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21. ENVIRONMENTAL MANAGEMENT PLAN

21.1. INTRODUCTION

This Environmental Management Plan (EM Plan) addresses the Terms of Reference (ToR) requirements for the South Galilee Coal Project (SGCP) and takes into account the findings of the SGCP Environmental Impact Statement (EIS).

Section 202 of the *Environmental Protection Act 1994 (EP Act)* states that the purpose of an EM Plan is to propose environmental protection commitments to assist the administering authority prepare the draft Environmental Authority (EA).

The commitments presented in this EM Plan are expressed so as to be measurable and auditable; they set objectives, standards and measurable indicators, and include control strategies to ensure achievement of the objectives.

21.1.1. Background

Joint venture participants AMCI (Alpha) Pty Ltd (AMCI) and Alpha Coal Pty Ltd (Alpha Coal), a subsidiary of Bandanna Energy Limited propose to develop the SGCP, a combined open cut and underground coal mine with an expected life of over 35 years. The SGCP will produce approximately 447 Million tonnes (Mt) of product coal for the export market.

The development and implementation of the SGCP is dependent on the approval and successful development of supporting external infrastructure (e.g. electricity and water supply infrastructure and a rail link to a coal export terminal). The SGCP will be supported by privately owned rail and port facilities that do not form part of the Project scope.

The Coordinator-General has declared the SGCP to be a 'significant project' requiring an EIS under section 26(1)(a) of the *State Development and Public Works Organisation Act 1971*. In November 2010, the Coordinator-General issued the ToR for the Project. The ToR outlined the requirements, both specific and general, that are to be addressed in the EIS and the EM Plan.

The ToR for the SGCP states:

- The EM Plan included within the EIS will comply with section 203 of the *EP Act*.
- The EM Plan must comprise the following components for performance criteria and implementation strategies:
 - commitments to acceptable levels of environmental performance, including environmental objectives, performance standards and associated measurable indicators, performance monitoring and reporting

- impact prevention or mitigation actions to implement the commitments
- corrective actions to rectify deviation from performance standards
- an action program to ensure environmental protection commitments are achieved and implemented. This will include strategies in relation to:
 - continuous improvement
 - environmental auditing
 - monitoring
 - reporting
 - staff training
- a rehabilitation program for land proposed to be disturbed under each relevant aspect of the proposal.

This EM Plan has been developed as an independent document which forms Section 21 of the main EIS submission. Further information on each of the elements described in the EM Plan can be found in the EIS.

21.1.2. The Project

The SGCP coal deposit has been defined by exploration activities undertaken in accordance with two Exploration Permits for Coal (EPCs) (1049 and 1180), held by Alpha Coal. The SGCP will be located within Mining Lease Application (MLA) 70453.

MLA 70453 provides sufficient area to design and locate the following key infrastructure:

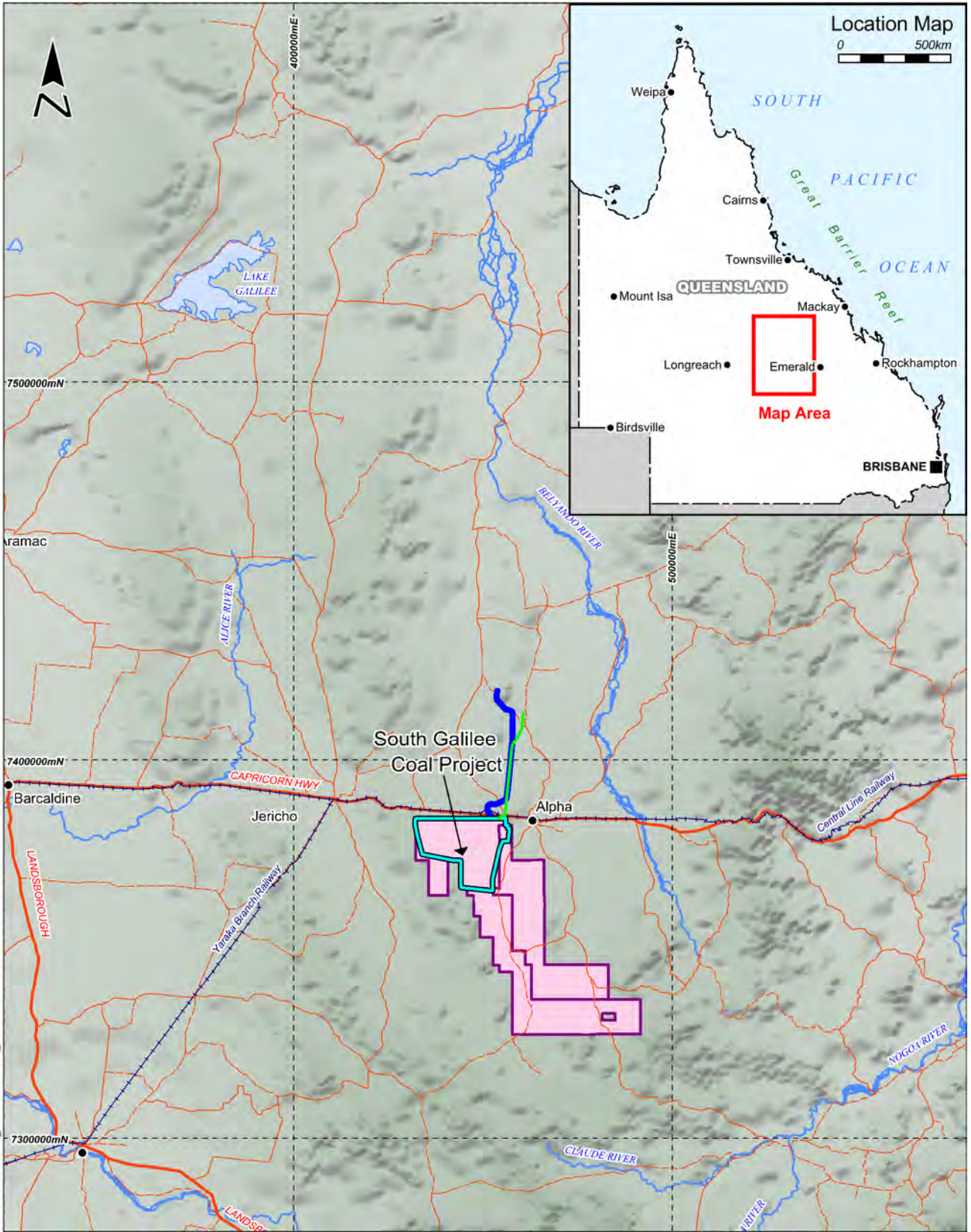
- mine access road
- accommodation village road
- water supply and reticulation infrastructure
- water management facilities
- stream diversions
- open-cut pit
- underground
- accommodation village
- power supply including electrical and telecommunications infrastructure
- dragline and dragline pad
- run of mine (ROM) dumps and sizing stations

- Coal Handling and Preparation Plant (CHPP)
- on-site rail component
- potable water treatment plant
- waste water treatment plant
- main infrastructure area (MIA) including administration building
- bath house
- workshops
- hardstand area and warehouses
- other material handling infrastructure.

21.1.3. Location

The SGCP is located within the Barcaldine Regional Council Local Government Area (LGA), approximately 12 kilometres (km) south-west of the township of Alpha. Alpha is situated approximately 170 km west of Emerald and 450 km west of Rockhampton in Central Queensland.

Figure 21-1 shows the SGCP regional location.



S:\PROJECTS\AM001-5TH GALILEE EIS\MAPINFO\WORKSPACES\2012_WSPACE\AM001_FIG 1-1 REGIONAL LOCATION.WOR



LEGEND

- MLA70453
- SGCP infrastructure corridor
- SGCP power line
- Principal road
- Road (sealed)
- Road (unsealed)
- Railway
- River
- Population centre

Data Source: Tenement - DEEDI, Topography (250k) - Geoscience Australia

Alpha Coal Pty Ltd

South Galilee Coal Project

SGCP Regional Location

25 0 25

Kilometres

Scale: 1:1,500,000 (A4)

09/08/2012

Proj. : MGA Z55
Datum: GDA 1994

FIGURE 21-1

21.1.4. Project Proponent

The SGCP is proposed by joint venture participants AMCI and Alpha Coal, a subsidiary of Bandanna Energy Limited.

21.1.4.1. AMCI (Alpha) Pty Ltd

AMCI is the manager of the joint venture and is responsible for preparation of the EIS. Consequently, for the purposes of this EIS, AMCI is herein referred to as the Proponent.

The AMCI Group was founded in 1986 and is a private global mining, investment and trading business operating in the resources industry. The AMCI Group currently holds significant strategic investments in private and public mining in Australia, the United States, South Africa, Europe and South America. AMCI is experienced in coal exploration and mine development, and was instrumental in the development of several mines in Queensland and New South Wales, including Coppabella, Moorvale, Carborough Downs and Glennies Creek.

Environmental, community and safety obligations are given priority by AMCI. AMCI has not been subject to any proceedings under Commonwealth, State or Territory law in relation to environmental protection or conservation issues. The SGCP will be undertaken in accordance with AMCI's Corporate Environment Policy (refer to **Appendix T—Corporate Environment Policy**).

21.1.4.2. Alpha Coal Pty Ltd

Alpha Coal is a wholly owned subsidiary of Bandanna Energy which holds four coal exploration tenements in the south-east of the Galilee Basin. A portion of two of these tenements is proposed to be developed as the SGCP.

Bandanna Energy is an exploration company listed on the Australian Securities Exchange. Bandanna Energy holds coal exploration tenements in the Bowen and Galilee Basins in Queensland. The company also holds mineral rights for oil shale and bentonite in Queensland.

Development of Bandanna Energy's port allocation at the Wiggins Island Coal Export Terminal will enable the company to move from an explorer to a producer, with the first coal from their Bowen Basin holdings scheduled to be shipped in 2014.

Further information about Bandanna Energy can be obtained from www.bandannaenergy.com.au.

21.1.5. Land Use and Tenure

Land within the SGCP area is predominantly cleared farmland used for low intensity beef cattle grazing. The SGCP crosses the catchments of Tallarenha Creek in the north, and Sapling Creek and Dead Horse Creek in the south.

Six homesteads are located within or partly within MLA 70453 and the infrastructure corridor area. The infrastructure corridor is required to accommodate the SGCP railway connection to transport construction materials and equipment in the construction phase and transport coal via third party rail systems onto the port in the operational phase. **Table 21-1** identifies the mining and exploration tenements and land tenure in the SGCP area.

Table 21-1 Real Property Description for Land Located Within or Partly Within MLA 70453 and the Infrastructure Corridor

| Tenure/Tenement ¹ | Real Property Description | Property Name | Land Owner |
|--|---------------------------|----------------|------------|
| MLA 70453 | | | |
| EPC 1049, EPC 1180, EPC 1040 and EPP 668 | 4315PH720 ² | Creek Farm | A |
| EPC 1049, EPC 1180 and EPP 668 | 1DM3 | Chesalon | B |
| EPC 1049, EPC 1040 and EPP 668 | 7BF57 | Tallarenha | C |
| EPC 1049, EPC 1040, EPC 1155 and EPP 668 | 31BF11 | Betanga | D |
| EPC 1049, EPC 1155 and EPP 668 | 1160PH286 | Armagh | E |
| EPC 1049, EPC 1180, EPC 1155 and EPP 668 | 3BF53 | Sapling Creek | F |
| Infrastructure Corridor | | | |
| EPC 1040, EPC 1263 and EPP 668 | 5BF5 | Oakleigh | G |
| EPC 1210, EPC 1263 and EPP 668 | 3CP860083 | Tresillian | H |
| EPC 1210, EPC 1040 and EPP 668 | 2SP136836 | Monklands | I |
| EPC 1210, EPC 1263 and EPP 668 | 4BF50 | Mentmore | J |
| EPC 1263 and EPP 668 | 6BF16 | Gadwell | J |
| EPC 1263 and EPP 668 | 7BF16 | Saltbush | K |
| EPC 1040 and EPP 668 | 301SP108315 | N/A | L |
| EPC 1049, EPC 1180, EPC 1040 and EPP 668 | 4315PH720 ² | Creek Farm | A |
| EPC 1040 and EPP 668 | 2BF38 | Leased Reserve | A |

- 1 EPC 1040 is held by Waratah Coal Pty Ltd
EPC 1155 is held by Waratah Coal Pty Ltd
EPC 1210 is held by the GVK Group
EPC 1263 is held by Queensland Thermal Coal Pty Ltd
EPP 668 is held by Australia Pacific LNG Pty Limited

- 2 4315PH720 is affected by MLA 70453 as well as the infrastructure corridor

21.1.6. Stakeholders

The Proponent is currently implementing a comprehensive community engagement strategy which identifies stakeholders, their values, concerns and issues with the SGCP. It provides a foundation for long-term relationships between the SGCP and the community based on trust and mutual respect.

Key Project stakeholders include:

- landowners
- community members and organisations
- local council
- local and regional emergency services (i.e. fire and rescue, ambulance and police)
- local education and health providers, including Queensland Health and the Department of Education and Training
- Indigenous groups
- Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPaC)
- Queensland Department of Environment and Heritage Protection (DEHP)
- Queensland Department of State Development, Infrastructure and Planning
- Queensland Department of Local Government and Planning
- Queensland Department of Transport and Main Roads
- Queensland Department of the Premier and Cabinet
- Queensland Department of Communities
- other regional mining proponents.

21.1.7. Standard Environmental Conditions

The SGCP will be subject to the conditions of an EA (mining activities) and the conditions of a Mining Lease. The EM Plan provides the proposed EA conditions, to assist DEHP in the development of the EA for the SGCP.

21.2. PROJECT DESCRIPTION

The SGCP will comprise both open cut and underground mining operations. The Project will be supported by privately owned and operated rail and port infrastructure facilities.

21.2.1. Coal Mine

The SGCP will be a new open cut and underground coal mining operation, located within MLA 70453. MLA 70453 is located over EPCs 1049 and 1180. It is estimated that approximately 498 Mt of ROM coal will be mined, yielding approximately 447 Mt of product coal over the mine's 33 year operational life.

Open cut mining at the SGCP will involve conventional strip mining using draglines with pre-stripping undertaken by conventional truck and shovel. The SGCP will comprise four open cut pits, with a total strike length of approximately 14 km. A truck and shovel fleet will be used for pre-stripping and a smaller truck and shovel operation will be utilised to mine coal and remove interburden. Development of multiple mining areas will allow both the D1 and D2 seams to be mined concurrently. This will allow blending of ROM coal from both seams to facilitate control of feed quality to the CHPP.

Prior to the commencement of mining operations, vegetation will be cleared and topsoil will be removed and stockpiled separately for later use in mine rehabilitation. Drilling and blasting of overburden material will be required as part of mining operations. Drilling and blasting is expected to be required for the lower 20 % of the Permian overburden material in order to uncover coal economically.

A power shovel will be used to excavate the boxcut to provide dragline access. The overburden material will be bulldozed to provide a flat surface for the dragline to be positioned on. The dragline will be positioned adjacent to the overburden material to be mined, from where it will dig and dump overburden onto the waste rock pile. A portion of the boxcut waste will be used for construction of flood prevention berms and the remainder will be placed within the waste rock emplacements. Overburden removed by the draglines will be placed in previous strips. The interburden waste will be dumped in-pit where practicable. The remaining interburden that cannot be dumped in-pit shall be trucked to the waste rock emplacements and tipped into voids between the dragline waste rock piles.

The underground mine will be a multi-seam operation, with the D1 seam mined first, followed by the D2 seam. The separation distance between the seams is approximately 9–17 metres (m). In order to maximise pillar stability during mining of the D2 seam, the underground mine has been designed so that the D2 longwall panels directly underlie the D1 panels (where both exist together). Coal will be extracted in panels 350 m wide, and up to 5 km in length. The minimum depth of cover will be 140 m.

21.2.2. CHPP and Mine Infrastructure

ROM coal from open cut mining will be hauled by truck to one of two main ROM dump stations and placed into a 600 cubic metres (m³) hopper. Transfer conveyors will transport coal to the sizing station, where it will be sized to meet the CHPP nominal topsize.

Coal will then be conveyed to the raw coal stockpile area located near the CHPP. The raw coal stockpile area will receive both open cut and underground ROM coal.

In Stage 1, coal will be processed in a wash plant or by dry beneficiation.

In Stages 2 and 3, the SGCP CHPP will use conventional wet beneficiation processes that are used extensively throughout the Australian coal industry.

The modular CHPP components will be constructed progressively to align with the mine plan coal production levels and staged execution strategy. The coarse coal fraction (+1.4 millimetres (mm)) will be beneficiated in dense medium cyclones and the fine fraction (1.4+0.125 mm) will be beneficiated using spirals. Material less than 0.125 mm will be discarded to rejects due to the low marginal value typically associated with coal in this fraction.

Two CHPP modules will be used, each with a nominal 1,000 tonnes per hour (tph) capacity (i.e. nominal CHPP feed rate of 2,000 tph). Coal will be processed and blended to produce a 13.5 % ash export thermal coal. The CHPP will be supported by a CHPP workshop and office.

The mine infrastructure will include:

- buildings to accommodate workshops, administration, training and emergency services, light vehicle workshops and heavy welding shop
- construction camp and accommodation village
- landfill
- mine access roads
- train load out facilities and supporting rail loop
- fuel, oil and explosive storage facilities
- stockpile areas
- borrow pits
- water treatment and sewage treatment plants (STP)
- raw water and environmental dams
- creek diversions, drainage channels and levee bunds
- water and wastewater systems
- conveyors
- electrical and communication systems.

21.3. ENVIRONMENTAL VALUES, IMPACTS, COMMITMENTS, AND DRAFT CONDITIONS

21.3.1. EM Plan Development Methodology

The EM Plan was developed by following the process outlined by the EM Plan information guidance as published by DEHP and the requirements of the ToR.

This document has been prepared in accordance with the following stages as described below:

- identify the environmental value, together with the background
- identify and develop the environmental protection objectives, in order to minimise impacts on the environmental values

- develop commitments to achieve compliance with the environmental protection objectives and standards
- develop proposed EA conditions to be included in the EA for the SGCP.

The guiding definitions for the terms that are used throughout the EM Plan are as follows:

- **Environmental Values:** Environmental values are those qualities or physical characteristics of the environment that are conducive to ecological health, public amenity or safety.
- Section 9 of the *EP Act* describes an Environmental Value as:
 - a quality or physical characteristic of the environment that is conducive to ecological health or public amenity or safety or
 - another quality of the environment identified and declared to be an environmental value under an environmental protection policy or regulation.¹
- **Environmental Protection Objectives:** Describe the key elements of the environment and the outcomes to be protected in order to minimise impacts on the environmental values.
- **Performance Criteria:** These are indicators by which the level of achievement of the environmental protection objectives can be determined in a measurable and auditable way.
- **Control Strategies:** These provide a contextual framework for the proposed EA conditions and describe the strategies proposed to meet the environmental protection objectives.
- **Proposed EA Conditions:** Draft conditions containing measurable indicators and standards that are proposed to be included in the EA to protect identified environmental values that may be impacted on by SGCP operations.
- **Monitoring:** Detailing the monitoring requirements that the Proponent is proposing for the future monitoring of the site.

21.3.2. General Conditions

21.3.2.1. Background

There are a number of general issues that do not relate to environmental values or control strategies, but are to be included in the EA. Conditions of the EA are proposed in the following Section.

21.3.2.2. Proposed EA Conditions

Financial Assurance

- A1** Provide financial assurance in the amount and form required by the administering authority prior to the commencement of activities proposed under this EA.

NOTE: The calculation of financial assurance for Condition A1 must be in accordance with the administering authority's guideline for calculating financial assurance for mining activities, and may include a performance discount. The amount is defined as the maximum total rehabilitation cost for complete rehabilitation of all disturbed areas, which may vary on an annual basis due to progressive rehabilitation. The amount required for the financial assurance must be the highest Total Rehabilitation Cost calculated for any year of the Plan of Operations and calculated using the formula: (Financial Assurance = Highest total annual rehabilitation cost x Percentage required).

- A2** The financial assurance is to remain in force until the administering authority is satisfied that no claim on the assurance is likely.

Prevent and/or Minimise Likelihood of Environmental Harm

- A3** In carrying out the environmentally relevant activities, you must take all reasonable and practicable measures to prevent and/or to minimise the likelihood of environmental harm being caused. Any environmentally relevant activity, that, if carried out incompetently, or negligently, may cause environmental harm, in a manner that could have been prevented, shall be carried out in a proper manner in accordance with the conditions of this authority.

NOTE: This authority authorises the environmentally relevant activity. It does not authorise environmental harm unless a condition contained within this authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

Maintenance of Measures, Plant and Equipment

- A4** The EA holder must ensure:
- a) that all measures, plant and equipment necessary to ensure compliance with the conditions of this EA are installed
 - b) that such measures, plant and equipment are maintained in a proper condition
 - c) that such measures, plant and equipment are operated in a proper manner.

Monitoring and Records

- A5** Record, compile and keep for a minimum of five (5) years all monitoring results required by this EA and make available for inspection all or any of these records upon request by the administering authority.
- A6** Where monitoring is a requirement of this EA, ensure that a competent person(s) conducts all monitoring.

Storage and Handling of Flammable and Combustible Materials

- A7** Spillage of all flammable and combustible liquids must be contained within an on-site containment system and controlled in a manner that prevents environmental harm (other than trivial harm) and maintained in accordance with section 5.9 of AS 1940.
- A8** Where monitoring is a requirement of this EA, ensure that a competent person(s) conducts all monitoring.

Notification of Emergencies, Incidents and Exceptions

- A9** All reasonable actions are to be taken to minimise environmental harm, or potential environmental harm, resulting from any emergency, incident or circumstances not in accordance with the conditions of this EA.
- A10** As soon as practicable after becoming aware of any emergency, incident or information about circumstances which results or may result in environmental harm not in accordance with the conditions of this EA, the administering authority must be notified in writing.
- A11** Not more than ten (10) business days following the initial notification of an emergency, incident or information about circumstances which result or may result in environmental harm, written advice must be provided to the administering authority in relation to:
 - a) proposed actions to prevent a recurrence of the emergency or incident
 - b) the outcomes of actions taken at the time to prevent or minimise environmental harm
 - c) proposed actions to respond to the information about circumstances which result or may result in environmental harm.
- A12** As soon as practicable, but not more than six (6) weeks following the initial notification of an emergency, incident or information about circumstances which result or may result in environmental harm, environmental monitoring must be performed and written advice must be provided of the results of any such monitoring performed to the administering authority.

- A13** The notification of emergencies, incidents or circumstances (incident) which result or may result in environmental harm in accordance with Condition A10 must include but not be limited to the following:
- a) the holder of the EA
 - b) the location of the incident
 - c) the number of the EA
 - d) the name and telephone number of the designated contact person
 - e) the time of the incident
 - f) the time the holder of the EA became aware of the incident
 - g) the suspected cause of the incident
 - h) the environmental harm caused, threatened, or suspected to be caused by the incident
 - i) actions taken to prevent any further incident and mitigate any environmental harm caused by the incident.
- A14** Contaminants must not be released to the receiving environment unless they are in accordance with the contaminant limits authorised by this EA.
- A15** This EA does not authorise environmental harm unless a condition contained within the authority explicitly authorises that harm. Where there is no condition or the authority is silent on a matter, the lack of a condition or silence shall not be construed as authorising harm.

Definitions

- A17** Words and phrases used throughout this EA are defined in the Definitions Section of this EA. Where a definition for a term used in this EA is sought and the term is not defined within this EA, the definitions in the *Environmental Protection Act 1994*, its regulations and policies must be used.

