PROJECT CHINA STONE

Environmental Management 24

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24 ENVIRONMENTAL MANAGEMENT

24.1 INTRODUCTION

This section describes the proposed environmental management measures that will be developed and implemented to address the potential environmental impacts associated with Project China Stone (the project). It includes the proponent's commitments to mitigate and manage environmental impacts. The proponent's environmental management framework is discussed, along with the series of environmental management and monitoring plans that will be developed and implemented for the project. These management plans will effectively manage and control the potential environmental impacts that have been identified in this Environmental Impact Statement (EIS).

This section has been primarily prepared to provide a basis for the issuance of the Environmental Authority (EA) from the Queensland Department of Environment and Heritage Protection (EHP). Additional management measures that are discussed in the EIS but will not be conditioned under the EA, such as management measures related to health and safety and social impacts, have also been included for completeness.

24.2 PROJECT DESCRIPTION

24.2.1 Project Location

The project involves the construction and operation of a large-scale coal mine on a greenfield site in Central Queensland at the northern end of the Galilee Basin (Figure 24-1). The project site is approximately 20,000 ha and is defined by the project Mining Lease Application areas (MLAs) (MLA 70514, MLA 70515, MLA 70516, MLA 70517 and MLA 70518). These MLAs are within the Exploration Permit for Coal (EPC 987) tenement which is held by the proponent (Figure 24-2). The proponent also holds a Mineral Development Licence Application (MDLA 516) over part of the project site.

24.2.2 Project Overview

The mine will produce up to approximately 55 million tonnes per annum (Mtpa) of Run of Mine coal. This equates to approximately 38 Mtpa of thermal coal for the export market. The mine life will be in the order of 50 years.

Coal will be mined using both open cut and underground mining methods targeting the A, B, C and D seams in the Permian coal measures. Open cut mining operations will involve multiple draglines and truck and shovel pre-stripping. Underground mining will involve up to three operating longwalls. Coal will be washed and processed on site and product coal will be transported from site by rail.

The majority of the mine infrastructure will be located to the east of the open cut mining area (Figure 24-3). It will include Coal Handling and Preparation Plants (CHPPs), stockpiles, conveyors, rail loop and train loading facilities, workshops, dams and a Tailings Storage Facility (TSF). A workforce accommodation village and private airstrip will also be located in the eastern part of the project site.

The project includes the construction and operation of an on-site power station and associated Power Station Waste Storage Facility (PSWSF). The power station will be used for the mine power supply and will comprise 3 x 350 Mega Watt (MW) generating units. It will utilise coal rejects from the mine as feed coal.

Environmental management has been inherent in the conceptual design of the project assessed in the EIS. Appropriate environmental management measures will continue to be incorporated into the detailed engineering designs to be developed prior to construction.

The project site is approximately 20,000 ha. The project is predicted to remove approximately 11,000 ha of remnant vegetation to allow for open cut mining and the construction of mine infrastructure. This vegetation is mostly classed as least concern Regional Ecosystems (REs) (10,974 ha) with only 24 ha of one of concern RE proposed to be removed. The total surface area predicted to be affected by mine subsidence (not including the part of the Southern Underground that will also be open cut mined) will be approximately 4,950 ha (i.e. the area within the predicted limit of measurable subsidence).

24.2.3 Environmentally Relevant Activities

Under Schedule 2A of the *Environmental Protection Regulation 2008* (EP Regulation), the project is classified as a resource activity under Environmentally Relevant Activity (ERA) 13 – Mining Black Coal. Table 24-1 indicates the prescribed ERAs listed under Schedule 2 of the EP Regulation that are proposed to be undertaken as part of the project and will be approved under the EA for the project.

The indicative locations of the prescribed ERAs are shown in Figure 24-4. The risk of land contamination from project activities, including ERAs, will be reduced through the considered design and construction of mine facilities and post-mining rehabilitation. These risks have been evaluated as part of the project impacts discussed throughout this EIS. Control strategies in relation to these risks are discussed in Section 24.4.

Table 24-1 Environmentally Relevant Activities

ERA	THRESHOLD
ERA 8 – Chemical Storage	Threshold 4 storing 200 t or more of chemicals that are solids or gases, other than chemicals mentioned in items 1 to 3 of ERA 8 definition.
	Threshold 5 storing 200 m^3 or more of chemicals that are liquids, other than chemicals mentioned in items 1 to 3 of ERA 8 definition.
ERA 14 – Electricity Generation	Threshold 2 (b) generating electricity using a fuel, other than a gas, at a rated capacity of more than 150 MW electrical.
ERA 31 – Mineral Processing	Threshold 2 (b) processing more than 100,000 t in a year of mineral products, other than coke.
ERA 56 – Regulated Waste Storage	Operating a facility for receiving and storing regulated waste for more than 24 hours.
ERA 60 – Waste Disposal	Threshold 2 (b) operating a facility for disposing of, more than 2,000 t but not more than 5,000 t in year of general waste or a combination of general waste and regulated waste, where regulated wastes are no more than 10% of the total amount of the waste.
ERA 61 – Waste Incineration and Thermal Treatment	Threshold 1 incinerating waste vegetation, clean paper or cardboard.
ERA 63 – Sewage Treatment	Threshold 1 (b) operating sewage treatment works, other than no-release works, with a total daily peak design capacity of more than 100 but not more than 1,500 EP.
ERA 64 – Water Treatment	Threshold 2 (a) desalinating 0.5 ML to 5 ML of water in a day, allowing the release of wastes to waters other than seawater.

24.3 ENVIRONMENTAL MANAGEMENT FRAMEWORK

24.3.1 Environmental Policy and Record

The proponent places the highest value on environmental performance and currently undertakes exploration activities in accordance with their environmental policy (Attachment 24-1). This policy will be updated, as necessary, prior to subsequent project phases to ensure the policy reflects the proponent's commitments to environmental mitigation and management for the mine.

The proponent has conducted exploration activities on the project site in accordance with relevant regulatory requirements and has not been prosecuted for any breaches under any relevant environmental Commonwealth, Queensland or international laws during the previous ten years.

24.3.2 Environmental Management System

Consistent with the commitments in the proponent's environmental policy, an Environmental Management System (EMS) will be developed and implemented for the project. The EMS will be designed to achieve the objectives of the proponent's environmental policy and to ensure that all regulatory requirements are met. The EMS will be designed to generally be aligned with ISO 14001, which is a benchmark international standard for EMS development.

The EMS will provide a framework for environmental management. A series of environmental management plans, monitoring and environmental operating procedures will be developed under the EMS framework to effectively manage and control the environmental impacts of the project. These plans and procedures will be developed progressively to respond to the changing nature of project impacts during each project phase. The environmental management measures and plans that have been identified during the impact assessment are discussed in Section 24.4.

Under the EMS, the proponent will also develop a Plan of Operations (PoO) that will be submitted to the EHP prior to commencing construction and periodically thereafter. The PoO will be developed to outline proposed mining activities up to a period of five years and will:

- Describe all mining activities that will take place on the project site during the period of the plan;
- Propose an action program for complying with all of the EA conditions;
- Present a rehabilitation program for available disturbed areas during the period of the plan;
- Calculate the maximum Financial Assurance for the mining project during the term of the plan; and
- Include a compliance statement describing the level of compliance with EA conditions.

Grievance Procedure

The EMS will include the development and implementation of a grievance and dispute resolution procedure to ensure any complaints from landholders and other stakeholders are managed effectively and efficiently. Where necessary, this may include monitoring or changes to environmental management plans and procedures.

Review and Auditing

The EMS framework will facilitate continual improvement in performance by the review and, where necessary, revision of the environmental management plans, procedures or monitoring. This will be undertaken periodically, as necessary, and prior to commencement of subsequent project phases to enable the proponent to adapt to the changes in the predicted and actual environmental impacts arising in each project phase.

Periodic audits of each plan will also be undertaken, as necessary, to ensure compliance with regulatory requirements and the proponent's environmental policy.

Training

Employees and contractors will undergo site inductions and training relating to environmental management in accordance with the EMS documentation and the proponent's environmental management commitments.

24.4 ENVIRONMENTAL VALUES, IMPACTS AND COMMITMENTS

24.4.1 Overview

The impact assessment undertaken for this EIS has identified management measures and monitoring required to be implemented in order to address the impacts of the project. These are discussed in the following sections for each environmental aspect. An outline of the objectives and performance criteria, control strategies and monitoring requirements of each environmental aspect is discussed.

Table 24-2 lists each environmental aspect and management plans that have been identified in the EIS. The environmental management plans will include the following key components:

- Scope and objectives of the plan;
- Brief outline of the potential impacts that have been identified for the relevant issue;
- Details of the specific mitigation and management measures that will be implemented including an implementation strategy and the performance criteria (as measurable outcomes) to be adopted;
- Roles and responsibilities of management, employees and contractors (as applicable) for the implementation of the plan;
- Monitoring requirements;
- Reporting protocols and requirements, including to regulatory agencies; and
- Process for review and evaluation of the effectiveness of the plan including outlining the process for corrective actions to be made, if warranted.

The proponent will engage with relevant stakeholders, as necessary, as part of the development of these plans.

The proponent's commitments to environmental management that are discussed throughout the EIS are also reproduced in Attachment 24-2.

Table 24-2 Environmental Management Plans to be Developed for the Project

ENVIRONMENTAL ASPECT	MANAGEMENT PLAN
Rehabilitation and Soil Resources	Erosion and Sediment Control Plan
	Topsoil Management Plan
	Rehabilitation Management Plan
	Subsidence Management Plan
	Mine Closure Plan
Water Resources	Site Water Management Plan
Biodiversity	Biodiversity Management Plan
	Feral Animal and Weed Management Plan
	Species Management Plan
	Biodiversity Offsets Strategy
Waste Management	Landfill Management Plan
Hazards and Risks	Integrated Risk Management Plan
	Power Station Principle Hazard Management Plan
	Bushfire Management Plan
	Spill Management Plan
	Emergency Response Management Plan
Socio-economic Impacts	Recruitment Plan
	Indigenous Participation Plan
	Training and Skilling Plan
	Employee Wellbeing Plan
	Local Industry Participation Strategy
	Local Content Plan
Consultation	Stakeholder Consultation Strategy

24.4.2 Land

Potential project impacts relating to land resources will occur from:

- Open cut mining including the management and use of soil resources, which is discussed in Section 4 – Project Description, Section 8 – Rehabilitation, and in the *Soils and Land Suitability Report* (Appendix E).
- Subsidence and the rehabilitation of subsidence effects, which are discussed in Section 6 – Subsidence, Section 8 – Rehabilitation and in detail in the *Subsidence Report* (Appendix A) and the *Draft Subsidence Management Plan* (Appendix B).
- The storage of tailings and power station waste in the TSF and PSWSF, which is discussed in Section 7 – Tailings and Power Station Waste Storage Facilities, and in detail in the *Mine Waste Storage Facility Conceptual Design Report* (Appendix C) and the *Geochemistry Report* (Appendix D).

- The rehabilitation of the overburden emplacement areas that include storage of overburden, coarse rejects and power station wastes (beyond Year 10), which is discussed in Section 8 – Rehabilitation and the *Geochemistry Report* (Appendix D).
- Decommissioning and mine closure activities which are discussed in Section 8 – Rehabilitation.

The management of these impacts are discussed in the following sections.

Objectives and Performance Criteria

The overarching environmental protection objective is to return land disturbed by the project to a post mining landform that is stable, self-sustaining, safe, requiring minimal maintenance, and within similar land suitability and ecological values to its pre mining state, as far as possible.

Performance criteria for the various types of land disturbance within the project site are provided in Attachment 24-3.

Control Strategies and Monitoring

Soils Management

Topsoil stripping, stockpiling, maintenance and respreading will be managed in accordance with a Topsoil Management Plan. Topsoil and subsoil management measures will include:

- Soil stripping plans will be developed showing the depth of topsoil to be stripped to ensure that all suitable materials are salvaged and that the quality of stripped soil is not reduced through contamination with unsuitable soils;
- Earthmoving plant operators will be trained and/or supervised to ensure that stripping operations are conducted in accordance with stripping plans and in situ soil conditions; and
- Care will be taken to ensure soil moisture conditions are appropriate (i.e. not too wet) during stripping, stockpiling, and re-spreading to ensure that structural degradation of the soil is avoided.

Measures to be adopted during stockpiling topsoil and subsoil include:

- Soil will be stored within designated topsoil stockpile areas or stockpiled within the footprint of the open cut mining area where required, in order to limit the disturbance footprint of the project;
- Drainage will be diverted around stockpiles to prevent erosion;
- Sediment control in accordance with the Erosion and Sediment Control Plan will be installed downstream of the stockpiles to collect any washed sediment;
- Topsoil stockpiles will be formed in mounds up to a maximum height of approximately 10 m consistent with the storage area available;
- Long-term stockpiles, not used for over six months, will be deep ripped and sown with local grass seed-stock and legumes in order to keep the soil healthy and maintain biological activity;
- Soil stockpiles will be clearly signposted for easy identification and to avoid any inadvertent losses;
- Establishment of weeds on the stockpiles will also be monitored and controlled; and
- An inventory of available material, including soil types, will be maintained to ensure adequate materials are available for planned rehabilitation activities.

Measures to be adopted during re-spreading topsoil and subsoil include:

- Mine rehabilitation planning will include balancing the topsoil and subsoil quantities required for rehabilitation against stored stockpile inventories. Topsoil used in rehabilitation will be applied in accordance with the specifications in the Topsoil Management Plan;

- Soil material will be re-spread in even layers at a thickness appropriate for the intended land use of the area to be rehabilitated and volume of soil available; and
- Soils will be selectively placed, with more erodible materials being placed on flatter areas in order to minimise erosion.

Soil loss from rehabilitated areas will be minimised through:

- Contour ripping to encourage rainfall infiltration and minimise runoff;
- Reseeding soon after re-spreading to establish a vegetation cover as early as possible;
- Installing slope drainage control to limit slope lengths and runoff velocities; and
- Installing collection drains and sediment dams to collect runoff and control suspended sediment.

Erosion and Sediment Control

An Erosion and Sediment Control Plan (ESCP) will be prepared for the project. It will include mitigation measures that aim to minimise erosion and the release of sediment to receiving waters and the contamination of stormwater. These may include measures such as revegetating soil stockpiles, appropriate timing for soil disturbance activities, and the installation of erosion, drainage and sediment control measures. The following erosion and sediment control measures will be implemented to conserve the soil resources on the project site:

- Vegetation clearing will be conducted progressively so that the minimum area necessary for construction and operations is cleared at any time;
- Runoff from higher areas will be directed around disturbed areas;
- Runoff from bare earthworks areas will be collected in drains and directed through sediment traps and settling ponds to control suspended sediment prior to discharge from the site;
- Earthworks batters will be constructed to stable slopes and re-vegetated soon after construction; and
- Earthworks areas will be landscaped and re-vegetated as soon as possible after construction is completed.

An ESCP for the initial construction phase will be developed as part of detailed design.

Subsidence Management

Underground longwall mining will result in subsidence of approximately 4,950 ha of the site (i.e. the area within the predicted limit of measurable subsidence). The key subsidence effects requiring management are:

- Formation of surface tension cracks;
- Formation of surface buckling effects (which may require management in some instances);
- Ponding of water in shallow surface depressions caused by subsidence;
- Potential erosion in minor surface drainage lines; and
- Impacts on the contributing catchment and ponding area of the northern seasonal wetland.

Subsidence impacts will be managed in accordance with Subsidence Management Plans that will be prepared throughout the life of the project in accordance with EHP requirements. The plans will provide for the proper and effective management of environmental impacts resulting from mine subsidence. The plans will form the basis for all operational management activities related to the mitigation and management of subsidence impacts. Subsidence Management Plans will be authorised under the conditions of the EA and are required to be prepared prior to the commencement of longwall mining that will result in subsidence.

A Draft Subsidence Management Plan has been prepared as part of this EIS and is included in Appendix B. The plan broadly discusses:

- Subsidence predictions and the prediction method;
- The predicted impacts on natural and man-made features that are likely to be affected by subsidence including groundwater, surface water, terrestrial and aquatic ecology, existing infrastructure and mine infrastructure;
- The mitigation and management of subsidence impacts;
- Monitoring; and
- Reporting requirements including the process for annual review of the effectiveness of subsidence impact management and revision of the Subsidence Management Plan.

Tailings and Power Station Waste Storage Facilities

The project will generate the following mine wastes that will be stored in dedicated storage facilities on the project site:

- Tailings generated by processing coal at the CHPPs. Life-of-mine tailings will be stored in a conventional wet TSF. The tailing will be pumped from the CHPP to the TSF as a slurry via a surface pipeline.
- Dry power station waste material (fly ash, bottom ash and clinker) generated by the power station. Waste from the power station will be transported by haul truck for storage in the PSWSF. The PSWSF will be a dry emplacement area constructed in a similar manner to an out-of-pit overburden emplacement. The PSWSF will have sufficient capacity to store power station waste for the first 10 years of operations. After this time, power station waste will be stored within the open cut mine overburden emplacement areas.

The nature of these materials has been assessed in the EIS in order to evaluate their geochemical properties and assess the level of risk from acid generation, the presence and leaching of soluble metals and salts, and/or other salinity/erosion issues. This information is presented in Section 7 – Tailings and Power Station Waste Storage Facilities, Section 8 – Rehabilitation and in detail in the *Geochemistry Report* (Appendix D). The geochemistry assessment indicated the nature of the tailings and power station waste material are likely to be benign and non-acid forming. Accordingly no special management measures or rehabilitation techniques are required for their handling and storage. These wastes are therefore unlikely to present any environmental issues for on-site or downstream water quality.

The conceptual design and operation of the TSF and PSWSF has been undertaken as part of the EIS. This information is presented in Section 7 – Tailings and Power Station Waste Storage Facilities and in detail in the *Mine Waste Storage Facility Conceptual Design Report* (Appendix C). The following assessments were undertaken as part of the EIS to inform the conceptual design of these facilities. The incorporation of the outcomes of these assessments into the design of the facilities will limit the risk that environmental harm may occur from the facilities:

- A preliminary consequence assessment was undertaken for the TSF in accordance with EHP guidelines and is discussed in the *Mine Waste Storage Facility Conceptual Design Report* (Appendix C). The TSF has been assigned a ‘significant’ consequence category and is therefore likely to be considered a regulated structure under the *Environmental Protection Act 1994* (EP Act) and would be regulated by conditions in the project’s EA. A further, detailed consequence category assessment including full dam break analysis will be conducted at the detailed design stage to confirm the consequence category.
- Determination of the design criteria for the TSF (including the Design Storage Allowance (DSA), Extreme Storm Storage and Mandatory Reporting Level (MRL)) in accordance with the EHP requirements for ‘significant’ hazard category dams. This is discussed further in the *Mine Waste Storage Facility Conceptual Design Report* (Appendix C).

- Characterisation of the foundation soils of the TSF and PSWSF in order to assess the geotechnical stability of the facilities over their operating life and in post closure. Further detail is provided in Section 7 – Tailings and Power Station Waste Storage Facilities and the *Mine Waste Storage Facility Conceptual Design Report* (Appendix C).
- An assessment of the appropriate factors of safety (FOS) to ensure the landform slopes of the mine waste storage facilities will be stable under a variety of load conditions. Further detail is provided in Section 7 – Tailings and Power Station Waste Storage Facilities and the *Mine Waste Storage Facility Conceptual Design Report* (Appendix C).

The design, construction and operation of the TSF and PSWSF will be undertaken by appropriately qualified and experienced engineers. All facilities will comply with the conditions of the EA and other relevant design standards and licence requirements.

Rehabilitation of these facilities will involve provision of capping and topsoil layers, and seeding. A self-sustaining native ecosystem will be established on the mine waste storage facilities. Further detail on rehabilitation of the TSF and PSWSF is provided in Section 7 – Tailings and Power Station Waste Storage Facilities.

