Adani Mining Pty Ltd

Carmichael Coal Mine and Rail Project

Environmental Management Plan - Rail

March 2014

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SECTION A: ENVIRONMENTAL MANAGEMENT FRAMEWORK

1. Introduction

1.1 Project Background

The Carmichael Coal Mine and Rail Project was declared a 'significant project' under the *State Development and Public Works Organisation Act 1971* (SDPWO Act) and as such, an Environmental Impact Statement (EIS) is required for the Project. The Project is also a 'controlled action' and requires assessment and approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

On 24 May 2011, the Coordinator-General issued the Final Terms of Reference (TOR) for the EIS (State of Queensland, 2011). The TOR set out the general and specific matters the project proponent must address when preparing the EIS. This document addresses Section 8 of the Final TOR relevant to the Project which required Adani to develop an Environmental Management Plan (EMP) for the Project. This EMP has been developed specifically to manage environmental requirements for the Project (Rail).

The EIS, submitted in December 2012, assessed the environmental, social and economic impacts associated with developing a 60 million tonne (product) per annum (Mtpa) thermal coal mine in the northern Galilee Basin, approximately 160 kilometres (km) north-west of Clermont, Central Queensland, Australia. Coal from the Project will be transported by rail to the existing Goonyella and Newlands rail systems, operated by Aurizon Operations Limited (Aurizon). The coal will be exported via the Port of Hay Point and the Point of Abbot Point over the 60 year (90 years in the EIS) mine life.

Project components are as follows:

- The Project (Mine): a greenfield coal mine over EPC 1690 and the eastern portion of EPC 1080, which includes both open cut and underground mining, on mine infrastructure and associated mine processing facilities (the Mine) and the Mine (offsite) infrastructure including a workers accommodation village and associated facilities, a permanent airport site, an industrial area and water supply infrastructure
- The Project (Rail): a greenfield rail line connecting to mine to the existing Goonyella and Newlands rail systems to provide for the export of coal via the Port of Hay Point (Dudgeon Point expansion) and the Port of Abbot Point, respectively including:
    - Rail (west): a 120 km dual gauge portion running west from the Mine site east to Diamond Creek
    - Rail (east): a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah
    - Quarries: The use of five local quarries to extract quarry materials for construction and operational purposes.

1.2 Environmental Management for the Carmichael Coal Mine and Rail Project

This EMP (Rail) has been prepared to support an environmental impact assessment process for the Carmichael Coal Project under the EPBC Act and SDPWO Act. As such, the EMP reflects the findings and recommendations of studies undertaken for the EIS, and provides a framework for management of identified impacts and implementation of recommendations made in the EIS. The EMP will be further developed as detailed design of the Project continues and to achieve compliance with conditions of approvals obtained.

Environmental management for the Project (Rail) will operate within an Environmental Management System (EMS) framework, in accordance with the ISO 14001: 2004 EMS standard.

In relation to site and project specific requirements, this EMS will apply on a site-specific and project-specific basis and is managed by the Environmental function on each site and overseen by the relevant area managers.

For projects and operating sites, the EMS requires:

- The establishment of systems and arrangements to ensure compliance with the Adani EMS Management Standards
- Utilising Adani EMS Compliance Guidelines for the development and implementation of procedures.
- Contributing to the implementation and on-going operation of the EMS.

In regards to ongoing environmental management, the Carmichael Coal Project has been split into three components for the purposes of preparing environmental management plans:

- Mining activities, being all activities carried out within the mining leases. Environmental management of these activities will be covered in the EMP (Mine)
- Off-site infrastructure, including workers accommodation village, dedicated airport, off-site industrial area and associated infrastructure such as water supply, storage and transfer infrastructure. Environmental management of these activities is covered in the EMP (Offsite).
- Railway activities, associated maintenance facilities and Quarries. Environmental management of these activities will be covered in this EMP (Rail).

Each EMP covers:

- Design and pre-construction requirements
- Construction phase activities
- Operation activities
- Decommissioning.

Closure and Rehabilitation requirements have been identified and included in a separate Closure and Rehabilitation Management Strategy Plans for the Rail and Quarries.

Depending on the selected contracting strategy for the construction and operation phases, contractors and subcontractors may be required to prepare stand-alone EMPs for those aspects of the project under their control. Such plans will be required to be consistent with this EMP.

As required by the continual improvement approach to environmental management, this EMP is a dynamic document and will be updated as required to reflect:

- Changing significance of impacts and hazards associated with the rail construction and associated infrastructure
- Changes in legal and other obligations
- Learnings and corrective actions from monitoring activities.

Reviews of the EMP and management review requirements are set out in Section 5.1. As the Carmichael Coal Rail Project has a proposed operating life of 90 years, it is likely that significant changes in legislation, policy and available techniques in relation to environmental management will occur during the life of the Project. Annual review of the EMP will ensure that any changes are adopted.

2. Project Description

2.1 Project location

The Project (Rail) alignment is located within a 95 metre (m) wide corridor that runs from the terminal facilities within the boundary of the Mine approximately 189 km eastwards to connect with the Wotonga Blair Athol Branch Railway of the existing Aurizon Operations Limited (Aurizon) Goonyella Coal Rail System (Goonyella rail system), south of Moranbah. The alignment is approximately 189 km long and runs west to east (Figure 2-1).The Project (Rail) traverses 11 leasehold lots and 10 freehold lots and sits wholly within the Isaac Regional Council (IRC) Local Government Area (LGA).

2.2 Project (Rail) Components

The Project (Rail) consists of a greenfield rail line connecting the Carmichael Mine to the existing Goonyella rail system to provide for export of coal via the Port of Abbot Point and/or the Port of Hay Point (Dudgeon Point expansion), respectively, including:

- Rail (east): a 69 km narrow gauge portion running east from Diamond Creek connecting to the Goonyella rail system south of Moranbah
- Rail (west): a 120 km dual gauge portion from the Mine site running west to east to Diamond Creek
- Quarries: The use of five (5) local quarries to extract quarry materials for construction and operational purposes.

The key components for the Project (Rail) include:

- Rolling stock
- Terminus facility
- Track (including earthworks and structures)
- Passing loops
- Maintenance facility (rolling stock and track)
- Signalling and communications
- Quarries /Borrows

2.2.1 Rolling stock

The number of trains operating within the rail system reflects the production of coal from the Project (Mine). The operation of the Project (Rail) is in support of the Project (Mine) with an expected operational life of 90 years. Operational capacity of the Project (Rail) will increase from 25 Mtpa in the first year of operation, to 44 Mtpa in 2020, reaching a capacity of 60 Mtpa in 2022, in line with production from the Project (Mine). To accommodate other existing and/or proposed third party users, provision has been made for a maximum operational capacity of 100 Mtpa on Rail (west) by 2024.

To reach the nominal maximum coal transport rate of 100 Mtpa for Rail (west), an estimated 18 return trips each day is required (i.e. 36 trips) where the net load per train is 24,000 tonnes of coal consisting of 240 wagons. While for Rail (east) 60 Mtpa will be the maximum transport amount, equating to an estimated 18 return trips each day (i.e. 36 trips) where the net load per train is 16,072 tonnes of coal consisting of 120 wagons.

Figure 2-1 Project (Rail) Location

2.2.2 Terminus facility

Coal product is loaded on to the trains at the terminus facility, located within the Mine Infrastructure Area (MIA). The terminus consists of:

- A dual gauge reception line of 4.5 km length
- Balloon loop loading line of 18.7 km length
- Dual gauge 4.5 km length departure line
- Train loading facility comprising a weighbridge and/or overload removal device
- Bad order siding
- Terminus facility comprising control room, dragging equipment detector, overload detector instrument, derailment detector, telecommunication system.

2.2.3 Tracks

The Project (Rail) will include track comprising both narrow and standard gauge along the length of the Project (Rail). Track will generally consist of:

- Ballast
- Sleepers
- Rail fixings and jewellery
- Rail.

Associated infrastructure will include bridges and culverts to provide access across watercourses, as well as over/under passes at stock routes and roads.

2.2.4 Passing loops

Five dual gauge passing loops, each 4.5 km in length, are proposed along Rail (west). Three narrow gauge passing loops, each 2.5 km in length are proposed along Rail (east).

Bad order sidings are required to allow maintenance activities to take place with minimal disruption to the rest of the line. Bad order sidings will be constructed at every second or third passing loop subject to further operational assessment.

2.2.5 Maintenance Facility

A Maintenance Facility will be located on Moray Downs near the Mine comprising:

- Traffic and workshop tracks
- Locomotive provisioning
- Locomotive and wagon maintenance
- Combined locomotive and wagon wash facility
- Storage areas for components
- Storage areas for diesel and other hazardous substances
- Administration and train crew depot.

A maintenance access track will run adjacent to the rail line wherever possible.

2.2.6 Signalling and communications

The signalling requirements for the Project (Rail) will consist of a series of remote control signalling (RCS) systems currently in use within Queensland. The train control will be located within the existing Aurizon train control centre as the Project (Rail) is integrating with the Aurizon rail system. In addition, a satellite control centre will be considered in Brisbane for controlling Project (Rail) operations.

2.2.7 Quarries

Adani requires the supply of up to 12 million tonnes of fill material for the construction and operation of the Carmichael Coal Mine and Rail Project and associated local council road upgrades. To supply the necessary quarry material, five (5) quarries / borrows will be developed in proximity to the rail line for construction of the Project, with one quarry (Borrow 7) being retained for the life of the mine. These include:

- Moray Quarry
- North Creek Quarry
- Borrow 7
- Disney Quarry
- South Back Creek.

2.3 Construction Activities

The construction program defines a number of stages and activities, consisting of:

- Site preparation: including site clearance, construction camp establishment, installation of temporary and permanent fencing, installation of drainage and water management controls and construction of site access
- Civil works: including bulk earthworks, black soil treatment, construction of cuts and embankments, installation of permanent drainage controls, construction of temporary haul roads, establishment of concrete batching plants, bridge and water course crossing construction
- Track works: including installation of the rail, signalling infrastructure and maintenance infrastructure.

In addition, transportation of equipment, materials and workforce will also take place.

2.4 Operational Activities

Operational activities for the Project (Rail) include:

- Coal loading at Terminus Facility
- Coal haulage, 24 hours per day, seven days per week throughout the year
- Track maintenance

- Locomotive and wagon maintenance
- Train washing
- Transportation of equipment, materials and workforce
- Material and equipment storage
- Storage and handling of diesel and other hazardous substances

3. Environmental Management Framework

3.1 Environment and Sustainability Policy

Adani is committed to the protection of the environment and to the sustainable management of its operations and activities. Adani operates an established Health, Safety and Security (HSS) Management System and will develop and implement an EMS to support the construction and operation of the Project. These systems will be developed to comply with relevant legislative standards for operation of railway operations within Queensland, and comprise an Environment and Sustainability Policy and EMS Management Standards. A copy of Adani's Environment and Sustainability Policy is attached in Volume 4 Appendix A of the EIS.

The EMS will guide environmental management for the Project (Rail) by providing a framework to prevent or minimise environmental harm, ensure compliance and promote continuous improvement. Key components of the system will include:

- Responsibility, authority and commitment
- Planning, objectives and legal obligations
- Training and competence
- Documentation, document control and records
- Incidents and performance measurement
- Communication, consultation and involvement
- Emergency preparedness and response
- Reviews, audits and inspections.

All contractors and staff involved in the Project (Rail) will be required to adhere to Adani's Environment and Sustainability Policy and the key requirements of the EMS.

3.2 Planning for Environmental Management

Environmental management requires a continuous process of:

- Identification of impacts and risks to the environment from the mining activity and setting targets for environmental performance and protection of environmental values
- Developing and implementing controls and management actions to achieve targets
- Monitoring and reporting on the effectiveness of controls and management actions in protecting environmental values and meeting objectives
- Reviewing and updating systems, processes and corrective actions through a focus on continual improvement.

This cycle, known as the plan-do-check-review cycle is shown in Figure 3-1.

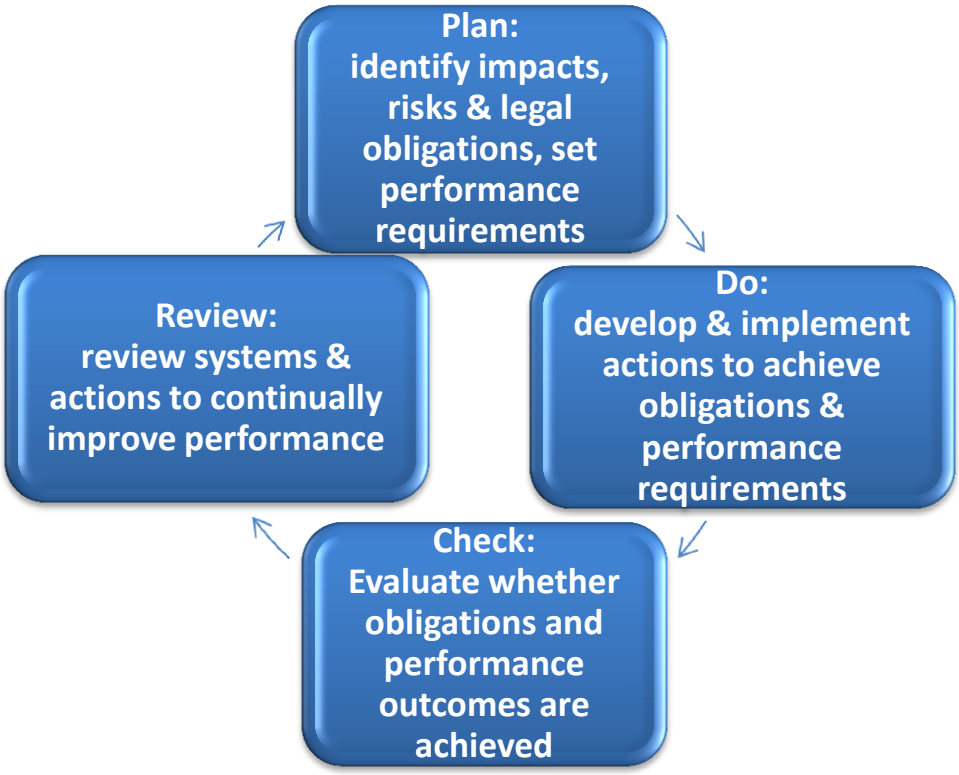


Figure 3-1 Plan-Do-Check-Review Cycle

Sub-plans (in Section B: Environmental Management Sub-plans) developed for this EMP reflects this process by presenting:

- Legislative framework relevant to the particular element
- Information on key environmental values and sensitivities potentially impacted by the rail operations
- A summary of impacts potentially arising from construction and operation
- Preliminary performance outcomes in relation to management of impacts on the environmental values
- Management controls for the design, construction and operation phases of the Project (Rail)
- A program of monitoring against performance indicators and suggested corrective actions in the event that monitoring indicates that performance requirements have not been met.

These sub-plans sit within an overall framework of continuous review and improvement of environmental performance.

This EMP reflects the general requirements of an environmental management system. Mapping of contents against ISO14001 requirements is provided in Table 3-1.

Table 3-1 Mapping Against EMS Requirements

ISO 14001 Requirement	How Addressed
PLANNING	
Environmental policy	Section 3.1 contains Adani's Environment and Sustainability Policy
Roles and responsibilities	Section 3.3 identifies roles and responsibilities during design, construction and operation.
Environmental aspects and impacts	Section B: Environmental Management Sub-plans contain environmental values and potential impacts of construction and operation of the Project (Rail) for each element.
Legal and other obligations	Overarching legal and other obligations are in Section 3.4. Sub-plans for each element also include legislation relevant to these elements. Conditions of approval not yet issued will be incorporated into the legal and other obligations register upon receipt.
Objectives and targets	Performance outcomes are also identified in sub-plans for each element. Monitoring requirements also include performance indicators for each monitoring requirement.
IMPLEMENTATION	
Operational control and procedures	Operational controls are set out in the individual sub-plans for each element in Section B: Environmental Management Sub-plans
Training and competency	Training and competency requirements are included in Section 3.7.
Documentation and records	Documentation and record keeping is addressed in Section 3.9. Management controls in each sub-plan also specify evidence requirements in relation to implementation of each control.
CHECKING	
Checks and inspections	Requirements for checks and inspections are set out in Section 4.2.
Monitoring	Section 4.1 identifies a summary of monitoring requirements. In addition, monitoring requirements are set out in the sub-plans for each element.
Auditing	Auditing requirements are provided in Section 4.3.
ACTING	
Corrective actions	Corrective action requirements are set out in Section 3.6.

ISO 14001 Requirement	How Addressed
Management review	Management review requirements are set out in Section 5.1.

3.3 Roles and Responsibilities

3.3.1 Overview

Adani's Compliance Guidelines set out requirements for assigning roles and responsibilities in relation to environmental management.

Preliminary roles and responsibilities for design and pre-construction, construction and operation phases are presented in Sections 3.3. These will be revised once organisational structures for each phase of the Project are confirmed.

In accordance with the guideline:

- Position descriptions will contain responsibilities and accountabilities for environmental compliance and management
- Performance against environmental compliance and management requirements will be part of the annual performance review and linked to remuneration and promotion of managers.

3.3.2 Design and Pre-construction

Table 3-2 Roles and Responsibilities – Design and Pre-construction

Role	Responsibility
CEO	Approve and endorse the Environment and Sustainability Policy. Ensure that adequate resources are available to comply with the Environment and Sustainability Policy.
Adani Senior Management	Ensure compliance with all legal requirements including requirements of EPBC approval, environmental authority and other environmental and planning approvals. Ensure that requirements of this EMP are incorporated into engineering and procurement processes, and that these processes do not conflict with environmental performance requirements. Ensure that adequate resources are available to meet all compliance requirements and implement the requirements of this EMP. Demonstrate a visible and pro-active commitment to environmental issues as per Adani Guideline CG-128 – Management Commitment.

Role	Responsibility
Adani Contract Management and Procurement Team	Ensure that procurement and contracting strategies reflect environmental performance requirements and requirements of Adani Guidelines CG-022 – Contractor's Management and CG-021 – Procurement. Ensure that specifications and contracts include performance requirements in relation to energy and water efficiency and other measures to reduce resource consumption and waste generation Incorporate environmental performance requirements into contracts. Ensure that contractors hold necessary approvals and authorisations, particularly in relation to waste management services. Review environmental performance credentials of potential contractors. Demonstrate a visible and pro-active commitment to HSS issues as per Adani Guideline CG-128 – Management Commitment.
Design Manager	Ensure that design requirements set out in this EMP and any other design requirements needed to meet conditions of approval are incorporated into design. Consider safety in design and minimisation of environmental impacts in design. Demonstrate a visible and pro-active commitment to HSS issues as per Adani Guideline CG-128 – Management Commitment.
Design Leads	Develop design checklists to reflect design requirements set out in this EMP and maintain records of compliance with design requirements.
Environmental Manager and Advisors	Provide advice to management, procurement and design teams in relation to environmental requirements. Conduct regular audits and checks of environmental performance. Manage technical studies and research activities relating to environmental assessment and management of the Project. Maintain and further develop the EMP.
Stakeholder Manager	Manage external relations with landholders and other stakeholders. Coordinate investigation and response to complaints and incidents involving members of the public.

3.3.3 Construction

Table 3-3 Roles and Responsibilities – Construction

Role	Responsibility
CEO	Approve and endorse Environment and Sustainability Policy. Ensure that adequate resources are available to comply with the Environment and Sustainability Policy. Demonstrate a visible and pro-active commitment to HSS issues as per Adani Guideline CG-128 – Management Commitment.
Adani senior management	Ensure compliance with all legal requirements including requirements of EPBC approval, environmental authority and other environment and planning approvals. Ensure that adequate resources are available within Adani and contractors to meet all compliance requirements and implement the requirements of this EMP. Monitor close-out of corrective actions. Review outcomes of incident investigations. Demonstrate a visible and pro-active commitment to environmental issues as per Adani Guideline CG-128 – Management Commitment.
Adani Contract Management Team	Manage environmental performance requirements in contracts, including penalties in the event of non-compliance. Demonstrate a visible and pro-active commitment to HSS issues as per Adani Guideline CG-128 – Management Commitment.
Adani Environmental Manager and Team	Provide advice to Adani management teams and personnel in relation to environmental requirements. Integrate environmental management requirements into work procedures and practices. Conduct audits and checks of compliance and environmental performance of contractors. Monitor and report on compliance against all project approvals and commitments. Communicate environmental obligations and requirements to construction staff. Track changes in legislation, policy and other obligations and ensure these are incorporated into environmental compliance and management requirements and communicated to relevant managers and staff. Manage technical studies and research activities relating to

Role	Responsibility
	environmental assessment and management of the Project. Raise corrective actions for any non-compliance with this EMP, approval conditions or in response to results of incident investigations. Conduct incident investigations, report to Adani on environmental performance including compliance, non-compliance, incidents and near misses with potential or actual environmental harm. Further develop the EMP.
Construction Managers and Supervisors	Implement all relevant requirements of this EMP. Integrate environmental management requirements into work procedures and practices. Provide initial responses to emergencies involving potential environmental impacts. Participate in incident investigations.
Construction workers and all other staff	Comply with all relevant requirements of this EMP.
Contractor Environmental Managers and Officers	Assist and support managers, supervisors and workers in implementing the EMP and achieving environmental compliance. Conduct monitoring, auditing and reporting activities required in this EMP. Assist with incident response and investigation where required to manage and address environmental impacts of incidents. Conduct induction training and tool box talks on environmental topics. Compile monthly and quarterly environmental reports.
Stakeholder Manager	Manage external relations with landholders and other stakeholders. Coordinate investigation and response to complaints and incidents involving members of the public.

3.3.4 Operation

Table 3-4 Roles and Responsibilities – Operation

Role	Responsibility
CEO	Approve and endorse Environment and Sustainability Policy. Ensure that adequate resources are available to comply with the Environment and Sustainability Policy. Assign authorities and responsibilities for environmental compliance and performance. Demonstrate a visible and pro-active commitment to HSS issues as per Adani Guideline CG-128 – Management Commitment.
Rail General Manager	Implement the Adani Environment and Sustainability Policy. Ensure compliance with all legal requirements including requirements of EPBC approval, environmental authority and other environment and planning approvals. Monitor actioning and close out of non-conformances. Ensure that adequate resources are available within Adani and contractors to meet all compliance requirements and implement the requirements of this EMP. Ensure that all personnel and contractors understand environmental authority conditions, responsibilities and requirements. Incorporate environmental performance and compliance requirements into job descriptions and performance reviews. Demonstrate a visible and pro-active commitment to HSS issues as per Adani Guideline CG-128 – Management Commitment. Reward outstanding performance in relation to environmental performance.
Rail Operation Manager	Ensure that requirements of this EMP are incorporated into all aspects of the rail operation and maintenance and are implemented. Raise corrective actions for any non-compliance with this EMP or in response to results of incident investigations. Conduct incident investigations. Demonstrate a visible and pro-active commitment to HSS issues as per Adani Guideline CG-128 – Management Commitment.

Role	Responsibility
Procurement Manager	Ensure that specifications include performance requirements in relation to energy and water efficiency and other measures to reduce resource consumption and waste generation. Ensure that contractors hold necessary approvals and authorisations, particularly in relation to waste management services. Review environmental performance credentials of potential contractors. Demonstrate a visible and pro-active commitment to HSS issues as per Adani Guideline CG-128 – Management Commitment. Meet requirements of Adani Guideline GG-021 - Procurement in relation to purchasing.
Rail Operation Supervisors	Integrate environmental management requirements with work procedures and practices. Raise corrective actions for any non-compliance with this EMP or in response to results of incident investigations. Coordinate initial response to incidents with potential or actual environmental harm.
Employees and Contractors	Comply with all requirements of this EMP.
Adani Environmental Manager and Team	Provide advice to Adani managers and personnel in relation to environmental requirements. Assist and support managers, supervisors and workers in implementing the EMP and achieving environmental compliance. Conduct monitoring, auditing and reporting activities required in this EMP. Monitor and report on compliance against all project approvals and commitments. Communicate environmental obligations and requirements to construction and operational staff. Lead and assist with incident response and investigation where required to address environmental impacts of incidents. Conduct induction training and toolbox talks on environmental topics. Compile monthly and quarterly environmental reports Conduct audits and checks of compliance and environmental performance of contractors.

Role	Responsibility
	Track changes in legislation, policy and other obligations and ensure these are incorporated into environmental compliance and management requirements and communicated to relevant managers and staff. Manage technical studies and research activities relating to environmental assessment and management of the Project. Review, update and further develop the EMP.
Stakeholder Manager	Manage external relations with landholders and other stakeholders. Coordinate investigation and response to complaints and incidents involving members of the public.

3.4 Legal and other Obligations

3.4.1 Overview

Adani Compliance Guideline CG-002 – Legal Obligations sets out system requirements in relation to legal and other obligations.

These obligations have been detailed through the Carmichael Coal EIS (Volume 4 Appendix D) and SEIS (Volume 4 Appendix C).

Evaluation of compliance with legal and other obligations will be undertaken through regular compliance audits and a quarterly review of changes in legal and other obligations will be undertaken.

Relevant legislation has been identified in sub-plans in this EMP.

3.4.2 Applicable Legislation and Policies

Applicable legislation, policies and other statutory instruments are shown in Section 3.4.2. Current versions of federal legislation can be obtained from http://www.austlii.edu.au/au/legis/cth/consol_act/.

Current versions of Queensland legislation can be obtained from http://www.legislation.qld.gov.au/acts_sls/acts_sl.htm.

Table 3-5 Summary of Relevant Environmental Legislation – Rail

Title	Relevance to the Project (Rail)
Commonwealth Legislation	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act implements Australia's obligations to protect and conserve biodiversity and heritage under a range of international treaties and agreements. In relation to projects, the Act requires assessment and approval of actions that may have a significant impact on a range of Matters of National Environmental Significance (MNES), including (as relevant to the Project) threatened species and ecological communities, migratory species, World Heritage areas and national heritage places. The Project has been declared a controlled action on 6 January 2011 due to the likely potential impacts on MNES (EPBC Referral 2010/5736). Assessment is to be under a bilateral agreement in place with the Queensland government. Activities associated with the Project may not commence until approval is granted under the EPBC Act. Once approval is granted, the Rail EMP will need to be updated to incorporate actions required to achieve compliance with approval conditions.
Native Title Act 1993 (NT Act)	The Commonwealth NT Act formalises the common law recognition of ancestral domain or native title, that is rights and interests over land and water possessed by Indigenous people in Australia under their traditional laws and customs. The NT Act provides for the existence of native title rights and interests over land that is or has been subject to a pastoral lease, and possibly some other forms of leasehold tenure.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	The *Aboriginal and Torres Strait Islander Heritage Protection Act* preserves and protects nominated areas and objects in Australia and in Australian waters which are of particular significance to Aboriginals in accordance with Aboriginal tradition.
Great Barrier Reef Marine Park Act 1975	The *Great Barrier Reef Marine Park Act* establishes a framework for the establishment, control, management and development of the Great Barrier Reef Marine Park (GBRMP). The GBRMP Act is administered by the Great Barrier Reef Marine Park Authority (GBRMPA).
National Greenhouse and Energy Reporting Act 2007 (NGER Act)	The NGER Act sets up a range of reporting mechanisms to assist the Australian Government in understanding greenhouse gas emissions and energy consumption by corporations. This information is used to monitor emissions profiles, inform government policy, programs and other initiatives and meet National and international reporting obligations. Adani will be required to report under the NGER Act.

Title	Relevance to the Project (Rail)
National Environment Protection Council Act 1994	The *National Environment Protection Council Act 1994* establishes the National Environment Protection Council (now known as the Environment Protection and Heritage Council). The Council is responsible for developing national environment protection measures (NEPM). The *National Environment Protection (National Pollutant Inventory) Measure 1998* requires organisations to report on emissions of certain pollutants. .
Clean Energy Act 2011	The *Clean Energy Future Act 2011* sets up the carbon pricing mechanism and contains rules for who is covered by the carbon pricing mechanism, what sources of carbon pollution are included, the surrender of emissions units, caps on the amount of carbon pollution from 1 July 2015, international linking, monitoring, enforcement, and appeal and review provisions.
Energy Efficiency Opportunities Act 2006 (EEO Act)	The EEO Act applies to businesses that use more than 0.5 PJ of energy per year. Participants in the program are required to assess their energy use and report publicly on the results of the assessment and the business response. Decisions on energy efficiency opportunities remain at the discretion of the business.
Carbon Credits (Carbon Farming Initiative) Act 2011	The Carbon Farming Initiative (CFI) has been developed to give farmers, forest growers and landholders the ability to generate accredited domestic offsets for access to domestic voluntary and international carbon markets.
Queensland Legislation	
Aboriginal Cultural Heritage Act 2003	The *Aboriginal Cultural Heritage Act 2003* establishes a 'cultural heritage duty of care', which requires that a person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage.
Agricultural Chemicals Distribution Control Act 1966	Under the *Agricultural Chemical Distribution Act 1966*, if you intend to use ground equipment to distribute herbicides on land that you do not own or occupy, you may need a commercial operator's licence.
Clean Energy Act 2008	This Act applies to business using more than 30 TJ of energy, but less than 500TJ and requires reporting of emissions.
Environmental Protection Act 1994 (EP Act)	The EP Act places emphasis on managing Queensland's environment within the principles of ecologically sustainable development. While concerned with all aspects of ecologically sustainable development, regulations, policies and other requirements under the EP Act focus on protection of air quality, acoustic quality and

Title	Relevance to the Project (Rail)
	water quality as well as on waste management and land contamination. The EP Act sets up a process for environmental approval of environmentally relevant activities as part of the development assessment process established under the *Sustainable Planning Act 2009*. Construction of components involving environmentally relevant activities cannot commence until a development approval (material change of use) is in place and must then comply with the conditions of the development approval. The EP Act also imposes a 'General Environmental Duty' requiring all individuals and organisations to take all reasonable and practical measures to avoid environmental harm.
Environmental Protection Regulation 2008 (EP Reg)	Schedule 2 of the EP Regulation lists 57 Environmentally Relevant Activities (ERAs) including waste disposal, water treatment plant and sewage treatment. The regulations also provide a regulatory regime for minor issues involving environmental nuisance such as noise.
Environmental Protection (Waste Management) Regulation 2000	The *Environmental Protection (Waste Management) Regulation 2000* implements various waste management matters covered by the EP Act. Relevant to the Carmichael Project, this regulation sets up a system for tracking of certain wastes that are hazardous to the environment. The system tracks wastes from the point of generation to the point of disposal through a docket system.
Environmental Protection (Water) Policy 2009 (EPP Water)	The EPP Water establishes environmental values in relation to Queensland's water resources. The EPP also sets up frameworks for water quality guidelines and prescribes specific water quality objectives for a number of basins in Queensland, which are included in Schedule 1 of the EPP Water. Specific water quality objectives have not yet been prescribed for the Burdekin Basin, and hence, water quality objectives default to the objectives required to protect the environmental values of waters.
Environmental Protection (Noise) Policy 2008 (EPP Noise)	The EPP Noise sets acoustic quality objectives and deals with the evaluation procedure. Additionally the policy deals with abatement of unreasonable noise and is intended to provide measures for nuisance noise control.
Environmental Protection (Air) Policy 2008 (EPP Air)	The purpose of the EPP Air is to identify environmental values to be protected or enhanced, specifically air quality indicators, and provides a framework for decision-making. The Project will be subject to obligations under the EPP Air.

