21. Environmental Management Plans

21.1 EMP Outline

21.1.1 Overview

A number of recommendations have been made in this Supplementary Environmental Impact Statement (EIS) in relation to management of environmental impacts. These recommendations will require actions to be taken during the design, construction and operation of the proposed marina.

In order to ensure that these recommendations are implemented, a Draft Environmental Management Plan (EMP) has been developed for the project.

An outline of the Draft EMP is provided in this Supplementary EIS to demonstrate the commitment of Windward AB Pty Ltd to ensuring that the recommendations of this Supplementary EIS are implemented. Environmental Management strategies for individual project elements are described in **Sections 21.3** and **Section 21.4**.

An EMP is a management tool used to assist in minimising impact to the environment. The role of the EMP is to ensure that:

- Commitments made in the Supplementary EIS are carried through to design, construction and operation of the proposed marina
- Conditions of the COG's report and any other permits and approvals are satisfied
- Best practice environmental management is achieved at all stages of the project
- Environmental monitoring is undertaken to confirm the effectiveness of environmental management measures in preventing unacceptable impacts on the environment and ensure compliance with any permit and approval conditions
- Where unacceptable environmental impacts are detected, ensure that corrective actions are implemented to repair any damage that has occurred and prevent any further unacceptable impacts or non-compliances from occurring.

The EMP is a dynamic document and should be regularly updated to incorporate changes in environmental management procedures in the light of ongoing monitoring results, new techniques, legislation and environmental policies of the Proponent in consultation with the relevant authorities.

The EMPs outlined in this Section are intended as drafts to demonstrate the commitment to implementing recommendations made in this Supplementary EIS. It is intended that the EMPs be further expanded and augmented prior to each stage of the project to ensure sufficient detail is included to achieve an appropriate standard of environmental management.

21.1.2 Activities Covered by the EMP

This EMP is prepared in a generic format to apply to all construction and operation activities in relation to marina construction and operation. Ultimately, separate EMPs are likely to be prepared for the range of activities as follows:

- Excavation, land reclamation and installation of civil works
- Channel dredging (incorporating a Dredge Management Plan)

- Construction of buildings and other facilities
- Operation of the marina and marina facilities area, including basic maintenance activities for the entire development.

21.1.3 Key Elements

Impact

The impact that requires management is stated. This forms the basis for identifying what needs to be protected or avoided.

Management Principles

Management principles are the operational policy or management objective which will be achieved for each impact. Management principles relate to the overall outcome that is to be achieved.

Performance Criteria

One or more performance criteria are provided for each impact identified in the of the EMP.

Performance criteria are intended to provide a concise statement of the standard which will be attained in managing the impact and are described in simple measurable terms. The environmental performance criteria specified relate to acceptable or best practice standards.

Monitoring

Monitoring involves measuring environmental or other conditions and evaluating performance against accepted performance criteria. Monitoring is discussed in more detail in **Section 21.5**.

In addition to monitoring each element of the EMP, audits may be used to provide a regular overview of environmental performance and compliance of a particular activity or activities.

Corrective Action

Where monitoring or audit indicates that performance criteria have not been achieved, corrective action shall be immediately implemented such that the non-compliance is corrected.

Responsibilities

Responsibility for implementing the plans will be determined by Project Management when construction and operational roles for staff and workers are defined.

If the nominated person is absent, then environmental responsibility will default to superior managers.

21.1.4 Administrative Matters

Each individual EMP will be required to incorporate communication and reporting requirements. This will include:

- internal communications of environmental management requirements and monitoring results
- formal reporting on environmental performance to regulatory authorities and key stakeholders
- release of environmental performance information to the community.

A formal document control system will be required to ensure that all documents relating to environmental management are appropriately handled. Documents may include:

- EMP documents
- Monitoring results including inspections, audits, sampling and analysis
- A list of any performance criteria that have not been met, the corrective action taken and a description of the magnitude of any possible environmental impact;
- Internal and external correspondence relating to environmental management
- A register of complaints detailing:
  - The originator of the complaint
  - The complaint investigation
  - The validity of the complaint
  - The response of remedial action.
- Any internal or external reports of environmental performance
- Records of environmental training.

All documents will be available for inspection by regulatory authorities acting within their jurisdiction on request.

21.1.5 Training

The EMPs will only be successful in managing environmental impacts where all those responsible for its implementation and review are thoroughly conversant with its content, interpretation and performance measurement. The Proponent is committed to providing training for its site workforce and ensuring that the contractual arrangements with the contractor specify the need for adequate training to be provided to all contracted members of the workforce.

Staff involved in environmental monitoring will be trained and competent in the operation, calibration and maintenance of the equipment. Sampling staff will also be trained and competent in sample collection, handling, storage and transport methodologies and techniques.

21.2 Regulatory and Other Compliance Documents

21.2.1 Commonwealth Legislation and Policies

Environment Protection and Biodiversity Conservation Act (EPBC Act) 1999 came into force on 16 July 2000. Under the EPBC Act, actions that have, or are likely to have, a significant impact or are a matter of national environmental significance require approval from the Commonwealth Environment Minister.

Relevant Commonwealth Legislation and Policies include:

- *Environment Protection and Biodiversity Conservation Act 1999*;
- Intergovernmental Agreement on the Environment (IGAE);
- National Waste Minimisation and Recycling Strategy; and
- National Greenhouse Strategy 1998.
- National Health and Medical Research Council (NHMRC)/AEC National Guidelines for Control of Emission of Air Pollutants from New Stationary Sources 1985;
- National Environmental Protection Measure for Ambient Air (Air NEPM) 1997;
- The National Strategy for Ecological Sustainable Development;
- The National Strategy for the Conservation of Biological Diversity;
- The Queensland Government's proposals for Natural Resource Management.

