Adani Mining Pty Ltd

NORTH GALILEE BASIN RAIL PROJECT

Environmental Impact Statement

Appendix P Environmental management plan framework

November 2013

This North Galilee Basin Rail Project environmental management plan ("the Report") has been prepared by GHD Pty Ltd ("GHD") on behalf of and for Adani Mining Pty Ltd ("Adani") in accordance with an agreement between GHD and Adani.

The Report may only be used and relied on by Adani for the purpose of informing environmental assessments and planning approvals for the North Galilee Basin Rail Project ("the Purpose") and may not be used by, or relied on by any person other than Adani.

The services undertaken by GHD in connection with preparing the Report were limited to those specifically detailed in Section 1.1 of the Report.

The Report is based on conditions encountered and information reviewed, including assumptions made by GHD, at the time of preparing the Report. Assumptions made by GHD are contained through the Report, including (but not limited to) concept design and operations information provided by Adani.

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- *reliance on the Report by a third party, or use of the Report other than for the Purpose.*

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Terms and abbreviations

Term and abbreviations	Definition
Adani	Adani Mining Pty Ltd
ADG	*Australian Code for Transport of Dangerous Goods by Road and Rails*
AS	Australian Standard
BCA	Building code of Australia
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERMP	Environmental Risk Management Plan
ERP	Emergency Response Plan
Final NGBR Project footprint	The final NGBR Project footprint will accommodate all rail infrastructure required for construction and operation, scalable to accommodate 100 mtpa product coal transport, including passing loops, a maintenance road, rolling stock maintenance (provisioning, fuel storage and refuelling, maintenance, etc.), water supply and pipeline, track and signalling maintenance facilities, staff crib, accommodation and training facilities and other necessary infrastructure associated with the operational functions of the NGBR Project.
Final rail corridor	The NGBR Project nominal 100 m wide corridor.
FMP	Fire Management Plan
GPS	Global Positioning System
HSS	Health, safety and security
mtpa	Million tonnes per annum
mAHD	Elevation in metres with respect to the Australian Height Datum.
NC Act	*Nature Conservation Act 1992*
NGBR Project	North Galilee Basin Rail Project
Preliminary investigation corridor	The NGBR Project nominal 1,000 m wide corridor.
QAS	Queensland Ambulance Service
QPS	Queensland Police Service
QRFS	Queensland Fire and Rescue Service
RIAR	Road Impact Assessment Report
SiD	Safety in Design

Term and abbreviations	Definition
TMP	Traffic Management Plan
TOR	Terms of Reference
WHS Act	*Work Health and Safety Act 2011*

1. Overview

1.1 Purpose of this plan

This framework for the Project Environmental Management Plan (the Project EMP) addresses the environmental management commitments for the design, construction and operational phases of the North Galilee Basin Rail Project (NGBR Project). The Project EMP builds on the commitments to environmental performance made in the NGBR Project Environmental Impact Statement (EIS). It provides a framework to manage the environmental values potentially affected by the NGBR Project and sets out environmental management and mitigation measures.

The Project EMP is intended to be a live document which will be developed in more detail as the NGBR Project progresses into detailed design, construction and operation. Decommissioning and rehabilitation of the rail corridor and ancillary infrastructure at the end of the operational life of the NGBR Project have not been considered in this Project EMP.

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 NGBR Project under their control. Such plans will be required to be consistent with this Project EMP.

1.2 Structure of the Project EMP

The Project EMP is set out in three sections:

- Project Description
- Environmental Management Framework
- Management Plans

The **Project Description** provides a description of the NGBR Project location, the components of the NGBR Project and proposed construction and operational activities relevant to the NGBR Project.

The **Environmental Management Framework** provides details of the management framework proposed to ensure environmental commitments are achieved and implemented relevant to the NGBR Project.

The **Management Plans** specify the environmental management activities, mitigation and control measures that will be used to prevent or minimise environmental impacts from the NGBR Project activities. The management plans relate to the environmental values identified in the EIS.

2. Project description

2.1 Project location

The NGBR Project is a 303.4 km standard gauge rail route connecting the proposed Carmichael Coal Mine and Rail Project (Carmichael Project) rail infrastructure to the Port of Abbot Point. The NGBR Project will service the Carmichael Project (Mine) and third-party users up to an operational capacity of 100 million tonnes per annum (mtpa). For the purpose of this EIS, the NGBR Project begins at chainage 3.49 km, in the vicinity of the balloon loop for Adani's proposed Abbot Point Terminal 0 Project at the Port of Abbot Point in the north. The NGBR Project runs south from this point to its connection with the Carmichael Project (Rail) infrastructure at chainage 306.9 km, west of the Gregory Developmental Road towards Mistake Creek. Throughout this EIS, the NGBR Project is described in terms of a preliminary investigation corridor, a final rail corridor, and the NGBR Project footprint. The preliminary investigation corridor is nominally 1,000 m wide, whereas the final rail corridor is nominally 100 m wide. The NGBR Project footprint is defined as the final rail corridor and all ancillary activities. The NGBR Project provides a more direct route to the Port of Abbot Point in comparison with the existing Goonyella and Newlands rail systems, and meets Adani's objective of providing a long-term rail solution for the Galilee Basin.

The NGBR Project is proposed in accordance with the Galilee Basin Coal Infrastructure Framework (State of Queensland 2013a), being a single, north-south, multi-user, common access rail corridor from the northern Galilee Basin to the Port of Abbot Point. A north-south corridor promotes the minimisation of impacts to landholders and the broader region.

2.2 Project components – construction and operation

The key construction and operation components of the NGBR Project are provided in Table 2-1 and Table 2-2 respectively.

Table 2-1 Key components (construction phase)

Component	Quantity	Unit
Construction camps	5	no.
Concrete batch plants	5	no.
Bridge laydown area	21	no.
Track laydown area	46	no.
Construction depot	2	no.
Construction yard	1	no.
Turning circle	69	no.
Cut length (total)	103.45	km
Cut volume (total)	15.28	million m^3
Deep cut length (>15 m depth)	4.5	km
Maximum cut depth	24.2	m
Fill length (total)	213.15	km
Fill volume (total)	15.68	million m^3
Deep fill length (>15 m depth)	3.4	km
Maximum fill depth	24.5	m
Bridge crossings	18	no.
Bridge length (total)[2]	2.57	km

Table 2-2 Key components (operations phase)

Component	Quantity	Unit
Route length (chainage 3.49 km to 306.9 km)	303.41	km
Passing loops	7	no.
Public road treatments	22	no.
At-grade crossings	13	no.
Grade-separated crossings	4	no.
Possible closures	5	no.
Occupational crossings	137	no.
At-grade crossings	38	no.
Grade-separated crossings	16	no.
Closures	83	no.
At-grade stock route crossings[1]	7	no.
Rolling stock maintenance depot	1	no.

1 - Queensland Stock Route Network (State of Queensland 2013b)

2 - 127 bridge spans at 20.2 m length

2.3 Construction activities

2.3.1 Overview

Construction of the NGBR Project will occur over four phases. The phases and the activities that make them up are itemised below:

- Phase 1, Site preparation – including
  - Construction camp establishment
  - Temporary drainage construction
  - Clearing and grubbing
  - Topsoil stripping
  - Service removal or treatment
  - Haul roads, access road and laydown construction
  - Installation of water supply infrastructure
  - Fencing (temporary and permanent)
  - Communication cable laying
- Phase 2, Drainage structure, earthworks and bridges – including
  - Drainage construction
  - Cut and fill earthworks

  - Capping layer application
  - Bridge construction
- Phase 3, Track laying – including
  - Welding
  - Track and sleeper laying
  - Ballasting and tamping
- Phase 4, Signal and communications – including
  - Installation of signalling equipment
  - Installation of wayside equipment
  - Provision of main signalling control centre

2.3.2 Phase 1 – Site preparation

Construction camp establishment

All five construction camps will be established prior to the commencement of works on site.

Temporary drainage construction

Temporary drainage construction will be established in order to:

- Minimise runoff from NGBR Project construction activities to waterways
- Minimise disturbance to waterways crossed by the NGBR Project

Clearing and grubbing

Generally, clearing and grubbing for bulk civil earthworks will be undertaken immediately prior to the earthworks to prevent erosion. Clearing and grubbing will include removal of trees, stumps, brush, roots, rubbish and debris from the site, shortly in advance of earthworks. Clearing and grubbing will include the following activities:

- Clearing and grubbing along final rail corridor fence lines to allow construction of fencing, the light vehicle access road, and communication cable laying
- Localised clearing and grubbing for construction camps and access roads, quarries and borrow areas, laydown areas, water supply infrastructure (particularly water storages) and construction depots
- Localised clearing and grubbing at major bridge or culvert crossings.

Topsoil stripping

Topsoil stripping will occur over the final NGBR Project footprint (final rail corridor and ancillary infrastructure areas).

All vegetation, topsoil and other organic and unsuitable material shall be stripped where directed, within the final rail corridor, to a minimum depth as nominated by future geotechnical assessments. Wherever possible and appropriate, such material will be stockpiled and recycled. Topsoil stockpiles will be managed to maintain soil fertility and other soil properties.

Topsoil will be stockpiled for future use in landscaping and rehabilitation. Excess topsoil will be spoiled to nominated spoil areas which may be within the final rail corridor or on adjacent land, provided landholder and environmental approvals are in place.

Topsoil stripping recommendations are included in Volume 1 Chapter 6 Topography, geology and soils.

Service removal and treatment

Initial assessment has determined that no major services will require removal. Where a service is likely to be impacted by the NGBR Project, consultation with the asset owner will be undertaken to determine the appropriate interface for the railway and method of protection during construction.

Haul roads, access roads and laydown construction

Temporary haul roads and access roads will be established along the NGBR Project final rail corridor during this time, as will access widening of designated State-controlled roads and local roads.

The roads will provide access for material delivery trucks to drainage and bridge structures. The materials to be delivered include:

- Fill material (sub-base and capping)
- Equipment, fuels and lubricants
- Water supply, sewage and waste removal
- Pre-cast culverts, headwalls and bridge girders
- Rail, sleepers and ballast.

Construction materials will be stockpiled at laydown areas established near the junctures of access roads to the construction road, or alternatively within designated areas within the construction yards.

Installation of water supply infrastructure

Water supply infrastructure will be installed, including any water pipelines, boreholes, holding dams, in-stream and off-stream storages, and river harvesting infrastructure.

Fencing (temporary and permanent)

Fencing will be established along the entire NGBR Project final rail corridor. Security fencing will also be established around temporary construction laydown areas.

Communication cable laying

Communication cables will be buried and directional boring will be employed under major waterways. Alternately, cables will pass over major waterways, and be transferred to bridge structures as soon as practicable.

2.3.3 Phase 2 – Drainage structures, earthworks and bridges

Drainage structure construction

Installation of culverts will begin prior to cut and fill earthworks. Precast culverts may be procured from an existing supplier and transported to the construction site.

Cast in-situ culverts will require a supply of concrete from one of five concrete batch plants spread across the NGBR Project.

Longitudinal drains will be cut by dozers or graders. Excavators and dump trucks may be utilised to excavate longitudinal drainage in areas of cut.

Cut and fill earthworks

Fill will be delivered to the NGBR Project via trucks or scrapers, depending on final source locations. Fill will be laid out by grader, dozers or compactors prior to compaction.

Cut activities will be dependent on the content of the material to be cut. Rippable material that does not contain oversized rocks will be removed and transported by dozers and scrapers, whereas rocky material will be removed by excavator and transported by dump truck. Unsuitable material will be relocated to an approved location.

Blasting may be required for large excavations; however this will be determined with further geotechnical investigations. Blasting activities would make use of ammonium nitrate fuel oil (ANFO) explosives.

Cut off drains and levees will be constructed to direct water away from earthworks. Catch drains will also be installed at the top of cuttings. Batter slope protection measures, such as grass mats or shotcrete, may be applied where batter slope material is unsuitable for exposure.

Direct buried signalling cable will be installed after bulk earthworks, prior to capping layer application, to minimise any trenching through capping during signalling and communications installation.

Capping layer application

The capping layer will be applied progressively, following construction of drainage structures and cut and fill earthworks for a given section of formation. Capping layer material will be taken from existing or to be developed quarries and borrow areas in the region of the NGBR Project.

The bottom capping layer will be applied as soon as possible to protect the formation from weather and vehicle damage. Capping materials may be treated to strengthen the capping layer; however this will be confirmed with further geotechnical investigations.

Bridge construction

Bridge construction will include the construction of bridges themselves and associated retaining walls and abutments. Any precast bridge girders will be procured from an existing supplier and transported to the construction site.

In areas of perennial water, temporary work platforms consisting of loose rock over geofabric will be established to provide access to any intermediate piers. It is expected that no more than one intermediate pier per crossing would fall within an area of perennial water.

Temporary low flow pipes may be required to maintain drainage flow paths and fish movements. Coffer dams may also be required around any intermediate piers to support substructure works.

In waterways where perennial water flows are likely, a crane lift may be required to undertake the erection of the span over the relevant waterway. Following construction, any temporary work platforms within the waterway will be removed and the waterway reinstated and rehabilitated by the construction contractor in accordance with conditions of the works approval permits.

Cast in-situ bridge structures will require a supply of concrete from one of five concrete batch plants spread across the NGBR Project.

Longitudinal drains will be cut by dozers or graders. Excavators and dump trucks may be utilised to excavate longitudinal drainage in areas of cut.

2.3.4 Phase 3 – Track laying

Welding

Short rails of 25 m length will be welded into 300 m long welded rails at the flash butt welding yard, utilising an automated flash butt welder. Welding activities will continue for approximately 12 - 14 months.

Track and sleeper laying

The majority of the NGBR Project rail and sleepers (368.24 km) will be laid by a mechanised track laying machine. A train loaded with long welded rail lengths and sleepers will be connected to the mechanised track laying machine. This approach is more efficient and enables greater daily production than other track construction approaches and eliminates significant numbers of heavy truck movements over the road network, thereby improving both worker and public safety. It is expected that this work will be completed over a period of approximately eight months.

Short track components and sleepers (approximately 10 km), at the construction depots, bad order sidings, turnouts and so forth, will be laid by an excavator with octopus attachment. Turnouts will be constructed in this manner in advance of the arrival of the mechanised track laying machine, to enable construction of passing loops. Track and sleeper laying at the rolling stock maintenance depot will also be constructed in this way.

The main track and sleeper laying operations will require a daily supply of track construction materials and tamping.

Ballasting and tamping

Ballasting will be undertaken utilising a ballast train, to be loaded at ballast sidings using frontend loaders. Ballast unloading will be undertaken over three passes, while the track will be lifted in four passes by a tamper.

2.3.5 Phase 4 – Signalling and communications installation

Signalling and communications installation for the NGBR Project prior to commencement of operations will include the following activities:

- Establishment of direct buried cable route via cable ploughing
- Establishment of solar arrays to power motorised points at passing loops
- Establishment of optic fibre running to main signalling control
- Establishment of preassembled equipment buildings and cases
- Installation of axle counters for train detection

2.4 Operational activities

2.4.1 Overview

The operation of the NGBR Project is expected commence in late 2016 and reach peak capacity of 100 mtpa by 2026. Rail and rolling stock maintenance activities will be required throughout operation.

2.4.1 Rolling stock

The utilisation of the capacity of the NGBR Project will reflect the production of coal from the Carmichael Project (Mine) and utilisation by third party users. The number of full consists and paths per day in the ramp-up to full production was estimated by static modelling of the NGBR Project rail system. At full capacity (100 mtpa), the following movements will occur daily:

- Fourteen loaded train movements
- Fourteen unloaded trains movements
- Five loaded train movements
- Five unloaded train movements

Unloaded trains will travel at up to 100 km per hour and loaded trains will travel at up to 80 km per hour. Within passing loops and maintenance sidings, trains will slow to 50 km per hour and 25 km per hour respective to each location.

2.4.2 Operational workforce

The operational workforce would be accommodated alternately at Bowen and the Carmichael Project (Mine) village. The size of the operational workforce required at any time will vary depending on the number of trains in operation. It is expected that 10 train crew members per train will be required. Up to 15 crew members per train may be necessary where trains are few in the early phase of operation. A small number of drivers will be based at the yards and provisioning facilities. Cycle times show that crews working the loaded trains would work a 12 hour shift, with change-overs occurring at the mine-end and port-end of the NGBR Project respectively.

2.4.3 Maintenance

Maintenance activities throughout operation include the following:

- Rolling stock maintenance, including:
  - Unit train maintenance
  - Block maintenance
- Track maintenance, including:
  - Routine maintenance
  - Major periodic maintenance
  - Emergency response

Maintenance infrastructure

There are several anticipated construction legacies that will be utilised for maintenance activities, including:

- Haul and access roads – for repurpose as maintenance access roads, as necessary, and storage of maintenance materials
- Track work at construction depot area and bad order sidings and rail loops – for stabilisation of track maintenance plant
- Ballast siding at construction depot area – for reduction and use for storage of maintenance materials, as well as stabilisation of track maintenance plant

- Passing loop locations – for storage of turnout components by prefabricating panel or complete system on site
- Buildings – for administrative requirements of maintenance teams.

Rolling stock maintenance

Unit train maintenance will be conducted on-track or at the rolling stock maintenance depot. Unit train maintenance is conducted on-track and generally completed in 12 hours, subject to the number of repairs identified. Locomotives can be maintained in situ or replaced by a maintenance spare for more extensive services. Wagons requiring wheel repairs will be hydro-lifted in situ to maximize asset utilization. Locomotives and wagons that cannot be maintained during unit train maintenance will be shunted off for shed servicing.

Block maintenance will be conducted at the rolling stock maintenance depot. Trains entering the rolling stock maintenance facility for block maintenance will attach to a lead block of 40 wagons and a locomotive at the outgoing departure signal. After attaching at the lead, a rail vehicle placer will haul the blocks of 40 wagons and a locomotive back and place in maintenance arrival lines. Wagons previously placed on the entry side of the wagon repair lines will progress along the line after receiving scheduled attention and repairs. Up to 40 wagons will be held on the wagon repair exit lines after maintenance is complete. After block maintenance, a locomotive and 40 wagons will be placed ready for the next scheduled block change out attachment.

Track maintenance

The primary on-going maintenance activities include:

- Track inspections and repairs
- Signal compliance and operations checks
- Structures inspections and repairs (both bridge and drainage)
- Turnout maintenance
- Minor faults and defect repair works
- First contact emergency response.

The primary major periodic maintenance activities include:

- Structures cleaning and repairs
- Drainage works
- Rerailing
- Turnout replacement
- Rail grinding
- Resurfacing
- Rail stress management
- Reballasting.

Emergency response activities will be governed by an emergency management plan. A preliminary emergency management plan has been developed for the NGBR Project and is presented in Appendix A. The emergency management plan imposes the following emergency requirements for emergency preparedness.

- Safety in design, under the *Work Health and Safety Act 2011*
- Fire safety, achieved through a fire management sub-plan
- Contractor emergency sub-plan, to respond to accidents involving contractors
- Emergency specific plans, including:
  - Vehicle accident response
  - Spill response
  - Train derailment or collision response
  - Natural hazard response

The emergency management plan also defines an emergency response team, necessary equipment and training measures, all required to reliably implement the plan.

3. Environmental management framework

3.1 Overview

This section provides details of the environmental management framework for the construction and operation of the NGBR Project. The purpose of the environmental management framework is to ensure a successful implementation of environmental commitments included in the EIS.

3.2 Environmental management system

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 environmental management system (EMS) to support the construction and operation of the NGBR Project. The EMS will be developed in accordance with the provisions of AS/NZS ISO 14001:2004 Environmental Management Systems – Requirements with guidance for use and will be integrated with existing management processes, including the HSS Management System.

The EMS will guide environmental management for the NGBR Project by providing a practical framework for managing environmental risks and to promote continuous improvement. Key components of the system will include:

- Environment and Sustainability Policy
- Planning, objectives and legal obligations
- Resources, roles, responsibilities and authorities
- Competence, training and awareness
- Communication, consultation and involvement
- Documentation, document control and records
- Operational controls
- Emergency preparedness and response
- Monitoring, inspections and audits
- Incident management
- Complaints management
- Non-conformity, corrective action and preventive action
- Environmental reporting
- Management review and continuous improvement

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

3.3 Environment and Sustainability Policy

Adani is committed to the protection of the environment and to the sustainable management of its operations and activities. The Adani Environment and Sustainability Policy demonstrates this commitment.

The policy will be communicated to all staff and contractors involved in the construction and operation of the NGBR Project. Adani will ensure that the general intent, scope and relevance of the document are understood. A copy of the policy is attached in Appendix B.

All contractors and staff involved in the NGBR Project will be required to adhere to Adani's Environment and Sustainability Policy and the key components of the EMS as a minimum requirement.

3.4 Planning, objectives and legal obligations

3.4.1 Environmental aspects and impacts, environmental values

Adani will ensure processes are in place to identify the key environmental aspects and their impacts of activities relating to the construction and operation of the NGBR Project at various key stages of the NGBR Project. Environmental management issues include:

- Air quality
- Flora and fauna
- Greenhouse gas emissions
- Soils, erosion and sediment
- Waste
- Noise and vibration
- Surface water and groundwater
- Scenic amenity and lighting
- Traffic management
- Social impacts
- Cultural heritage
- Hazardous substances.

The environmental management plans developed throughout the NGBR Project will ensure that the management and mitigation measures are being documented, communicated and implemented for all key aspects and impacts. More information on controls can be found in Section 3.9.

The environmental values likely to be affected by the construction and operational phases of the NGBR Project have been identified and are listed in each of the specific management plans in Section 4.

3.4.2 Objectives and Targets

Adani has developed environmental objectives and targets (performance criteria) for the NGBR Project that are specific to the environmental values to be protected and the potential

environmental impacts on these values. The environmental values are described in each of the specific management plans.

The objectives and targets are contained in each of the management plans. These objectives and targets have been developed in accordance with Adani's Management Standard *ST-02 Planning, Objectives and Legal Obligations.* They aim to be:

- Specific to the NGBR Project
- Quantified and measurable
- Realistic and achievable
- Focused on continual improvement
- Consistent with, and related to, Adani's Environment and Sustainability Policy and Adani HSS Management Standards
- Periodically reviewed and, if required, revised.

3.4.3 Applicable legislation

The key legislation applicable to the NGBR Project is outlined below.

