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THE NEW ENERGY IN COAL

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DRAFT Environmental Management Plan (EMP) Rail

China First Coal Project – Galilee Basin

December 2012

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CONTENTS

TABLES

FIGURES

Waratah Coal

ABBREVIATIONS

ACH Act - *Aboriginal Cultural Heritage Act 2003*

AHD - Australian Height Datum

ARMP - Approved Risk Management Plan

AS - Australian Standard

ASS - Acid Sulfate Soils

ASSMP - ASS Management Plan

bgl - below ground level

BMP - Bushfire Management Plan

BRC - Barcaldine Regional Council

CEC - Cation Exchange Capacity

CHMP - Cultural Heritage Management Plans

CLR - Contaminated Land Register

DMP - Disaster Management Plan

DSEWPaC - Department of Sustainability, Environment, Water, Population and Communities

DTMR – Department of transport and Mains Road

EC - Electrical Conductivity

EIS - Environmental Impact Statement

EM - Environmental Manager

EMP - Environmental Management Plan

EMR - Environmental Management Register

EP Act – *Environmental Protection Act 1994*

EPBC Act - *Environment Protection Biodiversity Conservation Act 1999*

EPC - Exploration Permit for Coal

ERAP - Emergency Response Action Plan

ESA – Equivalent Standard Axles

ESCP - Erosion and Sediment Control Plans

ESP - Exchangeable Sodium Percentage

GHG - Greenhouse Gases

GQAL - Good Quality Agricultural Land

IECA - International Erosion Control Association

ILUA - Indigenous Land Use Agreement

IRC - Isaacs Regional Council

LOS – Level of Service

MCF - Multi-Cargo Facility

NC Act - *Nature Conservation Act 1992*

NQBP - North Queensland Bulk Ports

NVMP - Noise and Vibration Management Plans

$PM_{2.5}$ - particulate matter with an aerodynamic diameter less than two and half microns

PM_{10} - particulate matter with an aerodynamic diameter less than ten microns

QH Act - *Queensland Heritage Act 1992*

QRA - Qualitative Risk Assessments

QWQG - Queensland Water Quality Guidelines

RAP - Remediation Action Plan

RE - Regional Ecosystems

SCL - Strategic Cropping Land

SEIS - Supplementary EIS

SEO - Site Environmental Officer

SHMS - Safety and Health Management System

SOP - Standard Operating Procedures

t - tonne

TN - Total Nitrogen

TP - Total Phosphorus

VPD - Vehicles Per Day

WONS - Weeds of National Significance

WRC - Whitsunday Regional Council

1. Introduction

This Draft Environmental Management Plan (EMP) has been prepared to outline an environmental management strategy for the rail component of the Galilee Coal Project (Northern Export Facility) (also known as, and hereafter referred to as, the China First Project). It outlines the strategic level overview EMP and establishes the environmental management and monitoring obligations associated with the construction and operation of the rail starting at the balloon loops adjacent to the mine site and ending at the boundary of the Abbot Point State Development Area.

1.1 Purpose of the EMP

The EMP proposes a range of measures to protect the identified environmental values that may be potentially affected by the Project. The measures proposed in this document are to be used by the administering authorities to establish the approval conditions for the project. Waratah Coal is committed to the preparation of specific EMPs for each core project component (i.e. mine, rail and port) to ensure compliance with best practice environmental management throughout the life of the Project.

This EMP is a live, interactive document that will be updated in accordance with best practice environmental management practices, standard operating procedures, any Works Approvals and Licence conditions, and in consultation with key project stakeholders. This draft EMP has been specifically prepared to provide strategic level environmental measures for Waratah Coal and its contractors to follow for the construction and operation of the rail and related infrastructure to ensure that:

- activities associated with the Project's development do not adversely affect adjacent environmental and heritage values or the local community
- any potential environmental impacts of the development are managed in accordance with legislative requirements and best environmental management practices.

1.2 Key Project Activities

The key activities that this EMP will apply to are:

- construction activities and services
- site preparation and general earthworks including vegetation clearing, topsoil stripping with storage or spreading and overburden removal
- blasting of hardrock
- electricity supply
- communication and signaling
- track and structure construction
- light and heavy vehicle haul roads and access roads
- explosives storage and magazines
- site rehabilitation and stabilization

- all other activities not described separately, but which are directly associated with or facilitate or support of the described activities
- actions to prevent environmental harm because of the described activities.

1.3 Objectives and Targets

The key objectives of this EMP are to:

- implement a system for compliance with the following requirements:
    - licences, approvals and permits
    - other relevant legislative requirements
    - obligations and commitments from Waratah Coal's Environmental Impact Statement (EIS) and Supplementary EIS (SEIS)
    - project environmental policy and environmental management system
- establish design, mitigation and management measures to achieve the environmental objectives in relation to the predicted impacts for design, construction and operations
- ensure that project design processes incorporate leading practice environmental design and sustainability principles to minimise the potential impacts of construction and operation on the environment and local community
- ensure that construction and operations are undertaken in a way that minimises potential impacts on the environment and community
- develop, implement and monitor measures that minimise pollution and optimise resource use
- address environmental related community issues arising from the construction and operations activities
- take all reasonable steps to minimise the likelihood that events of material or serious environmental harm as defined under the *Environmental Protection Act 1994* (EP Act) occur.

Waratah Coal's construction and operational environmental performance will be measured using a number of environment related targets described in Section 4 as Performance Criteria, listed separately for each Environmental Element. These will be used as strategic indicators for the ongoing assessment of performance during the construction and operational phases of the project. Assessment of Waratah Coal's compliance with Performance Criteria will be reported, reviewed and monitored on a regular basis via documented management system review, monthly reports and site meetings.

Copies of the relevant legislation, guidelines, standards and approvals will be held in hard copy or electronically in the project office and will also be available in relevant site offices.

1.4 EMP Structure

This EMP has been divided into:

- Introduction (this section)
- Project Description: Section 2
- EMP Implementation: Section 3 - the over-arching management regime for implementing the EMP
- Environmental Issues: Section 4 - specific elements outlining the key environmental issues, environmental values, potential impacts, commitments, mitigation measures and monitoring.

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2. Project Description

The key characteristics for the rail and supporting infrastructure are briefly described in the section below.

2.1.1 Rail Easement

Processed coal will be transported by a new railway system approximately 453 km in length[1] that runs from the Galilee Basin to the existing Port of Abbot Point. The railway component includes a state of the art, heavy haul, standard gauge railway to support 25,000 tonne (t) train units. The rail will initially be built to transport 60 Mtpa, and will ultimately cater for a capacity of 400 Mtpa. As such, Waratah Coal has undertaken the assessments to support, and are seeking approval for, a rail capacity of 400 Mtpa.

The final railway easement will be on average 49.5 m wide[2]. In relatively flat terrain the rail easement will be 40 m wide and in areas where cross-slope cuttings are required the width of the easement will be wider – up to 150 m (with two instances exceeding this – up to a maximum width of 184 m). The easement includes both the rail and a service road.

Until recently there was a commitment to utilise coal terminal, stockpiling and loading facilities being assessed as part of the North Queensland Bulk Ports (NQBP) T4-T9 and Multi-Cargo Facility (MCF) proposals. However, given the recent Queensland Government directive to defer the approval process for the expansion of Abbot Point until the end of 2012, and the associated uncertainty over the T4-T9 and MCF proposals, the limit of the assessment for this project is now defined as the boundary of the Abbot Point State Development Area (APSDA).

The rail traverses the Barcaldine, Isaacs and Whitsunday Regional Council (BRC, IRC and WRC respectively) administrative areas.

A brief description of the corridor follows:

APSDA to Bogie River (0 km – 38 km): the route starts at the western boundary of the APSDA (the rail loop is within the APSDA site) and then proceeds in a westerly direction before crossing the foothills between Mount Aberdeen and Mount Abbot. There is a major bridge crossing of Elliot River as well as small bridging of Saltwater Creek and significant culverts through Stockyard Creek area in this section.

Bogie River to Bowen River (38 km – 99 km): the route crosses Sandy Creek before climbing towards Peter Gordon Range where it crests and then travels downhill passing to the west of Collinsville, running west of the boundary of Xstrata Mining Lease. In this section the route will pass underneath two high voltage transmission lines (approximately 80 m apart) stemming from Collinsville Power Station, as well crossing the Bowen and Bogie Rivers and Sandy, Oaky, Strathmore and Pelican Creeks.

Collinsville to Bowen Development Rd (99 km – 162 km): initially the route trends uphill from the Bowen River into the Leichardt Range, towards the upstream reaches (or head) of the Suttor River where the route traverses over undulating terrain towards the Bowen Development Road. In this section the alignment crosses the North Queensland Gas Pipeline (near the Bowen River), as well as a 4.5 km stretch of the Bowen River floodplain. Bridge crossings also exist at Parrot, Sambo and Cockatoo Creeks.

Bowen Development Rd to Suttor River (162 km – 229 km): as the rail line descends through the Leichardt Ranges it heads in a south-west direction through open forested country and grasslands before crossing the

1 From the western boundary of the APSDA to the beginning of the rail loop at the mine site.

2 Average width was calculated by dividing the total area of the rail footprint (2215 ha) by the length of the rail (453 km).

downstream channels of the Suttor River. In this section the railway will cross the Suttor Development Road at grade and Bowen Development Road with a road-over-railway bridge. The route will also pass within 10 km of the township of Mount Coolon.

Suttor River to Gregory Development Rd (229 km – 280 km): this section sees the route deviate to the south around the heart of the Suttor River Catchment before crossing the Gregory Development Road (road under rail bridge) near the Twin Hill Mines.

Gregory Development Rd to Belyando River (280 km – 389 km): the route continues in a south-west direction across relatively flat terrain with easy rolling grades avoiding most of the widespread Belyando floodplain and the Epping Forest National Park. The route avoids most of the extensive Belyando floodplain and passes more than 10 km from the Epping Forest and Mezappa National Parks. The alignment will have major bridge crossings and significant culverts over Lestree Hill Creek, Sixteen Mile Creek, Mistake Creek and Lascelles Creek in this section.

Belyando River to China First Tenement (389 km – 453 km): the route continues south-west where it crosses the confluence of the Belyando River and its downstream tributaries. At this point the crossing of the extensive Belyando floodplain is less than 5 km. The corridor then continues in a southerly direction as it parallels the existing Galilee Basin Exploration Permit for Coal (EPCs), crossing Sandy Creek in culverts and bridge structure before leading into the loading balloon at the mine site.

2.1.2 Changes in rail alignment and KPs since the EIS

Options 1 and 2 of the rail alignment between KP 410-453 have been removed leaving the former option 3 as the sole option for this section of the rail alignment (see Figure 1). This is the option that most closely follows cadastral boundaries, and as such, is the option preferred by landowners as it minimizes impacts upon those affected landowners.

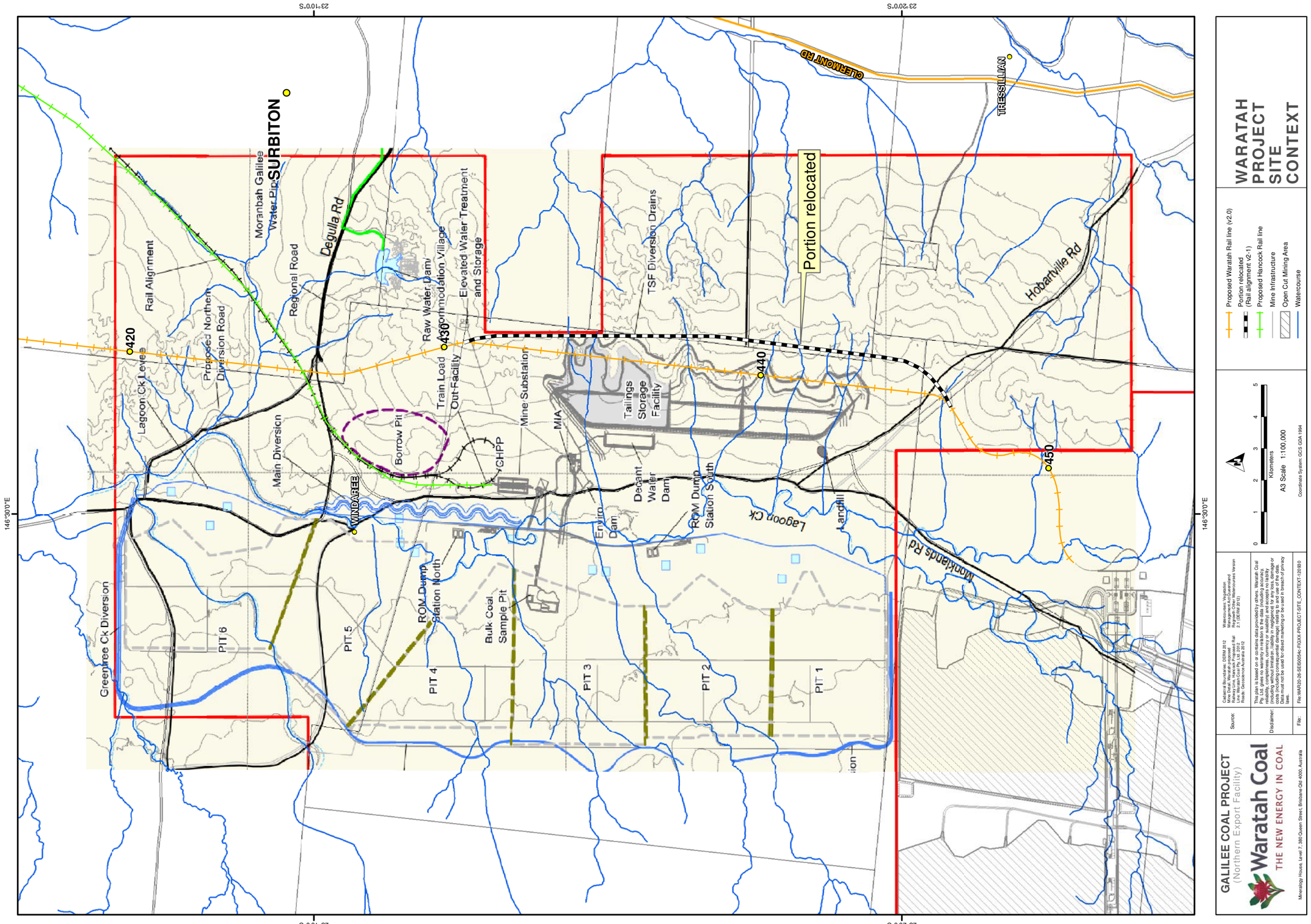
There have been some minor changes to the initial option 3 alignment as requested by the landowners to better align with the property boundaries. There has also been a change in alignment between KP 432-448 to accommodate the Hancock/GVK Alpha Project mine layout. This revised alignment through the Alpha and Kevins Corner Project areas has been discussed with both Hancock/GVK and the Department of Natural Resources and Mining and some further changes to the alignment through the mine area of the Alpha and Kevins Corner may be necessary once the final rail alignments, final land property boundaries and final infrastructure locations are determined.

Relatively minor changes to the rail alignment to accommodate design elements and landowner concerns have occurred in four other locations along the length of the alignment. The limit of the assessment for this project is now defined as the boundary of the Abbot Point State Development Area (APSDA) (see Figure 1 -Project Regional Context, and refer also to Attachment B – EIS Executive Summary for former APSDA layout).

Given that the limit of the assessment is now the boundary of the APSDA, the Kilometre Points (KPs) have been amended to reflect this. The EIS KP5 at the boundary of the APSDA is now KP0, and accordingly all other KPs along the route are now generally 5 km less than those KPs described in the EIS. All work presented within this SEIS utilises the new KPs, starting from KP0 at the boundary of the APSDA, and ending at KP 453 at the beginning of the rail balloon loop at the mine. .

The alignment is shown in **Figure 1**.

Figure 1. Rail Alignment



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2.1.3 Rail Development

The heavy haul railway will be of single standard gauge track configuration and accommodate up to 6 x 3.5 km long passing loops. The exact length of the railway (currently estimated at 453 km) will not be finalised until the specific route and train loadout facilities at the mine and coal terminal have been established.

The track will be of 68-75 kg/m Australian Standard (AS) plain carbon continually welded rail mounted on monoblock pre-stressed concrete sleepers, spaced 600 mm apart. These will be supported by a layer of deep clean ballast around 510 mm deep (measured from the top of the sleepers) with shoulders of 400 mm. Further refinement of track parameters will be conducted throughout the final design phase.

The corridor has been selected to accommodate 1 in 200 (0.5%) and 1 in 80 (1.25%) maximum loaded and unloaded grades, respectively, with no horizontal curves sharper than a radius of 1,000 m. It is expected that significantly flatter geometry beyond these limits can be achieved between the mine site and Leichhardt Ranges where the topography is relatively flat. The alignment has been modelled subject to curve compensation (0.034%) to ease grades around the smaller horizontal curve radii.

2.1.4 Rolling Stock

Currently two rolling stock configurations are being considered based on major coal transportation systems used in China and North America. Both train configurations are expected to deliver similar annual payloads, which is significantly more than the existing capacities of coal freight systems in Queensland.

Standard gauge coal wagons with a range of 25 - 36 t axle loads are not in daily operation as yet, but are common in iron ore operation. At this point in time, only prototype 36 t axle load coal wagons have been built. Wagon design is assumed on the basis of an enlarged AutoFlood III Aluminium Hopper Car, or alternatively C80 Gondola Car.

Motive power will be of standard diesel-electric locomotives, for example the General Electric Evolution Series locomotive, or DF Series Chinese locomotive manufactured by China Southern Rail (CSR) Group Ziyang Diesel Locomotive Co. Ltd. Use of electric traction although assessed, does not provide a cost efficient solution for this Project during the initial phases and the development phases.

It is expected that between six to seven trains per day will be needed to deliver the initial 40 Mtpa of product coal to the coal terminal. An allowance of six passing loops equally spaced by travel time (approximately 50 to 70 km apart) will be required along the route to meet the initial annual carrying capacity of 60 Mtpa.

Each train will be approximately 3.2 km in length, using distributive power and Electronically Controlled Pneumatic air brakes for improved train handling and optimal fuel performance. The effective length of the receiving and departure tracks in compliance with the length of the train and a safe stopping distance is estimated at 3.5 km.

2.1.5 Supporting Infrastructure

Marshalling yards for the maintenance, servicing and refueling of rolling stock will be located at the coal terminal end of the railway with a locomotive refueling facility located around the mine balloon loop area. This servicing facility will be of sufficient capacity to hold the entire rolling stock fleet and provide for the following functions:

- holding lanes for trains awaiting departure
- storage bays for rolling stock awaiting repair or taken out of cycle on rotation
- lanes for disconnecting and marshalling of trains
- wagon maintenance workshop

- locomotive maintenance and refueling facility
- roll by inspection facilities
- Central Control Terminal
- equipment and fuel storage
- security facilities
- water and wastewater handling and treatment
- cleaning and decontamination of rolling stock
- oil and sediment control traps
- staff and administration facility.

2.2 Process management

2.2.1 Environmental delivery strategy

Waratah Coal will implement environmental management controls that will deliver outstanding environmental performance throughout the development and delivery of the Project. Further, Waratah Coal will maintain an environmental management system in accordance with the intent of the environmental management standard ISO 14001.

2.2.2 Final Design Phase

The following will be implemented during the Final Design Phase:

- conduct further investigations necessary to finalise the design and environmental management requirements
- procure documentation and evaluation that incorporates the environmental requirements of the project
- design solutions that minimise the potential for environmental harm and maximise sustainable outcomes
- planning and environment-related licences and permits are obtained for all activities in an area as required prior to commencement of construction activities in that area
- develop construction techniques that reasonably and practically minimise the potential for environmental harm
- develop project environmental standards that maximise the environmental performance of the project
- incorporate safety in design processes relevant to the environmental performance of the project during construction and operation
- undertake early and continuous review of the design against environmental design criteria and environmental documents
- undertake detailed risk assessment and development of management controls for the construction phase.

The design team will be fully briefed on the special environmental requirements for the final design phase.

2.2.3 Construction phase

The following occurs during the construction phase:

- the environmental design, developed during the design and pre-construction phase, is implemented
- clear environmental management standards are communicated to and owned by personnel, consultants, subcontractors and suppliers
- clear environmental accountabilities and responsibilities are established for all key management positions
- inspection, monitoring, auditing and reporting are in place to establish performance against the requirements of this EMP and to facilitate improvement of the EMP
- all personnel are aware of and take ownership of their environmental responsibilities relevant to the work they are undertaking.

The following occurs during the commissioning phase:

- environmental risks associated with the risk of equipment failure during commissioning, as design and construction errors are identified and managed
- specific environmental risks associated with commissioning are identified and addressed
- changeover of environmental roles, responsibilities and accountabilities from the construction team to the operations team are managed effectively.

2.2.4 Operational Phase

The following will occur during the construction phase:

- clear environmental management standards are communicated to and owned by personnel, consultants, subcontractors and suppliers
- clear environmental accountabilities and responsibilities are established for all key management positions
- inspection, monitoring, auditing and reporting are in place to establish performance against the requirements of the EMP and to facilitate improvement of the EMP
- all personnel are aware of and take ownership of their environmental responsibilities relevant to the work they are undertaking.

3. EMP Implementation

3.1 Legal obligations

Waratah Coal is committed to complying with the laws of Federal, State and Local Governments where relevant and implement best practice management to ensure that the potential for events of serious or material environmental harm are minimised as far as reasonably practicable.

A Project-specific Environmental Legislation Register will be compiled during the Project's Final Design Phase to cover construction and operational phases of the Project. The Register will also provide a summary of relevant codes and standards and other guidelines that may affect the Project. This EMP and any subordinate plans will be developed with due regard to this register.

To aid compliance with Waratah Coal's legislative requirements, legal obligations will be identified and incorporated into work-site documentation. These documents will include suitable references or descriptions of the legislative requirements, whether forms, reports or actions as required aiding Waratah Coal's compliance and onsite management.

3.2 Licenses, approvals and permits

An Environmental Approvals and Obligations Register will be developed during the Final Design Phase of the Project once the Project's EIS, SEIS, Environmental Authority and other relevant permits have been granted. This register will document environmental requirements relevant to the Project that arise from a number of sources, including the EIS, approvals and licence requirements. This register will include a summary of how each obligation is met through this EMP or other associated management plans.

The Environmental Manager will be responsible for managing the approvals process, ensuring all the required authority approvals are obtained and that approvals are up-to-date and conditions are enacted during construction and operation on a monthly basis. Project personnel, in particular the Construction Manager and the Operations Manager, will be responsible for liaising with the Environmental Manager in timely planning of activities that require approval prior to commencement.

Where relevant, timelines for obtaining approvals will be incorporated into the wider Project running schedule to allow adequate time to prepare, submit and receive identified legislative approvals.

3.3 Roles and Responsibilities

All personnel managing or working on the Project shall be responsible for environmental management and continuous improvement in performance. All staff will be made aware of their responsibilities during the Project induction process.

All personnel associated with the Project shall be required to comply with the requirements of all applicable environmental legislation, regulations, codes of practice as well as project standards, procedures and work instructions. An outline of the environmental responsibilities of key personnel and contractors throughout the life of the Project are shown in **Table 1**.

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Table 1. Personnel roles and responsibilities

Specific Role	Responsibilities
Construction or Operations Manager	• incorporate the EMP actions and requirements into the Project specific procedures • appoint / nominate the Environmental Manager (EM) • allocate Project resources to manage environmental issues • ensure suppliers and contractors comply with environmental requirements.
Systems Manager (Quality, Environmental, OH&S)	• review the Final EMP to ensure compliance with AS/NZS ISO 14001. • ensure that audits of the EMP are carried out and reported to the EM and Construction / Operations Manager • provide advice and support in relation to environmental issues
Environmental Manager (EM)	• be suitably qualified and have demonstrated experience in construction or operations environmental management • act freely and independently to take all steps necessary to avoid or minimise adverse environmental impacts, including recommending to the construction or operations manager that activities cease due to inadequate environmental performance • report to the construction or operations manager on the performance of the EMP and improvement opportunities • review the performance of the EMP on a quarterly basis • review any environmental non-conformances, remediation and preventative actions • ensure that the EMP is effectively established, implemented and maintained at the project level • review and update the EMP and associated documentation • be present on site during any critical construction activities and provide support to the project team to enable them to meet their environmental commitments • arrange for environmental inspection and audit programs to be completed • implement an appropriate environmental awareness training program and assist site personnel to complete the training program • ensure that environmental records and files are maintained • ensure community complaints and non-conformances are recorded and appropriately considered and acted upon • liaise with relevant local authorities regarding works • liaise with the general public and key stakeholders, as required • oversee environmental monitoring requirements, as required by approvals, licenses and permits.
Project Engineers and Superintendents	• implement the EMP on site • report to the EM on environmental issues and non-conformances • ensure that site personnel are aware of their environmental obligations • take corrective action to resolve non-conformances.
Site Environmental Officer (SEO)	• appoint / nominate the Site Environmental Officer (SEO) • be on site during all construction or operations activities • undertake daily and weekly site inspections and audits, as required by the EMP • conduct site specific environmental awareness training • investigate and report on any environmental incidents and ensure that appropriate action is taken

Specific Role	Responsibilities
	• complete construction inspection checklists and report to the construction environmental manager • undertake environmental monitoring requirements, as required by approvals, licenses and permits.
Contractors	• comply with legal and contractual requirements • comply with management / supervisory directions • participate in awareness training as directed by management • notify project management prior to commencement of key activities • notify the EM / SEO of any non-conformances or potential or actual environmental harm occurring on the site • regularly report on activities and environmental performance.
All Personnel	• comply with the relevant Acts, Regulations, Codes of Practice and Standards • comply with the Environmental Policy and Procedures • promptly report to management any non-conformances and / or breaches of the system • participate in awareness training as directed by management. • comply with management / supervisory directions.

3.4 General Contractor Requirements

Each construction or operations Contractor will provide a separate EMP demonstrating their ability to manage their environmental impacts. The Contractor's EMP will identify how the Contractor will achieve the requirements of this EMP by defining their management strategies. It will be required to ensure compliance with all conditions, licenses, permits, consents and approvals relating to the construction or operational phases of the Project, relevant to the scope of works being undertaken. Conditions of approval will be made available to contractors at the time of tendering for work packages.

3.5 Inductions and Staff Training

All personnel associated with the Project shall undergo basic environmental management training as part of the initial safety and environmental induction to inform them of their responsibilities, and to ensure they are aware of their responsibilities and are competent to carry out their work in an environmentally acceptable manner. More intensive training will be undertaken according to a person's role and accountability. This will be modular and will include information on management systems, waste management, ground disturbance procedures, and other items outlined in this EMP.

Ongoing instruction shall be provided via modular training packages, toolbox meetings and the like. All inductions and ongoing instruction shall be recorded on a project register to ensure all staff are inducted and receive appropriate training.

All employees (including subcontractors) shall receive awareness instruction in the following areas:

- environmental policies
- EMP and related documents
- site environmental objectives and targets

- understanding the regulatory requirements applying to the Project and their consequent responsibilities as a member of the Project team
- potential consequences of departure from procedures
- emergency procedures and responses
- identification of their legal obligations.

Personnel performing tasks that carry higher than standard environmental risks (for example, tree clearing) shall receive additional induction and training in a modular format to further inform them of particular requirements, risks and controls or must be certified as having completed induction and training processes and / or as having gained appropriate experience, before undertaking such tasks.

3.6 Communications

3.6.1 Internal Communications

'Toolbox' meetings shall be regularly held by each crew during construction and operational activities. During these meetings, concerns and questions raised by personnel shall be addressed and any environmental incidents that occurred previously, discussed. In addition, new environmental management procedures or information shall be discussed to ensure effective implementation. If requested by personnel or felt necessary by the Construction or Operations Manager, Project Engineers or Superintendents, Environmental Manager or SEO, specific environmental management procedures already communicated to personnel will be reiterated during these meetings.

Regular meetings shall be held between the Site Environmental Team (Environmental Manager and the Site Environmental Officer), the Construction or Operations Manager and Project Engineers and / or Superintendents to establish the progress of development and the schedule and location of activities over the site.

3.6.2 External Communications

Waratah Coal acknowledges that one of the most important aspects of the delivery of the Project will be the ongoing efficient and effective management of all interactions with the community and stakeholders. External communication requirements will be documented in a Communications and Stakeholder Management Plan.

The Communications and Stakeholder Management Plan will be the guiding document for communication with stakeholders and is applicable to the construction and operational phases of the Project. The document will guide community involvement on the design, construction and commissioning of the Project, and closely interacts with the functions of the EMP and other Project management plans.

The key areas in which the EMP and the Communications and Stakeholder Management Plan interact include:

- the requirement to liaise with the community and businesses on environmental planning and management documents (such as site environmental plans) to ensure their concerns are considered
- the process of informing the community and local businesses about activities that may have an impact on surrounding communities (such as road works)
- the management of environment-related complaints and comments.

3.7 Public Communication and Complaint Resolution

Waratah Coal will, when made aware of complaints made by stakeholders and the community, treat such complaints as environmental incidents and will investigate causes and develop resolutions. Complaints management will ensure:

- residents in adjacent properties are made aware in advance of construction activities, including blasting schedules and safety procedures
- residents believe the construction team respond promptly to identified issues and impacts
- potential impacts relating to vegetation removal and other site works which may impact on visual amenity are minimise where practicable.

In implementing the public communication process, consultation will be undertaken with key stakeholders. With respect to traffic controls, consultation will be undertaken with Queensland Police, Queensland Ambulance, Queensland Fire and Rescue Service and Queensland Transport and others where appropriate. Construction traffic management planning will be adopted to ensure safety and prevent safety concerns regarding shared use of roads.

A communication program will be implemented to targeted residents in the immediate vicinity of pending works and the wider community including:

- regular construction updates
- advice on blasting and construction schedules
- the results of monitoring required by the EMP.

A complaint responses system will be adopted including promotion and provision of phone, email and website contact details. Enquiries and complaints will be followed up to assist in gauging the community's perceived impacts from the Project on social and economic values and amenity, with a communications register utilised including communication activities, residents' complaints and resolution of complaints.

A number of other actions will be undertaken to manage and preempt complaints from the community, including:

- undertake surveys with residents within close proximity of the mine areas on an annual basis to ascertain satisfaction with environmental management and complaint management procedures
- prepare and submit details of monitoring results, audits, training and incidents to Waratah Coal on a monthly basis, with a more detailed overview on an annual basis
- undertake regular reviews of the communications register to ensure enquiries and complaints are being addressed and followed up adequately, and that no systemic issues remain without mitigation measures being put into place
- significant complaints and community issues will be reported to regulatory agencies where required
- appropriate personnel will undertake adequate environmental awareness training covering the requirements of the EMP regarding community liaison, incidents and complaints.

3.8 Monitoring and Reporting

An Environmental Monitoring Plan will be developed for the Project to complement this EMP, following approval to ensure the plan incorporates all relevant monitoring requirements. The plan will document the overall site monitoring requirements, or links to specific documentation, to ensure monitoring is undertaken in accordance with the Project approvals and commitments made for the Project. It will outline the environmental monitoring to be undertaken, including monitoring sites, parameters and their frequency of measurement and also make reference to monitoring procedures and records. The plan will be made available to the administering authority on request.

Reporting of results of monitoring, auditing and general environmental performance will be undertaken on a recurring basis (i.e. to the Construction or Operations Manager, Environmental Manager) and to Waratah Coal. Environmental incidents will be reported as outlined in the following section.

Additional reporting requirements will include (but not be limited to):

- annual returns as required under any Environmental Authorities for the Project
- National Pollutant Inventory reporting as necessary
- National Greenhouse and Energy Reporting as necessary.

3.9 Auditing

The key objective of the Environmental Auditing and Review program is to monitor and report on compliance with the Project approvals and this EMP. Waratah Coal will conduct environmental audits to assess compliance with regulatory requirements and the performance of the EMP and its implementing strategies and procedures.

The program will comply with legislative reporting obligations, in addition to general annual auditing of internal processes, and audits will include comparison against (but not be limited to):

- commitments and performance objectives of this EMP and any site specific or associated EMPs
- legislative requirements, including the 'General Environmental Duty' (Section 319 of the EP Act)
- approval conditions
- the Project Objectives and Targets
- the continual improvement commitments of the Project.

3.10 Environmental Incident Response

The EP Act (s.320) requires that any person who becomes aware of any event or incident that may cause or has caused environmental harm to report the event or incident to the appropriate operational manager. Environmental incidents are defined as being any breaches or non-adherences to objectives and procedures prescribed in the EMP and environmental management procedures applied to the Project by Waratah Coal, including non-compliance with Project approval / Environmental Authority conditions. These incidents are to be reported to the SEO by the person responsible for the incident or the first person at the site of an incident. The SEO shall notify the Environmental Manager and the Construction or Operations Manager, who will

consider whether the incident resulting may be a breach of statutory conditions and be responsible for any resulting notification. Waratah Coal may elect to notify authorities of incidents that are not breaches of statutory requirements.

Environmental incidents shall be assigned a level of severity, as defined below for this Project:

- **LEVEL 1**: Minor non-adherence to procedure, and a negligible environmental impact
- **LEVEL 2**: Minor non-adherence to procedure and minor environmental impact that requires little management to be rectified
- **LEVEL 3**: Moderate breach of procedure and / or an environmental impact that requires management / mitigation to be rectified that could lead to a breach of environmental approval conditions
- **LEVEL 4**: Extreme breach of procedure and / or environmental impact that has or is likely to cause a breach of environmental approval conditions.