Conditions

- A18** The conditions of this EA are in force until a surrender of this EA is accepted pursuant to the *Environmental Protection Act 1994*. The conditions of this EA apply unless an amendment is approved pursuant to the *Environmental Protection Act 1994*.

21.3.3. Air Quality

21.3.3.1. Background

The SGCP operations will include the extraction, handling and placement of soil, waste rock and coal. These activities have the potential to generate air emissions (primarily dust) that may impact on nearby sensitive receptors. The potential air quality impacts from the SGCP have been assessed by:

- reviewing legislative requirements and ambient air quality goals
- describing existing air quality and dispersion meteorology within and surrounding the SGCP site
- identifying the nearest sensitive receptors
- modelling air dispersion to predict concentrations of particulate matter at nearest sensitive receptors
- determining the potential air quality impacts through comparison with air quality goals
- identifying mitigation measures to assist with management of the potential air quality impacts from the SGCP.

Greenhouse Gases (GHG) are also generated by a number of mining activities and potentially from the coal seam itself.

21.3.3.2. Environmental Values

The environmental values to be enhanced or protected are:

- the qualities of the air environment that are conducive to suitability for the life, health and well-being of humans
- the amenity of sensitive receptors.

21.3.3.3. Environmental Protection Objectives

The environmental protection objective for air quality is to minimise the impacts of dust generated at the SGCP on sensitive receptors within close proximity to the mining lease so that the air environment is conducive to the life, health, well-being of humans.

21.3.3.4. Performance Criteria

Air emissions from the Project comprise mainly particulate matter (dust). Particulate matter for the SGCP has been assessed on the basis of three standard categories:

- particulate matter less than 2.5 micrometres (μm) in diameter ($\text{PM}_{2.5}$)
- particulate matter less than 10 μm in diameter (PM_{10})
- total suspended particulates (TSP).

The applicable air quality criteria (from *Environmental Protection (Air) Policy 2008* and *Guidance for Assessment of Environmental Factors – Environment Noise (no. 8) (Draft)* (WA EPA, 2007)) are:

- dust concentration of PM_{2.5} of 25 µg/m³ averaged over 24 hours
- dust concentration of PM_{2.5} of 8 µg/m³ averaged over a year
- dust concentration of PM₁₀ of 50 µg/m³ over a 24 hour averaging time and no more than five occurrences per annum
- total suspended particulate of 90 µg/m³ averaged over a year
- dust deposition of 120 milligrams per square metres per day (mg/m²/day).

These criteria (excluding deposition) represent air qualities that are important in protecting human health and wellbeing. The deposition goal (or dust fallout) is used to assess dust nuisance. The indicators apply at any sensitive or commercial place, such as residences, parks, gardens, schools, shopping precincts, etc.

21.3.3.5. Control Strategies

21.3.3.5.1. Dust

A Dust Management Plan will be developed and implemented to mitigate adverse air quality impacts under worst case meteorological conditions.

Although many of these measures will be standard operating procedures for the SGCP, **Table 21-2** provides a summary of control procedures to mitigate dust emissions.

Table 21-2 Dust Mitigation Measures

| Source | Mitigation Measure |
|-------------------------|---|
| Mining Areas | Disturb the minimum area necessary for mining and rehabilitate promptly. |
| Coal Handling Area | Use water sprays and water trucks to suppress dust in coal handling areas. |
| Stockpiles | Maintain water sprays on raw and product coal stockpiles and transfer points. Topsoil stockpiles will be sown with an appropriate plant mix and managed to provide adequate ground cover is maintained. |
| Haul Roads | Maintain haul roads in good condition and use water trucks regularly to suppress dust. Investigate use of chemical suppressants if haul roads become too slippery. |
| Other Roads | Keep usage to a minimum and maintain in good condition. Use water trucks regularly to suppress dust. |
| Waste Rock Emplacements | Keep these areas moist, particularly if used by dump trucks. Keep recently spread material moist to encourage crusting of surface. |

Rehabilitation of disturbed areas will be undertaken progressively to minimise dust generation of non-vegetated areas.

The Proponent is committed to complying with Queensland Rail's (QR) Coal Dust Management Plan (QR Network, 2010), which stipulates various dust control measures (i.e. spray-on coal dust suppressant) for the rail transport of coal.

21.3.3.5.2. Greenhouse Gas

The SGCP will initially develop an opencut pit followed by an underground mine. At times the two operations will run concurrently. Thus, over the life of the mine the major energy users will be a dragline and two longwall units together with diesel truck use, conveyers and the CHPP.

The following management measures are proposed to minimise GHG emissions.

Electrical Efficiency

- a dragline is more energy efficient than a truck and shovel operation in removing overburden
- a number of measures to maintain efficiency of the dragline will be implemented including load monitoring, regular bucket maintenance and electrical calibration checks
- similarly, longwall efficiency will be monitored
- the compressed air circuit will be regularly monitored as leaks degrade the efficiency of the compressor
- the energy efficiency of electrical equipment will be a consideration during purchase.

Diesel Efficiency

- the fuel efficiency of haul trucks will be a consideration during purchase
- access ramps will be designed to optimise truck diesel use efficiency
- a conveyor will transport coal to the CHPP from the underground operation. Since this infrastructure passes the open pit, there are dump stations to the conveyor to significantly shorten the coal haul route.

Fugitive Emissions

It is difficult to reduce Coal Seam Gas (CSG) fugitive emissions from the open-pit as it is too shallow to generate sufficient methane to extract and too difficult to collect over the wide area of the pit. CSG will be emitted from the underground via the ventilation shafts and will be monitored.

No significant indications of gas have been reported during SGCP exploration activities. Work undertaken on the tenements located immediately north of the SGCP has not identified economically recoverable gas reserves, nor was methane considered to be a likely significant operational management issue. Pre-drainage and flaring methane to reduce emissions is thus not considered viable.

Other direct means of reducing greenhouse gas emissions could include such measures as:

- minimising clearing at the site
- utilising the existing Central Line Railway where practicable to transport construction material/equipment
- utilising the Galilee Basin common user rail line to transport supplies/equipment during the operations phase, where practicable
- maximising the use of renewable energy sources
- improved accuracy in greenhouse gas measurement by advancing from default factors to direct measurement methodologies.

Other indirect means of reducing greenhouse gas emissions could include such measures as:

- carbon sequestration at nearby or remote locations
- progressive rehabilitation of disturbed areas
- planting trees or other vegetation to achieve greater biomass than that cleared for the SGCP
- carbon trading through recognised markets.

Specific modules to address greenhouse abatement include:

- commitments to the abatement of greenhouse gas emissions from the development with details of the intended objectives, measures and performance standards to avoid, minimise and control emissions
- commitments to energy management, including undertaking periodic energy audits with a view to progressively improving energy efficiency
- a process for regular review of new technologies to identify opportunities to reduce emissions and use energy efficiently, consistent with best practice environmental management
- any voluntary initiatives such as projects undertaken as a component of the national Energy Efficiency Opportunities program, or research into improving the lifecycle and reducing the embodied energy and carbon intensity of the SGCPs processes or products

- opportunities for offsetting greenhouse emissions, including, if appropriate, carbon sequestration and renewable energy uses; and commitments to monitor, audit and report on greenhouse emissions from all relevant sources and the success of offset measures.

The Proponent is fully committed to sustainable development and complies with its obligations under the National Greenhouse Energy Reporting (NGER) program and specifically annual reporting of greenhouse gas emissions. The Proponent is committed to reducing the greenhouse gas emissions of its operations, accelerating the uptake of energy efficiency, integrating greenhouse issues into business decision making and providing consistent reporting of greenhouse gas emission levels.

21.3.3.5.3. *Monitoring*

Long-term dust monitoring is proposed is proposed for the SGCP. The existing long-term real-time dust concentration monitoring network will be maintained to record seasonal variations in the air quality of the area. Two monitoring units will be installed at the Creek Farm Homestead and Alpha Township prior to the commencement of construction to provide background data on the existing dust levels from non-SGCP activities.

Dust monitoring results will be reviewed regularly to determine if the site is causing an increase in dust concentrations above acceptable levels. An analysis of the prevailing meteorological extraction rates and processes will be included.

Local meteorological data will be collected from a monitoring station installed by the SGCP at the Creek Farm Homestead. This station will continue to collect temperature, relative humidity, rainfall and wind speed data over the life of the SGCP.

A network of seven dust deposition gauges have been installed at sensitive receptors surrounding the SGCP. Dust deposition (fallout) monitoring will continue at these locations over the life of the SGCP.

21.3.3.5.4. *Auditing*

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.

21.3.3.5.5. *Reporting*

A monthly report will be prepared to include details of air quality monitoring results and to document the occurrence of any complaints. All regulatory reporting requirements will be met.

21.3.3.5.6. *Commitments*

Upon receiving a valid complaint in relation to dust nuisance, the complaint will be investigated and air quality mitigation measures will be implemented as soon as practicable if the complaints are substantiated by investigation results.

All monitoring and sampling techniques will be in compliance with the government's Air Quality Sampling Manual (EPA, 1997) and applicable Australian Standards.

21.3.3.5.7. *Corrective Action*

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

21.3.3.6. *Proposed EA Conditions*

Air

Dust Nuisance

- B1** Subject to conditions B2 and B3 the release of dust or particulate matter or both resulting from the mining activity must not cause an environmental nuisance, at any sensitive or commercial place.
- B2** When requested by the administering authority, dust and particulate monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- B3** If the EA holder can provide evidence through monitoring that the following limits are not being exceeded then the holder is not in breach of B1:
- a) dust deposition of 120 milligrams (mg) per square metre per day, averaged over one month, when monitored in accordance with AS 3580.10.1 Methods for sampling and analysis of ambient air - Determination of particulates - Deposited matter - Gravimetric method of 1991 (or more recent editions) or
 - b) a concentration of particulate matter with an aerodynamic diameter of less than 10 micrometre (μm) (PM_{10}) suspended in the atmosphere of 50 micrograms (μg) per cubic metre over a 24 hour averaging time, at a sensitive or commercial place downwind of the operational land, when monitored in accordance with:
 - c) particulate matter - Determination of suspended particulate PM_{10} high-volume sampler with size-selective inlet - Gravimetric method, when monitored in accordance with AS 3580.9.6 *Methods for sampling and analysis of ambient air - Determination of suspended particulate matter - PM (sub) 10 high volume sampler with size-selective inlet - Gravimetric method of 1990 (or more recent editions) or*
 - d) any alternative method of sampling PM_{10} , which may be permitted by the Air Quality Sampling Manual as published from time to time by the administering authority.

- B4** If monitoring indicates exceedance of the relevant limits in condition B3, then the EA holder must:
- a) address the complaint including the use of appropriate dispute resolution if required
 - b) immediately implement dust abatement measures so that emissions of dust from the activity do not result in further environmental nuisance.

21.3.4. Water Resources

21.3.4.1. Background

The SGCP is located in the upper catchment of the Burdekin River Basin. With a catchment area of approximately 130,500 square kilometres (km²), the Burdekin River Basin is one of Queensland's largest. The river flows into coastal waters near the Great Barrier Reef.

Land use varies, ranging from beef cattle production and mining in the inland areas, to irrigated sugarcane and crop cultivation on the coastal delta and floodplains. This includes the Burdekin River Irrigation Area (BRIA). The BRIA is supplied from Lake Dalrymple, Queensland's largest reservoir, which has a capacity of 1,860 gigalitre (GL) and is formed by Burdekin Falls Dam.

The SGCP MLA crosses the upper tributaries of Sandy Creek and Native Companion Creek, which are both tributaries of the Belyando River. The Belyando River is part of the Suttor River sub-basin, which has a catchment area of approximately 52,550 km².

The MLA covers an area of approximately 310 km², which is approximately 0.2 % and 0.6 % of the Suttor River and Burdekin River catchments respectively. The MLA is located approximately 350 km upstream of the Burdekin Falls Dam and 510 km upstream of the river mouth. The SGCP crosses the catchments of Tallarenha Creek in the north, and Sapling Creek and Dead Horse Creek in the south.

Tallarenha Creek flows north to Lagoon Creek then Sandy Creek before joining the Belyando River 120 km to the north. Tallarenha Creek has a catchment area of approximately 210 km², and elevations from approximately 530 m Australian Height Datum (AHD) at the catchment ridge to approximately 365 m AHD at the Capricorn Highway crossing just downstream of the MLA boundary. Almost all of the Tallarenha Creek catchment to this location is within the MLA.

Sapling Creek and Dead Horse Creek are east-flowing tributaries of Alpha Creek, which flows to the north through the township of Alpha before joining Native Companion Creek.

Water balance modelling indicates that the mine will generally operate with a water deficit and will have to import water to make-up the balance. The allocation sought is 3,000 megalitres (ML) per annum will be on a 'take or pay' basis. Process water demand varies inversely with the ash in the product coal, which will depend on international market conditions. Hence, the water demand throughout the SGCP life will vary and the water allocation provides flexibility in terms of the site water balance.

The potential impacts on surface water during the life of the SGCP include potential change in runoff quality from disturbed catchments; potential reduction in streamflows due to the need to contain mine-affected water; potential changes to Tallarenha Creek flooding due to construction of clean water diversion around the disturbed areas.

The potential impacts on groundwater during the life of the SGCP are:

- dewatering of coal seams
- aquifer interconnection due to subsidence
- diminished groundwater recharge
- lowering of quality due to mine waste and water infrastructure
- alteration of evapotranspiration rates due to lowering groundwater
- alteration of water table level, bore level and quality impacts from the final void.

21.3.4.2. Environmental Values

Surface Water

Environmental values for surface water are set and described under various documents, including the:

- Guideline: Establishing draft environmental values, management goals and water quality objectives (DERM, 2011)
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000) (ANZECC Guidelines)
- *Environmental Protection (Water) Policy 2009 (EPP (Water))*.

The environmental values for surface water in the SGCP area remain relatively consistent between the documents, as shown in **Table 21-3**.

Table 21-3 SGCP Environmental Values – Water

| Guideline (DERM, 2011) | ANZECC Guidelines | EPP (Water) |
|---|---|--|
| <ul style="list-style-type: none"> • Aquatic - Slightly to Moderately disturbed (SMD) system. • Primary Industries - Stock watering. • Cultural and spiritual. | <p>'Environmental values' of receiving waters as those values or uses of water that the community believes are important for a healthy ecosystem.</p> <p>The receiving waterways relevant for the SGCP are classed as slightly to moderately disturbed.</p> | <p>Under Section 7 of the <i>EPP (Water)</i>, there are no particular environmental values attributed to the specific waterways located within the SGCP as they are not listed in Schedule 1.</p> <p>Section 7 (2) however, assigns the environmental values in the receiving water to be protected under the category 'other waters' as:</p> <ul style="list-style-type: none"> • ecosystem protection (Level 2 – disturbed ecosystems, Queensland Water Quality Guidelines 2009 (DERM, 2009) (QWQG) • agricultural uses (Irrigation and Stock Watering). |

Environmental values must consider that the catchment has seen significant changes in land use over the past 150 years, with rapid changes in the last 50 years. Widespread land clearing for agricultural use has occurred throughout much of the receiving water catchments.

Groundwater

The following environmental values are recognised by the National Water Quality Management Strategy guidelines:

- aquatic ecosystems
- primary industries
- recreation and aesthetics
- drinking water
- domestic use other than drinking
- industrial water
- cultural and spiritual values.

The environmental values considered in this Section include the water quality, quantity and standing water levels relating to both the existing and potentially impacted values for the local and regional groundwater area. The main environmental value associated with groundwater at the SGCP is for the purposes of stock watering. No groundwater dependent ecosystems or culturally significant areas have been identified.

21.3.4.3. Environmental Protection Objectives

Surface Water Objectives

The environmental protection objectives for surface water values include to:

- maintain the existing chemical, physical and biological integrity of downstream water quality to protect aquatic ecosystems
- minimise detrimental impact on the suitability of water for irrigation, stock watering, farm use and visual amenity
- minimise detrimental impact on the sustainability of geomorphologic characteristics of the watercourses.

Groundwater Objectives

The environmental protection objectives for groundwater include:

- minimise detrimental impact on the suitability of groundwater for agricultural use (stock watering)
- implement commitments to mitigate any adverse effects on the groundwater resources.

21.3.4.4. Performance Criteria

Performance criteria of water resources at the SGCP will be monitored against the following to meet environmental protection objectives:

- *Environmental Protection (Water) Policy 2009*
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000)
- *Fisheries Act 1994*
- Australian Drinking Water Guidelines (NHMRC, 2004).

The performance criteria for the SGCP are detailed below.

Environmental Protection (Water) Policy 2009

The objective of the *EPP (Water)* is to protect Queensland's waters while allowing for development that is ecologically sustainable. The *EPP (Water)* is subordinate legislation under the *EP Act*. Under the *EPP (Water)*, water quality must be assessed against established QWQG, however as the SGCP falls within the headwaters of the Central Coast Region where the QWQG are not complete, the use of ANZECC Guidelines is required. Queensland waters include water in rivers, streams, wetlands, lakes, aquifers, estuaries and coastal areas.

This purpose is achieved within a framework that includes:

- identifying environmental values for aquatic ecosystems and for human uses (e.g. water for drinking, farm supply, agriculture, industry and recreational use)
- determining water quality guidelines (WQGs) and water quality objectives (WQOs) to enhance or protect the environmental values.

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ, 2000)

The primary objective of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, developed by the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Agriculture and Resources Management Council of Australia and New Zealand (ARMCANZ), is: 'To provide an authoritative guide for setting water quality objectives required to sustain current, or likely future, environmental values (uses) for natural and semi-natural water resources in Australia and New Zealand.'

These guidelines play a vital role in the management of water quality in both New Zealand and Australia. They provide methods for setting limits on pollutant concentrations in freshwater, coastal and marine environments.

Fisheries Act 1994

The primary objective of the *Fisheries Act 1994* is to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats in a way that seeks to apply, balance and promote the principles of ESD.

A permit may be required for any activities that involve constructing waterway barrier works or works in declared fish habitat areas.

Australian Drinking Water Guidelines (NHMRC, 2004)

These guidelines provide information on acceptable water quality for human consumption and provide information on measures to maximise safety of drinking water. It provides a framework for identifying acceptable water quality and is intended for use by the Australian community and all agencies with responsibilities associated with the supply of drinking water. These guidelines are relevant for the provision of potable water at the SGCP and potable water supplies will be monitored against these guidelines.

21.3.4.5. Control Strategies

Surface Water

The proposed management and mitigation strategies are provided in the proposed Mine Water Management System (MWMS).

The overarching operational water management strategy for the SGCP seeks to:

- minimise the amount of surface run-off impacted by mining operations by diverting clean water flows around the mining operations
- minimise the amount of raw water to be imported to site by maximising the recycling of stored water resources within the SGCP
- minimise or prevent the need for mine water to be released from site. If controlled releases are required to maintain freeboard in dams during high rainfall events, water quality would need to meet Environmental Authority conditions and release criteria
- minimise impacts to water quality and quantity on existing downstream water users
- provide adequate protection of internal water management infrastructure and external surface water values during flood events.

It is envisaged that during the course of the mine life, progressive rehabilitation of available (i.e. no longer required) disturbed areas will be undertaken and once established and demonstrated to produce acceptable quality runoff, runoff from these areas will be diverted away from the MWMS through clean water bypass drains.

The following MWMS classifications have been nominated for the site:

- clean water management system
- saline/waste rock water system
- raw water system.

Water Quality – Construction

Potential impacts on water quality throughout the construction phase are summarised in **Table 21-4**, and corresponding mitigation measures are provided. Residual impacts are expected to be minimal with the implementation of these management strategies.

Table 21-4 SGCP Surface Water Quality Impacts and Mitigation Measures – Construction Phase

| Construction Impacts | Mitigation Measures |
|--|--|
| Sediment from construction entering surface water runoff during rainfall events, discharged to watercourses reducing water quality | <ul style="list-style-type: none"> • Areas of disturbed or exposed soil will be minimised and managed to reduce sediment mobilisation and erosion • An erosion and sediment control plan will be prepared and executed • Disturbance by heavy earth moving equipment will be minimised especially in riparian areas • The number of passes over water crossings will be minimised • Topsoil will be stripped and stockpiled away from drainage lines • Bunds will be constructed to restrict flow velocities across the site • Vegetation clearing will not be carried out during heavy rainfall • Dust suppression measures will be adopted such as water sprays or stockpile covers • Vehicle washdowns will be located away from drainage lines or watercourses • Construction activities that will affect existing drainage lines and control measures will only be carried out after suitable stormwater management infrastructure has been installed on-site • Sedimentation dams will be constructed to capture dirty water runoff and used preferentially for dust suppression • Any site dewatering activities will be treated and/or appropriately managed • Diversion of watercourse will be either by low flow diversion or coffer dam with pumping • Groundcovers will be established to rehabilitate areas disturbed by road crossings and slope protection material will be used on road batters • Mitre drains will be used to divert runoff from road shoulders and table drains into sedimentation dams |

Table 21-4 SGCP Surface Water Quality Impacts and Mitigation Measures – Construction Phase (cont)

| Construction Impacts | Mitigation Measures |
|--|--|
| <p>Potentially contaminated aqueous waste streams from temporary refuelling facilities, chemical storage facilities and vehicle washdown areas could enter into drainage lines</p> | <ul style="list-style-type: none"> • Temporary and permanent chemical and fuel storage areas will be appropriately bunded in accordance with AS 1940 • All transfers of fuels and chemicals will be controlled to prevent spillage outside bunded areas • Bunds and sumps will be frequently drained and treated/disposed of appropriately. • Contaminants and major spillage will be collected by a licensed waste collection and transport contractor for disposal at an off-site licensed facility. • Spill cleanup kits, in accordance with Australian Standards (AS 1940 and AS 3780), will be located in appropriate locations, including inside machinery and vehicles • Refuelling will occur within bunded areas in accordance with AS 1940 • In the event of a spill occurring, it will be controlled, contained and cleaned up to prevent the mobilisation of pollutants in drainage lines or watercourses • Site selection of storage and refuelling areas will minimise stormwater inundation and reduce the potential for clean runoff to mix with contaminated water • Wastewater from washdown areas will be directed through oil and grease separators and effluent directed to construction ponds for reuse |
| <p>Erosion and damage to sediment control infrastructure from significant rainfall events during construction.</p> | <ul style="list-style-type: none"> • Construction works will be scheduled to minimise exposure to flooding during the wet season (October to April) • Stormwater management measures such as drainage diversion and flood defence bunds will be implemented before construction commences • Emergency response procedures and flood warning system • Infrastructure will be designed with floor levels above an appropriate Annual Exceedance Probability (AEP) flood level • Monitoring equipment with telemetry system will be maintained on creeks, dams, release points • Flexible water management system will cater for a variety of conditions and operational needs - including sufficient storage capacity on-site • Dams and water management infrastructure (pumps and pipelines) will be monitored and maintained • Separation of clean and dirty water systems will be implemented • Standard operating procedures for water management will be implemented |

Water Quality – Operations

Potential impacts on water quality during the operation of the SGCP are summarised in **Table 21-5**, together with proposed mitigation measures. The residual impact on surface water quality is expected to be minimal with the implementation of these management strategies.

