TABLE OF CONTENTS

9.0 SAFEGUARDS, MITIGATION, MANAGEMENT AND MONITORING

9.1 Environmental Management Plans

This section covers the Environmental Management Plans (EMPs) for the construction and operational phases of the proposed Guthalungra Prawn Farm.

The EMP will provide Local and State Authorities and the Proponent with a framework to confirm compliance with relevant policies and requirements. The EMP will also provide the community with evidence that the management of the Project is conducted in an environmentally acceptable manner.

Purpose of an EMP

An EMP details the actions and procedures to be undertaken during the implementation and operational phases of the Project in order to mitigate adverse environmental and social impacts

The purpose of an EMP is to facilitate the compliance of the project with the licence requirements and intent of the Environmental Protection Act 1994 through the implementation of the following objectives:

- To encourage good management practices through planning, commitment and continuous improvement of environmental practices;
- To define how the management of the environment is reported, and performance is evaluated;
- To provide rational and practical environmental guidelines so as to:
  - minimise disturbance to areas of archaeological and anthropological of significance;
  - prevent the pollution of land, air and water;
  - protect native flora and fauna;
  - prevent soil erosion and facilitate revegetation;
  - comply with all applicable laws, regulations, standards and guidelines for the protection of the environment; and
  - adopt the best practicable means available to prevent or minimise adverse environmental impact.
- To implement waste management practices based on prevention, minimisation, recycling, treatment and disposal of wastes;
- To describe all monitoring procedures required to identify impacts on the environment; and
- To train employees and contractors in regard to environmental obligations.

The EMP is a dynamic document. It will 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.

Source Documents

The Proponent is required to give due consideration to the likely environmental impacts of this project under various federal, state and local government legislation, guidelines and policy. This section includes a description of current documents and guidelines relevant to environmental management of the Prawn Farm. It is noted however, that these will require reviewing at the time of commencement of design, construction and operation given the rapid rate of change in environmental legislation and guidelines in Queensland and Australia.

Queensland Legislation and Policies:

- *Environmental Protection Act 1994:*
  - Environmental Protection Regulation 1998;
  - Environmental Protection Amendment Regulations (No.2) 1999;
  - Environmental Protection (Water) Policy 1997;
  - Environmental Protection (Noise) Policy 1997;
  - Environmental Protection (Air) Policy 1997;
  - Environmental Protection (Waste) Regulation 2000; and
  - Environmental Protection (Waste) Policy 1997.
- *Fisheries Act 1994;*
- *Integrated Planning Act 1997;*
- *State Development and Public Works Organisation Act 1971;*
- *Transport Infrastructure Act 1995;*
- *Marine Parks Act 1982;*
- *Beach Protection Act 1968;*
- *Nature Conservation Act 1992;* and
  - *Nature Conservation (Wildlife) Regulation 1994.*
- *Vegetation Management Act 1999;* and
  - Vegetation Management Regulation 2000.
- *Rural Land Protection Act 1985;*
- *Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987;*
- *Queensland Heritage Act 1992;*
- National Greenhouse Strategy, Queensland Implementation Plan 1999;
- *Workplace Health and Safety Act 1995;*
- *Water Act 2000;*
- *Workplace Health and Safety Regulation 1997;*
- Environmental Protection Agency Guidelines including, but not limited to:
  - Draft Guidelines for the Assessment & Management of Contaminated Land in Queensland 1998.
- Environmental Protection Agency Practice Note 8.0 to the User's Guide (April, 1998) – Assessment of Unreasonable Noise.

Commonwealth Legislation and Policies:

- *Great Barrier Reef Marine Park Act 1975;*
- *Great Barrier Reef Marine Park (Aquaculture) Regulation 2000;*
- *Environment Protection and Biodiversity Conservation Act 1999;*
- *World Heritage Properties Conservation Act 1983;*
- *Australian Heritage Commission Act 1975;*
- *Heritage Commission Act 1995;*
- National Greenhouse Response Strategy 1992;
- Kyoto Protocol to the Framework Convention on Climate Change 1997;
- National Greenhouse Strategy 1998;
- Intergovernmental Agreement on the Environment 1992;
- National Waste Minimisation and Recycling Strategy.

National Guidelines:

- Australian Water Quality Guidelines for Fresh and Marine Waters 1992 (Australian and New Zealand Environment and Conservation Council) (ANZECC);
- ANZECC Guidelines for the Assessment and Management of Contaminated Sites 1992;
- AS 1055-1997 Acoustics – Description and Measurement of Environmental Noise;
- AS 1940-1993 The Storage and Handling of Flammable and Combustible Liquids;
- AS 2436 Guide to Noise Control on Construction, Maintenance and Demolition Sites;
- AS 2670 Evaluation of Human Exposure to Whole-Body Vibration;
- AS 2724.- 1984: Ambient Air – Particulate Matter – Determination of Deposited Matter Expressed as Insoluble Solids, Ash, Combustible Matter, Soluble Solids and Total Solids;
- AS 3780-1994: The Storage and Handling of Corrosive Substances;
- IEAust Engineering Guidelines for Queensland Construction Sites: Soil Erosion and Sediment Control 1996;
- National Environment Protection Measure for Ambient Air (Air NEPM) 1997;
- The National Strategy for Ecological Sustainable Developments;
- The National Strategy for the Conservation of Biological Diversity;
- The Queensland Government's proposals for Natural Resource Management;
- The National Pollutant Inventory; and
- Landscaping and Urban Design Guidelines.

EMP Components:

This Environmental Management Plan addresses the construction and operation phases of the growout ponds, pipeline and pumping station. The following issues are addressed:

- Soil Erosion and Sediment Control;
- Acid Sulphate Soils;
- Contaminated Land;
- Hydrology;
- Surface Water and Stormwater;
- Groundwater;
- Noise and Vibration;
- Air Quality;
- Flora and Fauna;
- Weed Management;
- Cultural Heritage;

- Visual Amenity;
- Chemical Storage and Spill Management; and
- Waste Management.

The following issues are also addressed for the operation phase of the growout ponds:

- Mosquito Management;
- Disease Management;
- Discharge Containing Antibiotics or Hormones;
- Management of Stock Feed; and
- Pond Discharge.

The EMPs are presented in table format with each issue having its own table outlining procedures to be undertaken. Issues outlined for environmental management are those listed in the Terms of Reference, section 2.10.2.

Table 9-1 indicates the format used to address these issues:

Table 9-1
EMP Format

Issue-	Aspect / impact of construction or operation.
Potential Impacts	Potential design, construction and operational impacts of the project as identified in the REF.
Objectives	The environmental management objective to be achieved during all phases of the project.
Statutory Requirements	Relevant statutes applicable to the project.
Performance Criteria	Desirable criteria to be met during design, construction and maintenance of the project.
Management Actions	Actions, procedures and requirements to be implemented during the relevant phase of the project to safeguard the environment.
Monitoring	The proposed monitoring action relevant to the management action.
Reporting	The proposed reporting action relevant to the management action.
Corrective Action	Revised actions, procedures and recommendations to meet the proposed performance criteria and objective where initial actions are unsuccessful.

Auditing

Farm Manager

The Farm Manager will audit the Construction Manager's implementation of the EMP. The Construction Manager is responsible for all impacts on-site until completion of the Defects Liability Period. This will be done to ensure that works being undertaken comply with the approved EMP. The frequency of the audits will depend upon the activities being undertaken, but at least quarterly audits are envisaged. Any changes to this frequency will be authorised by the Proponent. An audit report would be issued within 2 weeks and distributed to the Proponent, Construction Manager and if necessary, to any relevant authorities.

Actions to be undertaken by the Farm Manager during the audit are likely to include:

- Checking monitoring program and reporting procedures;
- Undertaking investigations where necessary;
- Reviewing performance standards and criteria against results;
- Preparing audit reports over time (with respect to agreed schedule) and submitting them to the Proponent; and
- Ensuring procedures for non-compliance and exceedance/ investigation/ intervention indicators are clearly identified.

The Farm Manager will be responsible for managing all necessary auditing of the Construction Manager during the construction phase. The Farm Manager shall prepare a strategic audit program to monitor the Construction Manager's implementation of the EMP and the Construction Manager's Quality System.

Actions to be undertaken by the Farm Manager during the audit are likely to include:

- Checking the monitoring program and reporting procedures;
- Reviewing performance standards and criteria against results; and
- Preparing audit reports over time (with respect to agreed schedule) and submitting those to the Proponent.

Design Contractor

Responsibilities of the Design Contractors include:

- Reviewing the EMP and noting environmental requirements in the design.

Construction Manager

Responsibilities of the Construction Manager include:

- Creating an EMP (Construction) in accordance with the requirements stated in this EMP and the requirements of the regulatory authorities;
- Obtaining all necessary statutory approvals and consents;
- Ensuring compliance with approvals and consents;
- Implementing environmental Protection measures as described in the approved EMP (Construction);
- Providing copies of the EMP (Construction) to each sub-contractor with responsibilities under the plan;
- Ensuring the full and complete implementation of the EMP (Construction) by sub-contractors;
- Ensuring that requirements of the EMP (Construction) are complied with by sub-contractors;
- Auditing sub-contractors implementation of the EMP (Construction) and adherence to the requirements of the EMP (Planning) and their quality systems;
- Establishing monitoring programs to test performance criteria and standards;
- Monitoring and reporting on the performance of environmental protection measures in accordance with the requirements of the EMP (Construction);

- Identifying (during monitoring) and reporting to the Farm Manager any non-conformances to the EMP (Construction) and corrective actions implemented;
- Managing corrective actions arising from monitoring activities and external audits;
- Providing regular reports to the Farm Manager; and
- Reviewing the EMP (Construction) implementation and effectiveness.

Environmental Awareness Training

The Design, Construction and Maintenance Manager's will ensure that all employees (including consultants, sub-consultants, contractors and sub-contractors) have received appropriate environmental training about the relevant EMPs and have an understanding of the EMPs. The Manager's will also ensure that all employees have an understanding of their own responsibilities and those of the environmental operating guidelines relevant to each Manager.

The EMPs will detail procedures to identify the needs for all employees (including consultants, sub-consultants, contractors, sub-contractors and visitors). Each will receive environmental training about the relevant EMP.

9.1.1 Growout Pond Construction Phase

Soil Erosion and Sediment Control	
Issue	Soil erosion and sediment control during the construction of the Prawn Farm
Potential Impacts	Temporary increase in dust emissions from the site during construction. Temporary increase in sedimentation of Elliott River and Abbott Bay.
Management Objectives	Maximise the use of existing access and laydown areas. Minimise earthworks and the removal of vegetation. Minimise the amount of erosion, and repair eroding land as soon as possible. Avoid any steep terrain or unstable soil profiles where possible.
Statutory and Other Requirements	Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992 *Environmental Protection (Water) Policy 1997* Erosion and Sediment Control Guidelines 1996 – Institute of Engineers *Fisheries Act 1994* *Water Act 2000*

Soil Erosion and Sediment Control				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Implement erosion and sediment control throughout the construction phase.	Assessment in accordance with the Erosion and Sediment Control Guidelines 1996.	Ensure excavations are not left open for extended periods, and stockpiles/ trenches are bunded. Regular inspections of stockpiles and trenches to ensure stability.	Construction Manager shall report to the Farm Manager every week.	Stop excavations and revise operating procedure.
Implement an erosion and sediment control plan.	Assessment in accordance with the Erosion and Sediment Control Guidelines 1996.	Monitor entire site prior to and during ground excavations.	Construction Manager shall report to the Farm Manager every week.	Replace eroded material, revegetate, install sediment traps, roughen surface, divert run-off as appropriate.
Locate and stabilise construction entry points and install drainage and sediment controls.	Concentration of traffic. Controlled runoff. Stable land surface.	Assess the potential erosion from soil maps and slope prior to and during ground excavations.	Construction Manager shall report to the Farm Manager every week.	Replace eroded material, revegetate, install sediment traps, roughen surface, divert run-off as appropriate.
Locate infrastructure within the building precinct. Place appropriate catch drains, and buffers around these areas.	No erosion within the building precinct.	Assess the potential erosion from soil maps and slope prior to and during ground excavations.	Construction Manager shall report to the Farm Manager every week.	Replace eroded material, revegetate, install sediment traps, roughen surface, divert run-off as appropriate.
Locate temporary construction roads with adequate spreader drains.	Stable roads and drains.	Assess the potential erosion from soil maps and slope prior to and during ground excavations.	Construction Manager shall report to the Farm Manager every week.	Replace eroded material, revegetate, install sediment traps, roughen surface, divert run-off as appropriate.

Soil Erosion and Sediment Control				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Control channelised flow velocities.	Stabilise channels; energy dissipaters if discharging to existing waterways or drainage area.	Assess the potential erosion from soil maps and slope prior to and during ground excavations.	Construction Manager shall report to the Farm Manager every week.	Replace eroded material, revegetate, install sediment traps, roughen surface, divert run-off as appropriate.
Control erosion on disturbed areas.	No failure of sediment traps.	Assess the potential erosion from soil maps and slope prior to and during ground excavations.	Construction Manager shall report to the Farm Manager every week.	Roughen surface, revegetate.
Trap sediment on site.	Functional buffers and sediment traps.	Use sediment fences and sediment ponds downslope of works and before discharge to natural drainage lines during ground excavations.	Construction Manager shall report to the Farm Manager every week.	Replace eroded material, revegetate, install sediment traps, roughen surface, divert run-off as appropriate.
Appropriately stage works.	Maximise retention of buffers and stabilised areas.	Minimise disturbed area, provide stabilised buffer around disturbed areas.	Construction Manager shall report to the Farm Manager every week.	Replace eroded material, revegetate, install sediment traps, roughen surface, divert run-off as appropriate.
Place diversion banks around disturbed areas in flood prone locations.	All erosion to be retained adjacent to source for replacing.	Minimise disturbed area, provide stabilised buffer around disturbed area.	Construction Manager shall report to the Farm Manager every week.	Replace eroded material, revegetate, install sediment traps, roughen surface, divert run-off as appropriate.
Place catch drains/ perimeter banks around stockpiles, disturbed areas and fill.	All erosion to be retained adjacent to source for replacing.	Place catch drains in disturbed areas and fill prone to erosion after 25mm of rain for stockpiles.	Construction Manager shall report to the Farm Manager every week.	Replace eroded material, revegetate, install sediment traps, roughen surface, divert run-off as appropriate.

Acid Sulphate Soils	
Issue	To identify and mitigate ASS and any leachate due to the disturbance of actual and potential ASS
Potential Impacts	Runoff of acidic leachate effecting aquatic environments. Acid sulphate soils generate acid through the oxidation of sulphidic materials on exposure to air, which may occur following excavation. Acid generation cannot occur while these materials remain buried or are otherwise covered to prevent access to oxygen. Soils located below the five metre contour and near coastal areas are more susceptible to generate acid sulphate soils. Acid sulphate materials only become an environmental hazard when any acids formed find their way (usually through drainage paths) into adjacent catchments. Such incidents are highly environmentally destructive, often leading to fish kills or dramatic lowering of the pH of receiving water bodies.
Management Objectives	Identify the location of acid sulphate soils. Minimise any potential impact of construction through disturbance of acid sulphate soils
Statutory and Other Requirements	*Environmental Protection Act 1994* *Integrated Planning Act 1997* The Guidelines for Sampling and Analysis of Lowland Acid Sulphate Soils (ASS) in Queensland 1998 The SPP For the Management of Acid Sulphate Soils

Acid Sulphate Soils				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Undertake an acid sulphate soil investigation to identify the location of acid sulphate soils.	A map developed indicating presence (if any) of ASS.	Assess potential for ASS from maps, plans and photos then confirm presence by sampling soil in likely areas prior to and during ground excavations.	Maintain a full record of events and results of samples analysed.	Stop excavation and develop and implement an ASS management plan. If pH<4 in any discharge water, immediately determine source of the acidity and neutralise. If external vegetation pH stress observed, identified areas shall be examined and the source of this stress remedied within 1 month.
Minimise potential impact of construction on acid sulphate soils.	No acid leachate produced from stockpiles. If pH falls below 4.5 have sample analysed using a NATA accredited laboratory.	Ensure excavations are not left open for extended periods, and stockpiles are bunded. Ensure lime is used during ASS storage.	A minimum of every week and in particular after heavy rain. Maintain a full record of events and results of samples analysed.	Stop excavations and revise operating procedures. If pH<4 in any discharge water, immediately determine the source of the acidity and neutralise. If external vegetation pH stress observed, identified areas shall be examined and the source of this stress remedied within 1 month.

Contaminated Land	
Issue	Contaminated land management during the construction phase of the Prawn Farm.
Potential Impacts	Contamination of soils and water as a result of construction.
Management Objectives	Assess and manage land contamination issues in a manner which protects the natural environment and human health and ensure that the site is suitable for its end use. Consult with EPA to establish the standards required for the on-site remediation of contaminated soil and the import of clean fill material.
Statutory and Other Requirements	*Environmental Protection Act 1994* QLD Guidelines for the Assessment & Management of Contaminated Land 1998

Contaminated Land				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Ensure that all personnel performing activities with the potential to contaminate land or water resources have attended environmental awareness training.	Training records and test completion.	Inspect personnel training records monthly for the duration of the project.	Construction Manager shall report to the Farm Manager every week.	Review induction procedure.
Appropriate on-site remediation of contaminated material prior to use.	QLD Guidelines for the Assessment & Management of Contaminated Land 1998.	Inspection of sampling results to ensure compliance with requirements.	Construction Manager shall report to the Farm Manager every week.	Revise plans as to where contaminated soils are used.
Appropriate disposal of heavily contaminated material and soil.	QLD Guidelines for the Assessment & Management of Contaminated Land 1998.	Inspection of waste tracking records to ensure compliance with requirements.	Construction Manager shall report to the Farm Manager every week.	As discussed with QEPA.
Ensure imported fill material to be used on site is inert and clean.	QLD Guidelines for the Assessment & Management of Contaminated Land 1998.	Signoff from contractor that fill meets EPA requirements.	Construction Manager shall report to the Farm Manager every week.	Obtain new uncontaminated fill.
Minimise potential for ground contamination from spillage of hazardous materials.	Compliance with relevant Australian Standard for hazardous material storage. Number of reported incidents.	Visual inspection to assess compliance with standards.	Construction Manager shall report to the Farm Manager every week.	Review handling and storage procedures. Review awareness training program.
Ensure the storage, handling and disposal of waste is in accordance with requirements.	Best practice guidelines.	Visual inspection of waste areas to ensure compliance.	Construction Manager shall report to the Farm Manager every week.	EPA guidelines must be followed.

Hydrology	
Issue	Flood management.
Potential Impacts	Restriction of flood flows. Changes in surface water flow paths.
Management Objectives	To achieve a “no worsening” result in terms of flooding (ie. existing levels of flood immunity are maintained and area consistent with current requirements) in stormwater systems and waterways affected by the project.
Statutory and Other Requirements	Not applicable.

Hydrology				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
The design of culvert inlet and outlet structures shall include appropriate erosion control measures.	The design of all channels and culverts shall be in accordance with Council requirements.	Review of design specifications prior to works.	Design Contractor shall report to the Farm Manager every week.	Construct peripheral bund between site and nearest water body.
Slopes stabilised ASAP during construction.	Erosion of slopes is minimised.	Weekly visual inspection of slopes to assess level of erosion.	Construction Manager shall report to the Farm Manager every week.	Take appropriate to further stabilize slopes.
Table drains stabilised to prevent erosion and to help filter water borne pollutants.	Erosion of table drains is minimised.	Weekly visual inspection of table drains to assess level of erosion.	Construction Manager shall report to the Farm Manager every week.	Construct table drains appropriately.
Alternate drainage paths provided where permanent or temporary works impact on the existing drainage path.	Appropriate design, construction and maintenance of drainage paths.	Visual inspection of existing drainage system prior to the commencement of site activities to identify existing areas of hydraulic concern.	Design Contractor shall report to the Farm Manager prior to commencement of construction activities. Results of monitoring and the condition of waterways after each major rainfall event included in a report.	Realign drainage patterns so that flows are maintained.

