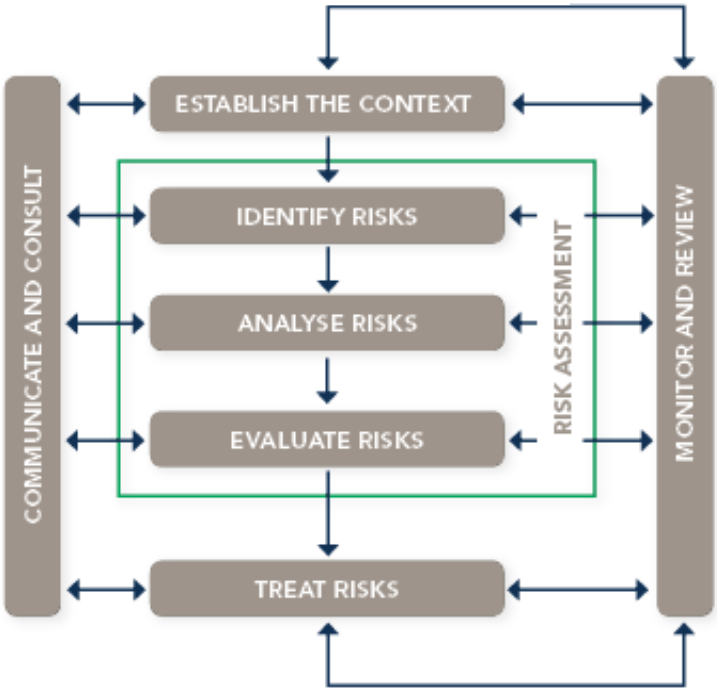
The Queensland Public Safety Business Agency, Queensland Ambulance Service, Mackay Regional Council and the Local Disaster Management Group were consulted during the preparation of the Draft EIS through the Stakeholder Newsletter (refer to **Appendix L – Social Impact Assessment – Stakeholder Contact Register**). No specific issues were raised during this process and it is intended that these agencies be consulted in the preparation of the proposed Evacuation and Emergency Response Plan for the Resort (refer to **section 27.7.2**). The Department of National Parks, Sport and Recreation was also consulted in relation to bushfire management, with proposed buffers to the National Park boundaries updated on the basis of these discussions.

27.4 Project Risk Assessment

The hazard and risk assessment has been undertaken in accordance with *AS/NZS ISO 31000:2009 Risk Management* and *SA/SNZ* HB *436:2013 Risk management guidelines - companion to AS/NZS ISO 31000:2009*. The assessment methodology comprises the following key components:

- Identify risks- Identification of potential hazards associated with the construction and operation of the resort;
- Analyse and Evaluate risks – understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening;
- Treat risks – implement the most effective control measure that is reasonably practicable in the circumstances; and
- Summarise using a hazard and risk assessment in the form of a risk register.

Figure 27-1. Risk Assessment Approach.



27.5 Risk Assessment Approach

The hazard and risk assessment (risk register) includes reasonably anticipated hazards associated with the redevelopment of the Lindeman Great Barrier Reef Resort, together with an assessment of the likelihood of occurrence to obtain a measure of risk associated with each hazard. All relevant chapters of the EIS include an assessment regarding risk and the summary of these are presented in **Table 24-4,** noting that **Chapter 9 – Marine Ecology** and **Chapter 26 – Matters of National Environmental Significance** adopt a different approach to address GBRMPA policy documents. The relevant stages of the project life cycle have been identified as the following the design phase, construction phase and the operations phase (ongoing resort operations). This risk register shall be used as a basis of the Lindeman Island Environmental, Health and Safety (EHS) Framework and will be updated to incorporate any additional identified risks specific to the Project as such risks become apparent.

27.5.1 Risk Register Methodology

The risk register details the potential impacts associated with the identified hazards; the level of risk if no controls are put in place (un-mitigated) and the risk level if mitigated to ensure that risks are kept to as low a level as reasonably practicable (residual risk). The level of risk is assessed using a risk score system determining the likelihood and consequence of identified hazards. This risk score is then used to determine the nature and urgency of further action required.

27.5.2 Likelihood Assessment

For the purposes of this risk assessment, the "Risk Likelihood Levels" presented in **Table 27-1** have been used.