Table 21-5 SGCP Water Quality Impacts and Mitigation Measures – Operations Phase

| Operations Impacts | Mitigation Measures |
|--|---|
| <p>Failure of water storages, storage embankments, pipelines, levees or bunds has the potential to result in non-compliant discharge and environmental impacts for downstream receiving waters, ecosystems and landholders</p> | <ul style="list-style-type: none"> • Design of water storages will utilise a Water Balance Model which considers all inputs and outputs which has run through a long-term period of climatic data to test storage capacities particularly in high rainfall wet seasons • Water storages will be designed in accordance with applicable Guidelines • Monitoring equipment will be installed to monitor storage volume during operation combined with a water management system to prevent overfilling • Design and construction supervision of dam embankments will be undertaken by a Registered Professional Engineer of Queensland (RPEQ) • Regular dam inspections will be undertaken by RPEQ • Regular inspections will be undertaken during operation of water storages, tailings dams levels, integrity of embankment and spillways • Regular pipeline, drain, bund and levee inspections and maintenance will be undertaken during operation |
| <p>Erosion and sediment mobilisation from mining and processing operations can cause deleterious effects on downstream water quality and aquatic habitats.</p> | <ul style="list-style-type: none"> • All potentially acid forming (PAF) material will be selectively handled where practicable to ensure that the potential for acid rock drainage is limited. Once all PAF material has been placed, a cover of non-acid forming (NAF) material will be applied over the entire waste rock emplacement area to ensure that the PAF waste is not exposed • Potential impacts will be mitigated using appropriate design for erosion and scour protection and a comprehensive mine water management plan • Swales and buffer strips are proposed to provide stormwater filtration prior to discharge to receiving waters. Swales are open vegetated (generally grass) drains, whilst buffers or filter strips are grassed surfaces aligned perpendicular to the direction of flow, which are used to filter particulate matter and associated pollutants from stormwater prior to its entry into adjacent receiving waters. Both swales and buffers provide water treatment through physical filtration of water through the vegetation and depending on the retention time some additional pollutants may be taken up by the vegetation • Progressive rehabilitation of waste rock emplacements will be undertaken to reduce erosion and sedimentation potential • An on-going monitoring program will be implemented to monitor the impacts of mine operations on the receiving watercourses. Site-specific trigger values for assessing water quality data against are proposed to be developed based on the baseline monitoring program |

Stream Diversions

The new channel design has been developed to mimic the general geometry of the existing creek low flow channels. The channel shape will be generally consistent with the existing creek channels comprising a trapezoidal shape (flat bed), bank slopes at 1(V) in 3(H). Based on the channel dimensions in the adjacent reaches of Sapling Creek, the low flow channel will be approximately 4 m wide at the base and 1 m deep (top width 10 m).

The proposed diversion channel alignment of Sapling Creek was selected to reduce the potential for subsidence to cause irregular lowering of the channel increasing sediment deposition and reducing channel capacity.

The low flow channel has been designed to meander within the constraints of the proposed diversion alignment.

Monitoring of deposition and erosion at fixed control locations with periodic (e.g. bi-annual) photographic surveys will be undertaken at the following locations:

- diversion channel
- confluences with Sapling Creek
- existing creek channels downstream of the diversion channel.

Evidence of impacts on creek morphology will trigger further investigation and identification of remedial strategies.

Rehabilitation of Channel

Stabilisation measures, such as rock riprap, will be implemented as part of the diversion channel to protect the channel construction from erosion and allow vegetation to progressively establish.

Surface exposure of dispersive soils will be either treated to minimise dispersion potential, or covered with topsoil to minimise exposure of dispersive. Softer alluvial material will be capped with rock and infilled with weed free, non-dispersive soil. In addition, in sections of the channel where dispersive soils are identified (if found), geotextile or similar will be placed on the bank before capping with fractured rock.

Diligent weed control, particularly in the stripping, stockpiling and re-spreading of topsoil will be a high priority.

Protection strategies such as rock armouring will be considered for the bed and banks to minimise scour potential due to changes in flow direction.

Mine Flood Protection

Levees are proposed to prevent flow down the Tallarenha Creek tributaries into the mining area, and a north-south channel collects flow and diverts it north around the pit back to Tallarenha Creek. During operations, the levees will be designed to protect the pit from flooding in the 3000 year average recurrence interval (ARI) flood event. Before mine closure, the levees will be upgraded to protect the pit from flooding up to the Probable Maximum Flood. The channel will be sized in accordance with the hydraulic performance criteria specified in the Central West Water Management and Use Regional Guideline: Watercourse Diversions (DERM, 2008).

The levee embankment would be designed for the following:

- slope stability
- erosion from flooding in the creeks and from direct rainfall
- piping failure in the foundation
- piping failure through the levee embankment
- ease of maintenance, including sufficiently wide crest for light and heavy vehicle access, if desired, and flat batter slopes for vegetation maintenance.

The flood protection levee banks will be regulated structures with conditions administered through the EA.

Erosion and deposition will be monitored at fixed control locations with periodic (e.g. bi-annual) photographic surveys.

Subsidence

Changes in the profile of Tallarenha Creek due to subsidence may affect the movement of sediment through downstream Quarry Material Allocation Notice (QMAN) areas is intended to be mitigated by engineering works designed to maintain free-draining stream channels post subsidence.

The establishment of a monitoring plan over the subsidence impacted areas of Tallarenha Creek will allow the identification of any changes to drainage that could have downstream impacts, and their mitigation through further channel engineering works.

Cumulative Impact Mitigation

Depending on the arrangement of the downstream projects, there will be some potential for cumulative impacts on downstream streamflow. However, given the contribution to streamflow from the catchment containing the SGCP relative to large downstream and adjacent catchments, the percentage cumulative reduction in flows is expected to be minor.

Groundwater

The SGCP has the potential to impact on groundwater resources. Mitigation and management measures to be implemented, to reduce or eliminate the risks identified, are required to:

- not detrimentally impact on the availability and suitability of groundwater for agricultural use (stock watering)
- prevent adverse changes to groundwater quality as a direct result of the mine project outside the mine footprint
- address landholders concerns over impacts on their groundwater supplies promptly
- a final void will remain at the end of mining to ensure the zone of influence, both groundwater level changes and hydrochemistry, will be managed and maintained and after mining ceases
- protect cultural heritage or spiritual values associated with surface water features that are maintained by groundwater (if any)
- no alteration of the diffuse recharge areas so as to ensure recharge during the life of the mine and after mining ceases.

21.3.4.5.1. *Monitoring*

Surface Water

The proposed surface water monitoring for the SGCP will include surface water quality monitoring and monitoring of stream diversion performance. The proposed monitoring programs are outlined in this Section.

Surface Water Quality

Two programs are proposed for surface water quality monitoring. A baseline monitoring program and an on-going water quality monitoring program are proposed to assess the impact of the Project operations on the receiving environment. Both programs would be undertaken in accordance with the Monitoring and Sampling Manual 2009 (DERM, 2010).

Baseline

The baseline monitoring program has commenced as part of the EIS and will continue until the mine is operational. As limited site-specific background water quality data is available, the monitoring program will be used to establish a data set for developing site-specific water quality trigger values.

Operations

An on-going monitoring program will be implemented to measure the impact of mine operations by monitoring watercourses upstream and downstream of the SGCP. This program will provide information to determine compliance with the EA conditions. The data will also allow performance reviews of various management plans and mitigation measures implemented to protect the watercourses in the SGCP.

Monitoring points will be provided at locations where contaminants could potentially be released from the MWMS. **Table 21-6** lists the release points from the mine water management system and the associated receiving waters.

Monitoring points will also measure receiving water quality upstream and downstream of the release points (**Table 21-7**).

Table 21-6 Release Points

| Release Point | Contaminant Source and Location | Monitoring Point | Receiving Waters |
|----------------------------|---------------------------------|-----------------------|-------------------------------|
| SGCP RP1 (Release Point 1) | Dirty Water Dam | Low Level Pipe Outlet | Tallarenha Creek |
| SGCP RP2 (Release Point 2) | Pit Water Dam | Low Level Pipe Outlet | Tallarenha Creek |
| SGCP RP3 (Release Point 3) | Sediment Dam North | Low Level Pipe Outlet | Tallarenha Creek |
| SGCP RP4 (Release Point 4) | Sediment Dam Central | Low Level Pipe Outlet | Tallarenha Creek |
| SGCP RP5 (Release Point 5) | Sediment Dam South | Low Level Pipe Outlet | Sapling Creek/ Alpha Creek |

Gauge boards will be installed at all dams to monitor storage water levels and volumes to enable inflows and outflows to be estimated. Automatic monitoring equipment may be installed at key storages.

The event-based sampling will enable quantification of released water quality from the site and any potential corresponding impact on receiving waters. On-site monthly sampling of the water storages allows for any potential pollutant generation to be identified as early as possible to trigger appropriate remedial action to be taken.

Table 21-7 Proposed Receiving Water Monitoring Points

| Monitoring Point | Description | Water Level (Flow) | Continuous Sampling of Trigger Levels | Frequency |
|------------------|--|--------------------|---------------------------------------|----------------------|
| SGCP TCU | Tallarenha Creek (Upstream Monitoring Point) | X | X | Daily During Release |
| SGCP TCD | Tallarenha Creek (Downstream Monitoring Point) | X | X | Daily During Release |
| SGCP SCU | Sapling Creek (Upstream Monitoring Point) | - | - | Daily During Release |
| SGCP SCD | Sapling Creek (Downstream Monitoring Point) | - | - | Daily During Release |
| SGCP DCU | Dead Horse Creek (Upstream Monitoring Point) | - | - | Daily During Release |
| SGCP DCD | Dead Horse Creek (Downstream Monitoring Point) | X | - | Daily During Release |
| SGCP ACU | Alpha Creek (Upstream Monitoring Point) | X | X | Daily During Release |
| SGCP ACD | Alpha Creek (Downstream Monitoring Point) | X | X | Daily During Release |
| SGCP HC | Highwall Channel (Downstream Monitoring Point) | - | - | Daily During Release |
| SGCP LC | Lowwall Channel (Downstream Monitoring Point) | X | - | Daily During Release |

Decommissioning

After mining has ceased and decommissioning and rehabilitation works are complete, the Proponent will seek to relinquish the SGCP leases. Prior to relinquishment, the Proponent will discuss the nature, scope and resourcing of an ongoing surface water monitoring program with the administering authority and any parties with ongoing interests in the surface water resources and infrastructure associated with the site if required. The proposed surface water monitoring locations are shown in **Table 21-7**.

Diversion

A monitoring system will be established in the Sapling Creek Diversion and in Dead Horse Creek downstream of the Sapling Creek Diversion outlet to establish baseline creek conditions and monitor ongoing performance during both operations and following mine closure.

The monitoring program will be designed considering the recommendations in the ACARP program 'Maintenance of Geomorphic Processes in Bowen Basin River Diversions' (C8030-C9068) (ID&A et al, 2002).

The monitoring program will include regular assessments of the geomorphic condition following flow events, and will include collection of site photographs, aerial photographs and aerial survey data.

The monitoring of the stream diversion would extend from pre-construction to licence relinquishment and comprises four components as shown in **Table 21-8**.

Table 21-8 Diversion Monitoring Requirements

| Monitoring Components | Objective |
|---------------------------|--|
| Baseline monitoring | To establish a baseline data set that can be used for comparison when applying for licence renewal and relinquishment. This occurs one year before construction and is to establish data to be used for comparison to assess the performance of the diversion. |
| Construction monitoring | To demonstrate works have been undertaken to specification. |
| Operations monitoring | To monitor and evaluate the diversion's performance to ensure it is operating in dynamic equilibrium. Occurs for 10 years after construction. |
| Relinquishment monitoring | To attain licence relinquishment by demonstrating the diversion is operating in dynamic equilibrium and not adversely impacting on adjoining reaches. |

Subsidence

The subsidence monitoring program will monitor erosion, sedimentation, and surface cracking. Mapping of the downstream and upstream active subsidence zone will be undertaken to determine if erosion and sedimentation is occurring in the channel to an unsustainable level and/or any significant surface flow losses into cracks are occurring between longwall blocks. The mapping will be used to evaluate the significance of subsidence impacts on the creek environment and trigger the need for any corrective action.

The monitoring strategy will include:

- annual photographic survey of each channel reach downstream and upstream of subsidence panels at and between the longwall panels to provide a benchmark for future reference
- annual GPS mapping and photographic documentation of surface cracking that has occurred during subsidence until it is demonstrated that cracks are effectively sealed
- repeat surveys (as above) after three flood events have passed through subsidence areas (at which time a reasonably balanced regime of erosion and deposition cycles along the channels should become evident) to provide a secondary benchmark for future reference
- aerial survey of the mine lease during the dry season to document the size and potential volume of channel bed depressions (water ponding areas) within subsidence areas and to identify any lateral shifting or sedimentation within the stream beds

- in the event that significant erosion and sedimentation is occurring at rates that are not sustainable in the stream systems (i.e. visual loss of riparian vegetation, or rapid bank erosion and undercutting) or in the event that pooled areas are not decreasing between aerial surveys, a stream restoration program will be developed by a qualified fluvial geomorphologist and administered.

Groundwater Monitoring

Following installation and during mining, groundwater levels in the bore network will be measured quarterly. Post-mining, groundwater levels in the bores will be measured quarterly for the first two years following cessation of mining and annually thereafter. Water-levels will be collected at least annually from surrounding domestic bores. If data is available, the SGCP water levels recorded should be compared with groundwater levels collected at neighbouring coal mines.

21.3.4.5.2. Commitments

The SGCP will minimise impact on downstream water bodies, groundwater and the local community.

The EA conditions will also require certified annual surveillance inspections of hazardous dams by a suitably qualified and experience engineer and obligation for the EA holder to rectify deficiencies identified in the annual surveillance outcomes.

21.3.4.5.3. Corrective Action

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

21.3.4.5.4. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.

21.3.4.5.5. Reporting

A monthly report will be prepared and submitted to the Proponent to include details of monthly surface and groundwater monitoring results and the occurrence of any complaints. All surface water and groundwater related regulatory reporting requirements will be met.

21.3.4.6. Proposed EA Conditions

Surface Water

Contaminant Release

W1 Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters except as permitted under the conditions of this EA.

W2 The release of contaminants to waters must only occur from the release points specified in **Table 21-9**.

Table 21-9 Contaminant Release Points, Sources and Receiving Waters

| Release Point | Longitude (GDA 94) | Latitude (GDA 94) | Contaminant Source and Location | Frequency of Monitoring | Receiving Waters |
|-----------------------|--------------------|-------------------|---------------------------------|-------------------------|-------------------------------|
| RP1 (Release Point 1) | 146.495 | -23.667 | Dirty Water Dam | Daily during release | Tallarenha Creek |
| RP2 (Release Point 2) | 146.495 | -23.663 | Pit Water Dam | Daily during release | Tallarenha Creek |
| RP3 (Release Point 3) | 146.491 | -23.657 | Sediment Dam North | Daily during release | Tallarenha Creek |
| RP4 (Release Point 4) | 146.492 | -23.700 | Sediment Dam Central | Daily during release | Tallarenha Creek |
| RP5 (Release Point 5) | 146.512 | -23.745 | Sediment Dam South | Daily during release | Sapling Creek/ Alpha Creek |

W3 The release of contaminants to waters must not exceed the release limits stated in **Table 21-10** when measured at the monitoring points specified in **Table 21-9** for each quality characteristic.

Table 21-10 Contaminant Release Limits

| Quality Characteristic | Release Limits | Monitoring Frequency |
|---|---|---|
| Electrical conductivity (µS/cm) | Aquatic ecosystem protection (no drinking water value): An end-of-pipe limit to achieve in the range 0 to 1000 EC in the receiving waters - (Must have natural flow i.e. the 20th percentile flow trigger and achieve a 1:4 dilution). | Daily during release (first sample within 2 hours of commencement of release) |
| pH (pH Unit) | Limit to be determined based on receiving water reference data. | Daily during release (first sample within 2 hours of commencement of release) |
| Turbidity (NTU) | Site-specific release limits to be determined from the Baseline Monitoring Program. | Daily during release (first sample within 2 hours of commencement of release) |
| Suspended solids (mg/L) | Site-specific release limits to be determined from the Baseline Monitoring Program and achievable best practice sedimentation control and treatment. | Daily during release (first sample within 2 hours of commencement of release) |
| Sulfate (SO ₄ ²⁻) (mg/L) | Site-specific release limits to be determined from the Baseline Monitoring Program. | Daily during release (first sample within 2 hours of commencement of release) |

W4 The release of contaminants to waters from the release points must be monitored at the locations specified in **Table 21-9** for each quality characteristic and at the frequency specified in **Table 21-10** and **Table 21-11**.

Table 21-11 Contaminant Release Limits

| Quality Characteristic | Release Limits (µg/L) | Monitoring Frequency |
|----------------------------------|---|---|
| Aluminium | Site-specific release limits to be determined from the Baseline Monitoring Program. | Commencement of release and thereafter weekly during release. |
| Arsenic | | |
| Cadmium | | |
| Chromium | | |
| Copper | | |
| Iron | | |
| Lead | | |
| Mercury | | |
| Nickel | | |
| Zinc | | |
| Boron | | |
| Cobalt | | |
| Manganese | | |
| Molybdenum | | |
| Selenium | | |
| Silver | | |
| Uranium | | |
| Vanadium | | |
| Ammonia | | |
| Nitrate | | |
| Petroleum hydrocarbons (C6-C9) | | |
| Petroleum hydrocarbons (C10-C36) | | |
| Fluoride (total) | | |

*NOTE: All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Release limits for metal/metalloids apply if dissolved results exceed limit. The list of quality characteristics required to be monitored as per **Table 21-11** will be reviewed once the results of the monitoring data is gathered for the Baseline Monitoring Program and if it is determined that there is no need to monitor for certain individual quality characteristics these can be removed from **Table 21-11**.*

- W5** If quality characteristics of the release exceed any of the release limits specified in **Table 21-11** during a release event, the EA holder must compare the downstream results in the receiving waters to the trigger values specified in **Table 21-11** and:
- a) where the trigger values are not exceeded then no action is to be taken
 - b) where the downstream results exceed the trigger values specified **Table 21-11** for any quality characteristic, compare the results of the downstream site to the data from background monitoring sites
 - i. if the result is less than the background monitoring site data, then no action is to be taken or
 - ii. if the result is greater than the background monitoring site data, complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - 1. details of the investigations carried out
 - 2. actions taken to prevent environmental harm.

NOTE: Where an exceedence of a release limits has occurred and is being investigated, in accordance with W5 (b)(ii) of this condition, no further reporting is required for subsequent release events for that quality characteristic.

- W6** If an exceedence in accordance with condition W5 (b)(ii) is identified, the holder of the authority must notify the administering authority within 14 days of receiving the result.

Contaminant Release Events

- W7** The holder must install, operate and maintain a stream flow gauging station to determine and record stream flows at the locations upstream of each release point as specified in **Table 21-12** for any receiving water into which a release occurs.
- W8** Notwithstanding any other condition of this EA, the release of contaminants to waters must only take place during periods of natural flow events specified as minimum flow in **Table 21-12** for the contaminant release point(s) specified in **Table 21-9**.
- W9** Contaminant release flow rate must not exceed 20 % of receiving water flow rate.
- W10** The daily quantity of contaminants released from each release point must be measured and recorded at the monitoring points in **Table 21-9**.
- W11** Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build-up of sediment in such waters.

Table 21-12 Contaminant Release during Flow Events

| Receiving Waters | Release Point (RP) | Gauging Station Description | Longitude (GDA94) | Latitude (GDA94) | Minimum Flow in Receiving Water Required for a Release Event | Flow Record Frequency |
|-------------------------------|-----------------------|-----------------------------|-------------------|------------------|--|----------------------------|
| Tallarenha Creek | RP1 (Release Point 1) | TBA | 146.495 | -23.667 | 0.5 m ³ /sec | Continuous (minimum daily) |
| Tallarenha Creek | RP2 (Release Point 2) | TBA | 146.495 | -23.663 | 0.5 m ³ /sec | Continuous (minimum daily) |
| Tallarenha Creek | RP3 (Release Point 3) | TBA | 146.491 | -23.657 | 0.5 m ³ /sec | Continuous (minimum daily) |
| Tallarenha Creek | RP4 (Release Point 4) | TBA | 146.492 | -23.700 | 0.5 m ³ /sec | Continuous (minimum daily) |
| Sapling Creek/ Alpha Creek | RP5 (Release Point 5) | TBA | 146.512 | -23.745 | 0.5 m ³ /sec | Continuous (minimum daily) |

Notification of Release Event

W12 The authority holder must notify the administering authority as soon as practicable (no later than six (6) hours of having commenced releasing mine affected water to the receiving environment). Notification must include the submission of written verification to the administering authority of the following information:

- a) release commencement date/time
- b) expected release cessation date/time
- c) release point/s
- d) release volume (estimated)
- e) receiving water/s including the natural flow rate
- f) any details (including available data) regarding likely impacts on the receiving water(s).

NOTE: Notification to the administering authority must be addressed to the Manager and Project Manager of the local administering authority via email or facsimile.

W13 The authority holder must notify the administering authority as soon as practicable, (nominally within 24 hours after cessation of a release) of the cessation of a release notified under condition W12 and within 28 days provide the following information in writing:

- a) release cessation date/time
- b) natural flow volume in receiving water
- c) volume of water released

- d) details regarding the compliance of the release with the conditions of Department interest: Water of this EA (i.e. contamination limits, natural flow, discharge volume)
- e) all in-situ water quality monitoring results
- f) any other matters pertinent to the water release event.

Notification of Release Event Exceedance

W14 If the release limits defined in **Table 21-10** are exceeded, the holder of the EA must notify the administering authority within 24 hours of receiving the results.

W15 The authority holder must, within 28 days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing:

- a) the reason for the release
- b) the location of the release
- c) all water quality monitoring results
- d) any general observations
- e) all calculations
- f) any other matters pertinent to the water release event.

Monitoring of Water Storage Quality

W16 Water storages stated in **Table 21-13** which are associated with the release points must be monitored for the water quality characteristics specified in **Table 21-14** at the monitoring locations and at the monitoring frequency specified in **Table 21-13**.

Table 21-13 Water Storage Monitoring

| Water Storage Description | Northing (GDA 94) | Easting (GDA 94) | Monitoring Location* | Frequency of Monitoring |
|---------------------------|-------------------|------------------|----------------------|-------------------------|
| Pit Water Dam | TBA* | TBA* | TBA* | Monthly |
| ROM Dump X Dam | TBA* | TBA* | TBA* | Monthly |
| ROM Dump S Dam | TBA* | TBA* | TBA* | Monthly |
| MIA Dam | TBA* | TBA* | TBA* | Monthly |
| ROM Stockpile Dam | TBA* | TBA* | TBA* | Monthly |
| Product Stockpile Dam | TBA* | TBA* | TBA* | Monthly |
| ROM Dump N Dam | TBA* | TBA* | TBA* | Monthly |
| Dam A | TBA* | TBA* | TBA* | Monthly |
| Dam B | TBA* | TBA* | TBA* | Monthly |

NOTE: * To be finalised by holder upon completion of detailed design.

W17 In the event that waters storages defined in **Table 21-13** exceed the contaminant limits defined in **Table 21-14**, the holder of the EA must implement measures, where practicable, to prevent access to waters by all livestock.

Table 21-14 On-site Water Storage Contaminant Limits

| Quality Characteristic | Value Type | Contaminant Limit |
|------------------------|------------|---|
| pH (pH unit) | Range | Site-specific contaminant levels to be determined from the Baseline Monitoring Program. |
| EC (µS/cm) | Maximum | |
| Sulfate (mg/L) | Maximum | |
| Fluoride (mg/L) | Maximum | |
| Aluminium (mg/L) | Maximum | |
| Arsenic (mg/L) | Maximum | |
| Cadmium (mg/L) | Maximum | |
| Cobalt (mg/L) | Maximum | |
| Copper (mg/L) | Maximum | |
| Lead (mg/L) | Maximum | |
| Nickel (mg/L) | Maximum | |
| Zinc (mg/L) | Maximum | |

NOTE: Total measurements (unfiltered) must be sampled and analysed.

