20. Environmental Management Plan

This Environmental Management Plan (EMP) has been prepared in order to propose environmental protection commitments to protect the environmental values potentially affected by the proposed rail works.

Commitments are proposed and identified, including environmental protection objectives, standards, measurable indicators and control strategies (ie to demonstrate how the objectives will be achieved).

The EMP will be refined and expanded further as required during the detailed design phase of the Project and through consultation with State and Local Government agencies.

20.1 Introduction

This EMP has been prepared for the purpose of addressing the EIS requirements under the final ToR. The EMP will be further expanded following the Coordinator-General's decision on the Project and during the detailed design phase of the Project.

20.1.1 Basis for the Plan

An important requirement of any project is to prepare an EMP to assist in the timely and proper implementation of environmental safeguards proposed as a result of the planning and environmental assessments.

The potential exists for the degradation of the site and surrounding natural values. This would be likely to occur during construction and operational as identified during the course of the environmental studies performed for this Project.

Planning and design measures are therefore necessary to demonstrate that all reasonable measures are taken to protect the existing environmental values, which may be impacted during construction and operation.

20.1.2 Aim of the Plan

The purpose of this EMP is to detail the actions and procedures to be carried out during the course of the Project in order to mitigate adverse and enhance beneficial environmental and social impacts. The environmental studies and consultation conducted as part of the EIS have identified the potential construction and operational impacts of proceeding with the Project.

A range of mitigation measures that need to be implemented have been identified from the EIS environmental studies to mitigate and manage these potential impacts.

The EMP addresses the proposed mitigation measures, records environmental commitments and establishes the framework to demonstrate they are implemented during each Project stage. In effect, the EMP becomes the key reference document in that it converts the undertakings and recommendations of the environmental studies into a set of actions and commitments to be followed by the designers, constructors and QR.

The EMP will also serve as the benchmark for measuring the effectiveness of environmental protection and management. This can be achieved by specifying the monitoring, reporting and auditing requirements, with nominated responsibilities and timing to demonstrate the necessary mitigation measures are met. The EMP also makes provision, as appropriate, for unforseen events by outlining corrective actions which may be implemented in these situations.

20.1.3 Format of the EMP

The EMP is structured as follows:

- Relevant statutory obligations and regulatory framework within which the Project will be required to progress (Section 20.2)
- Management structure and general project responsibilities for staff involved in the project (Section 20.3)
- Environmental management objectives for particular environmental aspects (Section 20.4)
- Subsequent stages of the environmental management process during the detailed design, construction and operational stages of the Project (Section 20.5)

To increase the useability of the EMP, it has been prepared as a stand alone document.

20.1.4 QR Environmental Management Approach

QR is committed to effective management of its environmental risks.

QR is taking a proactive approach to meeting its environmental obligations and continually improving environmental performance through an EMS that is consistent with ISO14001 and AS3806 Compliance Programmes. QR's EMS sits under the Governance and Management System Framework which applies risk principles to all its activities. Under this framework, QR Board approved policies are supported by management systems, which detail how the policy goals are to be achieved in QR. This gives effect to the QR Board Governance Charter including the Director's responsibility for, as well as the organisational role in, managing the interaction between economic efficiency, social obligations and environmental responsibility.

QR's EMS is designed to provide the framework for ensuring that the associated Policy is implemented, achieved, reviewed and maintained. The EMS includes standards and specifications which are mandatory and associated documents which are guidelines to assist with implementation.

QR formally issued its EMS in August 1999 recognising that the system would need to be refined over time with the benefit of experience and changing with internal and external environments. QR's EMS is currently being substantially revised to both align and integrate within QR's recently revised Governance and Management System Framework.

20.2 Statutory obligations

20.2.1 National Strategies and International Conventions

The following national policies provide the guiding principles for the design, construction and operation of the Project:

- National Ecologically Sustainable Development (ESD) Strategy 1992
- National Greenhouse Response Strategy 1992
- Framework Convention on Climate Change 1994

Other international conventions and agreements relevant to the Project include:

- **CAMBA** – Agreement between the Government of Australia and the Government of the Peoples Republic of China for the Protection of Migratory Birds and their environment
- **JAMBA** – Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and their environment
- **Ramsar Convention on Wetlands** – The Convention on wetlands, signed in Ramsar, Iran, 1971, is an inter-governmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources

In addition to the conventions and agreements above, a further two conventions are identified as being indirectly relevant to the Project. These are:

- **CMS or Bonn Convention** – The Convention on the Conservation of Migratory Species of Wild Animals aim is to conserve terrestrial, marine and avian migratory species throughout their range. The convention is aimed at restricting harvesting, conserving habitats and controlling other adverse factors. The species covered include marine mammals, sea turtles and sea birds.
- **Convention on Biological Diversity** – is a comprehensive, binding agreement covering the use and conservation of biodiversity.

20.2.2 Regulatory process

The following legislation is considered relevant to the Project:

- *Aboriginal Cultural Heritage Act 2003 (Qld)*
- *Animal Care and Protection Act 2001 (Qld)*
- *Dangerous Goods Safety Management Act 2001 (Qld)*
- *Environmental Protection Act 1994 (Qld)*
- *Environment Protection and Biodiversity Conservation Act 1999 (Cth)*
- *Explosives Act 1999 (Qld)*
- *Fisheries Act 1994 (Qld)*
- *Health Regulation 1996 (Qld)*
- *Integrated Planning Act 1997 (Qld)*
- *Lands Act 1994 (Qld)*
- *Land Protection (Pest and Stock Route Management) Act 2002 (Qld)*
- *Native Title Act 1993 (Cth)*
- *Nature Conservation Act 1992 (Qld)*
- *Plant Protection (Red Imported Fire Ant) Quarantine Notice 2001 (Qld)*
- *Queensland Heritage Act 1992 (Qld)*
- *Soil Conservation Act 1986 (Qld)*
- *State Development and Public Works Organisation Act 1971 (Qld)*
- *Transport Infrastructure Act 1994 (Qld)*
- *Transport Planning and Coordination Act 1994 (Qld)*
- *Vegetation Management Act 1999 (Qld)*
- *Water Act 2000 (Qld)*
- *Workplace Health and Safety Act 1995 (Qld)*

Relevant statutory approvals (refer Section 3.7) will be obtained prior to construction.

20.2.3 Monitoring and auditing standards and guidelines

The following standards apply to monitoring and auditing of performance:

Water and wastewater

- Australian and New Zealand Environment and Conservation Council (ANZECC)/National Health and Medical Research Council (NHMRC) – National Water Quality Management Strategy
- EPA Queensland Water Quality Objectives 2006
- EPA Water Quality Sampling Manual, Third Edition, 1999 – For use in Testing for Compliance with the *Environmental Protection Act 1994*. Third Edition (Department of Environment Heritage 1999)
- EPA Queensland Water Recycling Guidelines December 2005
- Standard Methods of the Examination of Water and Wastewater – American Public Health Association (APHA)/Australian Waste Water Association (AWWA)

- AS 2031 Selection of Containers and Preservation of Water Samples for Chemical and Microbiological Analysis

Soils

- ANZECC/NHMRC – Guidelines for the Assessment and Management of Contaminated Sites
- Queensland Government Chemical Laboratory – Guidelines for Soil Sampling
- "Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland" (Department of Environment 1998)

Air quality

- Australian Standard AS 3580 Methods of Sampling and Analysis of Ambient Air

Noise and vibration

- QR Code of Practice for Railway Noise Management
- Noise Measurement Manual, Third Edition, 2000
- AS 1055.1 and AS 1055.2 Acoustics – Description and Management of Environmental Noise
- AS 2187 Explosives – Storage Transport and Use (Explosives Code)
- AS 2436 Guide to Noise Control on Construction, Maintenance and Demolition Sites
- AS 2659.1 Guide to the Use of Sound Measuring Equipment
- AS 2659 Sound Level Meters

Dangerous goods

- AS 1216 Classification, Hazard Identification and Information Systems for Dangerous Goods
- AS 1678 Emergency Procedure Guides – Transport
- AS 1940 Storage and Handling of Flammable and Combustible Liquids
- AS 2508 Safe Storage and Handling Information Cards for Hazardous Materials
- AS 2809 Road Tank Vehicles for Dangerous Goods
- AS 2931 Selection and Use of Emergency Procedure Guides for Transport of Dangerous Goods

20.2.4 Best practice

For the purposes of the EMP the term "best practice" refers to the environmental management of an activity that achieves an ongoing minimisation of environmental harm of the activities through cost effective and practical measures currently used nationally and internationally for the activity.