A monitoring program will also be designed to monitor key environmental and design performance indicators of the TSF and PSWSF. The proposed monitoring program is as follows:

- Monitoring for the TSF will include:
  - Regular inspections and annual survey of the deposited tailings beach and decant pond;
  - Regular inspection of the spigot off-take system, tailings deposition and operation of the decant pumping system;
  - Regular inspection of the surface drainage around the perimeter of the TSF and the seepage collection system;
  - Annual engineering inspection of the TSF embankment and spillways;
  - Surface water monitoring including TSF decant pond water quality and return water volumes pumped to the Return Water Dam (refer to Section 13 – Surface Water for details);
  - Monitoring of pore water pressures in the TSF embankment; and
  - Monitoring of groundwater levels and water quality in the vicinity of the TSF (refer to Section 12 – Groundwater for details).
- Monitoring for the PSWSF will include:
  - Regular and annual surveys of the emplaced power station waste including assessment of storage capacity and monument survey to assess settlement of the facility with annual engineering survey reports;
  - Regular inspection of the surface drainage around the perimeter of the PSWSF and the seepage collection system;
  - Regular inspection of the internal drainage collection system and monitoring of internal surface runoff quality;
  - Monitoring of pore water pressures in the PSWSF; and
  - Monitoring of groundwater quality in the vicinity of the PSWSF (refer to Section 12 – Groundwater for details).

The results of the monitoring will be used to assess the performance of the TSF and PSWSF and to undertake regular reviews of the design and operating plans.

Rehabilitation of Overburden Emplacement Areas

Rehabilitation of overburden emplacement areas will be undertaken progressively throughout the mine life. Rehabilitation will be managed in accordance with a Rehabilitation Management Plan (RMP). The RMP will include detailed rehabilitation designs and procedures including thresholds for intervention and intervention measures in accordance with the strategies outlined in Section 8 – Rehabilitation.

The nature of the materials to be stored in the overburden emplacement areas has been assessed in the EIS in order to evaluate their geochemical properties and assess the level of risk from acid generation, the presence and leaching of soluble metals and salts, and/or other salinity/erosion issues. This information is presented in Section 8 – Rehabilitation and in detail in the *Geochemistry Report* (Appendix D). The geochemical analysis indicates the overburden material is relatively benign with low sodicity. Consequently the construction of the overburden emplacements will not require any selective handling of overburden. Similarly, the coarse coal reject material and power station waste that will be stored within the overburden emplacements were also found to be relatively benign. However, these materials are not likely to be a suitable growth medium for revegetation. These materials will be buried within the overburden with a minimum 2 m cover and will not be present at the surface of the final landform.

Based on the geochemistry and physical properties of the overburden emplacement materials, no special rehabilitation techniques are required for the overburden emplacement areas and a “conventional” overburden emplacement rehabilitation strategy is proposed. This is discussed further in Section 8 – Rehabilitation.

The RMP will also include monitoring and maintenance programs for site rehabilitation. This will include monitoring of revegetation and erosion. Maintenance works will be undertaken as necessary on the basis of monitoring results. Maintenance works will likely include:

- Ripping and reseeding areas of poor germination;
- Maintenance of rehabilitation drainage and sediment control works; and
- Installation of additional drainage and controls for erosion areas.

Rehabilitation goals, objectives, indicators and completion criteria were developed in accordance with the EHP Guideline *Rehabilitation Requirements for Mine Resource Activities* and are included in Attachment 24-3.

The RMP will also consider measures that are being successfully implemented as part of the Biodiversity Management Plan to enhance rehabilitation success. Such measures may include installation of logs, dead trees, stumps and hollows in strategic locations, in order to enhance habitat values.

Decommissioning and Mine Closure

Following cessation of mining activities the rehabilitation of the open cut and underground mining areas and the TSF will be completed. Mine infrastructure areas will be decommissioned and rehabilitated. A Mine Closure Plan will be prepared to provide guidance on mine closure activities and will include:

- Rehabilitation goals;
- An overview of closure and rehabilitation activities;
- Performance criteria; and
- Monitoring and reporting.

During site decommissioning all buildings and mine infrastructure will be dismantled and removed from site. The infrastructure hardstand areas will be inspected for any hydrocarbon contamination and remediated, as necessary. The hardstand areas will then be contoured, topsoiled, ripped and seeded with the aim of restoring the site to the required land use. Topsoil will be placed at a minimum depth of 0.3 m. Revegetation species will include a mixture of grasses and native trees. The portals of the underground mine access drifts and ventilation shafts will be permanently sealed at mine closure in accordance with the requirements of the Department of Natural Resources and Mines (DNRM).

The open cut mine final voids and ramps will be left in a geotechnically stable form. The catchment area of the final voids will be limited by the highwall drains and the externally draining overburden emplacement areas. Modelling of the final void water balance indicates that a lake will form in the final void. The modelling indicates that the lake will reach a quasi-equilibrium level approximately 50 m below the spill point of the final void. Overflow from the final void is therefore very unlikely. The predicted lake level is also below the level of the pre mining water table. This means that the final void will continue to act as a groundwater sink and void lake water will not migrate away from the void and potentially contaminate groundwater. Groundwater modelling also indicates that groundwater inflows to the final void will be relatively minor in the post mining phase, based on conservative groundwater modelling assumptions. The surface water and groundwater assessments for the final void are discussed in more detail in Section 13 – Surface Water and Section 12 – Groundwater, respectively.

The decommissioned site will be free draining with the exception of the final voids. Flood modelling conducted for the project indicates that the decommissioned site has a suitable drainage arrangement and the final voids will have immunity from the Probable Maximum Flood. Site drainage is discussed in more detail in Section 13 – Surface Water. Post closure project site land tenure arrangements will be determined during mine closure.

24.4.3 Terrestrial and Aquatic Ecology

Potential biodiversity impacts from the project are discussed in Section 9 – Terrestrial Ecology, Section 10 – Aquatic Ecology, Section 11 – Matters of National Environmental Significance and in detail in the *Terrestrial Ecology Report* (Appendix F) and the *Aquatic Ecology and Stygofauna Report* (Appendix G). The proposed *Biodiversity Offsets Strategy* is also included in Appendix H.

Objectives and Performance Criteria

The key environmental protection objective relating to biodiversity is to minimise and mitigate adverse impacts on terrestrial and aquatic flora and fauna. All reasonable attempts have been made to first avoid and then minimise and mitigate any adverse impacts on flora and fauna environmental values. The environmental values to be enhanced or protected are:

- The life, health and wellbeing of the terrestrial and aquatic flora and fauna; and
- The diversity of ecological processes and associated ecosystems within the project site.

Control Strategies

The following procedures and plans will be developed and implemented to mitigate or control impacts on flora and fauna.

Clearing Procedures

The following procedures will be implemented in order to minimise clearing impacts and unnecessary disturbance to native vegetation and aquatic habitat:

- The limits of clearing will be delineated prior to the commencement of any clearing and marked clearly on plans and on the ground;
- Vegetation beyond the identified clearing areas will not be disturbed; and
- Vegetation clearing will be undertaken sequentially and in accordance with the proponent's Permit to Disturb process. This will restrict the area of vegetation to be cleared to that required for the safe construction and operation of facilities.

Particular care will be taken in relation to any work in or adjacent to drainage lines, with mitigation measures including:

- Construction adjacent to drainage lines will only be undertaken when flows have ceased within the drainage lines.

- Any necessary sediment control works will be implemented, particularly if remnant pools are located adjacent to construction activities.
- Work will be undertaken in accordance with the requirements of an ESCP.

The proponent will consult with the Department of Agriculture and Fisheries, as necessary, in relation to construction in drainage lines that could impact fish habitat or fish passage.

Pre-clearing surveys will also be undertaken ahead of clearing, to limit fauna injury and mortality and to identify habitat features to be relocated. A Spotter Catcher, in possession of relevant permits under the *Nature Conservation Act 1992* (NC Act), will be on hand during clearing and to rescue any animals still remaining in the clearing area following the pre-clearance surveys.

Biodiversity Management Plan

A Biodiversity Management Plan will be prepared for the project. It will include measures to conserve and enhance the conservation value of areas of native vegetation that will be retained in the project site (i.e. areas outside of the footprint of open cut mining and infrastructure). Measures that will be detailed in the plan include:

- Installation of logs, dead trees, stumps and hollows in strategic locations, in order to enhance habitat values;
- Management of grazing pressure in the project site;
- A Fire Management Plan; and
- Prescriptions for the installation of fauna watering points. Although these watering points are primarily intended to mitigate for the loss of water for terrestrial species, a number of the watering points will be designed in a manner that will also provide aquatic habitat.

Feral Animal and Weed Management Plan

A Feral Animal and Weed Management Plan will be developed and implemented for the project site in order to control feral animals and weeds that are known to occur, and to prevent the introduction and establishment of any new invasive exotic species. The Feral Animal and Weed Management Plan will be developed in accordance with the following, where necessary:

- The *Land Protection (Pest and Stock Route Management) Act 2002*;
- Biosecurity Queensland guidelines, strategies and policies; and
- *The Regional Pest Management Strategy – Isaac, Mackay, Whitsunday – 2011-2014*.

The Feral Animal and Weed Management Plan will contain details of appropriate management measures that will be implemented if numbers are such that control is required of any feral animal or weed species. This will include information such as appropriate control strategies, timing, and specifications for follow up works.

Erosion and Sediment Control Plan

An ESCP will be prepared for the project, as discussed in Section 24.4.2. It will include mitigation measures that aim to minimise erosion and the release of sediment to receiving waters and the contamination of stormwater. These may include measures such as revegetating soil stockpiles, appropriate timing for soil disturbance activities, and the installation of erosion, drainage and sediment control measures. These measures will limit potential impacts on aquatic ecology.

Subsidence Management Plan

A Draft Subsidence Management Plan has been prepared as part of this EIS and is provided in Appendix B. It includes a description of management measures related to the repair of subsidence cracking, the subsidence of ephemeral drainage lines and the northern seasonal wetland, and the installation of remedial drainage works. It also describes details of a vegetation monitoring program, which will be undertaken to confirm that subsidence

does not give rise to impacts greater than those listed in the *Terrestrial Ecology Report* (Appendix F) and to identify additional mitigation measures in the event of unanticipated impacts.

Species Management Plan

A Species Management Plan is required to be developed and implemented for the project in accordance with the requirements of the NC Act. The Species Management Plan will outline actions to be taken to minimise impacts on animal breeding places and will be submitted to the EHP for approval prior to the commencement of construction activities. The program will include prescriptions on the nature and duration of pre-clearance surveys as well as measures to be employed during any clearing activities (e.g. relocation of habitat features such as hollows and logs). The Species Management Plan would also describe the role of a spotter catcher and the necessary permits for any relocation of fauna. Information contained in the Species Management Plan will likely be derived from the Biodiversity Management Plan.

Biodiversity Offsets Strategy

Biodiversity offsets will be required for any significant, residual impacts on Matters of State Environmental Significance (MSES) and Matters of National Environmental Significance (MNES). The following impacts have been determined to be residual, significant impacts requiring offsets:

- Clearing of approximately 24 ha of RE 10.10.3 *Eucalyptus drepanophylla* open-woodland on sandstone ranges for the purposes of open cut mining and the construction of mine infrastructure.
- Clearing of approximately 359 ha of vegetation comprising 23 REs as per the vegetation management watercourse map for the purposes of open cut mining and the construction of mine infrastructure.
- Clearing approximately 1,436 ha of high value habitat for the Squatter Pigeon (southern subspecies) for the purposes of open cut mining and the construction of mine infrastructure. A further 3 ha of high value habitat may be cleared for the construction of remedial drainage works in subsided areas (although it is noted that the exact location and design of drains is still to be confirmed).
- Clearing approximately 4,434 ha of high value habitat for the Black-throated Finch (white-rumped subspecies) for the purposes of open cut mining and the construction of mine infrastructure. A further 9 ha of high value habitat may be cleared for the construction of remedial drainage works in subsided areas (although it is noted that the exact location and design of drains is still to be confirmed).
- Clearing approximately 3,246 ha of high value habitat for the Koala for the purposes of open cut mining and the construction of mine infrastructure. A further 0.4 ha of high value habitat may be cleared for the construction of remedial drainage works in subsided areas (although it is noted that the exact location and design of drains is still to be confirmed).

Subsidence impacts on the northern seasonal wetland may cause a significant, residual impact on the northern seasonal wetland. The northern seasonal wetland is a High Ecological Significance wetland and therefore considered to be a MSES. It will be necessary to provide offsets under the Queensland *Environmental Offsets Regulation 2014* in the event of the project giving rise to significant, residual impacts on the wetland. The need for offsets will be determined once detailed mine planning has been conducted for this area given that even minor changes in the mine plan could significantly alter the nature and extent of any impacts on the wetland.

The proponent has developed a *Biodiversity Offset Strategy* (Appendix H) to provide these offsets. The Biodiversity Offset Strategy includes:

- The proposed offset area/s, including the location, property description, ecological values and proposed mechanism to secure the offset;
- The proposed management strategy for the offset area;
- Monitoring and reporting to be undertaken for the offset;

- A description of the objectives of the offset, particularly in relation to any relevant objectives and recovery actions for the species/community; and
- A description of the environmental gains to be achieved with the offset.

Monitoring

Monitoring will be incorporated, as necessary, into the management plans to be developed for the project to mitigate and manage biodiversity impacts. In particular, monitoring will be undertaken in relation to:

- The ongoing status and health of flora and fauna that is to be retained in the project site, including both vegetation monitoring and threatened species monitoring. This monitoring will provide feedback data to determine the level of success of the mitigation measures. Key performance monitoring indicators will be established to determine success of the mitigation measures. A framework for reporting on the results of the monitoring will be included in the Biodiversity Management Plan.
- The presence and abundance of exotic species recorded from the project site and those with potential to occur. The monitoring program will allow for early recognition of any weed or feral animal that may pose a threat to biodiversity, and will enable the timely implementation of control measures. Key indicators to be used for monitoring weeds and feral animals will be included in the Feral Animal and Weed Management Plan.
- Monitoring and reporting to be undertaken in relation to biodiversity offsets.

Monitoring methods will be aligned with relevant state and national guidelines and will be described in the relevant management plans.

In addition, a Receiving Environment Monitoring Program (REMP) will be developed and implemented in accordance with conditions prescribed in the EA. The REMP will include monitoring of the effects of mine water discharges on the downstream receiving environment including surface water flow and quality as well as environmental values, including aquatic ecology.

24.4.4 Groundwater

Potential impacts on groundwater are addressed in detail in Section 12 – Groundwater, and in the *Groundwater Report* (Appendix I).

Background

Regulatory Setting

The taking of or interfering with groundwater is regulated under the water licensing provisions of the Queensland *Water Act 2000* (Water Act). The Water Act requires that a water licence is required to take or interfere with artesian groundwater anywhere in Queensland. A water licence is also required to take or interfere with sub-artesian groundwater within areas declared as management areas or declared areas under subordinate Queensland legislation. A water licence applies to direct and indirect take of groundwater.

As discussed in Section 12 – Groundwater (subsection 12.4), the project will result in the take or interference with groundwater. The proponent will specifically require the following water licences prior to commencement of mining activities:

- A licence for take from the Great Artesian Basin (GAB) under the *Water Resource (Great Artesian Basin) Plan 2006*; and
- A licence for take from the Greater Western Sub-Artesian Area under the Queensland *Water Regulation 2002*.

The administering authority for the Water Act is the DNRM. The proponent will be required to comply with the requirements and conditions of the water licence. The licence will specify the approved location and the source aquifer for groundwater take, along with an approved volumetric groundwater allocation. The licence will also include standard conditions that identify existing water supplies to be protected, require the proponent to make-

good any pre-existing water supplies unduly affected by the project, and specify monitoring, assessment and reporting requirements. The licence will also impose requirements in relation to mine closure for the management of post mining groundwater take.

The DNRM licensing approach is designed to ensure that the total allocated groundwater take permissible in granted water licences remains within the sustainable yield of the groundwater resource. This approach ensures that individual and cumulative licensed groundwater take do not adversely impact the sustainability of the affected groundwater resource. Provided that the licensing regime does not over allocate the total take from the available groundwater resources, this regulatory approach will also ensure that the licensed take has no significant residual impact on water resources of the GAB or other aquifers.

The *Water Reform and Other Legislation Amendment Act 2014* (the Water Reform Act) was passed on 26 November 2014. The Water Reform Act includes a number of changes to the Water Act that would potentially affect the regulation of groundwater take associated with the project. Commencement of the Water Reform Act provisions has been deferred pending further review by the Queensland government.

The proponent will consult with the DNRM in relation to its obligations under the Water Act and will comply with the relevant requirements for groundwater take.

Groundwater Regime

The local topography is dominated by an elevated ridgeline located at the western periphery of the project site. This ridgeline (known as Darkies Range) comprises outcropping, highly weathered Triassic formations. East and west of this ridgeline, the lower-lying topography is overlain by later Tertiary and Quaternary sediments. This ridgeline forms a zone of groundwater recharge. Groundwater is located at significant depth in this area, due to the prominence of the ridgeline. Groundwater flow generally follows topography to the east and west of this recharge zone. A water table forms within the shallow sediments east and west of the ridge, while deeper groundwater becomes increasingly confined by low permeability formations.

The hydrogeological units of the project site are broadly:

- A veneer of localised fluvial Quaternary sediments that are limited to thin patches of mud and gravel that dry quickly following flow events;
- A veneer of highly weathered Tertiary sediments and localised fluvial Quaternary sediments that are generally thin or absent on the elevated ridge of Darkies Range. The Tertiary sediments generally thicken in the lower lying areas beyond Darkies Range. A water table forms within the Tertiary sediments in the south-east of the project site and extends east towards the Belyando River;
- Triassic sediments of the Clematis Sandstone that form a permeable and regionally significant aquifer where saturated;
- Low permeability Triassic sediments of the Moolayember and Rewan Formations that act as confining units above and below the Clematis Sandstone aquifer, respectively;
- Permian Betts Creek Beds that comprise coal seams between low permeability sediments; and
- Underlying Carboniferous sediments of the Joe Joe Group.

Groundwater storage and movement occurs within the massive sandstones of the Clematis Sandstone, the cleats that intersect the coal seams in the Betts Creek Beds, and the shallow Tertiary sediments. Other sediments in stratigraphic sequence exhibit low permeability and form discrete confining units between these water-bearing formations.

Groundwater Setting

A bore census was carried out to identify private bores surrounding the project site that could potentially be impacted by the project. It included consultation with landowners, a search of the DNRM database, review of the EISs undertaken for the nearby proposed Carmichael Coal Mine site, and an inspection of bores.

The bore census was targeted towards bores that could potentially be impacted by the project. The extent and nature of the water-bearing strata were also taken into account in planning the bore census. For example, areas to the east of the Betts Creek Beds subcrop are of limited concern due to the low potential for significant depressurisation through the base of the Betts Creek Beds into the underlying strata. A conservative search radius of 20 km beyond the project site boundary was undertaken in areas that could potentially be impacted by the project.

A total of 52 private bores were identified during the bore census. The bore census indicated that groundwater use is sporadic and dispersed over a wide area due to the generally significant depth to groundwater and typically low yields. Water quality is variable, but is generally suitable for stock watering.

The closest springs to the project site are the Doongmabulla Spring Complex, 22 km to the south of the proposed mining area. The Doongmabulla Spring Complex is registered under the GAB Resource Operations Plan as the closest spring that could support significant cultural and environmental values.

The Clematis Sandstone is the source aquifer for the springs. As discussed in Section 12 – Groundwater (subsection 12.3.3), the project site is located at the eastern margins of the Clematis Sandstone where this unit is largely dry and unsaturated. In the south of the project site, closest to the Doongmabulla Spring Complex, the Clematis Sandstone is generally absent. In this area, open cut mining and subsurface subsidence cracking above the Southern Underground Mine will only intersect a minor area of thin and unsaturated Clematis Sandstone.

Due to the absence of shallow groundwater there are no Groundwater Dependent Ecosystems within or in proximity to the project site.

There is limited potential for significant stygofauna habitat or assemblages to occur within the project site for the following reasons:

- No alluvial, limestone, or calcrete aquifers are present in the vicinity of the project site. The nearest alluvial aquifer is associated with the Belyando River, approximately 40 km east of the project site and beyond the predicted extents of project impacts on groundwater;
- Groundwater within the project site is disconnected from ephemeral surface water drainage lines and there is negligible potential for hyporheic mixing zones that typically host stygofauna; and
- Groundwater within the project site is generally located at significant depths within underlying rock and this depth is not conducive to the presence of stygofauna.

Groundwater Modelling

A 3D numerical groundwater flow model was developed to predict the extents of depressurisation and the associated impacts on groundwater users and the surrounding environment. A detailed description of the groundwater model is provided in the *Groundwater Report* (Appendix I). The model represented the key geological units as 18 layers and extended 75 km north-south and 85 km east-west. The groundwater model was based on the project geological model as well as all published lithological logs within the model extents, including drilling logs from the adjoining Carmichael Coal Mine Project and the DNRM groundwater database. The groundwater model was calibrated to existing groundwater levels using reliable measurements from all representative local and regional bores located over an area of 6,375 km^2.