Receiving Environment Monitoring and Contaminant Limits

W18 The quality of the receiving waters must be monitored at the locations specified in **Table 21-16** for each quality characteristic and at the monitoring frequency stated in **Table 21-15**.

Table 21-15 Receiving Waters Contaminant Trigger Levels

| Quality Characteristic | Contaminant Level | Monitoring Frequency |
|---|---|--------------------------|
| pH | Site-specific contaminant levels to be determined from the Baseline Monitoring Program. | Daily during the release |
| Electrical conductivity (µS/cm) | | |
| Suspended solids (mg/L) | | |
| Sulfate (SO ₄ ²⁻) (mg/L) | | |

Table 21-16 Receiving Water Upstream Background Sites and Downstream Monitoring Points

| Site ID | Receiving Waters Location Description | Coordinates | |
|----------|--|-----------------|------------------|
| | | Easting (GDA94) | Northing (GDA94) |
| SGCP TCU | Tallarenha Creek (Upstream Monitoring Point) | TBA | TBA |
| SGCP TCD | Tallarenha Creek (Downstream Monitoring Point) | TBA | TBA |
| SGCP SCU | Sapling Creek (Upstream Monitoring Point) | TBA | TBA |
| SGCP SCD | Sapling Creek (Downstream Monitoring Point) | TBA | TBA |
| SGCP DCU | Dead Horse Creek (Upstream Monitoring Point) | TBA | TBA |
| SGCP DCD | Dead Horse Creek (Downstream Monitoring Point) | TBA | TBA |
| SGCP ACU | Alpha Creek (Upstream Monitoring Point) | TBA | TBA |
| SGCP ACD | Alpha Creek (Downstream Monitoring Point) | TBA | TBA |
| SGCP HC | Highwall Channel (Downstream Monitoring Point) | TBA | TBA |
| SGCP LC | Lowwall Channel (Downstream Monitoring Point) | TBA | TBA |

NOTE: The data from background monitoring points must not be used where they are affected by releases from other mines.

W19 If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in **Table 21-15** during a release event the EA holder must compare the downstream results to the upstream results in the receiving waters and:

- a) where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken
- b) where the downstream results exceed the upstream results complete an investigation in accordance with the ANZECC & ARMCANZ 2000 methodology, into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining:
 - i. details of the investigations carried out
 - ii. actions taken to prevent environmental harm.

NOTE: Where an exceedence of a trigger level has occurred and is being investigated, in accordance with W19 (b) (ii) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.

Receiving Environment Monitoring Program (REMP)

W20 A REMP must be developed and implemented before the commencement of construction to monitor and record the effects of the release of contaminants on the receiving environment periodically and whilst contaminants are being released from the site, with the aims of identifying and describing the extent of any adverse impacts to local environmental values, and monitoring any changes in the receiving water. A copy of the REMP must be provided to the administering authority prior to its implementation and due consideration given to any comments made on the REMP by the administering authority. For the purposes of the REMP, the receiving environment is the waters of Tallarenha Creek, Sapling Creek, Dead Horse Creek and Alpha Creek and connected waterways downstream of the release.

W21 The REMP must address (but not necessarily be limited to) the following:

- a) Description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality)
- b) Description of applicable environmental values and water quality objectives to be achieved (i.e. as scheduled pursuant to the *Environmental Protection (Water) Policy 2009*)
- c) Any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed
- d) Water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP
- e) Monitoring for any potential adverse environmental impacts caused by the release
- f) Monitoring of stream flow and hydrology
- g) Monitoring of toxicants should consider the indicators specified in **Table 21-11** to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC & ARMCANZ 2000 guidelines for slightly to moderately disturbed ecosystems
- h) Monitoring of physical chemical parameters as a minimum those specified in **Table 21-10** (in addition to dissolved oxygen saturation and temperature)
- i) Monitoring biological indicators (for macroinvertebrates in accordance with the AusRivas methodology) and metals/metalloids in sediments (in accordance with ANZECC & ARMCANZ 2000, BATLEY and/or the most recent version of *AS 5667.1 Guidance on Sampling of Bottom Sediments*) for permanent, semi-permanent water holes and water storages

- j) The locations of monitoring points (including the locations specified in **Table 21-16** which are background and downstream impacted sites for each release point)
- k) The frequency or scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site-specific reference values within two years (depending on wet season flows) in accordance with the most recent version of the Queensland Water Quality Guidelines. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges
- l) Specify sampling and analysis methods and quality assurance and control
- m) Any historical datasets to be relied upon
- n) Description of the statistical basis on which conclusions are drawn
- o) Any spatial and temporal controls to exclude potential confounding factors.

W22 A report outlining the findings of the REMP, including all monitoring results and interpretations in accordance with condition W20 must be prepared and submitted in writing to the administering authority by the commencement of operations. This should include an assessment of background water quality, any assimilative capacity for those contaminants monitored and the suitability of current release limits to protect downstream environment values.

Water Reuse

W23 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying stock water to properties directly adjoining properties owned by the EA holder or a third party and subject to compliance with the quality release limits specified in **Table 21-17**.

Table 21-17 Stock Water Release Limits

| Quality Characteristic | Units | Minimum | Maximum |
|-------------------------|----------|---------|---------|
| pH | pH units | 6.5 | 8.5 |
| Electrical Conductivity | µS/cm | N/A | 5000 |

W24 Water contaminated by mining activity may be piped or trucked or transferred by some other means that does not contravene the conditions of this authority during periods of dry weather for the purpose of supplying irrigation water to properties directly adjoining properties owned by the EA holder or a third party and subject to compliance with quality release limits in **Table 21-18**.

Table 21-18 Irrigation Water Release Limits

| Quality Characteristic | Units | Minimum | Maximum |
|-------------------------|----------|---------|--|
| pH | pH units | 6.5 | 8.5 |
| Electrical Conductivity | µS/cm | N/A | Site-specific value to be determined in accordance with ANZECC & ARMCANZ (2000) Irrigation Guidelines and provided through an amendment process. |

W25 Water contaminated by mining activity may be piped or trucked off the mining lease for the purpose of supplying water to a third party for purpose of construction and/or road maintenance in accordance with the conditions of this EA.

W26 If the responsibility of water contaminated by mining activities (the water) is given or transferred to another person in accordance with conditions W23, W24, W25:

- a) the responsibility of the water must only be given or transferred in accordance with a written agreement (the third party agreement), and
- b) include in the third party agreement a commitment from the person utilising the water to use water in such a way as to prevent environmental harm or public health incidences and specifically make the persons aware of the General Environmental Duty (GED) under section 319 of the Environmental Protection Act 1994, environmental sustainability of the water disposal and protection of environmental values of waters.

Water General

W27 All determinations of water quality must be:

- a) performed by a person or body possessing appropriate experience and qualifications to perform the required measurements
- b) made in accordance with methods prescribed in the latest edition of the administering authority's Water Quality Sampling Manual
- c) collected from the monitoring locations identified within this EA, within ten (10) hours of each other where possible
- d) carried out on representative samples
- e) laboratory testing must be undertaken using a laboratory accredited (e.g. NATA) for the method of analysis being used.

NOTE: Condition W27 requires the Water Quality Manual to be followed and where it is not followed because of exceptional circumstances this should be explained and reported with the results.

- W28** The release of contaminants directly or indirectly to waters:
- a) must not produce any visible discolouration of receiving waters
 - b) must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

Annual Water Monitoring Reporting

- W29** The following information must be recorded in relation to all water monitoring required under the conditions of this EA and submitted to the administering authority in the specified format with each annual return:
- a) the date on which the sample was taken
 - b) the time at which the sample was taken
 - c) the monitoring point at which the sample was taken
 - d) the measured or estimated daily quantity of the contaminants released from all release points
 - e) the release flow rate at the time of sampling for each release point
 - f) the results of all monitoring and details of any exceedence with the conditions of this EA
 - g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

Temporary Interference with Waterways

- W30** Temporarily destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with the administering authority's guideline for activities in a watercourse, lake or spring associated with mining activities.

Water Management Plan

- W31** A Water Management Plan must be developed and implemented by the commencement of operations that provides for the proper and effective management of the actual and potential environmental impacts resulting from the mining activity and to ensure compliance with the conditions of this EA.
- W32** The Water Management Plan must be developed in accordance with the administering authority's guidelines for preparing a water management plan and must include at least the following components:
- a) contaminant source study
 - b) site water balance and model
 - c) water management system
 - d) saline drainage prevention and management measures

- e) acid rock drainage prevention and management measures (if applicable)
- f) emergency and contingency planning
- g) monitoring and review.

W33 Each year the holder of the EA must undertake a review of the water management plan prior to the wet season (i.e. by 1 November) and a further review following the wet season (i.e. by 1 May the following year) to ensure that proper and effective measures, practices or procedures are in place so that the mine is operated in accordance with the conditions of this EA and that environmental harm is prevented or minimised.

W34 A copy of the water management plan and/or a review of the water management plan must be provided to the administering authority on request.

Saline Drainage

W35 The holder of this EA must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.

Acid Rock Drainage

W36 The holder of this EA must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.

Stormwater and Water Sediment Controls

W37 An erosion and sediment control plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of stormwater.

W38 The maintenance and cleaning of any vehicles, plant or equipment must not be carried out in areas from which contaminants can be released into any receiving waters.

W39 Any spillage of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or receiving waters.

Groundwater

W40 Groundwater affected by the mining activities must be monitored at the locations and frequencies specified in **Table 21-19** and be carried out in accordance with the latest edition of the administering authority's Monitoring and Sampling Manual.

W41 In the event that groundwater fluctuations in excess of two metres per year are detected at the groundwater monitoring locations nominated in **Table 21-19** and the fluctuations are not the result of pumping from licensed bores, the administering authority must be notified within 14 days.

Table 21-19 Groundwater Monitoring Locations and Frequency

| Monitoring Point | Easting (MGA) | Northing (MGA) | Comments | Monitoring Frequency |
|------------------|---------------|----------------|--|----------------------|
| BH06 | 444010 | 7374020 | Located on southern boundary of MLA and will remain undisturbed for 10 years, so this will also provide useful background information, including monitoring the impact on groundwater from waste rock dumps. | Quarterly |
| BH21 | 446111 | 7378014 | To monitor dewatering of southern operations and baseline for future mining. Located at eastern boundary and will remain undisturbed for 25 years. | |
| BH33 | 441533 | 7382067 | Will remain undisturbed for at least 25 years. | |
| BH42 | 445067 | 7384006 | To monitor dewatering of the northern operations. Located on the northern boundary and may remain undisturbed throughout the mine life. | |
| BH85 | 445501 | 7381000 | To monitor dewatering of the northern operations. Will also provide background data prior to expansion and will likely remain undisturbed throughout the mine life. | |
| BH34 | 444148 | 7382453 | Located near northern proposed "dirty water" dam, and will likely remain undisturbed through the mine life. | |
| SP142 | 445299 | 7374183 | Located near southern proposed "dirty water" dam, and will likely remain undisturbed. Will also be useful to monitor the impact on groundwater from waste rock dump. | |
| BH27 | 442900 | 7379447 | Located in the middle of the model domain and possibly will remain undisturbed for 20 years. | |
| CK110 | 446300 | 7380050 | Located on eastern side of operation and will be useful to monitor groundwater impact from waste rock dump. May remain undisturbed for 10-15 years. | |
| BH05 | 442094 | 7374161 | Located at south western corner and will remain undisturbed for 10 years. | |
| BH18 | 440058.000 | 7378132.000 | Located at western side and may remain undisturbed for 15 years or more. | |
| CK177 | 439044 | 7380762 | Located at western side and may remain undisturbed for 25 years or more. | |
| BH39 | 438973 | 7383544 | Located at north western corner and will remain undisturbed for 25 years or more | |
| CK226 | 442113 | 7378175 | Located at the middle of the mining domain and will remain undisturbed for about 15 years. | |

Sewage Effluent

W42 All effluent released from the treatment plant must be monitored at the frequency and for the parameters specified in **Table 21-20**.

Table 21-20 Sewage Treatment Effluent Quality Targets for Dust Suppression and Irrigation

| Monitoring Point | Quality characteristics | Release limits | Frequency |
|------------------|---------------------------------------|----------------|-----------|
| STP | 5 day Biological oxygen demand (mg/L) | 20 | Monthly |
| | Suspended solids (mg/L) | 30 | |
| | Thermotolerant coliforms (Cfu/100 mL) | 10 | |
| | Total phosphorous (mg/L) | 15 | |
| | Total nitrogen (mg/L) | 30 | |
| | pH | 6.5 to 8.5 | |

W43 Sewage effluent used for dust suppression or irrigation must not exceed sewage effluent release limits defined in **Table 21-20**.

W44 Sewage effluent used for dust suppression or irrigation must not cause spray drift or over spray to any sensitive or commercial place.

W45 Subject to conditions W42 to W44 inclusive, sewage effluent from sewage treatment facilities must be reused or evaporated and must not be directly released from the STP to any waters or the bed and banks of any waters.

W46 The effluent irrigation areas must have a separation distance of at least 30 m from any groundwater bores and surface waters.

W47 The irrigation of treated effluent must be carried out in a manner such that:

- a) vegetation is not damaged
- b) soil erosion and soil structure damage is avoided
- c) there is no surface ponding of treated effluent
- d) percolation of treated effluent beyond the plant root zone is minimised
- e) the capacity of the land to assimilate nitrogen, phosphorus, salts, water and organic matter (as measured by oxygen demand) is not exceeded
- f) the quality of groundwater is not adversely affected.

W48 Notices must be prominently displayed on any treated effluent irrigation area warning staff and the public that the area is irrigated with treated effluent and not to use or drink the treated effluent. These notices must be maintained in a visible and legible condition.

W49 The daily volume of contaminants released to land must be determined by an appropriate method, for example a flow meter and records kept of such determinations.

Dams

All Dams

- G1** The holder of this EA must ensure that dams are designed, constructed, operated and maintained in accordance with accepted engineering standards.
- G2** Except for dams affected by condition G3, the hazard category of dams must be assessed by a suitably qualified and experienced person prior to their construction, and then not less frequently than on an annual basis.
- G3** The hazard category of dams constructed prior to grant of this EA, must be assessed by a suitably qualified and experienced person within six (6) months of this EA taking effect, and not less frequently than on an annual basis.
- G4** Where the hazard category of a dam is assessed as significant or high, the holder of the EA must act immediately to ensure:
- a) the administering authority is advised of the current location and details of that dam
 - b) that dam meets the hydraulic performance required of the assessed hazard category within six (6) months of that assessment.
- G5** The condition of dams must be monitored for early signs of loss of structural or hydraulic integrity, based on the advice of a suitably qualified and experienced person. The methods of monitoring and frequency of monitoring shall be as assessed by that suitably qualified and experienced person, based on the hazard category and particular circumstances of each dam.
- G6** In the event of early signs of loss of structural or hydraulic integrity, the holder of this EA must immediately take action to prevent or minimise any actual or potential environmental harm and report in writing any findings and actions taken to the administering authority within 28 days.
- G7** The holder of this EA must decommission each dam to a situation where ongoing environmental harm is prevented.
- G8** As a minimum, dams must be decommissioned such that they:
- a) no longer contain flowable substances
 - b) become stable landforms
 - c) comply with the rehabilitation requirements of this EA.

Location and Basic Specifications

- G9** All regulated dams are to be located within the control points defined in **Table 21-21**.

Table 21-21 Location of Regulated Dams

| Name of Regulated Dam | Easting (GDA94) | Northing (GDA94) |
|-----------------------|-----------------|------------------|
| Pit Water Dam | TBA* | TBA* |
| ROM Dump X Dam | TBA* | TBA* |
| ROM Dump S Dam | TBA* | TBA* |
| MIA Dam | TBA* | TBA* |
| ROM Stockpile Dam | TBA* | TBA* |
| Product Stockpile Dam | TBA* | TBA* |
| ROM Dump N Dam | TBA* | TBA* |
| Dam A | TBA* | TBA* |
| Dam B | TBA* | TBA* |

NOTE: * To be finalised by holder upon completion of detailed design.

G10 The following regulated dams are to be constructed and used in accordance with **Table 21-22**.

Table 21-22 Basic Specification of Regulated Dams

| Name of Regulated Dam | Hazard Category | Maximum Surface Area of Dam (ha) | Maximum Volume of Dam (m ³) | Maximum Depth of Dam (m) | Purpose |
|-----------------------|-----------------|----------------------------------|---|--------------------------|---------------------|
| Pit Water Dam | TBA | TBA | TBA | TBA | Saline Water System |
| ROM Dump X Dam | TBA | TBA | TBA | TBA | Saline Water System |
| ROM Dump S Dam | TBA | TBA | TBA | TBA | Saline Water System |
| MIA Dam | TBA | TBA | TBA | TBA | Saline Water System |
| ROM Stockpile Dam | TBA | TBA | TBA | TBA | Saline Water System |
| Product Stockpile Dam | TBA | TBA | TBA | TBA | Saline Water System |
| ROM Dump N Dam | TBA | TBA | TBA | TBA | Saline Water System |
| Dam A | TBA | TBA | TBA | TBA | Saline Water System |
| Dam B | TBA | TBA | TBA | TBA | Saline Water System |

G11 The following regulated dams are to be designed, constructed and operated in accordance with **Table 21-23**.

Table 21-23 Hydraulic Performance of Regulated Dams

| Regulated Dam | Spillway Capacity AEP | Design Storage Allowance AEP | Mandatory Reporting Level AEP |
|--------------------------------|-----------------------|---------------------------------|-------------------------------|
| Pit Water Dam | 1:1000 AEP | 1:20 AEP for 3 month wet season | 1:10 AEP 72 hr rainfall |
| ROM Dump X Dam | 1:1000 AEP | 1:20 AEP for 3 month wet season | 1:10 AEP 72 hr rainfall |
| ROM Dump S Dam | 1:1000 AEP | 1:20 AEP for 3 month wet season | 1:10 AEP 72 hr rainfall |
| Mine Industrial Area (MIA) Dam | 1:1000 AEP | 1:20 AEP for 3 month wet season | 1:10 AEP 72 hr rainfall |
| ROM Stockpile Dam | 1:1000 AEP | 1:20 AEP for 3 month wet season | 1:10 AEP 72 hr rainfall |
| Product Stockpile Dam | 1:1000 AEP | 1:20 AEP for 3 month wet season | 1:10 AEP 72 hr rainfall |
| ROM Dump N Dam | 1:1000 AEP | 1:20 AEP for 3 month wet season | 1:10 AEP 72 hr rainfall |
| Dam A | 1:1000 AEP | 1:20 AEP for 3 month wet season | 1:10 AEP 72 hr rainfall |
| Dam B | 1:1000 AEP | 1:20 AEP for 3 month wet season | 1:10 AEP 72 hr rainfall |

Certification and Operation

G12 The holder of this EA must not commence construction of a regulated dam unless:

- a) the holder has submitted to the administering authority two (2) copies of a design plan, together with the certification of a suitably qualified and experienced person that the design of the regulated dam is fit for purpose, compliant in all respects with this EA and in accordance with engineering best practice
- b) at least 28 days has passed since the submission of the design plan.

G13 When construction or modification of any regulated dam is complete, or within 12 months of a dam becoming a regulated dam by virtue of G2 or G3, the holder of this EA must submit to the administering authority two copies of a set of 'as constructed' drawings, together with the certification by a suitably qualified and experienced person that the dam 'as constructed' is fit for purpose, compliant in all respects with this EA and in accordance with engineering best practice.

G14 The holder of this EA must ensure that there is always a current operational plan for each regulated dam, which may form part of other plans required by legislation.

- G15** The holder of this EA must ensure that, where a current operational plan covers decommissioning and rehabilitation, those operations are consistent with the objectives in any design plan for the dam.
- G16** The holder of this EA or approval must notify the administering authority when the level in any regulated dam reaches the mandatory reporting level (MRL).

Annual Inspection and Report

- G17** The holder of this EA must arrange for each regulated dam to be inspected annually by a suitably qualified and experienced person, in accordance with conditions G18 to G21.
- G18** The annual inspection may be conducted as early as 1 September each year, but not later than 1 November each year, except that the assessment of adequacy of available storage in a dam must be based on dam levels observed within the month of October in the year that the inspection is conducted.
- G19** At each annual inspection, the condition of each regulated dam must be assessed, including the structural, geotechnical and hydraulic adequacy of the dam and the adequacy of the works with respect to dam safety.
- G20** At each annual inspection, the adequacy of the available storage against the design storage allowance must be assessed, and a mandatory reporting level must be determined and marked on each regulated dam.
- G21** For each inspection, two copies of a report certified by the suitably qualified and experienced person, including any recommendations to ensure the integrity of each regulated dam must be provided to the administering authority within 28 days of the inspection.

21.3.5. Noise and Vibration

21.3.5.1. Background

The SGCP is situated approximately 12 km south-west of the township of Alpha in a well-established grazing region. The area surrounding the site has undulating topography comprising open farmlands and native scrublands.

Potential sources of noise and/or vibration from the surrounding environment primarily comprise:

- farming and grazing activities
- residential activity noise
- environmental noise (e.g. insects, wind etc.)
- road and rail traffic.

Ten sensitive receptors have been identified within 19 km of the closest approach of the SGCP. The closest sensitive receptor is located within 1 km of the MLA 70453 boundary.

The sensitive receptors in the vicinity of the SGCP comprise the homesteads of grazing properties and the Alpha township. The locations and separation distances are contained in **Table 21-24**.

Table 21-24 Sensitive Receptors Adjacent to SGCP

| Sensitive Receptor | Separation Distance (km) from Sensitive Receptor to: | | |
|------------------------------|--|---------------|------------------|
| | MLA 70453 | Surface Works | Railway Corridor |
| Alpha Township | 7 | 14 | 8 |
| Eureka Station Homestead | 12 | 14 | 11 |
| Villafield Station Homestead | 1 | 9 | 6 |
| Bonanza Station Homestead | 2 | 10 | 9 |
| Creek farm Station Homestead | 1 | 8 | 8 |
| Chesalon Station Homestead | 1 | 6 | 15 |
| Betanga Station Homestead | 2 | 12 | 18 |
| Corn Top Station Homestead | 3 | 12 | 18 |
| Oakleigh Station Homestead | 6 | 8 | 2 |
| Saltbush Station Homestead | 17 | 19 | 2 |

21.3.5.2. Environmental Values

The environmental values to be enhanced or protected are the qualities suitable for the well-being of a community, including its social and economic amenity, and for the well-being of the individual, including the individual's opportunities to sleep, relax and converse without unreasonable interference from intrusive noise or vibration.

The environmental values to be enhanced or protected, as set out in the Queensland *Environmental Protection (Noise) Policy 2008 (EPP (Noise))*, are:

- the qualities of the environment that are conducive to protecting the health and biodiversity of ecosystems
- the qualities of the environment that are conducive to human health and wellbeing, including by ensuring a suitable environment for individuals to do any of the following:
 - sleep
 - study or learn
 - be involved in recreation, including relaxation and conversation
- the qualities of the environment that are conducive to protecting the amenity of the community.

21.3.5.3. Environmental Protection Objectives

Acoustic quality objectives, as defined in the *EPP (Noise)* seek to protect the amenity of an acoustic environment. The indoor night-time goals effectively address sleep disturbances, while during the day it protects the ability to have a conversation.

The environmental protection objective for noise and vibration is to minimise the impacts of noise and vibration generated by the SGCP on sensitive receptors within close proximity to the mining lease so that the acoustic environment is conducive to the health and well-being of humans.

