ENVIRONMENTAL MANAGEMENT PLAN
JOHNSON EXTENDED PROJECT

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FIGURES

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1. Introduction

This Environmental Management Plan (EM Plan) has been developed in support of the Environmental Authority (EA) application for the Johnson Extended Project submitted by the Proponent in 2007 under the *Environmental Protection Act 1994* (EP Act). In compliance with decision made by the Department of Environment and Heritage (DEHP) on 5 November 2013, this EM Plan has been prepared in accordance with the previous (i.e. prior to 31 March 2013 amendments) section 203 of the EP Act, while accounting for the current requirements of the EP Act, as detailed in the following Guidelines:

- *Application requirements for activities with impacts to water, Version 1A*
- *Application requirements for activities with impacts to air, Version 1*
- *Application requirements for activities with impacts to land, Version 1*
- *Application requirements for activities with noise impacts, Version 1*
- *Application requirements for activities with waste impacts, Version 1*

As per the previous section 202 of the EP Act the purpose of the submitted EM plan is to propose environmental protection commitments to assist the administering authority in preparing the draft environmental authority for the application.

1.1 Environmental Management Plan Outline

This Environmental Management Plan (EM Plan) has been prepared to address the content requirements of the previous section 203 of the EP Act, with consideration of the content requirements for EA applications under the current EP Act along with the abovementioned guidelines developed under the EP Act.

Section 1.0 provides an overview of the Johnson Extended Project activities for which approval is sought and the relationship with existing and adjacent projects, and sets out the background to the EA application and studies undertaken previously in support of the application.

Section 2.0 provides a detailed description of the project components, including the land on which the activities are proposed.

Section 3.0 includes an assessment of the likely impact of each relevant activity on the environmental values, including:

a. a description of the environmental values likely to be affected by each relevant activity;
b. details of any emissions or releases likely to be generated by each relevant activity;
c. a description of the risk and likely magnitude of impacts on the environmental values;
d. details of the management practices proposed to be implemented to prevent or minimise adverse impacts; and
e. details of how the land the subject of the application will be rehabilitated after each relevant activity ceases.

This section also describes the proposed measures for minimising and managing waste generated by each relevant activity, and details relevant to site management plans that relate to the subject land. Section 3 further describes codes of environmental compliance applicable to the activities and proposes draft conditions to include in the EA.

Section 4.0 describes the framework for implementation of the EM Plan and processes for the engenderment of continuous improvement in its application including training, non-conformity and emergency management, communications management, measuring, monitoring, reporting, auditing and review.

1.2 The Proponent

The Proponent of the Johnson Extended Project comprising mining lease applications numbered 70384, 70385, 70386 and 70387 (the Johnson Extended Project MLAs), also referred to as Johnson Extended #3, #4, #5 and #6, until recently was Peabody Coppabella Pty Ltd. On 4 March 2014 the Johnson Extended Project MLAs were approved and transferred to the Coppabella and Moorvale Joint Venture (CMJV) participants. Peabody Coppabella Pty Ltd is the Principal Holder. The CMJV participants own the adjacent Coppabella Coal Mine. The participants in the CMJV and their respective interest are as follows:

Peabody Coppabella Pty Ltd	73.3%
CITIC Australia Coppabella Pty Ltd	14.0%
Mapella Pty Ltd	7.0%
KC Resources Pty Ltd	3.7%
NS Coal Pty Ltd	2.0%

The correspondence address for the Johnson Extended Project MLAs is:

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100 Melbourne Street
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1.3 Johnson Extended Project Scope

The Johnson Extended Project is situated in the northern section of the Bowen Basin in Central Queensland, directly adjoining to the north-north-east of the existing Coppabella Coal Mine which is operated under EA Permit Number EPML00579213 (previously MIN100555707).

The Johnson Extended Project MLAs cover a total area of 179ha in an approximately 0.45km wide by 4.7 km long strip to the immediate north east of the existing Coppabella Coal Mine.

It is proposed that the Johnson Extended Project development be an underground Longwall Top Coal Caving (LTCC) operation, with underground access to be provided via the Coppabella Coal Mine commencing once the underground component of the Coppabella Coal Mine has been developed within the area of its existing mining leases (Coppabella Coal Underground Project).

Studies for progressing licensing and exploitation of the underground resource area of the Coppabella Coal Mine (Coppabella Coal Underground Project) are continuing, which, in time, would provide underground access to the Johnson Extended Project. On that basis, the Proponent has developed underground mining layouts and production scheduling to assist in defining a viable mine plan, production scheduling and definition of timing of access to the Johnson Extended Project.

It is proposed that the existing facilities of the Coppabella Coal Mine will be used for transport, storage and processing of material extracted from the Johnson Extended Project. It is proposed that these facilities would continue operation under the existing EA (EPML00579213, previously MIN100555707).

It is proposed that the EA for the Johnson Extended Project be applied to exploration and other mining and associated activities undertaken on the Johnson Extended Project ML areas or impacts directly associated with such activities. Potential impacts associated with services provided by the Coppabella Coal Mine would be managed under that existing EA as part of the existing Coppabella Coal Mine.

This EM Plan has been structured based on this proposed separation of environmental compliance responsibility, with the following categories of potentially impacting activities applied (where relevant) in the assessment of impacts and identification of management impacts in **Section 3**:

- **Johnson Extended Project exploration activities** including exploration activities (e.g. access, drilling and seismic survey) undertaken on the Johnson Extended Project MLAs. Further description of these activities is provided in **Section 2**.

- **Johnson Extended Project underground mining activities** including surface activities undertaken within the area of the Johnson Extended Project MLAs and directly related to the construction, operation and rehabilitation activities for underground mining, such as subsidence management and service provision (e.g. gas drainage, ventilation and dewatering). Further description of these activities is provided in **Section 2**.

Activities proposed to be undertaken under the existing EA EPML00579213 (previously MIN100555707), the Coppabella Coal Mine activities, are described and assessed in **Section 3**, however management strategies are deferred to the existing approved *Coppabella Environmental Management Plan*, and proposed conditions relevant to these activities are deferred to the existing EA.

1.4 Previous Studies

To support an understanding of potential environmental issues and impacts of underground mining for the Johnson Extended Project, a range of environmental background modelling and impact assessment studies and evaluation have been conducted during the period 2009 to 2012. These studies were targeted at understanding the impacts of the Johnson Extended Project and potential cumulative impacts as a result of transition from open cut to underground mining as part of the potential Coppabella Coal Underground Project and the impacts of accessing and mining the Johnson Extended Project.

The scope a number of completed studies is different from that of the Johnson Extended Project area, including and extending onto the adjacent Coppabella Coal Underground Project, area. Some of the studies have been completed to draft level only and remain to be finalised in regard to impact assessment. Nonetheless the studies provide an excellent basis for understanding the existing environment and potential impacts associated with the Johnson Extended Project. These studies have been relied upon where relevant in the development of this EM Plan.

The following studies will be provided upon request:

- Coppabella Underground Project: Terrestrial Ecology Baseline Assessment (August 2011). Prepared by Ecological Survey & Management.
- Coppabella Underground Project: Aquatic Ecology (June 2011). Prepared by FRC Environmental.
- Coppabella Underground Mine: Hydraulic Report (April 2011). Prepared by Cardno LawsonTreloar.
- Coppabella Underground Project: Groundwater Impact Assessment (December 2010). Prepared by Australasian Groundwater & Environmental Consultants Pty Ltd.
- Coppabella Underground Coal Mine: Air Quality Impact Assessment (January 2012). Prepared by ASK Consulting Engineers.
- Coppabella Underground Coal Mine: Noise Impact Assessment (January 2012). Prepared by ASK Consulting Engineers.
- Coppabella Underground Mine Project: Soil Survey and Land Resource Assessment (March 2010). Prepared by GSS Environmental.
- Modelling and Assessment Report: Coppabella Underground Mine Flood Modelling (January 2014). Prepared by Alluvium.

2. Project Description

2.1 Project Area

The Johnson Extended Project is situated within the Isaac Regional Council area, in Central Queensland. The area is a well-established grazing, farming and coal mining region within the Bowen Basin. The local region surrounding the Johnson Extended Project contains a number of existing open cut and underground coal mines. South Walker Creek, Moorvale, Carborough Downs, Millennium, Poitrel and Burton Coal Mines are all within 25km of the proposed Johnson Extended Project.

The Johnson Extended Project area is defined by the limits of the four MLA areas (MLAs 70384, 70385, 70386 & 70387) in which the subject exploration, underground coal mining activities and supporting surface activities are proposed to occur. The Project area is shown in **Figure 1**.

The study area used for the purposes of technical studies supporting this EM Plan (as described at Section 1) in most cases had a larger footprint than the Project Area and extended onto the existing Coppabella Coal mining leases (ML70161, ML70163, ML70164, ML70236 and ML70237) with sufficient area coverage such that environmental baseline data, modeling, evaluation and impact assessment and management strategies could be developed. Specific details of the study area are contained in each of the technical reports which will be made available upon request.

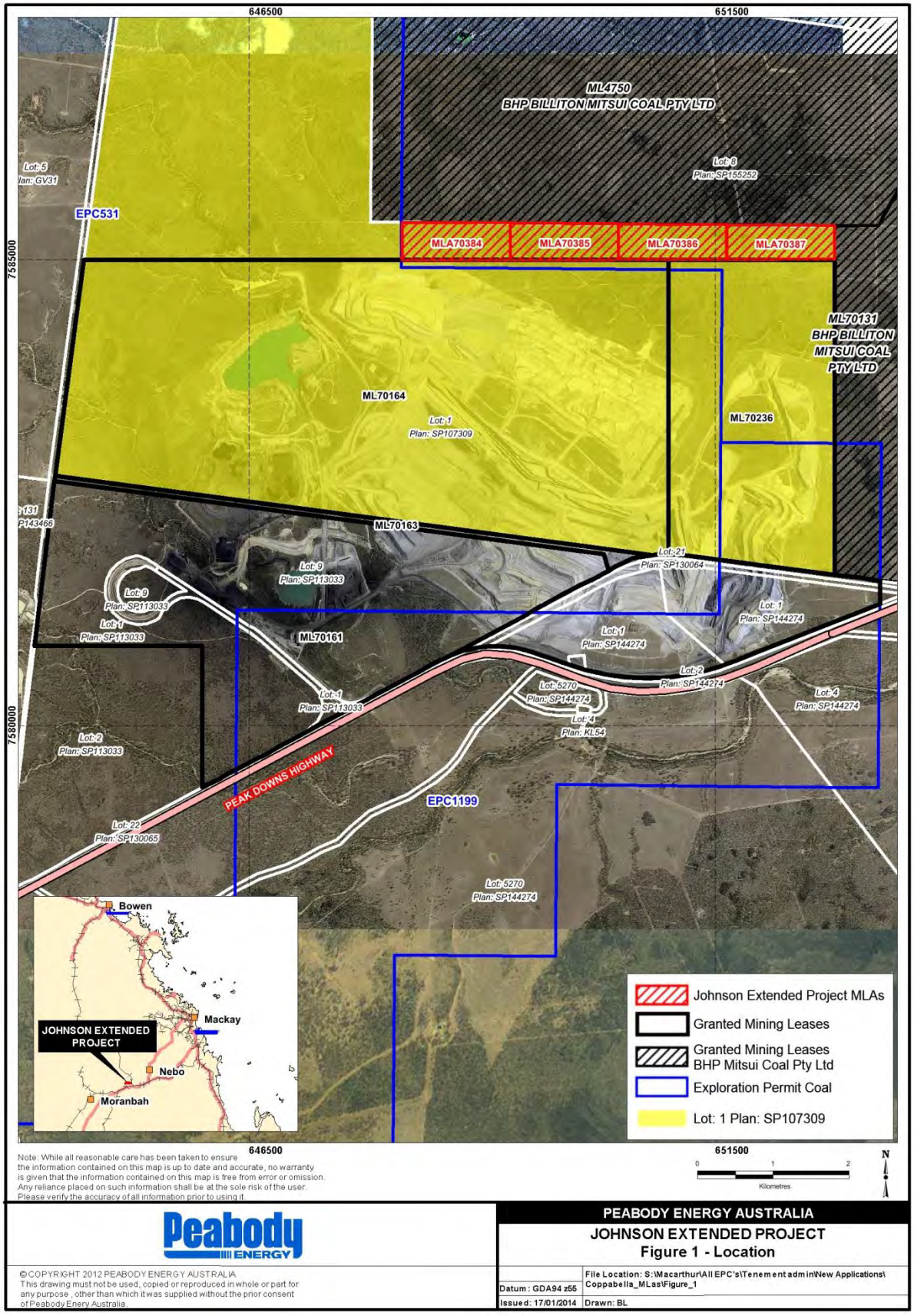
2.2 Project Location

The Johnson Extended Project is located largely to the northeast of Humbug Gully in the upper Isaac River catchment, approximately 10km east of the Coppabella Township in Central Queensland, approximately 150km southwest of Mackay and 45km east of Moranbah. The Project is bordered to the south by MLs for the current Coppabella Coal Mine and adjoins the South Walker Creek Mine and associated tenements, owned by BHP Mitsui Coal Pty Ltd, to the east (ML 70131) and north (ML 4750). (refer to **Figure 1**).

The Johnson Extended Project is close to major infrastructure including the Peak Downs Highway, the Goonyella-Hay point rail line and the regional raw water supply infrastructure.

As shown on **Figure 1** the Johnson Extended Project MLA area is contained entirely within Lot 1 on SP107309, which is within the County of Wodehouse and Parish of Kemmis.
The land over which the Johnson Extended Project MLAs is located is held as freehold and owned by Peabody Bistrotel Pty Ltd, which is owned by the participants in the CMJV. The Proponent of the Johnson Extended Project has negotiated a compensation agreement with Peabody Bistrotel Pty Ltd to allow the grant of the Johnson Extended Project MLAs.

Figure 1: Johnson Extended Project - Location



2.3 Coal Resource

The Johnson Extended Project targets the Leichhardt Lower Coal Seam with access provided via the adjacent Coppabella Coal Mine as part of the Coppabella Coal Underground Project. The geological model for the Coppabella Coal Underground Project has included the extent of the Johnson Extended Project area and both are described below.

2.3.1 Johnson Extended Project

The Leichardt Lower Seam within the area of the Johnson Extended Project MLAs typically has 60 to 260m depth of cover and is between 7m and 12m in thickness, providing a potential mineable coal target (non- Joint Ore Reserves Committee (JORC)) of up to 8.0 million tonnes of in-situ coal. Through the application of Longwall Top Coal Caving (LTCC) mining, coal recovery will be maximised.

Annual production is expected at a rate of 3.5 Mtpa of ROM coal, however this may be increased subject to further exploration, technical studies, and evolving operational experience with LTCC faces in Queensland. Based on the expected available in-situ coal tonnage and timing of access availability from the Coppabella Coal Underground Project, gas drainage and underground roadway development activities are expected to commence in 2024, with the longwall extraction life for the Johnson Extended Project expected to be approximately two and a half years (2027-2030). Decommissioning of infrastructure and rehabilitation of the Johnson Extended Project is expected to be complete by the end of 2032.