Table 27-1. Risk Likelihood Levels,

Level	Descriptor	Qualitative Description
A	Almost certain	The event is expected to occur; event will occur on an annual basis (or more frequent).
B	Likely	Probable that it will occur; event has occurred several times before at similar developments.
C	Possible	May or may not occur; event may occur once during the life of the development.
D	Unlikely	The event may occur at some time but is unlikely; heard of happening from time to time at similar developments.
E	Rare	The event may occur in exceptional circumstances; not heard of at similar developments.

27.5.3 Consequence Assessment

For the purposes of this risk assessment, the "Risk Consequence Levels" presented in **Table 27-2** have been used.

Table 27-2. Risk Consequence Levels.

Level	Descriptor	Qualitative Description
1	Insignificant	People: Event does not result in injury (i.e. no medical treatment required). Environment: No damaged detected. Property: No damage to property.
2	Minor	People: Reversible injury or illness. Environment: Minor impact of short duration or short term damage. Property: Minor damage to property (<$5,000 to repair).
3	Moderate	People: Irreversible disability or impairment (30%) to one or more persons. Environment: Short term damage resulting in complaints, localised impact. Property: Moderate damage to property (<$50,000 to repair).
4	Major	People: Severe injuries to one or more persons, single fatality. Environment: Significant impact locally and potential for off-site impacts. Property: Major damage to property (<$500,000 to repair).
5	Catastrophic	People: Multiple fatalities, or irreversible injuries. Environment: Significant impacts to regional ecosystems and threatened species, potential for widespread off site impacts. Property: Significant loss to property (>$1,000,000 to repair).

27.5.4 Standard Risk Assessment Matrix

The "Risk Categories" presented in **Table 27-3** have been used throughout the EIS to assign a risk level to the proposed development based on consideration of the likelihood and potential consequences of identified hazards. This risk evaluation process affords a score ranging from Low (1) to Extreme (25).

Table 27-3. Standard Risk Assessment Matrix.

RISK MATRIX	CONSEQUENCES				
PROBABILITY	Catastrophic Irreversible Permanent (5)	Major Long Term (4)	Moderate Medium Term (3)	Minor Short Term Manageable (2)	Insignificant Manageable (1)
Almost Certain (5)	(25) Extreme	(20) Extreme	(15) High	(10) Medium	(5) Medium
Likely (4)	(20) Extreme	(16) High	(12) High	(8) Medium	(4) Low
Possible (3)	(15) High	(12) High	(9) Medium	(6) Medium	(3) Low
Unlikely (2)	(10) Medium	(8) Medium	(6) Medium	(4) Low	(2) Low
Rare (1)	(5) Medium	(4) Low	(3) Low	(2) Low	(1) Low

All activities including but not limited to the implementation of risk control measures shall be undertaken by suitably trained and qualified people in accordance with relevant standards, regulations and standard operating procedures.

Previous chapters of the EIS have presented an analysis of potential impacts and mitigation measures associated with the project. So as not to duplicate this information, references to these sections are outlined in the following table.

Table 27-4. Risk Assessment Matrix - Summary.

