

14. Environmental Management Plan (Off Site)

SECTION A: ENVIRONMENTAL MANAGEMENT FRAMEWORK

14.1 Introduction

14.1.1 Project Background

The Carmichael Coal Mine and Rail Project (the Project) comprises of two major components:

- ▶ The Project (Mine): a greenfield coal mine over Exploration Permit for Coal (EPC)1690 and part of EPC1080, which includes both open cut and underground mining, on mine infrastructure and associated mine processing facilities (the Mine) and offsite infrastructure.
- ▶ The Project (Rail): a greenfield rail line connecting the Mine to the existing Goonyella rail system to provide for export of coal via the Port of Abbot Point and/or the Port of Hay Point (Dudgeon Point expansion).

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

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

14.1.2 Environmental Management for the Carmichael Coal Project

Adani operates within an established Health, Safety and Environment (HSE) Management System.

In relation to site and project specific requirements, the Adani Mining HSE Management System applies on a site-specific and project-specific basis and is managed by the HSE function on each site and overseen by the relevant area managers.

For projects and operating sites, the HSE management system requires:

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

This EMP has been prepared in compliance with the requirements of the Adani HSE management system. It has also been developed to meet requirements of Queensland Department of Environment and Heritage Protection (EHP) in relation to the issue of an environmental authority (mining lease).



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

- ▶ Mining activities, being all activities carried out within the mining leases. Environmental management of these activities is covered in the EMP (Mine)
- ▶ Off-site mining infrastructure, including:
 - Workers accommodation village
 - Dedicated airport
 - Off-site industrial area
 - Associated infrastructure including:
 - water supply, storage and transfer infrastructure
 - transmission lines
 - access roads
 - Railway activities and associated maintenance facilities.

This EMP (Offsite) covers the off-site infrastructure component.

Rail activities are covered in the Rail (EMP) Volume 3, Section 13.

Each environmental management plan covers:

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

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

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

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

- ▶ Changing significance of impacts and hazards associated with the mining activity
- ▶ Changes in legal and other obligations
- ▶ Learnings and corrective actions from monitoring activities.

Reviews of the EMP and management review requirements are set out in Section 14.15.



As the Project has a proposed operating life of 90 years, it is likely that significant changes in legislation, policy and available techniques in relation to environmental management will occur during the life of the project. Annual review of the EMP will ensure that changes are adopted.

14.2 Project Description

14.2.1 Project Location

The Project (Mine) is located in the northern part of the Galilee Basin, Central Queensland. The Mine will be developed over EPC1960 (incorporating Mining Lease Application (MLA) 70441) and part of EPC1080, located approximately 160 km north-west of the town of Clermont.

14.2.2 Offsite Infrastructure

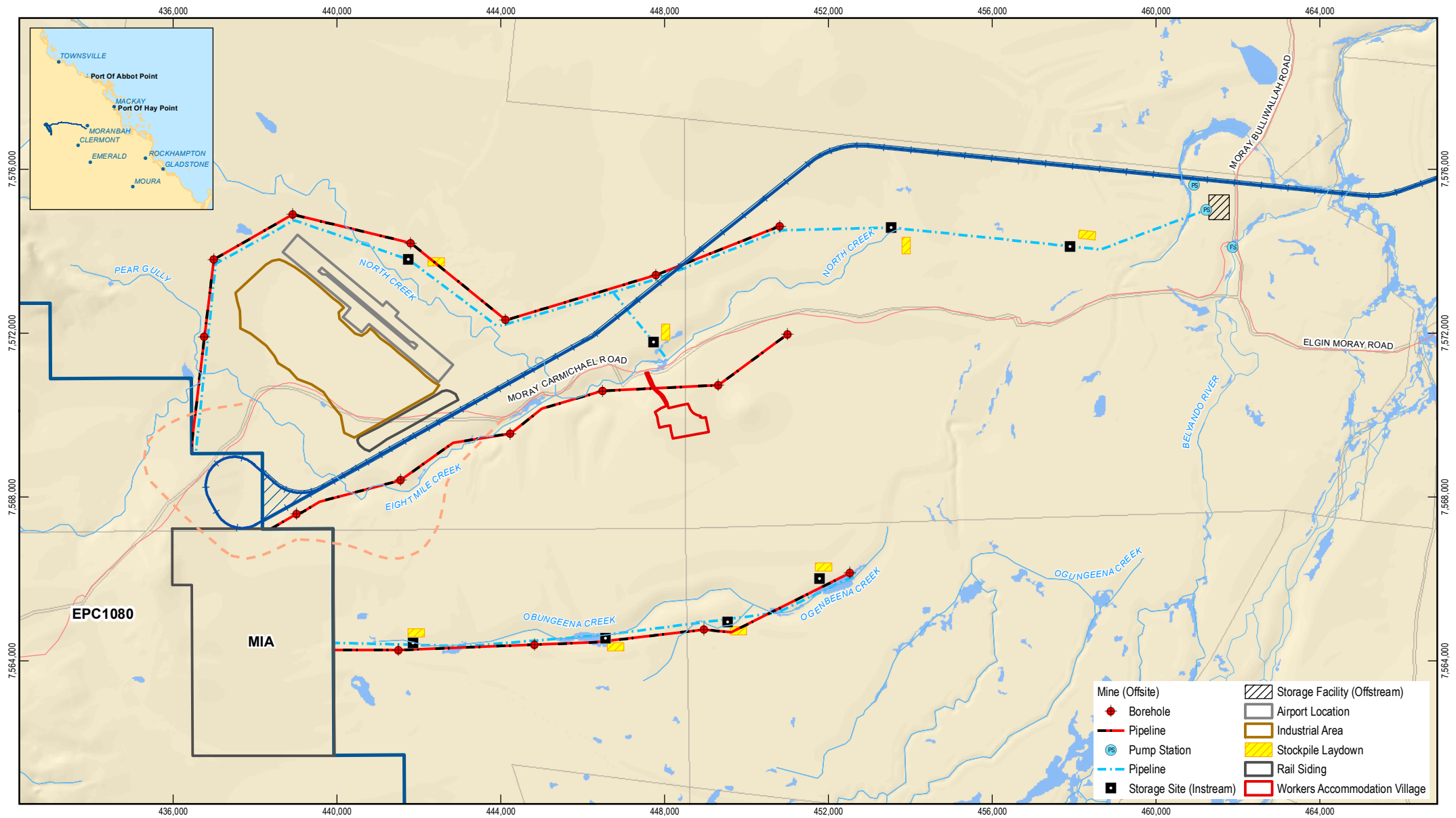
Offsite infrastructure necessary for the Project (Mine) includes that required for the successful construction and operation of the Mine (Figure 14-1). All Project (Mine) offsite infrastructure will be situated on the Moray Downs cattle station, Lot 662 on PH1491, to the east of the Mine site, including:

- ▶ Workers accommodation village
- ▶ Permanent airport
- ▶ Heavy industrial area
- ▶ Offsite water supply infrastructure
- ▶ Upgrade and realignment of Moray Carmichael Road

14.2.2.1 Workers Accommodation Village

The workers accommodation village will be located approximately 12 km east of the Mine and be accessed via the upgraded and realigned Moray Carmichael Road. The village will have capacity to accommodate up to 3,000 persons to accommodate construction and operational workforces for the Mine. All supporting recreational, health and safety requirements for workers will be provided in the village. The permanent airport will be positioned approximately 5 km west of the workers accommodation village and will provide access for fly-in-fly-out workers. Offsite water supply infrastructure will enable the extraction, storage and delivery of water during the construction and operation phases of the Project (Mine). The infrastructure will extend along the waterways North Creek and Belyando River.

The workers accommodation village will be purpose built to accommodate the workforce for the construction and operation of the Project (Mine). Facilities at the workers accommodation village will include medical facilities; recreational areas such as outdoor barbecues and shelters; recreational facilities including gymnasium, sport fields; covered walkways and hard and soft landscape treatments; laundry facilities; bus pick up and set down area and parking areas.



0 1 2 3 4
Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



LEGEND

- Town
- State Road
- Local Road
- Other Railway
- Cadastral Parcel
- Watercourse
- Waterbody
- Rail (West)
- Rail (West)
- Mine (Onsite)
- Mine Infrastructure Area
- Moray Carmichael Road (Realignment)
- Storage Site (Instream)
- Storage Facility (Offstream)
- Airport Location
- Industrial Area
- Stockpile Laydown
- Rail Siding
- Workers Accommodation Village



Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project

Job Number 41-25215
Revision C
Date 07-09-2012

Offsite Infrastructure Location

Figure 14-1

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14.2.2.2 Airport

An airport will function for the Carmichael Coal Mine and Rail Project to service fly-in-fly-out operation and general access to other regional and national centres. The siting of the airport considers its function of servicing the mine and rail workers accommodation. The airport will be accessed from the realigned Moray Carmichael Road and will be positioned approximately 5 km west of the workers accommodation village. The permanent airport will occupy approximately 365 ha and consist of an airstrip with a maximum length of 3,000 m and a width of 300 m, and a landside terminal of approximately 3,000 m²

14.2.2.3 Industrial Area

An industrial area will be established as part of the off-site infrastructure to provide for servicing and maintenance of vehicles and equipment for the mine. Facilities will include:

- Vehicle and equipment fabrication and maintenance workshops
- Bulk fuel storage
- Vehicle wash areas
- Warehouse and storage
- Office and administration buildings.

The industrial area will be located on a land parcel approximately 4 km to the east of the EPC 1080 lease directly to the north of the proposed rail alignment. The industrial area is located in this position to allow access to a rail siding for use in supply logistics to the mine development.

14.2.2.4 Water Supply

Water supply for the Mine and offsite infrastructure will be achieved using a combination of boreholes, mine dewatering, river flood harvesting, in-stream extraction, overland flow harvesting and water recycling. Water supply infrastructure will primarily be located offsite, however some water will be made available on site through recycling at the CHPP, mine dewatering and overland flow harvesting.

River flood harvesting is proposed at both the Belyando River and North Creek (see Figure 14-2). This will be achieved by installing pumps that will automatically switch on as river levels rise above a pre-determined level, and then switch off again when river levels fall.

The proposed Belyando River pump station will be located on the Moray Anabran on the western river bank. The pump station will consist of four centrifugal, submersible pumps operating in Duty / Assist / Assist / Standby configuration within a channel excavated to river invert depth, providing a combined flow rate of approximately 200 ML/day. The pumps will be located within a three sided concrete structure, with the control valves located on an adjacent, integral slab. All electrical equipment will be situated at high level, above the 1:100 ARI flood level. The proposed pump station structure footprint is 12 m x 10 m, with the incoming flow channel approximately 10 m wide x 15 m long.

There are several existing storage dams located adjacent to, and hydraulically connected to, North Creek and Obungeena Creek (see Figure 14-2). The dams capture water during flood periods. It is proposed that eight existing dams (four on North Creek and four on Obungeena Creek) are extended



and / or deepened to provide capacities of not more than 250 ML each. Each storage dam will have a dedicated pump station to transfer the flow to the main 20 GL storage within the mining lease.

A combination of four 250 ML storages (each 200 m x 200 m x 6.25 m deep) will be provided along North Creek. The method of extracting and releasing water from each of these storages will be via three self-priming pumps operating in Duty / Assist / Standby configuration, which will be situated on a slab adjacent to the storage, with suction pipes to the storage invert. The combined flow rate will be approximately 3 ML/day, the head requirements will vary for each pump station. Strainers will be provided on each suction pipe to protect the pumps and prevent inter-stream transfer of aquatic flora and fauna. The pump station footprints will each be approximately 10 m x 10 m. Electrical infrastructure will be located above the 1:100 ARI flood level, with locations to be confirmed at each storage.

Similarly, along Obungeena Creek, four 250 ML storages (each 200 m x 200 m x 6.25 m deep) will be provided. The three self-priming pumps (Duty / Assist / Standby) will be provided on an adjacent slab. The flow rate will be approximately 3 ML/day, head requirements will vary for each pump station location. The pump station footprints will each be 10 m x 10 m. Electrical infrastructure will be located above the 1:100 ARI flood level, with locations to be confirmed at each storage.

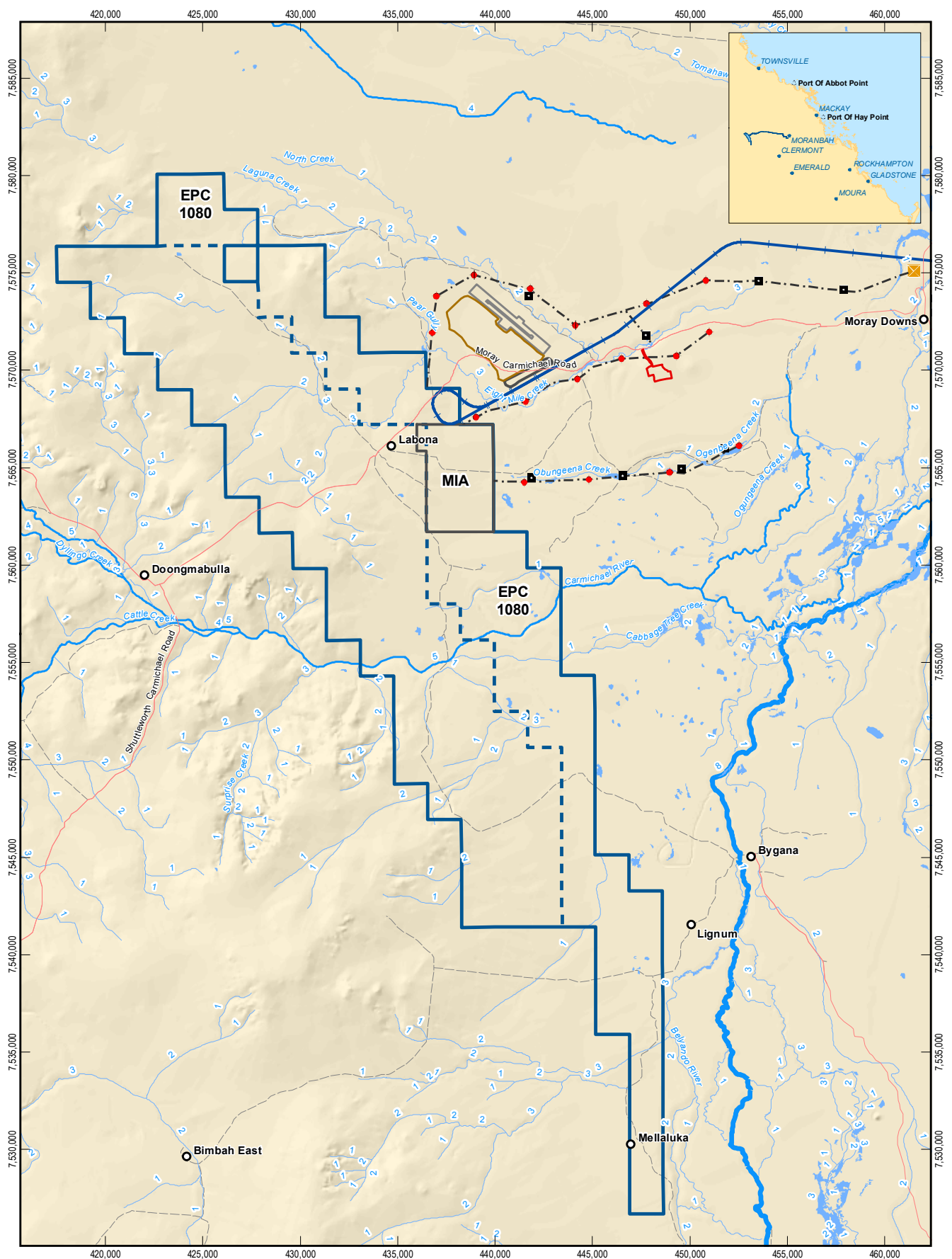
The pump stations will either be powered by local diesel generators or power from the grid. Where power from the grid is required, powerline alignments will follow the pipeline corridors identified for the associated pump station.

14.2.2.5 Access Roads

Access roads are to be provided to allow for vehicular access to:

- ▶ All pumping station and storage locations
- ▶ Air valves, scour valves and isolation valves on all pipelines (locations to be confirmed during detailed design)
- ▶ All boreholes
- ▶ All electrical infrastructure

Parking and loading areas, suitably sized for appropriate vehicles, will be provided to allow for maintenance and removal of mechanical and electrical equipment.



LEGEND

- | | | | | |
|--------------|----------------------------|--------------|--------------------------------|---------------------------------|
| ○ Homestead | — Rail (West) | Waterbodies | Mine (Offsite) | □ Airport Location |
| — Local Road | □ Mine (Onsite) | Stream Order | ● Borehole | □ Rail Siding |
| — Track | □ Mine Infrastructure Area | 1; 2; 3 | ■ Storage Site (Instream) | □ Industrial Area |
| | | 4; 5; 6 | ■ Storage Facility (Offstream) | □ Workers Accommodation Village |
| | | 7; 8; 9 | — Pipeline Network | |

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1:275,000 (at A4)
0 1 2 3 4 5

Kilometres
Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



Adani Mining Pty Ltd
Carmichael Coal Mine and Rail Project

Job Number 41-25215
Revision A
Date 19-11-2012

Surface Water Resources

Figure: 14-2

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Data Source: DERM: DCDB, Stream Network (2010); DME: EPC 1690 (2010)/EPC 1080 (2011); © Copyright Commonwealth of Australia - Geoscience Australia: Mainland, Homestead, Locality, Road (2007); Adant: Alignment Opt9 Rev3 (2012); Gassman/Hyder: Mine (Offsite) (2012); Created by: BW, MS

14.3 Environmental Management Framework

14.3.1 Environmental and Sustainability Policy

Adani is committed to the protection of the environment and to the sustainable management of its operations and activities. Adani operates within an established Health, Safety and Environment (HSE) Management System. This system has been developed to comply with relevant legislative standards for operation of coal mines within Queensland, and comprises an Environment and Sustainability Policy and HSE Management Standards. A copy of Adani's Environment and Sustainability Policy is attached in Volume 4 Appendix A.

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

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

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

14.3.2 Planning for Environmental Management

Environmental management requires a continuous process of:

- ▮ identification of impacts and risks to the environment from the mining activity and setting targets for environmental performance and protection of environmental values
- ▮ developing controls and management actions to achieve targets
- ▮ monitoring the effectiveness of controls and management actions in protecting environmental values
- ▮ implementing corrective actions where environmental performance requirements have not been achieved.