Commonwealth legislation

- *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
- *Energy Efficiency Opportunities Act 2006*
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Clean Energy Act 2011*
- *National Environment Protection Council Act 1994*
- *National Greenhouse and Energy Reporting Act 2007*
- *Native Title Act 1993*

Queensland legislation

- *Aboriginal Cultural Heritage Act 2003*
- *Clean Energy Act 2008*
- *Coastal Protection and Management Act 1995*
- *Environmental Protection Act 1994*
- *Fisheries Act 1994*
- *Forestry Act 1959*
- *Land Act 1994*
- *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act)
- *Local Government Act 2009*
- *Native Title (Queensland) Act 1993*
- *Nature Conservation Act 1992* (NC Act)
- *Queensland Heritage Act 1992*

- *State Development and Public Works Organisation Act 1971*
- *Strategic Cropping Land Act 2011*
- *Sustainable Planning Act 2009* (SP Act)
- *Transport Infrastructure Act 1994*
- *Transport Operations (Rail Safety) Act 2010*
- *Vegetation Management Act 1999*
- *Water Act 2000*
- *Water Supply (Safety and Reliability) Act 2008*
- *Work Health and Safety Act 2011*
- *Waste Reduction and Recycling Act 2011*

Local planning schemes

- *Bowen Shire Planning Scheme 2006 (Whitsunday Regional Council)*
- *Belyando Shire Planning Scheme 2008 (Isaac Regional Council)*

Legal and other obligations will be reviewed quarterly and whenever a major legislation or policy change occurs. The Project EMP will be updated as required to maintain compliance and any new requirements will be communicated to all parties affected by the change.

3.4.4 Likely permits / licences / approvals required

In addition to general legislative requirements, Adani and its contractors are responsible for ensuring compliance with the conditions of relevant licences, permits and approvals obtained for the NGBR Project.

Adani will obtain all permits, licences and approvals required under the relevant Commonwealth legislation, State legislation and local planning schemes. These permits, licences and approvals will be obtained as required prior to commencing the respective NGBR Project activities.

A detailed approvals register for the NGBR Project is included in Appendix C. These approvals will outline conditions to be applied to specific activities. Conditions will provide restrictions (thresholds, trigger values, quality objectives etc.) on the acceptable levels of environmental impact related to specific activities. The conditions will also impose strict requirements for monitoring these impacts and reporting any non-compliance throughout the construction and operations phase of the NGBR Project. Conditions will be incorporated into NGBR Project processes and procedures, including the respective environmental management plan.

3.5 Resources, roles, responsibilities and authorities

Adani's Compliance Guidelines (refer Appendix D) set out requirements for assigning roles and responsibilities in relation to environmental management. At this stage of the NGBR Project, organisational structures for the detailed design, construction and operation of the NGBR Project are not available. At the EIS stage of the NGBR Project, the following information is available:

- Adani will retain overall responsibility for implementation of environmental commitments and delivery of environmental outcomes during the construction and operation of the NGBR Project

- Adani proposes to engage a suitable Design Contractor for the detailed design phase of the NGBR Project
- A suitable contractor will be engaged for the construction phase of the NGBR Project (the Construction Contractor). Adani may delegate key responsibilities relating to environmental management to the Construction Contractor via a contractual agreement
- The operation of the NGBR Project will be the responsibilities of a Rail Operator.

Preliminary roles and responsibilities for detailed design and pre-construction, construction and operation phases are presented in the following tables. The roles and responsibilities will be revised and updated once organisational structures for each phase of the NGBR Project are confirmed.

Table 3-1 Roles and responsibilities- design and pre-construction

Role	Responsibility
Adani CEO	• Approve and endorse Adani's 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 environmental issues as per Adani Guideline *CG-128 – Management Commitment*
Adani Senior Managers	• Ensure compliance with all legal requirements • Ensure that requirements of this Project 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 Project EMP • Demonstrate a visible and pro-active commitment to environmental performance
Adani Environmental Manager	• Provide advice to management, procurement and design teams in relation to environmental requirements • Coordinate technical studies and research activities relating to environmental assessment and management of the NGBR Project • Coordinate the development of management plans described in this Project EMP • Ensure approval conditions relating to pre-construction and design are complied with • Provide technical input to detailed design on environmental management • Develop a EMP (construction) for the NGBR Project, incorporating approval conditions
Design Contractor –	• Ensure that design requirements set out in this EMP and any other

Role	Responsibility
Lead Designer	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 environmental issues as per Adani Guideline *CG-128 – Management Commitment*

Table 3-2 Roles and responsibilities – construction

Role	Responsibility
Construction Contractor - Construction Manager	• Ensure adequate resources for environmental management • Communicate and demonstrate commitment to environmental performance and continuous improvement to all staff and sub-contractors
Construction Contractor - Project Superintendents	• Communicate and demonstrate commitment to environmental performance and continuous improvement to all staff and sub-contractors • Integrate environmental management requirements into work procedures and practices • Report to Construction Manager and Adani on environmental performance and environmental incidents • Conduct environmental site inspections as per inspection schedules
Construction Contractor – All staff and sub-contractors	• Attend inductions training for the NGBR Project • Comply with procedures and work instructions
Adani – Project Manager	• Ensure compliance with all legal requirements of the NGBR Project • Ensure that adequate resources are available within Adani for the NGBR Project to meet all compliance requirements and implement the requirements of this Project EMP • Monitor Construction Contractor's environmental performance, e.g. review outcomes of incident investigations, monitor close-out of corrective actions by Construction Contractor • Demonstrate a visible and pro-active commitment to environmental issues as per Adani Guideline *CG-128 – Management Commitment*.
Adani - Environmental Manager	• Communicate changes of environmental obligations relating to approvals held by Adani to Construction Contractor • Conduct audits of construction sites and Construction Contractor's EMS • Review environmental site inspection reports and monitor close-

Role	Responsibility
	out of actions • Participate in environmental incident investigations, where appropriate • Provide advice on environmental management to Adani Senior Managers • Liaise with regulatory authorities as required

Table 3-3 Roles and responsibilities – operation

Role	Responsibility
Adani CEO	• Approve and endorse the 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 environmental issues as per Adani Guideline *CG-128 – Management Commitment*.
Rail Operator - 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 Project 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 environmental issues as per Adani Guideline *CG-128 – Management Commitment* • Reward outstanding performance in relation to environmental performance
Rail Operator - Operation Manager	• Ensure that requirements of this Project EMP are incorporated into all aspects of the rail operation and maintenance and are implemented. • Raise corrective actions for any non-compliance with this Project EMP or in response to results of incident investigations • Conduct incident investigations • Demonstrate a visible and pro-active commitment to

Role	Responsibility
	environmental issues as per Adani Guideline *CG-128 – Management Commitment*
Rail Operator - Operation Supervisors	• Integrate environmental management requirements with work procedures and practices • Raise corrective actions for any non-compliance with this Project EMP or in response to results of incident investigations • Coordinate initial response to incidents with potential or actual environmental harm
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 Project EMP and achieving environmental compliance • Conduct monitoring, auditing and reporting activities required in this Project EMP • Monitor and report on compliance against all NGBR 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 • 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
All rail staff and contractors	• Comply with all requirements of this Project EMP

3.6 Competence, training and awareness

System requirements in relation to training and competency are set out in Adani's Compliance Guideline *CG-003 -HSS Training*. In accordance with the compliance guideline, a training needs assessment will be undertaken and a training plan will be developed once organisational structures are confirmed for each of the construction and operation phases of the rail. The training plan will identify training requirements for each role within the NGBR Project and will include environmental and cultural heritage awareness training.

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*.

All staff, sub-contractors and visitors to the site will be required to attend induction training, which will include environmental awareness and obligations.

A training register will be maintained to record training attendance and currency of training for each staff, contractor and visitor.

3.6.1 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; and
- 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 Communication, consultation and involvement

Internal communication on environmental issues will be conducted throughout the NGBR Project in various forums, including:

- 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
- 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.

Communication plans will be developed for the construction and operational phase of the NGBR Project outlining communication protocols internally and with external stakeholders. The plans will be developed in accordance with the requirements of the Adani management standard *ST-07 Communication, Consultation and Involvement*.

The communication plans outline the responsibilities and protocols for internal and external communication, including communication with relevant authorities (e.g. Department of Environment and Heritage Protection (DEHP)), the media and the public. Key responsibilities will be assigned for the NGBR Project for external communication to ensure consistence and accuracy of the information conveyed to the external party. The communication plans will link to other procedures such as the incident management procedure or complaint management procedures.

The effectiveness of the communication will be assessed in third party environmental audits as measured through awareness of staff and subcontractors and compliance with day to day site environmental management requirements.

3.8 Documentation, document control and records

The document control and records management system applied to the NGBR Project will meet the requirements of Adani's Management Standard *ST-04 Documentation, Document Control and Records*. The document control and management system of the Construction Contractor and the Rail Operator will be required to meet the ST-04 requirements as a minimum.

All key documentation, including this Project EMP, will be incorporated in Adani's document management system, provided with unique document identifiers and version control.

The records management system aims to ensure that records are legible, retained and are easily retrievable. NGBR Project records may include, but are not limited to:

- Incident investigation reports
- Completed site checklists

- Monitoring data
- Calibration data
- Audit reports
- Records of training and induction.

All records obtained in relation to the environmental authority of the NGBR Project will be retained for five years.

The Construction Contractor and/or Rail Operator will be required to make such records available to Adani and/or any relevant authorities and their representatives on request where justified under legislative requirements.

3.9 Operational controls

All key activities relating to the NGBR Project will be required to comply with the requirements described in this Project EMP. In order to effectively implement the management and mitigation measures described in the management plans (Section 4), the Construction Contractor and Rail Operator will be required to develop or amend procedures and work instructions relating to the NGBR Project. These documents will clearly state how the activities may impact on environmental values and what measures are to be taken to control the impacts.

In addition to procedures and work instructions, Adani will ensure that physical operational controls will be in place to prevent or mitigate environmental impacts. Such controls may include but will not be limited to:

- Erosion and sediment control devices
- Watering trucks
- Use of flora and fauna spotters during vegetation clearing

Further information on controls specific to environmental values can be found in the management plans (Section 4).

3.10 Emergency preparedness and response

Adani, the Construction Contractor and the Rail Operator will ensure that all staff and sub-contractors have adequate competence and training to respond to environmental emergencies. Adani, the Construction Contractor and the Rail Operator will establish emergency response teams for the NGBR Project. Each of these teams will receive special training in emergency response including use of emergency response equipment.

An Emergency Management Plan has been developed to manage the potential hazards and risks identified in the hazard, risk, health and safety assessment undertaken as part of the NGBR Project EIS. The current Emergency Management Plan is attached in Appendix A. The Emergency Management Plan will be updated and expanded throughout development of the NGBR Project as more information becomes available and the design progresses.

The plan provides a systematic way to identify hazards and control risks while maintaining assurance that the risk controls are effective, to provide a safe and healthy work environment to its employees, contractors and visitors.

3.11 Monitoring, inspections and audits

The environmental performance of the NGBR Project will be determined by developing and implementing environmental monitoring programs and site inspection programs. Compliance with environmental requirements such as approval conditions, management standards, the Project EMP and system requirements will be assessed during environmental audits.

3.11.1 Environmental monitoring

Environmental monitoring programs will be developed for the construction and operational phases of the NGBR Project. These monitoring programs will address the EIS commitments and approval, permit and licensing conditions.

Monitoring activities will be conducted by a person who is suitably trained and qualified. Monitoring will be carried out in accordance with current guidelines and standards.

The results of the monitoring programs will be interpreted and reviewed regularly. Results will be reported to relevant authorities within agreed timeframes as determined in approval conditions. The incident management procedures will describe the procedures for instances, where exceedences of agreed trigger values are measured.

3.11.2 Environmental inspections

The Construction Contractor and Rail Operator will be required to conduct regular environmental site inspections in accordance with the Adani management standard *ST-18 Reviews, Audits and Inspections.* Further details on frequencies and type of inspections can be found in the management plans in Section 4.

Site inspections will be conducted to determine environmental performance against Project EMP requirements, e.g. adequacy of waste storage, housekeeping practices, condition of control devices. Checklists will be developed to ensure consistency and comprehensiveness of the process. Records of site inspections will be retained for the construction and operational phases in accordance with the records management system. Site inspection checklists will be developed for the construction and operational phases of the NGBR Project.

Inspections will be documented on a checklist that will record whether the performance requirement for each item was achieved and corrective actions necessary to meet 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 inspections, 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.*

3.11.3 Environmental audits

Environmental audit programs will be developed for the construction and operational phases of the NGBR Project. The audit programs will be developed in accordance with the Adani management standard Adani Compliance Guideline *CG-004 – Audits and Assessments.*

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 Adani Environmental Manager. Once an audit report is finalised:

- Audit reports will be circulated to the Rail Operator – General Manager and Rail Operator – Operation Manager
- 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 to verify compliance with applicable environmental requirements, including approval conditions, and management systems will be conducted at appropriate intervals during the construction and operational phases of the NGBR Project. An audit schedule outlining audit scope, frequency, and responsibility will be developed prior to each phase commencing.

The audit results, conclusions and subsequent corrective actions (if any) will be communicated to responsible parties. Audits will be conducted by qualified and experienced auditors internal or external to Adani, the Construction Contractor and the Rail Operator.

3.12 Incident management

Adani will ensure that all environmental incidents are identified, reported and thoroughly investigated, and that the appropriate corrective action is taken to prevent recurrence of the incident. Incident investigation requirements are set out in the Adani Compliance Guideline *CG-006 – Incident Investigation and Reporting*. The Construction Contractor and Rail Operator are to comply with this standard as a minimum.

In the event of an incident, the Construction Contractor/Rail Operator and Adani will take appropriate action to minimise any adverse environmental impact and promptly report details of the incident to relevant government agencies. The Construction Contractor/Rail Operator and Adani must carry out any lawful instruction received from the authorised representatives of relevant agencies.

The investigation of incidents will include a process for identifying all the contributing factors of the incident. The investigations will be carried out by competent persons with the appropriate involvement of relevant personnel and their representatives. The level of detail of these investigations will be appropriate to the actual or potential seriousness of the event.

Prioritised corrective or preventive actions will be implemented to prevent recurrence of similar events. Procedures will be established and maintained to ensure the follow-up and completion of corrective actions. Corrective actions following incidents will be communicated to all staff, as applicable.

An incident register will be developed and maintained, recording all environmental near-misses and incidents.

Additional procedures will be developed for specific environmental incidents, such as spills of hazardous substances and injury or death of native wildlife.

The incident management procedure will be communicated to all staff and contractors during environmental inductions and displayed at all site offices/crib rooms. Contact names and numbers will be updated as required.

3.13 Complaints management

Details of complaints will be recorded including details of complainant, reasons for the complaint, investigations undertaken, conclusions formed and actions taken. This information will be made available for inspection by the administering authority on request.

Complaints management procedures will be established for the construction and operational phases of the NGBR Project. A complaints register will be maintained.

3.14 Non-conformity, corrective action and preventive action

Adani will implement a corrective action process in accordance with the Adani Compliance Guideline *CG-005 – Corrective and Preventative Action*. The Construction Contractor and Rail Operator will be required to comply with this standard as a minimum. The process will consist 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
- Audit recommendations

- Complaints

Corrective actions will be raised through Adani's notification system or through a separate corrective action register if required for Construction Contractors not operating under Adani's systems. Completion and close out of corrective actions will be reported regularly to the Adani Rail Operator – General Manager.

3.15 Environmental reporting

3.15.1 Construction phase

During the construction phase, the Construction Contractor will be required to report any environmental incidents or breaches of the approval conditions immediately to an Adani key representative. Where there is an obligation to report to relevant authorities, this must also occur within the applicable timeframes and Adani representatives subsequently notified. Reporting will be in accordance with the NGBR Project communications plan.

The Construction Contractor will be required to prepare and submit a monthly report to Adani which will include the site inspection records, monitoring results, training undertaken, initiatives, incident records and details of any corrective and preventive actions taken where non-conformances had been identified and all non-conformances that have not been closed-out.

3.15.2 Operations phase

During operation, monthly reporting to Adani senior management will advise of site inspection outcomes, monitoring results, training undertaken, initiatives, incident records and details of any corrective and preventive actions taken where non-conformances had been identified and all non-conformances that have not been closed-out.

All staff and contractors will be required to report any environmental incidents (including complaints) or breaches of the approval conditions immediately to their supervisors who will then involve the Environmental Manager and implement further actions.

Reporting obligations under the environmental approval conditions and other legislation to government stakeholders will be complied with. Reports may include:

- Monitoring results as required by authorities
- Progress reports as required in approval conditions
- Annual returns as required under the *Environmental Protection Act 1994* (operation only).

Any significant environmental incidents or serious breaches of the approval conditions will be reported to the relevant authorities in accordance with legislative requirements (see also Section 3.12).

3.16 Management review and continuous improvement

The management review includes periodic system reviews and a review of the Project EMP.

Adani will conduct management reviews of their management systems at senior management level at least twice per year (*CG-011 – Management Review*). In relation to the environmental component of the management review, the management review will examine:

- Adequacy and effectiveness of the Project EMP
- Compliance

- Opportunities for improvement

Inputs to the management review will include, but will not be limited to:

- Monitoring and audit results
- 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 Adani's Corrective Action Register. The Construction Contractor and Rail Operator will be required to have similar processes in place.

The Project 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 Project 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 Project EMP will be communicated to the Construction Contractor and Rail Operator, as applicable.

4. Management Plans

The following specific management plans have been developed to provide practical measures to prevent or minimise environmental impacts on existing environmental values. The structure of the management plans for each element has been developed to meet the requirements of the Terms of Reference (TOR) for the EIS. The general structure of each management plan is outlined in Table 4-1.

Table 4-1 Structure of management plans

Element	Description of content
Existing environmental values and potential impacts	A description of the environmental values likely to be affected by the NGBR Project during the construction and operational phases.
Management objective(s)	The overarching objective to be achieved for the environmental value likely to be affected by the NGBR Project.
Performance criteria	Measurable outcomes or indicators prescribed to gauge whether the management objectives are being met.
Management and mitigation measures	The strategies, tasks or methods proposed to achieve the performance criteria. This section provides the measures relevant to design, construction and operation.
Monitoring requirements and corrective actions	The proposed monitoring activities to measure the performance criteria against relevant thresholds or trigger values. And the corrective actions to be implemented where certain performance criteria are not met.

Each environmental management plan covers the detailed design, construction and operational phases of the NGBR Project. Management plans have been developed for following environmental management issues:

- Section 4.1: Air quality
- Section 4.2: Flora and fauna
- Section 4.3: Greenhouse gas emissions
- Section 4.4: Soils, erosion and sediment
- Section 4.5: Waste
- Section 4.6: Noise and vibration
- Section 4.7: Surface water and groundwater
- Section 4.8: Scenic amenity and lighting
- Section 4.9: Traffic management
- Section 4.10: Community and stakeholder engagement
- Section 4.11: Cultural heritage
- Section 4.12: Hazardous substances.

4.1 Air quality management

4.1.1 Existing environmental values

The *Environmental Protection (Air) Policy* 2008 (Air EPP) applies to the air environment of Queensland and identifies the environmental values to be enhanced or protected in the state. These relate to:

- The health and biodiversity of ecosystems
- Human health and wellbeing
- Aesthetics
- Agricultural use.

4.1.2 Potential environmental impacts

Key impacts to air quality likely to result from the construction and operation of the NGBR Project are summarised in Table 4-2.

Table 4-2 Potential air quality Impacts

Activity	Potential environmental impact
Construction	
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
Operation	
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

4.1.3 Management objective

- Prevent or minimise any air quality impacts at the location of sensitive receptors during construction and operation of the NGBR Project.

4.1.4 Performance criteria

- No air quality complaints from the construction and operation of the NGBR Project.

4.1.5 Management and mitigation measures – air quality

Timing	Controls	Responsibility	Trigger/ Applicability	Documentation
Pre-construction / Construction	A **Dust Management Plan** will be developed and implemented for the construction phase of the NGBR Project, including the following: • Watering of construction site and access roads will be undertaken as required to control dust • Avoid movement or handling, or increase wetting, of soil material on days of very high winds in close proximity to downwind sensitive receptors • Any soil that is stockpiled for longer than two weeks will be covered, stabilised and/or moistened as required to prevent generation of dust particulates	Construction Contractor	-	Dust Management Plan
Pre-operation / Operation	A **Coal Dust Management Plan** will be developed and implemented for the operational phase of the NGBR Project. The plan will be consistent with the aims, objectives and mitigation measures proposed in the Aurizon Coal Dust Management Plan (Aurizon 2010).	Rail Operator	-	Coal Dust Management Plan

4.1.1 Monitoring and corrective actions – air quality

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Construction	Visual inspections for excessive dust emissions.	Construction Contractor	Ongoing	-
Construction / Operation	Visual inspections for excessive emissions from combustion engines (e.g. black smoke).	Construction Contractor Rail Operator	Ongoing	Stop using equipment/engine, where smoke is excessive. Repair equipment/engine causing smoke.

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Construction Operation	All complaints relating to air quality (including dust emissions) will be recorded	Construction Contractor Rail Operator	-	Complaints will be managed in accordance with the complaints management procedure. Air quality monitoring may be conducted following a complaint.

4.2 Flora and fauna management

4.2.1 Existing environmental values

Vegetation communities and habitat

Terrestrial ecological habitats and species within the preliminary investigation corridor (field surveys during the EIS stage) that are conservation significant (i.e. protected or identified by Commonwealth, State and/or regional bodies) include:

- Seven 'endangered' Regional Ecosystems (REs) and 18 'of concern' REs
- Constituent REs of three 'endangered' threatened ecological communities (TECs) – natural grassland, brigalow and semi-evergreen vine thicket (only the latter two were actually confirmed as present)
- One vulnerable plant species under the NC Act was confirmed present, black ironbox (*Eucalyptus raveretiana*), with several other threatened plant species predicted as potentially occurring
- Five threatened terrestrial fauna species (listed under the NC Act) were confirmed present, with potential for a further 11 threatened fauna species to likely occur. Those confirmed are
  - Squatter pigeon (southern) (*Geophaps scripta scripta*) – vulnerable
  - Black-necked stork (Ephippiorhynchus australis) – near threatened
  - Cotton pygmy-goose (*Nettapus coramandelianus*) – near threatened
  - Freckled duck (*Stictonetta naevosa*) – near threatened
  - Little pied bat (*Chalinolobus picatus*) – near threatened
- A number of EPBC Act listed 'migratory' and 'marine' birds confirmed present in a variety of habitats, but in particular the Caley Valley wetland
- Essential habitat mapped as occurring for the NC Act listed plant species *Bonamia dietrichiana*

Other terrestrial ecological values recorded in the preliminary investigation corridor include:

- A wide diversity of native plant species occurring in eight vegetation communities, despite communities often being impacted to varying extents by degradation including from introduced weed species
- Habitat for a wide diversity of common fauna species
- Potential conduits for regional movement of wildlife associated with connected tracts of remnant vegetation at the landscape scale.