Coal mined in the Johnson Extended Project area will be conveyed through the Coppabella Coal Mine to a ROM stockpile, and then loaded to trucks for transport to the Coppabella Coal Mine CHPP area. It is proposed that coal stockpiling, processing and process waste disposal will utilise the existing Coppabella Coal Mine facilities.

A JORC Resource estimate is not yet available for the Johnson Extended Project. The grant of the MLAs is required to facilitate further exploration and modeling work. Subject to grant of the Johnson Extended Project MLAs, the Proponent proposes initial exploration activities of close spaced drilling and 3D seismic investigation (see Section 2.4.1) to improve definition of geological structure, seam thickness and location, depth of cover, coal quality and washability, gas drainage parameters, overburden properties and geotechnical environment to the extent required to support JORC Resource and Reserve definition and estimation.

2.3.2 Coppabella Coal Underground Project

The existing Coppabella Coal Mine open-cut operation targets the Leichhardt Seam within the Rangal Coal Measures. Extensive exploration drilling and 2D seismic investigations undertaken on the existing Coppabella Coal Mine to explore underground coal resource (excluding the Johnson Extended Project area) has enabled the development of a Resource estimate prepared in accordance with the JORC Code. A substantial underground JORC Resource estimate sufficient to support underground mining has been demonstrated within the area covered by the existing Coppabella Coal Mine.

2.4 Project Activities

2.4.1 Johnson Extended Project Exploration Activities

The key exploration activities proposed to be undertaken that have the potential to impact on the environmental values of the area are seismic surveying and drilling. The indicative location of proposed exploration activities is shown on **Figure 2**.

Prior to these activities being undertaken, mapping of the proposed exploration areas is planned. This will initially be through aerial photography and subsequently through ground truthing and field mapping. Ground truthing will be undertaken on foot and in 4WD vehicles using existing tracks. Mapping will seek to enable the utilisation of existing pre-cleared areas (such as for tracks and fences).

Access to the Johnson Extended Project area for mapping, ground-truthing and drilling will initially be either via an existing exploration track from the west (from the adjoining EPC tenure) or via the Coppabella Mine Site from the south, as shown in **Figure 2**.

2.4.1.1. Seismic Survey

Seismic surveying will be conducted using light trucks (10 tonne), light vehicles (4WD), and a whacker packer or self-propelled envirovibe buggy. The whacker packer is walked, or mounted on front of a vehicle, and driven along the seismic line while geophones placed along the line receive reflected seismic waves which are in turn transferred to data logging equipment contained in one of the light trucks. The envirovibe buggy is similarly driven along the seismic survey path with periodic stops to hydraulically lower a plate to the ground and generate a seismic source through a range of frequencies prior to lifting and driving to the next location, along with the supporting vehicles.

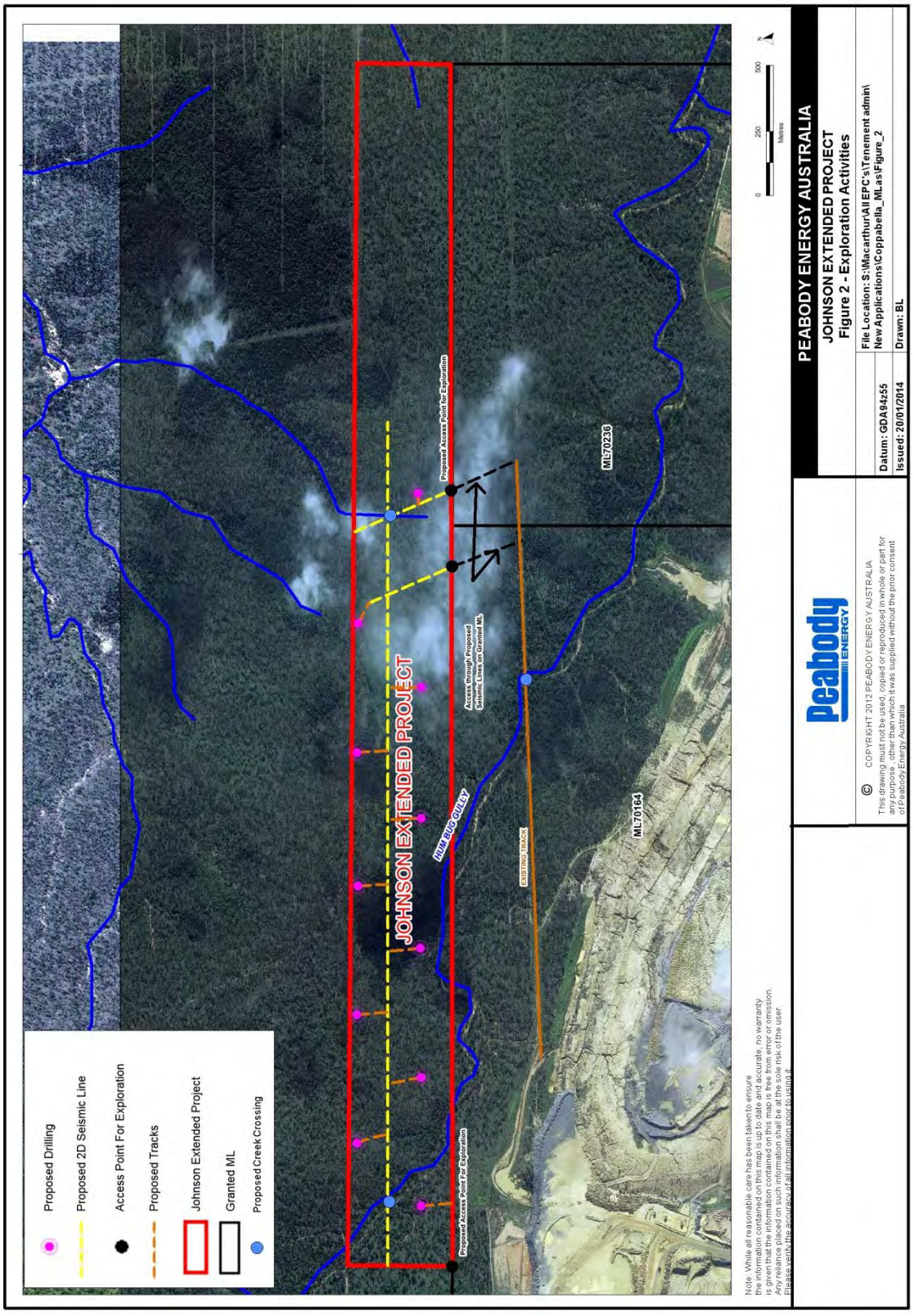
Where possible, existing tracks and fence lines will be utilised in seismic line pattern design. Where use of existing tracks and fence lines is not possible, active vegetation clearing may be required. Clearing of a seismic line involves slashing of grass or grading of a track (at surface level) for whacker packer or envirovibe buggy and vehicular access. Generally a tractor and slasher are preferred for line preparation; however, if ground conditions dictate, a backhoe loader or small grader is used instead to push or remove logs and small shrubs from the line. Should clearing of larger vegetation be required a small dozer (D6) would be used. Seismic lines are rehabilitated as per the *Code of Environmental Compliance Exploration and Mineral Development Projects*.

2.4.1.2. Drilling

Equipment used in the drilling program will likely involve a truck (approximately 15 tonne flatbed) mounted drill rig, a water and compressor truck (approximately 10 tonne flatbed), light vehicles (4WD) and a backhoe for sump development.

Where possible, access to selected drill sites will be via existing tracks, fence lines and clearings. Where it is not possible, clearing of access to the selected drill sites may be required, which will be undertaken in the same manner as the seismic lines described above. Sumps are typically constructed using a backhoe and dimensions are in the order of 8 to 10m^2 and 2.5m deep. A drill pad will be constructed with sufficient area for operations. Clearing for access and the drill pad will be undertaken utilising the same machinery hierarchy as for the seismic lines described above. Drill sites are rehabilitated as per the *Code of Environmental Compliance Exploration and Mineral Development Projects*.

Figure 2: Johnson Extended Project – Exploration Activities



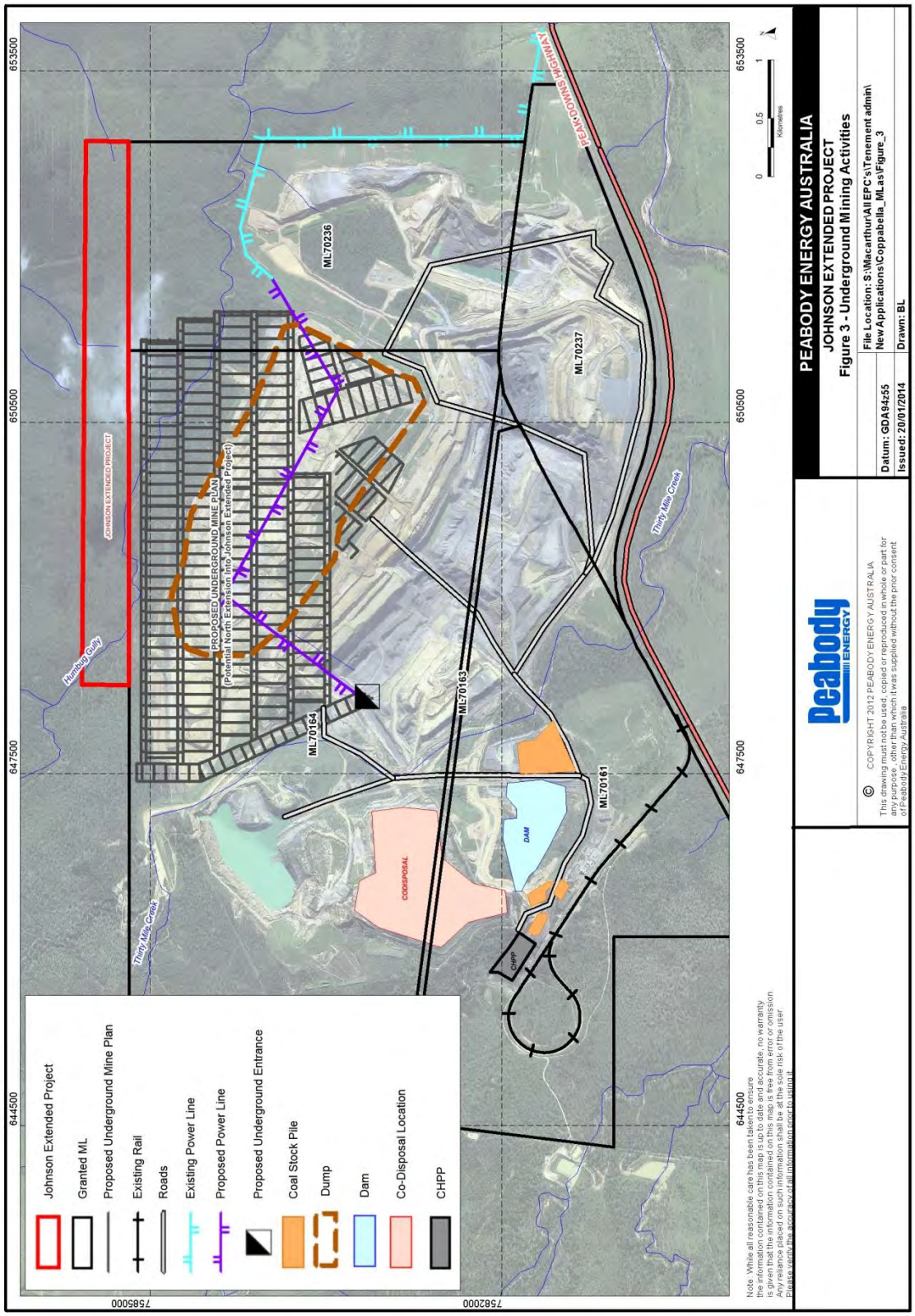
2.4.2 Johnson Extended Project Underground Mining Activities

The key activities that will be undertaken as part of the Johnson Extended Project underground mining activities will include:

- Undertaking of gas pre and post drainage and gas flaring activities
- Coal mining including development of roadways and bulk extraction utilising LTCC technology;
- Provision of services (including boreholes as required) and supporting infrastructure at the surface of the Johnson Extended Project area to enable coal mining to occur;
- Management of subsidence at the surface within the Johnson Extended Project area.

Figure 3 illustrates the indicative extent of the proposed underground mining activities (i.e. activities will be undertaken within the full extent of the Johnson Extended Project area comprising the 4 MLas).

Figure 3: Johnson Extended Project - Underground Mining Activities



2.4.2.1. Underground Mining

The Johnson Extended Project underground mining, targets the Leichardt Lower Seam which is typically between 7m and 12m in thickness in the Project area. Subject to commercial agreement with the CMJV, the mined coal and any associated waste rock will be transported to the surface via the Coppabella Coal Underground Project to the facilities of the Coppabella Coal Mine.

2.4.2.2. Services and Supporting Infrastructure

Services and supporting infrastructure that may be located on the Johnson Extended Project area to support coal mining may include:

- Gas drainage and flaring facilities;
- Ventilation, communication and emergency shafts;
- Services and pipelines (e.g. power, water, compressed air, ballast and concrete drop holes); and
- Potential groundwater monitoring and extraction bores and associated infrastructure to dewater any aquifer ahead of mining operations and handle underground water make, with connection to surface and pipeline / pumping facilities of the Coppabella Coal Mine.

Whilst existing cleared areas will be used where possible, vegetation clearing may be required to enable development, provision and access to services and supporting infrastructure. Clearing would be undertaken using similar equipment as described previously for exploration activity clearing.

Decommissioning and rehabilitation of sites of installed supporting infrastructure on the Johnson Extended project MLAs will be undertaken.

2.4.2.3. Subsidence Management

Subsidence management activities will be guided by a Subsidence Management Plan to be developed to specifically address the subsidence impacts and remediation of Humbug Gully.

Subsidence management activities may include:

- Installation of temporary sediment run off / erosion control measures or minor works;
- Deep ripping, backfilling or other reshaping of the ground surface in the areas of greatest surface cracking;
- Minor earthworks to reduce sudden elevation changes and minimise slope angles within the final land surface, especially within the vicinity of drainage lines;
- For drainage lines, re-contouring if and as required to ensure no interruption to flows; and
- Measures to exclude livestock, and other surface traffic, from disturbed areas until adequately rehabilitated.

Further discussion of subsidence management and rehabilitation is provided at **section 2.4.4**.

2.4.3 Coppabella Coal Mine Activities

Subject to conclusion of commercial negotiations, the Johnson Extended Project is expected to utilise the following services provided by the CMJV:

- Conveyance of Johnson Extended mined coal via Coppabella Coal Underground roadways to the surface within the Coppabella Coal Mine;
- Stockpiling of ROM coal at the Coppabella Coal Mine and transfer by trucking via existing Coppabella Coal Mine haul roads to the existing Coppabella Coal Mine processing facilities;
- Processing of Johnson Extended Project ROM coal at the existing Coppabella Coal Mine CHPP facility and disposal of rejects, and rejects storage rehabilitation and the conclusion of operations;
- Use of existing Coppabella Coal Mine water management infrastructure for recycling of pit water, with the addition of supplementary sumps and water flooding / inrush control in relevant areas.
- Provision, operation and establishment of support infrastructure facilities including offices, workshops, power and water supplies and rail loading facilities.