Title	Relevance to the Project (Rail)
Mineral Resources Act 1989 (MR Act)	The MR Act covers prospecting, exploration and mining of minerals in Queensland. A portion of the rail balloon loop is located within a Mining Lease.
Fisheries Act 1994	This Act regulates activities such as fishing, development in fish habitat areas, and damage to and destruction of marine plants in Queensland. Constructing or raising a waterway barrier is assessable development under the SP Act and Fish Habitat Management Operational Policy FHMOP 008 (Waterway barrier works development approvals) is established under the *Fisheries Act 1994* to guide application for waterway barrier works approval.
Forestry Act 1959	The purpose of the *Forestry Act 1959* is to provide for forest reservations, the management, silvicultural treatment and protection of State forests, and the sale and disposal of forest products and quarry material, the property of the Crown on State forests, timber reserves and on other lands; and for other purposes. The Act is administered by the Department of Natural Resources and Mines (DNRM).
Land Act 1994	The objective of the *Land Act 1994* requires land administered under the Act to be managed for the benefit of the people of Queensland on the basis of the following seven principles: sustainability, evaluation, development, community purpose, protection, consultation and administration.
Land Protection (Pest and Stock Route Management) Act 2002 (LP Act)	The purpose of the LP Act is to provide for pest management and for land and stock route network management. Under the LP Act landholders are required to manage certain declared weeds. Weed management is covered in Section B: Environmental Management Sub-plans.
Nature Conservation Act 1992 (NC Act) *Nature Conservation (Protected Plants) Conservation Plan 2000* *Nature Conservation (Wildlife Management) Regulation 2006*	The objective of the NC Act is to conserve nature which is to be achieved by an integrated and comprehensive conservation strategy for the whole of Queensland, involving amongst other things the protection of native wildlife and its habitat. The *Nature Conservation (Protected Plants) Conservation Plan 2000* identifies protected plants including those listed as least concern (almost all native plants within Queensland) as requiring a clearing permit from DNRM prior to removal. This Conservation Plan outlines how clearing permits, licences and exemptions can be issued to take protected plants. Under the *Nature Conservation (Wildlife Management) Regulation*, any activity that will tamper with (i.e. remove, damage, impair or degrade) the confirmed breeding place of a native animal (i.e. Endangered, Vulnerable, Near Threatened

Title	Relevance to the Project (Rail)
	and Least Concern wildlife) requires a Damage Mitigation Permit (DMP) or Species Management Programme (SMP) in order to be conducted legally. This permit will need to be held by fauna spotters involved in vegetation clearing activities.
Queensland Heritage Act 1992	The *Queensland Heritage Act 1992* provides for the conservation and protection of places and items of historical and/or non-Indigenous cultural heritage Under this Act, places and items must be entered into a Queensland Heritage Register in order to be protected. Substantial penalties may apply for damage to a place or items that have been entered on the Register.
State Development and Public Works Organisation Act 1971 (SDPWO Act)	The SDPWO Act has a number of functions in relation to State planning and development including coordination of environmental assessments of significant projects. In relation to coordination of environmental assessments, the SDPWO Act establishes an EIS process for projects declared as Coordinated Projects (previously 'significant projects') under the Act. The Office of the Coordinator-General provides an overall facilitation and coordination process in relation to the setting of Terms of Reference for an EIS, and assessment of an EIS prepared by a proponent. In this role, the Office of the Coordinator General seeks advice from other State government agencies. Where a project is being assessed under the EPBC Act through a bilateral agreement, the Office of the Coordinator General also liaises with SEWPC. The Carmichael Coal Project was declared a Significant Project under the SDPWO Act and an EIS was prepared to meet the environmental coordination requirements for significant projects. Work associated with the Project cannot commence until approval, in the form of a Coordinator-General's report is granted. Once approval is granted, the Rail EMP will need to be updated to incorporate actions required to achieve compliance with approval conditions.
Strategic Cropping Land Act 2011 (SCL Act)	In terms of planning and approvals, this legislation provides for the adoption of state planning policy that will implement cropping zones within Queensland, provide strategic cropping land (SCL) criteria and the assessment process for proponents.
Sustainable Planning Act 2009 (SP Act)	The SP Act provides a framework for development assessment and approval in Queensland, bringing together requirements of a range of legislation.

Title	Relevance to the Project (Rail)
Transport Infrastructure Act 1994	The overall objective of the *Transport Infrastructure Act 1994*, consistent with the objectives of the *Transport Planning and Coordination Act 1994*, is to provide a regime that allows for, and encourages, effective integrated planning and efficient management of a system of transport infrastructure.
Transport Operations (Rail Safety) Act 2010	The objective of the *Transport Operations (Rail Safety) Act 2010* is to: • Provide for improvement of the safe carrying out of railway operations; • Provide for the management of risks associated with railway operations; • Make special provision for the control of particular risks arising from railway operations; and • Promote public confidence in the safety of transport of passengers or freight by rail.
Vegetation Management Act 1999 (VM Act)	The purpose of the VM Act is to regulate the broad scale clearing of vegetation, preserve remnant endangered regional ecosystems, vegetation in areas of high nature conservation value, areas vulnerable to land degradation and regrowth vegetation. The VM Act also aims to prevent degradation, maintain or increase biodiversity, maintain ecological processes and allow for ecologically sustainable land use. The VM Act is administered by DNRM.
Water Act 2000 (Water Act)	The Water Act provides for management and sustainable use of freshwater resources in Queensland, including surface waters and groundwater. The approach to sustainable management of water resources is through the development of a Water Resource Plan (WRP) and Resource Operations Plan (ROP) for each basin. The WRP and ROP set out the rules for allocation and use of water resources. The Carmichael Project within the area covered by the *Water Resource (Burdekin Basin) Plan 2007*. Under the Water Act, a licence is required for taking or interfering with water, diversion of waterways and interfering with flow by impoundment of a waterway and will therefore be required for the water supply scheme. Where works are involve the vegetation removal or the placement / excavation of fill within a watercourse, works will be undertaken in accordance with the Guideline – Activities in a watercourse, lake or spring associated with a resource activity or mining operations.

Title	Relevance to the Project (Rail)
Water Resource (Burdekin Basin) Plan 2007 and Water Resource (Fitzroy Basin) Plan 2007	Water resource plans set out the requirements for sustainable management of water resources, when water may be taken with and without an allocation and matters to be considered when granting allocations.
Water Supply (Safety and Reliability) Act 2008	Among other things, this Act regulates dams that are not hazardous waste dams. Constructing or raising a dam is assessable development under the SP Act if failure of the dam would put more than 2 people at risk. The Act sets out requirements for failure impact assessment and other dam safety related requirements.
Work Health and Safety Act 2011 (WHS Act)	The WHS Act regulates dangerous goods and major hazard facilities within Queensland. A licence for storage and handling of hazardous materials, particularly dangerous goods and combustible liquids may be required for the Project (Rail). This licence is administered by the Department of Community Safety (DCS) and will be required for the storage and handling of fuel and other chemicals in quantities listed under the WHS Act.

3.4.3 Licences, Permits and Approvals

Adani is currently seeking approval for the Carmichael Coal Mine and Rail Project under the EPBC Act and SDPWO Act. This EMP has been prepared in support of these approval applications.

If these key approvals are issued, then Adani will be required to obtain a range of additional environmental approvals and permits as set out in Table 3-6. As permits and approvals are issued, Table 3-6 and relevant sub-plans in this EMP will be updated to reflect conditions.

Table 3-6 Project Approvals - Rail

Permit/ Approval/ Licence Relevant Legislation	Why it applies	Administrating Authority
Commonwealth Government Approvals		
EPBC Referral Decision *Environmental Protection and Biodiversity Conservation Act 1999*	The Project has been declared a "controlled action" on 6 January 2011 due to the likely potential impacts on MNES.	SEWPaC
EPBC Project Approval *Environment Protection and Biodiversity Conservation Act 1999*	Approval required from Commonwealth Minister. The EIS provides information for SEWPaC decision making.	SEWPaC
Indigenous Land Use Agreement (ILUA)	Required for the purposes of allowing development of the Project on land where native title exists or has not been	DNRM

Permit/ Approval/ Licence Relevant Legislation	Why it applies	Administrating Authority
Native Title Act 1993	supressed. An ILUA is currently being negotiated with the relevant native title claimants by Adani.	
State Government Approvals		
Declaration of 'significant project' *State Development and Public Works Organisation Act 1971*	Declared as a 'significant project' by the Office of the Coordinator General on 26 November 2010. The Project will have significant strategic significance, infrastructure impacts and employment opportunities. The Project requires an EIS under a bilateral agreement with SEWPaC.	Office of the Coordinator General
Cultural Heritage Management Plan *Aboriginal Cultural Heritage Act 2003*	CHMPs for the Project have been approved.	Department of Environment and Heritage Protection (DEHP) and Native Title claimants
Owner's Consent *Sustainable Planning Act 2009*	Land subject to a lease, land owned by the Crown, land that is a road (local government road or a SCR) requires an evidence of an allocation of an entitlement to the resource.	DNRM IRC Department of Transport and Main Roads (DTMR) Leaseholders
Permit to Clear Protected Plants *Nature Conservation Act 1992*	A licence, permit or authority is required to 'take' protected plants. This permit may apply for the Project.	DEHP
Damage Mitigation Permit (DMP) *Nature Conservation Act 1992*	Any activity that will 'tamper' (i.e. remove, damage, impair, degrade, etc.) with the confirmed breeding place of a native animal (that is endangered, vulnerable, near threatened and least concern wildlife) requires authorisation.	DEHP

Permit/ Approval/ Licence Relevant Legislation	Why it applies	Administrating Authority
Species Management Programme (SMP) *Nature Conservation Act 1992*	For larger impacts upon species protected under the NC Act, particularly where potential breeding places of endangered, vulnerable, near threatened or least concern species, or Essential Habitat for these species, is involved, a Species Management Program (SMP) may be required instead of the abovementioned DMP.	DEHP
Operational works approval for taking or interfering with water from a watercourse, lake or spring *Water Act 2000*	Applies to Project (Rail) activities that are likely to interfere with watercourses traversing the Project Area.	DNRM
Operational Works – Interfering with overland Flow *Water Act 2000*	Applies to Project (Rail) activities that will interfere / divert overland flow.	DNRM
Oversized load permits *Transport Infrastructure Act 1994*	For heavy machinery and oversized loads to be transported on the road network.	DTMR
Property Vegetation Management Plan (PVMP) and Property Map of Assessable Vegetation (PMAV) *Vegetation Management Act 1999*	The PVMP and PMAV are required for the Project (Rail) and will be submitted as part of the operational works application for clearing of native vegetation.	DNRM
ERA 63 – Sewage Treatment *Environmental Protection Act 1994*	Establishment and operation of environmentally relevant activities requires a permit under the EP Act. These ERAs will be approved as part of the Project (Rail) Environmental Authority (EA).	DEHP
Material Change of Use Development Application for Construction Camps *Sustainable Planning Act 2009*	Establishment of a new use within the Belyando Shire requires a MCU DA assessable against the provisions of the *Planning Scheme for the Belyando Shire 2008.*	IRC

Permit/ Approval/ Licence Relevant Legislation	Why it applies	Administrating Authority
A permit to work within or interfere with State-controlled Roads (SCRs) *Transport Infrastructure Act 1994*	Ancillary works and encroachments must not be constructed, maintained, operated or conducted on State-controlled roads, or on State-controlled roads in a specified district, without the written approval of the chief executive. This is likely to be applicable for the Project (Rail) as it crosses SCRs.	DTMR
Common Areas Declaration *Transport Infrastructure Act 1994*	Declaration of a common area is required where a relevant road (SCR) interrupts the route of a future railway land (Section 249, TI Act).	DTMR
Road Corridor Permit *Transport Infrastructure Act 1994*	A road corridor permit (RCP) to construct, maintain, operate or conduct ancillary works and encroachments on a SCR is required for the Project (Rail).	DTMR
Operational works approval for constructing or raising waterway barrier works *Fisheries Act 1994*	The Project will involve construction of waterway crossings that are defined as 'waterway barrier works'.	DAAF
Sales Permit for quarry material and/or timber *Forestry Act 1959*	A sales permit is required for use of forest products or quarry material taken from the Project (Rail).	DNRM
Local Government Approvals		
Belyando Shire Council Local Law No. 21 (Roads) 2007 *Local Government Act 2009*	An application to alter or improve a local government road under a local government road (roads). This permit is likely to relate to construction works to be carried out for the Project within local government controlled roads.	IRC
Belyando Shire Council Local Law No. 44 (Use of Explosives) *Local Government Act 2009*	A permit is required in order to set up or carry out blasting operations and/or explosives. This permit may be required during the construction stage in the unlikely or limited cases where blasting is necessary for construction of the Project (Rail).	IRC

Permit/ Approval/ Licence Relevant Legislation	Why it applies	Administrating Authority
Belyando Shire Council Local Law No. 45 (Extraordinary Traffic) *Local Government Act 2009*	A permit is required to drive "extraordinary traffic" on a road or bridge, whether concrete, bitumen, metalled, gravelled, or any prepared or formed surface. "Extraordinary vehicles" include haulage vehicles and those that are conveying and carrying goods and being of exceptional weight and nature. This permit is likely to be required during the construction stage of the Project (Rail).	IRC

3.5 Performance Outcomes and Indicators

Performance outcomes and indicators are identified in each of the environmental management sub-plans within this EMP under Section B Environmental Management Sub-plans.

These objectives and targets have been developed in accordance with Adani Management Standard ST-02 - Planning, Objectives and Legal Obligations. They aim to be:

- Specific to the Project
- Quantified and measurable
- Realistic and achievable
- Focused on continual improvement
- Consistent with, and related to, Adani's Environment and Sustainability Policy and the Adani Management Standards
- Periodically reviewed and, if required, revised
- Performance indicators will be reviewed annually as part of the EMP annual review.

3.6 Corrective Actions

Adani Compliance Guideline CG-005 – Corrective and Preventative Action requires that Adani implements a corrective action process consisting of the following steps:

- Identification of a problem (failure or deficiency)
- Root cause analysis to identify causes and determine solutions
- Decision as to the appropriate action
- Application and documentation of corrective or preventative action
- Follow-up and evaluation.

Corrective actions in relation to environmental management may arise from:

- Recommendations and outcomes of incident investigation reports, including investigations into incidents, near misses and non-compliances

- Reviews of monitoring results indicating that performance requirements are not being met and/or that trends indicate that environmental degradation may be occurring
- Checks and inspections (note that minor corrective actions identified through checks and inspections will generally be resolved on the spot)
- Identification of hazards or improvement opportunities (see also CG-009 – Hazard Notification and HSE improvement)
- Audit recommendations (see Section 4.3)
- Complaints.

Corrective actions will be raised through Adani's notification system or through a separate corrective action register if required for contractors not operating under Adani's systems. Completion and close out of corrective actions will be reported at rail management meetings.

3.7 Training, Competency and Awareness

3.7.1 Overview

System requirements in relation to training and competency are set out in Adani's Compliance Guideline CG-003 –Training. In accordance with the compliance guideline, a training needs assessment will be undertaken once organisational structures are confirmed for each of the construction and operation phases of the rail. Interim requirements are set out in this Section 3.7.

Trainers will hold appropriate accreditations or be otherwise appropriately qualified and experienced in the training topic to deliver the training. The provision of training will be in accordance with the Adani's Management Standard ST-03 - Training and Competence.

3.7.2 Environmental Induction and Awareness Training

All employees and contractors other than short term visitors will receive environmental induction training on commencement, and then annual environmental awareness training, covering:

- An overview of environmental values of the site
- Key environmental impacts and risks associated with construction/operation
- Legislative and other responsibilities, including the general environmental duty
- How to conduct task-based environmental risk assessment
- Work permit requirements in relation to any non-routine works
- Waste management and minimisation, including segregation and storage of wastes
- Erosion and sediment control and protection of watercourses
- Fauna interactions
- Weed hygiene requirements
- Aboriginal cultural heritage awareness
- Storage and handling of environmentally hazardous materials
- Spill prevention and response

- Fire prevention and response
- Energy and water conservation
- Incident notification and reporting requirements.

A visitor induction will be given to visitors and short term contractors not engaging in ground-disturbing activities covering:

- General compliance obligations
- Key environmental risks and impacts
- Management and minimisation of waste
- Work permit requirements
- Incident reporting and response.

3.7.3 Construction Training Matrix

A preliminary training matrix has been developed for construction activities and is shown in Table 3-7.

Table 3-7 Preliminary Construction Training and Competency Matrix

Training	CEO	Adani Project Management	Adani Contract Management Team	Adani Environmental Manager and Team	Construction Managers and Supervisors	Construction workers and all other staff	Contractor Environmental Managers and Officers	Emergency Response Teams	Visitors
General induction	M	M	M	M	M	M	M		
Short induction								AR	M
Adani EMS	M	M	M	M	M		M	AR	
Legal and other obligations	M	M		M	M		M	M	
Degree qualification – environmental management				M			M		
Dangerous goods storage and handling				M	M	AR	M	M	
Waste management and minimisation			M	M	M	AR	M		
Spill prevention and response				M	M	M	M	M	
Fire fighting				AR	AR	AR	AR	M	

Training	CEO	Adani Project Management	Adani Contract Management Team	Adani Environmental Manager and Team	Construction Managers and Supervisors	Construction workers and all other staff	Contractor Environmental Managers and Officers	Emergency Response Teams	Visitors
Vegetation clearing and in-stream work procedures				M	M	M	M		
Erosion and sediment control				M	M	M	M		
Energy and water conservation, including vehicle operation to minimise energy consumption			M	M	M	AR	M		
Cultural heritage awareness and monitoring		M		M	M	M	M		
Weed hygiene		M		M	M	M	M		
Work permit requirements		M		M	M	M	M		
Introductory training – new or substantially amended procedures		AR	AR	AR	AR	AR	M		

Training	CEO	Adani Project Management	Adani Contract Management Team	Adani Environmental Manager and Team	Construction Managers and Supervisors	Construction workers and all other staff	Contractor Environmental Managers and Officers	Emergency Response Teams	Visitors
Tool box talks – environmental topics including minor changes to compliance and management requirements and procedures	AR	M	M	M	M	M	M		AR

M = mandatory
AR = As relevant to work requirements

3.7.4 Operations Training and Competency Matrix

A preliminary training matrix has been developed for operation activities and is shown in Table 3-8.

Table 3-8 Operation Training and Competency Matrix

Training	CEO	Rail General Manager	Rail Area Managers	Procurement Manager	Rail Supervisors	Employees and Contractors	Environmental Managers and Officers	Emergency Response Teams	Visitors
General induction	M	M	M	M	M	M	M	M	
Annual environmental awareness training		M	M	M	M	M	M	M	
Short induction									M
Adani Env. Management System		M	M	AR	M		M	M	
Legal and other obligations	M	M	M	AR	M	AR	M	M	
Degree qualification – environmental management							M		
Dangerous goods storage and handling		AR	M		AR	AR	M	M	
Waste management and minimisation		M	M	M	M	M	M		
Spill prevention and response		M	M		M	M	M	M	
Fire fighting		AR	AR		AR	AR	AR	M	

Training	CEO	Rail General Manager	Rail Area Managers	Procurement Manager	Rail Supervisors	Employees and Contractors	Environmental Managers and Officers	Emergency Response Teams	Visitors
Vegetation clearing and in-stream work procedures			M		M	AR	M		
Erosion and sediment control			M		M	AR	M		
Energy and water conservation, including vehicle operation to minimise energy consumption		M	M	M	M	AR	M		
Cultural heritage awareness and monitoring		M	M		AR	AR	M		
Work permit requirements		M	M		M	M	M		
Weed Hygiene					M	M	M		
Tool box talks – environmental topics including minor changes to compliance and management requirements and procedures	AR	M	M	M	M	M	M	M	M
Introductory training – new or substantially amended procedures		M	M	M	M	M	M		

M = mandatory
AR = As relevant to work requirements

3.8 Communication and Reporting

3.8.1 External

External reporting is expected to be required in response to legislative requirements. Initial reporting requirements are set out in Table 3-9 and this will be updated based on conditions of approval.

Table 3-9 External Environmental Reporting Requirements

Reporting Trigger	Report Content	Report Recipient	Adani Responsibility
Annual return under environmental authority	Compliance with environmental authority requirements	DEHP	Rail General Manager
NGER	Energy consumption	Clean Energy Regulator	Rail General Manager
NPI	Pollutant emissions	DEHP	Rail General Manager
Incidents causing actual or potential environmental harm	Incident investigation and corrective actions	DEHP	Environmental Manager

The Social Impact Management Plan (SIMP) (SEIS, Volume 4, Appendix D2) contains a broader stakeholder engagement plan, including:

- Engagement with local and regional emergency services representatives
- Complaints and enquiries.

In accordance with the *Corporations Act 2001*, Adani's annual report will include compliance with environmental requirements.

3.8.2 Internal – Adani Corporate

Corporate communications will take place in accordance with management system requirements.

3.8.3 Internal – Site

Within the Project (Rail), communications regarding environmental matters will include:

- Environmental compliance, incidents, initiatives and corrective actions as agenda items in all management meetings
- Regular toolbox talks on environmental matters
- Environmental inductions and other training as described in Section 3.7

- Incorporation of environmental risk assessment and management into all risk assessment activities
- Posting of information on environmental issues, impacts and performance on noticeboards
- Inclusion of environmental performance and issues in weekly, monthly and annual reports.

3.9 Documentation, Document Control and Records

Document control in relation to environmental management will be through the site EMS as set out in CG-008 – Documentation and Document Control. This EMP and all associated sub-plans, documents and registers will be controlled documents subject to unique document identifiers and version control. The corrective action register will be managed through a database to ensure that updates on the status of corrective actions are available to managers and supervisors.

Other documentation and records to be retained will include:

- Incident investigation reports
- Completed site checklists
- Records of training and induction
- Audit reports
- All monitoring records.

Monitoring records in relation to the environmental authority must be retained for five years and must be available for provision to the administering authority within 10 business days of any request.

The document control and records management system will meet the requirements of Adani's Management Standard ST-04 Documentation, Document Control and Records.

3.10 Work Permits

In accordance with the Adani Compliance Guideline CG-036 – Work Permits, any non-routine activities that might adversely affect the environment must not be performed without a work permit.

Non-routine works which have potential to cause environmental harm may include:

- Any ground disturbing activity
- Activities involving use of environmentally hazardous substances
- Activities in areas of native vegetation
- Activities in or immediately adjacent to streams and watercourses
- Activities within or adjacent to Category A or B environmentally sensitive areas
- Activities that might generate hazardous wastes or large quantities of non-hazardous wastes

- Activities carried out in close proximity to residential dwellings.

The following matters will be covered as part of the process of issue of a work permit:

- Any legislative approval requirements and whether these approvals are in place
- Conditions of approvals or permits that might apply to the activity
- Whether there are any cultural heritage, flora or fauna monitoring requirements
- Opportunities to minimise waste generation or energy consumption
- Measures to prevent environmental impacts, including:
    - Impacts on environmentally sensitive areas
    - Accidental clearing of vegetation
    - Erosion and sediment release
    - Accidental release of hazardous substances to land, water or air
    - Measures to prevent noise or dust emissions exceeding the environmental authority or other legislated requirements
    - Improper disposal of waste
- Any requirements in relation to incident response, such as spill kits and PPE.

During construction, environmental and approval requirements will be part of a quality system to ensure that all relevant approvals and other requirements are in place before construction commences.

4. Monitoring and Reporting

4.1 Summary of Environmental Monitoring Requirements

Environmental monitoring requirements are set out in each sub-plan within this EMP. Table 4-1 provides a contextual summary of the require monitoring programs across the various project.

Table 4-1 Summary of Monitoring Requirements

Element	Pre-construction	Construction	Operation
Meteorology	✓	✓	✓
Air quality		✓	✓
Greenhouse gas and energy		✓	✓
Noise and vibration		✓	✓
Surface water		✓	✓
Groundwater		✓	✓
General and hazardous waste		✓	✓
Terrestrial ecology	✓	✓	
Aquatic ecology	✓	✓	
Scenic amenity		✓	✓
Erosion and sediment control		✓	✓
Contaminated land		✓	✓
Topsoil management		✓	✓
Cultural heritage	✓	✓	✓
Weed Management	✓	✓	✓

4.2 Checks and Inspections

4.2.1 Design and Pre-construction

During the design and pre-construction phase, monthly reviews will be undertaken against requirements of this EMP. A design checklist will be developed to document how design and pre-construction requirements have been met.

4.2.2 Construction and Operations

A formal site inspection will be conducted weekly by Adani's environmental team. Inspections will be carried out to assess project activities against compliance requirements set out in the environmental authority, other environment and planning approvals and this EMP.

Inspections will be documented on a checklist that will record whether the performance requirement for each item was achieved and corrective actions required to achieve the performance requirement. Where the non-conformance does not present a significant risk of environmental harm, and can be corrected promptly, the corrective action will be closed out on the checklist. Where the risk of environmental harm is more significant and/or the corrective action cannot be undertaken promptly, the action will be recorded in the corrective action register.

Where an incident or near miss is observed during checks, the incident investigation and reporting procedure will be followed.

Environmental inspection processes will meet the requirements of Adani's Management Standard ST-18 Reviews - Audits and Inspections.

4.3 Audits

4.3.1 Overview

Adani Compliance Guideline CG-004 – Audits and Assessments sets out requirements for audits of performance. An audit program has been developed to meet these requirements.

The following standards may be relevant to auditing activities:

- AS/NZS ISO 14012-1996 Guidelines for Environmental - Qualification Criteria for Environmental Auditors
- AS/NZS ISO 14015-2003 Environmental Management – Environmental Assessment of Sites and Organizations
- AS/NZS ISO/IEC 17021:2011 Conformity assessment - Requirements for bodies providing audit and certification of management systems
- AS/NZS ISO 19011-2003 Guidelines for Quality and/or Environmental Management Systems Auditing
- ISO 19011:2011 Guidelines for auditing management systems.

Draft audit reports will be reviewed by the Environmental Manager. Once an audit report is finalised:

- Audit reports will be circulated to the Rail General Manager and Rail Area Managers
- Recommendations will be entered into the corrective action register
- Findings will be discussed at management meetings
- Where relevant, findings will be presented as tool box talks
- Reports and findings will be tabled at management reviews
- Any non-compliances that are required to be reported under legislation or conditions of approval will be reported.

Audits may be carried out in conjunction with audits for the mine and off-site infrastructure.

4.3.2 Construction

Auditing during construction will depend on the contracting strategy selected and whether contractors and subcontractors operate under Adani's management systems or the contractor's own environmental management system.

If contractors/subcontractors are utilising their own environmental management systems, Adani will conduct audits on a six monthly basis, or for shorter duration contracts, at least once during the contract duration. These audits will cover:

- Contractor's compliance with legal and other obligations
- Whether contractor's management plans have appropriately identified environmental impacts and risks
- Whether roles, responsibilities and training and competency requirements have been identified and followed
- Whether adequate management and control strategies are in place to achieve compliance with legal requirements and performance requirements documented in this EMP
- Whether management and control strategies are being implemented
- Monitoring approaches and outcomes, and identification and implementation of corrective actions
- Adequacy of record keeping and reporting.

It would also be expected that contractors will have internal and external audit programs.

If contractors and subcontractors are utilising Adani's management system, system compliance audits will be conducted based on agreed and approved audit requirements.

4.3.3 Operation

Environmental audit processes will meet the requirements of Adani's Management Standard ST-18 - Reviews, Audits and Inspections. A preliminary audit schedule for the Carmichael Coal Rail has been developed and is shown in Table 4-2. Where audit outcomes and recommendations require corrective actions, these will be entered into the corrective action register.

Table 4-2 Preliminary Audit Schedule

Audit Type	Scope	Frequency
System audit	Audit against Adani EHS system requirements ISO 14001 accreditation audit	As agreed with certification body, externally no less than annually
Compliance audit	Confirm that legal and other obligations have been correctly and fully identified and that appropriate management and control strategies are in place and being implemented to meet requirements, including conditions of approval.	Bi-annual or if significant legislative changes occur

Audit Type	Scope	Frequency
Waste audit	Review waste generation types and quantities and waste management practices and identify opportunities to further minimise waste generation or to reduce the environmental impacts associated with waste management.	Bi-annual
Energy audit	Review energy consumption and identify opportunities to reduce energy consumption and/or associated greenhouse gas emissions. If greenhouse gas emission reduction programs are in place, review progress against commitments made. The audit must meet the requirements of AS/NZS 3598-2000 Energy Audits and requirements under the NGER Act and any other legislative requirements in relation to energy consumption and greenhouse gas emission reporting.	Annual
Environmental monitoring review	Review results of environmental monitoring activities including dust, groundwater, surface water, aquatic ecology and terrestrial ecology. Identify whether environmental performance requirements are achieved, and whether degradation of values or resources has occurred that may be attributable to the off-site infrastructure. Identify further investigations and/or corrective actions.	Annual
General environmental audit	Environmental impacts and risks have been correctly identified. Management controls are effective in managing the impacts and risks identified. EMP is consistent with environmental and planning permit conditions. Environmental management requirements are being implemented and evidence is available.	Six monthly

5. Reviews

5.1 Management Review

Adani's management system requires management reviews to be carried out at least twice per year (CG-011 – Management Review). Participants are to include Adani's senior management team.