21.2.2 Queensland *Environmental Protection Act 1994*

The *Environmental Protection Act 1994* (EP Act) is the umbrella legislation for the regulatory management of the environment in Queensland. The EP Act requires the exercise of duty of care, which places the responsibility for protection of the environment on all persons during the conduct of all activities.

The EP Act provides the power to administering authorities to order actions to be taken to improve environmental performance, conduct audits and environmental evaluations of activities, approve environmental management programs, and impose penalties or prosecute persons for non-compliance with the requirements of the EP Act.

The EP Act is the primary legislative environmental tool in Queensland. The EP Act also allows for the preparation of Environmental Protection Policies (EPPs). The project will comply with the following EPPs:

- Environmental Protection (Water) Policy 1997.
- Environmental Protection (Noise) Policy 1997.
- Environmental Protection (Air) Policy 1997.
- Environmental Protection (Waste) Policy 2000.

The Act does not regard the construction of a marina as an Environmentally Relevant Activity (ERA). However, any contractor engaged in the construction of the marina would need to secure a licence under the Act for such ERAs as:

- Petroleum storage;
- Dredging activities;
- Extraction of rock or gravel for construction purposes; and
- Concrete batching.

Under the *Environmental Protection Regulations 1998*, applicants for licences to carry out more than one ERA at a site may include an Integrated Environmental Management System (IEMS) (clause 42). The purpose of the IEMS is to set out the means by which the proponent will ensure that licence conditions will be met.

The IEMS must include the means by which the proponent will achieve the following:

- the monitoring of releases of contaminants into the environment and an environmental assessment of the releases;
- staff training and awareness of environmental issues;
- the conduct of environmental and energy audits;
- waste prevention, treatment and disposal;
- a program for continuous improvement; and
- reporting arrangements on the effectiveness of the environmental management of the activities (*Environmental Protection Regulations 42(2)*).

An IEMS is not mandatory and will be to the contractor to decide their preferred method of achieving correct licensing.

21.2.3 Other State Legislation

This Supplementary EIS has been being formulated under the provisions of the *State Development and Public Works Organisation Act 1971* (SDPWD). The Public Works Act requires that any department of the government or any board, body, authority or corporation, when undertaking a development that is likely to have environmental effects, must take such environmental effects into account. These effects are examined as part of a defined process established by the SDPWD through an EIS. This Supplementary EIS is then used to gain licences and approvals from the various government agencies and departments through their relevant legislation.

Major State legislative instruments under which approvals are required for either the construction or operation of the marina include the following:

- *State Development and Public Works Organisation Act 1971*
- *Environmental Protection Act 1994*
- *Integrated Planning Act 1997*
- *Nature Conservation Act 1992*
- *Fisheries Act 1994*
- *Queensland Heritage Act 1992*
- *Electricity Act 1994*
- *Transport Infrastructure Act 1994*
- *Land Act 1984*
- *Native Title Act 1993*
- *State Coastal Management Plan 2001*
- *Cultural Records (Landscapes Queensland and Queensland Estate) Act 1987.*

Other relevant State instruments include:

- Draft EPA Environmental Management Guidelines (1994);
- Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland, May 1998;
- National Greenhouse Strategy, Queensland Implementation Plan 1999
- State Planning Policy (SPP 2/02) Planning and Management of Coastal Development Involving Acid Sulphate Soils.

21.2.4 Guidelines

Relevant guidelines include:

- Australian and New Zealand Guidelines for Fresh and Marine Waters (Australia and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, 2000);
- Environmental Guidelines for Marinas in the Great Barrier Reef Marina Park (GBRMPA, 1994)
- Soil Erosion and Sediment Control, Engineers Guidelines for Queensland ; and
- Landscaping and Urban Design Guidelines.

Australian standards that are relevant to Environmental Management and Marinas include:

- Explosives storage transport and use Part 1: Storage (AS 2187.1 – 1998) This standard sets out requirements and precautions in the use of factory-made explosives and certain explosives mixed on sites;
- Explosives Storage transport and use Part 2: Use of explosives (AS 2187.2 – 1993) This standard sets out requirements and precautions in the storage, transport and use of explosives;
- The Storage and Handling of Flammable and Combustible Liquids (AS 1940 – 1993) This standard sets out the requirements for the design, construction and operations for the storage and handling of flammable and combustible liquids and includes matters relating to operations and management of emergencies;
- Risk Management (AS 4360: 1999) The standard provides a generic guide for the establishment and implementation of the risk management process involving establishing the context and the identification, analysis, evaluation, treatment, communication and ongoing monitoring of risks; and
- The Storage and Handling of Corrosive Substances (AS 3780-1994) The standard sets out the requirements and recommendations for the safe storage and handling of corrosive substances that meet the Class 8 classification of the Dangerous Goods Code.
- ISO 14000 International Standard for Environmental Management
- AS3962:2001 – Guidelines for the Design of Marinas.