Processed coal will be loaded to trains using existing facilities and transported by existing rail facilities to the Dalrymple Bay Coal Terminal (DBCT).

The CMJV is progressing licensing and evaluation for transition to underground mining from existing open cut operations. It is expected that underground access via the Coppabella Coal Underground Project to the Johnson Extended Project area for purposes of underground gas drainage and roadway development requirements will be available from 2024.

It is proposed that the abovementioned activities be undertaken under the existing (or then superseded) EA, with management strategies deferred to the *Coppabella Environmental Management Plan*.

2.4.4 Rehabilitation Methods

The following management and mitigation strategies are a summarised description of the rehabilitation methods intended to be implemented during mining in order to reduce the potential for land degradation within the project sites and adjoining areas.

2.4.4.1. Topsoil Stripping And Handling

Where topsoil stripping and transportation is required, the following topsoil handling techniques will be used to prevent excessive soil deterioration.

Topsoil will be stripped to pre-determined depths appropriate for each soil type.

The surface of soil stockpiles will be left in as coarsely textured a condition as possible in order to promote infiltration and minimise erosion until vegetation is established and to prevent anaerobic zones forming.

If long-term stockpiling is planned (i.e. greater than 12 months), stockpiles will be seeded and fertilised using annual cover crop species that produce sterile florets or seeds. A rapid growing and healthy annual pasture sward provides sufficient competition to minimise the emergence of undesirable weed species.

2.4.4.2. Topsoil Respreading

The following methods will be used as required to ensure the effective spreading of topsoil:

- Sampling and analysis of topsoil resources to assist in identifying potential soil deficiencies and estimating required rates of fertiliser or ameliorant (i.e. gypsum or lime) application;
- Topsoil spreading, treatment with fertiliser or ameliorants (if required) and seeding in one consecutive operation, to reduce the potential for topsoil loss to wind and water erosion; and
- Application of herbicide or weed "scalping" prior to spreading stockpiled topsoil in cases of weed infestation

2.4.4.3. Landform Design And Erosion Control

Post disturbance reshaping will be carried out where required with the aim to produce slope angles, lengths and shapes that are compatible with the proposed land use and not prone to an unacceptable rate of erosion. Integrated with this is a drainage pattern that is capable of conveying runoff from the newly created catchments whilst minimising the risk of erosion and sedimentation.

A variety of erosion and sediment control methods will be used, the main ones being the following:

- Contour banks at intervals down slopes in order to divide a long slope into a series of short slopes that prevent runoff from reaching a depth of flow or velocity that would cause erosion;
- Contour ripping across the grade, achieving erosion control while cultivating the surface in readiness for sowing;
- Engineered waterways intercepting and diverting runoff down slope, using erosion blankets, ground-cover vegetation and/or rip rap; and
- Sediment control dams for the purpose of capturing sediment laden runoff prior to off-site release and providing semi-permanent water storages that enhance the ecological diversity of the area.

Thorough seedbed preparation will be undertaken to ensure optimum establishment and growth of vegetation. All top soiled areas will be contour ripped. Best results are usually obtained by ripping when soil is moist and when undertaken immediately prior to sowing. The re-spread topsoil will be scarified prior to, or during seeding, to reduce run-off and increase infiltration.

2.4.4.4. Revegetation Methods

Re-vegetation methods will comprise:

- Sowing of seed of pasture grasses and legumes, trees or shrub species appropriate to the desired land use, generally in the October to February period depending on seasonal conditions and operational requirements;
- Planting of selected native trees and shrubs where required. The details on the selection of the type and rate of fertiliser and seed will depend on the physical and chemical properties of the surface being treated, the season, prevailing climatic conditions and the available machinery. The mine flora and fauna studies will be used in selecting plant species for rehabilitation;
- Annual monitoring of rehabilitated areas; and
- Maintenance work to promote acceptable cover or to repair failed areas.

2.5 Project Timeframes

Pre-development activities will be completed in the period from grant of the MLAs to 2024. The holder will commence further exploration activities for the Johnson Extended Project following grant of the MLAs. This exploration information is essential for proving JORC Resource and in order to support completion of a Feasibility Study and estimation of JORC Reserves during this period.

Exploration and studies activities to be completed in the period to 2024 include:

- Conducting of field exploration;
- Exploration information assessment, geological modeling and preparation of JORC Resource and Reserve estimates;
- Detailed dewatering and water handling studies;
- Further geotechnical modeling and assessment;
- Coal quality and washability testing;
- Overburden modeling and subsidence profiling;
- Gas content, composition, permeability and porosity determination;
- Gas drainage trials;
- Finalising the mine layout, production methods and productivity estimates, and confirming the annual production target; and
- Completing supporting infrastructure studies.

Subject to availability of access via Coppabella Coal Underground Project activities, gas drainage and underground roadway development activities for the Johnson Extended Project will commence from 2024, with first longwall coal in 2027 and completion of underground mining in 2030. Mine site rehabilitation activities are expected to be conducted during the course of mining (subsidence impacts) with infrastructure decommissioning and removal after completion of mining through to the end of 2032.

The holder is not aware of any alternative logical development scenario for the Johnson Extended Project. Should the Johnson Extended Project not be accessed via the Coppabella Coal Underground Project main headings in conjunction with this timing, access via surface drifts and/or shafts would be required and impose a large capital imposition for any party seeking to extract the coal within the MLAs, almost certainly rendering the coal uneconomic.

Further, it would result in sterilisation of boundary coal on the Coppabella Coal Mine MLs in the order of magnitude of 3,500 m length x 50m assumed barrier pillar width x 7.5m average seam thickness x 90% average mining recovery x 1.5 t/m3 assumed density = 1.8 Mt ROM.

2.6 Environmentally Relevant Activities

The EP Act (s18) defines an environmentally relevant activity (ERA) as:

a. an agricultural ERA as defined under section 75; or
b. a resource activity as defined under section 107; or
c. another activity prescribed under section 19 as an environmentally relevant activity.

A mining activity being identified as a resource activity (s107 EP Act), execution of the Johnson Extended Project will include the undertaking of a resource activity ERA (ERA 5 – Mining Black Coal). No other ERAs are proposed to be undertaken or authorised under the EA for the Johnson Extended Project.

As part of the support activities related to the Johnson Extended Project (but to be undertaken by the CMJV and located on the existing Coppabella Coal Mine MLs), the following ERAs will be undertaken:

- ERA 8 - Chemical Storage;
- ERA 31 – Mineral Processing;
- ERA 33 – Crushing, milling, grinding or screening; and
- ERA 63 - Sewage Treatment.

3. Environmental Values, Impacts, Commitments and Draft Conditions

3.1 Risk Assessment

This Section includes an assessment of the likely impact of each of the relevant activities proposed as part of the Johnson Extended Project on the environmental values of the project area. The identification and management of these impacts may be undertaken through a risk assessment.

Peabody Energy has developed a hazard identification and risk management standard (Peabody Energy (2012)) in order that a consistent hazard identification and risk analysis framework is applied across all Peabody Energy owner operated mine sites and projects. This standard, which accords with the Australian standard (AS/NZS ISO 31000-2009 Risk management – Principles and guidelines) has been applied to the Johnson Extended Project. The risk assessment process includes a number of steps which include:

- Establishing the context;
- Risk identification;
- Risk analysis;
- Risk evaluation; and
- Risk treatment.

The risk assessment process used evaluated the likelihood and consequences of positive and negative environmental effects occurring as a result of exposure to one or more hazards. A number of tools were used to identify and assess the risks as part of semi-quantitative analysis. Table 3-1 is the risk matrix that was applied to quantify the level of risk for each relevant event as low, moderate, high or extreme, whilst Table 3-2 and Table 3-3 provide guidance descriptors for likelihood and consequence respectively.

Table 3-1 Risk Matrix

L - Likelihood	C - Consequence				
	1	2	3	4	5
A (Very likely)	Low	Moderate	High	Extreme	Extreme
B (Likely)	Low	Moderate	High	High	Extreme
C (Possible)	Low	Moderate	Moderate	High	Extreme
D (Unlikely)	Low	Low	Moderate	Moderate	High
E (Highly Unlikely)	Low	Low	Low	Low	Moderate

Table 3-2 Likelihood Matrix

Category	Likelihood	Descriptor
A	Very Likely	Assessed that this consequence from the hazard has occurred several times on this site or is very likely to occur at some time on this site
B	Likely	Assessed that this consequence from the hazard has occurred on this site previously or is assessed to be likely to occur at some time on this site
C	Possible	Assessed as possible that this consequence from the hazard could occur on this site at some time
D	Unlikely	Assessed as unlikely that this consequence from the hazard will occur on this site / enterprise at any time
E	Highly Unlikely	Assessed that there is no practical possibility that this consequence from the hazard would ever occur on this site / enterprise

Table 3-3 Consequence Matrix

Area of effect	Estimated level of consequence				
	1	2	3	4	5
E - Environmental Impact	Environmental nuisance. Limited damage to minimal area of low significance	Minor short to medium term material environmental harm to small area(s) of limited significance	Serious short to medium term environmental harm with widespread impacts	Major environmental harm. Relatively wide spread medium to long term impacts	Extreme environmental harm. Long term wide spread effects on environment
R - Impact on reputation	Slight impact Public aware but no public concern	Limited impact Some local public concern	Considerable impact with potential for wider public concern	National impact with potential for wider public concern	International impact. International public attention

For each aspect of the environment the relevant environmental values were identified along with potential impacting events. Standard controls were identified and the risk analysis was undertaken, identifying likelihood, consequence and level of risk using the aforementioned tables. Further controls were applied (if required) and a residual risk ranking was derived. For each aspect, a risk assessment table, similar to that provided in Table 3-4 was developed.

Table 3-4 Example Risk Assessment Table

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R

For the purpose of setting “acceptable limits” for impact, Peabody Energy (2012) notes it can normally be taken that risks ranked as Low and Moderate from this procedure are at an acceptable level, whereas risks ranked as High or Extreme require further controls.

3.2 Preliminary - Proposed General EA Conditions

Schedule A – General

A1 This environmental authority authorises environmental harm referred to in the conditions. Where there is no condition or this environmental authority is silent on a matter, the lack of a condition or silence does not authorise environmental harm.

A4 The holder of this environmental authority must:

a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority

b) maintain such measures, plant and equipment in a proper and efficient condition

c) operate such measures, plant and equipment in a proper and efficient manner

d) ensure all instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority are properly calibrated.

Monitoring
A5 Except where specified otherwise in another condition of this environmental authority, all monitoring records or reports required by this environmental authority must be kept for a period of not less than 5 years.

Financial assurance
A6 The activity must not be carried out until the environmental authority holder has given financial assurance to the administering authority as security for compliance with this environmental authority and any costs or expenses, or likely costs or expenses, mentioned in section 298 of the Act.

A7 The amount of financial assurance must be reviewed by the holder of this environmental authority when a plan of operations is amended or replaced or the authority is amended.

Notification of emergencies, incidents and exceptions
A9 The holder of this environmental authority must notify the administering authority by written notification within 24 hours, after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with, the conditions of this environmental authority.

A10 Within 10 business days following the initial notification of an emergency or incident, or receipt of monitoring results, whichever is the latter, further written advice must be provided to the administering authority, including the following:

a) results and interpretation of any samples taken and analysed

b) outcomes of actions taken at the time to prevent or minimise unlawful environmental harm

c) proposed actions to prevent a recurrence of the emergency or incident.

Complaints
A11 The holder of this environmental authority must record all environmental complaints received about the mining activities including:

a) name, address and contact number for of the complainant

b) time and date of complaint

c) reasons for the complaint

d) investigations undertaken

e) conclusions formed

f) actions taken to resolve the complaint

g) any abatement measures implemented

h) person responsible for resolving the complaint.

A12 The holder of this environmental authority must, when requested by the administering authority, undertake relevant specified monitoring within a reasonable timeframe nominated or agreed to by the administering authority to investigate any complaint of environmental harm. The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures, where implemented, must be provided to the administering authority within 10 business days of completion of the investigation, or no later than 10 business days after the end of the timeframe nominated by the administering authority to undertake the investigation.

3.3 Air Quality

3.3.1 Description Of Surrounding Environment

The local airshed is typically rural, of reasonably good quality and with acceptable levels of pollutant concentrations.

The prevailing winds are predominantly from the east ranging from the north east to the south east. Winds during the morning are predominantly from the southeast. Winds during the afternoon are predominantly from the east and east-southeast. Highest speeds are normally associated with winds from the southeast. Wind speeds generally decrease during the night.