Aquatic habitats

Aquatic habitats within the preliminary investigation corridor include riverine (drainage lines, creeks and rivers), palustrine (vegetated wetlands), lacustrine (farm dams and billabongs) and estuarine environments.

Wetland protection areas and nationally important wetlands

The preliminary investigation corridor intersects one wetland protection area, the Caley Valley wetland. However, the final rail corridor does not intersect any wetland protection areas.

4.2.2 Potential environmental impacts

Key impacts to ecological values likely to result from the construction of the NGBR Project are as follows:

Table 4-3 Potential Flora and Fauna Impacts

Activity	Potential Environmental Impact
Construction	
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 and • 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
Earth works and spoil disposal	• Introduction of aquatic and terrestrial weeds • Fauna mortality • Loss of aquatic habitats
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

Activity	Potential Environmental Impact
Operation	
Permanent rail infrastructure and rail corridor	• Disruption and disturbance to fauna movements and longer-term fragmentation of habitats
Train movements	• Fauna strike leading to injury or mortality

4.2.3 Management objective

- Prevent or minimise impacts on terrestrial and aquatic ecological values within the NGBR Project area.

4.2.4 Performance criteria

- No vegetation clearing outside the specified, pre-approved boundaries
- Vegetation clearance to be preceded by final searches for specially protected species and their relocation as appropriate
- No injury or death of native fauna and livestock
- No increase in level of weed and pest infestation as a result of construction and operational activities for the NGBR Project
- Downstream habitats are not degraded by sediment deposition, scouring or water quality degradation.

4.2.5 Management and mitigation measures – flora and fauna

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Detailed Design	The layout of temporary and permanent structures and infrastructure (including construction areas, site offices, stockpile, laydown areas, access tracks and construction camps) will be designed to minimise clearing of remnant vegetation (in particular endangered, of concern and threshold REs).	Design Contractor	Layout of temporary and permanent structures and infrastructure	Design Plan
Detailed Design	Ground-truthing will be undertaken to determine if the potential TEC areas do meet the criteria for TEC status	Design Contractor	Mapped TEC areas along the final rail corridor	Design Plan
Detailed Design	Targeted additional field studies will be undertaken to determine the presence of individuals, populations/colonies and/or important habitat areas for threatened species not detected during field surveys for the EIS, where considered likely to occur. The findings of such studies will be a component of Species Management Plans.	Design Contractor	Along the final rail corridor	Design Plan
Detailed Design	Further surveys will be undertaken to refine broad-scale potential habitat mapping. The findings of these surveys will allow micro-scale adjustments to clearing footprints to avoid and minimise clearing of TECs and potential habitat for threatened species. Refinement of broad-scale potential habitat mapping will also inform development of the Construction Flora and Fauna Management Plan, Species Management Plans and finalisation of the Offsets Strategy.	Design Contractor	Areas of mapped potential habitat along the final rail corridor	Design Plan
Detailed Design	Fauna-friendly design principles will be incorporated the design of culverts, bridges and other watercourse structures, particularly in important habitat areas of mapped remnant vegetation and habitat potentially suitable for threatened species. This will enable the safer passage of fauna across the final rail corridor. Fauna-friendly design principles may include: • Culverts with ledges that facilitate fauna movement	Design Contractor	Culverts, bridges and other watercourse structures	Design Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	• Using grids that allow natural lighting • Protecting and enhancing entries and exits.			
Detailed Design	Watercourse structures will be designed in accordance with relevant guidelines.	Design Contractor	Watercourse structures	-
Detailed Design	The following design considerations will be applied to the detailed design of bridge structures: • Meet the fish passage requirements in accordance with the *Fisheries Act 1994* and other relevant guidelines • Avoid locating bridge piers or foundations within the main waterway channels • Design and orient bridge piers and pile caps, including those located within overbank areas, to avoid the formation of large-scale turbulence or the erosion of the bed and banks of the waterway • Minimise turbulence from bridge piers, foundations and base slabs that may lead to stream erosion or to disorientation of fish • When sizing the waterway area of the bridge, give appropriate consideration to fish passage requirements along the floodplains, including locating bridge abutments well away from the channel banks and the possible installation of floodplain culverts adjacent to the main crossing. • Maximise light penetration under the bridge or arch to encourage fish passage.	Design Contractor	Bridge structures	Design Drawings
Detailed Design	The following design considerations are to be considered during the detailed culvert design (based on Fairfull and Witheridge 2003): • Meet the fish passage requirements in accordance with the Fisheries Act 1994 and other relevant guidelines • Give appropriate consideration to fish passage requirements when	Design Contractor	Culvert design	Design Drawings

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	selecting the type of culvert to be installed (box or pipe) • Align the culvert with the downstream channel to minimise bank erosion • Minimise changes to the channel's natural flow, width, roughness and base-flow water depth through the culvert's wet cells which are located within the stream bed. Wet cells should have a minimum water depth of 0.2-0.5 metres to encourage fish passage • Maximise light penetration within the wet cells by maximising the height or diameter of the cells • Debris deflector walls can be used to reduce the impact of debris blockages on fish passage while also reducing maintenance costs • In sand and gravel-based watercourses, natural bed material should either be placed along the bed of the wet cells, or allowed to deposit in these cells. The hydraulic design of these culverts should allow for this added bed roughness which facilitates upstream fish movement • In clay-based watercourses that do not experience significant movement of bed load sediment, artificial roughness units such as rounded stone, can be grouted across the bed of the wet cells to provide the desirable bed roughness and fish resting areas • The combined width of culvert array is as close to the waterway width as possible, with the minimum individual culvert length of six metres • The base of the culvert is no higher than the stream bed. Ideally the culvert base will be the stream bed (for open base culverts) or buried to sufficient depth to allow bed material to deposit and reform the natural bed on top of the culvert base.			
Detailed Design	The culverts and bridges will be designed so that minimal backwater effects or major increase in afflux are introduced. To avoid adverse impacts, it is expected that the planning and design of diversions (if	Design Contractor	Design of culverts and bridges	-

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	required) would consider the following: • No change in freshwater inflow volume • Consideration of topography, geology and potential for contamination when determining preferred diversion location • Design diversion hydraulic and environmental parameters to match the existing natural watercourse, as determined by hydraulic modelling • Consideration of the capacity of the channel and the capacity for the floodplain of the new diversion to cope with out-of-channel flows under flooding conditions • Consideration of peak recommended design velocity, stream power and shear stress • Consideration of the ecological function of the diversion • Scour and erosion can be managed through design treatments such as bank stabilisation. Incorporating the above guidelines in conjunction with construction controls will limit the potential cumulative effects that scour, erosion and deposition will have on the water quality of surrounding waterways.			
Detailed Design	The final rail corridor will be fenced giving consideration to the movement of fauna. Fencing design should consider: • Movement of fauna through it (excluding those instances where fenced areas seek to protect fauna from threats such as trenches and human contact) • Not using barbed wire on the top strand of fences.	Design Contractor	Final rail corridor	Design Plan
Pre-construction Construction	A **Construction Flora and Fauna Management Plan** will be developed prior to construction commencing. The Construction Flora and Fauna Management Plan will include details relevant to the general management of flora and fauna impacts as well as Species Management Plans for identified threatened species that will be impacted. Where necessary, the	Adani	-	Construction Flora and Fauna Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	Construction Flora and Fauna Management Plan will incorporate flora and fauna monitoring activities. Specifically, ongoing monitoring and survey requirements necessary to assess the persistence and health of conservation significant populations will be outlined (i.e. EVNT flora and fauna species impacted by the NGBR Project).			
Pre-construction	Individual **species management plans** will be developed as part of the flora and fauna management plan to facilitate relocation of all native fauna encountered during clearing activities. For conservation significant fauna species considered to have the potential to occur, relocation techniques specific to each species or species group will be documented within the relevant species management plan.	Adani	Vegetation clearing	Species management plans
Pre-construction	A **Decommissioning and Rehabilitation Plan** will be developed prior to construction commencing with the overall aim of minimising the amount of land disturbed at any one time during the life of the NGBR Project. As soon as practicable after cleared areas are no longer required (i.e. temporary construction camps, laydown areas, quarries, borrows, turning circles and access tracks), rehabilitation will commence. Temporary construction infrastructure will be decommissioned and removed from site. The sites will then be rehabilitated to a state generally consistent with the natural environment. The Decommissioning and Rehabilitation Plan will include provisions for: • Removal of potentially hazardous stored substances • Remediation of any contaminated areas • Regrading of landscape to a state generally consistent with a natural environment (if required). Regrading works will ensure that permanent drainage lines are not compromised • Application of topsoil and revegetation with native species. Revegetation would use flora species of local provenance that were present prior to clearing commencing and species specific to	Adani	Construction sites, final rail corridor and ancillary infrastructure	Decommissioning and Rehabilitation Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	the RE cleared at that site • A mechanism for rehabilitation strategies to be refined throughout the life of the NGBR Project, and in accordance with any legislated requirements that might change over the 90 year life of the NGBR Project. • Requirements and mechanisms for post construction monitoring and audit of rehabilitation success As far as practicable, material cleared during construction will be chipped, mulched and stockpiled for reuse during rehabilitation. Materials with special habitat value, such as hollow bearing logs or trees, will be selectively removed for reuse during rehabilitation, or placed in nearby bushland. Any watercourse areas crossed will be restored and rehabilitated with measures to improve connectivity and provide enhancements to suitable habitat. • The Decommissioning and Rehabilitation Plan will also outline specific objectives and methodology for the following: • Seed collection • Flora regeneration • Landscape architecture (i.e. topography) • Creation of supplementary habitats (e.g. nesting boxes), where necessary			
Pre-construction	Weed mapping will be undertaken prior to commencement of construction. Mapping will cover the final rail corridor and ancillary infrastructure but will be particularly focused at high risk locations.	Adani	NGBR Project footprint	Weed map
Pre-construction	Baseline field surveys of identified hotspots within and near construction areas will be undertaken prior to commencement of construction.	Adani	NGBR Project footprint	Weed map
Pre-construction	Weed control will be undertaken in areas that are very heavily infested or	Adani	NGBR Project	Weed map

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	where weeds of national significance or Class 1, 2 or 3 weeds declared under the *Land Protection (Pest and Stock Route Management) Act 2002* are present prior to disturbance.		footprint	
Pre-construction	A **Weed and Pest Management Plan** will be developed prior to construction commencing. The weed and pest management plan will include details relating to the monitoring, management and, where necessary, eradication of weeds, disposal of green waste, and vehicle/plant weed wash down protocols.	Adani	-	Construction Weed and Pest Management Plan
Pre-construction	A **Mosquito Management Plan** will be developed for the construction phase of the NGBR Project. The management plan will include measures such as: • Prevent ponding of water on site, such as in stormwater drains, sediment traps, containers, water tanks, and so on • Storage containers capable of ponding water will be either discarded after use or stored under roof or stored in an inverted position when empty • Screen/cover water containers and tanks.	Construction Contractor	-	Mosquito Management Plan
Pre-construction	The following avoidance, mitigation and management measures for black-throated finch (southern) are proposed in consideration of the recovery actions documented in the National Recovery Plan for the Black-throated Finch Southern Subspecies: • Vegetation clearing extents will be kept to the minimum area necessary for construction to reduce the area subject to habitat fragmentation. Areas that must not be cleared or damaged would also be clearly identified on construction plans and demarcated in the field • A Coal Dust Management Plan will be developed and implemented • An Erosion and Sediment Control Plan will be developed and	Construction Contractor	Works in and around potential black-throated finch habitat	Threatened Species Management Plan and Flora and Fauna Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	implemented • In response to priority action #5: the final rail corridor will be fenced along its length to exclude livestock grazing. This may lead to the herbaceous layer (particularly perennial grasses) improving in condition, enhancing the availability of seeding grasses in the landscape			
Pre-construction	Where feasible, detailed design will consider positioning security lighting at permanent facilities to minimise the potential for lighting impacts on fauna.	Construction Contractor	NGBR Project footprint	
Pre-construction	Prior to construction commencing, consultation with the Department of National Parks, Recreation, Sport and Racing will be undertaken to obtain historical data on previously conducted turtle nesting surveys in the region.	Adani	-	-
Construction	Signage will be erected in areas along the construction footprint advising staff when they are entering or leaving infestation 'hotspots', where additional weed hygiene inspections may be required.	Construction Contractor	-	-
Construction	Soil stripped and stockpiled from areas containing known weed infestations will be stored separately and will not to be moved to areas free of weeds.	Construction Contractor	-	-
Construction	Water trucks will use suitably sized mesh on intake pipes to prevent fish species being transported to different waterways.	Construction Contractor	-	-
Construction	All vehicles, equipment and materials brought onto site will need to be certified as free of weeds and weed seed containing materials and carry a weed hygiene declaration. Records of compliance with this requirement will be retained. A weed wash-down facility will be constructed onsite, where required. The requirement for weed hygiene inspections/certifications will be enforced.	Construction Contractor	-	-
Construction	A **register of wildlife incidents** (fauna strike and mortality) will be established and maintained for the construction of the NGBR Project,	Construction Contractor	-	Register of wildlife incidents

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	recording the location and nature of the incident. This will allow for identification of trouble-spots and potential adaptive management			(Construction)
Construction	All construction personnel will be inducted before working on site and made aware of their responsibility regarding protection of native flora and fauna and weed and pest management.	Construction Contractor	Rail corridor and associated infrastructure	Construction Flora and Fauna Management Plan
Construction	Clearing will be avoided where possible by placing temporary infrastructure in areas that were previously cleared, degraded or have naturally lower aboveground biomass.	Adani	Vegetation clearing	Construction Flora and Fauna Management Plan
Construction	Corridor clearing widths within areas of high ecological value, such as riparian corridors, will be minimised and will be rehabilitated to restore connectivity to a level that considers the requirements of maintaining permanent infrastructure. All cleared areas which are no longer required will be rehabilitated in a way that facilitates the movement of fauna.	Construction Contractor	Vegetation clearing	Construction Flora and Fauna Management Plan
Construction	The extent of vegetation clearing as well as areas requiring protection, such as areas of high ecological value along riparian corridors, will be mapped. Clearing extents will be marked-out (i.e. with flagging, etc.) and communicated to all necessary construction personnel involved prior to clearing taking place.	Construction Contractor	Vegetation clearing	Construction Flora and Fauna Management Plan
Construction	Lighting during night works will be positioned to minimise light spillage beyond the boundaries of construction areas. This includes consideration of directional lighting and shields where fauna may be affected.	Construction Contractor		
Construction	Vegetation clearing will be undertaken progressively in a sequential manner (within each construction front) to allow more mobile fauna species to disperse away from cleared areas and clearing activities.	Construction Contractor	Vegetation clearing	Construction Flora and Fauna Management Plan
Construction	Clearing within areas of high ecological value, such as riparian corridors, will be rehabilitated to restore connectivity to a level that considers the requirements of maintaining permanent infrastructure, but rehabilitates all	Construction Contractor	Vegetation clearing	Construction Flora and Fauna Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	areas no longer required in a way that facilitates the movement of fauna.			
Construction	Pre-clearance surveys will be undertaken by appropriately qualified ecologists for specific protected species to facilitate any relocation required as appropriate	Construction Contractor	As required	Suitably qualified fauna spotter-catchers will undertake fauna removal and relocation where it is required
Construction	Temporary fencing will be installed around temporary laydown areas and associated rail infrastructure to exclude fauna and livestock from construction zones.	Construction Contractor	Temporary laydown areas and associated rail infrastructure	Construction Flora and Fauna Management Plan
Construction	Any pits/trenches that are to remain open after daily site works will be fenced or covered, if possible. Where this is not possible, fauna ramps will be put in place to provide a means of escape for trapped fauna.	Construction Contractor	Pits/trenches that are to remain open after daily site works	Construction Flora and Fauna Management Plan
Construction	Works within 20 m of a watercourse will be undertaken in accordance with the Department of Natural Resources and Mines' Guideline for carrying out activities in a watercourse, lake or spring. If a riverine protection permit is required for any of the works, the conditions of this permit will be adhered to.	Construction Contractor	Works within 20 m of a watercourse	Construction Flora and Fauna Management Plan
Construction	The following management measures will be considered and included in the Construction Flora and Fauna Management Plan for works within 20 m of a watercourse: • Areas where riparian vegetation is already disturbed will be utilised in preference to undisturbed areas • In-stream works will be undertaken in nil or low-flow conditions wherever possible, particularly for culvert installation. • Duration of in-stream works will be minimised through prior planning, such that all equipment and materials are available to allow works to be completed as quickly as possible	Construction Contractor	Works within 20 m of a watercourse	Construction Flora and Fauna Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	• Equipment parking and laydown areas will be located outside streams and riparian areas • The area of disturbance within streams and riparian zones will be the minimum area required for safe working and the area of disturbance for infrastructure installation clearly marked • Surrounding riparian habitat will be progressively rehabilitated after construction is complete, where clearance is not required to be maintained for safe and effective operations. • Temporary in-stream barriers will be designed to allow fish passage, particularly where the barrier will be in place for months rather than days or weeks, or will be in place through flows or seasons that are important for fish movement • If aquatic macrophytes are present immediately downstream of the barrier, the potential for water to pass across the barrier will be maximised • Full passage for fish will be reinstated and waterway bed and banks will be returned to their original profile and stability so that long-term fish passage at the site is not compromised once the temporary barrier is removed • Silt curtains or other sediment control devices where they can be installed will be used to protect the waterway from sediment plumes and restrict contaminant/runoff into waterway during construction of water crossings.			
Construction	Stockpiling of material will not occur within 50 metres of a watercourse or drainage line.	Construction Contractor	Stockpiling activities	Water Quality Management Plan
Construction	Any pits/trenches that are to remain open after daily site works will be fenced or covered, if possible. Where this is not possible, fauna ramps will be put in place to provide a means of escape for trapped fauna.	Construction Contractor	Construction areas	Construction Flora and Fauna Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Construction	Temporary fencing will be erected around construction zones to exclude mobile animals from vegetation clearing and civil works areas.	Construction Contractor	Construction areas	Construction Flora and Fauna Management Plan
Construction	Pre-clearance surveys will be undertaken in areas identified as potential habitat for threatened species, prior to commencement of clearing. In areas where these surveys indicate the presence of habitat features known or with the potential to provide habitat for these species, a fauna-spotter catcher will be engaged during clearing activities. During pre-clearance surveys, habitat features that may be used by fauna for nesting or shelter will be marked (e.g. hollow-bearing trees, log piles). Pre-demarcated habitat features identified during the pre-clearance survey would be thoroughly checked by the fauna spotter-catcher prior to vegetation clearing commencing. The spotter-catcher will facilitate the safe relocation of any fauna found into pre-determined suitable relocation sites. The spotter-catcher will record details of fauna or habitat features that have been relocated (i.e. GPS location, species or habitat relocated, description of relocation site).	Construction Contractor	Vegetation clearing	Construction Flora and Fauna Management Plan
Construction	Work areas should be checked for any trapped fauna before work commences each day	Construction Contractor	Construction areas	Construction Flora and Fauna Management Plan
Construction and operation	A register of wildlife incidents (fauna strike and mortality) will be established and maintained for the construction of the NGBR Project, recording the location and nature of the incident. This will allow for identification of trouble-spots and potential adaptive management	Construction Contractor	Construction activities	Construction Flora and Fauna Management Plan
Construction and operation	Procedures in the event that an animal is injured will be developed. Depending on the type and extent of injuries, animals would either be taken to the nearest veterinary practitioner or wildlife care network or humanely euthanized on site by a suitably authorised and trained practitioner.	Construction Contractor	Construction activities	Construction Flora and Fauna Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Construction and operation	All vehicles and plant will stay on pre-determined routes and adhere to site construction and operation rules relating to speed limits. Speed limits would be clearly signposted so as to minimise the potential for fauna impact.	Construction Contractor	Construction activities	Construction Flora and Fauna Management Plan
Construction and operation	Any road kill will be dragged to the edge of the road and subsequently removed as quickly as practicable to reduce potential for scavengers to be struck	Construction Contractor	Fauna accident	Construction Flora and Fauna Management Plan
Construction and operation	Where fencing is required, consideration will be given to not using barbed wire on the top strand of wire fences to reduce the risk of fauna entanglement (e.g. bats) resulting in injury or mortality	Construction Contractor	Construction areas	Construction Flora and Fauna Management Plan
Construction and operation	Employees will be made aware of environmental responsibilities regarding local fauna and site protocols for encountering fauna during inductions and ongoing environmental awareness training	Construction Contractor	Staff inductions	Construction Flora and Fauna Management Plan
Construction and operation	The final rail corridor will be fenced along its length to exclude wildlife and livestock. Wildlife friendly infrastructure will be incorporated where required within the design of bridges and culverts to allow safe fauna passage	Construction Contractor	Final rail corridor and ancillary infrastructure	Detailed design
Pre-operation	An **Operation Weed and Pest Management Plan** will be developed to manage pest and weed species during operation. The plan will address: • Management of introduced animals in and adjacent to cleared areas including monitoring and management of pest animals. • Monitoring, management and where necessary eradication of weeds, disposal of green waste, and vehicle/plant weed wash down protocols in and adjacent to cleared areas • Monitoring of remnant vegetation along the edge of the final rail corridor for the presence of weeds. Eradication and/or rehabilitation/restoration to prevent the spread of these species into remnant vegetation areas	Rail Operator	Final rail corridor and ancillary infrastructure	Operation Weed and Pest Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Operation	Permanent fencing of the final rail corridor will be maintained to minimise livestock and native wildlife from accessing the rail corridor.	Rail Operator	Final rail corridor and ancillary infrastructure	Detailed design
Operation	Permanent fencing of the final rail corridor will be maintained to minimise livestock and native wildlife from accessing the rail corridor.	Rail Operator	Final rail corridor	-
Operation	A **register of wildlife incidents** (fauna strike and mortality) will be established and maintained for the operation of the NGBR Project to allow for identification of trouble-spots and potential adaptive management	Rail Operator	Final rail corridor and ancillary infrastructure	Register of wildlife incidents (Operation)
Operation	A monitoring program will be developed and implemented to assess the success of the pre-construction and construction mitigation and management measures for flora and fauna. The monitoring program will include: • Monitoring of habitat features (i.e. hollows, logs) that have been relocated into adjacent habitat or artificial habitat (i.e. nest boxes, artificial water sources) that have been installed into adjacent habitat to compensate loss of habitat. Monitoring will be required to determine the usage of relocated/artificial habitat, such as nest boxes by the target species and any maintenance requirements. Methods will involve a visual inspection of each habitat feature to collect data on fauna species occupancy (presence or signs), presence of pest species, any deterioration of the habitat feature, maintenance required and whether the surrounding landscape has changed. Monitoring will be undertaken 12 months after the installation period followed by a summer or winter census to account for seasonal variation in the use of the habitat features. Annual monitoring and maintenance will be undertaken thereafter for a duration of three years. • Monitoring of fauna-friendly design features incorporated into culverts, bridges and other watercourse structures. Monitoring methods will be standardised and targeted to the likely fauna species that will utilise	Rail operator	Relocated habitat features, culverts bridge and watercourse with fauna friendly design principles, and rehabilitated areas	Monitoring program

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	the fauna crossing structures. Methods will likely include motion-detecting cameras with infrared flash installed, sand plots, and scat, track and scratch searches. Monitoring will commence six months after installation of fauna crossing structures (i.e. Veage and Jones 2007) and will be undertaken annually to coincide with periods that are likely to represent peaks in fauna movement and thus higher detection rates (i.e. spring), for a duration of three years to monitor the effectiveness of the fauna structures. • Monitoring of rehabilitated areas to assess success against rehabilitation criteria using the BioCondition assessment methodology. Monitoring of rehabilitated areas will commence 1-2 years after establishment. It is proposed that annual monitoring and maintenance be undertaken thereafter for a duration of five years.			