Stormwater	
Issue	Stormwater management during the construction phase of the Prawn Farm.
Potential Impacts	Contamination of surface water by release of contaminated waters off-site. Deterioration of the water quality of Abbot Bay.
Management Objectives	To ensure the discharge of contaminated water off the development site is prevented. To ensure runoff/ discharge from the development site does not cause deterioration of water quality of receiving waters. To ensure a permanent drainage system is designed to treat any runoff prior to discharge into receiving waters.
Statutory and Other Requirements	*Environmental Protection Act 1994* *Environmental Protection (Water) Policy 1997* The Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992 AS 1940 – 1993: The Storage and Handling of Flammable and Combustible Liquids

Stormwater				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Construct water storage prior to clearing of vegetation and commencement of earthworks.	Dams constructed ahead of site works commencing.	Dams are constructed in accordance with NRM approval for referrable dams.	Construction Manager shall report to the Farm Manager every week.	Construct peripheral bund between site and nearest water body.
Water sampling to monitor suspended solids.	Monitoring results in accordance with baseline water quality standards and EPP (Water).	Measurements to be collected at each water storage area.	Construction Manager shall report to the Farm Manager every week.	Stop discharge flow and store water whilst investigating source of suspended solids.
Sediment control devices installed in catchments of dams.	Sediment control devices are in place prior to commencement of construction.	Weekly inspection of all sediment fences within catchment of dams, preferably following storm events.	Construction Manager shall report to the Farm Manager every week.	All fences to be regularly maintained and any damaged fences to be immediately fixed.
Develop procedures for on-site material stock piling/ storage (include in awareness training).	On-site stock piling procedures.	Observe compliance with appropriate procedure every week.	Construction Manager shall report to the Farm Manager every week.	Avoid direct contact with the ground and stockpiled materials.
Ecologically sensitive areas are protected from erosion and pollution potential of stormwater run-off.	No degradation of pre-construction photographic records of development site.	Monthly visual inspection of measures adopted at discharge points.	Construction Manager shall report to the Farm Manager every week.	Contain on site and reuse waters for dust suppression.
Ensure that all personnel performing activities related to environmental management practices are trained, qualified and competent.	All staff and contractors have received environmental induction and awareness training.	Monthly review of staff records and site ID cards for training sign-off.	Construction Manager shall report to the Farm Manager every week.	Review induction procedures.

Stormwater				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Install drainage works to segregate surface water run-off from contaminated and uncontaminated lands.	Baseline water quality and EPP (Water) standards.	Weekly water quality sampling and analysis at point of discharge to the water management system.	Construction Manager shall report to the Farm Manager every week.	Review drainage system capabilities. Consult EPA regarding upgrade requirements.
Potentially hazardous liquid materials are stored and handled carefully.	All potentially hazardous materials are handled and stored carefully to avoid leads and spills.	Visual inspection and assessment of handling and storage procedures at all storage locations during deliveries.	Construction Manager shall report to the Farm Manager every week.	Storage of large quantities of materials to be covered and bunded (bund must be 120% of volume of largest container).
Divert uncontaminated run-off around hazardous areas in defined drainage corridors protected against erosion.	No breaches in the integrity of bunds or drains.	Visual inspection at diversion bunds, dams and drains following storm events.	Construction Manager shall report to the Farm Manager every week.	Evaluation and upgrade of system.
Stormwater directed around or away from all stockpiles that could cause pollution of stormwater.	No increase in sediment loading of surface water run-off.	Inspection of stockpile and material storage areas throughout the duration of construction activities.	Construction Manager shall report to the Farm Manager every week.	Cover temporary storage areas and restrict the storage of construction materials inside the designated areas.

Noise and Vibration	
Issue	Noise and vibration management during the construction phase of the Prawn Farm.
Potential Impacts	The main potential impacts of the project on existing noise and vibration levels are likely to be: Noise from construction machinery during construction works. Temporary impacts of vibration during the construction phase of the project.
Management Objectives	To minimise the level of noise generated during the construction phase. To minimise the noise impacts on adjacent landowners and existing residents. To minimise the level of vibration generated by construction activities.
Statutory and Other Requirements	*Environmental Protection (Noise) Policy 1997* *Workplace Health and Safety Act 1995* Noise level guidelines in the *Environmental Protection (Interim) Regulation 1995* EPA Practice Note 8.0 to the User's Guide (April 1998) – Assessment of Unreasonable Noise AS 1055-1997 Acoustics – Description and Measurement of Environmental Noise AS 2436: Guide to Noise Control on Construction, Maintenance and Demolition Sites AS 2670: Evaluation of Human Exposure to Whole-Body Vibration

Noise and Vibration				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Minimise construction noise (typical) noise.	Noise level guidelines and the EPP (Noise) 'Unreasonable noise' levels.	Undertake noise monitoring at agreed locations on periphery of the site.	Construction Manager shall report to the Farm Manager every week.	Investigate and monitor progress of all noise complaints.
Construction equipment regularly inspected and maintained in good working order.	Noise level guidelines and AS2436.	Visually inspect all site vehicles to rectify the problem.	Construction Manager shall report to the Farm Manager every week.	Stop use of equipment/ vehicles until problem is solved.
Construction equipment to have noise mitigation devices fitted.	AS2436 and the EPP (Noise).	Visual and audible inspection during routine maintenance events.	Construction Manager shall report to the Farm Manager every week.	Investigate all instances of excessive noise. Increase attenuation equipment.
Minimise construction site (atypical) noise.	Noise level guidelines and number of complaints.	Undertake noise monitoring at the periphery of the site to establish the effects on nearby residents.	Construction Manager shall report to the Farm Manager every week.	Inform community in advance where practical, of all scheduled atypical noise events.
Minimise vibration generation.	Compliance with regulatory standard or guideline.	Minimise vibration at the periphery of the site and along transport routes by the use of specialist equipment.	Construction Manager shall report to the Farm Manager every week.	Investigate mitigation techniques. Review designated transport routes.

Air Quality	
Issue	Air quality management during the construction phase of the Prawn Farm.
Potential Impacts	Dust generated from earthmoving activities. Dust from drilling and blasting (if required). Dust generated from vehicles traversing unsealed ground. Wind erosion of stockpiles and unsealed ground. Dust and/or spillage from haul trucks. Exhaust emissions from machinery and vehicles used during construction.
Management Objectives	To ensure that fugitive emissions cause minimal environmental nuisance beyond the boundaries of the development site. To ensure oil or oily water is not used as a dust suppressant under any circumstances. To employ work practices and procedures which minimise fugitive emissions.
Statutory and Other Requirements	*Environmental Protection (Air) Policy 1997* National Health and Medical Research Council Guidelines, 1985 Draft National Environmental Protection Measures and Impact Statement for Ambient Air Quality, 1997 AS 2724.1-1984: Ambient Air – Particulate Matter – Determination of Deposited Matter Expressed as Insoluble Solids, Ash, Combustible Matter, Soluble Solids and Total Solids.

Air Quality				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Undertake baseline air quality monitoring.	Baseline air quality monitoring undertaken.	Use of dust gauges to establish baseline data prior to any site works.	Construction Manager shall report to the Farm Manager on completion of the program.	N/A
Implement weekly dust monitoring program.	Maintain less than 120mg/ m^3 daily dust deposition at all monitoring sites.	Dust monitoring (TSP) at the site periphery and at sensitive receptors during the construction phase.	Construction Manager shall report to the Farm Manager every week.	Investigation of incidents and revision of dust control measures.
Cover excavated areas for the pouring of concrete and gravel ASAP.	Dust generation is minimised. Complaints register.	Visual inspection of excavation procedures to minimise the potential for dust generation during the construction phase.	Construction Manager shall report to the Farm Manager every week.	Investigation of incidents and revision of dust control measures.
Cease work likely to cause significant dust emission when wind speeds are forecast to be high.	Dust generation is minimised. Complaints register. Maintain less than 120mg/ m^3 daily dust deposition at all monitoring sites.	Dust monitoring (TSP) at the site periphery and at sensitive receptors during the construction phase.	Construction Manager shall report to the Farm Manager every week.	Investigation of incidents and revision of dust control measures.
Restrict speed of construction vehicles on unsealed roads.	Number of complaints of excessive speed and dust generation.	Observation of driving speeds and dust generated during the construction phase.	Construction Manager shall report to the Farm Manager every week.	Speed limit signage posting. Issue of warning system for persistent offenders – withdrawal of Contractor services.

Air Quality				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Seed topsoil stockpiles as soon as possible using approved seed mix.	Seeding undertaken within specified period.	Inspection of site procedures regarding stockpiles daily during the construction phase.	Construction Manager shall report to the Farm Manager every week.	Requirement to cover stockpiles not seeded within specified period.
Use dust suppression measures on unsealed roads and stockpiles.	Observation of dust generation by competent person. Maintain less than 120mg/ m^3 daily dust deposition at all monitoring sites.	Inspection of stockpile and unsealed roads daily during the construction phase.	Construction Manager shall report to the Farm Manager every week.	Increase frequency of dust suppression (water spraying) techniques.
Use of wheel wash facility.	Observation of material deposited on road surface. Number of complaints.	Observation to assess effectiveness of wheel wash system daily during the construction phase on exit road surfaces.	Construction Manager shall report to the Farm Manager every week.	Use of pressure spray to improve washing efficiency.

Flora and Fauna	
Issue	Flora and fauna management during the construction phase of the Prawn Farm.
Potential Impacts	Loss of areas of remnant native vegetation. Potential impacts on listed species. Potential degradation of water quality and aquatic habitat. Potential increase in weed invasions into remaining habitat. Potential increase in artificial barriers to movement. Potential increase in fauna mortality. Potential increase in habitat fragmentation and edge effects. Alteration of surface water flows, reducing suitability of areas to support certain vegetation communities.
Management Objectives	Minimise site disturbance during clearing to those areas required for the safe and effective construction of the Prawn Farm. Minimise impact upon fauna where possible. Allow key habitats to remain, where practical. Ensure construction personnel complete environmental awareness training.
Statutory and Other Requirements	*Environment Protection and Biodiversity Conservation Act 1999* *Nature Conservation Act 1992* *Nature Conservation (Wildlife) Regulation 1994* *Fisheries Act 1994* *Vegetation Management Act 1999* *Vegetation Management Regulation 2000*

Flora and Fauna				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Provision of environmental awareness training to all personnel involved in construction activities.	Records of attendance.	Formal training on or off site prior to any construction crew commencing work on site.	Construction Manager shall report to the Farm Manager every week.	Revise induction process.
Prepare and implement a Rehabilitation Plan.	Identification of species & techniques to be used for rehabilitation and revegetation following construction works. Identification of areas which will need rehabilitation and revegetation prior to construction works commencing. Planting densities. Timing of revegetation works. Soil and groundwater treatment.	Monthly visual inspections of rehabilitation area by a suitably qualified landscaper.	Construction Manager shall report to the Farm Manager prior to construction works commencing and then every 3 months for one year.	Revise rehabilitation plan.

Flora and Fauna				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
	Fertilisation regimes. Monitoring requirements (ie. Vegetation growth targets).			
Clearly mark all vegetation to remain, including fallen vegetation and hollow logs.	Vegetation clearly marked on site vegetation maps by a competent authority prior to clearing.	Walk site with authorised person(s) to identify and mark/flag vegetation to remain prior to clearing. Use findings of EIS flora surveys and maps.	Construction Manager shall report to the Farm Manager every week.	Stop clearing. Fence and sign areas and vegetation to remain. Protected vegetation accidentally cleared is to be cleanly removed and landform around remaining vegetation appropriately landscaped to prevent erosion or toppling of trees.
Ensure careful removal and storage of vegetation which may be successfully transplanted.	Records of salvageable plants being used in rehabilitation program.	Walk site and check map/ records prior to clearing works.	Construction Manager shall report to the Farm Manager prior to clearing.	Reassess method of plant removal.
Salvage useable timber.	Maps and record of useable timber being used or hauled to a mill.	Walk site and check map/ records post clearing works.	Construction Manager shall report to the Farm Manager post clearing.	If cleared timber remaining, contact relevant timber mill for collection.
Minimise removal of topsoil and retain for respreading on disturbed areas, where practical.	Proper topsoil management in practice.	Visual inspection of cleared site areas periodically.	Construction Manager shall report to the Farm Manager every week.	Change practice accordingly and/or educate site crew as to EMP requirements.
Ensure construction of access tracks through vegetated areas is minimised and existing tracks are used where possible.	Minimal access tracks are developed.	Visual inspection to confirm unauthorised tracks are not being formed.	Construction Manager shall report to the Farm Manager every week.	Close unnecessary tracks.
Identify animals with limited mobility in the area that can be relocated. Relocate to areas of similar habitat within the site, in accordance with a relocation plan.	Fauna of limited mobility removed from construction area, eg. echidnas, koalas. No deaths to animals with limited mobility during construction.	Area to be inspected by a suitably qualified and experienced ecologist capable of capturing and relocating fauna to safe areas.	Construction Manager shall report to the Farm Manager immediately following clearing.	If clearing and construction is causing the death of wildlife, reassess method of clearing to avoid deaths.
Manage the surrounding bushland and screening vegetation to minimise fire hazard potential, ie. 10m buffer zone.	Hazard reduction need to be assessed and conducted where necessary.	Reduce fuel load and minimise potential for fire in adjoining bushland areas, prior to the bushfire season.	Construction Manager shall report to the Farm Manager prior to bushfire season.	Hazard reduction to be completed prior to bushfire season.

Weed Management	
Issue	Weed management during the construction phase of the Prawn Farm.
Potential Impacts	Potential spread of weeds from construction vehicles entering and leaving the construction site. Increase in the extent and rate of weed infestation due to changes in groundcover.
Management Objectives	To meet the obligations of the *Rural Lands Protection Act 1985* To liaise with Bowen Shire Council and other appropriate organisations to determine best practice for weed management To ensure weed awareness training is included in staff and contractor induction processes prior to site access. To ensure vehicles and equipment is cleaned prior to movement from infested areas to non-infested areas. To preserve the conservation values of the area after construction, and where possible and restore degraded ecosystems. To ensure existing weeds are managed and further spread of weeds are minimised.
Statutory and Other Requirements	*Rural Lands Protection Act 1985*

Weed Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Survey and map development site.	In accordance with accepted practices.	Undertake baseline weed survey to determine weed distribution prior to start of site works.	Document weeds on a central register and report to Farm Manager.	N/A
Prepare and implement a weed management program.	In accordance with accepted practices.	Monthly visual inspection of activity site to ensure.	Construction Manager shall report to the Farm Manager every week.	Revise weed management plan if necessary.
Provide fact sheets of known declared weeds to all involved in site activities.	Include test questions regarding the 'weed policy' in awareness training.	Environmental awareness training during site induction to provide personnel with weed management information.	Construction Manager shall report to the Farm Manager every week.	Obtain extra fact sheets.
Minimise the spread of existing weeds.	*Rural Lands Protection Act 1985* wash down requirements.	Visually inspect equipment being moved from known weed areas to asses cleaning practices daily during the construction phase.	Construction Manager shall report to the Farm Manager every week.	On going care used to assist in weed control.
Vehicles coming from known weed infestation areas to be thoroughly inspected and washed down where necessary.	No new weed species found with the project site.	Remove weed seeds from vehicles at an appropriately designed and construction washdown facility daily during the construction phase.	Document weeds on a central register and report to the Farm Manager.	Appropriate eradication and control program implemented when new weeds are identified.
Develop a response plan for a weed outbreak.	Accepted practices.	Develop response plan following site survey to ensure preparedness.	Construction Manager shall report to the Farm Manager every week.	N/A
Avoid introduction of new weed species.	Prevention of new weed species.	Resurvey areas of activity during the construction phase.	Construction Manager shall report to the Farm Manager every week.	Review accepted practice implementation.

Cultural Heritage	
Issue	Cultural heritage management during the construction phase of the Prawn Farm.
Potential Impacts	Unknown material of cultural or archaeological significance may potentially be disturbed by construction activities.
Management Objectives	To recognise cultural heritage and historic values worthy of protection. To avoid the loss of cultural heritage and historic artefacts. To provide awareness training to all site personnel involved in site development activities.
Statutory and Other Requirements	*Native Title Act 1993* *Native Title (Queensland) Act 1993* *Queensland Heritage Act 1992* *Queensland Heritage Regulation 1992* *Cultural Record (Landscapes Queensland and Queensland estates) Act 1987* EPA guidelines for Reporting on Cultural Heritage in Queensland.

Cultural Heritage				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Assessment of culturally sensitive sites/ artefacts.	*QLD Heritage Act 1992.* *Cultural Record Act 1987.* EPA guidelines for Reporting on Cultural Heritage in Queensland.	Review of heritage registers, field surveys of affected sites conducted prior to construction.	Construction Manager shall report to the Farm Manager after initial site survey.	Complete prior to survey and construction.
Development of a Cultural Heritage Management Plan (CHMP).	Development of a CHMP approved by traditional owner groups by the proponent/ archaeologist prior to construction.	Consultation with traditional owner groups, heritage registers and archaeologists for cultural sensitivity bounds and definitions prior to construction.	Construction Manager shall report to the Farm Manager after the initial survey of sites.	Review and amend CHMP.
Cultural Heritage training and awareness.	General awareness of cultural heritage specifications. Preservation of artefacts during construction.	Develop and conduct induction for all personnel working on site.	Construction Manager shall report to the Farm Manager at the end of construction activities.	Review awareness training program.
Cultural heritage salvage and monitoring of construction activities in accordance with EPA permit.	Adherence to CHMP guidelines and salvage of cultural significant artefacts.	Application of CHMP during construction activities prior to construction.	Construction Manager shall report to the Farm Manager at the end of construction activities.	Review awareness training program.
Establishment of temporary storage facility for artefacts.	General awareness of cultural heritage specifications. Preservation of artefacts during construction.	Storage of materials salvaged during monitoring activities for preservation and possible analysis prior to construction.	Construction Manager shall report to the Farm Manager at the end of construction activities.	Review awareness training program.

Visual Amenity	
Issue	Visual amenity management during the construction phase of the Prawn Farm.
Potential Impacts	Loss of intact vegetation. Visual impacts including fencing and construction works Alteration to existing landform and topographical characteristics.
Management Objectives	Retention of as much of the landscape character as possible. Retention or enhancement of unique site qualities which reinforce the landscape character. ???? Where possible, limit the height and bulk of any buildings or structures to that required to function effectively and efficiently.
Statutory and Other Requirements	Not applicable.

Visual Amenity				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Prepare a Landscaping Plan to establish aesthetically suitable treatments at sensitive locations.	Minimisation of the visual and acoustic impacts upon surrounding recreational values.	A landscaping plan indicating the type of landscaping to be undertaken, the location and type of trees/shrubs to be planted and post- construction monitoring plans indicated.	Construction Manager shall report to the Farm Manager every week.	Review landscaping plan and revise.
Visual amenity plan developed for tall or bulky structures.	Retention of significant visual qualities within the project site.	Project infrastructure size and height to be limited, painted pale as to decrease skyline intrusion of visual plain, during and post construction.	Construction Manager shall report to the Farm Manager every week.	Review site development plan and revise.
Avoid placing structures within existing vegetation.	Retention and/or transplanting of significant landscape vegetation including historically important trees.	Visually assess transplanted vegetation.	Construction Manager shall report to the Farm Manager every week.	Review site development plan and revise.