Dust constitutes the main pollutant, originating from exposed soils in dry conditions. At times, local bushfires or controlled burning also affect the quality of the regional airshed.
Existing air pollution is mostly caused by dust generating activities. The main sources of particulate emissions include:

- Traffic on unsealed roads;
- Farming activities: traffic, cattle movements;
- Smoke from occasional grass/bush fires; and
- Activities at the surrounding mines including rail traffic

3.3.2 Environmental Values and Sensitive Receptors

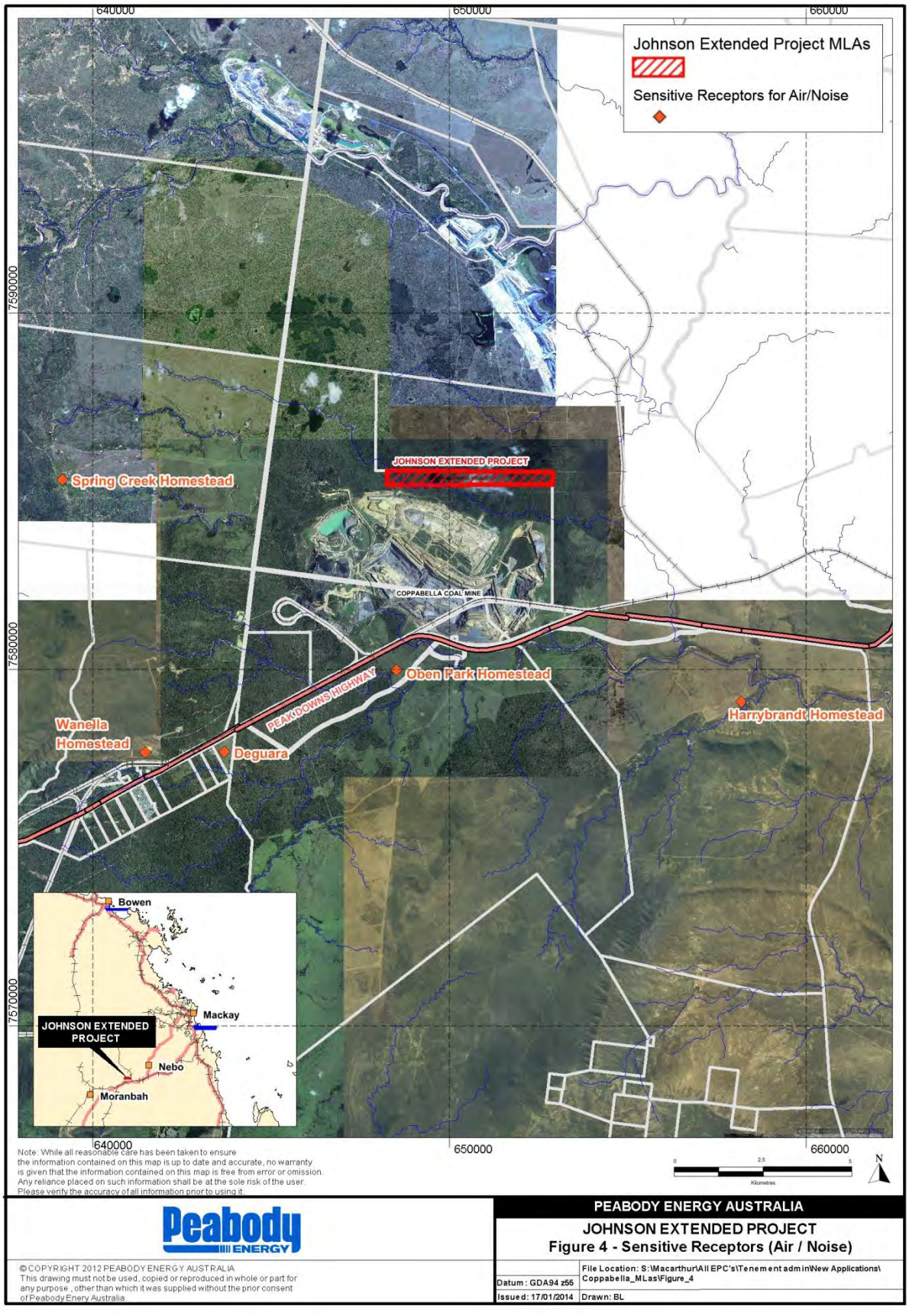
The environmental values (EVs) to be enhanced or protected listed under the *Environmental Protection (Air) Policy 2008* (EPP(Air)) that are of particular relevance to the project area are the qualities of the air environment that are conducive to human health and wellbeing, including its social and economic amenity.

Identified sensitive receptors are rural residences located in proximity to the existing Coppabella Coal mine, which are listed below and depicted in **Figure 4**: Location Of Sensitive Receptors – Air And Noise:

- Oben Park – about 2.5 km south east of south pit
- Harrybrandt residence - about 8km east of the mining lease boundary
- Wanella residence – about 5kms south west of the washplant
- Spring Creek residence - about 8km north west of the Creek Pit
- Deguara property – located towards eastern limit of the township of Coppabella and some 5 km to the south-west of Oben Park

The closest of the above Coppabella Coal Mine sensitive receptors to the Johnson Extended Project is the Oben Park homestead, at a distance some 5.3 km, followed by Harrybrandt residence and Spring Creek Homestead, respectively some 8.0 and 8.7 km distant. Based on the risk assessment conducted as part of evaluation and completion of development of this EM Plan, it is expected that both exploration and underground mining activities specific to the Johnson Extended Project MLAs will have negligible to no impact on air EVs and sensitive receptors.

Figure 4: Location Of Sensitive Receptors – Air And Noise



3.3.3 Assessment Of Potential Impacts On Environmental Values

3.3.3.1. Johnson Extended Project Exploration Activities

Activities and associated potential impacts

Dust-emitting activities during exploration will include the following:

- Vegetation clearing and associated soil disturbance;
- Vehicle traffic on unsealed roads;
- Wind erosion of cleared and unsealed areas (e.g. drill pads, tracks); and
- Exhaust emissions from mobile plant.

The use of diesel vehicles and plant during exploration activities will also generate gaseous emissions such as carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and Volatile Organic Compounds (VOC).

Potential impacts of the above activities consist of nuisance to sensitive receptors from excessive dust deposition. The quantities of gaseous emissions will be minor and will not have any impact on EVs and sensitive receptors.

Impact assessment

Table 3-5 presents the outcomes of the risk assessment of potential impacts from exploration activities on air quality.

Considering their small magnitude, short-term and temporary nature, combined with the proposed control measures in this EM Plan, exploration activities on the Johnson Extended MLAs are expected to have negligible impact on air quality EVs at the identified sensitive receptors.

Table 3-5 Risk Assessment Of Potential Impacts From Johnson Extended Project Exploration Activities On Air Quality

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Air quality	Human health, aesthetics, ecological health, agricultural use	Construction of tracks for 2D seismic survey and drill site access, along with drill pad development and drilling generating dust that causes air quality impacts to sensitive receptors	• Advise landholder of proposed activities • Obtain Landholder consent for any drill site located < 500m from a dam, stockyard, watering point or residence • Minimising areas of disturbance • Altering work practices to avoid or minimise the generation of dust; • Scheduling activities for times when they will have least impact; • Watering unsealed roads and tracks at >2L/m2/hour (as per current practices); • Limit vehicle speed limits to 30km/hr on property tracks and 10km/hr when near a residence • Rehabilitating and revegetating disturbed areas in a progressive manner and as soon as practicable (rehabilitate access tracks in consultation with landholder) • Leaving or creating wind breaks or screening; • Topsoil stripping limited to sump area and areas required for access track construction;	1	C	Low	Investigation and implementation of soil consolidation measures for dust producing areas (if required)	1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
			• Clearing of mature trees avoided as far as practicable; • Existing access and fence line tracks used where possible • Regular maintenance of all machinery • Record any complaints received regarding the release of dust and implement any practicable corrective action.							

3.3.3.2. Johnson Extended Project Underground Mining Activities

Activities and associated potential impacts

Dust emissions

Potentially dust-emitting activities to be carried out within the Johnson Extended Project leases during underground mining operations are:

- construction of tracks to access and develop services and supporting infrastructure;
- vehicle traffic on unsealed roads/tracks for monitoring and maintenance purposes; and
- earthworks carried out for remediation of any subsidence impacts

The use of diesel vehicles and plant for the purpose of monitoring and maintenance as well as earthworks will also generate gaseous emissions such as carbon dioxide (CO_2), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and Volatile Organic Compounds (VOC).

Gas vents to be installed at the ground surface will drain mostly methane gas (CH_4) from the coal seam to make it safer to mine.

Potential impacts of the above activities on EVs and sensitive receptors are expected to be negligible considering their relatively small magnitude. Vehicle traffic for monitoring and maintenance will only be occasional and will only involve one or two vehicles at a time. Earthworks for subsidence remediation will be restricted to the particular affected areas and are not anticipated to generate impacting levels of dust. The quantities of gaseous emissions will be minor.

Impact assessment

Table 3-6 presents the outcomes of the risk assessment of potential impacts from underground mining activities on air quality.

Mining activities will be carried out underground and the mine exhaust system is planned to be located outside the Johnson Extended Project MLAs. Air contaminant emissions will therefore not be released from within the Johnson Extended Project Area. Refer to section 3.3.3.3 covering Coppabella Coal Mine activities for provisions relevant to the management of such emissions.

Table 3-6 Risk Assessment Of Potential Impacts From Johnson Extended Project Underground Mining Activities On Air Quality

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Air quality values	Human health, aesthetics, ecological health, agricultural use	Construction of tracks for access to gas drainage facilities, pumps, monitoring bores and subsidence impacted areas, along with the undertaking of subsidence management activities (reprofiling land) causing air quality impacts (particulate matter) to sensitive receptors.	• Altering work practices to avoid or minimise the generation of dust; • Scheduling activities for times when they will have least impact; • Watering unsealed roads and tracks at >2L/m2/hour (as per current practices); • Revegetating disturbed areas as soon as practicable; • Leaving or creating wind breaks or screening; • Clearing of mature trees avoided as far as practicable; • Cleared vegetation to be placed back into rehabilitation as habitat where practicable and appropriate (rather than burnt); • Existing access and fence line tracks used where possible; • Fitting and maintenance of appropriate exhaust systems on all equipment utilised within the Johnson Extended Project MLs to minimise diesel particulate emissions.	1	C	Low		1	C	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		Gas drainage, vehicle and equipment emissions, causing air quality impacts (gaseous emissions) to sensitive receptors	• Use and maintenance of appropriate equipment within the Johnson Extended Project MLs to minimise emissions. • Flaring of drained gas (predominantly methane)	1	D	Low	• Where necessary monitoring of air quality at sensitive receptors	1	D	Low
		Activities undertaken on the MLAs, particularly coal extraction and fuel usage causing greenhouse gas emissions, increasing the risk of climate change impacts	• Improving the efficiency of site transport, procuring fuel efficient equipment and maintaining equipment in good working order to minimise fuel usage • Reducing fugitive methane emissions by adopting proven and economically viable technologies to reduce the discharge of methane • Adopting appropriate land use strategies on site, where appropriate, to develop carbon sinks through revegetation	1	C	Low	• Investigate gas drainage techniques so that a higher proportion of the coal seam methane may be converted to carbon dioxide.	1	C	Low

3.3.3.3. Coppabella Coal Mine Activities

Activities and associated potential impacts

Dust emissions

An Air Quality Impact Assessment was carried out for the proposed underground mining at Coppabella Mine as part of the Coppabella Coal Underground Project[1]. It identified the dust-emitting activities to be carried out outside the Johnson Extended Project leases during underground mining operations as being:

- Loading to trucks with coal;
- Bulldozing coal;
- Bulldozers on overburden;
- Truck unloading coal;
- Vehicle traffic on unsealed roads;
- Use of grader;
- Plant activities;
- Wind erosion of areas left free of vegetation and unsealed; and
- Mine ventilation.

The Air Quality Impact Assessment provides annual particulate emissions estimates for each activity, assuming no dust control measures are applied.

The use of diesel vehicles and plant during exploration activities will also generate gaseous emissions such as carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2) and Volatile Organic Compounds (VOC).

Potential impacts of the above activities are as follows:

- Nuisance to sensitive receptors from excessive dust deposition; and
- Cause a visibility hazard for nearby road users.

The quantities of gaseous emissions will be minor and will therefore not have any impact on EVs and sensitive receptors.

Odour and Air Toxics

No potential sources of odours exist at the Coppabella Coal Mine.

Spontaneous Combustion

The propensity for spontaneous combustion of Coppabella coal is assessed as being very low due to the coal's low inherent moisture and very low sulphur content. The Coppabella Coal Mine has had over the past twelve years no heating or spontaneous combustion of coal or waste materials and based on current coal quality drilling results, it is not expected that spontaneous combustion will become an issue in future.

[1] Coppabella Underground Mine, Air Quality Impact Assessment, ASK Consulting Engineers, 25 January 2012, prepared for Macarthur Coal Pty Ltd

Impact Assessment

The Air Quality Impact Assessment uses air quality limits set out in the EPP(Air) that are similar to those used in the current Coppabella Coal Mine EA EPML00579213 (previously MIN100555707).

Modelling of air quality undertaken for underground mining operations indicates that the underground mining operations are not expected to exceed the air quality criteria at any of the sensitive receptors.

3.3.4 Objectives

The primary objectives for air quality are:

- To ensure that there is no unreasonable release (as defined in the EPP (Air)) of contaminants to air impacting sensitive receptors attributable to any activities within the Johnson Extended Project area and at the Coppabella Coal Mine
- To control potential sources of air contaminants at the site to enable achievement of the statutory environmental protection objectives
- Control dust and odour sources at the site to enable achievement of the statutory environmental protection objectives
- To minimise greenhouse gas emissions where practical to do so.

3.3.5 Control Strategies

3.3.5.1. Johnson Extended Project Exploration & Underground Mining Activities

The control measures identified in Table 3-7 are deemed appropriate to meet air quality criteria at each sensitive receptor and keep impact risks low during the exploration and mining phases.

Table 3-7 Control Strategies: Air

Control Strategies	Explor.	Mining
Advise landholder of proposed activities	✓	
Obtain landholder consent for any drill site located < 500m from a dam, stockyard, watering point or residence	✓	
Minimising areas of disturbance	✓	
Topsoil stripping limited to sump area and areas required for access track construction	✓	
Limit vehicle speed limits to 30km/hr on property tracks and 10km/hr when near a residence	✓	✓
Altering work practices to avoid or minimise the generation of dust	✓	✓
Scheduling activities for times when they will have least impact	✓	✓
Watering unsealed roads and tracks (as per current practices)		✓
Rehabilitating and revegetating disturbed areas in a progressive manner and as soon as practicable (rehabilitate access tracks in consultation with Landholder)	✓	✓
Leaving or creating wind breaks or screening	✓	✓
Clearing of mature trees avoided as far as practicable	✓	✓
Existing access and fence line tracks used where possible	✓	✓
Fitting and maintenance of appropriate exhaust systems on all equipment utilised within the Johnson Extended Project MLs to	✓	✓

Control Strategies	Explor.	Mining
minimise diesel particulate emissions		
Use and maintenance of appropriate equipment within the Johnson Extended Project MLs to minimise emissions		✓
Improving the efficiency of site transport, procuring fuel efficient equipment and maintaining equipment in good working order to minimise fuel usage	✓	✓
Reducing fugitive methane emissions by adopting proven and economically viable technologies to reduce the discharge of methane		✓
Adopting appropriate land use strategies on site, where appropriate		✓
Record any complaints received regarding the release of dust and implement any practicable corrective action.	✓	✓

3.3.6 Proposed EA Conditions

3.3.6.1. Johnson Extended Project Exploration Activities

It is expected that environmental values relating to air quality will be adequately protected and managed through implementation of the conditions of the *Code of environmental compliance for exploration and mineral development projects, DEHP, Version 1* (or later version).

3.3.6.2. Johnson Extended Project Underground Mining Activities

It is proposed to apply similar EA conditions as those applicable under the adjacent Coppabella Mine EA EPML00579213 (previously MIN100555707), as follows:

Schedule B – Air

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 environmental authority 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 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) (PM10) suspended in the atmosphere of 50 micrograms 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:

    i. particulate matter- Determination of suspended particulate PM10 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), and
    ii. any alternative method of sampling PM10, which may be permitted by the *Air Quality Sampling Manual* as published from time to time by the administering authority.

B4 If monitoring indicates exceedence of the relevant limits in condition B3, then the environmental authority holder must:

a. Address the complaint including the use of appropriate dispute resolution if required; and

b. Immediately implement dust abatement measures so that emissions of dust from the activity do not result in further environmental nuisance.

3.4 Land

3.4.1 Strategic Cropping Land

There is no Strategic Cropping Land on the MLAs.

3.4.2 Description Of Surrounding Environment

A Soil Survey and Land Resource Assessment[2] carried out in the vicinity of the Johnson Extended Project area identified the following soil units as being present:

- Brown Duplex Sandy Loam
- Yellow Duplex Sand; and
- Yellow Duplex Sandy Loam.