20.3 Project management

The project delivery method for the rail infrastructure is being considered by QR. For the purposes of this EMP the following roles have been used:

- Detailed Design Consultant
- Environmental Consultant
- Construction Contractor
- Superintendent
- Operator

20.4 Environmental management strategies

20.4.1 Structure

The structure of the environmental management strategies that follow are to assist in separate consideration of the relevant environmental issues. It is intended that this format is user-friendly and is amenable to review and amendment. Where appropriate, management strategies for individual sections of the Project have been identified. The contents of a typical strategy are described below.

- Commitment or objective
- Mitigation measures (design, construction and operation where relevant)

20.4.2 Land use

Objectives

- Design works in order to minimise the need for land resumption and adverse impacts to existing and adjacent land uses.
- Set out procedures for accessing the work sites on public or private land, for the purpose of minimising potential impacts to the environment and to landowners and occupiers.

Mitigation measures

Design

The following measures will be implemented during the design phase:

- Directly affected property owners will be compensated for the acquisition of their land by monetary settlement. Leaseholders will have similar access to compensation to assist with relocation. QR will maintain communication with key stakeholders concerning potential land use incompatibilities.
- There is an opportunity to offset changes to individual property access by consolidating access in key locations. It will be necessary to maintain access from one side to another across the rail line for severed properties. This could be facilitated through underpasses for stock and vehicles at appropriate locations.
- Surplus land not required for the Project or potential future rail development may be returned to adjoining landowners or leased to rural or industrial activities.
- The forestry plantation trial to the north of the Gladstone-Mount Larcom Road is to be occupied by the proposed rail yards. The construction programme could be staged to maximise the amount of data obtained from the trial.
- GRC to include Western Moura Link Option on the amended GRC Planning Scheme.

20.4.3 Topography, geology and soils

Objectives

- To manage ground disturbance activities during pre-construction, construction and operational activities to minimise environmental impacts and maximise the potential for successful land rehabilitation following construction.
- Manage the storage, transport and handling of hazardous materials during site construction and operational activities to protect the environment.
- Manage the health and environmental risks from contaminated land.

- Manage the way contaminated soil is removed and disposed to ensure the risk is not relocated to another site.
- Minimise soil erosion and loss of fertile topsoil material.
- Aim to improve soil and geotechnical stability.

Mitigation measures

Design

To minimise potential impacts discussed above the following mitigation measures will be applied in design:

- Minimise the area of disturbance during each stage to that required to enable the safe construction, operation and maintenance of the rail corridor and Aldoga Rail Yard.
- Scheduling of works with consideration to periods of higher rainfall (summer months).
- Fill embankments during detailed design will be assessed in terms of both settlement and stability.
- The cut batters of line cuttings and the widening of cuttings will be assessed for stability. The cut batter angles will need to be appraised during detailed design based on material strengths and other geotechnical properties. Stability analysis will be required to assess the factor of safety of these cut slopes.
- A detailed geotechnical investigation will be completed to obtain information relating to stability assessments (including a rock mechanics study), foundation design parameter requirements and potential settlement of fill embankments and foundations.
- Stability of the Calliope River banks will be assessed and treatment measures be designed to control erosion and sediment movement.
- Minimise soil disturbance in areas listed on the Environmental Management Register (EMR). An EPA Waste Disposal Permit is required if this soil is to be moved from an EMR site.
- Where soil disturbance is required on an EMR site an appropriate environmental site investigation is undertaken. For example, identify whether the low level contaminated soil stockpile located on Lot 72 on SP122249 needs to be relocated during construction.
- Minimise disturbance of areas identified as susceptible to erosion.
- Where practical use existing tracks. Design new access tracks (permanent and temporary) with the aim of minimising disturbance of substrate and vegetation.
- Complete a cut and fill balance to minimise the external sourcing of fill.

Construction

To minimise potential impacts during construction, the following mitigation measures will be applied:

- Bulk earthworks for both excavation and filling activities will be carried out in a controlled and programmed manner.
- Minimise clearance of vegetation to that necessary for construction (ie staging of the works).
- Develop and implement a Soil Handling and Management Sub Plan to address:
  - Erosion and sediment control with particular consideration to erosion prone areas instream works.

  - The movement of actual or potentially contaminated soil (from the existing rail corridor or any properties listed on the EMR (eg Lots 71 and 72 on SP122249), including the application for an EPA Waste Disposal Permit (required for removal of soil from a land parcel which is listed on the EMR)).
  - Topsoil management.
  - Red imported fire ants from adjacent sites in accordance with QR's Fire Ant Risk Management Plan.
- Stockpiling of material (soil and mulch) to be within designated areas and/or offsite. This should be within areas that have been previously disturbed and/or cleared within the project area and away from sensitive receptors.
- Minimise the potential filling, draining or alteration of any waterway to that necessary for construction purposes only. These works are to be carried out in accordance with approval conditions only.
- Where necessary, drainage and overland water flow will be directed to stabilised areas. As soon as practical, vegetation will be established after practical completion of an area.
- Water quality monitoring will be undertaken following rain events significant enough to cause preventative and containment measures to become deflective and visual inspections reveal discolouration (eg turbidity, oil) in receiving waters.

Operation

To minimise potential impacts during operation, the following mitigation measures will be implemented:

- A level of maintenance on surface and subsurface drains will be required to minimise risk of impact to surrounding and downstream environments and structures.
- Vegetation on the rail embankment slopes should be maintained to prevent slope face degradation.

20.4.4 Terrestrial flora

Objectives

- To minimise the potential for impacts to terrestrial flora, REs and vegetation communities, particularly those of State and/or national listed significance, during design, construction, and operational activities.
- Minimise clearance of terrestrial vegetation and habitat.
- Maximise vegetation retention adjacent to REs where possible.
- Rehabilitate and maintain disturbed areas to minimise colonisation by weeds.
- Implement a rehabilitation plan for the revegetation and reinstatement of terrestrial habitat.
- Implement a weed management plan in consultation with relevant local and State agencies.

Mitigation measures

Design

The following mitigation measures will be implemented during the detailed design phase of the Project to minimise the impact on the floral assemblages within the area:

- Clearing of remnant vegetation will be restricted to the minimum required to enable the safe construction, operation and maintenance of the rail corridor and Aldoga Rail Yard. Including minimising the disturbance of sensitive areas such as:
  - Endangered RE 11.11.18
  - Of Concern RE 11.3.4
  - Dry rainforest and SEVT
  - Riparian vegetation
  - Steep slopes and along high river banks
- Develop a clearing programme to compliment the staging of the works (ie areas that will not be developed until a later date are afforded a degree of protection for as long as practically possible).
- Where practically possible, rail related services and other linear infrastructure to run parallel to proposed rail infrastructure (eg reduce the area of direct disturbance especially in riparian vegetation by running services along bridges).
- Where practically possible, limit the location of the passing tracks along the Moura Link to areas which have already been cleared.
- Where practical use existing tracks. Design new access tracks (permanent and temporary) with the aim of minimising the loss and/or impact on existing vegetation communities.
- Where practical, utilise bridge structures rather than culverts to minimise the clearing of riparian vegetation, disruption to the creek channel and subsequent flow on effects downstream environments. This is particularly relevant to the vegetation within and along the high water bank of the Calliope River.
- Minimise the access road footprint (Flynn Road) where practical.
- Minimise the filling, draining or alteration of any waterways.
- Undertake a detailed threatened species search for flora within dry rainforest and SEVT communities to complement preliminary findings.
- Prepare a Vegetation Rehabilitation and Management Sub Plan (VRMSP), including but not limited to the following measures:
  - Designated revegetation/rehabilitation locations (eg riparian zones, wetlands, sensitive vegetation communities, steep slopes, mapped REs, buffer zones) determined during the detailed design phase.
  - Collection of seed from local native flora for propagation and use in revegetation/rehabilitation works to be carried out prior to the commencement of the construction phase. This is particularly important in areas such as riparian zones and mapped REs.
  - Establish rehabilitation criteria to be utilised during rehabilitation monitoring and maintenance works and incorporate into the VRMSP. The objective of the criteria is to provide the opportunity to assess the success of implemented revegetation programmes, including those utilised for offset requirements under the VM Act.
  - The planned removal and/or disturbance to native vegetation is to be carried out in accordance with approval conditions.