Issue	Section References	Risk Assessment Table Reference
Coastal Processes	Section 8.12	Table 8-12. Risk assessment matrix – coastal processes.
Marine Ecology	Section 9.3	Table 9-12. Summary of project impact risk assessment on coral habitat in the project marine area. Table 9-13. Summary of project impact risk assessment on beaches and intertidal rocky shore habitat in the project marine area. Table 9-14. Summary of project impact risk assessment on aquatic vegetation (seagrass and macroalgae) in the project marine area. Table 9-15. Summary of project impact risk assessment on subtidal soft sediment fauna in the project marine area Table 9-16. Summary of project impact risk assessment on fish, sharks and rays, sea snakes and macrocrustaceans in the project marine area. Table 9-17. Summary of project impact risk assessment on marine turtles, marine mammals and marine birds in the project marine area.
Flora and Fauna	Section 10.9	Table 10-10. Risk assessment matrix – flora and fauna.
Scenic Values	Section 11.7	Table 11-6. Risk assessment matrix – visual impact.
Cultural Heritage	Section 12.4	Table 12-10. Risk assessment matrix – cultural heritage.
Air Quality	Section 13.8	Table 13-12. Risk assessment matrix – air quality.
Social	Section 14.11	Table 14-23. Risk assessment matrix – social
Noise and Vibration	Section 16.7	Table 16-22. Risk Assessment - noise
Water Quality	Section 17.9	Table 17-11. Risk assessment matrix – water quality
Water Resources	Section 18.12	Table 18-6. Risk assessment matrix – water resources
Flooding	Section 19.7	Table 19-3. Risk assessment matrix – flooding
Biosecurity	Section 20.6	Table 20-2. Risk assessment matrix - biosecurity
Bushfire Assessment	Section 21.9	Table 21-2. Risk assessment matrix – bushfire
Waste Management	Section 22.11	Table 22-3. Risk assessment matrix – waste
Site Contamination	Section 23.8	Table 23-5. Risk assessment matrix – site contamination
Infrastructure	Section 24.3.4	Table 24-11. Risk assessment matrix – wastewater collection, treatment and reuse infrastructure.
Transport	Section 25.8	Table 25-20. Risk assessment matrix – transport

27.6 Hazards – Potential Impacts and Mitigation Measures

To the extent that hazards are not addressed in the previous sections, the following table provides an overview of the key risks and mitigation measures.

Table 27-5. Risk assessment matrix – hazards.

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
Natural hazards – landslide.	High (12)	• Site specific assessment will be undertaken prior to construction works to determine slope stability caused by altering the existing terrain -	• Ensure large rocks sitting above ground are stabilised to avoid potential movement • Assessment of individual lots, road alignments and other infrastructure for the proposed development Geotechnical investigations to determine the stability, integrity and construction details • Onshore disposal and stockpiling of fill or dredged sediment shall be conducted to minimize risk of material liquefying and causing run-off (if applicable)	• Ensure maintenance of retaining walls and other structures.	Low (4)
Natural hazards – Earthquake /Tsunami associated with human injury or death.	High (12)	All structures are designed in accordance with relevant standards	• Management practices shall adhere to the Natural Disaster Strategy/Emergency Response Procedures. • Emergency response procedures implemented through the Construction Environmental Management Plan	• Natural Disaster Strategy/Emergency Response Procedures and shall include: • Site specific assessment of proposed infrastructure location and suitability - including roads, walking tracks, dams and stockpiling of sediments • Buildings shall be constructed with earthquake engineering techniques (e.g. constructed to withstand sideways loads)	Medium (5)

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
				• Ensure large rocks sitting above ground are stabilised to avoid potential movement • Ensure emergency supplies are located above foreseeable tsunami level	
Tropical cyclones and associated impacts on human health, fauna and damage to buildings and infrastructure.	Extreme (20)	• Buildings designed to provide protection up to specified event	• Management practices shall adhere to the Natural Disaster Strategy/Emergency Response Procedures. • Provision of a Cyclone Shelter and necessary food and medical supplies. Evacuation procedures.	• Management practices shall adhere to the Natural Disaster Strategy/Emergency Response Procedures. • Provision of a Cyclone Shelter and necessary food and medical supplies. • Evacuation procedures.	Medium (9)
Heatwave and associated impacts on human injury.	High (12)		• Management practices shall adhere to the Environmental Health and Safety Framework • Provision of a cooler environment away from the sun and from other sources of heat (e.g. machinery) Guidance on heat stress, heat exhaustion and heat stroke management strategies	• Management practices shall adhere to the Environmental Health and Safety Framework. • Provision of a cooler environment away from the sun and from other sources of heat (e.g. machinery) • Guidance on heat stress, heat exhaustion and heat stroke management strategies	Low (4)
Storm tide inundation, shoreline erosion or sea level rise.	Extreme (20)	• Buildings designed to provide protection up to specified event	• Adoption of appropriate floor levels that address storm tide inundation and sea level rise. • Revetments constructed in accordance with Australian Engineering Standards. • Management practices shall adhere to the Natural Disaster Strategy/Emergency	• Revetment condition to be monitored to ensure satisfactory performance. • Beach condition to be monitored to identify any profile changes. • Management practices shall adhere to the Natural Disaster Strategy/Emergency Response Procedures. • Evacuation procedures.	Medium (9)