4.2.6 Monitoring and corrective actions – flora and fauna

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Construction Operation	All collisions and other incidents involving wildlife or livestock will be recorded during construction and operation of the NGBR Project.	Construction Contractor Rail Operator	-	Corrective actions for vehicle collisions with wildlife may include modified traffic management, driver awareness training, fencing, underpasses.
Construction	Culverts, water crossings and other fauna passage structures will be regularly inspected and maintained.	Construction Contractor	Quarterly	Remove sediment and debris that may prevent aquatic fauna passageway.
Construction	The condition of all fencing will be inspected regularly to determine maintenance requirements.	Construction Contractor	Weekly	Repair fencing as required.
Construction	Weed levels will be monitored in areas adjacent to construction activities and any areas that are	Construction Contractor	Annually	Results will be considered in terms of baseline information

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
	rehabilitated after construction.			(collected prior to construction) and with reference to appropriate control (reference) sites. If significant infestations of any weeds occur, or if weeds of national significance or Class 1 or 2 weeds declared under the *Land Protection (Pest and Stock Route Management) Act 2002*, weed control measures will be implemented. Weed control measures will be based on Queensland Department of Agriculture, Fisheries and Forestry (DAFF) and local government advice.
Construction	All sediment control installations will be regularly inspected and maintained.	Construction Contractor	Weekly	Corrective actions may include: • Clearing of sediment control device of accumulated sediment. • Repairing sediment control devices, if required. • Re-designing sediment control devices, if required.
Construction	Regular inspections of compliance with weed hygiene inspections/certifications for equipment/vehicles brought to site.	Construction Contractor	Monthly	-
Construction	Conduct regular inspection of construction sites for	Construction Contractor	Weekly	Empty receptacles of ponded

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
	ponded water and mosquito breeding sites.			water. Turn receptacles over to prevent further ponding. Otherwise screen/cover receptacles. If larvae are detected in large numbers, contact the local council for assistance in choosing a suitable treatment method.
Construction	Upstream and downstream water quality monitoring (flow dependent) will be undertaken during construction to monitor the biological health of watercourses. Allowable threshold levels for downstream results will be determined in consultation with the DNRM prior to construction commencing and would be outlined in the NGBR Project conditions of approval. The threshold limit will include a maximum acceptable per cent increase above upstream back ground levels as well as an acceptable maximum duration for changes to any water quality parameter. Any noticeable changes in water quality, increased turbidity or sedimentation of waterways will be immediately investigated to determine the likely cause of the change.	Construction Contractor	As per Water Quality Management Plan.	Where degradation of water quality is a direct result of the operations of the NGBR Project, appropriate measures will be implemented to remedy the cause of the problem. Any exceedance of water quality trigger values will be recorded and reported to the regulator in accordance with any approval conditions.
Operation	The condition of all fencing will be inspected regularly to determine maintenance requirements.	Rail Operator	Six-monthly	Repair fencing as required.

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Operation	Culverts, water crossings and other fauna passage structures will be regularly inspected and maintained.	Rail Operator	Annually, following the wet season	Blockages will be cleared as required.
Operation	Ongoing monitoring of weed infestation associated with construction activities.	Rail Operator	Annually	As per Operation Weed Management Plan
Operation	Monitoring of habitat features (i.e. hollows, logs) that have been relocated into adjacent habitat or artificial habitat (i.e. nest boxes, artificial water sources) that have been installed into adjacent habitat to compensate loss of habitat.	Rail Operator	Annually	Identify why habitat features are not successful and undertake necessary actions to rectify the failures.
Operation	Monitoring of fauna-friendly design principles incorporated into culverts, bridges and other watercourse structures.	Rail Operator	Annually	Review the design of culverts, bridges and other watercourse structures that are not successfully allowing fauna to cross the final rail corridor and undertake appropriate modifications to the structures.
Operation	Monitoring of rehabilitated areas to assess success against rehabilitation criteria using the BioCondition assessment methodology.	Rail Operator	Annually	Undertake a review of rehabilitation and identify why rehabilitation has not met BioCondition criteria. Undertake necessary actions required to rectify identified failures.

4.3 Greenhouse gas emissions and energy management

4.3.1 Existing environmental values

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

4.3.2 Potential environmental impacts

Key sources of GHG emissions likely to result from the construction and operation of the NGBR Project are as follows:

Table 4-4 Potential Greenhouse Gas Emission Impacts

Activity	Potential Environmental Impact
Construction	
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
Operation	
Operation of trains, vehicles, plant and equipment using diesel or electricity	Emissions of greenhouse gases to the atmosphere
Maintenance yard and signalling/ communications equipment	Electricity imported from the grid
Waste generation	Loss of embodied energy and resources

Removal of vegetation for the final NGBR Project footprint is estimated to be the largest emission source during construction, accounting for 802 kt CO_2-e (74.9 per cent) of emissions, followed by diesel use associated with the operation of plant and machinery accounting for 268 kt CO_2-e (25.1 per cent).

The total scope 1 and scope 2 GHG emissions during operation is estimated to be 70,454 kt CO_2-e over the 90 year design life of the NGBR Project, encompassing 57,524 kt CO_2-e from operational diesel usage (scope 1 emissions) and 12,930 kt CO_2-e from electricity imported from the grid (scope 2 emissions).

4.3.3 Management objective

Vegetation clearing during construction phase and use of diesel fuel during operation shall be minimised using following approach for mitigation of GHG emissions:

- Clearing to be limited to approved areas and, the preferential use of existing cleared or minimally vegetated areas (e.g. exotic pasture) for the location of temporary facilities
- Substitute emission-intensive plant, equipment, fuel and power for energy-efficient alternatives, if practicable
- Maintain plant and equipment to maximise their efficiency.

4.3.4 Management and mitigation measures –greenhouse gas

Timing	Trigger/Applicability	Controls	Responsibility	Documentation
Detailed Design	Electricity use	Consider energy efficient waste water treatment units, including pumps and other associated equipment.	Construction Contractor	EMP
Detailed Design	Electricity use	The following measures will be considered to mitigate generation of GHG due to electricity use: • On site renewables such as solar power for non-critical electricity use within rolling stock maintenance facility, to avoid scope 2 emissions. • Renewable sources of electricity for connection to the rolling stock maintenance facility, to reduce scope 2 emissions. • Solar power for signalling and communications, as is successfully used at other remote locations within Australia.	Rail Operator	EMP
Pre-construction	Fuel and electricity use	Consider alternative fuels and energy sources such as biodiesel and solar power.	Construction Contractor	EMP
Construction	Vegetation clearing	The following measures will be implemented to mitigate generation of GHG due to vegetation clearing: • Place temporary infrastructure in areas that were previously cleared, degraded or have naturally lower aboveground biomass, to avoid unnecessary clearing-related emissions. • Stage vegetation clearing to coincide with construction works, to reduce the volume of clearing occurring at one time • Clearly identify clearing limits, to reduce incidental clearing.	Construction Contractor	EMP
Construction	Fuel use	A cut and fill balance will be maintained wherever possible to minimise haulage of cut and fill material.	Construction Contractor	EMP
Construction	Electricity use	Optimise efficiency of electrical equipment, through regular maintenance, prompt repair of malfunctioning equipment (to reduce inefficiency), and selection of equipment appropriate to the required task, in order to reduce electricity use.	Construction Contractor	EMP

Timing	Trigger/Applicability	Controls	Responsibility	Documentation
Pre-operation	Fuel use	The following measures will be considered to mitigate generation of GHG due to fuel use: • Prefer current model locomotives, or engines, to older models, to reduce fuel use. • Consider substitution of locomotives with hybrid models, with rechargeable energy storage systems and regenerative braking. • Consider fitting locomotives and wagons with electronically controlled pneumatic braking, to maximise braking efficiency and thereby reduce fuel use. • Consider implementing anti-idling engine management software, to optimise the balance of energy demands and fuel use. • Investigate the opportunity to substitute diesel for liquid natural gas, compressed natural gas, or biodiesel blends.	Rail Operator	EMP
Operation	Fuel use	Optimise operational activities and logistics, to avoid unnecessary vehicle movements.	Rail Operator	EMP

4.3.1 Monitoring and corrective actions – greenhouse gas

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Operation	An energy efficiency review will be undertaken at the commencement of operations and every five years following, to identify further initiatives and technology that may be integrated into the NGBR Project.	Rail Operator	As determined through relevant legislation	Further initiatives may include: • Use of engine management systems to determine optimal power output • Use of consistent management systems to optimally distribute the train loads • Parked train management, focussing on efficient load and temperature management.
Operation	Monitor scope 1 and scope 2 emissions from diesel fuel and electricity usage in accordance with *National Greenhouse and Energy Reporting Scheme.*	Rail Operator	Annually	-

4.4 Soils, erosion and sediment management

4.4.1 Environmental values

The following environmental values have the potential to be impacted by the NGBR Project:

- Topography, landform and geology
- Soil resources
- Good Quality Agricultural Land (GQAL)
- Strategic Cropping Land (SCL)
- Acid Sulfate Soils
- Land contamination

Table 4-5 shows the potential environmental impacts associated with construction and operational activities of the NGBR Project.

4.4.2 Potential environmental impacts

Key potential impacts to soils that may result from the construction and operation of the NGBR Project are as follows:

Table 4-5 Potential soils impacts

Activity	Potential Environmental Impact
Construction	
Vegetation clearing	Clearing vegetation will expose soils resulting in an increased risk of erosion
Topsoil stripping and stockpiling	Exposure of soils will increase risk of erosive resulting in loss of soil resource Reduced viability of topsoil/ subsoil to support native plants and pasture due to mixing of top soils and sub soils or sterilisation of soils through poor handling
Construction in areas with steep and long slopes, or where soils exhibit high erodibility	Increased risk of soil erosion
Construction works associated with cut and fill activities	Alteration of topography and landform Alteration or impeding overland flow and drainage patterns which may change topography over time Alteration of overland flow may result in course change of minor water ways and localised erosion Sterilisation and fragmentation of GQAL resource or SCL Disturbance of land containing contaminants deposited through previous land use activities

Activity	Potential Environmental Impact
Filling and excavation associated with bridge structures in areas at or below 5 m AHD	Disturbance of Acid Sulfate Soils (ASS)
Compaction and covering of soft muds with fill material (e.g. road base)	Disturbance of ASS
Dewatering	Oxidisation of Potential ASS (PASS)
Use of hazardous substances including fuels and oils	Release new contaminants into the environment as a result of unintended spillages or accidents
Operation	
Accidental spill or leakage of fuel or oil	Localised contamination of soil
Ongoing settlement and compaction	Degradation of the soil structure
Change in overland flow of water	Concentrated flows in areas not previously subject to long periods of saturation

4.4.3 Management objective

- Minimise changes in topography and landform
- Prevent the degradation of aquatic and terrestrial habitats from erosion and increased sediment load by minimising the disturbance to creek banks and by controlling site runoff from all areas disturbed during construction activities.
- Prevent loss of soil resources

4.4.4 Performance criteria

- Erosion identified will be rectified within reasonable timeframes
- Site runoff under standard conditions will contain minimal sediment load
- Topsoil and subsoil resources are retained and protected in a viable form to support the proposed post construction and operations land use.
- 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

4.4.5 Management and mitigation measures – soils, erosion and sediment control

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Design	Detailed design of the final rail corridor will aim to avoid construction on steep slopes and significant landform change.	Design Contractor	-	Design Plan
Pre-construction	A detailed soil and geotechnical investigation will be conducted prior to construction works commencing to validate proposed management practices for specific soil types and related issues. The investigation will be conducted in accordance with a specific soil survey methodology, which will include surveys tailored for: • SCL assessment • GQAL assessment • ASS assessment • Contaminated land assessment The survey for ASS will be consistent with: • State Planning Policy 2/02 Guideline: Acid Sulfate Soils • Guidelines for Sampling and Analysis of Lowland Acid Sulfate Soils in Queensland 1998 (CR Ahern, MR Ahern, and B Powell 1998) • Acid Sulfate Soils Laboratory Methods Guidelines (CR Ahern, AE McElnea and LA Sullivan 2004)	Adani	Final rail corridor and ancillary infrastructure areas	Survey reports
Pre-construction	An **Erosion and Sediment Control Plan** (ESCP) will be developed in accordance with following guidelines: • Best Practice Erosion and Sediment Control. International Erosion Control Association (Australasia) (IECA 2008) • Urban Stormwater Quality Planning Guidelines 2010 (DEHP 2010) • Manual for Erosion and Sediment Control Version 1.2. Sunshine Coast Regional Council, November 2008 (SRSC, 2008) The key objectives of the ESCP will be to: • Control surface water movement through construction sites	Adani	Final rail corridor and ancillary infrastructure areas	ESCP

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	• Minimise the extent and duration of soil disturbance • Minimise soil erosion • Minimise sediment laden water leaving construction sites • Promptly stabilising disturbed areas • Maximising sediment retention on site • Maintaining ESC measures in proper working order The ESCP will also include the following: • Site analysis - site characteristics and constraints (locality, topography, geology, groundwater, soils, vegetation, sensitive receptors), rainfall distribution and amounts relevant to the study area, staging of construction, details of proposed land disturbance activities and timeframe for construction implementation • Appropriate management and monitoring strategies to minimise erosion and sedimentation with respect to specific soil types, where required • Design and construction details of drainage, sediment control measures and sediment basins Plans and figures for erosion and sediment control including: • Explanatory notes and installation sequences • Contingency plans – in the case of rainfall events or unforseen situations • Soil management – location of stockpiles, management of dispersive soils, potential acid sulfate soils, high erosion risk areas, soils with extreme pH, required amelioration • Site access – and associated temporary sediment controls • Vegetation Management Plan – vegetation clearing, site stabilisation, rehabilitation • Monitoring and maintenance program –for drainage, erosion and sediment controls • Water discharge			

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Pre-construction	A **Soils Management Plan** (including management of topsoil and problematic soils associated with sodicity, salinity, dispersive, aggressive and gilgai characteristics) will be developed.	Adani	Final rail corridor and ancillary infrastructure areas	Soils Management Plan
Pre-construction	Prior to construction commencing, a detailed acid sulfate soils investigation will be undertaken in areas < 20 mAHD.	Construction Contractor	Areas < 20 mAHD	ASS Survey Report
Pre-construction	An **Acid Sulfate Soils Management Plan** (ASS Management Plan) will be developed for any activities below 5 m AHD that will: • Disturb >100 m^3 (bulked volume) of ASS material • Place hard fill material of >500 m^3, with an average thickness >0.5 m and/or • Disturb existing groundwater or surface water regimes Where avoidance of ASS disturbance is not possible, soils will be managed in accordance with the State Planning Policy 2/02 (SPP 2/02). Applicable management techniques include: • Chemical neutralisation (use of pure fine agricultural lime, Aglime) through mechanical mixing by plough or excavator, to provide adequate homogeneity of the sediment-lime mix • The less preferred method of anoxic storage or placement below the water table and beneath clean non-ASS fill • Disposal of neutralised material upon acceptance of relevant permits. The ASS Management Plan will include a risk assessment procedure for dewatering activities to ensure that potential acid sulfate soils within the site and on adjacent properties are not exposed to oxygen during construction	Construction Contractor	For any activities below 5 m AHD that will: • Disturb >100 m^3 (bulked volume) of ASS material • Place hard fill material of >500 m^3, with an average thickness >0.5 m and/or • Disturb existing groundwater or surface water regimes	ASS Management Plan
Pre-construction	A **Decommissioning and Rehabilitation Management Plan** will be developed for the NGBR Project with the overall aim of minimising the amount of land disturbed at any one time during the life of the final rail corridor (see also Flora and Fauna Management Plan in Section 4.2). The Decommissioning and Rehabilitation Plan will be developed in accordance with the legislative requirements current at the time of developing	Adani	Final rail corridor and ancillary infrastructure areas	Decommissioning and Rehabilitation Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	the plan. The Decommissioning and Rehabilitation Plan will include the following: • Relevant permits and approvals that may be required for the removal of facilities • Timing and methodology for the decommissioning • The intended use of the sites after decommissioning • Details of any structures or facilities that remain in place after decommissioning • Erosion and sediment controls during and after decommissioning • Rehabilitation details Reuse, recycling or disposal options for removed facilities, structures and materials, including community legacy opportunities			
Pre-construction	Adani will consult with landholders on how the NGBR Project may impact on the landholders' obligations under an Environmental Risk Management Plan (ERMP) and develop further mitigation measures relating to these obligations in cooperation with the landholders.	Adani	-	-
Pre-construction	Relevant forms will be prepared and submitted to the Department of Natural Resources and Mines (DNRM) for properties on which triggered SCL is intersected by the final rail corridor and/or ancillary infrastructure (if any). For those properties passing the history of cropping (HOC) assessment, Adani must submit an application for a strategic cropping land protection decision or compliance certificate.	Adani	For properties on which triggered SCL is intersected by the final rail corridor	Submissions to DNRM
Pre-construction	In the case of **temporary** impacts on SCL, the following information will be provided to DNRM: • Description of the area of temporary impact on SCL associated with each activity in addition to a detailed description of the actual physical land disturbance, operational work and construction activities involved in each temporary impact activity with attention paid to the location, extent (area), method of disturbance and duration of each activity	Adani	Temporary impacts on SCL	Submissions to DNRM

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	• A detailed restoration plan, including a description of the benchmarked pre-development site condition, the methods to be applied to ensure site restoration to an equivalent condition including restoration milestones / targets and monitoring regime • The timeframe for complete restoration to equivalent predevelopment conditions.			
Pre-construction	In the case of **permanent** impacts on SCL, the following stages will be undertaken: • Description of the area of the permanent impact on SCL associated with each activity will be provided and a detailed description of the actual physical land disturbance, operational work and construction activities involved in each permanent impact activity with attention paid to the location, extent (area), method of disturbance and duration of each activity • Calculation of the mitigation costs for all SCL impacted by the activity where a permanent impediment to cropping will be unable to be avoided. Fractions of one hectare will be rounded up to the nearest hectare for the purposes of calculating the mitigation liability within different SCL subzones.	Adani	Permanent impacts on SCL	-
Pre-construction	For the properties containing SCL that failed the preliminary HOC assessment, Adani will submit applications to DNRM for HOC validation. Consultation with DNRM will occur prior to the submission of these forms to ensure the application process is streamlined. This process requires submission of two application forms: • Part A—Strategic cropping land validation—all applications application form • Part B—Strategic cropping land validation—cropping history application form	Adani	For properties containing SCL that failed the preliminary HOC assessment	-

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Pre-construction	A ground-truthing exercise will be undertaken if the preliminary site investigation of the properties identifies the likelihood of any contamination within the final rail corridor or ancillary infrastructure areas. This ground-truthing will involve a visual inspection of the following: • Recording of site features and layout of structures • Inspection for visual signs of potential contamination – disturbed, distressed vegetation; soil staining etc. • Presence/location of the following – fill; stockpiled soils/material; chemicals; fuel storage; waste material; equipment/machinery relevant to potential site contamination • Inspection for evidence of former infrastructure; previous fuel/chemical storage, evidence of spills/leaks; condition of roads and infrastructure • Ground-truthing will determine the need for any intrusive investigations and sampling needs.	Adani	If the preliminary site investigation of the properties identifies the likelihood of any contamination within the final rail corridor or ancillary infrastructure areas	Inspection Report
Pre-construction	Where ground truthing determines that further investigation and sampling is required, a Sampling and Analysis Plan (SAP) will be developed and tailored to each property / potentially contaminated area. The SAP is to cover the following information: • Description of proposed activity / disturbance • Pollution sources • Sampling and analysis methodology • Quality assurance and quality control procedures • Data assessment and reporting	Adani	-	Sampling and Analysis Plan
Pre-construction	All temporary erosion and sediment control devices will be installed and functional during early works and prior to commencement of bulk earthworks.	Construction Contractor	-	Work Program Checklists
Pre-construction	Continued consultation with landowners, will be conducted with landholders, whose GQAL property is intersected by the final rail corridor to limit the effects of fragmentation. Mitigation measures such as provision of stock	Adani	GQAL property intersected by the final rail corridor	

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	crossings, amelioration of soils, limiting vehicle movement to designated access tracks and compensation may become necessary to implement.			
Pre-construction	An extensive geotechnical investigation will be undertaken along the length of the final rail corridor and in locations of ancillary infrastructure. The aim of the geotechnical investigation will be to provide site specific geological data, including the suitability and stability of existing geological conditions for construction of the NGBR Project.	Construction Contractor	Final rail corridor and ancillary infrastructure areas	Detailed Geotechnical Survey Report
Construction	Minimising severity and depth of soil excavation, mixing of soils, compaction and contamination with foreign material.	Construction Contractor	Soil excavation, mixing of soils, compaction and contamination with foreign material	Work Method Statements
Construction	Chemicals, oil, fuel and wastes will be managed in accordance with the Waste Management Plan and the Hazardous Substances Management Plan (see Sections 4.5 and 4.12 respectively).	Construction Contractor	-	Checklists Waste Management Plan Hazardous Substances Management Plan
Construction	All vehicles, plant and machinery will be routinely inspected and maintained to minimise the risks of leaking or spilling contaminants.	Construction Contractor	-	Checklists
Construction	Where construction on steep slopes and significant landform change cannot be avoided, appropriate control measures will be tailored and implemented to minimise disturbance of topography and landform. This will be addressed through the implementation of the ESCP.	Construction Contractor	Where construction on steep slopes and significant landform change cannot be avoided	ESCP Work Method Statements
Construction	Topographical features that pose a risk to the environment from erosion due to slope length and gradient are to be carefully managed during wet weather	Construction	Where topographical features pose a risk to	ESCP