  - Minimise the loss of canopy vegetation and works that will lead to the enhanced proliferation of weed species.

- Develop a Weed Management Sub Plan for implementation during construction and operation. This plan is to be prepared in consultation with relevant agencies and be compatible with State and Local Plans. Requirements to be addressed include, but are not limited to:
  - The inspection of all machinery (including motor vehicles) and equipment prior to entering and exiting the project area
  - Outline of treatment and disposal methods for weeds with specific measures for Class 2 weeds
  - Location of washdown/shakedown facilities
  - Map showing infestation and 'no-go' zones
  - Where appropriate, clearing mark and exclude weed infestations onsite
  - Procedures to minimise the risk of imported soil being contaminated (biotic and abiotic)
  - Adopt weed management strategies which have a minimal impact on sensitive areas such as aquatic habitats (eg type herbicide used and application rate)
- Where possible, retain significant trees identified during field activities, except where the tress pose a risk to the safe construction, operation and maintenance of the rail corridor and Aldoga Rail Yard (refer Figure 5.4).
- Ensure all necessary permits and approvals are in place prior to commencing construction works.
- Any fuel and chemical storage facilities should be designed in order to provide sufficient buffer zones and limited pathway to adjoining vegetation communities.
- An appropriately qualified environmental specialist to be available during this phase to address enquiries and issues pertaining to terrestrial flora as they arise.

Construction

The following measures will be implemented during the construction phase to mitigate impacts on floral assemblages within and adjacent to the project area:

- All native flora is protected under the NC Act and shall not be intentionally disturbed or destroyed as a result of works or worker actions without a permit.
- Minimise clearance of remnant vegetation to that necessary for construction. Ensure all necessary permits and approvals are in place prior to the commencement of construction.
- Where necessary, clearing activities to be conducted in accordance with approved performance requirements under the Vegetation Management Codes.
- Clearly mark designated revegetation/rehabilitation zones and other no go areas (including large significant trees) prior to any vegetation clearing. High visibility tape, barricade webbing or similar should be utilised.
- All vegetation mapped as Endangered and/or Of Concern within and adjacent the area of direct disturbance shall be clearly marked. All contractors are to be briefed on clearing requirements and restrictions (including fines) to prevent over-clearing of these areas.
- Where possible, minimise loss of canopy vegetation and works that will lead to the proliferation of weed species.
- Any additional clearing of native vegetation outside the approved area of disturbance will not be carried out without the necessary approvals.

- Minimise the potential filling, draining or alteration of any waterway to that necessary for construction purposes only. These works are to be carried out in accordance with approval conditions only.
- Minimise disturbance to riparian and instream vegetation where practical to prevent bank erosion and excess sedimentation. Work within these areas to be in accordance with the Guideline for Activities in a watercourse, lake or spring (refer Section 3.7.3).
- Implement VRMSP measures.
- Only woody vegetation may be mulched due to the high level of weed presence within the project area.
- Implement QR procedures in relation to bushfire management.
- Implementation of the construction phase component of the Weed Management Sub Plan.
- Relevant dust suppression techniques are adopted during construction to minimise smothering of native vegetation.
- Exclude the parking of heavy vehicles, stockpiling and the storage of plant and equipment from the drip zone of trees.
- Where practical, maintenance contractors are to remain on designated tracks at all times to minimise the disturbance of surrounding vegetation, particularly sensitive communities such as rainforest and SEVT.
- Where practical use existing and designated access tracks.
- Where practical, maintenance works are to be carried out within designated areas or offices and away from sensitive environments such as REs, riparian vegetation and waterways.
- Fuel and chemical storage facilities should be surrounded by sufficient buffer zone(s) to minimise the potential for leakage into neighbouring terrestrial and aquatic environments.
- Ensure there is an appropriately qualified Environmental Officer available during civil works to manage any potential issues in a timely manner.

Operation

The following measures will be implemented to mitigate impacts on floral assemblages within and adjacent to the project area:

- Maintain revegetation/rehabilitation areas as per the vegetation rehabilitation criteria outlined in the VRMSP.
- Comply with QR procedures to minimise potential fire risk to surrounding vegetation communities.
- Implementation of the operational component of the Weed Management Sub Plan.
- Provide designated parking and storage areas.
- Where practical, maintenance workers are to remain on designated tracks at all times to minimise the disturbance of surrounding vegetation, particularly sensitive communities such as rainforest and SEVT.
- Maintenance works to be carried out within designated areas or offices.
- Minimise any chemicals used within the project area and ensure they are handled and disposed of in accordance with the relevant Material Safety Data Sheet.
- Involve local landowner and key stakeholder with revegetation and weed management works where appropriate.

20.4.5 Terrestrial fauna

Design

The following mitigation measures will be implemented during the detailed design phase of the Project to minimise any adverse impacts on the fauna assemblages associated with or adjacent to the project area:

- Clearing of vegetation will be restricted to the minimum required to enable the safe construction, operation and maintenance of the rail corridor and Aldoga Rail Yard.
- Due consideration of the staging of the works to habitat loss and connectivity (ie do not clear the entire project area for the ultimate stage during the initial stages).
- All structures will be designed to minimise the risk to fauna.
- Consider mechanisms to facilitate fauna movement (culvert design and bridging).
- Maximise where practical retention of existing riparian vegetation along Larcom Creek, Calliope River and other watercourses.
- Minimise where practical the disturbance to Larcom Creek and adjoining floodplain.
- The design and location of the fuel and chemical storage facilities will provide for a sufficient separation from and limited pathways to aquatic environments.
- Any waste storage facilities associated with the Project will be designed and located to restrict fauna access.
- Project infrastructure lighting will be designed, with due consideration to safety, to have a minimal impact on surrounding habitats and fauna.
- Define areas to be rehabilitated and/or revegetated as per the VRMSP (refer Section 20.4.4).
- Where possible, retain significant *E. tereticornis* tree located along the Moura Link Eastern Option (between the Calliope River and Farmer Creek) subject to safety constraints.

Construction

The following mitigation measures will be implemented during the construction phase of the Project to mitigate any adverse impacts on the fauna assemblages associated with or adjacent to the project area:

- Fauna management measures which include, but are not be limited to, will be prepared and implemented during the construction phase:
  - Staff including contractors will be informed that all native wildlife is protected and shall not be intentionally harmed as a result of works or workers actions.
  - Staff will be educated (on site induction) in relation to the risks of fauna deaths and how to manage animals which are injured or displaced including threatened species
  - Outline procedures to be undertaken if an animal (healthy or injured) is encountered during construction.
  - Any injured fauna must be safely bundled and taken to the nearest vet or reported to the EPA where further instructions will be given.
  - Recognised fauna spotter/catcher (ie holds a Damage Mitigation Permit and/or Rehabilitation Permit issued by the EPA) to inspect the sites prior to clearing vegetation.
  - Contact details for qualified animal carers and vets within the area to be outlined provided to relevant staff.
  - Relocation of wildlife to similar habitats adjoining the project area.

- Trees containing hollows to be marked prior to construction. These may provide habitat for the Little pied bat.
- Removal of tree hollows must be conducted with the use of a cherry picker, qualified arborist and spotter/catcher in order to safely remove fauna species.
- Where applicable cleared hollow bearing trees will be used in rehabilitation programmes and/or offset areas (eg habitat in form of artificial hollows and/or woody debris).
- Where necessary hollow bearing trees are tapped prior to demolishing.
- Where applicable a ratio of 1:1 for replacement of any hollows knocked down or damaged during clearing shall be employed.
- In areas where natural hollows are scarce and significant numbers of hollow bearing trees are to be cleared, artificial nest boxes and/or hollows sourced from cleared areas are to be introduced. These boxes should be installed between 3 and 6 m from the ground for microbats and 4 to 8 m for sugar gliders.
- Where practical, retain large stags as potential nesting and roosting habitat, especially near watercourses and wetland areas.
- Identify and mark nesting areas and provide a buffer zone around nesting species.
- Identify and clearly mark feeder trees and glider flyways. These trees should be retained along with surrounding habitat ie hollow bearing trees wherever practical.
- Site works, such as trenches and excavations, will be designed to ensure fauna are not trapped or likely to be impacted by construction activities (eg install trench ramps at 15 degree slope every 30 m or place branches or suitable material for fauna to climb and escape from trenches).
- Inspect trenches, culverts and other structures prior to works within the area to determine whether there area any trapped or injured fauna species present and action as appropriate (eg contact spotter/catcher to relocate animal).
- Where temporary fencing is required consideration will be given to fauna movement, current land uses and construction staff safety requirements.
- Where practical minimise night work to reduce impacts to nocturnal as well as diurnal species.
- Identification and mapping of Squatter pigeon nest sites within the project area and access tracks. Where necessary, implement appropriate measures to maximise separation from the construction activities.
- Minimise work within the Larcom Creek area subsequent to major rainfall events (ie the ephemeral wetland along the creek was identified as habitat for the Tusked frog after a major rainfall event (>100 mm in 24 hours)).