Potential Impact	Significance of Impact: Unmitigated	Mitigation Measure			Significance of Impact: Mitigated
		Design	Construction	Operation	
			Response Procedures. • Evacuation procedures.		
Disease outbreak.	High (12)	• -	• Management practices shall adhere to the Environmental Health and Safety Framework • Provide a first aid centre/medical centre in the event of a disease outbreak. • Manage mosquitos in accordance with the *Public Health Act.*	• Management practices shall adhere to the Environmental Health and Safety Framework. • Provide a medical centre to provide a level of medical care required in the event of a disease outbreak. • Develop appropriate procedures in consultation with Queensland Health. • Manage mosquitos in accordance with the *Public Health Act.*	Low (4)

27.7 Environmental, Health and Safety Framework

The risk assessment identifies key risks to the environment, health and safety arising from the construction and operation of the project. The EIS assesses the potential impacts associated with these risks and details the measures which are proposed to mitigate the identified impacts. The construction and operation of the site will be undertaken in accordance with a series of management plans which include these management measures and provide relevant performance criteria, monitoring and recording commitments, and corrective actions in the event of failure to achieve the performance criteria. The following subsections details the plans and measures required to mitigate or manage risks associated with health, safety and the environment.

The Queensland Public Safety Business Agency, Queensland Ambulance Service, Mackay Regional Council, and the Local Disaster Management Group were consulted during the preparation of the Draft EIS through the Stakeholder Newsletter (refer to **Appendix L – Social Impact Assessment – Stakeholder Contact Register**). Discussions have also been undertaken with Department of National Parks, Sport and Recreation associated with bushfire management.

27.7.1 Environmental Management Plan

An overarching Construction and Operational Environmental Management Plan (EMP) (refer to **Chapter 28 - Environmental Management Plan**) has been developed to guide the management of the project and incorporate key commitments of the EIS. The EMPs provides performance criteria to minimise the impacts of the Project on the surrounding physical and social environment during the construction and operational phases, provides mechanisms whereby the environmental performance of the works can be measured, and specifies corrective actions in the event of non-compliance with the stated criteria. The EMPs include the requirement for Preventative Maintenance Programs as an additional control measure to reduce the risk of

environmental harm, including inspection, maintenance and maintenance records requirements for all site equipment and infrastructure.

27.7.2 Evacuation and Emergency Response Plan (Construction and Operational Phase)

An Evacuation and Emergency Response Plan (EERP) will be prepared for the resort construction and operation and will include specific provisions relating to training, criteria for declaring an emergency, emergency contact details, onsite plans to handle emergencies, a description of the mechanisms to alert people to an emergency, emergency procedures and evacuation routes and procedures. The plan will be developed in consultation with the Local Disaster Management Group, Queensland Health, Emergency Services, and other stakeholders to determine most efficient and practical management and transport procedures (e.g. transport to Proserpine or Mackay).

27.7.2.1 Emergency Response Procedures

Emergency Response Procedures (the procedures) shall outline instructions which all project personnel and emergency service personnel will follow in the event of an emergency (e.g. bushfire; flooding; cyclones; dam failure event and disease outbreaks). The procedures shall provide guidelines for actions to be taken during an emergency to minimise the potential for:

> Loss of life and/or injury to people;

> Damage to the environment; and

> Damage to the built environment.

The procedures will consider all relevant matters including:

> Analysis of foreseeable hazards;

> Assessment of the impacts from the identified foreseeable hazards;

> Assessment of what constitutes an emergency;

> Emergency contact details for key personnel who have specific roles or responsibilities under the Environmental Emergency and Management Plan (e.g. fire warden, medic etc.);

> Onsite plan to handle incidents with contact details for emergency services;

> A description of the mechanisms for alerting people to an emergency or possible emergency (e.g. siren) and post emergency procedures (e.g. notifying the regulator);

> Testing of emergency procedures under emergency like conditions including the frequency of required emergency drills; and

> Analysis of possible evacuation routes and hazardous areas.