The 3D numerical model included changes to model parameters to simulate the effects of subsurface subsidence cracking. The inherent uncertainty associated with subsidence cracking height and associated permeability predictions was addressed by adopting conservative key modelling assumptions. The model represents the predicted continuously cracked zone above each longwall as highly permeable and where the zone of continuous cracking is predicted to intersect only part of an overlying geological unit, the entire thickness of that unit is conservatively represented with a high permeability. The modelled vertical conductivity adopted for the cracked areas of the Clematis Sandstone above the Northern Underground is so high as to be considered uniformly free-draining.

These assumptions more than adequately account for any uncertainty associated with subsidence cracking predictions, and therefore provide a conservative basis for assessing potential worst case groundwater impacts.

Objectives and Performance Criteria

The environmental protection objectives relevant to groundwater are as follows:

- To minimise any adverse impacts on groundwater resources due to mining and mine dewatering;
- Prevent any contamination of groundwater quality; and
- Identify and effectively manage any potential impacts on natural features or water supplies dependant on groundwater.

Control Strategies

Groundwater monitoring will be conducted over the 50 year life of the mine to confirm the actual extent of groundwater impacts and validate the conservative predictions. The results of the groundwater monitoring conducted over the life of the mine will be used to inform the reassessment of potential post-mining groundwater impacts and identification of any bores that will potentially be impacted in the long-term post mining.

As part of mine closure planning, the proponent will enter into agreements with landholders of any potentially impacted bores. The groundwater monitoring program is described in the following section.

The project is not predicted to result in adverse impact on the groundwater regime. However, control strategies that will further reduce the potential for generation of contaminated groundwater will be adopted as follows:

- Hydrocarbon and chemical storage will be managed in accordance with the measures described in Section 22 – Hazard and Risk. These measures are standard practice at mine sites and that are designed to prevent the contamination of groundwater.
- The TSF and PSWSF will be designed to minimise leachate generation and with seepage collection systems.
- The proponent will comply with its underground water obligations as defined under the Water Act.

Monitoring and Reporting

Ongoing Pre-Mining Baseline Monitoring

The established groundwater monitoring network comprises 31 monitoring bores and 12 Vibrating Wire Piezometer (VWPs) at 24 locations across the project site and surrounding area (Figure 12-12). Data from this monitoring network enabled confirmation of baseline groundwater levels and quality from representative hydrogeological units.

The groundwater monitoring network established as part of EIS groundwater investigations will be maintained throughout the life of the project. Any monitoring bores or VWPs that are removed by mining during the life of the project will be replaced, where necessary.

Recording of groundwater levels from existing monitoring bores and VWPs will continue until the commencement of project construction. This will provide a long-term dataset that will enable natural water level fluctuations (such as responses to rainfall) to be distinguished from potential water level impacts due to depressurisation resulting from mining activities.

Groundwater quality monitoring will also continue until the commencement of project construction. This will establish a robust, long-term baseline groundwater quality that can be used to determine site-specific groundwater contaminant trigger levels and detect any changes in groundwater quality arising from mining activities during and post mining.

This baseline groundwater quality and level data will be reviewed prior to project construction to establish which water quality parameters should continue to be monitored and the frequency of the groundwater monitoring. All determinations of groundwater quality and levels will be undertaken by an appropriately qualified person.

Operations Phase Groundwater Monitoring

An operations phase groundwater monitoring program is required to identify any significant departure from baseline conditions or the EIS model predictions that could result in significant impacts to water resources, water users and environmental values. The proposed monitoring program will monitor groundwater levels and quality in relation to:

- Groundwater take from the GAB;
- Groundwater take from the Greater Western Sub-Artesian Area;
- Drawdown impacts on private water supply bores;
- Indirect depressurisation impacts on the water table in the Tertiary sediments; and
- Water quality impacts arising from mine waste storage facilities.

An operations phase monitoring program has been developed to meet these monitoring objectives and confirm the project effects on groundwater throughout the project operations phase. Details of the proposed operations phase groundwater monitoring program are provided in Attachment 24-4.

The existing monitoring bores will operate as groundwater compliance points. Site-specific reference conditions for the groundwater regime will be derived from ongoing pre-mining baseline monitoring and EIS groundwater model predictions.

The basis of calculation of groundwater quality triggers and limits is documented in Attachment 24-4. All proposed groundwater quality triggers and limits will be determined prior to project construction using long-term baseline data collected from the ongoing monitoring program. Monitoring data will be reconciled with the proposed groundwater quality triggers and limits on a quarterly basis to identify any deviations from long-term baseline groundwater quality. In accordance with the model EA conditions, the proponent will investigate any exceedance of the proposed groundwater quality triggers.

Groundwater level trigger thresholds have also been developed for each of the proposed monitoring bores. Groundwater level trigger thresholds are set at 90% of the predicted maximum water level change at each bore to allow for early identification of any unexpected impacts on groundwater levels, as shown in Attachment 24-4. Groundwater level monitoring data will be reconciled with the proposed groundwater level trigger thresholds on a quarterly basis to identify any deviations from the modelled predictions. In accordance with the model EA conditions, the proponent will investigate any exceedance of the proposed groundwater level trigger thresholds to determine whether there is a significant departure from the modelled predictions.

The proponent will also comply with any additional monitoring and reporting requirements under the Water Act water licensing regime.

The groundwater monitoring program, including triggers for investigation of unanticipated monitoring results, will be documented in the Site Water Management Plan that will be developed for the project (discussed in Section 24.4.5).

24.4.5 Surface Water

Potential impacts that are to be considered in relation to water resources are addressed in detail in Section 13 – Surface Water, the *Open Cut Mine Drainage Report* (Appendix J), and in the *Water Management System Modelling Report* (Appendix K).

Background

Surface Water Setting

The project site is located within the upper catchment of the Belyando Basin, 255 km upstream of the Burdekin Falls Dam. Burdekin Falls Dam is the largest dam in Queensland and is located at the upstream end of a

regulated water supply scheme involving a series of downstream weirs that are fed by controlled releases from the dam. The regional setting is characterised by high soil erosion rates which result in naturally elevated suspended sediment loads in watercourses. The Burdekin Falls Dam acts to attenuate natural sediment loads prior to any discharge into the lower Burdekin Basin and the coastal marine waters of Upstart Bay.

The local catchment setting is dominated by the elevated ridgeline of Darkies Range which is located at the western boundary of the project site. The majority of the project site drains east from Darkies Range forming the headwaters of Tomahawk Creek and North Creek. These creeks flow to the south-east to the Belyando River downstream of the project site.

The catchment of Lake Buchanan extends from Darkies Range to the west of the site. Only a very minor portion of the project site is within the Lake Buchanan catchment. Minor areas in the south-west of the project site also drain to the Carmichael River catchment via minor drainage lines.

The site is located at the head of the Tomahawk and North Creek catchments and site drainage is therefore highly ephemeral. There are no watercourses traversing the project site.

Site drainage is characterised by a network of steep rocky gullies in the steeper topography associated with Darkies Range. These gullies transition to minor drainage lines with wide shallow flow paths on the flatter areas of the project site to the east of Darkes Range.

The land uses downstream of the project site are predominantly grazing on natural pastures. Riparian and aquatic habitat on the project site and in the downstream catchment is degraded due to the effects of clearing and cattle grazing and persistent water bodies are known to be turbid. Aquatic ecology values are considered slightly to moderately disturbed. Aquaculture, industrial and recreational uses are not known within the local catchment setting.

Long-term monitoring data considered representative of receiving water flows and background water quality in the downstream Belyando River catchment has been collected and analysed. Long-term salinity (as electrical conductivity (EC) and total dissolved solids), pH, alkalinity and major ion levels are generally consistent throughout the regional drainage network and within the expected range for upland freshwater streams. Natural background concentrations of nutrients and some metals (i.e. aluminium, copper and zinc) are typically elevated.

Objectives and Performance Criteria

The environmental protection objectives for surface water are:

- To prevent contamination of downstream surface water resources by:
  - Achieving containment requirements; and
  - Maintaining regulatory compliance.
- To maintain water supply for the project with maximised use of mine-affected water.
- To minimise impacts from project activities on the hydrology of waterways (such as adverse increases or decreases in extent of flooding and quantity, duration, rate or timing of stream flows).

Performance criteria related to surface water will include operation in accordance with the Site Water Management Plan.

Control Strategies

The project will generate the following waters:

- Underground mine pit water comprising:
  - Groundwater inflow to the underground workings; and
  - Water recycled from underground operations.

- Open cut mine pit water comprising:
  - Groundwater inflow to the open cut pit; and
  - Runoff from the open cut pit catchment.
- Return water from the TSF comprising;
  - Supernatant recovered from the deposited tailings:
  - Rainfall and runoff from the contained internal TSF catchment; and
  - Runoff from the PSWSF which will be collected in sumps and transferred to the TSF decant pond.
- Runoff from areas disturbed by project activities including overburden emplacement areas and mine infrastructure areas;
- Runoff from areas affected by mine subsidence; and
- Runoff from areas undisturbed by project activities.

Water Management Strategies

The water management strategies for each of these waters are as follows:

- Where possible, divert clean runoff from undisturbed areas around areas disturbed by mining activities and allow to drain from the site;
- Control suspended sediment in site drainage water and potential downstream sedimentation through the collection of sediment-affected water and direction through sediment control structures in accordance with an ESCP;
- Contain mine-affected water in on-site mine water storages for use as mine water supply;
- Controlled release of any excess mine-affected water in accordance with EHP's Model Mining Conditions, which are designed to ensure the protection of downstream environmental values;
- Provide an adequate level of flood protection for mine infrastructure and the open cut pit; and
- Establish a free-draining post mining landform (with the exception of the final void).

Water Management System

The proposed mine water management system involves the use of mine-affected waters as mine water supply and an external raw water supply to meet high quality water supply requirements and make up any shortfall in the site water balance.

The key mine water dams and their operating logic are as follows:

- Return Water Dam – this dam will be used to store return water transferred from the TSF decant pond. It will have sufficient storage capacity to enable the TSF decant pond to be maintained at a low water level, ensuring there is no risk of an overflow from the TSF. This dam will be a priority source of water supply to the CHPP. This dam will have nil external catchment and will be operated with a minimum freeboard to ensure it does not overflow.
- Mine Water Dam – this dam will be used to store pit water generated from the underground and the open cut mines. Pit water will be pumped to the dam from the underground workings and the open cut pits via intermediate pit water dams. This dam will be a primary source of dust suppression water supply and a secondary source of water supply to the CHPP. This dam (and the intermediate pit water dams) will have nil external catchment and will be operated with a minimum freeboard to ensure it does not overflow. In order to minimise the accumulation of runoff in the open cut pits during extended wet periods, pit water will be transferred to this storage as a high priority and may accumulate in this dam during extended wet periods.

The dam will have a controlled release pipe to enable the controlled release of pit water in accordance with the EHP model EA discharge conditions. Controlled releases will be necessary following extended wet periods where accumulated runoff in the open cut pits exceeds the site pit water storage capacity. The estimated frequency and volume of controlled releases from this dam are discussed in Section 13 – Surface Water (subsection 13.5.5).

- Industrial Area Dam and mine infrastructure area catch dams – the Industrial Area Dam will be used to store water transferred from numerous mine infrastructure area catch dams. The catch dams will collect runoff draining from contained infrastructure area catchments. Any runoff collected in the catch dams will immediately be transferred to the Industrial Area Dam to ensure they are maintained with maximum storage capacity to contain rainfall runoff with a low probability of overflow. The Industrial Area Dam will be a primary source of dust suppression water and a secondary source of water supply to the CHPP. This dam will have nil external catchment and will be operated with a minimum freeboard to ensure it does not overflow. Due to the transfer of water from catch dams, water may accumulate in this dam during extended wet periods.
- Raw Water Dam – this dam will be a buffer storage for an external raw water supply, with nil external catchment. This dam will be the primary source of raw water supply to the underground mine, vehicle washdown, the power station and water treatment plant. This dam will be a secondary source of water supply for the CHPP and dust suppression.

All dams will be designed and constructed in accordance with relevant design standards and licence requirements, including standards defined in the Water Act. Designs will adequately address the structural integrity of containment walls during climatic extremes, including drought and flood.

Modelling of the proposed mine water management system indicates that there would be no uncontrolled discharges of mine-affected water for the 124 years of climate data assessed. This means that the probability that an uncontrolled discharge will occur is less than once in 124 years (i.e. the average recurrence interval of a discharge event is greater than 124 years).

However, during extended wet periods, significant runoff volumes will accumulate in the open cut pit. To ensure that the open cut mine can continue to operate following these extended wet periods, the ability to discharge mine-affected water under controlled conditions is required. The water management system has therefore been designed to allow for the controlled release of stored pit water from the Mine Water Dam to the Belyando River catchment.

Attachment 24-4 provides details of site-specific discharge conditions for the project. The proposed discharge conditions provide the following:

- Locations for:
  - Nominated point of release from the Mine Water Dam;
  - The receiving waters of the Belyando River; and
  - Upstream and downstream monitoring locations.
- Mine-affected water release limits including EC, pH and turbidity. In accordance with the model EA discharge conditions, turbidity (by instantaneous measurement) has been nominated as a surrogate for suspended sediments (by laboratory analysis) due to the remoteness of the project site. The proposed release limits have been determined as follows:
  - EC – flow dependent criteria based upon long-term daily flow data for the downstream receiving water monitoring location;
  - pH – as per the EHP Model Mining Conditions; and
  - Turbidity – as per the model EA discharge conditions, this will be derived based on measured dam water data.

Release trigger levels for a range of potential contaminants and receiving water trigger levels for key water quality parameters (pH, EC, turbidity and sulphate). In the event of an exceedance of the proposed levels, a tiered investigation of the water release event will be initiated. The proposed trigger levels are as per the model EA discharge conditions.

Management Plans and Procedures

The following procedures and plans will be developed and implemented to mitigate or control impacts on surface waters.

Site Water Management Plan
A Site Water Management Plan will be prepared for the project prior to commencement of the project. The plan will address water management for all stages of the project construction, operations and closure, as well as long-term post-mining water management requirements. This plan will include:

- A description of the existing setting including the surface water catchment and drainage setting, hydrogeology, and an overview of the existing surface and groundwater values, users and water quality.
- A description of the regulatory setting of the project.
- The water management objectives for the project.
- A description of potential project impacts on water.
- Control strategies including a description of the surface water drainage arrangements, water management system and water balance. This will include a discussion of options and alternatives for meeting the proposed water management objectives.
- A detailed description of the water management and monitoring measures to address each of the project impacts and maintain the effective operation of the control strategies.
- A description of the review process and remedial measures to address any impacts or potential water management issues identified through monitoring.

Erosion and Sediment Control Plan
The ESCP is described in Section 24.4.2.

Subsidence Management Plan
The Subsidence Management Plan is described in Section 24.4.2.

Monitoring

Water management system monitoring for the project will include quarterly monitoring of water levels and quality in mine water storage dams including the Return Water Dam, Mine Water Dam and intermediate pit water dams, and the Industrial Area Dam and associated infrastructure area catch dams. Parameters to be included in the monitoring program include pH and EC and annual monitoring of a comprehensive suite of water quality parameters, including metals and metalloids.

Any controlled releases of mine-affected water will be monitored in accordance with the EHP's Model Mining Conditions relating to the release of mine-affected water. These conditions require monitoring of the water released from the site, as well as the receiving waters. Attachment 24-4 provides the site-specific monitoring requirements for controlled releases, in accordance with the EHP Model Mining Conditions. The site water balance including water transfers, consumption and dam storage volumes will be monitored monthly. The water management system will be monitored and managed in accordance with a Site Water Management Plan. The site water balance will be reviewed annually and will trigger modifications to the water management system, where necessary, to ensure the optimum operation of the system.

Sediment control structures will be managed in accordance with an ESCP. The ESCP will include an inspection plan for sediment control structures to ensure they are maintained and remain effective.

24.4.6 Air Quality

Potential air quality impacts from the project are discussed in Section 15 – Air Quality and in detail in the *Air Quality Report* (Appendix L).

Objectives and Performance Criteria

The environmental protection objectives for air quality are:

- To comply with the relevant ambient air quality objectives at sensitive receptors beyond the boundaries of the mining lease;
- To minimise the impacts of odour from mine operations on sensitive receptors beyond the boundaries of the mining lease; and
- To implement energy efficiency and greenhouse gas emission reduction strategies to minimise the project's greenhouse gas emissions.

The applicable air quality objectives for the project are shown in Table 24-3 and Table 24-4 for mining operations and the power station, respectively. These objectives and guidelines are applicable to dust and air quality parameters at sensitive locations, such as residences.

Table 24-3 Ambient Air Quality Objectives Relevant to Mine Operations

INDICATOR	ENVIRONMENTAL VALUE	AVERAGING PERIOD	AIR QUALITY OBJECTIVE
Particulates in the form of $PM_{2.5}$	Health and wellbeing	24-hour	25 µg/m³
		Annual	8 µg/m³
Particulates in the form of PM_{10}	Health and wellbeing	24-hour [a]	50 µg/m³
TSP	Health and wellbeing	Annual	90 µg/m³
Dust deposition rate	Amenity	1-month	120 mg/m^2/day

Note [a] Five days per year allowed to exceed the objective

Table 24-4 Ambient Air Quality Objectives Relevant to Power Station Operations

INDICATOR	ENVIRONMENTAL VALUE	AVERAGING PERIOD	AIR QUALITY OBJECTIVE
Arsenic and compounds	Health and wellbeing	Annual	6 ng/m³
Beryllium and compounds	Health and wellbeing	1-hour	4 ng/m³
Boron and compounds	Health and wellbeing	1-hour [a]	50 µg/m³
	Health and wellbeing	Annual [a]	5 µg/m³
Cadmium and compounds	Health and wellbeing	Annual	5 ng/m³
Chromium (III) and compounds	Health and wellbeing	1-hour [b]	9 µg/m³
Chromium (VI) and compounds	Health and wellbeing	1-hour [b]	0.09 µg/m³
Cobalt and compounds	Health and wellbeing	1-hour [a]	0.2 µg/m³
	Health and wellbeing	24-hour [c]	0.1 µg/m³
	Health and wellbeing	Annual [a]	0.02 µg/m³
Copper and compounds (dust)	Health and wellbeing	1-hour [b]	18 µg/m³
Copper and compounds (fumes)	Health and wellbeing	1-hour [b]	3.7 µg/m³
Cumene	Health and wellbeing	1-hour [b]	21 µg/m³
Carbon monoxide (CO)	Health and wellbeing	8-hour	11 mg/m³
Fluoride and compounds	Health and biodiversity of ecosystems (other than protected areas)	24-hour	2.9 µg/m³
		30-day	0.84 µg/m³
		90-day	0.5 µg/m³
	Health and biodiversity of ecosystems (for protected areas)	90-day	0.1 µg/m³
	Protecting agriculture	24-hour	1.5 µg/m³
		30-day	0.4 µg/m³
		90-day	0.25 µg/m³
Lead and compounds	Health and wellbeing	Annual [b]	0.5 µg/m³
Manganese and compounds	Health and wellbeing	Annual	0.16 µg/m³
Mercury and compounds (organic)	Health and wellbeing	1-hour [b]	0.18 µg/m³
Mercury and compounds (inorganic)	Health and wellbeing	1-hour [b]	1.8 µg/m³
Nickel and compounds	Health and wellbeing	Annual	20 ng/m³
Nitrogen dioxide (NO_2)	Health and wellbeing	1-hour	250 µg/m³
		Annual	62 µg/m³
	Health and biodiversity of ecosystems	Annual	33 µg/m³

INDICATOR	ENVIRONMENTAL VALUE	AVERAGING PERIOD	AIR QUALITY OBJECTIVE
Sulfuric acid	Health and wellbeing	1-hour [b]	18 µg/m³
Sulfur dioxide (SO_2)	Health and wellbeing	1-hour	570 µg/m³
		24-hour	230 µg/m³
		Annual	57 µg/m³
	Protecting agriculture	Annual	32 µg/m³
	Health and biodiversity of ecosystems (for forests and natural vegetation)	Annual	22 µg/m³
Zinc and compounds (zinc chloride fumes)	Health and wellbeing	1-hour [b]	18 µg/m³
Zinc and compounds (zinc oxide fumes)	Health and wellbeing	1-hour [b]	90 µg/m³

Note:

[a] Objective from TCEQ 2009

[b] Objective from NSW DEC 2005

[c] Objective from OME 2008

Control Strategies

The following key measures to control and manage dust emissions and minimise the potential air quality impacts of the project are proposed:

- Haul roads will be watered to minimise dust emissions;
- Progressive rehabilitation will be conducted on the open cut mine overburden emplacement areas;
- Inactive disturbed areas will be rehabilitated as soon as possible;
- Electrostatic precipitators will be installed on the power station to minimise emissions of particulate matter; and
- Compliance with the relevant requirements of the Aurizon Coal Dust Management Plan at the train loading facility including the use of coal wagon veneering systems.