- Develop and implement a Pest Management Sub Plan which will include but not be limited to the following:
  - During construction, the sighting of any declared species will be reported to the relevant officer in DNRW with further management steps to be advised by the relevant government department and/or Gladstone Regional Council.
  - Project personnel and contractors will not willingly introduce any of the declared pest species listed under the LP Act.
  - Implement waste management measures to minimise increased numbers of introduced animals and opportunistic native fauna in the project area.
  - No biotic or abiotic contamination is to enter the construction site. Any imported material is to be checked prior to entering the project site.
- Where possible rehabilitate disturbed areas associated with construction works with suitable, endemic vegetation as per the VRMSP (refer Section 20.4.3).

- Revegetate the entrances to culverts to enhance their potential for fauna movement.
- Stockpiling of material (soil and mulch) to be within designated areas and/or offsite. This should be within areas that have been previously disturbed and/or cleared within the project area.
- Appropriate signage will be installed to promote driver awareness and provide safety for fauna crossing or inhabiting the area.
- Implement dust suppression mechanisms during relevant construction activities.
- Ensure there is an appropriately qualified Environmental Officer available during civil works to manage any potential issues in a timely manner.
- Develop and implement emergency response procedures to address potential risks of environmental harm (eg fires, chemical spills and hydrocarbon leaks).

Operation

The following mitigation measures will be implemented during the operational phase of the Project to minimise any adverse impacts on the fauna assemblages associated with or adjacent to the project area:

- All native fauna is protected and shall not be intentionally impacted as a result of the works or worker actions.
- Maintenance works are to be carried out within the designated area(s) to minimise impact on surrounding undisturbed areas
- Vehicular traffic generally should be restricted to constructed access tracks.
- Discourage the feeding of wildlife by project personnel throughout the project area.
- Implement fauna and pest management procedures. This will include procedures to manage the removal of native fauna where required, including contact details for local animal carers and vets.
- Prepare and implement emergency procedures to address the risk and management of operational activities in relation to chemical and hydrocarbon spills, fires and other emergencies which may impact the ecological value of the area.
- Where maintenance of the fencing is required consideration will be given to fauna movement, current land uses and safety/security requirements.
- Develop and implement a Waste Management Sub Plan with consideration to limiting fauna interaction and associated potential health risks.

20.4.6 Aquatic biology

Objectives

- Minimise impacts to aquatic flora and fauna resulting from modification of water flows, levels or quality.
- Prevent the pollution and sedimentation of stormwater runoff discharged from site to minimise impacts to aquatic flora and fauna.

Mitigation measures

The following mitigation measures will be implemented to minimise the potential impact on the aquatic environments within the area.

Design

The following mitigation measures will be implemented during the detailed design phase of the Project to minimise the impact on the aquatic environments within the area:

- Bridging design to minimise impact on riparian zones, wetlands and hydrological regimes by implementing the following:
  - Where practically possible, back-spanning of bridges to occur
  - Where practically possible, maximise bridge clearance heights over major watercourses
  - Corridor positioning to align with areas on watercourses which have been disturbed
  - Minimise the impact on Calliope River (ie separation of the Calliope River from the Moura Link Western Option directly north of the MSL junction).
- Where practically possible, rail related utility services to be located in close proximity to the rail alignment, especially along watercourses, effectively reducing the area of disturbance.
- Bridge structures to be adopted on major watercourses, including Larcom Creek, Calliope River and Farmer Creek.
- Location and design of fuel and chemical storage facilities to provide sufficient separation from and limited pathway to aquatic environments.
- Location and design of the treatment plants (sewage and industrial wastewater) and waste facilities to provide sufficient separation and limited pathway to aquatic environments.
- Incorporate and develop stormwater management systems for the Aldoga Rail Yard, such as longitudinal swales between tracks and standard erosion and sedimentation controls.
- Minimise the change to the geomorphology of the watercourses to prevent scouring and changes to instream flows (eg culvert design).
- Maximise the retention of riparian vegetation along Calliope River, Larcom Creek and other watercourses.
- Where practical design access tracks to minimise impact on existing overland flows.
- Where practical revegetate the rail corridor to increase biodiversity and filter overland flows.
- Develop measures to facilitate fish movement and prevent risk of scouring.

Construction

The following mitigation measures will be implemented during the construction phase of the Project to minimise the impact on the aquatic environments within the area:

- Preserve remnant vegetation and minimise riparian removal by having the contractor clearly mark the limit of clearing and trees to be removed/retained.
- Protect or establish native shrubs, trees and other vegetation along disturbed areas to filter pollutants, trap sediment and to prevent destabilising banks, subject to safety constraints.
- Where practical vegetation removal should be minimised in the floodplain and wetland ecosystems.
- Minimise operation of heavy equipment within the riparian zone or adjacent to waterways.
- Where practically possible, vehicles and machinery to remain on designated access tracks (existing and constructed).
- Where practical access tracks will be constructed clear of waterways.
- Implement procedures that will assist in the avoidance of material spills and for prompt clean up of any that occur.

- Install erosion and sediment control measures, prior to construction and maintain during construction.
- No filling, draining or alteration of any waterway, excluding that necessary for the development.
- Culvert and other mechanisms to facilitate water and fauna movement within existing drainage lines and floodplain ecosystems.
- Where practical, stockpiling of equipment and machinery is to occur within a disturbed area and/or away from drainage lines, floodplain areas and overland flow paths.
- Where practical, temporary access road design to minimise impact on overland and instream flows.
- Culvert and other infrastructure should match the drainage lines morphology to minimise scouring and sedimentation.
- Adopt weed management strategies which have a minimal impact on aquatic habitats (eg type herbicide used and application rate).

Operation

The following mitigation measures will be implemented during the operational phase of the project to minimise the impact on the aquatic environments within the area:

- Prepare and implement emergency procedures to address the risk and management of operational activities in relation to chemical and hydrocarbon spills, fires and other emergencies which may impact the ecological value of the area.
- Adopt weed management strategies which have a minimal impact on aquatic habitats (eg type herbicide used and application rate.)
- Access tracks will be constructed clear of waterways wherever possible.
- Where practical, traffic will be constrained to constructed access tracks.
- Ongoing maintenance activities to control the proliferation of introduced grass species along drainage lines minimising impact on local hydrology.
- Releases to Larcom Creek to correspond with flows within the creek and license conditions.
- Minimise the water extraction from surface and ground water resources including the reuse and recycle wastewater and stormwater from buildings where practical.

20.4.7 Surface water

Objectives

- To ensure that water quality entering creeks and waterways downstream during and post construction meet with approved statutory guidelines.
- Where the water quality of existing water bodies does not comply with the guidelines, water quality objectives should not exceed ambient historic and seasonal fluctuations.
- To maintain the aesthetic quality of downstream water bodies, waters should be kept free from:
  - Floating debris, oil, grease and other objectionable matter
  - Substances that produce undesirable colour, odour, taste or foaming
  - Substances that produce undesirable aquatic life, such as algal blooms, or dense growths of plants or insects
- No visible evidence of contaminants and pollutants leaving the site through stormwater runoff.
- Extraction and water harvesting to be minimised by adopting water efficient designs and procedures.

- In areas of current or future development there should be no significant worsening of flood levels in existing watercourses and culvert locations.
- Minimise increases in flow rate and volume of site runoff so that it does not cause major stream bank or bed erosion.

Mitigation measures

The following mitigation measures will be implemented.