21.3.5.4. Performance Criteria

The acoustic quality objectives are expressed as indoor noise level goals for dwellings at night (10 pm to 7 am) and outdoor noise level goals during the day (7 am to 6 pm) and evening (6 pm to 10 pm). Furthermore the *EPP (Noise)* also includes acoustic quality objectives for critical habitats (as defined in a conservation plan under the *Nature Conservation Act 1992*). These objectives are contained in **Table 21-25**.

Table 21-25 Acoustic Quality Objectives for Dwellings during the Day (7 am – 6 pm), Evening (6 pm – 10 pm) and Night (10 pm – 6 am)

| Location | Time of Day | Acoustic Quality Objectives (Measured at the receptors) dB(A) | | | Environmental Value |
|--|-------------------|---|---------------------------------|--------------------------------|--|
| | | L _{Aeq} , adj, 1 hr | L _{A10} , adj, 1 hr | L _{A1} , adj, 1 hr | |
| Dwelling outdoors | Daytime & evening | 50 | 55 | 65 | Health and wellbeing |
| Dwelling indoors | Daytime & evening | 35 | 40 | 45 | Health and wellbeing |
| Dwelling indoors | Night-time | 30 | 35 | 40 | Health wellbeing in relation to the ability to sleep |
| Protected area, or an area identified under a conservation plan under the <i>Nature Conservation Act 1992</i> as a critical habitat or an area of major interest | Anytime | The level of noise that preserves the amenity of the existing area or place | | | Health and biodiversity of ecosystems |

The potential for low frequency noise in the range of 20 - 200 hertz (Hz) should be assessed in accordance with the *DEHP Ecoaccess Guideline: Assessment of Low Frequency Noise*.

Blasting Criteria

Open cut coal mining procedures often include drilling and blasting of overburden material above the coal to make removal of that material easier.

According to the guideline "Noise and Vibration from Blasting" (EPA, 2006), blasting should generally be limited to the hours of 9 am to 3 pm, Monday to Friday, and from 9 am to 1 pm on Saturdays. Blasting should not generally take place on Sundays or public holidays.

Blasting outside these recommended times will be approved only where:

- blasting during the preferred times is clearly impracticable (in such situations blasts will be limited in number and stricter airblast overpressure and ground vibration limits will apply) or
- there is no likelihood of persons in a noise-sensitive place being affected because of the remote location of the blast site.

Blasting activities must be carried out in such a manner that if blasting noise should propagate to a noise-sensitive place, then:

- the airblast overpressure must be not more than 115 dB (linear) peak for nine out of any 10 consecutive blasts initiated, regardless of the interval between blasts
- the airblast overpressure must not exceed 120 dB (linear) peak for any blast.

Blasting operations must be carried out in such a manner that if ground vibration should propagate to a vibration-sensitive place:

- the ground-borne vibration must not exceed a peak particle velocity of 5 mm per second for nine out of any 10 consecutive blasts initiated, regardless of the interval between blasts
- the ground-borne vibration must not exceed a peak particle velocity of 10 mm per second for any blast.

21.3.5.5. Control Strategies

Modelling indicates that the *EPP (Noise)* acoustic quality objectives to protect human health and wellbeing will be met at all locations (excluding the accommodation village).

For the on-site accommodation village to comply with the indoor acoustic quality objectives, the accommodation units will require air conditioning to allow windows to remain closed to provide sufficient noise reduction.

The calculated noise levels in Alpha comply with the goals to avoid background creep for all time periods.

However, noise levels at the homesteads close to and east of the SGCP are likely to exceed the goals to avoid background creep during the evening and night. Noise levels at the two most adversely affected locations, the Creek Farm Station Homestead and Chesalon Station Homestead, will exceed the night goal for approximately 15 % of the time.

The main contributors will be the trucks operating in exposed locations and the shovel operating close to natural surface (whilst in the pit).

To reduce background creep at the Creek Farm Station Homestead and Chesalon Station Homestead the following mitigation methods will be undertaken where practicable:

- optimisation of mine layout to shield noise generation; reductions in noise levels can be achieved by 6 dB(A) by operating trucks behind mounding
- shovels and other heavy equipment operated during the evening will be used deep in the pit rather than close to the pit surface.

Any noise control designed for these homesteads will be equally effective for other receptors to the east of SGCP.

The noise goals to protect background creep will be exceeded at the accommodation village during all time periods however once the village is constructed and occupied it will generate self-noise (i.e. air conditioning, refrigeration and general activities) which will result in an increase in ambient noise levels.

The blast vibration guideline levels are expected to be met at all sensitive receptors for a maximum instantaneous charge (MIC) of 500 kilograms (kg) therefore no mitigation measures are proposed.

Road Traffic noise is expected to be below the recommend dB(A) noise increase, therefore no specific mitigation measures are proposed.

Due to the large separation distances between the railway and sensitive receptors, all sensitive receptors readily comply with the QR noise level goals for railways, therefore no specific mitigation measures are proposed.

21.3.5.5.1. Monitoring

It is proposed to monitor noise at the accommodation village and initially monitor background creep at the Creek Farm and Chesalon Station homesteads. A noise management plan will detail ongoing noise monitoring requirements including responses to noise complaints.

21.3.5.5.2. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.

21.3.5.5.3. Reporting

Reporting will be conducted internally on monitoring results, incidents and complaints and externally to relevant regulatory bodies on request.

21.3.5.5.4. *Commitments*

Upon receiving a valid complaint in relation to noise and vibration nuisance, the complaint will be investigated and noise and vibration mitigation measures must be implemented as soon as practicable if the complaints are substantiated.

The SGCP will achieve and maintain the level of noise and vibration which is outlined in the EA. Where site activities are the cause of a complaint, a revision of noise and vibration management procedures will occur for the activities identified as causing noise or vibration nuisance or a high noise event.

21.3.5.5.5. *Corrective Actions*

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

21.3.5.6. *Proposed EA Conditions*

Noise and Vibration

Noise Nuisance

- D1** Subject to conditions D2 and D3 noise from the mining activity must not cause an environmental nuisance, at any sensitive or commercial place.
- D2** When requested by the administering authority, noise monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.
- D3** If the EA holder can provide evidence through monitoring that the limits defined in **Table 21-26** and **Table 21-27**, are not being exceeded then the holder is not in breach of condition D1. Monitoring must include:
- a) LA, max adj, T
 - b) relevant background sound level
 - c) the level and frequency of occurrence of impulsive or tonal noise
 - d) atmospheric conditions including wind speed and direction
 - e) location, date and time of recording.

- D4** If monitoring indicates exceedance of the limits in **Table 21-26** and **Table 21-27**, then the EA holder must:
- address the complaint including the use of appropriate dispute resolution if required
 - immediately implement noise abatement measures so that emissions of noise from the activity do not result in further environmental nuisance.
- D5** The method of measurement and reporting of noise levels must comply with the latest edition of the administering authority's noise measurement manual.

Table 21-26 Noise Limits

| Noise level dB(A) | Monday to Sunday (including Public Holidays) | | |
|---------------------------------|---|--------------|--------------|
| | 7 am – 6 pm | 6 pm – 10 pm | 10 pm – 7 am |
| | Noise Measured at a 'Sensitive or Commercial Place' | | |
| L _{A10} , adj, 10 mins | B/g + 5 | B/g + 5 | B/g + 3 |
| L _{A1} , adj, 10 mins | B/g + 10 | B/g + 10 | B/g + 5 |

NOTE: "B/g" means background sound pressure level measured in accordance with the latest edition of the administering authority's noise measurement manual. **Table 21-26** does not purport to set operating hours for the mining activities.

Table 21-27 Airblast Overpressure Level

| Parameter | Airblast Overpressure Measured at a Sensitive or Commercial Place | |
|--|---|---------------------------------|
| | Monday to Sunday 9 am – 7 pm | Other Times and Public Holidays |
| Air blast overpressure level (dB [Lin] Peak) | Maximum 115 dB for 4 out of 5 consecutive blasts | No blasting to occur |
| Air blast overpressure level (dB [Lin] Peak) | 120 dB maximum | No blasting to occur |

Note: **Table 21-27** does not purport to set limits applicable to any particular explosive blast, rather sets design criteria for every explosive blast.

Vibration Nuisance

- D6** Subject to Conditions D7 and D8 vibration from the mining activity must not cause an environmental nuisance, at any sensitive place.
- D7** When requested by the administering authority, vibration monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive or commercial place, and the results must be notified within 14 days to the administering authority following completion of monitoring.

- D8** If the EA holder can provide evidence through monitoring that the limits defined in **Table 21-28**, are not being exceeded then the holder is not in breach of condition D6. Monitoring must include:
- a) peak particle velocity (mm/s)
 - b) air blast overpressure level (dB linear peak)
 - c) location of the blast/s within the mining area (including which bench level)
 - d) atmospheric conditions including temperature, relative humidity and wind speed and direction
 - e) location, date and time of recording.

Table 21-28 Vibration Limits

| Vibration Parameter | Vibration Measured at a Sensitive Place | |
|-------------------------------|---|---------------------------------|
| | Monday to Sunday 9 am – 7 pm | Other Times and Public Holidays |
| Peak particle velocity (mm/s) | Maximum 5 mm/s for 9 out of 10 consecutive blasts | No blasting to occur |
| Peak particle velocity (mm/s) | 10 mm/s maximum | No blasting to occur |

- D9** For the purposes of condition D6 the mining activities will not cause environmental nuisance where noise from the mining activities does not exceed the criteria specified in **Table 21-28**.
- D10** If monitoring indicates exceedence of the limits in **Table 21-28** then the EA holder must:
- a) address the complaint including the use of appropriate dispute resolution if required
 - b) immediately implement noise abatement measures so that emissions of noise from the activity do not result in further environmental nuisance.
- D11** Every explosive blast for the mining activity shall be designed by a competent person to achieve the criteria specified in **Table 21-27** and **Table 21-28**.
- D12** All relevant information pertaining to the design of every explosive blast for the mining activity in relation to the criteria specified in **Table 21-27** and **Table 21-28** shall be kept in written and diagrammatic form.

21.3.6. Waste Management

21.3.6.1. Background

Wastes will be generated throughout the construction, operational and decommissioning phases of the SGCP. Natural resource efficiency, cleaner production, pollution prevention and waste minimisation are all important components of the overall SGCP waste management strategy. Waste management strategies will apply over the construction, operational and decommissioning phases to minimise potential impacts of waste generation on the environment or health of the SGCP personnel or the local community. Waste is generally split into two types:

- mining waste
- non-mining waste (general and regulated).

The potential impacts associated with general and regulated waste are:

- gross waste accumulation
- loss of aesthetic value
- risk of vector-borne diseases from waste disposal sites
- land contamination through inappropriate storage and handling of wastes.

A potential impact associated with mine waste management is the degradation of water quality through contact with mine waste products in operational areas, including potentially saline or acid generating overburden material.

The scale of the SGCP requires a suitable waste disposal facility for long-term effective treatment of wastes generated during construction and operational phases. An on-site landfill facility will be established at the start of the construction phase following the approval of MLA 70453 to accommodate residual wastes that cannot be practically reused or recycled.

21.3.6.2. Environmental Values

The environmental values at the SGCP that may potentially be impacted upon by mine waste include:

- the life, health and wellbeing of people
- biological integrity and diversity of ecosystems and processes found on and surrounding the Project site
- the integrity of receiving environments, including land, air, and water
- the stability of disturbed land and its suitability for post mining use
- visual amenity.

21.3.6.3. Environmental Protection Objectives

The protection of water quality, air quality and land resources are the main objectives of the waste management strategy, along with responsible management of wastes so that any direct or indirect impacts on the health and well-being of people and the environment are avoided.

Waste management will aim to promote sustainable waste management practices in accordance with the *Waste Reduction and Recycling Act 2011 (WRR Act)*.

21.3.6.4. Performance Criteria

The Proponent is committed to minimising the impact of waste on the environment and the community, wherever practicable, through the adoption of the waste and resource management hierarchy from the *WRR Act*, as well as the goals identified in the *QLD Waste Reduction and Recycling Strategy 2010 – 2020 (DERM, 2010)*.

The QLD Reduction and Recycling Strategy aims to:

- reduce waste
- optimise recovery and recycling
- develop sustainable waste industries and jobs.

A continuous improvement approach will be adopted for the SGCP over the life of the mine. This approach will involve reviewing and modifying processes, materials and operating practices throughout the mine life when required. The development of quantifiable key performance indicators will be included in the Waste Management Plan (WMP).

21.3.6.5. Control Strategies

Regulated and General Wastes

A WMP will be developed prior to commencement of the SGCP and will be based on the following principles:

- effective implementation of the waste management hierarchy by focusing on:
- waste avoidance and reduction - by implementing practices that aim to reduce the amount of waste produced
- waste reuse - by encouraging reuse practices and regular monitoring of industry developments to identify opportunities for external reuse programs
- waste recycling - by implementing a recycling program with the aim of recycling all waste materials that have some value and where recycling options are available. Materials such as metals, oils, solvents, glass, paper and plastics will be assessed for recycling suitability

- energy recovery - monitoring of developments within the industry to identify potential opportunities for the generation of energy from waste materials
- waste disposal - if no other options are available, non-recyclable wastes generated will be disposed of at the landfill facility.
- continual development and improvement of waste management practices involving water conservation, treatment and reuse, waste reduction and resource recovery
- compliance with national and state waste management policies, the EP Act and associated regulatory instruments as a minimum.

The Proponent recognises that cleaner production has both economic and environmental benefits. Techniques to maximise the reuse of waste water and recycling of waste products will be applied to the SGCP with appropriate refinement on the basis of operational experience.

The cleaner production techniques that apply to the SGCP include:

- production process modification - CHPP will comprise a facility that employs leading practice technology in terms of coal resource recovery and waste minimisation
- input substitution - this refers to the selection and use of products which are less polluting and have a longer 'product life' (such as lubricants and coolants)
- product reformulation - this technique is not currently available for the SGCP
- production selection - wherever practicable, non-hazardous products will be selected in preference to hazardous materials
- improved operation and maintenance - this will involve the selection and use of the most appropriate and practicable fixed and mobile plant and equipment for use in coal extraction, transportation and processing including vehicles, and high levels of maintenance to maximise operating efficiency at the SGCP
- reuse of resources - reuse of resources that will otherwise be classified as wastes is the most common cleaner production technique applicable to the SGCP (e.g. reuse wooden pallets, cleared vegetative material, waste water, metals, lead from batteries) (refer to **Table 21-29** and **Table 21-30**)
- closed-loop recycling - where a product is recycled and used again in the same form (e.g. wooden pallets), is applicable to the SGCP.

Construction Phase

Indicative estimates of waste streams and volumes produced during the two year SGCP construction phase are shown in **Table 21-29**.

Where appropriate, the justification for waste volumes is described in **Table 21-29**. Where justification is not specifically provided, waste volumes have been generated by extrapolation from publicly available waste generation rates for similar existing or proposed coal mines (on the basis of workforce numbers or production rates).

A detailed inventory of waste streams and volumes will be developed as part of the Definitive Feasibility Study (DFS) and detailed engineering design processes.

Table 21-29 General and Regulated Waste Management – SGCP Construction Phase

| Type | Source(s) | Management | Approximate Quantity of Waste |
|--|--|---|---|
| Concrete and masonry | Mine infrastructure area, accommodation village, CHPP, conveyors, power transmission lines, water management infrastructure. | Only procure the amount necessary. Reuse where practicable (e.g. by crushing and using as road base). Disposal at the on-site landfill facility. | 1,705 tonnes (t) |
| Wooden pallets and other processed timber | Construction activities (e.g. CHPP, warehouse). | Those that are reusable will be reused on-site or returned to the supplier/owner. Any unserviceable pallets will be sent to general waste. | 1,705 t |
| Steel and scrap metal | Accommodation village, CHPP, mine infrastructure area, power transmission lines. | Only procure the amount necessary. Segregation and collection with transportation off-site by a licensed regulated transporter for recycling at a licensed waste recycling facility. Non-recyclable scrap metal will be disposed of to landfill as a last resort. | 500 t |
| Sealants, paints and resins | Mine infrastructure area, CHPP. | Procure only the amount necessary. Collection on-site and storage in a banded area. Transportation to occur off-site by a licensed regulated waste transporter. | Minor amounts |
| Electrical wastes | Waste from construction activities or temporary structures. | Segregation and collection on-site. Transportation by a waste contractor for off-site recycling or reprocessing where possible. | 570 t |
| Green waste | Cleared vegetation for construction phase. | Reuse on-site as habitat features, erosion control or rehabilitation material where practicable. | 105,300 t (based on 585 hectares [ha] of vegetation clearance, with 180 t biomass/ha) (Westman and Rogers, 1977). |
| General wastes including putrescible & organic (food waste), some plastics and paper | Construction offices, accommodation village, workshops. | General waste will be disposed of at the on-site landfill facility. | 28,800 t |
| Paper and cardboard, plastics, glass, aluminium cans | Construction offices, accommodation village. | Collection and segregation on-site. Transportation by a waste contractor for off-site recycling. | 2,000 t |

Table 21-29 General and Regulated Waste Management – SGCP Construction Phase (cont)

| Type | Source(s) | Management | Approximate Quantity of Waste |
|--|--|--|--|
| Grease trap wastes | Accommodation village. | Placed in a bunded storage container and collected by a licensed waste contractor for reuse, reprocessing, recycling or disposal. | 6 t |
| Waste oil and containers | Servicing of vehicles and equipment, construction and assembly of mining equipment, workshops. | Collected and stored on-site in a bunded area. Transported off-site by a licensed regulated waste transporter, to a licensed regulated waste receiver, for recycling. | 5,100 t |
| Batteries | Light vehicles, machinery, radios, mobile phones. | Collection and segregation on-site. Transported by a licensed waste contractor for off-site recycling or reprocessing. | 34 t |
| Tyres | Light and heavy vehicles. | Where an economic off-site tyre recycling option is identified, the Proponent will consider tyre recycling. Until then tyres will be stored and appropriately disposed of in overburden material once mining operations commence. No water interaction following in-pit placement of tyres will occur. | 1,070 t (based on the assumption that heavy vehicle tyres are changed every 12 months and weigh 3 t, while light/medium vehicle tyres are changed every 24 months and weigh 50 kg. |
| Sewage effluent | Construction offices, accommodation village, mine infrastructure area. | Sewage pump stations will be located at the accommodation village, mine infrastructure area and CHPP. The sewage wastewater will feed directly into the STP where it will be treated to meet a Class B quality standard (Public Health Regulation 2005, Schedule 3D). During construction an additional modular system will be required to deal with the waste flow associated with the workforce of 1,600 personnel. | 280 ML |
| Sewage sludge | STP | Collected and transported off-site by a licensed waste contractor for disposal at a licensed waste disposal facility. | 80 t |
| Gaseous emissions of CO ₂ , NO _x , SO ₂ and CH ₄ | Combustion of diesel. | Direct and indirect measures. | 19,600 t |

Operational Phase

The type, source, projected quantities and management of other operational wastes (apart from waste rock and coal washing wastes) to be produced during the operational phase of the SGCP are presented in **Table 21-30**.

Where appropriate, the justification for waste volumes is described in **Table 21-30**. Where justification is not specifically provided, waste volumes have been generated by extrapolation from publicly available waste generation rates for similar existing or proposed coal mines (on the basis of workforce numbers or production rates).

A detailed inventory of waste streams and volumes will be developed as part of the DFS and detailed engineering design processes.

Table 21-30 General and Regulated Waste Management – SGCP Operational Phase

| Type | Source(s) | Management | Annual Quantity |
|--|--|--|--|
| Concrete and masonry | Minor maintenance works. | Stockpiled for reuse on-site (e.g. as road base) or disposed of to landfill. | Minimal |
| Wooden pallets and other processed timber | MIA, CHPP, minor maintenance works. | Wooden pallets or wood that is reusable will be reused on-site or returned to the supplier/owner. Any unserviceable pallets will be sent to general waste. | 600 kg |
| Green waste | Cleared vegetation for construction phase and early works. | Reused on-site as habitat, erosion control or rehabilitation material where practicable. | 105,300 t (based on 585 ha of vegetation clearance, with 180 t biomass/ha) (Westman and Rogers, 1977). |
| General wastes including putrescible & organic (food waste), some plastics and paper | Offices, kitchenettes, crib rooms, administration area, workshop, accommodation areas. | General waste will be disposed of at the on-site landfill facility. | 3,000 t |
| Paper and cardboard, glass, plastics and aluminium cans | Workshop, offices, accommodation areas. | Collection and segregation on-site. Transportation off-site by a licensed regulated waste contractor for off-site recycling. | 180 t |
| Scrap metal | CHPP, MIA, accommodation village. | Only procure the amount necessary. Segregation and collection on-site. Transportation off-site for recycling. | 1,200 t |
| Waste oil | Vehicle and plant maintenance operations, CHPP, workshop. | Oil will be collected, and then transported off-site by a licensed regulated waste transporter to a licensed regulated waste receiver, for recycling. | 1,200 t |

Table 21-30 General and Regulated Waste Management – SGCP Operational Phase (cont)

| Type | Source(s) | Management | Annual Quantity |
|--|---|--|--|
| Oily sludge, absorbent, grease and oily rags (hydrocarbon contaminated material) | CHPP, workshop. | These will be collected on-site before being transported off-site by a licensed regulated waste contractor, for recycling or treatment and disposal. | 1,700 t |
| Waste oil/hydrocarbon drums | Vehicle and plant maintenance operations, CHPP, workshop. | Drums will be transported off-site by waste contractor for off-site reuse, recycling or disposal. Oil will be collected, and then transported off-site by a licensed regulated waste transporter to a licensed regulated waste receiver, for recycling. | 185 t |
| Batteries | MIA. | Collection and segregation on-site. Transported by a licensed waste contractor for off-site recycling or reprocessing. | 23 t |
| Conveyor belts | Conveyors, workshops. | Where an economic off-site conveyor belt recycling option is identified, the Proponent will consider conveyor belt recycling. Until then conveyor belts will be stored and appropriately disposed of in overburden material once mining operations commence. | 100 t |
| Blasting waste (detonating cord) | Blasting. | No specialist management is proposed as most detonating cord becomes buried during blasting and is disposed of in waste rock emplacement facilities during the overburden removal process. | Minimal |
| Electrical wastes | Minor maintenance. | Stockpiled for removal by a licensed waste contractor for reuse, recycling or disposal. | 500 kg |
| Waste water | CHPP, washdown areas, contaminated drainage. | Where practicable, runoff water (i.e. 'clean water') will be diverted away from mining operations and redirected back into existing drainage and creek systems. Runoff that cannot be diverted away from mining operations (i.e. 'mine affected water') will be collected in sediment ponds or sumps and where practicable, reused for operational purposes (e.g. at the CHPP, for dust suppression on haul roads or for vehicle washdown). The consumption of raw water will be kept to a minimum by implementing water efficient work practices and recycling where practicable. | Approximately 3,650 ML per annum of treated waste water will be piped to the Sediment Dam from the Waste Water Treatment Plant. Approximately 131 ML per annum of washdown area waste water will be produced. |

Table 21-30 General and Regulated Waste Management – SGCP Operational Phase (cont)

| Type | Source(s) | Management | Annual Quantity |
|--|--|--|-----------------|
| Sewage sludge | STP. | Collected and transported off-site by a licensed waste contractor for disposal at a licensed waste disposal facility. | 34 t |
| Sewage effluent | Construction offices, accommodation village, mine infrastructure area. | Sewage pump stations will be located at the accommodation village, mine infrastructure area and CHPP. The sewage wastewater will feed directly into the STP where it will be treated to meet a Class B quality standard (Public Health Regulation 2005, Schedule 3D). | 112 ML |
| Grease trap wastes | Accommodation village, workshops. | Waste grease to be placed in a bunded storage container to be collected by a licensed contractor for reuse, reprocessing, recycling or disposal. | 2.5 t |
| Tyres | Workshops. | Where an economic off-site tyre recycling option is identified, The Proponent will consider tyre recycling. Otherwise burial of scrap tyres will be in the waste rock emplacement. Positioning of the tyres within the in-pit waste rock emplacement will not compromise stability. No water interaction following in-pit placement of tyres will occur. Tyres will be stored further than 10 m from any combustible or flammable material. The size of scrap tyre stacks will be managed by storing for the least amount of time possible prior to disposal. | 1,895 t |
| Gaseous emissions of CO, NO _x , SO ₂ and CH ₄ . | Combustion of diesel, blasting, burning of cleared vegetation, and methane emissions (fugitive) from coal. | Direct and indirect measures. | 12.50 mt |

Mine Wastes

Appropriate storage of the waste rock and coal rejects has been a major component of the planning process for the SGCP. Prior to the commencement of mining operations, topsoil will be removed and stockpiled for later use in progressive mine rehabilitation on re-profiled slopes. The final landform will be physically stable and suitable for the agreed post mining landuse. The landform will be shaped to shed runoff in order to minimise any potential leaching or erosion.