Anticipated initiatives that may mitigate, reduce, control or manage GHG emissions through energy efficiency include:

- Regular assessment, review and evaluation of greenhouse gas reduction opportunities;
- Procurement policies that require the selection of energy efficient equipment and vehicles;
- Monitoring and maintenance of equipment in accordance with manufacturer recommendations;
- Optimisation of diesel consumption through logistics analysis and planning; and
- Progressive rehabilitation of land areas to manage and limit the cumulative loss of carbon storage associated with land clearing.

Monitoring

Due to the considerable distances to the closest sensitive receptors, an air quality monitoring program is not required. A complaints handling procedure will be implemented for the project. The procedure will include the

investigation of any complaints in relation to air quality impacts. These investigations would include air quality monitoring, if necessary.

24.4.7 Noise and Vibration

Potential noise and vibration impacts from the project are discussed in Section 16 – Noise and Vibration and in detail in the *Noise Report* (Appendix M).

Objectives and Performance Criteria

The environmental protection objective for noise is to prevent any nuisance noise impacts on surrounding sensitive receptors. In accordance with the *Environmental Protection (Noise) Policy 1997* and *2008* (EPP Noise), the environmental values to be enhanced or protected are the qualities of the acoustic environment that are conducive to:

- The wellbeing of the community or a part of the community, including its social and economic amenity; and
- The wellbeing of an individual, including the individual's opportunity to sleep, relax and converse without unreasonable interference from intrusive noise.

Noise criteria for the project have been developed using procedures described in the EHP Model Mining Conditions, and are shown in Table 24-5.

Table 24-5 Noise Criteria for All Sensitive Receptors

TIME PERIOD		$LA_{EQ,ADJ,15MIN}$	$LA_{1,ADJ,15MIN}$
Day	7 am to 6 pm	35	40
Evening	6 pm to 10 pm	35	40
Night	10 pm to 7 am	30	35

Blasting criteria are sourced from the *Noise and Vibration from Blasting Guideline* (NVBG) (EPA 2006), which contains the following criteria:

- Ground vibration limits of 5 mm/s Peak Particle Velocity (PPV) for 9 out 10 consecutive blasts, with an absolute limit of 10 mm/s PPV; and
- Noise limit (overpressure) of 115 dBL peak for 9 out of any 10 consecutive blasts, with an absolute limit of 120 dBL peak for all blasts.

Control Strategies

The noise impact assessment predicted the project is expected to produce acceptable environmental noise levels compared to appropriate criteria at all noise sensitive receptors under all prevailing meteorological conditions. As the assessment included conservative operating and weather conditions, noise levels produced by the project would generally be lower than the predicted levels. As such, no specific noise control strategies are warranted or proposed. However, as a precaution, aircraft noise would be managed by avoiding flightpaths over the closest sensitive receptors and scheduling aircraft movements during the day and evening where possible to avoid or minimise noise impacts on receptors.

Monitoring

A complaints handling procedure will be implemented for the project. The procedure will involve the investigation of any complaints in relation to noise and blast impacts. These investigations would include noise and blast impact monitoring, if necessary.

24.4.8 Visual Amenity

Potential visual amenity impacts from the project are discussed in Section 17 – Visual Amenity.

Objectives and Performance Criteria

The environmental protection objective for visual amenity is to ensure that scenic values are retained to the greatest practical extent.

Control Strategies

Due to the distances between the project and sensitive receptors as well as screening from vegetation and topography, impacts on visual amenity are predicted to be low. The following mitigation measures will also minimise the visual and lighting impacts of the project:

- Progressive rehabilitation and revegetation of overburden emplacement areas to minimise the visual effect;
- Use of neutral tones in the cladding of infrastructure to blend with the surrounding environment; and
- Design of external lighting to minimise off site impacts.

24.4.9 Socio-economic Aspects

Potential social and economic impacts from the project are discussed in Section 18 – Socio-Economic Impact Assessment and in detail in the *Socio-Economic Impact Assessment Report* (Appendix N).

Objectives and Performance Criteria

The objectives for socio-economic impact management are:

- To enhance the positive impacts of the project to ensure the greatest benefits from the project are achieved at a local, regional and state level;
- To ensure negative impacts of the project are minimised to the extent possible by developing and implementing a range of management strategies; and
- To work cooperatively with relevant stakeholders and Adani Mining Pty Ltd, the proponent of the adjacent Carmichael Coal Mine and Rail Project (CCM&RP), in the development and implementation of management strategies.

Control Strategies

The proponent has committed to developing a range of strategies to avoid, manage or enhance the predicted socio-economic impacts of the project. Strategies have been designed to operate as a cohesive collection of procedures. As such, several strategies may address one impact, and several impacts may be addressed by each strategy. Table 25 in the *Socio-Economic Impact Assessment Report* (Appendix N) shows the project impacts and strategies and project design features to be developed to address each impact. These are also discussed in detail in the *Socio-Economic Impact Assessment Report* (Appendix N). Along with these strategies, the proponent has committed to 27 management actions which are included in the project's commitments list in Attachment 24-2.

Monitoring

A socio-economic monitoring framework has been developed for the project. The framework is designed to measure the success of the identified management actions in achieving the proponent's desired management outcomes for each of the identified moderate to high risk impacts. This approach enables the management measures to be adapted if they are not reaching the desired outcomes, as evidenced through annual progress reporting.

Table 27 in the *Socio-Economic Impact Assessment Report* (Appendix N) presents the draft monitoring strategy for the project. Key Performance Indicators (KPIs) are identified for each desired outcome. These KPIs are

designed to measure progress towards the achievement of the desired outcome, rather than the corresponding management measures. This will enable flexible and adaptive management measures to be applied to achieve the desired outcome where monitoring shows that satisfactory progress is not being attained. These KPIs are designed to provide an ongoing baseline for the monitoring of project impacts and allow for the tracking of key indicators across time.

Potential sources of data for the KPIs and suggested frequency of monitoring are also identified. Consultation with key stakeholders may be necessary to complete the ongoing monitoring of the baseline and enable effective management of impacts. Stakeholders who may be partnered with in order to ensure achievement of the desired outcomes are also identified.

24.4.10 Consultation

Consultation that has been undertaken with stakeholders regarding the project is discussed in Section 3 – Consultation. The *Socio-Economic Impact Assessment Report* (Appendix N) also discusses the scope and approach to future consultation for the project.

Objectives and Performance Criteria

The proponent is committed to increasing the public benefit of the project through a consultative process. Prior to the commencement of construction, the proponent will develop a comprehensive Stakeholder Consultation Strategy. The objectives of the strategy are to:

- Demonstrate the proponent's commitment to open and transparent communications with communities of the local area about project activities;
- Continue to enhance the stakeholder relationships initially established during the preparation of the project's EIS;
- Progress the development of key strategies and plans designed to enhance the delivery of benefits to the local area and manage any potential adverse impacts of the project on the local area; and
- Ensure a coordinated approach to project communications.

Control Strategies

The Stakeholder Consultation Strategy will focus on developing and maintaining strategic partnerships and actively collaborating with government and Adani Mining Pty Ltd to ensure a coordinated approach to infrastructure upgrades and delivery. Potential communications tools and techniques to achieve these objectives include:

- Membership of relevant community development groups in the local area;
- A dedicated community liaison role for the local area;
- Face-to-face stakeholder meetings with local, regional and state government stakeholders and community groups as required;
- A comprehensive stakeholder database and records of consultation;
- Email updates on the project's progress will be distributed regularly to key stakeholders;
- Regular project newsletters reporting on project progress and achievements towards the desired outcomes for impact management will be developed and distributed in the local area; and
- Regular updating of the project website.

Monitoring

The proponent will report on an annual basis to relevant stakeholders from the commencement of the construction and early works phase and for two years following the commencement of mining operations. The annual report will:

- Describe the actions to inform the communities of the local area about project impacts and show that community concerns about project impacts have been taken into account when reaching decisions;
- Describe the actions to enhance local and regional employment, training and development opportunities; and
- Describe the actions to avoid, manage or mitigate project-related impacts on local community services, social infrastructure and community safety and wellbeing.

The proponent will also report annually to the Queensland Resources Council (QRC) on the effectiveness of the Local Industry Participation Strategy in complying with the QRC Code of Practice.

24.4.11 Traffic and Transportation

Potential impacts from the project from road traffic and rail, port and air transport are discussed in Section 19 – Traffic and Transport and in detail in the *Road Impact Assessment Report* (Appendix O).

Objectives and Performance Criteria

The environmental protection objectives relevant to traffic and transportation are to ensure appropriate measures are in place to manage the safety and efficiency of transport infrastructure impacted by the project.

Control Strategies

The following control strategies will be implemented:

- Any dangerous goods transported to site will be transported in accordance with the *Australian Dangerous Goods Code* (7th Edition).
- In accordance with the relevant legislation, the proponent will obtain all relevant permits from the Queensland Police Service (QPS) regarding escorting and scheduling of over dimensional loads.
- Once construction planning has commenced, the proponent will provide a detailed schedule of over dimensional loads to QPS in order to facilitate its planning.
- All road intersections and intersection lighting will be designed in accordance with the requirements of the authority responsible for the road (e.g. the Department of Transport and Main Roads (TMR) and/or Isaac Regional Council (IRC)). Designs will be in accordance with any applicable guidelines. This includes the following:
  - Improved turn treatments at the Gregory Developmental Road/Elgin-Moray Road Intersection to safely accommodate future traffic volumes. It is noted that upgrades to include protected turn lane treatments is required as part of the development of the CCM&RP which is anticipated to precede Project China Stone.
  - Provision of a basic right turn treatment and a basic left turn treatment at the new mine access road intersection with Moray-Carmichael Road to provide an appropriate level of safety and operational performance.
- Recalculation of the project's pavement rehabilitation impact on affected sections of the Flinders Highway and Gregory Developmental Road prior to the commencement of construction based on confirmed pavement loadings associated with the CCM&RP. This will enable the accurate quantification of any monetary contribution towards pavement rehabilitation activities in accordance with the TMR guideline.

- Recalculation of the project's pavement maintenance impact on affected sections of the Townsville Port Road, Flinders Highway, Gregory Developmental Road and the Peak Downs Highway prior to the commencement of construction based on confirmed traffic estimates from the CCM&RP Road Impact Assessment which is required to be submitted to TMR prior to the commencement of construction. This will enable the accurate quantification of any monetary contribution towards pavement maintenance activities in accordance with the TMR guideline.
- The airstrip will be designed, constructed and operated in accordance with the Civil Aviation Safety Authority (CASA) regulations and guidelines.
- Project air traffic control will be coordinated with the airports at the workforce source locations and the proposed Carmichael Coal Mine airstrip.

Monitoring

The proponent will continue consultation with the relevant road authorities and stakeholders including TMR, IRC, Charters Towers Regional Council (CTRC) and QPS, as appropriate, during the project planning and implementation phases of the project. Further consultation will be conducted with the TMR in relation to the management of traffic impacts on the state-controlled road network. Consultation will be conducted with the IRC in relation to the new mine access road and the location and design of the intersection of the access road with Moray-Carmichael Road.

24.4.12 Cultural Heritage

Potential cultural heritage impacts from the project are discussed in Section 20 – Cultural Heritage and in detail in the *Non-Indigenous Cultural Heritage Report* (Appendix P).

Objectives and Performance Criteria

The environmental protection objectives relevant to cultural heritage are:

- To ensure that Aboriginal cultural heritage is managed in accordance with the requirements of the Cultural Heritage Management Plan (CHMP); and
- To ensure that activities undertaken within the project site are conducted in a manner that avoids any damage to previously unrecorded sites of significant non-Indigenous heritage.

Control Strategies

The Wangan and Jagalingou People were identified as the Aboriginal parties for the project, in accordance with the *Aboriginal Cultural Heritage Act 2003*. The proponent has put in place with its consultant the process to initiate a CHMP with the Wangan and Jagalingou People in accordance with the Acts. Aboriginal heritage on the project site, including all artefacts of significance, will be managed in accordance with the CHMP.

Although no places of national, state or local heritage significance were identified within the project site, the following procedures will be adopted to mitigate impacts in the unlikely event that previously unrecorded sites of non-Indigenous cultural heritage significance are located during ground disturbance associated with the project:

- Staff briefings - the General Manager and all staff or contractors of the proponent who will be responsible for undertaking initial clearance and ground breaking activities will be informed of their obligations under Section 89 of the *Queensland Heritage Act 1992* to report to EHP any archaeological items that may constitute an important source of information about an aspect of Queensland's history.
- Find strategy - In the event that any staff or contractors of the proponent suspect that they have uncovered an archaeological object that may constitute an important source of information about an aspect of Queensland's history, the following measures will apply:
  - Disturbance of any areas immediately surrounding the find will cease immediately;

- If it is considered that the find is at risk of being inadvertently damaged by construction activities, a temporary fence will be erected around the find;
- EHP will be notified;
- A suitably qualified archaeologist will be engaged to inspect the find and determine its significance; and
- Should the find be of state significance, appropriate mitigation strategies will be developed in consultation with appropriate EHP officers.

- Archaeological Standards - In the event that archaeological monitoring or excavations are required as a result of implementing the Find Strategy, the standards outlined in the EHP *Guideline Archaeological Investigations* (EHP, 2013) will be applied (or any version of the EHP guidelines that may supersede this document).

24.4.13 Non-Mining Waste Management

Potential impacts relating to waste management and land contamination from the project are discussed in Section 21 – Non-Mining Waste Management.

Objectives and Performance Criteria

The environmental protection objectives relevant to non-mining wastes and land contamination are as follows:

- To reduce the quantity of wastes through the application of the waste management hierarchy;
- To ensure that waste materials are handled, stored and disposed of in a manner that minimises impacts on air, water and land resources and protects the health of people working on the project and in the surrounding community;
- To minimise land disturbance associated with on-site disposal areas; and
- To manage the following Notifiable Activities (NA) (from Schedule 3 of the EP Act) expected to be undertaken on the project site in a manner which does not result in the contamination of land:
  - NA 1 Abrasive blasting;
  - NA 7 Chemical storage;
  - NA 8 Coal-fired power station;
  - NA 14 Engine reconditioning works;
  - NA 20 Landfill; and
  - NA 29 Petroleum product or oil storage.

Environmental values to be or enhanced in regards to waste and contaminated land include:

- The life, health and well-being of people;
- The diversity of ecological processes and associated ecosystems; and
- Land use capability having regard to economic considerations.

Control Strategies

Waste

The proponent will develop and implement a waste management system for the project, which will have regard for the waste management hierarchy outlined in the *Waste Reduction and Recycling Act 2011* (WRR Act) and subordinate legislation. The proponent will develop and implement appropriate waste management policies, initiatives and plans for the appropriate containment and handling of hazardous or contaminated substances, use

of licensed waste transport contractors and the siting, design, operation and decommissioning of an on-site landfill for general (non-hazardous) wastes. All policies, initiatives and plans will be developed in accordance with appropriate corporate, legislative and statutory requirements.

Contaminated Land

The risk of land contamination from project activities, including NAs, will be reduced through consideration of the design and construction of the facilities to relevant standards and post-mining rehabilitation. This includes the following considerations:

- Siting and designing the on-site landfill in accordance with Queensland Government guidelines in order to responsibly plan for the disposal of general wastes on the site and reduce the risk of land contamination. The design would include a liner and leachate containment system to prevent potential contamination of surface or groundwater.
- Developing a management plan relating to the operation of the on-site landfill to reduce the risk of contamination of surface and/or groundwater.
- Designing and constructing hydrocarbon and chemical storage areas in accordance with AS 1940 in order to contain and recover spills. Bunding will also allow for collection of stormwater for treatment or appropriate disposal.
- Storing waste hydrocarbons and miscellaneous chemicals in separate sealed and bunded areas to prevent soil contamination.
- Directing workshop and truck wash-down area contaminants to an oil separator and sump for containment and subsequent treatment or appropriate disposal.
- Handling of waste hydrocarbons and miscellaneous chemicals in accordance with standard operating procedures to minimise potential for spillage and leakage.
- Training of key staff in spills prevention and clean up.
- Provision of oil spill cleanup kits at strategic locations as part of site emergency planning.
- Abrasive blasting work will be undertaken in a way that prevents overspray from escaping the area. This will be achieved by the use of screens, enclosures and/or an exclusion zone around the work area.
- Using engineering controls such as the use of water sprays and the enclosing of the crushing area to prevent coal dust dispersal and contamination of the surrounding area.
- Post-mine rehabilitation to include site remediation measures for any contaminated land.

Monitoring

The proponent will maintain an inventory of all waste types and quantities produced on the site and their applicable disposal method in accordance with the WRR Act and *Environment Protection (Waste Management) Regulation 2000*.

The proponent will also submit annual National Pollution Inventory reports in accordance with the *National Pollutant Inventory Guide* (SEWPaC 2012) and associated manuals (e.g. *Emission Estimation Technique Manual for Mining*, SEWPaC 2012) as required.

24.4.14 Hazards and Risks

Potential hazards and risks arising from the development of the project on surrounding land, people and property are discussed in Section 22 – Hazard and Risk.

Objectives and Performance Criteria

The environmental protection objectives relevant to hazards and risk are:

- To ensure that project activities are conducted in a manner that places the utmost importance on the safety and health of employees, contractors and the wider community; and
- To ensure the project has been designed and will be developed and operated in consideration of credible hazards including unplanned or unmanaged discharges from site, explosions, transport incidents and natural hazards.

Control Strategies

The following control strategies are proposed in relation to hazards and risks:

Health and Safety

- Development and implementation of a Safety and Health Management System (SHMS) to address the construction, operations and decommissioning phases of the project. The SHMS will meet the requirements of the *Coal Mining Safety and Health Act 1999* and regulation, as well as various risk management standards. The SHMS will address the following components:
  - Operational hazard analysis;
  - Regular hazard audits;
  - Fire safety;
  - Emergency response planning;
  - Qualitative risk assessment; and
  - Construction safety.
- An Integrated Risk Management Plan (IRMP) will be developed under the SHMS for the whole life of the project including construction, operations and decommissioning phases. The IRMP will be developed in accordance with relevant standards, including AS/NZS ISO 31000:2009.

Mine Infrastructure

- As far as is practical, project infrastructure has been located to maximise separation between potentially hazardous facilities and activities in order to minimise potentially hazardous conditions for workers, sensitive receptors and to address community safety values.
- Conservative design of all proposed mine water storages and the TSF in accordance with the EHP requirements for a 'significant' hazard.
- An assessment of the appropriate FOS has been completed to ensure the landform slopes of the mine waste storage facilities will be stable under a variety of load conditions.
- All mine water storages and mine waste storages will have their hazard consequence category reassessed on an annual basis following construction.
- The design, construction and operation of the mine water storages and mine waste storage facilities will be undertaken by appropriately qualified and experienced engineers.
- All mine water storages and mine waste storages will be constructed and operated to comply with regulatory and licence requirements including the conditions of the EA and other relevant design standards.
- The design, construction and operation of the power station in accordance with all relevant legislation, standards and guidelines. It will be operated as a discrete piece of infrastructure within the mine site, with fencing and a guard house and reception to manage entry and egress. A specific Principal Hazard

Management Plan will be developed for the facility as part of the SHMS that will include a detailed risk assessment based on detailed project design.

- The airstrip will be designed, constructed and operated in accordance with all applicable CASA legislation and regulations including the *Civil Aviation Act 1988*.