Design

- Riparian vegetation, flow dependent ecosystems and wetlands will be left undisturbed wherever possible (ie these areas are important in filtering overland flow and protecting environmental values of adjoining watercourses)
- Existing degraded areas should be clearly mapped and identified as areas to avoid or appropriate measures should be implemented to minimise further degradation. These measures should include:
  - Minimising the work footprint within the riparian zone and watercourse
  - Minimising the land clearing within the project area
  - Silt fencing or other erosion sediment control measures
- Recycle and reuse stormwater from Aldoga Rail Yard buildings where practical.
- No significant worsening in flooding upstream and downstream of the Project.
- Detailed hydraulic modelling will be undertaken.
- Minimise water extraction by utilising, where practical the GAWB existing raw water supply during construction and operation.
- Industrial Wastewater Treatment Plant and Sewage Treatment Plant to recycle and reuse wastewater where practical. Excess wastewater to be disposed of by licensed contractor and in accordance with trade waste permit.
- Industrial Wastewater Treatment Plant, Sewage Treatment Plant and other contaminant point sources (sediment stockpiles, waste facilities) to be located away from existing watercourses and overland flow paths. Where this is not possible implement procedures and devices to minimise the risk in the event of a catastrophic event or significant rainfall event:
  - Bunding of chemical and hydrocarbon storage areas in accordance with Australian Standards.
  - Adoption of design measure to treat (ie reduce flow and remove contaminants) and where necessary capture or harvest stormwater runoff. Measures may include Industrial Wastewater Treatment Plant, longitudinal swales and water quality treatment devices such as oil/grit separators and gross pollutant traps.
  - Preparation of a Stormwater Management System to identify drainage lines, water quality improvement devices and their locations.

Construction

- Stockpile materials and soils are to be located away from waterways and overland flow paths/drainage lines/low points.
- Implement measures to slow and/or prevent overland runoff. Such mechanisms include the installation of grass filter strips (or retention of existing grass filter strips) and/or the installation of artificial structures (eg diversion bunds, agi pipe chutes with rock protection at the base to convey water down batters without causing erosion, rock check dams along drainage lines).

- Areas of existing erosion and/or identified dispersive soils to be isolated and remediated (ie dispersive soils may be treated with gypsum) to prevent further damage.
- Where practical, undertake the major earthworks during the dry season and install temporary bunding or sediment traps.
- Water quality monitoring will be undertaken following rain events significant enough to cause preventative and containment measures to become deflective and visual inspections reveal discolouration (eg turbidity, oil) in receiving waters.
- Where possible minimise the amount of actual work required within the bed or banks of a watercourse or within a riparian zone.
- No filling, draining, damming or alteration of any waterway, excluding that necessary for the construction activities and for which approval has been given (ie installation of culverts or bridge footings).
- Where practical, control access points to riparian areas to minimise the area of disturbance (eg existing tracks or disturbed areas) and locate the access point at the most optimal location (ie not on an unstable outer bank or a stream bend). Utilise existing disturbed areas (eg stock crossings/tracks) wherever possible.
- Install erosion and sediment control measures prior to the commencement of any construction activity and inspect regularly and repair or replace if necessary.
- Stabilise disturbed areas as soon as possible following construction with a treatment appropriate to the location disturbed (eg hydromulch and seed batters, jute mat in drainage channels).
- Relevant employees will be educated in appropriate chemical handling techniques and they will be trained in the appropriate response to the identification of a spill or leak.
- Chemical spill kits will be located within vehicles carrying chemicals and near chemical storage areas.
- Temporary chemical storage areas and wash down facilities are to be located away from waterways and drainage channels and will be appropriately bunded in accordance with relevant Australian Standards. Provisions are to be in place to ensure an abductor truck can access the site to pump out the bunded area if required.
- Temporarily stockpiled materials (eg cement) will be stored away from waterways and drainage lines.
- Refuelling of plant will be undertaken away from any waterways, such that any accidental spills can be quickly and easily contained and will not enter a waterway.
- Adopt weed management strategies which have a minimal impact on aquatic habitats (eg type herbicide used and application rate).

Operation

- QR will aim to recycle and reuse wastewater (Sewage Treatment Plant and Industrial Wastewater Treatment Plant) from the proposed Aldoga Rail Yard. Surplus wastewater will be disposed of in accordance with a trade waste permit and/or in compliance with the EPA ERA licence conditions.
- Emergency response procedures will be implemented by QR which will document how environmental cleanup following a derailment is to be undertaken. The response will differ depending on the contents of the derailed carriages and the location where the derailment has occurred.
- All permanent erosion and sediment control structures will be regularly inspected and they will have a schedule for inspection and maintenance.

- Stormwater runoff from hardstand areas will be directed to the pollution control system for treatment.
- Clean stormwater will be diverted around the yard area via shallow diversion drains where practical.
- Recycle onsite water where water quality is suitable for reuse including dust control, washdown water, toilet flushing and landscaping
- Maximise the reuse and recycling of wastewater and stormwater from buildings.
- All chemicals/fuels/contaminants will be stored in an appropriately bunded restricted area and clearly signposted. All persons with access will be trained in spill management.
- Spills and wastewater will be managed under the Waste Management Sub Plan and hazardous substances Australian Standard AS 1940B1993
- Excess chemical and hydrocarbon wastewater to be disposed to a liquid waste disposal facility in accordance with trade waste permit and/or EPA license conditions
- Spill kits will be contained at various locations and clearly signposted throughout the rail yard. All staff on site will be trained to use the spill kits.
- Minimise risk to waterways (eg sedimentation and pooling of water) through the routine maintenance of culverts and bridges structures
- Adopt weed management strategies which have a minimal impact on aquatic habitats (eg type herbicide used and application rate).

20.4.8 Groundwater resources

Objectives

- Ensure construction activities have no adverse impact on the existing levels and water quality of local and regional groundwater.
- Develop and implement strict controls for the management and storage of all hazardous goods onsite and that a spill response programme and equipment, including training, are in place.
- Manage the potential for impacts resulting from the migration of contaminated groundwater.

Mitigation measures

The following mitigation measures will be implemented.

Design

The following measures will be implemented during the design phase to mitigate impacts on groundwater resources within and adjacent to the project area:

- Areas used for the storage, use and processing of potential groundwater contaminants will be designed in a fashion to allow the containment of leakages, spills and use.
- Fuel and chemical storage areas will be designed with suitable bunding and where possible incorporate roofing to prevent rainfall accumulating within the bunding. The bund should be designed in accordance with Australian Standards.
- Site structures should account for the presence of groundwater on the site with respect to potential embankment stability, floor heave, and corrosive water issues.
- Investigate the feasibility of utilising existing water supplies including the GAWB raw water supply.

- Adoption of water efficiency strategies including the recycling and reuse of wastewater to limit groundwater extraction.
- Minimising the land clearing within the project area, which impacts on water levels and infiltration rates.
- Sewage Treatment Plant design to consider the low water table within the proposed Aldoga Rail Yard (eg the use of a septic systems is not recommended).

Construction

The following measures will be implemented during the construction phase to mitigate impacts on groundwater resources within and adjacent to the project area:

- All fuels and chemicals used during the construction phase of the Project are stored in bunded facilities that prevent spills, leakage, or over topping of the facility. The facility should prevent any migration of fuels or chemicals to surface water bodies or the underlying groundwater.
- Hydraulic testing of the aquifer, to establish a sustainable yield, should groundwater be used for construction water supply. This will minimise the risk of over extraction, leading to reduced groundwater levels for other users within area.
- Revegetate exposed areas as soon as possible to increase evapo-transpiration and reduce infiltration.
- Where practical, utilise the existing GAWB raw water supply to limit groundwater extraction requirements during construction.
- The choice of location for groundwater supply bores will need to consider the volume and quality needs for the end use of water.

Operation

The following measures will be implemented during the operational phase to mitigate impacts on groundwater resources within and adjacent to the project area:

- Potential contaminants will be stored within suitably bunded areas.
- If an uncontrolled spill occurs it should be contained as soon as is possible and clean up commenced immediately. All fuel and chemical spills will be dealt with in a manner consistent with relevant health and safety guidelines.
- Adoption of water efficiency strategies including the recycling and reuse of wastewater to limit groundwater extraction
- The choice of location for groundwater supply bores will need to consider the volume and quality needs for the end use of water.

20.4.9 Air environment

Objectives

- Minimise potential for nuisance impacts as a result of dust emissions.
- Minimise emissions of pollutants from construction vehicles and machinery.
- Minimise potential odour impacts.
- Minimise greenhouse gas emissions (GHG) due to construction and operation of the Project.

Mitigation measures

Design

The following measure will be implemented during detailed design to mitigate impacts on the air environment within and adjacent to the project area:

- Where practicable, energy efficient maintenance and operational equipment will be selected to minimise energy consumption and overall life cycle costs.