Chemical Storage and Spill Management	
Issue	Chemical storage and spill management during the construction phase of the Prawn Farm.
Potential Impacts	The accidental discharge of environmentally hazardous materials during the construction activities. Chemicals such as oil, grease, paint and solvents will be stored on site for use during the construction phase of the development. If not handled, stored or used appropriately contamination of land and water could occur.
Management Objectives	Manage the selection, purchase, storage, handling and disposal of chemicals to ensure minimal environmental impact; Provide appropriate chemical storage facilities (designed to comply with AS 1940) and adequate spill prevention equipment. Equipment that uses fuel, lubricants, and/or hydraulic fluid shall be inspected at regular intervals. Spill prevention and control measures will include bunds around fuel storage areas and other chemical stores. Bunded areas will be sized to contain a volume larger than that of the enclosed vessel. Procedures will be developed and equipment will be in place to contain, minimise and recover spills. All staff to be provided with procedures and training in spill prevention and clean up.
Statutory and Other Requirements	*Environmental Protection Act 1994* *Environmental Protection Regulation 1998* *Workplace Health and Safety Act 1995* AS 1940-1993: The Storage and Handling of Flammable and Combustible Liquids AS 3780-1994: The Storage and Handling of Corrosive Substances

Chemical Storage and Spill Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Inventory of all potentially hazardous substances and store MSDS in a register.	Chemicals used and their storage meets Australian Standards (AS1940-1993 and AS 3780-1994).	Collate all MSDS information to determine storage and handing requirements during contract agreement.	Construction Manager shall report to the Farm Manager every week.	Prohibit use until MSDS available.
Develop emergency response plans (refer also to Emergency Response).	Training records.	Inspect facilities and training records at materials handling and storage locations.	Construction Manager shall report to the Farm Manager every week.	Prohibit use until MSDS is made available.
Provide hazard materials awareness training and spill management.	Training records. Number of incidents reported.	Inspect training records and exit tests of all personnel involved in hazardous materials.	Construction Manager shall report to the Farm Manager every week.	Revise training.
Storage areas to be covered and bunded, with impervious flooring and appropriately signed – located away from stormwater drainage lines.	Chemicals used and their storage meets Australian Standards (AS1940-1993) and AS 3780-1994). Number of overflow incidents. Stormwater contamination levels.	Weekly visual inspection of storage facilities and locations to maintain compliance with standards.	Construction Manager shall report to the Farm Manager every week.	Check if bunding design and covers is OK.

Chemical Storage and Spill Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Inspect storage areas weekly for any defects with bunding, floor, cover, structure, hoses and valves etc.	Chemicals used and their storage meets Australian Standards. Number of spillage incidents. Inspection records.	Weekly visual inspection of chemical and fuel storage areas.	Construction Manager shall report to the Farm Manager every week.	Review maintenance program.
Ensure that equipment, transfer hoses and valves that use fuel, oils or other chemicals are regularly maintained.	Monthly maintenance records.	Visual inspection of equipment and components before use and on a monthly basis.	Construction Manager shall report to the Farm Manager every week.	Review reason for spill and take action to ensure no recurrence.
Ensure appropriate spill containment devices are available at key points.	Chemicals used and their storage meets Australian Standards. Number of spills reaching the environment.	Visual inspection to assess equipment at key points.	Construction Manager shall report to the Farm Manager every week.	Terminate use of facilities until equipment is available.
Ensure that spill containment devices are available at depots, refuelling points, vehicle maintenance sites and other storage locations.	Chemicals used and their storage meets Australian Standards.	Monthly visual inspection to confirm availability and use at material storage/ handling facilities.	Design Contractor shall report to the Farm Manager every week.	Recover spilled material and report on cleanup.
Design containment areas so that spill can be recovered and containment areas are kept free of waste.	Good housekeeping standards. Number of spills sent to treatment plant.	Monthly visual inspection of materials storage/ handling locations to confirm compliance.	Design Contractor shall report to the Farm Manager every week.	Review housekeeping procedure.

Waste Management	
Issue	Waste minimisation and management during the construction phase of the Prawn Farm.
Potential Impacts	A number of sources of waste exist during the construction phase of the development. Issues which shall be given special consideration shall include disposal of cleared vegetation, and disposal of contaminated soils/materials from fuel/oil/batteries (regulated wastes) which require licensed removal and disposal sites. There is a duty of care on the waste generator to ensure licensing is held and that disposal is carried out correctly. Waste accumulated during maintenance of vehicles. Accumulation of substances such as waste oils, tyres, containers (with substances like paints, epoxy resins, preservatives, concrete mixtures and curing solutions), recyclables (steel, wood, plastic and cardboard packaging), general waste, batteries etc. Accumulation of domestic sewage from on-site amenities.
Management Objectives	To minimise the impact to the environment from both solid and liquid waste. To minimise the production of waste and amount of waste requiring disposal. To maximise the reuse and recycling of waste material. To contain, control and dispose of waste in accordance with the required waste management practices. Investigate the replacement of hazardous material with environmentally 'friendly' alternatives
Statutory and Other Requirements	*Environmental Protection (Waste) Policy 2000* *Environmental Protection (Waste) Regulation 2000* AS 1940 – 1993 The Storage and Handling of Flammable and Combustible Liquids Waste Management Strategy for Queensland

Waste Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Implement a waste management plan.	EPP (Waste) hierarchy of waste management practices. The hierarchy includes waste avoidance; waste recycling; waste to energy; waste treatment; and waste disposal. EPP (Waste).	Waste management plan developed prior to mobilisation.	Construction Manager shall report to the Farm Manager every week.	N/A
Check all vegetation for commercially useful plants and timber prior to commencing clearing.	Vegetation inspection by suitably qualified person.	Inspect areas to be cleared prior to clearing.	Construction Manager shall report to the Farm Manager.	N/A
Favour suppliers which use returnable packaging materials.	Audit waste stream to establish packaging contribution.	Assess supplier environmental policies and contractor methods statements to establish environmental commitment during the contract agreement phase.	Construction Manager shall report to the Farm Manager every week.	Review the 'approved supplier' list.

Waste Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Ensure that all personnel performing activities relating to environmental mgt practices are trained, qualified and competent.	Induction and training records.	Monthly reviews of staff records and site ID cards for training signing-off.	Construction Manager shall report to the Farm Manager every week.	Review induction and training program.
Avoid over ordering of materials and consumables.	Minimum stocking level guidelines.	Audit stock levels to control stocking levels.	Construction Manager shall report to the Farm Manager every week.	Review purchasing procedures.
Segregation of all waste.	Records of waste sent for recycling.	Monitor use of waste bins on site to facilitate recycling off site during construction phase.	Construction Manager shall report to the Farm Manager every week.	Increase awareness to environmental commitments.
Assess further opportunities for materials reuse/ recycling.	Audit of waste stream.	Pre-construction planning and visual site inspection during the construction phase.	Construction Manager shall report to the Farm Manager every week.	Review waste management practices.
Ensure that waste storage and disposal is undertaken according to best practices.	Visual assessment of storage areas, containers and bunds for odours, vermin, flies and leachate.	Inspection of waste storage areas every week.	Construction Manager shall report to the Farm Manager every week.	Review waste management practices.
Ensure that there is an effective reporting system for waste storage and disposal.	Waste management plan.	Inspection of waste mgt system every week.	Construction Manager shall report to the Farm Manager every week.	Review waste management system.
Provide adequate on-site facilities for liquid waste storage.	Septic maintenance records and liquid waste disposal records.	Undertake a weekly waste audit. Inspect temporary toilet facilities weekly to ensure regular maintenance.	Construction Manager shall report to the Farm Manager every week.	Review system for liquid waste storage/ disposal. Review septic maintenance contract/ procedures.
Process oily wastes through an oil/water separator.	Sample analysis results. Compliance with EPP (Water) standards.	Monthly visual inspection and sampling at discharge point. Monthly NATA laboratory analysis to determine hydrocarbon concentration.	Construction Manager shall report to the Farm Manager every week.	Temporary fuel dispensing areas to be covered and isolated from uncontaminated surface water runoff. Increase frequency of interceptor cleaning.
Ensure disposal of oily waste is appropriate.	Waste tracking system.	Waste transporter is licensed and an auditable system operations.	Construction Manager shall report to the Farm Manager every week.	Review Waste Tracking System.
Assessment of environmental impacts of proposed waste management methods.	Acceptability of Waste Management Plan. EPP (Waste).	Assess viability of proposed Waste Management Plan for construction activities prior to and during construction.	Construction Manager shall report to the Farm Manager every week.	Review of waste streams/ management strategies. Amendments to Waste Management Plan.

9.1.2 Growout Pond Operation Phase

Contaminated Land	
Issue	Contaminated land management during the operational phase of the Prawn Farm.
Potential Impacts	Contamination of soils and water as a result of Prawn Farm operation.
Management Objectives	To ensure all hazardous materials are stored, handled and disposed of in a responsible manner. To ensure al waste materials are stored, handled and disposed of in a responsible manner.
Statutory and Other Requirements	*Environmental Protection Act 1994* QLD Guidelines for the Assessment & Management of Contaminated Land 1998

Contaminated Land				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Ensure that all personnel performing activities with the potential to contaminate land or water resources have attended environmental awareness training.	Training records and test completion.	Inspect personnel training records monthly for the duration of the project.	Technicians to report to the Farm Manager every 6 months.	Review induction procedure.
Appropriate on-site remediation of contaminated material prior to reuse.	QLD Guidelines for the Assessment & Management of Contaminated Land 1998.	Inspection of sampling results to ensure compliance with requirements, when required for the duration of the project.	Technicians to report to the Farm Manager every 6 months.	Review report.
Appropriate disposal of heavily contaminated material and soil.	QLD Guidelines for the Assessment & Management of Contaminated Land 1998.	Inspection of waste tracking records to ensure compliance with requirements.	Technicians to report to the Farm Manager every 6 months.	Review report.
Minimise potential for ground contamination from spillage of hazardous materials.	Compliance with relevant Australian Standard for hazardous material storage. Number of reported incidents.	Visual inspection to assess compliance with standards at all storage and handling facilities, when required.	Technicians to report to the Farm Manager every 6 months.	Review handling and storage procedures. Review awareness training program.
Ensure the storage, handling and disposal of waste is in accordance with requirements.	Best practice guidelines.	Monthly visual inspection of waste disposal areas to ensure compliance.	Technicians to report to the Farm Manager every month.	

Surface Water and Stormwater	
Issue	Surface water and stormwater management during Prawn Farm operation.
Potential Impacts	Contamination of surface water by release of contaminated waters off-site. Deterioration of the water quality of receiving waters.
Management Objectives	Maximise discharge re-use and minimise water make-up requirements. Utilise captured storm water and excess water to provide make-up water to supplement water lost as vapour or in product streams. Use secondary treated sewerage discharge from STPs to provide additional make-up water as required. Design the project to be capable of zero discharge of wastewater to surface water systems during normal operation. Treat all process water that is excess to operational requirements, to irrigation water standard and store in the Water Storage for re-use. Capture stormwater from the site and store in the Water Storage for reuse as process water. Plan and manage discharges of excess water form the Water Storage to irrigation. Ensure stormwater run-off from the development site does not cause deterioration of water quality of receiving waters.
Statutory and Other Requirements	*Environmental Protection (Water) Policy 1997* Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992 AS 1940 – 1993: The Storage and Handling of Flammable and Combustible Liquids

Surface Water and Stormwater				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Re-establish ground cover.	Reduction in surface water run-off volume. Reduction in sediment erosion and transport.	On all disturbed areas following the construction phase in order to reduce erosion and the velocity of surface water run-off.	Technicians to report to the Farm Manager every 6 months.	Increase program of “soft landscaping”.
Operate site stormwater systems to maximise capture and reuse and to prevent contaminated runoff.	Baseline Water Quality and Relevant ANZECC Guidelines.	Water quality sampling and analysis at retention basins following storm events to ensure no contaminated runoff.	Technicians to report to the Farm Manager every month.	Review drainage system capabilities. Consult EPA regarding upgrade requirements.
Develop long term stormwater management structure.	Zero discharges during normal operation and maximising reuse of stormwater.	To be developed during the detailed design phase to ensure control of off site discharges.	Technicians to report to the Farm Manager every 6 months.	Review drainage system design and operation.
Develop and implement an operation and management plan for the Water Storage.	Minimum discharges from Water Storage. Discharged water meets irrigation water quality standards.	Water quality monitoring of stored water to control application of irrigation waters throughout operation.	Technicians to report to the Farm Manager every 6 months.	Review management plan and modify operation as required.

Surface Water and Stormwater				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Ensure that all personnel performing activities related to environmental management practices are trained, qualified and competent.	All staff and contractors have received environmental induction and awareness training.	Monthly review of staff records and site ID cards for training sign-off.	Technicians to report to the Farm Manager every month.	Review induction procedures.
Stormwater directed around or away from all stockpiles that could cause pollution of stormwater.	No increase in sediment loading of surface water run-off.	Inspection of stockpile and material storage areas throughout the duration of construction activities.	Technicians to report to the Farm Manager every 6 months.	Cover temporary storage areas and restrict the storage of construction materials inside the designated areas.

Mosquito Management	
Issue	Mosquito management during the operation of the Prawn Farm. Mosquitos are unlikely to breed within the proposed growout ponds or settlement ponds as the water movement is not conducive to mosquito larval development.
Potential Impacts	Increase in size of the mosquito population once the settlement ponds are commissioned.
Management Objectives	Inspect sedimentation ponds to assess the presence of mosquito larvae stocks. Seek advice from Bowen Shire Council if problem persists.
Statutory and Other Requirements	Bowen Shire Council requirements

Mosquito Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Control mosquito populations in the sedimentation ponds.	Maintain records. Recognised practices.	Weekly visual inspection to determine presence and quantity of larvae.	Technicians shall report to the Farm Manager every 6 months.	Sample larvae and determine an appropriate control method, such as stocking Water Storage with mosquito destroying fish or chemical control.

Groundwater	
Issue	Prevention of groundwater contamination during operation of the Prawn Farm.
Potential Impacts	Potential sources of contamination include the Growout Ponds, the reclaimed Water Storage, chemical or oil spills, fugitive process wastewater releases.
Management Objectives	Establish a groundwater monitoring program. Develop monitoring procedures in accordance with standard protocols and the requirements of the EPA. Monthly groundwater monitoring will provide necessary data to detect water quality trends. Six monthly monitoring of conductivity. Annual reporting of groundwater monitoring data.
Statutory and Other Requirements	*Environmental Protection (Water) Policy 1997* Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992

Groundwater				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Monitoring bores screened in the Growout Pond area and analysis of groundwater samples for conductivity.	No sustained changes in groundwater quality away from baseline conditions.	Monthly monitoring around Growout Ponds and reclaimed Water Storage to ensure early detection of any changes in groundwater quality or levels.	Technicians to report to the Farm Manager every 12 months.	Reduce or remove source of contamination.

Noise and Vibration	
Issue	Noise and vibration management during the operation of the Prawn Farm.
Potential Impacts	The main potential impacts of the project on existing noise and vibration levels are likely to be: Plant equipment. Power generation. Transport activities.
Management Objectives	To minimise the level of noise generated during the operation phase. To minimise the noise impacts on adjacent landowners and existing residents.
Statutory and Other Requirements	*Environmental Protection (Noise) Policy 1997* *Workplace Health and Safety Act 1995* Noise level guidelines in the *Environmental Protection (Interim) Regulation 1995* EPA Practice Note 8.0 to the User's Guide (April 1998) – Assessment of Unreasonable Noise AS 1055-1997 Acoustics – Description and Measurement of Environmental Noise AS 2436: Guide to Noise Control on Construction, Maintenance and Demolition Sites AS 2670: Evaluation of Human Exposure to Whole-Body Vibration

Noise and Vibration				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Minimise operation noise (typical) noise.	Noise level guidelines and the EPP (Noise) 'Unreasonable noise' levels.	Undertake monthly noise monitoring at agreed locations on periphery of the site.	Technicians shall report to the Farm Manager every 6 months.	Investigate and monitor progress of all noise complaints.
Equipment regularly inspected and maintained in good working order.	Noise level guidelines and the AS 2436.	Monthly visual inspection of all site vehicles to rectify any problems.	Technicians shall report to the Farm Manager every 6 months.	Stop use of equipment/ vehicles until problem is solved.
Equipment to have noise mitigation devices fitted.	AS 2436 and the EPP (Noise).	Monthly visual and audible inspection during routine maintenance events.	Report to the Farm Manager every 6 months.	Investigate all instances of excessive noise. Increase attenuation equipment.
Minimise site (atypical) noise.	Noise level guidelines and the number of complaints.	Undertake noise monitoring at the periphery of the site to establish the effects on nearby residents daily, during atypical events.	Technicians shall report to the Farm Manager every 6 months.	Inform community in advance where practical, of all scheduled atypical noise events.
Minimise vibration generation.	Compliance with regulatory standard or guideline.	Monitoring at the location of the complaint using specialist equipment.	Technicians shall report to the Farm Manager every 6 months.	Investigate mitigation techniques.

Air Quality	
Issue	Air quality management during operation of the Prawn Farm.
Potential Impacts	Increase of fugitive emissions including dust, smoke, fumes, particulates, odour and aerosols.
Management Objectives	Minimise the generation of fugitive sources within the site. Minimise the migration of fugitive emissions off the site. Minimise the production and migration of odour off site. Maintain emissions within the limits specified in the License under standard operating conditions by ensuring high efficiency operation and the maintenance of pollution abatement equipment.
Statutory and Other Requirements	*Environmental Protection (Air) Policy 1997* National Health and Medical Research Council Guidelines, 1985 Draft National Environmental Protection Measures and Impact Statement for Ambient Air Quality, 1997 AS 2724.1-1984: Ambient Air – Particulate Matter – Determination of Deposited Matter Expressed as Insoluble Solids, Ash, Combustible Matter, Soluble Solids and Total Solids.

Air Quality				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Establish a complaints register in conjunction with a dedicated phone number.	Record all complaints received.	Monitor activities to ensure compliance with Work Plan.	Technicians shall report to the Farm Manager every 6 months.	Investigate and mitigate.
Inspect the site to check for excessive surface dust or for any dry matter spills.	Dust emission complaints.	Daily visual inspections during operational hours.	Technicians shall report to the Farm Manager every 6 months.	Initiate corrective dust control actions.
Compile an odour control manual.	Manual development.	Manual to be developed prior to commissioning and will detail a method for odour impact minimisation in the event of system failures and identify corrective actions.	Technicians shall report to the Farm Manager every 6 months.	N/A
Install a meteorological station.	N/A	Monitor daily wind direction and speed.	Technicians shall report to the Farm Manager every 6 months.	Investigate and mitigate.
Undertake a review of complaints.	Records of odour complaints.	Attempt to identify cause through correlation with wind direction weekly.	Technicians shall report to the Farm Manager every 6 months.	Further investigation of odour issues.
Develop an odour mitigation strategy (including means for a rapid and controlled shutdown).	N/A	Strategy to cope with unexpected system failures.	Technicians shall report to the Farm Manager every 6 months.	N/A

Air Quality				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Inspect water management system to observe ambient odour levels. Weekly inspection of DO probes in wastewater treatment system for correct operation?	Number of complaints.	Daily assessment to determine any potential odour complaints.	Technicians shall report to the Farm Manager every 6 months.	Investigate and mitigate.
Monitor odour production.	Number of odour complaints.	Undertake a monthly and annual “site walkdown” to assess potential odour issues.	Technicians shall report to the Farm Manager every 6 months.	Trace odour source and take corrective action. Increase work force awareness as to odour problems.