This cycle, known as the plan-do-check-act cycle is shown in Figure 14-3

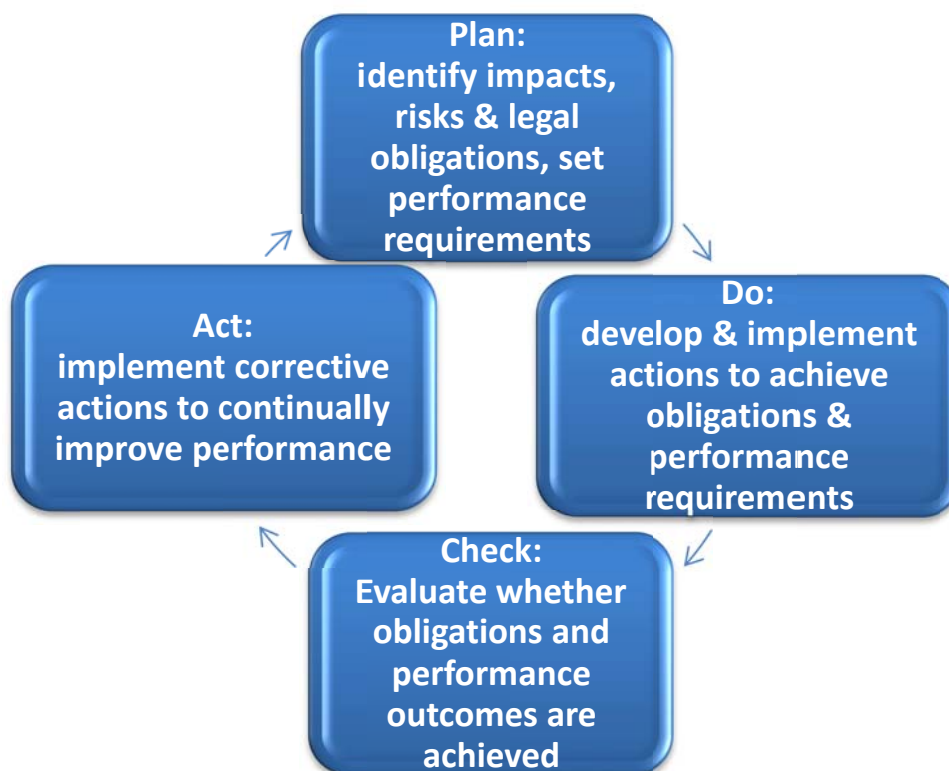


Figure 14-3 Plan-Do-Check-Act Cycle

Sub plans (in Section B) developed for this EMP reflect this process by presenting:

- ▶ legislative framework relevant to the particular element
- ▶ information on key environmental values and sensitivities potentially impacted by the mining activity
- ▶ a summary of impacts potentially arising from construction and operation
- ▶ preliminary performance outcomes in relation to management of impacts on the environmental values
- ▶ management controls for the design, construction and operation phases of the mining activity
- ▶ a program of monitoring against performance indicators and suggested corrective actions in the event that monitoring indicates that performance requirements have not been met.

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

This EMP reflects the general requirements of an environmental management system. Mapping of contents against ISO14001 requirements is provided in Table 14-1.

Table 14-1 – Mapping against EMS Requirements

ISO 14001 Requirement	How addressed
PLANNING	
Environmental policy	Section 14.3 contains Adani's Environment and Sustainability Policy
Roles and responsibilities	Section 14.4
Environmental aspects and impacts	Environmental values and potential impacts of construction and operation of the Carmichael Coal Mine are set out in Section B sub-plans for each element.
Legal and other obligations	Overarching legal and other obligations are in Section 14.5. Sub-plans for each element also include legislation relevant to these elements. Conditions of approvals not yet issued will be incorporated into the legal and other obligations register.
Objectives and targets	Section 14.6 Performance outcomes are also identified in sub-plans for each element. Monitoring requirements also include performance indicators for each monitoring requirement.
Environmental Management Program	An environmental management program has not yet been developed for the Carmichael Coal Mine
IMPLEMENTATION	
Operational control and procedures	Operational controls are set out in the individual sub-plans for each element
Training and competency	Training and competency requirements are included in Section 14.8.
Documentation and records	Documentation and record keeping is addressed in Section 14.10. Management controls in each sub-plan also specify evidence requirements in relation to implementation of each control.
CHECKING	
Checks and inspections	Requirements for checks and inspections are set out in 14.13
Monitoring	Monitoring requirements are set out in the sub-plans for each element
Auditing	Auditing requirements are provided in Section 14.14.
ACTING	
Corrective actions	Corrective action requirements are set out in Section 14.7.



ISO 14001 Requirement	How addressed
Management review	Management review requirements are set out in Section 14.15.1

14.4 Roles and Responsibilities

14.4.1 Overview

Adani Compliance Guideline HSE-CG-001 sets out requirements for assigning roles and responsibilities in relation to HSE management.

Preliminary roles and responsibilities for design and pre-construction, construction and operation phases are presented in Sections 14.4.2, 14.4.3 and 14.4.4. These will be revised once organisational structures for each phase of the project and off-site infrastructure are confirmed.

In accordance with HSE-CG-001:

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

14.4.2 Design and Pre-Construction

Table 14-2 – Roles and Responsibilities – design and pre-Construction

Role	Responsibility
CEO	Endorse Environment and Sustainability Policy Ensure that adequate resources are available to meaningfully comply with the Environment and Sustainability Policy
Adani Senior Project Management	Ensure compliance with all legal requirements including requirements of EPBC approval, environmental authority and other approvals Ensure that requirements of this EMP are incorporated into engineering and procurement processes, and that these processes do not conflict with environmental performance requirements Ensure that adequate resources are available to meet all compliance requirements and implement the requirements of this EMP Demonstrate a visible and pro-active commitment to HSE issues as per item 4.1 and 4.2 of HSE-CG-128.
Adani Contract Management and Procurement Team	Ensure that procurement and contracting strategies reflect environmental performance requirements and requirements of HSE-CG-022 and HSE-CG-021 Ensure that specifications and contracts include performance requirements in relation to energy and water efficiency and other

Role	Responsibility
	<p>measures to reduce resource consumption and waste generation</p> <p>Incorporate environmental performance requirements into contracts</p> <p>Ensure that contractors hold necessary approvals and authorisations, particularly in relation to waste management services</p> <p>Review environmental performance credentials of potential contractors</p> <p>Demonstrate a visible and pro-active commitment to HSE issues as per item 4.1 and 4.2 of HSE-CG-128.</p>
Design Manager	<p>Ensure that design requirements set out in this EMP and any other design requirements needed to meet conditions of approval are incorporated into design</p> <p>Consider safety in design and minimisation of environmental impacts in design</p> <p>Demonstrate a visible and pro-active commitment to HSE issues as per item 4.1 and 4.2 of HSE-CG-128.</p>
Design Leads	<p>Develop design checklists to reflect design requirements set out in this EMP and maintain records of compliance with design requirements</p>
Environmental Manager and advisors	<p>Provide advice to management, procurement and design teams in relation to environmental requirements</p> <p>Conduct audits and checks of environmental performance</p> <p>Manage technical studies and research activities relating to environmental assessment and management of the Project</p> <p>Further develop the EMP</p>
Stakeholder Manager	<p>Manage external relations with landholders and other stakeholders</p> <p>Coordinate investigation and response to complaints and incidents involving members of the public</p>

14.4.3 Construction

Table 14-3 – Roles and Responsibilities – Construction

Role	Responsibility
CEO	<p>Endorse Environment and Sustainability Policy</p> <p>Ensure that adequate resources are available to meaningfully Comply with the Environment and Sustainability Policy</p> <p>Demonstrate a visible and pro-active commitment to HSE issues as per item 4.1 and 4.2 of HSE-CG-128.</p>



Role	Responsibility
Adani senior project management	<p>Ensure compliance with all legal requirements including requirements of EPBC approval, environmental authority and other approvals</p> <p>Ensure that adequate resources are available within Adani and contractors to meet all compliance requirements and implement the requirements of this EMP</p> <p>Monitor close-out of corrective actions</p> <p>Review outcomes of incident investigations</p> <p>Demonstrate a visible and pro-active commitment to HSE issues as per item 4.1 and 4.2 of HSE-CG-128.</p>
Adani Contract Management Team	<p>Manage environmental performance requirements in contracts, including penalties in the event on non-compliance</p> <p>Demonstrate a visible and pro-active commitment to HSE issues as per item 4.1 and 4.2 of HSE-CG-128.</p>
Adani Environmental Manager and team	<p>Provide advice to Adani management teams and personnel in relation to environmental requirements</p> <p>Integrate environmental management requirements into work procedures and practices</p> <p>Conduct audits and checks of compliance and environmental performance of contractors</p> <p>Manage technical studies and research activities relating to environmental assessment and management of the Project</p> <p>Raise corrective actions for any non-compliance with this EMP or in response to results of incident investigations</p> <p>Conduct incident investigations Report to Adani on environmental performance including compliance, non-compliance and incidents and near misses with potential or actual environmental harm.</p> <p>Further develop the EMP</p>
Construction Managers and supervisors	<p>Implement all relevant requirements of this EMP</p> <p>Integrate environmental management requirements into work procedures and practices</p> <p>Provide initial responses to emergencies involving potential environmental impacts</p> <p>Conduct incident investigations</p> <p>Raise corrective actions for any non-compliance with this EMP or in response to results of incident investigations</p> <p>Report to Adani on environmental performance including compliance, non-compliance and incidents and near misses with potential or actual</p>

Role	Responsibility
	environmental harm.
Construction workers and all other staff	Comply with all relevant requirements of this EMP
Contractor Environmental Managers and Officers	<p>Assist and support managers, supervisors and workers in implementing the EMP and achieving environmental compliance.</p> <p>Conduct monitoring, auditing and reporting activities required in this EMP.</p> <p>Assist with incident response and investigation where required to manage and address environmental impacts of incidents.</p> <p>Conduct induction training and tool box talks on environmental topics.</p> <p>Compile monthly and quarterly environmental reports.</p>
Stakeholder Manager	<p>Manage external relations with landholders and other stakeholders</p> <p>Coordinate investigation and response to complaints and incidents involving members of the public</p>

14.4.4 Operation

Table 14-4 – Roles and Responsibilities – Operation

Role	Responsibility
CEO	<p>Endorse Environment and Sustainability Policy</p> <p>Ensure that adequate resources are available to meaningfully comply with the environmental policy Environment and Sustainability Policy</p> <p>Assign authorities and responsibilities for environmental compliance and performance</p> <p>Demonstrate a visible and pro-active commitment to HSE issues as per item 4.1 and 4.2 of HSE-CG-128.</p>
Mine General Manager	<p>Implement Environment and Sustainability Policy</p> <p>Ensure compliance with all legal requirements including requirements of EPBC approval, environmental authority and other approvals</p> <p>Monitor actioning and close out of non-conformances</p> <p>Ensure that adequate resources are available within Adani and contractors to meet all compliance requirements and implement the requirements of this EMP</p> <p>Ensure that all personnel and contractors understand environmental authorities, responsibilities and requirements</p>



Role	Responsibility
	<p>Incorporate environmental performance and compliance requirements into job descriptions and performance reviews</p> <p>Demonstrate a visible and pro-active commitment to HSE issues as per item 4.1 and 4.2 of HSE-CG-128.</p> <p>Reward outstanding performance in relation to environmental performance</p>
Area managers (accommodation village, airport, industrial area)	<p>Ensure that requirements of this EMP are incorporated into all aspects of site operation and maintenance and are implemented.</p> <p>Raise corrective actions for any non-compliance with this EMP or in response to results of incident investigations</p> <p>Conduct incident investigations</p> <p>Demonstrate a visible and pro-active commitment to HSE issues as per item 4.1 and 4.2 of HSE-CG-128.</p>
Procurement manager	<p>Ensure that specifications include performance requirements in relation to energy and water efficiency and other measures to reduce resource consumption and waste generation</p> <p>Ensure that contractors hold necessary approvals and authorisations, particularly in relation to waste management services</p> <p>Review environmental performance credentials of potential contractors</p> <p>Demonstrate a visible and pro-active commitment to HSE issues as per item 4.1 and 4.2 of HSE-CG-128.</p> <p>Meet requirements of HSE-GE-021 in relation to purchasing.</p>
Supervisors	<p>Integrate environmental management requirements with work procedures and practices</p> <p>Raise corrective actions for any non-compliance with this EMP or in response to results of incident investigations</p> <p>Coordinate initial response to incidents with potential or actual environmental harm</p>
Employees and contractors	<p>Comply with all requirements of this EMP</p>
Adani Environmental Manager and team	<p>Provide advice to Adani managers and personnel in relation to environmental requirements</p> <p>Assist and support managers, supervisors and workers in implementing the EMP and achieving environmental compliance.</p> <p>Conduct monitoring, auditing and reporting activities required in this EMP.</p> <p>Assist with incident response and investigation where required to</p>

Role	Responsibility
	<p>address environmental impacts of incidents.</p> <p>Conduct induction training and tool box talks on environmental topics.</p> <p>Compile monthly and quarterly environmental reports.</p> <p>Conduct audits and checks of compliance and environmental performance of contractors</p> <p>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</p> <p>Manage technical studies and research activities relating to environmental assessment and management of the Project</p> <p>Review, update and further develop the EMP</p>
Stakeholder Manager	<p>Manage external relations with landholders and other stakeholders</p> <p>Coordinate investigation and response to complaints and incidents involving members of the public</p>

14.5 Legal and other Obligations

14.5.1 Overview

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

Evaluation of compliance with legal and other obligations will be through a compliance audit as specified in Section 14.14 and a quarterly review of changes in legal and other obligations will be undertaken (Section 14.15).

Relevant legislation is also identified in sub plans in this EMP.

14.5.2 Applicable Legislation and Policies

Applicable legislation, policies and other statutory instruments are shown in Table 14-5. Current versions of federal legislation can be obtained from http://www.austlii.edu.au/au/legis/cth/consol_act/. Current versions of Queensland legislation can be obtained from http://www.legislation.qld.gov.au/acts_sls/acts_sl.htm.

Table 14-5 Summary of Relevant Environmental Legislation – Off-site infrastructure activities

Title	Relevance to the Mining Activity
Commonwealth Legislation	
<p><i>Environment Protection and Biodiversity Conservation Act 1999</i> (EPBC Act)</p>	<p>The EPBC Act implements Australia's obligations to protect and conserve biodiversity and heritage under a range of international treaties and agreements. In relation to projects, the Act requires assessment and approval of actions that may have a significant impact on a range of matters of National Environmental Significance, including (as relevant to the Carmichael Coal Project) threatened species and ecological communities, migratory species, World Heritage areas and national heritage places.</p> <p>The Carmichael Coal Project has been declared a controlled action on 6 January 2011 due to the likely potential impacts on Matters of National Environmental Significance (NES) (EPBC Referral 2010/5736). Assessment is to be under a bilateral agreement in place with the Queensland government.</p> <p>Activities associated with the Project may not commence until approval is granted under the EPBC Act. Once approval is granted, this EMP will need to be updated to incorporate actions required to achieve compliance with approval conditions.</p>
<p><i>Native Title Act 1993</i></p>	<p>The <i>Commonwealth Native Title Act 1993</i> (NT Act) formalises the common law recognition of ancestral domain or native title, that is rights and interests over land and water possessed by Indigenous people in Australia under their traditional laws and customs.</p> <p>Native title had not previously been extinguished over much of the off-site infrastructure area. Adani are progressing native title negotiations with relevant parties. Indigenous Land Use Agreements (ILUAs) and extinguishment assessments are being progressed.</p>
<p><i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i></p>	<p>The <i>Aboriginal and Torres Strait Islander Heritage Protection Act</i> preserves and protects nominated areas and objects in Australia and in Australian waters which are of particular significance to Aboriginals in accordance with Aboriginal tradition. There are no such areas of objects within or adjacent to the proposed off-site infrastructure area, and hence, requirements of this Act are not relevant to the off-site infrastructure activity.</p>
<p><i>National Greenhouse and Energy Reporting Act 2007</i></p>	<p>The <i>National Greenhouse and Energy Reporting Act 2007</i> sets up a range of reporting mechanisms to assist the Australian Government in understanding greenhouse gas emissions and energy consumption by corporations. This information is used to monitor emissions profiles, inform government policy, programs and other initiatives and meet National and international reporting obligations.</p> <p>Adani will be required to report under the NGER.</p>

Title	Relevance to the Mining Activity
<i>National Environment Protection Council Act 1994</i>	<p>The <i>National Environment Protection Act 1994</i> establishes the National Environment Protection Council (now known as the Environment Protection and Heritage Council). The Council is responsible for developing national environment protection measures (NEPM).</p> <p>The National Environment Protection (National Pollutant Inventory) Measure 1998 requires organisations to report on emissions of certain pollutants. Requirements relevant to Carmichael Project are discussed in Section 14.12.</p>
<i>Clean Energy Act 2011</i>	<p>The <i>Clean Energy Act 2011</i> establishes a mechanism for carbon pricing and trading. The Act currently only applies to entities producing over 25 kilotonnes of Scope 1 emissions.</p>
<i>Energy Efficiency Opportunities Act 2006</i>	<p>The <i>Energy Efficiency Opportunities Act</i> (EEO Act) applies to businesses that use more than 0.5 PJ of energy per year.</p> <p>Participants in the program are required to assess their energy use and report publicly on the results of the assessment and the business response. Decisions on energy efficiency opportunities remain at the discretion of the business.</p>
Queensland Legislation	
<i>State Development and Public Works Organisation Act 1971</i> (SDPWO Act)	<p>The SDPWO Act has a number of functions in relation to State planning and development including coordination of environmental assessments of significant projects. In relation to coordination of environmental assessments, the SDPWO Act establishes an EIS process for projects declared as Significant Projects under the Act. The Office of the Coordinator-General provides an overall facilitation and coordination process in relation to the setting of Terms of Reference for an EIS, and assessment of an EIS prepared by a proponent. In this role, the Office of the Coordinator General seeks advice from other State government agencies. Where a project is being assessed under the EPBC Act through a bilateral agreement, the Office of the Coordinator General also liaises with SEWPaC.</p> <p>The Carmichael Coal Project was declared a Significant Project under the SDPWO Act and an EIS was prepared to meet the environmental coordination requirements for significant projects.</p> <p>Work associated with the Project cannot commence until approval, in the form of a Coordinator-General's report is granted. Once approval is granted, this EMP will need to be updated to incorporate actions required to achieve compliance with approval conditions.</p>
Environmental Protection Act 1994 (EP Act)	<p>The EP Act places emphasis on managing Queensland's environment within the principles of ecologically sustainable development.</p> <p>While concerned with all aspects of ecologically sustainable development, regulations, policies and other requirements under the EP Act focus on protection of air quality, acoustic quality and water quality as well as on waste management and land contamination.</p> <p>The EP Act sets up a process for environmental approval of</p>