Transport, Storage and Use of Hazardous Materials

- The transport, storage, handling and disposal of hazardous substances or dangerous goods will be planned and managed prior to arrival on-site. Appropriate measures will be implemented in accordance with the requirements of the SHMS and all relevant legislation and guidelines (including the *Australian Code for the Transport of Dangerous Goods by Road and Rail (7th Edition)* where Dangerous Goods are concerned). These include but are not limited to:
  - A register of hazardous materials, including Material Safety Data Sheet (MSDS), will be stored on site at specified locations and updated at predetermined intervals. This register, once completed, will be made available to the Queensland Ambulance Service and Queensland Fire and Emergency Services.
  - All chemicals will be managed in accordance with the relevant MSDS and the 'Chemalert' chemical management system.
  - Hydrocarbons will be handled in accordance with AS 1940:2004.
  - Bulk fuel storage and refuelling facilities will be designed and built in accordance with AS 1940:2004. Bunding will also allow for stormwater to be collected for treatment or appropriate disposal.
  - The risk of storage tank failure will be minimised by designing in accordance with AS 1692:2006 *Tanks for flammable and combustible liquids*.
  - Storage areas for all chemicals will be suitably located and bunded to minimise the risk of chemical spills and potential harm to human health, property and the environment.
  - Bulk explosives will be brought to site by a licensed contractor and blasting would be undertaken by experienced and appropriately trained explosives contractors.
  - Suitable bunds will be constructed and maintained around fuel and oil storage facilities in accordance with AS 1940:2004.
  - Regular inspection programs will be undertaken to ensure the structural integrity of fuel tanks and bunds.
- A Spill Management Plan will be developed prior to construction and will provide the procedure to be followed for the containment, clean-up, investigation and reporting of any spills.
- Key staff will be trained in spills prevention and clean up.
- Firefighting facilities and fire suppression systems will be installed and maintained at all relevant fuel storage, chemical storage and refuelling locations and all appropriate staff will be trained in the operation of these systems.
- There will be strict control of ignition sources.
- All equipment and vehicle operators will be trained in the safe operation of equipment (including operating procedures for the refilling and maintenance of fuel storage tanks and mine vehicles) and the relevant emergency response procedures in the event of an incident.

Natural Hazards

- Development of a Bushfire Management Plan to address bushfire hazards and risks, and management including the use of firebreaks, fuel reduction within fire breaks and providing adequate road access for firefighting, other emergency vehicles and safe evacuation.

- Design of all mine water storages and waste storages will adequately address the structural integrity of containment walls during climatic extremes, including drought and flood.
- Design of site drainage infrastructure and the mine water management systems to account for any variability of water supply due to climate change.

Emergency Response

- Development of an Emergency Response Management Plan to specifically address major emergencies and incidents that could impact upon surrounding land uses. This will include reference to disaster management techniques including how site emergency response will integrate with response from emergency services providers. The plan will be developed in consultation with emergency service providers.
- Coordinating project infrastructure upgrades, including communication infrastructure upgrades, with local emergency service providers and Adani Mining Pty Ltd (as the proponent for the CCM&RP) to enable cost-effective expansion of emergency service communications along the Gregory Developmental Road.
- Engaging with Adani Mining Pty Ltd in relation to the proponent's participation in the Emergency Services Consultative Committee for the CCM&RP and the coordination of emergency response and sharing of resources where appropriate.
- Provision of a one-off donation of a heavy vehicle rescue kit to the Queensland Fire and Emergency Service in Charters Towers to improve local emergency service response to incidents.
- Consultation with the IRC, CTRC, TMR, QPS, Adani Mining Pty Ltd and the Road Accident Action Group to determine the need or otherwise for additional driver rest areas along the primary project supply routes.

Monitoring

- Inspections, reviews and independent reporting will all be used to identify corrective actions as part of the continual improvement of the SHMS.
- Auditing will form a key part of the SHMS. Internal auditing of the SHMS and management plans within the SHMS will be undertaken against corporate standards, thereby ensuring that SHMS standards are both consistent with, and learn from, other comparable operations. These audits will be supplemented by legal compliance audits, which will be used as an internal measure of compliance with the applicable legislative requirements. The proponent will conduct detailed management reviews of the SHMS on a monthly basis.
- The proponent will consult with key stakeholders including emergency service providers, IRC, CTRC, State Government and other relevant community stakeholders during the development of the SHMS and relevant management plans such as the Emergency Response Management Plan and Bushfire Management Plan.

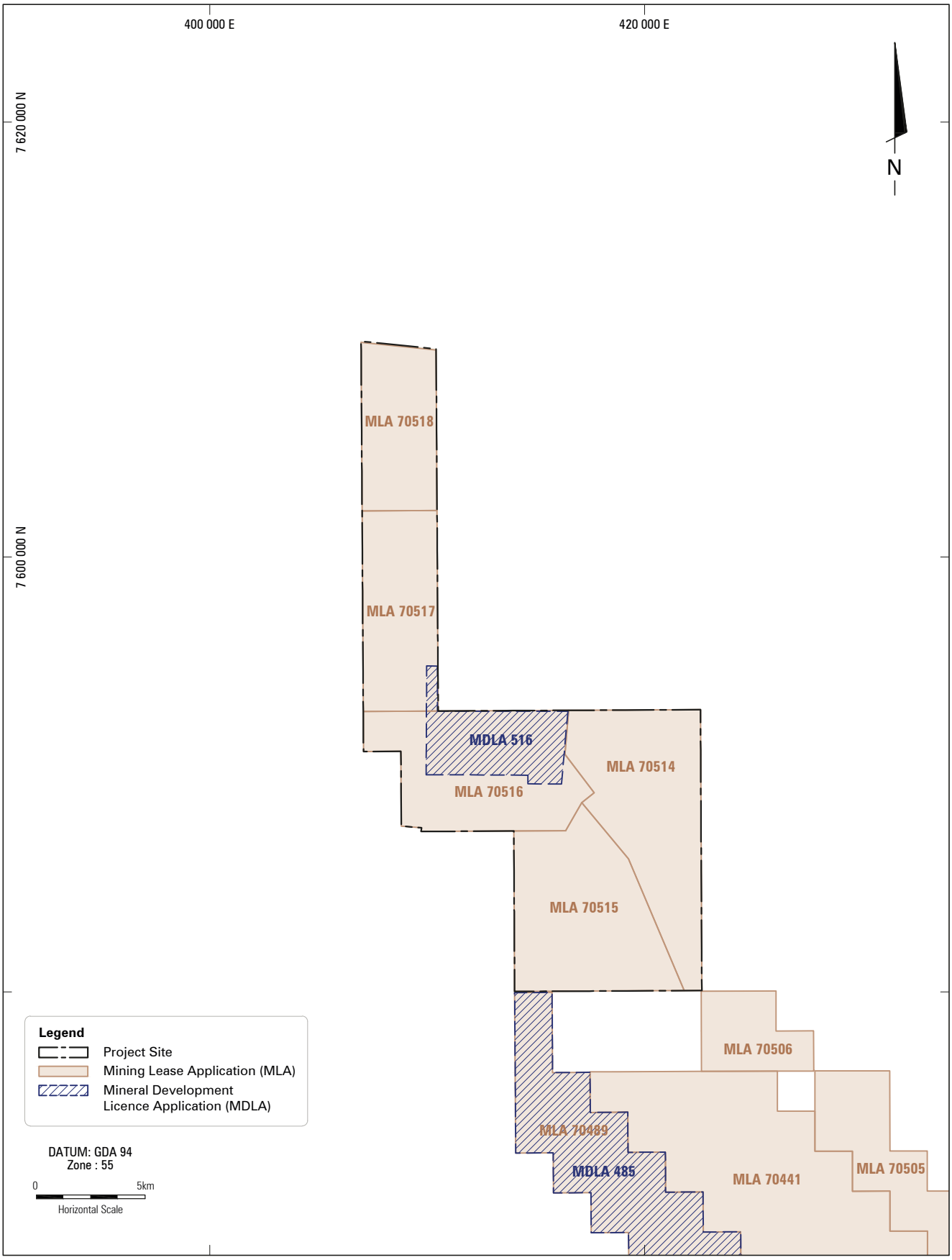
FIGURES

PROJECT CHINA STONE

MACMINES AUSTASIA | Hansen Bailey ENVIRONMENTAL CONSULTANTS

Project Location

FIGURE 24-1

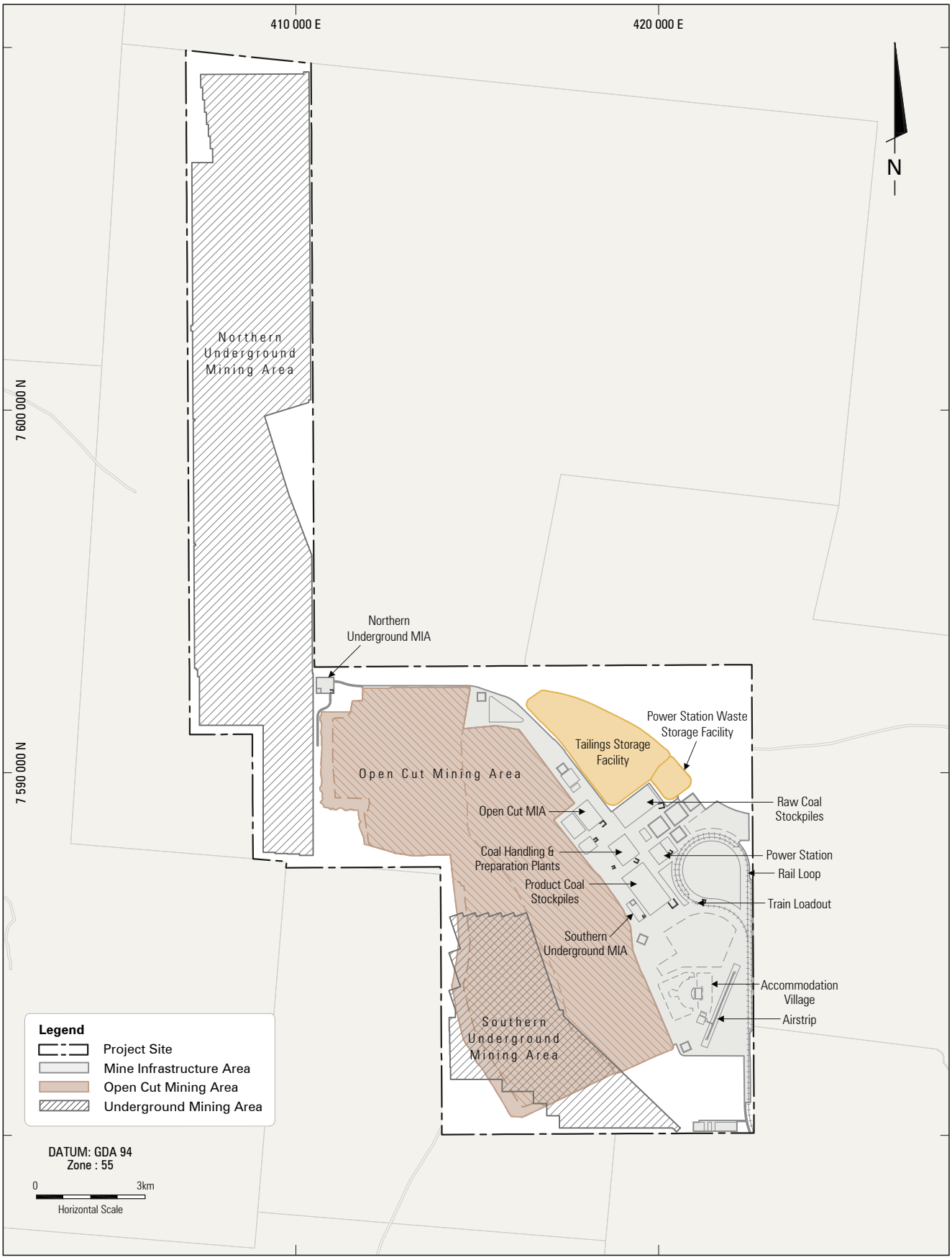


PROJECT CHINA STONE

MACMINES AUSTASIA | Hansen Bailey ENVIRONMENTAL CONSULTANTS

Coal Tenements

FIGURE 24-2

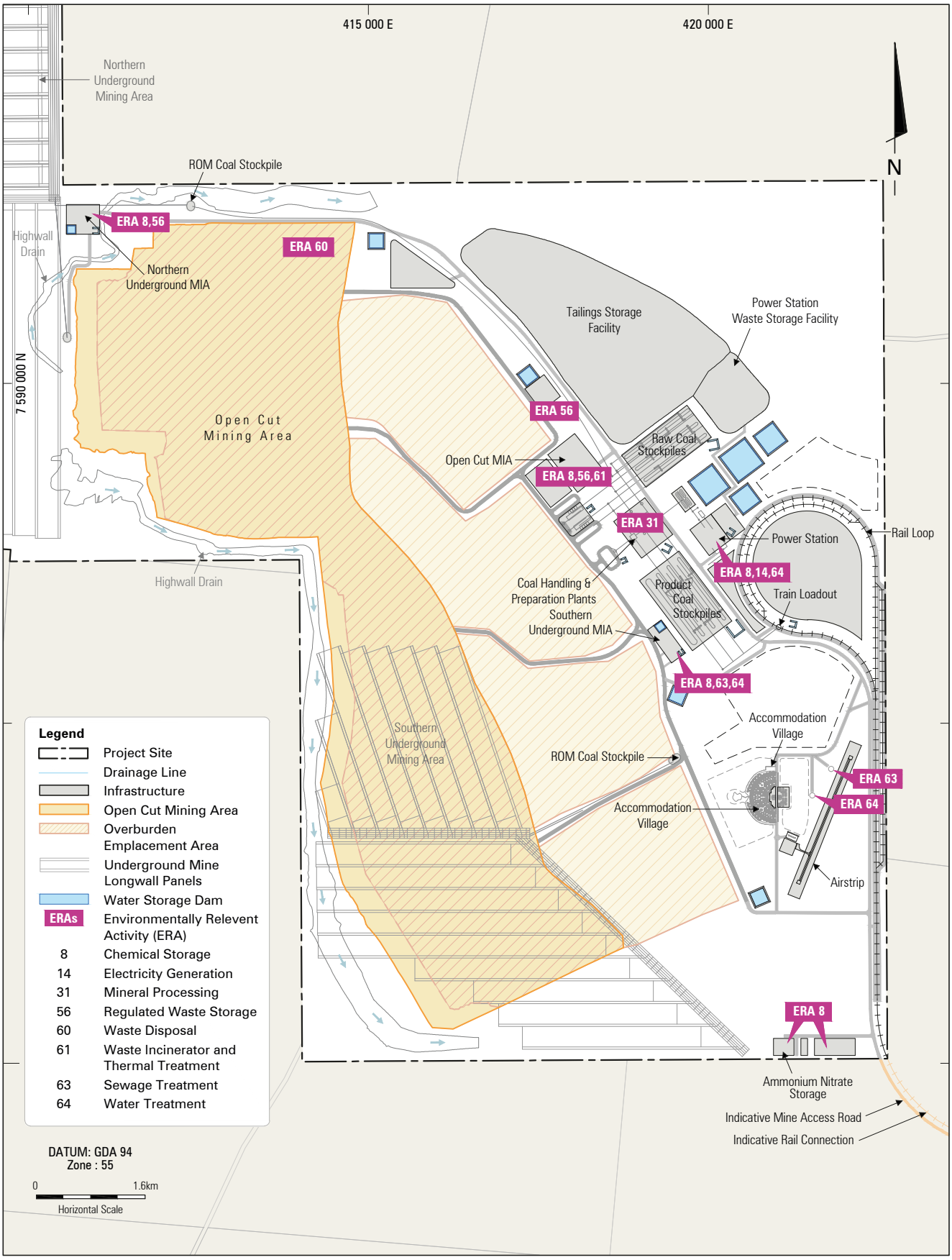


PROJECT CHINA STONE

MACMINES AUSTASIA | Hansen Bailey ENVIRONMENTAL CONSULTANTS

Project Layout

FIGURE 24-3



PROJECT CHINA STONE

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Indicative Locations of ERAs

FIGURE 24-4

ATTACHMENTS

ATTACHMENT 24-1

Environmental Policy

MACMINES AUSTASIA

Environmental Policy

We at Macmines Austasia Pty Ltd believe that natural resources can be developed and utilised in a manner consistent with proper stewardship for the environment.

Our environmental objectives are to:

- Manage our operations in an environmentally responsible manner;
- Achieve an environmental management performance standard of which the company can be proud; and
- Conduct environmental management to a standard that meets both legislative and business requirements.

To achieve our objectives, we will:

- Comply with all applicable environmental legal requirements and other agreements to which we are a signatory;
- Undertake environmental impact and risk assessments across the ongoing operation whilst ensuring performance objectives and targets are incorporated into strategic and operational planning;
- Promote continual improvement in our operations through the implementation and maintenance of an Environmental Management System;
- Allocate and support individual accountabilities in striving for excellence in environmental management;
- Acknowledge and respect cultural heritage on MacMines lands and leases;
- Through training, community consultation programs and risk management processes, make employees, contractors and other stakeholders aware of the Policy and our Environmental Management System; and
- Annually review this Policy and communicate it to all internal and interested external parties

Russ Phillips
Chief Executive Officer

September 2014

ATTACHMENT 24-2

Project Commitments Register

24.2 INTRODUCTION

This attachment provides a summary of the key environmental management commitments detailed throughout the Environmental Impact Statement (EIS). The management commitments and the relevant sections of the EIS in which they are found are also included.

Table 1 Statement of Commitments for Project China Stone

COMMITMENT	EIS SECTION
General	
The proponent will extract coal at a rate of up to 55 million tonnes per annum of Run of Mine coal over a mine life in the order of 50 years.	Section 1.2
The proponent will undertake longwall and open cut mining operations in accordance with this EIS.	Section 1.2
The project will comply with all application legislation, policies and Australian Standards relevant to the project as discussed in Section 2 and Attachment 2-1. This includes obtaining all necessary secondary approvals as summarised in Section 2.3.	Section 2 and Attachment 2-1
Consultation	
EIS feedback consultation will be held with stakeholders during the EIS public exhibition period.	Section 3.8
Prior to the commencement of construction, the proponent will develop a comprehensive Stakeholder Communication Strategy. The strategy will include developing and maintaining strategic partnerships and actively collaborating with government and Adani Mining Pty Ltd (Adani) to ensure a coordinated approach to infrastructure upgrades and delivery.	Section 3.8
Land Use	
The proponent will liaise with the Department of Natural Resources and Mines, the Isaac Regional Council and affected landowners in relation to the management and possible realignment of the stock route (U398), as necessary.	Section 5.4.4
The proponent will negotiate an agreement with the Wangan and Jagalingou People, as the registered Native Title claimants, in accordance with the requirements of the *Native Title Act 1993* (Commonwealth).	Section 5.4.5
Subsidence	
Subsidence Management Plans will be prepared throughout the life of the project in accordance with Department of Environment and Heritage Protection requirements. The plans will be authorised under the conditions of the Environmental Authority and are required to be prepared prior to the commencement of longwall mining that will result in subsidence. The plans will form the basis for all operational management activities related to the mitigation and management of subsidence impacts.	Section 6.4
Tailings and Power Station Waste Storage Facilities	
The Tailings Storage Facility (TSF) and Power Station Waste Storage Facility (PSWSF) will be constructed to be geotechnically stable landforms.	Section 7.4.5

COMMITMENT	EIS SECTION
Surface runoff and any seepage from the TSF and PSWSF will be monitored to confirm runoff and leachate water quality. In particular, water samples will be taken on a quarterly basis from the Return Water Dam, TSF decant pond, PSWSF runoff collection sumps and TSF/PSWSF seepage collection sumps.	Section 7.3.5
The TSF and PSWSF foundation will be inspected and suitable preparation measures taken to provide a low permeability foundation.	Section 7.4.3
A seepage collection system will be installed along the downstream toe of the TSF embankment and along the downstream toe of the external PSWSF slope to collect and contain any water seeping from the TSF and PSWSF. The seepage drain will be lined with geo-fabric material.	Section 7.4.3
Rehabilitation of available areas of the TSF embankment and PSWSF will be undertaken progressively throughout the mine life and will be an integral part of the development and operation of the facilities. Rehabilitation of the TSF and PSWSF will involve construction of the landform, provision of capping and topsoil layers, and seeding. A self-sustaining native ecosystem will be established on the storage facilities.	Section 7.4.5
A benign capping material (soil or suitable subsoil) will be placed over the final surface of the tailings and power station waste storage facilities, followed by a layer of topsoil. This will ensure successful revegetation of the waste storage facilities and a stable final landform.	Section 7.4.5
Monitoring programs will be implemented for the TSF and PSWSF to monitor key environmental and design performance indicators. The results of the monitoring will be used to assess the performance of the TSF and PSWSF and to undertake regular reviews of the design and operating plans.	Section 7.5
Rehabilitation	
Topsoil will be stripped and stockpiled ahead of open cut mining and construction of infrastructure and managed in accordance with a Topsoil Management Plan that will be prepared for the project. The plan will include the measures outlined in Section 8.5.3.	Section 8.5.3
Rehabilitation will be conducted in accordance with a Rehabilitation Management Plan (RMP) that will be developed for the project. The RMP will include detailed rehabilitation designs and procedures in accordance with the strategies outlined in the EIS. The RMP will also including monitoring and maintenance programs for site rehabilitation, including monitoring of revegetation and erosion. Maintenance works will be undertaken as necessary on the basis of monitoring results.	Section 8.2.4
Mine closure will be conducted in accordance with a Mine Closure Plan (MCP) that will be developed for the project. The MCP will be prepared to provide guidance on mine closure activities and will include: rehabilitation goals; an overview of closure and rehabilitation activities; performance criteria; and monitoring and reporting.	Section 8.2.5
Coarse coal reject material and power station waste that will be stored within the overburden emplacements are not a suitable growth medium for revegetation. These materials will be buried within the overburden with a minimum 2 m cover and will not be present at the surface of the final landform.	Section 8.2.1