Brown Duplex Sandy Loam (Brown Chromosol)

Description: This soil unit is characterised by an abrupt change between the light pale brown sandy loam surface soil and the light brown clay subsurface soil. These moderately structured soils range from slightly acidic to strongly alkaline at depth. The soils are non-saline to moderately saline at depth. The topsoils are generally non-sodic whilst the subsoils exhibit moderately sodic characteristics.

Land use: The land overlying these soils is dominated by open forest and grazing farmland. Farm tracks and remnant vegetation and sparse low lying shrubs transect the area.

Management: The top 0.12 m of this soil is marginally suitable for stripping and reuse as a topdressing medium in rehabilitation. The lower layers are generally unsuitable due to the limiting factors of massive structure (at increased depth) moderate potential for dispersion and strong alkalinity. Whilst this subsoil is unsuitable for use as a topdressing material, consideration may be given to selectively stripping and conserving this material for use as an intermediate layer. This soil requires only the standard erosion and sediment control measures if disturbed.

Yellow Duplex Sand (Yellow Sodosol)

Description: This soil unit is characterised by an abrupt change between the yellowish brown sandy surface soil and the brownish yellow sandy clay subsurface soil. These weakly to moderately structured soils range from slightly acidic

[2] Coppabella Underground Mine Project, Soil Survey and Land Resource Assessment, Preliminary Draft, GSS Environmental for McCollum Environmental Management Services, March 2010.

to strongly alkaline at depth. The topsoil's are generally non-sodic whilst the subsoil's exhibit moderate sodicity.

Land use: The land overlying these soils is dominated by open forest and grazing farmland. Farm tracks transect the area with remnant vegetation and sparse low lying shrubs.

Management: The 0.35 m of this soil is considered marginally suitable for stripping and reuse as a topdressing medium in rehabilitation due to high sand content in the topsoil layer and massive structure at depth. This soil requires only the standard erosion and sediment control measures if disturbed, however given the sodicity at depth, if the topsoil is removed, it may lead to dispersion and erosion in wet conditions.

Yellow Duplex Sandy Loam (Yellow Sodosol)

Description: This soil unit generally consists of light brown to pale brown sandy loams surface soils which overlie a texture contrast to brownish yellow sandy clay and clayey subsurface soil's. These moderately structured soils range from slight acidity to neutral in the upper surface layers to slight to moderately alkaline in the subsurface layers. The soils are non-saline and generally non-sodic in the surface layers to moderately sodic in the subsurface layers.

Land use: The land overlying these soils is dominated by open forest and open grazing farmland. Farm tracks with sections of remnant vegetation and low lying shrubs traverse the area.

Management: The 0.30 m of this soil is considered marginally suitable for stripping and reuse as a topdressing medium in rehabilitation due to high sand content in the topsoil layer. The lower layers are generally unsuitable due to the limiting factors of massive structure (at increased depth) moderate potential for dispersion and moderate alkalinity. This soil requires only the standard erosion and sediment control measures if disturbed, however given the sodicity at depth, if the topsoil is removed, it may lead to dispersion and erosion in wet conditions.

3.4.3 Environmental Values

The primary recent use of land in the proposed Johnson Extended Project area has been low intensity cattle grazing within remnant vegetation on native pasture.

All soil units have been assessed as not suitable for Rainfed Cropping and as marginally suitable for grazing. They have been classified as Agricultural Land Class C3 (low quality grazing, grazing of native pastures with limited suitability for pasture improvement) or Land Suitability Class 4.

The Yellow Duplex Sand has high Plant Available Water Capacity (PAWC) limitations, low fertility and its topsoil is susceptible to erosion due to its texture. In addition, the subsoil is sodic and high in clay content which may restrict plant rooting depth and growth.

The Yellow Duplex Sandy Loam has marginal topsoil texture as it is easily erodible, it has low fertility and high PAWC limitations. Subsoils within this unit are generally sodic and high in clay content which may restrict plant rooting depth and growth.

The Brown Duplex Sandy Loam has marginal topsoil texture as it is easily erodible, has low fertility and high PAWC limitations. Subsoils within this unit are generally sodic and high in clay content which may restrict plant rooting depth and growth

All three soil units should be able to support intermittent low-quality grazing of native pastures with no pasture improvement.

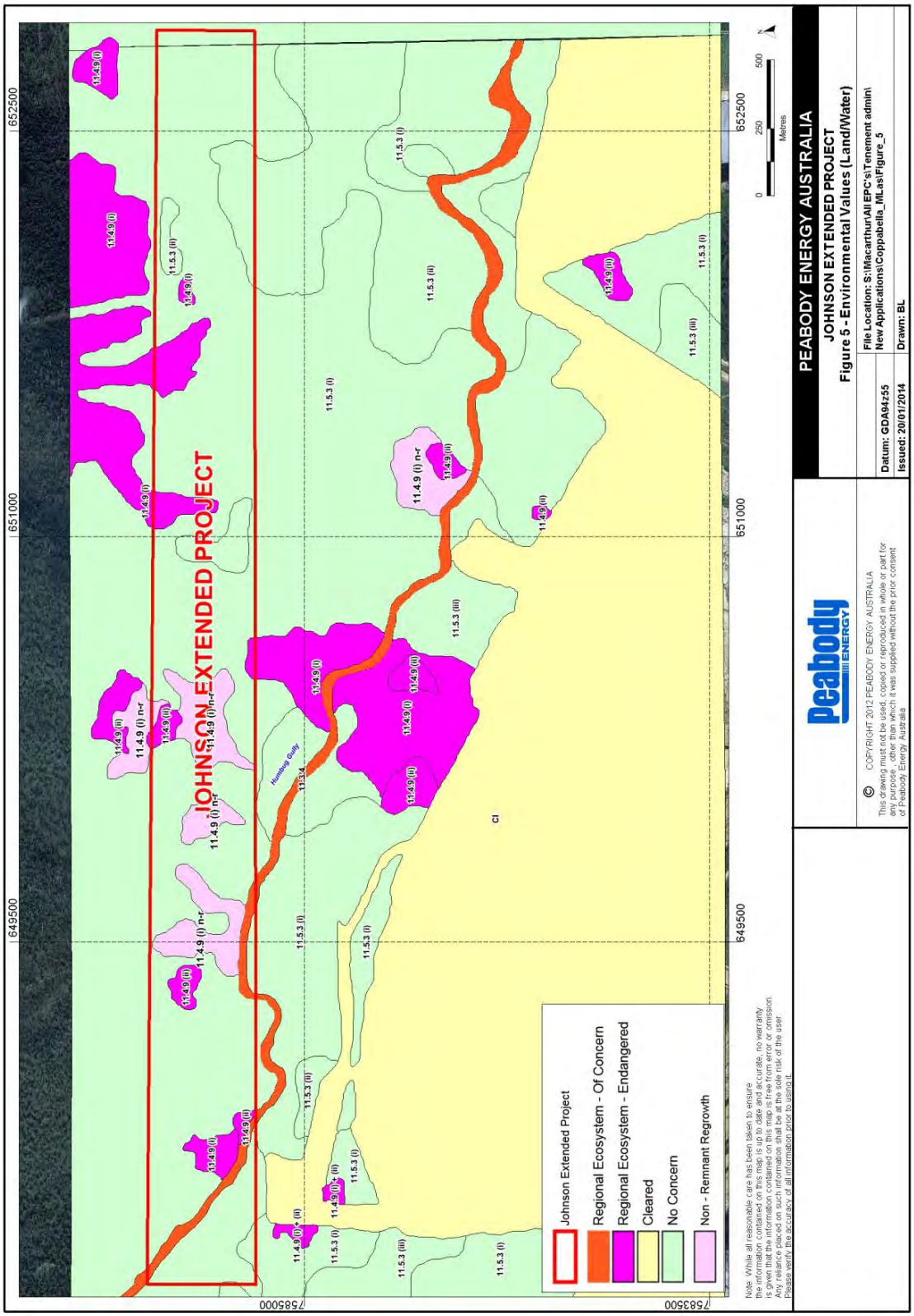
Native vegetation found on all three soil units consists of open sclerophyll forest disturbed by grazing activities. The Regional Ecosystems (REs) identified in the project areas are as follows:

- RE 11.3.4: Eucalyptus tereticornis and/or Eucalyptus spp. tall woodland on alluvial plains
- RE 11.4.9: Acacia harpophylla shrubby open forest to woodland with Terminalia oblongata on Cainozoic clay plains
- RE 11.5.3: Eucalyptus populnea and/or Eucalyptus melanophloia and/or Corymbia clarksoniana woodland on Cainozoic sand plains/remnant surfaces.

Figure 5 shows land and water EVs relevant to the Johnson Extended Project.

Post-closure land use will be determined as part of a mine closure strategy, which will be determined with appropriate stakeholders prior to closure, and considering the above potential use assessment.

Figure 5: Johnson Extended Project – Environmental Values (Land / Water)



3.4.4 Assessment Of Potential Impacts On Environmental Values

3.4.4.1. Johnson Extended Project Exploration Activities

Soil disturbing activities during exploration will include the following:

- Soil disturbance associated with vegetation clearing;
- Topsoil stripping to form tracks and drill pads;
- Drilling of boreholes;
- Vehicle traffic on unsealed roads; and
- Erosion of areas left free of vegetation and unsealed (e.g. drill pads, tracks).

Potential impacts of the above activities include degradation of land resource and receiving waters due to erosion, sediment runoff, loss of topsoils and decline in soil fertility.
Release or leaks of hazardous substances used for exploration activities may also cause degradation of the land resource.

Impact assessment

No changes to land suitability are expected to result from exploration activities. It is expected that less than 8 hectares will be required to be cleared of vegetation and disturbed as a result of surface activities, estimated as shown below (see also **Figure 2**).

Exploration Activity Type	Length Of Concern (m)	Length Endangered (m)	Length Non Remnant Regrowth Endangered (m)	No Concern (m)	Total Length (m)	Width (m)		Area Of Concern (m2)	Area Endangered (m2)	Area Non Remnant Regrowth Endangered (m2)	Area No Concern (m2)
Sesimic	42	467	568	14,923	16,000	4		168	1,868	2,272	59,692
Drilling			3 Holes	8 Holes						2,700	7,200
Tracks		21	217	975	1,213	4			84	868	3,900
Total Category Disturbance (m2)			900 m2/hole					**168**	**1,952**	**5,840**	**70,792**
									Total Disturbance (m2)		78,752
									Total Disturbance (Ha)		7.9

Table 3-8 presents the outcomes of the risk assessment of potential impacts on land from exploration activities.

Considering their small magnitude, short-term and temporary nature, combined with the proposed control measures in this EM Plan, exploration activities on the Johnson Extended Project MLAs are expected to have negligible impact on the identified land EVs.

Table 3-8 Risk Assessment Of Potential Impacts On Land From Johnson Extended Project Exploration Activities

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Land – Soils and landform	Land suitability for grazing or native biodiversity, habitat integrity	Landform modification through vegetation clearing, earthworks and stormwater diversion potentially causing degradation of land resource and receiving waters due to erosion, sediment runoff, loss of topsoils and decline in soil fertility.	• Limit extent of soil disturbance. • Consider seasonal influences, such as rainfall before establishing a drill site • Clearing will only commence when suitable erosion control measures are in place. • Topsoils managed in accordance with site specific procedures and management plans • Topsoil stockpiles will be located away from drainage paths and would be reused within 3-6 months where practical. • Effective erosion and sediment controls will be utilised where necessary to prevent erosion of disturbed areas and from soil stockpiles causing sedimentation of Humbug Gully • Avoid or minimise crossings of Humbug Gully and 'wet' areas. Any crossings would be constructed in a stable section of the bed and not running straight down the bank • Crossings would be positioned to prevent flow being directed towards the banks and provide erosion resistance to the bed and banks downstream of a crossing for a distance equal to the width of the normal flow channel; • Drilling, excavation or clearing will avoided, minimised and mitigated in Humbug Gully	1	C	Low		1	C	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		Degradation of habitat, loss of species diversity due to accidental release / leaks of hazardous substances used for exploration activities	• Storage and handling of flammable and combustible liquids will be in accordance with *AS 1940- Storage and Handling of Flammable and Combustible Liquids*. • Drill water will be contained within a sump located at drill site • All drilling fluids and muds will be captured and prevented from release from the drill site to land and waterways. Muds will be allowed to dry via natural evaporation prior to rehabilitation activities • All spills or hazardous contaminant will be cleaned up. • All excavations and sumps will be backfilled and shaped to a stable landform similar to that of surrounding undisturbed areas. • The conditions of the Code of Environmental Compliance for Exploration and Mineral Development Projects will be applied. • Topsoil and subsoil will be stockpiled separately.	1	D	Low		1	D	Low

3.4.4.2. Johnson Extended Project Underground Mining Activities

Activities and associated potential impacts

Potentially soil-disturbing activities to be carried out within the Johnson Extended Project leases during underground mining operations are:

- Underground mining;
- Earthworks carried out for remediation of any subsidence impacts;
- Vehicle traffic on unsealed roads/tracks for monitoring and maintenance purposes; and
- Erosion of areas left free of vegetation and unsealed (e.g. tracks).

Potential impacts from the above activities include the following:

- topsoil loss or degradation due to surface cracking and erosion;
- exposure of unstable (sodic or saline) subsoils, resulting in increased erosion potential;
- increased potential for surface erosion due to localised changes in topography and surface hydrology; and
- reduction in potential productivity of the land due to topsoil loss and modification of surface topography/hydrology.

These impacts may be magnified where subsidence occurs in areas of concentrated surface flow, such as creeks and drainage lines.

Impact assessment

Table 3-9 presents the outcomes of the risk assessment of potential impacts on land from underground mining activities.

Risk associated with potential impacts to land associated with subsidence was initially considered to be high; however with the development and implementation of a subsidence management plan and the rehabilitation of disturbed areas the residual risk level associated with potential subsidence impacts is reduced to moderate.

The subsidence management plan will identify and describe options for mitigating and managing subsidence impacts. The plan will address; the physical condition of surface drainage including erosion, incision processes, stream widening, tension cracking, lowering of bed and banks, creation of in-stream waterholes, changes to local drainage patterns and areas susceptible to high levels of erosion such as watercourse confluences. The plan will also address overland flow, capture of overland flow by subsided long-wall panels, increased overbank flows due to lowering of high bank watercourses and the portion of local and large scale catchment likely to be captured by subsided long-wall panels and the associated impacts on downstream users. The plan will address land condition and future suitability.

Most of the topsoil and subsoil material within the study area is considered to be relatively stable. If topsoil and surface vegetation cover are maintained, subsidence impacts when managed should not cause a significant increase in erosion potential. If the subsoil is exposed, measures outlined in this EM Plan will enable the effective prevention and mitigation of impacts.

Disturbed areas will be rehabilitated in accordance with the provisions detailed in the Code of Environmental Compliance for Mining lease projects and Guideline for rehabilitation requirements for mining projects.

Release or leaks of hazardous substances used for support and service activities associated with the underground mining may also cause degradation of the land resource; however this is assessed as a low risk.