In relation to the environmental component of the management review, the management review will examine:

- Adequacy and effectiveness of the EMP
- Compliance with Adani management system
- Opportunities for improvement
- Opportunities for waste minimisation.

Inputs to the management review will include:

- Results of monitoring and audits
- Status of achievement of performance requirements and indicators
- Summary of environmental incidents, non-compliances and complaints
- Status of corrective actions
- Communications and complaints
- Follow up of actions from previous management review
- Significant changes affecting environmental management, including legislation and policy changes.

Decisions and actions arising from the management review will be documented and actions will be entered into the corrective action register.

5.2 EMP Reviews

5.2.1 Annual Review

The EMP will be reviewed at least annually and updated to reflect:

- Changes in legislative requirements (including conditions of approvals)
- Environmental performance
- Outcomes of audits
- Outcomes of incident investigations
- Changes in external and internal policies, standards and guidelines
- Changes in requirements of Adani management system
- Any organisation changes such as changes in organisational structure
- Outcomes of the management review.

The review will ensure the continuing suitability, adequacy and effectiveness of the EMP and the Adani Management System. The review will include assessing opportunities for improvement.

Intermediate updates may also be undertaken in response to corrective actions or other changes that need to be addressed urgently.

Amendments to the EMP will be communicated to all staff through management meetings and tool box talks.

5.2.2 Review of Legal and Other Obligations

Legal and other obligations will be reviewed quarterly and whenever a major legislation or policy change occurs. The EMP will be updated as required to maintain compliance and any new requirements will be communicated to managers and staff through management meetings, special communications and tool box talks.

6. Air Quality

6.1 Legislative Framework

Air quality is managed through a framework established under the *Environmental Protection Act 1994*:

- The EP Act includes general objectives in relation to preserving environmental values in relation to air quality
- Under the EP Act, the *Environmental Protection (Air) Policy 2008* (EPP Air) is established and sets out objectives in relation to air quality.
- Under the EP Act, an environmental authority is required to undertake environmentally relevant activities, including a range of activities that may cause emissions to the air. In issuing an environmental authority, the regulator must have regard to the extent to which the activity meets the objectives established under the EPP Air. The environmental authority will then contain conditions in relation to air quality.

Occupational exposure to air contaminants is managed through the *Work Health and Safety Act 2011* and is not discussed further in this EMP.

The Commonwealth government has also established non-statutory air quality standards in the National Environmental Protection Measure (Ambient Air Quality).

The national pollutant inventory is established through a national environmental protection measure under the Federal *National Environment Protection Council Act 1994*. The Project will trigger thresholds for reporting a range of air emissions under this scheme, mostly due to the mining activities.

6.2 Environmental Values

Broad environmental values in relation to air quality are established in the EPP Air:

(a) the qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems;

(b) the qualities of the air environment that are conducive to human health and wellbeing;

(c) the qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property; and

(d) the qualities of the air environment that are conducive to protecting agricultural use of the environment.

Nine sensitive receptors were identified within a distance of five kilometres of the Project (Rail) corridor as identified in Figure 6-1.

Table 6-1 Air Quality Sensitive Receptors

Potential Receptors	Easting	Northing	Approximate Distance from the Project (Rail) (m)	Description/Comment
1	448007	7570210	2,450 (south)	Project (Mine) workers accommodation camp
2	462027	7572602	3,300 (south)	Homestead
3	475674	7575617	3,000 (south)	Homestead
4	482139	7579957	3,000 (south)	Homestead
5	494429	7589482	4,200 (north)	Homestead
6	525174	7583086	2,000 (north)	Homestead
7	546218	7578704	1,600 (north)	Homestead
8	555680	7578811	3,000 (north)	Homestead
9	561038	7577015	1,900 (north)	Homestead

Due to the rural nature of the Project area, the key contaminant of concern is particulate matter. Relevant air quality objectives in relation to particulate matter at sensitive receptors are shown in Table 6-2.

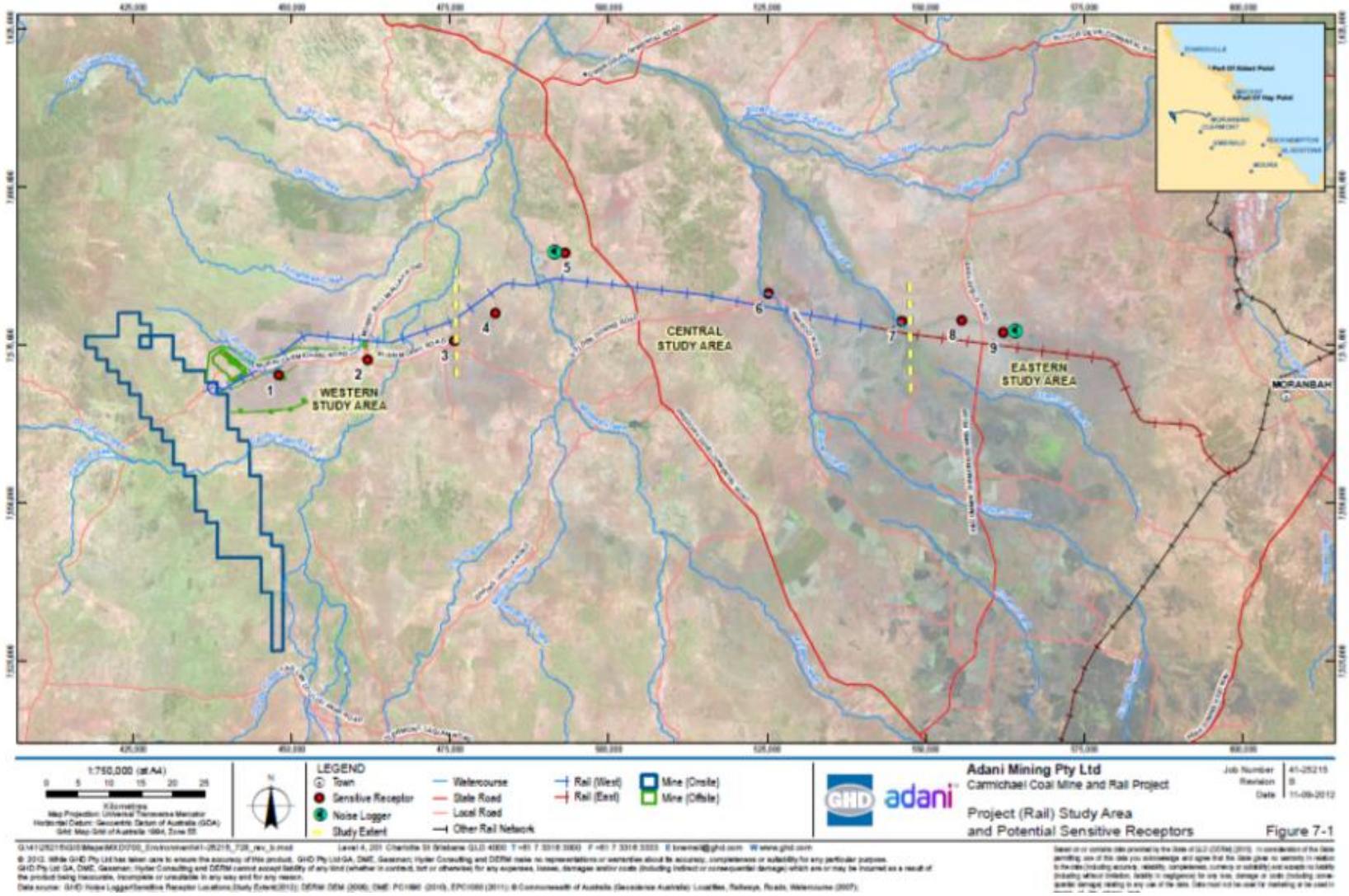
Table 6-2 Ambient Air Quality Objectives[(1)] and Criterion for Dust Deposition

Pollutant	Objective	Averaging period
Total suspended particulates	90 µg/m^3	Annual
Particulate matter <10 µm (PM_{10})	50 µg/m^3	24 hour
Dust deposition	120 mg/m^2/day	Monthly

(1) From EPP Air

Particulate matter levels in the area are typical of moderate-low rainfall rural areas. Sources of atmospheric dust include wind-blown erosion (crustal dust) and smoke from fires.

Figure 6-1 Potential Sensitive Receptors



6.3 Potential Impacts

6.3.1 Construction

Table 6-3 Potential Air Quality Impacts - Construction

Activity	Potential Environmental Impact
Vegetation clearing and earthworks	Particulate levels exceed air quality and dust deposition objectives at sensitive receptors during construction.
Sewage Treatment Plant and Concrete Batching Plant	Odour emissions and gaseous chemical release.
Fuel Storage	Odour emissions and gaseous chemical release.
Haul Vehicle operation	Particulate levels exceed air quality and dust deposition objectives at sensitive receptors.
Blasting	Particulate levels exceed air quality and dust deposition objectives at sensitive receptors.

6.3.2 Operations

Table 6-4 Potential Air Quality Impacts - Operations

Activity	Potential Environmental Impact
Rail emissions	Exhaust emissions from diesel powered locomotive engines, including fine particulate material. Fugitive coal dust emissions from uncovered coal wagons in transit (loaded or unloaded), any leakage from delivery doors, residual coal dust on wagon sills, couplings, shear plates and bogies of wagons and wind erosion of spilled coal in the corridor.
Rail emissions	Fugitive coal dust deposition on surrounding land, water and grazing pasture.
Quarry emissions	Particulate levels exceed air quality and dust deposition objectives at sensitive receptors.
Sewage Treatment Plant Operation	Odour emissions and gaseous chemical release.

6.4 Performance Outcome

Prevent or minimise any air quality impacts at the location of sensitive receptors during construction and operation of the Project (Rail).

No non-compliance with approval conditions.

No air quality complaints received from nearby sensitive receptors.

No environmental nuisance infringements as a result of construction or operations.

Meet EPP Air objectives for dust emission at sensitive receptors.

Not cause nuisance from dust deposition at sensitive receptors.

6.5 Performance Outcome

6.5.1 Design, Procurement and Pre-construction

Table 6-5 Air Quality Proposed Controls - Design, Procurement and Pre-construction

Control	Responsibility	Timing	Evidence
Plan construction activities and sequencing such that the area of exposed soils is minimised.	Construction Manager	Prior to commencement of construction	Earthworks schedule
Design temporary and permanent stockpiles (topsoil, spoil and coal) to minimise cross sectional area presented to the prevailing wind direction wherever space permits.	Design Manager	Prior to finalisation of detailed design	Design checklist
Identify obligations for national pollutant inventory (NPI) reporting and ensure that mechanisms are in place to collect required data.	Environmental Manager	Prior to commencement of construction	Monitoring records
The load-out facility will be designed to load wagons to the designed tolerance only and loading will be visually supervised.	Design Manager	During design	Design checklist
Wagon washing will be considered to reduce coal dust emissions from empty wagons on the return trip to mine.	Environmental Manager	Prior to commencement of operations	Coal Dust Management Plan
Collaborate with wagon suppliers to improve the design of coal wagons with regards to minimisation of coal dust emissions e.g. wagon sills, door mechanisms, electronically pneumatic controlled braking.	Design Manager / Procurement Team	Detailed design and procurement	Design checklist
An emission stack and filtration system at the flash butt welding facility shall be fitted with an effective rain protection device to maintain discharge of exhaust gases from the stack. A monitoring port at the exhaust stack shall be installed.	Design Manager / Procurement Team	Detailed design and procurement	Design checklist

All permanent refuelling locations are to be sealed with an impervious surface.	Design Manager / Procurement Team	Detailed design and procurement	Design checklist
An alarm system shall be installed as part of the Sewage Treatment Plant (STP) to inform the Operator of the STP failure. In the event that the Operator is not present on site, a 24 hour call system shall be established to ensure alerts raised are addressed at the earliest opportunity.	Design Manager / Procurement Team	Detailed design and procurement	Design checklist / Contract
Cement and fly-ash silos shall have an over-fill protection system and shall be installed to ensure that shut down of delivery automatically occurs when the level in any silo is within 600mm of its lid.	Design Manager / procurement team	Detailed design and procurement	Design Checklist / Contract
Install a meteorological monitoring station.	Environmental Manager	Prior to commencement of construction	Meteorological station in place

6.5.2 Construction

Table 6-6 Air Quality Proposed Controls - Construction

Control	Responsibility	Timing	Evidence
Regularly service vehicles, plant and equipment such that exhaust systems and fuel consumption comply with manufacturers' specifications.	Contractor's Representative	As per manufacturer's specifications	Vehicle logs
Operate dust suppression systems such that minimal dust generation is observed.	Contractor's Representative	Annual rail planning review	Visual inspection (Daily Inspection Report)
Minimise areas of exposed soil where possible. This will include progressive clearing where possible.	Construction Manager and Supervisors	Ongoing	Earthworks schedule Visual inspection

Control	Responsibility	Timing	Evidence
Stabilise topsoil stockpiles if left in place for longer than four weeks. Methods may include covering and planting of native grasses or sterile grasses.	Construction Manager and Supervisors	Ongoing	Topsoil management register Daily Inspection Report
Utilise water sprays to control dust on access tracks, work areas and stockpiles. Water may be sourced from raw water supply or treated wastewater. If treated wastewater is used, further protocols may be required to minimise worker exposure to water droplets.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
Avoid movement or handling, or increase wetting, of soil material on days of very high winds in close proximity to downwind sensitive receptors.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
A speed limit will be imposed on all construction site roads and disturbed work areas for safety and to minimise dust nuisance.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
Ensure an adequate supply of water will be available for dust suppression activities.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
Where practical, vegetation clearing or earthworks activities will be rescheduled if necessary to avoid periods of high wind.	Construction Manager and Supervisors	As required	Daily Inspection Report (Visual Inspection)
All material (e.g. mud, sand etc.) spilt onto external sealed roads will be cleaned and removed.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
No burning/ fires will be permitted on site unless authorised by Senior Management following consultation with Queensland Fire and Rescue Services.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)

Control	Responsibility	Timing	Evidence
Truck loads that have the potential to create a dust nuisance be covered at all times.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection) Weekly environmental report.
Spilt product shall be cleaned up using dry methods as quickly as practicable to prevent wind-blown materials and fumes.	Construction Manager and Supervisors	Ongoing	Incident Report
All equipment and vehicles will be operated and maintained in accordance with the manufacturer's specifications. Daily equipment and vehicle prestart inspections and regular servicing shall be undertaken to maintain good operating conditions.	Construction Manager and Supervisors	Ongoing	Plant / Vehicle Daily Inspections Plant / Vehicle Maintenance Reports
Cattle grids will be placed at the entrance to any sealed public road to assist with the removal of dust from construction vehicles contaminating the roads.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
Where possible, mulch / organic waste will be used on exposed soils to reduce dust generation and wind erosion.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
Sewage Treatment Plants (STP)			
All tanks within the STP facility shall be adequately sealed to minimise emission of odour.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
Effluent disposal areas shall be managed to prevent release of aerosols beyond the boundaries of the irrigation areas.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)

Control	Responsibility	Timing	Evidence
Should complaints about odour be received, the operator of the STP will investigate the cause of the odour and undertake corrective actions as required.	Construction Manager and Supervisors	Ongoing	Complaints Register
The operator shall provide an induction program for new employees, site visitors and contractors including risk management principles.	Construction Manager and Supervisors	Ongoing	Training Register
The STP shall only be operated by competent persons.	Construction Manager and Supervisors	Ongoing	Training Register
Any STP's will be maintained in accordance with manufacturer's specifications so that the highest quality of effluent is produced to ensure minimal risk of failure.	Construction Manager and Supervisors	As required	Inspection / Maintenance Reports
The Operator will inspect the sewage treatment plant infrastructure on a weekly basis to ensure any defects are identified and actions can be taken promptly to address.	Construction Manager and Supervisors	Weekly	Inspection Report
The Contractor will develop an Effluent Irrigation Management Plan prior to the operation of the sewage treatment plant.	Construction Manager and Supervisors	Prior to operation	Effluent Irrigation Management Plan
Flash Butt Welding Depot			
The workshop and hardstand areas are to be kept clean at all times	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
Welding gas tank integrity shall be tested and maintained in accordance with manufacturer's specifications.	Construction Manager and Supervisors	As required	Inspection records

Control	Responsibility	Timing	Evidence
Tank integrity shall be tested and maintained in accordance with manufacturer's specifications.	Construction Manager and Supervisors	As required	Inspection records
Tank leak tests shall be conducted regularly in accordance with manufacturer's specifications.	Construction Manager and Supervisors	As required	Inspection records
Gas tank leak tests shall be conducted in accordance with the manufacturer's specifications.	Construction Manager and Supervisors	As required	Inspection records
Fuel and Chemical Storage			
Refuelling will only occur in designated areas. Fuel and oil storage areas will be maintained and operated to minimise emissions to the atmosphere via leaks or spills.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
Tank integrity shall be tested and maintained in accordance with manufacturer's specifications.	Construction Manager and Supervisors	As required	Inspection records
Tank leak tests shall be conducted regularly in accordance with manufacturer's specifications.	Construction Manager and Supervisors	As required	Inspection records
All chemicals are to be stored in accordance with the Safety Data Sheet.	Construction Manager and Supervisors	Ongoing	Weekly inspection report (Visual Inspection)

Control	Responsibility	Timing	Evidence
Concrete Batching Plants			
Concrete batching plants will be maintained and operated in a clean state to minimise creation of air pollutants.	Construction Manager and Supervisors	Ongoing	Weekly Inspection Report (Visual Inspection)
Spilt materials shall be cleaned up using dry methods as quickly as practicable to prevent wind-blown materials and fumes.	Construction Manager and Supervisors	As required	Incident Report Daily Inspection Report
All areas within the plant that would be traversed by plant will be treated with compacted gravel.	Construction Manager and Supervisors	As required	Daily Inspection Report (Visual Inspection)
Vehicles speeds shall be limited to 10 km/hr on internal roads.	Construction Manager and Supervisors	Ongoing	Visual Inspection
Aggregate materials will be stored in three sided enclosed bins / stockpiles with walls 1.0 metres above the aggregate storage level and 2.0 metres beyond the front of the storage.	Construction Manager and Supervisors	Ongoing	Weekly Inspection Report (Visual Record)
Elevated storage bins are to be totally enclosed. Discharge chute and transfer areas from bins to the weighing hopper will also be enclosed.	Construction Manager and Supervisors	Ongoing	Weekly Inspection Report (Visual Record)
Aggregate storage bins and stockpiles are to be fitted with water sprays to keep stored material damp at all times.	Construction Manager and Supervisors	Ongoing	Weekly Inspection Report (Visual Inspection)
Filtered dust extraction systems will be provided to cement and fly ash silos. Filters are to be replaced as per manufacturer's specifications.	Construction Manager and Supervisors	Ongoing	Maintenance Records

Control	Responsibility	Timing	Evidence
Filters should be removed, inspected, cleaned, maintained and repaired according to manufacturer's specifications.	Construction Manager and Supervisors	As required	Plant Daily Inspection Records Plant Maintenance Records
Conveyor belts shall be equipped with spill trays and scrapers where practicable.	Construction Manager and Supervisors	Ongoing	Weekly Inspection Report (Visual Inspection)
Spill trays are to be cleaned out daily to ensure an adequate receiving capacity is maintained.	Construction Manager and Supervisors	Ongoing	Daily Inspection Report (Visual Inspection)
Trucks are to be cleaned of any spillage prior to leaving the site.	Construction Manager and Supervisors	Ongoing	Visual Inspection

6.5.3 Rail Operations

Table 6-7 Air Quality Proposed Controls - Operations

Control	Responsibility	Timing	Evidence
Regularly service vehicles, plant and equipment such that exhaust systems and fuel consumption comply with manufacturers' specifications.	Rail Operation Manager and supervisor	As per manufacturer's specifications	Vehicle logs
Stabilise topsoil stockpiles if left in place for longer than two weeks. Methods may include covering and planting of native grasses or sterile grasses.	Rail Operation Manager and supervisor	Ongoing	Topsoil Management Register

Control	Responsibility	Timing	Evidence
The loading of wagons will be visually supervised to avoid overloading of wagons.	Rail Operation Manager and supervisor	Each train	Visual inspection
Train speed will be optimised based on wagon class and coal supply (maximum loaded train speed of 80km/h and unloaded train speed of 100 km/h).	Rail Operation Manager and supervisor	Each train	Train control schedule
Adani will prepare a Coal Dust Management Plan identifying control measures to mitigate the emission of dust from loaded and unloaded coal trains. The plan will be consistent with the aims, objectives and mitigation measures proposed in the QR (2010) *Coal Dust Management Plan*.	Adani Environmental Team	Ongoing	Complaints Register Weekly Inspection Report
When operating on any Aurizon Operation Ltd (Aurizon) railway line, Adani will comply with the recommendations stated in the QR (2010) *Coal Dust Management Plan.* Treatment of coal surface (veneering) in wagons will be considered.	Rail Operation Manager and Supervisor	Ongoing	Complaints Register Weekly Inspection Report
Coal dust will periodically be removed from ballast and tracks.	Rail Operation Manager and Supervisor	Ongoing as required	Maintenance records
The coal train operators will maintain clear and regular communication with community groups, councils, forums and individuals by listening to and discussing issues. Information on train-related coal dust mitigation initiatives being undertaken will be provided to the appropriate forums.	Stakeholder Manager / Rail Operation Manager	Ongoing	Stakeholder register
Sewage Treatment Plants			
All tanks within the STP facility shall be adequately sealed to minimise emission of odour.	Rail Operation Manager and Supervisor	Ongoing	Weekly Inspection Report (Visual Inspection)

Control	Responsibility	Timing	Evidence
Effluent disposal areas shall be managed to prevent release of aerosols beyond the boundaries of the irrigation areas.	Rail Operation Manager and Supervisor	Ongoing	Weekly Inspection (Visual Inspection)

6.6 Monitoring and Corrective Action

Table 6-8 Air Quality Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Potential Corrective Action
Monitor air emissions as required under the NPI scheme	Environmental Manager	Annual	NPI report is submitted	NA
Dust deposition monitoring at three downwind and one upwind location, with locations to be moved as construction progresses	Environmental Manager	Ongoing, data collected monthly	Dust deposition does not exceed 120 mg/m^2/day (monthly average)	Investigate potential causes Develop mitigation measures to address dust deposition. This may include actions taken at the receptor location. Monitor ambient dust levels to check that residential receptors are not exposed to respirable dust levels in excess of EPP Air objectives.
Visual monitor haul roads for dust lift off	Supervisors / Environmental Officers	Ongoing	Dust lift off is not travelling beyond the lease boundary Chemical suppressants or sealants are regularly applied	Increase application of chemical suppressants or sealants Reduce vehicle speeds on haul roads Consider sealing haul roads

Monitoring action	Responsibility	Frequency	Performance Requirement	Potential Corrective Action
Visually monitor minor access roads and other disturbed areas for dust lift off	Supervisors / Environmental Officers	Ongoing	Dust lift off is not travelling beyond the lease boundary Water trucks are actively applying water	Increase application of water sprays Rehabilitate or stabilise surfaces
Monitor meteorological conditions (temperature, wind, rainfall)	Environmental Officer	Ongoing	NA	None required
Review meteorological data for changes from baseline or trends	Environmental Officer	Annual	Significant changes from baseline	If significant changes or trends are emerging, check design aspects that respond to meteorological conditions, including sizing and operation of water management systems. Make adjustments as necessary to address climate changes
Inspect train loading	Rail Supervisor	Each train	Wagons are not overloaded External aspects of trains and wagons do not generate dust	Remove overloaded material Adjust settings on automated load out equipment Clean trans/wagons
Visual inspections for excessive dust emissions from all cleared areas	Supervisors / Environmental officers	Ongoing	Dust lift off is not travelling more than around 500 metres Water trucks are actively applying water	Increase application of water sprays Rehabilitate or stabilise surfaces

Monitoring action	Responsibility	Frequency	Performance Requirement	Potential Corrective Action
Visual inspections for excessive coal dust emissions	Supervisors / Environmental Officers	Ongoing	Excessive coal dust emissions / cloud from coal trains	Reschedule activity if emissions caused by high winds Amend load out procedures if emissions caused by overloading of wagons Consider treatment of coal surface when in wagons (veneering)
Visual inspections for excessive emissions from combustion engines (e.g. black smoke)	Supervisors / Environmental Officers	Ongoing	Excessive smoke plumes from mobile or stationary combustion engines	Rectify any mechanical issues immediately
Visual inspection for coal fires on trains	Rail Supervisor	Each train	Coal fires	Any reports on coal fires will be investigated immediately

7. Greenhouse Gas Emissions

7.1 Legislative Framework

The legislative framework relevant to energy, carbon and greenhouse gas management includes:

- Commonwealth *Clean Energy Act 2011* – establishes the carbon pricing mechanism and deals with assistance for emissions intensive trade-exposed industries and the coal fired electricity generation sector;
- Commonwealth *Energy Efficiency Opportunities Act 2006* – sets out requirements for large energy using businesses, and allows for regulations to provide detailed requirements for assessment, reporting, verification and other elements of the Australian Government energy efficiency program;
- Commonwealth *National Greenhouse and Energy Reporting Act 2007* establishes a national system for reporting greenhouse gas emissions, energy consumption and production by corporations from 1 July 2008; and
- Queensland *Clean Energy Act 2008* – an Act to improve the efficiency and management of the use of energy, and the conservation of energy, in relation to particular businesses and other activities.

7.2 Environmental Values

Environmental values in relation to greenhouse gas emissions are not site specific, but rather, relate to global accumulation of greenhouse gases at levels that may cause climate change.

7.3 Potential Impacts

The greenhouse gas emissions for the Project (Rail) were calculated based on estimated energy usage during construction and operations. The total Scope 1 emissions over the life of the Project (Rail) are estimated to be approximately 57,647 t/CO_2-e for:

- Construction at 311 kt/CO_2-e
- Operation at 57,335 kt/CO_2-e

The emissions are attributed to:

- Diesel consumption for coal haulage accounting for 99.5 per cent of emissions
- Vegetation clearing 0.3 per cent and diesel consumption (during construction) accounting for 0.2 per cent

The average annual Scope 1 emissions over the life of the Project (Rail) were estimated to be approximately 614 kt/CO_2-e per annum.

Electricity is not proposed to be used during construction and therefore Scope 2 emissions are zero. Details with regard to the future proposed electrification of the rail track were not proposed at the time of the assessment and therefore Scope 2 during operations emissions are also zero. If electrification of the rail track occurs in the future then the emissions and associated impacts will be assessed at this time.

As per International Standard and the Greenhouse Gas Protocol, the accumulative impact of greenhouse gases resulting from the Project is expressed in terms of CO_2-e. Through this calculation, the greenhouse gas potential of relevant gases (CO_2, CH_4, N_20) has been taken into account.

The majority of greenhouse gas emissions produced by Project (Rail) is through the combustion of diesel. The greenhouse gas potential for minor components as a result of this combustion is quite high, hence this is converted to t/CO_2-e which is the relevant international standard for greenhouse gas reporting. Individual gases are not reported separately as these figures provide limited value.

7.3.1 Construction

Table 7-1 Greenhouse Gas Emissions Potential Environmental Impacts - Construction

Activity	Potential Environmental Impact
Operation of vehicles, plant and equipment using diesel or electricity	Emissions of greenhouse gases to the atmosphere
Waste generation	Loss of embodied energy and resources
Vegetation clearing	Release of carbon stored in vegetation
Wastewater treatment	Release of methane

7.3.2 Operation

Table 7-2 Greenhouse Gas Emissions Potential Environmental Impacts – Operation

Activity	Potential Environmental Impact
Operation of trains, vehicles, plant and equipment using diesel or electricity	Emissions of greenhouse gases to the atmosphere
Waste generation	Loss of embodied energy and resources
Vegetation clearing	Release of carbon stored in vegetation
Wastewater treatment	Release of methane

7.4 Performance Outcome

Minimise the greenhouse gas emissions intensity rising from construction and operation of the rail corridor.

7.4.1 Design and pre-construction

Table 7-3 Greenhouse Gas Emissions Proposed Controls - Design, Procurement and Pre-construction

Control	Responsibility	Timing	Evidence
Consider the following guidelines and rating schemes when designing buildings, infrastructure and other components: • Building Code of Australia requirements, including insulation, building materials and energy efficiency • National Australian Built Environment Rating System (NABERS) • Australian Green Infrastructure Council rating scheme • Green Building Council of Australia rating scheme.	Design Manager	During design	Design checklist Building and infrastructure specifications
Incorporate fuel and material efficiency requirements into the procurement strategy, including: • Appropriate sizing, maintenance and selection of equipment • Purchase of used equipment where this leads to reduced greenhouse gas emissions over the equipment life • Minimisation of packaging • Consideration of the energy efficiency ratings of equipment. • Equipment, plant and vehicles that can use biodiesel	Procurement Team	During procurement of equipment, plant and vehicles	Equipment, plant and vehicle specifications
Consider fuel consumption when planning transportation of materials and minimise transport distances wherever possible.	Procurement Team	During procurement of equipment, plant and vehicles	Equipment, plant and vehicle specifications
Register the rail line with the National Greenhouse and Energy Reporting scheme[1].	Environmental Manager	Prior to commencement of rail activities	Registration
Register the rail line in the Liabilities Entities Database.	Environmental Manager	Prior to commencement of rail activities	Registration

Control	Responsibility	Timing	Evidence
Develop a Project Procurement Strategy to identify equipment, plant and machinery, and Project (Rail) resources that contribute to reduced greenhouse gas emissions, including: • Souring of materials locally wherever possible • Selecting fuel efficient vehicles, plant and equipment.	Procurement Team	Prior to procurement of equipment, plant and vehicles	Project Procurement Strategy
Develop and implement vehicle operating guidelines to encourage the correct and efficient operation of vehicles. Guidelines will be included in the employee inductions.	Environmental Manager	Prior to construction	Vehicle operating guidelines
Develop and implement a Traffic Management Plan that: • Reduces the number of vehicles and/or trips required for transport • Uses buses for transportation of large numbers of personnel to minimise the number of vehicles operating.	Construction Manager and Supervisors	Prior to construction	Traffic Management Plan
Develop a comprehensive greenhouse gas emissions inventory to provide details on construction emissions.	Environmental Manager	Prior to construction	GHD emissions inventory
Consider efficient fuel saving design when purchasing rolling stock, including: • Electronically Controlled Pneumatic (EPC) braking • Aerodynamics • Anti-idling engine management software • Automatic engine stop start systems • Fuel options e.g. biodiesel, liquefied natural gas, compressed natural gas • Hybrid locomotives with rechargeable energy storage systems.	Design Manager / Procurement Team	Prior to procurement of trains	Project Procurement Strategy / Design checklist

[1] Note that registration of the Project with the National Greenhouse and Energy Reporting scheme and as a liable entity will be undertaken as part of the Mine EMP.