21.3 Construction Implementation Plan

■ Table 21-1 Coastal Processes – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Storm Surge and other extreme weather conditions	☐ All land and building floor heights must meet accepted best practice standards with regard to height above sea level	☐ See Table 2.3	☐ survey and preparation of as-built drawings during construction	☐ rework as necessary	☐ construction contractor

■ Table 21-2 Erosion, Sediment Control and Acid Sulphate Soils – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
ASS Generation of acid from the disturbance and subsequent oxidation of PASS sediments during excavations undertaken.	**ASS** ☐ Undertake a detailed ASS investigation and Identify areas containing ASS/PASS sediments; ☐ Design the development to minimise disturbance of ASS/PASS sediments.	**ASS** ☐ Adopt active and passive management strategies in accordance with the current Draft State Planning Policy and other adopted Government Guidelines / Codes of Practice.	**ASS** ☐ Undertake assessment of 'Base Line' water quality parameters in the receiving waters.	**ASS** ☐ document the construction and operation of the site to comply with recommendations of the ASS EMP, (attached at **Appendix E**).	**ASS** ☐ Proponent

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Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
ASS Generation of acid from the disturbance and subsequent oxidation of PASS sediments during excavations undertaken.	**ASS** ☐ Implement a Construction Phase ASS EMP	**ASS** ☐ the Construction Phase ASS EMP should be prepared in accordance with the Draft State Planning Policy - 'Planning and Managing Development Involving Acid Sulfate Soils'. However, it may form part of a 'global' ASS EMP for construction and operation of the site. See draft ASS in **Appendix E**.	**ASS** ☐ The pH level of waters retained for treatment on-site shall be monitored using an automatic monitoring and data recording system.	**ASS** ☐ If the pH level of retained waters falls outside of the specified quality parameters for release from the site - dose with a slurry of hydrated lime in accordance with requirements of the ASS EMP	**ASS** ☐ Proponent and/or Site Superintendent
☐ lowering of local pH level resulting in damage to infrastructure and impact on acid intolerant flora & fauna; ☐ mobilisation of heavy metals, present in the sediments disturbed, which result in impacts on local flora & fauna; ☐ deposition of Iron precipitates on exposed surfaces and /or nearby vegetation.	☐ Undertake a detailed ASS investigation and Identify areas containing ASS/PASS sediments; ☐ Prepare and implement an ASS Environmental Management Plan for the development.	☐ Ensure no significant impacts on nearby marine receiving waters (or groundwater) resulting from the disturbance, transportation or deposition of PASS materials. ☐ In order to achieve this, ensure: • any ASS/PASS spoil is neutralised by the addition of agricultural lime resulting in a TPA of <4 moles H+/tonne • the pH of receiving waters near the site does not drop by > 0.2 units below the established 'base line' level or 6.5 (whichever is lower); or rise above 8.5.	☐ The pH level of waters retained for treatment on-site shall be monitored using an automatic monitoring and data recording system. ☐ The system shall be recalibrated weekly and before any stoppages in the work program (ie. weekends, weather). ☐ Monitoring to be undertaken: ▪ four times each day, during the period of disturbance, ▪ the system employed will have an accuracy of not less than 0.1 pH.	☐ Failure to meet 'Performance Criteria' outlined in the EMP, requires a request for Corrective Action and cessation of operations until performance criteria are met. Examples of CARs include: 1. If pH level in retained waters falls outside the stated limits. 2. Should any breaches of bund walls be detected.	☐ The Proponent or his representatives.

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■ Table 21-3 Water Quality – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Release of some sediment to Boathaven Bay from channel dredging activities.	☐ Sediment levels do not cause long term impacts on ecosystems	☐ Dredging works to be undertaken in accordance with the Section 86 Permit issued under the Queensland harbours Act and the conditions of the Environmental Authority issued by the EPA.	☐ Monitor turbidity at locations around Boathaven Bay to detect plumes	☐ Reduce, change method of or cease dredging works in accordance with Dredge Management Plan. ☐ Deploy silt curtains as appropriate	☐ Construction Manager ☐ Dredging contractors
Release of turbid water from dredge spoil disposal area.	☐ Sediment levels do not cause long term impacts on ecosystems	☐ Comply with permit and approval conditions ☐ Plumes of turbid waters not to exceed pre-agreed levels. .	☐ Monitor discharge from dredge spoil disposal area for pH and turbidity ☐ Monitoring of turbidity at selected locations in Boathaven Bay, to be increased during channel dredging.	☐ Reduction in turbidity levels through increased residence time, filtering or flocculation. ☐ Cease dewatering of construction area work during high rainfall events.	☐ Construction Project Manager.
Lowering of pH due to Acid Sulphate Soils	☐ Acidic discharges do not cause acute or long term impacts on ecosystems	☐ pH of discharge water from the site >6.5	☐ monitoring of excavation and dredge spoil as per ASS Management Plan ☐ Monitor pH of discharge	☐ Treat to pH>6.5 with addition of lime	☐ Construction Manager
Release of hydrocarbons	☐ Fuels and oils for all activities outside the enclosed marina basin and dredge spoil area to be properly stored and handled	☐ No spills or leaks	☐ Monitor storage and handling of oils and hydrocarbons	☐ Prevent situations where spill risk occurs ☐ Clean up any spills immediately	☐ Construction contractor