Title	Relevance to the Mining Activity
	<p>environmentally relevant activities as part of the development assessment process established under the Sustainable Planning Act 2009. Construction of components involving environmentally relevant activities cannot commence until a development approval (material change of use) is in place and must then comply with the conditions of the development approval.</p> <p>Environmentally relevant activities likely to be associated with the off-site infrastructure re listed in Table 14-7.</p> <p>The EP Act also imposes a 'General Environmental Duty' requiring all individuals and organisations to take all reasonable and practical measures to avoid environmental harm.</p>
<i>Environmental Protection Regulation 2008 (EP Regulation)</i>	<p>Schedule 2 of the EP Reg lists 64 Environmentally Relevant Activities (ERAs) including waste disposal, motor vehicle workshop and sewage treatment. The regulations also provide a regulatory regime for minor issues involving environmental nuisance such as noise.</p>
<i>Environmental Protection (Waste Management) Regulation 2000</i>	<p>The <i>Environmental Protection (Waste Management) Regulation 2000</i>, implements various waste management matters covered by the EP Act.</p> <p>Relevant to the Carmichael Project, this regulation sets up a system for tracking of certain wastes that are hazardous to the environment. The system tracks wastes from the point of generation to the point of disposal through a docket system. See also Section 14.21.</p>
<i>Environmental Protection (Water) Policy 2009 (EPP Water)</i>	<p>The EPP (Water) establishes environmental values in relation to water resources. The EPP and also sets up frameworks for water quality guidelines and prescribes specific water quality objectives for a number of basins in Queensland. Specific water quality objectives have not yet been prescribed for the Burdekin Basin, and hence, water quality objectives default to the objectives required to protect the environmental values of waters.</p> <p>Environmental values and water quality objectives derived for the Carmichael Project are discussed in Section 14.19.</p>
<i>Environmental Protection (Noise) Policy 2008 (EPP Noise)</i>	<p>The EPP Noise defines environmental values in relation to the acoustic environment and sets acoustic quality objectives.</p> <p>Environmental values and acceptable noise levels for the Carmichael Project off-site infrastructure are discussed in Section 14.18.</p>
<i>Environmental Protection (Air) Policy 2008 (EPP Air)</i>	<p>The EPP Air defines environmental values in relation to air quality and sets ambient air quality objectives.</p> <p>Environmental values and acceptable noise levels for the Carmichael Project off-site infrastructure are discussed in Section 14.16.</p>
<i>Mineral Resources Act 1989 (MR Act)</i>	<p>The MR Act covers prospecting, exploration and mining of minerals in Queensland. It does not apply to the off-site infrastructure as this will not be located within a mining lease or other mining tenure held by Adani.</p>

Title	Relevance to the Mining Activity
<i>Waste Reduction and Recycling Act 2011</i>	<p>The legislation establishes a framework for waste management and resource recovery practices in Queensland. The purpose of the new legislation is to promote waste avoidance and reduction and to encourage resource recovery and efficiency.</p> <p>The WRR Act does not impose any particular obligations on Adani in relation to the Carmichael Project off-site infrastructure, but does establish frameworks for introduction of a range of waste management strategies and initiatives such as waste levies, product stewardship programs and other resource recovery programs. These may have implications in relation to waste management services required by Carmichael Project.</p>
<i>Sustainable Planning Act 2009 (SP Act)</i>	<p>The SP Act provides a framework for development assessment and approval in Queensland, bringing together requirements of a range of legislation. As it is intended that a State Development Area be declared over the main off-site infrastructure area, a material change of use under the Planning Scheme will not be required. However, a material change of use for conduct of environmentally relevant activities will be required (see also Table 14-7).</p> <p>A range of operational works approvals will be required including:</p> <ul style="list-style-type: none"> • Waterway barrier works approval for in-stream water supply dams • New or raised dams, if failure of the dam would put two or more people at risk • Clearing native vegetation • Constructing structures for taking or interfering with water. <p>Lot reconfiguration may also be required and is covered under the SP Act.</p>
<i>Water Act 2000 (Water Act)</i>	<p>The Water Act provides for management and sustainable use of freshwater resources in Queensland, including surface waters and groundwater.</p> <p>The approach to sustainable management of water resources is through the development of a Water Resource Plan (WRP) and Resource Operations Plan (ROP) for each basin. The WRP and ROP set out the rules for allocation and use of water resources.</p> <p>The Carmichael Project within the area covered by the <i>Water Resource (Burdekin Basin) Plan 2007</i>.</p> <p>Under the Water Act a licence is required for taking or interfering with water, diversion of waterways and interfering with flow by impoundment of a waterway and will therefore be required for the water supply scheme. A riverine protection permit is also required for works in a watercourse.</p>
<i>Water Resource (Burdekin Basin) Plan 2007.</i>	<p>Water resource plans set out the requirements for sustainable management of water resources, when water may be taken with and without an allocation and matters to be considered when granting allocations.</p>



Title	Relevance to the Mining Activity
<i>Water Supply (Safety and Reliability) Act 2008</i>	Among other things, this Act regulates dams that are not hazardous waste dams. Constructing or raising a dam is assessable development under the SP Act if failure of the dam would put more than 2 people at risk. The Act sets out requirements for failure impact assessment and other dam safety related requirements.
<i>Fisheries Act 1994</i>	This Act regulates activities such as fishing, development in fish habitat areas, and damage to and destruction of marine plants in Queensland. Constructing or raising a waterway barrier is assessable development under the SP Act and Fish Habitat Management Operational Policy FHMOP 008 (Waterway barrier works development approvals) is established under the <i>Fisheries Act 1994</i> to guide application for waterway barrier works approval.
<i>Aboriginal Cultural Heritage Act 2003</i>	<p>The Aboriginal Cultural Heritage Act 2003 establishes a 'cultural heritage duty of care', which requires that a person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage.</p> <p>In order to discharge this duty of care, Adani has entered into cultural heritage management agreements with the Wangan and Jagalingou People registered native title claim (QUD85/04, QC04/6).</p>
<i>Queensland Heritage Act 1992</i>	The <i>Queensland Heritage Act 1992</i> provides for the conservation and protection of places and items of historical and/or non-Indigenous cultural heritage. There are no places protected under this Act within the Carmichael Project off-site infrastructure area.
<i>Nature Conservation Act 1992 (NC Act)</i> <i>Nature Conservation (Protected Plants) Conservation Plan 2000</i> <i>Nature Conservation (Wildlife Management) Regulation 2006</i>	<p>The objective of the NC Act is to conserve nature which is to be achieved by an integrated and comprehensive conservation strategy for the whole of Queensland, involving amongst other things the protection of native wildlife and its habitat.</p> <p>A permit under the NC Act will be required for clearing of all native plants. A permit will also be required if a confirmed breeding place for a native animal is to be disturbed.</p> <p>The <i>Nature Conservation (Protected Plants) Conservation Plan 2000</i> sets out certain requirements in relation to permits to clear native plants. The <i>Nature Conservation (Wildlife Management) Regulation</i> sets out requirements in relation to permits for tampering with breeding places</p> <p>A permit is also required for fauna spotters involved in vegetation clearing activities to authorise taking of native animals that may require relocation.</p>
<i>Vegetation Management Act 1999 (VM Act)</i>	The VM Act sets up a process for classifying remnant vegetation and for protecting and conserving remnant vegetation and associated ecological and biodiversity values. Clearing of vegetation specified under the VM Act is assessable development under the SP Act and a development approval is required.

Title	Relevance to the Mining Activity
<i>Land Protection (Pest and Stock Route Management) Act 2002</i>	<p>The purpose of the <i>Land Protection (Pest and Stock Route Management) Act 2002</i> (LP Act) is to provide for pest management and for land and stock route network management.</p> <p>Under the LP Act landholders are required to manage certain declared weeds. Weed management is covered in Section 14.22.</p>
<i>Land Act 1994</i>	<p>The <i>Land Act 1994</i> regulates non-freehold land, and also provides a mechanism for conversion of leasehold land into freehold land. The location of the off-site infrastructure is leasehold land (Moray Downs) but Adani will seek to convert this portion to freehold land. While the land remains leasehold, conditions of the lease must be adhered to.</p>
<i>Strategic Cropping Land Act 2011</i> (SCL Act)	<p>The SCL Act protects areas identified as strategic cropping land, being areas of high quality agricultural land. There are no such areas within the Carmichael Project off-site infrastructure area.</p>
<i>Clean Energy Act 2008</i>	<p>This Act applies to business using more than 30 TJ of energy, but less than 500TJ and requires reporting of emissions</p>

14.5.3 Licences, Permits and Approvals

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

If these key approvals are issued, then Adani will be required to obtain a range of additional environmental approvals and permits as set out in Table 14-6. As permits and approvals are issued, Table 14-6 and relevant sub-plans in this EMP will be updated to reflect conditions of approval.

Table 14-6 Approvals Register

Legislation	Approval or Permit	Trigger
EPBC Act	Approval to undertake a controlled action	Potentially significant impacts on matters of national environmental significance
SDPWO Act	Coordinator-General's report	Declaration of the Carmichael Coal Mine and Rail Project as a Significant Project for which an EIS is required.
SDPWO Act	Development Approval	Development within a State Development Area
SP Act	Material change of use	Conduct of an environmentally relevant activity (including construction of the facilities required for the environmentally relevant activity) (see also Environmentally relevant activities proposed at the off-site infrastructure area are shown in Table 14-7).
SP Act	Operational works to clear native vegetation	Clearing of any endangered, of concern or least concern regional ecosystems

Legislation	Approval or Permit	Trigger
SP Act	Operational works to construct or raise a waterway barrier	Any works in-stream that might temporarily or permanently interfere with fish passage
SP Act	Operational works to construct or alter a dam	Construction or alteration of a dam that triggers a failure impact assessment. The 5 GL offstream storage may trigger this approval subject to failure impact assessment.
SP Act	Operational works to take or interfere with water	Taking or interfering with water of the operation is mentioned as assessment development under a regulation or water resource plan
SP Act	Reconfiguration of a lot	If it is required to reconfigure a lot, for example to allow certain land to be made freehold.
EP Act	Registration certificate	Operator of a mining activity or an environmentally relevant activity
NC Act	Permit to take protected plants	Clearing of native vegetation
NC Act	Permit to take protected animals	Handling of native fauna encountered prior to or during vegetation clearing
NC Act	Permit to tamper with a breeding place	Required if any confirmed animal breeding places are disturbed by the off-site infrastructure activity
Water Act	Riverine protection permit	Disturbance to the bed and banks of a watercourse.
Water Act	Licence to interfere with flow by impounding water	Required if impoundment of any watercourse, lake or spring is to occur.

Environmentally relevant activities proposed at the off-site infrastructure area are shown in Table 14-7

Table 14-7 Environmentally Relevant Activities

ERA number	ERA description (Refer to Schedule 2 and Schedule 6 – <i>(Environmental Protection Regulation 2008)</i>)	Aggregate Environmental Score
8.1	Chemical Storage – storing a total of 50 t or more of chemicals of dangerous goods class 1 or class 2, division 2.3	51
8.3(b)	Chemical Storage – up to 500 m ³ of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3	85
8.5	Storing 200 m ³ or more of chemicals that are liquids, other than chemicals mentioned in items 1 to 3, under subsection (1)(d)	31
14	Electricity Generation	TBC

ERA number	ERA description (Refer to Schedule 2 and Schedule 6 – (Environmental Protection Regulation 2008)	Aggregate Environmental Score
15	Fuel Burning	TBC
18(a)	Boiler Making	Nil
21	Motor Vehicle Workshop Operation	TBC
43	Concrete Batching	TBC
56	Regulated waste storage	21
57	Regulated waste transport	7
60	Waste disposal - Operating a facility for disposing of general waste and regulated waste where the regulated waste is less than 10% of the total waste and the total quantity of waste is less than 2000 t per year	13
63	Sewage Treatment – operating sewage treatment works, other than no-release works, with a total daily peak design capacity 1500 to 4000 equivalent persons.	76
65	Water Treatment	TBC

Note: Asphalt and concrete batching at present will be carried out as mobile and temporary ERAs.

Note: TBC – AES to be confirmed based on activity requirements.

Resource entitlements are also required for applications under the SP Act that affect State resources. Requirements are set out in Schedule 14 of the *Sustainable Planning Regulation 2009*.

14.5.4 Other Obligations

A range of other obligations are in place under legislation and are shown in Table 14-8.

Table 14-8 Other Obligations Register

Legislation	Obligation
EP Act	Notification of notifiable activities
NGER Act	Reporting of greenhouse gas emissions
EEO Act	Reporting of energy use and opportunities to reduce
Native Title Act	Indigenous land use agreement in place and implemented
NEPC Act	National Pollutant Inventory reporting
ACH Act	Cultural heritage management plan
LP Act	Management of Class 2 and 2 declared weeds



Legislation	Obligation
EP Act	Authorised officers under the EP Act must be allowed entry to any areas where ERAs are being carried out on request and must be given all reasonable assistance.
Queensland Work Health and Safety Act 2011	Notification of storage of dangerous goods
Queensland <i>Clean Energy Act 2008</i>	Conduct of an energy audit and preparation of an energy savings plan. Publication of information on energy savings plan
<i>Forestry Act 1959</i>	Notify NRM of forest and quarry products on State land within the off-site infrastructure area

14.6 Performance Outcomes and Indicators

Performance outcomes and indicators are identified in each of the environmental management subplans within this EMP under Section B.

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

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

Performance indicators will be reviewed annually as part of the EMP annual review (Section 14.15.3.1).

14.7 Corrective Actions

Adani HSE Compliance Guideline HSE-CG-005 requires that Adani implements a corrective action process consisting of the following steps:

- ▶ identification of a problem (failure or deficiency);
- ▶ root cause analysis to identify causes and determine solutions;
- ▶ decision as to the appropriate action;
- ▶ application and documentation of corrective or preventative action; and
- ▶ 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) (see Section 14.13)
- ▶ Identification of hazards or improvement opportunities (see also HSE-CG-009)
- ▶ Audit recommendations (see Section 14.14)
- ▶ Complaints.

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

14.8 Training, Competency and Awareness

14.8.1 Overview

System requirement sin relation to HSE training and competency are set out in Adani HSE Compliance Guideline HAS-CG-003. In accordance with the compliance guideline, a training needs assessment will be undertaken once organisational structures are confirmed for each of the construction and operation phases of the mining activity. Interim requirements are set out in this Section.

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 HSE Management Standard HSE ST₀₃ Training and Competence.

14.8.2 Induction 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.

Environmental induction and awareness training for the off-site infrastructure component may be combined with training undertaken for the Carmichael Coal Mine, but will distinguish between compliance requirements relating to the mine and those relating only to the off-site infrastructure.

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.

14.8.3 Construction Training Matrix

A preliminary training matrix has been developed for construction activities and is shown in Table 14-9.

Table 14-9 Construction Training and Competency Matrix

Training	CEO	Adani senior project management	Adani Contract Management Team	Adani Environmental Manager and team	Construction Managers and supervisors	Construction workers and all other staff	Contractor Environmental Managers and ...	Visitors
General induction	M	M	M	M	M	M	M	
Short induction								M
Adani HSE Management System	M	M	M	M	M		M	
Legal and other obligations	M	M		M	M		M	
Degree qualification – environmental management				M			M	
Dangerous goods storage and handling				M	M	AR	M	
Waste management and minimisation			M	M	M	AR	M	
Spill prevention and response				M	M	M	M	
Fire fighting				AR	AR	AR	AR	
Vegetation clearing and in-stream work procedures				M	M	M	M	
Erosion and sediment control				M	M	M	M	
Energy and water conservation, including vehicle operation to minimise energy consumption			M	M	M	AR	M	
Cultural heritage awareness and monitoring		M		M	M	M	M	
Work permit requirements		M		M	M	M	M	
Introductory training – new or substantially amended procedures		AR	AR	AR	AR	AR	M	
Tool box talks – environmental topics including minor changes to compliance and management requirements and procedures	A R	M	M	M	M	M	M	AR

M = mandatory

AR = As relevant to work requirements

14.8.4 Operations Training Matrix

A preliminary training matrix has been developed for operation activities and is shown in Table 14-10.

Table 14-10 Operation Training and Competency Matrix

Training	CEO	Mine General Manager	Area Managers	Procurement Manager	Supervisors	Employees and contractors	Environmental Managers and Officers	Visitors
General induction	M	M	M	M	M	M	M	
Annual environmental awareness training		M	M	M	M	M	M	
Short induction								M
Adani HSE Management System		M	M	AR	M		M	
Legal and other obligations	M	M	M	AR	M	AR	M	
Degree qualification – environmental management							M	
Dangerous goods storage and handling		AR	M		AR	AR	M	
Waste management and minimisation		M	M	M	M	M	M	
Spill prevention and response		M	M		M	M	M	
Fire fighting		AR	M		M	AR	AR	
Vegetation clearing and in-stream work procedures			M		M	AR	M	
Erosion and sediment control			M		M	M	M	
Energy and water conservation, including vehicle operation to minimise energy consumption		M	M	M	M	AR	M	
Cultural heritage awareness and monitoring		M	M		AR	AR	M	
Work permit requirements		M	M		M	M	M	
Tool box talks – environmental topics including minor changes to compliance and management requirements and procedures	AR	M	M	M	M	M	M	M

Training	CEO	Mine General Manager	Area Managers	Procurement Manager	Supervisors	Employees and contractors	Environmental Managers and Officers	Visitors
Introductory training – new or substantially amended procedures		M	M	M	M	M	M	

M = mandatory

AR = As relevant to work requirements

14.9 Communication and Reporting

14.9.1 External

External reporting is expected to be required in response to legislative requirements. Initial reporting requirements are set out in Table 14-11 and this will be updated based on conditions of approval.

Table 14-11 – External Environmental Reporting Requirements

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

The Social Impact Management Plan (SIMP) contains a broader stakeholder engagement plan, including:

- ▶ Engagement with local and regional emergency services representatives
- ▶ Complaints and inquiries.