7.4.2 Construction

Table 7-4 Greenhouse Gas Emissions Project Controls – Construction

Control	Responsibility	Timing	Evidence
Driver and operator training in relation to efficient operation of vehicles, plant and equipment.	Construction Manager	As required	Training register
Operation of vehicles, plant and equipment to minimise diesel consumption and wear and tear on parts.	All staff	Ongoing	Diesel fuel consumption
Regularly service vehicles, plant and equipment such that exhaust systems and fuel consumption comply with manufacturers' specifications.	Construction Manager	Ongoing	Vehicle maintenance records
Minimise transportation distances within the site wherever possible.	Construction Manager	Ongoing	Diesel fuel consumption
Operate and maintain air conditioning systems in accordance with manufacturer's instructions and Guide to Best Practice Maintenance & Operation of HVAC Systems for Energy Efficiency (Council of Australian Governments National Strategy on Energy Efficiency January 2012).	Construction Manager	Ongoing	Maintenance records
Select vehicle size for worker transport to match group size and use buses for transporting larger groups.	Construction Manager	Ongoing	Diesel fuel consumption
Reuse of materials on site will be considered, where possible, to reduce transport distances and heavy vehicle trips to any offsite disposal area.	Construction Manager / Supervisors	Ongoing	Waste register
Use of teleconferencing and video conferencing to reduce travel to and from offices.	All staff	Ongoing	NA

7.4.3 Operations

Table 7-5 Greenhouse Gas Emissions Project Controls – Operation

Control	Responsibility	Timing	Evidence
Driver and operator training in relation to efficient operation of vehicles, plant and equipment.	Rail Operations Manager	As required	Training register
Operation of vehicles, plant and equipment to minimise diesel consumption and wear and tear on parts.	All staff	Ongoing	Diesel fuel consumption
Regularly service vehicles, plant and equipment such that exhaust systems and fuel consumption comply with manufacturers' specifications.	Rail Operation Manager and Supervisors	Ongoing	Vehicle maintenance records
Minimise transportation distances within the site wherever possible.	Rail Operation Manager and Supervisors	Ongoing	Diesel fuel consumption
Operate and maintain air conditioning systems in accordance with manufacturer's instructions and Guide to Best Practice Maintenance & Operation of HVAC Systems for Energy Efficiency (Council of Australian Governments National Strategy on Energy Efficiency January 2012).	Rail Operation Manager and Supervisors	Ongoing	Maintenance records
Select vehicle size for worker transport to match group size and use buses for transporting larger groups.	Rail Operation Manager and Supervisors	Ongoing	Diesel fuel consumption
Prepare and submit NGER reports (in conjunction with Mine).	Environmental Manager	Annually	Report
Prepare and submit reports under *Queensland Clean Energy Act 2008.*	Environmental Manager	Annually	Report
Purchase carbon units under the emissions trading scheme or offset emissions. Surrender carbon units to the Clean Energy Regulator.	CEO	Annually	Carbon

7.5 Monitoring and Corrective Action

Table 7-6 Greenhouse Gas Emissions - Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Monitor or estimate all scope 1 emissions: • Diesel consumption (litres) • Explosives use (mass used) • Wastewater treatment (volume treated) • Vegetation cleared (are and type)	Environmental Manager	Annually	Accurate and auditable account of all scope 1 emissions In accordance with the *National Greenhouse and Energy Reporting Act 2007*	Improve monitoring and estimation methods Regular improvements in transport operations energy efficiency
Monitor scope 2 emissions (electricity consumption)	Environmental Manager	Annually	Accurate and auditable account of all scope 2 emissions In accordance with the *National Greenhouse and Energy Reporting Act 2007*	Regular improvements in transport operations energy efficiency
Conduct energy audits for greenhouse gas emissions and energy use (see also Section 6.2)	Environmental Manager	Annual or as required by legislation	Continuous improvement in energy use reduction	Increases in greenhouse gas emissions or a reduction of energy efficiency will be further investigated and measures implemented, where possible
Regular energy audits and reviews of railway operations will be conducted to identify possible energy efficiency improvement opportunities	Environmental Manager	Annual or as required by legislation	In accordance with the *Energy Efficiency Opportunities Act 2006* (EEO Act)	Ongoing optimisation of operational activities and logistics, therefore reducing the number of vehicles and/or trips required

8. Noise and Vibration Management Plan

8.1 Legislative Framework

Ambient and environmental noise is managed through a framework established under the *Environmental Protection Act 1994*:

- The EP Act includes general objectives in relation to preserving environmental values in relation to air quality
- Under the EP Act, the *Environmental Protection (Noise) Policy 2008* (EPP Noise) is established and sets out objectives in relation to ambient noise levels and the acoustic environment
- Under the EP Act, an environmental authority is required to undertake environmentally relevant activities, including a range of activities that may cause noise emissions. In issuing an environmental authority, the regulator must have regard to the extent to which the activity meets the objectives established under the EPP Noise. The environmental authority will then contain conditions in relation to noise.
- The EP Act also contains some requirements in relation to noise nuisance, however these are unlikely to be applicable at this location given the absence of sensitive receptors.

Occupational exposure to noise is managed through the *Work Health and Safety Act 2011* and is not discussed further in this EMP.

8.2 Environmental Values

Environmental values for the acoustic environment that are to be protected or enhanced are established in the EPP Noise as follows:

a. *the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems; and*

b. *the qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following—*

   (i) sleep;

   (ii) study or learn;

   (iii) be involved in recreation, including relaxation and conversation; and

c. *the qualities of the acoustic environment that are conducive to protecting the amenity of the community.*

The land use in the vicinity of the Project (Rail) is rural in nature. Potential sensitive receptors, as identified under the EPP Noise within approximately five kilometres of the Project (Rail) are listed in below (Table 8-1) and identified in Figure 6-1. The nearest identified sensitive receptor is located approximately 1.6 km away.

Protected areas identified under the *Nature Conservation Act 1992* are classed as sensitive receptors; however, the closest protected area under the NC Act to the Project (Rail) is Nairana National Park, which is approximately 10 km away.

Table 8-1 Noise and Vibration Sensitive Receptors

Potential Receptors	Easting	Northing	Approximate Distance from the Project (Rail) (m)	Description/Comment
1	448007	7570210	2,450 (south)	Project (Mine) workers accommodation camp
2	462027	7572602	3,300 (south)	Homestead
3	475674	7575617	3,000 (south)	Homestead
4	482139	7579957	3,000 (south)	Homestead
5	494429	7589482	4,200 (north)	Homestead
6	525174	7583086	2,000 (north)	Homestead
7	546218	7578704	1,600 (north)	Homestead
8	555680	7578811	3,000 (north)	Homestead
9	561038	7577015	1,900 (north)	Homestead

The existing noise environment is consistent with the quiet rural setting with background noise levels as shown in Table 8-2.

Table 8-2 Summary of Noise Monitoring Results

Location	Background LA90 dB(A)			Ambient LAeq dB(A)		
	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)
Disney Homestead	25	27	21	45	47	44
Mulliwa Homestead	31	31	27	48	41	43

Measured ground vibration results indicate very low ground vibration levels (in the order of 0.1 mm/s) at all locations which confirms the lack of perceivable vibration at all sites. Baseline vibration results are tabulated below.

Table 8-3 Summary of Vibration Monitoring Results

Location	Date/ Time	Direction			Sum	Observations
		Trans	Vert	Long		
Disney Homestead	06/09/2011 8:22 am	0.0794	0.0635	0.0794	0.0926	No perceivable ground vibration
Mulliwa Homestead	06/09/2011 7:25 am	0.0952	0.0794	0.0794	0.0966	No perceivable ground vibration

8.3 Potential Impacts

8.3.1 Construction

Table 8-4 Noise and Vibration Potential Environmental Impacts – Construction

Activity	Potential Environmental Impact
Civil works during construction	Disturbance (noise) to sleep, social activities, work activities Disturbance (noise) of livestock and native fauna
Pile driving, rock breaking and heavy equipment operation	Disturbance (noise) to sleep, social activities, work activities Damage to infrastructure (vibration) Discomfort to human beings (vibration) Disturbance (noise) of livestock and native fauna
Blasting	Disturbance (noise and vibration) of livestock and native fauna Damage to infrastructure (vibration) Disturbance and discomfort (noise and vibration) to sleep, social activities, work activities Disturbance (noise) of livestock and native fauna

8.3.2 Operations

Table 8-5 Noise and Vibration Potential Environmental Impacts – Operation

Activity	Potential Environmental Impact
Rail operations	Disturbance to sleep, social activities and/or work activities Disturbance of native fauna and livestock

8.4 Performance Outcome

No adverse noise impacts on sensitive receptors attributable to the construction and operation of the Project (Rail).

No complaints regarding excessive noise or vibration.

Any noise and vibration complaint is addressed within specified time frames.

Impacts from noise are managed to meet the Rail Noise criteria adopted from Queensland Rail's Code of Practice for Railway Noise Management (QR, 2007):

- 65 dB(A) –assessed as the 24 hour average equivalent continuous A-weighted sound pressure level (LAeq)
- 87 dB(A) - assessed as a single event maximum sound pressure level (LAmax)

Single events over a given 24 hour period Impacts from airblast overpressure are managed to meet acoustic quality objectives and void disturbance to homesteads surrounding the Project (Rail).

8.4.1 Design and Pre-construction

Table 8-6 Noise and Vibration Proposed Controls - Design, Procurement and Pre-construction

Control	Responsibility	Timing	Evidence
Locate mobile plant (e.g. compressors, generators), concrete batching plans and construction camps as far as practicable away from the nearest potential sensitive receptors.	Design Manager	Prior to construction	Design checklist
Undertake pre-construction building and infrastructure surveys on properties / infrastructure potentially susceptible to vibration damage from construction of the railway and operation of the quarries.	Environmental Manager	Prior to construction	Building and Infrastructure Structural Survey Report

8.4.2 Construction

Table 8-7 Noise and Vibration Proposed Controls – Construction

Control	Responsibility	Timing	Evidence
Construction activities generating noise above ambient levels within the vicinity of the nearest noise sensitive places within 2 km of the Project (Rail) will, wherever possible and practicable, be confined to general work hours of 6:30 am – 6:30 pm	Construction Manager and Supervisors	Ongoing	Daily Report
Impact pile driving will only be undertaken between the hours of 6:30 am – 6:30 pm.	Construction Manager and Supervisors	Ongoing as required	Daily Report
Where it is necessary for such activities (noise and vibration generating) to be carried out outside standard day-time working hours, potentially impacted receptors will be notified at least one week in advance of the activities. The notification will include: • The schedule of construction and maintenance activities (the proposed times)	Stakeholder Manager / Environmental Officer	One week prior to construction outside of standard hours	Stakeholder register

Control	Responsibility	Timing	Evidence
• The reasons for construction and maintenance activities being carried out outside standard day-time working hours • Likely timeframes of construction and maintenance activities (the proposed dates) • Access routes for workers and equipment • Nature of construction and maintenance activities.			
Principal noise sources (e.g. exhausts) will be directed away from noise-sensitive places as far as possible.	Construction Manager and Supervisors	Ongoing	Weekly Inspection Report (Visual Inspection)
Regularly service vehicles, plant and equipment such that noise emissions comply with manufacturers' specifications.	Construction Manager and Supervisors	Ongoing	Vehicle maintenance records Daily Plant inspections
Plant will be used in accordance with manufacturer's specifications. Equipment will be sited away from noise sensitive areas.	Construction Manager / Environment Manager	Ongoing	Visual Inspection Weekly Environment Report
Use of audible warning devices will be within operational health and safety constraints.	Construction Manager and Supervisors	Ongoing	Weekly Inspection Report (Visual inspections)
Co-ordination of loading/unloading of material activities will be within standard day-time working hours wherever practicably possible.	Construction Manager and Supervisors	Ongoing	Daily Report

Control	Responsibility	Timing	Evidence
If blasting is required, the following controls will be implemented to reduce noise and vibration levels • Reducing the MIC by using delays, reduced hole diameter and/or deck loading • Changing the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination • Exercise strict control over spacing and orienting all blast drill holes • Use minimum practicable sub-drilling which gives satisfactory toe conditions • Investigate alternative rock-breaking techniques • Establish times of blasting to suit local conditions • Direction of detonator initiation away from neighbouring residences	Construction Manager and Supervisors	If blasting is required	Blasting Register / Report Environmental Weekly Report
Blasting will occur between 9 am and 3 pm Monday to Friday and 9 am to 1 pm on Saturdays. No blasting is to occur on Sundays.	Construction Manager and Supervisors	Ongoing as required	Blasting Schedule Environmental Inspection Report
Once the exact location of blasting is known, the distance to any potential receptors will be used for the charge mass estimate. Blast monitoring will be undertaken to assess compliance, determine the site constraints and confirm the predictions. The blast design will ensure that the airblast overpressure and ground vibration limits are met at sensitive receptors.	Environmental Manager / Construction Manager	Ongoing as required	Monitoring Records
Building and infrastructure condition surveys will be undertaken on properties potentially susceptible to vibration damage following vibration generating activities associated with the construction of the railway and operation of the quarries (e.g. Blasting and pile driving).	Environmental Manager	Prior to construction	Building and Infrastructure Structural Survey Report

Control	Responsibility	Timing	Evidence
Avoid unnecessary revving of engines and switch off equipment when not required.	Construction Manager and Supervisors	Ongoing	Visual Inspection
Trafficked areas are to be kept in good condition to minimise noise from vehicle movement.	Construction Manager and Supervisors	Ongoing	Visual Inspection Daily Report
Ensure that all operators of plant and haul trucks do not drive aggressively, with limited horn use.	Construction Manager and Supervisors	Ongoing	Visual Inspection
Start up plant and equipment sequentially rather than all together.	Construction Manager and Supervisors	Ongoing	Visual Inspection
Minimise the drop heights of materials into trucks when loading.	Construction Manager and Supervisors	Ongoing	Visual Inspection
Plant and equipment will be switched off when not required. Machines that might have intermittent use will be shut down between work periods or will be throttled down to a minimum. Plant and equipment noise attenuation will be adopted and maintained.	Construction Manager and Supervisors	Ongoing	Visual Inspection
Sources of significant noise will be enclosed when practicable.	Construction Manager and Supervisors	Ongoing	Weekly Inspection Report
Acoustic covers will be used on engines where available.	Construction Manager and Supervisors	Ongoing	Weekly Inspection Report

Control	Responsibility	Timing	Evidence
Construction and operation workers will be training on the noise and vibration management controls including: • Appropriate use of other audible warning devices • Avoiding unnecessary revving and idling of engines.	Environmental Manager	Prior to construction and operation	Training Register

8.4.3 Operations

Table 8-8 Noise and Vibration Proposed Controls – Operation

Control	Responsibility	Timing	Evidence
Regularly service vehicles, plant and equipment to facilitate operation within acceptable sound and vibration limits set out in EPP (Noise).	Rail Operation Manager and Supervisors	Ongoing	Vehicle maintenance records
Train operators are to be trained in the appropriate use of horns and warning devices.	Rail Operation Manager and Supervisors	Ongoing	Training Register
Track lubrication / greasing will be provided on tight curves where there is a higher potential for noise from wheel / rail interaction.	Rail Operation Manager and Supervisors	Ongoing	Maintenance records
Limit dropping of materials from heights.	Rail Operation Manager and Supervisors	Ongoing	Visual Inspection Complaints
Reduce unnecessary revving and idling of engines.	Rail Operation Manager and Supervisors	Ongoing	Visual Inspection Complaints

Control	Responsibility	Timing	Evidence
Locate mobile plant away from potential noise receptors as far as is practicable.	Rail Operation Manager and Supervisors	Ongoing	Visual Inspection Complaints

8.5 Monitoring and Corrective Action

Table 8-9 Noise and Vibration - Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Monitor vibration levels at sensitive receptors and structures in close proximity to construction activities.	Construction Manager / Environmental Manager	Ongoing	No sustainable vibration levels causing loading	Make good any verified damage in consultation with the landholder.
Check for structural damage at sensitive receptors.	Construction Manager / Environmental Manager	After blasting activities in proximity to these locations or on receipt of complaint	No further structural damage compared to dilapidation survey report	Make good any verified damage in consultation with the landholder.
All noise complaints will be recorded, acknowledged, considered and responded to as soon as is practicable.	Stakeholder Manager / Construction Manager	Ongoing in response to a complaint	An initial response is provided to the complainant within 24 hours.	Noise complaints will be managed in accordance with the complaints management procedure. If complaint-related monitoring data indicate excessive noise, further appropriate control measures will be developed as appropriate.

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Undertake noise or vibration monitoring in response to a complaint.	Environmental Manager	In response to a complaint	Noise levels do not exceed objectives	Implement noise attenuation or mitigation measures. Measures may include those in AS2436:2010 *Guide to noise and vibration control on construction, demolition and maintenance sites.* Measures may also be taken at the sensitive receptor with agreement from the complainant.

9. Surface Water

9.1 Legislative Framework

There are two key pieces of legislation that govern surface water resources in Queensland.

The EP Act establishes the frameworks for managing water quality such that environmental values in relation to water quality are protected. This includes:

- *Environmental Protection (Water) Policy 2008* which:
  - Identifies environmental values and management goals for Queensland waters (surface water and groundwater)
  - Establishes water quality goals and guidelines for waters
  - Provides guidance on making consistent, equitable and informed decisions about waters
  - Includes requirements for monitoring of ambient water quality.
- Requirements for assessment and approval of activities (environmentally relevant activities) that might result in a discharge to surface waters or other impact on surface waters.
- Provisions in relation to compliance with approval conditions in relation to impacts of activities on surface water resources.
- Specific offences relating to contamination of surface waters.

The *Water Act 2000* regulates the sustainable use of water resources, including allocation of water resources for environmental benefits as well as activities that impact on the integrity of watercourses. Water resource plans (WRPs) define the availability of water for each basin in Queensland, and frameworks and mechanisms for sustainably managing water supply and demand. Resource operations plans then set out rules in relation to the allocation of water resources and other decisions made under the WRP. The Carmichael Rail Project is located within the area covered by the *Water Resource (Burdekin Basin) Plan 2007* and the *Water Resource (Fitzroy Basin) Plan 2011*.

Water supply for the Carmichael Coal Rail Project will come from a combination of instream storages, groundwater bores and adjacent landholders.

9.2 Environmental Values

The Project (Rail) traverses the western most extremity of the Fitzroy River catchment across the broad, flat Suttor and Belyando River sub-catchments of the Burdekin River to a looped terminus at Labona on the eastern side of the proposed Project (Mine).

The hydrological regime is characterised by a prolonged dry autumn, winter and spring with little or no flow and summers where large tropical rain systems and cyclones flood local creeks and rivers for weeks at a time across wide floodplains. Highly dispersive cracking clay soils in a recently deforested gilgai landscape absorb large amounts of rain before discharging highly turbid, sediment-charged runoff to the rivers and creeks.

Almost all of the waterways within the Project (Rail) area are ephemeral. Under normal conditions the main stem of the Belyando River maintains a small base flow during the dry season. Once storm flow reaches the rivers and creeks, they rapidly fill and overflow into floodplains where flooding can persist for several days and sometimes weeks at a time.

Ecologically, the waterways are described as slight to moderately disturbed due to the loss of much riparian vegetation as a result of the land use. Twelve major waterways and 76 minor waterways and overland flow paths are crossed by the railway.

The major waterway crossings will comprise either a bridge or culvert or a combination of both depending on the predicted depth of the water. Crossings of the smaller waterways will also consist of either a bridge or culvert or a combination of both but will predominantly be culvert only.

Identified environmental values for the affected waterways include:

- Aquatic ecosystems
- Stock watering and farm use
- Other values (floodplain)

9.2.1 Scheduled Environmental Values

The following environmental values are to be protected:

- Aquatic ecosystems – slightly to moderately disturbed
- Primary industries – irrigation
- Primary industries – stock watering
- Cultural and spiritual values

9.3 Potential Impacts

Maintaining the formation level so that it minimises the fill material required, while satisfying hydrological requirements, and is critical to the Project (Rail) design. Concept design flood immunity at formation level is 50 years ARI and 100 years ARI at rail level.

Minimising the crossing of waterways, roads and stock routes, and limiting disturbance to flora and fauna, were also incorporated in the initial route selection process. Subsequent design then determined the most appropriate location and method of avoiding or crossing these environmental features and infrastructure assets. Based on the upstream catchment areas of the water courses and the estimated structure sizing, water way crossings were assessed and categorised.

Table 9-1 Waterway Crossings

Crossing Type	Crossing location	Numbers in design
Major Water Crossings (Catchment over 100 km^2)		
Major Bridge Structures	Grosvenor Creek	9
	Logan Creek	
	Gowrie Creek	
	Mistake Creek	
	Belyando River	
	Ogenbeena Creek (lower crossing)	
	Ogenbeena Creek	
	North Creek	
	Eight Mile Creek	
Major Drainage Structures	Diamond Creek	3
	Unnamed Waterway	
	East Tributary of Belyando River	
Minor Water Crossings (Catchment area less than 100 km^2)		
Minor Bridge Structures		8
Minor Drainage Structures		68
Total		88

9.3.1 Construction

The main construction phase surface water effects on these values relate to the potential disturbance of watercourses for the crossings, which manifest as:

- Change and / or interruption to flows, particularly a rise in flood levels upstream of the railway (afflux)
- Degradation of water quality
- Barriers to movement of aquatic fauna.

Table 9-2 Potential Surface Water Impacts – Construction

Activity	Potential Environmental Impact
Vegetation clearing, topsoil stripping and general earthworks	Erosion and subsequent degradation of water quality. Release of sediments to water through erosive processes.

Activity	Potential Environmental Impact
Watercourse diversion	Changes in downstream flows. Replacement of natural watercourses with artificial watercourses.
Storage, handling and use of environmentally hazardous substances	Spills and leaks and subsequent degradation of water quality.
Extraction of water for water supply	A small reduction in downstream flow may occur, however this is not expected to be significant and will not affect availability of water to users and aquatic ecosystems.
Irrigation of treated wastewater	Contaminated surface runoff and subsequent degradation of water quality.
Wastewater generation and treatment	If improperly managed, release of nutrients, pathogens and other contaminants to downstream waters.
Structures within a floodplain	Increased afflux and flooding extent and duration upstream. Reduced flood flows downstream.
Storage and handling of hydrocarbons and other environmentally hazardous materials	Contamination of surface water resources.

9.3.2 Operations

The main surface water environmental effects of railway during the operating (permanent) phase on the environmental values derive from long term changes to surface water flows and include:

- Increased depth and extent of flooding
- Possibly longer inundation periods
- Possibly altered drainage patterns
- Scouring and geomorphological changes

Table 9-3 Potential Surface Water Impacts – Operations

Activity	Potential Environmental Impact
Storage, handling and use of environmentally hazardous substances	Spills and leaks and subsequent degradation of water quality.
Extraction of water for water supply	A small reduction in downstream flow will occur, however this is not expected to be significant and will not affect availability of water to users and aquatic ecosystems.

Activity	Potential Environmental Impact
Irrigation of treated wastewater	Contaminated surface runoff and subsequent degradation of water quality.

9.4 Performance Outcome

Environmental values relating to aquatic ecosystems, stock and domestic use and cultural and spiritual values are maintained.

Water quality downstream of the rail project meets the following requirements:

- Total petroleum hydrocarbons are below detection level.
- Turbidity is no more than 10 per cent higher than the upstream value measured within 60 minutes.
- Dissolved oxygen in flowing waters is no more than 10 per cent lower than the upstream value measured within 60 minutes.
- Electrical conductivity in flowing waters is no more than 10 per cent higher than the upstream value measured within 60 minutes.
- Nutrient levels are no more than 10 per cent higher than the upstream value.
- No degradation of water quality downstream relative to upstream values.

9.4.1 Design and pre-construction

Table 9-4 Surface Water Proposed Controls - Design and Pre-construction

Control	Responsibility	Timing	Evidence
Obtain water licences for all extractions and development approvals for all structures.	Environmental Manager	Prior to construction of any water management infrastructure	Licences and permits in place
Design stormwater systems for rail infrastructure areas to include sediment retention basins capable of retaining a 1 in 20 ARI event as a minimum.	Design Manager	During design	Design checklist
Locate infrastructure and facilities away from drainage lines and steep slopes where practicable.	Design Manager	Prior to construction commencing	Design checklist
Schedule construction works as far as practical such that: • Works in watercourses do not need to take place in times of flow • Major vegetation clearing and earthworks activities do not take place in wet conditions • Stormwater systems are installed as early as possible in the construction phase.	Construction Manager	Prior to construction commencing	Construction Schedule
Design access roads and tracks with drainage systems to minimise concentration of flow and erosion risk.	Design Manage	During design	Design checklist
Design off-stream storage and in-stream storages in accordance with relevant requirements of Queensland Dam Safety Management Guidelines (DNRM 2002).	Design Manager	During design	Design checklist

Control	Responsibility	Timing	Evidence
Ensure that any dams constructed along the alignment comply with the requirements of the Code for self-assessable development for taking overland flow water for limited capacity works including: • Burdekin Basin – size of the dam to be less than 250 ML • Fitzroy Basin – size of the dam to be less than 50 ML	Design Manager	During design	Design checklist
Review climate forecasts and adopt appropriate measures in design criteria for dams, levees, diversions and other water management structures.	Design Manager	During design	Design checklist
Seek confirmation from DNRM regarding designation of watercourses under the Water Act.	Environmental Manager	During design	Confirmation on file
Prepare detailed design for diversions (if required), taking into account: • Hydraulic requirements including energy dissipation • Creation of a geomorphologically stable channel • Potential for environmental values to be reinstated • Potential erosion at outlet point.	Design Manager	When designing diversions	Design checklist
Design all watercourse crossings to: • Maintain flow and minimise afflux where this may affect sensitive receptors or infrastructure. • Minimise the risk of damage to the creek banks during construction • Minimise the change in the sediment transport regime at the crossing • Minimise the risk of creek bank r erosion during flood events.	Design Manager	During design	Design checklist

Control	Responsibility	Timing	Evidence
Design causeways to provide sufficient hydraulic capacity to allow the conveyance of natural flows with minimal increase in velocity or afflux.	Design Manager	When design causeways	Design checklist
Investigate water supply and demand options.	Design Manager	During detailed design	Design checklist
A Water Supply Management Plan will be developed pre-construction and implemented to address water usage, treatment of the recycled water and compliance with the requirements of the *Queensland Recycled Water Management Plan and Validation Guidelines.*	Environmental Manager / Design Manager	Pre-construction	Water Supply Management Plan in place
The construction of bridge and culvert structures will be programmed during periods of low flow where possible.	Construction Manager	Prior to construction	Schedule
The construction of works within watercourses will be scheduled to be undertaken during the drier periods, when most waterways are dry or have minimal flow.	Construction Manager	Prior to construction	Schedule
Bridges will be used in preference to causeways as temporary building platforms/vehicle access as they involve less disturbance to the bed of the low flow channel.	Design Manager	During design	Design checklist
A detailed scour assessment will be conducted to determine the appropriate depth of cover or scour protection measures to be adopted at each crossing.	Design Manager	During design	Design checklist
The invert of culverts is to be set below the ground surface.	Design Manager	During design	Design checklist
Locate construction camps and concrete batching plants away from creeks and waterways and preferentially, at least 0.5 m above the 100 year ARI flood level.	Design Manager	During design	Design checklist

Control	Responsibility	Timing	Evidence
Develop a Topsoil Management Plan prior to construction commencing identifying topsoil recovery and management of topsoil during storage.	Design Manager / Environmental Manager	During design	Topsoil Management Plan

9.4.2 Construction

Table 9-5 Surface Water Proposed Controls – Construction

Control	Responsibility	Timing	Evidence

If dams are required to be drained:
• Test water quality (pH, DO, turbidity and EC)
• Utilise water for dust suppression as a first preference
• If water cannot be used for dust suppression, then manage as follows:
  ○ If EC is less than 700 us/cm, pH is in the range 6-8.5, turbidity is less than 50 NTU and DO is above 4 mg/l, water may be pumped to the downstream watercourse. Pump rate should be such that water does not overflow the channel, scouring does not occur and suspended sediment from the base of the storage is not suspended. Monitor turbidity levels through and cease discharge if turbidity exceeds 50 NTU.
  ○ If DO is below 4 mg/L, discharge to watercourse may be possible with aeration, however care must be taken not to stir up sediment from the bottom of the storage such that turbidity exceeds 50 NTU.
  ○ If EC is less than 1,200 us/cm, use water for irrigation of pasture areas or rehabilitation trials. Water is to be irrigated
	Construction Manager and Supervisors	When draining dams	Water quality data and discharge records, permit to disturb.