Procedures will be revised regularly throughout the Project and if necessary in response to an emergency situation where insufficient mitigation measures are noted. If a pollution incident occurs, all necessary action should be taken to minimise the size and any adverse effects of the release. Emergency procedures shall be detailed for oil spills, fires or explosions, collisions or groundings, cyclones and tsunamis. A Quick Response

Emergency Action Plan Guide shall also be developed as part of the EMP. Procedures should also address any apparent loss of stored fuel, e.g. stock reconciliation discrepancies.

27.7.2.2 Response Training and Induction

All Project staff will undergo a mandatory induction process which will include first aid training, evacuation and emergency response training and basic fire training. All Project staff shall receive training for general environmental responsibilities, site-specific values such as ecological values and features to be preserved (onsite and offsite), environmental management controls, particularly in relation to water quality. Induction and training topics will include the following:

> Environmental Awareness and Responsibility, including actions arising from the Environmental Management Plan;

> Pollution Control;

> Risk Minimisation;

> Reporting and Documentation;

> Emergency Response Procedures; and

> Performance Indicators and Timeframes.

Specific training shall be provided for individuals who have a formal role in an emergency e.g. fire warden, first aid officers, medics etc.

27.7.3 Natural Disaster Strategy

A Natural Disaster Strategy will be developed in consultation with key local and State agencies to respond to all possible natural disasters that may occur. The strategy shall reference the *Whitsunday Disaster Management Plan 2014* in the nomination of mitigation measures to protect the community and community assets from identified natural disasters which may impact all or part of the Whitsunday Region.

The strategy shall focus on the following key areas:

> Preparation - for the impact of and recovery from a disaster event;

> Mitigation; and

> Post-disaster response.

Monitoring of weather conditions and forecasts to avoid working in high risk conditions is the key risk avoidance measure for natural hazards. An emergency management plan and response procedure for the construction period will also help to safeguard worker safety in the event that avoidance is not possible.

27.8 Summary

The risk assessment identifies key risks to the environment, health and safety arising from the construction and operation of the project. The EIS assesses the potential impacts associated with these risks and details the measures which are proposed to mitigate the identified impacts. The construction and operation of the site will be undertaken in accordance with a series of management plans which include these management measures and provide relevant performance criteria, monitoring and recording commitments, and corrective actions in the event of failure to achieve the performance criteria. Consultation has been undertaken with Local Disaster Management Groups as part of the preparation of the EIS through seeking a response to the Stakeholder Newsletter issued in March 2016 and discussions with the Department of National Parks, Sport and Recreation associated with bushfire management.

The following key measures are proposed:

- An overarching Environmental Management Plan (EMP) (refer to **Chapter 28 - Environmental Management Plan**) has been developed to guide the management of the project and incorporate key commitments of the EIS. The EMPs provides performance criteria to minimise the impacts of the Project on the surrounding physical and social environment during the construction and operational phases, provides mechanisms whereby the environmental performance of the works can be measured, and specifies corrective actions in the event of non-compliance with the stated criteria. The EMPs include the requirement for Preventative Maintenance Programs as an additional control measure to reduce the risk of environmental harm, including inspection, maintenance and maintenance records requirements for all site equipment and infrastructure.

- An Evacuation and Emergency Response Plan (EERP) will be prepared for the resort construction and operation and will include specific provisions relating to training, criteria for declaring an emergency, emergency contact details, onsite plans to handle emergencies, a description of the mechanisms to alert people to an emergency, emergency procedures and evacuation routes and procedures (e.g. bushfires; flooding; disease outbreak). The plan will be developed in consultation with the Local Disaster Management Group, Queensland Health, Emergency Services, and other stakeholders to determine most efficient and practical management and transport procedures (e.g. transport to Proserpine or Mackay).

- All Project staff will undergo a mandatory induction process which will include first aid training, evacuation and emergency response training and basic fire training. All Project staff shall receive training for general environmental responsibilities, site-specific values such as ecological values and features to be preserved (onsite and offsite), environmental management controls, particularly in relation to water quality;

- A Natural Disaster Strategy will be developed in consultation with key local and State agencies to respond to all possible natural disasters that may occur. The strategy shall reference the *Whitsunday Disaster Management Plan 2014* in the nomination of mitigation measures to protect the community and community assets from identified natural disasters which may impact all or part of the Whitsunday Region.