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■ Table 21-4 Coastal and Estuarine Flora and Fauna – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Loss of mangroves.	☐ Mangroves behind the marina facilities area and spoil disposal area to be retained	☐ Design shows these mangroves retained ☐ Design shows adequate channels to allow tidal flows to this area	☐ N/A	☐ Modify design	☐ Proponent
Unnecessary damage to mangroves to be retained.	☐ Clearly identify strands of mangrove to be retained. ☐ Demonstrate to construction contractors which mangroves are to be retained. ☐ construction contract is to include maps of areas to be retained and where equipment and materials are not to be stored. ☐ Construction contractors are to operate with care when operating near these mangroves for retention, in order not to damage them.	☐ Construction contractors are aware of the mangroves to be retained if they are to work in the vicinity. ☐ Mangroves to be retained are not damaged.	☐ Mangroves unnecessarily damaged are reported to the construction manager. ☐ Opportunistic visual inspection when construction manager is in the vicinity.	☐ If damage occurs, construction contractors are to be reminded of the mangrove strands to be retained and remain undamaged.	☐ Construction manager
Mangroves health declines significantly due to water quality impacts from construction.	☐ Regular (three monthly during construction then yearly during operation) monitoring of mangrove health, looking at evidence of dieback or stress of plants.	☐ Mangrove mortality levels not above levels in non-disturbed parts of Boathaven Bay.	☐ Mangrove health is monitored each three months during construction and yearly for three years following construction.	☐ Management plans are devised to limit further mortality. ☐ Rehabilitation plan developed to restore mangroves if possible.	☐ Construction Manager
Threatened species killed or injured during construction.	☐ Search for threatened species in areas to be excavated or reclaimed prior to construction in that area.	☐ No threatened species injured or killed.	☐ Observation prior to construction activities.	☐ Relocation of plant or animal prior to works in that area.	☐ Construction Manager.

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■ Table 21-5 Marine Ecosystems – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Disturbance of marine habitat and seagrass beds	☐ Minimise zones of impacts ☐ Minimise level of segregation and habitat fragmentation ☐ Incorporate zones of protection in design documents	☐ Footprint of disturbance considered minimal for scope of design ☐ Design of footings, pilings and rock breakwaters to maximise value of hard substrate	☐ Ensure limits of disturbance are defined on designs and are not exceeded	☐ Re-design of zones of impact	☐ Proponent
Loss of marine habitat	☐ Clearly define limits of disturbance on design drawings and on-site where possible ☐ retain selected marine vegetation as potential habitat for aquatic species ☐ Placement of dredge and excavation spoil in unvegetated areas	☐ Limits of disturbance not crossed ☐ Select stands of trees on the outer limit of inundation zone ☐ Minimal loss of potential habitat	☐ Zones of no disturbance not impacted areas by construction activities ☐ Impacted areas to be assessed against a baseline seasonally ☐ Visual presence of suitable habitat for aquatic fauna species	☐ Consult with leading marine ecologist ☐ revise construction practices to current best practice methodologies	☐ Construction Manager
Dredging may injure or kill turtles and Dugongs	☐ Avoid impacts on Dugong and turtles by visual observation for Dugong and turtles within 100m of dredge head. ☐ Use turtle exclusion device on cutter suction dredge head.	☐ Adequate monitoring in place to detect most Dugong and turtle in the dredging area ☐ Turtle exclusion devise located on cutter suction dredge head	☐ Visual monitoring of dredge areas ☐ Turtle exclusion device used on cutter suction dredge head during dredging activities.	☐ Cease dredging until turtle/Dugong has left area (may be driven away gently by boats) ☐ Cease dredging until turtle exclusion device is incorporated onto cutter suction dredge head.	☐ Construction Manager
Direct and indirect effects on marine ecosystems	☐ Impacts are understood and responded to	☐ Impacts minimised wherever practicable	☐ Biological monitoring at quarterly intervals during initial construction year ☐ Further monitoring depending on results of initial monitoring	☐ Amend construction practices as appropriate to minimise impacts	☐ Proponent ☐ Construction Manager
Increase in sedimentation and turbidity	☐ See Water Quality EMP				
Oil and hydrocarbon spills killing and polluting marine vegetation and fauna	☐ See Water Quality EMP				

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Effects of blasting on fish, turtles and marine mammals	☐ Avoid dangerous				
Effects of light on turtles	☐ Turtles not affected by light from the development	☐ Sodium vapour lamps used where practicable and safe ☐ Otherwise, lights shielded so that light spillage onto Boathaven Bay is minimised	☐ Design checks	☐ Amend lighting design	☐ Proponent ☐ Design engineers

■ Table 21-6 Air Quality – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Odour from kitchens and commercial areas	☐ Design exhaust fans and outlets to allow appropriate dispersion of odours ☐ Design waste management areas to minimise odour impacts on marina users	☐ No odour detectable by marina patrons	☐ To be implemented during operation phase	☐ Modify design if odour problems exist	☐ Proponent
Odour and volatile hydrocarbons from fuel storage and handling facilities	☐ Design facilities in accordance with As 1940 and other appropriate standards	☐ Meets all applicable standards	☐ To be implemented during operation phase	☐ Modify design if odour or emission problems exist	☐ Proponent
Odour from sewage pump out facilities	☐ Design facilities to ensure containment of odour	☐ No odour detectable by marina patrons	☐ To be implemented during operation phase	☐ Modify design if odour problems exist	☐ Proponent

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Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Dust emissions from earthmoving and related activities	❑ Control dust so that off-site dust impacts do not occur	☐ No dust plumes visible from outside the site ☐ Maintain dust depostition on adjacent lands below acceptable limits (monthly average daily deposition of 120 mg/m^2/day)	☐ Visual monitoring of dust plumes and dust deposition ☐ Dust fall gauges installed and analysed monthly	❑ Minimise exposed dirt areas ❑ Use water sprays to control dust emissions ❑ Minimise height and volume of stockpiles ❑ Cover soils and fill on haul trucks entering and leaving the site ❑ Clean wheels of trucks leaving the site ☐ Avoid use of chemical dust suppressants.	☐ Construction contractor
Heavy vehicle and equipment emissions	☐ Minimise emissions from heavy vehicles and equipment	☐ Vehicles and equipment maintained in accordance with manufacturer's requirements ☐ Vehicles and equipment shut down when not in use	☐ Maintenance history of vehicles and equipment ☐ Spot checks for idling vehicles and equipment	☐ Conduct maintenance ☐ Turn vehicles and equipment off when appropriate	☐ Construction contractor