Table 3-9 Risk Assessment Of Potential Impacts On Land From Johnson Extended Project Underground Mining Activities

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Soils and land-form	Land suitability for grazing or native biodiversity, habitat integrity	Landform modification through subsidence and vegetation clearing, earthworks and stormwater diversion associated with surface activities and subsidence management activities potentially causing degradation of land resource and receiving waters due to erosion, sediment runoff, loss of topsoils and decline in soil fertility.	• Site-specific topsoils assessment will be undertaken • Limit extent of soil disturbance. • Topsoils managed in accordance with site specific procedures and management plans • Soils stripped will be separately stored in accordance with soil properties • The height of topsoil stockpiles be minimized as far as practicable • Topsoil stockpiles would be reused as soon as practicable • A temporary cover crop may be established on the stockpiles where necessary • Effective erosion and sediment controls will be utilised where necessary to prevent erosion of disturbed areas and from soil stockpiles causing sedimentation of Humbug Gully • Avoid or minimise crossings of Humbug Gully and 'wet' areas. Any crossings will be constructed using generally accepted industry practices	3	A	High	• A subsidence management plan will be developed and implemented. • Development of an erosion and sediment control plan for other areas of disturbance • Disturbed areas will be rehabilitated in accordance with the provisions detailed in the *Code of Environmental Compliance for Mining Lease Projects, Version 1* (or more recent version). For areas in Humbug Gully, rehabilitation will be undertaken as soon as practicable and prior to the onset of the wet season.	2	A	Moderate

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		Degradation of habitat, loss of species diversity due to accidental release / leaks of hazardous substances used for surface activities	• Storage and handling of flammable and combustible liquids must be in accordance with *AS 1940- Storage and Handling of Flammable and Combustible Liquids.*	1	D	Low		1	D	Low

3.4.5 Objectives

The objectives with regards to land management are:

- To achieve a stable final land profile which is adequately vegetated and drained and does not cause soil loss or degradation and vegetation loss. The land profile achieved is to enable the protection and enhancement of potential sustainable environmental values identified, namely cattle grazing and native biodiversity life.
- To prevent or reduce the amount of soil loss from the Johnson Extended Project area during the exploration and mining phases.

3.4.6 Control Strategies

3.4.6.1. Johnson Extended Project Exploration And Underground Mining

The control strategies identified in Table 3-10 are considered appropriate to protect the identified environmental values by preventing and mitigating loss of soil quality during the exploration and underground mining phases. Further details regarding these control strategies can be found in the Soil Survey and Land Resource Assessment.

Table 3-10 Control Strategies: Land

Control Strategies	Explor.	Mining
Limit the extent of soil disturbance to what is only necessary for the operations.	✓	✓
Consider seasonal influences, such as rainfall before establishing a drill site	✓	
Clearing will only commence when suitable erosion control measures are in place.	✓	✓
Topsoils managed in accordance with site specific procedures and management plans	✓	✓
Topsoil stockpiles will be located away from drainage paths and will be reused within 3-6 months where practical.	✓	✓
Effective erosion and sediment controls will be utilised where necessary to prevent erosion of disturbed areas and from soil stockpiles causing sedimentation of Humbug Gully	✓	✓
Avoid or minimise crossings of Humbug Gully and 'wet' areas. Any crossings would be constructed in a stable section of the bed and not running straight down the bank	✓	✓
Crossings would be positioned to prevent flow being directed towards the banks and provide erosion resistance to the bed and banks downstream of a crossing for a distance equal to the width of the normal flow channel;	✓	✓
Drilling, excavation or clearing will be avoided, minimised and mitigated in Humbug Gully.	✓	
Storage and handling of flammable and combustible liquids must be in accordance with *AS 1940- Storage and Handling of Flammable and Combustible Liquids*.	✓	✓

Control Strategies	Explor.	Mining
Drill water is to be contained within sump located at drill site	✓	
All drilling fluids and muds must be captured and prevented from release from the drill site to land and waterways. Drilling fluids must be removed via a sucker truck and disposed of at a designated waste disposal area.	✓	
Hydrocarbon spill controls must be in place and used appropriately (bunded pallets, covered to prevent rainwater accumulating, sealed containers etc.)	✓	
All spills or hazardous contaminant must be cleaned up.	✓	✓
All excavations and sumps must be backfilled and shaped to a stable landform similar to that of surrounding undisturbed areas.	✓	
The conditions of the Code of Environmental Compliance for Exploration and Mineral Development Projects must be applied.	✓	
Soils stripped will be separately stored in accordance with soil properties	✓	✓
Topsoils will be managed in accordance with site specific procedures and management plans	✓	✓
The height of topsoil stockpiles will be limited as far as practicable	✓	✓
Topsoil stockpiles will be reused as soon as possible	✓	✓
A temporary cover crop will be established on the stockpiles where required	✓	✓
A subsidence management plan will be developed and implemented		✓
Disturbed areas will be rehabilitated in accordance with the provisions detailed in the *Code of Environmental Compliance for Mining Lease Projects, Version 1* (or more recent version). For areas in Humbug Gully, rehabilitation will be undertaken as soon as practicable and prior to the onset of the wet season (~April).	✓	✓

3.4.7 Proposed EA Conditions

3.4.7.1. Johnson Extended Project Exploration Activities

It is expected that environmental values relating to land quality will be adequately protected and managed through implementation of the conditions of the *Code of environmental compliance for exploration and mineral development projects, DEHP, Version 1* (or later version).

Specific conditions relating to terrestrial ecology can be found at section 3.5.6.1.

3.4.7.2. Johnson Extended Project Underground Mining Activities

Schedule H - Land and rehabilitation

H1 Land disturbed by mining must be rehabilitated in accordance with Table H1 - Rehabilitation Requirements. Table H1 is to be provided to the administering authority prior to the commencement of underground mining activities.

Table H1 – Final land use and rehabilitation approval schedule

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
Infrastructure					
Roads and tracks					
Subsidence panels					

H2 Rehabilitation must commence progressively in accordance with the plan of operations.

H3 Before applying for surrender of a mining lease, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the mining lease which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use.

H4 Before applying for progressive rehabilitation certification for an area, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the area the subject of the application which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use under condition H1.

H5 Minimise the potential for contamination of land by hazardous contaminants.

Schedule F – Subsidence

F17 A Subsidence Management Strategy must be developed by an appropriately qualified person(s) and implemented by the holder of this environmental authority prior to the commencement of activities that result in subsidence.

F18 The Subsidence Management Strategy must:

a) provide 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 environmental authority;

c) describe the proposed impacts of subsidence on any land, watercourse and floodplain including but not limited to:

i. physical condition of surface drainage:

- erosion;
- areas susceptible to higher levels of erosion such as watercourse confluences;
- incision processes;
- stream widening;
- tension cracking;
- lowering of bed and banks;
- creation of instream waterholes;
- changes to local drainage patterns;

ii. overland flow:

- capture of overland flow by subsided long-wall panels;
- increased overbank flows due to lowering of high bank of watercourses;
- the portion of local and large scale catchment likely to be captured by subsided long-wall panels and the associated impacts on downstream users;

iii. surface water quality:

iv. land condition: current land condition to be impacted by subsidence;

v. infrastructure: detail of existing infrastructure (pipelines, railway, powerlines and haul roads) should be identified where there is a potential impact from effects of land subsidence;

d) propose options for mitigating any impacts associated with subsidence and how these mitigation methods will be implemented;

e) describe cumulative impacts on watercourses or catchments;

i) include a program for monitoring and review of the effectiveness of the Subsidence Management Plan

F19 A Subsidence Panel Plan will be developed for each longwall panel by a suitably qualified and experienced person, prior to longwall mining occurring in that panel.

The Subsidence Panel Plan must:

a) assess the plan against the requirements under condition F18;

b) include recommended actions to ensure actual and potential environmental impacts are effectively managed for the longwall panel; and

c) assess the condition of the previous longwall panel, including the structural, geotechnical and hydraulic adequacy of the subsided longwall panel and the adequacy of the works with respect to the Subsidence Panel Plan, as far as data relating to the previous panel is available at the time of assessment.

F20 The holder of this environmental authority must attach to the review report required by condition F19, a written response to the report and recommended actions, detailing the actions taken or to be taken by the environmental authority on stated dates:

a) to ensure compliance with this environmental authority; and

b) to prevent a recurrence of any non-compliance issues identified.

F21 The review report required by condition F19 and the written response to the review report required by condition F20 must be submitted to the administering authority upon request.

3.5 Terrestrial Ecology

3.5.1 Description Of Surrounding Environment

Various terrestrial ecology investigations have been previously undertaken over or adjacent to the Johnson Extended Project area, including:

- *Coppabella Underground Project: Terrestrial Ecology Baseline Assessment* (Draft), Ecological Survey and Management, 2011;
- *Flora and Fauna Assessment – Coppabella Mine,* Ison Environmental Planners, 1997,; and,
- *Flora and fauna habitat assessment for the Peak Downs Highway Diversion at Coppabella,* WBM Oceanics Australia, 2000.

Ecological Survey and Management (2011) is the most relevant assessment, given that it includes the most recent survey of the Project area and is targeted specifically at the Johnson Extended Project. A copy of this assessment is provided in Appendix 1.
The majority of the project area and areas immediately to the North, East and West supports native remnant vegetation with varying levels of disturbance due to cattle grazing activities. Areas to the south are largely cleared of remnant vegetation due to the operations of the Coppabella Coal Mine. Areas further north have been cleared due to the operations of the South Walker Creek Mine.

The topography of the Project Area is very gently undulating with Humbug Gully dissecting the western quarter of the Project Area in a north-west to south-east direction. There are a number of other ephemeral drainage lines present throughout the Project Area. Gilgais or 'melon holes' have developed within many of the small Brigalow patches present within the central portion of the Project Area. Gilgai are small undulations in the soil surface that create depressions (typically less than a metre deep and less than 10 m across) that can hold water for a considerable period during and following the wet season.

3.5.2 Environmental Values And Sensitive Receptors

Environmental values relevant to the terrestrial ecology of the project area are associated with the native biodiversity and habitat integrity, along with usability for agricultural purposes.

The environmental values of the area in relation to flora and fauna habitat has been diminished over time due to historic grazing, along with pest species incursions in the remnant vegetation.

3.5.2.1. Regional Ecosystems

Ecological Survey and Management (2011) confirmed the presence of remnant vegetation throughout the majority of the Johnson Extended Project area through detailed vegetation mapping which identified communities analogous with three distinct Regional Ecosystems (RE). The location of these three ecosystems across the Johnson Extended Project area is identified in **Figure 5** and the ecosystems including their *Vegetation Management Act 1999* (VMA) and Biodiversity status are described in **Table 3-11**.

Table 3-11 Regional Ecosystems Identified Across The Johnson Extended Project Area

REID	Description	VMA class	Biodiversity status
11.5.3	Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana on Cainozoic sand plains/remnant surfaces	Least concern	No concern at present
11.3.4	Eucalyptus tereticornis and/or Eucalyptus spp. woodland on alluvial plains	Of concern	Of concern
11.4.9	Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains	Endangered	Endangered

The predominant vegetative cover in the area is analogous with RE 11.5.3, with variations identified within and adjacent to the project area. The *Eucalyptus populnea* (Poplar Box) complex is the most common variation within the project area. The presence of RE 11.3.4 within the project area is associated with Humbug Gully, which dissects the western quarter of the project area in a north-west to south-east direction. The community is relatively narrow (less than 40 metres in width) sitting along the banks and associated narrow terraces of this drainage line. The community possesses a relatively consistent canopy composition and distribution, and is dominated by *Eucalyptus tereticornis* (Queensland Blue Gum).

The balance of vegetation identified within the Project Area is representative of RE 11.4.9, with two distinct associations or cohorts of this RE identified within and immediately adjacent to the project area. These cohorts are represented by small patches of *Acacia harpophylla* (Brigalow) open forest and *Casuarina cristata* (Belah) woodland to open woodland. The small patches of *A.harpophylla* exist within broader patches of *Casuarina cristata* woodland or as isolated groves within eucalypt woodland. The *Casuarina cristata* woodland to open woodland is generally associated with narrowly incised, collapsed gullies and associated broad depressions. The overall condition of the canopy and sub-canopy layers of the *Casuarina cristata* dominated cohort is poor with a high percentage of trees found to be dead or senescing. This cohort is representative of 'Endangered' regulated regrowth.
No areas of vegetation corresponding to regrowth watercourse vegetation or essential habitat were identified within the project area.

Detailed descriptions of the vegetation communities present within the Project Area are provided in Ecological Survey and Management (2011).

3.5.2.2. Threatened Flora

Table 3-12 identifies threatened flora records returned from various database searches (undertaken for an area within 20km radius of the Coppabella Underground Project area), along with their *Nature Conservation (Wildlife) Regulation 2006* (NCR) status and the likelihood of their occurrence in the project area. These searches were undertaken and assessed by Ecological Survey and Management (2011) through desktop and field assessment.

Table 3-12 Threatened Plant Species Identified And Likelihood Of Occurrence In Project Area[3]

Scientific name	Common name	NCR status[a]	Data source[b]	Potential to occur in project area
Bertya pedicellata	-	NT	Wildlife Online	Very Low: Underlying geology and preferable habitat not present on site
Capparis humistrata	-	E	Wildlife Online	Very Low: Underlying geology and preferable habitat not present on site
Dichanthium queenslandicum	King Blue Grass	V	DSEWPaC Wildlife Online	Very Low: Underlying geology and preferable good-quality habitat not present on site
Dichanthium setosum	-	NT	DSEWPaC Wildlife Online	Low: Habitat marginally present but underlying geology not present on site
Digitaria porrecta	Jointed Fingergrass	NT	DSEWPaC	Low: Habitat marginally present but underlying geology not present on site
Eucalyptus raveritiana	Black Ironbox	V	DSEWPaC	Low: Habitat marginally present in Humbug Gully but detailed survey failed to locate this distinctive eucalypt species.
Leucopogon cuspidatus	-	V	DSEWPaC	Very Low: Underlying geology and preferable habitat not present on site
Macropteranthes leiocaulis	Southern Bonewood	NT	Wildlife Online	Very Low: Preferable habitat not present on site
Solanum adenophorum	-	E	Wildlife Online	Low: Habitat marginally present but underlying geology not present on site

a - NCR status: Conservation status of each taxon: Endangered (E), Vulnerable (V), Near Threatened (NT).
b - Source: DSEWPaC (DSEWPaC 2009b), HERBRECS (Queensland Herbarium 2009), Wildlife Online (DERM 2011a)

No species of state significance were recorded during the current field surveys. All nine species identified during the desktop review are considered to have a low or very low likelihood of occurrence within the project area based on the lack of suitable habitat (vegetative and/or underlying geology) and/or recent records from within the database search areas.

[3] Extracted and modified from Ecological Survey and Management (2011)

3.5.2.3. Weeds

Table 3-13 identifies weeds that were recorded during surveys undertaken by Ecological Survey and Management (2011), that are either classified as 'Weeds of National Significance' (WONS) or identified under the *Land Protection (Pest and Stock Route Management) Regulation 2003* (LPR).