Control	Responsibility	Timing	Evidence
such that ponding and runoff does not occur ○ If EC is more than 1,200 us/cm, pH is outside the range 6-8.5, or turbidity exceeds 50 NTU, transfer to another storage for later use.			
Construct water storage structures in accordance with relevant requirements of Queensland Dam Safety Management Guidelines (DNRM 2002).	Construction Manager and Supervisors	During construction	RPEQ sign off or other documentation as required by guidelines
Conduct surveillance and maintenance on all water storage structures as per relevant requirements of the Queensland Dam Safety Management Guidelines (DNRM 2002).	Construction Manager and Supervisors	As per guidelines	Dam safety reports
Ensure that any dams constructed along the alignment comply with the requirements of the Code for self-assessable development for taking overland flow water for limited capacity works including: • Burdekin Basin – size of the dam to be less than 250 ML • Fitzroy Basin – size of the dam to be less than 50 ML.	Design Manager	During design	Design checklist
Where works are undertaken within waterways, works will comply with the DRNM Guidelines	Construction Manager	During construction	Weekly environmental inspection checklist
Develop and implement customised erosion and sediment control plans for each work area prior to construction commencing. General principles for erosion and sediment control will be drawn from industry guidelines in place at the time of construction (International Erosion Control Association (Australasia), Best Practice Erosion and Sediment Control (2008)). Erosion and sediment control measures are to be based on an erosion risk assessment and are to include:	Construction Manager / Environmental Manager	Prior to construction commencing	Erosion and sediment control plans Weekly environmental inspection checklist

Control	Responsibility	Timing	Evidence
• Requirement to construct across watercourses during dry periods (as far as possible) to limit localised erosion at construction areas • Requirement to clearly identify areas for land clearing and earthworks on construction plans and on the ground to avoid unnecessary disturbance to areas outside the construction area • Installation and maintenances standards for erosion and sediment control devices, in particular for areas near earthworks, watercourses and key stormwater flow paths • Locating any soil or mulch stockpiles away from watercourses and key stormwater flow paths to limit potential for transport of these substances into the watercourses via runoff • Rehabilitation and / or requirements to protect / stabilise exposed earth from water and wind erosion • Stabilisation of creek banks disturbed during construction • Monitoring requirements for the purposes of detecting changes in water quality downstream of the construction area • Treatment and management requirements for sodic, dispersive and aggressive soils • Inspection requirements to maintain the effectiveness of installed control mechanisms, including frequency and corrective actions to be undertaken in the event that erosion control mechanisms are not operating appropriately.			

Control	Responsibility	Timing	Evidence
Limit vehicle movements to designated access tracks wherever safe and practical.	Construction Manager and Supervisors	Construction and operation	Weekly environmental inspection checklist
Install perimeter catch drains around major temporary construction laydown areas and accommodation camps to prevent offsite upslope clean water from entering the site and bunding and basins downslope to confine dirty water within the site and out on the low flow channel. Design and management of the installation of such controls will be in accordance with IECA guidelines (IECA 2008).	Construction Manager and Supervisors	Before commencement of earthworks	Weekly environmental inspection checklist
Stockpiling of soil in the bed and banks of watercourses will not be permitted except for major watercourse crossings, where temporary stockpiling outside the low flow channel will be allowed if required.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist Daily diary
Rehabilitation of any disturbed ground due to temporary construction infrastructure will be conducted progressively as soon as construction activities are complete in any area in accordance with the Rail Rehabilitation Management Strategy (SEIS Volume 4, Appendix X).	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
Existing riparian vegetation will be retained as far as is practicable.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist Photographic evidence
Land clearing activities will, where possible, seek to avoid alteration to drainage paths such that the impacts to water quality and downstream flows are minimised to the greatest extent possible.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist

Control	Responsibility	Timing	Evidence
If temporary stream or channel diversion are required to facilitate activities in wet periods, stream flow will be maintained where practicable to provide connectivity between aquatic habitats and facilitate aquatic fauna passage.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
Temporarily disturbed areas will be stabilised as soon as practical by mulching and/or reinstating topsoil and subsoil and compacting replaced soils.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
The integrity of topsoil resources associated with construction and temporary disturbances will be maintained as near to pre-disturbance conditions as possible, which may require the addition of ameliorants.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
Stripped topsoil will be set aside for use in reinstatement where properties allow and in accordance with the Topsoil Management Plan. Topsoil stockpiles will be managed to maintain soil fertility and other soil properties.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
Protection measures for exposed slope and batters, such as grass mats or shotcrete, will be installed as required if in situ materials are unsuitable.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
To avoid large areas of the construction corridor being unnecessarily exposed to the erosive effects of wind and rain, areas will be cleared immediately in advance of construction fronts.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
Stormwater will be captured on site where possible (e.g. Maintenance facility, construction depot, construction camps) and will be reused for irrigation, dust suppression or discharged via sediment basin.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist

Control	Responsibility	Timing	Evidence
Refuelling or servicing of vehicles and plant will not be permitted within the low flow channel.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
The low flow channel and any culverts will be kept clear of debris.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist Daily diary
Any boring or similar activity required during construction will utilise drilling fluids and chemicals that are environmentally neutral and biodegradable.	Construction Manager and Supervisors	Construction	Hazardous Substance Review
Chemicals and hazardous substances will be appropriately stored in containment bunding in accordance with AS1940-2004 – The storage and handling of flammable and combustible liquids.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
Spills and leaks are to be cleaned up as soon as practicable.	Construction Manager and Supervisors	As required	Incident Report
Spill kits, absorbent material and other containment equipment must be maintained in clearly identified and unobstructed locations ready for use in the event of a spill.	Construction Manager and Supervisors	Construction	Weekly environmental inspection report
Visual inspections shall be carried out during significant rainfall events in order to identify any visible signs of contaminated stormwater or contaminated runoff leaving the site.	Environmental Manager / Construction Manager	During significant rainfall events	Weekly environmental inspection report

Control	Responsibility	Timing	Evidence
Concrete Batching Plants			
Clean water diversion bunds or drains will be installed to prevent offsite overland flow water from entering the site.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
The site will be separated into clean, dirty and contaminated catchments. Water from clean catchments will be prevented from stormwater runoff from dirty and contaminated catchments.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
All wastewater from the concrete batching plant will be collected and recycled on site where possible. Wastewater will not be discharged outside the boundary of the project site.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
Sediment ponds will be installed to capture runoff entering or crossing the plant footprint catching areas on site for reuse (e.g. Dust suppression, washing, watering and batching water).	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist
Washout of trucks shall only occur within the designated bay area only.	Construction Manager and Supervisors	Construction	Weekly environmental inspection checklist

9.4.3 Operations

There are no specific operational controls in relation to erosion and sediment control. If ground disturbing activities are required, the controls for the construction phase should be followed.

9.5 Monitoring and Corrective Action

Table 9-6 Surface Water - Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Monitor the potential for flooding in accordance with the BOM flood warning system	Construction Manager / Environmental Manager	Daily following heavy rain events	Appropriate notice of floods / significant rainfall events is provided	Staff notified and equipment and materials removed from flood prone areas if required
Visual inspection of dams and waterways in the vicinity of construction sites for signs of contamination	Construction Manager and Supervisors	Weekly or during rainfall events	Free from signs of contamination e.g. oily sheen, discolouration	Investigate source of contamination
Inspect erosion and sediment control devices	Construction Manager and Supervisors / Operations Manager	Weekly (Checklist)	See weekly checklist	Undertake repairs or replace devices Empty sediment from sediment traps Repair scouring or other eroded areas
Check capacity of sediment retention basins and stormwater systems	Construction Manager and Supervisor	At the end of each wet season	Design capacity is retained	Excavate deposited sediment and dispose of in accordance with legislative requirements
Inspect stormwater systems, including diversion drains and outlets	Construction Manager and Supervisors	Monthly during wet season	No visible signs of scouring, concentration of flow or bypass flows	Repair scouring Maintain, repair or upgrade stormwater system to prevent scouring, concentration of flows over high risk areas or bypass flows

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Inspect downstream waterways for signs of increased turbidity and sedimentation	Construction Manager / Environmental Manager	Regularly during construction	See weekly checklist	Catch drains will be installed at appropriate locations to direct water away from the rail corridor embankment and into surrounding drainage lines. Diversion drains installed will be kept clear and free of debris

10. Groundwater

10.1 Legislative Framework

There are two key pieces of legislation that govern ground water resources in Queensland.

The EP Act establishes the frameworks for managing water quality such that environmental values in relation to water quality are protected. This includes:

- The *Environmental Protection (Water) Policy 2008* which:
  - Identifies environmental values and management goals for Queensland waters (surface water and groundwater)
  - Establishes water quality goals and guidelines for waters
  - Provides guidance on making consistent, equitable and informed decisions about waters
  - Includes requirements for monitoring of ambient water quality.
- Requirements for assessment and approval of activities (environmentally relevant activities) that might result in impacts on groundwater resources.
- Provisions in relation to compliance with approval conditions in relation to impacts of activities on ground water resources.

The *Water Act 2000* regulates the sustainable use of water resources, including allocation of water resources for environmental benefits as well as activities that impact on the integrity of watercourses. Water resource plans (WRPs) define the availability of water for each basin in Queensland, including the Great Artesian Basin (GAB), and frameworks and mechanisms for sustainably managing water supply and demand. Resource operations plans then set out rules in relation to the allocation of water resources and other decisions made under the WRP. The Carmichael Coal Rail Project is within the area covered by the *Water Resource (Burdekin Basin) Plan 2007* and the *Water Resource (Fitzroy Basin) Plan 2011*.

10.2 Environmental Values

The Project (Rail) falls entirely within the Highlands Sub-artesian Groundwater Management Area and is not expected to impact upon the Great Artesian Basin (GAB). The proposed Project (Rail) traverses the Bowen Unincorporated Area (UA), which is bound to the west by the Great Artesian Basin GMU and the Isaac River GMU to the north-west.

The ephemeral nature of the watercourses within the Project (Rail) area suggests little to no significant groundwater base-flow during dry periods. The Belyando River sustains permanent water holes in some sections of the river, indicating that there is some base-flow, although this would be highly reduced during the dry season.

According to the Springs of Queensland dataset (Environmental Protection Agency (EPA), 2005) there are no reported spring complexes within the Project (Rail) study area.

Outside of the riparian areas associated with the main watercourses then groundwater dependant ecosystems (GDEs) are unlikely to be present within the Project (Rail) study area. The other minor creeks and rivers are typically ephemeral and are not associated with areas of remnant vegetation. This is understood to be related to elevated depths to water table away

from the main river systems and little or no groundwater contribution to vegetation demands and/or river flows.

Forty-three registered bores occur within a 10 km radius buffer of the Project (Rail). Abandoned bores total 19, of which 15 are reported as destroyed. The remaining 24 bores are assumed to be in use, seven of which are defined as 'water supply' bores and eleven of which are defined as having an 'unknown' use. It is possible that some or all of the 11 existing bores with an 'unknown' facility role may abstract groundwater for water supply. There are two registered bores (RN 37604 and RN 132303) within 1 km of the Project (Rail), both of which are reported to be abandoned and destroyed (DERM, 2012). Bores that are greater than 1 km from the Project (Rail) have a very low risk of being impacted from construction or operational activities.

10.3 Potential Impacts

10.3.1 Construction

Construction of new infrastructure such as culverts, cuttings, embankments and bridge structures has the potential to result in short-term, localised impacts on shallow groundwater, such as increases or decreases in groundwater levels. Based on groundwater studies undertaken to date, intersection of shallow groundwater aquifers is unlikely to occur.

Table 10-1 Groundwater Potential Environmental Impacts – Construction

Activity	Potential Environmental Impact
Dewatering of excavations	Drawdown of groundwater may occur, however most excavations are relatively shallow with respect to the groundwater levels, relatively small in volume and requiring dewatering only over a short period of time. Hence, impacts are not expected. Disposal of groundwater from dewatering has the potential to cause surface water degradation particularly if salinity is high.
Contamination from spills or leaks of environmentally hazardous substances	Large spills of environmentally hazardous materials or leaks that are allowed to continue over long periods of time may cause contamination of groundwater. Improper irrigation of treated wastewater may cause nutrients to leach to groundwater.
Water supply bores	Drawdown from water supply bores is not expected to affect any existing groundwater users or groundwater dependent ecosystems.

10.3.2 Operations

Table 10-2 Groundwater Potential Environmental Impacts – Operation

Activity	Potential Environmental Impact
Water supply bores	Drawdown from water supply bores is not expected to affect any existing groundwater users or groundwater dependent ecosystems.
Contamination from spills or leaks of environmentally hazardous substances	Large spills of environmentally hazardous materials or leaks that are allowed to continue over long periods of time may cause contamination of groundwater. Improper irrigation of treated wastewater may cause nutrients to leach to groundwater.

10.4 Performance Outcome

Groundwater users are not adversely impacted in terms of availability of water for stock and domestic use.

Impacts on groundwater dependent ecosystems do not cause loss of biodiversity values.

10.5 Proposed Controls

10.5.1 Design and pre-construction

Table 10-3 Groundwater Proposed Controls - Design and Pre-construction

Control	Responsibility	Timing	Evidence
Liaise with adjacent landholders and develop bore monitoring programs to detect changes in bores used for water supply.	Design Manager / Environmental Manager	Prior to commencement of construction	Groundwater Monitoring Plan
If extended dewatering is identified during detailed design and major drawdown of the alluvial aquifer is expected, a Groundwater Management Plan may be required.	Design Manager / Environmental Manager	Detailed design	Groundwater Management Plan
Where dewatering of pits/quarries/excavations is required, consider: • Opportunities for reinjection of the groundwater down-gradient • Engineered cut-offs for pits and excavations dependent on the size of the pits and groundwater inflows.	Design Manager	Prior to construction	Groundwater Management Plan
Sand will be obtained from borrow pits where shallow aquifers are not present, as far as is practicable.	Procurement team	Development of procurement strategy	Procurement Strategy
If blasting is required, undertake a census of all existing groundwater bores and spring complexes within a one kilometre radius: • Physically finding and detailing bore properties • Search the Queensland Groundwater Database (DERM, 2010), the Department of Natural Resources and Mines (DNRM) Water Entitlement Registration Database • Enquiries with the local council and liaison with local landholders.	Design Manager	Prior to construction	Census of potential impacted groundwater bores and spring complexes

Control	Responsibility	Timing	Evidence
Design pylon structures, culverts and filling activities to minimise the loading and compaction of alluvial sediments, which may alter shallow groundwater regimes and discharge.	Design Manager	During design	Design checklist
If extensive loading or compaction of alluvium at watercourse crossings is required, explore alternative design concepts to minimise this (e.g. piles)	Design Manager	During design	Design checklist

10.5.2 Construction

Table 10-4 Groundwater Proposed Controls – Construction

Control	Responsibility	Timing	Evidence
A number of monitoring bores will be installed and tested at the quarry locations prior to construction to assess baseline groundwater conditions including depth to water, groundwater flow direction, and indicative aquifer permeability and groundwater quality.	Construction Manager / Environmental Manager	Prior to construction commencing	Photographic evidence Weekly environmental inspection checklist
Monitoring of the groundwater monitoring bores at the quarry locations will occur on a monthly basis. A monitoring program shall be developed prior to construction commencing.	Environmental Manager	During construction	Monitoring records
Dewatering of shallow groundwater, if required for bridge pylons and/or culverts construction, will be of a short duration.	Construction Manager and supervisors	As required	Weekly environmental inspection checklist
Check that work permit applications include appropriate measures for management of groundwater from excavations	Environmental Manager	Prior to issuing permit	Work permit

10.5.3 Operations

There are no operational controls required in relation to groundwater.

10.6 Monitoring and Corrective Action

Table 10-5 Groundwater - Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
If blasting is required, potentially impacted bores and spring complexes will be monitored pre and post blasting to assess pre and post blasting impacts.	Environmental Manager	As required, before and after blasting	No impact on surrounding bores and springs	Determine any mitigation measures that may be needed. Measures may include make-good reparations, capture of water if there is increased flow etc.

11. General and Hazardous Waste Management

11.1 Legislative Framework

The key legislation in relation to waste management is the EP Act, which identifies effective waste management strategies as part of an integrated management approach to environment protection and ecologically sustainable development. The EP Act also sets up requirements for minimisation, handling, transport, storage and disposal of wastes. Under the EP Act and *Environmental Protection (Waste Management) Regulation 2000* (EP Regulation), activities associated with waste management, including transport, treatment, storage and disposal of wastes are environmentally relevant activities and an authorisation is required to carry out these activities. Schedule 7 of the EP Regulation also defines regulated waste, being wastes that are particularly hazardous to the environment if not managed appropriately.

The EP Regulation establishes procedures for tracking of certain regulated wastes. Trackable wastes are defined in Schedule 1 of this regulation and a docket system is in place to track these wastes from the point of origin to disposal.

Waste Reduction and Recycling Act 2011 (WRR Act) and *Waste Reduction and Recycling Regulation 2011* strengthens waste management and resource recovery practices in Queensland. The WRR Act provides a framework for statewide waste management strategy and establishment of levies and other mechanisms to promote waste minimisation. The strategy identifies waste tyres from commercial and industrial activities as a high priority for waste minimisation and management.

11.2 Environmental Values

Wastes represent lost or degraded material and energy resources.

Improper waste management can impact on a range of environmental values including land, air quality, surface water and groundwater. Improper waste management can also cause a range of public health hazards.

11.3 Potential Impacts

Types of wastes likely to be produced during construction and operation of the Project (Rail) are listed in Table 11-1, together with potential environmental or public health impacts that may arise if wastes are not properly managed.

Table 11-1 Waste Generation Potential Environmental Impacts

Waste type	Potential Environmental Impact (with no management)
Vegetation waste	Fire hazard
	Emissions of greenhouse gases as vegetation rots
	Possible loss of nutrients in natural nutrient cycles
	Spread of weeds
	Visual impact

Waste type	Potential Environmental Impact (with no management)
	May harbour vermin (may also harbour native animals)
Packaging waste	Lost resource Visual impact Source of litter Plastics may entrap native animals
Waste concrete and concrete wash out waste	Localised increases in pH Lost resource Visual impact
Scrap metal	Loss of resource Visual impact Localised soil contamination with potential to leach to surface and groundwater Human health risk (tetanus)
Other building and demolition wastes	Loss of resource Visual impact
Waste oil and oil contaminated wastes	Contamination of soils, surface water and groundwater Toxicity to plants and animals Degradation of water resources Loss of resource
Waste solvents and paints	Contamination of soils, surface water and groundwater Toxicity to plants and animals Degradation of water resources Loss of resource
Office wastes	Litter Loss of resource
Food wastes	May attract vermin Odour Disease, particularly through bacterial infection
Other domestic wastes	Loss of resource Litter Plastics may entrap animals
Wastewater (toilets,	Contamination of land, surface and groundwater

Waste type	Potential Environmental Impact (with no management)
showers, kitchen, laundry)	Degradation of water resources
Sewage and water treatment plant sludge	Inhibition of native plant growth
	Increased nutrient levels in aquatic ecosystems, causing eutrophication and algal outbreaks
	Spread of disease
	Odour
Tyres	Fire hazard
	Toxic smoke if fire occurs
	Visual impact
	Loss of resource
	Collect water which may harbour mosquitoes and other biting insects
Batteries	Loss of resource
	Release of acidic and/or metallic contaminants to land, surface water and groundwater
	Toxicity to plants and animals
	Degradation of water resources
	Inhibition of native plant growth

11.4 Performance Outcome

Minimise generation of waste in accordance with the waste management hierarchy:

- AVOID unnecessary resource consumption;
- REDUCE waste generation and disposal;
- RE-USE waste resources without further manufacturing;
- RECYCLE waste resources to make the same or different products;
- RECOVER waste resources, including the recovery of energy;
- TREAT waste before disposal, including reducing the hazardous nature of waste;
- DISPOSE of waste only if there is no viable alternative.

Avoid adverse impacts of waste on land contamination, surface and groundwater quality and visual amenity.

11.4.1 Waste Management Inventory

Table 11-2 presents waste storage and handling requirements and indicative waste management methods, in order of preference. Final waste management methods will depend on the availability of waste management contractors to provide a cost effective service to this location.

Table 11-2 General and Hazardous Waste Management

Waste type	Waste storage and handling requirements	Indicative waste management methods
Vegetation waste	Store so as to minimise fire hazard Separate logs and hollow trees Avoid mixing native vegetation with introduced vegetation where possible Store away from trafficked areas	Place logs and hollow trees in rehabilitated areas or areas of retained habitat. Mulch or otherwise treat native vegetation for reuse in revegetation areas (trials to be undertaken to determine best methods for reuse).
Packaging waste	Segregate plastic, wood and cardboard Flatten cardboard and store in low fire risk areas Contain plastics so that these do not blow away	Return packaging to source wherever possible. Mulch cardboard and wood for reuse in revegetation (subject to trials). Plastics and cardboard removed from site for recycling where viable.
Waste concrete and concrete wash out waste	Concrete wash out in designated and contained areas away from watercourses	Crush waste concrete for reuse in road building if required Recycle for use on site (where possible) Disposal at a licensed waste facility
Scrap metal	Segregate from other wastes	Off-site recycling if feasible Disposal at a licensed waste facility

Waste type	Waste storage and handling requirements	Indicative waste management methods
Other building and demolition wastes	Segregate from other wastes	Disposal at a licensed waste facility Recycle waste materials on site.
Waste oil and oil contaminated wastes	Store in sealed containers in a designated bunded area, away from sources of fire and watercourses	Consider use of biological methods to treat oily waste and waste oils Removal by authorised oil recovery contractor if viable
Waste solvents and paints	Store in sealed containers in a designated bunded area, away from sources of fire and watercourses	Removal by authorised solvent recovery contractor if viable Consider distillation of solvents to recover usable solvents Harden waste paints Removal for disposal in authorised landfill facility if other options are not feasible
Office wastes	Print paper on both sides Segregate paper, cartridges, computer wastes Store paper in a closed container to avoid litter Separate storage of paper and cardboard to assist in recycling	If feasible, remove wastes for recycling Disposal at a licensed waste facility
Food wastes	Store in sealed containers	Disposal at a licensed waste facility
Other domestic wastes	Store in enclosed containers	Disposal at a licensed waste facility
Wastewater (toilets, showers, laundry, kitchen)	Storage capacity for untreated wastewater for at least seven days Kitchen wastes to pass through a grease trap or similar	Irrigate on pasture or revegetation areas (subject to soil investigations and MEDLI modelling) Use for irrigation of landscaped areas

Waste type	Waste storage and handling requirements	Indicative waste management methods
	Treat in one or more package wastewater treatment plants to Class A. Storage capacity for treated wastewater for up to 10 days	Use for vehicle washing
Sewage and water treatment plant sludge	Store in fully contained receptacles in a designated area away from watercourses and flood plain areas	Use in revegetation areas – subject to trials Disposal at a licensed waste facility
Batteries	Store in contained areas	Removal by authorised contractor for material recovery or disposal at an authorised disposal facility

11.4.2 Design and Pre-construction

Table 11-3 General and Hazardous Waste Management Proposed Controls - Design and Pre-construction

Control	Responsibility	Timing	Evidence
Identify opportunities for waste minimisation and recycling in design of all components.	Design Manager	During design phase	Design checklist
Ensure waste contracts are in place for all wastes that require removal from the site for reuse, recycling, treatment and/or disposal. Utilise contractors that can offer reuse and recycling services in preference to those that cannot and ensure that all contractors hold appropriate authorisations to transport, receive, store, reprocess, treat and/or dispose of wastes expected to be generated.	Procurement Manager	Prior to commencement of construction	Requests for tenders, tenders received Contracts in place
Identify obligations for national pollutant inventory (NPI) reporting and ensure that mechanisms are in place to collect required data.	Environmental Manager	Prior to commencement of	Monitoring records

Control	Responsibility	Timing	Evidence
		construction	
Select appropriate wastewater treatment system to achieve treatment levels that protect environmental values and allow maximum reuse of treated wastewater without creating health and safety issues.	Design Manager	Prior to commencement of construction	Design checklist
If treated wastewater is to be disposed of through irrigation, develop an effluent irrigation management plan based on soil testing and results of MEDLI modelling.	Design Manager / Environmental Manager	Prior to commencement of construction	Effluent irrigation management plan
Determine storage requirements for untreated and treated wastewater in the event of unforseen events such as malfunction of the wastewater treatment plant or wet weather.	Design Manager	Prior to commencement of construction	Design checklist
Develop a Project Procurement Plan to outline requirements to avoid the purchase of excess materials which may be wasted.	Procurement Manager	Prior to commencement of construction	Procurement Plan
Vehicle and machinery components will be purchased in bulk and/or with minimal packaging to reduce packaging waste.	Procurement Manager	Prior to commencement of construction	Procurement Plan
Site specific Wastewater and Effluent Management Plans will be developed and implemented to ensure compliance with effluent treatment and design discharges	Design Manager / Environmental Manager	Prior to commencement of construction	Wastewater and Effluent Management Plan

11.4.3 Construction and Operation

Table 11-4 General and Hazardous Waste Management Proposed Controls - Construction and Operation

Control	Responsibility	Timing	Evidence
Maintain a waste register, including the following information: • Waste type and waste code • Waste source • Potential contaminants and other environmental hazards • Quantity generated • Storage locations and requirements • Whether the waste is regulated and trackable • Waste avoidance or reduction measures in place • Management method (reuse, recycling, on-site disposal, off-site disposal) • Quantities removed for reuse/recycling/disposal • Relevant waste contractor.	Procurement Manager / Environmental Manager / Operations Manager	Continual	Waste register
For trackable wastes, waste register will include: • Consignment number for the load; • Transport provider's details (including licence number); • Date and time trackable waste removed from Adani Mining's premises; • Quantity removed;	Procurement Manager / Environmental Manager / Operations Manager	Continual	Waste register

Control	Responsibility	Timing	Evidence
• Receiver's details (including licence number).			
Dedicated waste storage areas will be established at all construction and operation sites. Waste storage areas will include areas for: • Segregation of wastes for wood, steel, glass, other recyclables and general waste • Secure, contained storages for hazardous and putrescible wastes. • Food scraps and other wastes that may potentially attract animals will be stored in waste containers with lids Waste storage areas will be clearly signed and located so as to be at low risk of interaction with vehicle and equipment. Bins will be regularly collected and disposed of in the nearest registered landfill or transported to recycling facilities, where possible.	Construction Manager and Supervisors / Operations Manager	Ongoing	Weekly inspection records
Materials will be reused or recycled where possible. This may include: • Timber will be reused on site where possible, or recycled on or offsite • Concrete sleepers will be crushed and recycled • Ballast will be removed and cleaned off site for reuse. Any ballast not reused will be sent for recycling.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register

Control	Responsibility	Timing	Evidence
• Waste concrete will be crushed and recycled where possible • Suitable steel off cuts or scrap metal will be recycled • Cabling will be recycled • Recyclable packaging material			
Wastewater will be treated in portable treatment plants on site in accordance with the Effluent Management Plan.	Construction Manager / Environment Manager / Operations Manager	Ongoing	Effluent Management Plan Irrigation Records Weekly environmental inspection checklist Waste register
Where practicable, tyres will be repaired and reused; otherwise tyres will be stored in a designated area free of flammable material awaiting disposal.	Construction Manager and Supervisors / Operations Manager	Ongoing	Weekly environmental inspection checklist Plant maintenance records
Where practicable, engine air filters will be recycled off-site by a local contractor, or otherwise disposed of at a local waste disposal facility.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register
Decanted hydrocarbons from interceptors will be stored in sealed tanks and will be removed by a licensed vacuum truck contractor and disposed of at a licensed facility.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register

Control	Responsibility	Timing	Evidence
Other miscellaneous oil/hydrocarbon wastes will be stored in designated bins for collection by a licensed contractor for energy recovery and/or disposal. Coolants will be stored in a separate tank for collection and reconditioning by suppliers.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register
Lead acid vehicle batteries will be stored on-site in a designated area within weatherproof battery storage containers. Other dry or gel cell batteries will be stored in dedicated containers within a battery storage area for collection and recycling or disposal by a licensed contractor.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register
Engine oil or fuel filters will be crushed and evacuated of oil. Filters will be stored in clearly labelled bunded area for collection and recycling by a licensed contractor.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register
Spoil that cannot be reused onsite will be moved to an approved landfill site. Spoil will be tested in accordance with the relevant legislation prior to disposal and stockpiled within the project area.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register
Cleared vegetation that is weed free will be mulched, chipped and stockpiled for rehabilitation and revegetation works on-site.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register
Vegetation that cannot be reused will be transported to a processing facility for chipping, mulching or composting.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register
Wastes from administrative and office facilities will be managed to reduce excess or inappropriate office materials. Internal practices will include recycling office stationary, cartridges and computer	Construction Manager and Supervisors / Operations	Ongoing	Waste register

Control	Responsibility	Timing	Evidence
waste.	Manager		
Use of electronic documents, double sided printing and reuse of non-confidential printed material will be encouraged to minimise waste paper.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register
Waste computer equipment including monitors, keyboards and printer cartridges will be stored within office areas for collection by a licensed contractor for recycling.	Construction Manager and Supervisors / Operations Manager	Ongoing	Waste register
No burning of wastes will be permitted on or off site.	Construction Manager and Supervisors / Operations Manager	Ongoing	Weekly environmental Inspection checklist
Induction training will include waste management, such as waste disposal and segregation practices.	All staff	Inductions	Induction records

11.5 Monitoring and Corrective Action

Table 11-5 General and Hazardous Waste Management - Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Review waste register for waste avoidance, reuse, recycling or other minimisation opportunities. Identify trends in waste generation and check that	Environmental Manager	Annually for first five years and then every second year	Waste avoidance and minimisation opportunities are maximised	Review on-site procedures and incorporate waste avoidance and minimisation measures Amend waste contracts to maximise reuse and recycling in preference to disposal

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
appropriate storage, handling and management measures are in place for each waste type				
Monitor wastes as required under the NPI scheme	Environmental Manager	Annual	NPI report is submitted	NA
Review waste contracts	Procurement Manager	Annual	Waste contractors are properly authorised to transport, treat and dispose of waste Waste contracts maximise reuse and recycling of waste over disposal where practical	Utilise only contractors with proper authorisations for waste management services Amend waste contracts to maximise reuse and recycling in preference to disposal
Storage areas will be regularly inspected to assess condition and appropriateness of storage	Environment Manager / Construction Manager	Weekly	Management of wastes in accordance with AS1940 and the Material Safety Data Sheets.	Any inappropriately stored substances will be removed immediately and moved to an appropriate storage area

12. Flora and Fauna Management

12.1 Legislative Framework

Terrestrial and aquatic ecosystem values are protected by Federal and State legislation. The Commonwealth EPBC Act provides protection for matters of national environmental significance including listed threatened species, listed migratory species and threatened ecological communities. The Rail Project must proceed in accordance with conditions of approval under this Act. Offsets are required where significant impacts on matters of national environmental significance are unavoidable.

The *Vegetation Management Act 1999* (VM Act) protects remnant native vegetation and approval is required to clear this. Endangered and of concern vegetation must be offset under this Act.

In Queensland, the NC Act also provides a framework for protecting all native plants and animals including threatened species, breeding places and habitat.

Under the EP Act, rail projects are also subject to the Queensland Biodiversity Offsets Policy (DERM, October 2011) in relation to impacts on state significant biodiversity values.