■ Table 21-7 Noise and Vibration – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Noise levels from marine facilities, areas, air conditioning plant and other noisy activities	☐ assess and control noise emissions through consideration of appropriate siting, acoustic enclosures and the like during the detailed design of each facility	☐ Indicative compliance of individual activities with likely environmental authority limits, where relevant, as referred to in **Table 11-6**, **Table 11-7** and **Table 11-8** of this report.	☐ Review design and noise level estimates	☐ Modify design as appropriate	☐ Proponent, individual facilities developers

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Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
NOISE Potential reduction in amenity for residents and hotel / tourism operators	☐ restrict work construction hours to 6:30am-6:30pm , Monday to Saturday, unless inaudible at the nearest sensitive places. ☐ Regularly maintain construction equipment; ☐ use best available noise attenuation devices for mobile and stationary plant ☐ Undertake further assessment during detailed design stage of the works to determine the best available method for minimising noise from piling ☐ Investigate the feasibility of restricting piling works to the hours of 8 am – 4 pm ☐ Maintain Community Consultation program and a complaints register ☐ Prepare a construction noise management plan	☐ No audible noise at nearest sensitive places outside 6:30 am to 6:30 pm ☐ All noise complaints in response to construction works resolved	☐ Monthly noise monitoring at nearest sensitive place. ☐ Event monitoring in response to valid complaints in relation to construction noise	☐ Respond to any valid complaints through investigation and mitigation as appropriate ☐ Modify activities where practicable to ensure noise levels meet recommendations of this report.	**EXAMPLE** ☐ Proponent ☐ Construction contractor

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
VIBRATION Potential structural damage to dwellings located up to 50 m from the works Potential reduction in human comfort at dwellings located within 50 m of works	☐ Maintain Community Consultation program and a complaints register throughout the duration of works ☐ Prepare and implement detailed Vibration management plan as part of the Construction Environmental Management Plan ☐ dilapidation survey of dwellings located within 30 m of the works ☐ Conduct vibration monitoring at dwellings, where necessary	☐ Complaints in response to ground borne vibration from the works resolved	☐ Possible ground vibration monitoring during pile driving works within 50m of potentially affected dwelling if dilapidation survey indicates risk	☐ Any valid complaints received in response to the construction works shall be investigated and addressed as soon as practicable after the complaint is made.	☐ Proponent ☐ Construction contractor

■ Table 21-8 Waste Management – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Volume of waste sent to landfill	☐ Waste management hierarchy	☐ Waste Management Plan; ☐ Volume of waste sent to lanfill; ☐ % of total waste recycled;	☐ Annual waste audit	☐ Revise waste management practices	☐ Construction Project Manager

■ Table 21-9 Infrastructure and Facilities – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Capacity of water supply infrastructure to area may be inadequate	☐ Agreement to be reached with Whitsunday Shire Council in relation to payment of charges to allow augmentation of water supply	☐ Water supply meets demand of this and other developments without diminishing access elsewhere in the community	☐ N/A	☐ N/A	☐ Proponent

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
	infrastructure				
Capacity of Sewage transmission and disposal infrastructure may be inadequate	☐ Agreement to be reached with Whitsunday Shire Council in relation to payment of charges to allow augmentation of sewage infrastructure	☐ Wastewater transfer and treatment meets demand of this and other developments without diminishing quality of treatment	☐ N/A	☐ N/A	☐ Proponent
Power Supply to be confirmed	☐ Agreement to be reached with Ergon	☐ Power Supply meets demands without diminishing access to this service by others	☐ N/A	☐ N/A	☐ Proponent

■ Table 21-10 Socio-Economics – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Community awareness of the project	☐ Local community and other stakeholders to be informed of development of the project1	☐ Stakeholders informed wherever practicable of progress of the project and any significant changes ☐ All requests for information met	☐ Stakeholders aware to the extent practicable	☐ Provide additional information	☐ Proponent, developers
Impacts on availability of accommodation due to housing of workforce	❑ minimise disadvantage to local residents	☐ Construction contractor to develop accommodation plan, taking into consideration availability and cost of housing in Airlie Beach and Proserpine as part of contract requirements ☐ Details of plan to be provided in bid documents	☐ Plan implemented ☐ Housing availability	☐ Provide additional temporary housing if availability is low such that local residents are not disadvantaged	☐ Construction contractor
Employment opportunities for local residents	☐ maximise opportunities for local residents and youth to be employed during construction	☐ Advertising and recruitment locally ☐ Preference given to locals with equivalent skills and qualifications for positions	☐ Workforce statistics	☐ Increase local employment where resources are available	☐ Construction contractor

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Training opportunities	☐ Maximise opportunities for youth and others to receive training during construction	☐ At least 5% and preferably 10% of construction employees to be apprentices or trainees ☐ Establish connection with Cannonvale TAFE and local high schools to facilitate employment and training opportunities	☐ Workforce statistics	☐ Increase training	☐ Construction contractor
Community awareness of the project	☐ Local community and other stakeholders to be informed of development of the project1	☐ Stakeholders informed wherever practicable of progress of the project and any significant changes ☐ All requests for information met	☐ Stakeholders aware to the extent practicable	☐ Provide additional information	☐ Proponent, developers
Participation of local business and industry	❑ maximise opportunities for local and regional businesses	☐ local and regional industries able to tender on an equal footing	☐ tender evaluation criteria	☐ None	☐ Proponent ☐ Construction contractor