The level of the environmental incident shall be determined by the relevant Project Engineer, Environmental Manager and SEO with advice from Waratah Coal's environmental consultants, if required.

The procedures may vary depending on the level of incident occurring. Contingency actions specific to incidents are described in the individual component management plans contained in this EMP and will be detailed in the Construction and Operation EMPs and EMS.

'Generally, the control methods should follow the Control, Contain, Cleanup hierarchy of approaches, whereby the source of the spill is (safely) controlled, the spill itself contained so as to minimise or avoid its movement into the environment, and cleanup undertaken.

However, Health and Safety concerns will always take precedence when managing an incident. The site Health and Safety Plan will override incident response in the event of a conflict, however generally if a situation is not safe, personnel will not enter the area unless they are:

- properly fitted with Personal Protective Equipment and trained in its use
- sufficiently experienced to deal with the situation
- acting under an approved Safety Management Plan or Procedure for the specific site and job.

3.11 Documentation

Waratah Coal will maintain an Environmental Management System which be managed and maintained in accordance with ISO 14001 standards. Documentation relating to environmental issues during construction and operational phases comprises this EMP, permits, Works Approvals, licences and Contractors' EMPs, and will be referenced in the site EMS. This documentation shall be made available via a site intranet.

The relevant Project Engineer shall be responsible for issuing this documentation to contractor personnel and maintaining an inventory of documentation distribution. They shall be responsible for ensuring all document holders receive updates to the documents which may be made from time to time.

3.12 Maintenance and Review

The EMP is an overarching strategic document which outlines the Project's overall environmental commitments. It is used as a planning document for the rail construction (and where relevant operational)

activities to provide Waratah Coal with a strategic framework for environmental management that is consistent with Project approvals.

The EMP will be updated prior to works beginning on the Project, on any amendment to the project approvals, and when any other changes necessitate a revision (e.g. legislative changes). In addition, periodic review of the will be undertaken throughout the Project. Amendments will be made where required, with any material changes to the EMP (commitments, deviations from the project approvals) discussed with DEHP and approval sought if required.

Continual review and updating of the EMP will ensure it remains current, with any issues rectified and the continual improvement approach utilised in improving site management over time.

Any relevant changes will be communicated to relevant project personnel via 'Toolbox' meetings.

Waratah Coal

4. Environmental Management

4.1 Environmental Management Framework

The EMP elements addressed in this section have been selected from those major components addressed and considered to require management under the EIS and SEIS project works, being:

- geology and soils
- land contamination
- hydrology and water quality
- groundwater
- terrestrial flora
- terrestrial fauna
- aquatic flora and fauna
- weed management
- pest management
- air quality
- noise and vibration
- waste
- hazard and risk
- transport
- cultural heritage
- visual amenity
- land rehabilitation.

Each element is detailed in the following sections, using the following structure:

1. **Element** - Aspect of construction or operation to be managed (as it affects environmental values)
2. **Operational Policy** - The operational policy or management objective that applies to the element
3. **Performance Criteria** - Measurable performance criteria (outcomes) for each element of the operation
4. **Implementation Strategy** - The strategies, tasks or action program that is to be implemented to achieve the performance criteria
5. **Monitoring** - The monitoring requirements to measure actual performance
6. **Auditing** - The auditing requirements to demonstrate implementation of agreed construction and operation environmental management strategies and compliance with agreed performance criteria
7. **Reporting** - Format, timing and responsibility for reporting of monitoring and auditing results

8. **Corrective Action** - The actions to be implemented in case a performance requirement is not reached and the person(s) responsible for the actions (including staff authority and responsibility management structure).

4.2 Element Plans

The following sections relate to specific elements of the environment that may be impacted by the project. Environmental values and potential impacts are described for each element, with objectives performance criteria and control strategies proposed to minimise potential impacts on environmental values.

4.2.1 Element 1 – Geology and Soils

4.2.1.1 Background

4.2.1.1.1 Topography

The following sections describe the topography of the rail alignment in the five zones of the 453 km.

Kilometer Point (KP) 0-KP20 (Coastal Plains) - the topography of the coastal plain ranges from wetlands and residual clay plains to flat, weathered granite and granitic hills. The rail alignment tracks westward for 5.6 km from the coal terminal along relatively flat terrain between 5 m and 15 m Australian Height Datum (AHD) with some isolated areas below the 5 m AHD contour associated with creek crossings.

KP20-KP80 (Clarke Ranges) - elevations in this area range from around 100 m AHD to over 1,000 m AHD; however the rail alignment reaches maximum elevations of about 200 m. The topography includes the granite hills of Mt Abbot (1056 m), Mt Aberdeen (910 m), Mount MacKenzie (514 m), Pine Hill (624 m), and Highlanders Bonnet (487 m).

KP80-KP120 (Bowen River Valley) - the topography of this area reflects the Bowen River Valley's erosional impact upon the underlying geology with the topography falling from 233 m AHD to 150 m AHD in the centre of the valley before climbing up to 350 m as the valley gives way to the Leichhardt Range.

KP120-KP185 (Leichhardt Range) - the topography of the Leichardt Range inclines from 250 m to 516 m AHD and includes Bulgonunna Peak (516 m). The intrusive rock types form areas of higher relief with radial drainage to the Suttor Formation which surrounds them. The area is also dissected by tributaries of the Suttor River that eventually drain to the southwest, into the Belyando and subsequently the Burdekin catchment.

KP185-KP453 (Inland Plains) - the topography comprises undulating plains crossing the Suttor River Valley at 190 m to 220 m, rising up to 250 m on areas of outcrop before dropping back to about 230 m on sandy cover. The topography then steadily rises to the west reaching about 250 m to 290 m across the Belyando River valley and rising to 300 m to 320 m adjacent to the Permian Sandstones. It finally reaches 330 m at the end of the rail alignment. The generally low undulating topography indicates a low potential for landslip in this area.

4.2.1.1.2 Geology

This section describes the geology of the rail alignment and the main structural features that may impact upon project construction such as fault zones and dykes following structural trends within the five regional zones.

KP0-KP20 (Coastal Plains) - The coastal plain is dominated by intrusive / extrusive rock types and recent alluvial and erosional geology with a low potential for fossils. This includes the predominantly Palaeozoic granitoid terrain from which the Tenosols and sandy soils are derived and the Quaternary mudflats and alluvial

valley floors from which the cracking clays are derived. Quaternary coastal sand dunes and talus outwash surround the granitoid intrusives along the coast.

KP20-KP80 (Clarke Ranges) - The geology of the Clarke Range is comprised of granite, rhyolite, diorite and other igneous rocks ranging in origin from Carboniferous to Early Permian age (354 to 270 million years). The foothills of the range are generally low undulations before rising to very rugged and broken country.

The major structural faults and shears that occur in close proximity to and / or intersect the rail alignment include those in the Bulgonunna Volcanics region where the north-west trending fault sets dominate including the Glenore Shear zone. Further to the south-east of the rail alignment, the Millaroo Fault Zone extends through the Lizzie Creek Volcanics. It is highly unlike that fossil will be found in this area. There are numerous other faults and structures exploited by dykes that mirror the north-west trend of these zones. The combination of localised steep topography and greater prevalence of fault and fracture systems indicates a higher potential for landslip in these areas adjacent to the rail alignment. The presence of dykes indicates the potential for bars of hard ground requiring rock breaking or explosives in areas otherwise amenable to normal excavation / construction equipment.

KP80-KP120 (Bowen River Valley) - The Bowen River Valley is cut into the Lizzie Creek Volcanics including basalts, andesites, tuffs and minor acid volcanic. Further south, the Blackwater and Back Creeks Group comprising sedimentary rocks including sandstones, siltstones, shales and coal. The Hecate granite intrudes these sediments at KP90. The major structures in the area include northwest trending faults in some intrusive and the easterly dip of the Blackwater and Back Creeks Group sedimentary rocks.

The Back Creek and Blenheim groups of the Collinsville coal measures and the Blackwater Group are described as having fossiliferous content. Recorded fossil finds in these units include marine invertebrates such as bivalves and brachiopods as well as aquatic plants.

KP120-KP185 (Leichhardt Range) - The Leichhardt Range comprises sandstone, conglomerate and claystones of the Tertiary Suttor Formation to about KP150, after which the corridor intersects the Bulgonunna Volcanics until KP180. Here these are a group of Carboniferous intrusive volcanic including rhyolite and tuffs.

KP185 – KP453 (Inland Plains) - From KP185 to the mine, the alignment crosses sedimentary rocks of the Suttor Formation and alluvium of the Suttor River derived from these rock types until KP230. From KP230, the sandy alluvium derived from surrounding rock forms a sheet covering most of the landscape with outcrops of low grade metamorphic and acid igneous rocks. Tertiary sedimentary rocks and sandstones as well as siltstones of the Permian Colinlea Sandstone and sedimentary rocks of the Lower Carboniferous Drummond Group are also found in this area. The Permian and younger sedimentary rocks have fossiliferous potential; however, along the rail alignment, there is extensive Quaternary cover and therefore there is a low potential for fossiliferous geological units to occur at the surface.

The largest structure affecting the study area is the Anakie Inlier. The Post-Upper Devonian movement of the Anakie Inlier shaped the Devonian and Permian depositional basins. This controlled the major northwest trending fold axes in these basins. The adjacent basinal sediments in the southeast portion of the Project area are generally much less structurally disrupted with little faulting. These areas are characterised by very gently dipping sedimentary units.

4.2.1.1.3 Soils

The following section provides an overview of the soil types along the rail alignment split into the five specific regions.

KP0-KP20(Coastal Plains) - soils in the coastal area are regionally mapped as Sodosols; however, site sampling in the APSDA indicates Vertosols and some Tenosols are present. Vertosols include clay soils with shrink-swell properties that exhibit strong cracking when dry and can be associated with gilgai landscape microrelief. They

also form mounds and depressions in the landscape as a result of repeated shrinking and swelling of the clay blocks of subsoil. Tenosols comprise sandy to gravelly soils derived from granitoid outwash. Sodosols include sodic soils predominantly in areas subject to periodic inundation.

Soils sampled in the coastal plains included Tenosols and Vertosols on the coastal land above the inundated saline mudflats that have a pH of 5.9 to 8.6. More alkaline soils are generally associated with Vertosols and Sodosols. The soil fertility is indicated by Cation Exchange Capacity (CEC) which identifies the soil's ability to supply the plant nutrients Ca, Mg and K. The Tenosols generally have low CEC (i.e. SS01, 1.9 meq/100g) while the clay soils have generally higher CEC (SS05, 52.4 meq/100g). This is also reflected in the individual cation analyses. Saline soils with salt scalds are apparent on periodically inundated lands adjacent to the wetlands. Salinity as indicated by the chloride and EC suggests that Tenosols generally have low salinity while the Vertosols have moderate salinities.

The topsoil availability is likely to limited in the range of <0.1 m in the area of the shallow Tenosols, while the Sodosols may produce topsoils up to 0.3 m thick. Cracking clays are present at several locations (SS03, 06 and 08) throughout this area, generally in very low flat plains and / or near creeks and floodplains.

The soil sodicity and / or Emerson Crumb dispersivity analyses of samples SS02 and SS06 reported high potential for erosion and indicate that soils in these areas tend to be sodic in nature and prone to dispersion and erosion.

The variable rainfall and relatively flat topography of this area can result in localised flooding occurring over the rail alignment during rain events >200 mm over a 48 hr period. Flooding generally occurs during summer months as a result of heavy monsoon rainfalls caused by tropical lows and rain depressions generated from cyclones crossing the north eastern Queensland coastline. This can contribute to scour and tunnel erosion in soils in this area.

Six sites were visually assessed to determine their potential for erosion. Four of the six sites (Sites SO2, SO3, SO6 and SO8) were assessed as having a high potential for erosion. The four sites were deemed to have a high potential either due to evidence of existing erosion or were considered to be susceptible to erosion due to sandy substrates with no vegetative cover. The remaining two sites were assessed as having a low potential due to minimal erosion or comprising heavily vegetated banks.

KP20-KP80 (Clarke Ranges) - dominant Chromosol, Sodosol and Vertosols soils within this area include loamy red duplex soils from KP20 to KP52, shallow stony, loamy red duplex soils from KP53 to KP58 and hard alkaline yellow soils from KP58 to KP69. The hilly areas have very shallow stony duplex soils, while valley floors have occasional small areas of dark clays and / or red-brown clays, hard alkaline yellow and crusty loamy soils that are generally consistent with the area being mapped as Chromosol soils with some cracking clays in valleys. However, the dominant soils are loamy red duplex soils of shallow to moderate depth (up to 0.3 m). In some areas yellow loamy duplex soils are locally dominant, although these are often closely associated, particularly on lower slopes with mottled yellow duplex soils.

Between approximately KP70 and KP80, the alignment traverses an area bordering Sodosol / Vertosol soil areas. The landform in this section of the alignment includes moderate to strongly undulating lands with some hills. Dominant soils are described as grey loamy and standard loamy duplex soils associated with alluvial plains which are more consistent with Sodosol soils. From approximately KP77 to KP79, the dominant soils are shallow sands, sandy or loamy duplex soils which are more consistent with the Sodosol or Tenosol soils (weakly developed soils). Based upon the mapped soil types and observations from soil sampling, topsoil is expected to be in the range of 0.1 m to 0.3 m.

The area dominated by Chromosol soils are generally low salinity but often also low fertility soils as indicated by CEC results of 4.6 (SS09) to 8.6 (SS13) in most samples from this area. Though some clays around river valleys have high CEC and greater potential for agriculture (SS15), they also have low Mg content.

From approximately KP20 to KP80, the Chromosols in areas of higher relief are likely to have low to high erosion potential. While these soils generally contain high organic matter and lower proportions of sand / silts, the higher relief increases the potential for erosion in some areas. In the lowland portions of this area, the erosion potential will generally be lower, except where creeks with periodic high flows which can scour the soil profile. Where sampled, Emerson Crumb tests identified Chromosols as having moderate erodibility on the surface and at depth and are anticipated to have lower potential for erosion than other areas.

The Sodosols had near neutral pH and low salinity. Some (SS15) had low Exchangeable Sodium Percentage (ESP) and are considered to be generally less prone to erosion than the Chromosols. Topsoil depths are anticipated to be in the order of 0.1 to 0.3 m in Chromosol areas and up to 0.6 m deep in Sodosol areas.

Six sites were visually assessed to determine their potential for erosion. Five of the six sites (Sites SO10 to SO15) were described as having a low potential for erosion due to a combination of predominantly clayey substrates, vegetative cover and low energy stream flows. Site SO9 would likely have a high potential for erosion due to sandy banks and a rocky stream bed indicating the potential for high energy flows capable of severe scouring.

KP80-KP120 (Bowen River Valley) - sodosols mapped in the area includes loamy duplex soils with mottled yellow-brown subsoils. These were present in the undulating lands on tributaries while small alluvial areas have grey loamy duplex soils. Tenosols are present as thin soils on sandstone ridges. Dominant soils in the valley floor include dark clays of moderate depth, with older terraces and levees having deep sandy or sandy loam with 0.3 m to 0.6 m A horizons with a clear change to reddish brown clay or sandy clay. Gilgai microrelief is present on the deep clays. On the southern undulating slopes that rise to the south, more thin loamy duplex soils are present. This area is usually strongly dissected by many small streams and nearly all soils have a gravel-strewn surface and are often eroded.

From approximately KP80, the rail alignment traverses Sodosol mapped areas until it reaches about KP120 where the alignment traverses an area bordering Tenosol / Sodosol / Kandosol soil mapped areas.

Soils are described as sandy to loamy duplex soils and some shallow sands on the moderately undulating lands consistent with the Sodosol and Tenosol mapped areas with deep sandy or sandy loams on the alluvial floodplains more consistent with Kandosol soils (soils which lack a strong texture contrast and have a weakly structured B horizon).

Soils in these areas generally have a pH from 6.9 to 7.9, with low CEC indicating generally low fertility. The deep clays in the river valleys have higher CEC. The soils are generally low salinity soils with low Electrical Conductivity (EC) and low to medium ESP. However, the clay soils at SS20 (Rosella Creek a tributary of the Bowen River) were saline with a high ESP indicating some salinity is present in soils in the valley floors. These valley floor clay soils can also be sodic and therefore susceptible to dispersion, as indicated by high ESP and / or low Ca:Mg ratios.

Some clay soils (SS18) had high Emerson Crumb results indicating low potential for erosion, while others (SS19) had lower results. This indicates that while clays are widespread throughout the valley floors, the erosion potential of these soils will vary over their extent in the alignment.

From a review of aerial photography and on-site observations, areas around creek lines appear to be subject to erosion. However, the erosion potential can vary along the alignment within individual soil types. The most susceptible soils for erosion are sodic or dispersive clays and loamy soils. Topsoil availability in areas is not subject to excess salinity or sodicity and is generally considered to be between 0.1 m to 0.2 m; however, some sandy loams on alluvial terraces may have topsoils up to 0.6 m deep.

KP120-KP185 (Leichhardt Range) - the rail alignment traverses mainly Tenosol with small areas of Kandosol. The landscape varies throughout this portion of the alignment from level plains to strongly undulating elevated land. Dominant soils on the level plains are loamy yellow earths with areas of loamy red earths and cracking

clays. Dominant soils on the strongly undulating elevated areas may include shallow stony gritty leached sands or sandy loams more consistent with Tenosols.

Soils in this area include acidic soils with very low CEC and ESP (SS24, 25, 26, 27 and 30). Several samples (SS25, 27, 29 and 30) had very low exchangeable calcium and low Mg, indicating low fertility soils. This was further enforced by poor growth on stony soils. The soils are generally low salinity soils with EC of <150 µs/cm, low chloride and low to very low ESP with the exception of Sodosols where soils (SS30) recorded a very high EC of 2240 µs/cm, chloride of 3020 mg/kg and very high ESP of 54.2.

Kandosols in the generally low relief areas between KP125 and KP185 are considered to have generally low to moderate erosion potential. The higher erosion potentials are expected locally in alluvial areas with higher sand or silt contents. Emerson Crumb results indicate that some soils in the valley floors have moderate dispersion potential and will be susceptible to erosion after disturbance, while others are generally stable.

Tenosols from KP160 to KP185 are generally shallow soils in areas of moderate to high relief and are anticipated to have moderate to high erosion potential. The Tenosols were non-dispersive; however, the stoniness of these soils combined with the shallow bedrock would be unsuitable for stripping and susceptible to erosion. The Tenosols encountered in sampling had nil to minimal (0.05 m) topsoil.

Five waterway sites (SO20 to SO24) were visually assessed for their erosion potential. Three of the five sites (SO20, SO21 and SO24) were assessed as likely having a high erosion potential. Evidence of erosion was observed at Sites SO20 and SO24, while Site SO21 was described as sandy banks with moderate flow. The remaining two sites (SO22 and SO23) were assessed as having a moderate to high erosion potential comprising sandy substrates with high proportions of vegetation likely to reduce the potential for erosion.

KP190-KP453 (Inland Plains) - from approximately KP185 to KP210, the alignment traverses areas mapped as Sodosols. The landscape varies from the gently undulating to low hilly lands from about KP185 to KP195 to level or gently undulating plains from approximately KP197 to KP220. Dominant soils on the hilly land are shallow stony gritty leached sands or sandy loams more consistent with Tenosol soils. The soils of the sloping plains consist of loamy duplex soils more consistent with Sodosol soils to loamy yellow, red and grey earths and cracking clays on the lower areas associated with Vertosol soils (from approximately KP210 to KP300). Landforms include level to gently undulating alluvial plains from approximately KP215to KP225, KP252 to KP269 and KP277 to KP356 with more strongly undulating lands from KP226 to KP251.

Soils described on the more strongly undulating slopes are dominated by sand and gravelly loamy duplex soils and sandy red earths more consistent with Sodosol or Kandosol soils. Dominant soils within the more level or gently undulating land include deep grey clays and cracking clays consistent with Vertosol soils and loamy duplex soils, sandy red and yellow earths more consistent with Sodosol or Kandosol soils.

From approximately KP300 to KP415, the alignment traverses areas predominantly soils mapped as Kandosols with a section of Vertosols from KP360 to KP370. The landform in this section of the alignment varies from level plains to undulating lands with the exception of some strongly undulating land from approximately about KP405 to KP407.

Dominant soils on the level plains to undulating lands include sandy and loamy red and yellow earths, loamy duplex soils consistent with Kandosol, Chromosol or Sodosol soils and grey deep clays consistent with Vertosol soils. The dominant soils on the strongly undulating land are shallow stony loams with small areas of stony red earths consistent more consistent with Rudosol soils.

From approximately KP415 to KP453, the soils are mapped as Kandosol soils. Land forms consist of very gently to level undulating plains. Dominant soils are sandy or loamy red and yellow earths with some areas of sandy surfaced duplex soils, associated with deep red sands that form low dunes. This is consistent with the mapped Kandosol soil description. These soils are generally neutral or near neutral pH with low salinity. The soils

mostly have low CEC and ESP indicating lower fertility with the exception of some areas in the alluvial valleys. Sodicity as indicated by ESP is generally low although some clays soils have elevated sodicity.

The Emerson Crumb results (SS48) suggest that the soils have the potential for erosion through dispersion. They also generally have low Ca:Mg ratios. However, the generally lower topography results in overall lower potential erosion impact from rainfall runoff.

Topsoil depth varies along this area of the rail alignment. Deeper topsoils of 0.25-0.6 m thickness were observed although, generally they are approximately 0.3 m thickness which are expected in areas of heavy clay soils, while the sandy soils exhibit shallower topsoil depth of up to 0.15 m.

4.2.1.2 Environmental Values

The rail alignment topography varies along the length of the corridor from low coastal plains in its most easterly portion to gently undulating plains at its western extent. Between these, the alignment transects through granitic hills associated with the Clarke Ranges where the highest elevation reaches some 200 m. A complex of soil units were identified across the project area, including areas of sodosols and vertosols in the east and predominantly sodosols at the western extent of the alignment. Broadly, many of the soil units have been identified as prone to erosion and dispersion and also exhibit low fertility.

The environmental values of the land at the Project site that are to be protected or enhanced are:

- the continued functionality of undisturbed land and ecosystems within and adjacent to the rail corridor
- the potential of topsoil for use as a resource in the rehabilitation of disturbed areas
- the suitability of land to support safe beneficial post disturbance land uses such as agriculture and native ecosystems.

4.2.1.3 Potential Impacts

The proposed rail alignment will result in permanent sterilisation of approximately 21 km of Class A or B Good Quality Agricultural Land (GQAL) suitable for cropping (just under 5% of the length of the alignment). The rail alignment intercepts Strategic Cropping Land (SCL) for about 2.5 km (about .5% of its length).

The main potential impacts of the proposed rail will include changes to agricultural land capability and increased risk of erosion in areas of construction and / or operation. In addition, some soils encountered will be sodic and / or dispersive and this may affect excavation conditions for portions of the rail. Further, areas of geological shear zones, faulting and / or with dykes were identified that may impact upon rail construction. Potential impacts to the topography, geology, soils and landform of the project and management strategies and commitments to mitigate these impacts have been identified. Further detailed investigations are required to fully evaluate some potential impacts. This will delineate areas of potential impacts and assess the appropriate scale of mitigation or management

4.2.1.4 Operational Policy Objective

- minimise environmental impact by preventing soil loss and erosion
- minimise impacts to land based resources such as GQAL and agricultural productivity.

4.2.1.5 Performance Criteria

The risk of soil erosion impacts from all work areas where vegetation is removed or the soil disturbed is appropriate managed and mitigated.

4.2.1.6 Implementation Strategy

Design Phase

- where possible the rail is to be aligned to avoid areas of problem soils (highly dispersive, cracking clays, potential acid sulphate soils)
- optimise alignment to minimise impacts on topography

Construction Phase

- undertake further investigations to evaluate soil properties and suitable management measures prior to construction
- develop and implement a Soil and Water Management Plan that includes the requirement to develop and implement Erosion and Sediment Control Plans (ESCP) that comply with the International Erosion Control Association (IECA) Australasia's Best Practice Erosion and Sediment Control guideline. The ESCPs are to include, but are not limited to, the measures listed below:
    - consider construction sequence and timing to minimise exposure to rain and stream flows
    - minimise areas of disturbance, particularly of dispersive material
    - ensure suspended sediment levels in waters discharged are no, or marginally, higher than in receiving waters
    - employ progressive site clearance and site rehabilitation techniques
    - utilise sediment barriers and sedimentation ponds
    - protect stockpiles of soil material with non-invasive quick-growing grass species
    - protect areas from excess run-on flows
    - shape landforms to take account of the erodibility of soil materials used
    - use vegetation species common locally and appropriate to the soil materials for revegetation works
    - rapid revegetation of disturbed areas
    - divert uncontaminated run off away from cleared / contaminated areas
    - control runoff through sedimentation dams, drains and disposing to stable drainage lines
    - bund stockpiled material
    - remove of loose, surplus excavated sand, gravel and clays to prevent excessive erosion
    - confine traffic to defined roads and access tracks
    - compact high traffic areas
    - backfilled excavations and cover with topsoil
- erosion and sediment control plans are to be amended to account for changes in site conditions or treatment methods in the case of the failure of a device
- clean surface water is to be diverted away from erosion prone areas (cleared slopes) using cut-off and interceptor drains
- where practicable construction activities are to be undertaken outside of the wet season to minimise the risk of high intensity rainfall and floods

- work is to be scheduled to ensure temporary erosion control works are in place by the end of each day, especially before weekends, if rain is imminent or when permanent erosion control works are not in place
- construction activities must be scheduled so that work in sensitive areas can be completed and rehabilitated as quickly as reasonably possible
- disturbed ground is to be remediated as soon as practicable by backfilling, covering with topsoil and revegetation
- rehabilitation work is to coincide with vegetation growth periods
- topsoil is to be stockpiled for later rehabilitation or landscaping works
- sufficient materials to implement erosion and sediment controls are to be on site at all times. This may include but is not limited to:
    - rip rap
    - geotextiles
    - silt sausages
    - silt fences
    - sand bag check dams
    - coir logs
- land surfaces and batters are to be shaped and contoured to reduce the potential for mass movement or failure
- dispersive soils are to be ameliorated with products such as gypsum, hydrated lime, or aluminum sulphate to promote bonding of soil particles
- in the event sediment basins are not effective in reducing suspended solids levels, environmentally benign chemicals are to be used to aid flocculation
- construction of access roads are to be constructed with suitable scour protection and drainage for heavy vehicles
- stormwater collected within interceptor drains and excavations are to be discharged into sedimentation traps and detention basins
- sedimentation basins are to be designed for a 24 hour storm event of a return period of one year for sediment retention and a one hour storm event of a return period of 100 years for flow. Sediment basins are to be inspected and cleaned out on a regular basis and managed to ensure the required retention capacity is maintained
- avoid the use of blading and grubbing clearing methods
- stage works to reduce the impact on water quality at any one time
- schedule clearing outside of summer months when high intensity storms are more prevalent
- erosion and sediment controls are to be retained until 70% ground cover has been achieved
- stockpiled topsoil is to be used as soon as practicable to limit the deterioration in biological activity
- stockpile heights are not to not exceed 2 m

- site specific investigations are to be undertaken to determine the erodibility potential of soils present
- limit the length of time soil is exposed to climate conditions (rain drop impacts and wind) by staging construction activities and completing rehabilitation works at the completion of each stage
- restore drainage flow paths and maintain vegetative cover to reduce potential for concentrated flow paths to develop.

Operation Phase

- develop and implement a Rehabilitation Plan for the rail corridor

4.2.1.7 Monitoring, reporting and corrective actions

Design Phase

- rail design is to be checked to ensure design requirements were met.

Construction Phase:

- regularly inspect of sediment and erosion control structures and measures. In wet weather or when using large quantities of water in construction works more frequent monitoring may be necessary
- implement detailed monitoring programs to assess impacts to the immediate construction site and sensitive receiving environments (i.e. water ways and aquatic ecosystems)
- repair any damaged or ineffective sediment and erosion control structures. If required, remove any build ups of sediment
- prepare and submit a monthly report to Waratah Coal, which includes monitoring results, audits, training and incidents
- any incident, spill or release of materials to the environment is to be immediately reported to Project Supervisor and the SEO
- incidents, complaints and any significant environmental harm are to be reported to regulatory body/ies where required
- necessary corrective actions are to be implemented following an incident or complaint
- the Contractor is to ensure that all appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding soil management and erosion control
- the Construction Manager is to request the cessation of works at any time should a breach of performance criteria of the EMP occur or is at risk of occurring.

Operation Phase:

- monitor the rail corridor for signs of erosion. Particular attention is to be paid to drainage lines and waterways
- stabalise and repair eroded areas immediately.

4.2.1.8 Commitments

To ensure appropriate management of soils is conducted during the construction and operation of the rail, Waratah Coal commits to doing the following:

- identify specific access areas and determine goals for rehabilitation of disturbed land to minimise areas that will have lower land use quality post-mining
- manage lay down areas in a manner that will not result in a reduction in land quality
- prepare and implement erosion control measures and continue to monitor and maintain the measures implemented
- ESCPs will be developed and put in place prior to the commencement of construction works for all areas of the rail that may cause erosion
- topsoil management measures will be documented, monitored and maintained with a reconciliation of top soil excavation and rehabilitation maintained. Excess topsoil will be used in project areas with topsoil deficits. Waratah coal will source further top soil (if required) from local suppliers in the project area
- prior to construction carry out soil sampling at waterways to better identify erosion risk and put in place appropriate management measures
- prior to construction undertake soil resistivity surveys of high risk areas, record the current salinity status of these areas and implement measures to ensure no further significant salinisation occurs due to the project activities

4.2.2 Element 2 – Land Contamination

4.2.2.1 Background

A total of 46 lots intersect with the rail alignment, of these, four lots were listed on the Environmental Management Register (EMR). One property in the southern section of the Rail Corridor (Lot 5 RU81) was listed on the EMR for the notifiable activities of operating a livestock dip or spray race facility and storing petroleum products or oil. Three properties in the northern section of the Rail Corridor (Lot 1 SB279, Lot 5088 SM101 and Lot 618 PH2106) were listed on the EMR for the notifiable activities of operating a livestock dip or spray race facility and / or storing petroleum products or oil. All four properties identified on the EMR contained areas of 'Endangered' regional ecosystems and ecosystems considered to be 'of concern'.

Site inspections of the railway corridor also identified the presence of numerous cattle dips.

4.2.2.2 Environmental Values

The environmental values of the land within and adjacent to the rail corridor that are to be protected from contamination are:

- the continued functionality of undisturbed land and ecosystems
- the stability of disturbed land and ensuring it is non-polluting
- the suitability of land to support safe beneficial post disturbance land uses such as agriculture and native ecosystems.

4.2.2.3 Potential Impacts

- leaching of contaminants to groundwater or via overland flow to surface waters
- mobilisation of contaminants if not appropriately managed

- where the project construction intersects areas of extractive resources, there is potential for mobilisation of contaminants from the elevated levels of minerals, elements or compounds in the resource material
- demolition of buildings in the rail alignment has the potential to impact soils with hazardous materials if not appropriately assessed and managed
- spills and leaks from various contaminating sources such as, petrol and other chemicals stored on site during construction and operations should be managed properly.

4.2.2.4 Operational Policy Objective

- prevent spills from occurring on the project site
- contain, clean and, if necessary, remediate any spills that do occur
- ensure all fill imported to the rail easement is clean and free from any contaminants

4.2.2.5 Performance Criteria

- all fill used on site is 'inert' and free from contaminants
- contaminated soils are managed so that contaminants are not released to the environment
- spills involving materials that may cause environmental harm are contained and effective cleaned
- control the risk of transporting contaminates to the project site.

4.2.2.6 Implementation Strategy

Construction Phase

- avoid disturbing known contaminated land sites
- conduct a preliminary contaminated land assessment prior to any activity within a EMR listed site
- if contaminated land is identified, undertake further investigations as necessary and develop a remediation plan
- if during any site earthworks or excavation, offensive or noxious odours and / or evidence of gross contamination not previously detected is observed, site works are to cease in that area and action taken to immediately abate the environmental harm. The area is to be isolated through high visibility fencing and appropriate signage so that other activities may continue elsewhere within the remediation site without representing additional risks.

Chemical and Hazardous Goods Storage (Construction and Operation)

- chemical storage is to comply with **Material Safety Data Sheet (MSDS)** requirements. MSDS for products will be kept on site and readily available to employees and contractors
- smaller quantities of chemicals, fuels and oils are to be stored in self bunded pallets, within a bunded area in the workshop, or in a bunded container on the site. Bulk quantities of fuel should be stored in double skinned tanks (self bunding)
- waste products (e.g. oil / water separator waste, sludges and residues), are to be contained within weatherproofed, sealed and bunded areas to ensure stability of the waste containment receptacles and prevent any leakages or spills causing environmental harm to soils, surface water or groundwater

- regular inspections are to be carried out on the tanks, bunds and storage areas
- an approval and a disposal permit is to be obtained from the DEHP (Contaminated Land Unit) for the removal of contaminated soil, in accordance with the EP Act
- contaminated soils are to be removed in accordance with a DEHP approved Remediation Action Plan (RAP).

Spill Management (Construction and Operation)

- the Emergency Management Plan is to include standard procedures for the storage, handling, disposal and spill response for potentially hazardous waste materials used on site
- prepare and implement procedures for the remediation of contaminated soil spills that may occur during transport
- in the event of a large spill, the site is to be investigated, managed and remediated in accordance with the requirements of the contaminated land provisions of the EP Act and the QLD EPA Draft Guidelines.