A portion of the boxcut waste material will be used for the construction of flood prevention berms and the remainder will be stored in waste rock emplacements. Overburden removed by draglines will be placed in previous strips.

Any PAF material will be selectively handled where practicable to minimise the potential for acid rock drainage.

The interburden waste will be dumped in-pit where practicable. Reject material from coal washing will also be dumped within the dragline waste rock piles.

21.3.6.5.1. Monitoring

The movement of regulated waste other than that specified in Schedule 7 of the *Environmental Protection Regulation 2008 (EP Regulation)* is required to be monitored by a waste tracking system. Waste tracking will be undertaken at the SGCP with any wastes generated to be tracked in accordance with the *EP Regulation*.

The WMP will include procedures for identification and management of trackable wastes associated with the SGCP. All employees and waste management contractors must act in compliance with these procedures. Trackable wastes will be transported by licensed waste transport contractors to a facility licensed to accept waste of this nature.

The site where the regulated waste is disposed of must be licensed by DEHP. Where the Proponent and/or a contractor carry out these activities, the Proponent and the contractor will be required to hold the appropriate approvals. This requirement will be incorporated into the WMP. Monthly waste monitoring and auditing will be undertaken at the SGCP and be included as a component of the site WMP. The WMP will include continuous improvement mechanisms through auditing and review.

Monitoring will include the recording of waste types and volumes generated on-site (e.g. general waste, bulk general waste, regulated waste, scrap metal and recyclables) and waste transported off-site. Records will be maintained in order to determine where large quantities of certain wastes are being produced. Records will be reviewed on a regular basis and appropriate corrective actions formulated to reduce or eliminate waste generation or impacts associated with waste.

Ongoing geochemical sampling and monitoring of potential impacts of waste on surface water/groundwater will occur.

21.3.6.5.2. *Auditing*

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.

21.3.6.5.3. *Reporting*

In addition to the Queensland Government's regulatory requirements for waste management, the SGCP will be required to comply with relevant National Environmental Protection Measures (NEPM) developed by the National Environmental Protection Council (NEPC). The relevant NEPM for the SGCP is the National Pollutant Inventory (NPI), under which emissions and wastes are reported. All NPI information is accessible to the community, industry and government through the NPI website.

The NPI is a database designed to provide the community, industry and government with information on the types and amounts of certain substances being emitted to land, air and water. The NPI NEPM provides the framework for the establishment of the NPI and sets out the requirements for reporting, including how a facility triggers a reporting obligation and what substances are on the reporting list.

The SGCP will trigger a reporting obligation under the NPI and consequently, the SGCP will be required to estimate and report mine emissions to the NPI on an annual basis in accordance with the National Pollutant Inventory Guide (Department of Sustainability, Environment, Water, Population and Communities [SEWPaC], 2011) and associated manuals (e.g. Emission Estimation Technique Manual for Mining [SEWPaC, 2011]).

21.3.6.5.4. *Commitments*

- A register of all chemicals stored at the SGCP will be maintained
- The storage and handling of flammable and combustible liquids will be in accordance with AS 1940 – Storage and Handling of Flammable and Combustible Liquids
- All regulated waste will be appropriately disposed of to a facility licensed to receive such wastes and, where required, be tracked
- As part of the staff awareness and induction program, re-use and recycling will be encouraged
- A WMP will be developed prior to the construction phase and will detail waste management for the construction and operational phases
- Geochemical sampling and assessment will continue to be undertaken over the life of the SGCP to validate mine waste characteristics and the proposed management measures.

21.3.6.5.5. *Corrective Actions*

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

21.3.6.6. *Proposed EA Conditions*

Waste Management

Storage of Tyres

- E1** Scrap tyres stored awaiting disposal or transport for take-back and recycling, or waste-to-energy options must be stored in stable stacks and at least 10 m from any other scrap tyre storage area, or combustible or flammable material, including vegetation.
- E2** All reasonable and practicable fire prevention measures must be implemented, including removal of grass and other materials within a 10 m radius of the scrap tyre storage area.
- E3** Where no feasible recycling or waste-to-energy options area available, disposing of scrap tyres resulting from the mining activities in waste rock emplacements is acceptable, provided tyres are placed as deep in the waste rock as reasonably practicable.
- E4** Scrap tyres resulting from the mining activities disposed within the operational land must not impede saturated aquifers or compromise the stability of the consolidated landform.
- E5** A WMP, in accordance with the *Waste Reduction and Recycling Act 2011* must be implemented and must cover:
 - a) how the EA holder will recognise and apply the waste management hierarchy
 - b) identify characterisations of wastes generated from the Project and general volume trends over the past five (5) years
 - c) waste commitments with auditable targets to reduce, reuse and recycle
 - d) waste management control strategies including:
 - e) the type of wastes
 - f) segregation of the wastes
 - g) storage of the wastes
 - h) transport of the wastes
 - i) monitoring and reporting matters concerning the waste
 - j) emergency response planning

- k) disposal, reused and recycling options.
 - l) identify the potential adverse and beneficial impacts of the wastes generated
 - m) hazardous characteristics of the wastes generated including disposal procedures for hazardous wastes
 - n) processes to be implemented to allow for continuous improvement of the waste management systems
 - o) identification of responsible staff (positions) for implementing, managing and reporting the WMP
 - p) staff awareness and induction programs that encourage re-use and recycling.
- E6** Where possible and practical, vegetation waste from clearing shall be spread on rehabilitated areas. Vegetation waste only may be burnt as a last resort and only if there is minimal risk of causing nuisance to the neighbouring sensitive receptors. General waste must not be burnt or allowed to burn on the licensed site unless permitted by the administering authority.
- E7** All regulated waste removed from the site must be removed by a person who holds a current approval to transport such waste under the provisions of the *EP Act*.
- E8** Regulated waste must only be removed to a facility licensed under the *EP Act* to receive such waste.

Waste Rock Emplacement Facility

Certification and Operation

- E9** The disposal of mine waste on-site will only take place in authorised waste rock emplacement facilities.
- E10** Waste rock emplacement facility(s) shall be designed to prevent environmental harm arising from contaminants being generated in the facility, leachate and runoff from the facility or other sources.
- E11** Authorised waste rock emplacement facility(s) must be constructed and maintained in accordance with certified design plans, submitted to the administering authority.
- E12** Design plans for the authorised waste rock emplacement facility(s) must include performance indicators, such that:
- a) during operations the waste rock emplacement facility(s) will be operated with minimal or no potential for adverse environmental harm resulting from collapse of any component of facility
 - b) the potential for leachate generation will be minimal or non-existent

- c) adequate drainage structures, erosion protection and storage are provided to manage seasonal and rare rainfall events with minimal or no environmental harm.

E13 Construction of any waste rock emplacement facility must not commence unless:

- a) the EA holder has submitted to the administering authority two (2) copies of a design plan
- b) certification from a suitably qualified and experienced person that the design of the waste rock emplacement facility(s) will deliver the performance stated in that design plan and that it will be compliant in all other respects with this EA
- c) at least 20 business days has passed since the receipt of those documents by the administering authority or
- d) the administering authority notifies the EA holder that a design plan and certification has been submitted for that emplacement facility.

Operational Plan

E14 An operational plan must be developed and maintained for the waste rock emplacement facility. The operational plan must include but not be limited to:

- a) description of landform development stages of the waste rock emplacement facility
- b) placement technique for waste rock and waste material from the coal handling and processing plant on the SGCP
- c) management of any containment structures within the waste rock emplacement facility designed to contain materials from the coal handling and processing plant on the SGCP
- d) demonstration of how operations of the waste rock facility are consistent with the accepted design plan for the facility
- e) decommissioning and rehabilitation strategies for the waste rock emplacement facility that demonstrate consistency with conditions of this EA.

21.3.7. Rehabilitation and Decommissioning

21.3.7.1. Background

Rehabilitation

The overriding principle for the SGCP rehabilitation program is that areas disturbed by mining activities will be progressively rehabilitated to a stable landform with a self-sustaining vegetation cover.

Decommissioning

Decommissioning will occur at the cessation of mining operations but prior to formal mine closure and will involve the removal of mine infrastructure and services, and the remediation of all disturbed areas.

Decommissioning and rehabilitation of the SGCP will be undertaken in a manner that minimises environmental harm and risk to human health. Any dangerous goods or chemicals will be removed from site and any contaminated areas will be managed and rehabilitated to minimise danger posed to the wider public.

The decommissioning and final rehabilitation of the SGCP will be staged over several years. A contaminated site assessment will be conducted as part of the Final Rehabilitation Report. This assessment will recommend appropriate remediation activities for any identified contaminated land. Following remediation works, no sites will require registration on the Queensland Contaminated Land Register (CLR).

21.3.7.2. Environmental Values

The environmental values that have been considered in relation to rehabilitation and decommissioning at the SGCP include:

- the health and well-being of people
- the diversity of ecological processes and associated ecosystems
- the maintenance of soil resources and agricultural land suitability
- the maintenance of water quality and flows in waterways
- the creation of safe, stable, non-polluting and sustainable landforms.

21.3.7.3. Environmental Protection Objectives

Specifically, the rehabilitation strategy for the SGCP will have the following objectives:

- mining and rehabilitation will aim to create a landform with land use suitability similar to that prior to disturbance unless other beneficial land uses are pre-determined and agreed
- mine wastes and disturbed land will be rehabilitated to a condition that is self-sustaining or to a condition where the maintenance requirements are consistent with an agreed post-mining land use
- the water management system will aim to capture all mine affected water and will aim to maximise on-site storage capacity so existing and future use of downstream water is not compromised.

21.3.7.4. Performance Criteria

The guideline, Rehabilitation Requirements for Mining Projects (DEHP, 2012), provides information on both progressive and final rehabilitation requirements for mining projects operating in Queensland under the provisions of *EP Act*. This was the overarching guideline used in determining the SGCP rehabilitation and decommissioning management strategy.

The SGCP will adhere to the guideline by:

- setting progressive rehabilitation goals and objectives, in consideration of the rehabilitation hierarchy
- setting rehabilitation indicators and appropriate monitoring programs
- setting completion criteria to be achieved prior to release of rehabilitated land.

In addition to the guideline, the rehabilitation strategy for the SGCP will consider the requirements contained in:

- Environmental Management Policy for Mining in Queensland 1991 (Department of Mines and Energy, 1991)
- A Policy Framework to Encourage the Progressive Rehabilitation of Large Mines (Environmental Protection Agency [EPA], 2004)
- Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland 1995 (Department of Minerals and Energy, 1995)
- Leading Practice Sustainable Development Program for the Mining Industry: Mine Rehabilitation (Department of Industry, Tourism and Resources, 2006a)
- Leading Practice Sustainable Development Program for the Mining Industry: Mine Closure and Completion (DITR, 2006b).

21.3.7.5. Control Strategies

Erosion Mitigation

Erosion and sediment control is an essential component to achieving site stability, particularly on rehabilitated landforms that have steep or long slopes, and is usually achieved through a combination of vegetation establishment, structural cladding and surface drainage control.

Major earth works programs will be scheduled to avoid the high rainfall period between December and March, where practicable.

Disturbed areas will be stabilised as quickly as possible to limit erosion. Progressive revegetation will be undertaken and erosion and sediment control measures will be employed, including:

- minimising the area disturbed
- undertaking topsoil stripping and stockpiling immediately prior to earthworks, where practicable
- progressively rehabilitating available areas
- installing runoff control devices to reduce slope length (e.g. 'whoa boys', berms, temporary sediment fences, straw bale banks or geotextile socks)
- treating runoff in sediment traps and dams
- removing all temporary control measures after the disturbed site is stabilised
- minimising the gradient of the final landform
- establishing groundcover as soon as practicable.

Waste Water Mitigation

Water management designs will allow for the segregation of clean and mine affected water, by directing all water that comes into contact with coal stockpiles, hardstands, workshop areas, waste rock emplacements and haul roads into adequately sized sediment retention ponds. This water will be used for dust suppression on roads and product stockpiles when necessary. The SGCP will recycle water stored in these dams for use in the CHPP and for haul road watering purposes.

Rainwater falling on undisturbed areas is classified as clean water and diverted away from disturbed areas by grass and/or rock-lined drainage lines. Water management designs for the SGCP will enable the separation of clean and mine affected water.

Clearing Vegetation

Clearing of vegetation will be undertaken using a staged approach. Staged clearing of vegetation allows animals to move away from clearing operations into adjacent, uncleared habitats. Clearing will also be conducted with fauna spotter-catchers in communication with the operators of the clearing machinery. Fauna removal will be undertaken immediately prior to clearing.

Rehabilitation and Revegetation

Rehabilitation of disturbance areas will be undertaken throughout the life of the SGCP in accordance with a rehabilitation management plan. A Mine Rehabilitation Plan will be prepared to direct land rehabilitation during and after the operational life of the mine. Re-establishing vegetation cover will be undertaken with a view to creating self-sustaining ecosystems similar to surrounding ecosystems. The final land use will be a combination of grazing and native bushland.

Only native species will be used for revegetation, apart from any sterile grass cultivars that are required to ensure soil stability. The use of exotic grass species (e.g. buffel grass) in the rehabilitation of native bushland areas is strongly discouraged as such activities may promote the spread of the exotic grass species into otherwise unaffected areas, and restrict the development of the native groundcover vegetation. Locally collected seed will be used where practicable to preserve local genetic integrity.

Buffer zones will be established around areas of threatened ecological communities and communities with a conservation-significant biodiversity status, where clearing is adjacent to these areas.

Retained areas of native vegetation will be monitored and managed for the life of the project to reduce weed infestation and promote biodiversity values.

Trees will be felled into the construction zone to avoid impacting on vegetated margins.

Topsoil and mulch will be stockpiled where practicable for use on retained vegetation and rehabilitation areas to promote revegetation and retention of soil quality.

Vegetation clearing and construction will be limited to dry weather conditions where practicable to minimise erosion, runoff and soil disturbance.

Disturbed vegetation areas that are no longer required post-construction will be stabilised and revegetated as soon as practicable and monitored for weeds as per the weed and pest animal management plan.

21.3.7.5.1. Monitoring

Erosion Monitoring

The extent of soil loss from rehabilitated sites relative to background rates of soil loss (from reference sites) is an indicator of landform stability. Rehabilitated sites will be monitored on final slopes to track and identify erosion.

The erosion monitoring program will include the following:

- the logging of rainfall and climatic conditions
- an assessment of vegetation cover at permanent, representative monitoring sites (i.e. reference sites)
- documenting evidence of failure or instability on rehabilitated slopes at reference sites
- maintaining photographic records at permanent representative photographic stations, recorded on a regular basis
- an assessment of upstream and downstream water quality, including parameters that may be indicative of excessive erosion, such as sediment concentration.

This qualitative surveying will be undertaken to directly determine sediment loss from landforms. Sediment traps may also be used as an indicator of soil loss.

Diversion Drains

Water diversion drains will be required to divert clean water around the SGCP disturbance areas. Monitoring of impacts associated with alterations to the drainage regime will be conducted on regular intervals and if necessary rectification works will be undertaken to mitigate affected areas.

Rehabilitation

Rehabilitation will be monitored during operations and after final rehabilitation has been completed to validate rehabilitation performance and identify any additional work required to meet success criteria. This monitoring will include an assessment of:

- plant establishment, growth, diversity and cover
- evidence and type of erosion.

Rehabilitation performance criteria will be submitted to the DEHP for review and comment in a Rehabilitation Management Plan. The Rehabilitation Management Plan will, at a minimum:

- develop design objectives for rehabilitation of disturbed areas and post-mining land uses across the mine
- specify soil and waste rock characteristics for use in rehabilitation
- detail rehabilitation methods applied to different areas of the SGCP
- identify rehabilitation performance criteria for different rehabilitation areas
- explain planned native vegetation rehabilitation areas and corridors
- identify rehabilitation sites to be used to develop rehabilitation success criteria
- develop a contingency plan for rehabilitation maintenance or redesign
- describe end of mine landform design plan and post mining land uses across the mine
- propose endangered regional ecosystem (ERE) management and offset protection.

In addition to rehabilitated areas, reference sites will be monitored to compare the development and success of the rehabilitation against a control. Monitoring will be conducted periodically by independent, suitably skilled and qualified persons at locations which will be representative of the range of conditions on the rehabilitating areas. Annual reviews will be conducted of monitoring data to assess trends and monitoring program effectiveness.

21.3.7.5.2. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.

21.3.7.5.3. Reporting

A report will be prepared periodically to include details of rehabilitation monitoring results and the issues which occurred with rehabilitation processes.

At the end of mine life, a Registered Professional Engineer of Queensland (RPEQ) will assess the geotechnical issues and erosivity of the proposed final landforms, including the final void, to demonstrate long-term landform stability.

21.3.7.5.4. Commitments

At closure the SGCP will have rehabilitated disturbed land to a stable landform with a self-sustaining vegetation cover.

The SGCP will decommission the site in consultation with the landowner.

21.3.7.5.5. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

21.3.7.6. Proposed EA Conditions

Rehabilitation and Decommissioning

Rehabilitation Landform Criteria

- F4** All areas significantly disturbed by mining activities must be rehabilitated to a stable landform with a self-sustaining vegetation cover in accordance with **Table 21-31** and **Table 21-32**.

Table 21-31 Final Land Use and Rehabilitation Approval Schedule

| Details | Disturbance Type | | | | | |
|---|------------------|------------------------------------|----------------------|----------------|----------|--|
| | Residual Voids | Waste Rock Emplacement Facility(s) | Sediment/Supply Dams | Infrastructure | ROM Area | Road(s) and Tracks |
| Projective surface area (ha) | TBA | TBA | TBA | TBA | TBA | TBA |
| Map reference | TBA | TBA | TBA | TBA | TBA | TBA |
| Pre-mine land use | Grazing | Grazing | Grazing | Grazing | Grazing | Grazing |
| Post-mine land use | Water storage | Native Ecosystem | Water storage | Grazing | Grazing | Grazing or to remain as farm access upon agreement with landholder |
| Post-mine land suitability classification | TBA | TBA | TBA | TBA | TBA | TBA |
| Projective cover range (%) | TBA | TBA | TBA | TBA | TBA | TBA |

Table 21-32 Landform Design Criteria

| Disturbance Type | Maximum Slope Range % | Projective Surface Area (ha) |
|---|-----------------------|------------------------------|
| Waste rock emplacement facility – external wall | TBA | TBA |
| Waste rock emplacement facility – low wall | TBA | TBA |
| Boxcut batter | TBA | TBA |

- F5** Progressive rehabilitation must commence when areas become available within the operational land.
- F6** Complete an investigation into rehabilitation of proposed areas of disturbance and submit a report to the administering authority proposing acceptance criteria to meet the outcomes in **Table 21-31** by Year 5 of operations. Development of acceptance criteria is to consider the re-establishment of representative regional ecosystems (reference sites or another suitable alternative approved by the administering authority) and functioning habitat of areas equal to or greater than areas to be cleared and specific revegetation performance descriptors (e.g. rehabilitated areas are to display characteristics of the existing (pre-mining) regional ecosystems).

- F7** Areas which are to be rehabilitated to native ecosystem must achieve a self-sustaining native ecosystem with species composition and distribution similar to an analogue site or another suitable alternative approved by the administering authority.
- F8** Areas to be rehabilitated must be rehabilitated to the landform design criteria defined in **Table 21-32** and the landforms must be stable.
- F9** Where reasonable and practicable, areas of the site where grazing is nominated as the post-mine land use must include native grass species endemic to the area.

Residual Void Outcome

- F10** Residual voids must comply with the following outcomes:
 - a) Residual voids must not cause any serious environmental harm to land, surface waters or any recognised groundwater aquifer, other than the environmental harm constituted by the existence of the residual void itself and subject to any other condition within this EA
 - b) Residual voids must comply with **Table 21-33**.

Table 21-33 Residual Void Design

| Void Identification | Void Wall – Competent Rock Slope (%) | Void Low Wall – Incompetent Rock Slope (%) | Void Maximum Surface Area (ha) |
|---------------------|--------------------------------------|--|--------------------------------|
| Pit | TBA | TBA | TBA |

21.3.8. Land Resources

21.3.8.1. Background

Land within the SGCP area is primarily used for low intensity beef cattle grazing. The majority of the area has been cleared for improved pasture. There is no evidence of any cropping in the area and there are no protected areas (e.g. National Park, State Forest, Reserve, Conservation Park, Nature Refuge etc.) within the SGCP area.

Background land tenures and tenure holders are indicated in **Table 21-34**. The predominant tenure type is leasehold.

Table 21-34 Real Property Description for Land Located Within or Partly Within MLA 70453 and Infrastructure Corridor

| Tenure/Tenement ¹ | Real Property Description | Property Name | Landholder |
|--|-----------------------------|----------------|------------|
| MLA 70453 | | | |
| EPC 1049, EPC 1180, EPC 1040 and EPP 668 | Lot 4315 PH720 ² | Creek Farm | A |
| EPC 1049, EPC 1180 and EPP 668 | Lot 1 DM3 | Chesalon | B |
| EPC 1049, EPC 1040 and EPP 668 | Lot 7 BF57 | Tallarenha | C |
| EPC 1049, EPC 1040, EPC 1155 and EPP 668 | Lot 31 BF11 | Betanga | D |
| EPC 1049, EPC 1155 and EPP 668 | Lot 1160 PH286 | Armagh | E |
| EPC 1049, EPC 1180, EPC 1155 and EPP 668 | Lot 3 BF53 | Sapling Creek | F |
| Infrastructure Corridor | | | |
| EPC 1040, EPC 1263 and EPP 668 | Lot 5 BF5 | Oakleigh | G |
| EPC 1210, EPC 1263 and EPP 668 | Lot 3 CP860083 | Tresillian | H |
| EPC 1210, EPC 1040 and EPP 668 | Lot 2 SP136836 | Monklands | I |
| EPC 1210, EPC 1263 and EPP 668 | Lot 4 BF50 | Mentmore | J |
| EPC 1263 and EPP 668 | Lot 6 BF16 | Gadwell | J |
| EPC 1263 and EPP 668 | Lot 7 BF16 | Saltbush | K |
| EPC 1040 and EPP 668 | Lot 301 SP108315 | N/A | L |
| EPC 1049, EPC 1180, EPC 1040 and EPP 668 | Lot 4315 PH720 | Creek Farm | A |
| EPC 1040 and EPP 668 | Lot 2 BF38 | Leased Reserve | A |

¹ EPC 1040 is held by Waratah Coal Pty Ltd
EPC 1155 is held by Waratah Coal Pty Ltd
EPC 1210 is held by the GVK Group
EPC 1263 is held by Queensland Thermal Coal Pty Ltd
EPP 668 is held by Australia Pacific LNG Pty Limited

² 4315PH720 is affected by MLA 70453 as well as the infrastructure corridor

Land Use Suitability

The *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland – Land Suitability Techniques* (DME, 1995) provide criteria for the assessment of land use suitability.