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	periods and erosive rainfall events. This will be addressed through the implementation of the ESCP.	Contractor	the environment from erosion due to slope length and gradient	Work Method Statements
Construction	In the event of a fossil find during construction, work will stop in the vicinity of the find and an appropriately qualified archaeologist engaged to assess its significance and authenticity. Suspected fossils will not be destroyed, damaged, moved, excavated or disturb unless documented approval has been granted by the construction environmental manager. The potential for fossils finds will be outlined in inductions to create awareness and train employees in the identification of archaeological material and actions to take in the case of a find.	Construction Contractor		Soils Management Plan
Construction	Earthworks will not be conducted during high rainfall events, particularly those events with (predicted) intense raindrop impact.	Construction Contractor	High rainfall events	Work Method Statements
Construction	All surface drains and erosion and sediment controls will be inspected and maintained regularly.	Construction Contractor	All surface drains and erosion and sediment controls	Checklists Inspection and maintenance schedule
Post Construction	Soils and landform underlying temporarily disturbed areas will be reinstated progressively and after construction to attain pre-development conditions.	Construction Contractor	Completion of construction works in temporarily disturbed areas	Work program
Operation	All permanent erosion and sediment control devices will be installed and are functional prior to commencement of operation.	Construction Contractor	-	-
Operations	Chemicals, oil, fuel and wastes will be managed in accordance with the Hazardous Substances Management Plan and the Waste Management Plan.	Rail Operator	Ancillary infrastructure	Checklists Waste Management Plan Hazardous

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
				Substances Management Plan
Operations	All vehicles, plant and machinery will be routinely inspected and maintained to minimise the risks of leaking or spilling contaminants.	Rail Operator	Ancillary infrastructure	Checklists Inspection and maintenance schedule
Operations	All surface drains and erosion and sediment controls will be inspected and maintained regularly.	Rail Operator	All surface drains and erosion and sediment controls	Checklists Inspection and maintenance schedule

4.4.6 Monitoring and corrective actions – soils, erosion and sediment control

Timing	Monitoring activity	Responsibility	Applicability	Frequency	Corrective Action(s)
Construction	All vehicles, plant and machinery will be routinely inspected and maintained to minimise the risks of leaking or spilling contaminants.	Construction Contractor	All vehicles, plant and machinery	Upon arrival to site, then monthly	-
Construction	Each construction site will be inspected regularly for potential sources of land contamination (e.g. inappropriately stored hazardous substances) or actual signs of contamination.	Construction Contractor	Each construction site	Weekly	Corrective measures will be implemented as required and may include clean-up, remediation and/or disposal of affected material.
Construction	All surface drains and erosion and sediment controls will be inspected and maintained regularly. Deficiencies, including drain blockages, damage to sediment controls and signs of erosion will be recorded and rectified in a timely manner.	Construction Contractor	All construction sites	Weekly and following rain event	-
Operation	The final rail corridor and ancillary infrastructure will be	Rail Operator	Final rail	Annually	Corrective measures will be

Timing	Monitoring activity	Responsibility	Applicability	Frequency	Corrective Action(s)
	inspected regularly for potential sources of land contamination or actual signs of contamination.		corridor and ancillary infrastructure		implemented as required and may include clean-up, remediation and/or disposal of affected material.
Operation	All surface drains and erosion and sediment controls will be inspected and maintained regularly. Deficiencies, including drain blockages, damage to sediment controls and signs of erosion will be recorded and rectified in a timely manner.	Rail Operator	Final rail corridor and ancillary infrastructure	Six-monthly	-

4.5 Waste management

4.5.1 Existing environmental values

Wastes represent lost or degraded material and energy resources. Improper waste management can impact on a range of environmental values including soil, air, surface water and groundwater quality. Improper waste management may also cause a range of public health hazards.

4.5.2 Potential environmental impacts

Types of waste likely to be produced during construction and operation of the NGBR Project and their potential environmental impacts are listed in Table 4-6.

Table 4-6 Potential Waste Generation Impacts

Waste type	Potential impact
Green waste	Fire hazard
	Emissions of greenhouse gases as vegetation rots
	Possible loss of nutrients in natural nutrient cycles
	Spread of weeds
	Visual impact
	Pest species
Packaging waste Rubbish and debris Waste pallets Waste bulk bags	Visual impact
	Source of litter
	Plastics may entrap native animals
Waste concrete Waste shotcrete	Localised increases in pH (wash out waste)
	Visual impact
Waste metal	Visual impact
	Localised soil contamination with potential to leach to surface and groundwater
	Human health risk (tetanus)
Waste ballast Waste wood Waste glass Waste plastic Waste rubber	Visual impact
	Source of litter

Waste paper Waste cardboard Waste aluminium cans	
Waste solvents and paints	Contamination of soils, surface water and groundwater
Maintenance fluids	Toxicity to plants and animals
Hydrocarbons and water mixtures or emulsions	Degradation of water resources
Electrical waste	Visual impact
Waste fittings and upholstery	Source of litter
Food waste	May attract vermin
	Odour
	Disease, particularly through bacterial infection
Wastewater	Contamination of land, surface and groundwater
Sewage sludge and residues	Degradation of water resources
	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
	Collect water which may harbour mosquitoes and other biting insects

Batteries	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
Spoil	Visual impact
	Dust generation
	Degradation of water resources
	Inhibition of native plant growth
Topsoil	Visual impact
	Dust generation
	Degradation of water resources
	Spread of weeds
Waste ANFO packaging	Fire hazard
	Safety hazard
	Visual impact
Clinical and related waste Pharmaceuticals, drugs and medicines	Health hazard

4.5.3 Management objective

- Minimise generation of waste in accordance with the waste and resource management hierarchy:
  - AVOID unnecessary resource consumption;
  - REDUCE waste generation and disposal;
  - REUSE 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 soil, surface water and groundwater quality and visual amenity.

4.5.4 Performance criteria

- Recycling and reuse targets are being met
- No littering as a result of NGBR Project activities
- No unapproved wastewater discharge

4.5.5 Management and mitigation measures - waste

Timing	Controls	Responsibility	Trigger	Documentation
Pre-construction Pre-operation	**Waste management plans** will be developed and implemented for the construction and operation of the NGBR Project. The waste management plan will describe the waste storage and handling requirements and waste management methods for the NGBR Project. A preliminary plan of the waste storage and handling requirements and indicative waste management methods, listed in order of preference for each waste type, is presented in Appendix E. Final waste management methods will depend on the availability of waste management contractors to provide a cost effective service to this location.	Construction Contractor Rail Operator	Production of waste	Waste Management Plan – Construction Waste Management Plan – Operation
Pre-construction Pre-operation	A waste register will be developed and maintained to facilitate monitoring of waste and support the waste management strategy. The register will include the following information: • Waste type and waste code • Quantities removed for reuse/recycling/disposal • Cost of waste disposal • Waste contractor For trackable wastes, the waste register will also include: • Consignment number for the load • Transport provider's details (including licence number) • Date and time waste was removed from premises • Quantity removed • Receiver's details (including licence number)	Construction Contractor Rail Operator	Waste removal	Waste register
Pre-construction	A **Procurement Plan** will be developed, including measures to avoid ordering surplus goods, services and materials (ordering to size), avoid packaging waste (ordering in bulk) and identification of suppliers with product stewardship arrangements.	Construction Contractor	Use of materials	Procurement Plan

Timing	Controls	Responsibility	Trigger	Documentation
Pre-construction / Construction / Operation	Only authorised contractors will be used to collect and recycle waste. Waste contracts will be in place for all wastes that require removal from the site for reuse, recycling, treatment and/or disposal prior to construction commencing. Preference will be given to waste contractors that can offer reuse and recycling services. Adani will request evidence of appropriate authorisations held by all nominated waste contractors.	Construction Contractor	Waste removal	Waste Management Plan – Construction Waste Management Plan - Operation Waste contracts
Pre-construction	If treated wastewater is to be disposed of through irrigation, an effluent irrigation management plan will be developed based on soil testing and results of MEDLI modelling	Adani	Generation of treated wastewater and need for disposal	Effluent Irrigation Management Plan
Pre-construction	Site based management plans (SBMP) will be developed and implemented to ensure compliance with waste treatment and design discharges	Adani		SBMP
Construction / Operation	Wastewater will be treated in portable treatment plants on site in accordance with the SBMP.	Construction Contractor Rail Operator	Generation of wastewater	SBMP
Construction / Operation	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. Construction areas will be kept clean and free of waste to prevent attracting fauna species.	Construction Contractor Rail Operator	Storage and handling of waste	Waste Management Plan – Construction Waste Management Plan - Operation

Timing	Controls	Responsibility	Trigger	Documentation
Construction Operation	Induction training will include waste management, such as waste disposal and segregation practices	Construction Contractor Rail Operator	Waste management system	Site induction records

4.5.6 Monitoring and corrective actions – waste

Timing	Monitoring activity	Responsibility	Applicability	Frequency	Corrective Action
Construction Operation	Waste quantities (reuse, recycling and disposal) will be measured for major waste types and recorded in the waste register.	Construction Contractor Rail Operator	Waste management strategy and EMS continuous improvement	Ongoing	-
Operation	Waste quantities will be regularly reviewed to identify general trends and waste reduction opportunities.	Construction Contractor Rail Operator	Waste management strategy and EMS continuous improvement	Annually for first five years and then every second year	Update waste management plan and associated procedures, as required. Communicate changes and conduct training, where required.
Construction Operation	Waste storage areas will be regularly inspected for condition of storage area, containment and appropriateness of storage (e.g. waste segregation).	Construction Contractor Rail Operator	Waste storage and handling	Weekly	Any inappropriately stored substances will be removed immediately and moved to an appropriate storage area. Update waste management plan, if required.
Construction	Untreated sewage tanks and pipes will be monitored regularly for leaks.	Construction Contractor	Sewage storage	Weekly	Repair leaks and treat contaminated area(s) in accordance with SBMP.
Construction Operation	Waste contracts will be reviewed for performance and compliance with regulatory requirements.	Construction Contractor Rail Operator	Waste management strategy	Annually	Update waste contracts, where required.

4.6 Noise and vibration management

4.6.1 Existing environmental values

The environmental values to be protected with regards to noise and vibration include:

- Human health and wellbeing (for instance by interfering with sleep, relaxation or recreation activities)
- Community amenity
- The health and biodiversity of ecosystems.

The construction and operation of the NGBR Project has the potential to generate noise and vibration emissions that have an impact at sensitive receptors, including potential for nuisance or harm to human health and wellbeing.

Sensitive receptors within six kilometres of the preliminary investigation corridor of the NGBR Project include 23 homesteads and are listed in Table 4-7. No non-residential premises were located within this area.

Table 4-7 Noise and vibration sensitive receptors

Receptor	Easting	Northing	Distance to centreline of final rail corridor (m)
Homestead 1	609916	7794255	2,740
Homestead 2	604874	7790877	1,202
Homestead 3	585906	7784622	2,248
Homestead 4	591656	7782269	2,631
Homestead 5	592845	7775614	4,730
Homestead 6	591975	7774322	3,826
Homestead 7	594112	7773398	5,724
Homestead 8	581086	7764508	3,622
Homestead 9	583141	7758004	2,121
Homestead 10	573776	7744903	2,927
Homestead 11	577907	7743136	1,564
Homestead 12	565463	7733205	6,208
Homestead 13	563357	7723411	5,366
Homestead 14	574094	7721935	3,913
Homestead 15	569153	7714138	4,313
Homestead 16	586276	7700615	3,869
Homestead 17	580954	7681237	2,822
Homestead 18	579067	7655503	4,170

Receptor	Easting	Northing	Distance to centreline of final rail corridor (m)
Homestead 19	570319	7624819	4,981
Homestead 20	550182	7623709	4,744
Homestead 21	530696	7620414	5,209
Homestead 22	519416	7613045	1,109
Homestead 23	494429	7589483	6,634

Unattended monitoring was undertaken at four monitoring locations. The results of unattended monitoring are provided in Table 4-8. Results are presented as a rating background level (RBL), a single-figure representation of background noise during a given assessment period (day, evening or night). For a given monitoring location, RBL is calculated as follows:

- The median value of measurements between 7 am to 6 pm (day)
- The median value of measurements between 6 pm to 10 pm (evening)
- The median value of measurements between 10 pm to 7 am (night).

Table 4-8 Summary of unattended noise monitoring

Location	Background L_{A90} dB(A)			Ambient L_{Aeq} dB(A)		
	Day	Evening	Night	Day	Evening	Night
A	26	40	31	46	56	48
B	21	35	19	52	48	46
C	21	30	20	49	40	39
D	24	24	20	51	41	42

The results of attended vibration monitoring are in Table 4-9. There was no perceptible ground vibration at any of the monitoring locations, which conformed with the recorded levels.

Table 4-9 Summary of vibration monitoring

Location	Time (hrs)	Sum (mm/s)	Observations
A	18:29-18:50	0.102	No perceptible ground vibration
B	10:43-11:09	0.237	No perceptible ground vibration
C	14:14-14:35	0.093	No perceptible ground vibration
D	18:59-19:28	0.093	No perceptible ground vibration

4.6.2 Potential environmental impacts

Key potential impacts to noise and vibration that may result from the construction and operation of the NGBR Project are as follows:

Table 4-10 Potential Noise and Vibration Impacts

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

4.6.3 Management objective

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

4.6.4 Performance criteria

- No complaints relating to excessive noise and vibration attributable to the NGBR Project.
- 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 (L_{Aeq})
  - 87 dB(A) - assessed as a single event maximum sound pressure level (L_{Amax})
- Single events over a given 24 hour period Impacts from airblast overpressure are managed to meet acoustic quality objectives and avoid disturbance to homesteads.

4.6.5 Management and mitigation measures - noise and vibration

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Detailed Design	Factor distance to nearest sensitive locations into initial blasting design to ensure that impacts are avoided.	Design Contractor	-	-
Detailed Design	Locate noise generating ancillary infrastructure (construction depot, concrete batch plant, laydown areas) as far as practicable from sensitive receptors.	Construction Contractor	-	-
Pre-construction	Consider noise performance in the procurement of construction equipment.	Construction Contractor	-	-
Construction	As far as practicable, confine construction activities which are likely to generate major noise emissions (use of large machines etc.) within two kilometres of a sensitive receptor to general building work hours.	Construction Contractor	Construction activities which are likely to generate major noise emissions (use of large machines etc.) within two kilometres of a sensitive receptor	Construction Environmental Management Plan
Construction	If planned construction activities within two kilometres of a sensitive receptor will not be confined to general building work hours, provide the following information to the relevant landholders at least two days prior to the activity occurring: • Nature of the activity • Justification for the activity to be outside general building work hours • Proposed date and timing of the activity • Access routes for workers and equipment	Construction Contractor	Construction activities which are likely to generate major noise emissions (use of large machines etc.) within two kilometres of a sensitive receptor	Construction Environmental Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Construction	As far as practicable, confine loading and unloading activities to general building work hours.	Construction Contractor	Loading and unloading activities	Construction Environmental Management Plan
Construction	Confine impact pile driving to general building work hours.	Construction Contractor	Pile driving	Construction Environmental Management Plan
Construction	Confine blasting to general building work hours.	Construction Contractor	Blasting	Construction Environmental Management Plan
Construction	Potentially affected sensitive receivers will be notified five days in advance of night works occurring in a particular location.	Construction Contractor	Night works	Notification letters
Construction	Any noise complaints regarding night-time works will be investigated immediately and measures would be developed to minimise any identified impacts in consultation with the affected sensitive receiver. Measures for consideration may include provision of alternate accommodation, use of alternate construction equipment or techniques and rescheduling of works to another night or to daytime working hours	Construction Contractor	Night works	Complaints form
Construction	Adhere to general protocols for construction including: • As far as practicable, situate mobile plant (e.g. compressors, generators) away from sensitive receptors • As far as practicable, direct principal noise sources (e.g. exhausts) away from sensitive receptors • Minimise use of warning devices, within operational health and safety	Construction Contractor	-	Construction Environmental Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	constraints			
Construction	Modify blast design as necessary to prevent impact, including: • Reduce maximum instantaneous charge using delays, reduced hole diameter, or deck-loading • Changing the burden and spacing by altering the drilling pattern and/or delay layout, or altering the hole inclination • Spacing and orientation of 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 near residences.	Construction Contractor	Blasting	Construction Environmental Management Plan
Construction Operation	Fit equipment with noise suppression equipment	Construction Contractor Rail Operator	-	Construction Environmental Management Plan
Construction	Adhere to maintenance schedule for equipment, ensuring that all equipment maintenance is as per the specifications of the manufacturer.	Construction Contractor	-	Maintenance schedule
Operation	Minimise use of horns and warning devices, within operational health and safety constraints.	Rail Operator	-	Construction Environmental Management Plan
Operation	Adhere to a maintenance schedule for rolling stock and maintenance equipment, ensuring that all equipment is maintenance as per the	Rail Operator	Rolling stock	Maintenance schedule

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	specifications of the manufacturer.		maintenance yard	
Operation	Site-specific work practices for the rolling stock maintenance yard, such as • Minimisation of dropping materials from heights • Minimisation of operating equipment at full power • Training and induction for work practices to minimise noise and vibration • Direction of noise sources away from sensitive receptors • Service and maintain all plant and equipment according to service schedules	Rail Operator	Rolling stock maintenance yard	Standard operating procedures

4.6.6 Monitoring and corrective actions – noise and vibration

Timing	Monitoring activity	Responsibility	Frequency	Corrective action
Construction Operation	During construction and operation, actual noise and vibration levels will be monitored to ensure compliance with approved limits. Blasting in particular will be monitored to ensure that blast design is appropriate to site conditions and considers any potential sensitive receptors.	Construction Contractor Rail Operator	-	Equipment found to be producing excessive noise (i.e. which exceeds noise emissions standards for vehicles) will be taken out of use and repaired or removed from site.
Construction	Undertake airblast overpressure monitoring during initial blasts to assist with the optimisation of blast parameters and confirmation of predictions.	Construction Contractor	-	Optimise blast parameters
Operation	Undertake operational noise monitoring to ensure compliance with approved limits.	Rail Operator	Annually	Where operational noise monitoring identifies noise impact occurring at a sensitive receptor, employ additional mitigation, such as: • Construction of screening and barriers or

Timing	Monitoring activity	Responsibility	Frequency	Corrective action
				bunds • Noise mitigating building works at sensitive receptors, such as double glazing
Construction Operation	Monitor complaints relating to noise and vibration.	Constructions Contractor Rail Operator	-	Respond to complaints in accordance with complaints management procedures. Implement mitigation measures, where required.

4.7 Surface water and groundwater management

4.7.1 Existing environmental values

The following environmental values with regards to surface water are applicable to the NGBR Project:

- Aquatic ecosystems - slightly to moderately disturbed
- Primary industries - irrigation
- Primary industries - stock watering
- Primary industries - human consumers of aquatic foods[1]
- Recreation and aesthetics - secondary recreation[1]
- Recreation and aesthetics - visual recreation[1]
- Cultural and spiritual values.

The primary demand for groundwater is stock and domestic water supply purposes.

4.7.2 Potential environmental impacts

Key potential impacts to surface waters and groundwaters that may result from the construction and operation of the NGBR Project are as follows:

Table 4-11 Potential surface water and groundwater impacts

Activity	Potential Environmental Impact
Construction	
Vegetation clearing, topsoil stripping and general earthworks	Erosion and subsequent degradation of water quality Release of sediments to water through erosive processes
Watercourse diversion	Changes in downstream flows
Storage, handling and use of hydrocarbons and other environmentally hazardous substances	• Spills and leaks and subsequent degradation of water quality. • Large spills of environmentally hazardous materials, or leaks that are allowed to continue over long periods of time may cause contamination of groundwater.
Extraction of water for water supply	Reduction in downstream flow may occur
Irrigation of treated wastewater	Contaminated surface runoff and subsequent degradation of water quality Improper irrigation of treated wastewater may cause nutrients to leach to groundwater.
Wastewater generation and treatment	If improperly managed, release of nutrients, pathogens and other contaminants to downstream waters

[1] These values are only applicable for the Suttor River catchment as the value is at or within the Burdekin Falls Dam which is downstream of the preliminary investigation corridor within the Suttor River catchment.

Activity	Potential Environmental Impact
Structures within a floodplain	Increased afflux and flooding extent and duration upstream Reduced flood flows downstream
Dewatering of excavations	• Drawdown of groundwater may occur • Disposal of groundwater from dewatering has the potential to cause surface water degradation particularly if salinity is high
Operation	
Storage, handling of hydrocarbons and use of other environmentally hazardous substances	• Spills and leaks and subsequent degradation of water quality. • Large spills of environmentally hazardous materials, or leaks that are allowed to continue over long periods of time may cause contamination of groundwater.
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

4.7.3 Management objective

Prevent or minimise environmental impacts on surface water and groundwater from the NGBR Project.

4.7.4 Performance criteria

No degradation of water quality downstream relative to upstream values attributable to the NGBR Project.