Land Contamination (fill)

- ensure that all fill material brought on to the site meets the requirements of:
    - National Environmental Protection (Assessment and Site Contamination) Measure
    - Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland (1998)
- all fill material must be virgin excavated natural material (i.e. soil, aggregate)
- ensure that the site source of the imported fill is not listed on the Environmental Management Register / Contaminated Land Register (EMR / CLR)
- conduct visual inspections of the imported fill material to ensure that it contains no waste material
- obtain documentation from the fill provider, which must contain the following:
    - date of arrival on site
    - volume / quantity of fill material
    - provider
    - source of fill material
    - documentation that the site of the fill material is not listed on the EMR / CLR.

4.2.2.7 Monitoring, reporting and corrective actions

Construction and Operation

- the administering authority is to be notified in writing within two business days of detection of any gross contamination and advised of appropriate remedial action
- any environmental incidents involving spills are to be recorded, including time of incident, persons involved, details of incident, mitigation measures and actions taken to minimise the probability of recurrence. The SEO is to be notified immediately of any significant spills or potential risk of spills
- incidents, complaints and any significant environmental harm are to be reported to regulatory body/ies where required

- ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding waste management, spill procedures and the storage and handling of hazardous substances and materials with the potential to cause environmental harm
- the Construction Environment Manager is to request the cessation of works at any time should a breach of performance criteria of the EMP occur or is at risk of occurring.

4.2.2.8 Commitments

To minimise risks associated with existing contamination and to minimise the risk of causing contamination from the construction and operation of the rail, Waratah Coal commits to doing the following:

- where possible the project footprint will be re-aligned to avoid areas of potential or identified contamination
- where contamination is present within the project footprint, Waratah Coal will enter into agreements with the owner of the contamination to assess and appropriately manage or remediate the contamination
- any building / structures to be demolished will be assessed for hazardous material content with preparation of demolition management plans for the appropriate demolition and disposal of the hazardous materials
- where the project footprint cannot be re-aligned, DEHP compliant Stage 1 and 2 ESAs will be undertaken to assess the scale and extent of contaminant impacts
- where contamination is identified it will be managed and / or remediation under the Environmental EP Act with DEHP approved SMPs and / or RAPs in order to make the sites suitable for the proposed use
- Waratah Coal will appoint a third party reviewer to assess all contaminated land assessment and remediation work
- any notifiable activities that are required for the project will be implemented and managed in accordance with relevant guidelines and legislation once construction commences and also during the operational phase. The notifiable activities may include:
    - storing hazardous contaminants
    - petroleum product or oil storage
    - chemical storage.

4.2.3 Element 3 Hydrology and Water Quality

4.2.3.1 Background

The rail alignment traverses four different catchments, the Belyando, Suttor, Bowen / Bogie and Don. This section describes the Bowen / Bogie Catchment (approximately KP25 to KP135), the Suttor Catchment (approximately KP135 to KP265) and the lower reaches of the Belyando Catchment (approximately KP265 to KP453). All three are sub-catchments of the Burdekin with the Belyando and Suttor forming part of the Upper Burdekin and Bowen / Bogie the Lower Burdekin. Characteristics for the three catchments have been described together as topography and land uses and climate do not vary significantly.

4.2.3.1.1 Topography and Land Uses

Topography varies over the catchments with the areas south of Collinsville characterised by low relief floodplains with minor undulating slopes across the Suttor River floodplain. North of Collinsville the terrain becomes steeper across the Leichardt and Clarke Ranges before traversing low lying coastal areas as the alignment approaches Abbot Point.

The Bowen River is cut into the Lizzie Creek volcanic including basalts, andesitic, tuffs and minor acid volcanic and further to the south the Blackwater and Back Creeks Group comprising sedimentary rocks including sandstones, siltstones, shales and coal. Dominant soils in the river valley include dark clays at depth with sandy loam overlying these clays. In the Suttor catchment, the alignment crosses sedimentary rocks of the Suttor Formation and alluvium of the Suttor River derived from these rock types. Dominant soils on the hilly land are shallow, gritty leached sands or sandy loams. The soils of the sloping plains consist of loamy duplex soils to loamy yellow, red and grey earths and cracking clays on the lower areas.

The dominant land use within both catchments is agriculture (grazing) in relatively natural environments such as semi cleared paddocks. In the Bowen / Bogie catchment, an operating coal mine is located adjacent to the rail alignment (near Collinsville).

4.2.3.1.2 Riparian Condition

Lower Belyando Catchment

Riparian areas in the catchment generally consisted of a layer of mature Eucalypts including ironbarks species one or two trees thick directly on the banks of the streams. These are surrounded by a layer of saplings and shrubs before the landscape opens up into grazing paddocks. Soils were mostly clays and fine sediment.

Suttor Catchment

Riparian vegetation density varied across the sites. Most sites had larger tree species (10-35% >10m tall) although two sites (WQ19 and WQ28) had extensive large trees. Four sites had <10% large trees. The majority of sites had some undisturbed vegetation with trees with fairly regular vegetation along both banks; however, sites WQ21, WQ22, WQ26 and WQ28 had highly disturbed riparian vegetation communities. The only site with regular riparian vegetation was site WQ27. All sites except for WQ22 had extensive coverage of trees <10 m, shrubs and grasses. Site W22 was heavily cleared with grasses the only dominant vegetation. Most sites had limited to slight shading.

All streams sampled contained flowing water during the wet season with WQ25, WQ26 and WQ28 (Suttor River, Verbena and Logan Creeks respectively) all flooding at the time of sampling. Streams that hadn't broken their banks were relatively narrow (< 10 m wide).

Bowen / Bogie Catchment

Riparian vegetation density was varied across the sites. Most sites had larger tree species (10-35% >10 m tall) although two sites (WQ13, WQ14 and WQ18) had very limited large trees. WQ18 also had several trees within the stream itself. The majority of sites had undisturbed vegetation with trees regular vegetation along both banks. Site WQ10 had undisturbed riparian vegetation communities. All sites except for WQ14 had extensive coverage of trees <10 m, shrubs and grasses. Site WQ14 was heavily cleared with grasses the only dominant vegetation. Most sites had limited to moderate shading depending on stream width.

No sites had banks that were overtopped; however many showed signs of recent flooding such as scattered debris and flattened vegetation. This may have been a result of Cyclone Ului. Soils in the catchment were course compared to the upland catchments (predominantly sands and pebbles.

4.2.3.1.3 Morphology

Lower Belyando Catchment

The streams in the lower reaches of the Belyando catchment (WQ41 to WQ29) were predominantly remnant channels that were flat, low or moderate banked streams. At a number of locations it was not possible to observe the main channel due to the high quantity of water within the stream. In these locations flood channels were observed. The streams ranged from 3 m to 60 m (WQ32) wide although most streams had an observed floodplain that extended up to 25 m either side of the centre of the stream. Site WQ32 had a floodplain of over 2 km wide. Most streams sampled had flowing and pooled water although two streams (WQ35 and WQ38) had significant flowing water (glides >65%) and over half the streams had extensive runs. All streams except for those with high flows also had large pools that covered extensive areas. The majority of the streams had no in stream aquatic plant growth except for site WQ31 that had significant emergent aquatic plants.

Silt was the dominant particle observed at the majority of sites. All the streams had limited bedrock. Erosion varied across the streams with the vast majority having moderate to severe erosion. The majority of streams had partly or very restricted flows due to non-vegetated mid channel bars. Only WQ34 had unobstructed base flows.

Suttor Catchment

The streams on the Suttor catchment were predominantly remnant channels that were flat or two staged (stepped) banked streams. Like the lower reaches of the Belyando, at a number of locations, due to the high quantity of water within the stream, it was not possible to observe the main channel, and in these locations, flood channels were observed. The streams ranged from 3 m to 2 km (WQ25) wide although most streams had an observed floodplain that extended from 40 m to 400 m either side of the centre of the stream. Site WQ25 had a floodplain of over 6 km wide. Most streams sampled had flowing and pooled water although two streams (WQ23 and WQ24) had significant flowing water (rapids and riffles >65%) and all the streams had extensive runs. Most streams except for site WQ23 had almost no pools. The majority of the streams had no in stream aquatic plant growth except for site WQ22 that had some submerged aquatic plants.

Silt was the dominant particle in the southern area of the catchment while sand was the dominant sediment in the upper reaches of the catchment. All the sites except WQ24 had limited bedrock. Erosion varied across the streams with the majority having either a stable substrate and / or moderate deposition. Only site WQ24 had observed erosion. The majority of streams were partly to very restricted at base flow with this either being a non-vegetated side channel bars in the upper reaches and vegetated mid channel bars in the lower reaches.

Bowen / Bogie Catchment

The streams on the Bowen / Bogie catchments were highly varied in stream shape. Sites WQ14, WQ15 and WQ16 were high and steeped banked streams while the remainder was remnant channels that were broad banked. The streams ranged from 2 m to 80 m (WQ10) wide. Most streams sampled had flowing and pooled water although two streams (WQ10 and WQ12) had significant flowing water (including rapids and riffles) and sites WQ11, WQ12 and WQ16 had extensive runs. The majority of the streams had no in stream aquatic plant growth except for site WQ16 that had moderate aquatic plants.

Sand was the dominant particle in the catchment. All the sites except for site WQ14 had limited bedrock. Erosion varied across the streams with the majority having either a stable substrate and / or moderate / severe deposition. Only site WQ12 had observed erosion. The majority of streams were moderately restricted at base flow by either non-vegetated side channel bars or vegetated mid channel bars.

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4.2.3.2 Environmental Values

The rail alignment intersects two major drainage basins, namely the Burdekin River and Don River Basins, and crosses 10 major waterways, namely:

- Sandy Creek and Belyando River
- Lascelles Creek and Mistake Creek
- Suttor River
- Bowen River and Pelican Creek
- Bogie River and Sandy Creek
- Elliot River.

The following describes the water quality catchment environmental values for the rail corridor.

Lower Belyando - results for the lower Belyando are similar to the upper and are summarised below:

- EC and pH show similar patterns with the median, 20th and 80th percentile either falling within or only marginally exceeding the Queensland Water Quality Guidelines (QWQG) upland streams compliance levels
- DO is well below the lower QWQG limits with only three out of the 25 samples having a reading of 80% saturation or above. This is likely to be as result of the ephemeral nature of the streams with pools not generating any oxygen during the dry season and high flows during wet season not allowing oxygen uptake
- Total zinc, nickel and lead levels occasionally exceeded the ANZECC and ARMCANZ guideline limits of 3.4 µg/L, 8 µg/L and 11 µg/L, respectively. These exceedances were generally spread across various sites during both the dry and wet season sampling events and were likely the result of runoff from roads and homesteads upstream
- Copper consistently exceeded the ANZECC and ARMCANZ limit of 1.4µg/L at most of the sites during both seasonal sampling, which is likely a result of the geological characteristics of the catchment
- Nutrients (nitrogen and phosphorus) were both relatively high with the 20th percentiles of Total Nitrogen (TN) and Total Phosphorus (TP) above the QWQG upland streams trigger value which is likely a result of the high level of organic material observed in waterways
- PAHs and PCBs were all below the limit of reporting while Traces of TPHs were detected at several of the sites during wet season sampling. This may be a result of runoff from the recent rain events collecting petrol and oil spills or decaying matter from the Eucalyptus sp. in the riparian areas.

Sutter Catchment - Baseline results from the Suttor catchment show that water quality varies significantly within the Catchment. Generally it is of reasonable quality with the physio chemical properties comparable to the guidelines for slightly to moderately disturbed upland streams in the central coast region and historical results from the Eaglefield monitoring station.

Medians for EC and pH fall within QWQG criteria levels. Only the 80th percentile and above for DO are within the guideline range (85% to 110%). All turbidity readings taken in the catchment were below the guideline criteria of 50 NTU. Given the lack of historical data, it is difficult to compare these readings to other areas of the Catchment; however comparison with the QWQG indicates that the streams are generally characteristic of upland streams.

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Metals were generally low with median levels within or marginally exceeding relevant guideline limits. Copper marginally exceeded guideline limits at several sites (WQ20, WQ25, WQ26, WQ27 and WQ28) which are likely a result of elevated copper levels in the surrounding geology.

Nutrients levels were elevated with the medians of TN and TP above QWQG criteria. This is the result of large amounts of organic matter being present in the streams due to flushing during and after storm events.

PAHs and TPHs were detected at two sites (WQ20 and WQ25) during dry season monitoring and is likely a result of spills that have occurred in the surrounding area or decomposing plant matter in the riparian areas flushing into the stream after a large storm event.

Bowen / Bogie Catchment - Baseline results from the Bowen / Bogie Catchment show that the streams are generally in good condition with the physio-chemical properties comparable to the QWQG for slightly to moderately disturbed lowland streams in the central coast region and the limited historical results from the Coolon Road monitoring station.

Medians for EC and pH fall within QWQG criteria levels. The 80th percentile and above for DO were the only ones within the QWQG range (85% to 110%). All turbidity readings taken in the Catchment were below the guideline criteria of 50 NTU. Given the lack of historical data, it is difficult to compare these readings to other areas of the catchment; however comparison with QWQG indicates that the streams are generally characteristic of lowland streams.

Metals levels in this Catchment are generally low with minor and isolated exceedances of ANZECC and ARMCANZ (2000) guideline limits. Copper marginally exceeded guideline limits at several of the sites (WQ12, WQ14, WQ15 and WQ16) which are likely a result of elevated copper levels in the surrounding geology.

Nutrient levels in Bowen / Bogie Catchment are also generally low with all TN results below the lowland streams criteria of 500µg/L. TP exceeds the guideline limits from the 20th percentile onwards; however levels are relatively low compared to the Belyando Catchment. Polychlorinated Biphenyl, Polycyclic Aromatic Hydrocarbons and Total Petroleum Hydrocarbon were below the limit of reporting at all sites in this Catchment.

The lower levels of nutrients, metals and contaminants identified in this catchment compared to the Belyando and Suttor Catchments are likely to be as a result of the more stable nature of the streams and sandy sediments. A number of the streams sampled were perennial and contain flowing water year round while waters in the Belyando Catchment are ephemeral and would likely only contain water for short periods during and after the summer storm season.

4.2.3.3 Potential Impacts

During construction and operation of the rail corridor there are a number of mechanisms that have the potential to impact on surface water quality including:

- increased sediment loads due to surface disturbance and vegetation clearing
- pesticides used for weed control
- use of potentially contaminated / low quality water for dust suppression and other site activities
- storage of oil, fuel and chemicals on site
- construction and operational phase water demands
- changes to stormwater regimes
- changes to the local hydraulic regime resulting from the rail alignment through watercourses and floodplains.

4.2.3.4 Operational Policy Objective

- maintain environmental flows in the watercourses throughout construction and operation
- maintain water quality values in the watercourses throughout construction and operation.

4.2.3.5 Performance Criteria

- compliance with water quality criteria as stated within the relevant Water Resource Plans is achieved throughout construction
- existing water users' entitlements are not effected throughout construction
- water quality objectives are protected as required by the Environmental Protection (Water) Policy 1997.

4.2.3.6 Implementation Strategy

Design Phase

- undertake detailed hydraulic modelling and design watercourse crossings to minimise the effects of increased flood heights, scour and changes in velocity
- include appropriate scour protection to stabalise watercourse bed and banks
- all drainage structures associated with the Project including those necessary for supporting facilities such as access roads are to be designed to the appropriate standards. All designs are to incorporate an appropriate level of flood immunity, minimisation of impacts to upstream landholders and mitigation of the impacts of velocity and scour.

Construction Phase

Hydrology

- all construction activities within watercourses and floodplains are to be scheduled to reduce the potential for flooding to occur during construction
- prepare flood management plans for both construction and operation.

Water

- develop and implement a Soil and Water Management Plan that includes the requirement to develop and implement ESCPs that comply with the IECA Australasia's Best Practice Erosion and Sediment Control guideline and include measures provided in this EMP
- restrict the construction area footprint as much as practical to minimising areas of disturbance
- incorporate temporary stream protection works during construction to minimise erosion within the watercourse
- key phases of the construction sequence are to be timed to coincide with low rainfall periods as much as far as practical
- sediment sampling and analysis is to be undertaken where works are to be carried out within the watercourse (i.e. piling for creek crossings and the coal conveyor) to identify soil properties and potential contaminants including pesticides and herbicides
- implement procedures to treat sediment laden water. These could include:

  - filtering runoff from the site, using geotextile fabrics, vegetation and silt curtains (once the sediments are introduced into the waterway)
  - use of sedimentation basins (i.e. settlement ponds) where sediment settles prior to discharge. Chemical flocculants can also be used to hasten settlement, especially when fine sediments are present. The use of flocculants (i.e. alum sulphate) will be managed in accordance with operating procedures including MSDS

- reduce the rate of stormwater flow within the construction area through the use of energy dissipation techniques (i.e. whoa boys, rock rip-raps, surface profiling)
- install clean water diversions around the construction areas
- when water is present and piling is proposed, vibrocorers should be used where possible in preference to hammer pile drivers to reduce re-suspension of bottom sediments
- stormwater is to be collected within the construction areas, and where applicable, diverted into holding / settlement ponds for treatment and reuse
- the water detained in sediment ponds is to be reused on the construction site where possible
- regularly check and maintain sediment basin depths
- stabalise the bed and banks of watercourses immediately following completion of construction activities
- an ASS Management Plan will be developed prior to the commencement of construction. The plan is to include the results of detailed site investigations and put in place management measures to reduce the potential for Acid Sulfate Soils (ASS) to impact on surface waters
- stabalise exposed soils by using materials such as mulch, biodegradable matting, and geotextile fabrics
- where possible, vegetation root mass is not to be removed from the ground
- stage vegetation clearing so only the area required for immediate construction works is initially cleared
- the construction footprint area will be progressively reshaped and re-vegetated with native species as work phases are completed
- clearly mark wash down areas for plant and equipment
- ensure trucks transporting fill material to and from site are covered at all times and that shakedown facilities are provided at the construction compound
- a water quality monitoring program is to be developed in consultation with DEHP. That monitoring program is to clearly outline:
  - monitoring locations
  - monitoring frequency and schedule
  - routine and event-based monitoring
  - Water and Sediment Quality Parameters (those water quality parameters already sampled will be used as a starting point)
  - Quality Assurance / Quality Control objectives

- sampling and analysis methodologies (the DERM (2009)11 sampling protocols should be used as the guiding document)
- protocols for other data collection techniques (e.g. any data loggers that might be installed)
- documentation and records
- data quality assessment
- analysis.

Chemicals

- fuel, oil and chemicals onsite during construction and operation phases are to be stored in accordance with Australian Standard 1940B-1993, the Storage and Handling of Flammable and Combustible Liquids, and the *Dangerous Goods Act 1975* and the *Pesticides Act 1999*
- large supply tanks are to be located at least 50 m from watercourses in appropriate bunded and lined enclosures
- oil containment booms and oil spill recovery equipment is to be available when working on water
- contaminated soil shall be removed to a licensed facility prior to the filling phase
- emergency response procedures will be developed, with chemical spill response kits available at all construction sites and staff trained in their use.

Site Water Management

- stormwater management plans specific to each section of the rail corridor are to be developed prior to construction
- grey water will be re-used where feasible.

4.2.3.7 Monitoring, reporting and corrective actions

Construction Phase

- water quality monitoring is to be undertaken in accordance with the Water Quality Monitoring program developed in consultation with DEHP
- daily visual monitoring of flows in the watercourses to are to be undertaken to ensure flows are maintained
- where required, georeference photopoints are to be established to monitor potential impacts to watercourse geomorphology
- in the event of a spill or incident targeted water quality monitoring will be carried out up and down stream to determine potential impacts from the event
- in the event flows are impeded by construction works, the following organisations are to be notified immediately:
  - Fisheries Queensland
  - DEHP
  - the relevant Regional Council

- visual inspections of the sediment and erosion controls are to be undertaken during and after rainfall. Additional monitoring may be required to determine the extent of stormwater runoff after pulse events
- any incident, spill or release of materials to the environment is to be immediately reported to the Project Supervisor and SEO
- incidents, complaints and any significant environmental harm is to be reported to regulatory body/ies where required
- daily visual observations will be undertaken to identify if contaminated waters (elevated turbidity, suspended solids etc.) are observed flowing from the construction site. The SEO is to be notified if contaminated waters are observed leaving the construction site and required to take appropriate action
- adverse impacts to downstream water quality shall be reported to the DEHP and any impacts to potable water supply off- takes, reported to the relevant Regional Council
- rehabilitation works will be conducted at areas where unacceptable sedimentation has occurred as a direct result of the Project
- the Contractor will ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding water quality management, sediment and erosion control and spill management procedures
- the Construction Environment Manager can request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring.

Operation Phase

- inspect the rail alignment regularly for signs of erosion and coal spills
- address erosion issues immediately
- clean coal spills immediately.

4.2.3.8 Commitments

Waratah Coal will undertake the following commitments with relation to surface water values throughout the construction and operation of the rail:

- implement an erosion and sediment control plan prior to the commencement of construction activities
- construct, monitor and maintain all sediment and erosion control devices throughout the construction phase of the project
- undertake all monitoring and sampling techniques in accordance with the DEHP's Water Quality Sampling Manual and applicable Australian Standards
- obtain and operate in accordance riverine protection permits and / or relevant guidelines (as required) for all in stream works as part of construction
- rehabilitate disturbed areas as soon as practicable to minimise sediment mobilisation to receiving waters
- undertake additional baseline water quality modelling prior to the commencement of construction

- not release contaminants associated with construction activities that have the potential to cause environmental harm
- investigate all substantiated water related complaints and implement corrective actions as necessary.

4.2.4 Element 4 – Groundwater

4.2.4.1 Background

The following describes the undeclared groundwater management area and the highlands groundwater management unit traversed by the rail corridor.

KP0 – KP225 Undeclared Groundwater Area

A large undeclared groundwater area is intersected by the rail alignment between KP0 and KP225. In this area, aquifer systems predominantly occur in unconfined and confined weathered and fractured granite / igneous systems. Shallow unconfined and confined tertiary aquifers in shale, sandstone and clay strata are also likely to exist in the southern portion of this undeclared groundwater area. DEHP records indicate that groundwater in the Suttor Formation appears as an unconfined aquifer in the coarse sandstones with water levels between 10 m to 80 m below ground level (bgl). Shallow alluvial unconfined aquifers in alluvial leads may occur in river valleys; however specific data does not exist for these aquifers.

Limited data is available with reference to yields and water quality. Yields of between 1 and 5.6 L/s and a range in salinity between 400 and 1,300 mg/L total dissolved solids (TDS) occurs in the granite aquifers (SKM, 2009). Limited static water level data exist for bores within the area. The data available indicates water levels from 5 m to 30 mbgl.

The conceptual hydrogeological model for the granitic aquifers comprises rainfall recharge onto areas of outcrop in the south and west of the undeclared groundwater area between KP125 and KP165 likely to be associated with the Mount Coolon range. Groundwater recharge from these zones would be expected to flow down a topographic gradient in a westerly direction via natural groundwater flow paths to the alluvial leads and to deeper weathered or fractured granite aquifers.

The hydrogeological model for the shallow unconfined tertiary aquifers comprises rainfall recharge across the entire area of the aquifers and also via infiltration from alluvial leads in river valleys. Direction of flow of these aquifers is likely to follow surface gradients. The alluvial leads are recharged via infiltration of rainfall and stream water in times of flow / flood. Flow direction in these leads will be towards the structural base of the alluvial lead and then in the downstream direction in river valleys. Where the rivers are effluent to the leads, some flows away from rivers may occur, whilst in areas where the alluvials are influential to the river flows, the flows will be towards the river.

KP225 – KP453 Highlands Groundwater Management Unit

The rail alignment crosses the Highlands GMU between KP225 and KP453. The aquifer systems in this area are comprised predominantly of tertiary shale, sandstone (including the Suttor Formation) and clay strata. The depth to the top of these aquifers ranges from 10 – 150 m bgl and static water levels range from 10 m to 80 m bgl. Semi-confined Permian aquifers are likely to exist at greater depth within the area.

Data from the tertiary aquifers indicate a range in yield of between 0.3 to 13 L/s and a range in salinity of 200 to >10,000 mg/L TDS. Some of these values exceed the ANZECC and ARMCANZ (2000) guidelines for livestock drinking water of 2,000 mg/L; however, guidelines for total dissolved solids are not specified for ecosystem protection.

The conceptual hydrogeological model for the rail component comprises of rainfall recharge to tertiary aquifers in areas east of the boundary of the Great Artesian Basin and percolation from surface water bodies during periods of flow. The semi confined Permian aquifers are recharged via both surface rainfall in recharge zones and leakage from the shallow unconfined tertiary aquifers.

4.2.4.2 Environmental Values

The rail alignment traverses both an undeclared groundwater area (westerly portion between KP0 and KP225 and the Highlands Groundwater Management Unit (eastern rail section from KP225 – KP453).

Previous studies of groundwater in the area of the rail alignment identified that the main potential impacts with respect to groundwater are related to shallow near surface groundwater that could be impacted by the project's railway construction activities.

Water quality should meet the Environmental Protection Policy (Water) 1997 (EPP Water) requirements. The requirements are based on the Queensland Water Quality Guidelines, as these are given precedence over other recognised guidelines. The rail alignment falls within the Central Coast Queensland region of the guidelines. Existing water quality data will be compared with Central Queensland values for upland and lowland streams.

4.2.4.3 Potential Impacts

The main potential impacts with respect to groundwater are related to shallow near surface groundwater that could be impacted by the following railway construction activities:

- storage and handling of fuels / chemicals / raw materials
- bridge construction.

Impacts to local groundwater regimes may also occur where groundwater is within the construction zone in the upper 1 m of the surface or where bridge construction entails deeper construction in areas of shallow groundwater that requires dewatering of construction areas. If managed properly it is unlikely that the construction or operation of the railway will have any significant impact on groundwater resources.

4.2.4.4 Operational Policy Objective

Ensure the preservation of groundwater quality and quantity during construction and operation.

4.2.4.5 Performance Criteria

- minimal impacts to groundwater quality and quantity.

4.2.4.6 Implementation Strategy

Design Phase

- a geotechnical assessment of the rail alignment is to be undertaken to assess areas where construction requirements (i.e. excavation or blasting) have potential for impacts to groundwater.

Construction Phase

- bore drilling, construction and development methods are to be in accordance with the Minimum Construction Requirements for Water Bores in Australia (Land and Water Committee, 2003)
- safe and effective fuel, oil and chemical storage and handling is to be employed on site. This includes storing these materials within roofed, bunded areas with a storage capacity exceeding the capacity of the storage vessel by 10% and an impermeable floor

- appropriate spill control materials including booms and absorbent materials will be provided on site and at refuelling facilities
- in the event groundwater contamination occurs, the impact will be assessed and remediated in accordance with the requirements of the EP Act
- ESCPs will be developed prior to the commencement of construction to reduce impacts on groundwater
- where blasting is to be undertaken, conduct a census of bores within a 500 m area and monitor bores to assess potential impacts and requirements for mitigation measures
- agreements with surrounding landowners will be established regarding monitoring of impacts and make good provisions where impacts occur.

4.2.4.7 Monitoring, reporting and corrective actions

- a groundwater monitoring program is to be developed and implemented to assess any changes in groundwater quality
- a monthly report is to be prepared and submitted to Waratah Coal and include details of monitoring results, audits, training and incidents
- incidents, complaints and any significant environmental harm reported to regulatory body/ies where required.

4.2.4.8 Commitments

To minimise potential impacts to groundwater, Waratah Coal commit to:

- developing ESCPs prior to the commencement of construction to reduce impacts on groundwater
- implementation of management plans and containment structures for potential contaminants
- remediation of groundwater contamination should it be caused by the project
- geotechnical assessment of the rail alignment to assess areas where construction requirements (i.e. excavation or blasting) have potential for impacts to groundwater
- site specific investigation of the areas identified from geotechnical review
- entering into agreements with surrounding landowners regarding monitoring of impacts and make good provisions where impacts occur.

4.2.5 Element 5 – Terrestrial Flora

4.2.5.1 Background

The proposed rail corridor is located within the Brigalow Belt North bioregion and Desert Uplands bioregion. At the broad scale, the proposed rail corridor transects cleared pasture lands, eucalypt and acacia woodlands and narrow strips of riparian vegetation.

Four threatened ecological communities listed under the *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act) are expected to be impacted by the rail corridor (**Table 2**).

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Table 2. Rail impacts on EPBC Act listed threatened ecological communities

Ecological Community	EPBC Act Status	Clearing Area (ha)
Brigalow (*Acacia harpophylla* dominant and co-dominant)	E	30.02
Weeping Myall Woodlands	E	23.42
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	E	1.94
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	E	21.36

Three endangered Regional Ecosystems (RE) and 16 of concern REs are expected to be impacted by the rail corridor, totalling an area of approximately 136 ha (**Table 3**).

Table 3. Rail impacts on endangered and of concern regional ecosystems

RE	Description	VM Act Class	Clearing Area (ha)
11.3.1	*Acacia harpophylla* and / or *Casuarina cristata* open forest on alluvial plains	E	9.37
11.4.8	*Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains	E	23.21
11.4.9	*Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains	E	2.56
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	OC	18.26
11.3.3	*Eucalyptus coolabah* woodland on alluvial plains	OC	25.18
11.3.33	*Eremophila mitchellii* open woodland on alluvial plains	OC	2.25
11.3.4	*Eucalyptus tereticornis* and / or *Eucalyptus* spp. tall woodland on alluvial plains	OC	24.08
11.4.5	*Acacia argyrodendron* woodland on Cainozoic clay plains	OC	4.81
11.4.6	*Acacia cambagei* woodland on Cainozoic clay plains	OC	0.53
11.4.11	*Dichanthium sericeum*, *Astrebla* spp. and patchy *Acacia harpophylla*, *Eucalyptus coolabah* on Cainozoic clay plains	OC	2.29
11.5.10	*Melaleuca tamariscina* shrubland on Cainozoic sand plains / remnant surfaces	OC	2.19
11.9.10	*Acacia harpophylla*, *Eucalyptus populnea* open forest on fine-grained sedimentary rocks	OC	7.76
11.11.13	*Acacia harpophylla* or *A. argyrodendron*, *Terminalia oblongata* low open forest on deformed and metamorphosed sediments and interbedded volcanics	OC	5.02
11.11.16	*Eucalyptus cambageana*, *Acacia harpophylla* woodland on old sedimentary rocks with varying degrees of metamorphism and folding	OC	1.47

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11.12.10	*Corymbia clarksoniana* woodland on igneous rocks	OC	2.61
11.12.14	*Lophostemon spp.* woodland on igneous rocks	OC	1.18
11.12.15	*Allocasuarina torulosa*, *Livistona drudei* woodland on igneous rocks	OC	1.58
11.12.16	*Acacia spp.* low woodland on igneous rocks.	OC	1.58
11.12.18	Montane shrubland on igneous rocks	OC	0.39
		Total (ha)	**136.32**

Field surveys of the rail corridor identified 187 Least Concern flora species.

4.2.5.2 Potential Impacts

Potential direct and indirect impacts associated with construction and operation of the rail corridor on listed flora species include:

- direct loss of individuals through clearing activities
- reduction in the long term viability of the local populations by removing individual plants, population reduction and increased spatial isolation of plant populations
- direct loss of potential habitat
- potential effects on health and viability of plants outside the clearance footprint through:
    - increased edge effects and associated potential to increasing the abundance of weed species and fire intensity
    - potential for dust to reduce the health of plants and associated vegetation retained outside the construction footprint
    - potential for temporary facilities, materials and equipment to damage plants and associated vegetation outside the construction footprint.

4.2.5.3 Operational Policy Objective

Undertake construction and operational activities in a manner that does not result in unnecessary clearing and maximise the re-use of native vegetation.

4.2.5.4 Performance Criteria

- no unnecessary removal of remnant vegetation and clearing of threatened species and mature vegetation is avoided wherever possible
- felled vegetation is re-used on site wherever possible
- retained vegetation is not compromised by site clearing works, gross mechanical disturbance or impacts associated with sedimentation and / or pollutant export from the development area
- weed invasion is prevented both within the construction site and in surrounding areas
- rehabilitation of areas required only for construction
- compliance with licenses and approvals.

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4.2.5.5 Implementation Strategy

Design Phase

- undertake a detailed flora survey of all remnant vegetation areas within the corridor prior to finalisation of the alignment
- avoid aligning the rail corridor through areas of high ecological significance.

Construction Phase

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

Identification of Exclusion Zones

- a Vegetation Clearance Management Plan is to be developed for the Project to prevent excessive clearing and impact to vegetation. Strategies are to include:
    - limit the clearing of riparian zones to the extent necessary to complete the works safely
    - construction drawings are to clearly define areas to be cleared
    - clearing boundaries are to be clearly marked by high visibility tape, barricade webbing or similar
    - the contractor shall monitor vegetation clearing to ensure only approved areas are cleared.
- the following activities are not to be permitted outside of clearance boundaries:
    - storage and mixing of materials
    - vehicle parking
    - liquid disposal
    - machinery repairs and / or refueling
    - construction site office or shed
    - combustion of any material
    - stockpiling of soil, rubble or debris
    - any filling or excavation including trench line, topsoil skimming and / or surface excavation, unless otherwise approved by the Construction Manager
    - unauthorised pesticide, herbicide or chemical applications.

Minimising Damage to Uncleared Areas

- all activities in areas to remain uncleared are to be carried out in such a manner as to minimise damage to the vegetation.