Table 3-13 Listed Weeds Identified During Survey[4]

Botanical name	Common name	WONS	LPR	RE
Eriocereus martinii	Harissa Cactus	no	Class 2	11.5.3 & 11.4.9
Opuntia tomentosa	Velvet Prickly Pear	no	Class 2	11.5.3 & 11.4.9
Parthenium hysterophorus	Parthenium Weed	yes	Class 2	11.5.3 & 11.4.9

All three State-declared exotic species were infrequently encountered within the project area. The control and/or eradication of *Eriocereus martinii* poses the greatest management challenge and for the maintenance of the natural integrity of remnant vegetation and regulated regrowth within the project area. Currently this species occurs as isolated mature clumps (to 2m in height) and is generally associated with or located beneath shrub layer species.
Of the non-declared and exotic species recorded during surveys, most are poorly established within their suitable habitats; however, the exotic pastoral grasses of *Bothriochloa pertusa*, *Cenchrus ciliaris* and *Rhynchelytrum repens* are frequently distributed throughout the project area.

3.5.2.4. Threatened Fauna

Desktop research and targeted field survey was undertaken by Ecological Survey and Management (2011) in order to identify threated fauna potentially associated with the project area.

Ecological Survey and Management (2011) identified that the quality of the fauna habitat within the project area is moderate. While there are a number of exotic species recorded, their overall abundance was considered to be relatively low. Riparian vegetation associated with the numerous ephemeral drainages present is also considered to be relatively intact and apart from some areas that displayed some damage from grazing activities, the balance of the project area is considered to contain a reasonable cover of woody vegetation. The level of fallen timber, deep leaf litter and hollow bearing trees across the project area is considered to be below natural levels.

Table 3-14 identifies threatened fauna records returned from various data base searches (undertaken for an area within 20km radius of the project area), along with their NCR status and the likelihood of their occurrence in the project area. These searches were undertaken

[4] Extracted and modified from Ecological Survey and Management (2011)

and assessed by Ecological Survey and Management (2011) through desktop and field assessment.

Table 3-14 Threatened Plant Species Identified And Likelihood Of Occurrence In Project Area[5]

Common Name	Scientific Name	NCR Status	Potential to occur in the project area
Reptiles			
Ornamental Snake	*Denisonia maculata*	Vulnerable	Present
Striped-tailed Delma	*Delma labialis*	Vulnerable	Low
Retro Slider	*Lerista allanae*	Endangered	Low
Yakka Skink	*Egernia rugosa*	Vulnerable	Low to moderate
Brigalow Scalyfoot	*Paradelma orientalis*	Vulnerable	Low
Fitzroy River Turtle	*Rheodytes leukops*	Vulnerable	Low
Birds			
Squatter Pigeon	*Geophaps scripta scripta*	Vulnerable	High
Red Goshawk	*Erythrotriorchis radiatus*	Endangered	Low
Australian Painted Snipe	*Rostratula australis*	Vulnerable	Low to moderate
Star Finch	*Neochmia ruficauda ruficauda*	Endangered	Low
Glossy Black cockatoo	*Calyptorhynchus lathami*	Vulnerable	Low
Square-tailed Kite	*Lophoictinia isura*	Near Threatened	Moderate
Black-necked Stork	*Ephippiorhynchus asiaticus*	Near Threatened	Low to moderate
Black-chinned Honeyeater	*Melithreptus gularis*	Near Threatened	Low to moderate
Mammals			
Eastern/Greater Long-eared Bat	*Nyctophilus timoriensis / corbeni*	Vulnerable	Low to moderate
Little Pied Bat	*Chalinolobus picatus*	Near Threatened	Present

[5] Extracted and modified from Ecological Survey and Management (2011)

Of the 16 threatened or near threated species listed under the NCR that were identified through desktop research as potentially occurring within the project area, the Ornamental Snake and Little Pied Bat were confirmed as occurring. The Squatter Pigeon was identified as having a high potential to occur and the Square-tailed Kite was identified as having a moderate potential to occur in the project area. The remaining species are considered to have a low or low to moderate potential to occur.

Special least concern fauna listed under the NCR includes the Koala (*Phascolarctos cinereus*), Echidna (*Tachyglossus aculeatus*), Platypus (*Ornithorhynchus anatinus*) and certain migratory species. While none of these species were recorded from the project area by Ecological Survey and Management (2011) the Short-beaked Echidna and Koala are considered to have a high potential to occur and the Platypus is considered to have a low potential to occur due to the lack of permanent water. Database searches by Ecological Survey and Management (2011) identified a total of 10 migratory species that could potentially occur within the project area. Of these species, the Rainbow Bee-eater and Satin Flycatcher were recorded during the surveys. The White-throated needletail and Fork-tailed Swift were considered likely to overfly the project area but the existing habitats are not considered likely to be of importance for these species.

Ecological Survey and Management (2011) notes that overall, the fauna community of the project area is typical of that occurring in the broader area and there do not appear to be any sites of particular significance with respect to high biodiversity, important breeding or feeding areas, high endemism, unusual fauna assemblages, or unique habitat types or assemblages. Ecological Survey and Management (2011) notes that all of the habitats occurring within the study area are well represented throughout the broader Coppabella area and wider Central Highlands region.

Ecological Survey and Management (2011) identifies that the project area is near the southern extent of a larger patch of native vegetation that extends to the north and west to a range located approximately 10 km to the west of the project area. Ecological Survey and Management (2011) notes that although this area has been fragmented by clearing associated with agriculture and mining activities, it represents a relatively well connected landscape; however as the project area is located close to the southern limit of this area of native vegetation (with more extensive clearing to the south of the Peak Downs Highway) it is considered unlikely that the native vegetation of the project area plays an important role in maintaining landscape connectivity.

3.5.2.5. Pest Animals

During the field survey by Ecological Survey and Management (2011) feral pest species recorded were wild dogs or dingoes (*Canis lupus dingo* or *Canis familaris*) European Rabbit (*Oryctolagus cuniculus*) and Pigs (*Sus scrofa*). Each of these species is a declared pest under Queensland's *Land Protection (Pest and Stock Route Management) Act 2002*. The Cane Toad (*Rhinella marina*) is also likely to be present. Low numbers or activity of these species was observed during the field survey suggesting that the project area supports relatively small populations of these species.

3.5.3 Assessment Of Potential Impacts On Environmental Values

3.5.3.1. Johnson Extended Project Exploration Activities

Activities and associated potential impacts

Exploration activities have the potential to impact on land values associated with terrestrial ecology, including through:

- Introduction and / or spread of pests or weeds by equipment
- Fire disturbance
- removal / loss of vegetation, flora and fauna habitat due to clearing for tracks and drill pad sites and / or land degradation due sediment erosion and runoff associated with these
- Injury to fauna due to direct contact by equipment or entrapment in excavations / holes caused by activities; and
- Degradation of habitat, loss of species diversity due to accidental release / leaks of hazardous substances

Impact assessment

Table 3-15 presents the outcomes of the risk assessment of potential impacts from exploration activities on terrestrial ecology.

Considering their small magnitude, short-term and temporary nature, combined with the proposed control measures in this EMP, exploration activities on the Johnson Extended MLAs are expected to have negligible impact on environmental values for land associated with terrestrial ecology.

Table 3-15 Risk Assessment Of Potential Impacts From Exploration Activities On Land Values Associated With Terrestrial Ecology

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Terrestrial Ecology	Native biodiversity, habitat integrity and agricultural use	Introduction and / or spread of pests or weeds by equipment used for exploration activities	• Vehicles and machinery will be adequately cleaned before moving from areas containing declared plants into the project area • Weed infestated areas will be identified and effectively managed prior to commencement of and during works • Feral animal control programs will be undertaken as necessary • Effective weed and pest management will be undertaken in any areas to be rehabilitated • Induction programs will include information on nature conservation and weed control issues	1	D	Low		1	D	Low
		Fire disturbance caused by exploration activities	• All reasonable and practicable fire prevention measures will be implemented (smoking ban, collection of rubbish, etc.) • Selected personnel will be trained in the use of firefighting equipment including fire extinguishers • Fire extinguishers and / or firefighting equipment will be available to vehicles and work sites • Drill holes (apart from those to be used for monitoring purposes) will be decommissioned as soon as practical	1	C	Low		1	C	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
			• Slashing in heavily grassed areas will be undertaken if necessary							
		Removal / loss of vegetation, flora and fauna habitat due to clearing for tracks and drill pad sites and / or land degradation due sediment erosion and runoff associated with these	• Clearing will be limited as far as practicable • Sensitive receiving environments identified will be taped off with danger tape • Existing access and fence line tracks will be used where possible and any new tracks constructed will link natural clearings where possible • Spacing of 2D seismic lines will not typically be less than 500 m apart, with spacings reduced to 250 m at no more than 50 points • The operational area of drill sites will be no greater than 500 square metres • Sump size will be no greater than 10 m2 • Topsoil stripping will be limited to sump areas • Clearing of mature trees will be avoided as far as practicable • Spacings between parallel tracks will not be less than 250 m • Track construction involving blade clearing of established ground cover vegetation and/or clearing of mature	2	B	Moderate	Where / if necessary an offset plan will be provided in accordance with the *Queensland Biodiversity offset Policy* to offset relevant residual impacts.	1	B	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
			trees will be prevented or minimised • Line of site clearing between drill sites will be avoided • Construction of new crossings over watercourses will be avoided and only used when no reasonable alternative is available • Tracks will be constructed and maintained with adequate drainage to avoid accelerated erosion • Drill sites and sump areas will be appropriately signposted • Equipment will be used in a manner which minimises disturbance of topsoil and ground cover. • Where practical, the rootstock of existing vegetation will be left intact to promote regrowth and prevent erosion. • Drill sites will be prepared so that stormwater runoff into and from the drill site is minimised. • Disturbed areas will be rehabilitated in accordance with the provisions detailed in the *Code of Environmental Compliance for Exploration and Mineral Development Projects*.							

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		Injury to fauna due to direct contact by equipment used for exploration activities or entrapment in excavations / holes caused by activity	• Pre-clearing inspection for any clearing of remnant vegetation • Unless required for monitoring or other purposes, all excavations, drill holes or sampling sites will be backfilled as soon as practical following the completion of exploration activities • Implementation of speed limits for vehicular movements including a limit of 30km/hr on property tracks and 10km/hr when near a dam, stockyard, watering point or residence. • Rubbish and waste will be removed from the drill sites at the completion of the drilling activities (inclusive of markers and flagging tape)	1	C	Low	Use of cattle panels (around excavations) or ramps into excavations to prevent entry or enable fauna escape if fauna entrapment becomes apparent as a substantive issue	1	D	Low
		Degradation of habitat, loss of species diversity due to accidental release / leaks of hazardous substances used for exploration activities	• Storage and handling of flammable and combustible liquids will be in accordance with *AS 1940- Storage and Handling of Flammable and Combustible Liquids*. • Spillage of all flammable and combustible liquids will be contained within an on-site containment system and controlled in a manner that prevents environmental harm (other than trivial harm) • Drilling fluids and muds will be contained within sumps • Where practical, refueling and routine	1	D	Low		1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
			maintenance of vehicles will be undertaken within designated service areas.							

3.5.3.2. Johnson Extended Project Underground Mining Activities

Activities and associated potential impacts

Underground mining activities proposed to be undertaken on the Johnson Extended Project area have the potential to impact on land values associated with terrestrial ecology including through:

- Introduction and / or spread of pests or weeds by equipment used for surface activities in the area of the MLAs
- Fire disturbance caused by surface activities in the area of the MLAs
- Removal / loss of vegetation, flora and fauna habitat due to clearing for tracks, subsidence related impacts and subsidence management, along with potential associated land degradation due sediment erosion and runoff
- Injury to fauna due to direct contact by equipment used for surface activities; and
- Degradation of habitat, loss of species diversity due to accidental release / leaks of hazardous substances used for surface activities.

Impact assessment

Table 3-16 presents the outcomes of the risk assessment of potential impacts from mining activities undertaken on the Johnson Extended Project area on land values associated with terrestrial ecology.

Risk associated with potential impacts to terrestrial ecology is generally considered to be low, with the risk ranking for impacts associated with subsidence identified as moderate. With the development and implementation of a subsidence management plan, the rehabilitation of disturbed areas, and the development and implementation of an offsets plan, the residual risk level associated with potential subsidence impacts is reduced to low.

The subsidence management plan will identify and describe options for mitigating and managing subsidence impacts, which will be implemented. The plan will address the physical condition of surface drainage including erosion, incision processes, stream widening, tension cracking, lowering of bed and banks, creation of in-stream waterholes, changes to local drainage patterns and areas susceptible to high levels of erosion such as watercourse confluences. The plan will also address overland flow, capture of overland flow by subsided long-wall panels, increased overbank flows due to lowering of high bank watercourses and the portion of local and large scale catchment likely to be captured by subsided long-wall panels and the associated impacts on downstream users. The plan will address land condition and future suitability.

Disturbed areas will be rehabilitated in accordance with the provisions detailed in the *Code of Environmental Compliance for Mining Lease Projects* and *Guideline for rehabilitation requirements for mining projects*

Peabody aims to minimise the environmental impacts of its operations. In the case of this project, impacts have been minimised by employing best practice. Peabody also acknowledges that while every effort is made to minimise and mitigate impacts, there are cases where a project will result in a residual unavoidable impact. In these cases environmental offsets allow for development to proceed while maintaining environmental outcomes. To this end, the Queensland Government has developed the Queensland Biodiversity Offset Policy 2011. Peabody will prepare a separate environmental offset

strategy for this project to assess the potential for unavoidable residual impacts and how these will be offset in accordance with the prevailing Biodiversity Offset Policy at the time.