4.7.5 Management and mitigation measures - surface water and groundwater quality

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Pre-construction	A **Water Quality Management Plan** will be developed and implemented prior to construction commencing. The plan will include: • Storing fuels, chemicals, wastes and other potentially environmentally hazardous substances in contained areas away from watercourses • Refuelling to take place away from watercourses. Spill kits are available during refuelling • Regular checks of vehicles and equipment for oil leaks • Dewatering procedures for the management of construction groundwater inflow or stormwater collection on site including appropriate capture, treatment and disposal measures • Emergency response protocols and procedures for implementation in the event of a contaminant spill or leak • Waterway profiles at temporary construction access roads and temporary construction facility areas will be reinstated and disturbed areas promptly stabilised following completion of construction works • Existing disturbed areas will be utilised to access waterways • The construction of waterway crossings will be scheduled during dry or low flow periods, where practicable • The construction of waterway crossings will be completed promptly to minimise impacts • All construction camp stormwater captured on site will be reused for irrigation, dust suppression or stored within sediment basins before being appropriately treated and discharged. • The route used by machinery in and out of the work sites on	Adani	-	Water Quality Management Plan

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	waterways will be controlled and the need for access of heavy machinery to the bed of the waterways will be avoided, where possible. Works will be undertaken from the top of waterway banks where possible. • Emergency spill response procedures.			
Detailed design	Detailed design of watercourse structures will include: • Further investigations, including detailed identification and consideration of all afflux affected property and assets, to determine afflux levels and appropriate drainage structure dimension requirements. Additional hydrology and hydraulic modelling will be undertaken during detailed design to refine bridge design, culvert design and afflux values. • Causeways and other temporary drainage structures will be designed to provide sufficient hydraulic capacity such that there is minimal increase in velocity of natural flows • Further investigation into scour protection to determine the appropriate depth of cover or scour protection required at each crossing and the appropriate permanent scour protection measures provided for abutments, piers, culverts, inlets and outlets.	Design Contractor	Watercourse structures	-
Detailed design	Rail bridges will be designed for a 100 year ARI discharge plus 300 mm freeboard to mitigate impacts from flooding.	Design Contractor	Rail bridges	-
Pre-construction	At quarry locations, further investigation into potential groundwater impacts will be undertaken to better characterise the groundwater conditions and impacts at these locations.	Adani	Quarry locations	-
Detailed design	Cuts/excavations and ground support will be designed to reduce the need for dewatering through the alteration of construction techniques. Increased construction effort, for example, may reduce the duration over which	Design Contractor	Cuts/excavations and ground support	-

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	dewatering may be required.			
Construction	Wastewater from concrete batching plants will be captured, stored and either reused in concrete batching or treated and disposed appropriately	Construction Contractor	Wastewater from concrete batching plants	-
Construction	Further management and mitigation measures relating to erosion and sediment control are included in Section 4.4).	Construction Contractor	-	-
Pre-construction	Appropriate permits and/or licences will be obtained for all water required during construction, including groundwater abstraction, overland flow harvesting, in-stream and off-stream storages. In addition, appropriate permits for operational works that affect waterways will be obtained for all waterways to be affected during construction.	Adani	-	-
Pre-construction	Allowable threshold levels for downstream results will be determined in consultation with DNRM prior to construction commencing and are expected to be outlined in the NGBR Project conditions of approval. The threshold limit will include a maximum acceptable per cent increase above upstream background levels as well as an acceptable maximum duration for changes to any water quality parameter.	Adani	Downstream water quality	Water Quality Management Plan
Operation	All cross drainage and longitudinal drainage structures will be maintained and kept clear of debris	Rail Operator	-	-

4.7.1 Monitoring and corrective actions – surface water and groundwater quality

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Construction	Upstream and downstream water quality monitoring (flow dependant) will be undertaken during construction to monitor the physical and biological health of watercourses. Allowable threshold levels for downstream results will be determined in consultation with the DNRM prior to construction commencing and would be outlined in the NGBR Project conditions of approval. The threshold limit will include a maximum acceptable per cent increase above upstream back ground levels as well as an acceptable maximum duration for changes to any water quality parameter. Any noticeable changes in water quality, increased turbidity or sedimentation of waterways will be immediately investigated to determine the likely cause of the change.	Construction Contractor	As per Water Quality Management Plan	Where degradation of water quality is a direct result of the operations of the NGBR Project, appropriate measures will be implemented to remedy the cause of the problem. Any exceedance of water quality trigger values will be recorded and reported to the regulator in accordance with any approval conditions.
Construction	Waterways in the vicinity of the construction sites will be visually inspected for signs of contamination (e.g. oily sheen, discolouration).	Construction Contractor	Weekly	If signs of contamination are found, investigate source and determine further actions.
Construction Operation	Monitoring of Bureau of Meteorology (BOM) flood warning system for potential of flooding following heavy rain events to take preventative actions.	Construction Contractor Rail Operator	Following heavy rain events	Staff will be notified and equipment and materials removed from flood prone areas if required.
Construction Operation	Inspection for flood damage will be undertaken following heavy rain events	Construction Contractor Rail Operator	As soon as safe to do so, following heavy rain events	All flood damaged infrastructure will be re-instated.

4.8 Scenic amenity and lighting management

4.8.1 Environmental values

Construction and operation of the NGBR Project has the potential to impact scenic amenity and lighting including potential impacts on landscape character and views from sensitive receptors.

The following environmental values with regards to scenic amenity and lighting are applicable to the NGBR Project:

- Vegetation influencing rural (agricultural) landscape character
- Scenic viewing values – obstruction from the NGBR Project
- Natural lighting – currently limited anthropogenic lighting influences in the study area.

4.8.2 Potential environmental impacts

Key potential impacts to scenic amenity and lighting that may result from the construction and operation of the NGBR Project are as follows:

Table 4-12 Potential scenic amenity and lighting impacts

Activity	Potential Environmental Impact
Construction	
Vegetation clearing	Increased visual permeability Change in landscape from native vegetation to cleared land
Lighting	During construction periods, localised and temporary light pollution caused by lighting for night works, construction camps and vehicle travelling at night
Vehicle movements	Increased illumination on roads between the NGBR Project and construction camps caused by vehicles travelling at night
Operation	
Vegetation clearing	Increased visual permeability Change in landscape from native vegetation to cleared land
Lighting	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
Rail infrastructure and facilities	Increase in presence of built infrastructure in the landscape.

4.8.3 Management objective

- Minimal change to scenic amenity from residential viewpoints and sensitive receptors.
- Light spillage into areas adjacent to the NGBR Project area is minimised during construction and operation.

4.8.4 Performance criteria

- No complaints from community about significant lighting impacts or scenic amenity during construction.
- No complaints from community about significant lighting impacts during operation.

4.8.5 Management and mitigation measures – scenic amenity and lighting

Timing	Controls	Responsibility	Trigger/applicability	Documentation
Detailed design	Where feasible, detailed design would incorporate the following measures: • Positioning security lighting at permanent facilities to minimise the potential for lighting impacts • Landscape planting around maintenance facilities.	Design Contractor	-	Design Plan
Construction	Materials and machinery will be stored tidily.	Construction Contractor	Temporary construction laydown areas	Induction
Construction	Plan construction works to avoid the need for night works in the vicinity of sensitive receptors which are likely to be moderately impacted during construction	Construction Contractor	-	Work Plan
Construction	Lighting during night works will be positioned to minimise light spillage beyond the boundaries of construction areas. This includes consideration of directional lighting and shields where sensitive receptors may be affected.	Construction Contractor	Night works	-
Construction	Liaise with adjoining land owners with the potential to be moderately impacted during construction on minimising the impacts from on-site lighting prior to works commencing.	Construction Contractor	Night works in the vicinity of landowners	-
Construction	Clearing of mature landscape trees will be avoided within temporary construction laydown areas not required for operation, where possible.	Construction Contractor	Temporary construction laydown areas	Site layout drawing
Construction	Temporary boarding, barriers and traffic management signage will be removed as soon as practical after construction.	Construction Contractor	Temporary boarding, barriers and traffic management signage	Induction

4.8.1 Monitoring and corrective actions – scenic amenity and lighting

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Construction	Monitoring and reporting activities will include a regular check on tidiness of access roads and worksites.	Construction Contractor	Weekly	Corrective actions may include: • Tidy up access roads and worksites • Raise awareness with construction workforce.
Construction Operation	Complaints relating to scenic amenity and lighting will be recorded and regularly reviewed.	Construction Contractor Rail Operator	-	Manage complaints in accordance with the complaints management procedure.
Operation	Lighting levels will be measured annually in the vicinity of sensitive receptors to identify opportunities to reduce lighting impacts.	Rail Operator	Annually	Corrective actions will be determined as part of the annual review, which may include: • Repositioning or redesign of lighting if found to spill offsite excessively, where required. • Vegetation screening.

4.9 Traffic management

4.9.1 Existing values and potential impacts

Construction and operation of the NGBR Project has the potential to impact the existing transport network that will be utilised for transporting material and personnel, including:

- Key roads
- Key intersections
- Public and active transport
- Proposed infrastructure
- Rail infrastructure
- Air infrastructure
- Port infrastructure.

Construction traffic associated with the NGBR Project, including heavy vehicle movements, will create short-term increases in traffic volumes on local and State-controlled roads. However, due to the relatively low existing traffic volumes on these roads, the performance of all key roads is anticipated to operate satisfactorily at Level of Service (LOS) C (C=stable flow) or better. Based on the nominal capacity of the road network, the additional construction traffic resulting from the project can be adequately accommodated at acceptable levels of service.

Due to the relatively small number of operational workforce, and the currently capacity of the existing road network (LOS A, with A = free, unrestricted flow), operational traffic is anticipated to have a minimal impact on the performance of key roads and key road intersections within the study area.

4.9.2 Management objective

Maintain performance of NGBR Project key roads.

4.9.3 Performance criteria

- No traffic incidents resulting in an unacceptable reduction in traffic flow.
- No increase in traffic accidents attributable to the NGBR Project.

4.9.4 Management and mitigation measures – traffic management

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Detailed design	Consult with Isaac Regional Council (IRC), Whitsunday Regional Council (WRC) and the Department of Transport and Main Roads (DTMR) and landholders in regard to stock holding yards to manage and regulate movement of stock across the NGBR Project.	Design Contractor	-	-
Detailed Design	Detailed design of the NGBR Project will include measures that allow users of the Bicentennial National Trail safe and uninterrupted access through the final rail corridor.	Design Contractor	-	-
Detailed Design	To minimise the potential land use impacts on affected properties, the following will be considered during detailed design: • Private tracks and occupational crossings within and between properties will be maintained to assist in mitigating fragmentation and facilitate access to other portions of land that have been severed by the final rail corridor. • Private tracks will be joined to local roads or grade-separated to preserve their utility. Occupational crossings will be constructed to provide access typically under the NGBR Project final rail corridor. In other instances it may be necessary to provide occupational crossings and/or stock crossings at-grade, including appropriate protection measures. • Minimise the extent of intrusion of the final rail corridor into the property, including the location of the corridor adjacent to property boundaries.	Design Contractor	-	-
Detailed Design	Temporary traffic management strategies and interface agreements will be developed during detailed design in consultation with DTMR for the duration of the construction works and will include consideration of the following: • Construction of acceleration / deceleration lanes • Construction of passing lanes to allow construction traffic and through traffic to safely manoeuvre and pass with minimal disruption	Adani Design Contractor	-	Temporary traffic management strategies and interface agreements
Detailed Design	Coaches used to transport FIFO workers will be compliant with the	Adani	-	-

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
	requirements of the *Disability Discrimination Act 1992*.			
Pre-construction	Limit overall areas of disturbance during construction. Any modifications to existing access tracks or occupational crossings will be undertaken in consultation with affected landholders.	Construction Contractor	-	-
Pre-construction	A **Construction Traffic Management Plan** (TMP) will be developed and implemented prior to construction commencing on site. Development of the TMP will include consultation with DTMR to identify mitigation measures to address the relative increase in traffic levels on affected road sections of the State-controlled road network. Consultation with DTMR, WRC and IRC will also be undertaken in relation to the specific requirements of the TMP, and the QPS in relation to the safe movement of over-sized vehicles. The TMP will include: • Installation of specific warning signs at local access roads to construction sites to warn existing road users of entering and exiting traffic • Distribution of day warning notices to advise local road users of scheduled construction activities • Advanced notice to road users of lane closures and advice on alternative routes • Installation of appropriate traffic control and warning signs for areas identified where potential safety risk issues exist • Measures for managing transportation of construction materials to maximise vehicle loads and therefore minimise vehicle movements • Induction of truck and vehicle operators on the requirements of the TMP • Heavy vehicle routes for construction traffic accessing and exiting construction sites • Site access roads will include adequate sight and emergency stopping distances when positioning road	Adani	-	TMP

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Pre-construction	A **Road Impact Assessment** (RIA) will be prepared prior to construction commencing for all key roads and approaches to key intersections in the study area. The RIA will include detailed information on the construction and operation aspects of the NGBR Project (e.g. construction traffic vehicles, quantity of materials to be hauled, haulage routes, quarry locations, program, etc.). The RIA will confirm required road improvements to mitigate the impact of increased construction traffic and locations where a detailed Pavement Impact Assessment (PIA) is required.	Adani	-	RIA
Pre-construction	A Detailed Pavement Impact Assessment (PIA) will be prepared and submitted to DTMR/Council prior to construction commencing. The RIA will identify locations on the road network where a detailed pavement impact assessment is required. The detailed PIA will assess the impact of the construction traffic on the life of the affected road pavements and recommend remedial measures. The extent of the remedial measures and compensation will be discussed and agreed with DTMR/Council.	Adani	-	PIA
Pre-construction	Adani will communicate with the public and operators of school buses and public transport to promote awareness of the impact and management of construction and operation activities.	Adani	-	-
Pre-construction	Infrastructure agreements will be developed prior to commencement of construction activities. The agreements will be developed through the development of the project and will outline infrastructure specific management requirements to be implemented during construction and operation of the NGBR Project.	Adani		Infrastructure agreements
Construction	The TMP will be implemented.	Construction Contractor	-	TMP
Construction	The daily number of construction vehicles mobilising to and from site will be kept at a minimum. Construction personnel will be transferred by bus from the camps to the work sites will, where feasible.	Construction Contractor	-	-

Timing	Controls	Responsibility	Trigger/Applicability	Documentation
Construction	Speed limits will be restricted and enforced in all construction areas.	Construction Contractor	-	-
Operation	Appropriate controls will be implemented and maintained to access roads during operations to facilitate any ongoing maintenance activities required within the corridor; strategies will include the incorporation of appropriate fencing, gating, signage, etc.	Rail Operator		

4.9.1 Monitoring and corrective actions – traffic management

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Construction	Vehicular traffic (e.g. compliance with speed limits) will be monitored regularly during construction.	Construction Contractor	Weekly	Corrective actions may include driver education; or signage.
Construction and operation	All traffic related incidents will be recorded and managed in accordance with the NGBR Project incident management procedure.	Construction Contractor Rail Operator	As required	If traffic monitoring indicates significant increases in traffic beyond planned levels, mitigation measures will be implemented such as rescheduling site or transport activities or community notices. Relevant road manager/s will be notified in each instance of such occurrences. Incident investigations may identify the need for additional corrective actions.

4.10 Social management

4.10.1 Existing values and potential impacts

The local study area comprises the 64 properties (individual lot on plans which may be managed separately or with other lots) crossed by the NGBR Project final rail corridor (a nominally 100 m wide corridor).

The regional study area comprises the local government areas (LGAs) crossed by the NGBR Project preliminary investigation corridor (a nominally 1,000 m wide corridor) These LGAs are Whitsunday Regional Council (WRC) and Isaac Regional Council (IRC). The majority of the NGBR Project (approximately 260 km) will be located within the WRC LGA, while the remainder (approximately 40 km) will be located in IRC LGA. Key urban localities within the study area include Bowen, Collinsville (in WRC LGA) and Moranbah (in IRC LGA).

For the economic assessment the Mackay Regional Council LGA (MRC LGA) has also been considered due to the potential to source labour, equipment and materials from Mackay, which is a regional hub and a key mining service support centre in the region. Reference has been made to the Mackay, Isaac and Whitsunday (MIW) region, to indicate instances where data for the MRC LGA has been included as part of the regional study area.

The NGBR Project may impact on the following social values:

- Regional development, local and regional business and employment
- Workforce management
- Landholders and land access
- Housing and accommodation
- Community health and wellbeing
- Community and stakeholder engagement

4.10.2 Management objective

- Minimise and prevent significant negative social impacts and enhance positive social benefits from NGBR Project.

4.10.3 Performance criteria

- Key performance indicators for each strategy and initiatives are being met.

4.10.4 Management and mitigation measures – social management

Timing	Controls	Responsibility	Stakeholders	Documentation
Local and regional business and employment strategies				
Pre-construction	Consultation will be undertaken with affected landowners regarding potential loss of land during construction and operation. Where necessary, compensation with affected landholders will be negotiated.	Adani	Landowners	-
Pre-construction	Consultation will be undertaken with Ergon Energy, Powerlink, Telstra, Optus, Reef Networks, SunWater and North Queensland Gas Pipeline regarding potential disruptions to their infrastructure and appropriate protection measures will be developed.	Adani	Ergon Energy, Powerlink, Telstra, Optus, Reef Networks, SunWater, North Queensland Gas Pipeline	-
Pre-construction	Consultation will be undertaken with gas and water service providers to establish the most effective protection, relocation or modification for each service crossing in accordance with AS 4799—Installation of Underground Utility Services and Pipelines within Railway boundaries.	Adani	Gas and water service providers	-
Pre-construction	Consultation with DEHP and DNRM will be undertaken to confirm the mitigation requirements relating to development and location of the final rail corridor within RA8.	Adani	DEHP and DNRM	-
Pre-construction and ongoing	Consultation with DEHP and affected landholders will continue throughout the NGBR Project regarding existing stock routes traversed by the final rail corridor.	Adani	DEHP and affected landholders IRC and WRC	-
Pre-construction, construction and operation	Develop a Local Content Strategy in accordance with the Queensland Resources Council's, Queensland Resources and Energy Sector Code of Practice for Local Content 2013 and associated Implementation Guidelines	Adani	Adani Department of State Development, Infrastructure and Planning (DSDIP) Queensland Resources	Local Content Strategy

Timing	Controls	Responsibility	Stakeholders	Documentation
			Council (QRC) Industry Capability Network (ICN) WRC IRC Whitsunday Marketing and Development Ltd Bowen Collinsville Enterprise Office of Advanced Manufacturing	
Pre-construction, construction and operation	Develop local employment initiatives	Adani	-	-
Pre-construction, construction and operation	Develop and implement Indigenous employment initiatives	Adani	Adani Contractors B.E.S.T Bowen Employment Services Jangga, Birri and Juru Peoples Indigenous employment agencies in the region DATSIMA	-
Pre-construction, construction and operation	Development and implement initiatives to build capacity for local and regional businesses	Adani	Adani Contractors Whitsunday Marketing and Development Ltd Bowen and Collinsville Enterprise	-
Pre-construction, construction and operation	Develop recruitment and training program to enhance local employment opportunities	Adani	-	-

Timing	Controls	Responsibility	Stakeholders	Documentation
Workforce management strategies				
Pre-construction, construction and operation	Develop a Workforce Management Plan in consultation with (DETE),	Adani	Adani Contractors Workforce and families	Workforce Management Plan
Landholder impact management strategies				
Pre-construction and construction	Continue to implement, manage and monitor the existing Land Access Protocol in consultation with landholders	Adani	Adani Contractors Landholders	Land Access Protocol
Pre-construction	Engage in fair and reasonable land acquisition negotiation processes	Adani	Landholders	-
Housing and accommodation impact management strategies				
Construction and operation	Monitor regional housing conditions through consultations with key housing stakeholders in Bowen and Collinsville	Adani	-	-
Construction and operation	Implement an approach to accommodation management that is transparent and flexible to changing housing conditions between now and when the NGBR Project commences.	Adani	-	-
Community health and wellbeing management strategies				
Construction and operation	Develop a Workforce Integration and Cohesion Program	Adani	Adani, WRC Other service providers (to be identified)	Workforce Integration and Cohesion Program
Pre-construction	Engage with emergency service providers for input into the Emergency Management Plan and monitor Project's impact on their services	Adani	Adani, Queensland Fire and Rescue Services Queensland Police Services Queensland Ambulance Service	Emergency Management Plan

4.10.1 Monitoring and corrective actions – community and stakeholder engagement

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Construction Operation	Monitor success of the implementation of the various amenity management plans and Traffic Management Plan through the Grievance Management Procedure which will be managed by the stakeholder engagement team	Adani	ongoing	Amend management strategies as required.
Construction Operation	Social impacts and the effectiveness of management strategies will be reviewed and reported through Adani's annual reporting processes.	Adani	Annually	Amend management strategies as required.
Construction Operation	The stakeholder engagement team will monitor success of the implementation of the various amenity management plans and TMP through the Grievance Management Procedure.	Adani	Annually	Updated plans.
Construction Operation	Monitor the NGBR Project impact on emergency service providers.	Adani	Annually	Amend management strategies as required.

4.11 Cultural heritage management

4.11.1 Existing environmental values and potential impacts

Indigenous cultural heritage places are likely to occur within the study area, with particularly high concentrations expected upon raised terraces overlooking the many permanent fresh water sources that are traversed by the final rail corridor.

No non-Indigenous cultural heritage sites were identified within the NGBR Project footprint. Furthermore it is considered that there is low potential for previously unidentified heritage places to be found within the final rail corridor.

4.11.2 Potential environmental impacts

Key potential impacts to cultural heritage that may result from the construction of the NGBR Project are as follows:

Table 4-13 Potential cultural heritage impacts

Activity	Potential Cultural Heritage Impact
Vegetation clearing and ground disturbance	• Vegetation clearing and ground disturbance may disturb and potentially destroy artefacts • The contextual setting of artefacts may 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

No direct impacts on places of non-Indigenous cultural heritage significance are expected.

4.11.3 Management objective

- All work shall be conducted in accordance with the duty of care requirements under the *Aboriginal Cultural Heritage Act 2003.*

4.11.4 Performance criteria

- No non-conformances with Cultural Heritage Management Plans (CHMPs).