Sediment and Erosion Control

- prior to any site preparation operations, the SEO (or other suitably qualified personnel) is to undertake an inspection of all erosion and sediment controls and ensure sensitive areas are protected

- on completion of construction, progressive rehabilitation is to be undertaken and include replacement of topsoil, contouring, re-vegetation with local native species and mulching.

Protection of Trees within Construction Zones

- the contractor is to provide fences and / or trunk girdles to prevent unintended physical damage to the root system, trunk or canopy of native vegetation identified for retention, which may be impacted upon by clearing works
- all works carried out on either foliage or root systems of trees in consultation with a qualified arboriculturist or horticulturist
- as required, develop translocation plans for suitable threatened flora species in consultation with a qualified arboriculturist or horticulturist
- all works are required to adhere to the Australian Standards (AS) 4373 – 1996 (Pruning of Amenity Trees).

Vegetation Reuse

- millable timber or timber suited to other commercial purposes is to be salvaged and large woody debris suitable as aquatic or terrestrial habitat shall be saved for placement in critical locations. Remaining suitable material is to be mulched for use in rehabilitation and landscaping.

Vegetation Offset Strategy

- vegetation offsets are to be provided for the loss of significant regional ecosystems as part of the Vegetation Offsets Strategy for the Project. The strategy is to provide offsets in accordance with the 'Policy for Vegetation Offsets' (DERM, 2011) to mitigate the clearing of 'Endangered' and 'Of Concern' REs
- as part of the strategy, the restoration of vegetation connectivity and generation of buffers for existing remnant vegetation is to be sought wherever possible to improve the general connectivity of vegetation and habitat throughout the landscape
- develop a management plan to ensure their long term success of offset areas and is to include measures for planting maintenance, weed and pest management and development of a monitoring program
- develop and implement a landscaping and re-vegetation plan after construction of the Project that involves targeted re-vegetation of riparian areas.

Rehabilitation

A detailed Rehabilitation Plan will be developed and implemented and include:

- areas necessary for construction, but not required for the operational phase are to be progressively rehabilitated. Rehabilitation is to include the re-establishment of original REs where possible
- a monitoring schedule (e.g. quarterly monitoring of areas under rehabilitation)
- suitable completion criteria and indicators to measure the progress of rehabilitation. This may include 70% of cover of native and introduced species within each stratum as occurring on adjoining reference sites of the same land type
- at least two reference sites within the same sub-catchment is to be established within each RE being rehabilitated to provide benchmarking of rehabilitation progress and completion
- the rehabilitation program is to incorporate a wide variety of species endemic to the area and representative of the RE being rehabilitated.

Weed Management

- all mulch produced on site from cleared vegetation will exclude material from weed species. Mulch containing weed species material shall be treated separately and not be used on site
- revegetation works are to be completed under strict supervision to avoid unnecessary soil disturbance
- develop and implement a Weed Management Plan to address the construction, rehabilitation and operation phases of the project. At a minimum the weed management plan is to include:
    - compulsory use of wash-down facilities for vehicles and equipment entering and leaving the construction site and those areas proposed for vegetation clearance
    - machinery, equipment and vehicles are required to be certified as "weed and vegetative matter free" prior to entering the construction site
    - weeds shall not to be used as mulch for landscape, and should be appropriately managed to prevent reseeding and / or colonization
    - soil and landscaping material brought onto the site must be from a source that is clean and weed free
    - management methods for declared and noxious weeds must be consistent with recommendations in DEHP Pest Fact sheets
    - a weed monitoring program and procedures for controlling declared weeds.

Significant Community / Species Management Plan

Significant Community / Species Management Plans will be developed and implemented for Brigalow and Natural Grassland Communities, Black Ironbox and any other significant flora species which may potentially be impacted by the rail. These plans will include:

- proposed management measures identified for construction and operation of the rail infrastructure
- a monitoring and evaluation program for the community / species
- offset commitments relating to the community / species.

Operation Phase

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

- develop and implement a Weed Management Plan to regularly monitoring of the prevalence of weed species within and adjacent to the rail corridor
- where practical, maintenance vehicles are to remain on designated tracks at all times to minimise the disturbance of surrounding vegetation
- control and / or remove any weeds that have been introduced or exacerbated as a result of the works.

4.2.5.6 Monitoring, reporting and corrective actions

Construction Phase

- the Contractor is to monitor vegetation clearing and earthworks on a continual basis to confirm that specific controls have been implemented and appropriate work practices have been adopted to achieve the specified performance objectives
- disturbed areas are to be inspected monthly for weed growth and appropriate weed control measures are implemented when warranted
- clearing methods are to be regularly inspected to ensure compliance with this EMP
- re-vegetated areas are to be monitored to identify new weed infestations or declared weeds
- a monthly report is to be prepared and submitted to Waratah Coal and include details of monitoring results, audits, training and incidents
- any incident that contravenes the objectives of this EMP is to be reposted immediately to the Project Supervisor and SEO
- where required, any incidents, complaints or significant environmental harm is to be reported to regulatory body/ies
- the Contractor is to ensure appropriate personnel undertake adequate environmental awareness and training which covers the requirements of this EMP regarding vegetation clearing and weed management
- the Construction Environment Manager is to request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or at risk of occurring.

Operation Phase

- the management of rehabilitated offset areas is to be undertaken by appropriately skilled contractors for a period of two years to ensure successful plant establishment. Works are to involve planting maintenance, weed control, watering of planted stock, replacement of mulch if disturbed and replacement planting if there are any deaths.

4.2.5.7 Commitments

To manage potential impacts on flora associated with the construction and operation of the rail, Waratah Coal commits to:

- finalising a Biodiversity Offset Strategy in consultation with DEHP and Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)
- develop a Fire Management Plan in accordance with the relevant local planning policies, the relevant State planning policy and in consultation with the Rural Fire Service
- develop and a Weed and Pest Management Plan in consultation with Biosecurity Queensland and the various regional council's
- conduct a detailed flora survey of all remnant vegetation areas within the corridor prior to finalising the alignment with the purpose of identifying the presence of significant flora species as listed under Commonwealth and State legislation. Where significant species are identified, all practicable measures will be implemented to avoid or limit impacts

- develop a Species Management Plan in accordance with Commonwealth and State requirements for vegetation offsets, DEHP's Back on Track Species Prioritisation Framework and other relevant management and / recovery plans to reduce the impacts on significant flora species
- develop a Significant Community / Species Management Plans in accordance with Commonwealth and State legislation for those values or species where unavoidable impacts will have a significant impact on their habitat
- develop and implement a ESCP in accordance with the relevant local planning policies and the relevant State planning policy.

4.2.6 Element 6 – Terrestrial Fauna

Habitat for 10 EPBC Act listed threatened fauna species is expected to be impacted by the rail corridor (**Table 4**). Impacts on threatened fauna habitat are not cumulative as some species occur within the same area.

Table 4. Rail impacts on EPBC Act listed threatened fauna species

Common Name	Scientific Name	EPBC Act Status	Clearing area (ha)
Ornamental Snake	*Denisonia maculate*	V	185.29
Black-throated Finch	*Poephila cincta cincta*	E	89.55
Brigalow Scaly-foot	*Paradelma orientalis*	V	593.65
Northern Quoll	*Dasyurus hallucatus*	E	291.41
Striped-tailed Delma	*Delma labialis*	V	402.13
Yakka Skink	*Egernia rugosa*	V	1,122.32
Dunmall's Snake	*Furina dunmalli*	V	105.28
Red Goshawk	*Erythrotriorchis radiatus*	V	486.49
Australian Painted Snipe	*Rostratula australis*	V	7.86
Koala	*Phascolarctos cinereus*	V	854.23

Habitat for 20 *Nature Conservation Act 1992* (NC Act) listed threatened fauna species is expected to be impacted by the rail corridor (**Table 5**). Impacts on threatened fauna habitat are not cumulative as some species occur within the same area.

Table 5. Rail impacts on NC Act threatened fauna species

Common Name	Scientific Name	NC Act Status	Clearing Area Brigalow Belt Bioregion (ha)	Clearing Area Desert Uplands Bioregion (ha)
Ornamental Snake	*Denisonia maculata*	V	185.29	-
Black-throated Finch	*Poephila cincta cincta*	E	89.55	13.66
Brigalow Scaly-foot	*Paradelma orientalis*	V	593.65	15.68
Spotted-tailed Quoll	*Dasyurus maculatus maculatus*	E	291.41	-
Striped-tailed Delma	*Delma labialis*	V	402.13	-

Yakka Skink	*Egernia rugosa*	V	1,122.32	15.68
Dunmall's Snake	*Furina dunmalli*	V	105.28	-
Red Goshawk	*Erythrotriorchis radiatus*	V	486.49	17.52
Australian Painted Snipe	*Rostratula australis*	V	7.86	-
Koala	*Phascolarctos cinereus*	SLC	854.23	-
Little Pied Bat	*Chalinolobus picatus*	NT	854.23	-
Common Death Adder	*Acanthophis antarcticus*	NT	99.59	-
Rough Frog	*Cyclorana verrucosa*	NT	47.85	-
Cotton Pygmy Goose	*Nettapus coromandelianus*	NT	7.86	-
Freckled Duck	*Stictonetta naevosa*	NT	7.86	-
Black-necked Stork	*Ephippiorhynchus asiaticus*	NT	7.86	-
Grey Goshawk	*Accipiter novaehollandiae*	NT	489.69	-
Square-tailed Kite	*Lophoictinia isura*	NT	407.91	-
Glossy-black Cockatoo	*Calyptorhynchus lathami*	V	76.87	-
Black-chinned Honeyeater	*Melithreptus gularis*	NT	407.91	-

4.2.6.1 Environmental Values

The aforementioned impacts on EPBC and NC Act listed species were derived from a detailed desktop assessment to support the Preliminary Biodiversity Offsets Proposal. In addition, a number of migratory species listed under the EPBC Act have the Preliminary field studies undertaken for the potential to occur, however it is considered unlikely that the construction or operation of the railway would constitute a significant impact to any of these species. A detailed survey is required to confirm the presence or absence and potential presence of each of these species along the proposed rail corridor prior to alignment finalisation.

4.2.6.2 Potential Impacts

Potential direct and indirect impacts on fauna are likely to include the following:

- loss of habitat such as mature vegetation, hollow-bearing trees and fallen logs, and therefore loss of nesting, refuge and foraging resources
- mortality
- habitat fragmentation and loss of connectivity (disturbance to fauna movement corridors)
- barrier effects
- edge effects.

4.2.6.3 Operational Policy Objectives

Construction and operation of the rail is completed in a manner that provides maximum protection of the health and livelihood of native fauna.

4.2.6.4 Performance Criteria

- no significant impact to terrestrial fauna
- the risk (of injury and death) to fauna is managed and minimised during site clearing operations
- retained habitat is not compromised by site clearing works, gross mechanical disturbance or impacts associated with sedimentation and / or pollutant export from the construction area
- fauna species continue to utilise the retained habitat area post-development.

4.2.6.5 Implementation Strategy

The specific element EMP relating to the management of fauna is provided below.

Design Phase

- fauna friendly design principles are to be employed
- design of watercourse crossings are to consider fauna movement across the rail corridor.

Construction Phase

- detailed fauna habitat surveys are to be conducted at all remnant vegetation areas within the corridor prior to finalisation of the alignment
- develop and implement a Fauna Management Plan for the project
- develop and implement a Significant Species Management Plan for any significant fauna species identified as potentially impacted by the proposed rail. These plans are to include:
    - proposed management measures including those identified for construction and operation of the rail infrastructure
    - a monitoring and evaluation program for the community / species
    - offset commitments relating to the community / species
- employ a suitably qualified ecologist / spotter catcher
- during construction, install trench ramps at 15 degree slope every 30 m or place branches or other suitable material for fauna to climb and escape from trenches
- culverts and other structures are to be inspected for fauna prior to works within the area. Trapped or injured fauna species are to be relocated / cared for by the spotter catcher
- where temporary fencing is required consideration is to be given to fauna movement, current land uses and site personnel safety requirements
- implement waste management measures to minimize potential for increased numbers of introduced animal and opportunistic native fauna in the project area
- where possible rehabilitate disturbed areas with suitable endemic vegetation
- clearing is to be conducted in a sequential manner and in a way that directs escaping wildlife away from the activity and into adjacent natural areas.

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Compliance with the Code of Practice

- comply with DEHP guidelines and the Draft Queensland Code of Practice for the welfare and management of wild animals affected by land-clearing and the modification or destruction of wildlife habitats and wildlife spotter / catchers.

Restoration of Habitat

- re-vegetate cleared areas associated with the project
- restore vegetation connectivity and buffer existing remnant vegetation wherever possible to improve the general habitat connectivity throughout the landscape.

Identification of Habitat Trees

- habitat trees must be identified prior to the selective clearing operations. (Habitat trees are defined as those trees that provide suitable foraging, refuge and nesting resources for arboreal and avian fauna and micro-bats). These include hollow-bearing trees, trees with fissures, trees with food resources (e.g. pollen, nectar, foliage, arthropods). Larger, old growth trees are also considered to be habitat trees as they are likely to provide greater amounts of foraging resources, cover, and a high number of potential hollows. Dead (stag) trees are also regarded as important habitat trees as they provide roosting and nesting resources
- a DEHP accredited spotted / catcher is to inspect habitat trees prior to vegetation clearance (i.e. trees with hollows, fissures or with substantial food resource, mature trees or stag trees) and determine the presence of fauna and implement a relocation plan for any fauna found. The spotter / catcher must also be present during vegetation clearing to relocate any native fauna
- clearing is to be conducted using a staged approach where the smaller non-habitat trees are removed in the first stage with the larger remaining habitat trees removed three to five days after the initial clearing.

Tree Hollows

- if any denning, roosting or nesting animals are observed within hollow limbs, but cannot be readily removed by an ecologist / spotter catcher, DEHP are to be consulted to determine an appropriate removal strategy
- nesting boxes are to be provided to mitigate impacts on hollow-dependent fauna as a result of loss of habitat. These will be erected on trees in offset and revegetated areas to provide habitat for arboreal mammals and nesting birds
- prior to tree removal, an appropriately qualified ecologist / spotter catcher is to attempt to “flush out” any denning or nesting animals not observed during the initial hollow inspection. A second inspection of the relevant trees should be carried out post-felling, to relocate fauna disturbed by the clearing process or remaining within the felled timber, to a suitable location determined in consultation with DEHP.

Care of Injured Fauna

- prior to clearing appropriate local wildlife care and veterinary surgeons are to be identified to assist with injured fauna
- all injured animals are to be immediately removed and taken to an appropriately qualified veterinary surgeon. Any orphaned or injured fauna discovered at a later stage during operational works are to be reported to the DEHP

- fauna rescue operations is to be undertaken by an appropriately qualified ecologist / spotter catcher (i.e. DEHP accredited spotter-catcher).

Retention and Re-use of Hollow Logs

- habitat logs, branches and other shelters are to be salvaged from vegetation clearing and replaced within the proposed re-vegetation areas to create habitat for small mammals and reptiles
- hollow logs are to be relocated to cleared areas as habitat features.

Road Traffic

- to minimise impacts on wildlife the following mitigation measures will be incorporated in the proposed Construction Traffic Management Plan:
    - limit construction vehicle movements at times of optimal fauna activity - dawn, dusk and night
    - reduce speed limits on haul routes (local and regional roads)
    - signage and education
    - wildlife rescue protocols.

Night Lighting

- lighting during construction and operation of the project will target the work area or amenity areas with minimal spill particularly to areas of potential habitat for nocturnal and light sensitive species.

Operation Phase

The following mitigation measures will be implemented during the operational phase to minimise any adverse impacts on fauna associated with or adjacent to the rail corridor:

- maintenance works are to be carried out within designated areas only
- vehicular traffic is restricted to constructed access tracks
- implement fauna and pest management plans
- where maintenance of fencing is required, consideration will be given to fauna movement, current land uses and safety / security requirements
- monitor and remove any dead carcasses along the rail corridor to reduce the occurrence of predators.

4.2.6.6 Monitoring, reporting and corrective actions

Construction Phase

- monitor vegetation clearance, earthwork components and requirements of this EMP on a continual basis (as specified above) to confirm that specific controls have been implemented and appropriate work practices are being adopted to achieve the specified Operational policy objectives
- a monthly report is to be prepared and submitted to Waratah Coal to include details of monitoring results, audits, training and occurrence of any incidents
- any incident, spill or release of materials to the environment is to be immediately reported to the Project Supervisor and SEO
- incidents, complaints and any significant environmental harm are to be reported to the regulatory body/ies where required

- appropriate personnel are to undertake adequate environmental awareness and training covering the requirements of the EMP regarding fauna management
- the Construction Environment Manager is to request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or at risk of occurring.

4.2.6.7 Commitments

To manage potential impacts on terrestrial fauna associated with the construction and operation of the rail, Waratah Coal commits to:

- finalising a Biodiversity Offset Strategy in consultation with DEHP and DSEWPaC
- develop a Fire Management Plan in accordance with the relevant local planning policies, the relevant State planning policy and in consultation with the Rural Fire Service
- develop and a Weed and Pest Management Plan in consultation with Biosecurity Queensland and the various regional council's
- conduct a detailed fauna survey of all remnant vegetation areas within the corridor prior to finalising the alignment with the purpose of identifying the presence of significant fauna species as listed under Commonwealth and State legislation. Where significant species are identified, all practicable measures will be implemented to avoid or limit impacts
- develop a Species Management Plan in accordance with Commonwealth and State requirements for vegetation offsets, DEHP's Back on Track Species Prioritisation Framework and other relevant management and / recovery plans to reduce the impacts on significant fauna species. Where habitat for significant fauna species is identified, all practicable measures will be implemented to limit the impact
- develop a Significant Community / Species Management Plans in accordance with Commonwealth and State legislation for those values or species where unavoidable impacts will have a significant impact on their habitat
- develop and implement a Soil and Erosion Management Plan in accordance with the relevant local planning policies and the relevant State planning policy.

4.2.7 Element 7 – Aquatic Flora and Fauna

4.2.7.1 Background

Twenty sites along the rail corridor, most of which were in the Burdekin catchment, have been assessed for aquatic ecological values over two studies conducted in 2012 as part of the SEIS.

Habitat condition

Targeted surveys found that the waterways in the rail corridor project area were generally in good condition, though there was some evidence of erosion, riparian vegetation clearing, understory disturbance and exotic weed occurrence at a number of sites. However, this was expected given that the adjacent land use to most of the waterways sampled was light grazing.

Fish community

Fish fauna consisted primarily of potadromous species; however, a number of catadromous and anadromous species were recorded, which has important implications for maintenance of fish passage for spawning for these species.

The exotic fish Gambusia (*Gambusia holbrooki*) and Tilapia (*Oreochromis mossambicus*) were also recorded.

Macro-crustacean Community

The macro-crustacean community was of limited diversity when compared with the diversity known for the Burdekin Catchment as a whole, but this was consistent with the findings of earlier studies in the project area vicinity.

Macroinvertebrate Community

The macroinvertebrate community diversity was within the expected range for Central Queensland waterways for samples of macroinvertebrates taken from edge habitats. For composite habitat sample, diversity was often higher than expected.

Turtles

Whilst the studies did not target aquatic vertebrates other than fish, turtles were caught as by-catch. Only two species were captured, the Saw-shelled Turtle (*Wollumbinia latisternum*) and Krefft's Turtle (*Emydura maquaria krefft*i). Both of these species are potentially vulnerable to increased turbidity and disturbance to the riparian zone due to their partial reliance on macrophytes and algae as a food source and the use of reed beds as a nursery area for juveniles. As such, there is potential for clearing of riparian vegetation and reed beds and generation of turbid plumes associated with construction of the rail to affect these species. However, such impacts would likely be highly localized and / or short lived, so significant impacts on these turtle populations are considered unlikely.

Macrophyte community

Macrophyte diversity and cover was generally low in the waterways sampled. Both studies recorded emergent forms particularly those belonging to the Cyperaceae family as most common. However, a number of submerged macrophytes were recorded. Submerged macrophytes are potentially vulnerable to increases in turbidity so this has implications for any increases to turbidity associated with the construction of the rail.

No exotic or noxious macrophytes were recorded, although several are known to occur in the study area.

4.2.7.2 Environmental Values

Four aquatic habitat types are present within the proposed rail corridor, estuarine, lacustrine, palustrine and riverine. The dominant aquatic environment within the proposed rail corridor is freshwater riverine habitats. In addition, several wetlands listed as Great Barrier Reef Wetland Protection or management areas were located within or adjacent to the rail.

1,411 fish belonging to 19 species were recorded from the 2012 studies. Studies undertaken in 2010 previously recorded 5,675 fish belonging to 28 species. Eastern Rainbowfish (*Melanotaenia splendida*) and Spangled Perch (*Leiopotherapon unicolor*) were the most widely recorded species. A total of 1,344 individuals from 52 macro invertebrate taxa were recorded in by the 2012 surveys. Overall, impacts to surface water resulting from the works are expected to be minimal.

4.2.7.3 Potential Impacts

Construction Phase

Construction works that have the most potential to impact on aquatic ecosystems include:

- bridge construction
- disturbing and stockpiling soils
- piling and culvert works for stream crossings

- use of potentially contaminated / low quality water for dust suppression and other site activities
- storage of oil, fuel and chemicals on site.

Potential impacts arising from construction of the rail include:

- loss of habitat
- fauna mortality
- decreased water quality
- changes to hydrology.

If properly managed the impacts to surface water resulting from the works are expected to be minimal.

Operation Phase

There is little available information specifically addressing the effect of operational rail lines on water quality; however impacts to aquatic ecosystems may occur if site runoff is not managed correctly.

Major incidents releasing contaminants into streams have the greatest potential to impact on aquatic fauna if spill response efforts are not carried out in a timely manner. However, the effects of multiple small releases over extended periods are difficult to quantify and will be highly dependent on the nature of the chemical released.

4.2.7.4 Operational Policy Objective

- minimise and mitigate adverse impacts on aquatic fauna and flora, during construction of the project
- minimise and mitigate adverse impacts on aquatic fauna and flora, during operation of the project.

4.2.7.5 Performance Criteria

- no discharge of materials through stormwater runoff from construction and operational areas, with particular regard to suspended sediments, fuels, chemicals, and oils
- no waste materials (general and construction rubbish etc.) entering waterways from construction and operational areas
- minimal occurrence of aquatic weeds at adjoining watercourses from a work site
- no uncontrolled or untreated release of water or sediment from a work site.

4.2.7.6 Implementation Strategy

The specific element EMP relating to the management of freshwater ecology is provided below.

Design Phase

- gain relevant permits for operational works that involve the raising of a waterway barrier outside of the mining lease
- in consultation with Fisheries Queensland, ensure fish passage is maintained through appropriate environmental design
- culverts located within the main channel of rivers and creeks are to be depressed below the natural surface to facilitate fish passage in accordance with the Queensland *Fisheries Act 1994*
- align railway to avoid broad diverse riparian vegetation assemblages, high value habitat nodes

- design watercourse crossings to be elevated and minimise dissection of contiguous ecotonal vegetation corridors and high value habitat nodes and corridors in highly fragmented landscapes
- wildlife underpasses are to be incorporated into the design of bridges and culverts crossing waterways.

Construction Phase

Water quality

- maintain water quality in accordance with criteria determined in consultation with DEHP and included in the water quality monitoring program.

Sediment and Erosion Control

Implement and maintain water quality. Particular attention is to be paid to the management of stockpiles and exposed soils. Management measures are to include, but are not limited to:

- the development and implementation of ESCPs for the rail alignment. The ESCP will detail control measures to be implemented, construction details, dimensions, materials to be used, expected outcomes and staging of erosion and sediment control until construction is complete. The ESCP is to be signed off by the appropriate authority prior to the commencement of works and include the following principles:
    - minimisation of the construction footprint at all phases
    - timing of major earth works to coincide with low rainfall and low flow periods as far as practical
    - staged clearing of vegetation
    - wash down of plant and equipment at appropriate handling facilities
    - locate stockpiles of excavated materials away from the watercourses and install appropriate runoff and sediment control measures
- where possible, and where water is present, vibrocorers are to be used in preference to hammer pile drivers to reduce re-suspension of bottom sediments
- a storm water management plan for each component of the construction is to be developed and implemented. These should consider the use of storm water tanks and re-use of grey water
- prior to construction works occurring within the confines of a watercourse (i.e. piling for bridge crossings) sediment sampling is to be carried out to identify potential contaminants
- stabilise and rehabilitate disturbed ground as soon as practical.

Weed Control

- develop and implement a program to monitor and control terrestrial and aquatic weed growth
- managing cattle access to the water in consultation with land owners.

Barriers to mobile fauna movement

- avoid isolating waterbodies and allow mobile fauna to move away from areas of impact.

Rehabilitation

- revegetate understorey and midstorey vegetation following construction.

Operation Phase

- train cleaning is to be undertaken regularly
- trains are not to be overloaded
- coal loads are to be covered
- restrict train speed limits in sensitive areas.

4.2.7.7 Monitoring, reporting and corrective actions

- an aquatic ecosystem monitoring program is to be developed and implemented for construction works through the EMP. The monitoring program is to incorporate the following:
    - impact monitoring criteria for each catchment crossed by the rail
    - monitoring is to include visual inspections of construction areas and surrounding waters for evidence of spills
    - physical and chemical water quality monitoring up and down stream of work sites within the rail corridor
- a water quality monitoring program is to be developed in consultation with DEHP. That monitoring program will clearly outline:
    - monitoring locations
    - monitoring frequency and schedule
    - routine and event-based monitoring
    - water and Sediment Quality Parameters (those water quality parameters already sampled will be used as a starting point)
    - Quality Assurance /Quality Control objectives
    - sampling and analysis methodologies (the DEHP (2009) 11 sampling protocols should be used as the guiding document)
    - protocols for other data collection techniques (e.g. any data loggers that might be installed)
    - documentation and records
    - data quality assessment
    - analysis
- a monthly report is to be prepared and submitted to Waratah Coal and is to include details of monitoring results, audits, training and incidents
- incidents, complaints and any significant environmental harm reported to regulatory body/ies where required
- appropriate measures are to be undertaken to protect the aquatic environment where unacceptable impacts or risk of environmental harm becomes apparent
- any incident which contravenes the objectives of the EMP is to be immediately reported to the Project Supervisor and SEO

- the Construction Environment Manager is to request the cessation of works at their discretion should a breach of performance criteria of the EMP be occurring or is at risk of occurring.

4.2.7.8 Commitments

Waratah Coal commit to undertaking the following actions:

- develop an ESCP prior to the commencement of construction
- ensure bridge and culvert design allows for the passage of aquatic species
- implement mitigation measures designed to preserve the existing water quality values within and downstream of the rail corridor.

4.2.8 Element 8 – Weed Management

4.2.8.1 Background

This study identified 16 significant weed species within the project footprint including eight declared species (**Table 6**).

Parthenium Weed (*Parthenium hysterophorus*) is possibly the most significant weed identified within the rail corridor. It was observed at approximately the following KPs 81, 96, 111, 120, 200 / 201, 221, 223, 227 / 228, 255, 258, 265 and 311 but is likely to occur in other parts of the rail corridor. Parthenium weed commonly displaces native and pasture grasses in areas of heavy clay soils which are intensively grazed and / or cropped. Parthenium weed is also known to cause human health problems.

Prickly Acacia (*Acacia nilotica* subsp. *Indica*) is a significant weed which can form dense thickets. One individual was recorded at approximately KP 67.5 (Site 10) but it is known to occur in dense stands in the local vicinity.

Rubber Vine (*Cryptostegia grandiflora*) is a widespread pest in the area which often forms dense thickets particularly along drainage lines closer to the coast. Rubber Vine reduces fauna and flora habitat values as well as grazing productivity when dense. Rubber Vine was observed at approximately KPs 17, 45, 49, 62, 67 / 68, 70 / 71 and 81 but is likely to occur in other parts of the proposed rail corridor.

Harissa Cactus (*Lantana camara*) is frequently present along the entire length of the rail corridor, usually in low numbers as scattered individuals or small clumps. This species was observed at approximately KPs 49, 62, 73, 200 / 201, 227 / 228, 236 / 237, 255, 265, 301, 203 and 304.

Common Lantana (*Lantana camara*) was observed at approximately KP 79 but is likely to occur in other parts of the proposed rail corridor.

Velvet Tree Pear (*Opuntia tomentosa*) was observed at approximately KPs 160, 223, 255, 270, 301, 203 and 304 but is likely to occur in other parts of the proposed rail corridor.

Parkinsonia (*Parkinsonia aculeate*) was observed at approximately KP 410 but is likely to occur in other parts of the rail corridor.

Buffel Grass (*Cenchus ciliaris*) is widespread throughout much of the proposed rail corridor as the majority of the land has been previously cleared to accommodate agricultural uses, particularly cattle grazing. This species is an introduced and highly valued pasture grass in many areas; however, it has the potential to out-compete native groundcover species and increase biomass.

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4.2.8.2 Environmental Values

Surveys undertaken as part of the EIS and SEIS have identified 16 significant weed species occurring within the rail project footprint. This included eight species declared as Weeds of National Significance (WONS) as described in **Table 6**.

Table 6. Significant Weed Species Occurring in the Rail Corridor

Common Name	Scientific name	Classification	
		WONS	LP Act Class
Prickly Acacia	*Acacia nilotica* subsp. *Indica*	X	Class 2
Buffel Grass	*Cenchus ciliaris*		
Rubber Vine	*Cryptostegia grandiflora*	X	Class 2
Harissa Cactus	*Harrissia martini*		Class 2
Common Lantana	*Lantana camara*	X	Class 3
Parthenium Weed	*Parthenium hysterophorus*	X	Class 2
Velvet Tree Pear	*Opuntia tomentosa*		Class 2
Parksonia	*Parkinsonia aculeate*	X	Class 2

Parthenium Weed is possibly the most significant weed identified within the rail corridor. Parthenium Weed commonly displaces native and pasture grasses in areas of heavy clay soils which are intensively grazed and / or cropped and is also known to cause human health problems.

4.2.8.3 Potential Impacts

The construction and operation of the rail infrastructure has the potential to spread existing significant, environmental and other weeds and introduce new weed species to the area which can result in:

- out-compete native groundcover species including threatened or near threatened species
- reduce food and / or habitat availability for native fauna species
- increase biomass which may bias fire regimes towards much more intense and frequent fire events which could degrade fire sensitive communities, particularly Brigalow forests and woodlands
- render land less productive and in some cases have serious health impacts on livestock and people.

4.2.8.4 Operational Policy Objective

- no new declared weeds or introduced flora species are introduced
- declared weeds already present in the rail corridor are not spread as a result of project activities.

4.2.8.5 Performance Criteria

- obligations under the *Land Protection (Pest and Stock Route Management) Act 2002* are met
- all vehicles working off road have “weed and vegetative matter clean” certificates

- documentation available showing quarry sites inspected for weeds prior to extraction
- existing infestations of weed and pest species are controlled
- no additional weed and pest infestations occur due to construction or operational activities.

4.2.8.6 Implementation Strategy

Mitigation measures to minimise the potential impacts include the development of a detailed Weed Management Plan that addresses the construction, rehabilitation and operation phases of the project should be prepared prior to construction.

Pre construction Phase

- vehicles, machinery and plant equipment imported from overseas are to be inspected by quarantine and customs in accordance with the requirements and protocols of AQIS
- materials including gravel, mulch, packing materials, sand and soil from interstate shall be inspected and be certified weed and pest free before being brought into Queensland
- priority weed infestations are to be identified during pre-clearance surveys
- develop and implement species specific treatment applications that are relevant to the size and growth stage of each infestation
- declared weeds are to be controlled in general accordance with Biosecurity Queensland best practice management for each species.

Construction and Operation Phases

- a Weed Management Plan is to be developed and implemented during construction and operation
- management plans for Parthenium and Buffel Grass are to be developed and contain specific control strategies for these species
- all mulch produced on site from cleared vegetation is to exclude material from weed species. Mulch containing weed species material shall be treated separately and is not to be used for on site revegetation works
- key staff and contractors are to attain proficiency in the identification of common and declared weed plants within the Project regional area in which they are working. Construction contractors are to be made aware of their responsibilities and manage their activities so as to minimise the introduction and / or spread of priority weed species on site and to surrounding land
- priority existing declared weed infestations are to be treated or removed from all work areas and access routes, Any live weed material containing seed or suspected of containing seed is to be placed into sealed plastic bags and disposed of at a licensed refuse facility
- vehicles, plant and equipment are to remain in weed free areas and minimise contact with weed infestations unless undertaking weed control activities
- weed vegetation is to be stockpiled separately to top soil and other excavated material
- weed material be disposed of at a designated disposal site or otherwise appropriately managed to avoid weed seed spread to other areas along the corridor or surrounding lands
- clear and grade wash-down areas are to be clearly identified (marked on construction drawings and in the field) at locations where infestation levels change. Stationary weed wash-downs are to be provided at locations appropriate to movement into and out of weed infested areas

- vehicle cleanliness is to be re-established at identified points (marked on construction drawings and in the field). Vehicles, plant and equipment failing inspection will require cleaning and re-inspection prior to leaving
- boundary fence lines are to be marked on construction drawings and in soil transfer across these lines is to be limited
- lay down areas and camp sites are to be regularly inspected for weeds. Any declared or priority weeds identified are to be controlled or removed in accordance with Queensland Government and other local government requirements
- declared weeds identified within the Project footprint to be treated and disposed of within the site using best practice control measures appropriate for the species. Non-declared weeds may be removed and relocated to a waste disposal facility
- revegetation works are to be staged and monitored for weed infestations.