Queensland *Land Protection (Pest and Stock Route Management) Act 2002* identifies declared pest plant and animal species, and provides for their control. The LP Act imposes a legal responsibility on all landowners to control declared species on their land (subject to certain conditions).

The *Fisheries Act 1994* (Fisheries Act) protects fish and fish habitat. Matters regulated by the Fisheries Act include maintaining fish passage and creating a waterway barrier and an approval is required for raising a waterway barrier, unless codes can be complied with.

12.2 Environmental Values

The Project (Rail) passes through a predominantly cleared and fragmented landscape, of which 1,502 ha is non-remnant vegetation and 366 ha is remnant vegetation. Within the remnant vegetation, a range of vegetation communities and habitat types exist including 18 regional ecosystems (REs) and two EPBC Act listed TECs.

No threatened flora species listed under the EPBC Act or the NC Act were recorded within the Study Area for the Project (Rail) during field surveys. Eight terrestrial fauna habitat types are defined across the Study Area, containing broadly similar habitat values in terms of structure, but providing varying value for wildlife based on their specific forage and shelter resources. Open cleared land was the most common and widespread fauna habitat type within the Study Area, typically providing a low diversity of suitable resources for fauna compared to the higher ecological value of remnant vegetation, which typically occurred in association with watercourses and creek lines.

12.3 Potential Impacts

12.3.1 Construction

Table 12-1 Flora and Fauna Potential Environmental Impacts – Construction

Activity	Potential Environmental Impact
Vegetation clearing	Loss of native plants and vegetation communities Loss of low grade habitat for native animals, including some threatened species Injury or mortality to native animals Degradation of adjacent habitat due to dust deposition, changes in overland flow regimes, exposure of edges to sunlight and increased predation Proliferation of weeds and pests, including class 2 declared weeds and pests under the LP Act Proliferation of exotic pasture grasses including buffel grass (*Cenchrus ciliaris*), which may impact the habitat quality for EPBC Act listed species including black-throated finch (southern) and squatter pigeon (southern) Sedimentation of waterways Landscape fragmentation, reduction in connectivity and reduced capacity for fauna dispersal
Disturbances to watercourses and changes to surface water flows	Loss of aquatic habitat for aquatic flora and fauna Degradation of aquatic habitat and riparian zones Aquatic fauna mortality Reduced local availability of habitats associated with natural and artificial water bodies
General site activities	Introduction of new weeds and pests Spread of weeds and pests across the site Noise and light Changed fire regime
Drainage and removal of dams	Localised impact to residential native fish, crustacean and turtle species Loss of aquatic habitat
Earth works and spoil disposal	Changed geomorphology as a result of scour and deposition Introduction of aquatic and terrestrial weeds Fauna mortality Loss of aquatic habitats

Activity	Potential Environmental Impact
Construction within watercourses	Loss of aquatic habitat
	Changes in downstream flows
	Scouring and degradation of bed and banks
	Changes in geomorphological form in downstream areas due to scouring or sediment deposition

12.4 Performance Outcome

No unapproved loss in biodiversity values over and above those impacts permitted through project approvals and implementation of Offset requirements.

No vegetation clearing outside the specified, pre-approved boundaries where practicable and in allowance for safe construction working.

Vegetation clearance to be preceded by final searches for specially protected species and their relocation as appropriate.

No injury or death of wildlife.

Appropriate signage to keep construction workers outside retained habitat areas

No increase in level of weed and pest infestation as a result of construction and operational activities for the Project (Rail).

Downstream habitats are not degraded by sediment deposition, scouring or water quality degradation.

Downstream flow changes remain within natural fluctuations.

12.4.1 Design and Pre-construction

Table 12-2 Flora and Fauna Proposed Controls - Design and Pre-construction

Control	Responsibility	Timing	Evidence
General requirements			
Review clearing requirements for the construction of the Rail alignment and associated infrastructure and identify opportunities to reduce clearing of native vegetation and utilise existing cleared areas wherever possible.	Design Manager / Environmental Manager	During detailed design	Design checklist
Identify facilities and resources in the region for assistance in the event that native animals are injured and develop procedures for response to native animal injuries that avoid unnecessary suffering of animals.	Environmental Manager	Prior to any vegetation clearing	Injured animal procedures
Prepare a Vegetation Offsets Management Plan following the recommendations of the Revised Offset Strategy Report (SEIS, Volume 4, Appendix F).	Environmental Manager	Prior to any vegetation clearing	Offsets Management Plan
Design lighting systems to minimise light spill into areas of native vegetation and upward glow including: • Directional lighting and shields • Sensitive placement and specification of lighting • Minimise security lighting • Fauna-sensitive lighting.	Design Manager	During detailed design	Design checklist
Develop a Fauna Species Relocation Plan to facilitate relocation of fauna individuals according to species requirements (particularly if conservation significant fauna species are encountered).	Environmental Manager	Prior to any vegetation clearing	Fauna Species Relocation Plan
Education sessions regarding local fauna and flora that may be present and protocols to be undertaken if fauna are encountered.	All staff	During inductions	Induction records

Control	Responsibility	Timing	Evidence
Education sessions regarding weed management procedures and protocols and restrictions placed on bringing domestic animals to the Study Area.	All staff	During inductions	Induction records
Fauna underpasses/ culverts will be incorporated into the design within suitable habitats and mapped bioregional corridors (often at watercourses) to promote fauna movement and reduce the ecological impacts that the rail corridor incurs. Fauna underpasses should be vegetated, sized and fenced appropriately to encourage fauna use. These are to be designed in accordance with the Rail Fauna Crossing Strategy (SEIS, Volume 4, Appendix U).	Design Manager	During design	Detail Designs
Design and layout of the temporary and permanent structures and infrastructure within the construction footprint (including construction areas, such as site offices, construction stockpile locations, machinery/equipment laydown areas and storages, access tracks and accommodation camps) will as far as possible avoid areas of remnant vegetation (in particular endangered, of concern and threatened Res) and make use of previously cleared, non-remnant land.	Design Manager	During design	Detail Designs
The rail corridor will be fenced giving consideration to the movement of fauna. Fencing design should consider: • Fauna can move through it (excluding those instances where fenced areas seek to protect fauna from threats such as trenches human contact • Not using barbed wire on the top strand of fences.	Design Manager	During design	Detail Designs
Pre-clearing surveys are to be undertaken in accordance with the Species Management Program (Least Concern, Special Least Concern and Colonial Breeders) (SEIS Volume 4, Appendix C3).	Construction Manager / Environmental Manager	Prior to construction	Fauna Survey Fauna Relocation Register

Control	Responsibility	Timing	Evidence
Pre-clearing surveys are to be undertaken in accordance with the Threatened Species Management Program (SEIS Volume 4, Appendix C3). • Should the clearing be unavoidable during the breeding season, a suitably qualified ecologist to undertake a pre-clearing survey of native vegetation and habitat in the non-breeding season prior to the clearing activities to search for inactive breeding places of applicable species. Where possible, inactive breeding places (i.e. nests, hollows and burrows) will be removed and relocated into adjacent habitat and placed at a similar height. Those inactive breeding places (i.e. hollows) left in site will be barricaded to avoid re-colonisation by fauna before the clearing commences. • 24 hours prior to clearing activities a pre-clearing survey of native vegetation and habitat will be undertaken by a licensed spotter-catcher to check for presence of applicable species, as well as their breeding places (i.e. nests, hollows, burrows). Hollow bearing trees identified for removal will be thoroughly searched by a licensed fauna spotter-catcher using cherry-pickers, cameras on poles or spotter-catcher with tree climbing certificates.	Construction Manager / Environmental Manager	Prior to construction	Fauna Survey Fauna Relocation Register
As far as practicable, design watercourse structures such as culvert crossings, bridges and bed level crossings in accordance with: • Code for self-assessable development Minor waterway barrier works – Part 3 culverts (WWBW01) (DAFF, April 2013); • Code for self-assessable development Minor waterway barrier works – part 4 – bed level crossings (WWBW01) (DAFF, April 2013) • Code for self-assessable development Temporary Waterway Barrier Works (WWBW02) (DAFF, April 2013)	Design Manager / Environment Manager	During detailed design	Design checklist

Control	Responsibility	Timing	Evidence
• Guideline – Activities in a watercourse, lake or spring associated with resource activity or mining operations (WAM/2008/3435) (DERM (2010a)).			
Review clearing requirements for the rail alignment and associated infrastructure and identify opportunities to reduce disturbance to watercourses, avoid removal of mature trees if possible and utilise existing disturbed cleared areas wherever possible.	Design Manager	During detailed design	Design checklist
Plan works in watercourses to minimise the period of disturbance to the watercourse.	Construction Manager	Prior to construction	Schedule
Develop and implement a Fauna Relocation Plan to avoid mortality of aquatic fauna impacted by construction activities.	Environment Manager	Prior to construction commencing	Fauna Salvage Relocation Plan
Schedule works in watercourses to occur outside the wet season wherever possible.	Construction Manager	Prior to construction	Construction Schedule
Culverts will be provided at key areas within floodplain habitats (i.e. lacustrine/palustrine habitats).	Design Manager	During design	Design checklist
Design and layout of watercourse crossings and use of culverts to bridge aquatic habitats will consider the requirement for fish movement including under flow conditions. This will be done in accordance with DEEDI guidelines for the design of stream crossings for fish passage (Cotterell, 1998).	Design Manager	During design	Design checklist
Design temporary stream or channel diversions to ensure that stream flow is maintained to provide connectivity between aquatic habitats and facilitate aquatic fauna passage.	Design Manager	During design	Design checklist

Control	Responsibility	Timing	Evidence
Weed and Pest Management			
Equipment manufacturers to be informed of AQIS quarantine requirements. If packing materials are found to be contaminated at the site of unpacking, then they are to be removed and taken off-site to a licensed facility for disposal at the manufacturer's expense.	Procurement Team	During procurement	Purchasing records
A site specific weed management plan is to be prepared identifying the location of existing weeds, appropriate control measures to be implemented across the project and the identification of temporary and permanent wheel wash locations across the project.	Environmental Manager	3 months prior to construction commencing	Weed Management Plan
Adani will develop a pest control program for the management of feral cats, pigs and cane toads. The pest control program will be developed in consultation with the Carmichael Mine Project.	Environmental Manager	Prior to construction commencing	Pest Control Program

12.4.2 Construction and Operations

Table 12-3 Flora and Fauna Proposed Controls - Construction and Operation

Control	Responsibility	Timing	Evidence
The boundary of the project footprint will be clearly marked on site. Any areas outside of this boundary will be designated as 'no go' zones.	Construction Manager	Prior to clearing commencing	Weekly environmental inspection checklist
Clearly delineate areas for vegetation clearing and ensure that all personnel involved are aware of the clearing limits.	Construction Manager/Area Manager	Prior to vegetation clearing	Clearing report Weekly environmental inspection checklist

Control	Responsibility	Timing	Evidence
Vegetation clearing operations are to be supervised by a suitably qualified ecologist to monitor compliance of vegetation clearing within the defined clearing extents.	Construction Manager / Environmental Manager	During vegetation clearing	Incident Report Weekly environmental inspection report
Vegetation clearing will be undertaken in a sequential manner to allow more mobile fauna species to disperse away from cleared areas and clearing activities.	Construction Manager / Environmental Manager	During vegetation clearing	Incident Report Construction Schedule Weekly environmental inspection checklist
Vegetation clearing in sensitive habitat areas will be undertaken in the presence of a qualified fauna spotter-catcher. Pre-demarcated habitat features will be thoroughly checked by fauna spotter-catcher prior to clearing. Provisions for the relocation of fauna should be made prior to the commencement of clearing.	Construction Manager / Environmental Manager	Prior to clearing	Clearing records Fauna spotter / catcher report
Habitat features such as hollows and log piles will be salvaged, where possible, and placed in nearby (retained) habitat areas. Where this is not possible, the loss of habitat features will be supplemented in adjacent habitat areas with artificial habitat (for example, nest boxes).	Construction Manager / Environmental Manager	Prior to clearing	Fauna Spotter / catcher report
If any pits/trenches are to remain open after daily site works have been completed, they will be fenced, covered, or fauna ramps should be put in place to provide a potential means of escape for trapped fauna.	Construction Manager and supervisors	Daily after construction works	Weekly environmental inspection checklist Incident reports
Work areas will be checked for fauna that have become trapped before work commenced each day.	Construction Manager and supervisors	Daily before construction being	Incident reports

Control	Responsibility	Timing	Evidence
Temporary fencing will be erected around high value habitats to be retained to exclude construction works.	Construction Manager / Environmental Manager	Prior to construction commencing	Weekly environmental inspection checklist
All vehicles and plant will adhere to site rules relating to speed limits. Speed limits should be developed so as to minimise the potential for road kill.	All staff	Ongoing	Incident reports
Reduce the number of construction vehicles mobilising to and from site daily – retain vehicles within the construction zone and transfer personnel by means of bus to and from the work front daily to reduce the exposure for animal strike in areas away from the construction footprint.	Construction Manager	Ongoing	Incident reports
The rail corridor and permanent rail infrastructure will be fenced to restrict livestock movement from within the rail corridor. Plain wire will be used on the top strand of the fence to minimise impact to fauna.	Construction Manager / Operations Manager	Construction and operation	Weekly environmental inspection checklist
Temporary fencing will be installed around temporary laydown areas and associated rail infrastructure to exclude fauna and livestock from construction zones.	Construction Manager / Operations Manager	Ongoing	Weekly environmental inspection checklist
Any road kill identified on local, state controlled and the railway haul road will be moved to the side of the road.	All personnel	Ongoing	Incident report
All injured animals are to be reported to the Project Environmental Manager / Officers immediately.	All personnel	Ongoing	Incident records
Construction within rivers and creeks will be undertaken in the drier periods, as far as is practicable, to avoid impacts to fish passage.	Construction Manager	Ongoing	Construction schedule

Control	Responsibility	Timing	Evidence
No pet animals will be allowed to be brought to the construction site.	All staff	Ongoing	Non-conformance report
Avoid undertaking works in streams in times of flow wherever possible.	Construction Manager and supervisors / Operations Manager	During construction	Schedule Weekly environmental inspection checklist
Where dry beds are required for the construction of culverts and bridges, salvage of fish and aquatic fauna will be undertaken in accordance with the DAFF Fish Salvage Guidelines.	Construction Manager / Environmental Manager / Operations Manager	During construction	Fauna Relocation Plan Relocation records
The Site induction must cover relevant vegetation protection as well as fauna interaction rules including information on protection species listed under the EPBC Act.	Environmental Manager /Operations Manager	Ongoing	Induction Records
Following clearing, rehabilitation will occur in areas no longer required as rail construction progresses to facilitate fauna passage around the construction footprint. Rehabilitation is to be undertaken in accordance with the Closure and Rehabilitation Management Strategy.	Construction Manager / Environmental Manager	Ongoing	Weekly environmental inspection checklist
No Construction employee on the project shall intentionally damage or injure native flora or fauna respectively.	All staff	Ongoing	Incident Records
Fauna are not to be fed by project construction employees.	All staff	Ongoing	Incident Records

Control	Responsibility	Timing	Evidence
Weed and Pest Management			
Vehicles and equipment are to be cleaned before being brought to site and inspected on entry to site. *Queensland Government Checklist for Cleandown Procedures* (2000) to be followed for clean down and inspection (http://www.daff.qld.gov.au/documents/Biosecurity_EnvironmentalPests/IPA-Cleandown-Procedures.pdf).	Construction Manager and supervisors / Operations Manager	Whenever vehicles or equipment are brought to site	Weed hygiene declaration form
Vehicles and earthmoving equipment imported interstate for project use will be thoroughly cleaned at their point of origin to mitigate introduction of foreign seed and soil potentially harmful to Australia's flora and fauna.	Logistics Manager / Operations Manager	Prior to leaving the state of origin	Weed hygiene declaration form
Soil stripped and stockpiled from areas containing known weed infestations, particularly of declared weeds, are to be stored separately and are not to be moved to areas free of weeds.	Environmental Manager / Construction Manager / Operations Manager	Ongoing	Topsoil records
All soil and materials of plant origin to be certified as weed free by the supplier using the Queensland Government weed hygiene declaration form or similar (http://www.daff.qld.gov.au/4790_7075.htm).	Construction Manager / Operations Manager	Whenever soil or plant materials are brought to site	Weed hygiene declaration form
Workers to be advised of the nuisance and adverse impacts associated with noxious weeds and plant. The following weeds have the potential to exist within the construction footprint: • Prickly pear (*Opunita sp*) • Harrisia cactus (*Harrisia martini)*	Environmental Manager	Prior to works commencing	Training Register

Control	Responsibility	Timing	Evidence
• Parthenium (*Parthenium hysterophorus)* • Prickly acacia (*Acacia nilotica*) • Giant rats tail (*Sporobolus pyramidalis*) • Hymenachne (*Hymenachne ampleicaulis*) These weeds have been declared as state significant weeds under the *Land Protection (Pest and Stock Route Management) Act 2002*. Additional information and a copy of Isaac Regional Council's Pest Management Plan (27 June 2013) is located at http://www.isaac.qld.gov.au/c/document_library/get_file?uuid=00d7553f-4216-4a32-a00a-26043ccfcc8d&groupId=12238.			
Disturbed topsoil and vegetative material will be returned as close as possible to the original sites in order to limit the potential spread of weeds and pathogens.	Construction Manager and Supervisors / Operations Manager	During rehabilitation	Topsoil records
There are to be no vehicle movements on vegetated areas that may contain weed material, i.e. stay on established tracks/roadways.	Construction Manager and Supervisors / Operations Manager	During construction	Weekly environmental inspection checklist
Conduct regular visual inspections of identified weeds and pest species. Pest and weed species identified shall be managed in accordance with DAFF requirements to prevent their growth and proliferation.	Construction Manager / Environmental Manager / Operations Manager	During construction	Weekly environmental inspection checklist

Control	Responsibility	Timing	Evidence
An annual weed survey will be undertaken of the project area to monitor existing and new weeds.	Environmental Manager / Operations Manager	Every 12 months during construction	Weed survey report
Weed control will be conducted at least once every three months.	Construction Manager / Operations Manager	Every 3 months during construction	Weed control report
Runoff from wash-downs will be captured and treated as necessary to remove/kill weeds prior to discharge.	Construction Manager / Operations Manager	As required	Weekly environmental inspection checklist
Prior to collecting topsoil from the stockpile, any weeds will be carefully scalped off the topsoil. If weeds are present then the top 5cm deep weed-infected layer will be removed and to prevent its transfer to the rehabilitated areas.	Construction Manager and supervisors	During rehabilitation	Topsoil management records
Aquatic weed infestations will be identified and managed in accordance with the Isaac Regional Council Pest Management Plan and weed and pest control strategies detailed within this EMP (Rail).	Environmental Manager / Operations Manager	During operations	No increase in existing infestation or the occurrence of new infestations Weed control report
Staff will be informed via a site specific induction of the aquatic species that are likely to be encountered within the Project Area.	Environmental Manager / Construction Manager / Operations Manager	During operations	Induction training records

12.5 Monitoring and Corrective Action

Table 12-4 Fauna and Fauna - Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Conduct a weed audit targeting high risk locations at a suitable time of the year when growing conditions and identifications of weeds are optimal (i.e. late wet season). High risk locations may include areas such as riparian corridors and areas of black soil. Following the audit, appropriate scale weed mapping can be undertaken to identify weed hotspots and for the preparation of the Project Weed Management Plan.	Environmental Manager	Annually	Weed levels in disturbed areas are similar to pre-clearing	Conduct a weed control program
Monitor pest animal numbers at key water resource locations.	Environmental Manager	Quarterly	No increase in pest animal occurrence	Conduct a pest animal control program
Monitor road kill/injury statistics.	Environmental Manager	Annually	No particularly high occurrences of animal death/injury	Provide fauna crossing or other control to protect animals from harm.

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Conduct monitoring as per Species Management Plans.	Environmental Manager	As per species management plans	As per species management plans	As per species management plans
Monitor incidents of fauna strike and mortality in a Fauna Mortality Register.	Environmental Manager	During construction and operation	No particularly high occurrences of animal death/injury	Incidents involving animal strike or injury will be managed and reported as an incident in accordance with the incident management procedure. Ongoing modifications to fauna conservation management strategies where necessary

13. Biosecurity Management

13.1 Legislative Framework

Legislative requirements in relation to biosecurity include:

13.1.1 Commonwealth Legislation

***Environment Protection and Biodiversity Protection Act 1999* (EPBC Act)**

Under the *EPBC Act*, the Commonwealth can, among other things, list key threatening processes, develop and implement threat abatement plans (TAPs) and outline recovery plans to manage and reduce the impact of invasive species. As defined by SEWPaC, invasive species include diseases, fungi and parasites, feral animals, insects and other invertebrates, introduced marine pests and weeds.

Weeds

The Australian Weeds Strategy (DEWR, 2007) outlines a coordinated strategy for weed management across Australia. It provides consistent guidance on weed management and identifies Weeds of National Significance (WoNS), which are nationally agreed priority plants for control and management. Twenty WoNS are outlined in the Australian Weeds Strategy (DEWR, 2007); with an additional 12 included in April 2012. The strategy also addresses roles and responsibilities for weed management, outlining the various roles of government (national, state and local), industry and individuals in weed management. The following TAPs for weeds are of relevance to the Project (Rail):

- Threat abatement plant to reduce the impacts of northern Australia's biodiversity by the five listed grasses (SEWPaC, 2012)

Pest animals

The Australian Pest Animal Strategy (DEWR, 2007) outlines a national strategy for the management of vertebrate animals in Australia. This strategy outlines that it is the landholder's responsibility to detect and report new occurrences of pest animals and manage pest animals on their own land. Landholders also have a responsibility to management pest animal problems on their own land and where relevant, plan pest animal management activities jointly with neighbours. The following TAPs for pest species are of relevance to the Project (Mine):

- Threat abatement plan for competition and land degradation by unmanaged goats (DEWHA, 2008)
- Threat abatement plan for competition and land degradation by rabbits (DEWHA, 2008)
- Threat abatement plan for predation by European red fox (DEWHA, 2008)
- Threat abatement plan for predation by feral cats (DEWHA, 2008)
- Threat abatement plan for the habitat degradation, competition and disease transmission by feral pigs (DEWHA, 2005)
- Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (SEWPaC, 2011)

Diseases, fungi and parasites

Invasive diseases, fungi and parasites can have negative impacts on both biodiversity and agricultural crops. Due to the presence and likelihood of presence of threatened species within the Project (Rail) and the location of the Project within an agricultural landscape, it is vital that the Project does not introduce or spread diseases, fungi and parasites within the region. The following TAPs for diseases, fungi and parasites are of relevance to the Project (Mine):

- Beak and feather disease affecting endangered psittacine species (DEH, 2005).
- Threat abatement plan for infection of amphibians with chytrid fungus resulting in chytridiomycosis (DEH, 2006).

Quarantine Act 1908

The *Quarantine Act 1908* outlines a framework for the prevention or control of the introduction, establishment or spread of diseases or pests that will or could cause significant damage to human beings, animals, plants or other aspects of the environment or economic activities. Although a Commonwealth Act, the Queensland Department of Agriculture, Fisheries and Forestry administer the *Quarantine Act 1908* in Queensland.

13.1.2 State Legislation

***Land Protection (Pest and Stock Route Management) Act 2002* (LP Act)**

The LP Act is the primary piece of legislation for the management of weeds, pest animals and stock routes in Queensland. The Act provides for the management of particular pests in Queensland by declaring animals and plants to be declared pests, providing for pest management planning and establishing principles of pest management (on land). The LP Act also restricts the introduction, keeping or sale of declared pests and precents the spread of declared pests in the State.

Land Protection (Pest and Stock Route Management) Regulation 2003 (LP Regulation)

The LP Regulation supports the policy objectives outlined in the *LP Act*. The LP Regulation declares pest plant and animal species for control and management. The LP Regulation also provides current listings of all declared pest plant and animal species under the *LP Act*.

Land Act 1994

The *Land Act 1994* outlines a duty condition that it if a lease is issued for agricultural, grazing or pastoral purposes, the lessee must take reasonable steps to manage any declared pests.

Plant Protection Act 1989

The *Plant Protection Act 1989* aims to prevent, control and remove pest infestations of plants.

The whole of Queensland is a declared pest quarantine area for the following species:

- Banana freckle
- Tropical race 4
- Fire ant
- Fire blight
- Grape phylloxera.
- Mediterranean fruit fly
- Potato pest

- Asian sugarcane planthopper
- Branched broomrape
- Mango malformation disease.

The Project is also located within the southern buffer pest quarantine area for pests of banana plants other than tropical race 4 or banana freckle and within a quarantine area for the sugarcane pest plant.

Agricultural Chemicals Distribution Control Act 1966

May be relevant when using aerial control of spur-throated locust (*Austracris guttulosa*) and Migratory locust (*Locusta migratoria*) both Class 2 Declared Pest species under the *Land Protection (Pest and Stock Management) Act 2002*- the check if this is relevant to aerial locust control

Pest Management Act 2001

The *Pest Management Act 2001* provides for the regulation of health risks associated with pest control activities and the adverse results of ineffective control of pests. Also establishes a licensing regime to regulate pest control activities and ensure that activities are carried out by pest management technicians in a safe and competent way. Contractors commissioned to undertake pest control within the Project (Mine) will be required to hold current a current licence under this Act.

Land Protection (Pest and Stock Route Management) Act 2002

Land Protection (Pest and Stock Route Management) Regulation 2003

Provides legislative measures to manage pests and address the impacts they have on the economy, the environment and society.

Landowners, including state agencies, are required to control declared pest plants consistent with guidelines and local government area pest management plans and the Queensland Weeds Strategy 2002-06.

Under the Local Law provisions of the *Local Government Act 1993*, a local government can declare any plants not declared under the LP Act and enforce their control.

The *Land Act 1994* also has provisions requiring control of weeds declared under the LP Act on leasehold land.

13.2 Environmental Values

The Project contains a range of fauna habitat types that share broadly similar habitat values (based on habitat structure), but vary in their value for wildlife based on the specific forage and shelter resources they provide. Ironbark-box woodland was the most widespread fauna habitat type at the Project Area. In general, across the Project, disturbance to fauna habitats from cattle, weeds and feral animals was observed to be low. These disturbances were mainly observed in cleared areas, where ecological value is relatively low, between the Carmichael River and the Moray-Carmichael Road, and in eastern parts of the Project Area.

Five fauna species comprising five mammals and one amphibian were also recorded during field studies including the following notable species:

- Feral cat
- Pig

- Dog
- European fox
- Cane toad
- European rabbit.

Native flora species were prevalent across much of the Project Area, in association with areas of remnant vegetation. Field studies identified 114 native flora taxa and 11 introduced taxa in the Project Area. Of the 11 introduced species, one was a declared Weeds of National Significance (WONS) and three were declared weeds under the Queensland LP Act.

The land use within and surrounding the Project Area is agricultural and in general the prevalence of weeds, introduced animals and disturbances associated with cattle (i.e. loss of vegetative cover, compaction of ground, degradation of riparian areas and waterways) was observed to be relatively low. In localised areas, the level of disturbance observed was relatively higher – for example in the vicinity of cattle water points (farm dams, some stock troughs), and parts of the riparian zone of the Carmichael River.

During the field surveys, 11 introduced species were recorded, of which three species are 'declared plants' under the LP Act, one of which, Parthenium weed (Parthenium hysterophorus), is a WONS. These species are outlined below:

- Parthenium weed (*Parthenium hysterophorus*)
- Prickley pear (*Opuntia stricta*)
- Harrisia cactus (*Harrisia martini)*

Increased movement of people, vehicles, machinery, vegetation waste and soil may facilitate the spread of weeds at and near the Project Area. Five WONS that are also declared plants under the LP Act (parkinsonia (*Parkinsonia aculeata*), parthenium, prickly pear, velvety tree pear (*Opuntia tomentosa*) and rubber vine (*Cryptostegia grandiflora*)) are known to occur at the Project Area. Despite the fact that 11 introduced plant species were recorded, weeds were not found to be abundant across much of the Project Area.

13.3 Potential Impacts

Table 13-1 Potential Environmental Impacts

Activity	Potential Environmental Impact
Vehicle movements	Increased movement of people, vehicles, machinery, vegetation waste and soil may facilitate the spread of weeds at and near the Project Area. Five WONS that are also declared plants under the LP Act (parkinsonia (*Parkinsonia aculeata*), parthenium, prickly pear, velvety tree pear (*Opuntia tomentosa*) and rubber vine (*Cryptostegia grandiflora*)) are known to occur at the Project Area.
	Increasing the prevalence of weeds at the Project Area (and potentially beyond to the surrounding landscape), may reduce the quality of habitats for some flora and fauna species, particularly by replacing native plants.

Activity	Potential Environmental Impact
Construction activities	Vegetation clearing and soil disturbance allows seeds present in soil to germinate. Germination and plant growth for weeds is typically faster than for native species and this can lead to increased weed levels in disturbed areas and affect the ability for native vegetation to re-establish.
	There is also significant potential for weeds, either as seeds or other plant propagules, to be introduced to sites attached to dirty vehicles and equipment or to be contained in soil or seed mixes brought to the site. This can lead to increased levels of weeds already present on the site, or infestation by new weeds.
Ongoing operations	An increase in the prevalence of these animals may adversely impact native fauna in that it may lead to: • Increased competition for resources • Increased predation of native species by introduced animals • Habitat degradation including pig damage of riparian areas and erosion caused by rabbit burrowing.

13.4 Performance Outcome

No increase or spread of weeds beyond pre development conditions as a result of project activities.

No unapproved biosecurity management activities.