Flora, Fauna and Weed Management	
Issue	Flora, fauna and weed management during the operation of the Prawn Farm.
Potential Impacts	
Management Objectives	Regular inspection of all rehabilitation areas to ensure that replanting and re-establishment of vegetation communities is successful. Maintain landscaped areas. Manage undisturbed areas to ensure vegetation cover is well established and sustainable.
Statutory and Other Requirements	*Environment Protection and Biodiversity Conservation Act 1999* *Nature Conservation Act 1992* *Nature Conservation (Wildlife) Regulation 1994* *Fisheries Act 1994* *Vegetation Management Act 1999* *Vegetation Management Regulation 2000*

Flora, Fauna and Weed Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Maintenance of landscaped areas.	In accordance with the landscape management plan.	Visual inspection by a competent person every 3 months for first year to assess implementation of management practices.	Technicians shall report to the Farm Manager every 6 months.	Review landscape management contract.
Manage the surrounding bushland and screening vegetation to minimise fire hazard potential, ie. 10m buffer zone.	Hazard reduction need assessed and conducted where necessary.	Reduce fuel load and minimise potential for fire in adjoining bushland areas, prior to the bushfire season.	Technicians shall report to the Farm Manager prior to bushfire season.	Hazard reduction to be completed prior to bushfire season.

Problem Species Management	
Issue	Pest management during the operation of the Prawn Farm.
Potential Impacts	Predation of stock from marine, terrestrial and avian predators.
Management Objectives	To ensure predators are kept from the ponds throughout the production period.
Statutory and Other Requirements	Not applicable.

Problem Species Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Finfish predation of juvenile stock.	Screening of the intake water through 100 micron mesh.	Weekly visual inspections.	Technicians to report increases in predation to the Farm Manager.	Revise management and operational procedures.
Finfish predation of adult stock.	Screening of the intake water through larger micron mesh.	Weekly visual inspections.	Technicians to report increases in predation to the Farm Manager.	Revise management and operational procedures.
Avian predation of stock.	Netting of ponds. Waterline nets. Scare birds. Increase in personnel around ponds during optimum bird feeding times.	Weekly visual inspections.	Technicians to report increases in bird numbers to the Farm Manager.	Revise management and operational procedures.
Increase in rats and mice.	Storage of stock-feeds in sheds with concrete floor. Appropriate hygiene practices.	Weekly visual inspections.	Technicians to report rodent outbreaks to the Farm Manager.	Revise management and operational procedures.
Poaching of stock by trespassers.	Rigid security system.	Weekly visual inspections of security complex.	Technicians to report suspicious circumstances to the Farm Manager.	Revise management and operational procedures.

Disease Management	
Issue	Disease management during the operation of the Prawn Farm.
Potential Impacts	Death or morbidity in suspect prawns.
Management Objectives	To maintain a healthy pond environment, which is not conducive to the establishment of disease causing organisms.
Statutory and Other Requirements	*Fisheries Act 1984* Commonwealth *Quarantine Act 1908*

Disease Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
To develop and implement a disease management protocol.	Disease is managed on site.	Protocol is in place.	Farm manager shall report to the DPI only on disease outbreak.	Revise management and operational procedures.
Ensure prawn health.	No spread of disease. Control and elimination of diseased stock.	Maintain records of all introductions and disposals of prawns, including their source and destination. Health monitoring on a regular basis. Maintain records of all disease outbreaks and parasite infections. Utilise preventative dips within the hatchery, for introduction of brood stock and prior to nauplii introduction or movement.	Farm manager shall report to the DPI only on disease outbreak.	Revise management and operational procedures.
Management of pond water.	Bacteria levels. Water quality parameters.	Regular exchange of pond water. Monitoring of pond water and substrate conditions.	Technicians shall report to the Farm Manager monthly.	Revise management and operational procedures.
Management of feeding regimes.	Appropriate implementation of stock feeding plan.	Monitoring of growth rates on a regular basis.	Technicians shall report to the Farm Manager monthly.	Revise management and operational procedures.
Transport of specimens.	Maintain all necessary preservatives and transport boxes for specimen collection and transport to the laboratory on site.	Documentation is available to confirm transport and arrival.	Farm Manager shall report to the DPI on disease outbreak.	Revise management and operational procedures.

Visual Amenity	
Issue	Visual amenity management during the operation of the Prawn Farm.
Potential Impacts	Alteration to existing landform and topographical characteristics.
Management Objectives	To maintain vegetation screens surrounding the Prawn Farm and Processing Plant. To protect existing vegetation. To maintain any landscaped noise barriers. To treat buildings and structures in pale colours.
Statutory and Other Requirements	Not Applicable

Visual Amenity				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
On land owned by the Project, maintain visual screening of Project infrastructure with native plant species.	Re-establishment of vegetation.	Native plant species to be maintained for visual screening of all infrastructure during operation.	Technicians shall report to the Farm Manager.	Review screening plan and revise. Monitor growth and maintain screens.
Maintain quality of external appearance.	Maintenance of external appearance.	One-two storey buildings regularly maintained.	Technicians shall report to the Farm Manager.	Review site development plan and revise. Maintain high level of external appearance.

Chemical Storage and Spill Management	
Issue	Chemical storage and spill management during the operation of the Prawn Farm.
Potential Impacts	The accidental discharge of environmentally hazardous materials. Chemicals such as oil, grease, paint and solvents will be stored on site for use during the operational phase of the Prawn Farm. If not handled, stored or used appropriately contamination of land and water could occur.
Management Objectives	Manage the selection, purchase, storage, handling and disposal of chemicals to ensure minimal environmental impact; Provide appropriate chemical storage facilities and adequate spill prevention equipment. Equipment that uses fuel, lubricants, and/or hydraulic fluid shall be inspected at regular intervals. Spill prevention and control measures will include bunds around fuel storage areas and other chemical stores. Bunded areas will be sized to contain a volume larger than that of the enclosed vessel. Procedures will be developed and equipment will be in place to contain, minimise and recover spills. All staff to be provided with procedures and training in spill prevention and clean up.
Statutory and Other Requirements	*Environmental Protection Act 1994* *Environmental Protection Regulation 1998* *Workplace Health and Safety Act 1995* AS 1940-1993: The Storage and Handling of Flammable and Combustible Liquids AS 3780-1994: The Storage and Handling of Corrosive Substances

Chemical Storage and Spill Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Inventory of all potentially hazardous substances and store MSDS in a register.	The use and storage of chemicals meets Australian Standards.	Collate all MSDS information to determine storage and handing requirements.	Technicians shall report to the Farm Manager every month.	Prohibit use until MSDS available.
Provide hazard materials awareness training and spill management.	Training records. Number of incidents reported.	Inspect training records and exit tests of all personnel involved in hazardous materials every month.	Technicians shall report to the Farm Manager every month.	Revise training.
Storage to be covered and bunded, with impervious flooring and appropriately signed – located away from stormwater drainage lines.	Number of overflow incidents. Stormwater.	Visual inspection to maintain compliance with standards at storage facilities and locations every month.	Technicians shall report to the Farm Manager every month.	Check if bunding design and covers are OK.
Inspect storage areas weekly for any defects with bunding, floor, cover, structure, hoses and valves etc.	Chemicals used and their storage meets Australian Standards. Number of spillage incidents. Inspection records.	Weekly visual inspection of chemical and fuel storage areas.	Technicians shall report to the Farm Manager every month.	Review maintenance program.
Ensure that equipment, transfer hoses and valves that use fuel, oils or other chemicals are regularly maintained.	Monthly maintenance records.	Visual inspection of equipment and components before use and on a monthly basis.	Technicians shall report to the Farm Manager every month.	Review reason for spill. Take action to ensure no recurrence.

Chemical Storage and Spill Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Ensure appropriate spill containment devices are available at key points.	Chemicals used and their storage meets Australian Standards. Number of spills reaching the environment.	Visual inspection to assess equipment at key points.	Technicians shall report to the Farm Manager every 6 months.	Terminate use of facilities until equipment is available.
Ensure that spill containment devices are available at depots, refuelling points, vehicle maintenance sites and other storage locations.	Chemicals used and their storage meets Australian Standards.	Monthly visual inspection to confirm availability and use at material storage/ handling facilities.	Technicians shall report to the Farm Manager every 6 months.	Recover spilled material and report on cleanup.
Design containment areas so that spill can be recovered and containment areas are kept free of waste.	Good housekeeping standards. Number of spills sent to treatment plant.	Monthly visual inspection of materials storage/ handling locations to confirm compliance.	Technicians shall report to the Farm Manager every 6 months.	Review housekeeping procedure.

Waste Management	
Issue	Waste minimisation and management during operation of the Prawn Farm.
Potential Impacts	A number of sources of waste exist during the construction phase of the development. Issues which shall be given special consideration shall include, but not be limited to: Solid waste will mainly consist of processing waste, industrial sewage and general 'domestic' waste.
Management Objectives	To minimise the amount of waste produced at the site. To reuse and recycle in preference to disposal. To minimise environmental damage arising from the production, handling and disposal of waste. Housekeeping procedures, including spillage control, will be implemented to minimise the generation of waste. Records shall be maintained of all waste removed from the site using a waste tracking system.
Statutory and Other Requirements	*Environmental Protection (Waste) Policy 2000* *Environmental Protection (Waste) Regulation 2000* AS 1940 – 1993 The Storage and Handling of Flammable and Combustible Liquids Waste Management Strategy for Queensland

Waste Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Implementation of the Waste Hierarchy principles.	Operational Waste Management Plan.	Monthly inspection of waste records, amounts and types to asses where cost savings could be made.	Technicians shall report to the Farm Manager every 6 months.	Increase staff awareness as to "polluter pays" principle and adoption of waste hierarchy.
Minimise the amount of hazardous waste produced.	Operational Waste Management Plan.	Monthly inspection of waste records. Determine where "friendly" alternative products can be used, resulting in a reduction of hazardous waste production.	Technicians shall report to the Farm Manager every 6 months.	Revise approved supplier list. Review product specification.
Implement a Waste Tracking System.	Waste records.	Inspection of waste records to determine system operational every month.	Technicians shall report to the Farm Manager every 6 months.	Review Report.
Maintain training records.	Induction and training records.	Inspection of training records every 6 months to ensure that staff is aware and competent.	Technicians shall report to the Farm Manager every 6 months.	Revise induction and training procedures.
Maintenance of NPI data.	National Environmental Protection Measures (NEPM). Discharges to land.	Inspection of discharge of sewage water to land records every 6 months.	Technicians shall report to the Farm Manager every 6 months.	Review Report.

Discharge Containing Antibiotics Or Hormones	
Issue	Discharge of pond water, containing levels of antibiotics or hormones, into the surrounding environment during the operation of the Prawn Farm.
Potential Impacts	Harm to local fish and crustacean populations etc. However no hormones or antibiotics will be used for this operation.
Management Objectives	Regular inspection of pond walls to assess condition. Monitor release of contaminants into the surrounding environment. Staff training and awareness of environmental issues. Seek advice from DPI if problem persists.
Statutory and Other Requirements	*Environmental Protection Act 1994* *Environmental Protection (Water) Policy 1997* *Environmental Protection Regulation 1998* Commonwealth *Agricultural and Veterinary Chemicals Code Act 1994* *National Registration Authority*

Discharge containing Antibiotics or Hormones				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Pond discharge.	EPA nutrient discharge limits.	Monitor release of contaminants into the surrounding environment.	Technicians to report to the Farm Manager every month. Farm Manager to seek advice from DPI if problem persists.	Revise management and operational procedures.
Training and awareness.	Induction and training records.	Inspection of training records every 6 months to ensure that staff is aware and competent.	Technicians to report to the Farm Manager every 6 months.	Revise induction and training procedures.

Management Of Stock Feed	
Issue	Management of stock feed to ensure no impact on waterway health during operation of the Prawn Farm.
Potential Impacts	Impact on local fish and crustacean populations. Increase of nutrients in waterway.
Management Objectives	Regular inspection of pond walls to assess condition. Monitor release of contaminants into the surrounding environment. Staff training and awareness of environmental issues. Seek advice from DPI if problem persists.
Statutory and Other Requirements	*Environmental Protection Act 1994* *Environmental Protection (Water) Policy 1997* *Environmental Protection Regulation 1998*

Management of Stock Feed				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Develop and implement a Feed Management Program.	Precise feed management to reduce potential for over feeding.	Daily monitoring of feed.	Farm Manager shall report to the EPA and GBRMPA tri-monthly.	Revise feeding schedules.
Settlement pond management.	EPA nutrient discharge limits.	Monthly monitoring of TN, TP and TSS.	Farm Manager shall report to the EPA and GBRMPA monthly.	Revise feeding schedules.

Pond Discharge	
Issue	Discharge of pond waters during Prawn Farm operation.
Potential Impacts	Increase in nutrients potentially causing eutrophication Increase in sedimentation of marine environment potentially causing loss of seagrass beds. Reduction in size and extent of seagrass beds potentially effecting dugong population.
Management Objectives	Monitor release of contaminants into the surrounding environment. Staff training and awareness of environmental issues. Seek advice from DPI if problem persists.
Statutory and Other Requirements	*Environment Protection and Biodiversity Conservation Act 1999* *Environmental Protection Act 1994* *Environmental Protection (Water) Policy 1997* *Environmental Protection Regulation 1998* *Nature Conservation Act 1992* *Fisheries Act 1994* *Marine Plant Permit*

Pond Discharge				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
	Recirculating prawn farm design including sedimentation and bioremediation ponds. Best practice prawn farm design methods utilised.	Monthly monitoring at discharge location.	Technicians to report to the Farm Manager monthly.	
Total suspended solids mean value <20 mg/L, with no single value >50 mg/L.	Compliance with regulatory standard or guideline.	Monthly monitoring at discharge location.	Technicians to report to the Farm Manager monthly.	Revise sludge management. Increased aeration. Lower stocking density by harvesting.
pH value between 6.5 – 8.5.	Compliance with regulatory standard or guideline.	Daily monitoring when discharging.	Technicians to report to the Farm Manager monthly.	Revise sludge management. Increased aeration. Lower stocking density by harvesting.
DO level > 4 mg/L.	Compliance with regulatory standard or guideline.	Daily monitoring when discharging.	Technicians to report to the Farm Manager monthly.	Revise sludge management. Increased aeration. Lower stocking density by harvesting.
Max TN 3 mg/L.	Compliance with regulatory standard or guideline.	Monthly monitoring at discharge location.	Technicians to report to the Farm Manager monthly.	Revise sludge management. Increased aeration. Lower stocking density by harvesting.

Pond Discharge				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
TP max 0.3 mg/L	Compliance with regulatory standard or guideline.	Monthly monitoring at discharge location.	Technicians to report to the Farm Manager monthly.	Revise sludge management. Increased aeration. Lower stocking density by harvesting.
Chlorophyll a Max 100 µg/L.	Compliance with regulatory standard or guideline.	Monthly monitoring at discharge location.	Technicians to report to the Farm Manager monthly.	Revise sludge management. Increased aeration. Lower stocking density by harvesting.

9.1.3 Pipeline Construction Phase

Soil Erosion and Sediment Control	
Issue	Soil erosion and sediment control during pipeline construction.
Potential Impacts	Land disturbance along the length of the pipeline routes may increase the risk of erosion.
Management Objectives	The pipeline trenches will be open for a minimal period of time during construction. Vehicle movement will be limited to the easement and access tracks. Erosion repair works will be provided as soon as practicable during the progress of pipeline construction in areas of disturbance that may concentrate run-off. Topsoil stockpiles shall be stored to prevent excessive loss by wind and water run-off.
Statutory and Other Requirements	Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992 *Environmental Protection (Water) Policy 1997* Erosion and Sediment Control Guidelines 1996 – Institute of Engineers *Fisheries Act 1994* *Water Act 2000*

Soil Erosion and Sediment Control				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Implement erosion and sediment control throughout the construction phase.	Assessment in accordance with the Soil Erosion and Sediment Control – Engineers Guidelines for QLD. Trench opened for a minimal time span.	Ensure excavations are not left open for extended periods, and stockpiles/ trenches are bunded. Regular inspections of stockpiles and trenches to ensure stability.	Construction Manager shall report to the Farm Manager every week.	Stop excavations and revise operating procedure.
Movement and construction activities with watercourse banks.	Visual assessment of construction corridors. Compliance to construction in specified boundaries. Erosion avoided using standard erosion and sediment control techniques.	Minimise the movement of vehicles and personnel within creek banks.	Construction Manager shall report to the Farm Manager every week.	Review access and revise operating procedures.
Implementation of appropriate reclamation and rehabilitation measures.	Regular checks or erosion control devises and revegetation status, of all impacted sites through photo/ video pre/post construction comparisons. Pre-construction landforms re-instated.	During, and at completion of ground excavations, contours are to be re-established, topsoils respread, endemic groundcover and brush matting to serve as interim erosion control and encourage natural revegetation.	Construction Manager shall report to the Farm Manager every week.	Revise rehabilitative procedures.

Soil Erosion and Sediment Control				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Storage and construction facilities near watercourses.	Best practice guidelines. Visual assessment of construction. Contractors and staff kept to easement and access tracks.	Weekly monitoring. Avoid storage of materials and construction facilities near water course banks.	Construction Manager shall report to the Farm Manager every week.	Revise construction techniques. Revise easement route to avoid excessive disturbance to watercourses.
Soil rehabilitation.	Best practice guidelines. Visual assessment of construction.	Relieve compactions and facilitate infiltration and revegetation in heavily compacted areas, post construction.	Construction Manager shall report to the Farm Manager every week.	Revise rehabilitative procedures.
Soil preservation.	Pre-construction landforms re-instated and revegetated.	Ensure that streambed material and creek bank soils are not mixed. Imported soils tested for potential ASS and weeds.	Construction Manager shall report to the Farm Manager every week.	Review access and revise operating procedures.

Acid Sulphate Soils	
Issue	Management of acid sulphate soils during pipeline construction.
Potential Impacts	Runoff of acidic leachate effecting aquatic environments. Acid sulphate soils generate acid through the oxidation of sulphidic materials on exposure to air, which may occur following excavation. Acid generation cannot occur while these materials remain buried or are otherwise covered to prevent access to oxygen. Soils located below the five metre contour and near coastal areas are more susceptible to generate acid sulphate soils. Acid sulphate materials only become an environmental hazard when any acids formed find their way (usually through drainage paths) into adjacent catchments. Such incidents are highly environmentally destructive, often leading to fish kills or dramatic lowering of the pH of receiving water bodies.
Management Objectives	To assess the potential risk of ASS for all trenching activities for the pipeline. Identify potential acid sulphate soils prior to site works and monitor during construction activities. Liming rates to be implemented as required.
Statutory and Other Requirements	*Environmental Protection Act 1994* *Integrated Planning Act 1997* The Guidelines for Sampling and Analysis of Lowland Acid Sulphate Soils (ASS) in Queensland 1998

Acid Sulphate Soils				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Undertake an acid sulphate soil investigation to identify the location of acid sulphate soils. Samples are to be analysed for appropriate liming rates.	Investigation in accordance with Guidelines for Sampling and Analysis of Lowland Acid Sulphate Soils (ASS) in Queensland 1998.	Assess potential for ASS from maps, plans and photos then confirm presence by sampling soil in likely areas prior to and during ground excavations.	Construction Manager shall report to the Farm Manager every week.	Stop excavation and develop and implement an ASS management plan. If pH<4 in any discharge water, immediately determine the source of the acidity and neutralise.
Minimise potential impact of construction on acid sulphate soils. Close trenches within 2-3 days for clays and 1 day for sands containing sulphidic material. Backfill in the reverse order of extraction.	No acid leachate produced from stockpiles. Trench opened for minimal time span.	Ensure excavations are not left open for extended periods, and stockpiles are bunded. Ensure lime is used during ASS storage, replace soil in original order.	Construction Manager shall report to the Farm Manager every week.	Stop excavations and revise operating procedures.
Divert water flow away from the trenchline. Place excavated spoil on the upslope side of the trench. Place topsoil separately.	Trench closed within 7 days. Compact soil in trench, leave slight excess to accommodate settlement but not in areas where it will concentrate run-off.	Careful placement of extracted material, replace soil in original order, compact soil in trench.	Construction Manager shall report to the Farm Manager if ASS suspected or at infilling.	Stop excavations and revise operating procedures.