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



14.9.2 Internal – Adani Corporate

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

14.9.3 Internal – Site

Within the Carmichael Project off-site infrastructure, communications regarding environmental matters will include:

- ▶ Environmental compliance, incidents, initiatives and corrective actions as agenda items in all management meetings
- ▶ Regular toolbox talks on environmental matters
- ▶ Environmental inductions and other training as described in Section 14.8.
- ▶ 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.

14.10 Documentation, Document Control and Records

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

Other documentation and records to be retained will include:

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

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

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

14.11 Work Permits

In accordance with HSE-CG-036, any non-routine activities that might adversely affect the environment must not be performed without a work permit.

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

- ▶ any ground disturbing activity
- ▶ activities involving use of environmentally hazardous substances

- activities in areas of native vegetation
- activities in or immediately adjacent to streams and watercourses
- activities within or adjacent to Category A or B environmentally sensitive areas whether there are any cultural heritage, flora or fauna monitoring requirements
- opportunities to minimise waste generation or energy consumption
- measures to prevent environmental impacts, including:
 - impacts on environmentally sensitive areas
 - accidental clearing of vegetation
 - erosion and sediment release
 - accidental release of hazardous substances to land, water or air
 - measures to prevent noise or dust emissions exceeding the environmental authority or other legislated requirements
 - improper disposal of waste
- any requirements in relation to incident response, such as spill kits and PPE.

14.12 Monitoring and Reporting

14.12.1 Summary of Environmental Monitoring Requirements

Environmental monitoring requirements are set out in each sub plan within this EMP. Table 14-12 provides a contextual summary of the required monitoring programs across the project.

Table 14-12 – Summary of Monitoring Requirements

Element	Pre-construction	Construction	Operation
Meteorology	✓	✓	✓
Air quality	✓	✓	✓
Greenhouse gas and energy		✓	✓
Noise and vibration		✓	✓
Surface water	✓	✓	✓
Groundwater	✓	✓	✓
General and hazardous waste		✓	✓
Terrestrial ecology	✓	✓	✓
Aquatic ecology	✓	✓	✓
Scenic amenity		✓	✓



Element	Pre-construction	Construction	Operation
Erosion and sediment control		✓	✓
Contaminated land		✓	✓
Topsoil management		✓	✓
Cultural heritage	✓	✓	✓

14.13 Checks and Inspections

14.13.1 Design and Preconstruction

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

14.13.2 Construction and Operations

A site inspection will be conducted weekly by Adani's environmental team. Inspections will be carried out to assess project activities against compliance requirements set out in this EMP. The checklist will record:

- ▶ Whether each performance requirement was fully, partially or not met
- ▶ Required corrective actions
- ▶ Whether the corrective action was closed out at the time of the inspection, or entered into the corrective action register for attention. Where the non-conformance does not present a significant risk of environmental harm, and can be corrected promptly, the corrective action will be closed out on the checklist. Where the risk of environmental harm is more significant and/or the corrective action cannot be undertaken promptly, the action will be recorded in the corrective action register.

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

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

14.14 Audits

14.14.1 Overview

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

The following standards may be relevant to auditing activities:

- ▶ AS/NZS ISO 14012-1996 Guidelines for Environmental - Qualification Criteria for Environmental



Auditors

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

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

- Audit reports will be circulated to the mine manager and area managers
- Recommendations will be entered into the corrective action register
- Findings will be discussed at management meetings
- Where relevant, findings will be presented as tool box talks
- Reports and findings will be tabled at management reviews (Section 14.15.1)
- Any non-compliances that are required to be reported under legislation or conditions of approval will be reported.

Audits may be carried out in conjunction with audits for the Mine.

14.14.2 Construction

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

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

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

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

If contractors and subcontractors are utilising Adani's HSE system, system compliance audits will be

conducted based on audit requirements identified in Section 14.14.1.

14.14.3 Operation

Environmental audit processes will meet the requirements of Adani's HSE Management Standard HSE-ST-18 Reviews, Audits and Inspections. A preliminary audit schedule for the Carmichael Project has been developed and is shown in Table 14-13. Where audit outcomes and recommendations require corrective actions, these will be entered into the corrective action register.

Table 14-13 – Preliminary Audit Schedule

Audit Type	Scope	Frequency
System audit	Audit against Adani EHS system requirements ISO 14001 accreditation audit	As agreed with certification body, externally no less than annually
Compliance audit	Confirm that legal and other obligations have been correctly and fully identified and that appropriate management and control strategies are in place and being implemented to meet requirements, including conditions of approval.	Bi-annual or if significant legislative changes occur
Waste audit	Review waste generation types and quantities and waste management practices and identify opportunities to further minimise waste generation or to reduce the environmental impacts associated with waste management.	Bi-annual
Energy audit	Review energy consumption and identify opportunities to reduce energy consumption and/or associated greenhouse gas emissions. If greenhouse gas emission reduction programs are in place, review progress against commitments made. The audit must meet the requirements of AS/NZS 3598-2000 Energy Audits and requirements under the NGER Act and any other legislative requirements in relation to energy consumption and greenhouse gas emission reporting.	Annual

Audit Type	Scope	Frequency
Environmental monitoring review	Review results of environmental monitoring activities including dust, groundwater, surface water, aquatic ecology and terrestrial ecology. Identify whether environmental performance requirements are achieved, and whether degradation of values or resources has occurred that may be attributable to the off-site infrastructure. Identify further investigations and/or corrective actions.	Annual
General environmental audit	<ul style="list-style-type: none"> Environmental impacts and risks have been correctly identified Management controls are effective in managing the impacts and risks identified EMP is consistent with environmental authority conditions Environmental management requirements are being implemented and evidence is available. 	Six Monthly

14.15 Reviews

14.15.1 Management Review

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

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

- Adequacy and effectiveness of the EMP
- Compliance with Adani HSE management system
- Opportunities for improvement
- Opportunities for waste minimisation.
- Inputs to the management review will include:
- Results of monitoring and audits
- Status of achievement of performance requirements and indicators
- Summary of environmental incidents, non-compliances and complaints
- Status of corrective actions
- Communications and complaints
- Follow up of actions from previous management review



- ▶ Significant changes affecting environmental management, including legislation and policy changes

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

14.15.2 EMP Reviews

14.15.3.1 Annual Review

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

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

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

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

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

14.15.3.2 Review of Legal and Other Obligations

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

SECTION B: ENVIRONMENTAL MANAGEMENT SUBPLANS

14.16 Air Quality

14.16.1 Legislative Framework

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

- ▶ The EP Act includes general objectives in relation to preserving environmental values in relation to air quality
- ▶ Under the EP Act, the Environmental Protection (Air) Policy 2008 (EPP (Air)) is established and sets out objectives in relation to air quality
- ▶ Under the EP Act, mining activities are required to hold an environmental authority. In issuing an environmental authority, the regulator must have regard to the extent to which the activity meets the objectives established under the EPP (Air). The environmental authority will then contain conditions in relation to air quality.

Occupational exposure to air contaminants is managed through the *Coal Mining Safety and Health Act 1999* (CMSH Act) and is not discussed further in this EMP.

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

The national pollutant inventory is established through a national environmental protection measure under the Federal *National Environment Protection Council Act 1994*. Carmichael Coal mine will trigger thresholds for reporting a range of air emissions under this scheme.

14.16.2 Environmental Values

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

- (a) the qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems; and
- (b) the qualities of the air environment that are conducive to human health and wellbeing; and
- (c) the qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property; and
- (d) the qualities of the air environment that are conducive to protecting agricultural use of the environment.

In relation to the off-site infrastructure, the key contaminant of concern is particulate matter. Relevant air quality objectives in relation to particulate matter at sensitive receptors is shown in Table 14-14.



Table 14-14 - Ambient Air Quality Objectives (1) and the Criterion for Dust Deposition (2)

Pollutant	Objective	Averaging period
Total suspended particulates	90 $\mu\text{g}/\text{m}^3$	Annual
Particulate matter <10 μm (PM10)	50 $\mu\text{g}/\text{m}^3$	24 hour (3)
Particulate matter <2.5 μm (PM2.5)	25 $\mu\text{g}/\text{m}^3$	24 hour
Particulate matter <2.5 μm (PM2.5)	8 $\mu\text{g}/\text{m}^3$	Annual
Dust deposition	120 $\text{mg}/\text{m}^2/\text{day}$	Monthly

1. From EPP Air
2. Typical standard applied by Queensland Department of Environment and Heritage
3. Five exceedences are allowed per year

The off-site infrastructure is located in an isolated rural area with a small number of sensitive receptors. Particulate matter levels in the area are typical of moderate-low rainfall rural areas. Sources of atmospheric dust include wind blown erosion (crustal dust) and smoke from fires.

14.16.3 Potential Impacts

14.16.3.1 Construction

Table 14-15 - Potential Environmental Impacts – Construction

Activity	Potential Environmental Impact
Vegetation clearing and earthworks	Particulate levels are not expected to exceed air quality and dust deposition objectives at sensitive receptors during construction

14.16.3.2 Operations

Impacts on air quality are expected to be minimal during operation of the off-site infrastructure.

14.16.3.3 Performance Outcome

Meet EPP (Air) objectives for dust emission at sensitive receptors as per Table 14-14.

Not cause nuisance from dust deposition at sensitive receptors

14.16.4 Proposed Controls

Table 14-16 Design, procurement and preconstruction

Control	Responsibility	Timing	Evidence
Install a meteorological monitoring station	Environmental manager	Prior to commencement of construction	Install a meteorological monitoring station
Plan construction activities and sequencing such that the area of exposed soils is minimised	Construction manager	Prior to commencement of construction	Plan construction activities and sequencing such that the area of exposed soils is minimised
Design temporary and permanent stockpiles (topsoil, spoil and coal) to minimise cross sectional area presented to the prevailing wind direction wherever space permits	Design manager	Prior to finalisation of detailed design	Design temporary and permanent stockpiles (topsoil, spoil and coal) to minimise cross sectional area presented to the prevailing wind direction wherever space permits
Identify obligations for national pollutant inventory (NPI) reporting and ensure that mechanisms are in place to collect required data.	Environmental Manager	Prior to commencement of construction	Identify obligations for national pollutant inventory (NPI) reporting and ensure that mechanisms are in place to collect required data.

Table 14-17 Construction

Control	Responsibility	Timing	Evidence
Regularly service vehicles, plant and equipment such that exhaust systems and fuel consumption comply with manufacturers' specifications	Construction manager(s)	As per manufacturer's specifications	Vehicle logs

Control	Responsibility	Timing	Evidence
Minimise areas of exposed soil where possible	Construction manager	Ongoing	Earthworks schedule Visual inspection
Stabilise topsoil stockpiles if left in place for longer than four weeks. Methods may include covering and planting of native grasses or sterile grasses.	Construction manager	Ongoing	Topsoil management register Visual inspection
Utilise water sprays to control dust on access tracks, work areas and stockpiles. Water may be sourced from raw water supply or treated wastewater. If treated wastewater is used, further protocols may be required to minimise worker exposure to water droplets	Construction manager	Ongoing	Visual inspection

14.16.4.1 Operations

There are no particular requirements for air quality during operations. If earthmoving activities are to be carried out, controls for the construction phase should be implemented.

14.16.5 Monitoring and Corrective Action

Table 14-18 – Air quality monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Potential Corrective Action
Visually monitor minor access roads and other disturbed areas for dust lift off	Supervisors Environmental officers	Ongoing	Dust lift off is not travelling more than around 500 metres Water trucks are actively applying water	Increase application of water sprays Rehabilitate or stabilise surfaces



Monitoring action	Responsibility	Frequency	Performance Requirement	Potential Corrective Action
Monitor air emissions as required under the NPI scheme	Environmental Manager	Annual	NPI report is submitted	NA

14.17 Greenhouse Gas Emissions

14.17.1 Legislative Framework

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

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

14.17.2 Environmental Values

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

14.17.3 Potential Impacts

Table 14-19 - Potential Environmental Impacts – Construction and Operation

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

14.17.4 Performance Outcome

Minimise the greenhouse gas emissions intensity arising from construction and operation of the Carmichael Project off-site infrastructure.

14.17.5 Proposed Controls

14.17.5.1 Design and Pre-construction

Table 14-20 – Greenhouse Gas Emissions – Design and Preconstruction Controls

Control	Responsibility	Timing	Evidence
<p>Consider the following guidelines and rating schemes when designing buildings, infrastructure and other components:</p> <ul style="list-style-type: none"> Building Code of Australia requirements, including insulation, building materials and energy efficiency National Australian Built Environment Rating System (NABERS) Australian Green Infrastructure Council rating scheme Green Building Council of Australia rating scheme. 	Design manager	During design	<p>Design checklist</p> <p>Building and infrastructure specifications</p>
<p>Incorporate fuel and material efficiency requirements into the procurement strategy, including:</p> <ul style="list-style-type: none"> appropriate sizing, maintenance and selection of equipment purchase of used equipment where this leads to reduced greenhouse gas emissions over the equipment life minimisation of packaging consideration of the energy efficiency ratings of equipment. equipment, plant and vehicles that can use biodiesel 	Procurement team	During procurement of equipment, plant and vehicles	Equipment, plant and vehicle specifications
<p>Consider fuel consumption when planning transportation of materials and minimise transport distances wherever possible.</p>	Procurement team	During procurement of equipment, plant and vehicles	Equipment, plant and vehicle specifications

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

14.17.5.2 Construction

Table 14-21 – Greenhouse Gas Emissions - Construction Controls

Control	Responsibility	Timing	Evidence
Driver and operator training in relation to efficient operation of vehicles, plant and equipment	Construction manager	As required	Training register
Operation of vehicles, plant and equipment to minimise diesel consumption and wear and tear on parts	All staff	Ongoing	Diesel fuel consumption
Regularly service vehicles, plant and equipment such that exhaust systems and fuel consumption comply with manufacturers' specifications.	Construction manager and contractors	Ongoing	Vehicle maintenance records
Minimise transportation distances within the site wherever possible	Construction manager and contractors	Ongoing	Diesel fuel consumption
Operate and maintain air conditioning systems in accordance with manufacturer's instructions and Guide to Best Practice Maintenance & Operation of HVAC Systems for Energy Efficiency (Council of Australian Governments National Strategy on Energy Efficiency January 2012)	Construction manager and contractors	Ongoing	Maintenance records
Select vehicle size for worker transport to match group size and use buses for transporting larger groups	Construction manager and contractors	Ongoing	Diesel fuel consumption

14.17.5.3 Operations

Table 14-22 – Greenhouse Gas Emissions - Operational Controls

Control	Responsibility	Timing	Evidence
Driver and operator training in relation to efficient operation of vehicles, plant and equipment	Mine manager	As required	Training register
Operation of vehicles, plant and equipment to minimise diesel consumption and wear and tear on parts	All staff	Ongoing	Diesel fuel consumption

Control	Responsibility	Timing	Evidence
Regularly service vehicles, plant and equipment such that exhaust systems and fuel consumption comply with manufacturers' specifications.	Area managers	Ongoing	Vehicle maintenance records
Minimise transportation distances within the site wherever possible	Area managers	Ongoing	Diesel fuel consumption
Operate and maintain air conditioning systems in accordance with manufacturer's instructions and Guide to Best Practice Maintenance & Operation of HVAC Systems for Energy Efficiency (Council of Australian Governments National Strategy on Energy Efficiency January 2012)	Area managers	Ongoing	Maintenance records
Select vehicle size for worker transport to match group size and use buses for transporting larger groups	Area managers	Ongoing	Diesel fuel consumption
Prepare and submit NGER reports (in conjunction with Mine)	Environmental manager	annually	Report

14.17.6 Monitoring and Corrective Action

Table 14-23 – Greenhouse Gas Emissions - Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Conduct energy audits (see also Section 14.14)	Environmental manager	Annual or as required by legislation	Continuous improvement in energy use reduction	Review results and identify opportunities to reduce energy consumption and greenhouse gas emissions

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Monitor or estimate all scope 1 emissions: <ul style="list-style-type: none"> ▶ Diesel consumption (litres) ▶ Explosives use (mass used) ▶ Wastewater treatment (volume treated) ▶ Vegetation cleared (are and type) 	Environmental manager	Annually	Accurate and auditable account of all scope 1 emissions	Improve monitoring and estimation methods
Monitor scope 2 emissions (electricity consumption)	Environmental manager	Annually	Accurate and auditable account of all scope 2 emissions	NA

14.18 Noise and Vibration

14.18.1 Legislative Framework

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

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

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

14.18.2 Environmental Values

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

- (a) the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems; and
- (b) the qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following—
 - (i) sleep;
 - (ii) study or learn;
 - (iii) be involved in recreation, including relaxation and conversation; and
- (c) the qualities of the acoustic environment that are conducive to protecting the amenity of the community.

The off-site infrastructure is located in an isolated rural area with a small number of sensitive receptors. The existing noise environment is consistent with the quiet rural setting with background noise levels as shown in Table 14-24.

Table 14-24 Summary of Noise Monitoring Results

Location	Background L_{A90} dB(A)			Ambient L_{Aeq} dB(A)		
	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)	Day (7 am to 6 pm)	Evening (6 pm to 10 pm)	Night (10 pm to 7 am)
Location A Doongmabulla	31	31	27	48	41	43

14.18.3 Potential Impacts

14.18.3.1 Construction

Table 14-25 - Potential Environmental Impacts – Construction

Activity	Potential Environmental Impact
Civil works during construction	<p>Noise levels are predicted to be below background noise levels at all locations except Lignum homestead, where construction noise may be faintly audible when works are taking place in the east of the ML.</p> <p>Livestock and native animals are not expected to be affected by noise</p>
Construction related traffic	<p>Noise from construction-related traffic is predicted to be within guideline levels but incremental increases in traffic noise levels may be perceptible at locations close to Gregory Developmental Road and along the Moray-Carmichael Road.</p>

Activity	Potential Environmental Impact
Pile driving, rock breaking and heavy equipment operation	Vibration levels are not predicted to affect any sensitive receptors.

14.18.3.2 Operations

Table 14-26 - Potential Environmental Impacts – Operation

Activity	Potential Environmental Impact
Off-site infrastructure activities	Off-site infrastructure is not likely to cause any noise impacts on sensitive receptors in the area.
Operation related traffic	Noise from operation-related traffic is predicted to be within guideline levels but incremental increases in traffic noise levels may be perceptible at locations close to Gregory Developmental Road and along the Moray-Carmichael Road.
Airport	Noise from the airport has not been modelled

14.18.3.3 Performance Outcome

No noise related complaints

14.18.4 Proposed Controls

14.18.3.4 Design, and Pre-construction

Table 14-27 – Noise and Vibration – Design, Procurement and Preconstruction Controls

Control	Responsibility	Timing	Evidence
Undertake a noise assessment of the airport, using the Australian Noise Exposure Forecast (ANEF) approach or similar.	Design manager	During detailed design	Design checklist
If unacceptable noise levels are predicted at any sensitive receptors, determine ameliorative measures including reorientation of the airport or measures at the sensitive receptor.			