Wash-down facilities and "Clean" plant.

- high risk materials entering Project sites via road transport shall be inspected and be certified weed and pest free using the Biosecurity Queensland weed hygiene declaration form. Vehicle and equipment hygiene, inspection and certification requirements will meet as a minimum the requirements of the Waratah Coal Vehicle Weed Hygiene Procedure. The Vehicle Weed Hygiene Procedure and inspection report follows the requirements of Biosecurity Queensland.

Inspection and certification requirements are outlined below.

- all vehicles, machinery and plant must be inspected by qualified Project personnel or a third party inspector for weeds and high risk materials such as soil prior to entering a project site. An inspection report will be issued once the inspector confirms the vehicle is free of all organic material.
  The following activities do not require a vehicle or equipment to undergo inspection or require an inspection report:
    - any vehicle / equipment travelling exclusively on formed roads to a major facility administration area (e.g. to a car parking area) or cleared corridor other than in a prescribed weed outbreak area
    - emergency vehicles responding to an emergency
    - private landholders who are moving around their own properties and where the Galilee Coal Project is constructing or maintaining an asset
    - guests of landholders that are visiting a property on non-business and where the Galilee Coal Project is constructing or maintaining an asset - Where an emergency has been declared on all Project sites all authorised vehicles are exempt.
- it is the responsibility of the driver or machine operator to organise this inspection prior to travelling to site. Drivers and machine operators may inspect their own vehicle / machinery if they are a trained staff member or authorised third-party inspector
- a register of trained staff members is to be kept at each site
- the level of inspection and wash-down requirements are determined using the weed risk matrix
- a copy of the valid inspection report is to be kept within the vehicle. A duplicate copy of the vehicle / equipment inspection report must be retained by the inspector and these copies handed

over to Galilee Coal Project staff when a new book of vehicle / equipment inspection reports is issued

- administration staff will keep a record of vehicle / equipment inspection report forms for a period of no less than five years as required by the LP Act. All vehicles entering a project site must have a valid inspection report in the vehicle at all times. Vehicles / equipment will not be permitted to enter the site or will be required to undergo cleaning prior to leaving the site if found to be without a valid inspection report
- selected Project personnel are to be trained in machinery inspection for and cleaning of plant, animal and soil matter and will be authorised to inspect vehicles, issue inspection reports (and authorisation sticker) and void inspection reports (and authorisation stickers) if a vehicle is deemed unclean following vehicle wash-down
- a movement protocol is to be developed and implemented for vehicles and plant to ensure declared weeds are not spread.

Rehabilitation

- cleared areas are to be rehabilitated as soon as practicable
- a detailed Rehabilitation Plan is to be developed and include a detailed rehabilitation monitoring and evaluation plan as well as a monitoring schedule (e.g. quarterly monitoring of areas under rehabilitation). Suitable completion criteria and indicators to measure the progress of rehabilitation may include 70% of cover of native and introduced species within each stratum as occurring on adjoining reference sites of the same land type. At least two reference sites within the same sub-catchment should be established within each RE being rehabilitated to provide benchmarking of rehabilitation progress and completion.

Operation Phase

- the Weed Management Plan is to be implemented and regular monitoring of the prevalence of weed species in disturbed and adjacent areas is to be undertaken
- areas necessary for construction, but not required for the operational phase are to be progressively rehabilitated. Rehabilitation is to include the re-establishment of original REs wherever possible
- maintenance workers are to remain on designated tracks at all times to minimise the disturbance of surrounding vegetation
- any weeds that have been introduced or exacerbated as a result of the Project are to be controlled and / or removed.

4.2.8.7 Monitoring, reporting and corrective actions

- vehicles, plant and equipment are to be inspected for vehicle hygiene inspection reports and sticker when entering and / or leaving the Project site. The service crew are to undertake visual checks of all vehicles for vegetative matter once every 28 days (or each work cycle). Spot-checks of plant and equipment, which are expected to predominantly remain within the corridor and associated work areas, will be randomly carried out by the nominated person. Plant or equipment will be spot-checked each work cycle (28 days)
- environmental personnel and other approved construction crew members are to check / review the use of un-authorised access routes by project vehicles on an ongoing basis. All completed checklists will be lodged with the site coordinator. Checklists and complaints registers are to be reviewed regularly to monitor compliance with this plan

- vehicles, plant and equipment failing spot checks are to be sent for wash-down at the nearest facility
- staff and contractors are required to observe their work area and report all new infestations, in particular Parthenium outbreaks, as soon as possible
- where required, notification is to be provided to the relevant Council and to Biosecurity Queensland on the locations of declared weed infestations identified within the Galilee Coal Project area
- the distribution of known declared weeds is to be monitored and, where feasible, eradicated or contained in accordance with the *Land Protection (Pest and Stock Route Management) Act 2002*
- employees / contractors working on site are required to report the presence of declared weeds or weed outbreaks to the supervisor and SEO by the end of the working day
- a monthly report is to be prepared and submitted to Waratah Coal and is to include details of monitoring results, audits, training and incidents
- any incident which contravenes the objectives of the EMP is to be reported immediately to the Project Supervisor and SEO
- incidents, complaints and any significant environmental harm are to be reported to regulatory body/ies where required
- the Contractor is to ensure appropriate personnel undertake adequate environmental awareness training covering the requirements of the EMP regarding weed management
- the Construction Environment Manager is to request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring.

4.2.8.8 Commitments

To manage potential impacts associated with weeds on terrestrial ecology associated with the construction and operation of the rail, Waratah Coal commits to:

- develop a Weed and Pest Management Plan in consultation with Biosecurity Queensland and the various regional council's
- implement vehicle, equipment and plant wash down procedures as outlined in this EMP.

4.2.9 Element 9 – Pest Management

4.2.9.1 Background

Pest animal management along the rail corridor is generally not feasible due to the highly mobile nature of most pest animal species. Pest animal species may traverse the rail easement; however, it is unlikely that they will persist solely within the corridor, instead utilising a substantial body of land outside of that managed by China First.

Pest animal management within the rail corridor, which consists of particular sized land units, is achievable when a pest species remains within the project area and control is feasible within that specifically sized area. Some control measures such as trapping and shooting will not be feasible within smaller geographic units. If the development of China First infrastructure occurs within an area frequented by a pest species, or a declared pest species becomes resident within an area managed by China First, the species will be managed in accordance with legislative requirements.

4.2.9.2 Environmental Values

Two common introduced species, the Feral Cat (*Felis catus*) and Pig (*Sus scrofa*), were recorded within the proposed rail corridor. Both species are listed as a declared Class 2 animal under the LP Act. Under the LP Act, landowners must take reasonable steps to keep land free of Class 2 pests.

Management of these pests requires coordination with programs led by local government, community or landowners.

4.2.9.3 Potential Impacts

The clearing of vegetation within the project are will mobilise pest animal species that occur on site prior to construction works including pigs, foxes, rabbits, cats and wild dogs. These species are highly mobile and utilise large areas of habitat, and are likely to vacate the site due to disturbance during construction and clearing of vegetation.

4.2.9.4 Operational Policy Objective

- pest infestations do not increase as a consequence of the project and existing populations of introduced fauna are controlled.

4.2.9.5 Performance Criteria

- no additional, or increase in distribution of pest infestations as a consequence of the construction activities at, or within the rail corridor.

4.2.9.6 Implementation Strategy

Construction Phase

- a Pest Management Plan is to be developed for the project and include measures that:
    - ensure waste is managed appropriately
    - where practicable, ensure water is not left to lie on sites for longer than seven days (i.e. avoid ponds of standing water)
    - ensure stormwater treatment and sediment control devices are designed and managed as to not create breeding habitat for mosquitoes
- design the water holding facilities on site to minimise the occurrence of shallow pools with still water and open unvegetated gradually sloping banks
- engage with key stakeholders in Project area to determine management objectives for wild dogs
- no domestic cats or dogs are allowed on any sites within the Project area
- if rodents are prevalent within the site buildings and accommodation camps, rodent baits are to be used. The baits are to be placed and contained to minimise exposure to non- target species
- landowners of the affected properties are to be consulted prior to any trapping or control actions
- key stakeholders are to be engaged with to coordinate efforts to manage pest fauna within the wider Project area
- a mosquito and biting midge management plan will be developed in consultation with Queensland Health and is to include:
    - an assessment of work areas is to be undertaken to identify potential breeding sites

- specific area control plans based on assessment of potential breeding sites will conform to DEHP'S Mosquito Management Code of Practice for Queensland
- Queensland Health and the relevant local councils are to be contacted for assistance in choosing a suitable control method.

Tramp Ant Management

All cargo arriving from areas of known tramp ant occupancy is to be inspected prior to the introduction to the project site. Early detection of an incursion will enable a more effective mitigation response. In the event tramp ants are identified on site, Biosecurity Queensland is to be consulted for specific management advice.

Management of fire ants is to be conducted in cooperation with Biosecurity Queensland Control Centre (telephone 13 25 23) and any discovery of an incursion is to be reported immediately. A request for site inspection for commercial operations is available at the DAFF site: http://www.daff.qld.gov.au/4790_8027.htm

- materials, equipment and machinery are to be inspected for fire ants prior to entering the project site
- high risk materials (soil, bailed hay and straw, plants, mulch, green waste, construction materials, equipment) are to be sourced from suppliers who have a Department of Agriculture, Fisheries and Forestry Approved Risk Management Plan (ARMP) if the business trades in, handles or moves high risk materials from a restricted area
- where suppliers do not have an approved ARMP, a fire ant declaration form is to be completed prior to moving high risk materials to areas outside the restricted area
- all suppliers of high risk items must declare if they operate within a restricted zone. A copy of the ARMP for any materials sourced within a restricted area will be lodged with the relevant Project Supervisor.

Exotic Fish

A detailed in-field aquatic values assessment will be undertaken at representative watercourses during the final field design. This aquatic values survey is to be completed prior to construction and will provide a baseline for the ongoing monitoring plan. Priority pest fish species identified in waterways within the Project area will be reported to Fisheries Queensland and Biosecurity Queensland. Population management or removal techniques will be implemented with consultation with the relevant authorities and landholders in accordance with the Queensland Exotic Fish Operational Strategy 2008.

4.2.9.7 Monitoring, reporting and corrective actions

- the presence of pests is to be monitored as part of the weekly site inspections
- camera traps may be installed at breaks in the boundary fences and within the properties to monitor pest animal activity
- annual cane toad breeding activity monitoring is to be undertaken
- annual monitoring of rodent activity around the rail corridor and all site camps is to be conducted using non-lethal trapping
- employees / contractors working on site are to report the presence of feral animals to the SEO
- a monthly report is to be prepared and submitted to Waratah Coal and include details of monitoring results, audits, training and incidents

- all sightings of pest animals or signs of pest animal activity is to be reported to the site manager and environmental representative. Timely notification is to be provided to the relevant Council on the locations of pest activity identified
- a pest animal sightings register will be established and maintained
- a six monthly report on pest animal activity will be prepared by Galilee Coal Project. This report is to include a summary of all relevant training provided to staff and contractors, a summary of the pest animal register, the findings of the annual monitoring programs and recommendations for any corrective actions required
- any incident which contravenes the objectives of the EMP is to be immediately reported to the Project Supervisor and SEO
- incidents, complaints and any significant environmental harm are to be reported to the regulatory body/ies where required
- appropriate control measures are to be implemented where infestations occurring
- the Contractor is required to ensure that the appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding pest management
- the Construction Environment Manager is to request the cessation of works at any time, at their discretion, should a breach of performance criteria of the EMP be occurring or is at risk of occurring.

4.2.9.8 Commitments

To manage potential impacts associated with pest species on terrestrial ecology associated with the construction and operation of the rail, Waratah Coal commits to:

- develop a Weed and Pest Management Plan in consultation with Biosecurity Queensland and the various regional council's.

4.2.10 Element 10 – Air Quality

4.2.10.1 Background

The impacts on air quality of the activities associated with the operation of the rail have been assessed against Environmental Protection Policy (Air) 2008 (EPP(Air)) air quality guidelines for total suspended particles (TSP), particulate matter with an aerodynamic diameter less than 10 microns (PM_{10}) and particulate matter with an aerodynamic diameter less than 2.5 microns ($PM_{2.5}$). Dust deposition rates have also been assessed against relevant guidelines.

Fugitive emissions from coal wagons were estimated using the methodology presented in the Interim Report Environmental Evaluation of Fugitive Coal Dust Emissions from Coal Trains Goonyella, Blackwater and Moura Coal Rail Systems, prepared for Queensland Rail Limited.

Background concentrations were estimated based on air quality monitoring conducted at West Mackay by DEHP. They are likely higher than the actual background dust levels along the rail easement.

The steady-state Gaussian dispersion model AUSPLUME was run with two annual meteorological datasets to compare the maximum time-averaged concentrations to their relevant guidelines. The two meteorological datasets were generated using a meteorological prediction model, The Air Pollution Model, with one located close to Alpha, near the mine (for year 2008), and another one located close to Bowen, near the coal terminal.

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As it was not feasible to model the entire length of the proposed rail, a representative section of the rail was modelled. Terrain effects were not accounted for in AUSPLUME as a non-specific section of track was modelled. The total length of the rail modelled was 12.4 km, represented as a straight line.

The dust emissions were modelled as a series of joined area sources that represented the dust plumes generated from trains running on two proposed tracks. Each source was 20 m wide, to simulate a scenario where the two tracks are located within a land strip of 20 m wide, well within the proposed 100 m rail alignment. A total number of 120 sources were modelled.

A line of receptors was set up, perpendicular to the modelled rail line, crossing the line at the middle. The gap between receptors was 25 m near the track, and 50 m further away. The furthest receptors are 2 km away from the track on both sides of the rail.

4.2.10.1.1 Existing Air Quality

DEHP monitor ambient air levels across major populated districts across the state. These levels are assessed to comply against the National Environmental Protection (Ambient Air Quality) Measure and the EPP (Air). Due to the general remoteness of the rail, there is no regulatory ambient air quality monitoring stations in the near vicinity. The closest DEHP air quality monitoring station is located at West Mackay. West Mackay is located in a light industrial area, which often observes high levels of dust, attributed to local industries. Table 2 summarises recent dust monitoring data at West Mackay over a five year period.

Existing emission sources for the length of the rail are due to agricultural land use practices, occasional impacts from biogenic emissions, regional dust storms and fires, and are expected to be relatively low.

Estimating existing background dust level for the rail from the West Mackay Station data is a conservative approach, as air quality emissions are substantially higher across the region of Mackay due to light industry, and are not representative of background air quality along the rail.

For the purposes of the EIS and SEIS assessment, and considering the predominantly rural environment within the study area, the estimated background levels for dust are:

- 26 µg/m³ for 24-hour average PM_{10} levels (70th percentile of 24-hour concentrations, averaged during 2006-2009)
- 22 µg/m³ for annual average PM_{10} levels (annual average concentrations, averaged during 2006-2009)
- 5.2 µg/m³ for 24-hour average $PM_{2.5}$ levels (20% of PM_{10} values, based on Midwest Research Institute, 2006)
- 4.4 µg/m³ for annual average $PM_{2.5}$ levels (20% of PM_{10} values, based on Midwest Research Institute, 2006)
- 44 µg/m³ for annual average TSP levels (twice PM_{10} values, based on Midwest Research Institute, 2006).

The use of 20% of PM_{10} to estimate $PM_{2.5}$ background concentrations is based on Midwest Research Institute (2006), in which the recommended ratio of $PM_{2.5}$ to PM_{10} is 0.2 for agriculture activities, which is applicable to the rail where terrestrial wind erosion is presumably the major source of background dust emissions.

4.2.10.2 Environmental Values

The proposed rail corridor is predominately a rural landscape and the majority of the existing emissions are relatively low and derived from agricultural land use practices, biogenic emissions, regional dust storms and fires. A large proportion of the proposed rail easement will traverse uninhabited regions; however, nineteen

individual residents or regional towns along the proposed corridor have been identified as sensitive receptors. The rail alignment does pass close to areas of vegetation that may be sensitive to dust suppression.

Relevant environmental values for air quality are provided under the Environmental Protection (Air) Policy 2008 (EPP (Air)) are:

- protecting the health and biodiversity of ecosystems
- human health and wellbeing
- protecting the aesthetics of the environment, including the appearance of buildings, structures and other property
- protecting agricultural use of the environment.

4.2.10.3 Potential Impacts

Air quality indicators (under the EPP (Air)) potentially adversely affected by the Project's rail activities (construction and operation) are:

- dust particles (as PM_{10})
- dust particles (as total suspended particulates).

Primary sources of dust emission include:

- clearing of vegetation and topsoil
- excavation and transport of earth material
- blasting
- vehicles travelling on unpaved roads
- vehicles and machinery exhausts
- activities from temporary hard rock and gravel quarries situated along the alignment
- wind erosion of the coal surface of open coal wagons.

Dust impacts during the operational phase of the Project were assessed and the results indicate that dust impacts drop very quickly with the distance from the rail and dust generated from coal wagons will not lead to exceedances of the guidelines at sensitive residential locations.

4.2.10.4 Operational Policy Objectives

- ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards
- minimise emissions to levels as low as practicable on an on-going basis and consider offsets to further reduce cumulative emissions
- minimise greenhouse gas emissions in absolute terms and reduce emissions per unit of product to as low as reasonably practicable
- minimise airborne emissions through all reasonable and practicable measures.

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4.2.10.5 Performance Criteria

- no excessive dust emissions during construction or operation of the rail
- no air quality related complaints from neighbouring properties
- no adverse impacts to the environment associated with rail activity emissions.

4.2.10.6 Implementation Strategy

Design Phase

- maximise the separation distance between construction and operational activities and sensitive receptors.

Construction Phase

Crushing and Concrete Batching

- enclosures around cement truck unloading bays (at least two sides for drive through plant and three sides for rear unload plant) or sealed transfer processes
- aggregate is to be stored within protected stockpile areas (e.g. two or three sided bins, with aggregate loaded to no more than 0.5m below bin wall height) where possible
- where necessary, water aggregate stockpiles regularly to control visible dust
- drop heights for material deliveries / conveyor transfers are to be minimised where possible
- spills beneath conveyors, handling areas and on sealed areas are to be regularly cleaned
- stationary dust generating activities (including concrete batching, rock crushing) are to be located as far as practical from sensitive receivers
- use natural landforms or stabilised earth mounds within which stationary equipment to protect operations from prevailing strong winds
- incorporate appropriate dust controls and enclosures into design, including semi enclosing crushing and batching plants and include dry collection systems (fabric filters).

Transportation and wheel generated dust

- regularly inform truck drivers (including contractors) and machinery operators of the designated vehicle access routes and other relevant practices such as:
- regularly maintain site vehicles and maintenance equipment to ensure efficient running of engines
- minimise vehicle speeds on unsealed road areas (<20-40 km/hr) to minimise wheel generated dust
- water unpaved roads and trafficked areas as required to prevent visible dust emissions travelling offsite from these areas
- dust suppressants such as compacted road base, aggregate or chemical binding agents (subject to acceptability in water quality management practices)are to be used
- public roads are to be regularly cleaned (sweep) of mud and soil material
- all materials transported off site are to be covered
- ensure truck loads transported around the site are no taller than the vehicle side walls as required to control visible dust

- site access hardening, including laying grates, gravel pads, paving or other hard surface at the site exit of sufficient length to remove soil and other material from vehicles. Geotextile fabric should be laid under loose material such as gravel to prevent movement and mixing with the soil surface, where possible.

Excavation and Stockpiling

- water sprays (hand held hoses or sprinklers) are to be used during excavation activities where necessary to control visible dust
- stockpiles or material stores are to be kept damp by water sprays and / or covered and should be located as far from residences as possible where necessary to control visible dust
- any stockpiles are to be located in sheltered locations where possible, with the slope of the upwind surface minimised
- regularly water spoil stockpiles prior to stabilisation
- if necessary provide dust / wind fencing around stockpile areas to control visible dust
- ensure exposed areas are minimised, stabilised and revegetated promptly.

Drilling and Blasting

- install dust collection devices on drill rigs (bag filters, water sprays)
- dry and fine material within the blasted area from drilling should be wetted down to suppress dust evolution
- blasting is to be restricted when strong winds are blowing (particularly during dry weather) and when winds are blowing towards sensitive areas
- blast designs are to consider restricting blast size to minimise dust emissions.

Diesel exhaust emissions

- develop and implement a TMP to manage the movement of construction vehicles entering and leaving the construction sites and queuing along local roads adjacent to residential dwellings
- minimise extended engine idling and queuing adjacent to residential dwellings
- regularly maintain diesel exhaust equipment and ensure compliance with appropriate design emission standards for in service vehicles
- maintain diesel powered stationary plant to ensure appropriate levels of air emissions and consider fitting emission controls where required.

General Work Practices

- minimise the size of exposed areas susceptible to wind erosion at any time
- stabilised disturbed ground as possible after earthworks have been completed
- works are to be ceased within areas close to residents during excessively dry and windy conditions and where dust emissions unable to be controlled by watering or other means
- load and unload materials as far as practical from dust sensitive areas
- regularly inspect site dust controls and their effectiveness.

Complaint handling

- a line of communication between the construction contractor and local community is to be established as part of a complaints management system
- a site activity log is to be kept to assist with the retrospective investigation of community complaints. The log shall record the type of activities occurring during day and night-time hours
- a complaint register is to be prepared and maintained throughout the duration of construction and would incorporate commitments to investigate and close out complaints within a reasonable timeframe
- findings from review of the complaints register, monitoring and site inspections are to be incorporated into regular reporting (e.g., monthly), including actions taken control or ameliorate further such incidents
- incident records, and actions taken to address air quality issues, shall be used to further modify work or environmental management practices on site.

Greenhouse Gases

- develop and implement a greenhouse gas reduction strategy for the project
- design a construction works program to source most construction materials from within or close to the Project area to reduce fuel use and energy consumption associated with transport of materials
- maintain construction plant and vehicles in good working order to maximise fuel efficiency
- use appropriately sized equipment for construction activities
- minimise waste generation from construction and using recycled materials, wherever possible, such as partial substitution of cement with fly ash, recycled aggregate excavated from the project area
- reuse of cleared timber (where possible).

Operation Phase

To meet the air quality objectives during the operational phase of the rail, the following dust mitigation and management options, some of which were adapted from the Queensland Rail Dust Management Plan (2010), may be considered:

- collaborate with other proposed large scaled mining developments within the region to manage dust emissions to achieve levels below the adopted air quality guidelines
- use tippler wagons (gondola) rather than the more traditional bottom dump coal wagons
- the top of the tippler wagons are to be covered
- ensuring flat coal wagon loading as a standard practice and policy, to reduce wind erosion from the surface and coal spillage
- excess coal on the wagon sill is to be brushed off immediately after the coal is loaded, to minimise parasitic coal that dislodges and falls off the wagon during transit
- the dustiness of coal being transported is to be determined, to allow for preventative measures to be taken to reduce dust emissions
- implement a coal moisture regulation system to achieve optimum moisture content of coal and reduce fugitive dust emissions

- alter the design of rail route during the planning phase of the project, to ensure sufficient buffer distances for sensitive receptors
- manage locomotive speed at sensitive locations to reduce dust emissions
- if dust presents a significant problem for some communities after the rail becomes operational consider the installation of dust monitors to determine appropriate mitigation measures.

4.2.10.7 Monitoring, reporting and corrective actions

- a detailed air quality monitoring plan is to be prepared prior to construction commencing. The plan is to include the installation of dust monitoring equipment at sensitive locations along the proposed rail
- estimating and reporting of annual greenhouse gas emissions to the relevant regulatory authority is to be undertaken as required, to assist with the ongoing management of energy efficiency programs
- annual energy use is to be reviewed to identify potential energy efficiency opportunities on a regular and ongoing basis
- a monthly report is to be prepared and submitted to Waratah Coal to include details of air quality monitoring results, audits, training and the occurrence of any complaints
- significant dust event are to be immediately reported to Project Supervisor and SEO and appropriate require mitigation measures are to be implemented
- incidents, complaints and any significant environmental harm is to be reported to regulatory body/ies where required
- air quality mitigation measures are to be implemented as soon as is practicable, upon receipt of valid complaint relating to nuisance dust, where air quality objectives are not being met or where there is a significant change in activity being undertaken on site
- appropriate personnel are to be provided with adequate environmental awareness training regarding air quality management and the environmental management commitments relating to dust generation
- the Construction Environment Manager is to request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring.

4.2.10.8 Commitments

In managing potential air quality impacts and implementation to various control measures in the reduction of dust emissions associated with the operation phase of the proposed rail easement, Waratah Coal will meet air quality objectives by:

- providing covers for their coal wagons
- using rotary coal wagons rather than bottom dump wagons
- using state-of-the-art locomotives that have been designed to comply with current and future emission standards
- managing locomotive speed and train performance requirements along the rail easement (operational efficiencies reduce fuel emissions)

- implementation of control measures for dust load such as coal moisture regulating systems, coal loading systems designed to minimise exposed areas and coal spillage
- managing locomotive speed along the rail easement
- installation and maintaining of dust monitoring equipment at sensitive locations along the proposed corridor
- co-operative collaboration with other proposed large-scale mining developments across the region. A requirement to manage dust emissions to levels below the adopted air quality guidelines is necessary from all parties, and
- continue ongoing consultation with the community.

The short term dust emissions associated with construction have not been quantified. These emissions are to be effectively managed through a dust management plan for construction.

In minimising the amount of Greenhouse Gases (GHG) generated by rail easement, Waratah Coal commits to:

- developing ongoing processes for minimising energy consumption and GHG emissions within the Project, by investigating the use of renewable energy sources in the operation of the proposed rail easement
- measure and report GHG emissions in compliance with the National Greenhouse and Energy Reporting System, and
- working with government on developing measures to address GHG emissions.

4.2.11 Element 11 – Noise and Vibration

4.2.11.1 Background

Noise

Noise monitoring was conducted in accordance with the Australian Standard AS1055.1-1997 Acoustics – Description and measurement of environmental noise, Part 1: General procedures, and the Queensland Noise Measurement Manual (3rd Edition, 1 March 2000). Properties for monitoring were selected to represent potentially affected residences nearest to the proposed rail alignment. Baseline noise levels were monitored for a minimum period of seven days at seven sites.

A noise model of the rail corridor and surrounding area, including the noise sensitive receptor locations, was constructed using SoundPLAN software. The graphical noise contours generated by the model represent the envelope of results for noise propagation in all directions (i.e. summary of typical worst-case noise propagation in all directions relative to the noise source). Noise contours were interpolated from predicted grid noise levels that were calculated at a height of 1.6 m above local ground level. Point source receptors were also located at a height of 1.6 m above ground level, representing mid-window height. The model ground terrain was based on elevation data sourced from the DEHP and was assigned to be 100% absorptive in the model which is consistent with predominant forested grass-land.

The source noise data used to model noise emissions during the typical operation of train movements were based on measured noise levels and library data files from relevant EIS documentation and manufacture specifications. Noise spectra were included in addition to the overall levels.

For the development of the model, each coal train was assumed to haul approximately 20,000 tonnes of coal to the coal terminal. Daily average calculations assumed 14 movements per day (seven up and seven down) initially for a 40 mtpa capacity, with 134 movements per day for the ultimate capacity of 400 mtpa. These movements would be at a time of choice for the mining operations and could be any time during the day or night.

The proximity of noise sensitive receptors to the proposed railway corridor alignment are provided in **Table 7**.

Table 7. Distance from residential receives to proposed rail alignment

Residential Receiver	Approximate Distance From Proposed Rail (km)
Monklands	2.4
Hobartville	4.2
Skye	3.6
Forrester	4.8
Riverview	6.0
Riverview	0.7
Weetalaba (Abandoned Homestead)	1.5
Abandoned House	0.7
Warrigal	3.3
Havilah	11.1
Birralee	5.3
Colinta Holdings	0.6
Collinsville	10.3
Bakara	0.1
Glenalpine	0.6
Eton Vale	3.6
Lenore	1.6
Colinta Holdings	0.8
Merinda	12.0
Thursto	4.8

The predicted noise levels at residences nearest to the proposed rail alignment are outlined in **Table 8**.

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Table 8. Predicted noise levels at residences

Residential receiver	Predicted Noise Levels at Residences (dBA)		
	Initial Capacity (40mtpa) LAeq, 24hr	Ultimate Capacity (400mtpa) LAeq, 24hr	Pass-by Max LPA
Monklands	21	31	28
Hobartville	34	43	41
Skye	23	33	29
Forrester	23	33	29
Riverview	15	25	17
Riverview	32	41	42
Weetalaba (Abandoned Homestead)	26	36	34
Abandoned House	37	47	48
Warrigal	26	36	27
Havilah	<0	<0	<10
Birralee	15	25	19
Colinta Holdings	34	44	43
Collinsville	<0	<0	<10
Bakara	47	57	66
Glenalpine	33	43	44
Eton Vale	21	31	26
Lenore Station	29	38	38
Colinta Holdings	30	40	40
Merinda	<0	<0	<10
Thursto	18	28	15

Vibration

Vibration levels associated with coal train pass-bys have been examined for residential locations located within 200 m of the proposed rail corridor. The only receptor within 200 m of the rail corridor is Bakara. Vibration levels have been predicted based on levels sampled near Queensland Rail coal freight operations in South-East Queensland.

Predicted levels at Bakara are presented in **Table 9** based on measured ground vibration levels at a position 20 m from the nearest rail line during the passby of a loaded diesel-hauled coal train.

The predicted levels comply with the vibration levels recommended to achieve human comfort. It is concluded that no adverse human comfort vibration impacts would result at Bakara during coal train pass-bys.

Table 9. Predicted vibration levels

Residential Receiver	Distance to rail line	Ground Vibration	
		Peak Particle Velocity (mm/s)	Dominant frequency
Coal train vibration samples	20 m	0.2 (wagons) 0.3 (locomotives)	5-20 Hz
Bakara	80 m	<0.1	
AS2670.2 1990 Comfort Criterion		0.18 0.1	2 Hz ≥8 Hz

4.2.11.2 Environmental Values

The EIS has determined that predicted noise emissions for the use of the rail corridor easily comply with the QR criteria but exceed the night-time noise criterion (42dBA $_{max\ LpA}$) at four residences. These residences are within 700 m of the proposed rail corridor.

The Queensland Environmental Protection (Noise) Policy 2008 (EPP (Noise)) specifically identifies the acoustic environmental values to be enhanced or protected within the state of Queensland. These values are:

- the protection of the health and biodiversity of ecosystems
- the protection of human health and wellbeing by ensuring a suitable acoustic environment for individuals to:
    - sleep
    - study or learn
    - be involved in recreation, including relaxation and conversation
    - the protection of the amenity of the community.

4.2.11.3 Potential Impacts

Noise from construction and operational activities has the potential to cause an environmental nuisance at any sensitive or commercial place.

No adverse vibration impacts would result at any residential locations during coal train pass-bys.

4.2.11.4 Operational Policy Objective

To construct the rail corridor and associated infrastructure in a manner that has minimal impact to the qualities of the acoustic environment that are conducive to the following:

- the health and biodiversity of ecosystems
- human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to sleep, study or learn, be involved in recreation, relax and converse

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- the amenity of the community
- the structural and cosmetic integrity of Indigenous and non-Indigenous cultural heritage sites and dwellings is protected.

4.2.11.5 Performance Criteria

- construction noise must achieve the criteria contained in **Table 10** at the stated times

Table 10. Construction noise level criteria

Noise Level dB(A) measured as	Monday to Saturday			Sundays and Public Holidays		
	7 am – 6 pm	6 pm – 10 pm	10 pm – 7 am	7 am – 6 pm	6 pm – 10 pm	10 pm – 7 am
	Noise measured at a Noise sensitive place			Noise measured at a Noise sensitive place		
$L_{Aeq, 1hr}$	Bg + 10	Bg + 5	Bg + 3	Bg+ 5	Bg + 3	Bg+ 0
$L_{A1, adj, 10 mins}$	Bg + 15	Bg + 10	Bg + 6	Bg + 10	Bg + 6	Bg + 0
	Noise measured at a Commercial place			Noise measured at a Commercial place		
$L_{Aeq, 1hr}$	Bg + 15	Bg + 10	Bg + 6	Bg + 10	Bg + 6	Bg + 0

- ground vibration from blasting must not exceed:
  - peak particle velocity of 5 mm per second for nine out of any ten consecutive blasts initiated, regardless of the interval between blasts
  - peak particle velocity of 10 mm per second for any blast
- air blast overpressure levels from blasting must not exceed:
  - 115 dB(linear) peak for nine out of any ten consecutive blasts, regardless of the interval between blasts
  - 120 dB (linear) peak for any blast at the project area.

Temporary accommodation facilities will be designed to achieve the noise levels objectives shown at **Table 11** to protect workers' health and well-being:

Table 11. Indoor noise objectives

Time	Noise objectives for indoors, measures at the receptor in dB(A)		
	$L_{Aeq, adj,1hr}$	$L_{A10,adj,1hr}$	$L_{A1,adj,1hr}$
Day and evening	35	40	45
Night	35	40	45

Blasting

Airblast overpressure level (when measured at, or extrapolated to, any noise sensitive or commercial place), will not exceed 115 dB (linear peak) for nine out of any ten consecutive blasts and 120 dB (linear peak) at any time. Ground-borne vibration peak particle velocity caused by blasting operations, when measured at, or extrapolated to, any noise sensitive or commercial place, must not exceed more than 5 mm per second for nine out of any ten consecutive blasts initiated, nor 10 mm per second at any time.