Acid Sulphate Soils				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Lime pipelines at recommended rate, bund excavated material as contains ASS. Lime trench bottom after excavation. Lime ASS at recommended rates. Lime trench bottom at recommended rate and also a second, lesser lime layer at 1m.	No acid leachate leaves trench site. Trench open for minimal time span.	Careful placement of extracted material. Lime lower 0.5m at recommended rate. Lime surface of area to be used to place extracted material, place topsoil furthest from trench as a bund. Stage works to place slurry pipeline in dry weather if possible.	Construction Manager shall report to the Farm Manager if ASS suspected or at infilling.	Stop excavations and revise operating procedures.
Install trench cut-offs at drain or creek junctions. Place 10cm by 20cm of lime adjacent to cut-offs in trench bottom or at twice the required liming rate where ASS is identified.	If pH <5 test for SO^4, Aluminium.	Monitor groundwater discharge at creek and drain crossings daily during ground excavations.	Construction Manager shall report to the Farm Manager if ASS suspected or at infilling.	Lime drains to neutral pH and monitor daily.
Mix appropriate amounts of lime with stockpiled material.	If pH <4 add lime at rate recommended by lab testing.	Monitor soil pH daily during ground excavations.	Construction Manager shall report to the Farm Manager if ASS suspected or at infilling.	Lime to recommended rates, mix and monitor neutralisation.

Contaminated Land	
Issue	Contaminated land management during pipeline construction.
Potential Impacts	Excavation exposes contaminated material which may have potential to result in risk to public health or to the environment.
Management Objectives	Assess and manage land contamination issues in a manner which protects the natural environment and human health and ensure that the site is suitable for its end use. Meet the requirements of the EP Act and specifically regulations and guidelines relating to Queensland Contaminated Sites. Consult with EPA to establish the standards required for the on-site remediation of contaminated soil and the import of clean fill material.
Statutory and Other Requirements	*Environmental Protection Act 1994* Queensland Guidelines for the Assessment & Management of Contaminated Land 1998

Contaminated Land				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Ensure that all personnel performing activities with the potential to contaminate land or water resources have attended environmental awareness training.	Training records and test completion.	Inspection of personnel training records for the duration of the project.	Construction Manager shall report to the Farm Manager every week.	Review induction procedure.
Appropriate on-site remediation of contaminated material prior to use.	QLD Guidelines for the Assessment & Management of Contaminated Land 1998.	Inspection of sampling results to ensure compliance with standards/ requirements.	Construction Manager shall report to the Farm Manager every week.	Revise plans as to where contaminated soils are used.
Appropriate disposal of heavily contaminated material and soil.	QLD Guidelines for the Assessment & Management of Contaminated Land 1998.	Inspection of waste tracking records to ensure compliance with standards/ requirements.	Construction Manager shall report to the Farm Manager every week.	Revise plans.
Ensure imported fill material to be used on site is inert and clean.	QLD Guidelines for the Assessment & Management of Contaminated Land 1998.	Inspection of waste tracking records to ensure compliance with requirements.	Construction Manager shall report to the Farm Manager every week.	N/A
Minimise potential for ground contamination from spillage of hazardous materials.	Compliance with relevant Australian Standard for hazardous material storage. Number of reported incidents.	Visual inspection to assess compliance with standards.	Construction Manager shall report to the Farm Manager every week.	Review handling and storage procedures. Review awareness training program.
Ensure the storage, handling and disposal of waste is in accordance with requirements.	Best practice guidelines.	Weekly visual inspection of waste areas to ensure compliance.	Construction Manager shall report to the Farm Manager every week.	N/A

Stormwater	
Issue	Stormwater management during pipeline construction.
Potential Impacts	Contamination of surface water by release of contaminated waters off-site. Deterioration of the water quality of Abbot Bay.
Management Objectives	To ensure the discharge of contaminated water off the development site is prevented. To ensure runoff/ discharge from the development site does not cause deterioration of water quality of receiving waters.
Statutory and Other Requirements	*Environmental Protection Act 1994* *Environmental Protection (Water) Policy 1997* The Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992 AS 1940 – 1993: The Storage and Handling of Flammable and Combustible Liquids

Stormwater				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Contaminated water to be retained within the construction site.	Baseline Water Quality and Relevant ANZECC Guidelines.	Visual inspection to assess adequate containment following spill/ leakage incident.	Construction Manager shall report to the Farm Manager every week.	Review handling and storage procedures.
Ensure the storage, handling and disposal of contaminated water is in accordance with requirements.	Records of sample analysis. Records of disposal.	Determine contamination level (using NATA accredited laboratory) of water to assess appropriate method of disposal, at all waste storage areas, fuel loading areas, spill/ leakage incidents.	Construction Manager shall report to the Farm Manager every week.	Review awareness training program. Review handling and storage procedures.
All stormwater management structures/ devices are intact and functional.	Accepted working practices.	Visual inspection to assess compliance with standards, monthly and in anticipation of major rainfall events.	Construction Manager shall report to the Farm Manager every week.	Review handling and storage procedures.
Minimise potential for ground contamination from spillage/ leakage of contaminated water.	Compliance with relevant AS3780 – 1994, hazardous material storage. No. of reported incidents.	Visual inspection of storage and handling facilities/ locations to assess compliance with standards.	Construction Manager shall report to the Farm Manager every week.	Review handling and storage procedures. Review awareness training program.

Pipeline Construction	
Issue	Construction of the pipeline.
Potential Impacts	Loss of vegetation
Management Objectives	Maintain vegetation status, rehabilitation and biodiversity.
Statutory and Other Requirements	*Environmental Protection Act 1994* *Environmental Protection (Water) Policy 1997* *Fisheries Act 1994* *Marine Plant Permit* The Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992 AS 1940 – 1993: The Storage and Handling of Flammable and Combustible Liquids.

Pipeline Construction				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Maintenance of current surface hydrology regime.	Pipeline designed and constructed to maintain current surface hydrology regime.	Ensure saltpan, freshwater wetland and dune system profiles are re-established to pre-construction survey specifications as quickly as possible after construction. Monitor weekly and post construction.	Construction Manager shall report to the Farm Manager before and after construction.	Maintain surface area based upon survey.
Eastern most section of the pipeline installed using bulldozer.	Best practice guidelines. Disturbance to the ground surface minimised. Impacts on significant flora and fauna minimised. Weed infestation from construction activities minimised. Fauna barrier effect of a wide disturbance corridor reduced.	Ensure bulldozer activities comply with best practice guidelines and accepted standards. Monitor weekly at appropriate points.	Construction Manager shall report to the Farm Manager before and after construction.	Revise construction techniques to avoid excessive disturbance to surrounding environment.
Clearing of vegetation in wetland area.	Best practice guidelines. Visual assessment of construction.	Vegetation disturbance to be minimized.	Construction Manager shall report to the Farm Manager every week.	Revise construction techniques.
Movement and construction activities.	Visual assessment of construction corridors. Compliance to construction in specified boundaries.	Construction vehicles restricted to the pipeline corridor.	Construction Manager shall report to the Farm Manager every week.	Repair damage to surrounding environment.

Pipeline Construction				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Pressure testing of pipelines.	Best practice guidelines. Visual assessment of construction.	Ensure release of water from pressure testing of the pipelines flows into ponds. Monitor weekly.	Construction Manager shall report to the Farm Manager every week.	Revise pressure testing.
Storage and construction facilities near wetland.	Best practice guidelines. Visual assessment of construction.	Avoid storage of materials and construction facilities near wetland. Monitor weekly.	Construction Manager shall report to the Farm Manager every week.	Revise construction techniques.
Maintenance and refuelling of machinery.	Best practice guidelines. Visual assessment of construction.	Avoid undertaking maintenance or refuelling of machinery within the saltpan, freshwater wetland or dune system.	Construction Manager shall report to the Farm Manager every week.	Revise construction techniques. Revise easement route to avoid excessive disturbance to freshwater and marine wetlands.
Manage acid sulphate soils.	No acid leachate produced from spoil.	Sample soil daily at appropriate points for acid forming potential. Neutralise as required.	Construction Manager shall report to the Farm Manager every week.	Revise construction techniques to avoid excessive disturbance to freshwater and marine wetlands.

Intake and Discharge Pipeline Construction	
Issue	Construction of the pipeline within Abbot Bay.
Potential Impacts	Loss of seagrass
Management Objectives	To minimise and mitigate the impacts to the environment during construction of the intake and discharge structures.
Statutory and Other Requirements	*Environmental Protection Act 1994* *Environmental Protection Regulation 1998* *Fisheries Act 1994* *Marine Plant Permit*

Intake and Discharge Pipeline Construction				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Clear demarcation of disturbance paths within intertidal areas.	Recognition of disturbed areas.	Daily monitoring of construction site by Construction Manager.	Reporting to farm Manager weekly. Reporting to EPA as per Dredging ERA	Areas to be delineated and worked to.
Prepare a works schedule based on the predicted tidal regime of the site.	Works completed to schedule	Daily monitoring of construction site by Construction Manager.	Reporting to farm Manager weekly. Reporting to EPA as per Dredging ERA	Work schedule to be maintained
Dredging is also an Environmentally Relevant Activity under the EPA 1994, and an Environmental Authority (ERA) issued by the Environmental Protection Agency is required to carry out this activity.	ERA requirements are meet.	Daily monitoring of construction site by Construction Manager.	Reporting to farm Manager weekly. Reporting to EPA as per Dredging ERA	Compliance with ERA to be meet
Monitoring of suspended sediment levels and appropriate triggers for corrective action; and Biological monitoring of impacts on adjacent seagrass beds.	ERA requirements are meet.	Monitoring by environmental scientist as per Dredging ERA.	Reporting to farm Manager weekly. Reporting to EPA as per Dredging ERA	Dredging procedures maintained to meet ERA compliance schedule
Any necessary dewatering to occur on the beach area.	ERA requirements are meet.	Daily monitoring of construction site by Construction Manager. Monitoring by environmental scientist as per Dredging ERA.	Reporting to farm Manager weekly. Reporting to EPA as per Dredging ERA	Dewatering procedures maintained to meet ERA compliance schedule
Stabilise disturbed area as constructed to minimise erosion and in accordance with the Soil Erosion and Sediment Control EMP.	ERA requirements are meet.	Daily monitoring of construction site by Construction Manager. Monitoring by environmental scientist as per Dredging ERA.	Reporting to farm Manager weekly. Reporting to EPA as per Dredging ERA.	Rehabilitation procedures maintained to meet ERA compliance schedule.

Noise and Vibration	
Issue	Noise and vibration management during pipeline construction.
Potential Impacts	The main potential impacts of the project on existing noise and vibration levels are likely to be: Noise from construction machinery during construction works. Temporary impacts of vibration during the construction phase of the project.
Management Objectives	To minimise the level of noise and vibration generated by construction activities. Inspect all construction equipment regularly and maintain in optimal working condition.
Statutory and Other Requirements	*Environmental Protection (Noise) Policy 1997* *Workplace Health and Safety Act 1995* Noise level guidelines in the *Environmental Protection (Interim) Regulation 1995* EPA Practice Note 8.0 to the User's Guide (April 1998) – Assessment of Unreasonable Noise AS 1055-1997 Acoustics – Description and Measurement of Environmental Noise AS 2436: Guide to Noise Control on Construction, Maintenance and Demolition Sites AS 2670: Evaluation of Human Exposure to Whole-Body Vibration

Noise and Vibration				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Maintenance of equipment.	Records of construction equipment maintenance.	Audible inspection every month of muffler and noise suppression devises to ensure regular maintenance and repair.	The Construction Manager shall report to the Farm Manager every week.	Monitor maintenance of equipment.
Construction management.	EPP (Noise).	Construction to proceed where possible within designated EPP (Noise) time boundaries. Monitor monthly.	The Construction Manager shall report to the Farm Manager every week.	Monitor maintenance of equipment.
Construction progression.	Maintenance of construction equipment.	Liaise with community on construction times and transportation routes for path of least disturbance.	The Construction Manager shall report to the Farm Manager every week.	Designate transportation corridors for least disturbance.

Air Quality	
Issue	Air quality management during pipeline construction.
Potential Impacts	Increase of fugitive emissions including dust, smoke, fumes, particulates, odour and aerosols.
Management Objectives	To minimise the release of fugitive emissions from the pipeline routes during construction by implementation of mitigation and control plans. Ensure that fugitive emissions cause minimal environmental nuisance beyond the boundaries of the development site. Ensure oil or oily water is not used as a dust suppressant under any circumstances. Set up work practices and procedures to minimise fugitive emissions.
Statutory and Other Requirements	*Environmental Protection (Air) Policy 1997* National Health and Medical Research Council Guidelines, 1985 Draft National Environmental Protection Measures and Impact Statement for Ambient Air Quality, 1997 AS 2724/1 1984: Ambient Air – Particulate Matter – Determination of Deposited Matter Expressed as Insoluble Solids, Ash, Combustible Matter, Soluble Solids and Total Solids.

Air Quality				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Minimise soil disturbance.	Meet speed limits.	Limit topsoil removal, speed on unsealed tracks to be limited, topsoil stockpiles to be sheltered from wind.	Construction Manager shall report to the Farm Manager every week.	Educate drivers.
Use dust suppression measures on unsealed roads and stockpiles.	Observation of dust generation by competent person. Maintain less than 120mg/ m^3 daily dust deposition at all monitoring sites.	Inspection of stockpile and unsealed roads daily during the construction phase.	Construction Manager shall report to the Farm Manager every week.	Increase frequency of dust suppression (water spraying) techniques.
Storage of stockpiles.	Stockpiles are watered.	Visually inspect the site to reduce potential dust problem.	Construction Manager shall report to the Farm Manager every week.	Revise stockpile storage techniques.

Flora and Fauna	
Issue	Flora and fauna management during pipeline construction.
Potential Impacts	Loss of areas of remnant native vegetation. Potential impacts on listed species. Potential degradation of water quality and aquatic habitat. Potential increase in weed invasions into remaining habitat. Potential increase in artificial barriers to movement. Potential increase in fauna mortality. Potential increase in habitat fragmentation and edge effects. Alteration of surface water flows, reducing suitability of areas to support certain vegetation communities.
Management Objectives	Bund building materials and stockpiles to avoid run-off into wetland. Avoid areas of established vegetation for storage of construction materials or equipment where possible, minimising loss of vegetation by excessive clearing. Take key habitat areas into consideration when selecting the easement, access tracks and siting of facilities. Flag the edge of the easement and keep construction activity within this boundary. Ensure access tracks are maintained in stable condition. Ensure that prior to undertaking the wetland crossing, a profile of the wetland is surveyed, to aid in the re-establishment of the wetland profile following construction.
Statutory and Other Requirements	*Environment Protection and Biodiversity Conservation Act 1999* *Nature Conservation Act 1992* *Nature Conservation (Wildlife) Regulation 1994* *Fisheries Act 1994* *Vegetation Management Act 1999* *Vegetation Management Regulation 2000*

Flora and Fauna				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Provision of environmental awareness training to all personnel involved in construction activities.	Records of attendance.	Formal training on or off site prior to any construction crew commencing work on site.	Construction Manager shall report to the Farm Manager every week.	Revise induction process.
Prepare and implement a Rehabilitation Plan.	Identification of areas to be rehabilitated, and species & techniques to be used for rehab following construction. Include planting densities, timing, soil and groundwater treatment, fertilisation regimes, and monitoring requirements.	Monthly visual inspections of rehabilitation area by a suitably qualified landscaper.	Construction Manager shall report to the Farm Manager prior to construction works commencing and then every 3 months for one year.	Revise rehabilitation plan.

Flora and Fauna				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Clearly mark all vegetation to remain, including fallen vegetation and hollow logs.	Vegetation clearly marked on site vegetation maps by a competent authority prior to clearing.	Walk site with authorised person(s) to identify and mark/flag vegetation to remain prior to clearing. Use findings of EIS flora surveys and maps.	Construction Manager shall report to the Farm Manager every week.	Stop clearing. Fence and sign areas and vegetation to remain. Protected vegetation accidentally cleared is to be cleanly removed and landform around remaining vegetation appropriately landscaped to prevent erosion or toppling of trees.
Salvage useable timber and plants.	Maps and record of useable timber being used or hauled to a mill.	Walk site and check map/ records post clearing works.	Construction Manager shall report to the Farm Manager post clearing.	If cleared timber remaining, contact relevant timber mill for collection.
Minimise removal of topsoil and retain for respreading on disturbed areas, where practical.	Proper topsoil management in practice.	Visual inspection of cleared site areas periodically.	Construction Manager shall report to the Farm Manager every week.	Change practice accordingly and/or educate site crew as to EMP requirements.
Ensure construction of access tracks through vegetated areas is minimised and existing tracks are used where possible.	Minimal access tracks are developed.	Visual inspection to confirm unauthorised tracks are not being formed.	Construction Manager shall report to the Farm Manager every week.	Close unnecessary tracks.
Survey for nesting sites of the Beach Stone Curlew if construction works to be undertaken during July – February.	Pre construction survey if construction to commence during breeding season (July – February) to ensure nests will not be effected.	Visual inspection to confirm presence/ absence of species.	Contract Ecologist shall report to the Construction Manager after survey.	
Identify animals with limited mobility in the area that can be relocated. Relocate to areas of similar habitat within the site, in accordance with a relocation plan.	Fauna of limited mobility removed from construction area, eg. Echidnas, koalas. No deaths to animals with limited mobility during construction.	Area to be inspected by a suitably qualified and experienced ecologist capable of capturing and relocating fauna to safe areas.	Contract Ecologist shall report to the Construction Manager immediately following clearing.	If clearing and construction is causing the death of wildlife, reassess method of clearing to avoid deaths.
Manage the surrounding bushland and screening vegetation to minimise fire hazard potential, ie. 10m buffer zone.	Hazard reduction need to be assessed and conducted where necessary.	Reduce fuel load and minimise potential for fire in adjoining bushland areas, prior to the bushfire season.	Construction Manager shall report to the Farm Manager prior to bushfire season.	Hazard reduction to be completed prior to bushfire season.

Weed Management	
Issue	Weed management during pipeline construction.
Potential Impacts	Potential spread of weeds from construction vehicles entering and leaving the construction site. Increase in the extent and rate of weed infestation due to changes in groundcover.
Management Objectives	To meet the obligations of the *Rural Lands Protection Act 1985* To liaise with Bowen Shire Council and other appropriate organisations to determine best practice for weed management To ensure weed awareness training is included in staff and contractor induction processes prior to site access. To ensure vehicles and equipment is cleaned prior to movement from infested areas to non-infested areas. To preserve the conservation values of the area after construction, and where possible, restore degraded ecosystems and the habitat of fauna species. To ensure existing weeds are managed and further spread of weeds are minimised.
Statutory and Other Requirements	*Rural Lands Protection Act 1985*

Weed Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Identify and locate weed species.	*Rural Lands Protection Act 1985.*	Prior to and during construction, assess potential for weed infestation, new outbreaks and possible impacts. Survey and map area.	Construction Manager shall report to the Farm Manager and Noxious weeds officer – shire council.	Stop excavation, develop and implement a weed management plan. Review awareness training program.
Minimise the spread of existing weeds.	*Rural Lands Protection Act 1985* wash down requirements. New infestation of exotic weed species.	Log previous location of all machinery along the pipeline route and instigate machine wash-down weekly.	Construction Manager shall report to the Farm Manager and Noxious weeds officer – shire council.	Review machinery log data and implement weed management plan. Review awareness training program.
Ensure imported and excavated fill material, to be used on site, is inert and clean.	*Rural Lands Protection Act 1985.*	Weekly visual assessment of new infestation of exotic weed species.	Construction Manager shall report to the Farm Manager and Noxious weeds officer – shire council.	Stop excavation, and implement a weed management plan. Review awareness training program.
Minimise and reduce current weed outbreaks/ population size.	Visual assessment of halted or reduced infestation of exotic weed species. *Rural Lands Protection Act 1985.*	Random site sample of population status of declared weed species, and control/ reduction methods established.	Construction Manager shall report to the Farm Manager and Noxious weeds officer – shire council.	Implementation of a weed management plan. Review accepted practice implementation.