13.5 Proposed Controls

13.5.1 Design, Procurement and Pre-construction

Table 13-2 Biosecurity – Design, Procurement and Pre-construction Controls

Control	Responsibility	Timing	Evidence
Weed mapping will be undertaken prior to commencement of construction. Mapping will cover the whole site but be particularly focused at high risk locations, such as areas of black soil so that weed hotspots can be identified. Baseline field surveys of identified hotspots within and near construction areas will be undertaken prior to commencement of construction. Weed control will be undertaken in areas that are very heavily infested or where WONS or Class 1 or 2 weeds declared under the LP Act are present prior to disturbance.	Environmental Manager	Prior to Construction	Weed Mapping Report

13.5.2 Construction and Operation

Table 13-3 Biosecurity – Construction and Operational Controls

Control	Responsibility	Timing	Evidence
Waste management measures should include containment of food scraps in securely sealed containers.	Camp Manager	During Construction and Operations	Compliance
Vegetation and soil waste should not be moved to areas of lower weed infestation.	Construction Manager	During Construction and Operations	Site Management Plans No spread of infestations
Pest animal occurrence will be monitored during construction. If increased densities of pest animals are observed, or new pest animals are identified, humane pest controls will be implemented to manage numbers.	Environmental Manager	During Construction and Operations	Monitoring records and logs

Control	Responsibility	Timing	Evidence
Monitoring will be undertaken annually during construction, with results to be considered in terms of baseline information (collected prior to construction) and with reference to appropriate control (reference) sites. If significant infestations of any weeds occur, or if WONS or Class 1 or 2 weeds declared under the LP Act, weed control measures will be implemented. Weed control measures will be based on Queensland Department of Agriculture, Forestry and Fisheries and Isaac Regional Council advice. Declared pests listed under the *Plant Protection Act 1989* will also be monitored as part of the annual monitoring program during construction.	Environmental Manager	During Construction and Operations	Monitoring records and logs
All vehicles, equipment and materials brought onto site will be certified as free of weeds and weed seeds and carry a weed hygiene declaration. Records are to be kept of compliance with this requirement. Adani will install a weed wash down facility onsite.	Plant Manager / Contractors	During Construction and Operations	Records Wash down facility
Soil stripped and stockpiled from areas containing known declared pests listed under the *Plant Protection Act 1989 and* weed infestations will be stored separately and are not to be moved to areas free of weeds and declared pests.	Site Manager	During Construction and Operations	Soil management plans and records
Construction staff will not bring domestic animals to the Project Area.	Site Manager	During Construction and Operations	No domestic animals
Monitoring of feral species populations in the Project Area and implementation of a control program if necessary.	Environmental Manager	During Construction and Operations	Monitoring records and logs Control Program
Monitoring of class 2 declared pest species listed under the LP Act that are known to occur within the Isaac Regional Council area (including migratory and spur-throated locusts)	Environmental Manager	Quarterly	Control Program

14. Scenic Amenity

14.1 Legislative Framework

While the EP Act includes aesthetic dimensions in its definition of environment, there are no specific provisions in relation to scenic amenity.

14.2 Environmental Values

The Project (Rail) corridor predominantly transverses a rural (agricultural) landscape primarily used for cattle grazing. Topography within the corridor is generally flat to undulating, without distinctive topographical features. There are a number of small hills to the north and south of the corridor. Land form often provides open views across flat plains, sometimes to distant hills, however, vegetation dominates and provides short, middle and long views within the Study Area. Representative sensitive receptors are summarised below:

Table 14-1 Scenic Amenity Sensitive Receptors

View location	Visual Context
Gregory Developmental Road	The scattered vegetation allows for long and wide views to low lying hills. The dense woodlands provide enclosed, immediate views. Views are experienced by regional and local road users.
Kilcummin Diamond Downs Road	Views from the road are short to native hedge rows and/wire fences adjacent to lot boundaries. There are intermittent long sweeping views through to agricultural broad acre paddocks of native grasslands and sparsely scattered trees. Views are experienced by local road users.
Moray Bulliwallah Road	Closed, short to middle views consisting of vegetation. Electricity poles and wires in view along the road. Views are experienced by local road users.
Moray Carmichael Road	Views from this viewpoint are experienced by local road users, which include flat topography and sparse vegetation allows open, long views over broad pastures to low woodlands and some short, intermediate vistas to nearby shrubs.
Residential property approximately 2 km east of Kilcummin Diamond Downs Road	Views are generally characterised by the topography and presence of local vegetation. Vistas range from short to middle distance and are of clumped vegetation or views across lowland cleared pasture land. Views experienced by residents.
Residential property approximately 3.2 km west of Kilcummin Diamond Downs Road	Views are generally characterised by the topography and presence of local vegetation. Vistas range from short to middle distance and are of clumped vegetation or open views across lowland cleared pasture land. Views experienced by residents.
Residential property located on Golden Downs Road	Views are generally characterised by the topography and limited presence of local vegetation. Vistas range from middle to long distance and are of clumped vegetation to open views across

View location	Visual Context
	lowland cleared pasture land. Views experienced by residents and road users for local access.
Residential property located approximately 3.2 km west of Gregory Developmental Road	Views are generally characterised by the topography and presence of local vegetation. Vistas range from middle to long distance and are of clumped vegetation to open views across lowland cleared pasture land. Views experienced by residents.
Residential property located approximately 1.4 km north of Elgin Moray Road	Views are generally characterised by the topography and presence of local vegetation. Vistas range from middle to long distance and are of clumped vegetation to open views across lowland cleared pasture land. Views experienced by residents.
Residential property on Elgin Moray Road approximately 1.5 km south of road intersection.	Views are generally characterised by the topography and presence of scattered vegetation. Vistas range from middle distance of clumped vegetation to open views across low cleared pasture land. Views experienced by residents and road users.

14.3 Potential Impacts

Potential impacts to the scenic amenity within the vicinity of the Project (Rail) corridor area outlined below:

Table 14-2 Potential Environmental Impacts

Activity	Potential Environmental Impact
Vegetation clearing	Increased visual permeability Change in landscape from native vegetation to cleared land.
Rail infrastructure and facilities	Increase in presence of built infrastructure in the landscape.
Lighting	During construction periods, localised and temporary light pollution caused by lighting for night works, construction camps and vehicle travelling at night Operational periods will result in localised and temporary light pollution, including direct glare, periodic increased illumination and temporary unexpected fluctuations in lighting associated with passing trains.
Vehicle movements	Increased illumination on roads between the Project (Rail) and construction camps caused by vehicles travelling at night.

14.4 Performance Outcome

Minimal change to visual amenity from residential viewpoints and sensitive receptors.

The site is not over-lit unnecessarily and light spillage into adjacent areas is minimised.

14.4.1 Design, Procurement and Pre-construction

Table 14-3 Visual Amenity Proposed Controls - Design, Procurement and Pre-construction

Control	Responsibility	Timing	Evidence
Design lighting systems to minimise light spillage and upward "glow": • Directional lighting and shields • Sensitive placement and specification of lighting • Minimise security lighting	Design Manager	During detailed design	Design checklist

14.4.2 Construction and Operation

Table 14-4 Visual Amenity - Construction and Operational Controls

Control	Responsibility	Timing	Evidence
Temporary hoardings, barriers, traffic management and signage will be removed when no longer required.	Construction Manager and Supervisors	Ongoing	Weekly environmental inspection checklist
Progressively revegetation disturbed areas in accordance with the Rehabilitation Management Strategy to minimise impact on neighbouring landholders.	Construction Manager and Supervisors / Environmental Manager	Ongoing	Rehabilitation Management Strategy Weekly environmental inspection checklist

Control	Responsibility	Timing	Evidence
Light pollution at quarries, maintenance facilities and during construction will be managed and reductions achieved through: • Co-locating temporary and permanent facilities as far as practicable • Appropriate luminaries will be specified to reduce light spill, sky glow and glare.	Construction Manager and Supervisors / Environmental Manager	Ongoing	Weekly environmental inspection checklist
All rail construction areas and quarries will be operated in a neat and tidy manner to minimise visual impact on neighbouring landholders.	Construction Manager and Supervisors / Environmental Manager	Ongoing	Weekly environmental inspection checklist

14.5 Monitoring and Corrective Action

There are no monitoring requirements in relation to visual amenity.

15. Contaminated Land

15.1 Legislative Framework

The legislative requirements covering contaminated land in Queensland are primarily contained in the *Environmental Protection Act 1994* (EP Act) and subordinate legislation. The EP Act is administered by DEHP.

The EP Act contains a number of provisions in relation to the investigation, management and remediation of contaminated land. If notices are received from DEHP in regard to contaminated land, these notices must be complied with.

In Queensland, acceptable and unacceptable contaminant levels are set in:

- *National Environment Protection (Assessment of Site Contamination) Measure 1999*
- *Draft Guidelines for the Assessment and Management of Contaminated Land in Queensland 1998*

It is an offence under the EP Act to remove soils from a site listed on the CLR or EMR without a permit.

15.2 Environmental Values

Contamination of soil affects the viability of the soil resource. Disturbance of contaminated soil, or contamination of soil also has potential to impact on a surface water quality, groundwater resources and aquatic ecosystem values.

15.3 Potential Impacts

The potential impacts of land contamination may arise in two ways. First, construction and operation activities may increase human exposure to pre-existing contaminants, or mobilise contaminants to surface water or groundwater. Second, construction and operation activities may release contaminants into soils, causing soil contamination.

Soil contamination then has a number of flow on effects, including:

- Acute or chronic toxicity effects on humans and animals that come into contact with the soil, including where contaminated soil becomes windblown. Contaminated soil guidelines generally focus on whether or not levels of particular contaminants might be high enough to cause toxic effects.
- Inhibition of plant growth, and death of existing plants in contaminated areas.
- Mobilisation of contaminants by overland flows to surface watercourses. This in turn may lead to acute or chronic toxicity effects to aquatic organisms and to contamination of water supplies.
- Contaminants in watercourses may be deposited in sediment on the bed of the watercourse, resulting in sediment contamination. Subsequent flow events may re-mobilise sediments into the water columns, and contaminated sediments may also inhibit aquatic plant growth.

- Mobilisation of contaminants to groundwater, which in turn may lead to contamination of groundwater supplies. In high permeability aquifers, contaminant plumes may be conveyed over considerable distances.

The following activities may risk spillage and consequent contamination of soil, groundwater or surface water during construction:

- Storage, handling, transportation and disposal of bulk fuel (up to 130,000 L) and oil
- Refuelling by mobile fuel trucks
- Wastewater treatment operations
- Temporary sewage treatment plant operations
- Storage and handling of fertilisers and soil ameliorants
- Storage and handling of other chemicals and hazardous materials such as chemicals for water treatment, cleaning products, solvents and degreasers
- Operation of equipment such as breakage of hydraulic hoses
- The use of pesticides to control weeds along the rail alignment
- Accidents involving locomotives or maintenance vehicles
- Haulage of coal by train leading to spillage of coal. (Coal is relatively inert but can cause physical smothering of flora
- Operational maintenance facilities, associated fuel and chemical storage and waste oil facilities.

It is not intended that the Project (Rail) will lead to land contamination requiring registration in the CLR. Any Notifiable Activities under Schedule 3 of the EP Act, such as the storage of hazardous material, associated with the Project (Rail) will be reported to DEHP.

15.4 Performance Outcome

Land contamination does not cause inhibition of plant growth, degradation of water resources or toxic effects to humans or other animals. Relevant contaminated land guidelines in place at the time will be used to indicate whether contaminant levels are acceptable.

Prevent release of contaminants into soil, groundwater or surface water as a result of construction and operation activities.

No incident resulting from inappropriate storage and handling of hazardous substances, including no release of hazardous substances to land, water or air.

15.4.1 Design and Pre-construction

Table 15-1 Contaminated Land Proposed Controls - Design and Pre-construction

Control	Responsibility	Timing	Evidence
Notify DEHP of the location of all notifiable activities.	Environmental Manager	On issue of development approval (environmentally relevant activities)	Correspondence
Design all fuel storages (including tanks and bunds) to meet the requirements of *AS 1940: The Storage and Handling Of Flammable And Combustible Liquids.*	Design Manager	Prior to construction	Design checklist
Install tank level indicators on all fuel storages for monitoring fuel and oil levels.	Design Manager	Prior to construction	Design checklist
Diesel will be stored in above ground tanks and day tank storage systems.	Design / Construction Manager	Prior to construction	Design checklist
For all workshop areas, provide: • Secure storage for oils and waste oils with roof and containment bunding equal to 110 % of the largest container • An impervious floor (concrete or similar) in all areas where vehicle maintenance will routinely be carried out • Preferable roofed areas for vehicle maintenance • Containment bunding, including rollover bunds or drains such that spills and rainwater are contained within the designated area • Drainage of maintenance areas to sumps with oil/water separation	Design Manager	Prior to construction	Design checklist

Control	Responsibility	Timing	Evidence
• Return of treated stormwater and wastewater from maintenance areas for reuse in vehicle washing.			
For refuelling areas, provide: • An impervious floor (concrete or similar) where possible • Containment bunding, including rollover bunds such that spills and rainwater are contained within the designated area • Drainage of refuelling areas to sumps with oil/water separation.	Design Manager	During design	Design checklist
Design vehicle washdown areas so that all runoff water is captured and passed through oil water separators and sediment catchment devices.	Design Manager	Prior to construction	Design checklist
A Spill Response Plan will be prepared and incorporated into an incident response plan, including requirements for spills to be reported, contained and cleaned.	Environmental Manager	Prior to construction	Spill Response Plan
Refuelling will only occur at designated sites away from watercourse and sensitive receptors.	Construction Contractor	Ongoing	Site checklist

15.4.2 Construction and Operation

Table 15-2 Contaminated Land - Construction and Operation Controls

Control	Responsibility	Timing	Evidence
If contamination occurs as a result of the Project (Rail), including the potential for the disturbance of a previously contaminated site, then management will be carried out in accordance with the contaminated land provisions of the EP Act, National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM, 1999) and Draft Guidelines for the Assessment and Management of	Environmental Manager	As required	Site Contamination Assessment Remediation Action Plan Sampling results

Control	Responsibility	Timing	Evidence
Contaminated Land in Queensland (DoE, 1998; now administered by DEHP). Broadly, the management measures will include: • A site contamination assessment (SCA) will be undertaken in accordance with the National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM, 1999) • Management and remediation will adhere to a Site Management Plan or Remediation Action Plan approved by DEHP • Validation sampling will be conducted to verify that remediation is successful Any required long term monitoring will be provided for in operational plans.			
Manage oily waste and hydrocarbon contaminated waste, including waste from sumps and bunds.	Construction Manager and Supervisors	Ongoing	Waste Register Weekly environmental inspection checklist
Water from vehicle wash areas to be recirculated for use.	Area Manager	Ongoing	Weekly environmental inspection checklist
Diesel storage tanks and bunds are regularly inspected and maintained.	Area Manager	As per AS 1940 and/or manufacturer's instructions	Maintenance records
Transport of diesel and other dangerous goods to be in accordance with Australian Code for Transport of Dangerous Goods by Road and Rail.	Logistics Manager	Ongoing	Transport records
Refuelling is only to take place at designated refuelling areas.	Construction Manager and Supervisors	Ongoing	Weekly environmental inspection checklist

Control	Responsibility	Timing	Evidence
Refuelling activities to be supervised at all times.	Area Managers	Ongoing	Observations of mobile refuelling activities
Workshop, refuelling and other areas are not to be cleaned by hosing of water.	Area Managers	Ongoing	Weekly checklist
Spill kits to be in place at workshops, refuelling areas and other areas where fuels and oils are handled or stored	Warehouse Manager	Ongoing	Weekly checklists
In the event of a small to medium spill (up to 100 L): • Don appropriate PPE (for diesel and oil spills, this shall include long sleeved shirts and trousers made of cotton, plastic or rubber gloves, boots) • If safe to do so, shut off source of spill • If safe to do so, use spill kit materials to contain the spill and place absorbents over the spilt material • If spill kit is not available, use available materials to contain the spill from flowing across the ground • Contact the environmental manager/HSS Manager and supervisor for further assistance • Place all contaminated material in plastic bags and clearly label as hydrocarbon contaminated material • Environmental manager/officer to advise if soils are to be bio remediated or disposed of • Place all hydrocarbon contaminated material awaiting disposal in designated waste storage area and clearly label • Environmental manager/officer to arrange for disposal permits if required	All staff	As required	Incident Report

Control	Responsibility	Timing	Evidence
• Complete incident investigation and report as per Adani HSS system requirements.			
In the event of a large spill: • Don appropriate PPE (for diesel and oil spills, this shall include long sleeved shirts and trousers made of cotton, plastic or rubber gloves, boots) • If safe to do so, shut off source of spill • If safe to do so, use available spill kit or other material to contain material to stop overland flow. For very large spills, if earthmoving equipment is available this may be used to raise a bund downslope of the spill area. • Remove all potential ignition sources and prevent traffic from entering the area • Contact the environmental officer and/or supervisor for further assistance. • Environmental manager to determine further clean up requirements and methods • Environmental officer to discuss with Environmental Manager whether notification under EP Act is required. • Place all hydrocarbon contaminated material awaiting disposal in designated waste storage area and clearly label • Environmental officer to arrange for disposal permits if required • Complete incident investigation and report as per Adani HSS system requirements.	All staff	Ongoing	Incident report

Control	Responsibility	Timing	Evidence
Conduct risk assessment for incidents of contamination and determine appropriate mitigation and management strategies. Hierarchy of management approaches, from most to least preferred: • On-site treatment of the chemical substances to reduce risk to an acceptable level • Offsite treatment of excavated soil to reduce risk to an acceptable level, after which the treated soil is returned to the site • Containment of soil on site with a properly designed barrier • Disposal of affected soil to an approved landfill. Document in contaminated land register and incident report.	Environmental Manager	As required	Contaminated land register Incident reports
Undertake further testing as required to delineate extent of contamination and/or validate that adequate clean-up has occurred. Enter results in contaminated land register and incident report.	Environmental Manager	As required	Contaminated land register Incident reports
If it appears likely that groundwater contamination may have occurred, initiate groundwater testing.	Environmental Manager	As required	Contaminated land register Incident reports
Enter locations of all spills of diesel, oil or other hazardous substances into a contaminated land register. Include details of the type and quantity of contaminant, and testing and remediation actions undertaken. Provide a reference to the incident investigation report.	Environmental Manager	As required	Contaminated land register

15.5 Monitoring and Corrective Action

Table 15-3 Contaminated Land - Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Soil and groundwater testing as required to follow up a particular incident of contamination	Environmental Manager	As required	Soil and groundwater contamination levels are within current guidelines	Further remediation as required until guideline levels are met
Weekly environmental inspection checklist	Environmental Manager	Weekly After rain events	As per checklist	As required to achieve performance requirements in checklists

16. Soil Resources

16.1 Legislative Framework

The requirement to manage topsoil arises from:

- Legislative requirements in relation to rehabilitation
- State government policy SPP1/92 regarding maintenance of good quality agricultural land resources.

Under the *Forestry Act 1959*, the state may recover forestry resources and quarry material from State land prior to disturbance.

16.2 Environmental Values

The Project (Rail) is predominantly within the Belyando River / Suttor River sub catchment (crossing the main stems of the Belyando River, Mistake Creek and Logan Creek). The last 27 km of the rail corridor (in the east) enters the Isaac River catchment via Grosvenor Creek. A number of ephemeral tributaries of these main waterways along with farm dams (created within the tributaries) and several non-perennial watercourses are also traversed.

All the watercourses flow in a general northward direction towards the Suttor River. Stream flows reflect rainfall variability and seasonality, flooding occurs in summer and it is not uncommon for an absence of flow between May and November.

The rail corridor intersects a number of landforms including:

- Broadly undulating or level plains
- Gently undulating plains
- Level plains with moderate to strong gilgai microrelief
- Level or very gently undulating outwash plains dissected by numerous small shallow prior stream channels, some of which are sand-filled
- Undulating low rises that are old levees of major streams
- Alluvial plains associated with major streams; numerous braided channels may occur and many areas are subject to irregular flooding
- Undulating lands, often with high gravelly ridges
- Gently to moderately undulating lands with some high ridges
- Extensive level old alluvial plains that have a very slight (few inches) gilgai microrelief
- Level or very gently undulating clay plains with slight to moderate (0.5 m) gilgai microrelief, occasionally stronger (1 m). Where the unit is adjacent to major streams many small braided channels occur and the area is subject to flooding
- Gently undulating lands with broad ridge crests and low rises
- Hilly deeply dissected plateaux consisting of level stony plateau surfaces, high bluffs and cliffs bordering narrow valleys, and some undulating colluvial slopes and alluvial flats, massing sandstone outcrop is common.

Approximately 120 km of the Project (Rail) corridor traverses the western extent of the strategic cropping land Management Area in the western cropping zone. There are no strategic cropping land protection areas within the Project (Rail) vicinity.

Strategic cropping land is limited in extent within the Project (Rail) area and occurs in fragmented parcels. The Project (Rail) corridor traverses areas mapped as strategic cropping land within the western cropping zone.

Good Quality Agricultural Land (GQAL) has been mapped along the Project (Rail). Class C1 agricultural land considered suitable for sown pastures with moderate limitations dominates the landscape in the vicinity of the Project (Rail). The Project also traverses limited areas of Class A land suitable for cropping and Class B (marginal for cropping) which is more widespread along the Project corridor however still to a limited extent.

16.2.1 Soils

The soil types occurring within the rail project area were described and mapped as part of a desktop soil assessment, shown in Appendix W of the Rail EIS. The study made use of the following soil and land system mapping (at varying scales) and information to describe the soil types and distinguish between the varying land scapes traversed by the rail corridor:

- Lorimer, MS 2005, *The Desert Uplands: an overview of the Strategic Land Resource* Assessment Project, Technical Report, Environmental Protection Agency Queensland (DUSLARA)
- Gunn, R.H. Galloway, R.W. Pedley, L and Fitzpatrick, E.A, 1967. Lands of the Nogoa - Belyando Area, Queensland - Land Research Series No. 18, Commonwealth Scientific and Industrial Research Organisation, Australia, Melbourne, Victoria (ZCQ2)
- Shields, P.G, Chamberlain H.J., and Booth N.J. 1993. Soils and Agricultural Use, in the Kilcummin Area, Central Queensland, Project Report Series: QO93011, Department of Natural Resources and Mines, Brisbane Queensland (KCM)

The information provided, although more detailed was split between three different reports with inconsistent nomenclature. The ASC classification (Isbell 2002) was used to provide consistent nomenclature across the three zones (DUSLARA, ZCQ2 and KCM).

From west to east, the relevant information in the reports, is described for the western 37 km within the DUSLARA report (1:100,000) (Section DUSLARA), the central 132 km in the ZCQ2 document (1:500,000) (Section ZCQ2) and the eastern 20 km of the rail corridor was reported in the KCM data (1:100,000) (Section KCM).

More detailed soil surveys are being undertaken of the Project (Rail) area, which will provide detailed mapping of landscape changes and soil types, together with providing additional data on soil chemical and physical properties. This data will focus management for the individual soil types and allow for an assessment of the agricultural land suitability and an estimate of the potential soil loss for each soil type to be calculated. In addition this data will be used to prepare and update relevant environmental management plans required for the project in relation to topsoil stripping depths, areas of sodic soil etc.

16.2.2 Erosion risk

A slope hazard analysis was undertaken along the proposed rail corridor using a combination of Light Detection Ranging Radar (LIDAR) data and 10 m contour data. The Project (Rail) area

is generally located on level very gently inclined slopes, with the exception of areas associated with major drainage lines.

The level to gently inclined areas (<1% to 3% slope), which cover the majority of the alignment, are classes as having a low to moderate erosion rating based on the modal slope only (Queensland Department of Main Roads, Road Drainage Design Manual, 2002). Some minor occurrences of steep to cliffed areas (≥ 32% slope) occur in association with major drainage lines of the Belyando River and its tributaries, Mistake Creek and Logan Creek, these areas are classed as having an erosion rating of high to very high based on modal slope.

16.2.3 Soils

The dominant soils include texture contrast soils (Yellow and Brown Chromosols and Sodosols), with shallow to deep light textured sandy loam surface soils, deep sandy uniform-textured profiles (sandy Tennosols), deep sandy gradational profiles (red Kandosols). These soils are generally susceptible to erosion, following the removal of surface vegetation, with topsoils dominated by high proportions of light sand, low topsoil and subsoil fertility, with acidic pH. Shallow rocky soils (Rudosols), are found on ridges, crests and hill slopes within the Project (Rail) area. These soils have limited potential due to an inherently low fertility, and shallow effective rooting depth (ERD). The high proportion of sand within these soils and there position within the landscape makes them susceptible to erosion if disturbed.

Dispersive sodic subsoils occur within a large proportion of the duplex soils, which are highly susceptible to erosion and tunnelling, if exposed and left un-protected.

Areas of cracking deep grey and red brown clays (Vertosols) also occur on extensive level plains, within the area, with a moderate fertility and varying levels of subsoil salinity and alkalinity. Poor drainage an inundation following high rainfall events will restrict vehicle movement on these soils. The high shrink swell capacity of these soils also has ramifications for the engineering design, placement of buildings, roads, pipelines and underground cables.

16.3 Potential Impacts

Table 16-1 Potential Environmental Impacts - Construction and Operation

Activity	Potential Environmental Impact
Vegetation clearing	Exposure of soils to erosive forces, resulting in loss of soil due to increased surface runoff. All soils will be susceptible to erosion with the removal of vegetation. Soils susceptible to wind erosion include the soils with the sandy or loamy topsoils. Duplex soils with sodic subsoils will be susceptible to dispersion if exposed. Exposure of soils with fine sandy surface horizons to raindrop impact, resulting in surface capping, decreasing profile infiltration Reduced viability of topsoil/subsoil to support native plants and pasture due to possible degradation of topsoil structure and loss of organic matter. Sedimentation and increased turbidity of adjacent water bodies

Activity	Potential Environmental Impact
	Increased soil salinity through changes in hydrology
	Reduced agricultural productivity and associated economic impacts
Changes in land use	Loss of GQAL
	Loss of strategic cropping land
	Disruption to stock movement
	Property severance
Topsoil stripping and stockpiling	Poor topsoil management can lead to incorrect depths of stripping occurring, allowing for the mixing and stockpiling of topsoil and unsuitable subsoil material. Incorrectly stockpiled topsoil can lead to compaction and structural breakdown, together with poor aeration, which causes biological degradation, limiting the viability of the material for rehabilitation
	Exposure of soils to erosive forces, resulting in loss of soil due to increased surface runoff .resource
Earthworks	Soil compaction due to machinery impacts, decreases infiltration and increases the potential for surface runoff and sheet erosion, compaction also leads to an increase in the soil bulk density and affects seed germination and root establishment of vegetation
	Continued use of unsealed access tracks by heavy vehicles has the potential to pulverise the soil and produce bulldust, this is particularly relevant in soils with a moderate to high proportions of fine sand and silt.
	Exposure of soils to erosive forces, resulting in loss of soil due to increased surface runoff .resource

16.4 Performance Outcome

Topsoil and subsoil resources are adequately recovered, stockpiled and biological and physical viability maintained to support the proposed post mining land use.