4.2.11.6 Implementation Strategy

Construction Phase

- Noise and Vibration Management Plans (NVMP) are to be developed by the Construction Contractor(s) prior to the commencement of construction activities and include at least the following requirements:
    - the noise control plan should be in general accordance with AS 2436 regarding selection of equipment and processes to be used on site, maintenance of equipment, use of temporary screens and enclosures etc., as appropriate
    - specify target noise limits, management measures to demonstrate how these limits will be met and how impacts to sensitive receivers will be managed to acceptable levels
    - an effective community consultation program with occupants of the nearest noise sensitive locations shall be implemented and maintained throughout the construction period
    - a Complaints Register shall be established and maintained throughout the construction period. Upon receipt of a complaint, a process to investigate the complaint and undertake suitable remedial action or monitoring shall be initiated with the complaints and results recorded
- as far as practicable, general construction activities are to be conducted in accordance with the EPP (Noise) and Environmental Protection Regulation 1998
- general construction activities are to occur between 6:00am and 6:00pm 7 days a week. On occasion general construction activities may be required outside these hours and may include but are not limited to: oversized delivery of plant or equipment, concrete pours, pneumatic testing and material delivery
- noise management measures are to be developed and implemented for all out-of-hours construction activities (6.00pm- 6.00am). These are to include consultation with potentially affected residents and prior notification of unavoidable construction activities.

Noise Management

- construction works are to be conducted in accordance with Australian Standard 2436 - 1981, Guide to noise control on construction, maintenance and demolition sites (Standards Australia, 1981)
- prior to the commencement of site works, the community are to be informed of the upcoming activities and likely duration
- the construction programme is to be developed in consultation with the local community to schedule noisier activities (such as blasting) during least sensitive times of the day
- rock breaking, rock hammering, blasting and any other activities which result in impulsive or tonal noise generation are only to be conducted during normal operational hours
- appropriate selection of construction processes / methodologies and equipment is to be employed to minimise the generation of noise
- employ respite periods for particularly noisy activities where possible
- a site activity log is to be maintained, which records the type of activities occurring during various times of the day to assist with any retrospective investigation of community complaints relating to noise (or dust) complaints.

Maximise shielding and distance to receivers

- maximise the offset distance between noisy plant and continuous operations (generators, compressors, crushers etc.) and nearby noise sensitive receivers or ensure plant are screened utilising:
    - purpose built barriers
    - materials stockpiles
    - site sheds, buildings or other structures
    - natural topographical barriers
- where possible, loading and unloading of materials and equipment is to be conducted in areas as far away from noise sensitive areas as possible.

Plant and equipment worker education and awareness

- regularly educate workers and contractors (such as during tool box / pre-start meetings) to maximise awareness of project noise goals and nuisance noise generating activities and encourage minimisation of these activities, including:
    - unnecessary or overuse of horns
    - use of compression air brakes adjacent to sensitive areas
    - efficient material handling procedures to reduce unnecessary loud banging sounds.

Plant and equipment

- equipment with directional noise characteristics (emits noise strongly in a particular direction) are to be oriented so that noise is directed away from sensitive areas
- noisy plant working at the same time and close together is to be avoided when adjacent to sensitive receivers
- acoustic enclosures or localised noise screens are to be incorporated around fixed plant or over individual pieces of equipment as appropriate based on acoustic assessment for:
    - crusher and screening plant
    - concrete batch plant
    - maintenance area / shed
- all mechanical plant is to be silenced by best practical means using current control technology and in accordance with manufacturers specifications
- where practicable, plant with the lowest noise rating which meets the requirement of the task is to be selected
- where possible for works in close proximity to sensitive receivers, use electric motors in preference to diesel motors
- where enclosures are fitted to equipment, ensure doors and seals are in good working order and that doors can be closed properly against the seals
- if piling is required, bored piles which are cast in-situ or screened drop hammers are to be used rather than untreated drop-hammer driven piles
- ensure that internal combustion engines (all mobile and stationary equipment) are fitted with a suitable muffler in good repair

- where appropriate, metal surfaces subject to impacts from heavy objects (such as rock dropping into empty truck trays, or metal grates on road ramps etc.) should be lined with rubber impact protection to minimise impact noise
- ensure that tailgates on trucks are securely fitted to avoid unnecessary "clanging" noise, particularly during movement of empty trucks
- where using pneumatic equipment, select silenced compressors or use quieter hydraulic equipment
- conduct regular inspections and effective maintenance of both stationary and mobile plant and equipment (including mufflers, enclosures)
- equipment not being utilised as part of the work would not be left standing with engines running for extended periods.

Traffic noise management

- truck deliveries to laydown areas and construction sites will be restricted to between 6:30pm and 6:30am. Suitable routes and times of travel will be identified prior to rail and plant construction to reduce disturbances to residents and traffic conditions
- a Traffic Management Plan is to be developed and include management of noise associated with traffic during the construction phase of the Project. This may include speed restrictions, and management of night-time traffic along roads adjacent to residential or other sensitive land uses
- include measures to reduce the construction traffic impacts such as:
    - establish designated access route/s to the site and inform drivers of these routes, parking lots and acceptable delivery times
    - undertake regular site road maintenance (and inspections) to minimise noise impacts from trucks travelling over irregularities in the road surface (such as pot-holes, washouts or ruts)
    - limit vehicle speeds in critical areas both on and off site
    - allow for one-way traffic flow through the site to minimise the use of reversing alarms as much as possible and minimise traffic delays
    - use 'smart', reversing alarms
    - limit excessive acceleration from site exits
    - ensure that vehicles required within compounds do not "queue" outside the worksite close to residential areas
    - restrict entry and departure of heavy vehicles to and from the site to the standard daytime construction times where practicable
    - maintaining the vehicle fleet in compliance with Australian Design Rule 28/01 for engine noise emissions, tested in accordance with the National Road Transport Commission document Stationary Exhaust Noise Test Procedures for In-Service Motor Vehicles.

Blasting overpressure and vibration

- blasting is to be designed to meet EP Act criteria and managed by a blasting contractor, who is responsible for controlling blast overpressure and vibration in accordance with the project limits, through a detailed management plan. The plan must address Australian Standard 2187–2006

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Explosives—Storage and Use Part 2: Use of explosives, and would include the following types of measures to minimise impacts:

- reduce the maximum instantaneous charge of each blast
- change drilling patterns, burden, blast hole diameter, deck loading, location, spacing and orientation of blast holes or using a combination of appropriate delays
- where possible orientate faces so that they do not face directly towards residences and keeping face heights to a minimum
- consider weather forecasts in the ongoing management of blast impacts (allowing for the effects of adverse wind on the propagation of air blast to surrounding areas).

Operation Phase

To achieve the night-time criterion for 24 hour use of the rail corridor for the residences located at Colinta Holdings (south), Bakara and Glenalpine Waratah Coal will:

- upgrade the residential buildings to ensure that the internal sleep disturbance criterion is achieved. This may include upgrade of the bedroom facades (particularly the windows) along with the installation of some form of mechanical ventilation to ensure that the ventilation requirements of the Building Code of Australia (BCA) could be achieved with external windows and doors closed; or
- relocate the residence or some other form of change of use for the residences so they would no longer be noise-sensitive locations; or
- attenuate rail noise through the use of noise barriers adjacent to the rail line. Heights and their locations would be determined during the detailed design of the rail line.

Although no adverse vibration impacts would result at the sensitive receptors during coal train pass-bys a vibration management plan for the operation of the railway project will be developed.

4.2.11.7 Monitoring, reporting and corrective actions

- ongoing monitoring and review of the site noise management practices is to be undertaken:
  - at the commencement of construction activities
  - in response to a valid community complaint regarding construction noise
  - where review of upcoming construction schedule indicates a high likelihood for impact at nearest sensitive receiver locations
- the purpose of monitoring is as a proactive management tool to assist with:
  - investigating the likely sources of construction noise impact
  - quantifying the extent of likely impact (through comparison with the project noise level goals)
  - identifying the need for further controls or modified site noise management practices
  - establishing the effectiveness of noise mitigation implemented
- ad hoc noise monitoring would also be undertaken in response to noise complaints or where new activities are initiated, as required. Were noise monitoring is required in response to valid community complaints investigations it would be performed at a location representative of the nearest affected sensitive receiver to the site or a location representative of the complainant(s) dwelling

- the L_{Amax}, L_{A10}, L_{A1}, L_{A90}, L_{Aeq} noise levels would be reported and construction noise levels are to be compared with the project noise level goals.

Blast Overpressure Monitoring

Blast overpressure and vibration monitoring is to be continuously undertaken to ensure blasting levels remain within the approval criteria.

- noise level measurements and investigations undertaken in response to community complaints would be summarised and included with other environmental reporting documentation (as required) and provided to the EPA on request. Reporting would note:
    - the time of monitoring
    - the type and location of activities occurring on site at the time of monitoring
    - the location of monitoring positions with respect to site noise sources (also marked on a plan)
    - noise generating activities audible at the monitoring location
    - other extraneous noise sources which could influence the noise level measurement
    - weather conditions prior to and during the monitoring (or complaint)
- where site activities are identified as the probable cause of concern or complaint, action is to be taken to minimise future events by revising noise management procedures (involving modification to work practices or further controls at source or at receiver) for the activities identified as contributing to the nuisance or high noise event
- management measures outlined above are to be revised and the commitments implemented to reduce potential for future impacts as a result of similar activities
- if complaints are received in relation to a short-term unavoidable event/s or emergency the community engagement and awareness of the possibility of such future activities would be improved
- where construction noise level investigations in response to community complaints show unacceptable project noise levels, revision to the noise mitigation measures and management commitments are to be undertaken to further control noise impacts
- the project noise level goals would be used to assist with determining the need for further corrective actions
- where further source noise controls or mitigation in the sound transmission path are not possible or ineffective in further controlling noise levels, controls at the receiver would be investigated. Detailed investigation of façade attenuation would be required as part of these investigations.

4.2.11.8 Commitments

To manage potential impacts of noise and vibration, Waratah Coal will implement the following commitments.

With respect to the noise of train passbys during operations along the rail corridor, the following mitigation measures will be considered for implementation at Colinta Holdings (), Bakara, Hobartville, Riverview, Lenore Station, Salisbury Plains and Glenapline stations:

- Develop and implement a NVMP for the construction and operation of the rail
- upgrading of the residential buildings to ensure that the internal sleep disturbance criterion is achieved. This may include upgrade of the bedroom facades (particularly the windows) along with

the installation of some form of mechanical ventilation to ensure that the ventilation requirements of the BCA could be achieved with external windows and doors closed (not applicable for Hobartville, Riverview, Lenore Station, Salisbury Plains and one of Colinta Holdings)

- relocation of the residence or some other form of change of use for the residences so they would no longer be noise-sensitive locations
- attenuation of the rail noise through the use of noise barriers adjacent to the rail. Heights and their locations would be determined during the detailed design of the rail.

4.2.12 Element 12 – Waste

4.2.12.1 Background

The Galilee Basin Railway Strategic Planning Study identified the most feasible corridor between the mine and the coal terminal while satisfying a broad range of requirements. The preferred corridor comprises an estimated track alignment length of approximately 453 km. The following information and estimated waste generation calculations are based on the quantities likely for the preferred corridor.

4.2.12.1.1 Construction

During the construction of the rail alignment, the major infrastructure components will include:

- site preparation works (including accommodation camps and laydown areas / depots)
- construction of the rail alignment itself
- construction of the rail maintenance facility
- construction of maintenance roads will be located within the railway easement along the length of the railway.

It is anticipated that the largest volume of waste will be associated with the construction of the railway track, rather than the ancillary activities associated with the construction or the long term operation of the rail alignment. Therefore it is estimated that the key points of waste generation during construction of the railway include the following.

General Alignment: Vegetation clearing and surplus earthwork / spoil material are likely to form the major portion of waste generated. The clearing footprint is approximately 22.2 Mm^2. The volume of expected vegetative waste has not been estimated as detailed vegetation assessments to determine vegetative cover are currently being undertaken. The preferred corridor traverses through diverse terrains ranging from relatively sparse rural land to the undulating slopes of the Leichardt and Clarke Ranges.

The railway alignment will be constructed at or near the natural surface where possible, and has been designed to minimise and balance the quantities of earthwork material. Waste will be minimised by reuse of material where possible throughout the rail alignment. Construction selected fill material for the rail embankments (approximately 3,420,000 m^3) will be sourced from material recovered from excavation of the railway cuttings (approximately 17,240,000 m^3).

Based on the preliminary assessment of the corridor alignment, excess earthwork material (referred to as dump material) will be approximately 340,000m^3. Some of this material comprises topsoil that will be stripped along the entire railway. This material will be stockpiled and spread on the outer edge of the railway and used for rehabilitation works.

The remainder of the dump material is comprised of both unusable cut beyond the layer of topsoil (such as cuttings through black soils), together with surplus usable cut (beyond the general fill requirements). It is

expected that this material will be either stockpiled in spoil heaps along the railway, used to backfill borrow pits and quarries, or as a last resort, hauled to a suitable dump site (either a landfill or new dump pit by agreement with landowners or local council).

Ballast material (approximately 1,000,000 m^3 bulk cubic metres) will be sourced from existing and new quarry sites. Significant quantities of surplus ballast material are therefore not expected due to design specifications.

Remote and temporary camps: It is estimated that there will be up to four remote construction camps, located approximately 100 km apart. These will be temporary structures for construction teams working in remote areas along the extent of the rail alignment during track laying. The camps will generate putrescibles and sewage waste with putrescibles waste expected to form the major waste stream.

A construction workforce of 1000 people split over several camps is considered necessary for the railway development. It is likely that mobile toilet and shower systems, and hence sewage and grey water will be managed via the use of a pump out system directed to a primary septic tank and collection well, prior to removal by the designated contractor. Sewage waste will then be treated via connection with municipal sewage waste infrastructure. Office waste including paper, toner and ink usage are expected to be minimal due to the primary operations orientated around general day to day living activities. It is understood that minor servicing will be undertaken and hazardous waste (waste oil, lubricants, hydraulic fluid, etc.) will be generated. Spill kits will be located within the designated plant service area with the personnel trained in emergency response management to ensure a prompt response to such incidents.

Concrete Batch Plant: A concrete batch plant will be located near Collinsville and will service the rail corridor for the manufacture culverts and bridge structures (at this stage it is envisaged that the concrete rail sleeper will be procured from offshore). Waste generation is likely to include turbid and highly alkaline wastewater as well as dust emissions associated with the concrete batching plant. The plant will be designed such that clean stormwater will be diverted away from contaminated areas and directed to the stormwater discharge system. The wastewater collection system will be designed to collect process wastewater from:

- agitator washout
- plant and yard wash down
- concrete batching area
- slump stand
- contaminated stormwater
- any additional wastewater from the batching plant operation.

The process wastewater will be directed to a settling pond (or series of ponds) so the water can be reused in the concrete batching process to minimise the volume of wastewater to be discharged under a trade waste license. The dry sediment will be removed from the ponds and depending on the levels of contaminants, will either be land farmed and re-used throughout the Project where practicable, or disposed of at a licensed waste facility.

Mechanical Workshop: It is understood that all plant and equipment will be serviced off site for major servicing requirements. There will be capability onsite for minor servicing in the event of plant breakdown or tyre blowouts. The potential for the generation of small quantities of regulated waste including tyres, hydraulic fluids, coolants and oils is likely. The onsite vehicle maintenance contractors will be responsible for all waste generated. The vehicle maintenance contractor will be required to store any dangerous goods or hazardous substances in accordance with Australian Standard 1940: Storage and Handling of Flammable and Combustible Liquids (AS1940) with appropriate spill kits readily available and located near the designated storage area. All waste will be transported by a licensed contractor to an approved waste disposal facility.

Bridge, Culvert and Retaining Walls: Currently 12 bridges, 359 culverts totalling approximately 14 km in length and three retaining walls with a total face area of 892 m^2 are proposed for the preferred corridor. It is anticipated that the majority of waste generated will be construction material comprising predominantly excess concrete / cement and surplus steel and reinforcement off cuts. In order to minimise the extent of general building waste generated during the construction phase of the Project, where feasible and practicable, Waratah will prefabricate materials off-site with transportation and drop-off at designated points along the rail alignment. By procuring construction materials to the specifications and quantities necessary, general building waste from the Project will be considerably reduced.

Construction Emission Sources: Air emissions during the construction phase of the rail easement will be primarily dust related. Emissions of combustion-related pollutants, such as nitrogen oxides and volatile organic compounds from diesel construction equipment and vehicles are expected to be minor. Dust emission sources include clearing of vegetation and topsoil, excavation works, blasting, transportation movements, and temporary activities associated with quarries along the proposed alignment

4.2.12.1.2 Operation

During the operation of the rail, the waste streams generated are anticipated to be significantly reduced in comparison to the construction phase of the Project. There will be a reduced workforce and demand for raw construction materials. Points of waste generation during the operation of the rail alignment are likely to be associated with:

Track maintenance: It is anticipated that waste generated during track maintenance will comprise predominantly vegetative waste associated with clearing of overgrown weeds and shrubs, concrete from broken sleepers, surplus ballast, and steel from damaged or broken track or fittings. It is anticipated that organic herbicides will be used along the extent of the rail alignment to manage weeds, and therefore some waste in the form of empty containers will be generated. All containers will be triple rinsed for recycling.

Operation of the maintenance facility for rail operations: This facility is expected to generate several waste streams due to its multiple purposes in servicing plant and equipment as well as providing facilities for track and signalling workers. The major portions of the waste are likely to comprise hazardous solids and liquids including waste oil, lubricants, coolant, oily rags and putrescibles waste including general domestic waste and sewage and grey water from ablutions. Hazardous substances will be stored within the facility, and in the event of spills, spill cleanup material will also be required to be managed.

Maintenance of Access Roads: During maintenance of access roads within the easement of the rail corridor, generated waste will predominantly consist of spoil and excess fill material from road surface re-profiling / regrading.

Operational Emission Sources: Potential emissions during rail operations (coal transportation) will primarily come from locomotive exhausts. This in part settles on rail easements. Where combustion related pollutants, such as nitrogen oxides and VOCs from diesel construction equipment and vehicles will minimally contribute as a primary emission source. Odour may rise from fuel burning of vehicles or equipment or explosive usage, but it is not expected to reach significant levels in the ambient air.

4.2.12.1.3 Decommissioning

Given that the rail will be a significant piece of infrastructure that has the potential to benefit communities and a variety of private organisations, it is not expected that the rail would be decommissioned. This will particularly be the case if the rail becomes the only link to expand coal extraction operations within the Galilee Basin. Should the rail be decommissioned, it is expected that the rail embankment and bridge structure will

remain *in-situ.* The track and concrete sleepers would be removed as would culverts and or other structures in flood prone areas.

4.2.12.1.4 Rail waste inventory

A review of the activities expected throughout the construction, operation and decommissioning phases of the rail alignment established that the majority of the waste streams are likely to occur throughout all phases. **Table 12** presents the waste characteristics and potential disposal options for the waste streams associated with the rail alignment.

Table 12. Rail waste inventory

Project Activity	Waste Generated	Waste Character-isation	Phase Waste Expected			Temporary Site Storage	Final Disposal Option	Management Methods
			Construction	Operation	Decommiss-ioning			
General Earthworks								
Vegetation Clearing	Plant matter	Biodegradable Solid	Yes	Yes	Yes	Stockpile	Reuse	Millable timber to be harvested for sale. Mulching of waste vegetation / timber by reuse on site during rehabilitation. Burning of green waste is strictly prohibited and is not an acceptable waste management option. Exposed areas following clearing will be minimised and erosion control measures implemented. Preferred re-use as a substitute energy source.
	Weeds	Biodegradable Solid – some seeds may regenerate.	Yes	Yes	Yes	Stockpile	Refer to EMP and Weed Management Sub Plan.	
	Mulch	Biodegradable Solid	Yes	Yes	Yes	Stockpile	Reuse	
	Timber	Solid Inert	Yes	-	-	Stockpile	Recycle	
Topsoil Placement / Removal	Topsoil	Solid inert	Yes	Yes	-	Stockpile	Reuse	Topsoil to be stripped and stockpiled for subsequent rehabilitation works. Topsoil to be returned to areas from which it was stripped during rehabilitation works where practicable to maximise return of plant propagules and prevent sediment laden runoff.

Project Activity	Waste Generated	Waste Character-isation	Phase Waste Expected			Temporary Site Storage	Final Disposal Option	Management Methods
			Construction	Operation	Decommiss-ioning			
Excavation of unsuitable in-situ material	Spoil	Solid inert*	Yes	Yes	-	Stockpile	Reuse	Excess spoil will be used where practicable in rehabilitation works or stored in temporary bunded stockpiles.
		Potential contamination	Yes	Yes	Yes	Separate stockpile from non-contaminated material	Disposal with potential treatment and re-use.	Spoil identified as contaminated / regulated waste will be transported off site by licensed regulated waste transporter and disposed to a licensed waste receiver. Where there is a shortage of material, or where it is practical to remediate the area, in-situ treatment options will be adopted for the project.
Placement or Removal of sub-grade / fill	Excess Fill	Inert solid	Yes	Yes	Yes	Stockpile	Reuse	Excess fill will be used where possible in ancillary activities i.e. construction of haul and access roads. Residual fill will be stockpiled and used during rehabilitation works.
Concrete batching								
Concrete Manufacture	Process Wastewater	Alkaline liquid	Yes	Yes	-	Sedimentation pond	Treat and reuse	Waste will be minimised by procuring only the amount required for the activity. Containment of solid and liquid wastes (bowl washout water) will be disposed at the concrete batch plant. Collection of excess concrete for re-use as fill material.
	Surplus Cement	Solid Inert	Yes	Yes	-	Stockpile	Reuse	
	Surplus Concrete	Solid Inert	Yes	Yes	-	Stockpile	Reuse	

Project Activity	Waste Generated	Waste Character-isation	Phase Waste Expected			Temporary Site Storage	Final Disposal Option	Management Methods
			Construction	Operation	Decommiss-ioning			
Bridge, culvert and stock crossing								
Drainage and Structural Works	Spoil	Solid Inert / Potential Contamination	Yes	-	Yes	Stockpile	Disposal	As per previous management method outlined above.
	Concrete	Solid Inert	Yes	-	Yes	Stockpile	Reuse	Collection of excess concrete for re-use as fill material / erosion protection of for hard stand areas.
	Steel	Solid Inert (Ferrous Metal)	Yes	-	Yes	Scrap metal skip	Recycle	Minimise waste by procuring only the necessary quantities. Segregation via provision of scrap metal skips with transportation off-site by a licensed waste contractor.
General track works								
Laying / Removal of cable	Surplus Cable	Solid inert (Non Ferrous Metal)	Yes	Yes	Yes	Scrap metal skip	Recycle	Minimisation of waste by procuring only necessary quantities. Segregation and collection on site with transportation off site by licensed waste contractor for recycling.
	Surplus Conduit	Solid Inert	Yes	Yes	Yes	Stockpile	Recycle	
Laying / Removal of ballast	Surplus Ballast	Solid inert	Yes	Yes	Yes	Stockpile	Reuse	Minimisation of waste by procuring only necessary quantities. During decommissioning, an assessment for market demand will be undertaken or recycle / disposal to nearby

Project Activity	Waste Generated	Waste Character-isation	Phase Waste Expected			Temporary Site Storage	Final Disposal Option	Management Methods
			Construction	Operation	Decommiss-ioning			
								facility.
Laying / Removal of sleepers	Broken or surplus sleepers	Solid inert	Yes	Yes	Yes	Stockpile	Reuse / Recycling Facility	Minimisation of waste by procuring only the amount necessary. Broken concrete sleepers during operational phase will be stockpiled until sufficient quantity to transport off site to licensed disposal facility or will be broken down and used for erosion control works or as base for hard stand area.
Laying / Removal of track	Surplus steel	Solid inert (Ferrous Metal)	Yes	Yes	Yes	Scrap metal Skip	Sale	Minimise waste by procuring only the amount necessary. Segregation via provision of scrap metal skips with transportation off-site by waste contractor.
	Surplus fittings	Solid inert (Ferrous Metal)	Yes	Yes	Yes	Scrap metal Skip	Recycle	
Plant operation								
Fuel Combustion	Water Vapour and Particulate Matter including CO_2 Emissions	Inert Gas	Yes	Yes	Yes	Not Applicable	Disperse to Atmosphere	Where practicable, low emission plant and equipment will be selected for use throughout the Project.
Plant maintenance								

Project Activity	Waste Generated	Waste Character-isation	Phase Waste Expected			Temporary Site Storage	Final Disposal Option	Management Methods
			Construction	Operation	Decommiss-ioning			
Routine Maintenance (oil change. Water check etc.)	Waste oil, lubricants, fuels.	Hazardous liquid	Yes	Yes	Yes	Designated storage in bunded tanks / drums.	Disposal	Waste oil should be stored in drums to be drained on site. The drums will be transported off site by waste contractor for offsite reuse, recycling or disposal. Oil and other hazardous material will be collected and transported offsite by a licensed regulated waste transporter to a licensed regulated waste receiver or recycler.
	Used filters and oily rags.	Hazardous material	Yes	Yes	Yes	Designated storage in receptacle.	Disposal	
High Level Plant Maintenance	Waste oil, fuel, lubricants, hydraulic fluid.	Hazardous liquid	Yes	Yes	Yes	Designated storage	Disposal	As per management methods described above.
	Broken Parts	Solid Inert (likely to be Ferrous Metal)	Yes	Yes	Yes	Scrap metal skip or general waste skip	Recycle / Recondition or dispose.	Assessment to be undertaken for potential market for recycling / resale. Segregation and collection on site. Transport off site by waste contractor for recycling.
	Tyres	Solid Inert (Limited Regulated Waste)	Yes	Yes	Yes	Stockpile	Recycle	Due to fire risk, tyres to be stockpiled away from flammable material. Transportation off site by licensed regulated waste transporter to license regulated waste receiver.
	Batteries	Hazardous material	Yes	Yes	Yes	Stockpile	Recycle	Stockpile in a covered and bunded area. Transport off site by licensed regulated waste transporter to a licensed regulated waste

Project Activity	Waste Generated	Waste Character-isation	Phase Waste Expected			Temporary Site Storage	Final Disposal Option	Management Methods
			Construction	Operation	Decommiss-ioning			
								receiver.
Wash down	Waste wash down water containing: Sediment and Detergent	Contaminated Liquid	Yes	Yes	Yes	Sedimentation pond	Treat for reuse, or disposal	Wash down to be conducted over hard stand and drainage to sump sediment ponds. Sedimentation pond to be cleaned regularly.
Receival of parts / supplies	Packaging Material: Timber Pallets and Plastic / Paper / Cardboard	Solid inert	Yes	Yes	Yes	Stockpile pallets. Paper, plastic cardboard to be stored in designated recycling receptacle.	Recycle / Reuse	Quantities of timber pallets may be reduced by procuring only the necessary quantities required. Pallets in good condition will be returned. Damaged pallets may be processed via wood chipper for use on vegetated / rehabilitation areas. Paper, plastic and cardboard to be segregated and transported off site by waste contractor.
Chemical and Fuel Storage	Empty Containers	Hazardous Liquid	Yes	Yes	Yes	Stockpile	Disposal	Stockpile in a covered and bunded area. Transport off site by licensed regulated waste transporter to a licensed regulated waste receiver or supplier.
	Surplus Material	Hazardous Liquid	Yes	Yes	Yes	Liquid to be stored in designated drums in bunded area.	Recycle or Disposal at appropriate facility by licensed	Refer to management methods described above.

Project Activity	Waste Generated	Waste Character-isation	Phase Waste Expected			Temporary Site Storage	Final Disposal Option	Management Methods
			Construction	Operation	Decommiss-ioning			
							transporter.	
	Spill Cleanup Material	Hazardous Material (solid)	Yes	Yes	Yes	Designated bins.	Disposal at appropriate facility by licensed transporter.	Selected staff to be trained in spill response and clean up procedures. Spill cleanup kits to be located at appropriate locations and easily accessible in the event of a spill event.
Staff accommodation and site offices – remote and temporary camps								
Dining Facilities	Grey water	Contaminated liquid	Yes	Yes	Yes	Sedimentation pond or onsite septic	Reuse on site or disposal	Removal by licensed contractor to approved facility.
	General waste including putrescibles and organic.	Biodegradable	Yes	Yes	Yes	General waste skips or dedicated compost receptacle.	Dispose or Application of Compost.	General waste to be transported off site to nearby landfill. Food scraps to be used as compost / fertiliser for application on vegetated / rehabilitation areas.
	Packaging material	Solid inert	Yes	Yes	Yes	Dedicated recycle bin	Recycle	Refer to management methods described above.
Printing	Waste paper	Solid inert	Yes	Yes	Yes	Dedicated recycle bin	Recycle	Printing management methods will be implemented including double side printing,

Project Activity	Waste Generated	Waste Character-isation	Phase Waste Expected			Temporary Site Storage	Final Disposal Option	Management Methods
			Construction	Operation	Decommiss-ioning			
	Printing Cartridges	Solid inert	Yes	Yes	Yes	Dedicated Recycle Bin	Recycle	recycling of printed paper for reuse where possible and avoid printing where it is not essential. Collection and segregation on site. Transportation off site by waste contractor for recycling.
Ablutions	Sewage	Biodegradable Liquid Biological Hazard	Yes	Yes	Yes	On Site Septic	Collection and disposal by contractor	Removal by licensed contractor to approved facility.
	Grey water	Contaminated liquid	Yes	Yes	Yes	Sedimentation pond or septic.	Reuse on site or disposal.	Where disposal is the preferred option, removal to be undertaken by licensed contractor to approved facility.

4.2.12.2 Environmental Values

Waste may be generated from numerous sources that have the potential to impact on the environment (e.g. land, water and ecological matters). In turn, environmental aspects may influence the impact of the waste itself due to the natural conditions and environmental setting. For example, where a portion of the site is located within close proximity to a river, in the event of a spill, there is the increased potential for transportation of the contaminant to other sensitive areas. Likely sources of waste include:

- vegetation matter
- typical construction wastes including packaging, concrete, gravel, timber, metals and plastics
- surplus spoil from earthworks
- domestic wastes.

4.2.12.3 Potential Impacts

Wastes will be stored or transported for offsite disposal. It is recognised that improper storage or disposal of waste may impact the environmental values recognised in the Environmental Protection (Waste Management) Policy 2000, namely:

- the life, health and well-being of people
- the diversity of ecological processes and associated ecosystems
- the land use capability.

4.2.12.4 Operational Policy Objective

- minimise the generation of wastes, where practicable and appropriately contain, control and dispose of all waste generated.

4.2.12.5 Performance Criteria

- minimal waste generated during construction and operation phases
- no inappropriate disposal or management of waste
- no contamination of soil, air or water results from waste disposal activities
- compliance with Waratah Coal waste management requirements and systems.

4.2.12.6 Implementation Strategy

The following control strategies are proposed

- a waste management is to be developed and include:
    - opportunities and actions to implement the waste management hierarchy
    - implement appropriate methods for disposal of waste in accordance with reasonable requirements of local governments and DEHP
    - waste management procedures
    - training and management
    - a monitoring and reporting program

- appropriate planning is to be employed when ordering materials, including provisions to return excess materials and used chemicals containers to the supplier
- preference is to be given to materials that will result in no or low, levels of waste (including from the materials and the packaging)
- waste streams are to be separated into various components where these are produced
- recyclable wastes will be collected and re-used or recycled.

The major sources of waste generated from the rail construction activities and their treatment are described in **Table 13**.

Table 13. Waste stream management

Waste stream	Waste source	• Management strategy
green waste	vegetation clearing	• suitable material to be used on site to provide fauna habitat • remaining material to be chipped and mulched, and reused during progressive rehabilitation and revegetation • burning of green wastes will only occur as a last resort subject to obtaining permits and approvals.
building waste	initial construction of rail associated infrastructure and ongoing construction works	• stored onsite in areas designated from time to time in plans of operations and regularly removed for disposal at the china first waste management facility.
Sewage	contractor offices, crib room, accommodation facilities	• sewage and grey water will be either be collected for treatment and disposal off-site or treated on site and disposed of to effluent absorption beds or irrigation fields • the liquid waste treatment method will be selected in consultation with a relevant local authority and DEHP and the relevant environmental authority obtained • sewage treatment systems will be commissioned at temporary workers accommodation in accordance with relevant state and Regional Council regulations • regularly maintained port-a-loos will be used at remote worksite as required.
general waste	construction, rail site administration and management facilities	• collected in bins, stored in designated waste transfer areas and periodically removed from disposal to the china first waste management facility.
petrols, oils, lubricants, other	routine servicing and shutdown overhaul of vehicles and	• hazardous wastes will be managed in accordance with the requirements of

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Waste stream	Waste source	• Management strategy
chemical wastes, industrial waste	equipment in workshops and maintenance facilities, refueling and fuel storage facilities.	relevant legislation and industry standards • stored in bunded areas then removed by licensed contractor for reuse, reprocessing, recycling or disposal • a hazardous materials inventory will be prepared; • if a hazardous waste is released to waters or land immediate action must be taken to prevent further releases, to contain the hazardous waste from spreading to sensitive areas. Rehabilitation of contaminated areas must be undertaken to restore the environment to the condition prior to release • hydrocarbon wastes will be collected for safe transport off site for reuse, recycling, treatment or disposal at approved locations.

Disposal

- dispose of all waste material that is unable to be reused or recycled onsite, within an approved land fill
- all wastes leaving the site are to be tracked in accordance with the requirements of the Environmental Protection (Waste Management) Regulation 2000 Schedule 2
- vegetative waste is not to be burnt on site without a 'Permit to Burn' issued by the Rural Fire Brigade and compliance with any other relevant statutory requirement.