Land use suitability is described according to a five rank class system, including:

- Class 1 – suitable land with negligible limitations
- Class 2 – suitable land with minor limitations
- Class 3 – suitable land with moderate limitations
- Class 4 – land which is marginally suited for a proposed use
- Class 5 – unsuitable land with extreme.

The SGCP area comprises land suitability Class 4, which correlates to Class C Good Quality Agricultural Land (GQAL).

Land Class

The *State Planning Policy 1/92: Development and the Conservation of Agricultural Land* (SPP 1/92) defines four classes of agricultural land for Queensland. Class A land in all areas is considered to be GQAL. In some areas, Class B land (where agricultural land is scarce) and better quality Class C land (where pastoral industries predominate) may also be considered GQAL. The description of the classes is as follows:

- Class A: Crop Land
- Class B: Limited Crop Land
- Class C: Pasture
- Class D: Non-agricultural Land.

The land suitability assessment undertaken by Land Resources Assessment and Management Pty Ltd (LRAM) in July 2011 found that the SGCP area is comprised of approximately 97.5 % Class C2 pasture land and 2.5 % Class C1 land. These two subclasses of pasture land are:

- Class C1 – higher productivity pasture land based on high quality native pastures or on pastures that can be readily improved (represents GQAL)
- Class C2 – lower productivity pasture land based on low quality native pastures on which pasture improvement is not economically viable (does not constitute GQAL).

Approximately 780 ha of GQAL are located within the SGCP area.

Soils

As described in **Table 21-35** eleven soil types were identified within the SGCP area.

Table 21-35 Soil Types and Areas within the SGCP

| Soil Type | Area (ha) |
|--|-----------------|
| Rocky sands and sandy loams | 1,960 |
| Ironstone sands and sandy loams | 245 |
| Shallow red-yellow earths | 20,535 |
| Deep red-yellow earths | 3,370 |
| Shallow red-grey texture contrast (TC) soils | 40 |
| Deep red-grey TC soils | 660 |
| Deep yellow-grey TC soils | 1,415 |
| Alluvial red TC soils | 1,120 |
| Alluvial yellow-grey TC soils | 1,875 |
| Alluvial sands and sandy loams | nd ³ |
| Alluvial loams and earths | nd ³ |

NOTE: "nd" - The 'Alluvial sands and sandy loams' and 'Alluvial loams and earths' only occur as minor soils associated with other dominant soils and therefore their areas could not be readily determined (nd)

Environmentally Sensitive Areas

Land clearing, grazing and track construction have affected the vegetation communities at the SGCP site. The levels of disturbance vary across the area. No Category A, B or C Environmentally Sensitive Areas (ESAs) are located within the SGCP area.

The soil survey data indicates that there is no potential within the top 1.8 m of all soil profiles at the SGCP for acid generation by disturbance of PAF materials during earthworks and construction. The potential for soil erosion will be mitigated by progressive rehabilitation and minimising the development of steep slopes.

The potential land contamination risks associated with the SGCP include:

- storage and use of fuel and chemicals
- landfill
- waste rock and reject handling and storage.

The primary visual impact will be from the waste rock emplacements. Visual impacts will be minimised by landform design and rehabilitation.

21.3.8.2. Environmental Values

The environmental values of the land at the SGCP to be protected or enhanced are:

- the integrity of undisturbed land and ecosystems on the SGCP site
- the integrity of topsoil as a resource to be used in rehabilitation
- a stable, non-polluting landform (including the prevention of contaminated land)
- scenic or visual amenity qualities
- maintaining land use suitability.

21.3.8.3. Environmental Protection Objectives

The objectives to protect the land environmental values are:

- to provide a stable landform which is non-polluting:
- Land disturbed by mining activities will be made stable to ensure that the post mine landforms are not compromised by instability.
- to provide a beneficial post mining land use:
- The post-mine land uses for areas disturbed by mining will be a mosaic of self-sustaining vegetation communities and grazing land, using appropriate native tree, shrub and grass species, and improved pasture species as appropriate.

- to minimise the extent and degree of disturbance on land and remnant vegetation as mining continues and will continue to rehabilitate available land disturbed by mining
- to maximise the recovery and reuse of topsoil
- to minimise land contamination and to continue to remediate areas of contamination, as appropriate within the constraints of the continuing operations
- to minimise pre-mining disturbance and to continue to rehabilitate exploration areas.

21.3.8.4. Performance Criteria

The SGCP will consider the SPP 1/92, which is implemented under the *Sustainable Planning Act 2009* in order to protect good quality agricultural land (GQAL).

Due to the absence of Queensland or Australian guidelines for the assessment of landscape and visual impact for mining or similar developments, the *United Kingdom's Landscape Institute - Institute of Environmental Management and Assessment Guidelines* were used to determine impacts in the EIS.

The SGCP is located within the Barcaldine Regional Council Local Government Area (LGA), an amalgamation of the previous Aramac, Barcaldine and Jericho Shires. The Jericho Shire Planning Scheme (Campbell Higginson Town Planning, 2006) was consulted for any relevant visual amenity requirements. The Jericho Shire Planning Scheme stipulates that ridgelines and escarpments must be maintained in a natural state to protect rural character and landscape values. The Jericho Shire Planning Scheme also requires that the design of lighting does not prejudice the amenity of the Rural Landscape.

21.3.8.5. Control Strategies

Topsoil Management

Topsoil resources directly impacted by mining activities will be stripped ahead of mining for reuse in the rehabilitation program. Appropriate erosion, sediment and dust controls will be established prior to and during soil disturbance.

Prior to stripping the soil, vegetation on areas to be disturbed will be cleared, windrowed and mulched or retained for fauna habitat.

Care will be taken to ensure that dispersive clay subsoils are not stripped and mixed with topsoil. Designated topsoil stockpiling areas will be suitably prepared to minimise topsoil losses.

The duration of topsoil stockpiling will be minimised where practicable to reduce soil deterioration and weed colonisation. Where stockpiles are to remain in place until the decommissioning phase, they will be sown with an appropriate seed mix.

Topsoil stockpile heights will be kept to a minimum and, depending on topsoil structure, will be no greater than 2 m high mounds, where practicable.

Soil Erosion

An Erosion and Sediment Control Plan (ESCP) will be developed and implemented prior to the commencement of construction. The ESCP will contain standard erosion control measures as well as specific measures applicable to particular areas/processes. The ESCP will also detail the monitoring and reporting program for erosion and sediment control structures and practices. An indicative erosion monitoring program has been developed.

The standard erosion control measures will include:

- scheduling major earth works to avoid the high rainfall period of December to March, where practicable
- diverting water away from bare earth
- constructing runoff control devices (e.g. 'whoa boys', berms, temporary sediment fencing, straw bale banks or geotextile socks filled with coarse filter media)
- disturbed areas will be rehabilitated following the completion of works, where practicable
- rock filter dams, sediment traps and/or sediment basins will be incorporated into the design of stormwater runoff controls.

The ESCP will include specific mitigation measures for areas of dissected terrain, areas with dispersive texture contrast soils, areas with severe subsoil salinity, waste rock emplacements, subsidence areas, borrow pits and minor stream crossings. A summary of these specific measures is provided in **Table 21-36**.

Table 21-36 Summary of Specific Erosion Controls

| Area | Control Measure |
|--|---|
| Dissected terrain | <ul style="list-style-type: none"> • exclude these areas from development, where practicable • avoid location of ancillary facilities within this area • minimise the number of access tracks • locate any essential access tracks on gentle grades diagonally across the slope • minimise drainage to line crossings, where practicable • incorporate general all-purpose fertilisers into local topsoil material used as planting media during rehabilitation • implement all erosion control measures applicable to sloping areas with dispersive texture contrast soils (below) |
| Sloping areas with dispersive texture contrast soils | <ul style="list-style-type: none"> • avoid inverting the soil or leaving clay subsoil exposed during clearing and/or grubbing • treat any exposed clay subsoil as soon as practicable through amelioration and capping with planting media and/or impermeable material • leave at least 100 mm of undisturbed soil material on top of clay subsoil during grubbing operations • level and lightly compact the land surface as soon as practicable following the completion of clearing/grubbing operations in a manner that spreads runoff water away from the disturbed area • fill any holes with soil material so clay subsoil is not exposed • reshape the land surface on top of pipelines and adjacent service tracks in a manner that spreads runoff water away from the disturbed area • cap pipeline mounds with at least 100 mm of ameliorated topsoil and seed • where pipelines or access tracks are not mounded, reduce slope length by installing runoff control devices at regular intervals (e.g. 'whoa boys', sediment fences, straw bale banks or geotextile socks) |
| Areas with severe subsoil salinity | <ul style="list-style-type: none"> • bury excavated subsoils deep or cap with at least 300 mm of suitable topsoil following completion of construction activities • if saline subsoil is required to be stockpiled for a short period, the stockpile will be surrounded with a berm to prevent water running onto the stockpile from further upslope and to detain runoff water within the stockpile area |
| Waste rock emplacements | <ul style="list-style-type: none"> • design the final surface topography to adequately control surface water runoff • maximum slope of external batters will be 33 % (1V:3H) • cap emplacement with a minimum of 100 mm of suitable topsoil • if there is insufficient topsoil, mulch with rock fragments of at least 60 mm diameter • revegetate with appropriate plant species |
| Subsidence areas | <ul style="list-style-type: none"> • rehabilitate areas with significant subsidence-induced surface cracks by ripping to a minimum 300 mm depth, regrading and seeding |
| Borrow pits | <ul style="list-style-type: none"> • implement standard erosion control measures and erosion control measures applicable to sloping areas with dispersive texture contrast soils (above) • careful location of borrow pits in dissected terrain • surround any pits that expose saline subsoil with a berm • implement runoff control devices to prevent water running over the cut faces from further upslope and to detain runoff water within the disturbed area • minimise erosion due to rainfall splash by leaving final cut faces as close to vertical as practicable |
| Minor stream crossings | <ul style="list-style-type: none"> • stream crossings will avoid sections of active, unstable stream flow with a potential high risk of stream bank erosion • minimise disturbance to stream banks • restabilise crossing points as soon as practicable following disturbance by refilling and slightly compacting, capping with at least 100 mm suitable topsoil and revegetating |

Land Contamination

Waste management measures will be implemented to minimise the risk of land contamination at the site. Waste management will aim to promote sustainable waste management practices in accordance with the *Waste Reduction and Recycling Act 2011 (WRR Act)*.

Strategies for the prevention of land contamination due to the storage, spillage or disposal of hazardous materials will include:

- maintaining Material Safety Data Sheets (MSDS) for all chemicals used on-site shall be kept in a central register and be available to all staff at all times
- constructing appropriate spill containment facilities for process reagents and petroleum products
- establishing and maintaining a register of location and quantities of hazardous substances
- training operators in the implementation of safe work practices for minimising the risk of spillage
- develop remediation plans for contaminated sites
- develop emergency plans in the event of a spill.

The key planning document to prevent or minimise land contamination will be the WMP. Following completion, remediation and rehabilitation of the SGCP, no areas within MLA 70453 are anticipated to require inclusion on the CLR.

Scenic Amenity Mitigation and Management

Where direct light impacts could potentially occur, appropriate mitigation measures will be impacted, including the installation of light fixtures in accordance with *AS 4282:1997 Control of the obtrusive effects of outdoor lighting*.

Other mitigation measures to reduce impacts on the visual amenity of the area include:

- use of high pressure sodium lights where practicable
- consideration of appropriate colour selection and finishes for mine infrastructure to reduce visual contrast
- consideration of the orientation of lighting emitting infrastructure
- establishment of buffer vegetation between the proposed new surface infrastructure and sensitive receptors
- retaining existing vegetation on-site wherever practicable.

Based on the above assessment, the SGCP is assessed as having a low to moderate visual impact on the surrounding area.

21.3.8.5.1. *Monitoring*

Erosion Monitoring

An indicator of landform stability is the extent of soil loss from rehabilitation sites relative to background rates of soil loss. Selected final slopes on rehabilitation sites will be monitored to identify any exceedence of background soil loss rates.

An erosion monitoring program will be implemented and will include the following:

- the monitoring of rainfall and climatic conditions
- regular monitoring of temporary and permanent erosion and sediment control structures during construction, operations and decommissioning
- an assessment of vegetation cover at permanent, representative monitoring locations
- documenting evidence of failure or instability on rehabilitated slopes at permanent, representative monitoring sites
- maintaining photographic records at permanent, representative photographic stations, taken on a regular basis
- reporting as part of annual environmental reporting requirements.

Qualitative surveying (described above) will be undertaken to indicate excessive sediment loss from landforms. If necessary, sediment traps may also be utilised as an indicator of soil loss.

21.3.8.5.2. *Auditing*

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.

21.3.8.5.3. *Reporting*

At the end of mine life, a RQEP will assess the geotechnical issues and erosivity of the proposed final landforms, including the final void, to demonstrate long-term landform stability.

21.3.8.5.4. *Commitments*

At closure the SGCP will achieve the agreed rehabilitation success criteria of:

- available disturbed areas will be progressively rehabilitated
- rehabilitation will be progressively monitored against the agreed criteria
- contaminated sites will be assessed as part of the Final Rehabilitation Report.

21.3.8.5.5. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

21.3.8.6. Proposed EA Conditions

Land

Preventing Contaminant Release to Land

F1 Contaminants must not be released to land in manner which constitutes nuisance, material or serious environmental harm.

Topsoil

F2 Topsoil must be strategically stripped ahead of mining in accordance with a topsoil management plan.

F3 A topsoil inventory which identifies the topsoil requirements for the SGCP and availability of suitable topsoil on-site must be detailed in the Plan of Operations.

General

F11 The environmental management plan and plan of operations must be consistent with the geotechnical and erosivity assessment within three months of the completion of the assessment outlined in condition F12.

F12 Complete an assessment report, to be undertaken by a Registered Professional Engineer of Queensland (RPEQ), of geotechnical issues and erosivity of the proposed final landforms, including final voids, at least 1 year before the end of mining to demonstrate long-term landform stability. Reference is to be made to the Queensland Mining Guidelines (or subsequent reprints) in making this assessment.

F13 Cleared vegetation from the site must be managed in accordance with the following hierarchy:

- a) reuse, e.g. use of logs and tree stumps as shelter for fauna in rehabilitated areas
- b) recycle, e.g. mulching of vegetation and use in rehabilitation on the site
- c) other alternative management options implemented in a way that causes the least amount of environmental harm.

F14 A weed management plan must be developed and implemented during the continuation of this EA, and prior to the commencement of construction activities. The weed management plan must describe how the weeds are to be managed in accordance with the *Land Protection (Pest and Stock Route Management) Act 2002* and/or local government requirements for weeds not declared under state legislation.

Infrastructure

F15 All infrastructure constructed by or for the EA holder during the licensed activities including water storage structures, must be removed from the site prior to surrender, except where agreed in writing by the post mining land owner/holder.

NOTE: This is not applicable where the landowner/holder are also the EA holder.

Exploration

F16 Disturbance due to exploration activities in areas not authorised to be mined must be rehabilitated in accordance with provisions detailed in the Code of Environmental Compliance for Exploration and Mineral Development Projects.

21.3.9. Cultural Heritage

21.3.9.1. Background

21.3.9.1.1. Indigenous Cultural Heritage

Heritage Register Search

A search was undertaken of the following heritage registers for items or places of heritage significance on the SGCP site:

- the World Heritage Register
- the (former) Register of the National Estate
- the National Heritage List
- the Commonwealth Heritage List
- the State Heritage Register
- the Department of Environment and Heritage Protection (DEHP) Cultural Heritage Database and Register
- the Barcaldine Regional Council heritage register including the former Jericho Shire Planning Scheme.

No items or places were identified within the SGCP in any of these registers. However, sites may exist within the SGCP area that has not yet been recorded.

Field Survey

Initial Indigenous cultural heritage inspections were undertaken prior to the commencement of exploration drilling and/or geotechnical investigations, with subsequent inspections conducted on an 'as needs' basis. Indigenous cultural heritage inspections of specific exploration drilling sites were conducted by representatives of the Wangan and Jagalingou People in August 2011 under the approved Cultural Heritage Management Plan (CHMP). No Indigenous cultural heritage was identified during this process.

Comprehensive Indigenous cultural heritage field surveys across the proposed SGCP area commenced in October/November 2011 and were prioritised according to the order in which areas are to be disturbed.

21.3.9.1.2. *Non-Indigenous Cultural Heritage*

Heritage Register Search

A search was undertaken of the following heritage registers for items or places of heritage significance on the SGCP site:

- the World Heritage Register
- the Australian Heritage Places Inventory (including entries from the (former) Register of the National Estate, Commonwealth Heritage List and National Heritage List)
- the Queensland Heritage Register
- Queensland National Trust Register
- Barcaldine Regional Council heritage register including the former Jericho Shire Planning Scheme.

No items or places were identified within or close to the SGCP in any of these registers. However, sites may exist within the SGCP area that has not yet been recorded.

Field Survey

As presented in **Table 21-37**, five non-Indigenous cultural heritage features were identified within MLA 70453. An additional four features were identified outside, but in close proximity to MLA 70453 or the infrastructure corridor (refer to **Table 21-37**). The naming protocol for the identified features indicates whether they lie within (numerals) or outside of (letters) MLA 70453 and the infrastructure corridor.

Table 21-37 Identified Non-Indigenous Cultural Heritage Features

| Feature | Description | Location | Condition |
|---------|-------------------------------|---|--------------------------|
| 1 | Bore Site 1 | Within MLA 70453 | Poor – largely destroyed |
| 2 | Bore Site 2 | Within MLA 70453 | Poor |
| 3 | Creek Farm Outstation Complex | Within MLA 70453 | Poor |
| 4 | Sapling Creek Overshot | Within MLA 70453 | Excellent |
| 5 | Chesalon Yard Complex | Within MLA 70453 | Poor – largely destroyed |
| A | Old Betanga Homestead Site | Outside MLA 70453 and the infrastructure corridor | Poor – largely removed |
| B | Creek Farm Overshot | Outside MLA 70453 and the infrastructure corridor | Excellent |
| C | Oakleigh Yard Complex | Outside MLA 70453 and the infrastructure corridor | Fair |
| D | Oakleigh Fence | Outside MLA 70453 and the infrastructure corridor | Poor – largely destroyed |

21.3.9.2. Environmental Values

The cultural and scientific significance of European and Aboriginal occupation in the vicinity of the SGCP and resulting cultural heritage values.

Indigenous

Cultural heritage is the value people have given to items and places through their association with those items and places. These values include items and places of significance to Indigenous people and places of scientific significance.

Non-Indigenous

Cultural heritage is the value people have given to items and places through their association with those items and places. These values include items and places of social value to the local community and places of historic, architectural or scientific significance. Non-Indigenous cultural heritage is generally associated with human activities since the beginning of non-Indigenous settlement of an area, as well as natural places which have meaning for people of the current day.

21.3.9.3. Environmental Protection Objectives

The environmental protection objective is to preserve the cultural heritage values (Indigenous and non-Indigenous) of the SGCP area.

21.3.9.4. Performance Criteria

All known Indigenous and non-Indigenous archaeological records which have been identified by the EIS will be preserved and not impacted on by the SGCP.

All unknown Indigenous and non-Indigenous records found during the construction and operation of the SGCP will be reported to DEHP and the Proponent.

21.3.9.5. Control Strategies

The Proponent is committed to avoiding and/or minimising harm to all cultural heritage values within the SGCP operations.

Indigenous Cultural Heritage

The following general mitigation and management measures will be implemented at the SGCP to minimise impacts on Indigenous cultural heritage:

- A comprehensive field survey will be conducted prior to surface disturbance
- where identified Indigenous cultural heritage features are located proximal to proposed surface disturbance, these sites will be demarcated where practicable to minimise the risk of accidental damage
- where direct disturbance is unavoidable, consideration will be given to collecting and relocating significant Indigenous cultural heritage features

- all SGCP employees and contractors will be made aware of their responsibilities and obligations in relation to cultural heritage as part of the induction and training process
- in the event that significant Indigenous cultural heritage features are identified, a monitoring program will be developed in consultation with the Wangan and Jagalingou People prior to the commencement of construction in order to monitor the potential impact of the SGCP activities against baseline values.

A CHMP was executed by all parties on 11 July 2011 and approved by DEHP on 5 August 2011.

Practical strategies to manage potential impacts on Indigenous cultural heritage sites and artefacts/items have been formulated in consultation with the Wangan and Jagalingou Traditional Owners and are contained within the CHMP. Site avoidance is the preferred option for cultural heritage protection, although where impacts are unavoidable, alternative management practices will be necessary.

Non-Indigenous Cultural Heritage

General control measures will be adopted to manage any unexpected discovery of items or places located within the Proponent's operations. Should any further sites or places be identified, they will be managed in accordance with the applicable legislation.

In order to minimise the risk of accidental damage to identified and unidentified non-Indigenous features, the following strategies will be implemented:

- a clearing permit must be obtained prior to clearing or excavating
- SGCP personnel will undergo an induction informing them of their responsibilities in relation non-Indigenous cultural heritage finds.

A non-Indigenous CHMP will be developed prior to the commencement of construction. The non-Indigenous CHMP will be a key tool in the management of non-Indigenous cultural heritage at the SGCP. The non-Indigenous CHMP will provide:

- the general principles of non-Indigenous cultural heritage management
- general mitigation and management measures (including responsibilities and channels of communication)
- mitigation and management measures for known non-Indigenous cultural heritage features
- a find strategy for items of potentially significant cultural heritage
- periodic review requirements.

21.3.9.5.1. Monitoring

Indigenous

In the event that significant Indigenous cultural heritage features are identified, a monitoring program will be developed in consultation with the Wangan and Jagalingou People prior to the commencement of construction in order to monitor the potential impact of the SGCP activities against baseline values.

Non-Indigenous

If significant non-Indigenous cultural heritage features are identified, a monitoring program will be developed in order to monitor the potential impact of the SGCP activities against baseline values.

21.3.9.5.2. Commitments

With respect to cultural heritage the SGCP will:

- conduct regular cultural heritage education sessions/trainings for employees.
- implement the agreed Cultural Heritage Management Plan (CHMP) in consultation with the traditional owners, and in accordance with the requirements of the ACH Act.

21.3.9.5.3. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

21.3.9.5.4. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.

21.3.9.5.5. Reporting

Any Indigenous or non-Indigenous archaeological items discovered at the SGCP will be reported to the site supervisor in accordance with the CHMP.

21.3.9.6. Proposed EA Conditions

There are no proposed conditions for cultural heritage.

21.3.10. Social

21.3.10.1. Background

The project is located in a rural area with neighbours involved in grazing and coal mining activities. The Proponent is undertaking a comprehensive community engagement with the objectives to:

- identify stakeholders and their values, concerns and issues
- develop a consultation process that can be integrated into the community with minimal disturbance and which provides a foundation for long-term relationships between the SGCP and the community that is based on trust and mutual respect
- promote stakeholder confidence by ensuring open and transparent two-way communication
- develop a range of communication activities and tools that deliver regular, consistent and accurate information
- provide factual information about the SGCP and ensure all stakeholders understand any potential benefits and/or impacts
- acknowledge and manage the expectations of stakeholders
- ensure community feedback mechanisms are in place to maximise opportunities for input into the Environmental Impact Assessment (EIA) process and actively seek opinions from stakeholders on matters of relevance to the SGCP
- work with stakeholders to develop agreed outcomes and solutions to issues where practicable
- meet the statutory requirements for community involvement in the formal approvals process and ensure stakeholder issues are appropriately addressed as part of the EIA process
- continually improve the acceptance and reputation of the SGCP on a local, regional and state level and monitor and evaluate community acceptance of the SGCP.