14.18.3.5 Construction

Table 14-28 – Noise and Vibration Construction Controls

Control	Responsibility	Timing	Evidence
If a noise or vibration complaint is received, follow the complaints and inquiries procedure set out in Section 14.31.	Stakeholder Manager	As required	Incident register

14.18.3.6 Operations

Table 14-29 – Noise and Vibration Operational Controls

Control	Responsibility	Timing	Evidence
If a noise or vibration complaint is received, follow the complaints and inquiries procedure set out in Section 14.31.	Stakeholder Manager	As required	Incident register

14.18.3.7 Monitoring and Corrective Action

Table 14-30 – Noise and Vibration monitoring and Corrective Action

\	Responsibility	Frequency	Performance Requirement	Corrective Action
Undertake noise or vibration monitoring in response to a complaint	Environmental manager	In response to a complaint	Noise levels do not exceed objectives in Section 14.18.2	<p>Implement noise attenuation or mitigation measures.</p> <p>Measures may include those in AS2436:2010 <i>Guide to noise and vibration control on construction, demolition and maintenance sites</i>.</p> <p>Measures may also be taken at the sensitive receptor with agreement from the complainant</p>



14.19 Surface Water

14.19.1 Legislative Framework

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

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

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

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

Water supply for the Carmichael Coal mine and offsite infrastructure comes from a combination of instream storages, groundwater bores and flood harvesting.

Under the Water Act:

- ▶ A water licence is required in relation to harvesting from instream storages, flood harvesting from the Belyando River and groundwater extraction.
- ▶ A riverine protection permit is required in relation to works that disturb the bed and banks of a watercourse.

A watercourse is defined in the Water Act as a *river, creek or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow events—*

(a) in a natural channel, whether artificially modified or not; or

(b) in an artificial channel that has changed the course of the stream. (Water Act Section 48).

In practice, Department of Natural Resources and Mines (NRM) will generally determine which of the waterways and drainage lines on the site constitute a watercourse under the Water Act definition.



Under the *Sustainable Planning Act 2009*, development permits are required for installation of structures used to take water, including pumps and water storages.

14.19.2 Environmental Values

The off-site infrastructure area is located within the Belyando subcatchment of the Burdekin Basin.

Two creeks, North Creek and Obungeena Creek run in a west to east direction to the north and south of the off-site infrastructure area. These creeks have existing instream farm dams. The two creeks are ephemeral drainage lines and become unchannelised downstream of the off-site infrastructure. The creeks eventually drain to the Belyando River.

14.19.2.1 Construction

Table 14-31 - Potential Environmental Impacts – Construction

Activity	Potential Environmental Impact
Vegetation clearing and earthworks	Erosion and subsequent degradation of water quality (see Section 14.25 for discussion and controls)
Storage, handling and use of environmentally hazardous substances	Spills and leaks and subsequent degradation of water quality (see Section 14.26 for discussion and controls)
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
Irrigation of treated wastewater	Contaminated surface runoff and subsequent degradation of water quality (see Section 14.26 for controls)

14.19.2.2 Operations

Table 14-32 - Potential Environmental Impacts – Operation

Activity	Potential Environmental Impact
Storage, handling and use of environmentally hazardous substances	Spills and leaks and subsequent degradation of water quality (see Section 14.26 for discussion and controls)
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
Irrigation of treated wastewater	Contaminated surface runoff and subsequent degradation of water quality (see Section 14.26 for controls)



Activity	Potential Environmental Impact
5 GL water storage dam	Dam failure may impact downstream environments and the Gregory Developmental Road. Population at risk has not been determined.

14.19.3 Performance Outcome

Water quality downstream of the off-site infrastructure area meets the following requirements:

- ▶ Total petroleum hydrocarbons are below detection level
- ▶ Turbidity is no more than 10% higher than the upstream value measured within 60 minutes
- ▶ Dissolved oxygen in flowing waters is no more than 10% lower than the upstream value measured within 60 minutes
- ▶ Electrical conductivity in flowing waters is no more than 10% higher than the upstream value measured within 60 minutes

Nutrient levels are no more than 10% higher than the upstream value

14.19.4 Proposed Controls

14.19.4.1 Design and Pre-construction

Table 14-33 – Surface Water – Design and Preconstruction Controls

Control	Responsibility	Timing	Evidence
Obtain water licences for all extractions and development approvals for all structures	Environmental Manager	Prior to construction of any water management infrastructure	Licences and permits in place
Conduct failure impact assessment on 5 GL off-stream storage	Design Manager	Prior to commencing design, with review during design as required	FIA
Design off-stream storage and in-stream storages in accordance with relevant requirements of Queensland Dam Safety Management Guidelines (NRM 2002).	Design Manager	During design	Design check list

14.19.4.2 Construction

Table 14-34 – Surface Water – Construction Controls

Control	Responsibility	Timing	Evidence
<p>If dams are required to be drained:</p> <ul style="list-style-type: none"> ▶ Test water quality (pH, DO, turbidity and EC) ▶ Utilise water for dust suppression as a first preference 	Construction manager	When draining dams	Water quality data and discharge records, permit to disturb.



Control	Responsibility	Timing	Evidence
<p>If water cannot be used for dust suppression, then manage as follows:</p> <ul style="list-style-type: none"> • If EC is less than 700 us/cm, pH is in the range 6-8.5, turbidity is less than 50 NTU and DO is above 4 mg/l, water may be pumped to the downstream watercourse. Pump rate should be such that water does not overflow the channel, scouring does not occur and suspended sediment from the base of the storage is not suspended. Monitor turbidity levels through and cease discharge if turbidity exceeds 50 NTU. • If DO is below 4 mg/L, discharge to watercourse may be possible with aeration, however care must be taken not to stir up sediment from the bottom of the storage such that turbidity exceeds 50 NTU. • If EC is less than 1200 us/cm, use water for irrigation of pasture areas or rehabilitation trials. Water is to be irrigated such that ponding and runoff does not occur • If EC is more than 1200 us/cm, pH is outside the range 6-8.5, or turbidity exceeds 50 NTU, transfer to another storage for later use. 			
Construct water storage structures in accordance with relevant requirements of Queensland Dam Safety Management Guidelines (NRM 2002).	Construction manager	During construction	RPEQ sign off or other documentation as required by guidelines
<p>Other controls in relation to erosion and sediment control (Section 14.25), aquatic ecology (Section 14.23), waste management (Section 14.21) and contaminated land (Section 14.26) are relevant to protection of surface water values.</p>			

14.19.4.3 Operations

Table 14-35 – Surface Water - Operational Controls

Control	Responsibility	Timing	Evidence
Conduct surveillance and maintenance on all water storage structures as per relevant requirements of the Queensland Dam Safety Management Guidelines (NRM 2002).	Area manager	As per guidelines	Dam safety reports
Other controls in relation to waste management (Section 14.21) and contaminated land (Section 14.26) are relevant to protection of surface water values.			

14.19.5 Monitoring and Corrective Action

Table 14-36 – Surface Water monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Monitor water quality in North Creek and Obungeena Creek upstream and downstream of the off-site infrastructure for: <ul style="list-style-type: none"> ▶ Dissolved oxygen (field) ▶ pH (field) ▶ turbidity (field) ▶ Electrical conductivity (field) ▶ Total petroleum hydrocarbons (laboratory) 	Environmental Manager	At least four times during wet season	<ul style="list-style-type: none"> ▶ Total petroleum hydrocarbons are below detection level ▶ Turbidity is no more than 10% higher than the upstream value measured within 60 minutes ▶ Dissolved oxygen in flowing waters is no more than 10% lower than the upstream value ▶ Electrical conductivity in flowing waters is no more than 10% higher than the 	Raise an incident report and conduct an investigation into the cause of non-compliance with performance requirements



Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
<ul style="list-style-type: none"> Nutrients (laboratory) <p>All sampling to be undertaken in accordance with Monitoring and Sampling Manual 2009 Environmental Protection (Water) Policy 2009 (current version)</p>			<p>upstream value.</p> <ul style="list-style-type: none"> Nutrient levels are no more than 10% higher than the upstream value. 	

14.20 Groundwater

14.20.1 Legislative Framework

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

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

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

The *Water Act 2000* regulates the sustainable use of water resources, including allocation of water resources for environmental benefits as well as activities that impact on the integrity of watercourses. Water resource plans (WRPs) define the availability of water for each basin in Queensland, including the Great Artesian Basin (GAB), and frameworks and mechanisms for sustainably managing water supply and demand. Resource operations plans then set out rules in relation to the allocation of water resources and other decisions made under the WRP. The Carmichael Project is within the area covered by the *Water Resource (Burdekin Basin) Plan 2007* and at the edge of the area covered by the *Water Resource (Great Artesian Basin) Plan 2006*.

Water licences are required for groundwater extraction which is part of the water supply strategy.

14.20.2 Environmental Values

In relation to the off-site infrastructure, there is limited information about groundwater resources.

There are no groundwater dependent ecosystems in close proximity to the off-site infrastructure area. A small number of bores are in use for stock and domestic supply.



14.20.3 Potential Impacts

14.20.3.1 Construction

Table 14-37 - Potential Environmental Impacts – Construction

Activity	Potential Environmental Impact
Dewatering of excavations	<ul style="list-style-type: none"> Drawdown of groundwater may occur, however most excavations are relatively shallow with respect to the groundwater levels, relatively small in volume and requiring dewatering only over a short period of time. Hence, impacts are not expected. Disposal of groundwater from dewatering has the potential to cause surface water degradation particularly if salinity is high
Contamination from spills or leaks of environmentally hazardous substances	<ul style="list-style-type: none"> Large spills of environmentally hazardous materials, or leaks that are allowed to continue over long periods of time may cause contamination of groundwater. Measures to prevent soil contamination set out in Section 14.27 will also address risk to groundwater. Improper irrigation of treated wastewater may cause nutrients to leach to groundwater. Measures for management of irrigation of treated sewage are set out in Section 14.19.4 will address this impact.

14.20.3.2 Operations

Table 14-38 - Potential Environmental Impacts – Operation

Activity	Potential Environmental Impact
Water supply bores	<ul style="list-style-type: none"> Drawdown from water supply bores is not expected to affect any existing groundwater users or groundwater dependent ecosystems
Landfill leachate	<ul style="list-style-type: none"> Leachate from the general waste landfill may cause groundwater changes and contamination. Changes may include decreased pH, increased organic carbon levels and contamination with metals and hydrocarbons.

14.20.3.3 Performance Outcome

- Groundwater users are not adversely impacted in terms of availability of water for stock and domestic use
- Impacts on groundwater dependent ecosystems do not cause loss of biodiversity values

14.20.4 Proposed Controls

14.20.4.1 Design and pre-construction

Table 14-39 – Groundwater – Design Preconstruction Controls

Control	Responsibility	Timing	Evidence
Install groundwater monitoring bores around landfill site. A minimum of four bores should be installed, with nested piezometers where multiple aquifers are intersected	Environmental Manager	12 months prior to commencement of landfill operation	Bores in place
Determine trigger and compliance levels for groundwater quality and levels	Environmental Manager	Prior to commencement of landfill operation	Trigger and compliance levels set

14.20.4.2 Construction

Table 14-40 – Groundwater - Construction Controls

Control	Responsibility	Timing	Evidence
Identify presence and quality of groundwater in any areas where excavation is to occur and determine approach to managing groundwater from excavation such that degradation of surface water quality or land does not occur. Document management approach and monitoring requirements in the work permit application	Construction Manager	Prior to any excavation more than 2 m below ground level	Work permit details
Check that work permit applications include appropriate measures for management of groundwater from excavations	Environmental Manager	Prior to issuing permit	Work permit

14.20.4.3 Operations

There are no operational controls required in relation to groundwater.

14.20.5 Monitoring and Corrective Action

Table 14-41 – Groundwater Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Conduct baseline monitoring on landfill monitoring bores, including: <ul style="list-style-type: none"> Water levels pH, DO, turbidity, EC, temperature (field and lab) total organic carbon Major ions Fluoride and sulfide Nutrients Dissolved metals 	Environmental Manager	Monthly for 12 months	12 data points available for determining trigger levels	NA
Conduct monitoring on landfill monitoring bores, including: <ul style="list-style-type: none"> Water levels pH, DO, turbidity, EC, temperature (field and lab) total organic carbon Major ions Fluoride and sulfide 	Environmental Manager	Annually	Trigger levels are not exceeded	<ul style="list-style-type: none"> Repeat monitoring immediately on receiving non-compliant results If repeat results indicate persistent elevation, raise an incident report and commence incident investigation. Undertake corrective actions as identified in the incident investigation



Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
<ul style="list-style-type: none"> ▶ Nutrients ▶ Dissolved metals 				

14.21 General and Hazardous Waste Management

14.21.1 Legislative Framework

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

The *Environmental Protection (Waste Management) Regulation 2000* establishes procedures for tracking of certain regulated wastes. Trackable wastes are defined in Schedule 1 of this regulation and a docket system is in place to track these wastes from the point of origin to disposal.

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

The following Adani HSE System compliance guidelines also apply to waste management:

- ▶ HSE-CG-063 – management of wastes
- ▶ HSE-CG-064 – waste minimisation
- ▶ HSE-CG-065 – waste recycling and reuse
- ▶ HSE-CG-066 – waste treatment
- ▶ HSE-CG-121 – waste disposal.

14.21.2 Environmental Values

Wastes represent lost or degraded material and energy resources.

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

14.21.3 Potential Impacts

Types of wastes likely to be produced during construction and operation of the Carmichael Project off-site infrastructure are listed in Table 14-42, together with potential environmental or public health impacts that may arise if wastes are not properly managed.



Table 14-42 - Potential Environmental Impacts – Waste Generation

Waste type	Potential Environmental Impact (with no management)
Vegetation waste	<ul style="list-style-type: none"> ▮ Fire hazard ▮ Emissions of greenhouse gases as vegetation rots ▮ Possible loss of nutrients in natural nutrient cycles ▮ Spread of weeds ▮ Visual impact ▮ May harbour vermin (may also harbour native animals)
Packaging waste	<ul style="list-style-type: none"> ▮ Lost resource ▮ Visual impact ▮ Source of litter ▮ Plastics may entrap native animals
Waste concrete and concrete wash out waste	<ul style="list-style-type: none"> ▮ Localised increases in pH ▮ Lost resource ▮ Visual impact
Scrap metal	<ul style="list-style-type: none"> ▮ Loss of resource ▮ Visual impact ▮ Localised soil contamination with potential to leach to surface and groundwater ▮ Human health risk (tetanus)
Other building and demolition wastes	<ul style="list-style-type: none"> ▮ Loss of resource ▮ Visual impact
Waste oil and oil contaminated wastes	<ul style="list-style-type: none"> ▮ Contamination of soils, surface water and groundwater ▮ Toxicity to plants and animals ▮ Degradation of water resources ▮ Loss of resource
Waste solvents and paints	<ul style="list-style-type: none"> ▮ Contamination of soils, surface water and groundwater ▮ Toxicity to plants and animals ▮ Degradation of water resources ▮ Loss of resource
Office wastes	<ul style="list-style-type: none"> ▮ Litter ▮ Loss of resource



Waste type	Potential Environmental Impact (with no management)
Food wastes	<ul style="list-style-type: none"> ▶ May attract vermin ▶ Odour ▶ Disease, particularly through bacterial infection
Other domestic wastes	<ul style="list-style-type: none"> ▶ Loss of resource ▶ Litter ▶ Plastics may entrap animals
Wastewater (toilets, showers, kitchen, laundry)	<ul style="list-style-type: none"> ▶ Contamination of land, surface and groundwater ▶ Degradation of water resources
Sewage and water treatment plant sludge	<ul style="list-style-type: none"> ▶ Inhibition of native plant growth ▶ Increased nutrient levels in aquatic ecosystems, causing eutrophication and algal outbreaks ▶ Spread of disease ▶ Odour.

14.21.4 Performance Outcome

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

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

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

14.21.5 Proposed Controls

14.21.5.1 Design and pre-construction

Table 14-43 – General and Hazardous Waste Management – Design and Preconstruction Controls

Control	Responsibility	Timing	Evidence
Locate and design landfill in accordance with the Department of Environment and Heritage Protection guideline <i>Landfill siting, design, operation and rehabilitation</i> (August 2012) or other guidelines current at the time of design	Design manager	Prior to construction of landfill	Design checklist
Identify opportunities for waste minimisation and recycling in design of all components	Design manager	During design phase	Design checklist
Include requirements for minimisation of packaging waste in contract specifications for equipment, plant, consumables and other items.	Procurement manager	Prior to commencement of construction	Contracts and specifications
Ensure waste contracts are in place for all wastes that require removal from the site for reuse, recycling, treatment and/or disposal. Utilise contractors that can offer reuse and recycling services in preference to those that cannot and ensure that all contractors hold appropriate authorisations to transport, receive, store, reprocess, treat and/or dispose of wastes expected to be generated.	Procurement manager	Prior to commencement of construction	Requests for tenders, tenders received Contracts in place
Identify obligations for national pollutant inventory (NPI) reporting and ensure that mechanisms are in place to collect required data.	Environmental Manager	Prior to commencement of construction	Monitoring records

Control	Responsibility	Timing	Evidence
Select appropriate wastewater treatment system to achieve treatment levels that protect environmental values and allow maximum reuse of treated wastewater without creating health and safety issues	Design manager	Prior to commencement of construction	Design checklist
If treated wastewater is to be disposed of through irrigation, develop an effluent irrigation management plan based on soil testing and results of MEDLI modelling	Design manager	Prior to commencement of construction	Effluent irrigation management plan
Determine storage requirements for untreated and treated wastewater in the event of unforeseen events such as malfunction of the wastewater treatment plant or wet weather	Design manager	Prior to commencement of construction	Design checklist

14.21.6 Waste Management Inventory

Table 14-44 presents waste storage and handling requirements and indicative waste management methods, in order of preference. Final waste management methods will depend on the availability of waste management contractors to provide a cost effective service to this location.