Waste Transport

- the movement of hazardous materials and regulated wastes is to occur at non-peak times to minimise the possibility of traffic conflicts and associated risks
- transport of wastes is to be carried out by a licensed carrier, and in accordance with the DEHP tracking system as defined in Environment Protection (Waste Management) Regulation 2000.

4.2.12.7 Monitoring, reporting and corrective actions

- regularly inspect on-site facilities to ensure waste is being generated, stored, handled, disposed and transported in accordance with this EMP
- registers and manifests are to be maintained to track waste material. This documentation is to be subject to internal or external audits, especially for any regulated waste material
- any discharges from site that could impact on the environment are to be monitored in accordance with DEHPs requirements
- records are to be kept of any regulated waste removed from the site. This includes the name and licence number of waste transporters, volume and description of waste transported, destination of waste and licence number of the waste treatment operator

- waste contractors are to provide certification (licence) records verifying their registrations and points of discharge of waste
- assess actual waste results and compare to predicted impacts and mitigation measures. Provide baseline data to enable continuous improvement of waste avoidance, reduction and management measures throughout the project
- a monthly report is to be prepared and submitted to Waratah Coal and include details of monitoring results, audits, training and incidents
- any environmental incidents involving spills recorded including time of incident, persons involved, details of incident, mitigation measures and actions taken to minimise the probability of recurrence. Report spills immediately to Project Supervisor and SEO
- incidents, complaints and any significant environmental harm are to be reported to regulatory body/ies where required
- appropriate personnel are to undertake adequate environmental awareness training covering the requirements of the EMP regarding waste management
- the Construction Environment Manager is to request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring.

4.2.12.8 Commitments

To manage potential impacts associated with the creation and management of waste, Waratah Coal will implement the following commitments:

- undertaking actions that will reduce potential impacts through a proactive rather than reactive approach to waste generation and minimization
- preparing a project specific WMP to be incorporated into the rail EMP. The EMP will be prepared in accordance with legislative requirements and any conditions imposed by the Coordinator-General
- where practicable and possible, have materials prefabricated to reduce waste streams from the construction of the Project
- carrying out waste management in a manner that will have the most benefit to the local community. This includes:
    - throughout the life of the rail Waratah will work with the regional councils and other relevant groups to determine existing capacities and accepted waste types of their landfills and where required assist with the planning of expansion and upgrade of landfills to ensure wastes generated from the Project can be accommodated
    - when sourcing waste contractors preference will be given to local businesses employing sustainable waste management practices
    - work with local businesses so that they can take advantage of opportunities for re-use and recycling.

Waratah Coal

4.2.13 Element 13 – Hazard and Risk

4.2.13.1 Background

A preliminary risk assessment was undertaken to model and review potential hazards associated with the rail infrastructure and potential risks to safety and health of its workforce and individuals that may interact with the Project. The process allowed for a consistent method to be applied to the overall project components to compare potential safety and health risks against statutory requirements and workforce / stakeholder expectations.

The preliminary risk assessment provided a preliminary assessment of the risks associated with the construction and operation of the rail infrastructure. A further detailed risk assessment will be conducted as part of completing the detailed design phase of the Project to ensure where possible risk mitigation is embedded into the design features.

Hazards associated with the construction and operation of the rail system would generally be considered similar to those of the existing operating rail facilities in Queensland. Typical hazards expected include:

- fuel spills – the storage and handling of fuel and oils that may result in spills and leaks
- transport – the use of heavy vehicles, pedestrians and marine craft both on and offsite
- heavy machinery – the use of heavy machinery that may result in injury to workers and damage to equipment
- hazardous materials / substances / chemicals – the storage, handling and may result in spills and leaks
- adverse weather – undertake activities in adverse weather conditions such as cyclones, storms, winds or heat that may result in equipment damage or injury
- working at heights – injury associated with falls from heights and material falling from height
- confined space entry, excavation and trenching – injuries associated with working in confined spaces
- slips, trips and falls – through every day construction activities
- dust exposure – exposure to long term dust (that may contain hazardous materials) resulting in injury or making the work place hazardous
- excessive noise exposure - impacts to hearing from prolonged noise exposure
- blasting and vibration – that may lead to injury to personnel or serious damage to equipment
- electrical work – electrocution, injury and fires which may damage or cause injures to personnel and equipment.

Waratah propose to adopt industry standard measures to assess and develop risk mitigation strategies and these will include the implementation of a Project wide Safety And Health Management System, ongoing reviews assessing the constructability of the rail infrastructure, the development of Standard Operating Procedures (SOPs) and the completion of a HAZOP assessment.

4.2.13.2 Environmental Values

Baseline Qualitative Risk Assessments (QRA) undertaken for both rail construction and operation have indicated that health and safety risk profiles vary from low' to extreme. Once mitigation measures and design treatments are applied to the assessed hazards the residual risks are either ranked as being low or moderate.

The exception being the high risk ranking associated with the potential for collisions of trains and collisions at level crossings. Notwithstanding the risk treatments proposed, the historical data suggests that there will always be an inherent level of high risk associated with level crossings.

Across the baseline QRA, no extreme or high ranking risks were detected outside the rail's boundary, however without QRA, offsite hazards associated with vehicle movements, were ranked high. Applied QRA control measures and design treatments downgraded the associated risk to moderate.

4.2.13.3 Potential Impacts

Hazards associated with the construction and operation of the rail system would generally be considered similar to those of the existing operating rail facilities in Queensland. Typical hazards expected include:

- fuel spills – the storage and handling of fuel and oils that may result in spills and leaks
- transport – the use of heavy vehicles, pedestrians and marine craft both on and offsite
- heavy machinery – the use of heavy machinery that may result in injury to workers and damage to equipment
- hazardous materials / substances / chemicals – the storage, handling and may result in spills and leaks
- adverse weather – undertake activities in adverse weather conditions such as cyclones, storms, winds or heat that may result in equipment damage or injury
- working at heights – injury associated with falls from heights and material falling from height
- confined space entry, excavation and trenching – injuries associated with working in confined spaces
- slips, trips and falls – through every day construction activities
- dust exposure – exposure to long term dust (that may contain hazardous materials) resulting in injury or making the work place hazardous
- excessive noise exposure - impacts to hearing from prolonged noise exposure
- blasting and vibration – that may lead to injury to personnel or serious damage to equipment
- electrical work – electrocution, injury and fires which may damage or cause injures to personnel and equipment.

4.2.13.4 Operational Policy Objective

Safely manage the risks to the existing environmental values, including surrounding land uses associated with the Project.

4.2.13.5 Performance Criteria

- compliance with relevant Standards, guidelines and legislation
- storage, use and disposal of any chemicals, fuels, solvents or other hazardous materials or substances which may cause pollution, is done so in such a way that does not cause environmental harm
- containment of all spills involving materials that may cause environmental and effective cleaned up and measures taken to prevent the incident from recurring

- recording and reporting of incidents accurately and describing the extent of spill that occurred.

4.2.13.6 Implementation Strategy

To minimise the potential risk to the health and safety of onsite and offsite personnel as a result of the construction and operational activities Waratah Coal will:

- the construction and operation of the rail is to be undertaken under a formal SHMS in accordance with all relevant legislative requirements
- monitor and implement amendments to the SHMS where necessary
- frequently liaise with internal and external stakeholders with respect to safeguarding and improving the SHMS.

Hazardous Materials or Dangerous Goods

- store and transport materials according to relevant Australian standards, guidelines and legislation, including:
    - *Dangerous Goods Safety Management Act 2001*
    - AS4452 The Storage and Handling of Toxic Substances
    - AS1940 The Storage and Handling of Flammable and Combustible Liquids
    - AS3780 The Storage and handling of Corrosive Substances
    - MSDS
    - regional council requirements
- implement a program of regular equipment inspection and testing to ensure reliable performance
- operators are to be trained in the safe operation of the system and emergency procedures in the event of fuel oil leakage
- spill containment equipment will be available at the unloading pad for use in the event of spillage
- a sump is to be provided to collect any spillage and allow recovery
- ignition sources are to be strictly controlled and limited to avoid a fire
- an approved fire protection system is to be installed around new hydrocarbon storage areas
- the following measures are to be taken to minimise the potential for the leakage of fuel oil from storage tanks:
    - construct adequate bunding to contain spills, in accordance with AS 1940:2004
    - install tank level indicators on fuel oil tanks for monitoring of fuel oil levels
    - maintain fuel oil tanks to ensure safe and effective operation of all components
    - design tanks in accordance with AS 1692: 2006 steel tanks for flammable and combustible liquids
- refuelling and maintenance activities are to be undertaken within designated bunded areas to minimise the potential for soil and water contamination
- prepare and implement spill response measures including:
    - a program for regular equipment inspection and testing to ensure reliable performance

  - operators are to be trained in the safe operation of the system and emergency procedures in the event of fuel oil leakage
  - spill containment equipment is to be available at the unloading pad for use in the event of spillage
  - provide a sump to collect any spillage and allow recovery
  - ignition sources are to be strictly controlled and limited to avoid a fire
  - install an approved fire protection system around new hydrocarbon storage areas
- provide spill kits for contaminated material and protective clothing at each transfer and storage location for use in the event of any spillages or leaks
- a copy of up to date MSDS for each chemical / product used on site, is to be available on site and readily available to all site personnel
- provide appropriate signage using HAZCHEM coders which are to be visible at all times. Signage is also to list contact details for the Safety Officer and SEO in case of an emergency
- fire fighting equipment is to be checked as per regulatory requirements and maintained at all times
- keep records on the existing inventory, storage location, personnel training and disposal of waste for all chemicals, fuel and dangerous goods used on site
- all relevant staff must be trained in appropriate handling, storage and containment practices for chemicals, fuel and dangerous goods
- liquid chemicals and fuels stored in above ground tanks and chemicals and fuels stored in drums must be bunded in accordance with relevant Australian Standards
- implement particulate and gas / vapour exposure standards and procedures that apply to dust, fibres, mist and fume (i.e. particulates), and gas and vapour exposures in the workplace (with emphasis on inhalation as the primary route of exposure). The standards and procedures will cover:
  - evaluation of particulate and gas / vapour hazards
  - development of a control program to ensure that employees, contractors and the community do not suffer adverse health effects from particulates or gas / vapours, either used or generated by the Project.

Emergency response

- develop an Emergency Response Action Plan (ERAP) to account for natural disasters such as storms, floods and fires will be developed for the construction, operation and maintenance phases
- the Emergency Response Action Plan is to be prepared in consultation with the Department of Community Safety, regional councils and Queensland Police
- designated first aid and emergency rescue facilities and equipment is to be available
- stores, workshops and offices are to be fitted with approved and certified fire detection (smoke detectors) and sprinkler systems
- first aid and fire fighting equipment (hand held extinguishers and fire hoses) are to be installed at strategic points within each building
- a site based fire management plan is to be developed for construction and operation phases

- fire fighting equipment and exit locations are to be suitably signed and all work areas will be within the required distance to reach emergency exits
- emergency exits are to be planned to allow for the safe evacuation of the workforce and in accordance with Building Code of Australia
- appropriately trained personnel are to be available throughout the life of the Project to provide first aid and emergency response to on site emergencies
- the site will have a fire truck or suitably equipped water truck or trailer that can support fire response requirements. Site fire fighting capabilities also will be addressed in the Emergency Response Action Plan
- fire drills will be undertaken on a regular pre-determined basis
- Waratah Coal will liaise with local State Emergency Services and local ambulance and hospital services with respect to emergency response planning, and the development of those plans.

Transportation, vehicle collision and driving conditions

- construction workers operating vehicles on-site are to be trained and licensed, so that these vehicles are driven in a safe and appropriate manner
- speed control (signage) will be used at all work sites
- all vehicles will be fitted with radios for two-way communication
- watering of roads and access areas will be undertaken regularly to reduce emissions of wheel generated dust and improve visibility
- adequate night lighting through the provision of lighting towers and vehicle headlights will be provided to ensure night operating and driving conditions are safe
- vehicles will carry HAZCHEM identification and response guidelines for use by emergency personnel attending the scene of the accident
- tankers will incorporate internal valves on all outlets to prevent spills in the event of vehicle damage
- tankers will conform with the Australian code for the transport of dangerous goods by road and rail, and AS 2809.4.

Equipment

- construction vehicles and equipment will be operated within the manufacturer's specifications. All vehicles and equipment will be maintained and serviced on a regular basis. Records of maintenance and servicing will be retained on-site for the duration of the construction phase
- machinery and equipment operators will be trained and carry their current licences, where necessary
- there will be specific and detailed standard operating procedures implemented that deal with high voltage.

Explosives and blasting

- a specialist explosives company will provide the ammonium nitrate, emulsion, detonators and boosters to be used during blasting operations. The Contractor's personnel will be licensed and trained in the transport, handling, mixing and use of explosive materials and which has an

established record of operation in the industry and adherence to the Australian Explosives Manufacturer Safety Committee (AEMSC) Code of Practice

- blasting operations will comply with the *Explosive Act 1999*
- personnel in the vicinity of a blast will continue to wear PPE and all personnel will observe safe distances during blasting activities as defined by the Contractor
- licensed transporters operating in compliance with the Australian Dangerous Goods Code will undertake the transport of dangerous goods to the construction site
- the transport of ammonium nitrate will be undertaken in compliance with the requirements of AS 1678.5.1.002-1998: Emergency procedure guide - Transport - Ammonium nitrate.

Personal safety

- access to the construction site will be denied to any site staff / visitor not wearing the following mandatory PPE:
    - safety helmet
    - steel cap boots
    - safety glasses
    - high visibility vest
- fall protection will be controlled through appropriate elevated work platforms and the proper use of harnesses.

Public risk

- a safety risk assessment will be undertaken of the Project to identify areas of high risk to public safety. Exclusion zones will be developed to prevent public access to high risk areas, with fences and signs erected to delineate such areas.

Security

- fencing will protect the worksite from unauthorised public access
- prior to being given access to the Project site, visitors will complete mandatory registration and an environmental, health and safety induction. The scope of induction will reflect those areas of the Project site that the visitor will be permitted access.

Flooding

- the Emergency Management Plan is to incorporate flood management measures to ensure safety of site occupants.

In addition:

- rail infrastructure will be designed with flood immunity to the 100 ARI peak design flood event
- construction activities will be phased to minimise potential flood impacts
- standard flood hazardous management procedures will be implemented based on dangerous flood depths and velocities. These will include procedures for dealing with flood warnings, flood awareness, flood readiness and suitable evacuation measures. Ongoing flood management during operation of the railway will include regular inspections and maintenance works of flood control infrastructure in line with industry standards, guidelines and principles.

Bushfires

- a Bushfire Management Plan (BMP) will be prepared that provides a strategic approach to the management of bushfires in the rail corridor and maintenance areas. This document will provide plans and processes based on contemporary "best-practice" for managing fires in tropical Savannah systems that best mitigate wild fire risks. The BMP will be focused on preservation of life and infrastructure in a context that adheres to ecological needs wherever possible. Moreover the BMP will include strategies that minimise the risk of fire leaving the rail corridor (such as the regular control of vegetation within the corridor easement).

Emergency Response Action Plan

- prior to commencement of construction activities, Waratah will prepare an Emergency Response Action Plan (ERAP). The purpose of the ERAP is to define the processes for emergency response for incidents occurring along the rail corridor or rolling stock yard. It will be used as a guide for the Emergency Response Team Leader, Emergency Response Team Members and all site personnel. The ERAP will form a critical component of the Safety and Health Management System (SHMS). Separate SOPs will be prepared for the safe day to day operation of the rail system

Disaster Management Plan

- Waratah Coal will develop a Disaster Management Plan (DMP) as part of the management plans and procedures to be developed for the project. The DMP will incorporate stakeholder consultation in its preparation. The DMP will be supplemented by the inputs from risk workshops and hazard and risk assessments that Waratah Coal has committed to undertaking in cooperation with all its specialist sub-consultants and stakeholder.

4.2.13.7 Monitoring, reporting and corrective actions

- regular monitoring will be undertaken to assess the implementation and effectiveness of the Project health and safety measures. Monitoring will involve the compilation and assessment of data relating to health and safety issues, such as reported near misses, accident reports and any health surveillance data (sickness data). Outcomes from this monitoring may trigger the need for additional safety and health risk control actions
- accident and near miss data is to be monitored to identify where:
    - common themes occur
    - PPE is being incorrectly used
    - corrective actions are ineffective or have not been strictly implemented
    - procedures / practices need to be reviewed
    - re-training may be required
- any environmental incidents involving spills recorded including time of incident, persons involved, details of incident, mitigation measures and actions taken to minimise the probability of recurrence. Immediate reporting to the Project Environmental Advisor of any large spills or potential risk of spills; incidents, complaints and any significant environmental harm are to be reported to regulatory body/ies where required
- in the event of a spill of hazardous substances, review necessary work procedures and operation controls to ensure they are fit for purpose and revised as necessary

- appropriate personnel are to undertake adequate environmental awareness training covering the requirements of the EMP regarding the management of hazardous substances
- the Construction Environment Manager is to request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring.

4.2.13.8 Commitments

To minimise the potential risk to the health and safety of onsite and offsite personnel as a result of construction and operational activities associated with the rail alignment, Waratah will commit to:

- construct the infrastructure under a formal SHMS in accordance with the requirements of all relevant legislation
- undertake the operations of the rail under a formal SHMS in accordance with all relevant legislative requirements
- monitor and implement amendments to the SHMS where necessary and frequently ensuring its applicability and currency to be maintained throughout the life of the Project
- frequently liaise with internal and external stakeholders with respects to safeguarding and improving the SHMS.

4.2.14 Element 14 – Transport

4.2.14.1 Background

The construction of the railway over a three year period is expected to have a temporary impact on the local transport network. Currently state controlled roads intersected by the railway carry light traffic volumes, with the exception being the Bruce Highway. Parts of these roads will be used as supply routes for materials from quarries, goods and services from regional townships, as well as for transport of workers from accommodation camps. Consequently, this may increase traffic on these roads by up to 157 Vehicles Per Day (VPD). These figures are considered suitable for assessment without considering future traffic growth, as the traffic impacts are only expected to occur during the temporary construction phase.

Heavy vehicle impacts to the external road network will predominately concentrate along haul routes to quarry sites. This will increase traffic by up to 87 VPD and result in a significant proportional increase in traffic on background conditions and a more substantial increase in ESAs, given the high percentage of trucks, albeit from a low base.

In accordance with DTMR guidelines, the capacity of local roads was assessed through consideration of Level Of Service (LOS). For a 100 km/hr two lane rural road, a LOS A is achieved where maximum daily traffic volume is less than 4,000 vehicles. Only the Bruce Highway is expected to carry this magnitude of traffic, with construction traffic expect to marginally increase on current volumes of 2,600 VPD. As such, the provision of adequate two-lane, two-way carriageways will retain a LOS A on all roads used by railway construction traffic, including the Bruce Highway. All other non-State controlled roads are expected to operate with less than 60 vph, including development traffic.

Road Intersections

As with LOS, road intersections are generally not likely to experience any significant congestion where traffic volumes are less than 100 Vehicles Per Hour (vph). As such, existing configured intersections are expected to be suitable to cater for railway generated construction traffic. The exception to this may be intersections along the Bruce Highway, between the site and traffic sources such as workers villages, quarries and the rolling stockyard.

Rail Crossings

The proposed railway will impact a number of existing infrastructure transport corridors including:

- Major State Controlled Roads and Railway Lines:
  - Gregory Development Road – Kilometrage 280 km
- Minor State Controlled Roads and Local Authority Roads
  - Strathalbyn Road (WRC) – Kilometrage 39 km
  - Tabletop Road (WRC) – Kilometrage 62 km
  - Curringa Road (WRC) – Kilometrage 69 km
  - Strathmore Road (WRC) – Kilometrage 71 km
  - Bicentennial Nation Trail Road (WRC) – Kilometrage 71 km
  - Bowen Developmental Road (TMR) – Kilometrage 163 km
  - Glenavon Road (WRC) – Kilometrage 193 km
  - Suttor Developmental Road (TMR) – Kilometrage 197 km
  - Stratford Road (WRC) – Kilometrage 208 km
  - Avon Road (IRC) – Kilometrage 257 km
  - Clermont Laglan Road (IRC) – Kilometrage 342 km
  - Albro Pioneer Road (IRC) – Kilometrage 389 km
  - Surbiton Wendouree Road (BRC) – Kilometrage 410 km
  - Degula Road (BRC) – Kilometrage 423 km
  - Hobartville Road (BRC) – Kilometrage 445 km.

Private Property Roads

There are approximately 190 existing tracks that have been identified as crossing the rail line.

4.2.14.2 Environmental Values

The railway corridor will impact a number of existing infrastructure transport corridors including minor and major State Controlled Roads, Stock Routes, local and private roads and existing rail networks. The EIS determined that while the rail will have an impact during the construction phases, the impact is temporary and is likely to cease prior to nearby projects commencing. As such, the peak loading on the roads are unlikely to coincide and any overlap would be short term.

Once the rail is operational, no additional traffic loading on roads along the line will be generated While occasional maintenance and service vehicles may access the railway, virtually all vehicle access will be restricted to operations near the mine and coal terminal. This will include the major traffic generator for the rail, being the marshalling yards, which will be directly accessed from the Bruce Highway. However, even at peak operation, the rail (independent of the mine and coal terminal) is likely to generate only a small number of vehicle movements per day.

4.2.14.3 Potential Impacts

Due to the remote nature of the majority of the railway, environmental impacts to nearby sensitive receivers such as residences, stock and roadside vegetation, is expected to be minimal. The exception to this may be along designated haul routes through townships, such as Collinsville and Mount Coolon. The potential environmental impacts and other roadside issues resulting from rail traffic may include:

Road Noise – some construction activities may generate elevated noise levels on background levels, mainly resulting from heavy vehicle movements to and from quarries. Excessive environmental noise can be a displeasing annoyance and distraction to the activity and balance of human and stock life. The intensity of roadside noise may temporarily impact residences within 500 m of either the railway, or along construction haulage routes (particularly through townships).

Dust and Weed Contamination – routes used for construction traffic may contribute to dust contamination, particularly along unsealed roads during the dry season. This may present a health and safety impact to adjoining land uses, stock and roadside vegetation. In particular it can pose a safety concern to motorists travelling along unsealed roads by obstructing sight distance. The movement of vehicles to and from the railway corridor increases the risk of spreading noxious weeds, plant debris and exotic pests.

Roadworks in a Road Reserves – the construction of the railway will require works to be conducted within existing road and rail reserves. This may include temporary closures to allow construction of bridges, level crossings and associated track works. These may result in interruptions to residents using these routes.

Over Dimensional Vehicles – the construction of the railway will require over-dimensional vehicles to operate between the site and regional townships. These will predominately supply the railway with large prefabricated items, materials and equipment. Accessibility for over-dimensional vehicles is available at the Bruce Highway intersection with the rail line. Further access will be via the Bowen Developmental Road and Suttor Developmental Road, which are also unrestricted. Currently the only restriction for over-dimension access within the vicinity of the site is through the township of Tambo. There are no excess dimension restrictions for the townships of Alpha, Jericho or Emerald, or for the Capricorn Highway.

Heavy Mass Vehicles – the construction of the railway is likely to require the transport of heavy materials and equipment to the site. Transport along approved Higher Mass Limit (HML) roads for vehicles with pavement friendly suspension is administered by DTMR. Currently the Bruce Highway and a small part of the Bowen Development Road are the only HML approved routes within the vicinity of the railway corridor

Dangerous Good and Hazardous Materials – the development of the railway will require the transport of dangerous goods and hazardous materials to and from the site. This may include fuel and oils, flammable gas, corrosive materials including solvents, explosives and chemical wastes including sewage. The transport of these goods increases the risk of a chemical spill on route.

4.2.14.4 Operational Policy Objective

Manage construction traffic and transport issues to minimise potential impact on the community and the operation of the road network.

4.2.14.5 Performance Criteria

- potential construction traffic impacts on communities are avoided, mitigated and managed
- minimisation, as much as possible, of potential traffic disruptions to the operation of the road network and the public transport (school buses) due to construction works
- maintenance of safe access near all project work areas for road users

- local and broader communities are kept informed about the time and scale of changes in the traffic conditions on roads in the vicinity
- traffic flows near construction works are monitored, as required
- corrective measures are implemented in response to traffic impacts subsequent to construction works.

4.2.14.6 Implementation Strategy

The following mitigation measures apply to the construction phase of the railway to address the impacts to the traffic and transport environment. As minimal impacts are expected to result from operating traffic, mitigation measures have not been suggested for this stage of the project.

Waratah Coal will develop the following documents:

- Road Impact Assessment Report
- Road Use Management Plan
- Traffic Management Plans
- Traffic Control Plans.

These plans will cover key safety and logistical issues such as:

- signage and traffic control requirements, including requirements for bypasses if necessary
- development of temporary access routes and intersections to QDRM standards
- heavy vehicle movements and operating requirements, including appropriate routes, hours of operation, vehicle wash-down and operational restriction
- mitigation works and monetary contributions to be made to road authorities to provide a safe and efficient road network
- relevant contacts within the project
- issue identification and responses
- planning and permit requirements including those needed for over-dimensional vehicles and transport of dangerous goods
- processes for community information and responses.

General

- prepare a TMP in consultation with DTMR, Queensland Police Force and the relevant regional council for all elements of the works. The TMP is to include measures to minimise the adverse effects on the road network and school bus routes. The plan is to also address the safety and convenience for all road users and consider the following:
    - one lane to remain open at all times
    - installation of proper signage to make drivers aware about road works and guide them through the work area
    - measures to help ensure safety and manage the changes in traffic conditions (e.g. traffic controllers and / or variable message signage
    - wet weather specific operational requirements including any management measures necessary to address any potential environmental impacts of wet weather operations)

  - truck routes and construction site access
  - maintenance of traffic flows past worksites on all bus routes
- roadwork contractors will be advised to avoid the school pick up and drop off periods
- control working hours and avoiding haulage tasks during peak traffic periods and during school drop-off and pick-up times. Where haulage in peak hours is unavoidable, such activities should be managed in accordance with specific traffic management plans provided to the relevant agencies in advance
- established truck routes and arterial roads are to be used for the haulage of construction materials and spoil in order to minimise truck traffic on local roads
- minimise congestion by staging the construction work
- the capacity of intersections and road links along the haulage routes will be analysed in order to identify and mitigate against any operational impacts
- model the exit sign and construction traffic (on the major roads and intersections in the vicinity of the site) in order to predict the effect of temporary traffic arrangements
- provide signage and delineation past the work site, including any diversion routes
- implement measures to help ensure safety and manage the changes in traffic conditions (e.g. traffic controllers and / or variable message signage)
- confirm intersection configurations for all new intersections and any revised existing intersections to ensure they are adequate to safely cater for the future traffic volumes and that the intersection performance criteria are met
- identify management and process controls as a means of mitigating or eliminating the hazards and risks associated with construction traffic and transport during construction
- consider drainage as well as the volume of traffic during and post construction to ensure that road designs are suitable to account for scour and load capacity
- adopt appropriate industry and local government standards and code of practice for the construction and realignment of local roads.

Road Noise

Truck drivers are required to conduct themselves with appropriate care towards local residents, including;

- limiting the use of air brakes in townships and near residences
- restricting the movements of heavy vehicles to within standard business hours when possible
- driving in a safe and responsible manner to limit vehicle noise in general.

Dust Suppression and weed control

- dust may be controlled through watering the area where dust is generated
- all heavy vehicles leaving the site will be subject to a wash-down of tyres or rumble grid to limit loose material and noxious weeds being transported onto sealed access roads.

Heavy vehicle movement

- following the identification of suppliers for materials and equipment which require over-dimension transport, route assessments and applications for appropriate permits are to be undertaken. This will include assessment and applications for any vehicle requiring a pilot escort. Suitable mitigation

measures will be developed subject to refinement of freight requirements including haul paths, size, weight and frequency of over-dimension vehicles

- each haulage contractor is required to prepare a Road Use Management Plan (RUMP) to addresses the following key items associated with the haulage of materials:
    - haulage routes
    - safety management
    - traffic management
    - operations
    - environmental controls
    - emergency plans
- heavy vehicle movements are to avoid interference with major events
- haulage tasks during peak traffic periods and during the school drop-off and pick-up times are to be avoided. Where haulage in peak hours in unavoidable, such activities managed in accordance with specific traffic management plans provided to the relevant agencies and appropriate Regional Councils in advance
- dilapidation surveys prior to haulage operations are to be prepared to identify any pre-start improvement. A maintenance plan is to be prepared to manage any impacts during construction and a post construction survey is to be undertaken to confirm the need or otherwise for restoration following completion
- established truck routes and arterial roads are to be used for the haulage of construction materials and spoil in order to minimise truck traffic on local roads.

Dangerous and Hazardous Goods Movements

- all transportation of dangerous and hazardous goods by road are to be carried out in accordance with the licensing and vehicles requirements set out by DTMR. This includes operational policies that all drivers transporting dangerous goods are adequately trained, hold valid licenses and that all vehicles are adequate for transport of these materials in accordance with the following legislation:
    - *Transport Operations (Road Use Management) Act 1995*
    - Transport Operations (Road Use Management – DG) Regulation 2008
    - The Australian DG Code 7th Edition
    - National Transport Commission (Road Transport Legislation – DG Act) Regulations 2006.
- transport of hazardous and dangerous materials during the construction phase will be undertaken in accordance with the DEHP tracking system as defined in Environment Protection (Waste Management) Regulation 2000.

Stock Routes

Impacts to stock routes are to be mitigated in accordance with DEHP and council requirements, together with consultation with affected pastoralists, drovers and graziers. Any stock routes to be realigned or severed will be re-established to meet the surrounding conditions.

Local traffic

Local communities and local authorities are to be notified where practicable about proposed changes to local traffic access and possible delays due to construction activities.

Workforce transportation and parking

- sufficient parking to accommodate employees' vehicles is to be provided and instructions given to commuting employees to use the providing parking facilities in order to avoid traffic disruption due to road side parking
- use buses and encourage carpooling for transportation of construction workforce.

Emergency vehicles

- at least one lane is to be kept open on all roads during the construction period.

4.2.14.7 Monitoring, reporting and corrective actions:

- construction conditions and traffic management arrangements are to be monitored and reviewed as appropriate in order to address any negative impacts
- traffic flows and road network performance is to be monitored on a continual basis to confirm that specific controls have been implemented and appropriate work practices are being adopted to achieve the specified performance objectives
- a monthly report on local traffic conditions, including any accidents involving construction traffic is to be provided to the Project Supervisor
- a monthly report is to be prepared and submitted to Waratah Coal and include details of local traffic conditions, including any accidents involving construction traffic, any monitoring results, audits, training and incidents
- any incident which contravenes the objectives of the EMP is to be reported immediately to the Project Supervisor and SEO
- incidents, complaints and any significant environmental harm is to be reported to regulatory body/ies where required
- investigate and implement additional traffic management and transport options as required
- appropriate personnel are to undertake adequate environmental awareness and training covering the requirements of the EMP regarding traffic management
- the Project Manager is to request the cessation of works at any time should they feel that the performance criteria of the EMP have been breached.

4.2.14.8 Commitments

To manage potential impacts to traffic and transport associated with the construction and operation of rail, Waratah Coal will implement the following commitments:

- Waratah Coal develop the following documents:
    - Road Impact Assessment Report
    - Road Use Management Plan
    - Traffic Management Plans
    - Traffic Control Plans.

These plans will cover key safety and logistical issues such as:

- signage and traffic control requirements, including requirements for bypasses if necessary

- development of temporary access routes and intersections to QDRM standards
- heavy vehicle movements and operating requirements, including appropriate routes, hours of operation, vehicle wash-down and operational restriction
- mitigation works and monetary contributions to be made to road authorities to provide a safe and efficient road network
- relevant contacts within the project
- issue identification and responses
- planning and permit requirements including those needed for over-dimensional vehicles and transport of dangerous goods
- processes for community information and responses.

4.2.15 Element 15 – Cultural Heritage

4.2.15.1 Background

4.2.15.1.5 Indigenous Cultural Heritage

Cultural Heritage Management Plans

Waratah Coal is in the process of completing Cultural Heritage Management Plans (CHMP) negotiations with relevant Aboriginal parties. Waratah Coal has undertaken appropriate steps to identify correct Aboriginal parties in accordance with the *Aboriginal Cultural Heritage Act 2003* (ACH Act). The following registered Native title claims have been identified as Aboriginal Parties: The status of CHMP negotiations is shown in **Table 14**.

Table 14. Status of CHMP negotiations with Aboriginal parties

Aboriginal party	Consultations commenced	Number of Meetings to date	CHMP status	Expected timing for CHMP Approval
Wangan and Jagalingou People (QC 04/6)	October 2010	4	CHMP has been agreed	CHMP has been approved
Jangga People (QC98/10)	October 2010	2	CHMP has been agreed	CHMP has been approved
Birri People (QC 98/12)	November 2010	2	CHMP has been agreed	CHMP has been approved
Southern Notification area	June 2011	2	Negotiations are ongoing	Ongoing – Q1 2013
Northern notification area – endorsed Aboriginal parties	Consultations are yet to commence	N/A	N/A	Ongoing - Q2 2013

A portion of the rail corridor is within the APSDA. The NQBP and Coordinator General has completed negotiations with the Juru People (QC10/5) in the APSDA area to finalise an Indigenous Land Use Agreement (ILUA) to address works undertaken within the APSDA. The ILUA will also address protocols for the

management of cultural heritage. Waratah Coal will liaise with the relevant Aboriginal party to establish and implement the cultural heritage protocols outlined within this ILUA for its' proposed works within the APSDA.