The community consultation process to date has engaged stakeholders at both local and regional levels, and provided SGCP specific information as well as information on the potential social, economic and environmental impacts, relating to the project.

Mining activities can impact on the following community values:

- sense of community
- social cohesion
- sense of identity
- housing affordability

- service capacity and provision
- air quality
- acoustic amenity
- ground vibration
- surface water and groundwater
- economy
- traffic and transport
- visual amenity.

21.3.10.2. Environmental Values

The environmental values to be protected include lifestyle, the wealth, health, safety, and well-being of the community surrounding the SGCP.

21.3.10.3. Proposed Environmental Protection Objectives

The environmental protection objective is to minimise environmental nuisance to neighbours from mining and associated activities and to respond to concerns expeditiously.

21.3.10.4. Control Strategies

A draft Social Impact Management Plan (SIMP) has been developed. The SIMP provides a framework for ongoing management, audit and review of social impacts during the operation and decommissioning of the SGCP.

The Community Reference Group (CRG) for the SGCP operations is an overarching management tool to enable the Proponent to monitor impacts on the community and facilitate the provision of project information and feedback.

The Proponent is committed to the continuation of the CRG meetings that commenced as part of the SGCP EIS. Through the CRG, the Proponent will have a mechanism to:

- respond to community enquiries and complaints
- resolve disputes with stakeholders
- develop action plans with stakeholder involvement for ongoing social and community support
- report on progress of activities and commitments
- monitor, through stakeholder feedback the effectiveness of their community engagement processes
- adjust mitigation strategies to achieve the best outcomes for all parties.

The success of the CRG will depend largely on the continued interest and involvement of the local community and interested stakeholders.

The SGCP will maintain a complaints procedure that includes:

- maintenance of a register of complaints held on-site
- a process for receiving, handling and investigating complaints
- prompt investigation and provision of a response as soon as practicable
- a non-compliance notification will be given to any party whose actions result in a non-compliance with site environmental requirements, particularly in the event of a complaint.

The Proponent will continue to undertake stakeholder engagement throughout the construction, operational and final decommissioning phases of the SGCP.

21.3.10.4.1. Monitoring

Monitoring will be conducted as outlined in the SIMP.

21.3.10.4.2. Commitments

- maintenance of a complaints register at the SGCP
- a process for receiving, handling and investigating complaints.

21.3.10.4.3. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

21.3.10.4.4. Auditing

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.

21.3.10.4.5. Reporting

SIMP reports will be prepared annually during construction and three-yearly during the operations phase. SIMP reports will include:

- a summary of stakeholder engagement undertaken during the preceding period and its effectiveness
- a summary and analysis of all grievances/disputes reported during the preceding period

- an assessment of progress in implementing proposed management and mitigation strategies and achieving KPIs stipulated in the following:
- Community Engagement Plan (CEP)
- Workforce Management Plan
- Local Industry Participation Plan (LIPP)
- Housing and Accommodation Plan (HAP)
- Community Partnership Program
- Landholder Management Plan (LMP)
- a description of any proposed updates/revisions to the SIMP document.

A copy of the SIMP reports will be provided to the Social Impact Assessment Unit (SIAU) and made available to key stakeholders upon request.

21.3.10.4.6. *Proposed EA Conditions*

Complaint response

H1 All complaints received must be recorded including details of complainant, reasons for the complaint, investigations undertaken, conclusions formed and actions taken. This information must be made available for inspection by the administering authority on request.

21.3.11. Nature Conservation

21.3.11.1. Background

The SGCP area is predominantly low-lying, undulating land with shallow relief, ranging from 378 m above sea level to 450 m above sea level. In the western portion of the SGCP area lays the northern limit of the Carnarvon Range. Remnant vegetation along this range is contiguous with vegetation in the Carnarvon Ranges and Carnarvon National Park, approximately 135 km to the south. The SGCP area has historically been used for cattle grazing and occurs within both remnant and nonremnant vegetation. Remnant vegetation occurs over approximately 54 % of the SGCP area.

Ten plant species of conservation significance potentially occur in the SGCP area based on desktop surveys. Three species were confirmed during flora surveys:

- Round-leaved Heath Myrtle (*Micromyrtus rotundifolia*) is listed as Vulnerable under the *Nature Conservation Act 1992 (NC Act)*. It was found growing in the mine survey area within RE 10.7.7. The species is likely to occur elsewhere within the SGCP area due to the availability of suitable habitat.

- Large-podded Trefoil (*Desmodium macrocarpum*) is listed as Near Threatened under the NC Act. It was located within the infrastructure corridor survey area, on the properties Saltbush and Tresillian. The population within the SGCP area occurred in RE 11.5.3 and non-remnant vegetation. The species is likely to occur elsewhere within the SGCP area due to its ability to grow in both remnant and non-remnant vegetation across the site.
- *Eleocharis blakeana* is listed as Near Threatened under the NC Act. It was located in the infrastructure corridor survey area in a coolibah-dominated wetland (RE 10.3.15i). The species is unlikely to be widespread within the SGCP area due a lack of suitable habitat.
- Four species of threatened (Endangered or Vulnerable) and Near Threatened fauna were confirmed from the SGCP area. The Brigalow Scaly-foot (*Paradelma orientalis*), little pied bat (*Chalinolobus picatus*), square-tailed kite (*Lophoictinia isura*) and the koala (*Phascolarctos cinereus*), are listed as Vulnerable or Near Threatened under the NC Act and/or EPBC Act. Threatened species not recorded during ecological surveys were assigned a likelihood of occurrence within the SGCP survey area based on historical records, known geographic range and habitat availability.

Aquatic ecology assessments were undertaken to describe the environmental aspects of on-site surface waterways in terms of surface water quality, aquatic flora and fauna and the relevant habitats across the SGCP area. No species of high conservation value were identified within the SGCP area, as the majority of the fish species and macroinvertebrates present are generalists.

The lack of stygofauna and troglifauna and the unfavourable habitat conditions present suggest that significant subterranean communities do not exist within the SGCP area and is therefore not considered to be a relevant environmental factor.

The SGCP has the potential to cause habitat loss, introduce weeds, release contaminants, and contaminate surface and groundwater.

21.3.11.2. Environmental Values

The environmental values of the land that are to be protected or enhanced are the qualities and physical characteristics of the environment conducive to ecological health.

21.3.11.3. Environmental Protection Objectives

The performance criteria for nature conservation are:

- compliance with the requirements of SGCP's EA
- protection of conservation significant species, communities and habitat

- minimise project impacts upon species and communities during the construction and operation at the SGCP
- no unplanned or unapproved disturbance/clearing of flora and fauna.

21.3.11.4. Performance Criteria

Environmental values at the SGCP during all phases of construction, operation and decommissioning will be maintained in accordance with the following protection performance criteria:

- compliance with the requirements of the SGCP EA
- implementation of surface water quality guidelines presented in the Queensland Water Quality Guidelines (2009) and (where data is not available for reference in the Queensland Guidelines) the ANZECC (2000) water quality guidelines, will be used as standards by which are determined
- development and implementation of management plans for fire, weeds, pest animals and threatened species known to occur on-site
- development and implementation of a Biodiversity Offsets Strategy as required under the Queensland Biodiversity Offset Policy 2011
- compliance with rehabilitation success criteria for the SGCP with reference to the guideline: Rehabilitation Requirements for Mining Projects (DERM, 2012).

The Australian Coal Association Research Program (ACARP) have conducted research into 'Design and Rehabilitation Criteria for Bowen Basin River Diversions' (Earth Tech, 2002) and the Department of Natural Resources and Mines have created the 'Central West Water Management and Use Regional Guideline: Watercourse Diversions – Central Queensland Mining Industry' (undated). These guidelines will be considered during the detailed design of the creek diversion.

The sampling for stygofauna and troglifauna was undertaken in accordance with WA Guidance Statements (EPA 2003, 2007). This SGCP has adopted the WA protocols for sampling stygofauna and troglifauna such that study results fully satisfy DEHP requirements.

21.3.11.5. Control Strategies

21.3.11.5.1. Terrestrial Flora and Fauna

Clearing of Vegetation

Clearing of vegetation will be staged. Staged clearing of vegetation allows animals to move away from clearing operations into adjacent, uncleared habitats. Clearing will also be conducted with fauna spotter-catchers in communication with the operators of the clearing machinery. Fauna removal will be undertaken immediately prior to clearing.

Any flora species of conservation significance within the clearing footprint will be surveyed, marked and recorded for purposes of biodiversity offsets prior to the undertaking of clearing operations.

Rehabilitation and Revegetation

Rehabilitation of disturbance areas will be undertaken throughout the life of the SGCP in accordance with a Rehabilitation Management Plan (RMP). A Mine Rehabilitation Plan will be prepared to direct land rehabilitation during and after the operational life of the mine.

Control strategies outlined in the RMP include:

- native species will be used for revegetation, apart from any sterile grass cultivars that are required to ensure soil stability
- buffer zones will be established around areas of threatened ecological communities and communities with a conservation-significant biodiversity status, where clearing is adjacent to these areas
- retained areas of native vegetation will be monitored and managed for the life of the project to reduce weed infestation and promote biodiversity values in the areas
- trees will be felled into the construction zone to avoid impacting on vegetated margins
- felled trees will be placed in areas away from the mine's impacts, to act as shelter for fauna
- topsoil and mulch will be stockpiled where practicable for use on retained vegetation and rehabilitation areas to promote revegetation and retention of soil quality
- vegetation clearing and construction will be limited to dry weather conditions where practicable to minimise erosion, runoff and soil disturbance
- large tracts of non-remnant vegetation away from the mine footprint will be revegetated and rehabilitated to link existing fragments of habitat.

Weeds and Pest Animal Management Plan

A Weed and Pest Animal Management Plan (WPAMP) will be prepared and implemented over the life of the SGCP.

The introduction and/or spread of weed species will be mitigated by:

- restricting light vehicle movement in areas outside of regular activity, particularly on irregularly used tracks
- restricting vehicle movement during and following rainfall, where practicable
- implementing strict wash-down procedures for all vehicles (including clearing and construction machinery) entering clearance zones, grazing areas or conservation areas
- controlling weeds according to guidelines under the relevant Weed Fact Sheet from Department of State Development, Infrastructure and Planning (DSDIP)
- training and awareness of all staff.

Threatened Species Management Plan

The Threatened Species Management Plan (TSMP) will include specific mitigation and management measures to address predicted impacts on threatened species and communities. Such measures include:

- remnant vegetation in the SGCP area will be managed for biodiversity values, including implementation of an appropriate fire regime, pest animal and weed management and exclusion of stock
- maintaining awareness of all staff on-site regarding the presence of species of conservation significance and the requirements of the TSMP
- revegetating cleared areas that do not form part of the operational mine (e.g. infrastructure corridor edges)
- staged rehabilitation and revegetation of overburden as the mine operational life progresses in areas that are no longer being mined
- fire regime management including precautions such as clearing fire breaks
- where practicable, restricting unnecessary vehicle movement during and following rainfall
- exclusion of cattle from waterways and remnant vegetation to prevent fouling and habitat degradation.

Environmental Offsets

Environmental offsets are measurable conservation outcomes undertaken to counterbalance an impact that causes a loss in biodiversity values, and achieve an equivalent or better environmental outcome for the biodiversity values impacted (DERM, 2011b). Offset options will be presented in the Biodiversity Offsets Strategy and will outline measures to ensure that these offsets are managed to maintain and enhance biodiversity values.

21.3.11.5.2. Surface Aquatic Ecology

Habitat Removal

Stream diversions will mimic the natural materials and geometry of the stream reaches lost, where practicable. Key considerations for creek diversion construction include to:

- carry out clearing of riparian vegetation for the proposed creek diversion in a staged manner, to allow fauna to migrate to adjacent habitat areas
- carry out works during the dry season when minimal (if any) water is present, so as to reduce impacts on water quality and fish movements
- rehabilitate diversion with appropriate riparian species
- monitor diversion rehabilitation.

Modification of In-stream habitats

Reductions in the potential for impacts on in-stream habitat will be achieved through minimising the number of creek crossings or temporary levees required, where practicable and using bridge crossing designs that minimise the number of pylons required, or only require pylons on upper banks for support.

Runoff and Chemical Spills

The key mitigation measures to reduce the potential impacts from runoff include:

- wherever practicable, avoid construction works near streams
- where the avoidance of construction works in, near, or adjacent to streams is not practicable, these works will be performed during the dry season. If exposed soils cannot be rehabilitated prior to the wet season, appropriate barriers to reduce sediment transport (e.g. silt curtains) will be installed well before significant rainfall occurs. Such measures must be adequate to manage the heavy rainfall events experienced at the site
- where practicable, construction in stages will be carried out such that cleared areas can be rehabilitated quickly while construction progresses

- stockpiled excavated earth material will be stored away from waterways and bunded such that runoff does not enter the waterway, but is captured in a temporary storage reservoir and either treated or removed from site
- the use of vegetation such as grasses and macrophytes as sediment filters will be considered where practicable. Where this is not practicable, geotextile, rip rap and stabilisation techniques will be considered.

The key mitigation measures to reduce the potential impacts from chemical spills include:

- current best practice for the management of fuels, oils and chemicals on-site including bunding to AS 1940
- all chemicals will be stored appropriately in a secure area with MSDS's for each chemical stored and spills kits made readily available in that area
- construction staff will be trained to use spill kits to contain spills
- all spills will be reported, no matter how minor, and the impacts and reasons for their occurrence investigated
- all chemical loads will be properly secured during transport and MSDS's sheets for each are to be stored with the transport vehicle
- safe driving and general safe work practices will be required when transporting chemicals.

21.3.11.5.3. *Subterranean Fauna*

No specific subterranean fauna management measures are proposed as it is unlikely that the site supports subterranean fauna.

21.3.11.5.4. *Monitoring*

The proposed monitoring will include:

- retained areas of native vegetation will be monitored and managed for the life of the project to reduce weed infestation and promote biodiversity values in the areas.
- disturbed vegetation areas that are no longer required post-construction will be stabilised and revegetated as soon as practicable and monitored for weeds as per the WPAMP.
- a WPAMP will be prepared and implemented over the life of the SGCP. The WPAMP will include a monitoring program and auditable performance measures, including reductions in class 1 and 2 pest animals and noxious weeds.

- the TSMP will contain the proposed monitoring and reporting timeframes for management of each threatened species impacted on by the SGCP to facilitate auditing of environmental performance measures.
- creek diversion rehabilitation will be monitored to determine success.
- a rehabilitation monitoring
- the location of known weed infestations (particularly Parthenium).

21.3.11.5.5. *Commitments*

- reasonable steps will be taken to keep land free from Class 2 and 3 pests such as Parthenium (*Parthenium hysterophorus*) and Lantana (*Lantana camara*) which are known to occur in the study region, in compliance with the LP(PSRM) Act 2002
- measures to control the spread of these weeds including vehicle washdowns will be adopted across the SGCP
- recent sampling within the Galilee Basin to the north of the SGCP has recovered stygofauna. Based on these findings, the SGCP MLA is considered to have some potential for the presence of stygofauna and will be subject to a second round of sampling as per the WA guidelines
- a Mine Rehabilitation Plan will be prepared to direct land rehabilitation during and after the operational life of the mine.

21.3.11.5.6. *Corrective Actions*

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

21.3.11.5.7. *Auditing*

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.

21.3.11.5.8. *Reporting*

A land conservation report will be prepared periodically and submitted to the Proponent. SGCP will comply with any regulatory land conservation requirements.

21.3.11.6. Proposed EA Conditions

There are no proposed conditions for the Nature Conservation section.

21.3.12. Transport

21.3.12.1. Background

The SGCP site is accessed from the Capricorn Highway. When travelling to and from the SGCP site, the majority of vehicles will utilise the:

- Capricorn Highway—the predominant road infrastructure in the vicinity of the SGCP. The highway is a State Controlled Road (SCR) connecting Rockhampton to the east with Barcaldine to the west. The highway is fully sealed, with sealed shoulders and overtaking lanes and a speed limit of up to 100 km/hr except through townships
- Clermont-Alpha Road a SCR connecting Alpha to Clermont. The highway is fully sealed, however the shoulders are unsealed. The Road has a speed limit of up to 100 km/hr
- Gregory Highway—a SCR connecting Springsure to Clermont where it connects with the Peak Downs Highway. The highway is fully sealed with sealed shoulders and overtaking lanes and a speed limit of up to 100 km/hr
- Dawson Highway - is a SCR that connects Springsure and Gladstone. The Highway is fully sealed, with sealed shoulders, overtaking lanes, and speed limits of up to 100 km/hr.

The SGCP will connect directly to the Capricorn Highway by a sealed mine access road. No existing local roads will be required for mine access. The connection to the Capricorn highway will consist of a priority controlled, three-way T intersection 8.8 km west of Alpha.

Construction and Operation Phases

Road transport would be required for transport of the following during the construction period:

- road base, ballast and fill materials
- trucks and vehicles
- parts for construction of draglines and shovels
- diesel-powered generators and fuel
- CHPP construction equipment and materials
- workshops, warehouses and associated mine infrastructure building materials and equipment

- pre-fabricated accommodation buildings and site offices
- construction personnel
- other construction materials and equipment.

Road transport would also be used to transport personnel to site during operations and for delivery of some materials and equipment (e.g. equipment maintenance parts, food and supplies to the accommodation village, ANFO etc.).

It is expected that traffic volumes on local roads as well as pavement impacts will increase. After an upgrade, traffic through the Alpha Aerodrome will increase.

21.3.12.2. Environmental Values

The values of the existing transport network to be enhanced or protected are the qualities and characteristics that are conducive to safety and public amenity.

The environmental values considered in this transport section include the existing utilisation of transport infrastructure, including traffic volumes and all subsequent changes to transport infrastructure and its level of utilisation resulting from the SGCP.

Potential impacts of transport associated with amenity, human health and ecological values as a result of dust, noise, vibration and any other environmental impact. The objective of the proposed mitigation measures is to minimise the potential impacts on the environmental values identified.

Although there is potential for air quality impacts associated with vehicle movements on unsealed roads, rail load-out and coal dust entrainment from train wagons, these impacts are anticipated to be minimal. Dust deposition levels are predicted to be within 10 % of ambient levels within 5 km of the SGCP.

21.3.12.3. Proposed Environmental Protection Objectives

The environmental protection objective for transport is to minimise the impacts on the transport network and public safety.

Performance Criteria

The performance criteria for traffic management of the SGCP are:

- Minimisation of potential disruptions to traffic on the Capricorn Highway and surrounding communities caused by the SGCP construction and operational phases
- Maintenance of safe access near all project work areas for road users
- Number of related traffic health and safety incidents.

21.3.12.4. Control Strategies

Mitigation Measures for Road Impacts

The following road impact mitigation techniques are proposed:

- the development and implementation of a Transport Management Plan prior to the commencement of the construction phase of the SGCP
- the construction of auxiliary right turn and auxiliary left turn treatments at the intersection of the Carpentaria Highway and the SGCP Mine Access road
- case-by-case assessment of pavement impacts and subsequent maintenance and rehabilitation costs.

Mitigation Measures for Air Impacts

An upgrade to the Alpha Aerodrome will be required as a result of the SGCP and other significant projects in the Alpha area. The upgrade will include a runway extension of 15 m and it is anticipated that commercial air service providers will meet the associated costs.

Mitigation Measures for Port Impacts

The Proponent is currently in negotiation for the allocation of port capacity at the Abbot Point Coal Terminal (APCT). No construction works on sea transport infrastructure are proposed to be directly undertaken by the Proponent.

21.3.12.4.1. Monitoring

Road network performance to be monitored on a continual basis to confirm specified performance objectives set out within the Transport Management Plan (TMP) are adhered to.

21.3.12.4.2. Commitments

- control strategies outlined in the EIS will be implemented
- implementation of road works identified in the control strategies to mitigate the traffic impacts of the project
- adherence to the TMP to confirm specified performance objectives.

21.3.12.4.3. Corrective Actions

If a performance objective or target is not met, the responsible person will review the performance and revise the management measures accordingly.

SGCP personnel will undertake adequate environmental awareness training covering the requirements of the EM Plan.

21.3.12.4.4. *Auditing*

An auditing program will be implemented at the SGCP. The program will include:

- internal environmental audits that will assess the suitability of environmental monitoring programmes
- compliance and other audits of regulatory requirements.

21.3.12.4.5. *Reporting*

Health and safety incidents or any complaints will be reported to the administering authority.

21.3.12.5. *Proposed EA Conditions*

There are no proposed conditions for the Transport section.

21.3.13. **Environmental Management**

21.3.13.1. *Environmental Management System*

The Project operations will take place under an environmental management system (EMS). The Proponent's approach will be to certify the EMS against the *ISO 14001* Standard within the initial years of operation.

The EMS is the cornerstone of the operation's due-diligence approach to environmental management, and encompasses the measures used to prevent or minimise environmental harm, maintain compliance and promote continuous improvement.

21.3.13.1.1. *Risk*

Under the EMS the SGCP will assess the significant aspects and impacts interacting and changing the environment. A risk register will be developed and action plans and strategies put in place to mitigate the assessed risks.

21.3.13.1.2. *Monitoring*

Environmental monitoring is performed in accordance with the EA to provide data to measure the impact of the SGCP on the surrounding environment and to measure the efficiency/effectiveness of the various environmental impact control strategies.

Monitoring will be in place to assess the performance of the EMS and compliance with the EA. Rehabilitation success, surface water quality, groundwater quality and level, particulate and dust deposition and noise will be monitored. Commitments and EA conditions have been included in the relevant sections of this EM Plan.

21.3.13.1.3. *Reporting*

External

The Proponent aims to provide timely, relevant and appropriately presented information to government authorities, the local community and the general public on the environmental performance of the SGCP.

Reporting commitments under the EA and other legislation will be complied with and includes:

- prepare Annual Returns as required under the Environmental Protection Act 1994
- submit National Pollutant Inventory (NPI) reports as necessary
- report incidents that may potentially compromise compliance with the conditions of the Environmental Authorities immediately to operations management
- preparing reports as required under other legislation, for example, the National Greenhouse and Energy Reporting System and Energy Efficiency Opportunities.

Internal

The site Environmental Manager will (in a timely manner) report any incidents or breaches of the EM Plan or EA conditions to the Site Senior Executive and report to the DEHP in accordance with the requirements of the project's EA.

21.3.13.1.4. Staff Training

The Proponent will provide employees, contractors and visitors with appropriate environmental awareness through inductions, formal presentations, and impromptu meetings.

Specifically, the Proponent requires that employees, contractors and visitors are aware of:

- their roles and responsibilities (including environmental incident reporting)
- the environmental impacts, potential or actual, of their activities on-site
- the potential consequences of poor environmental performance
- site emergency procedures.

Records of training content and attendance will be maintained.

21.3.13.2. Environmental Auditing and Review

The Proponent will conduct environmental audits to assess compliance with regulatory requirements and the performance of the EMS.

The objectives of the Environmental Auditing and Review programs are to:

- monitor and report on compliance with statutes, the EM Plan commitments and Plan of Operations,
- environmental policy, company standards, best practice guidelines and signatory codes

- monitor the EMS for consistency with the principles of ISO14001
- conduct a senior management review of performance via consideration of the audit reports.

An environmental auditing program will be implemented at the SGCP. The program will include:

- Internal Environmental Audits - annually
- EMS Review – annually
- Plan of Operations Audits – with each Plan of Operations (usually annually)
- Administering Authority Audits - at a frequency determined by DEHP.