Construction

In order to control dust emissions related to construction activities and thus reduce the risk of dust nuisance at the location of nearby residences, a number of dust control measures should be taken, including:

- Development of a Dust Management Sub Plan prior to construction commencing. The Sub Plan will include:
  - Minimise major dust generating activities during high wind speeds where practicable and unwatered.
  - Restricting vehicle speeds on unsealed haul roads to reduce dust generation.
  - Minimise spills and implement prompt cleanup procedures.
  - Stockpiled material should be treated appropriately to prevent wind erosion from the prevailing wind.
  - Regular cleaning of machinery and vehicle tyres to prevent track-out of dust to public roads.
  - Minimising onsite burning or incineration.
  - Internal construction roads are appropriately surfaced as soon as possible after the commencement of site activities.
  - Routing roads away from sensitive areas wherever practically possible.
  - Revegetating disturbed areas as soon as practicable.
  - Vehicles and equipment are to be appropriately maintained to minimise air emissions.
  - Visual monitoring of dust to occur on a daily basis.
  - In the event of a dust complaint, the contractor will:
    - In the first instance, alter procedures to reduce the nuisance issue.
    - Liaise with administering authority and/or complainant over remedial action.

During construction, emissions of greenhouse gases may be minimised by implementing a variety of mitigation and management measures, including:

- Minimising haul distances between construction sites to spoil sites
- Implementing regular maintenance program for equipment and construction fleet
- Using appropriately sized equipment for construction activities
- Minimising waste from construction

Operation

In regards to the impact of emissions associated with the Project, these may be minimised by implementing a variety of mitigation techniques, including:

- Regular maintenance of all equipment.
- Minimising unnecessary travel between sheds.
- In order to reduce the potential for impact of dust emissions from coal wagons, the duration that fully-loaded coal trains are held 'in-transit' at the rail yard (ie while waiting for access to the port unloading facility) should be minimised.

- Only minimal amounts of reclaimed coal dust are held onsite. During adverse wind conditions visual inspection of stockpiles should be conducted and mitigation procedures implemented if required.
- Maintain complaints register relating to air quality, including remedial actions.
- In the event of a dust complaint, the QR will:
  - In the first instance, investigate cause of the complaint
  - Determine appropriate remedial action
  - Liaise with administering authority and/or complainant over remedial action
  - Implement appropriate remedial action
- Notify nearby residents and the community in advance of dust generating maintenance activities.
- Air quality should be compliant with the requirements of the *Environmental Protection Policy (Air) 1997.*
- All operational personnel are aware of the sensitivities with regard to elevated dust levels within and adjacent to the project area.
- Initiatives to reduce emissions of greenhouse gases will be identified during the detailed design phase and implemented during operation.

The Coal Loss Management Project that was completed for QR identifies strategies to reduce the risk being caused by coal dust emissions from loaded coal wagons. The implementation of these strategies will lead to a reduction in coal dust emissions across the Moura, Blackwater and Goonyella systems and will reduce any potential impact of the Project.

20.4.10 Noise and vibration

Objectives

- Construction noise and vibration impacts to be reduced as far as practicable through the implementation of appropriate management procedures, including use of low noise equipment and management of construction hours.
- Operational noise levels to be maintained by appropriate mitigation measures, including appropriate infrastructure design and noise mitigation measures.
- To minimise the impacts of noise and vibration associated with pre-construction, construction and operational activities on local residents, sensitive places and sensitive animals.
- Design and implement a public complaint system to deal with construction noise and other impacts from construction and operational traffic movements.
- Design and implementation of mitigation measures to achieve compliance with the Project noise and vibration goals, where feasible and reasonable.

Mitigation measures

The following mitigation measures will be implemented:

Construction

Noise

- When practical, quietest plant and equipment will be utilised.
- Regular maintenance of equipment to keep it in good working order.

- Noise measurements of plant and equipment to maintain/check noise emissions within manufacturers' specifications.
- Mobile plant and other diesel powered equipment to be fitted with residential class mufflers.
- Minimise the usage of truck exhaust brakes onsite.
- Where practical, use silenced air compressors onsite.
- Construction work to occur within the daytime period wherever practically possible.
- Where practical, minimise the coincidence of plant and equipment working simultaneously near sensitive receptors.
- Operators of construction equipment are to be made aware of the potential noise issues and of techniques to minimise noise emissions through a continuous process of operator education.
- Reversing alarms within construction areas can not be avoided for safety reasons. Consideration should therefore be given to sourcing so-called "quiet" white-noise alarms whose annoying character diminishes quickly with distance and self-adjusting alarms which adjust emission levels relative to the local background noise level.
- Large rocks are to be placed in dump trucks not dropped.
- Horn signals should be kept at a low volume, where feasible without compromising public and employee safety.
- Implement, as part of the broader community involvement plan, a well-planned, focussed community awareness programme in order to improve the understanding of the noise and vibration issues and to assist in allaying potential concerns, particularly where vibration is the perceived concern. This programme may include, for example:
  - Active community consultation and the maintenance of positive relations with residents.
  - All measures are undertaken to reduce the noise and vibration impact at neighbouring properties.
  - In the event of complaints, an investigation of the cause of the construction noise will be undertaken.
  - Provision of a complaints phone number.
  - Residents are to be made aware of the times and duration that they will likely be affected. Making residents aware of likely future occurrence of noise significantly reduces annoyance and allows people to make arrangements accordingly.
- Construction site personnel are to be made aware of all community attitudes and complaints.

Vibration

Based on predicted vibration levels and safe working distances, no mitigation measures are required to reduce vibration levels at residences in the communities surrounding the Project.

During detailed design consideration will be given to the completion of building condition surveys for any buildings that fall within the safe working distances for the prevention of cosmetic damage.

Where appropriate, further investigations will also be undertaken for any structures within and around the safe working distances in order to determine if the cosmetic damage criterion (as used for this assessment), is applicable or whether a higher value may be more appropriate.

Blasting

These predicted airblast overpressure and ground vibration levels are well below the nominated criteria for this Project.

Operation

No mitigation measures are proposed to manage operational noise because no sensitive place was predicted to have levels above legislative target limits. However, if exceedances of legislative target limits are identified during detailed design, mitigation measures will need to be investigated and designed. This must be done in consultation with the affected property owners prior to implementation of any such measures.

20.4.11 Waste

Objectives

- To minimise waste generation and ensure appropriate handling and disposal of domestic and industrial wastes generated during design, construction, operation and maintenance.
- All waste streams will have regard to the *Environment Protection (Waste Management) Policy 2000* principles, especially the waste management hierarchy of waste avoidance, reuse, recycling, treatment and disposal.

Mitigation measures

Waste management sub plan

Measures to mitigate the impacts of the Project wastes on environmental values will be outlined in a Waste Management Sub Plan. A Waste Management Sub Plan will be developed during detailed design for the construction (contractor requirement) and operational phase of the Project and will aim to:

- Minimise waste generation and the cost of waste
- Prevent damage to the environment
- Contribute towards ecologically sustainable development (in accordance with QR's Environmental Policy)
- Ensure the operation complies with environmental license conditions

The Waste Management Sub Plan will be based on QR's relevant operational procedures for managing waste materials.

Where practically possible, the quantity of wastes generated and removed from site will be reduced, with wastes to be segregated and recycled. Onsite reuse of wastes including soil, green waste and concrete is to be undertaken, with wastes associated with materials packaging returned to suppliers wherever practically possible. Remaining wastes generated during construction will be recycled or disposed at Council's Benaraby landfill where recycling is not feasible.

Waste collection practices will be designed to prevent the site from becoming contaminated by oil or chemical spills during construction. New opportunities to reduce, reuse or recycle waste that may become available throughout the construction period will be incorporated into the waste management strategy.

It is proposed that acceptable regulated waste will be removed by a regulated waste contractor and disposed at the Benaraby landfill. Regulated waste which is not compatible with the landfills operational license will be transported to a landfill licensed to accept the waste.

Appropriate disposal permits for the disposal of contaminated soil from site will be obtained if needed in accordance with Section 424 of the EP Act. Disposal permits enable appropriate and legal disposal and tracking of contaminated soil or materials.

Waste management strategies

The detailed design of the Project will take into account waste minimisation, reuse and cleaner production principles and philosophies to minimise waste production and maximise reuse of any waste produced. The Project will maximise waste reuse and will engage waste management contractors who will reuse and/or recycle wastes where possible. The hierarchy for waste management as specified in the EPP (Waste) will be followed with emphasis on waste avoidance and reduction where practically possible, followed by reuse of waste, recycling and finally disposal.