Field Surveys

To date, specific field surveys for the Waratah Coal Project have not been conducted. Detailed cultural heritage surveys of the proposed rail corridor will be undertaken in accordance with the requirements of the agreed CHMPs.

4.2.15.1.6 Non-Indigenous Cultural Heritage

Register Review

Waratah Coal undertook a review of the relevant non-Indigenous cultural heritage registers. No places were identified in the Australian Heritage Places Inventory within or in close proximity to the project area.

No places were identified in the Queensland Heritage Register within the Project area or immediately adjacent. Five places were identified within 20 km of the rail corridor; however, it is highly unlikely these places will be affected.

The sites identified are:

- Strathmore Homestead (QHR 602683) - Strathmore homestead is located 11 km west of the rail on Strathmore Road. It is significant as one of the earliest pastoral runs established in north Queensland and comprises a 1860s slab hut and c. 1900 house
- Bowen River Hotel (QHR 600042) - The Bowen River Hotel is located 18 km west of the rail on Strathmore Road. It is significant as an 1860s structure built as a hotel on the Bowen Down road, which was the main route from Bowen to the central west and north Queensland pastoral districts
- Bowen Consolidated Colliery (QHR 601850) - The Bowen Consolidated Colliery is located 10 km east of the rail at Scottville. The colliery is significant as an intact coal mine of the early 20th century and as evidence of the development of the coal mining industry in the region
- Bowen Cemetery (QHR 602730) - The Bowen Cemetery is located 12 km east of the rail on the Collinsville-Scottsville Road. The cemetery is significant for its association as the burial place of 23 miners killed in mining accidents including seven killed in a major accident at the Collinsville State mine in October 1954
- Barclay's Battery (QHR 602242) - Barclay's Battery is located 10 km north-west of the rail at Mount Coolon. Barclay's Battery is significant as evidence of gold-mining operations in the earlier part of the 20th century in north Queensland.

The WRC, IRC and the BRC. None of these local authorities currently have heritage registers or provision for the protection of heritage places in their planning schemes.

Field Assessment

Field surveys identified 38 cultural features or sites within one km of the rail corridor. Of the 38 sites seven types of cultural heritage were observed. These being:

- homesteads 4
- cattle yards 4
- stock-watering facilities 21
- windmill 1

- cattle feed lot 1
- roads 5
- historic roads 2

Homesteads - with the exception of Hobartville, the other four homesteads are typical post-World War II complexes comprised of low-set timber houses with metal roofs and an assortment of metal clad sheds used for machinery and equipment. Of these four homesteads, none are unusual or exceptional or have any significant cultural heritage values. Hobartville may have local values but is well outside the corridor and will not be impacted.

Dams / earth tanks - dams or earth tanks were the most common feature within the corridor – a total of 21 tanks of varying capacity were identified. More than half were in the southern section of the corridor, indicating more intensive grazing on the Belyando Downs and Suttor River plains compared with the northern section through the Clarke and Leichhardt ranges

Earth tanks are ubiquitous on pastoral properties and none identified within the corridor have significant cultural heritage values.

Windmills - windmills have been and are widely used on pastoral properties to pump sub-artesian groundwater to water stock. Mass-produced windmills were available from the late 19th century, and in Queensland the two most common locally produced brands were Comet and Southern Cross. The one windmill close to the corridor is certainly a typical example of a windmill found throughout rural Australia and not significant.

Roads - Roads and paths are not normally considered as having heritage values place but they can be important in demonstrating early tracks and transportation routes.

The rail corridor crosses four major roads: the Gregory Developmental Road, the Suttor Developmental Road, the Bowen Developmental Road and the Bruce Highway. The Gregory Development Road had its origins in a major inland route planned prior to World War II linking Brisbane to Cairns. However, events during World War II overtook the proposal and only part of the road was built. The other developmental roads were planned in the 1950s to improve road transport for the pastoral industry and have been gradually upgraded in subsequent decades. The proposed design of the rail will not impact on the roads.

Cattle yards - three cattle yards were identified within and immediately adjacent to rail corridor. Like tanks, yards for mustering and branding are an integral part of a cattle property and none of these yards are neither unusual or exceptional.

Early roads and associated facilities - when Bowen became the point of entry to the northern and north-west hinterland in 1861, the need for a trafficable road from newly established pastoral runs was a high priority. Bowen Downs station, near Muttaburra, was one of the first properties to be established in the north-west. The owners of Bowen Downs were proactive in developing a road from their property to Bowen. The route they developed soon became the major inland road from Bowen to the inland. The main route followed a south-west direction from Bowen, following a section of Eurie Creek and then crossing the Bogie River near Eton Vale station. The main road continued in a south-west direction while an alternate route went in a more southerly direction.

Significant sections of the Bowen Downs road survive in river crossings, location of hotels, coaching stops, cuttings, stone pitching and roadside quarries. The road later became a designated stock route and is therefore a gazetted road. A substantial stone causeway survives where the road crossed the Suttor River.

Eton Vale remnants - on Eton Vale station, evidence of the road is still clearly visible in the crossing of the Bogie River and Spring Creek. Other remnants include quarries, and stone flagging that was possibly the base of a water tank. Remnants of a hotel that was to became the site of a township known at Kinnahaird also

remain. Approximately 20 km south where the proposed railway intersects the Bowen Downs road, are remnants of a small changing station; located near a tributary of Machinery Creek. These remnants comprise stone flagging, the ant-bed base of a building, well, and fragments of pottery and bottles. The pottery and bottle fragments date from the 19th century and it is likely that this was the site of a modest inn or changing station.

The remnants of both the main Bowen Downs road and changing station are highly significant as evidence of one of the most important early roads in north Queensland. This section of the road was developed at some cost and effort and was probably funded by the consortium who owned Bowen Downs station. The owners of Bowen Downs station considered it was vital for the success of their station for a suitable road to the most accessible port.

This site, in conjunction with other sites on the early coach roads from Bowen, would meet the criteria for entry on the Queensland Heritage Register and evidence of a highly significant early road in north Queensland.

4.2.15.2 Environmental Values

Items of unrecorded Indigenous cultural heritage may occur within of near the proposed rail corridor and without appropriate site management initiatives, may be threatened by construction impacts. Unrecorded Indigenous heritage resources within impact areas will be identified during dedicated field surveys conducted by each relevant Aboriginal party as agreed in the CHMPs.

The proposed rail project will have a minimal impact on places of non-indigenous cultural heritage significance. Two places that would meet the threshold for entry on the Queensland Heritage Register were identified; however these places are not likely to be directly impacted by the Project works.

4.2.15.3 Potential Impacts

No listed Indigenous or non-indigenous cultural heritage items will be impacted by the planned rail corridor development. However, it is possible that during construction items of indigenous and non-indigenous cultural heritage are discovered and destroyed / damaged.

4.2.15.4 Operational Policy Objective

Manage the risk of disturbing known and unknown components of indigenous and non-indigenous archaeological records and areas.

4.2.15.5 Performance Criteria

- all known indigenous and non-indigenous archaeological records, as identified within the EIS, are preserved and not impacted upon by the project
- all unknown indigenous and non-indigenous archaeological records found during the course of the project are reported to the appropriate party and Waratah Coal.

4.2.15.6 Implementation Strategy

Indigenous Cultural Heritage

CHMPs are developed between Waratah Coal and the Wangan and Jagalingou, Jangga and Birri. CHMPS are also in progress for the southern and northern notification areas. The mitigation measures included within the CHMPs are comprehensive and entail a number of possible procedures that will include (but not be limited to):

- indigenous cultural heritage is to be avoided in the first instance, wherever practical
- further detailed field investigations are to be carried out

- cultural heritage items are to be collected and relocated, as agreed with the relevant Aboriginal parties.

Management measures during construction will include:

- cultural heritage induction is to be completed by the workforce
- a provision for the monitoring of specific construction activities
- appointment of an Indigenous Liaison Officer during construction and operation
- a procedure for the find of Human remains
- a procedures for unexpected finds
- a conflict resolution process.

All site operations are to be carried out in accordance with the relevant CHMPs as agreed between Waratah Coal and the Aboriginal parties for the area.

Non-indigenous cultural heritage

- a strategy for the management of non-indigenous cultural heritage items is to be developed. The procedure is to include:
    - an outline statutory obligations for all parties involved
    - an induction for all construction personnel regarding non-indigenous cultural heritage management procedures
    - procedures to be implemented in the case of the find on non-indigenous heritage material during construction. This will include:
        - notification of heritage consultant to assess significance of find
        - stop / redirection of-work requirements and establishment of buffer zone
        - procedures for informing DEHP
        - documentation and recording of site in-situ
        - if required, removal and conservation of find if assessed as significant
        - management and deposition of find in an appropriate museum or interpretative facility.

4.2.15.7 Monitoring, reporting and corrective actions

- audits of the CHMP are to be conducted quarterly (internally) and annually (externally).
- the CHMP is to contain provision for its review in the event of variation of any of the existing project components or if additional project elements emerge that were not anticipated in the original project concept, or variation as required by the parties upon their review of the agreement on a regular basis for the duration of the agreement or if particular issues arise at any time. The CHMP will also make provision for pro-active auditing by Waratah Coal of all aspects of its implementation
- any findings of any indigenous or non indigenous archaeological items are to be reported to the Site Supervisor and SEO in accordance with the CHMP
- non-compliances with CHMPs will be investigated and findings of investigations incorporated into work procedures to ensure no repetition of non-compliances.

4.2.15.8 Commitments

To manage potential impacts to Indigenous and non-Indigenous cultural heritage, Waratah Coal will implement the following commitments:

- continue engagement and negotiations with endorsed Aboriginal parties and to develop (where not already developed) and implement agreements to manage cultural heritage
- facilitate the further examination and formal reporting of the Mountain Creek changing station and the Bowen Downs road to DEHP in accordance with the *Queensland Heritage Act 1992* (QH Act) requirements; and,
- implement procedures during site activities that aim to identify, assess and record undetected non-Indigenous heritage sites, including appropriate induction of relevant project personnel.

4.2.16 Element 16 – Visual Amenity

4.2.16.1 Background

The rail alignment passes through a range of landscape and vegetation types embracing the Capricorn Uplands (KP453 to KP170), the Dry Tropical Uplands (KP170 to KP43) and the Whitsunday Coast (KP43 to KP0).

Capricorn Uplands (KP453 - KP170) - Capricorn Uplands region is mostly flat to low undulating grasslands, woodlands and forests. Limited mining activities occur in this region combined with various levels of grazing. Also present are several national parks, reserves and refuges.

In this section the corridor passes through predominantly rural land with flat to gently undulating topography. Due to the topography the rail will be visible to the largest geographical area but also the least inhabited area.

Cudmore National Park and the Narrien Range National Park are situated north of the proposed mine, and to the west and east of this section of rail. Both national park's lack formal visitor accommodation infrastructure and are noted as having limited visitor access.

Gregory Development Road (KP280), and Suttor Development Road (KP197), occur in this region and will be intersected by this project component. These roads are understood to be predominantly used by locals, tourists, and mine workers

Although the least inhabited area of the rail corridor, there are two homesteads within close proximity to the alignment and numerous properties within and just outside of the 2.5 km "mid-ground" boundary from the rail alignment. These homesteads, being of 'Surbiton' (Homestead 11), and 'Mirabilla' (Homestead 18), are within 1.5km and are only affected by the rail component of this project.

The small town of Mt Coolon (population 75) is located near to KP195 (9.2 km north west) and experiences almost no visual impact. This town has a long history with Gold mining and is part of the "Bowen Coalface Towns" along with Collinsville and Scottsville, which was recently listed by the Queensland Heritage Council with an aim to conserve it as a living museum and tourist attraction. The three towns are collectively marketed as a tourist experience.

Dry Tropical Uplands (KP170 - KP43) - The Dry Tropical Uplands region features undulating to mountainous grasslands and sparse forests. This basalt gorge country has a rural landscape character with mining interests within the area. This bioregion consists of a series of ranges, plateau, valleys, contains nature reserves and eight national parks.

As the rail alignment passes through both mountainous sites and nature reserves, it becomes open to views and potentially negative visual impacts from these sites. However, as many of the nature reserves are

National or State Parks dedicated to fauna / flora protection they have limited visitation, reducing the magnitude of any visual impact.

The Bowen Developmental Road (KP163) occurs in this region and will experience visual impact through its intersection by this project component. This road is understood to be used by locals, tourists, and mine workers, and is in the process of being upgraded for greater use.

As the rail continues north, it passes the regional town of Collinsville (Population 2063) located approximately 12.0 km east at KP76, and the small mining town of Scottsville approximately 9 km south east of KP80 near Collinsville. The Bowen Consolidated Colliery mine is located between these towns and the proposed project component and was recently listed by the Queensland Heritage Council with an aim to conserve it as a living museum and tourist attraction.

There are 23 known homesteads in this region, but only one which will have a high visual impact from the alignment. The 'Homestead near to McGregor Peak' (Homestead 60) is nestled at the base of McGregor Peak, and would share its valley with the rail alignment, which would be situated approximately 300 m west.

Whitsunday Coast (KP43 - KP0) - the Whitsunday Coast region has a wet coastal landscape with forested hills, mountains and scenic offshore islands. This region possesses extensive natural areas with coastal towns and tourist developments.

The rail curves around Mt Roundback, before essentially running parallel to, but not crossing, the Bruce Highway. In this area the rail will be seen by the greatest number of people especially from the Bruce Highway and North Coast Rail.

The Bruce Highway (KP0) is the main transport route between Brisbane to the north. It is used by tourists, locals and many transportation industries. The rail project component will run parallel to the Bruce Highway just north of the proposed Coal Terminal site.

This final section of rail has three homesteads, being the 'Homestead near to Mt Mackenzie' (Homestead 61), 'Salsbury Plains' (Homestead 45), and the 'Caley Valley' (Homestead 48), which will be visually effected by the rail alignment. Both 'Salsbury Plains' (Homestead 45), and 'Caley Valley' (Homestead 48) are located within the Abbot Point State Development Area and are outside of the scope of this EIS/SEIS. The 'Homestead near to Mt Mackenzie' is located approximately 10km from the peak of Mount Mackenzie and within the 1.5km 'foreground' of the proposed rail alignment.

4.2.16.2 Environmental Values

The 453 km length of the rail alignment will result in the perception of having a major visual impact on the landscape. However, this component of the project will for the majority, have low visual impact in the existing landscape due to its considerable length avoiding most areas of development. All areas close to the rail alignment (<1.5 km) will experience medium to high visual impact that would be difficult to buffer although for the majority of the length is sparsely populated limiting observers.

Sensitive receptors such as National Parks, Nature Reserves, and Biological Research land and look-out points were found to be restricted for visitation or at such a distance from the rail alignment that the impact was rendered insignificant.

Major transportation routes, such as the Bruce Highway and North Coast Rail will expose the rail alignment to the greatest number of people. These places, due to fast movement of the highway / rail traffic and visual dominance of the port project component, will have a lesser visual impact from the rail project component. The crossing under the Bruce Highway will also be less apparent if the alignment crosses at close to 90° angle. In locating the train loop between the North Coast Rail line and Bruce Highway the visual impact in this area is increased and hard to buffer, and so creates high impact. Other roads existing along the rail alignment would

have a moderate to high visual impact, although could be visually buffered to reduce detrimental views, providing that level crossing sight lines are guaranteed.

There is not expected to be any permanent lighting along the extent of the rail corridor, except for the lighting at the level crossing points, which would pose a low impact, and of the train lights which would prove a significant impact at visual receptors that have views overlooking the track.

It was found that the impacted towns of Collinsville, Scottsville and Mt Coolon, being historic mining towns would not be adversely affected by this project component and were considered to have a low to incidental impact.

Of the six homesteads found to be highly impacted by this project component, each would be severely affected, with the rail stretching across the entirety of their visual horizon, and in some cases, being just on the doorstep. Due to their proximity to the project, any buffering for these homesteads would be very difficult to implement. The further twenty homestead effected with medium to low visual impact should be able to be visually buffered from the rail component. It should be noted that as this project is implemented, the potential for more homesteads found within the visual field is high.

The visual impact of the temporary workers camps could prove significant; however as these locations are undefined and are moveable; the actual impact cannot be assessed. To reduce visual impact for the long term these sites would need to be located in existing cleared areas, along existing roads and given strict site limits to ensure existing vegetation and geology remains visually intact.

4.2.16.3 Potential Impacts

The following potential changes to the landscape and perceived visual amenity may occur as a result of the railway:

- change of view shed
- temporary and permanent changes to the topography and landforms.

4.2.16.4 Operational Policy Objective

Site rehabilitation works are undertaken to assist in the restoration of the visual environment of the easement and its surrounds.

4.2.16.5 Criteria

Disturbed areas are rehabilitated with native endemic vegetation.

4.2.16.6 Implementation Strategy

The management measures to be implemented for the rail alignment include:

- plants are to be used to provide a buffer and screens will be established pre-construction and maintained during development to ensure effective screening by the commencement of operations
- where all other mitigation measures fail to alleviate the visual impact, homesteads identified as having high visual exposure is to be relocated to a less sensitive location further from the rail
- flood and site lighting is to be designed by a lighting specialist to ensure that surrounding areas do not experience light pollution from the rail
- existing topsoil from the site is to be stripped and placed into temporary stockpiles prior to construction to provide additional visual buffering

- waste generated during construction is to be collected and stored neatly on-site and removed as soon as possible
- rehabilitation of disturbed areas is to be completed as site works are completed. Rehabilitation should incorporate a selection of indigenous and fast growing plant species that are endemic to the area
- locate night lights as required for safety and security, but ensure lights are focussed on the areas required, with shields around the globes to limit extraneous light where necessary. Lighting of the site is to conform with the following Australian standards:
    - AS1158 Road lighting
    - AS 4282 Control of the obtrusive effects of outdoor lighting.

4.2.16.7 Monitoring, reporting and corrective actions

- regular auditing undertaken to ensure compliance with objectives of the EMP
- report monitoring results to SEO
- implement contingencies where propagation or plantings are failing to germinate / grow.

4.2.16.8 Commitments

Waratah Coal commits to undertaking actions that will reduce potential impacts through a proactive rather than reactive approach to the visual landscape character and perceived visual amenity. Waratah Coal commits to the implementation of the following management measures:

- topography changes will be minimal to maintain visual landscape character and existing vegetation will be maintained where possible. Endemic plant species mixes will be used to provide buffering and will be established pre-construction and maintained during project development to ensure effective screening by the commencement of operations
- the most highly impacted of the homesteads will be buffered by extensive planting / mounding or both with consultation with their owners
- grade separated crossings will include planting on batters to create vegetated regions at these crossings. The Clermont Alpha Road will gain a 1km vegetation buffer between road and rail to maintain the visual landscape character of the area
- the rail alignment will be designed to cross level crossings of minor roads at right angles and not be aligned parallel to roads on approach
- vehicle wash-downs at rail camps should continue as standard practice to enter the rail alignment site to ensure weed species do not move across vegetation areas
- vehicle wash-downs will continue as standard practice and wash-downs will be located at strategic points along the rail alignment and at all entry points from construction camps
- the working rail corridor will be limited to the 80m (or less), and any clearing outside this width during development will be re-vegetated using 'best-practice' re-vegetation techniques. Rail work camps will be located along existing roads, and placed on existing cleared land, or in areas where quick re-vegetation may occur
- once a rail-camp is finished in an area, that area will be returned to the pre-use landscape character, or the naturally occurring local vegetation character

- site lighting for the rail and workers camps will be designed by a lighting expert to minimise light pollution and strict light-use management regimes shall be abided by all workers at these places
- colour and style of existing built form will be investigated and used in rail camps to best blend into the landscape character. Non-reflective materials will be used to reduce glare
- the establishment of an interactive coal centre at APSDA / the beautification of the road over rail bridge for the Bruce Highway should be investigated to reduce the impact from community perceptions about this development
- where all other mitigation measures fail to alleviate the visual impact, a separation of 1.5km between the rail and homesteads will be created by realignment of the rail or the relocation of the homesteads to areas of low to incidental impact.

4.2.17 Element 17 – Land Rehabilitation

4.2.17.1 Background

The DEHP has produced the following rehabilitation hierarchy to prevent of minimise environmental harm:

- avoid disturbance that will require rehabilitation
- reinstate a "natural ecosystem" as similar as possible to the original ecosystem (where the project is occurring on previously natural vegetated land)
- develop an alternative outcome with a higher economic value than the previous land use
- reinstate the previous land use (e.g. grazing in this instance)
- develop lower value land use
- leave the site in an unusable condition or with a potential to generate future pollution or adversely affect environmental values.

The construction of the rail will where practicable avoid the un-necessary disturbance to land within and adjacent to the corridor. Where the project disturbs "natural systems" the rehabilitation objectives will be to reinstate the affected lands to a condition as similar as possible to the original system. The Project will provide offsets for areas of "natural vegetation" with high ecological value in accordance with extant Commonwealth and State "offset policies".

The vast majority of the lands that will be disturbed by the rail have been disturbed and modified as a result of the existing grazing activities. Disturbances range from highly modified systems (i.e. chain-pulled and blade-plowed paddocks) through to less-modified paddocks (i.e. understory containing environment weeds). The project will aim to progressively re-establish affected lands to as close as practicable to previous agricultural land uses.

The construction of the rail will result in some areas that will not be returned to the previous land use . These areas will where practicable be developed to a lower value land use. These areas will be left in a state that is stable, is not a health risk to humans or livestock, and minimizes potential to generate future pollution or adversely affect environmental values.

4.2.17.2 Environmental Values

The EIS has determined that based on the results of soil sampling, the land within the rail footprint is generally considered class C and class D Good Quality Agricultural Land (GQAL). These land classes are described respectively defined as being "land that is suitable only for improved pastures or native pastures" or "non-agricultural land, being land not suitable for agricultural uses due to extreme limitations". Minor areas of class

A (land suitable for cropping with minimal limitations) and class B (marginal for current or potential crops due to severe limitations) are located across the alignment.

As the land within the rail footprint will be effectively sterilised in the long term, opportunities for land rehabilitation are limited. However, areas used for construction access and lay down will be rehabilitated in accordance with the implementation strategies outlined in the table below.

4.2.17.3 Potential Impacts

Where disturbed ground is not appropriately rehabilitated and revegetated there is an increase potential for the following impacts to occur:

- erosion
- soil degradation
- changes to drainage patterns
- decreased water quality
- loss of habitat and foraging resources for fauna species.

4.2.17.4 Operational Policy Objective

Site rehabilitation works are designed to leave the landscape compatible with existing surrounding land uses.

4.2.17.5 Performance Criteria

- no new weed species introduced and no expansion of existing weed infestations
- vegetation re-established similar to surrounding condition
- no significant change in drainage pattern
- rail alignment stabilised with no significant erosion events
- disturbed areas are rehabilitated with native endemic vegetation where practicable.

4.2.17.6 Implementation Strategy

- rehabilitation of disturbed areas is to be undertaken progressively
- rehabilitation areas are to be deep ripped prior to topsoil spreading
- rehabilitation areas are to be re-profiled to original or stable contours, re-establishing surface drainage lines and other land features where practicable
- topsoil application is only to take place after subsoil re-spreading and compaction and will be evenly spread and left with a slightly rough surface
- driving vehicles on freshly topsoiled areas within the rail is prohibited
- remove flagging used to identify clearing boundaries and sensitive features
- install erosion and sediment control measures where necessary. Existing soil erosion measures will be reinstated to a condition at least equal to the pre-existing state
- cleared native vegetation is to be spread over the rehabilitation areas (where practicable) to assist in the distribution of seed stock and provide shelter for fauna. Distribution of vegetation will be controlled to ensure that any erosion will be visible during inspections

- native ground cover and shrubs are to be encouraged to re-vegetate where appropriate to minimise habitat barrier effects in significant habitat areas
- trees will be permitted to grow in proximity to infrastructure when infrastructure operability and safety is not affected
- environmental features such as rocks and dead timber are to be replaced where appropriate
- re-vegetation activities are to take place as soon as is practicable after the spreading of topsoil
- a reseeding plan based on soil types, existing local vegetation characteristics and landholder preferences is to be developed
- seeding is to be utilised in areas where rapid restoration is required e.g. watercourse crossings and areas of high potential
- where disturbed areas are to be re-planted or re-seeded, preference will be given to local native species. Non-invasive introduced species may be used where appropriate to provide environmentally acceptable short term surface stability
- vegetation will be allowed to regenerate naturally on cleared areas not required to be kept tree or shrub free for infrastructure protection and maintenance
- where applied, seed id to be evenly spread over the disturbed area
- infrastructure warning signs are to be erected within the rail alignment
- all waste materials and equipment are to be removed from the construction area in a progressive manner
- temporary access roads will be closed and rehabilitated to a condition compatible with the surrounding land use or as agreed with the landholder
- disused silt fences are to be removed
- fences or other barriers are to be installed where appropriate and where approved by the landholder to minimise unauthorised access.

4.2.17.7 Monitoring, reporting and corrective actions

- photo record are to be preserved before work commences for use during rehabilitation
- undertake regular inspections during construction to monitor for erosion, presence of weeds, revegetation success and general stability of the rail corridor and infrastructure area
- monitor significant areas until the establishment of regrowth and if necessary appropriate reapplication of seed is to be carried out if revegetation is not successful
- assess the success of restoration by comparing the percentage cover and species diversity on the rehabilitated areas with that of adjoining land
- monitoring is to also include an assessment of the effectiveness of weed control measures
- monitoring results are to be reported to the SEO
- implement contingencies such as:
    - limit access to the affected area
    - re-seed rehabilitated sites, implement soil stabilisation techniques and establish drainage networks

- where necessary, undergo additional rehabilitation using alternate strategies.

4.2.17.8 Commitments

To minimise risks associated with rehabilitation, Waratah Coal commit to:

- undertaking rehabilitation works in a progressive manner
- identifying specific access areas and determine goals for rehabilitation of disturbed land to minimise areas that will have lower land use quality post construction of the rail
- prepare and implement rehabilitation management plans for areas disturbed during construction activities
- manage lay down areas in a manner that will not result in a reduction in land quality
- prepare and implement erosion control measures and continue to monitor and maintain the measures implemented
- erosion and sediment control plans will be developed and put in place prior to the commencement of construction works for all areas of the rail that may cause erosion that effects rehabilitation works.

4.2.18 Element 18 – Acid Sulfate Soils

4.2.18.1 Background

No ASS fieldwork has as yet been conducted for the rail alignment rather, Waratah Coal has undertaken a literature review of:

- the relevant legislation and guidelines applicable to ASS within the project area
- topography, geology and soils mapping and aerial photography available for the project area
- previous ASS investigations relevant to the project area.

DEHP has produced ASS risk maps for various regions across Queensland that provides risk mapping based on field investigations carried out by Queensland Acid Sulfate Soils Investigation Team. Current DEHP ASS mapping does not include the project site. The closest ASS Hazard map is the Bowen ASS Area Map. ASS investigations terminated on the south east bank of the Don River approximately 15km south east of Abbot Point.

The majority of the rail corridor is located in areas with a low to nil probability of encountering ASS. A review of the CSIRO's ASRIS broad scale soils mapping (mapped at a scale of 1:2,000,000) indicates that the rail alignment at Abbot Point may contain ASS. The CSIRO's Australian Soil Resource Information System broad scale mapping also indicates that sections where rail may need to traverse the APSDA includes areas which may contain ASS, however as the limit of the assessment for this EIS/SEIS is the boundary of the APSDA, these are outside of the scope of this EIS/SEIS.

4.2.18.2 Environmental Values

The EIS has determined that, based on desktop assessment, ASS may be encountered within the rail corridor alignment at or below 5 m AHD where the rail corridor crosses creeks and streams. Based on the outcome of these desktop studies, there is a requirement for field-based ASS investigations to be undertaken along the rail corridor at locations below 20 m AHD. Of particular focus during these investigations will be the eastern extent of the rail alignment in the vicinity of the proposed coal terminal.

Waratah Coal has committed to undertaking further ASS investigations during the Project's Final Design Phase. If required, Waratah Coal will develop an ASS Management Plan which will conform with the requirements of the Queensland Acid Sulfate Soil Technical Manual and the State Planning Policy 2/02 (SPP2/02) – Planning and Managing Development Involving Acid Sulfate Soils and the SPP2/02 Guidelines: Acid Sulfate Soil.

4.2.18.3 Potential Impacts

The potential impacts of excavating or removing ASS include:

- the oxidation of potential ASS producing sulfuric acid and leaching out of metals (principally iron and aluminium) from the soil matrix and the resulting surface water impacts of lowered pH, metals contamination, dissolved oxygen depletion, iron staining of water ways and effects on marine biota such as mass mortalities and chronic disease
- the shortening of the lifespan of built infrastructure due to corrosion of metal and calcium substitution in concrete.

4.2.18.4 Operational Policy Objective

Minimise environmental impact by managing Acid Sulphate Soils.

4.2.18.5 Performance Criteria

Minimise and manage the risks of impacts from ASS in accordance with Queensland Acid Sulfate Soil Technical Manual.

4.2.18.6 Implementation Strategy

- site specific investigations for ASS are to be carried out prior to construction in areas along the rail alignment considered to be high risk (i.e. < 5 m AHD). If ASS are identified an ASS Management Plan for specific construction works will be developed
- if an ASS Management Plan (ASSMP) is required for the project, as ASSMP will be developed which includes measures such as:
    - a description of the occurrence of ASS on the site, including:
        - vertical and spatial distribution of ASS
        - a map of the site distribution of ASS
        - results of the preliminary ASS assessment
    - an overview of the proposed works including:
        - the dewatering and drainage strategies
        - the soil excavation strategy
        - delineation of any clay and peat lenses and horizons that may affect dewatering or excavation of soil
        - temporary storage of ASS, if proposed
        - reuse / disposal of excavated ASS
    - a description of the management strategies to minimise impacts from the site works including:

- strategies for preventing the oxidation of iron sulfides (including avoiding the disturbance of ASS by redesigning layout of the excavations and / or re-flooding of potential ASS to limit oxidation)
- treatment strategies for ASS (including neutralisation of ASS, use of lime / limestone barriers, burial of potential ASS)
- strategies for management of the watertable level on and off-site both during and post construction
- containment strategies to ensure that all contaminated stormwater and acidic leachate associated with the oxidation of ASS is prevented from entering the environment both in the short and long-term

- during the construction phase, the following will be undertaken:
  - all soil testing will be carried out in accordance with legislative and guideline requirements for ASS
  - all construction activities that involve excavation of natural materials from a depth greater than 0.5 m below natural surface level will include specific ASS management requirements
  - prior to commencing excavation works the following will occur:
    - sufficient area is available at the designated treatment pad to stockpile all of the excavated material
    - sufficient quantity of ag-lime is available on site to treat 200% of the estimated excavation volume, unless otherwise established through approved testing methods
    - suitable plant and equipment is available on site to spread and mix the ag-lime through the excavated material
  - during excavation of ASS material the following will be recorded daily:
    - details of source location, offset and depth
    - volume of excavated material
    - treatment location
    - quantity of ag-lime added to treated ASS material
    - disposal / storage location
  - spoil will be stored on site with adequate protection in accordance with an ESCP and stored away from drainage channels and water courses in accordance with the site's water quality management plan
  - after treatment is completed, verification testing will be conduct. Lots / stockpiles which fail verification will be re-treated at liming rates determined from the verification testing. Additional verification tests will be conducted after re-treatment
  - all neutralising agents will be handled and stored according to the specific MSDS for the product supplied by the manufacturer. MSDS sheets are to be retained onsite in the site offices.

4.2.18.7 Monitoring, reporting and corrective actions

- undertake regular inspections of soil during excavation
- records are to be kept documenting the volume of ASS excavated and treated, and quantity of lime and verification testing outcomes of treated excavation lots
- a monthly report is to be prepared and submitted to Waratah Coal and include details of monitoring results, audits, training and incidents
- any incident or disturbance of ASS is to be reported immediately to the project Supervisor and SEO
- incidents, complaints and any significant environmental harm are to be reported to regulatory body/ies where required
- appropriate control measures are to be implemented where unacceptable risk of ASS exposure is identified or may occur
- necessary corrective action is to be implemented following incident or complaint
- the Contractor will ensure that all appropriate personnel undertake adequate environmental awareness and training covering the requirements of the EMP regarding ASS management
- the Construction Environmental Manager is to request the cessation of works at any time should a breach of performance criteria of the EMP be occurring or is at risk of occurring.

4.2.18.8 Commitments

Based on the results of the preliminary assessments, Waratah Coal commits to the following:

- full investigations will be carried out to assess the presence of ASS within the footprint of the coal terminal prior to finalising the design
- an ASSMP will be developed for the construction of the coal conveyor system detailing the management requirements for ASS during construction of the coal conveyor including monitoring, treatment, verification testing and reporting
- ASS investigations and hydrogeological investigations will be conducted for the coal stockyards areas to assess the potential for the filling activities to be conducted on site to impact on ASS below the stockyards causing the extrusion of PASS, acidification of groundwater and or the mobilisation of acidified groundwater to receiving waters
- ASS investigations will be conducted on creek and steam channel crossings below 20m AHD where acid sulfate soils may be present at or above the 5m AHD contour;
- where ASS are identified within the rail corridor, a detailed ASSMP will be developed including monitoring, treatment, verification testing and reporting for the individual construction works.