Table 14-44 – General and Hazardous Waste Management

Waste type	Waste storage and handling requirements	Indicative waste management methods
Vegetation waste	<ul style="list-style-type: none"> Store so as to minimise fire hazard Separate logs and hollow trees Avoid mixing native vegetation with introduced vegetation where possible Store away from trafficked areas 	<ul style="list-style-type: none"> Place logs and hollow trees in rehabilitated areas or areas of retained habitat Mulch or otherwise treat native vegetation for reuse in revegetation areas (trials to be undertaken to determine best methods for reuse)
Packaging waste	<ul style="list-style-type: none"> Segregate plastic, wood and cardboard Flatten cardboard and store in low fire risk 	<ul style="list-style-type: none"> Return packaging to source wherever possible

Waste type	Waste storage and handling requirements	Indicative waste management methods
	<p>areas</p> <ul style="list-style-type: none"> Contain plastics so that these do not blow away 	<ul style="list-style-type: none"> Mulch cardboard and wood for reuse in revegetation (subject to trials) Plastics and cardboard removed from site for recycling where viable Burial of packaging wastes in on-site landfill
Waste concrete and concrete wash out waste	<ul style="list-style-type: none"> Concrete wash out in designated areas away from watercourses 	<ul style="list-style-type: none"> Crush waste concrete for reuse in road building if required Dispose of in on-site landfill
Scrap metal	<ul style="list-style-type: none"> Segregate from other wastes 	<ul style="list-style-type: none"> Off-site recycling if feasible Dispose of in on-site landfill
Other building and demolition wastes	<ul style="list-style-type: none"> Segregate from other wastes 	<ul style="list-style-type: none"> Dispose of in on-site landfill or engineered cell in open cut void
Waste oil and oil contaminated wastes	<ul style="list-style-type: none"> Store in sealed containers in a designated bunded area, away from sources of fire and watercourses 	<ul style="list-style-type: none"> Consider use of biological methods to treat oily waste and waste oils Combine with oily wastes from off-site infrastructure Removal by authorised oil recovery contractor if viable Disposal in on-site landfill
Waste solvents and paints	<ul style="list-style-type: none"> Store in sealed containers in a designated bunded area, away from sources of fire and watercourses 	<ul style="list-style-type: none"> Removal by authorised solvent recovery contractor if viable Consider distillation of solvents to recover



Waste type	Waste storage and handling requirements	Indicative waste management methods
		<ul style="list-style-type: none"> usable solvents ▶ Harden waste paints ▶ Removal for disposal in authorised landfill facility if other options are not feasible
Office wastes	<ul style="list-style-type: none"> ▶ Print paper on both sides ▶ Segregate paper, cartridges, computer wastes ▶ Store paper in a closed container to avoid litter 	<ul style="list-style-type: none"> ▶ If feasible, remove wastes for recycling ▶ If not feasible, bury in on-site landfill
Food wastes	<ul style="list-style-type: none"> ▶ Store in sealed containers 	<ul style="list-style-type: none"> ▶ Placement in on-site landfill or removal by authorised contractor
Other domestic wastes	<ul style="list-style-type: none"> ▶ Store in enclosed containers 	<ul style="list-style-type: none"> ▶ Placement in on-site landfill or removal by authorised contractor
Wastewater (toilets, showers, laundry, kitchen)	<ul style="list-style-type: none"> ▶ Storage capacity for untreated wastewater for at least three days ▶ Kitchen wastes to pass through a grease trap or similar ▶ Treat in one or more package wastewater treatment plants to Class A or A+ ▶ Storage capacity for treated wastewater for up to 10 days 	<ul style="list-style-type: none"> ▶ Irrigate on pasture or revegetation areas (subject to soil investigations and MEDLI modelling) ▶ Use for irrigation of landscaped areas ▶ Use for vehicle washing

Waste type	Waste storage and handling requirements	Indicative waste management methods
Sewage and water treatment plant sludge	<ul style="list-style-type: none"> Store in fully contained receptacles 	<ul style="list-style-type: none"> Use in revegetation areas – subject to trials Place in on-site landfill or removal by authorised contractor for disposal

14.21.7 Other Controls

Table 14-45 – General and Hazardous Waste Management - Controls

Control	Responsibility	Timing	Evidence
<p>Maintain a waste register, including the following information:</p> <ul style="list-style-type: none"> Waste type and waste code Waste source Potential contaminants and other environmental hazards Quantity generated Storage locations and requirements Whether the waste is regulated and trackable Waste avoidance or reduction measures in place Management method (reuse, recycling, on-site disposal, off-site disposal) Quantities removed for reuse/recycling/disposal Relevant waste contractor. <p>A combined waste register may be maintained for the mine and off-site infrastructure</p>	Procurement manager	Continual	Waste register

Control	Responsibility	Timing	Evidence
<p>For trackable wastes, waste register will include:</p> <ul style="list-style-type: none"> Consignment number for the load; transport provider's details (including licence number); Date and time trackable waste removed from Adani Mining's premises; Quantity removed; Receiver's details (including licence number). 	Procurement manager	Continual	Waste register

14.21.8 Monitoring and Corrective Action

Table 14-46 – General and Hazardous Waste Management Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Review waste register for waste avoidance, reuse, recycling or other minimisation opportunities. Identify trends in waste generation and check that appropriate storage, handling and management measures are in place for each waste type	Environmental Manager	Annually for first five years and then every second year	Waste avoidance and minimisation opportunities are maximised	Review on-site procedures and incorporate waste avoidance and minimisation measures Amend waste contracts to maximise reuse and recycling in preference to disposal
Monitor wastes as required under the NPI scheme	Environmental Manager	Annual	NPI report is submitted	NA



Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Implement monitoring requirements as set out in effluent irrigation management plan	Environmental Manager	As per effluent irrigation management plan	As per effluent irrigation management plan	Adjust treatment methods Adjust irrigation regime
Review waste contracts	Procurement manager	Annual	Waste contractors are properly authorised to transport, treat and dispose of waste Waste contracts maximise reuse and recycling of waste over disposal where practical	Utilise only contractors with proper authorisations for waste management services Amend waste contracts to maximise reuse and recycling in preference to disposal
Track cost savings achieved by waste reduction and include in HSE budget as a cost recovery	Procurement Manager	Annually	NA	NA

14.22 Terrestrial Ecology

14.22.1 Legislative Framework

Terrestrial ecosystem values are protected by Federal and State legislation.

The Commonwealth EPBC Act provides protection for matters of national environmental significance including listed threatened species, listed migratory species and threatened ecological communities. The off-site infrastructure must proceed in accordance with conditions of approval under this Act. Offsets are required where significant impacts on matters of national environmental significance are unavoidable.

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

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

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

14.22.2 Environmental Values

The offsite infrastructure area is largely dominated by the open cleared land habitat type, and thus provides limited habitat values for native fauna species. A number of small patches of remnant vegetation are present within the proposed offsite infrastructure area, and are typically mapped as part of a mixed vegetation community of ironbark-box woodland in conjunction with gidgee or brigalow shrubby woodland.

Riparian vegetation is associated with the Belyando River and to a lesser extent ephemeral creeks in the area.

14.22.3 Potential Impacts

Table 14-47 - Potential Environmental Impacts – Terrestrial Ecology

Activity	Potential Environmental Impact
Vegetation clearing	<ul style="list-style-type: none"> 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
Works in and adjacent to	<ul style="list-style-type: none"> Loss of or degradation of surface water resources utilised by native animals



Activity	Potential Environmental Impact
watercourses	
General site activities	<ul style="list-style-type: none"> ▶ Introduction of new weeds and pests ▶ Spread of weeds and pests across the site ▶ Noise and light ▶ Changed fire regime

14.22.4 Performance Outcome

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

14.22.5 Proposed Controls

14.19.5.1 Design Procurement and Pre-construction

Table 14-48 – Terrestrial Ecology – Design and Preconstruction Controls

Control	Responsibility	Timing	Evidence
Prepare offsets management plan	Environmental Manager	Prior to any vegetation clearing	Offsets management plan
Design lighting systems to minimise light spill into areas of native vegetation	Design manager	During detailed design	Design checklist
Review clearing requirements for off-site infrastructure and identify opportunities to reduce clearing of native vegetation and utilise existing cleared areas wherever possible	Design manager	During detailed design	Design checklist
Identify facilities and resources in the region for assistance in the event that native animals are injured and develop procedures for response to native animal injuries that avoid unnecessary suffering of animals.	Environmental manager	Prior to any vegetation clearing	Injured animal procedures

14.19.5.2 Construction and Operations

Table 14-49 – Terrestrial Ecology Construction and Operational Controls

Control	Responsibility	Timing	Evidence
Implement offset strategy and management plan	Environmental manager	Ongoing	Offset areas in place as per offset strategy
Where clearing is to take place in remnant native vegetation, conduct pre-clearing surveys. Surveys are to include: <ul style="list-style-type: none"> Searches for breeding places or habitat 	Environmental manager	During the wet season immediately prior to clearing	Survey results

Control	Responsibility	Timing	Evidence
<ul style="list-style-type: none"> Searches of micro habitat for reptiles 			
Determine requirements to manually relocate species from areas to be cleared based on pre-clearing survey results and conduct relocations as required	Environmental manager	Prior to clearing	Records of translocations
<p>Based on pre-clearing survey results, determine any particular requirements in relation to clearing and document in permit to disturb application. Requirements may include:</p> <ul style="list-style-type: none"> Presence of a spotter catcher Clearing in a particular direction to allow animals to escape Felling of habitat trees separately to general clearing Salvage of habitat features Mulching of vegetation. 	Construction manager/area manager	Prior to clearing	Permit to disturb specifies optimal clearing approach
Clearly delineate areas for vegetation clearing and ensure that all personnel involved are aware of the clearing limits	Construction manager/area manager	Prior to clearing	Clearing limits delineated
If areas are available for rehabilitation, follow rehabilitation methods in Section 14.32.5.			
Conduct pest control program for feral cats, pigs and cane toads	Environmental manager	Annually	Records of control program.
Vehicles and equipment are to be cleaned before being brought to site and inspected on entry to site. <i>Queensland Government Checklist for Cleandown Procedures</i> (2000) to be followed for clean down and inspection (http://www.daff.qld.gov.au/documents/Biosecurity_EnvironmentalPests/IPA-Cleandown-Procedures.pdf).	Construction manager/area manager	Whenever vehicles or equipment are brought to site	Weed hygiene declaration form

Control	Responsibility	Timing	Evidence
All soil and materials of plant origin to be certified as weed free by the supplier using the Queensland Government weed hygiene declaration form or similar (http://www.daff.qld.gov.au/4790_7075.htm).	Construction manager/area manager	Whenever soil or plant materials are brought to site	Weed hygiene declaration form
Drag any road kill to the side of the road immediately and arrange for collection and disposal	All personnel	Ongoing	Road kill removed from roads
Report injured animals to environmental manager/officers	All personnel	Ongoing	Incident records
Respond to injured animals as per procedures developed	Environmental Manager	As required	Incident record

14.22.6 Monitoring and Corrective Action

Table 14-50 – Terrestrial Ecology Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Conduct monitoring of offset areas	Environmental Manager	As per offset strategy and management plan	As per offset strategy and management plan	As per offset strategy and management plan
Conduct inspections of disturbed areas for weed proliferation	Environmental Manager	Annually	Weed levels in disturbed areas are similar to pre-clearing	Conduct a weed control program
Check for pest plants and fauna within subsided areas where ponding occurs	Environmental Manager	Annually	Weed and pest animal levels are similar to pre-subsidence	Conduct a weed and pest control program
Monitor pest animal numbers at key water resource locations	Environmental manager	Quarterly	No increase in pest animal occurrence	Conduct a pest animal control program



Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Monitor road kill/injury statistics	Environmental manager	Annually	No particularly high occurrences of animal death/injury	Provide fauna crossing or other control to protect animals from harm.

14.23 Aquatic Ecology

14.23.1 Legislative Framework

Legislative requirements in relation to aquatic ecosystems include:

- ▶ The EPBC Act protects a range of animals and plants that occur in aquatic environments
- ▶ The EP Act and associated EPP (Water) recognise aquatic ecosystem health as a water quality value and set objectives for protection of aquatic ecosystems
- ▶ The *Water Act 2000* includes requirements in relation to protection of watercourses, including a requirement for a riverine protection permit in relation to works in the bed and banks of watercourses and a water licence for diversion of water courses.
- ▶ The *Fisheries Act 1994* protects fish and fish habitat. Matters regulated by the *Fisheries Act 1994* include maintaining fish passage and creating a waterway barrier and an approval is required for raising a waterway barrier, unless codes can be complied with.

14.23.2 Environmental Values

North Creek and Obungeena Creek are ephemeral watercourses that flow in a west to east direction through to the north and south of the off-site infrastructure area. The creeks become unchannelised further downstream but flows eventually discharge to the Belyando River. Both creeks have existing water storages constructed.

14.23.3 Potential Impacts

14.23.3.1 Construction

Table 14-51 - Potential Environmental Impacts – Construction

Activity	Potential Environmental Impact
Enlargement of water storages on North Creek and Obungeena Creek	<ul style="list-style-type: none"> ▶ Degradation of bed and banks ▶ Changes in downstream flow characteristics
Construction of pipelines and access roads in watercourses	<ul style="list-style-type: none"> ▶ 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
Construction of pump station in Belyando River	<ul style="list-style-type: none"> ▶ Scouring and degradation of bed and banks ▶ Minor loss of aquatic habitat
Water quality degradation	<ul style="list-style-type: none"> ▶ See Section 14.19



14.23.3.2 Operations

Table 14-52 - Potential Environmental Impacts – Operation

Activity	Potential Environmental Impact
Extraction of water from storages on North Creek and Obungeena Creek	<ul style="list-style-type: none"> ▶ Reduced downstream flows particularly in low flow events
Extraction of water from Belyando River	<ul style="list-style-type: none"> ▶ Slightly reduced flows in flood events
Water quality degradation	<ul style="list-style-type: none"> ▶ See Section 14.19

14.23.4 Performance Outcome

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

Downstream flow changes remain within natural fluctuations

14.23.5 Proposed Controls

14.23.5.1 Design and pre-construction

Table 14-53 – Aquatic Ecology – Design and Preconstruction Controls

Control	Responsibility	Timing	Evidence
Review clearing requirements for off-site infrastructure and identify opportunities to reduce disturbance to watercourses, avoid removal of mature trees if possible and utilise existing disturbed cleared areas wherever possible	Design manager	During detailed design	Design checklist
Establish control and impact monitoring sites on North Creek and Obungeena Creek	Environmental Manager	Prior to construction	Aquatic ecology monitoring program
Plan works in watercourses to minimise the period of disturbance to the watercourse	Construction manager	Prior to construction	Schedule
Schedule works in watercourses to occur outside the wet season wherever possible.	Construction manager	Prior to construction	Schedule
As far as practicable, design pipeline crossings, culvert crossings, pump offtakes and bed level crossings in accordance with: <ul style="list-style-type: none"> Code for self-assessable development Minor waterway barrier works – part 3 culverts (WWBW01) (DAFF 2011a); Code for self-assessable development Minor waterway barrier works – part 4 – bed level crossings (WWBW01) October (DAFF 2011b). Guideline - activities in a watercourse, lake or spring associated with mining operations (WAM/2008/3435) (DERM (2010a)) 	Design manager	During detailed design	Design checklist

14.23.5.2 Construction

Table 14-54 – Aquatic Ecology - Construction Controls

Control	Responsibility	Timing	Evidence
Avoid undertaking works in streams in times of flow wherever possible.	Construction manager	During construction	Schedule
Locate temporary lay down areas, parking areas and refuelling areas at least 100 m from any defined watercourse.	Construction manager	During construction	Inspections
For buried pipeline crossings and in-stream pump offtakes, ensure that design requirements are met during construction and: <ul style="list-style-type: none"> Remove topsoil and vegetation and set aside for reinstatement Place pipelines such that the bed level of the stream will be restored once backfilling is complete Backfill trenches with material in a similar order to naturally occurring material Replace topsoil Rehabilitation techniques are set out in Section 14.32.5.	Construction manager	During construction	Stable work areas
For culvert and low level crossings for access roads, ensure that design requirements are met during construction and: <ul style="list-style-type: none"> Remove topsoil and vegetation and set aside for reinstatement Place culverts or pipes such that the bed level remains even Use topsoil and vegetation in rehabilitation Stabilise completed surfaces with “soft” techniques such as jute matting or geotechnical fabric as far as practicable.	Construction manager	During construction	Stable work areas

14.23.5.3 Operations

There are no particular operational controls in relation to aquatic ecology. Operational controls in relation to erosion and sediment control, subsidence management, surface water management and groundwater management are relevant to protecting downstream aquatic ecosystem values.

14.23.6 Monitoring and Corrective Action

Table 14-55 – Aquatic Ecosystems - Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Monitor aquatic ecology monitoring sites: <ul style="list-style-type: none"> in situ water quality (at time and location of each aquatic ecology monitoring event); fish species and abundance; and macroinvertebrate taxa and abundance. Undertake statistical analysis of results including SIGNAL, PET and multivariate analysis	Environmental Manager	One event prior to commencement of construction Biannually thereafter Monitoring to take place towards the end of the wet season	No statistically significant changes between control and impact sites, and between baseline and post impact results from each monitoring event.	If significant differences are observed, an incident should be logged and an incident investigation carried out to determine cause of changes and develop corrective actions.

14.24 Scenic Amenity

14.24.1 Legislative Framework

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

Scenic amenity is often a consideration under regional and local planning provisions and there may be provisions under the Development Scheme for the State Development Area.

14.24.2 Environmental Values

The landscape in the vicinity of the offsite infrastructure area is flat to slightly undulating modified bushland. The dominant land use is grazing which takes place on a mosaic of pasture and remnant vegetation.

Viewers travelling along Moray-Carmichael Road will be able to see the off-site infrastructure otherwise, it is not expected to be visible from homesteads in the area.

14.24.3 Potential Impacts

Table 14-56 - Potential Environmental Impacts

Activity	Potential Environmental Impact
Vegetation clearing	<ul style="list-style-type: none"> Increased visual permeability Change in landscape from native vegetation to cleared land
Off-site infrastructure and facilities	<ul style="list-style-type: none"> Increase in presence of built infrastructure in the landscape.
Lighting	<ul style="list-style-type: none"> Appearance of a glow around buildings and infrastructure at night

14.24.4 Performance Outcome

Minimal change to visual amenity from residential viewpoints.