4.11.5 Management and mitigation measures – cultural heritage

Timing	Controls	Responsibility	Trigger/ Applicability	Documentation
Pre-construction	CHMPs will be developed in accordance with the *Aboriginal Cultural Heritage Act 2003* and the Department of Torres Strait Islander and Multicultural Affairs (DATSIMA) guidelines. The CHMPs will incorporate the following information: • A process for undertaking cultural heritage surveys within the NGBR Project footprint • A process for including Indigenous people associated with the NGBR Project in assessment of the Indigenous cultural heritage values of the NGBR Project footprint and the protection and management of Indigenous cultural heritage • Processes for mitigating, managing and protecting identified cultural heritage sites and objects in the NGBR Project footprint, including associated infrastructure developments, during both the construction and operational phases of the NGBR Project • Provisions for managing the accidental discovery of cultural material, including burials • A clear recording process to assist initial management and recording of accidental discoveries • Protocols in relation to monitoring, including giving notice to the relevant Traditional Owners to provide monitors, the activities of these monitors during monitoring activities and requirements if a cultural heritage find is made • Developing a cultural heritage awareness program to be incorporated into the contractor/staff manual and induction program • A conflict resolution process.	Adani	Indigenous and Non-Indigenous cultural heritage	CHMPs

Timing	Controls	Responsibility	Trigger/ Applicability	Documentation
	In accordance with the CHMP, impacts to previously unregistered and unassessed items or places of Indigenous cultural heritage significance will be mitigated by: • Undertaking comprehensive cultural heritage surveys with all Native Title and Traditional Owner stakeholders in accordance with duty of care to protect and manage Aboriginal cultural heritage values under the *Aboriginal Cultural Heritage Act 2003* • Generating survey reports to provide detailed assessment and management recommendations • Assessing significance of any cultural heritage.	Adani	Previously unregistered and unassessed items or places of Indigenous cultural heritage significance	Indigenous Cultural Heritage Survey report
	In accordance with the CHMP impacts to previously unregistered and unassessed items or places of non-Indigenous cultural heritage significance will be mitigated by: • Undertaking comprehensive archaeological survey in accordance with duty of care to protect and manage cultural heritage values under the *Queensland Cultural Heritage Act 1992* • Generating survey reports to provide detailed assessment and management recommendations • Assessing significance of any cultural heritage	Adani	Previously unregistered and unassessed items or places of Indigenous cultural heritage significance	Indigenous Cultural Heritage Survey report
	In accordance with the CHMP impacts to previously unexpected items or places of Indigenous or non-Indigenous cultural heritage significance will be managed through: • Stop work arrangements in the vicinity of suspected finds • Establishment of buffer zones • Notification to the relevant Native Title and Traditional Owner stakeholder	-	-	-

Timing	Controls	Responsibility	Trigger/ Applicability	Documentation
	• Assessment of the cultural heritage by the relevant Native Title and Traditional Owner stakeholders • Management of all unexpected human remains finds in accordance with CHMP management provisions, 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* • Follow procedures identified in *Onsite Procedures for Historical Archaeology* (DEHP 2012).			
	All surface disturbance will be contained to areas which have been previously survey for cultural heritage, or where monitoring in accordance with the CHMP has occurred to reduce the potential impacts.	-	-	-
	Construction and operations activities will be undertaken in accordance with the prepared ILUA.	-	-	-
Pre-Construction	An assessment will be conducted of impacts on previously registered and identified items or places of Indigenous cultural heritage. The assessment will include a survey and site extent determination.	Adani	Previously registered and identified items or places of Indigenous cultural heritage	Impact assessment report
Pre-Construction	Management arrangements will be established based on the recommendations contained within the Cultural Heritage Survey reports. Management arrangements may include: • Avoidance – where the NGBR 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	Adani	Indigenous cultural heritage	CHMPs

Timing	Controls	Responsibility	Trigger/ Applicability	Documentation
	areas where otherwise project activities may have a direct impact on identified values • Monitoring – inspections, audits and/or monitoring of project activities to ensure that project activities comply with agreed management arrangements.			
Construction	Cultural heritage awareness training will be developed and implemented in accordance with the CHMPs to ensure that all personnel are aware of duty of care requirements.	Construction Contractor	Indigenous cultural heritage	Cultural heritage awareness training
Construction	Previously registered and identified places of Indigenous cultural heritage will be avoided and buffer zones will be established.	Construction Contractor	Previously registered and identified places of Indigenous cultural heritage	Construction plans CHMPs
Operation	Cultural heritage awareness training will be developed and implemented in accordance with the CHMPs to ensure that all personnel are aware of duty of care requirements.	Rail Operator	Indigenous cultural heritage	Cultural heritage awareness training

4.11.6 Monitoring and corrective actions – cultural heritage

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Construction	Monitoring of ground disturbing activities at certain locations in accordance with relevant CHMP.	Construction Contractor	As per relevant CHMP	All unexpected finds will be managed in accordance with the relevant CHMP, which may include measures such as: • Stop work arrangements in the vicinity of the finds, e.g. establishment of exclusion zones • Notification
Construction / Operation	Audits will be conducted against compliance with the CHMPs.	Adani	Quarterly	Corrective and preventive actions will be identified for all non-conformances identified during the audits.

4.12 Hazardous substances management

4.12.1 Existing environmental values and potential impacts

The environmental values to be protected with regards to hazardous substances include:

- Human health, wellbeing and safety
- Community amenity
- The health and biodiversity of ecosystems.

The construction and operation of the NGBR Project has the potential to expose sensitive receptors, including site personnel, to hazardous substances. In addition, hazardous substances may impact on other environmental values including those of soil, air, surface water and groundwater.

4.12.2 Potential environmental impacts

Key potential impacts from the use, storage and handling of hazardous substances during construction and operation of the NGBR Project are as follows:

Table 4-14 Potential impacts from hazardous substances

Activity	Potential Environmental Impact
Construction	
Storage, handling and use of hydrocarbons and other environmentally hazardous substances	• Spills and leaks and subsequent degradation of soil and/or water quality, and impact to terrestrial and aquatic ecology • Large spills of environmentally hazardous materials, or leaks that are allowed to continue over long periods of time may cause contamination of groundwater
Operation	
Storage, handling of hydrocarbons and use of other environmentally hazardous substances	• Spills and leaks and subsequent degradation of soil and/or water quality, and impact to terrestrial and aquatic ecology • Large spills of environmentally hazardous materials, or leaks that are allowed to continue over long periods of time may cause contamination of groundwater

4.12.3 Management objective

- Prevent and minimise impacts on environmental values from inappropriate storage and handling of hazardous substances.

4.12.4 Performance criteria

- No spills to soil, air or water.

4.12.5 Management and mitigation measures – hazardous substances

Timing	Controls	Responsibility	Trigger/ Applicability	Documentation
Detailed Design	Provisions will be made for fuel, oil and chemical storage areas to be designed in accordance with relevant Australian Standards.	Adani	Hazardous substances storage areas	Design specifications
Pre-construction	An emergency spill response plan will be developed prior to construction commencing, including containment, clean-up and reporting requirements for spills, and all staff will be trained accordingly.	Construction Contractor	Spills	Construction emergency spill response plan
Pre-operation	An emergency spill response plan will be developed prior to operation commencing, and all staff will be trained accordingly.	Rail Operator	Spills	Operation emergency spill response plan
Construction Operation	Dangerous goods and hazardous substances will be transported in accordance with the current *Australian Code for Transport of Dangerous Goods by Road and Rails* (ADG)	Construction Contractor Rail Operator	Transport of dangerous goods and hazardous substances	-
Construction Operation	Oils, fuels and other hazardous substances will be stored and handled in accordance with the specifications of the safety data sheet (SDS), as appropriate. SDS will be made available where these substances are stored and/or used. All hazardous substances will be stored in bunded areas to minimise the potential for spills.	Construction Contractor Rail Operator	-	-
Construction Operation	Wastewater will be managed in accordance with the Waste Management Plan (refer to Section 4.5).		-	-

4.12.6 Monitoring and corrective actions – hazardous substances

Timing	Monitoring activity	Responsibility	Frequency	Corrective Action
Construction Operation	Storage areas will be regularly inspected to assess condition and appropriateness of storage	Construction Contractor Rail Operator	Weekly	Measures may include: • Remove inappropriately stored substances. • Repair bunding, where required. • Re-design storage area, where required.
Construction Operation	All bunded areas will be inspected regularly and each time before and after a rain event to assess capacity of bunds	Construction Contractor Rail Operator	Weekly	Empty bund to ensure required storage capacity is maintained. Visual inspection of contents of bund will determine disposal option (e.g. clear rainwater/oily sheen).
Construction Operation	The condition and adequacy of spill kits will be regularly inspected.	Construction Contractor Rail Operator	Weekly	Replace used and/or missed spill kits, as soon as practicable.
Construction Operation	All vehicles, plant and machinery will be routinely inspected and maintained to ensure they are not at risk or leaking or spilling contaminants.	Construction Contractor Rail Operator	Weekly	

Appendices

Appendix A – Emergency Management Plan

1. Emergency management

1.1 Overview

This Emergency Management Plan has been developed to manage the potential hazards and risks identified in the preliminary hazard and risk assessment undertaken as part of the NGBR Project EIS. This Emergency Management Plan will be updated and expanded throughout development of the NGBR Project as more information is available and the design progresses.

The Emergency Management Plan provides a systematic way to identify hazards and control risks while maintaining assurance that the risk controls are effective, to provide a safe and healthy work environment to its employees, contractors and visitors. The overall management of hazards and risks will include appropriate organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the workplace health and safety policy, and so managing the risks associated with the business of the organisation. The emergency management plan addresses following requirements for emergency preparedness.

- Safety in design, under the *Work Health and Safety Act 2011*
- Fire safety, achieved through a fire management sub-plan
- Contractor emergency sub-plan, to respond to accidents involving contractors
- Emergency specific plans, including
  - Vehicle accident response
  - Spill response
  - Train derailment or collision response
  - Natural hazard response

The Emergency Management Plan also defines an emergency response team, necessary equipment and training measures, all required to reliably implement the plan.

1.2 Safety in design

Work Health and Safety Act 2011 (WHS Act) imposes a duty on a person to eliminate risks to health and safety, so far as is reasonably practicable and if it is not reasonably practicable to eliminate risks to health and safety, to minimise those risks so far as is reasonably practicable. The WHS Act requires project proponent, designer, suppliers, contractors and government regulators and inspectorates to work towards the Safety in Design (SiD) in various stages. Adani has adopted SiD with an aim to prevent injuries and disease by considering hazards as early as possible in the planning and design phase. The NGBR Project will incorporate the following safety in design measures:

- Fuel, oil and chemical storage areas in accordance with relevant Australian Standards
- Rail associated infrastructure to identified ARI's
- Fire detection and response systems as per Australian Standards
- Buildings designed to Building Code of Australia.

The NGBR Project will incorporate the provision of:

- In-vehicle communication systems as per Australian Standards

- Forward collision avoidance systems for heavy vehicles
- In-cab signalling systems
- Radio communication systems
- Transponders/Global positioning system
- Rail track signalling systems
- Adequate lighting at the maintenance yard, flash butt weld area
- Advanced design for coal wagons
- Appropriate fencing along the final rail corridor which will be in accordance with existing standards for Queensland Rail – Civil Engineering, Standard Rural Fences (QR Standard Drawing Numbers 2550 and 2614A) (DTMR, 2013).

These measures will be identified in the design specifications in the engineering feasibility stage.

1.3 Fire safety

A Fire Management Pan (FMP) will be developed during the detailed design phase with an approach to safety. Typically the FMP will address the following:

- Identification of potential fire hazards which will include fuel sources, ignition (heat) sources and oxygen sources
- Fire risk assessment and risk control for activities at the flash futt welding construction depot, material handling yard and construction camps
- Safe systems of work through use of work health and safety analysis tools
- Provision of adequate information, instruction, training and supervision on works with potential for fire hazards. Provide adequate fire risk controls
- Consultation with all stakeholders
- Monitoring, review and revision of the fire risk management process
- A fire risk management assessment will be carried out in accordance with AS/NZS ISO 31000:2009.

The Bushfire Risk Analysis map prepared in June 2008 by the Queensland Fire and Rescue Service (QFRS) indicates the NGBR Project area has been classified as having a low to medium bushfire hazard.

The NGBR Project will ensure the safety of any person in a building associated with the construction and operation of the NGBR Project in the event of a fire or hazardous material emergency. The NGBR Project will implement a strategy to manage the provision of fire safety and reduce the likelihood and severity of fire hazards. This will include fire management systems (as described above), building fire safety measures, details of emergency response plans, onsite fire fighting equipment, appropriate maps and plans and an outline of any dangerous goods stored.

Appropriate design and layout of the facility and operating procedures and arrangements are essential to fire prevention. The NGBR Project will ensure compliance with the QFRS guidelines.

The buildings will be designed with attention to:

- Occupancy limits for buildings
- Means of escape from building - evacuation routes, exit doors, fire/smoke doors, evacuation signs/diagrams
- Maintenance of fire safety installations - exit signs/emergency lighting, fire extinguishers, fire hose reels, fire detection and alarm system, evacuation system, sprinkler system, hydrant system, smoke and ventilation system, standby power supply
- Housekeeping
- Evacuation planning, instructions and practice - fire and evacuation plans, fire and evacuation instructions.

All buildings, structures and fixed plants will be protected with a suitable water supply, water reticulation and hydrant system. For buildings and occupied facilities, a fire hose system or a fire hydrant system, and/or pump sets will be in compliance with the Building Code of Australia (BCA).

The fire safety systems installed in a building will be any one or combination of the methods in a building to warn people of emergency, provide for safe evacuation, restrict the spread of fire and extinguish fire. Fire detection measures proposed include the provision of:

- Smoke or other fire detection systems
- Use of plant monitoring systems such as bearing temperatures, vibrations, infra-red sensors, brake release, belt tracking, belt slip and other systems
- Effective inspection and corrective action system
- Communications with people within mine and with external response agencies

An adequate supply of water for fire fighting purposes will be provided at the rail maintenance facility. The acceptable sources of water supply will be in accordance with Section 4 Water Supplies of Australian Standard AS 2419.1-2005 Fire hydrant installations Part 1: System design, installation and commissioning (AS 2419.1), as applicable.

Water storage tanks and their capacities will be in accordance Section 5 Water Storage of AS 2419.1, as applicable. Maintenance of onsite storages will be carried out during periods of least risk, e.g. non-production and kept to a minimum time frame.

Fire protection pump sets will be installed in accordance with Australian Standard AS 2941-2008 Fixed fire protection installations - Pumpset systems. All fire extinguishers will be maintained in accordance with Australian Standard AS 1851-2005 Maintenance of Fire Protection Systems and Equipment.

The NGBR Project will develop a fire and evacuation plan with adequate instructions to people concerning the action to be taken by them in the event of fire will be provided in a building as required under the *Fire and Rescue Service Act 1990*. The *Building Fire Safety Regulation 2008* sets of the requirements for a fire and evacuation plan and will contain information such as:

- Name of the building
- Contact details for occupier of the building
- Evacuation coordination procedures for the building
- Instructions for evacuating the building safely in accordance with the evacuation coordination procedures for the building in the event of a fire or hazardous material emergency

- Method of operation of fire fighting equipment and manually operated fire alarms in the building
- Procedures for giving fire and evacuation instructions to people working in the building

1.4 Services provided by contractors

A number of contractors will provide services during operation. These may include:

- Transportation of diesel fuel to temporary storages at construction camps during the construction phase and to the maintenance facility which will be located towards the northern end near Port of Abbot Point.
- Transportation of potentially hazardous substances and other general materials to flash butt welding yard and maintenance facilities
- Services as required for concrete batching plants
- Transport to workers to site
- Waste management and disposal.

1.4.1 Contractor emergency response plan

The NGBR Project will incorporate incident prevention and response requirements into contracts which will be signed with these contractors.

1.5 Specific emergency response plans

1.5.1 Vehicle accident response

A response plan will be developed to address any occurrences of vehicle accidents. This plan will be developed prior to activities commencing on the site, and will include measures to minimise impacts associated with the vehicular accidents, including notification of emergency services with calling '000' established as the first priority response.

1.5.2 Spill response

An emergency spill response plan will be developed in accordance with the requirements of the *Environmental Protection Act 1994* and will include reporting of the spill to the Incident Controller. The spill will be assessed to identify the type of oil (lube oil, diesel or chemical), location of the spill source, the quantity of oil spilled and its environment, community, health and safety impact. The Incident Controller will undertake immediate steps to spill containment/control, recovery of spill material and waste management. Recovery operations are then commenced which includes provision of welfare, reconstruction/clean up and replenishment of material stocks.

1.5.3 Train derailments or collisions

A rail emergency recovery operation will involve multiple agencies for days or weeks depending on the extent of emergency. There may be a need to implement other emergency response plans such spill response plan.

Emergency response begins as soon a rail emergency such as derailment or collision is identified or reported. A local command centre will be established and Incident Commander nominated. The Incident Commander co-ordinate the effort of removing the property and debris associated with the wreckage. Train services will be suspended till it is established it is safe to

operate. Recovery services will include clearing debris, restoring public utilities, removing wreckage, processing insurance claims and investigating the accident.

1.5.4 Natural hazard response

The Emergency Response Plan will include responses for natural events such as cyclones and earthquakes.

1.6 Emergency response team

An emergency response team will be established to ensure trained and equipped personnel are available in the event of an incident. The team will be stationed at the maintenance facility near Abbot Point and will consist of personnel trained in emergency response as well as volunteers from each operation shift and on-duty maintenance staff.

Members of the internal emergency services will be trained in the following in relation to environmental and community hazards:

- Diesel/ oil spill response and clean-up
- Fire fighting and fire rescue
- First aid and resuscitation
- Bushfire rescue
- Response to intrusion by unauthorised people
- Response to vehicular accidents
- Response to bomb threats
- Response to cyclone warnings and post recovery operations
- Rescue – heights, water, confined spaces, vehicles and remote locations
- Handling chemicals
- Response to electrocution
- Response to snake bite

Trained first aid personnel will be employed on-site. Refresher training will be provided to these personnel. Onsite emergency services will be stationed at each construction camp site as well as at the maintenance facility near Abbot Point during the operational phase and will be available and have the capacity to respond to emergencies.

1.7 Emergency response equipment

The following equipment will be available to support incident response:

- A fully equipped first aid kit in each light vehicle
- Oil and chemical spill response equipment suitable for spills to land and creeks
- Personnel protective equipment as required to protect personnel involved in incident response activities
- Suitable communication equipment to communicate during emergencies
- Emergency response equipment

- A central first aid room equipped with response facilities such as oxygen cylinder, defibrillators and basic medical supplies

1.8 Training

All personnel will undergo a generic induction training which will include both preventative and responsive measures in relation to environmental and community hazards. Personnel will undergo specific training in hazard prevention and response in relation to their work area. Training will be updated as required throughout the duration of employment.

Adani will organise practical and desktop exercises with participation from QFRS, Queensland Police Service (QPS) and Queensland Ambulance Service (QAS). Feedback from such exercises will be incorporated in the emergency response plans and procedures.

1.9 External emergency services

The NGBR Project will interface with the following external emergency services to assist in emergency response:

- QAS – in relation to evacuation of injured persons
- QFRS – in relation to support in bushfire or coal seam fire fighting where required
- Queensland Health – acute and emergency services
- QPS – in relation to road closures, transportation of heavy loads, evacuations and unauthorised entry
- Local and District Disaster Management Groups

The interface and roles and responsibilities including communication protocols will be outlined in relevant documentation.

Appendix B – Adani Environment and Sustainability Policy

Adani Mining Pty Ltd
Environment and Sustainability Policy

Adani Mining Pty Ltd is an environmentally responsible company that is committed to protection of the environment and to the sustainable management of its operations and activities.

We will achieve this by:

- Promoting engagement, participation and a culture of innovation;
- Encouraging the efficient use of water and energy, recycling of materials, reduction of waste and prevention of pollution;
- Improving our management if greenhouse emissions and energy efficiency;
- Implementing and maintaining an Environmental Management System in accordance with AS/NZS ISO 14001;
- Meeting or exceeding environmental legislation and other criteria to which we subscribe;
- Completing regularly reviews of our environmental performance and identify and implement opportunities for improvement;
- Motivating and influencing our suppliers and subcontractors with our approach towards responsible environmental practice;
- Promoting initiatives, systems, values and behaviours that drive environmental sustainability;
- Displaying strong leadership in environmental management internally and within the industries we operate; and
- Provide a positive environmentally friendly working environment.

We all have an accountability and responsibility to:

- Immediately report and remediate any damage, spills or loss of containment;
- Follow all environment and sustainability work practices, procedures, instructions and rules;
- Work in a manner which ensures minimal environmental impact;
- Encourage other employees to work in a responsible manner; and
- Participate in training.