Cultural Heritage	
Issue	Cultural heritage management during pipeline construction.
Potential Impacts	Unknown material of cultural or archaeological significance may potentially be disturbed by construction activities.
Management Objectives	To recognise cultural heritage and historic values worthy of protection. To avoid the loss of cultural heritage and historic artefacts. Temporary storage of any culturally significant artefacts or materials salvaged from construction monitoring. To provide awareness training to all site personnel involved in site development activities.
Statutory and Other Requirements	*Native Title Act 1993* *Native Title (Queensland) Act 1993* *Queensland Heritage Act 1992* *Queensland Heritage Regulation 1992* *Cultural Record (Landscapes Queensland and Queensland estates) Act 1987* EPA guidelines for Reporting on Cultural Heritage in Queensland.

Cultural Heritage				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Assessment of culturally sensitive sites/ artefacts.	*QLD Heritage Act 1995* *Cultural Record Act 1987* EPA guidelines for Reporting on Cultural Heritage in Queensland.	Review of heritage registers, and conduct field surveys of affected sites prior to construction.	Construction Manager shall report to the Farm Manager after initial site survey.	Complete prior to survey and construction.
Development of a Cultural Heritage Management Plan (CHMP).	Development of a CHMP approved by traditional owner groups by the proponent/ archaeologist prior to construction.	Consultation with traditional owner groups, heritage registers and archaeologists for cultural sensitivity bounds and definitions prior to construction.	Construction Manager shall report to the Farm Manager after the initial survey of sites.	Review and amend CHMP.
Cultural Heritage training and awareness.	General awareness of cultural heritage specifications. Preservation of artefacts during construction.	Develop and conduct induction for all personnel working on site.	Construction Manager shall report to the Farm Manager at the end of construction activities.	Review awareness training program.
Cultural heritage salvage and monitoring of construction activities in accordance with EPA permit.	Adherence to CHMP guidelines and salvage of cultural significant artefacts.	Application of CHMP during construction activities prior to construction.	Construction Manager shall report to the Farm Manager at the end of construction activities.	Review awareness training program.
Establishment of temporary storage facility for artefacts.	General awareness of cultural heritage specifications. Preservation of artefacts during construction.	Storage of materials salvaged during monitoring activities for preservation and possible analysis prior to construction.	Construction Manager shall report to the Farm Manager at the end of construction activities.	Review awareness training program.

Visual Amenity	
Issue	Visual amenity management during pipeline construction.
Potential Impacts	Loss of intact vegetation. Visual impacts including pump station Alteration to existing landform and topographical activities. To limit the length of time between disturbance and reinstatement of the surface level for underground pipes.
Management Objectives	Minimise vegetation clearing, Limit the height and bulk of any buildings or structures to that required to function effectively and efficiently
Statutory and Other Requirements	Not applicable.

Visual Amenity				
Management Action	**Performance Criteria**	**Monitoring**	**Reporting**	**Corrective Action**
Visual amenity plan for tall or bulky structures.	Number of complaints registered.	Project infrastructure size and height to be limited, painted pale as to decrease skyline intrusion of visual plain, during and post construction.	Construction Manager shall report to the Farm Manager every week.	Review site development plan and revise.
Control vegetation clearing as per agreement with regulatory agencies.	Clearing to meet regulatory criteria.	The area to be cleared will be staked and no clearing is to occur outside of this area.	Construction Manager shall report to the Farm Manager every week.	Review site development plan and revise.

Chemical Storage and Spill Management	
Issue	Chemical storage and spill management during construction of the pipeline.
Potential Impacts	The accidental discharge of environmentally hazardous materials during the construction activities. Chemicals such as oil, grease, paint and solvents will be stored on site for use during the construction phase of the development. If not handled, stored or used appropriately contamination of land and water could occur.
Management Objectives	Manage the selection, purchase, storage, handling and disposal of chemicals to ensure minimal environmental impact; Provide appropriate chemical storage facilities (designed to comply with AS 1940) and adequate spill prevention equipment. Equipment that uses fuel, lubricants, and/or hydraulic fluid shall be inspected at regular intervals. Spill prevention and control measures will include bunds around fuel storage areas and other chemical stores. Bunded areas will be sized to contain a volume larger than that of the enclosed vessel. Procedures will be developed and equipment will be in place to contain, minimise and recover spills. All staff to be provided with procedures and training in spill prevention and clean up.
Statutory and Other Requirements	*Environmental Protection Act 1994* *Environmental Protection Regulation 1998* *Workplace Health and Safety Act 1995* AS 1940-1993: The Storage and Handling of Flammable and Combustible Liquids AS 3780-1994: The Storage and Handling of Corrosive Substances

Chemical Storage and Spill Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Inventory of all potentially hazardous substances and store MSDS in a register.	Chemicals used and their storage meets Australian Standards (AS1940-1993) and AS 3780-1994).	Collate all MSDS information to determine storage and handing requirements during contract agreement.	The Construction Manager shall report to the Farm Manager every week.	Prohibit use until MSDS available.
Provide hazard materials awareness training and spill management.	Training records. Number of incidents reported.	Inspect training records and exit tests of all personnel involved in hazardous materials.	Construction Manager shall report to the Farm Manager every week.	Revise training.
Storage areas to be covered and bunded, with impervious flooring and appropriately signed – located away from stormwater drainage lines.	Chemicals used and their storage meets Australian Standards. Number of overflow incidents. Stormwater contamination levels.	Weekly visual inspection of storage facilities and locations to maintain compliance with standards.	Construction Manager shall report to the Farm Manager every week.	Check if bunding design and covers is OK.
Inspect storage areas weekly for any defects with bunding, floor, cover, structure, hoses and valves etc.	Chemicals used and their storage meets Australian Standards. Number of spillage incidents. Inspection records.	Weekly visual inspection of chemical and fuel storage areas.	The Construction Manager shall report to the Farm Manager every week.	Review maintenance program.

Chemical Storage and Spill Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Ensure that equipment, transfer hoses and valves that use fuel, oils or other chemicals are regularly maintained.	Monthly maintenance records.	Visual inspection of equipment and components before use and on a monthly basis.	Report to the Environmental Manager every week.	Review reason for spill and take action to ensure no recurrence.
Ensure appropriate spill containment devices are available at key points.	Chemicals used and their storage meets Australian Standards. Number of spills reaching the environment.	Visual inspection to assess equipment at key points.	Report to the Environmental Manager every week.	Terminate use of facilities until equipment is available.
Ensure that spill containment devices are available at depots, refuelling points, vehicle maintenance sites and other storage locations.	Chemicals used and their storage meets Australian Standards.	Monthly visual inspection to confirm availability and use at material storage/ handling facilities.	Report to the Environmental Manager every week.	Ensure spill containment devices are provided.
Design containment areas so that spill can be recovered and containment areas are kept free of waste.	Good housekeeping standards. Number of spills sent to treatment plant.	Monthly visual inspection of materials storage/ handling locations to confirm compliance.	Report to the Environmental Manager every week.	Review housekeeping procedure.

Waste Management	
Issue	Waste minimisation and management during construction of the pipeline.
Potential Impacts	A number of sources of waste exist during the construction phase of the development. Issues which shall be given special consideration shall include, but not be limited to disposal of cleared vegetation, disposal of contaminated soils/materials from fuel/oil/batteries (regulated wastes) which require licensed removal and disposal sites. There is a duty of care on the waste generator to ensure licensing is held and that disposal is carried out correctly. Waste accumulated during maintenance of vehicles. Accumulation of substances such as waste oils, tyres, containers (with substances like paints, epoxy resins, preservatives, concrete mixtures and curing solutions), recyclables (steel, wood, plastic and cardboard packaging), general waste, batteries etc.
Management Objectives	To minimise the impact to the environment from both solid and liquid waste. To minimise the production of waste and amount of waste requiring disposal. To maximise the reuse and recycling of waste material. To contain, control and dispose of waste in accordance with the required waste management practices. Investigate the replacement of hazardous material with environmentally 'friendly' alternatives
Statutory and Other Requirements	*Environmental Protection (Waste) Policy 2000* *Environmental Protection (Waste) Regulation 2000* AS 1940 – 1993 The Storage and Handling of Flammable and Combustible Liquids Waste Management Strategy for Queensland

Waste Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Implement a waste management plan.	EPP (Waste) 2000 hierarchy of waste management practices. The hierarchy includes waste avoidance; waste recycling; waste to energy; waste treatment; and waste disposal. EPR (Waste) 2000.	Waste management plan developed prior to mobilisation.	Construction Manager shall report to the Farm Manager every week.	N/A
Check all vegetation for commercially useful plants and timber prior to commencing clearing.	Vegetation inspection by suitably qualified person.	Inspect areas to be cleared prior to clearing.	Construction Manager shall report to the Farm Manager.	N/A
Favour suppliers which use returnable packaging materials.	Audit waste stream to establish packaging contribution.	Assess supplier environmental policies and contractor methods statements to establish environmental commitment during the contract agreement phase.	Construction Manager shall report to the Farm Manager every week.	Review the 'approved supplier' list.

Waste Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Ensure that all personnel performing activities relating to environmental management practices are trained, qualified and competent.	Induction and training records.	Monthly reviews of staff records and site ID cards for training signing-off.	Construction Manager shall report to the Farm Manager every week.	Review induction and training program.
Avoid over ordering of materials and consumables.	Minimum stocking level guidelines.	Audit stock levels to control stocking levels.	Construction Manager shall report to the Farm Manager every week.	Review purchasing procedures.
Segregation of all waste.	Records of waste sent for recycling.	Monitor use of waste bins on site to facilitate recycling off site during construction phase.	Construction Manager shall report to the Farm Manager every week.	Increase awareness to environmental commitments.
Assess further opportunities for materials reuse/ recycling.	Audit of waste stream.	Pre-construction planning and visual site inspection during the construction phase.	Construction Manager shall report to the Farm Manager every week.	Review waste management practices.
Ensure that waste storage and disposal is undertaken according to best practices.	Visual assessment of storage areas, containers and bunds for odours, vermin, flies and leachate.	Inspection of waste storage areas every week.	Construction Manager shall report to the Farm Manager every week.	Review waste management practices.
Ensure that there is an effective reporting system for waste storage and disposal.	Waste management plan.	Inspection of the waste management system every week.	Construction Manager shall report to the Farm Manager every week.	Review waste management system.
Provide adequate on-site facilities for liquid waste storage.	Septic maintenance records and liquid waste disposal records.	Undertake a weekly waste audit. Inspect temporary toilet facilities weekly to ensure regular maintenance.	Construction Manager shall report to the Farm Manager every week.	Review system for liquid waste storage/ disposal. Review septic maintenance contract/ procedures.
Process oily wastes through an oil/water separator.	Sample analysis results. Compliance with EPP (Water) standards.	Monthly visual inspection and sampling at discharge point. Monthly NATA laboratory analysis to determine hydrocarbon concentration.	Construction Manager shall report to the Farm Manager every week.	Temporary fuel dispensing areas to be covered and isolated from uncontaminated surface water runoff. Increase frequency of interceptor cleaning.
Ensure disposal of oily waste is appropriate.	Waste tracking system.	Waste transporter is licensed and an auditable system operations.	Construction Manager shall report to the Farm Manager every week.	Review Waste Tracking System.
Assessment of environmental impacts of proposed waste management methods.	Acceptability of Waste Management Plan. EPP (Waste) and EPR (Waste).	Assess viability of proposed Waste Management Plan for construction activities prior to and during construction.	Construction Manager shall report to the Farm Manager every week.	Review of waste streams/ management strategies. Amendments to Waste Management Plan.

9.1.4 Pipeline Operation Phase

Soil Erosion and Sediment Control	
Issue	Soil erosion and sediment control during pipeline operation.
Potential Impacts	Land disturbance along the length of the pipeline routes may increase the risk of erosion.
Management Objectives	To minimise erosion by using good practice erosion an sediment control works, and minimise the number of access tracks by rehabilitating those not required for general maintenance. Vehicles movement should be limited to the easement and access tracks and speeds limited. Any erosion that occurs as a result of pipeline maintenance activities will be controlled as soon as possible. Easement and access tracks will be maintained and low level ground cover permitted to regrow as erosion and dust suppression measures. Assessment of the integrity and effectiveness of erosion control measures will be undertaken at regular periods. Maintenance activities will occur only within previously cleared sites and within the pipeline easements.
Statutory and Other Requirements	Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992 *Environmental Protection (Water) Policy 1997* Erosion and Sediment Control Guidelines 1996 – Institute of Engineers *Fisheries Act 1994* *Water Act 2000*

Soil Erosion and Sediment Control				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Minimise use of access tracks.	Minimal degradation of access tracks.	Public access to access track to be prohibited and staff kept to easement boundaries, traffic speed limited.	Technicians shall report to the Farm Manager every 6 months.	Review access and revise operating procedures.
Monitoring of appropriate reclamation and rehabilitation measures.	Regular checks, of erosion control devices and revegetation status, of all impacted sites through photo/video pre/post construction comparisons. Pre-construction landforms reinstated.	Rehabilitation and revegetation to be monitored.	Technicians shall report to the Farm Manager every 3 months for one year.	Review rehabilitative procedures.
Soil rehabilitation.	Best practice guidelines. Visual assessment of construction.	Relieve compactions and facilitate water infiltration and revegetation in heavily compacted areas, post construction.	Technicians shall report to the Farm Manager every 6 months.	Revise rehabilitative procedures.

Weed Management	
Issue	Weed management during pipeline operation.
Potential Impacts	Potential spread of weeds from maintenance vehicles inspecting the easement.
Management Objectives	To prevent the introduction of weeds and distribution of existing weeds to previously non-infested areas. Minimise spread of weed species along the easement arising from actions associated with the management of the easement by the Proponent. Monitor revegetation of disused access tracks and cleared sites for possible infestation of weed species.
Statutory and Other Requirements	*Rural Lands Protection Act 1985*

Weed Management				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Undertake weed management investigation to identify and locate weed species.	*Rural Lands Protection Act 1985* wash down requirements. Shire Council weed inventory.	Assess potential for weed infestation, new outbreaks and possible impacts. Survey and map region.	Reporting to the Farm Manager and Noxious weeds officer – shire council, every month.	Stop excavation, develop and implement weed management plan. Review awareness training program.
Prevention of weed migration through construction machinery.	New infestation of exotic weed species. *Rural Lands Protection Act 1985.*	Log previous location of all machinery and investigate machine wash-down.	Reporting to the Farm Manager and Noxious weeds officer – shire council, every month.	Review machinery log data and implement weed management plan. Review awareness training program.
Ensure imported and excavated fill material, to be used on site, is inert and clean.	Visual assessment of new infestation of exotic weed species. *Rural Lands Protection Act 1985.*	Random soil sample of imported and excavated fill.	Reporting to the Farm Manager and Noxious weeds officer – shire council, every 6 months.	Stop excavation, and implement a weed management plan. Review awareness training program.
Minimise and reduce current weed outbreaks/ population size.	Visual assessment of halted or reduced infestation of exotic weed species. *Rural Lands Protection Act 1985.*	Random site sample of population status of declared weed species, and control/ reduction methods established.	Reporting to the Farm Manager and Noxious weeds officer – shire council, every 6 months.	Implementation of a weed management plan. Review awareness training program.

Visual Amenity	
Issue	Visual amenity impacts during pipeline operation.
Potential Impacts	Visual amenity impacts including traffic…
Management Objectives	Native vegetation screening along pipeline routes to be maintained. Visual amenity plan implementation to be monitored.
Statutory and Other Requirements	Not applicable.

Visual Amenity				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Maintain visual screening of above ground pipeline infrastructure and easements with native plant species.	Number of complaints registered.	Native plant species to be maintained for visual screening of infrastructure.	Reporting to the Farm Manager.	Review screening plan and revise. Monitor growth and maintain screens.
Confirm navigation aids with relevant authorities.	Aids acceptance to the relevant authorities.	Aids are maintained.	Reporting to the Farm Manager.	Aids are repaired as required.

9.1.5 Pump Station Construction

Pump Station Construction	
Issue	Soil erosion and sediment control. Stormwater management. Contamination of surface water by release of contaminated waters off-site. Minimisation of damage to vegetation and rehabilitation post construction. Waste minimisation and management.
Potential Impacts	Land disturbance during construction may increase the risk of erosion. Potential degradation of water quality and aquatic habitat. Potential release of contaminants into environment from inappropriate waste disposal. Potential increase in weed invasions into remaining habitat.
Management Objectives	Vehicle movement will be limited to the easement and access tracks. To ensure runoff/ discharge from the development site does not cause deterioration of water quality of receiving waters. To contain, control and dispose of waste in accordance with the required waste management practices.
Statutory and Other Requirements	Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992 *Environmental Protection (Water) Policy 1997* Erosion and Sediment Control Guidelines 1996 – Institute of Engineers

Soil Erosion and Sediment Control				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Implement erosion and sediment control throughout the construction phase.	Assessment in accordance with the Soil Erosion and Sediment Control – Engineers Guidelines for QLD. Trench opened for a minimal time span.	Ensure excavations are not left open for extended periods, and stockpiles/ trenches are bunded. Regular inspections of stockpiles and trenches to ensure stability.	Construction Manager shall report to the Farm Manager every week.	Stop excavations and revise operating procedure.
Bund any “dirty” areas to ensure no contamination of stormwater.	No loss of dirty water.	Visual inspection of construction site periodically.	Construction Manager shall report to the Farm Manager every week.	Change practice accordingly and/or educate site crew as to EMP requirements.
Prepare and implement a Rehabilitation Plan.	Identification of rehabilitation areas, species & techniques to be used for rehab and post construction. Planting densities, timing, soil and groundwater treatment, fertilisation regimes, and monitoring requirements.	Monthly visual inspections of rehabilitation area by a suitably qualified landscaper.	Construction Manager shall report to the Farm Manager prior to construction works commencing and then every 3 months for one year.	Revise rehabilitation plan.

Soil Erosion and Sediment Control				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Clearly mark all vegetation to remain, including fallen vegetation and hollow logs.	Vegetation clearly marked on site vegetation maps by a competent authority prior to clearing.	Walk site with authorised person(s) to identify and mark/flag vegetation to remain prior to clearing. Use findings of EIS flora surveys and maps.	Construction Manager shall report to the Farm Manager every week.	Stop clearing. Fence and sign areas and vegetation to remain. Protected vegetation accidentally cleared is to be cleanly removed and landform around remaining vegetation appropriately landscaped to prevent erosion or toppling of trees.
Minimise removal of topsoil and retain for respreading on disturbed areas, where practical.	Proper topsoil management in practice.	Visual inspection of cleared site areas periodically.	Construction Manager shall report to the Farm Manager every week.	Change practice accordingly and/or educate site crew as to EMP requirements.
Ensure construction of access tracks through vegetated areas is minimised and existing tracks are used where possible.	Minimal access tracks are developed.	Visual inspection to confirm unauthorised tracks are not being formed.	Construction Manager shall report to the Farm Manager every week.	Close unnecessary tracks.
Implement a waste management plan.	EPP (Waste) hierarchy of waste management practices. The hierarchy includes waste avoidance; waste recycling; waste to energy; waste treatment; and waste disposal. EPR (Waste).	Waste management plan developed prior to mobilisation.	Construction Manager shall report to the Farm Manager every week.	N/A
Ensure that waste storage and disposal is undertaken according to best practices.	Visual assessment of storage areas, containers and bunds for odours, vermin, flies and leachate.	Inspection of waste storage areas every week.	Construction Manager shall report to the Farm Manager every week.	Review waste management practices.