14.24.5 Proposed Controls

14.24.5.1 Design, Procurement and Pre-construction

Table 14-57 – Visual Amenity – Design, Procurement and Preconstruction Controls

Control	Responsibility	Timing	Evidence
Design lighting systems to minimise light spillage and upward “glow”	Design manager	During detailed design	Design checklist

14.24.5.2 Construction and Operation

Table 14-58 – Visual Amenity – Construction and Operational Controls

Control	Responsibility	Timing	Evidence
Maintain all off-site infrastructure areas in a neat and tidy condition.	NA		Site checks
Retain vegetation along Moray-Carmichael Road	Construction manager, Area manager	During construction and operation	Vegetation screening

14.24.5.3 Monitoring and Corrective Action

There are no monitoring requirements in relation to visual amenity.



14.25 Erosion and Sediment Control

14.25.1 Legislative Framework

While there are no formal legislative requirements in relation to erosion and sediment control, the EP Act specifically makes it an offence to deposit contaminants into surface waters, and to place contaminants in such a way as the contaminant may be reasonably expected to enter surface waters.

Development approval conditions for the off-site infrastructure may also contain requirements in relation to erosion and sediment control.

14.25.2 Environmental Values

Environmental values relevant to erosion and sediment control include soil resources, particularly topsoil resources which are a scarce resource. Erosion and sediment mobilisation also has potential to impact on a surface water quality (Section 14.19) and aquatic ecosystem values (Section 14.23.2).

14.25.3 Potential Impacts

Vegetation clearing, earthworks and stockpiling of topsoil and overburden during both construction and operation will result in exposure of soils to erosive forces from either overland flows of water or wind action.

The initial impact of erosion is loss of topsoil resources, which may compromise rehabilitation success.

Sediment mobilised by overland flow will be carried to drainage lines and watercourses. Impacts include:

- ▶ Increased turbidity, affecting light penetration and photosynthesis processes in aquatic environments
- ▶ Direct smothering of aquatic ecosystems by deposition of sediment
- ▶ Where large quantities of sediment are transported to watercourses, geomorphological changes may occur. For example, sediment deposition may obstruct flow causing exacerbation of flooding and alteration of channel pathways.
- ▶ The quality of water available to downstream users may be degraded, particularly in relation to appearance and palatability. Pumps and pipes used to extract water from watercourses may become blocked by sediment build up.

Note that impacts relating to wind erosion (dust generation) are covered in Section 14.16.

Works in watercourses will also result in erosion of the bed and banks if undertaken in flow conditions or if disturbed areas are not stabilised before flows occur. Management of the impacts of works in watercourses is covered in Section 14.19.



14.25.4 Performance Outcome

Sediment releases from the off-site infrastructure area will not cause degradation of aquatic ecosystem and water supply values downstream. Generally, this will be indicated by less than 10% increase in turbidity levels from upstream to downstream of activity areas.

Topsoil resources will not be lost through erosion. This will be measured by visual observation of disturbed areas.

14.25.5 Proposed Controls

14.25.5.1 Design and Pre-construction

Table 14-59 – Erosion and Sediment Control – Design and Preconstruction Controls

Control	Responsibility	Timing	Evidence
Design stormwater systems for infrastructure areas to include sediment retention basins capable of retaining a 1 in 20 year ARI event (or other event as determined through risk assessment in design phase)	Design Manager	Prior to commencement of construction	Design checklist Stormwater system designs
Locate infrastructure and facilities away from drainage lines and steep slopes wherever practicable.	Design Manager	Prior to commencement of construction	Design checklist
Schedule construction works as far as practical such that: <ul style="list-style-type: none"> Works in streams do not need to take place in times of flow Major vegetation clearing and earthworks activities do not take place in wet conditions Permanent stormwater systems are installed as early as possible in the construction phase 	Construction Manager	Prior to commencement of construction	Construction Schedule
Design access roads and tracks with drainage systems to minimise concentration of flow and erosion risk	Design Manager	Prior to constructing roads	Design checklist

14.25.5.2 Construction

Table 14-60 – Erosion and Sediment Control - Construction Controls

Control	Responsibility	Timing	Evidence
<p>Develop and implement a customised erosion and sediment control plan for each work area, including linear infrastructure. General principles for erosion and sediment control will be drawn from industry guidelines in place at the time of construction (current preferred guidelines are the International Erosion Control Association (Australasia) Best Practice Erosion and Sediment Control (2007)).</p> <p>Erosion and sediment control to be developed based on erosion risk assessment and to include:</p> <ul style="list-style-type: none"> Divert surface flows around disturbed areas. This will include permanent diversion of minor watercourses that currently pass through the proposed open cut and overburden dump areas Minimise exposure of soils to erosive forces. This is largely achieved by clearing vegetation progressively with minimal time lag between clearing and construction works, and stabilising and/or rehabilitating cleared areas and stockpiles as quickly as possible Detain sediment laden runoff using sediment fences, check dams and sediment dams to allow sediment to settle out For permanent or long term facilities, install permanent stormwater control works as quickly as possible. 	Construction Manager	Prior to any ground disturbance from September to March of each year.	Erosion controls in place
Strip topsoil as per topsoil management plan (Section 14.27)	Construction manager	When commencing construction	Topsoil register



Control	Responsibility	Timing	Evidence
<p>For areas no longer required after construction, and for buried infrastructure alignments, reinstate areas by:</p> <ul style="list-style-type: none"> Reforming of surfaces to reinstate drainage patterns and prevent scouring or ponding Replacement of topsoil and revegetation with selected native plant species (Section 14.32.4). Trees and large shrubs are not to be placed over buried infrastructure. <p>Erosion and sediment controls to remain in place until the area is stable and no longer a source of sediment. For areas stabilised by revegetation, a 70% ground cover is required.</p>	Construction manager	As soon as possible after completion of construction	Rehabilitation register
Refer Section 14.23.5.2 for controls in relation to watercourse crossings			

14.25.5.3 Operations

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

14.25.6 Monitoring and Corrective Action

Table 14-61 – Erosion and Sediment Control - Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Inspect erosion and sediment control devices	Environmental Manager	Weekly (Checklist)	See weekly checklist	<p>Undertake repairs or replace devices</p> <p>Empty sediment from sediment traps</p>

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
				Repair scouring or other eroded areas
Check capacity of sediment retention basins for overburden stockpiles and stormwater systems	Area Manager	At the end of each wet season	Design capacity is retained	Excavate deposited sediment and dispose of to in-pit disposal area
Inspect stormwater systems, including diversion drains and outlets	Environmental Manager	Monthly during wet season	No visible signs of scouring, concentration of flow or bypass flows	Repair scouring Maintain, repair or upgrade stormwater system to prevent scouring, concentration of flows over high risk areas or bypass flows



14.26 Contaminated Land

14.26.1 Legislative Framework

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

Prior to commencement of off-site infrastructure activities, none of the affected land parcels were listed on the environmental management register (EMR) or contaminated land register (CLR). As activities proposed at the off-site infrastructure are notifiable activities, all land parcels on which these activities take place will be listed on the EMR.

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

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

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

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

14.26.2 Environmental Values

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

14.26.3 Potential Impacts

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

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

- ▀ Acute or chronic toxicity effects on humans and animals who come into contact with the soil, including where contaminated soil becomes wind blown. Contaminated soil guidelines generally focus on whether or not levels of particular contaminants might be high enough to cause toxic effects.
- ▀ Inhibition of plant growth, and death of existing plants in contaminated areas.
- ▀ Mobilisation of contaminants by overland flows to surface watercourses. This in turn may lead to acute or chronic toxicity effects to aquatic organisms and to contamination of water supplies.



- ▶ Contaminants in watercourses may be deposited in sediment on the bed of the watercourse, resulting in sediment contamination. Subsequent flow events may re-mobilise sediments into the water columns, and contaminated sediments may also inhibit aquatic plant growth.
- ▶ Mobilisation of contaminants to groundwater, which in turn may lead to contamination of groundwater supplies. In high permeability aquifers, contaminant plumes may be conveyed over considerable distances.

14.26.4 Performance Outcome

Land contamination does not cause inhibition of plant growth, degradation of water resources or toxic effects to humans or other animals. Relevant contaminated land guidelines in place at the time will be used to indicate whether contaminant levels are acceptable (current guidelines are listed in Section 14.26.1).

14.26.5 Proposed Controls

14.26.5.1 Design and pre-construction

Table 14-62 – Contaminated Land– Design and Preconstruction Controls

Control	Responsibility	Timing	Evidence
Notify DEHP of the location of all notifiable activities	Environmental Manager	On issue of development approval (environmentally relevant activities)	Correspondence
Design all fuel storages to meet the requirements of AS1940: storage and handling of flammable and combustible liquids.	Design manager	Prior to construction	Design checklist
All fuel storage to be above ground	Design manager	Prior to construction	Design checklist
For all workshop areas, provide:	Design manager	Prior to construction	Design checklist
<ul style="list-style-type: none"> ▀ Secure storage for oils and waste oils with roof and containment bunding equal to 110% of the largest container ▀ An impervious floor (concrete or similar) in all areas where vehicle maintenance will routinely be carried out ▀ Preferable roofed areas for vehicle maintenance ▀ Containment bunding, including rollover bunds or drains such that spills and rainwater are contained within the designated area ▀ Drainage of maintenance areas to sumps with oil/water separation ▀ Return of treated stormwater and wastewater from maintenance areas for reuse in vehicle washing 			

Control	Responsibility	Timing	Evidence
For refuelling areas, provide: <ul style="list-style-type: none"> An impervious floor (concrete or similar) Containment bunding, including rollover bunds such that spills and rainwater are contained within the designated area Drainage of refuelling areas to sumps with oil/water separation Return of treated stormwater and wastewater from refuelling areas for vehicle washing 	Design manager	Prior to construction	Design checklist
Design vehicle washdown areas so that all runoff water is captured and passed through oil water separators and sediment catchment devices	Design manager	Prior to construction	Design checklist
Include a provision in contracts that makes all contractors responsible for and liable for costs of clean up of any contamination arising from activities undertaken by the contractor	Procurement manager	Prior to issuing any contract	Contract

14.26.5.2 Construction and Operation

Table 14-63 – Contaminated Land - Construction and Operation Controls

Control	Responsibility	Timing	Evidence
Manage oily waste and hydrocarbon contaminated waste, including waste from sumps and bunds, in accordance with requirements in the waste management sub plan (Section 14.21).			
Water from vehicle wash areas to be recirculated for use	Area manager	Ongoing	Site checklist
Diesel storage tanks and bunds are regularly inspected and maintained	Area manager	As per AS 1940 and/or manufacturer's	Maintenance records

Control	Responsibility	Timing	Evidence
		instructions	
Transport of diesel and other dangerous goods to be in accordance with Australian Code for Transport of Dangerous Goods by Road and Rail	Warehouse manager	Ongoing	Transport records
Refuelling is only to take place at designated refuelling areas	Area managers	Ongoing	Observations of mobile refuelling activities
Refuelling activities to be supervised at all times	Area managers	Ongoing	Observations of mobile refuelling activities
Workshop, refuelling and other areas are not to be cleaned by hosing of water	Area managers	Ongoing	Weekly checklist
Spill kits to be in place at workshops, refuelling areas and other areas where fuels and oils are handled or stored	Warehouse manager	Ongoing	Weekly checklists
In the event of a small to medium spill (up to 100L): <ul style="list-style-type: none"> Don appropriate PPE (for diesel and oil spills, this shall include long sleeved shirts and trousers made of cotton, plastic or rubber gloves, boots) If safe to do so, shut off source of spill If safe to do so, use spill kit materials to contain the spill and place absorbents over the spilt material If spill kit is not available, use available materials to contain the spill from flowing across the ground Contact the environmental manager/HSE Manager and supervisor for further assistance 	All staff	Ongoing	Incident register and reports

Control	Responsibility	Timing	Evidence
<ul style="list-style-type: none"> Place all contaminated material in plastic bags and clearly label as hydrocarbon contaminated material Environmental manager/officer to advise if soils are to be bioremediated or disposed of Place all hydrocarbon contaminated material awaiting disposal in designated waste storage area and clearly label Environmental manager/officer to arrange for disposal permits if required Complete incident investigation and report as per Adani HSE system requirements 			
<p>In the event of a large spill:</p> <ul style="list-style-type: none"> Don appropriate PPE (for diesel and oil spills, this shall include long sleeved shirts and trousers made of cotton, plastic or rubber gloves, boots) If safe to do so, shut off source of spill If safe to do so, use available spill kit or other material to contain material to stop overland flow. For very large spills, if earthmoving equipment is available this may be used to raise a bund downslope of the spill area. Remove all potential ignition sources and prevent traffic from entering the area Contact the environmental officer and/or supervisor for further assistance. Environmental manager to determine further clean up requirements and methods 	All staff	Ongoing	Incident register and reports

Control	Responsibility	Timing	Evidence
<ul style="list-style-type: none"> Environmental officer to discuss with environmental manager whether notification under EP Act is required (See Section 14.30.2) Place all hydrocarbon contaminated material awaiting disposal in designated waste storage area and clearly label Environmental officer to arrange for disposal permits if required Complete incident investigation and report as per Adani HSE system requirements 			
<p>Conduct risk assessment for incidents of contamination and determine appropriate mitigation and management strategies.</p> <p>Hierarchy of management approaches, from most to least preferred:</p> <ul style="list-style-type: none"> on-site treatment of the chemical substances to reduce risk to an acceptable level off-site treatment of excavated soil to reduce risk to an acceptable level, after which the treated soil is returned to the site containment of soil on site with a properly designed barrier disposal of affected soil to an approved landfill. <p>Document in contaminated land register and incident report.</p>	Environmental manager	As required	Contaminated land register, incident reports
Undertake further testing as required to delineate extent of contamination and/or validate that adequate clean up has occurred. Enter results in contaminated land register and incident report.	Environmental manager	As required	Contaminated land register, incident reports
If it appears likely that groundwater contamination may have occurred, initiate groundwater testing	Environmental manager	As required	Contaminated land register, incident reports

Control	Responsibility	Timing	Evidence
Enter locations of all spills of diesel, oil or other hazardous substances into a contaminated land register. Include details of the type and quantity of contaminant, and testing and remediation actions undertaken. Provide a reference to the incident investigation report	Environmental Manager	As required	Contaminated land register

14.26.6 Monitoring and Corrective Action

Table 14-64 – Contaminated Land – Monitoring and Corrective Action

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

14.27 Soil Resources

14.27.1 Legislative Framework

The requirement to manage topsoil arises from:

- ▶ Legislative requirements in relation to rehabilitation (see also Section □)
- ▶ State government policy SPP1/92 regarding maintenance of good quality agricultural land resources.

Note that there is no strategic cropping land within the off-site infrastructure area.

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

14.27.2 Environmental Values

Soils in the off-site infrastructure area are suitable for grazing but not for production of export quality cattle, or for cropping.

All soils have high fine sand contents throughout the recommended maximum depth for reuse. Any salvaged material is likely to be subject to slaking, sealing and have poor physical properties due to this very high fine sand content.

14.27.3 Potential Impacts

Table 14-65 - Potential Environmental Impacts – Construction and Operation

Activity	Potential Environmental Impact
All vegetation clearing and earthworks	Exposure of soils to erosive forces, resulting in loss of soil resource
	Loss of soil growth media through mixing with spoil
	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
	Inability to rehabilitate the off-site infrastructure area
	Reduced agricultural productivity and associated economic impacts

14.27.4 Performance Outcome

Topsoil and subsoil resources are retained and protected in a viable form to support the proposed post mining land use.

14.27.5 Proposed Controls

14.27.5.1 Design, procurement and pre-construction

Table 14-66 – Soils – Design and Preconstruction Controls

Control	Responsibility	Timing	Evidence
Provide details to NRM regarding proposed footprint relative to State land such that NRM can determine whether there is a need to salvage quarry material or forest products	Environmental Manager	12 months prior to disturbance	Correspondence
Identify a suitable location or locations for topsoil stockpiling. The area should not be subject to significant overland flow, or flow should be diverted around the area. Risk of accidental disturbance should be minimised.	Environmental Manager	12 months prior to disturbance	Correspondence

14.27.5.2 Construction and Operations

Table 14-67 – Soils – Construction Controls

Control	Responsibility	Timing	Evidence
Survey soils types to confirm stripping depths and other limitations such as sodicity, slaking and alkalinity.	Construction manager	Prior to vegetation clearing	Survey results
Strip topsoil prior to any earthworks or other surface disturbance. Topsoil stripping depths and other requirements will be set out permit to disturb.	Construction manager	Prior to any earthworks or disturbance	Permit to disturb
Place topsoil in stockpiles no more than 1.5m in height and with side slope steepness depending on the nature of the topsoil such that stockpiles do not fail.	Construction manager	Immediately on stripping of topsoil	Topsoil register

Control	Responsibility	Timing	Evidence
If stockpiles are to remain in place for more than six months, rip and seed topsoils. Seeding may be with native grass species or a sterile introduced grass species. This should be recorded on the topsoil register.	Construction manager	Immediately after placement in stockpile	Topsoil register
Use water sprays to prevent wind erosion	Construction manager	As required	Visual inspections
Stockpiled topsoils may be used for rehabilitation trials or for offset areas.	Environmental Manager	As required	Rehabilitation records
Replace topsoil in any disturbed areas that are not required after construction and seed with grass or other species as determined through rehabilitation trials.	Construction manager	As required	Rehabilitation records

14.27.6 Monitoring and Corrective Action

Table 14-68 – Soils Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Visual inspection of topsoil stockpile areas	Environmental manager	In high wind conditions	Minimal dust lift off	Apply water Seed stockpiles if necessary
Visual inspection of topsoil stockpile areas	Environmental manager	Monthly and after rainfall (>10 mm)	<ul style="list-style-type: none"> Stockpiles are intact and not slumping Management requirements in topsoil register have been implemented Stockpiles greater than 	Reshape stockpiles Apply seed to stockpiles Apply water



Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
			<ul style="list-style-type: none"> 6 months have been seeded Vegetation cover is healthy (where required) No sign of erosion 	

14.28 Aboriginal Cultural Heritage

14.28.1 Legislative Framework

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

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

14.28.2 Environmental Values

The Project affects one native title/Aboriginal party area being located within the external boundaries of the Wangan and Jagalingou People registered native title claim (QUD85/04, QC04/6).

Details of places and items of Aboriginal cultural heritage significance will not be disclosed in any public documentation. In general, the following Aboriginal cultural heritage values are associated with the mine site and may also be present at the off-site infrastructure area:

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

As a complete survey of the off-site infrastructure area has not been undertaken, there is potential for inadvertent discovery of other sites and artefacts.