COMMITMENT	EIS SECTION
Subsidence will not alter the land suitability for grazing and subsided areas will be able to continue to be used for grazing post-mining.	Section 8.4.1
Mine infrastructure areas will be rehabilitated as part of mine closure and restored to their pre-mining land suitability, where possible. Management measures will be put in place to ensure that the suitability of land for grazing is unchanged.	Section 8.4.1
Flora and Fauna, including Matters of National Environmental Significance	
Clearing procedures will be implemented to minimise clearing impacts and unnecessary disturbance to native vegetation. Particular care will be taken in relation to any work in or adjacent to drainage lines.	Sections 9.7.2, 10.7.2 and 11.8.2
Pre-clearing surveys will be undertaken ahead of clearing, to limit fauna injury and mortality and to identify habitat features to be relocated.	Sections 9.7.2 and 11.8.2
A Spotter Catcher, in possession of relevant permits under the *Nature Conservation Act 1992* (NC Act), will be present during clearing and to rescue any animals still remaining in the clearing area following the pre-clearing surveys.	Sections 9.7.2 and 11.8.2
Areas of native vegetation in the project site, outside of the footprint of the open cut mining and the mine infrastructure area, will be managed to conserve and enhance their conservation values.	Sections 9.7.2 and 11.8.2
The proponent will provide fauna watering points in areas that currently do not contain water in the dry season. These water sources will include cattle troughs, and areas of aquatic habitat created through excavating pools to provide a deeper reservoir of water. Such watering points will be fenced to prevent access by cattle.	Sections 9.7.2, 10.7.2 and 11.8.2
A Biodiversity Management Plan will be prepared for the project. It will include measures to conserve and enhance the conservation value of areas of native vegetation that will be retained in the project site as well as vegetation and threatened species monitoring.	Sections 9.7.3 and 11.8.1
A Feral Animal and Weed Management Plan will be developed and implemented for the site in accordance with the provisions of the *Land Protection (Pest and Stock Route Management Act) 2002*	Sections 9.7.3 and 11.8.3
A Species Management Program will be developed and implemented for the project in accordance with the requirements of the NC Act.	Sections 9.7.3 and 11.8.3
Speed limits along internal roads, appropriate signage and careful driving policies will be put in place to increase the awareness of drivers and decrease the risk of vehicles striking fauna.	Sections 9.6.5 and 11.7.5
Biodiversity offsets will be obtained for significant, residual impacts on Matters of National Environmental Significance and Matters of State Environmental Significance	Sections 9.8, 10.8 and 11.9

COMMITMENT	EIS SECTION
The following actions will be undertaken in relation to the northern seasonal wetland prior to any subsidence of the wetland: ■ Undertake detailed ground survey of the wetland prior to subsidence; ■ Undertake a detailed review of potential impacts on the wetland, making use of subsidence predictions based on the detailed mine plan; ■ Design any necessary drainage works, such as drains or levees, in order to reduce potential impacts on the wetland; and ■ Determine offset requirements if significant, residual impacts on the wetland are predicted.	Section 10.6.3
The following available guidelines and codes will be reviewed, where relevant, as part of the detailed design of any works in waterways: ■ *Guide for the Determination of Waterways using the Spatial Data Layer Queensland Waterways for Waterway Barrier Works* (DAFF 2013); and ■ *Fisheries Guidelines for Fish Habitat Buffer Zones* (Bavins et al. 2000).	Section 10.7.2
The proponent will consult with the Department of Agriculture and Fisheries (DAF), as necessary, in relation to construction in drainage lines that could impact fish habitat or fish passage.	Section 10.7.2
Consultation will be undertaken with the DAF prior to the commencement of construction to confirm whether there are any forest products or quarry materials authorised under the Forestry Act on the project site. In the event these are identified, the DAF will be provided the opportunity to harvest forest products.	Section 2, Attachment 2-1
Groundwater	
Any impacts on private bores within the project site will be managed through land access agreements with landholders.	Section 12.4.8
The groundwater monitoring program established as part of EIS groundwater investigations will be continued throughout the life of the project.	Section 12.5
The proponent will consult with the Department of Natural Resources and Mines in relation to its obligations under the *Water Act 2000* and will comply with the relevant requirements for groundwater take.	Section 12.6
Surface Water	
Site drainage infrastructure will be designed in accordance with relevant engineering guidelines and standards.	Section 13.4.1
The highwall drains and the northern and southern drainage corridors will remain in place after mine closure and are designed to ensure they will remain stable in the long term.	Sections 13.3.5 and 13.4.1
An Erosion and Sediment Control Plan (ESCP) will be prepared for the project prior to commencement of construction to address erosion and the control of suspended sediment.	Sections 13.3.4 and 13.6.1
Sediment control structures will be managed in accordance with an ESCP. The ESCP will include an inspection plan for sediment control structures to ensure they are maintained and remain effective.	Section 13.5.6

COMMITMENT	EIS SECTION
The proponent will undertake remedial drainage earthworks to re-establish free drainage in areas where subsidence will cause surface ponding.	Section 13.6.4
Controlled release of any excess mine-affected water will be in accordance with the EHP's Model Mining Conditions. Controlled releases will be necessary following extended wet periods where accumulated runoff in the open cut pits exceeds the site pit water storage capacity.	Sections 13.4 and 13.5.3
Culverts will be designed so that the road and rail have flood protection from the 50 year Average Recurrence Interval flood event in the southern drainage corridor. Detailed design of culverts will be undertaken during detailed design.	Sections 13.4.2 and 13.6.3
All dams will be designed and constructed in accordance with relevant design standards and licence requirements, including standards defined in the *Water Act 2000*.	Section 13.5.3
A detailed consequence category assessment will be conducted at the detailed design stage to confirm whether any of the mine water dams will be regulated dams under the *Environmental Protection Act 1994* (EP Act).	Section 13.5.3
If necessary, a small earth bund will be constructed at the northern end of the topsoil stockpile area to prevent erosion of any stockpiled topsoil in this area during flooding.	Section 13.6.3
Erosion protection and energy dissipation measures for the drainage features downstream of the northern highwall drain will be considered during detailed design.	Section 13.6.3
The southern drainage corridor will be monitored for erosion after flow events and erosion control measures will be installed, if necessary.	Section 13.6.3
Subsidence of drainage gullies will be monitored to identify any erosion or instability. Remedial stabilisation will be undertaken where necessary. All monitoring and remediation will be undertaken in accordance with the Subsidence Management Plan.	Section 13.6.4, Appendix B – *Draft Subsidence Management Plan*
The water management system will be monitored monthly and managed in accordance with a Site Water Management Plan.	Section 13.5.6
Quarterly monitoring of water levels and quality (pH and EC) will be undertaken in mine water storage dams including the Return Water Dam, Mine Water Dam and intermediate pit water dams, and the Industrial Area Dam and associated infrastructure area catch dams.	Section 13.5.6
Annual water monitoring will be undertaken in mine water storage dams including the Return Water Dam, Mine Water Dam and intermediate pit water dams, and the Industrial Area Dam and associated infrastructure area catch dams, for a comprehensive suite of water quality parameters, including metals and metalloids.	Section 13.5.6
Air Quality and Greenhouse Gas (GHG)	
The proponent will consult with the relevant property owner and Adani, as the proponent of the Carmichael Coal Mine and Rail Project (CCM&RP), in relation to the management of any adverse cumulative impacts on sensitive receptors where the *Environmental Protection (Air) Policy 2008* objectives are predicted to be exceeded.	Section 15.8.11

COMMITMENT	EIS SECTION
The following measures will be implemented to control and manage dust emissions and minimise the potential air quality impacts of the project: ■ Haul roads will be watered to minimise dust emissions; ■ Progressive rehabilitation will be conducted on the open cut mine overburden emplacement areas; ■ Inactive disturbed areas will be rehabilitated as soon as possible; ■ Electrostatic precipitators will be installed on the power station to minimise emissions of particulate matter; and ■ Compliance with the relevant requirement of the Aurizon Coal Dust Management Plan at the train loading facility including the use of coal wagon veneering systems.	Sections 15.8.12 and 24.4.6
A complaints handling procedure will be implemented for the project. The procedure will include the investigation of any complaints in relation to air quality impacts. These investigations would include air quality monitoring, if necessary.	Section 15.8.12
The proponent will report yearly on GHG emissions, energy production and consumption in accordance with the *National Greenhouse and Energy Reporting Act 2007*.	Section 2, Attachment 2-1
The proponent will consider the following initiatives that may mitigate, reduce, control or manage GHG emissions through energy efficiency including: ■ Regular assessment, review and evaluation of greenhouse gas reduction opportunities; ■ Procurement policies that require the selection of energy efficient equipment and vehicles; ■ Monitoring and maintenance of equipment in accordance with manufacturer recommendations; ■ Optimisation of diesel consumption through logistics analysis and planning; and ■ Progressive rehabilitation of land areas to manage and limit the cumulative loss of carbon storage associated with land clearing.	Sections 15.9.2 and 24.4.6
Noise and Vibration	
Aircraft movements would be scheduled during the day and early evening where possible and aircraft flight-paths would be selected to minimise noise impact to receptors.	Section 16.6.7
A complaints handling procedure will be implemented for the project. The procedure will involve the investigation of any complaints in relation to noise and blast impacts. These investigations would include noise and blast impact monitoring, if necessary.	Section 16.7

COMMITMENT	EIS SECTION
Visual Amenity	
The following mitigation measures will minimise the visual and lighting impacts of the project: ■ Progressive rehabilitation and revegetation of overburden emplacement areas to minimise the visual effect; ■ Use of neutral tones in the cladding of infrastructure to blend with the surrounding environment; and ■ Design of external lighting to minimise off site impacts.	Section 17.4
Socio-Economic Impacts	
The proponent will report on an annual basis to relevant stakeholders from commencement of construction and for two years following commencement of mining operations. The annual report will: ■ Describe the actions to inform the communities of the Local Area about project impacts and show that community concerns about project impacts have been taken into account when reaching decisions; ■ Describe the actions to enhance local and regional employment, training and development opportunities; and ■ Describe the actions to avoid, manage or mitigate project-related impacts on local community services, social infrastructure and community safety and wellbeing.	Section 18.8
The proponent will develop a project Recruitment Plan in consultation with the Queensland Department of Education and Training (DET) and the Federal Department of Employment, prior to the commencement of construction.	Section 18.7.1
Prior to the commencement of the construction phase, the proponent will update the existing project labour study (Appendix D of Appendix N).	Section 18.7.1
The proponent will provide updated workforce data to the DET prior to the commencement of recruitment for the construction phase.	Section 18.7.1
During the operations phase the workforce will be employed predominantly on a non-resident long distance commuting basis (i.e. fly-in/fly-out (FIFO)). However, the proponent will re-evaluate the feasibility of bus-in/bus-out and, in the long term, FIFO out of Charters Towers in order to increase the employment opportunities for residents of the Local Area, if feasible.	Section 18.7.1

COMMITMENT	EIS SECTION
The proponent will develop an Indigenous Participation Plan (IPP) for the project prior to the commencement of construction. The IPP will articulate the proponent's commitments to supporting Indigenous employment on the project and the creation of Indigenous small business opportunities. These commitments include: ■ A dedicated Indigenous liaison role for the project; ■ Continuing to work with Traditional Owners and Indigenous groups to further develop Indigenous business and employment opportunities; ■ Engaging with Indigenous employment agencies such as Jenagar and Myuma, and State agencies such as the Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP) to coordinate the provision of employment opportunities for Indigenous persons in the region, including the provision of structured training programs; ■ Providing culturally appropriate employment opportunities and supporting and implementing initiatives to assist Indigenous persons to be employed by the proponent or project contractors; and ■ Aiming to achieve Indigenous representation on the project matching Indigenous representation in the wider Australian population.	Section 18.7.1
The proponent will prepare a detailed Training and Skilling Plan (TSP) prior to the commencement of construction. The TSP will include: ■ Specific training targets for proponent and contract workforces; ■ A policy for granting higher education scholarships relevant to mining, to school leavers in workforce Home Base Locations; ■ Partnerships with secondary schools in the Local Area and regional training centres such as the Dalrymple Trade Training Centre; and ■ Engagement with Queensland Minerals and Energy Academy and the Queensland Resources Council to extend relevant programs to the Local Area.	Section 18.7.1
The proponent will provide additional information in relation to the range of initiatives to be adopted that target the recruitment and training of specific vulnerable groups closer to the commencement of the construction phase. At such a time the labour market conditions will have been reassessed and a more comprehensive training plan for construction and operations will have been developed in consultation with key stakeholders.	Appendix N Subsection 6.3.6
The proponent will investigate the option of an off-site office in Charters Towers or Townsville, for administrative and community operations. This office would enable greater participation in the project by individuals with health or lifestyle conditions that limit their capacity to undertake FIFO work, e.g. persons with a disability.	Appendix N Subsection 6.3.6
The proponent will develop a Local Industry Participation Strategy prior to the commencement of construction, which will address the Queensland Resource and Energy Sector Code of Practice for Local Content and include the proponent's Australian Industry Participation Plan and proposed Local Content Plan.	Section 18.7.1
■ The proponent will develop a Local Content Plan prior to the commencement of construction in consultation with the CTRC, IRC and local businesses. The Local Content Plan will include actions to: Identify capable local industry; ■ Assist local industry and businesses within the Local Area to develop appropriate capabilities to tender for procurement opportunities; and ■ Inform local industry of project procurement opportunities.	Section 18.7.1

COMMITMENT	EIS SECTION
In response to consultation, the proponent will also consider initiatives including: ■ Appoint a single point of contact for local businesses to contact in relation to project procurement opportunities; ■ Develop a publicly available local procurement policy which outlines procurement processes; and ■ Establish formal and regular communications with local businesses in Charters Towers and Clermont to keep local business owners informed of project progress and upcoming procurement opportunities.	Section 18.7.1
The proponent will engage with the Charters Towers Regional Council (CTRC) in relation to the provision of support (financial and/or in-kind) to assist the CTRC with the development of infrastructure that enables the Charters Towers Local Government Area to capitalise on the opportunities presented by the proximity of the project and the project's supply chain routes.	Section 18.7.1
The proponent will develop a Project Servicing Strategy for the commencement of the construction phase. The Project Servicing Strategy will apply to all phases of the project.	Appendix N Subsection 7.5.1
The proponent will support sustainable residential population growth in regional centres by: ■ Nominating selected commuting collection points based on demographic and labour considerations and servicing capacity; ■ Extending the Employee Wellbeing Plan to these selected locations, as appropriate; and ■ Regular communication with relevant commuting coordinators and/or regional councils to confirm that project induced population growth can be managed within existing service delivery strategies.	Section 18.7.1
The proponent will keep local governments in the home base locations informed of project labour sourcing strategies and associated workforce numbers through regular face-to-face engagement. Where significant project induced permanent resident population growth is identified, the proponent will support the affected local government in responding to any demand generated by the population.	Section 18.7.1
The proponent will keep the State Government, CTRC and the IRC informed of the size of the non-resident worker population associated with the project.	Section 18.7.1
The proponent will engage at regular intervals with the State Government regarding project labour sourcing strategies and associated workforce numbers.	Appendix N Subsection 6.8.3

COMMITMENT	EIS SECTION
The proponent will establish an Employee Wellbeing Plan prior to the commencement of construction, which may include: ■ The inclusion of a comprehensive discussion of FIFO lifestyle management in the Induction programs for all employees; ■ Provision to all employees, the Guide for Long Distance Commuting (FIFO/DIDO) Workers developed by the QRC; ■ Mental health and isolation adjustment support for all employees for their first year of employment; ■ Engagement with FIFO Families to establish a project FIFO Families group within the identified Home Base Locations; and ■ The establishment of an on-site activities calendar to enhance social network building among the workforce.	Section 18.7.1
The workforce accommodation facility for project operations will include the following design elements to support positive employee health and wellbeing during shift roster periods: ■ High speed internet connection in accommodation units to enable video calling; ■ Sports areas and gym equipment to encourage healthy activities; ■ Communal courtyards between accommodation units to encourage socialization; ■ A nurse-led health centre with tele-health facilities; and ■ Notice boards for advertising on-line support networks (e-support), village activities and visiting specialists.	Appendix N Subsection 6.4.2
The proponent will investigate the potential opportunities to support the development of social connections between residents of the accommodation village at the proposed Carmichael Coal Mine and residents at the project accommodation village. This may include scheduled social and recreational events e.g. football games, barbeques.	Appendix N Subsection 6.4.2
The proponent will prepare a Fitness for Work (FFW) Plan incorporating Fatigue Management Procedure as a component of a Workforce Code of Conduct. The FFW - Fatigue Management Procedure will be applicable to all employees and visitors associated with the project.	Appendix N Subsection 6.4.2
The proponent will develop a FFW – Drug and Alcohol Procedure as a component of the Workforce Code of Conduct. The proponent will apply a rigorous drug and alcohol procedure across the construction and operations phase workforces, which will involve entry tests, random drug and alcohol sampling and fitness for work drug and alcohol sampling. The appointed lead CEW contractor will also be responsible for ensuring employee contractor compliance with this policy during this project phase.	Appendix N Subsection 6.4.2
The proponent will conduct ongoing consultation with Queensland Health regarding medical services provision and project demand on health services in the region.	Appendix N Subsection 6.4.2
The proponent will provide a one-off donation of a heavy vehicle rescue kit to Queensland Fire and Emergency Services in Charters Towers to improve local emergency service response to incidents.	Sections 18.7.1 and 22.6.5

COMMITMENT	EIS SECTION
The proponent will consult with the Isaac Regional Council, CTRC, Department of Transport and Main Roads (TMR), Queensland Police Service (QPS), Adani and the Road Accident Action Group to determine the need for any additional driver rest areas along the primary project supply routes.	Sections 18.7.1 and 22.6.5
The proponent will register the airstrip with the Royal Flying Doctor Service.	Appendix N Subsection 6.4.2
The proponent will make resources available to emergency service providers when at the mine site. This will include making office space and equipment available for use.	Section 18.7.1
The proponent will provide bus services between Emerald and the project site, and Townsville and the project site prior to the construction of the airstrip to limit the number of construction workers commuting on the regional road network.	Appendix N Subsection 6.6.9
The proponent will coordinate project infrastructure upgrades, including communication infrastructure upgrades, with local emergency services and Adani to enable cost-effective expansion of emergency service communications along the Gregory Developmental Road.	Sections 18.7.1 and 22.6.5
The proponent will engage with Adani in relation to the proponent's participation in the Emergency Services Consultative Committee for the CCM&RP and the coordination of emergency response and sharing of resources, where appropriate.	Sections 18.7.1 and 22.6.5
The proponent is committed to supporting the participation of the Operations Phase workforce in volunteer roles across the Surrounding Area, where feasible. Employee policies that enable emergency services personnel to be released from duties to attend emergency calls and to perform crucial volunteer actions e.g. assist with the rural bushfire service will be developed for all phases of the project.	Appendix N Subsection 6.6.9
The proponent will develop an ongoing program of landholder liaison for the preconstruction, construction and operations phases of the project.	Section 18.7.1
The proponent will implement a complaints handling procedure at the commencement of the construction phase to ensure any complaints from landholders and other stakeholders are handled quickly and effectively.	Section 18.7.1
Traffic and Transport	
The proponent will obtain all relevant permits from the QPS in accordance with the relevant legislation regarding escorting and scheduling of over dimensional loads.	Section 19.2.3
The proponent will provide a detailed schedule regarding the number and size of over dimensional loads and their timing in order to facilitate QPS planning once detailed construction planning has commenced.	Section 19.2.3
A basic right turn treatment and a basic left turn treatment will be provided at the mine access road intersection with Moray-Carmichael Road following resolution of the access road alignment.	Section 19.2.5
The project's pavement rehabilitation impact will be recalculated prior to the commencement of construction based on confirmed pavement loadings associated with the CCM&RP to enable the accurate quantification of any monetary contribution towards pavement rehabilitation activities in accordance with the TMR guideline.	Sections 19.2.7 and 24.4.11