9.1.6 Pump Station Operation

Pump Station Operation	
Issue	Soil erosion and sediment control during pump station construction. Contamination of surface water by release of contaminated waters off-site. Noise control during pump station operation. Lighting control during pump station operation. Waste minimisation and management.
Potential Impacts	Potential degradation of water quality and aquatic habitat. Noise from pump station operation affecting wildlife. Potential impacts on Marine Turtles as a result of pump station lighting. Potential release of contaminants into environment from inappropriate waste disposal.
Management Objectives	To ensure runoff/ discharge from the development site does not cause deterioration of water quality of receiving waters. To ensure noise levels are within acceptable limits. To limit light emissions from pump station. To contain, control and dispose of waste in accordance with the required waste management practices.
Statutory and Other Requirements	Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992 AS 1055-1997 Acoustics – Description and Measurement of Environmental Noise AS 4282-1997: The Control of Obtrudes Effects of Outdoor Lighting *Environmental Protection (Water) Policy 1997* EPA Practice Note 8.0 to the User's Guide (April 1998) – Assessment of Unreasonable Noise Erosion and Sediment Control Guidelines 1996 – Institute of Engineers

Pump Station Operation				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Insulate pump station as per AS1055-1997.	Pump meets regulation.	Audited against the regulation.	Report to Farm Manager.	Revise to meet regulation.
Control light emissions from pump station as per AS4282-1997.	Temporary light emissions.	Audited against the regulation.	Report to Farm Manager.	Revise to meet regulation.
Paint pump station in greens/browns to minimise visual scar on environment.	Paint mix to meet design.	Meets design specifications.	Revise to meet regulation.	Revise to meet deign specification.
Implement a waste management plan to dispose of oil and grease.	EPP (Waste) 2000 hierarchy of waste management practices. The hierarchy includes waste avoidance; waste recycling; waste to energy; waste treatment; and waste disposal. EPR (Waste) 2000	Waste management plan developed prior to mobilisation.	Construction Manager shall report to the Farm Manager every week.	Revise waste management plan.

Pump Station Operation				
Management Action	Performance Criteria	Monitoring	Reporting	Corrective Action
Ensure that waste storage and disposal is undertaken according to best practices.	Visual assessment of storage areas, containers and bunds for odours, vermin, flies and leachate.	Inspection of waste storage areas every week.	Technician shall report to the Farm Manager every week.	Review waste management practices.

9.2 Environmental Safeguards & Mitigation Measures

9.2.1 Introduction

Proposed safeguards to avoid and mitigate effects on the environment are discussed in this section, with reference to appropriate Environmental Management Plans where possible.

The following format has been used to address these issues:

Table 9-2
Format of Mitigation Measures

Issue-	Aspect / impact of construction or operation
Issue #	A description of the mitigation and any necessary rehabilitation measures for dealing with the project's relevant impacts (as defined by the EPBC Act).
Statutory Requirements -	Relevant statutes applicable to the project.
Responsibility -	The name of the entity responsible for endorsing or approving each Issue and monitoring program.
Mitigation Measures -	A consolidated list of Issues proposed to be undertaken to prevent, minimise or compensate for the project's relevant impacts.
Effectiveness	An assessment of the expected or predicted effectiveness of the mitigation and/or rehabilitation measures for dealing with the project's relevant impacts.

9.2.2 Environmental Issues and Mitigation Measures

Issue 1	**Incorporate Environmental Protection Into The Design, Siting, Layout And Landscaping Of Facilities And Associated Works**
Statutory Requirements	*Environmental Protection Act 1994* *Environmental Protection (Water) Policy1997* *Fisheries Act 1994* *Bowen Shire Council Planning Scheme 1998*
Responsibility -	Proponent Local Government EPA
Mitigation Measures -	*Overall Design:* • Discharge Treatment: – Primary treatment of pond water discharge by pre-sedimentation followed by settlement; – Recirculation to intake reservoirs. *Pond Design* • Prevention of stock loss using screen walls designed to minimise erosion therefore reducing sediment accumulation on the pond floor. • Pond walls vegetated above the waterline: – Below the waterline, plastic lining or gravel faced; and – Correct placement of aerators. *Pipeline:* • Pipeline buried to minimise ongoing impact; and • construction works rehabilitated.

Issue 1	**Incorporate Environmental Protection Into The Design, Siting, Layout And Landscaping Of Facilities And Associated Works**
	Siting Ponds and infrastructure: • The ponds and infrastructure have been sited in such a way as to optimise the use of suitable land for the purpose of prawn farming and minimise interference unsuitable areas. For this reason the ponds and infrastructure have been located on Lot 8 where there are large areas of earth suitable for the construction of prawn ponds; • Development on Lot 370 has been avoided in areas of environmental and cultural significance; and • Appropriate consideration of highest astronomical tide buffers. *Landscaping*: • Pond walls vegetated (salt tolerant grass); • Pipeline trenches/ boreholes rehabilitated to original condition; • Perimeter fence for security; • Native planting trees & shrubs adjacent to Coventry Road; and • Work areas suitably landscaped to enhance aesthetic quality and present corporate image.
Effectiveness	The site is suitable for the scale of development envisaged. Aesthetically the site is well located and suitable for this land use.

Issue 2	**Control Unnecessary Soil Disturbance**
Statutory Requirements	*Environmental Protection Act 1994* Erosion and Sediment Control Guidelines 1996 – Institute of Engineers
Responsibility -	Proponent EPA
Mitigation Measures -	Refer to actions listed in the EMP (Growout Pond and Pipeline Construction Phase) • Development and implementation of an Erosion and Sediment Control Plan. • Vehicle entry points located prior to construction. • Construction boundaries flagged and marked prior to construction.
Effectiveness	Reduce the amount of soil disturbance and erosion during construction and operation will maintain stormwater runoff water quality from the site.

Issue 3	**Control Erosion**
Statutory Requirements	*Environmental Protection Act 1994* Erosion and Sediment Control Guidelines 1996 – Institute of Engineers
Responsibility -	Proponent EPA
Mitigation Measures -	Refer to actions listed in the EMP (Growout Pond and Pipeline Construction Phase) • Development and implementation of an Erosion and Sediment Control Plan. • Locate and stabilise construction entry points and install drainage and sediment controls. • Appropriate catch drains and buffers placed around buildings. • Locate temporary construction roads with adequate spreader drains. • Control of channelised flow velocities. • Sediment traps and functional buffers placed to control erosion on disturbed areas. • Appropriate staging of works. • Diversion banks placed around disturbed areas in flood prone locations.

Issue 3	Control Erosion
	• Catch drains/ perimeter banks placed around stockpiles, disturbed areas and fills.
Effectiveness	Reduce the amount of soil disturbance and erosion during construction and operation will maintain stormwater runoff water quality from the site.

Issue 4	Prevent Flooding And Changes To Groundwater
Statutory Requirements	*Environmental Protection Act 1994* *Environmental Protection (Water) Policy 1997*
Responsibility -	Proponent EPA
Mitigation Measures -	Refer to Growout Pond Construction and Operation Phase (Groundwater) EMP: • Monitoring bores screened in the Growout Pond area. Analysis of groundwater samples for conductivity. • Perimeter drains have been designed to capture floodwaters from the site and these waters will be released in areas where stormwater usually drains.
Effectiveness	Flooding will be avoided by an appropriate drainage network. Impacts on groundwater will be minimized.

Issue 5	Mitigate Any Impacts Of Flooding On The Development
Statutory Requirements	*Environmental Protection Act 1994* *Environmental Protection (Water) Policy 1997* The Australian Water Quality Guidelines for Fresh and Marine Waters, ANZECC, 1992 AS 1940 – 1993 - The Storage and Handling of Flammable and Combustible Liquids
Responsibility -	Proponent
Mitigation Measures -	Refer to Growout Pond Construction Phase EMP (Hydrology): • The design of the facility will be above the calculated and measured flood heights for the project site. • The design of culvert inlet and outlet structures shall include appropriate erosion control measures. • Slopes stabilised ASAP during construction. • Table drains stabilised to prevent erosion and to help filter water borne pollutants. • Alternate drainage paths provided where permanent or temporary works impact on the existing drainage path.
Effectiveness	• Flooding will be mitigated by having the facility located above calculated flood heights. Stormwater will also be collected and channelled around the site and allowed to discharge in areas where drainage usually occurs.

Issue 6	**Identify, Mitigate And Manage Acid Sulphate Soils And Any Leachate Due To The Disturbance Of Actual And Potential Acid Sulphate Soils**
Statutory Requirements	• Environmental Protection Act 1994 • Guidelines for Sampling and Analysis of Lowland Acid Sulphate Soils in Queensland 1998
Responsibility -	• Proponent • EPA
Mitigation Measures	Refer to Growout Pond and Pipeline Construction Phase (Acid Sulphate Soils) • Potential for ASS assessed from maps, plans and photos then presence confirmed by sampling soil in likely areas prior to and during ground excavations. • Excavations will not be left open for extended periods, and stockpiles bunded. • Lime will be used during ASS storage and soil replaced in original order. • Careful placement of extracted material, soil replaced in original order, and soil compacted in trench. • Careful placement of extracted material. Lime lower 0.5m at recommended rate. Lime surface of area to be used to place extracted material, place topsoil furthest from trench as a bund. Stage works to place pipeline in dry weather if possible. • Monitor groundwater discharge at creek and drain crossings daily during ground excavations. • Monitor soil pH daily during ground excavations.
Effectiveness	These measures will manage the impacts of ASS disturbed on sites and to prevent water quality degradation.

Issue 7	**Prevent The Passage Of Any Water Into The Surrounding Environment That May Contain Levels Of Antibiotics Or Hormones That May Impact Upon The Local Natural Environment**
Statutory Requirements	*Environmental Protection Act 1994* *Environmental Protection Regulation 1998* Commonwealth *Agricultural and Veterinary Chemicals Code Act 1994* National Registration Authority
Responsibility	Proponent EPA
Mitigation Measures	Refer to Growout Pond Operation Phase EMP (Discharge Containing Antibiotics or Hormones): • Antibacterials will not be used. • Hormones will not be used.
Effectiveness	As antibiotics and hormones will not be used by this project there will be no impact on the local natural environment.

Issue 8	**Manage Stock Feed To Ensure No Impact From It Or Any Additives On Waterway Health During Normal Operations**
Statutory Requirements	• Environmental Protection Act 1994 • Environmental Protection Regulation 1998
Responsibility	• Proponent • EPA
Mitigation Measures	Refer to Growout Pond Operation Phase EMP (Management of Stock Feed): • Precise feed management to reduce potential for over feeding. • Daily monitoring of pH and DO during discharge. • Monthly monitoring of TN, TP and TSS. If nutrient discharge levels exceed EPA limits, reduce feeding rates. • Stock feeds stored in air conditioned sheds with concrete floor to minimise increase in mice and rats.

Issue 8	**Manage Stock Feed To Ensure No Impact From It Or Any Additives On Waterway Health During Normal Operations**
Effectiveness	Meeting EPA nutrient discharge limits would ensure stock feed is managed to minimise any impact from it or any additives on waterway health during normal operations.

Issue 9	**Minimise Impacts Of Discharge Of Pond Discharge On The Marine Environment, Including Tidal Hydrology, Marine Plants, Fisheries And Marine Mammals And Reptiles**
Statutory Requirements	*Environment Protection and Biodiversity Conservation Act 1999* *Environmental Protection Act 1994* *Environmental Protection Regulation 1998* *Nature Conservation Act 1992* *Fisheries Act 1994* *Marine Plant Permit*
Responsibility	Proponent EA EPA DPI
Mitigation Measures	Refer to Growout Pond Operation Phase EMP (Pond Discharge): • Recirculating Prawn Farm: Discharge of pond water to primary sedimentation treatment ponds to allow for sedimentation, followed by secondary settlement treatment ponds. Return of secondary treatment pond water to the intake pond for recirculation where possible. • Pre-Sedimentation/Settlement Ponds: Used to reduce contaminant loads in discharge water. This will assist the removal of settled solids (and nutrients absorbed to these particles) from the water column by sedimentation. • Bioremediation Used to complement settlement ponds and reduce suspended solids, TN, TP, Chlorophyll *a* and bacteria, substrate provided for bacterial growth, baffles used in settlement ponds to reduce short-circuiting. Further techniques trialled. • Rigorous aeration management and precise feed management will be undertaken. • Pond Design: 80% of sediment accumulated on pond floors can come from erosion of pond walls. This will be minimised by vegetating / protecting pond walls above the waterline. Correct placement of aerators will be used. • Sludge management: • Sludge will be disposed of appropriately as per waste management EMP (Growout Pond Operation). • Lower stocking density and pond biomass through continuous harvesting . • Feed Capping to limit feed to a pond • Use of natural dyes to replace fertilizer (for initial seeding of pond)
Effectiveness	Measures to achieve ongoing minimisation of the Prawn Farm's environmental harm as stated above follow those provided in the EPA Marine Prawn Aquaculture Licensing Discussion Paper 2000. Recent trials by DPI and additional research have shown how these measures reduce contaminant loads in discharge waters.

Issue 10	**Control Aquaculture Disease Outbreaks**
Statutory Requirements	*Fisheries Act 1994* Commonwealth *Quarantine Act 1908* *GBRMP Act and regulations*
Responsibility	Proponent DPI (Animal and Plant Health Services) AQIS GBRMPA
Mitigation Measures	Refer to Growout Pond Operation Phase EMP (Disease Management): • Reporting of disease outbreaks as required by Queensland Fisheries Service and Great Barrier Reef Marine Park Authority • Screening of stock for diseases • Purchase of certified disease free post larvae • The only drugs and chemical substances to be used in the prawn farm operations will be those authorised by the National Registration Authority, prescribed by a veterinarian, or those substances that have been declared "Exempt from Registration" and their use shall be in accordance with the label's specifications. • Records of all introductions and disposals of prawns, including their source and destination, will be maintained. • Health monitoring will be undertaken on a regular basis. • Records of all disease outbreaks and parasite infections will be maintained. • Exchange pond water as required • Monitoring of pond water and substrate conditions will be • Monitoring of growth rates, feed conversion, specific growth rates undertaken regularly • Strict regulation of pond biomass and feeding rate • Screens in position to reduce escape stock • Facility in place to isolate individual ponds or sections of the operation • Extensive training program for staff.
Effectiveness	Sick or dying prawns will be submitted for examination and diagnosis by a prawn pathologist as soon as the condition(s) becomes apparent. Timely diagnosis and remediation, and correct culture environments should ensure aquaculture disease outbreaks are controlled.

Issue 11	**Control Of Organisms Such As *Vibrio Parahaemolyticus* And Other Pathogens During Production And Processing**
Statutory Requirements	*Food Production (Safety) Act 2000*
Responsibility	Proponent Safe Food Queensland AQIS
Mitigation Measures	• Food safety Management Plan in place across the organisation; • HACCP based Quality Assurance Program in place; • Staff training; • Occupational Health policies in place; • Conform with industry Codes of Practice; and • AQIS export accreditation.
Effectiveness	Regular third party audits to maintain quality and safety accreditation

Issue 12	Prevent Escape Of Cultured Stock In The Wild
Statutory Requirements	• Fisheries Act • Commonwealth Quarantine Act 1908
Responsibility	• Proponent • DPI (Animal and Plant Health Services) • GBRMPA
Mitigation Measures	• All ponds screened during operation and harvesting; • All discharge water pumped 4 km through pipeline likelihood of prawn survival low to negligible; and • Reduce bird predation through pond and stock management.
Effectiveness	Highly effective in the prevention of cultured stock to the environment.

Issue 13	**Control the impact of the project on those native flora and fauna species that could become 'problem species' in the context of this proposed aquaculture project**
Statutory Requirements	*Nature Conservation Act 1992* *Rural Lands Protection Act 1985*
Responsibility	Proponent EPA DPI
Mitigation Measures	Refer to Growout Pond Operation Phase EMP (Pest Management): • Screening of the intake and discharge waters. • Netting of ponds. • Bird management protocols including use of scarers, removal of waste, management of blooms. • Storage of stock-feeds in sheds with concrete floor. • Appropriate hygiene practices.
Effectiveness	These techniques will reduce the presence of native fauna on the site.

Issue 14	**Prevent Or Minimise The Creation Of Mosquito Breeding Sites, And/Or Adequately Manage Such Sites**
Statutory Requirements	Not applicable
Responsibility	• Proponent • DPI
Mitigation Measures	Refer to Growout Pond Operation Phase EMP (Mosquito Management): • Control mosquito breeding by pond design with steep sides and a constant water level. • The surface aerators will maintain turbulent conditions which will not support mosquito larvae. • Predation by prawns of mosquito larvae
Effectiveness	Mosquitos are unlikely to breed within the growout ponds as the water movement is not conducive to mosquito larval development. Although unlikely, mosquito larval development may occur in the settlement ponds. However local fish species will naturally inhabit the ponds and will consequently eat mosquito larvae.

Issue 15	**Prevent Or Minimise Impacts On Terrestrial Fauna And Fauna Habitat And Prevent Impacts On Terrestrial Species Listed On The EPBC Act And The NCWR**
Statutory Requirements	*Environment Protection and Biodiversity Conservation Act 1999* *Environmental Protection Act 1994* *Environmental Protection Regulation 1998* *Nature Conservation Act 1992* *Fisheries Act 1994* *Marine Plant Permit*
Responsibility	Proponent EA EPA DPI
Mitigation Measures	Refer to Growout Pond and Pipeline Construction Phase EMP (Flora and Fauna) • The Site Selected Has Been Effectively Cleared For Cattle Grazing. • The Ecological Footprint Of The Road Has Been Minimized. The Road Will Revegetated And Will Have Minimal Impact On Any Hydrological Feature Of The Wetland. • The Pump Station Site Is Situated In The Road Reserve And Has A Small Ecological Footprint.
Effectiveness	The land where the prawn farm is to be situated has been effectively cleared for cattle grazing. Much of the ecological values of the site have been lost. The impact of the construction of the pipeline route will be minimized by the short period of construction and the small ecological footprint of the road and pump station.

Issue 16	**Mitigate/ Rehabilitate Areas Of Marine Plant Loss Resulting From Impacts On The Marine Environment And Important Habitats Particularly Marine Plants, Intertidal, Lagoonal And Soft Bottomed Environments**
Statutory Requirements	*Environment Protection and Biodiversity Conservation Act 1999* *Environmental Protection Act 1994* *Environmental Protection Regulation 1998* *Nature Conservation Act 1992* *Fisheries Act 1994* *Marine Plant Permit*
Responsibility	Proponent EA EPA DPI
Mitigation Measures	• Refer to Pipeline Construction Phase EMP (Intake and Discharge Pipeline Construction) for measures to mitigate/rehabilitate areas of marine plant loss and intertidal environments. • Refer to Pipeline Construction Phase EMP (Pipeline Construction) for measures to mitigate/rehabilitate areas of marine plant loss in the wetland area. • A small area of seagrass (<5 %) of potential seagrass habitat in Abbot Bay may be loss as a result of discharge.
Effectiveness	There will be no loss of terrestrial marine plants. Seagrass may be loss during the installation of the intake and discharge pipelines. A small area of seagrass (<5 %) of potential seagrass habitat in Abbot Bay may be lost as a result of discharge.