Samir Vora
Chief Operating Officer

Date: 24th May 2012

Appendix C – Project Approvals Register

Legislation	Approval / permit required	Comments	Timing – preparation and lodgement of application material	Project wide[1]	Site preparation / civil works[2]	100 m corridor including rail line and passing loops	Accommodation camps[3]	Rail depot (storage and manufacturing yard)	Rolling stock maintenance depot	Concrete batching plants	Temporary lay down areas (track and road crossings)	Temporary lay down areas (waterway crossings)	Water way crossings	Turning circles	Water supply[4]	Haulage and transport of plant / materials during construction and operations	Quarries and borrow pits	Ongoing railway operation and maintenance[5]	Road crossings	Rail crossings	Stock route crossings
Commonwealth approval requirements																					
Environment Protection and Biodiversity Conservation Act 1999	Controlled action assessment via Environmental Impact Statement	Assessment in parallel with State assessment under SDPWO Act	In progress	**X**																	
Native Title Act 1993	Indigenous land use agreement	Being undertaken as a concurrent process	In progress	**X**																	
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	General duty of care	Proponent has a responsibility under the Act to report the discovery of anything reasonably suspected to be Aboriginal remains.	Draft EIS CHMP development in progress	**X**																	
State approval requirements																					
State Development and Public Works Organisation Act 1971	Coordinated Project assessment via Environmental Impact Statement	Assessment by CG in parallel with EPBC Act assessment	Draft EIS	**X**																	
	Development approval under the APSDA Development Scheme	Within the APSDA	Draft EIS	**X**																	
	Declaration of a new NGBR State Development Area (SDA)	Remainder of NGBR Project not located within APSDA or on strategic port land	Post draft EIS	**X**																	
	Material change of use under a potential NGBR SDA Development Scheme	Remainder of NGBR Project not located within APSDA or on strategic port land	Post draft EIS	**X**																	
	Declaration as a Private Infrastructure Facility (PIF)	Remainder of NGBR Project not located within APSDA or on strategic port land or new SDA	Post draft EIS	**X**																	

Legislation	Approval / permit required	Comments	Timing – preparation and lodgement of application material	Project wide[1]	Site preparation / civil works[2]	100 m corridor including rail line and passing loops	Accommodation camps[3]	Rail depot (storage and manufacturing yard)	Rolling stock maintenance depot	Concrete batching plants	Temporary lay down areas (track and road crossings)	Temporary lay down areas (waterway crossings)	Water way crossings	Turning circles	Water supply[4]	Haulage and transport of plant / materials during construction and operations	Quarries and borrow pits	Ongoing railway operation and maintenance[5]	Road crossings	Rail crossings	Stock route crossings
State approval requirements																					
Sustainable Planning Act 2009 (SP Act)	Community Infrastructure designation (CID)	This may apply across the entire NGBR Project footprint within or not within APSDA, SPL or a new SDA.	Post draft EIS	X																	
	Material change of use under Belyando Shire Planning Scheme (including ERAs)	Lodged as an application under the IDAS process; assessed by the Isaac Regional Council	Post draft EIS			X	X	X	X								X				
	Material change of use under Bowen Shire Planning Scheme (including ERAs)	Lodged as an application under the IDAS process; assessed by the Whitsunday Regional Council	Post draft EIS			X	X	X	X								X				
	Development permit for reconfiguration of a lot under Belyando Shire Planning Scheme	Lodged as an application under the IDAS process; assessed by the Isaac Regional Council	Post draft EIS			X	X		X								X				
	Development permit for reconfiguration of a lot under Bowen Shire Planning Scheme	Lodged as an application under the IDAS process; assessed by the Whitsunday Regional Council	Post draft EIS			X	X		X								X				
	Development permit for operational works under Belyando Shire Planning Scheme	Lodged as an application under the IDAS process; assessed by the Isaac Regional Council	Post draft EIS		X							X	X				X				
	Development permit for operational works under Bowen Shire Planning Scheme	Lodged as an application under the IDAS process; assessed by the Whitsunday Regional Council	Post draft EIS		X							X	X				X				

Legislation	Approval / permit required	Comments	Timing – preparation and lodgement of application material	Project wide[1]	Site preparation / civil works[2]	100 m corridor including rail line and passing loops	Accommodation camps[3]	Rail depot (storage and manufacturing yard)	Rolling stock maintenance depot	Concrete batching plants	Temporary lay down areas (track and road crossings)	Temporary lay down areas (waterway crossings)	Water way crossings	Turning circles	Water supply[4]	Haulage and transport of plant / materials during construction and operations	Quarries and borrow pits	Ongoing railway operation and maintenance[5]	Road crossings	Rail crossings	Stock route crossings
State Approval requirements coordinated under the Sustainable Planning Act 2009																					
Aboriginal Cultural Heritage Act 2003	General duty of care and CHMP with each relevant Indigenous group	Being undertaken concurrently.	Draft EIS and CHMP development in progress	X																	
Coastal Protection and Management Act 1995	Works within tidal waters	Only required where the NGBR Project is developed within tidal waters	Post draft EIS			X						X	X								
Environmental Protection Act 1994	ERA 16 Extractive and screening activities	Extracting, other than by dredging, a total of 5000 tonnes or more of material, in a year, from an area or screening 5000 tonnes or more of material in a year	Post draft EIS		X												X				
	ERA 33 Crushing, milling, grinding or screening	Crushing, grinding, milling or screening more than 5000 tonnes of material in a year	Post draft EIS														X				
	ERA 63 Sewage treatment	Operating 1 or more sewage treatment works at a site that has a total daily peak design capacity of at least 21 EP.	Post draft EIS				X		X												
	ERA 64 Water treatment	Treating 10 ML or more raw water in a day. Carrying out, in a day, advanced treatment (i.e. treatment of water that has been treated in a sewerage treatment plant) of 5 ML or more of water, allowing the release of waste to waterways	Post draft EIS				X		X												

Legislation	Approval / permit required	Comments	Timing – preparation and lodgement of application material	Project wide[1]	Site preparation / civil works[2]	100 m corridor including rail line and passing loops	Accommodation camps[3]	Rail depot (storage and manufacturing yard)	Rolling stock maintenance depot	Concrete batching plants	Temporary lay down areas (track and road crossings)	Temporary lay down areas (waterway crossings)	Water way crossings	Turning circles	Water supply[4]	Haulage and transport of plant / materials during construction and operations	Quarries and borrow pits	Ongoing railway operation and maintenance[5]	Road crossings	Rail crossings	Stock route crossings
State Approval requirements coordinated under the Sustainable Planning Act 2009																					
Environmental Protection Act 1994	Suitability statement required for development on land listed on the EMR / CLR	Site assessment required to determine level of contamination and if any remediation required.	Post draft EIS		X		X		X				X				X				
	Disposal permit for removing or disposing of contaminated soil	Required where contaminated soil is proposed to be removed from site	Post draft EIS		X		X		X				X				X				
Fisheries Act 1994	Development permit for removal of / damage to marine plants	Required where the NGBR Project will involve damage to marine plants, likely in areas within the coastal zone and under tidal influence i.e. watercourse crossings at the northern end of the final rail corridor	Post draft EIS		X							X	X								
	Development permit for carrying out Operational Works / Waterway Barrier Works Permit	Required where temporary or permanent waterway barrier works are required for construction and operation works.	Post draft EIS		X							X	X								
Forestry Act 1959	Permit to search for and to get samples of quarry material	To occur early to inform the EIS process.	Granted														X				
	Sales Permit		Post draft EIS														X				
Land Act 1994	Permit for temporary road closure	May be required for establishment of site access roads	Post draft EIS		X																
	Reconfiguring a lot	Required where land parcels are required to be reconfigured or tenure converted	Post draft EIS	X																	

Legislation	Approval / permit required	Comments	Timing – preparation and lodgement of application material	Project wide[1]	Site preparation / civil works[2]	100 m corridor including rail line and passing loops	Accommodation camps[3]	Rail depot (storage and manufacturing yard)	Rolling stock maintenance depot	Concrete batching plants	Temporary lay down areas (track and road crossings)	Temporary lay down areas (waterway crossings)	Water way crossings	Turning circles	Water supply[4]	Haulage and transport of plant / materials during construction and operations	Quarries and borrow pits	Ongoing railway operation and maintenance[5]	Road crossings	Rail crossings	Stock route crossings
Land Protection (Pest and Stock Route Management) Act 2002	Permit for activity in a Stock Route area		Post draft EIS																		X
Transport Infrastructure Act 1994	Road control permit / traffic control permit	Required for works within a State-controlled road corridor and to control traffic during works on a State-controlled road	Post draft EIS		X														X	X	
Transport (Rail Safety Act) 2010	Railway Manager accreditation (infrastructure and operator)	Concurrent process	In progress	X																	
Vegetation Management Act	Development permit for Operational Works – clearing vegetation	Where clearing of assessable vegetation is required a PMAV and PVMP will be developed	Post draft EIS		X	X	X	X	X		X	X	X	X	X		X		X	X	X
Water Act 2000	Riverine protection permit		Post draft EIS									X	X		X						
	Permit to take water (temporary)		Post draft EIS												X						
	Water allocation		Post draft EIS												X						
	Water licence		Post draft EIS												X						
State approval requirements not coordinated under the Sustainable Planning Act																					
Explosives Act 1999	Permit for use, handling or transport of explosives		Post draft EIS		X											X	X				
National Greenhouse and Energy Reporting Act 2007	General duty of care	Where a report on GHG emissions associated with the NGBR Project are required under NGER	Draft EIS	X																	

Legislation	Approval / permit required	Comments	Timing – preparation and lodgement of application material	Project wide[1]	Site preparation / civil works[2]	100 m corridor including rail line and passing loops	Accommodation camps[3]	Rail depot (storage and manufacturing yard)	Rolling stock maintenance depot	Concrete batching plants	Temporary lay down areas (track and road crossings)	Temporary lay down areas (waterway crossings)	Water way crossings	Turning circles	Water supply[4]	Haulage and transport of plant / materials during construction and operations	Quarries and borrow pits	Ongoing railway operation and maintenance[5]	Road crossings	Rail crossings	Stock route crossings
State approval requirements not coordinated under the Sustainable Planning Act																					
Nature Conservation Act 1992	Permit to take / clear protected plants (includes all native vegetation)	Approval required for any proposed 'taking' or destruction of certain listed flora and fauna species or vegetation on State land	Post draft EIS		X	X	X	X	X		X	X	X	X	X		X		X	X	X
Strategic Cropping Land Act 2011 and Strategic Cropping Land Regulation 2011	Approval in accordance with SPP 1/12	Approval required where the NGBR Project will unavoidably have a permanent impact on areas of SCL	Post draft EIS	X																	
Transport Infrastructure Act 1994	Port development consent on strategic port land	On strategic port land in accordance with the Port of Abbot Point Land Use Plan, administered by NQBP	Post draft EIS	X																	
Work Health and Safety Act 2011	Permit for storage / use of dangerous goods	Where the relevant thresholds are exceeded	Post draft EIS		X		X	X	X							X	X				
Waste Reduction and Recycling Act 2011	Approval of resource for beneficial use	Where resources may be diverted from waste disposal streams and be reused as part of waste management strategy	Post draft EIS	X																	

Appendix D – Adani Management Standards and Guidelines

Adani Management Standards

- ST-03 Training and Competency
- ST-04 Documentation, Document Control and Records
- ST-18 Reviews, Audits and Inspection

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-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-128 Management Commitment

Appendix E – Waste Management Measures by Waste Type

Waste Management Measures by Waste Type – NGBR Project Construction and Operation

Waste	Hierarchy	Management
Green waste	AVOID	Clearing will be avoided by placing temporary infrastructure in areas that were previously cleared, degraded or have naturally lower aboveground biomass.
	REDUCE	Areas to be cleared will be demarcated to reduce incidental clearing.
	REUSE	As far as practicable, cleared material will be chipped, mulched and stockpiled for reuse during rehabilitation. Materials with special habitat value, such as hollow bearing logs or trees, will be selectively removed for reuse during rehabilitation, or placed in nearby bushland.
	RECOVER	Adani may seek a resource entitlement under the *Forestry Act 1959*, for the recovery and sale of timber. In this case, an authorised contractor would be engaged to remove timber.
	DISPOSE	Declared weeds will be disposed in accordance with the weed and pest management plan (refer Volume 2 Appendix P Environmental management plan framework)
Rubbish and debris	RECYCLE	Rubbish and debris includes any unexpected waste encountered during clearing and grubbing, and may include scrap metal, plastic and wood. Such wastes will be stored for collection by an authorised contractor for offsite recycling, where recycling is considered feasible.
	DISPOSE	Where rubbish and debris is not recyclable, the waste will be removed to a storage location for collection by an authorised contractor for offsite disposal.
Food waste	AVOID	Procurement of surplus food will be avoided by adhering to a Procurement Plan.
	REDUCE	Food preparation at construction camps will reduce food waste, where practicable
	RECYCLE	Options to recycle food waste by worm farming for reuse as compost will be pursued where practicable.

Waste	Hierarchy	Management
	DISPOSAL	Putrescible waste will be stored at allocated bins at each construction camp, for collection by an authorised contractor, and disposed offsite.
Wastewater	AVOID	Generation of wastewater will be avoided by installation of water saving fixtures and waterless urinals at construction camps.
	REDUCE	Wastewater will also be reduced by efficiencies in collective washing of dishes, and potential collective washing of clothes.
	REUSE	Treated wastewater will be reused for dust suppression, where suitable.
	TREAT	Wastewater, including sewage and grey water, will be treated onsite at modular aerobic treatment units.
	DISPOSE	The method of disposal of treated wastewater will be dependent on water quality. Waste water discharge limits and thresholds will be developed based on site location, ground conditions, vegetation, and proximity to waterways and groundwater sources. Site based management plans (SBMP) will be developed to ensure that site-specific treatment and discharge requirements are complied with.
Sewage sludge and residues	DISPOSE	Sewage sludge and residues, including filter cake, will be stored in modular aerobic treatment units, for collection by an authorised contractor and disposed offsite.
Spoil	REDUCE	The NGBR Project is designed to adhere to the natural ground profile, where practicable, in order to reduce earthworks.
	REUSE	A cut and fill balance will be maintained wherever possible to maximise reuse of cut material as fill. Surplus cut material, including imported material, will be reused for other construction activities, such as backfill, building pads and roads.
	RECYCLE	Surplus material that cannot be reused will be stockpiled on site. Adani will explore options to recycle spoil wherever possible. For example, by providing this material to local governments for daily cover material of their landfill sites or to other construction projects in the region.

Waste	Hierarchy	Management
	DISPOSE	Surplus material that cannot be reused will be stockpiled on site before being moved to an appropriate landfill. Spoil agreements may be sought with landholders. All stockpiles will be sited away from waterways and managed to minimise erosion and sedimentation.
Waste shotcrete	AVOID	Problematic soils will be avoided and/or batters appropriately sloped during cut and fill earthworks, avoiding the requirement for shotcrete. Procurement of surplus concrete powder will be avoided by adhering to a Procurement Plan.
	RECYCLE	Waste shotcrete will be crushed and recycled where practicable.
	DISPOSE	Waste shotcrete that cannot be recycled will be stored for collection by an authorised contractor, and disposed offsite.
Waste ANFO packaging	AVOID	Procurement of surplus ANFO will be avoided by adhering to a Procurement Plan.
	REUSE	Product stewardship arrangements will be sought, with a view to pallets being reused under return to supplier arrangements.
	DISPOSE	Waste ANFO packaging will be collected and stored in designated storage areas for offsite disposal by an authorised contractor.
Topsoil	REUSE	Topsoil will be stockpiled for reuse during rehabilitation. Stockpiles will be managed to maintain soil structure and fertility.
	TREAT	Low quality topsoil will be treated with ameliorants to improve structure and fertility.
	DISPOSE	Surplus or unusable topsoil will be disposed at locations within the 100 m final rail corridor, or on adjacent land, subject to landholder agreement and relevant environmental approvals.
Waste concrete	AVOID	Procurement of surplus concrete powder will be avoided by adhering to a Procurement Plan.
	RECYCLE	Waste concrete will be crushed and recycled where practicable.

Waste	Hierarchy	Management
	DISPOSE	Waste concrete that cannot be recycled will be collected and stored in designated storage areas for offsite disposal by an authorised contractor.
Waste bulk bags	AVOID	To avoid generation of bulk bags, concrete powder will be sourced, where practicable, from quarries in the vicinity of the NGBR Project and transported in bulk by dump truck.
	REUSE	Product stewardship arrangements will be sought with concrete powder suppliers.
	RECYCLE	Waste bulk bags will be stored for collection by an authorised contractor and recycled offsite.
	DISPOSE	Where recycling is not considered feasible, the waste will be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Waste ballast	AVOID	Procurement of surplus ballast will be avoided by adhering to a Procurement Plan.
	REUSE	All surplus ballast will be stockpiled at a ballast siding at the construction depot area (refer to Volume 1 Chapter 2 Project description), for reuse during maintenance activities.
Waste metal	AVOID	Procurement of surplus metal, including rail, will be avoided by adhering to a Procurement Plan.
	REDUCE	Waste metal will be reduce by limiting offcuts
	RECYCLE	Suitable rail offcuts or scrap metal (including metal bands from packaging of construction materials and hot waste from welding) will be stored for collection by an authorised contractor and recycled offsite. Market demand for this recyclable waste will also be considered.
Waste wood	AVOID	Procurement of surplus wood will be avoided by adhering to a Procurement Plan.
	REUSE	Waste wood will be stored on site for reuse, where practicable.

Waste	Hierarchy	Management
	RECYCLE	Waste wood that cannot be reused on site (including cable reels from packaging) will be collected in designated recycling containers for offsite disposal by an authorised contractor, where recycling is considered feasible. Market demand for this recyclable waste will also be considered.
Waste glass	AVOID	Procurement of glass for domestic uses will be avoided in the first instance for health and safety reasons (refer to Volume 1 Chapter 18 Hazard, risk, health and safety). Where glass is required for construction, procurement of surplus glass will be avoided by adhering to a Procurement Plan. Market demand for this recyclable waste will also be considered.
	RECYCLE	Waste glass will be stored at recycling bins at each construction camp, for collection by an authorised contractor and recycled offsite, where feasible.
	DISPOSE	Where recycling is not considered feasible, the waste will be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Waste plastic	AVOID	Procurement of surplus plastic will be avoided by adhering to a Procurement Plan. Generation of food packaging will be avoided through supply of reusable lunch boxes, drink bottles and cutlery to the NGBR Project workforce.
	RECYCLE	Waste plastic will be stored at recycling bins at each construction camp, for collection by an authorised contractor and recycled offsite.
	TREAT	Plastic containers will be rinsed prior to disposal to prevent regulated waste liquids entering recycling bins.
	DISPOSE	Where recycling is not considered feasible, the waste will be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Waste rubber	AVOID	Procurement of surplus rubber (e.g. gloves, earplugs, tyres) will be avoided by adhering to a Procurement Plan.

Waste	Hierarchy	Management
	RECYCLE	Waste rubber will be stored at recycling bins for collection by an authorised contractor and recycled offsite.
	DISPOSE	Where recycling is not considered feasible, or is contaminated, the waste will be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Waste paper	AVOID	Procurement of surplus paper will be avoided by adhering to a Procurement Plan. Generation of food packaging will be avoided through supply of reusable lunch boxes, drink bottles and cutlery to the NGBR Project workforce.
	REDUCE	Waste paper in office and administration facilities will be minimised by enabling 'secure print' feature on all printers and by encouraging double-sided printing.
	RECYCLE	Waste paper will be shredded and, where feasible, utilised in composting. Waste paper will be stored at recycling bins at each construction camp, for collection by an authorised contractor, and recycled offsite, where feasible.
	DISPOSE	Where recycling is not considered feasible, the waste will be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Waste cardboard	AVOID	Procurement of surplus cardboard will be avoided by adhering to a Procurement Plan. Generation of food packaging will be avoided through supply of reusable lunch boxes, drink bottles and cutlery to the NGBR Project workforce.
	RECYCLE	Waste cardboard will be stored at recycling bins at each construction camp, for collection by an authorised contractor, and recycled offsite, where feasible.
	DISPOSE	Where recycling is not considered feasible, the waste will be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.

Waste	Hierarchy	Management
Waste aluminium cans	AVOID	Procurement of surplus aluminium cans will be avoided by adhering to a Procurement Plan. Generation of food packaging will be avoided through supply of reusable lunch boxes, drink bottles and cutlery to the NGBR Project workforce.
	RECYCLE	Waste aluminium will be stored at recycling bins at each construction camp, for collection by an authorised contractor, clubs or charities, and recycled offsite.
Electrical waste	AVOID	Procurement of surplus appliances and cabling will be avoided by adhering to a Procurement Plan.
	REUSE	Product stewardship arrangements will be sought, with a view to some electrical appliances being reused under return to supplier arrangements.
	RECYCLE	Electrical waste will be stored at recycling bins at each construction camp, for collection by an authorised contractor, and recycled offsite, where feasible. Market demand for this recyclable waste will also be considered.
	DISPOSE	Where recycling is not considered feasible, the waste will be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Waste fittings, upholstery and furniture	AVOID	Procurement of surplus fittings, upholstery and furniture will be avoided by adhering to a Procurement Plan.
	RECYCLE	Waste fittings, upholstery and furniture will be stored at recycling bins at each construction camp, for collection by an authorised contractor, and recycled offsite, where feasible. Market demand for this recyclable waste will also be considered.
	DISPOSE	Where recycling is not considered feasible, the waste will be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Waste rags and absorbent materials	AVOID	Procurement of materials will be avoided by adhering to a Procurement Plan.

Waste	Hierarchy	Management
	REUSE	Rags and absorbent materials used in rolling stock maintenance will be reused in ongoing maintenance activities as far as practicable.
	DISPOSE	Where reuse is not considered feasible, the waste will be collected and stored in designated waste storage areas for collection by an authorised contractor for offsite disposal.
Waste pallets	AVOID	Procurement of surplus pallets will be avoided by adhering to a Procurement Plan.
	REDUCE	Delivery of material on pallets will be limited wherever possible. If materials have to be delivered to site on pallets, ensure that pallets are returned to the supplier at time of delivery, where practicable.
	REUSE	Product stewardship arrangements will be sought, with a view to pallets being reused under the stewardship of the supplier.
	RECOVER	Options to recover wood from pallets by chipping, for reuse as mulch, will be pursued where practicable.
Clinical and related wastes	DISPOSE	Clinical and related waste (other than biohazards or sharps), including sanitary wastes, will be collected in designated waste containers for offsite disposal by an authorised contractor. Sharps and biohazards containers will be used for separate storage and disposal.
Pharmaceuticals, drugs and medicines	DISPOSE	Waste pharmaceuticals, drugs and medicines will be collected in designated containers for offsite disposal by an authorised contractor.
Maintenance fluids	AVOID	Maintenance fluids, such as lubricants, oils and diesel, will be stored in appropriate containers within bunded areas, in accordance with *AS 1940-2004*, to avoid the generation of waste from spills.
	RECYCLE	Used engine oil or fuel filters will stored for collection by an authorised contractor, and taken offsite for recycling.

Waste	Hierarchy	Management
	DISPOSE	Waste maintenance fluids will be collected and stored in designated waste storage areas for collection by an authorised contractor, and disposed offsite. Waste maintenance fluids will be stored in the same manner as unused maintenance fluids.
Hydrocarbons and water mixtures or emulsions	REUSE	Water separated and treated from hydrocarbon and water mixtures or emulsions, including oil and water mixtures or emulsions, will be reused in a similar manner to treated wastewater.
	TREAT	Hydrocarbon and water mixtures or emulsions, including oil and water mixtures or emulsions, will be treated by removal of solids, oil separation, disinfection, filtration and chlorine dosing.
	DISPOSE	Separated oil will be stored in designated waste storage containers and removed by an authorised contractor for disposal offsite.
Tyres	AVOID	Procurement of surplus tyres will be avoided by adhering to a Procurement Plan.
	REDUCE	Plant and equipment will be operated efficiently, to reduce the frequency of tyre replacements.
	RECYCLE	Options to recycle on site for local use will be explored. These options include the following: impact-absorbing surfaces; bitumen and road construction; pastoral and agricultural use; and civil engineering applications. The above actions would be subject to a beneficial reuse approval under the *Waste Reduction and Recycling Act 2011* (refer to Volume 1 Chapter 20 Legislation and approvals).
	DISPOSE	If options for reuse or recycling are not practicable, waste tyres will be stockpiled on site, for collection by an authorised contractor and disposed offsite.

Waste	Hierarchy	Management
Batteries	AVOID	Procurement of surplus batteries will be avoided by adhering to a Procurement Plan. Lead acid vehicle batteries will be stored in appropriate weatherproof battery storage containers, to avoid the generation of waste from leaks.
	RECYCLE TREAT DISPOSE	All batteries will be collected by an authorised contractor for offsite recycling, treatment or disposal. The most suitable options will be determined prior to construction and operation commencing.

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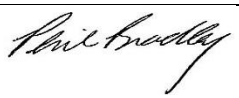
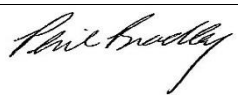
1	M Trebitsch	P Bradley		P Bradley		26/11/13

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