COMMITMENT	EIS SECTION
The project's pavement maintenance impact will be recalculated prior to the commencement of construction based on confirmed traffic estimates from the CCM&RP Road Impact Assessment, which is required to be submitted to TMR prior to the commencement of construction. This will enable the accurate quantification of any monetary contribution towards pavement maintenance activities in accordance with the TMR guideline.	Sections 19.2.7 and 24.4.11
The proponent will continue consultation with the relevant road authorities and stakeholders including TMR, Isaac Regional Council (IRC), CTRC and QPS, as appropriate, during the project planning and implementation phases of the project.	Section 19.2.11
Consultation will be conducted with the IRC in relation to the new mine access road and the location and design of the intersection of the access road with Moray-Carmichael Road.	Section 19.2.11
The airstrip will be designed, constructed and operated in accordance with the Civil Aviation Safety Authority (CASA) regulations and guidelines.	Section 19.5
Project air traffic control will be coordinated with the airports at the workforce source locations and will also be coordinated with the CCM&RP airstrip.	Sections 19.5 and 24.4.11
Cultural Heritage	
The proponent will negotiate a Cultural Heritage Management Plan with the Wangan and Jagalingou People's. Impacts on Aboriginal cultural heritage will be managed in accordance with the Cultural Heritage Management Plan.	Section 20.2.2
The General Manager and all staff or contractors of the proponent who will be responsible for undertaking initial clearance and ground disturbance activities will be informed of their obligations to report to the EHP any archaeological items that may constitute an important source of information about an aspect of Queensland's history.	Section 20.3.7
A Find Strategy will be implemented in the event that any staff or contractors of the proponent suspect that they have uncovered an archaeological object that may constitute an important source of information about an aspect of Queensland's history.	Section 20.3.7
In the event that archaeological monitoring or excavations are required as a result of implementing the Find Strategy, the standards outlined in the EHP *Guideline Archaeological Investigations* (EHP, 2013) will be applied (or any version of the EHP guidelines that may supersede this document).	Section 20.3.7
Non-Mining Waste	
The proponent will develop and implement a waste management system for the project that will be based on all relevant regulatory requirements, and the values and principles described in Section 21.2. The waste management system will be subject to a continual improvement process with the aim of identifying new opportunities for waste minimisation and addressing any new waste streams generated.	Section 21.2.5
The landfill will be designed and managed to dispose of general (non-regulated and non-hazardous) wastes in accordance with the Queensland Government *Guideline - Landfill Siting, Design, Operation and Rehabilitation, EM2319, Version 2* (EHP 2013).	Section 21.2.5

COMMITMENT	EIS SECTION
Wastes will be collected, handled and stored so as to protect mine site staff, community health and prevent nuisance.	Section 21.2.6
The proponent will maintain an inventory of all waste types and quantities produced on the site and their applicable disposal method in accordance with the *Waste Reduction and Recycling Act 2011* and *Environmental Protection (Waste Management) Regulation 2000*.	Section 21.2.8
The proponent will submit annual National Pollution Inventory reports in accordance with the *National Pollutant Inventory Guide* (SEWPaC 2012) and associated manuals (e.g. *Emission Estimation Technique Manual for Mining*, SEWPaC 2012) as required.	Section 21.2.8
Details of areas with Notifiable Activities will be provided to the EHP, in accordance with legislative requirements.	Section 21.3.4
The proponent will reduce the risk of land contamination from project activities through the consideration of the design, construction and operation of project facilities and post-mining rehabilitation activities. This includes the appropriate containment and handling of hazardous or contaminated substances and training of key staff in spills prevention and clean up.	Section 21.3.5
Hazard and Risk	
The proponent will comply with the *Coal Mining Safety and Health Act 1999* and will establish appropriate health and safety systems to ensure compliance with the Act.	Section 22.2 and 22.3
The proponent will prepare and implement a Safety Health Management System to address the construction, operations and decommissioning phases of the project in compliance with the *Work Health and Safety Act 2011* and associated regulations.	Sections 22.2 and 22.3
The proponent will develop a corporate Safety and Health Policy that demonstrates a commitment to safe operations and continual improvement in safety performance.	Section 22.3.2
A detailed risk register will be created for the project that will identify hazards and management controls to reduce risks.	Section 22.3.2
A high level Integrated Risk Management Plan will be developed for the whole life of the project including construction, operations and decommissioning phases.	Section 22.3.2
The proponent will develop a series of Principal Hazard Management Plans in order to manage specific hazards at the site such as bushfires and the power station.	Section 22.3.2
The proponent will develop and implement a Bushfire Management Plan to address bushfire hazards and risks, and management.	Section 22.3.2
The proponent will develop an Emergency Response Management Plan (ERMP) to specifically address major emergencies and incidents that could impact upon surrounding land uses.	Section 22.3.2
The proponent will consult with key stakeholders including emergency service providers, the IRC, the CTRC, State Government and other relevant community stakeholders during the development of the Safety and Health Management System (SHMS) and key management plans such as the ERMP.	Section 22.3.2

COMMITMENT	EIS SECTION
All site personnel (including contractors) will undergo a comprehensive site induction and familiarisation, which will cover all aspects of the SHMS. Refresher training on the SHMS will be provided regularly to employees and contractors. Employees and contractors will also be trained in basic first aid and fire training as part of their induction and refresher training.	Section 22.3.2
The proponent will develop a Hazard, Defect and Incident Procedure to report any incidents, identify new hazards and to monitor conformance with the SHMS.	Section 22.3.2
The proponent will conduct detailed management reviews of the SHMS on a monthly basis.	Section 22.3.2
A rigorous re-appraisal of hazards associated with the project will be undertaken as part of the SHMS prior to the commencement of the construction, operations and decommissioning phases of the project, based on detailed design and operating plans.	Section 22.4
Detailed consequence category assessment will be conducted at the detailed design stage to confirm whether any of the mine water dams will be regulated structures under the EP Act.	Section 22.6.1
All dams on the project site will be designed by a suitably qualified engineer and will have their consequence category reassessed on an annual basis following construction. All dams will be designed and constructed in accordance with relevant design standards and licence requirements, including standards defined in the *Water Act 2000* and will comply with the conditions of the EA. Designs will adequately address the structural integrity of containment walls during climatic extremes, including drought and flood.	Section 22.6.1
A detailed consequence category assessment of the TSF including full dam break analysis will be conducted at the detailed design stage to confirm the consequence category.	Section 22.6.2
The design, construction and operation of the mine waste storage facilities will be undertaken by appropriately qualified and experienced engineers. All facilities will comply with the conditions of the EA and other relevant design standards and licence requirements. Regular monitoring will also be undertaken which will reduce the potential risk of an unplanned or unmanaged release from the facilities.	Section 22.6.2
The power station will be designed, constructed and operated in accordance with all relevant legislation, standards and guidelines. It will be operated as a discrete piece of infrastructure within the mine site, with fencing and a guard house and reception to manage entry and egress. A specific Principal Hazard Management Plan will be developed for the facility as part of the SHMS that will include a detailed risk assessment based on detailed project design.	Section 22.6.3
The airstrip will be designed, constructed and operated in accordance with all applicable CASA legislation and regulations. An aerodrome certification will be required to be obtained once it has been constructed.	Section 22.6.4
The transport, storage, handling and disposal of hazardous substances or dangerous goods will be planned and managed prior to arrival on-site. Appropriate measures will be implemented in accordance with the requirements of the SHMS and all relevant legislation and guidelines.	Sections 22.6.5 and 24.4.14

COMMITMENT	EIS SECTION
All chemicals and proprietary substances used for the project will carry a Material Safety Data Sheet (MSDS) which will clearly state whether the substance is hazardous or non-hazardous. Where an MSDS shows a substance to be hazardous, the appropriate risk and safety phrases will be provided to ensure best practice management measures are applied.	Sections 22.6.5 and 24.4.14
The project will appoint a radiation safety officer to ensure industrial gauges are stored and maintained in accordance with the relevant radiation safety standard. In addition the project will develop a Standard Operating Procedure in accordance with Section 96 c (iii) of the *Coal Mining Safety and Health Regulations 2001*.	Section 22.6.5
The bulk explosive material would be brought to site by a licensed contractor and the blasting would be undertaken by experienced and appropriately trained explosives contractors. Explosives will be stored more than 10 km from any sensitive receptors and have been located, as much as practical, to maximise separation from other potentially hazardous activities or facilities within the project site. The proponent will comply with the *Explosives Act 1999* and will establish appropriate health and safety systems to ensure compliance with this Act.	Section 22.6.5
The proponent will comply with the relevant acts, standards and policies regarding the storage, transport and use of hazardous materials to ensure health and safety. These are further discussed in Section 22.6.5.	Section 22.6.5
A Spill Management Plan will be developed as part of the ERMP, prior to construction and will provide the procedure to be followed for the containment, clean-up, investigation and reporting of any spills.	Section 22.6.5
Numerous risk control measures will be put in place to reduce the health and safety risks on the project site. These are discussed in Table 22.5.	Section 22.6.5
Consultation with key stakeholders will be undertaken as part of the emergency response planning, including local and regional representatives from the emergency service providers.	Section 22.8
The proponent will provide information to local and regional emergency service providers as it becomes relevant or available.	Section 22.8
Environmental Management	
The proponent will update the existing environmental policy prior to subsequent project phases to ensure the policy reflects the proponent's commitments to environmental mitigation and management for the site.	Section 24.3.1
An Environmental Management System (EMS) will be developed and implemented for the project. The EMS will be designed to achieve the objectives of the proponent's environmental policy and to ensure that all regulatory requirements are met. The EMS will be designed to generally be aligned with ISO 14001, which is a benchmark international standard for EMS development.	Section 24.3.2
The EMS will include the development and implementation of a grievance and dispute resolution procedure to ensure any complaints from landholders and other stakeholders are handled quickly and effectively. Where necessary, this may include monitoring or changes to environmental management plans and procedures.	Section 24.3.2

COMMITMENT	EIS SECTION
The EMS will be subject to review, and where necessary, revision of the environmental management plans, procedures or monitoring programs. This will be undertaken periodically, as necessary, and prior to commencement of subsequent project phases to enable the proponent to adapt to the changes in the predicted and actual environmental impacts arising in each project phase.	Section 24.3.2
Periodic audits of each environmental management plan each plan will be undertaken, as necessary, to ensure compliance with regulatory requirements and the proponent's environmental policy.	Section 24.3.2
Employees and contractors will undergo site inductions and training relating to environmental management in accordance with the EMS documentation and the proponent's environmental management commitments.	Section 24.3.2

ATTACHMENT 24-3

Rehabilitation Criteria

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
Domain 1 – Mine Infrastructure Areas: ■ Mine infrastructure ■ Coal Handling and Preparation Plants ■ Accommodation village ■ Airstrip ■ Internal service roads ■ Overland conveyors ■ Mine rail infrastructure ■ Mine water dams ■ Minor surface facilities above underground mining area	Long-term safety	Rehabilitation or conversion of exploration drill holes and groundwater monitoring bores	All exploration drill holes and all monitoring bores established on the Mining Lease have been rehabilitated or converted to water bores	Certification of the following by an appropriately qualified person: ■ All exploration drill holes or monitoring bores not converted to water bores have been rehabilitated. ■ All aquifers have been isolated where exploration drill holes or monitoring bores have intersected more than one water bearing strata, in accordance with the *'Minimum Construction Requirements for Water Bores in Australia' (Australian Government, February 2012)* or latest edition. ■ All exploration drill holes or monitoring bores converted to a water bore have been converted in accordance with the *'Minimum Construction Requirements for Water Bores in Australia' (Australian Government, February 2012)* or latest edition.
		Site is safe for humans and animals	Appropriate decommissioning of infrastructure	A risk assessment is to be undertaken by an appropriately qualified person at closure to ensure the site is safe and all infrastructure has been decommissioned appropriately.
			Remediate contaminated land	Evidence in the Rehabilitation Report that all areas contaminated by hydrocarbons or other chemicals used during the life of the mine have been excavated and disposed of appropriately.

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
	Non-polluting	No contamination of surface water and groundwater resources	Downstream surface water quality	Evidence in the Rehabilitation Report that surface water monitoring demonstrates the quality of water in the receiving environment meets relevant water quality objectives.
				Regulated Structures are certified to be decommissioned in accordance with the administering authorities' requirements.
			Groundwater quality	Evidence in the Rehabilitation Report that groundwater monitoring demonstrates that the groundwater quality is not negatively impacted compared to the baseline monitoring results.
	Stable landform	Landform achieves appropriate erosion rates	Slope angle and length	Evidence in the Rehabilitation Report that rehabilitated surfaces match the slope of surrounding land surfaces.
			Engineered structures to control water flow	Evidence in the Rehabilitation Report that required contour banks, channel linings, surface armour, engineered drop structures, etc are in place and functioning.
			Erosion control	Evidence in the Rehabilitation Report that rehabilitated surfaces are stable and not actively eroding.
		Appropriate vegetation cover	Vegetation type and density	Evidence in the Rehabilitation Report that the vegetation type and density of species in rehabilitated areas are suited to the soil composition, slope, aspect, climate and other factors.
				Evidence in the Rehabilitation Report that the vegetation types and densities in rehabilitated areas reflect the vegetation types and densities prior to construction of mine infrastructure.

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
			Foliage Cover	Minimum of 70% ground cover is present (or 50% if rocks, logs or other features of cover are present). No bare surfaces >20 m^2 in area or >10 m in length down slope.
			Maintain species composition, diversity, and community structure (flora and fauna)	Evidence in the Rehabilitation Report that the species composition and community structure reflect the species composition and community structure prior to construction of mine infrastructure.
	Sustainable land use	Soil properties support the desired land use	Topsoil and subsoil support the proposed vegetation and land use	Evidence in the Rehabilitation Report that soil properties (e.g. pH, salinity, nutrient content, sodium content) reflect the soil properties prior to construction of mine infrastructure.
		Establish self-sustaining natural vegetation or habitat	Plant regeneration	Evidence in the Rehabilitation Report that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence.
			Presence of key plant species	Evidence in the Rehabilitation Report that the vegetation includes the presence of species, density and composition reflective of the vegetation prior to construction of mine infrastructure.
			Density of key plant species	
			Composition of key plant species	
			Abundance of declared plants (weeds) identified through inspection	Evidence in the Rehabilitation Report that declared weeds and pest animals are adequately controlled on the site.
			Abundance of exotic grasses	
			Actions taken to eradicate plants declared under local or State legislation	

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
		Agricultural cattle grazing	Land is suitable for cattle grazing	Evidence in the Rehabilitation Report that cattle grazing is able to be undertaken on rehabilitated areas, by comparison to reference sites.
			Landform stable when grazed	Evidence in the Rehabilitation Report that land maintenance requirements are comparable to reference sites.
				Evidence in the Rehabilitation Report that the rehabilitated landform is safe for stock and for undertaking management activities associated with stock.
			Stock access to water sources	Stock only allowed access to water sources that meet stock water requirements.
Domain 2 – Tailings and Power Station Waste Storage Facilities: ■ TSF ■ PSWSF	Long-term safety	Structurally safe with no hazardous materials	Safety assessment of landform stability (geotechnical issues)	Certification by an appropriately qualified and experienced person, in the Rehabilitation Report, that the TSF and PSWSF has been constructed as-designed, including: ■ Provision of as-built plans of the final TSF and PSWSF; ■ Confirmation that slopes are stable in the long term; ■ Confirmation that capping thickness is appropriate; ■ Evidence of revegetation success; ■ Confirmation that drainage has been appropriately established and that there is no active erosion; and ■ Confirmation that erosion and sediment control measures have been installed and are operating as designed.

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
			Exposure to, and availability of heavy metals and other toxic materials	Evidence in the Rehabilitation Report, based on the results of progressive sampling and geochemical characterisation required by the EA, confirming the low potential for acid mine drainage.
	Non-polluting	No contamination of surface water and groundwater resources	Downstream surface water quality	Evidence in the Rehabilitation Report that surface water monitoring demonstrates the quality of water in the receiving environment meets relevant water quality objectives.
			Groundwater quality	Evidence in the Rehabilitation Report that groundwater monitoring demonstrates that the groundwater quality is not negatively impacted compared to the baseline monitoring results.
	Stable landform	Landform design achieves appropriate erosion rates	Safety assessment of landform stability (geotechnical issues)	Certification by an appropriately qualified and experienced person, in the Rehabilitation Report, that the TSF and PSWSF has been constructed as-designed, including: ■ Provision of as-built plans of the final TSF and PSWSF; ■ Confirmation that slopes are stable in the long term; ■ Confirmation that capping thickness is appropriate; ■ Evidence of revegetation success; ■ Confirmation that drainage has been appropriately established and that there is no active erosion; and ■ Confirmation that erosion and sediment control measures have been installed and are operating as designed.

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
	Sustainable land use	Soil properties support the desired land use	Topsoil and subsoil support the proposed vegetation and land use	Evidence in the Rehabilitation Report that soil properties (e.g. pH, salinity, nutrient content, sodium content) provide a suitable growth medium for relevant vegetation species.
				Evidence in the Rehabilitation Report that topsoil has been respread to suitable depths.
		Establish self-sustaining natural vegetation or habitat	Plant regeneration	Evidence in the Rehabilitation Report that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence.
			Presence of key plant species	Evidence in the Rehabilitation Report that the vegetation includes the presence of species, density and composition reflective of the vegetation prior to the construction of the TSF and PSWSF.
			Density of key plant species	
			Composition of key plant species	
			Abundance of declared plants (weeds) identified through inspection	Evidence in the Rehabilitation Report that declared weeds and pest animals are adequately controlled on the site.
			Abundance of exotic grasses	
			Actions taken to eradicate plants declared under local or State legislation	
		Agricultural cattle grazing on appropriate areas	Control of stocking rates on slopes not suitable or safe for cattle grazing	Evidence in the Rehabilitation Report that access to slopes not suitable for cattle grazing is controlled.
			Stock access to water sources	Stock only allowed access to water sources that meet stock water requirements.

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
Domain 3 – Subsidence Area: ■ Areas within the predicted limit of measureable subsidence	Long-term safety	Ensure site is safe for humans and animals	Rehabilitation of subsidence impacts	Evidence in the Rehabilitation Report that rehabilitation of subsidence impacts has been undertaken in accordance with the Subsidence Management Plan.
	Non-polluting	No contamination of surface water and groundwater resources	Downstream surface water quality	Evidence in the Rehabilitation Report that surface water monitoring demonstrates the quality of water in the receiving environment meets relevant water quality objectives.
			Groundwater quality	Evidence in the Rehabilitation Report that groundwater monitoring demonstrates that the groundwater quality is not negatively impacted compared to the baseline monitoring results.
	Stable landform	Surface water drainage	Stable drainage works	Evidence in the Rehabilitation Report that remedial drainage works have been properly designed and constructed and are not actively eroding.
			Stabilise subsided drainage lines	Evidence in the Rehabilitation Report that subsided sections of drainage lines will be maintained in a stable condition post-subsidence.
		No significant changes to hydrological conditions	Ponding	Evidence in the Rehabilitation Report that there are no residual subsidence ponds in the limit of measureable subsidence.
		Landform achieves appropriate erosion rates	Tension cracks rehabilitated	Evidence in the Rehabilitation Report that tension cracks have been rehabilitated in accordance with the Subsidence Management Plan and are stable and not actively eroding.
				Evidence in the Rehabilitation Report that rehabilitated tension cracks have been successfully revegetated, by comparison to reference sites.