Issue 17	**Minimise And Where Necessary Remediate Vegetation Disturbance**
Statutory Requirements	*Vegetation Management Act 1999* *Fisheries Act 1994* *Marine Plant Permit*
Responsibility	Proponent NRM DPI
Mitigation Measures	Refer to EMP (Growout Pond and Pipeline Construction Phase) • Revegetation of the pipeline route will be undertaken with local grass or wetland species.
Effectiveness	There will be little disturbance of terrestrial vegetation. The pipeline route will be revegetated with local species. There may be loss of seagrass

Issue 18	**Prevent Or Minimise Direct And/Or Indirect Impacts On Biotic And Non-Biotic World Heritage Values Of The Area During Construction And Operation**
Statutory Requirements	*Environment Protection and Biodiversity Conservation Act 1999* *Environmental Protection Act 1994* *Environmental Protection Regulation 1998* *Nature Conservation Act 1992* *Fisheries Act 1994* *Marine Plant Permit* AS4282-1997: The Control of Obtrusive Effects of Outdoor Lighting
Responsibility	Proponent EA EPA DPI
Mitigation Measures	Refer to EMP <u>Dugongs</u> • Indirect effects of pond discharge unlikely to impact on dugong populations in Abbott Bay. However Prawn farm design using best practice environmental design options will be used (refer to Operating Features section). • Discharge standards and monitoring regimes as per EPA licence requirements will be adhered to, to minimise and monitor impacts on water quality of receiving environments. <u>Marine Turtles</u> • Facility lighting on beaches will not be required. • Discharge standards and monitoring regimes as per EPA licence requirements will be adhered to, to minimise and monitor impacts on water quality of receiving environments. <u>Cetaceans</u> • Implement management actions as per EMPs (Chemical storage and spill management) to avoid accidental discharge of environmentally hazardous materials into the Marine Park.

Issue 18	**Prevent Or Minimise Direct And/Or Indirect Impacts On Biotic And Non-Biotic World Heritage Values Of The Area During Construction And Operation**
	Wetlands of International and National Importance: • The intake and discharge pipeline will traverse through Southern Upstart Bay Wetland, listed on the directory of important wetlands in Australia. Temporary effects of pipeline construction will impact on the wetland. Mitigation measures are identified in the Pipeline Construction EMP (Soil Erosion and Sediment Control, Acid Sulphate Soils, Contaminated Land, Pipeline Construction, etc). Longer term effects associated with pipeline operation (including erosion and sediment control, weed invasion and loss of visual amenity) are mitigated in the relevant Pipeline Operation EMPs. Fish Habitat Areas: • The development site and the proposed pipeline intake and discharge site are not located within a declared Fish Habitat Area (FHA). The Burdekin Fish Habitat Area (FHA005), located in Upstart Bay, is the nearest FHA to the development site and pond discharge will not be discharged into this FHA. Tidal flow will also not translocate pond discharge into Upstart Bay. Dugong Protection Areas • The development site and the proposed pipeline intake and discharge site are not located within a Dugong Protection Area (DPA). The nearest DPA is the Upstart Bay Dugong Sanctuary and pond discharge will not be discharged into this FHA. Tidal flow will also not translocate pond discharge into Upstart Bay. National Parks • The main site and pipeline site will not directly effect either the Abbot Bay Resources Reserve or Cape Upstart National Park. A temporary increase of sediment loads in the Elliott River may occur as a result of construction. Mitigation measures for this potential impact are included in the Growout Pond Construction EMP (Soil Erosion and Sediment Control). National Estate • The intake and discharge pipeline will traverse through Cape Upstart Lowlands National Estate, identified as containing Indigenous Values of National Estate significance. Direct impacts to the National Estate could occur from pipeline construction. Mitigation measures to address these impacts are listed in the Pipeline Construction EMP (Cultural Heritage) and recommendation of the Cultural Heritage Assessment Report
Effectiveness	Measures to achieve ongoing minimisation of the Prawn Farm's environmental harm as stated above follow those provided in the EPA Marine Prawn Aquaculture Licensing Discussion Paper 2000. Recent trials by DPI and additional research have shown how these measures reduce contaminant loads in discharge waters.

Issue 19	**Avoid, (Or In The Case Of Damage, Rehabilitate) Impacts On Sites And Values Of Environmental Or Heritage Significance (World Heritage, National Estate Etc)**
Statutory Requirements	*Environment Protection and Biodiversity Conservation Act 1999* *Environmental Protection Act 1994* *Environmental Protection Regulation 1998* *Nature Conservation Act 1992* *Fisheries Act 1994* *Marine Plant Permit*
Responsibility	Proponent EA EPA DPI
Mitigation Measures	• Refer to the Pipeline Construction EMP (Cultural Heritage) for measures to avoid impact, or rehabilitate damage on Cape Upstart Lowlands National Estate. • Refer to the Pipeline Construction EMP (Pipeline Construction, Flora and Fauna) for measures to avoid impact, or rehabilitate damage on Southern Upstart Bay Wetland. • Refer to the Pipeline Construction EMP (Marine plants) for measures to avoid impact, or rehabilitate damage to marine plants in the World Heritage Area. • Refer to the Growout Pond Operation EMP (Pond Discharge) for measures to minimise impact on values of the World Heritage Area (eg. marine mammals and reptiles).
Effectiveness	Cultural heritage sites are maintained

Issue 20	**Control Noise**
Statutory Requirements	*Environmental Protection Act 1994* *Environmental Protection (Noise) Policy 1997* Noise level guidelines in the *Environmental Protection (Interim) Regulation 1995* AS 1055-1997 Acoustics – Description and Measurement of Environmental Noise AS 2670 Evaluation of Human Exposure to Whole-Body Vibration.
Responsibility	Proponent EPA
Mitigation Measures	Refer to (Growout Pond and Pipeline Construction and Operation Phase EMP (Noise): • Regular maintenance of equipment. • Construction to proceed where possible within designated EPA (Noise) time boundaries. • Liaison with community on construction times and transportation routes for path of least disturbance.
Effectiveness	Noise criteria are met

Issue 21	Prevent And Control Spills
Statutory Requirements	*Environmental Protection Act 1994* *Environmental Protection Regulation 1998* *Workplace Health and Safety Act 1995* AS 1940-1993: The Storage and Handling of Flammable and Combustible Liquids AS 3780-1994: The Storage and Handling of Corrosive Substances
Responsibility	Proponent EPA
Mitigation Measures	Refer to Growout Pond Construction and Operation Phase EMP (Chemical Storage and Spill Management): • Inventory of all potentially hazardous substances and store MSDS in a register. • Provide hazard materials awareness training and spill management. • Design containment areas so that spill can be recovered and containment areas are kept free of waste. • Storage areas to be covered and bunded, with impervious flooring and appropriately signed – located away from stormwater drainage lines. • Inspect storage areas weekly for any defects with bundling, floor, cover, structure, hoses and valves etc. • Ensure that equipment, transfer hoses and valves that use fuel, oils or other chemicals are regularly maintained. • Ensure appropriate spill containment devices are available at key points.
Effectiveness	No spillages leading to wastewater contamination

Issue 22	Prevent Pollution From Solid And Liquid Waste Including Options For Reuse And Recycling
Statutory Requirements	*Environmental Protection (Waste) Policy 2000* *Environmental Protection (Waste) Regulation 2000* AS 1940 – 1993 The Storage and Handling of Flammable and Combustible Liquids Waste Management Strategy for Queensland
Responsibility	Proponent EPA
Mitigation Measures	Refer to Growout Pond and Pipeline Construction and Operation Phase EMPs (Waste Management): • Develop and implement a waste management plan. • Check all vegetation for commercially useful plants and timber prior to commencing clearing. • Favour suppliers which use returnable packaging materials. • Ensure that all personnel performing activities relating to environmental management practices are trained, qualified and competent. • Avoid over ordering of materials and consumables. • Segregation of all waste. • Assess further opportunities for materials reuse/ recycling. • Ensure that waste storage and disposal is undertaken according to best practices. • Ensure that there is an effective reporting system for waste storage and disposal. • Provide adequate on-site facilities for liquid waste storage. • Process oily wastes through an oil/water separator. • Ensure disposal of oily waste is appropriate. • Assessment of environmental impacts of proposed waste management methods.
Effectiveness	Wastes are minimised

Issue 23	**Reduce The Potential For Contamination Of The Harvested Product By Soil Contaminants Such As Heavy Metals And Pesticides**
Statutory Requirements	*Environmental Protection (Waste) Policy 2000* *Environmental Protection (Waste) Regulation 2000* Waste Management Strategy for Queensland
Responsibility	Proponent
Mitigation Measures	Refer to EMP (Growout Pond Operation Phase)
Effectiveness	Soil contamination is minimised

Issue 24	**Minimise And Mitigate Impacts On The Existing Cultural Heritage Values Of Any Cultural Heritage Items And/Or Places Located At The Site Or Adjacent To The Site**
Statutory Requirements	*Native Title Act 1993* *Native Title (Queensland) Act 1993* *Queensland Heritage Act 1992* *Queensland Heritage Regulation 1992* *Cultural Record (Landscapes Queensland and Queensland estates) Act 1987* EPA guidelines for Reporting on Cultural Heritage in Queensland.
Responsibility	Proponent EPA
Mitigation Measures	Refer to Growout Pond and Pipeline Construction Phase EMP (Cultural Heritage): • Assessment of culturally sensitive sites/ artefacts. • Preparation of a Memorandum of Understanding with the Traditional Owners of the site • Development of a Cultural Heritage Management Plan (CHMP). • Cultural Heritage training and awareness. • Cultural heritage salvage and monitoring of construction activities in accordance with EPA permit. • Establishment of temporary storage facility for artefacts.
Effectiveness	Cultural heritage is preserved

Issue 25	**Minimise Any Deleterious Effects On Economic, Social, Recreational, Conservation, Cultural And Community Activities And Resources**
Statutory Requirements	*Environmental Protection Act 1994*
Responsibility	Proponent
Mitigation Measures	Refer to EMP (Growout Pond Construction and Operation Phase)
Effectiveness	Impacts are minimised on economic, social, recreational, conservation, cultural and community activities and resources

Issue 26	**Minimise And Mitigate Impacts On The Community As A Consequence Of The Impact Of Natural Hazards On The Project**
Statutory Requirements	*Environmental Protection Act 1994*
Responsibility	Proponent
Mitigation Measures	Refer to EMP (Growout Pond Construction and Operation Phase)
Effectiveness	Impacts are minimised on the community as a consequence of the impact of natural hazards on the project

Issue 27	**Educate Employees And Construction Managers In Relation To Their Environmental Protection Obligations**
Statutory Requirements	*Environmental Protection Act 1994*
Responsibility	Proponent
Mitigation Measures	Refer to EMP (Growout Pond Construction and Operation Phase)
Effectiveness	Environmental regulations will be meet

Issue 28	**Train Staff On Appropriate Operational, Water Quality And Disease Management Procedures**
Statutory Requirements	*Environmental Protection Act 1994, Fisheries Act 1994*
Responsibility	Proponent
Mitigation Measures	Refer to EMP (Growout Pond Operation Phase) Refer to training Section and list of National Seafood Industry Training Package Competencies that will be delivered in the Pacific Reef Training Plan appended to the Pacific Reef Guthalungra Business Plan
Effectiveness	Environmental and disease regulations will be meet

Issue 29	**Secure Infrastructure, Stock And Equipment**
Statutory Requirements	Not applicable
Responsibility	Proponent
Mitigation Measures	Refer to EMP (Growout Pond Construction and Operation Phase) • A rigid security system will be used, with weekly visual inspections of the security complex, to ensure no breaches or possible breaches occur.
Effectiveness	Secure infrastructure will enhance productivity and minimise environmental harm

9.3 Monitoring Programs

9.3.1 Water Quality Monitoring

Intake and discharge water quality monitoring will take place:

- At the pump station;
- In Abbot Bay, water quality samples will be collected at GPS located points at 500 and 1000 m north and south of the discharge point; and
- Samples will be collected weekly in appropriately labelled bottles, iced where required and transported immediately to a NATA registered laboratory in Townsville.

Samples will be collected by prawn farm staff who have undertaken an accredited water sampling course. The manager of the prawn farm will have the responsibility of liaising with all regulatory agencies. Any non compliance samples will be reported as required by the various licensing agencies.

The parameters that will be analysed are:

- Total Suspended Solids;
- Chlorophyll a;
- Total Nitrogen; and
- Total phosphorus.

Real time flow will be also be recorded at the discharge point.

Discharge guidelines for the aquaculture industry are still being discussed. Contingency plans will be discussed with the various regulatory agencies when consensus has been reached between the aquaculture industry and these agencies on appropriate discharge guidelines.

Seagrass monitoring

Seagrass monitoring will be undertaken in Abbot Bay. The intensity of sampling should not be decided at this stage but after consultation with the relevant government agencies.

Underwood in Harding and Fisher (1999) gives an excellent overview about practical environmental sampling which should be considered in the seagrass monitoring program. Underwood considers before any sampling is done, the power of the chosen analysis should be determined. This requires some estimation of intrinsic variance and a determination of an appropriate effect size. Then the appropriate number of samples to be taken in each area can be calculated as part of the design of the sampling program.

These issues have to be discussed with the regulatory agencies so that agreed and appropriate monitoring program can be undertaken.

As Underwood describes, determining the relevant size of effect is not an easy mater. It requires much more informed debate by regulators, developers, environmental scientists, the public and by legal practitioners. The issue is not simply to assert that there will or there will not be some ill-defined impact. Instead, consensus must be reached about how much impact would be critical for continued functioning of the affected system at the appropriate spatial scale.

So, instead of declaring that there will be no impact or simply asserting that there will be reduced area of seagrass, the debate should recognise that there may be an anthropogenic change and that this is probably tolerable or acceptable up to a certain magnitude. In the example given by Underwood, there is a difference of ten worms (or about 2.5 per cent of the average) either side of the average in two undisturbed locations. This is natural. On the other hand, we may know (from relevant previous research) that a decrease of 50 per cent of the numbers is indicative of loss of diversity, disruption of food webs, etc.

In such a case, the effect size needed to be detected in sampling must be set larger than 2.5 per cent (which is natural), but smaller than 50 per cent (which would be detected too late to prevent loss of integrity of the system). So, an effect size round 40 per cent might be considered appropriate. Thus, we need to design the sampling to have large power for a difference of 380 and 400 worms per unit in undisturbed areas and 230 worms per core in the potentially impacted area (i.e. 40 per cent fewer than the mean number in control areas).

If a larger impact were to occur, the power to detect it would be even greater, so we need only define a minimal effect. If a difference of at least 40 per cent were defined to be an impact (ie this is defined to be the minimal difference that causes concern), the previous example would not indicate an impact – even though there was more difference between control and disturbed areas than occurs between disturbed areas.

An estimate of the variance among replicates can be obtained from previous similar sampling if there has been some. Alternatively, variance can be estimated by a pilot sample consisting of a few replicates in each of the areas to be monitored.

Armed with these and having chosen α (say as $P = 0.05$ to be consistent with most environmental sampling), the power of sampling with different sizes of sample can be determined using ϕ and appropriate tables, algorithms or software. The size of sampling to be used would then be chosen to give large power.

The number of samples needed may exceed the budget. If this happens, under a precautionary principle, α would have to be *increased* to increase power for a given maximal size of sample. In practice, increasing α means that there will be an increased chance of declaring there to be an impact when none has occurred. This should be pointed out to those who are likely to be aversely affected by such an erroneous finding (for example, the developer who will be forced to take preventive action at an unnecessary cost; or the regulatory agencies who may be sued).

The appropriate advice to such parties is that α can only be reduced again – thereby decreasing the chance of errors affecting the development – if the power of the experiment is maintained. The variance that influences power is a property of the biological system and cannot possibly be altered.

The effect size that the sampling is designed to detect (ie the minimal difference that has been defined to be an impact) has already been negotiated, so that also cannot be altered. Because neither of these can be changed, the only variable left is an increase in the number of replicate samples as the only option. So, the developers and others can have decreased probability of Type I error (α, the probability of declaring an impact is present when there is none) by paying more for the appropriate sampling, allowing an increase in sampling. No other alternative would be consistent with a precautionary principle.

Such programs are currently being tested by both prawn farm operators and proponents in Queensland with increasing knowledge of the opportunities and constraints of such biological monitoring programs.

Acid Sulphate Soils (ASS) Runoff Monitoring

Monitoring of waters associated with ASS are discussed in the Environmental Monitoring Plan discussed in Section 9.

Antibiotics and Hormones

No antibiotics and hormones will be used on site.

Groundwater

A number of ground water bores have been installed on site. Groundwater levels will be recorded monthly on site. Water quality samples will be collected six monthly basis and measured for conductivity. Sampling will be undertaken by a qualified science or engineering graduate from the staff of the prawn farm.

Reporting will be undertaken on regular basis to all of the regulatory agencies involved. Internal reporting will be part of an accredited Environmental Management System.

Mangroves

No mangrove communities will affected by the project.

Monitoring of bed and bank stability around the intake and discharge points

The pipeline will be buried and anchored in Abbot Bay. The pipeline will be videoed directly after construction. Annual video runs will be made of the line to determine if anchor points are satisfactory and if there is any bank instability which will lead to erosion around the pipe, intake and discharge structures. Based upon a review of the video, mitigation measures may be adopted.

Remote Infrastructure Monitoring

The pump station and pipeline will have pressure gauges to confirm breakages in the pumping system and activate shut down systems.

Settlement Pond Holding Capacity

The settlement ponds have been over deigned for the predicted flow rates from the ponds. Each of the three stages will monitor flows from the one outlet from the settlement ponds. A flow meter will record these flows on a daily basis. Daily discharges across the farm can then be calculated and monitored against licence conditions.

Feed Consumption and Conversion Monitoring

Pacific Reef has developed a detailed program for feed data collection including a suite of recording techniques that are commercial property of the organisation. A detailed description of feed monitoring and recording techniques will not be included in this EIS. A summary of the feeding undertaken on the farm is provided in Section 4.4 and summarised below.

Feed Consumption Monitoring

Feed is placed on feed trays that are lowered into ponds after each feed. The feed trays are monitored after each feed (at least 4 times daily). Subsequent feeding rates are adjusted in response to the feed uptake by the prawns. The feed remaining on the feed trays after a set period of time is an indication of the feeding rate of the prawns.

Various factors impact on the feeding rate of pond reared prawns including:

- Biomass of prawns in the pond;
- Animal size;
- Manufacturers recommended feeding rate;
- Stock health;
- Pond physio-chemical characteristics such as salinity and DO level; and
- Climatic conditions, particularly temperature.

All of these issues are taken into account by experienced staff when assessing feeding rate and rates are changed accordingly.

Pacific Reef has adopted a feed cap approach to limiting the feeding rates across the farm. The ponds will be stocked and harvested in such a way as to limit the maximum biomass in a pond to 6 tonnes. This means that an individual feed will not exceed 30 kg.

Daily Feed Rate is adjusted according to the rate of growth of the prawns and the food conversion ratio.

Monitoring Feed Conversion Ratio (FCR)

In order to determine the FCR of the pond, an estimation of the increase in biomass in required. The average weight of the stock in each pond is ascertained each month by taking representative sample weights of the stock in a pond. A cast net is used to collect prawns, which are weighed, and an averaged determined. An appropriate attrition rate is used and the standing biomass of the pond is estimated.

It is common practice to record the monthly FCR in order to assess and adjust the feeding rates of the stock.

The monthly Feed Conversion Ratio is calculated as follows:

Monthly FCR = Monthly increase in pond biomass/ amount of feed distributed to the pond over the month.

Feed Quality

Pacific Reef Fisheries are committed to the purchase of the best possible feed available in the market. Feed quality and utilisation are considered to be areas in which the greatest improvement in discharge quality and environmental impact can be made. This is discussed in more detail in Section 4.

Monitoring of Pathogens during Processing to Prevent Food Borne Diseases.

Pacific Reef Fisheries have developed an extensive Food Safety Plan as part of their HACCP Program and have obtained AQIS export approval at their current prawn processing operation at Alva Beach, Ayr. The information contained in the Food Safety Plan is confidential however the procedures and practices currently used at Alva Beach will be introduced at Guthalungra and a HACCP program implemented for processing prior to operation.