Avoidance

The construction control and reduction factors will be required to identify opportunities for avoiding waste generation. If avoidance is not possible, the construction contractors will be responsible for reducing waste generation on site. Strategies for reducing waste will be detailed in the contractor's waste management plan and may include:

- Consideration of the use of materials and products that have a recycled content wherever cost and performance are competitive, and where environmentally preferable to the non-recycled alternative.
- Arrangements made with suppliers to return any construction materials not used.
- Where practically possible, goods being ordered in bulk to minimise packaging wastes and packaging material returned to the suppliers wherever practicable.
- Encouraging employees to avoid and reduce waste wherever possible.

Reuse

Strategies for the reuse of waste products during construction may include where practicable:

- Where practically possible, chipping and mulching of vegetation cleared during construction and re-use of mulched material for landscaping purposes.
- Use of suitable vegetation in rehabilitation and revegetation strategies (ie hollow bearing logs area suitable habitat for fauna).
- Topsoil free of weeds to be stockpiled and stored for reuse, if possible.
- Waste concrete and pavements reused during road construction (sub-base layer) or as hard stand areas in construction compounds.
- Reuse of clean spoil in fill areas (ie cut-fill balance).
- Reuse of concrete from work throughout the duration of the Project.
- Reuse of steel structures in the Project.
- Reuse of structures including culverts, cabling, poles and similar infrastructure.
- Broken tiles, bricks and other masonry to be used in fill or transferred to a building supply company by transferring to batching plants or use as a select/earthworks coarse layer.

Recycling

Strategies for recycling during construction may include:

- Waste impacted by contaminated soil should be treated prior to recycling to prevent cross contamination of clean material.
- Provision of recycle facilities for general rubbish, eg glass, plastic, waste paper and metals, using colour-coded bins. These facilities will be provided within the construction compound and where practically possible at construction locations on site, including the construction accommodation village. Recycling of general wastes such as aluminium and steel cans within the construction compounds.

- Collection of demolition materials and reuse on site or transport where practically possible to a recycling depot.
- Collection and transport of steel scraps to a recycling facility. A target of 100% recycling of steel scraps should be implemented.
- Collection of packaging material (eg pallets) returned to the suppliers wherever practicable
- Investigation by the contractor of the availability of treated wastewater, runoff or groundwater inflow for use during construction activities for dust suppression, washdown facilities or for watering progressive landscape works.
- The use of recycled materials to the limits of design in concrete, roadbase, asphalt and other construction materials.
- Collection and recycling of used oils (motor and hydraulic) by a licensed contractor
- Empty oil and fuel drums and other containers collected or returned to recycled facilities by a licensed contractor.
- Training of all relevant employees in waste management procedures and recycling opportunities.

Disposal

Waste unable to be reused or recycled will be disposed of in a certified land fill site under the control and management of Gladstone Regional Council. Materials will include putrescible wastes from kitchens and lunchrooms, and non-putrescible materials unable to be recycled.

The transport of regulated wastes and contaminated soils or other materials will be conducted by licensed contractors for disposal at licensed facilities, in accordance with legislative requirements.

Waste storage

Proposed waste storage, treatment and containment areas will be located at each construction laydown area, and will be designed and constructed in accordance with the requirements of the relevant standards and guidelines. For example, Safe Storage and Handling of Dangerous Goods, DES (Department of Emergency Services), Removal and Disposal of Contaminated Soil, EPA, A52714 Storage and Handling of Hazardous Chemical Substances guidelines will be followed for the preparation of containment areas for hazardous and dangerous goods.

Waste transport

Waste management contractors will be appointed to dispose of general construction and operational wastes. Wastes will be recycled, reused or where possible disposed of at GRC's Benaraby landfill. Potential wastes to be recycled at Council's landfill are summarised below.

- Drums and containers (where possible)
- Scrap steel
- Waste oil
- Lead acid batteries
- Paints and solvents
- Paper and cardboard
- Cans, plastic bottles and glass

The movement of hazardous materials and regulated wastes will occur at non-peak times to minimise the possibility of traffic conflicts and associated risks. This will also be timed with the operational hours of the receiving facilities. Where possible hazardous materials and regulated wastes will be temporarily stockpiled on site to minimise the number of transport movements required.

All movement of hazardous materials, dangerous goods and regulated wastes will be in accordance with the relevant regulations and guidelines. A waste tracking system will be in place and this will allow waste to be tracked from the source to the place of storage, recycling, treatment or disposal. In addition to the waste tracking system, transport vehicles will be equipped to take the particular type of waste required and have appropriate signage to minimise any impacts. Similarly, movement of spoil and other non-hazardous wastes will be in accordance with the EP Act. For example, all loads will be covered to minimise dust generation and potential loss of load.

Sewage/septic waste

A package sewage treatment plant will be installed with effluent suitable for irrigation of landscaped areas. Based on the relatively small quantities of sewage generated at the Aldoga Rail Yard, it is likely that all effluent could be reused onsite. The design of the package treatment plant will be confirmed during detailed design and will be undertaken in parallel with obtaining the necessary licences and approvals. If it is found during detailed design that a treatment plant is not feasible, then sewage could be conveyed by a new sewerage pipeline to one of the nearby Council controlled sewage treatment plants.

Groundwater protection

Washdown activities are only to occur over paved areas with drainage reporting to the industrial wastewater system. Other measures will include the lining (eg clay) of wastewater ponds to minimise the infiltration of contaminants into the groundwater and having potential recharge zones designated as 'no-go zones'.

Stormwater management

The potential for rainwater harvesting from the Aldoga Rail Yard buildings will be investigated during detailed design.

Measures to minimise contamination of stormwater from the Aldoga Rail Yard will be outlined in a Stormwater Management System, including the diversion of "dirty" runoff from areas potentially contaminated to the Industrial Wastewater Treatment Plant. Target pollutants for capture include:

- Hydrocarbons - workshop aprons, carparks
- Coal fines - around rail areas upstream of wagon wash

20.4.12 Transport

Objectives

- To minimise the impact on existing traffic and infrastructure associated with the transport of equipment and materials during pre-construction, construction and operations.
- Manage interactions between railway activities and other infrastructure.
- Develop and implement a Traffic Management Plan to minimise the disruption caused by construction machinery and material delivery schedules to existing public roads and traffic flows, particularly during peak times at shift changes.
- Access from public roads to construction sites must be managed in accordance with all State regulatory requirements, including warning signage and transport control staff at critical intersections.
- Ensure the rail and road infrastructure and ancillary services operate in a safe and efficient manner.
- Minimise disruption and delay to the existing rail network during construction.

Mitigation measures

The following mitigation measures will be implemented:

Design

- Prepare a Traffic Management Plan in accordance with DMR requirements.
- QR will enter into infrastructure agreements with DMR and GRC with respect to the impact on the road network.
- Undertake an assessment of the proposed road/rail interface (Australian Level Crossing Assessment Model (ALCAM).
- Potential impacts of additional train traffic are being addressed by QR (eg modelling of the additional rail traffic along the proposed infrastructure). Additional infrastructure required will be finalised during subsequent detailed design stages.

Construction

- Implement a Traffic Management Plan.

20.4.13 Cultural heritage

Objectives

- Ensure all indigenous and non-indigenous cultural heritage artefacts and sites of significance are identified, protected and managed in accordance with all relevant statutory requirements during design, construction, operation and maintenance.
- Prevent the loss of, or damage to, items of Indigenous and non-Indigenous cultural heritage as a result of construction works.

Mitigation measures

To minimise the impact from construction on the existing Indigenous and non-Indigenous environment, the following management measures will be implemented:

- Ongoing consultation with Traditional Owner representatives (Port Curtis Coral Coast people).
- Finalise the draft CHMP and obtain approval from DNRW.
- Project works to be undertaken in accordance with the ACH Act.
- Implement the CHMP, which will include requirements for monitoring construction, specifically excavation activities within the proposed project area.
- Construction staff to attend cultural heritage inductions, by Traditional Owner group representatives prior to commencement of works, to promote an understanding of the potential indigenous heritage existing within the development.
- Construction staff will be made aware of the importance of the ACH Act and the Duty of Care.
- Clearly map and define the location of non-indigenous cultural heritage to minimise the risk of disturbance during construction and operation.
- Where potential non-indigenous cultural material is encountered, the significance of the sites and potential mitigation measures (eg relocation) will be determined consultation with local historical groups and the EPA.