■ Table 21-11 Visual Amenity – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Buildings may appear bulky and block views	☐ Buildings and structures to be designed to maximise aesthetic appeal and sympathy with Airlie Beach townscape	☐ Development approval from Whitsunday Shire Council	☐ N/A	☐ N/A	☐ Proponent and developers
Construction site appears messy	☐ Maintain site in a neat condition	☐ Site neat ☐ No waste lying about	☐ Daily inspection	☐ Clean and/or tidy messy areas	☐ Construction contractor

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Minimise exposure of construction site	☐ Retain mangroves along Shute Harbour Road ☐ Landscape site as soon as practicable ☐ Prioritise Shute Harbour Road boundary ☐ Consult with affected property owners regarding landscaping	☐ Mangroves retained ☐ Use fast growing species which will maximise screening without blocking vistas	☐ landscaping complete and successful	☐ repair any areas where revegetation is unsuccessful	☐ Construction contractor

■ Table 21-12 Cultural Heritage – Design and Construction

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Activities being conducted within area of traditional use of the Ngaro people	☐ Representatives of Ngaro people to be kept informed of project activities	☐ Supplementary EIS made available to Gudjuda Reference Group and Southern Birri Gubba Reference Group ☐ Contact made with Gudjuda Reference Group and Southern Birri Gubba Reference Group once detailed design for construction is complete	☐ Consultation records	☐ Contacts made	☐ Proponent
Activities being conducted within area of traditional use of the Ngaro people	☐ Representatives of Ngaro people to be kept informed of project activities	☐ Gudjuda Reference Group and Southern Birri Gubba Reference Group notified of commencement of construction ☐ Gudjuda Reference Group and Southern Birri Gubba Reference Group able to visit site on request complete	☐ Consultation records ☐ Visits by traditional owner representatives	☐ Contacts made	☐ Proponent

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Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Accidental discovery of items of cultural heritage significance	☐ All accidental finds identified as such and reported	☐ Workers involved in excavation briefed on identification of cultural heritage material ☐ Archaeologist approved by traditional owners identified and retained for duration of construction period ☐ Procedure developed for notification of Gudjuda Reference Group and Southern Birri Gubba Reference Group and/or archaeologist in the event that cultural heritage materials are identified	☐ Ongoing inspections by construction supervisors	☐ Follow procedures developed	☐ Proponent ☐ Construction works supervisor

21.4 Operation Implementation Plans

■ **Table 21-13 Coastal Process - Operation**

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Extreme weather events	☐ ensure development is incorporated into a Counter Disaster Plan	☐ Meet all requirements of *State Counter Disaster Organisation Act 1975*	☐ Review and revise plan as appropriate ☐ Debrief and revise plan after emergency events	☐ Revise plan as appropriate	☐ Proponent and all facility managers

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■ Table 21-14 Acid Sulphate Soils - Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
ASS Generation of acid from the disturbance and subsequent oxidation of PASS sediments during maintenance dredging.	**ASS** ☐ Implement an Operational Phase ASS Environmental Management Plan - outlining the requirements for treatment of spoil from periodic maintenance dredging operations.	**ASS** ☐ the Operational Phase ASS Environmental Management Plan should be prepared in accordance with the Draft State Planning Policy - 'Planning and Managing Development Involving Acid Sulfate Soils'. However, it may form part of an overall ASS EMP for construction of, and operations at, the site.	**ASS** ☐ Undertake pH monitoring of waters held in the permanent treatment basin, in accordance with requirements of ASS EMP.	**ASS** ☐ If the pH level of retained waters falls outside of the specified quality parameters for release from the site - dose with a slurry of hydrated lime in accordance with requirements of the ASS EMP	**ASS** ☐ Proponent / Leasee

■ Table 21-15 Water Quality - Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Release of some sediment to Boathaven Bay from maintenance channel dredging activities.	☐ Sediment levels do not cause long term impacts on marine ecosystems	☐ Dredging to be conducted in accordance with a dredging and spoil management plan and Environmental Authority	☐ Reduce, change method of or cease dredging works in accordance with Dredge Management Plan. ☐ Deploy silt curtains if turbidity levels are excessive.	☐ Reduce, change method of or cease dredging works in accordance with Dredge Management Plan. ☐ Deploy silt curtains as appropriate	☐ Marina Manager to inform dredging contractor of permit conditions.
Hydrocarbon contamination of marina water	☐ To provide drip trays underneath fuel bowsers to catch drips. ☐ To provide emergency spill containment equipment at vessel refuelling berths.	☐ Drip trays provided underneath bowsers and emptied daily or as appropriate ☐ Emergency spill containment equipment on standby	☐ Daily inspection to see if these are present	☐ Stop refuelling until these are present	☐ Marina Manager

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■ Table 21-16 Coastal and Estuarine Flora and Fauna Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Lights from marina disturb foraging migratory waders at night from August to April ((main period when migratory birds are present).	☐ Orient lighting in marina away from intertidal areas to the east of the marina.	☐ Significant disorientation or disturbance of birds does not occur.	☐ Opportunistic and incidental.	☐ Review lighting of marina to minimise excessive lighting of eastern intertidal areas.	☐ Marina Manager.
Threats to mangroves retained	☐ Mangroves behind marina facilities area and spoil disposal area are retained in good health	☐ Mangrove Health	☐ Annual check on health	☐ Amend drainage	☐ Marina Manager