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
		Appropriate vegetation cover	Vegetation type and density	Evidence in the Rehabilitation Report that the vegetation type and density of species in rehabilitated areas are suited to the spoil composition, slope, aspect, climate and other factors.
				Evidence in the Rehabilitation Report that the vegetation types and densities in rehabilitated areas reflect the vegetation types and densities prior to subsidence.
			Foliage Cover	Minimum of 70% ground cover is present (or 50% if rocks, logs or other features of cover are present). No bare surfaces >20 m^2 in area or >10 m in length down slope.
			Maintain species composition, diversity, and community structure (flora and fauna)	Evidence in the Rehabilitation Report that the species composition and community structure reflect the species composition and community structure prior to subsidence.
	Sustainable land use	Soil properties support the desired land use	Topsoil and subsoil support the proposed vegetation and land use	Evidence in the Rehabilitation Report that soil properties (e.g. pH, salinity, nutrient content, sodium content) reflect the soil properties prior to subsidence.
		Establish self-sustaining natural vegetation or habitat	Plant regeneration	Evidence in the Rehabilitation Report that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence.
			Presence of key plant species	Evidence in the Rehabilitation Report that the vegetation includes the presence of species, density and composition reflective of the vegetation prior to subsidence.
			Density of key plant species	
			Composition of key plant species	

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
			Abundance of declared plants (weeds) identified through inspection	Evidence in the Rehabilitation Report that declared weeds and pest animals are adequately controlled on the site.
			Abundance of exotic grasses	
			Actions taken to eradicate plants declared under local or State legislation	
		Agricultural cattle grazing	Land is suitable for cattle grazing	Evidence in the Rehabilitation Report that cattle grazing is able to be undertaken on rehabilitated areas, by comparison to reference sites.
			Landform stable when grazed	Evidence in the Rehabilitation Report that land maintenance requirements are comparable to reference sites.
				Evidence in the Rehabilitation Report that the rehabilitated landform is safe for stock and for undertaking management activities associated with stock.
			Stock access to water sources	Stock only allowed access to water sources that meet stock water requirements.

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
Domain 4 – Overburden Emplacement Areas: ■ Areas within the open cut mining area designated to store overburden, coarse rejects and power station waste	Long-term safety	Structurally safe with no hazardous materials	Safety assessment of landform stability (geotechnical issues)	Certification by an appropriately qualified and experienced person, in the Rehabilitation Report, that rehabilitated slopes are stable, including: ■ Confirmation that slopes are constructed to maximum slope requirements; ■ Evidence of revegetation success; ■ Confirmation that drainage has been appropriately established and that there is no active erosion; and ■ Confirmation that erosion and sediment control measures have been installed and are operating as designed.
			Exposure to, and availability of heavy metals and other toxic materials	Evidence in the Rehabilitation Report, based on the results of progressive sampling and geochemical characterisation required by the EA, confirming the low potential for acid mine drainage.
	Non-polluting	No contamination of surface water and groundwater resources	Downstream surface water quality	Evidence in the Rehabilitation Report that surface water monitoring demonstrates the quality of water in the receiving environment meets relevant water quality objectives.
			Groundwater quality	Evidence in the Rehabilitation Report that groundwater monitoring demonstrates that the groundwater quality is not negatively impacted compared to the baseline monitoring results.

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
	Stable landform	Landform design achieves appropriate erosion rates	Safety assessment of landform stability (geotechnical issues)	Certification by an appropriately qualified and experienced person, in the Rehabilitation Report, that rehabilitated slopes are stable, including: ■ Confirmation that slopes are stable in the long term; ■ Confirmation that topsoil thickness is appropriate; ■ Evidence of revegetation success; ■ Confirmation that drainage has been appropriately established and that there is no active erosion; and ■ Confirmation that erosion and sediment control measures have been installed and are operating as designed.
	Sustainable land use	Soil properties support the desired land use	Topsoil and subsoil support the proposed vegetation and land use	Evidence in the Rehabilitation Report that soil properties (e.g. pH, salinity, nutrient content, sodium content) provide a suitable growth medium for relevant vegetation species.
				Evidence in the Rehabilitation Report that topsoil has been respread to suitable depths.
		Establish self-sustaining natural vegetation or habitat	Plant regeneration	Evidence in the Rehabilitation Report that species in rehabilitated areas show evidence of flowering, viable seed setting, germination and emergence.
			Presence of key plant species	Evidence in the Rehabilitation Report that the vegetation includes the presence of species, density and composition reflective of the vegetation in reference sites.
			Density of key plant species	
			Composition of key plant species	

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
			Abundance of declared plants (weeds) identified through inspection	Evidence in the Rehabilitation Report that declared weeds and pest animals are adequately controlled on the site.
			Abundance of exotic grasses	
			Actions taken to eradicate plants declared under local or State legislation	
		Agricultural cattle grazing on appropriate areas	Control of stocking rates on slopes not suitable or safe for cattle grazing	Evidence in the Rehabilitation Report that access to slopes not suitable for cattle grazing is controlled.
			Stock access to water sources	Stock only allowed access to water sources that meet stock water requirements.
Domain 5 – Open Cut Final Voids ■ Areas within the open cut mining areas which will remain as final voids	Long-term safety	Structurally safe with no hazardous materials	Safety assessment of landform stability (geotechnical issues)	Certification by an appropriately qualified and experienced person, in the Rehabilitation Report, that final voids are stable, including: ■ Confirmation that slopes are geotechnically stable in the long term; ■ Confirmation that drainage has been appropriately established and that there is no active erosion; ■ Confirmation that erosion and sediment control measures have been installed and are operating as designed; and ■ A risk assessment has been completed and risk mitigation measures have been implemented. Where risk mitigation measures include bunds, safety fences and warning signs, confirmation that these have been installed.

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
			Exposure to, and availability of heavy metals and other toxic materials	Evidence in the Rehabilitation Report, based on the results of progressive sampling and geochemical characterisation required by the EA, confirming the low potential for acid mine drainage.
	Non-polluting	No contamination of surface water and groundwater resources	Downstream surface water quality	Evidence in the Rehabilitation Report that surface water monitoring demonstrates the quality of water in the receiving environment meets relevant water quality objectives.
				Evidence in the Rehabilitation Report, based on up to date modelling, the final void lake is unlikely to overflow and potentially contaminate downstream surface water quality.
			Groundwater quality	Evidence in the Rehabilitation Report that groundwater monitoring demonstrates that the groundwater quality is not negatively impacted compared to the baseline monitoring results.
				Evidence in the Rehabilitation Report, based on up to date groundwater modelling that the final void lake is not likely to contaminate groundwater
	Stable landform	Landform design achieves appropriate erosion rates	Safety assessment of landform stability (geotechnical issues)	Certification by an appropriately qualified and experienced person, in the Rehabilitation Report, that the final voids are stable in the long term and have been constructed in accordance with the Mine Closure Plan, including: ■ Confirmation that slopes are stable in the long term; ■ Confirmation that drainage, including highwall drains, has been appropriately established and that there is no active erosion; and

MINE DOMAIN	REHABILITATION GOAL	REHABILITATION OBJECTIVES	INDICATORS	COMPLETION CRITERIA
				■ Confirmation that erosion and sediment control measures have been installed and are operating as designed.

ATTACHMENT 24-4

Proposed Draft Environmental Authority Conditions for Groundwater, Surface Water and Sewage Treatment

GROUNDWATER

Tables 1 to 3 describe the proposed operations phase monitoring program. A detailed discussion of the operations phase monitoring program is provided in Section 12 – Groundwater.

Table 1 Groundwater Monitoring Locations and Frequency

MONITORING POINT REFERENCE	EASTING (GDA94)	NORTHING (GDA94)	SURFACE RL[1]	GEOLOGICAL UNIT	MONITORING FREQUENCY
MB04	413863	7590355	366.3	Tertiary Sediments	Quarterly
MB07	415547	7590584	343.0	Tertiary Sediments	Quarterly
MB09	414434	7592831	342.2	Tertiary Sediments	Quarterly
MB16	417115	7585134	329.0	Tertiary Sediments	Quarterly
MB17	417118	7585137	329.0	Tertiary Sediments	Quarterly
MB18	414442	7583778	341.5	Tertiary Sediments	Quarterly
MB20	420926	7589917	297.3	Tertiary Sediments	Quarterly
MB32	420524	7590538	302.1	Tertiary Sediments	Quarterly
MB21	407809	7592771	470.4	Clematis Sandstone	Quarterly
MB22	409254	7588046	388.0	Clematis Sandstone	Quarterly
MB29	407367	7608867	496.1	Clematis Sandstone	Quarterly
MB30	409939	7609491	483.6	Clematis Sandstone	Quarterly
MB31	406705	7613342	468.6	Clematis Sandstone	Quarterly
MB33	407079	7604221	417.8	Clematis Sandstone / Rewan Formation	Quarterly
MB12	410626	7590113	376.9	Rewan Formation	Quarterly
MB13	408638	7594223	389.1	Rewan Formation	Quarterly
MB14	407589	7598323	446.3	Rewan Formation	Quarterly
MB15	409522	7602328	408.7	Rewan Formation	Quarterly
MB19	414446	7583780	341.5	Rewan Formation	Quarterly
MB23	410019	7595392	415.7	Rewan Formation	Quarterly
MB24	408081	7596736	440.0	Rewan Formation	Quarterly
MB25	407410	7596980	462.0	Rewan Formation	Quarterly
MB26	407115	7601043	410.6	Rewan Formation	Quarterly
MB27	407959	7600572	415.2	Rewan Formation	Quarterly
MB28	409796	7599783	436.5	Rewan Formation	Quarterly

MONITORING POINT REFERENCE	EASTING (GDA94)	NORTHING (GDA94)	SURFACE RL[1]	GEOLOGICAL UNIT	MONITORING FREQUENCY
VWP1	410643	7590108	385.0	Rewan Formation / Betts Creek Beds	Daily water level (in the form of daily water pressure data) collected and downloaded quarterly
VWP2	408642	7594211	398.0	Betts Creek Beds	Daily water level (in the form of daily water pressure data) collected and downloaded quarterly
VWP3	407578	7598319	458.0	Rewan Formation / Betts Creek Beds	Daily water level (in the form of daily water pressure data) collected and downloaded quarterly
VWP4	409533	7602316	418.0	Rewan Formation	Daily water level (in the form of daily water pressure data) collected and downloaded quarterly
MB03	414830	7589056	346.7	Betts Creek Beds (Coal Seam)	Quarterly
MB05	413873	7590356	366.1	Betts Creek Beds	Quarterly
MB06	413874	7590369	366.0	Betts Creek Beds (Coal Seam)	Quarterly
MB08	415553	7590570	342.9	Betts Creek Beds	Quarterly
MB10	414439	7592830	342.1	Betts Creek Beds	Quarterly
MB11	414442	7592837	341.9	Betts Creek Beds (Coal Seam)	Quarterly
Landholder Bores[2]					
RN103875 (Roo Bore)	415439	7588709	343.0	Betts Creek Beds	Quarterly
RN103876 (Camp Bore)	416315	7592174	333.1	Betts Creek Beds	Quarterly
RN90255	419633	7577047	330.3	Clematis Sandstone	Quarterly
RN90259	423688	7577246	290.0	Rewan Formation	Quarterly
Lin Bore	424923	7591009	288.6	Tertiary Sediments	Quarterly

MONITORING POINT REFERENCE	EASTING (GDA94)	NORTHING (GDA94)	SURFACE RL[1]	GEOLOGICAL UNIT	MONITORING FREQUENCY
Lin Yards	425457	7590678	286.0	Tertiary Sediments	Quarterly
Warratah Camp Bore	414226	7576678	316.0	Clematis Sandstone	Quarterly
Brumby Hole	419476	7598953	331.0	Tertiary Sediments /Joe Joe Group	Quarterly
RN17981	423527	7576054	289.7	Rewan Formation	Quarterly
Pidgenhole	424286	7594242	298.1	Tertiary Sediments	Quarterly
Edgers Bore	427723	7587725	275.6	Tertiary Sediments	Quarterly
Wild Bore	415707	7574936	303.4	Clematis Sandstone	Quarterly
RN153583	401055	7600393	-	Clematis Sandstone	Quarterly
Gum Hole	425174	7596844	307.0	Tertiary Sediments	Quarterly
RN132941	420989	7573964	297.6	Tertiary Sediments	Quarterly
Allens Bore	430014	7585765	265.6	Tertiary Sediments	Quarterly
RN153582	403774	7583208	-	Clematis Sandstone	Quarterly
RN17451 (Moonoomoo Bore)	402814	7584618	322.0	Moolayember Formation	Quarterly
RN132938	423989	7574860	285.8	Betts Creek Beds	Quarterly
8 Mile Bore	397808	7606133	338.7	Moolayember Formation	Quarterly
RN89072	426589	7598813	326.4	Tertiary Sediments	Quarterly

1 Surface Reduced Level (RL) for boreholes represents the top of casing level. The Surface RL of Vibrating Wire Piezometers is represented by ground level. All values presented in metres above Australian Height Datum (AHD).

2 Subject to landholder permission.

Table 2 Groundwater Quality Triggers and Limits

PARAMETER	UNITS	CONTAMINANT TRIGGER LEVELS	CONTAMINANT TRIGGER BASIS
Physical Parameters			
pH	pH Units	TBA	85th percentile of background
Electrical Conductivity	µS/cm	TBA	85th percentile of background
Total Dissolved Solids	mg/L	TBA	85th percentile of background
Major Anions and Cations			
Carbonate (CO_3)	mg/L	TBA	85th percentile of background
Bicarbonate (HCO_3)	mg/L	TBA	85th percentile of background
Chloride (Cl)	mg/L	TBA	85th percentile of background
Fluoride (F)	mg/L	TBA	85th percentile of background
Sulfate (SO_4)	mg/L	TBA	85th percentile of background
Calcium (Ca)	mg/L	TBA	85th percentile of background
Magnesium (Mg)	mg/L	TBA	85th percentile of background
Sodium (Na)	mg/L	TBA	85th percentile of background
Potassium (K)	mg/L	TBA	85th percentile of background
Metals and Metalloids			
Aluminium	mg/L	TBA	85th percentile of background
Arsenic	mg/L	TBA	85th percentile of background
Boron	mg/L	TBA	85th percentile of background
Cadmium	mg/L	TBA	85th percentile of background
Chromium	mg/L	TBA	85th percentile of background
Cobalt	mg/L	TBA	85th percentile of background
Copper	mg/L	TBA	85th percentile of background
Iron	mg/L	TBA	85th percentile of background
Mercury	mg/L	TBA	85th percentile of background
Manganese	mg/L	TBA	85th percentile of background
Molybdenum	mg/L	TBA	85th percentile of background
Nickel	mg/L	TBA	85th percentile of background
Lead	mg/L	TBA	85th percentile of background
Selenium	mg/L	TBA	85th percentile of background
Silver	mg/L	TBA	85th percentile of background
Uranium	mg/L	TBA	85th percentile of background

PARAMETER	UNITS	CONTAMINANT TRIGGER LEVELS	CONTAMINANT TRIGGER BASIS
Vanadium	mg/L	TBA	85th percentile of background
Zinc	mg/L	TBA	85th percentile of background
Nutrients			
Ammonia	mg/L	TBA	85th percentile of background
Nitrite	mg/L	TBA	85th percentile of background
Nitrate	mg/L	TBA	85th percentile of background
Total Phosphorus	mg/L	TBA	85th percentile of background
Hydrocarbons			
Total Recoverable Hydrocarbons (TRH)	mg/L	TBA	85th percentile of background
BTEXN (Benzene, Toluene, Ethylbenzene, Xylene, Napthalene)	mg/L	TBA	85th percentile of background

Note: Contaminant trigger levels to be finalised based on baseline information to be provided to the administering authority prior to commencement of mining operations.

Table 3 Groundwater Level Monitoring

MONITORING LOCATION	LEVEL TRIGGER THRESHOLD	CONTAMINANT TRIGGER BASIS
All monitoring points listed in Table 1	TBA	90% of the maximum predicted water level change based upon the EIS groundwater model

SURFACE WATER

Tables 4 to 9 describe the proposed limits and triggers governing the controlled release of mine-affected water. A detailed discussion of the proposed release events is provided in Section 13 – Surface Water.

Table 4 Mine-affected Water Release Points, Sources and Receiving Waters

RELEASE POINT	EASTING (GDA94)	NORTHING (GDA94)	MINE-AFFECTED WATER SOURCE AND LOCATION	MONITORING POINT	RECEIVING WATERS
RP 1	420441.25	7588525.72	Mine Water Dam piped release point	Mine Water Dam discharge point	Belyando River

Table 5 Mine-affected Water Release Limits

QUALITY CHARACTERISTIC		MONITORING FREQUENCY	COMMENT
Electrical Conductivity (µS/cm)	Release limits specified in Table 6 for variable flow criteria	Daily during release (the first sample must be taken within 2 hours of commencement of release)	No comment
pH (pH Unit)	6.5 (minimum) 9.0 (maximum)		No comment
Turbidity (NTU)	To be derived from measured trigger level based upon demonstrated dam water monitoring correlation		Turbidity is required to assess ecosystems impacts and can provide instantaneous results.

Table 6 Mine-affected Release During Flow Events

RECEIVING WATERS		GAUGING STATION	EASTING (DECIMAL DEGREE)	NORTHING (DECIMAL DEGREE)	FLOW RECORDING FREQUENCY	RECEIVING WATER FLOW CRITERIA (m^3/s)	MAX. RELEASE RATE	ELECTRICAL CONDUCTIVITY RELEASE LIMITS µS/cm
Belyando River	RP 1	120301B Belyando River at Gregory Developmental Road	146.859645	−21.533111	Continuous (Hourly)	Low Flow: <0.06 m^3/s for a period of 28 days after natural flow events that exceed 0.001 m^3/s	0.06 m^3/s	168
						Medium Flow: > 0.06 m^3/s	<3 m^3/s	1,500
							<1.5 m^3/s	3,500
						High Flow: > 6 m^3/s	<6 m^3/s	10,000

Table 7 Release Contaminant Trigger Investigation Levels, Potential Contaminants

QUALITY CHARACTERISTIC	TRIGGER LEVELS (µg/L)	COMMENT ON TRIGGER LEVEL	MONITORING FREQUENCY
Aluminium	55	For aquatic ecosystem protection	At commencement of release and thereafter weekly during release
Arsenic	13		
Cadmium	0.2		
Chromium	1		
Copper	2		
Iron	300		
Lead	4		
Mercury	0.2		
Nickel	11		
Zinc	8		
Boron	370		
Cobalt	90		
Manganese	1,900		
Molybdenum	34		
Selenium	10		
Silver	1		
Uranium	1		
Vanadium	10		
Ammonia	900		
Nitrate	1,100		
Petroleum Hydrocarbons (C6-9)	20	No comment	
Petroleum Hydrocarbons (C10-36)	100	No comment	
Fluoride (total)	2,000	Protection of livestock and short-term irrigation	
Sodium	TBA	No comment	
Suspended Solids	TBA		
Sulphate (SO_4) (mg/L)	TBA		

All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metals and metalloids apply if dissolved results exceed the trigger level.

Table 8 Receiving Water Upstream Background Sites and Downstream Monitoring Points

MONITORING POINT	RECEIVING WATER LOCATION DESCRIPTION	EASTING (DECIMAL DEGREE)	NORTHING (DECIMAL DEGREE)
Downstream Monitoring Point			
Monitoring Point 1 (MP1)	120301B Belyando River at Gregory Development Road	146.859645	-21.533111
Upstream Monitoring Point			
Monitoring Point 2 (MP2)	Belyando River Upstream of North Creek	146.656819	-21.959460

Table 9 Receiving Waters Contaminant Trigger Levels

QUALITY CHARACTERISTIC		MONITORING FREQUENCY
pH	6.5 – 9.0	Daily during release
Electrical Conductivity (µS/cm)	TBA	
Turbidity	TBA	
Sulphate (SO_4) (mg/L)	250	

SEWAGE TREATMENT

Table 10 describes the proposed release limits governing the operation of the proposed sewage treatment facilities. Further details on the proposed sewage treatment facilities is provided in Section 13 – Surface Water.

Table 10 Contaminant Release Limits to Land

QUALITY CHARACTERISTIC	UNIT	RELEASE LIMIT	LIMIT TYPE	MONITORING FREQUENCY
5 Day Biochemical Oxygen Demand	mg/L	20	Maximum	Monthly
Total Suspended Solids	mg/L	30	Maximum	Monthly
Nitrogen	mg/L	30	Maximum	Monthly
Phosphorus	mg/L	15	Maximum	Monthly
E-coli	Organisms/100 ml	1,000	Maximum	Monthly
pH	pH units	6.0 – 9.0	Range	Monthly