Minimise soil loss occurring due to mining operations, through implementation of appropriate erosion control practices

Minimise soil compaction

16.4.1 Design, procurement and pre-construction

Table 16-2 Soils - Design and Pre-construction Controls

Control	Responsibility	Timing	Evidence
Identify a suitable location or locations for infrastructure placement and topsoil stockpiling. The area should not be subject to significant overland flow, or flow should be diverted around the area. Risk of accidental disturbance should be minimised. Avoid disturbance of areas with known sodic, reactive and saline soils, if unavoidable: • Apply and blend suitable soil conditioners, such as gypsum to reduce the levels of sodicity or dispersion in the soils • Construction methods employed on areas of reactive soils must be suitability engineered to reduce the potential impact of reactive soils on infrastructure • In areas of known saline soils, infrastructure placement should minimise the area to be disturbed and maintain as much natural vegetation as possible. In areas of light textured sandy soils, infrastructure placement should: • Design and implement appropriate ESC measures; • Minimise the amount of vegetation removed; • Restrict vehicle movement to designated tracks; • Protect exposed areas as soon as possible following disturbance by re-establishing vegetation, applying a protective mulch to the surface on level to gently sloping areas, covering smaller areas	Design Manager / Environmental Manager	Prior to construction commencing	Design plans

Control	Responsibility	Timing	Evidence
and steeply sloping areas with geo-fabric or sprayed with a polymer to bind the soil.			
Prepare an Erosion and Sediment Control Plan (ESCP) in accordance with the *Best Practice Erosion and Sediment Control Manual* (IECA, 2008) and implemented for the Project area prior to the commencement of mining operations; Design of all drainage around proposed structures and permanent landforms should consider the presence of erodible and dispersive soils and apply suitable erosion reduction methods; Minimise the area to be disturbed; All disturbed areas should be revegetated, or protected from erosion using suitable erosion control measures;	Environmental Manager , Area Manager	Prior to any earthworks	Erosion and Sediment Control Management Plan (ESCMP)
Provide details to DNRM regarding proposed footprint relative to State land such that DNRM can determine whether there is a need to salvage quarry material or forest products.	Environmental Manager	12 months prior to disturbance	Correspondence
Prepare a topsoil management plan for construction: • Clear delineation of area to be disturbed and soil types within this area, together with no-go areas • Proposed depth of stripping for each soil type and volume generated • Any pre-stripping treatment requirements (for example weed control)	Design Manager / Environmental Manager	Prior to construction commencing	Topsoil management plan documentation

Control	Responsibility	Timing	Evidence

• Whether single or two phase stripping is required
• Whether each soil type is to be immediately placed on an area prepared for rehabilitation or stockpiled
• Location for rehabilitation placement or stockpiling of each soil type
• Segregation of soils according to soil type, soil properties and potential for weed infestation
• Management requirements while stockpiled
• Intended use for each soil type in rehabilitation, having regard to:
  ○ Timing when area will become available for rehabilitation
  ○ Potential for soils to contain native plant seeds or introduced plant seeds
  ○ Surface cover requirements and volume of topsoils required.
  ○ Slope and drainage
• Topsoil must be stored in stockpiles no more than 1.5 m high to maintain biological and structural viability
• Topsoil must be stockpiled for the shortest practicable and/or re-used as soon as possible to limit biological and structural degradation.
• Placement of topsoil must consider the landscape position from where the topsoil was stripped. Light texture loamy sands and sandy loams are not to be placed on landforms with excessive slopes.
• Depth of topsoil placement should be the same as the depth stripped			

Control	Responsibility	Timing	Evidence
Develop a topsoil register for recording: • Soil type • Source location • Date and depth of stripping • Date and location of stockpile placement • Volume in stockpile • Date of required management actions (turning, seeding and amelioration) • Date, depth and location of replacement and amelioration	Design Manager / Environmental Manager	Prior to any earthworks	Topsoil Register in place prior to stripping
Undertake soil surveys along the rail alignment and in locations where associated railway infrastructure will be located in accordance with the Rail Soil Survey Methodology (SEIS, Volume 4, Appendix T1).	Design Manager / Construction Manager	Surveys must commence at least three months prior to construction commencing	Soil sampling analysis
Develop and implement a Soil Management Plan detailing treatment and management requirements for sodic, dispersive and aggressive soils.	Design Manager / Environmental Manager	Prior to construction	Soil Management Plan
Where permanent impacts upon strategic cropping land are identified, a Deed of Agreement will be established between Adani and the Department of Agricultural, Fisheries and Forestry (DAFF) to facilitate mitigation.	Environmental Manager	Prior to construction	Deed of Agreement
Maintain surface drainage patterns through design of culverts and cut/fill areas. Where changes in flows cannot be avoided, soil stabilisation to prevent salinisation or other forms of soil degradation	Design Manager	Prior to construction	Design Plans

Control	Responsibility	Timing	Evidence
will be considered.			
The crossing of pastoral property and farm access roads will be minimised and alternative access will be negotiated prior to construction commencing	Stakeholder Manager	Prior to construction	Land access agreement
Negotiate stock and occupational crossing locations with stakeholders and finalise the land acquisition process.	Design Manager Stakeholder Manager	Prior to construction	Finalisation of land acquisition process

16.4.2 Construction and Operations

Table 16-3 Soils Project Controls – Construction

Control	Responsibility	Timing	Evidence
Confirm mapped soil types and stripping depths, together with additional limitations such as sodicity, slaking and alkalinity.	Construction Manager	Prior to vegetation clearing	Survey results
Cleary identify, mark out areas and communicate depths for stripping to machinery operators. Delineate no-go areas	Environmental Manager	Prior to vegetation clearing	Topsoil Management Plan
Strip topsoil to recommended depths prior to any earthworks or other surface disturbance. Topsoil stripping depths and other requirements will be set out permit to disturb.	Construction Manager	Prior to any earthworks or disturbance	Permit to disturb
Place topsoil in stockpiles no more than 1.5m in height and with side slope steepness depending on the nature of the topsoil such that stockpiles do not fail.	Construction Manager	Immediately on stripping of topsoil	Topsoil register
If stockpiles are to remain in place for more than six months, rip and seed topsoils. Seeding may be with native grass species or a sterile	Construction	Immediately after	Topsoil register

Control	Responsibility	Timing	Evidence
introduced grass species. This should be recorded on the topsoil register. Clearly sign post stockpiles for easy identification	Manager	placement in stockpile	
Adequately cover stockpiles of light sandy soils, cover with geo-fabric or spray with polymers to restrict wind and water erosion from stockpiles. Stockpiles of saline and sodic subsoils must be bunded to reduce run on and runoff and prevent the migration sediment and salts from stockpiles . Apply ameliorants to stockpiles of dispersive soils to improve soil structure and reduce runoff. Protect with mulch or vegetation.	Construction Manager	As required	Visual inspections
Stockpiled topsoils may be used for rehabilitation trials or for offset areas.	Environmental Manager	As required	Rehabilitation records
Replace topsoil in any disturbed areas that are not required after construction and seed with grass or other species as determined through rehabilitation trials.	Construction Manager	As required	Rehabilitation records
Temporarily disturbed areas will be stabilised as soon as practical by reinstating topsoil and subsoil and compacting replaced soils.	Construction Manager	As required	Rehabilitation records
Implement Erosion and Sediment Control measures consistent with the practices described in the International Erosion Control Association (IECA), *Best Practice Erosion and Sediment Control Guideline*, 2008.	Construction Manager	Ongoing	Weekly environmental inspection checklist
Potential runoff and sediment loading of water courses. Erosion and	Environmental Manager, Area	On commencement of	Visual inspection and

Control	Responsibility	Timing	Evidence
runoff during construction will be minimised by • Implement appropriate measures, as designed for the site; • Minimise the amount of vegetation clearing, clear progressively if possible; • Site rehabilitation to be carried out progressively following disturbance and as soon as possible following disturbance.	Manager	construction and ongoing	site operations plan
Soil Compaction • Use appropriate earthmoving machinery when working with these soils (i.e. using vehicles with large wheel/track size) • Implement controlled trafficking measures, restrict vehicle movement to designated roads and tracks; • Minimise trafficking when the soils are wet; • Compacted areas that are to be rehabilitated should be remediated by ripping the compacted layer/s prior to the spreading of topsoil; Depth of ripping is dependent on the degree of compaction, and should be assessed prior to rehabilitation works.	Environmental Manager	On commencement of construction and ongoing	Visual inspection
Placement of infrastructure • Identify and implement correct management procedures as outlined in the Soil Management Plan, for areas of sodic, reactive and saline soils • Ensure proper topsoil management procedures are implemented to ensure rehabilitation is successful	Area Manager	Ongoing	Site Operations Plan

Control	Responsibility	Timing	Evidence
• Implement appropriate ESC measures to avoid loss of high potential soil; • Undisturbed land will be returned, or retained as its pre-mining land suitability or as mutually agreed			
Sodicity and Salinity • Limit removal of vegetation on mapped saline soils to avoid potential rises in groundwater and salinity • In cleared areas, re-vegetation must be completed as soon as possible following clearing or the soil is to be protected using the methods outlined within the ESCMP • In sodic soils, clearing methods should minimise ground disturbance and maintain as much rootstock as possible • Use of ameliorants such as gypsum on sodic soils to improve soil structure and minimise dispersion •	Environmental Manager	Ongoing	Visual monitoring for salinity and sodicity
Erodible light textured sandy soils: • Implement appropriate ESC measures; • Minimise the amount of vegetation removed; • Schedule construction activities where possible; • Restrict vehicle movement to designated tracks; • Protect exposed areas as soon as possible following disturbance by re-establishing vegetation, applying protective mulch to the surface on level to gently sloping areas, covering smaller areas	Environmental Manager, Area Manager	On commencement of construction and ongoing	Visual inspection and site operations plan

Control	Responsibility	Timing	Evidence
and areas of steep slopes with geo-fabric or spray with an approved polymer to bind the exposed soil;			
Dust creation • Minimise the amount of areas being disturbed; • Schedule constructive activities if possible; • Minimise and plan vehicle movement to only what is necessary • Seal tracks and roads if possible with, crushed stone, or small problem areas with geo-fabric if possible; • Establish vegetation or spray exposed areas with polymers • Cover gently sloping areas with mulch • Spray unsealed (unprotected) roads with water to minimise the creation of bulldust		On commencement of construction and ongoing	Visual inspection and site operations plan
Reinstating all temporarily disturbed areas progressively during and after construction. Reinstatement will be as close as possible to pre-construction conditions. If soils have been impacted or are naturally low in fertility, amelioration with suitable fertiliser or other ameliorants, such as lime to restore soils to pre-construction productivity or improve productivity for successful rehabilitation. Addition of fertilisers and ameliorants to take place at the same time as topsoil re-placement. Placed saline or sodic subsoil material, must be capped with a layer of benign subsoil material or suitable topsoil of an appropriate depth.	Environmental Manager / Construction Manager	Ongoing	Weekly environmental inspection checklist
The crossing of pastoral property and farm access roads will be minimised and alternative access will be provided during unavoidable	Stakeholder Manager /	As required	Consultation records

Control	Responsibility	Timing	Evidence
construction activities as appropriate	Construction Manager		

16.5 Monitoring and Corrective Action

Table 16-4 Soils Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Visual inspection of topsoil stockpile areas	Environmental Manager	In high wind conditions	Minimal dust lift off	Rectify existing and re-design/re-apply control measures if necessary Apply water Seed stockpiles if necessary
Visual inspection of topsoil stockpile areas	Environmental Manager	Monthly and after rainfall (>10mm)	Stockpiles are intact and not slumping Management requirements in topsoil register have been implemented Stockpiles greater than 6 months have been seeded Vegetation cover is healthy (where required) No sign of erosion	Reshape stockpiles Apply seed to stockpiles Apply water
Visual inspection for erosion and signs of sediment	Environmental Manager	Monthly and after rainfall	Sediment loads and dirty water runoff from construction a site is being adequately captured and attenuated by	Correct, fix and re-design ESC

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
mobilisation off site		(>10mm)	control measures as designed	measures if required
Visual inspection of progressively rehabilitated areas	Environmental Manager	Weekly	Erosion and sediment controls are functioning as designed, no visible signs of soil loss form rehabilitated areas Planted vegetation is successfully established and providing the required level of cover as outline within the Rehabilitation Management Plan	Correct, fix and re-design ESC measures if required Re-apply fertiliser and other ameliorants and re-seed areas of poor germination. Hydro mulch on steeper slopes Irrigate re-seeded areas if necessary

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Test soils as outlined in the Rail Soil Survey Methodology	Construction Manager / Environment Manager	Prior to construction commencing	NA (documented in topsoil register)	Identify constraints to stockpiling and rehabilitation and treatment or amelioration to required to maximise rehabilitation success

17. Aboriginal Cultural Heritage

17.1 Legislative Framework

Protection of Aboriginal cultural heritage is largely achieved through the *Aboriginal Cultural Heritage Act 2003* which establishes a duty of care in relation to managing impacts on items and places of Aboriginal cultural heritage significance. For the Carmichael Project, the duty of care will be discharged through the preparation and implementation of cultural heritage management plans, which are to be agreed by Adani and the relevant Aboriginal parties.

There are no Aboriginal cultural heritage places or items within the rail project area that are listed under either Federal or Queensland heritage protection legislation (Commonwealth *Aboriginal and Torres Strait Island Heritage Protection Act 1984*, *Environment Protection and Biodiversity Conservation Act 1999*, *Queensland Heritage Act 1992*).

17.2 Environmental Values

The Project affects four native title/Aboriginal party areas. Details of the Cultural Heritage Management Plans (CHMP) are confidential to the signatories and are not provided herein.

Table 17-1 Native Title / Aboriginal Party Areas and Agreements

Native Title/Aboriginal Party Area	Project Area Affected	Agreement in place
Wangan and Jagalingou People Registered native title claim (QUD85/04, QC04/6)	The Project (Mine) and first 17 km of the Project (Rail) are located within the external boundaries of the Wangan and Jagalingou People	A CHMP for the life of the Project is established and approved by the Chief Executive of DERM in November 2011
Jangga People Registered native title claim (QUD6230/98, QC98/10)	Approximately 145 km of the Project (Rail) is located within the external boundaries of the Jangga People	A CHMP for the life of the Project was established and approved by the Chief Executive of DERM in November 2011
Barada Barna Kabalbara and Yetimarla People #4 (BBKY #4) Former registered native title claim (QUD6023/01, QC01/25)	Approximately 17 km of the Project (Rail) is located within the external boundaries of the Barada Barna Kabalbara and Yetimarla People #4 (BBKY #4)	A CHMP for the life of the Project has been agreed, signed and submitted for approval by the Chief Executive of the Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATISMA) in September 2012

Native Title/Aboriginal Party Area	Project Area Affected	Agreement in place
Barada Barna People Registered native title claim (QUD380/08, QC08/11).	Approximately 3 km of the Project (Rail) is located within the external boundaries of the Barada Barna People	A CHMP for the life of the Project was executed in November 2011 and was submitted to be approved by the Chief Executive of DATISMA in September 2012

A cultural heritage assessment identified 39 culturally significant sites within the Project corridor. Details of places and items of Aboriginal cultural heritage significance will not be disclosed in any public documentation. In general, the following Aboriginal cultural heritage values are associated with the mine site and may also be present at the rail project area:

- Culturally significant sites within the Project Area should be viewed as connected to the broader landscape outside the Project Area boundary, particularly known ceremonial grounds, rock art, pathways, camp sites, scarred trees and scattered artefacts.
- The Carmichael River, Cabbage Tree Creek and a network of creeks and the northern creek system were generally identified as seasonal camping areas and pathways through the broader landscape. Artefact finds are more likely in these areas.
- Artefacts identified include a variety of stone artefacts, scarred trees, grinding grooves. Artefacts were present as discrete items or scatters, with denser scatters associated with potential camping places.

As a complete survey of the rail corridor has not been undertaken, there is potential for inadvertent discovery of other sites and artefacts.

17.3 Potential Impacts

17.3.1 Construction and Operation

Table 17-2 Potential Cultural Heritage Impacts - Construction and Operation

Activity	Potential Cultural Heritage Impact
Vegetation clearing and ground disturbance	Vegetation clearing and ground disturbance will disturb and potentially destroy artefacts The contextual setting of artefacts will also be effectively destroyed by ground disturbance
Disturbance and erosion of streams and drainage lines	Erosion may expose artefacts on stream banks and drainage lines, with subsequent loss to downstream environments

17.4 Performance Outcome

Cultural heritage management plan requirements are met.

17.5 Proposed Controls

17.5.1 Design, Procurement and Pre-construction

Table 17-3 Indigenous Heritage Proposed Controls - Design, Procurement and Pre-construction

Control	Responsibility	Timing	Evidence
A Native Title Strategy to manage Indigenous Land Use Agreements (ILUA) will be finalised and adopted.	CEO	Pre-construction	Approve Strategy
Cultural Heritage Management Plans (CHMP) will be finalised and approved.	CEO	Pre-Construction	Approved Plans
Adani will carry out a full Cultural Heritage Surveys with all relevant Aboriginal Parties at prior to construction commencing.	Environment Manager	Pre-Construction	Survey Reports
Establish management arrangements for each part of the Project Area based on the recommendations contained within the Cultural Heritage Survey reports. Management arrangements may include: • Avoidance – where the Project may proceed without any impacts on the identified values • Further assessment – e.g. excavations in identified areas where there is a likelihood of further, subsurface, cultural material being present • Mitigation – the removal, recording and preservation of cultural heritage in areas where otherwise Project activities may have a direct impact on identified values • Monitoring – inspections, audits and/or monitoring of	Environment Manager	Pre-Construction	Cultural Heritage Management Plans

Control	Responsibility	Timing	Evidence
project activities to ensure that project activities comply with agreed management arrangements.			
Any required pre-clearing surveys for construction areas will be undertaken in accordance with the CHMP.	Construction Manager	Pre-Construction	Survey Reports
If significant finds are made, consideration will be given to whether the construction footprint can be altered to avoid disturbance.	Construction Manager	Pre-Construction	Design Review
Undertake cultural heritage awareness training in accordance with the CHMP to ensure that all personnel are aware of duty of care requirements.	All personnel	Staff inductions	Training records
Establish and implement committees made of up representatives of both Adani and relevant Aboriginal parties to oversee the assessment and management of cultural heritage values of the Project Area.	Environmental Manager	Prior to construction	Minutes of meetings

17.5.2 Construction

Table 17-4 Indigenous Heritage - Construction Controls

Control	Responsibility	Timing	Evidence
Monitoring of ground disturbing activities at certain locations. Protocols in relation to monitoring, including giving of notice to the relevant Aboriginal parties to provide monitors, the activities of these monitors during monitoring activities and requirements if a cultural heritage find is made are set out in the CHMPs.	Construction Manager	Ongoing	Compliance with CHMP
Implement the requirements of the CHMP including continued communication, continued cultural heritage assessment and associated reporting.	Construction Manager and supervisors	Ongoing	Compliance with CHMOP
Manage unexpected cultural heritage finds in accordance with each CHMP, including the following arrangements: • Stop work arrangements in the vicinity of suspected finds – establishment of buffer zones etc. • Notification to the relevant Aboriginal party and Aboriginal party assessment of the find • Management of all unexpected finds in accordance with CHMP management provisions With regard to the discovery of human remains, each CHMP references DATSIMA's guidelines, *The Discovery, Handling and Management of Human Remains under the Provisions of The Aboriginal Cultural Heritage Act 2003 And Torres Strait Islander Cultural Heritage Act 2003*.	Construction Manager / Environmental Manager	Ongoing	Compliance with CHMP

Control	Responsibility	Timing	Evidence
Respond to disputes in accordance with the processes and procedures outlined in each CHMP.	Construction Manager / Environmental Manager	Ongoing	Compliance with CHMPs
Collection and management of any artefact finds.	Construction Manager / Environmental Manager	Ongoing	Compliance with CHMP

17.5.3 Operation

Table 17-5 Indigenous Heritage - Operation Controls

Control	Responsibility	Timing	Evidence
Monitoring of ground disturbing activities at certain locations. Protocols in relation to monitoring, including giving of notice to the relevant Aboriginal parties to provide monitors, the activities of these monitors during monitoring activities and requirements if a cultural heritage find is made are set out in the CHMPs.	Rail General Manager	Ongoing	Compliance with CHMP
Collection and management of any artefact finds.	Rail General Manager	Ongoing	Compliance with CHMP

17.6 Monitoring and Corrective Action

Monitoring and corrective action requirements are set out in the CHMPs developed for the Carmichael Coal project.

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18. Non-Indigenous Cultural Heritage

18.1 Legislative Framework

Legislation protecting non-Indigenous cultural heritage is as follows:

- The EPBC Act, administered by DSEWPaC, protects listed national heritage places.
- The *Queensland Heritage Act 1992* (QH Act), administered by the DEHP identifies and protects places of state heritage significance. It applies to discovery and protection of any previously unidentified archaeological artefacts or archaeological places.

The Charter for the Conservation of Places of Cultural Significance (The Burra Charter) 1977 is used to define cultural significance in Queensland and derives its philosophical principles from the International Council on Monuments and Sites (ICOMOS).

18.2 Environmental Values

There are no listed non-indigenous cultural heritage sites present within the rail project and associated infrastructure construction footprint. Some items associated with pastoral activities may have limited, localised cultural heritage significance, however no particular values have been identified.

The potential for inadvertent discovery of significant non-indigenous cultural heritage items is considered low.

18.3 Potential Impacts

Potential impacts related to inadvertent discovery of non-indigenous cultural heritage items may arise from vegetation clearing and ground disturbance and hence, are similar during both the construction and operation phases. Potential impacts are shown in Table 18-1

Table 18-1 Potential Cultural Heritage Impacts - Construction and Operation

Activity	Potential Cultural Heritage Impact
Vegetation clearing and ground disturbance	Inadvertent finds of items of actual or potential cultural heritage significance

18.4 Performance Outcome

Previously unknown sites of non-indigenous cultural heritage significance are identified and contribution that these sites may make to understanding of pastoral activities and use of the area is recorded.

Table 18-2 Non-Indigenous Cultural Heritage - Construction and Operation Controls

Control	Responsibility	Timing	Evidence
In the event that an inadvertent find of potentially significant cultural heritage material is made cease work and notify the Environmental Officer or Environmental Manager	All staff	Ongoing	Incident register
Determine whether further action is required and archaeological assessment and/or salvage if required	Environmental Manager	If a find is made	Incident register

18.5 Monitoring and Corrective Action

In the event that a significant non-indigenous cultural heritage place or item is identified, monitoring requirements may need to be developed.

19. Emergency Management and Response

19.1 Emergency Response Plan

An emergency response plan will be developed for the rail project as required by the Adani Compliance Guideline CG-015 – Emergency Preparedness and Response and will include:

- Identification and risk assessment of potential emergencies and incidents, including those that might cause environmental harm
- Roles and responsibilities in relation to emergency response, reporting and notification
- Up-to-date site location and layout (Adani Compliance Guideline CG-027 – Technical Documentation)
- Emergency phone numbers (internal and external)
- Type, use and location of emergency response equipment, including PPE
- Hazardous materials on site, including location, quantity, types, method of storage, handling, fire-fighting methods to be used and environmental hazards (refer Adani Compliance Guideline CG-024 – Hazardous Substances and Dangerous Goods)
- Procedures for response to all reasonably foreseeable incidents and emergencies
- The arrangements for alert or alarm situation (who should be notified, how, etc.).

Local emergency services will be consulted in preparation of the emergency response plan and the plan will be made available to local emergency services.

19.2 Likely emergencies or incidents which may have environmental impacts are shown in Potential Impacts

Table 19-1. In relation to environmental incidents and emergencies, requirements for prevention will be included in relevant sub-plans within this EMP.

19.3 Potential Impacts

Table 19-1 Emergencies with Potential Environmental Impacts

Incident	Potential Environmental Impact	Prevention	Emergency Response
Spills of environmentally hazardous materials	Contamination of soil Contamination of surface water and groundwater Toxicity to animals and plants Water resources cannot be uses for identified beneficial uses	Design of storages Storage and handling procedures Training Spill containment and clean up equipment in place at risk areas for small, medium and large spills	Contain spill Remove all contaminated materials or remediate contamination in-situ
Bushfire	Loss of native vegetation and habitat Death or injury of native animals Death or injury to humans Air pollution – particulates and greenhouse gas emissions	Management of combustible materials and ignition sources and including vehicle movements across grassed areas and cigarettes. Fuel reduction where necessary and consistent with fire regimes for native vegetation Fire protection and fire fighting equipment Firebreaks Training	Fight fire using trained crews and equipment and with assistance from Queensland emergency services as required Ensure a sufficient water supply is available Ensure roads are accessible at all times Compliance with Adani's Rail Bushfire Management Plan (AD-RSM-PLN-022.1)

Incident	Potential Environmental Impact	Prevention	Emergency Response
Flooding	Exposure of soils to erosive forces, resulting in loss of soil resource Loss of sewage during a flood event Loss of hazardous substances during a flood event	Siting rail infrastructure outside of the flood plains. Installation of controls such as levies around infrastructure that is located within flood plains Monitor weather warnings	Compliance with Adani's Emergency Response Standard (AD-RSM-STD-0.22) Determine flood risk Monitor weather warnings Protect assets (relocate if possible) Secure site Evacuate all construction personnel

19.4 Incident Reporting and Notification

Incident reporting requirements will be set out in the Emergency Response Plan and will include those set out in Table 19-2.

Table 19-2 Incident Reporting and Notification

Type of Incident	Report to	Report by	Timing
All serious incidents	Environmental Manager	First on scene	Immediately
incidents involving actual or potential environmental harm	Environmental Manager and/or officers	First on scene	Immediately
Incident involving non-compliance with environmental authority	DEHP – pollution hotline	Rail General Manager or Environmental Manager	Within 24 hours (initial notification)
	DEHP – representative officer	Rail General Manager or Environmental Manager	Within 21 business days (full report)
Incident involving non-compliance with another approval	Relevant agency	Rail General Manager or Environmental Manager	On becoming aware of the non-compliance
Incidents causing actual or potential serious or material environmental harm[(1)]	DEHP Owner and occupier of affected land All persons at the affected land	Rail General Manager or Environmental Manager[(2)]	Within 24 hours of becoming aware

(1) Note Environmental harm is defined in Sections 14-17 of the EP Act http://www.legislation.qld.gov.au/acts_sls/Acts_SL_E.htm

(2) Note that if the Rail General Manager or Environmental manager is not available, the person who first became aware of the potential or actual environmental harm must themselves make a report to DEHP and the owners and occupiers of the affected land

19.5 Incident Investigation

Incident investigation requirements are set out in the Adani Compliance Guideline CG-006 – Incident Investigation and Reporting.

In relation to environmental incidents, reports to the administering authority of the EP Act must include “the event, its nature and the circumstances in which it happened”.

Environmental incident investigations and reports will cover:

- A description of the incident, including witness accounts.
- A description of any releases to land, air or water or other environmental harm that may have occurred, including loss of native plants or habitat for native animals.
- A description of the environmental values affected or potentially affected.

- Whether releases or other harm caused by the incident was in excess of prescribed standards or requirements (for example, whether particulate emissions exceeded compliance levels, or whether vegetation was cleared outside areas where clearing was authorised).
- Whether a formal non-compliance with legislative requirements or approval conditions occurred.
- Whether the incident constituted serious or material environmental harm as defined under the EP Act.
- Whether internal procedures or requirements were breached.
- Formal and informal reports and notifications made internally and externally.
- A review of the causes of the incident or near miss.
- Recommendations in relation to actions required to rectify any environmental harm or damage that may have occurred.
- Recommendations in relation to preventing a recurrence of the incident or near miss. These may include:
    - Disciplinary action against individual employees
    - Revisions to procedures and work methods
    - Maintenance, repairs or re-design of infrastructure, facilities or equipment.

All recommendations from incident investigations will be included in the corrective action register.

20. Community

20.1 Legislative Framework

A key focus of the EP Act is to protect amenity and beneficial uses of the environment for humans, particularly in relation to noise, air quality, waste management, land contamination and surface and groundwater quality. Management measures to minimise impacts on these values are contained within this EMP. It is a condition of the environmental authority that if complaints are received in relation to any of these issues, these complaints are investigated and responded to.

The Queensland Government has introduced a requirement for many Significant Projects being assessed under the SDPWO Act or the EP Act to include a social impact management plan (SIMP). The SIMP contains a range of measures to mitigate and monitor social impacts of a project on members of the community. Hence, this EMP only addresses impacts on the community in relation to the environmental values protected under the EP Act.

20.2 Environmental Values and Potential Impacts

Environmental values and potential impacts in relation to the community are set out in this EMP in the following sub-plans:

- Air quality
- Noise
- Water quality
- Scenic amenity

20.3 Potential Impacts

The extent of the land through which the Project (Rail) traverses is classified as production from relatively natural environments and is used predominantly for cattle grazing and fattening. It has been identified through this assessment that the construction and operation of the Project (Rail) has potential to result in direct permanent changes to the land use in the Project (Rail).

The construction and operation of the Project (Rail) has the following potential impacts:

- Fragmentation and intrusion of agricultural property, GQAL and strategic cropping land
- Altered overland water flow
- Clearing of endangered REs
- Reduction of water quality in waterways and water storages
- Increased traffic and damage of road infrastructure
- Disruption of stock movement through the Stock Route Network
- Temporary raising or realignment of power lines.

20.4 Performance Outcome

Community amenity and beneficial uses of air, noise and water resources are not degraded when compared to requirements set out in the environmental authority.

20.5 Proposed Controls

If complaints or inquiries are received from a member of the community or other external party:

Table 20-1 Community - Complaint Management

Control	Responsibility	Timing	Evidence
The complaint or inquiry will be recorded in the Consultation Manager database, including details of the complainant and the nature of the complaint.	Stakeholder Manager	Ongoing	Consultation Manager database entry
An initial response will be provided to the complainant within 24 hours of receipt of the complaint.	Stakeholder Manager	Ongoing	Consultation Manager database entry Complaint Register
If an investigation of the complaint is required, this will be undertaken using the incident investigation procedure established under the Adani Management System.	Stakeholder Manager	Ongoing	Complaint Register
Any corrective actions identified will be entered into the corrective action register.	Stakeholder Manager	Ongoing	Corrective Action Form and Register

20.5.1 Design and pre-construction

Table 20-2 Community - Design and Pre-construction Controls

Control	Responsibility	Timing	Evidence
A construction Traffic Management Plan (TMP) will be developed prior to construction commencing. The TMP will include following mitigation measures: • A community information awareness program will be implemented for the construction phase of the Project (Rail). This program will be initiated prior to construction commencing and throughout the entire construction period to ensure that local residents are aware of the construction activities, with particular regard to construction traffic issues. The awareness program will identify communication protocols for community feedback on issues relating to construction vehicle driver behaviour and construction-related matters. • The DTMR, IRC and the Queensland Police service will be consulted with regards to identifying mitigation measures to address increases in traffic levels on Gregory Developmental Road and Kilcummin Diamond Downs Road during the construction period. • DTMR and IRC will be consulted with regards to ensuring general signposting of construction access roads are appropriate and provide adequate warning of heavy vehicle and construction activity. • Signposted and non-signposted speed restrictions will be	Logistics Manager / Construction Manager	Prior to Consultation Commencing	Traffic Management Plan Induction Records Community Information awareness brochures Minutes of meeting Correspondence to community Warning notices

Control	Responsibility	Timing	Evidence
reviewed along the road network and where necessary, additional signposting of speed limitations will be provided. • Construction activity warning notices will be distributed to advise local road users of scheduled construction activities. • Advance notice of road/lane closures and advice on alternative routes will be provided. • Appropriate traffic control and warning signs will be provided for areas identified to have existing potential safety risks. • The transportation of construction materials will be managed to maximise vehicle loads and minimise vehicle movements. • Whenever practical, the use of internal and haulage access roads will be promoted rather than public roads by construction vehicles. • Project induction training will be provided to truck and vehicle operators.			
The project design will maintain the utility of access routes to and from private properties wherever possible by: • Preserving access tracks within and between properties • Grade separating or joining private tracks to local roads • Constructing operational crossings. The design will be further modified based on the outcomes from Adani's consultation with landholders.	Design Manager	During design	Final design

20.5.2 Construction and Operation

Table 20-3 Community - Construction and Operation

Control	Responsibility	Timing	Evidence
Busses will be used to move construction workers from the airport to the temporary construction camps and to the work site.	Construction Contractor	Ongoing	Bus transport logs
Safety induction to staff and contract workers will include awareness regarding traffic, protocol around opening / closing landholder gates.	Construction Contractor / Environmental Manager	Ongoing	Training Register
Drivers will be trained in safe driving of the vehicle and fatigue management strategies.	Construction Contractor / HSS manager	Ongoing	Training Register
Train speeds at 'at grade' crossings will be restricted based on the outputs of risk assessments.	Operations Manager	Ongoing	Risk Assessment
Installation of signage and controls (as appropriate) at all crossings. These include temporary requirements during construction stage and permanent requirements for operation stage.	Operations Manager / Construction Manager	Ongoing	Visual inspection
Establish permanent holding yards at either side of 'at grade' stock crossings as necessary.	Construction Manager	During construction	Stock yards located either side of crossing
Ensure all gates passed through on private properties are left as found.	Construction Manager	During construction	Gate Register

21. References

Adani Compliance Guidelines

- CG-002 Legal Obligations
- CG-003 Training and Competency
- CG-004 Audits and Assessments
- CG-005 Corrective and Preventative Action
- CG-006 Incident Investigation and Reporting
- CG-008 Documentation and Document Control
- CG-009 Hazard Notification and HSE Improvement
- CG-011 Management Review
- CG-015 Emergency Preparedness and Response
- CD-019 Demolition and Decommissioning
- CG-021 Procurement
- CG-022 Contractor Management
- CG-024 Hazardous Management and Dangerous Goods
- CG-27 Technical Documentation
- CG-036 Work Permits
- CG-128 Management Commitment

Adani Management Standards

- ST-02 Planning Objectives and Legal Obligations
- ST-03 Training and Competency
- ST-04 Documentation, Document Control and Records
- ST-18 Reviews, Audits and Inspection

USEPA, Region 7 Environmental Management System, http://www.epa.gov/region7/ems/index.htm accessed 24/09/2012