■ Table 21-17 Marine Ecosystems – Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Poor water quality in marina	☐ See Water Quality EMP				
Boat strike or injury to macrofauna (turtles etc)	☐ Establish appropriate sped limits in conjunction with Queensland Transport ☐ Wash or wake of vessels not interfering with intertidal flats and fringing mangroves ☐ Educate tourists and commercial operations on the aspects of safe boating and the conservation significance of the region	☐ Minimal to no boat strikes or injuries ☐ Minimal impacts on mangroves and other marine species	☐ Keep account of boat strike, injuries and fatalities ☐ Police speed limits in marina and channel	☐ Revise education processes ☐ Introduce fines and increase policing of marina	☐ Operator
Maintenance dredging	☐ See Water Quality EMP				

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■ Table 21-18 Air Quality – Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Hydrocarbon emissions and odour from fuel storage and handling facilities	☐ Manage fuel storage and handling facilities so that odour and volatile hydrocarbon emissions are minimised	☐ Emissions from fuel storage and handling facilities comply with AS1940.	☐ As per Environmental Authority or permit	☐ Modify design and/or operation to ensure compliance	☐ Marina operator
Odour from kitchens	☐ Odour from exhaust fans and kitchen wastes are minimised	☐ No problem odours detectable by marina users	☐ Spot checks for odour	☐ Remove odorous wastes ☐ Repair or modify exhaust fans	☐ Commercial operators
Odour from sewage pump out facilities	☐ Odour from sewage pump out facilities is minimised	☐ No problem odours detectable by marina users	☐ Spot checks for odour	☐ Repair or modify system as appropriate	☐ Marina operator
Emissions from boats	☐ Exhaust emissions from boats are minimised	☐ Boat engines are not left idling unnecessarily	☐ none	☐ Remind patrons to turn engines off whenever possible	☐ Marina operators
Emissions from boat repair facilities	☐ No adverse effects on local air quality as a result of boat repair facilities	☐ All facilities comply with requirements of the *Environmental Protection Act*	☐ As specified in individual Environmental Authorities	☐ Take steps to comply with Environmental Authorities	☐ Owners/operators of boat repair facilities

■ Table 21-19 Noise and Vibration – Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Potential Noise impacts from Air conditioning / refrigeration plant etc Potential noise impacts from watercraft movements into and out of the marina Potential impacts from operation of licensed premises and entertainment areas	☐ preliminary minimisation of emissions through consideration during detailed design ☐ regular maintenance of plant items to ensure operational efficiency ☐ Compliance of individual operators with appropriate time and noise limit restrictions, as outlined in individual Environmental Authority	☐ Compliance with noise emission limits specified in Environmental Authority for individual activities, where relevant, as referred to in **Table 11-6**, **Table 11-7** and **Table 11-8** of this report. ☐ Noise complaints in response to operation of facilities resolved	☐ Event monitoring in response to validated complaint in regard to noise emissions from premises	☐ Valid complaints received shall be investigated and addressed as soon as practicable after the complaint is made.	☐ Operators of individual facilities

■ Table 21-20 Waste Management - Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Visual impact of waste facilities	☐ Minimise visual intrusion of waste storage and handling facilities	☐ Waste management plan	☐ Complaint register ☐ periodic site peripheral inspection	☐ Review existing screening	☐ Project Services Manager
Vermin	☐ Reduce vermin potential	☐ Waste management plan	☐ Periodic inspection to assess potential for vermin	☐ Review control procedures ☐ Commission Pest Control study	☐ Project Services Manager
Odour nuisance	☐ Minimise potential for odour generation	☐ Waste management plan	☐ Complaint register ☐ Periodic area inspection	☐ Review maintenance procedures	☐ Project Services Manager
Vector Control	☐ Minimise potential for vector development	☐ Site inspection records	☐ Periodic inspection to assess potential for standing water	☐ Review disposal practices	☐ Project Services Manager
Volume of waste sent to landfill	☐ Waste management hierarchy	☐ Waste Management Plan; ☐ Volume of waste sent to landfill; ☐ % of total waste recycled;	☐ Annual waste audit	☐ Revise waste management practices	☐ Project Services Manager

■ Table 21-21 Infrastructure and Facilities – Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Cost to Whitsunday Shire Council for water and wastewater	☐ User pays	☐ Payments in accordance with Whitsunday Shire Council schedules	☐ Payments made	☐ Make appropriate payments	☐ Facility operators

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■ Table 21-22 Socio-Economics – Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Employment opportunities for local residents	☐ maximise opportunities for local residents and youth to be employed during operation	☐ Advertising and recruitment locally ☐ Preference given to locals with equivalent skills and qualifications for positions	☐ Workforce statistics	☐ Increase local employment where resources are available	☐ Facility operators
Training opportunities	☐ Maximise opportunities for youth and others to receive vocational training relevant to the range of facilities at Port of Airlie	☐ Establish connection between employers, Cannonvale TAFE and local high schools to facilitate employment and training opportunities ☐ Establish connection between Maritime Training Academy, Cannonvale TAFE and local high schools to provide paths to marine based careers	☐ Training statistics	☐ Increase training opportunities ☐ Improve communications	☐ Facility operators ☐ Principal, Maritime Training College
Community awareness of the project	☐ Local community and other stakeholders to be informed of development of the project1	☐ Stakeholders informed wherever practicable of progress of the project and any significant changes ☐ All requests for information met	☐ Stakeholders aware to the extent practicable	☐ Provide additional information	☐ Proponent, developers
Accommodation for students at Marine Academy	☐ Affordable accommodation is available for students	☐ Students are not prevented from pursuing studies due to lack of accommodation	☐ Student difficulties	☐ Accommodation office to coordinate accommodation issues	☐ College operator