14.28.3 Potential Impacts

14.28.3.1 Construction and Operation

Potential Aboriginal cultural heritage impacts during the construction phase are summarised in Table 14-69.

Table 14-69 - Potential Cultural Heritage Impacts – Construction and Operation

Activity	Potential Cultural Heritage Impact
Vegetation clearing and ground disturbance	<ul style="list-style-type: none"> Vegetation clearing and ground disturbance will disturb and potentially destroy artefacts The contextual setting of artefacts will also be effectively destroyed by ground disturbance
Disturbance and erosion of streams and drainage lines	<ul style="list-style-type: none"> Erosion may expose artefacts on stream banks and drainage lines, with subsequent loss to downstream environments

14.28.3.2 Performance Outcome

Cultural heritage management plan requirements are met.

14.28.4 Proposed Controls

14.28.4.1 Design and pre-construction

Table 14-70 outlines the design, procurement and preconstruction controls for indigenous heritage management.

Table 14-70 – Indigenous Heritage – Design, procurement and preconstruction controls

Control	Responsibility	Timing	Evidence
Cultural heritage management plans will be finalised and approved	CEO	Pre-Construction	Approved Plans
Any required pre-clearing surveys for construction areas will be undertaken in accordance with the CHMP	Construction Manager	Pre-Construction	Survey Reports
If significant finds are made, consideration will be given to whether infrastructure footprints can be altered to avoid disturbance	Construction Manager	Pre-Construction	Design Review
If keeping places are required, these will be established.	Construction Manager	Pre-Construction	Established places as required

14.28.4.2 Construction

Table 14-73 outlines the construction controls for indigenous heritage management.

Table 14-71 – Indigenous Heritage – Construction Controls

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

14.28.4.3 Operation

Table 14-74 outlines the operation controls for indigenous heritage management.

Table 14-72 – Indigenous Heritage – Operation Controls

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

14.28.5 Monitoring and Corrective Action

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

14.28.6 Proposed Environmental Authority Conditions

Environmental authority conditions are not proposed in relation to Aboriginal cultural heritage.

14.29 Non-Indigenous Cultural Heritage

14.29.1 Legislative Framework

Legislation protecting non-Indigenous cultural heritage is as follows:

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

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

14.29.2 Environmental Values

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

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

14.29.3 Potential Impacts

Potential impacts related to inadvertent discovery of non-indigenous cultural heritage items will arise from vegetation clearing and ground disturbance and hence, are similar during both the construction and operation phases. Potential impacts are shown in Table 14-73.

Table 14-73 - Potential Cultural Heritage Impacts – Construction and Operation

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

14.29.4 Performance Outcome

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

14.29.5 Proposed Controls

Table 14-74 – Non-Indigenous Cultural Heritage – Construction and Operation Controls

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

14.29.6 Monitoring and Corrective Action

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

14.29.7 Proposed Environmental Authority Conditions

Environmental authority conditions are not proposed.

14.30 Emergency Management and Response

14.30.1 Emergency Response Plan

An emergency response plan will be developed for the off-site infrastructure as required by HSE-CG-015 and will include:

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

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

Likely emergencies or incidents which may have environmental impacts are shown in Table 14-75. In relation to environmental incidents and emergencies, requirements for prevention will be included in relevant sub-plans within this EMP.

Table 14-75 Emergencies with Potential Environmental Impacts

Incident	Potential Environmental Impact	Prevention	Emergency Response
Spills of environmentally hazardous materials	<ul style="list-style-type: none"> Contamination of soil Contamination of surface water and groundwater Toxicity to animals and plants Water resources cannot be used for identified beneficial uses 	<ul style="list-style-type: none"> Design of storages (Section 14.26) Storage and handling procedures (Section 14.26) Training (Section 14.8) Spill containment and clean up equipment in place at risk areas for small, medium and large spills 	<ul style="list-style-type: none"> Contain spill Remove all contaminated materials or remediate contamination in-situ
Bushfire	<ul style="list-style-type: none"> Loss of native vegetation and habitat Death or injury of native animals Death or injury to humans Air pollution – particulates and greenhouse gas emissions 	<ul style="list-style-type: none"> Management of combustible materials and ignition sources as per HSE-CG-045 and including vehicle movements across grassed areas and cigarettes. Fuel reduction where necessary and consistent with fire regimes for native vegetation Fire protection and fire fighting equipment Training (Section 14.8) 	<ul style="list-style-type: none"> Fight fire using trained crews and equipment and with assistance from Queensland emergency services as required

14.30.2 Incident Reporting and Notification

Incident reporting requirements will be set out in the Emergency Response Plan and will include those set out in Table 14-76.

Table 14-76 Incident Reporting and Notification

Type of Incident	Report to	Report by	Timing
All serious incidents	Environmental Manager	First on scene	Immediately
incidents involving actual or potential environmental harm	Environmental Manager and/or officers	First on scene	Immediately
Incident involving non-compliance with environmental authority	EHP – pollution hotline	Mine Manager or Environmental Manager	Within 24 hours (initial notification)
	EHP – representative officer	Mine Manager or Environmental Manager	Within 14 business days (full report)
Incident involving non-compliance with another approval	Relevant agency	Mine Manager or Environmental Manager	On becoming aware of the non-compliance
Incidents causing actual or potential serious or material environmental harm (1)	EHP Owner and occupier of affected land All persons at the affected land	Mine Manager or Environmental Manager (2)	Within 24 hours of becoming aware

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

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

14.30.3 Incident Investigation

Incident investigation requirements are set out in Section 4.4 of HSE-CG-006.

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

Environmental incident investigations and reports will cover:

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

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

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

14.31 Community

14.31.1 Legislative Framework

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

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

14.31.2 Environmental Values and Potential Impacts

Environmental values and potential impacts in relation to the community are set out in this EMP as follows:

- ▶ Air quality – Section 14.16
- ▶ Noise – Section 14.18
- ▶ Water quality – Section 14.19 and 14.20
- ▶ Scenic amenity – Section 14.24.

14.31.3 Performance Outcome

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

14.31.4 Proposed Controls

Table 14-77 outlines to proposed controls to manage community issues during pre-construction, construction and operation.

Table 14-77 – Community – Pre Construction, Construction and Operation Controls

Control	Responsibility	Timing	Evidence
The complaint or inquiry will be recorded in the Consultation Manager database, including details of the complainant and the nature of the complaint	Community and Stakeholder Manager	Ongoing	Records and Actions
If an investigation of the complaint is required, this will be undertaken using the incident investigation procedure established under the HSE system	Community and Stakeholder Manager	Ongoing	Procedure followed as evidenced by incident reports
Any corrective actions identified will be entered into the corrective action register	Community and Stakeholder Manager	Ongoing	Records and Actions
Any community non-compliances with conditions of the environmental authority will be notified to the administering authority	Community and Stakeholder Manager	Ongoing	Records and Actions

14.32 Rehabilitation and Decommissioning

14.32.1 Legislative Framework

There are no particular legislative requirements in relation to rehabilitation of the off-site infrastructure area. Approvals in relation to vegetation clearing and works in watercourses may contain conditions in relation to post-construction restoration.

14.32.2 Environmental Values

In relation to rehabilitation, environmental values include:

- Soil resources suitable for supporting native pasture and native vegetation
- Stable and sustainable landform
- Protection of safety of the public
- Land use of grazing
- Habitat for native plants and animals including vegetation communities and species of conservation significance



- Surface water runoff and drainage patterns and surface water quality.

14.32.3 Potential Impacts

During construction of the off-site infrastructure, some disturbance will occur outside of the final footprint of the infrastructure. This may include disturbance to the bed and banks of watercourses to allow access for installation of water supply infrastructure as well as other access tracks, laydown areas and other temporary facilities.

Additionally, some components of the off-site infrastructure will involve underground infrastructure and similar impacts may occur if backfilled surfaces are not reinstated.

On decommissioning, removal of all above ground components will leave a disturbed surface that will need to be reinstated in order to provide a stable and usable land surface for future activities.

If rehabilitation of each of these areas is not undertaken, the off-site infrastructure area may have ongoing adverse impacts on the environment and community including:

- Erosion and sediment release to surface waterways
- Destabilisation of bed and banks of streams with consequent geomorphological changes and impacts on water quality and aquatic and riparian ecosystems.
- Mobilisation of soils by wind
- Loss of topsoil resources
- Weed invasion
- Permanent loss of any viable future land use of the site
- Degradation of visual amenity

14.32.4 Performance Outcomes and Rehabilitation Criteria

Overarching objectives for rehabilitation of all lands disturbed by the off-site infrastructure are:

- Creation of a stable land surface with slopes not exceeding pre-existing slopes
- Restoration of drainage such that ponding and scouring (concentration of flow) is avoided. This has been demonstrated over at least three wet seasons.
- 70% cover grasses
- Trial establishment of native grass, shrubs and trees at a density supported by soil conditions to achieve targeted environmental values
- Weed infestation is similar or below pre-disturbance levels and levels on adjacent un-mined areas
- Removal of all wastes and potentially contaminated materials such that contaminant levels are within guideline levels in place at the time of closure for protection of humans and other animals
- Contamination assessment indicates that there is no risk to downstream water quality from leaching of contaminants from soils based on comparison to guidelines in place at the time of closure
- Surface is stable and erosion rates are similar to nearby areas that have not been affected by development



- ▶ Removal of all above ground components
- ▶ All below ground components either removed or made safe and non-polluting.

14.32.5 Proposed Controls

14.32.5.1 General Rehabilitation Methods

General rehabilitation methods for each domain are identified in Table 14-78.



Table 14-78 – General Rehabilitation Methods

Aspect	Method
General construction areas	<ul style="list-style-type: none"> Remove all waste and remnant materials and dispose of at an authorised facility If contamination has occurred and will affect revegetation success, cause a safety hazard or contaminated runoff, remediate or remove contaminated soils Grade and re-contour all areas such that surface drainage is restored and ponding and scouring will not occur rip or otherwise de-compact compacted surfaces place topsoil seed or plant vegetation water vegetation and manage weeds until 70% cover is achieved leave erosion and sediment control devices in place until revegetation is achieved.
Buried infrastructure – post construction	<ul style="list-style-type: none"> Grading and re-contour all areas such that surface drainage is restored, preferential drainage paths are not provided along the infrastructure alignment and ponding and scouring will not occur rip or otherwise de-compact compacted surfaces place topsoil seed or plant grasses or small shrubs, having regard to potential effects of roots on underground infrastructure water vegetation and manage weeds until 70% cover is achieved. leave erosion and sediment control devices in place until revegetation is achieved.
Watercourses – post construction	<ul style="list-style-type: none"> determine rehabilitation method prior to initial disturbance replace soils in trenches in original sequence reform bed and banks to achieve a smooth surface



Aspect	Method
	<ul style="list-style-type: none"> stabilise banks using organic materials revegetate bed and banks with native species water vegetation and manage weeds until 70% cover is achieved. leave erosion and sediment control devices in place until revegetation is achieved.
Off-site infrastructure – closure	<p>Rehabilitation approach to consist of:</p> <ul style="list-style-type: none"> Removal of all above ground infrastructure. Components suitable for reuse at other mining or industrial operations will be reused. Otherwise, recyclable materials will be recovered and non-recyclable components will be disposed of at authorised facilities. Conduct of a risk assessment of all below ground infrastructure and components to determine what can be left in place and what needs to be removed. Impacts of surface disturbance associated with removal of below ground infrastructure and components to be considered in addition to potential for contamination to arise. Removal of below ground infrastructure where risk assessment indicates that this is the most appropriate course of action. Recovery of recyclable components and disposal at authorised facilities of non-recyclable components. Making safe below ground infrastructure that is to be left in place. For pipelines, this will include draining and sealing pipelines. Recording of location of all infrastructure and other components left in place Removal of any wastes, contaminated soils or other potential sources of contamination. In this regard, reference will be made to incident registers to identify locations where spills have occurred and contaminants may remain in-situ Conducting contaminated soil assessments as required Grading and re-contouring all areas such that surface drainage is restored and ponding and scouring will not occur ripping or otherwise de-compacting compacted surfaces placing topsoil as per topsoil management plan and topsoil register



Aspect	Method
	<ul style="list-style-type: none"> ▶ seeding or planting vegetation ▶ watering vegetation ▶ managing weeds and revegetation until 70% cover is achieved.
Water storage areas, including raw water dams, sediment ponds and in-stream structures	<p>Rehabilitation approach for all water storages will consist of:</p> <ul style="list-style-type: none"> ▶ testing of water quality in all dams, and sediment quality in sediment ponds, and other dams that may have received contaminated water ▶ determination, in consultation with the landholder, whether any water storages may be of beneficial use for ongoing use of the site for grazing. Only water storages where water quality and sediment quality meets stock watering criteria in place at the time of closure will be allowed to be used ▶ for those storages that are to be removed: <ul style="list-style-type: none"> - treating water as required to meet water quality requirements for either discharge to a final void or to Carmichael River - draining of water, with discharge as determined based on water quality assessment and treatment - removal of any contaminated sediments. Contaminated sediments will be placed in the landfill if this can be done without causing environmental harm, or removed for disposal at an authorised waste disposal facility. - breaching of walls such that the storage can no longer contain water - Grading and re-contouring all areas such that surface drainage is restored and ponding and scouring will not occur - ripping or otherwise de-compacting compacted surfaces - placing topsoil as per topsoil management plan and topsoil register - seeding or planting vegetation - watering vegetation



Aspect	Method
	<ul style="list-style-type: none"> - managing weeds and revegetation until 70% cover is achieved.
	<ul style="list-style-type: none"> ▸ For those storages to be left in place for future use: <ul style="list-style-type: none"> ○ conduct of inspections and checks as per dam safety guidelines in place at the time of decommissioning ○ depending on outcome of inspections, undertaking of any maintenance requirements, or determining that the structure must be decommissioned ○ provision of information on dam design and safety to the landholder
Topsoil placement	<ul style="list-style-type: none"> ▸ Topsoil stripping and management will be in accordance with topsoil management plan and register as set out in Section 14.27. ▸ Topsoil will either be directly transposed from topsoil stripping areas or from stockpiles ▸ Topsoil types will be matched to underlying landforms wherever practicable ▸ Testing will be undertaken prior to placement in areas available for rehabilitation to determine the need for soil amelioration to address limiting properties and enhance rehabilitation success ▸ Test results and the need for amelioration will be recorded in the topsoil register ▸ Soil amelioration will be carried out as indicated by test results and this will be recorded in the topsoil register ▸ Prior to topsoil placement compacted surfaces will be ripped or otherwise de-compacted as far as possible to provide for friction between topsoil and the underlying surface, and to promote drainage and infiltration ▸ Topsoil will be spread at a depth of 50-100 mm ▸ On slopes, methods developed through trials will be used to maintain stability of soils after placement ▸ On slopes, drainage will be managed to minimise topsoil erosion risk
Revegetation	<ul style="list-style-type: none"> ▸ Seeds will be collected from local plant stocks. Seeds will be dried and stored ▸ Where trials indicate, seedlings will be grown for use in revegetation



Aspect	Method
	<ul style="list-style-type: none"> ▶ Species mixes for each rehabilitation area will be identified for each area to be rehabilitated based on: <ul style="list-style-type: none"> - End land use including, for designated native vegetation areas, habitat requirements - Slope and drainage characteristics - Available topsoil for placement in rehabilitation areas ▶ Revegetation will take place immediately on placement of topsoil using a mixture of seeding and planting of seedlings ▶ Revegetation techniques will be developed through revegetation trials ▶ Seeded or planted areas will be watered regularly, with frequencies to be determined through trials ▶ Weed inspections and control will be undertaken monthly until vegetation cover criteria are met and then annually until weed levels are below pre-disturbance levels
Habitat Development	<ul style="list-style-type: none"> ▶ Microhabitat requirements for targeted native species, including listed species known to have utilised the off-site infrastructure area prior to off-site infrastructure will be determined based on literature and trials in offset areas. Microhabitat may include: <ul style="list-style-type: none"> - Nesting boxes and roosts - Logs, felled trees and rocks salvaged from cleared areas - Water sources.

14.32.5.2 Rehabilitation Management

Table 14-79 Rehabilitation Management – Construction

Control	Responsibility	Timing	Evidence
<p>Prepare a Rehabilitation Management Plan for post-construction rehabilitation including rehabilitation of temporary construction areas, watercourses and buried infrastructure.</p> <p>Rehabilitation management plan to include:</p> <ul style="list-style-type: none"> Site specific rehabilitation techniques, including materials, vegetation species and techniques for placement of materials Site-specific rehabilitation success criteria, with reference to pre-disturbance conditions Monitoring program. 	Construction manager	Prior to disturbance	Rehabilitation Management Plan
Collect local provenance seeds for use in rehabilitation	Environmental Manager	Prior to clearing	Seed collections

Table 14-80 Rehabilitation Management – Operation and Closure

Control	Responsibility	Timing	Evidence
<p>Undertake a risk assessment in relation to demolition or decommissioning of all buildings, facilities and infrastructure as per Section 4.1 of HSE-CG-019. Record any requirements in relation to environmental management, such as management of hazardous materials material reuse and waste disposals in the demolition plan.</p>	Area Manager	Prior to commencing any demolition or decommissioning work	Demolition plan
Prepare a Rehabilitation Management Plan for post-closure rehabilitation	Area manager	Prior to closure of off-	Plan in place



Control	Responsibility	Timing	Evidence
including rehabilitation of off-site infrastructure. Rehabilitation management plan to include:			site infrastructure area
<ul style="list-style-type: none"> Site specific rehabilitation techniques, including materials, vegetation species and techniques for placement of materials Site-specific rehabilitation success criteria, with reference to pre-disturbance conditions Monitoring program. 			

14.32.6 Monitoring and Corrective Action – Rehabilitation

Table 14-81 – Rehabilitation Monitoring and Corrective Action

Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Monitor rehabilitation progress against completion criteria	Mine manager	Bi-annually for all areas under rehabilitation	Completion criteria to be developed	<ul style="list-style-type: none"> Carry out maintenance or repairs as required Update rehabilitation methods and techniques where opportunities for improvement are identified



Monitoring action	Responsibility	Frequency	Performance Requirement	Corrective Action
Monitor reference sites for comparison to rehabilitated areas	Mine Manager	Bi-annually or as required for comparison to rehabilitated areas	Reference site continue to be valid for use as reference sites	Seek new reference sites if existing sites have been subject to external influences which render the sites inappropriate as reference sites.



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