The Operational EMP for the rail infrastructure will include the requirement to comply with the ACH Act.

20.4.14 Visual and lighting impacts

Objectives

- Implement revegetation measures to promote the use of local native flora species.
- To protect and enhance the visual amenity of the site and surrounding areas.
- To design and implement a landscape programme that integrates the development into the existing character of the site through the use of local native species.
- Minimise visual impacts of project.
- Strengthen natural corridors and rehabilitate degraded areas.

Mitigation measures

The following mitigation measures will be implemented.

Design

The following mitigation measures will be implemented to mitigate the visual impacts of the Project:

- Use vegetation (natural and landscaping) to minimise the impact on visual amenity and landscape character of the area.
- Clearing of vegetation will be restricted to the minimum required to enable the safe construction, operation and maintenance of the rail corridor and Aldoga Rail Yard.
- Possible staging of the works to minimise the impact on visual amenity and landscape character of the area.
- Consideration to the lighting requirements with respect to visual amenity and safety for the Aldoga Rail Yard. This should also include potential impacts on local road and rail traffic.
- During consultation with DMR (traffic management and alterations to local road network) identify potential issues associated with lighting requirements and local traffic.

Construction

The following mitigation measures will be implemented to mitigate the visual impacts of the Project during construction:

- Where practical, revegetate disturbed areas within the project area with endemic vegetation (in accordance with the VRMSP) to minimise the visual impact and naturally screen the rail infrastructure.
- Where practical, construct infrastructure, particularly buildings, in materials with a visually neutral colour (eg mist green).
- Where practical, the Project infrastructure should be visually integrated into the existing landscape.
- Scheduling works to operate where possible during daylight hours (refer Section 10). Where night works are required consideration will be given to the lighting requirements with respect to visual amenity, sensitive receptors and safety.

Operation

The following mitigation measures will be implemented to mitigate the visual impacts of the Project during operation:

- Consideration to the lighting requirements with respect to visual amenity and safe operation of the Aldoga Rail Yard. This will include consideration of the safe operation of local road and rail traffic within the vicinity of the yard.
- Where practical, landscaping of the Aldoga Rail Yard with local native flora species.

20.4.15 Social environment

Objectives

- Provide clear communication to community members on the Project.
- Provide adequate construction workforce accommodation.

Mitigation measures

The following mitigation measures will be implemented:

Design

- Regular consultation with directly affected landowners and key stakeholders to address any issues as they arise.
- Pursue a construction accommodation strategy.

Construction

- Where possible, target the employment of local and regional professionals, technical, skilled and semi-skilled workers.
- Share resources and promote on-going employment opportunities through the movement of construction workers from other major projects as they reach completion.

Operation

- Accommodation for the operational workforce may be accommodated in the study area if some of the proposed allotments in the Calliope area are approved and developed. Therefore no mitigation measures are required to address the additional operational workforce required for the Project.

20.4.16 Health and safety

Objectives

- Ensure a prompt and appropriate response is made to unplanned incidents where life and property are threatened during the construction phase.
- Provide a safe work site during the construction phase, achieve sustained reductions in the number of accidents during the operation phase and maintain a safe and secure site environment.
- Ensure that satisfactory safety provisions are implemented during construction and for the operational phase of the Project.

Mitigation measures

The following mitigation measures will be implemented to minimise potential health and safety impacts:

Design

- Consideration should be given to minimise potential mosquito breeding in the design stage. Queensland Health (2002) has published Guidelines to minimise mosquito and biting midge problems in new development areas. This document provides advice on how to prevent or minimise the impact of mosquitoes and other biting insects in new development areas.

Construction

- Construction and installation of water storages should be carried out in accordance with Part 8, Mosquito Prevention and Destruction of the *Health Regulation 1996*. Where a risk assessment process has identified that there is a significant risk of mosquito borne disease, holding tanks for recycled water should be designed so as to prevent entry of mosquitoes.
- Implement emergency response procedures which are compatible with QR's emergency procedures.
- Implement legal obligations in relation to occupational health and safety.

Operation

- Implement and/or amend emergency procedures for the operation of the rail infrastructure and Aldoga Rail Yard.
- Implement legal obligations in relation to occupational health and safety.
- Regular maintenance of all structures associated with storage or treatment of recycled water is necessary to minimise mosquito breeding. For example, if mosquitoes are present in an open water storage, water plants should be cleared away from the edge of the storage to reduce habitat for larvae. In particular, recent research suggests that dense mats of surface vegetation or fallen decaying material can encourage mosquito breeding (Dale et al 2001).
- When recycled water is used for irrigation, surface ponding should be prevented by appropriate irrigation scheduling.
- Open recycled water storages should be monitored regularly to identify presence of mosquito larvae.
- If a potential health risk from mosquito breeding has been identified, biological control using natural predators, such as aquatic invertebrates or native fish known to prey upon mosquito larvae, may be considered.

20.5 Environmental Management Process

20.5.1 Preamble

QR's Environmental, Planning and Processes Manual and documentation requirements are summarised below.

Environmental Management Plan (Planning) (EMP(P))

The EMP(P) summarises the assessment and lists management recommendations for planning, also including recommendations for design, construction and operations.

Design Drawings

Incorporates all environmental management measures that can realistically be shown on a drawing at this stage of the Project.

Environmental Design Report (EDR)

Documents how the planners and designers have incorporated the recommendations of the EMP (P) into detailed design.

Environmental Management Plan (Construction) (EMP(C))

The Construction Contractor, using information from the above sources, prepares the EMP(C). The plan would typically cover erosion and sediment control, the need for fauna spotter/catchers etc.

Construction Drawings

Incorporate as much direction on environmental management as practicable, eg siting of no-go vegetation areas, permanent erosion control devices etc.

Audit, Feedback and Improvement

This should at least be done at 'practical completion' stage, but could be done at any time. It can be formal or informal and include office and/or onsite issues.

Environmental Management Plan (Operation) (EMP (O))

Summarise the assessment and lists management recommendations for operations (may include above and/or below rail considerations relating to maintenance, decommissioning etc).

This EMP will be refined following a government decision on the Project and will form the EMP(P) for the Project.

20.5.2 Content of an EMP

The Construction and Operational EMPs should address the requirements of the relevant environmental management strategies outlined in the EMP in separate sections. The EMPs should provide information under several different headings (which complement those in the environmental management strategies) as outlined below.

- **Overview of Impacts and Existing Situation** – The anticipated construction and/or operational impacts of the Projects as determined in the EIS and EMP (P) should be detailed.
- **Objectives –** This section should provide the management objectives or environmental commitments to be achieved, as included in the 'objectives' section of the relevant environmental management strategy.
- **Non Compliance –** This section should provide information on the corrective actions to be implemented. The level or extent of corrective actions implemented should reflect the seriousness of the event. The various indicators which should trigger the implementation of corrective actions are provided in the 'corrective actions' section of the relevant environmental management strategy.
- **Mitigation measures** – This section should provide details of the actions to be performed onsite. These actions should be developed from the requirements provided in the 'mitigation measures' section of the relevant environmental management strategy.

- **Monitoring** - This section should provide information on the monitoring activities to be performed. The actions included in this section may be sourced from the 'Monitoring' section of the relevant environmental management strategy.
- **Reporting** - This section should provide information on the reporting which will be performed by the Construction Contractor. The details included in this section may be able to be sourced from the 'Reporting' section of the relevant environmental management strategy.
- **Corrective actions** – This section should outline the action, or the commitment for action, to be implemented when a specified mitigation measures is not met or legislative requirements have been exceeded.

20.5.3 Submission of an EMP(C)

The Construction Contractor will submit an EMP(C) to QR for approval prior to major construction activities commencing.

The Construction Contractor should be solely responsible for the full and complete implementation of the EMP(C).

20.5.4 Auditing

The Construction Contractor should include in the reporting section of the EMP(C) the requirement to provide weekly checklist audit reports to QR upon request.

The Superintendent should audit the Construction Contractor's implementation of their EMP(C). Actions to be undertaken by the Superintendent during the audit are likely to include:

- Check monitoring programme and reporting procedures.
- Undertake investigations where necessary.
- Review performance standards and criteria against results.
- Prepare audit reports over time (with respect to agreed schedule) and submit to the QR upon request.
- Procedures for non compliance and exceedance/investigation/intervention of indicators identification.