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■ Table 21-23 Visual Amenity – Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Buildings and structures may become shabby	☐ maintain high level of aesthetic quality	☐ site remains in good repair	☐ regular inspections	☐ repair and make good any items detracting from visual amenity	☐ facility owners and managers
Impact of litter	☐ control litter so that it does not detract from visual amenity	☐ no litter on site or in adjacent waters	☐ regular inspections	☐ remove litter ☐ provide additional receptacles ☐ clean or repair trash racks on stormwater drains	☐ Facility owners and managers ☐ Whitsunday Shire Council
Failure of landscaping	☐ Landscaping is implemented and maintained according to the landscaping plan	☐ Landscaping maintained	☐ Regular inspections	☐ Repair and replant as necessary	☐ Facility owners and managers

■ Table 21-24 Cultural Heritage – Operation

Impact	Management Principles	Performance Criteria	Monitoring Requirements	Corrective Action	Responsibility
Information on Cultural Heritage of Whitsunday Area	☐ In consultation with traditional owners, provide interpretive information on cultural heritage	☐ Information displayed to satisfaction of traditional owners	☐ N/A	☐ N/A	☐ Proponent

21.5 Environmental Monitoring

21.5.1 Environmental Monitoring Requirements

The following requirements shall be adhered to in design and implementation of environmental monitoring activities:

- Monitoring procedures will be developed in accordance with standard protocols, including requirements of the Environmental Protection Agency and other relevant agencies.
- Sampling locations for each type of monitoring activity will be determined by appropriately qualified and experienced experts and shall include reference sites where appropriate. For biological monitoring, permanent transects and quadrats will be established at this stage to allow direct comparison during and after construction.
- All equipment used for environmental monitoring shall be calibrated and maintained in accordance with manufacturer's instructions and details pertaining to calibration and maintenance recorded
- Relevant weather and other conditions at the time of each monitoring activity will be recorded
- Monitoring will be undertaken by suitably trained and experienced persons
- Samples requiring laboratory analysis shall only be analysed at NATA registered laboratories and appropriate Quality Assurance requirements of these laboratories will be adhered to in the collection, handling, storage and transportation of these samples. This will include the collection of field blanks and other QA samples as required.
- Details of all monitoring activities and results will be maintained through the document control system.

Monitoring requirements for each stage of the project are set out in **Table 21-25** to **Table 21-29**.

Table 21-25 Monitoring Requirements - Preconstruction

Element	Monitoring Parameters	Requirements
Surface Water Quality	Suspended solids/turbidity, pH, temperature, dissolved oxygen, nutrients, heavy metals	At least 4 sampling events one week apart at locations to be determined
Ecosystems	Seagrass, mangroves, marine invertebrates, coral communities	1 sampling event at locations to be determined
Noise	Ambient noise levels at nearby sensitive receptors	Collection of 7 days data
Soils and Sediments	Full ASS testing in accordance with QASSIT guidelines	Full program within marina and channel area
Soils and sediments	Full suite of analytes as specified in National Ocean Guidelines for Dredged Material (Environment Australia May 2002) for surface and near surface samples	Selected samples from marina and channel area

■ Table 21-26 Monitoring Requirements - Excavation, land reclamation and installation of civil works

Element	Monitoring Parameters	Requirements
Discharge from spoil disposal area	Turbidity, pH Other parameters as indicated following further sediment analysis	Turbidity weekly, with increased frequency if problems identified Frequency of pH monitoring to be determined following ASS testing
Surface Water Quality	Suspended solids/turbidity, pH, temperature, dissolved oxygen, nutrients, heavy metals	Weekly.
Ecosystems	Seagrass, mangroves, marine invertebrates, coral communities	Monthly
Noise	Ambient noise levels at nearby sensitive receptors	Monthly or in response to complaints
Soils and Sediments	ASS	As specified in ASS management plan

■ Table 21-27 Monitoring Requirements - Channel dredging

Element	Monitoring Parameters	Requirements
Surface Water Quality	Suspended solids/turbidity, pH, temperature, dissolved oxygen, nutrients, heavy metals, hydrocarbons	Turbidity daily Other parameters weekly or as required in dredge management plan
Ecosystems	Seagrass, mangroves, marine invertebrates, coral communities	As for excavation/reclamation
Noise	Ambient noise levels at nearby sensitive receptors	As for excavation/reclamation
Soils and Sediments	Full ASS testing in accordance with QASSET guidelines	As for excavation/reclamation

■ Table 21-28 Monitoring Requirements - Construction of buildings and other facilities

Element	Monitoring Parameters	Requirements
Surface Water Quality	Suspended solids/turbidity, pH, temperature, dissolved oxygen, hydrocarbons	Monthly
Ecosystems	Seagrass, mangroves, marine invertebrates, coral communities	Six monthly
Noise	Ambient noise levels at nearby sensitive receptors	As required to respond to complaints

■ **Table 21-29 Monitoring Requirements - Operation of the marina and marina facilities area**

Element	Monitoring Parameters	Requirements
Discharges from marina facilities area	Suspended solids, hydrocarbons, selected metals	Quarterly or as specified in Environmental Authority
Surface Water Quality within marina	Suspended solids/turbidity, pH, temperature, dissolved oxygen, nutrients, heavy metals	Annually or as specified in Environmental Authority
Ecosystems	Seagrass, mangroves, marine invertebrates, coral communities	Annually for 5 years following completion of marina and marina facilities
Soils and Sediments	ASS, metals, nutrients	Prior to maintenance dredging

21.5.2 Decommissioning

In the event that the marina or any component thereof is to be decommissioned, options for decommissioning will need to be investigated and environmental assessment should be included in assessment of options.

An Environmental Management Plan should be prepared for the selected option and should include effects on sediments, water quality, ecosystems and the social environment.