Table 3-16 Risk Assessment Of Potential Impacts From Mining Activities Undertaken On The Johnson Extended Project Area On Land Values Associated With Terrestrial Ecology

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Land values	Terrestrial ecology including for native biodiversity, habitat integrity and agricultural use	Introduction and / or spread of pests or weeds by equipment used for surface activities in the area of the MLas	• Vehicles and machinery will be adequately cleaned before moving into the project area from areas containing declared plants. • Weed infestation areas will be identified and effectively managed prior to commencement of and during works • Control programs will be implemented to reduce the presence of declared and environmental weeds and feral species in accordance with the Coppabella Weed Management Plan. • Effective weed and pest management will be undertaken in any areas to be rehabilitated • Induction programs will include information on nature conservation and weed control issues	1	D	Low		1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		Fire disturbance caused by surface activities in the area of the MLas	• All reasonable and practicable fire prevention measures will be implemented (smoking ban, collection of rubbish, etc.) • Selected personnel will be trained in the use of firefighting equipment including fire extinguishers • Fire extinguishers and / or firefighting equipment will be available to vehicles and work sites • Slashing in heavily grassed areas will be undertaken if necessary	1	C	Low		1	C	Low
		Removal / loss of vegetation, flora and fauna habitat due to clearing for tracks, subsidence related impacts and subsidence management, along with potential associated land degradation due sediment erosion and runoff	• Clearing will be limited as far as practicable • Sensitive receiving environments identified will be taped off with danger tape. • Where practical, the rootstock of existing vegetation will be left intact to promote regrowth. • Topsoil stripping will be limited • Clearing of mature trees will be avoided as far as practicable • Spacing between tracks will not be less than 250m • Existing access and fence line	2	B	Moderate	• A subsidence management plan will be developed and implemented • Rehabilitation of disturbed areas • Development and implementation of an offset plan	1	B	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
			tracks will be used where possible and any new tracks constructed will link natural clearings where possible; • Track construction involving blade clearing of established ground cover vegetation and/or clearing of mature trees will be prevented or minimised • Construction of new crossings over Humbug Gully will be avoided and only used when no reasonable alternative is available • Tracks will be constructed and maintained with adequate drainage to avoid accelerated erosion • Equipment used in a manner which minimises disturbance of topsoil and ground cover. • Work areas will be appropriately signposted							
		Injury to fauna due to direct contact by equipment used for	• Pre-clearing inspection will be carried out for any clearing of remnant vegetation	1	C	Low		1	C	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		surface activities	• Implementation of speed limits for vehicular movements including a limit of 30km/hr on property tracks and 10km/hr when near a dam, stockyard, watering point or residence.							
		Degradation of habitat, loss of species diversity due to accidental release / leaks of hazardous substances used for surface activities	• Storage and handling of flammable and combustible liquids will be in accordance with *AS 1940- Storage and Handling of Flammable and Combustible Liquids*. • Where practical, refueling and routine maintenance of vehicles will be undertaken within designated service areas	1	D	Low		1	D	Low

3.5.4 Objectives

The primary objective in relation to terrestrial ecology for the Johnson Extended Project during exploration, operation and post mining is to protect and ultimately enhance the ecological value of the ML areas and to not cause unnecessary adverse impacts on remnant vegetation and habitat throughout operations. The land management objectives include:

- To achieve a stable final land profile which is adequately vegetated and drained and does not cause soil loss or degradation and vegetation loss. The land profile achieved is to enable the protection and enhancement of the two environmental values identified, namely cattle grazing and native biodiversity life.
- To prevent or reduce the amount of soil loss from the Johnson Extended Project area during the exploration and mining phases.

The post mining land use proposed for the Johnson Extended Project area is a combination of grazing and nature conservation. The proposed post mining land use has been selected based on the values of each use to the region and success of similar strategies at other mines within the area.

3.5.5 Control Strategies

3.5.5.1. Johnson Extended Project Exploration And Mining Activities

Key control strategies in relation to the management of the potential impacts of exploration and mining on terrestrial ecological values are described in Table 3-17 below.

Table 3-17 Control Strategies: Terrestrial Ecology

Control Strategies	Explor.	Mining
Vehicles and machinery will be adequately cleaned before moving into the project area from areas containing declared plants	✓	✓
Weed infestation areas will be identified and effectively managed prior to commencement of and during works	✓	✓
Feral animal control programs will be undertaken as necessary	✓	✓
Effective weed and pest management will be undertaken in any areas to be rehabilitated	✓	✓
Induction programs will include information on nature conservation and weed control issues	✓	✓
All reasonable and practicable fire prevention measures will be implemented	✓	✓
Selected personnel will be trained in the use of firefighting equipment including fire extinguishers	✓	✓
Fire extinguishers and / or firefighting equipment will be available to vehicles and work sites	✓	✓
Drill holes (apart from those to be used for monitoring purposes) will be decommissioned as soon as practical	✓	
Slashing in heavily grassed areas will be undertaken if necessary	✓	✓
Clearing will be limited as far as practicable	✓	✓
Sensitive receiving environments identified will be taped off with danger tape	✓	✓
Existing access and fence line tracks will be used where possible and any new tracks constructed will link natural clearings where possible	✓	✓
Spacing of 2D seismic lines will not typically be less than 500 m apart, with spacings reduced to 250 m at no more than 50 points	✓	
The operational area of drill sites will be no greater than 500 m^2	✓	

Control Strategies	Explor.	Mining
Sump size will be no greater than 10 m^2	✓	
Topsoil stripping will be limited to sump area	✓	
Topsoil stripping will be limited		✓
Clearing of mature trees will be avoided as far as practicable	✓	✓
Spacings between tracks will not be less than 250 m	✓	✓
Track construction involving blade clearing of established ground cover vegetation and/or clearing of mature trees will be prevented or minimised	✓	✓
Line of site clearing between drill sites will be avoided	✓	✓
Construction of new crossings over watercourses will be avoided and only used when no reasonable alternative is available	✓	
Construction of new crossings over Humbug Gully will be avoided and only used when no reasonable alternative is available		✓
Tracks will be constructed and maintained with adequate drainage to avoid accelerated erosion	✓	✓
Drill site and sump area will be appropriately signposted	✓	
Work areas will be appropriately signposted		✓
Equipment will be used in a manner which minimises disturbance of topsoil and ground cover	✓	✓
Where practical, the rootstock of existing vegetation will be left intact to promote regrowth	✓	✓
Drill sites will be prepared so that stormwater runoff into and from the drill site is minimised	✓	
Disturbed areas will be rehabilitated in accordance with the provisions detailed in the *Code of Environmental Compliance for Exploration and Mineral Development Projects*	✓	
A subsidence management plan will be developed and implemented		✓
Rehabilitation of disturbed areas		✓
An offset plan will be developed and implemented	✓	✓
Pre-clearing inspection for any clearing of remnant vegetation	✓	✓
Unless required for monitoring or other purposes all excavations, drill holes or sampling sites will be backfilled as soon as practical following the completion of exploration activities	✓	
Implementation of speed limits for vehicular movements including a limit of 30km/hr on property tracks and 10km/hr when near a dam, stockyard, watering point or residence	✓	✓
Rubbish and waste will be removed from the drill site at the completion of the drilling activities (inclusive of markers and flagging tape)	✓	
Use of cattle panels (around excavations) or ramps into excavations to prevent entry or enable fauna escape if fauna entrapment becomes apparent as a substantive issue	✓	
Storage and handling of flammable and combustible liquids will be in accordance with *AS 1940- Storage and Handling of Flammable and Combustible Liquids*	✓	✓
Drilling fluids and muds will be contained within sumps	✓	
Where practical, refuelling and routine maintenance of vehicles will be undertaken within designated service areas	✓	✓

3.5.6 Proposed EA Conditions

3.5.6.1. Johnson Extended Project Exploration Activities

Exploration activities shall be carried out in compliance with the standard conditions of the *Code of environmental compliance for exploration and mineral development projects, DEHP, Version 1* (or later version), with the exception of standard Condition 13. The following alternate conditions are proposed, consistent with the EA conditions as applicable under the current Coppabella Mine EA EPML00579213 (previously MIN100555707):

X1 The environmental authority holder is authorised to carry out exploration activities in or within five hundred (500) metres of Endangered Regional Ecosystems located within ML 70384, 70385, 70386 and 70387.

X2 When carrying out exploration activities in or within five hundred (500) metres of any Endangered Regional Ecosystems, the holder of the environmental authority must do so in accordance with conditions X3 to X7.

X3 Drilling or Seismic Grid a) Spacing of grid lines or 2D seismic lines is not less than five hundred (500) metres apart; and b) Spacings may be reduced to two hundred and fifty (250) metres at no more than fifty (50) specified points; and c) seismic lines constructed within Endangered Regional Ecosystems must not exceed a total disturbance area of twenty (20) hectares.

X4 Drill Sites a) Operational area is to be no greater than nine hundred (900) square metres; and b) Sump size is to be no greater than ten (10) square metres; and c) Topsoil stripping must be limited to sump area; and d) Clearing of mature trees must be avoided as far as practicable.

X5 Tracks a) Spacings between parallel tracks must not be less than two hundred and fifty (250) metres; and b) Existing access and fence line tracks must be used where possible and any new tracks constructed must link natural clearings where possible; and c) Track construction involving blade clearing or established ground cover vegetation and/or clearing of mature trees is prevented or minimised; and d) Line of site clearing must be avoided; and e) Construction of new crossings over watercourses must be avoided and is only permitted when no reasonable alternative is available; and f) All tracks must be constructed and maintained with adequate drainage to avoid accelerated erosion.

X6 Other Land Disturbances a) Activities must not include costeaning or bulk sampling; and b) All equipment such as earthmoving and drilling equipment must be used in a manner which minimises unnecessary disturbance of topsoil and ground cover vegetation; and c) Camp sites must not be established.

X7 Disturbance due to exploration activities must be rehabilitated in accordance with provisions detailed in the *Code of Environmental Compliance for Exploration and Mineral Development Projects*.

3.5.6.2. Johnson Extended Project Underground Mining Activities

It is proposed to apply biodiversity offsets conditions extracted from the DEHP Guideline *Model mining conditions* as follows:

Biodiversity offsets

H6 The holder of this environmental authority must provide an offset for impacts on applicable state significant biodiversity values, in accordance with Queensland Biodiversity Offset Policy. The biodiversity offset must be consistent with the requirements for an offset as identified in the Biodiversity Offset Strategy (as per condition H7) and must be provided:

a) prior to impacting on state significant biodiversity values; or

b) where a land based offset is to be provided, within 12 months of the later of either of the following

1. the date of issue of this environmental authority; or
2. the relevant stage identified in the Biodiversity Offset Strategy submitted under condition H7; or

c) where an offset payment is to be provided, within 4 months of the later of either of the following

3. the date of issue of this environmental authority; or
4. the relevant stage identified in the Biodiversity Offset Strategy submitted under conditions H7.

H7 A Biodiversity Offset Strategy must be developed and submitted to the administering authority within either 30 days, or a lesser period agreed to by the administering authority, prior to impacting on the applicable state significant biodiversity values.

3.6 Noise And Vibration

3.6.1 Description Of Noise Environment

Noise levels in the area are typical of rural environments but are, for some sensitive receptors, affected by noise from existing mining operations.

A noise impact assessment was carried out for the proposed underground mining operations at Coppabella Mine[6]. For the purpose of the assessment, noise logging was carried out at the two closest sensitive receptors, homesteads Harrybrant (Lot 4 on SP144274) and Oben Park (WP156).

Table 3-18 provides a summary of the measured noise levels at both homesteads.

The noise levels are expressed in terms of the Leq, L10, and L90. The L10 and L90 are respectively the A-weighted noise levels exceeded 10%, and 90% of the time. The Leq is the A-weighted energy average noise level containing the same acoustic energy as the actual fluctuating noise level.

Background noise levels were also measured at both homesteads. Due to the likelihood that the background noise levels at Oben Park are affected by the operation of the mine, the background noise levels from Harrybrant are used as the typical background noise levels at

[6] Coppabella Underground Coal Mine, Noise Impact Assessment (draft), 25 January 2012, ASK Consulting Engineers for Macarthur Coal.

both sites, in the absence of the mine. These levels are provided in Table 3-19 Measured Background Noise Levels At Harrybrant Homestead.

The background noise levels (min L90) are calculated using the 'lowest 10th percentile' of the L90 levels in each period of the day.

Table 3-18 Summary Of Measured Noise Levels

Location	Statistic	L10,dB(A)			L90,dB(A)			Leq,dB(A)		
		Day	Even	Night	Day	Even	Night	Day	Even	Night
Harrybrant	**Max**	57	55	56	41	38	47	66	51	53
	Min	27	20	19	19	18	17	25	20	18
	90%	49	40	44	32	32	32	47	37	41
	10%	32	26	24	22	19	18	31	24	22
	Average	40	34	34	26	25	23	39	31	31
Oben Park	**Max**	85	63	66	70	46	52	77	56	58
	Min	33	34	28	29	24	24	31	29	25
	90%	51	56	59	41	41	49	46	48	52
	10%	38	41	42	32	30	30	35	36	37
	Average	44	48	51	36	37	40	40	42	45

Table 3-19 Measured Background Noise Levels At Harrybrant Homestead

Location	Background Noise Level, minL90, dB(A)		
	Day	Evening	Night
Harrybrandt	22	19	18

3.6.2 Environmental Values And Sensitive Receptors

The key environmental values for noise and vibration are outlined in the Environmental Protection (Noise) Policy 2008 (EPP Noise):

The environmental values to be enhanced or protected are the qualities of the acoustic environment that are conducive to—
(a) the wellbeing of the community or a part of the community, including its social and economic amenity; or
(b) the wellbeing of an individual, including the individual's opportunity to have sleep, relaxation and conversation without unreasonable interference from intrusive noise.

EPP(Noise) sets noise level objectives for various periods of the day. Schedule 1 of the EPP(Noise) includes the following acoustic quality objectives to be met at residential dwellings:

- Outdoors:
  - Daytime and Evening: 50 dB(A) LAeq,adj,1hr, 55 dB(A) LA10,adj,1hr and 65 dB(A) LA1,adj,1hr.

- Indoors:
  - Daytime and Evening: 35 dB(A) LAeq,adj,1hr, 40 dB(A) LA10,adj,1hr and 45 dB(A) LA1,adj,1hr.
  - Night: 30 dB(A) LAeq,adj,1hr, 35 dB(A) LA10,adj,1hr and 40 dB(A) LA1,adj,1hr.

As indicated in the Noise Impact Assessment, the EcoAccess Guideline "Noise and vibration from blasting" applies to mining activities and contains criteria applicable to noise and vibration emitted from blasting. The criteria address human comfort and are below typical limits for prevention of structural damage, as follows:

- Airblast: Airblast overpressure of 115 dB (linear peak) for nine (9) out of ten (10) consecutive blasts initiated and not greater than 120 dB (linear peak) at any time.
- Vibration: 5 mm/s peak particle velocity for nine (9) out of ten (10) consecutive blasts and not greater than 10 mm/s peak particle velocity at any time.

The guidelines states that:

"blasting should generally only be permitted during the hours of 9am to 3pm, Monday to Friday, and from 9am to 1pm on Saturdays. Blasting should not generally take place on Sundays or public holidays.
Blasting outside these recommended times should be approved only where:
(a) Blasting during the preferred times is clearly impracticable (in such situations blasts should be limited in number and stricter airblast overpressure and ground vibration limits should apply); or
(b) There is no likelihood of persons in a noise sensitive place being affected because of the remote location of the blast site."

The current EA EPML00579213 (previously MIN100555707) applicable to the Coppabella Mine sets the vibration limits at 10mm/s peak particle velocity at any sensitive receptor.

The Coppabella mine's sensitive noise and vibration receptors are the homesteads located in the vicinity of the mine site:

- Harrybrant: approximately 7.8 km of the Johnson Extended Project area boundary and 12 km from the coal processing facilities
- Oben Park: approximately 5.1 km of the Johnson Extended Project area boundary and 2.5 km from the coal processing facilities
- Spring Creek: approximately 8.7 km of the Johnson Extended Project area boundary and 6.8 km from the coal processing facilities
- L&G Tones: approximately 8.7 km of the Johnson Extended Project area boundary and 4.5 km from the coal processing facilities
- Wanella: approximately 10 km of the Johnson Extended Project area boundary and 5.9 km from the coal processing facilities

Figure 5 illustrates the location of each homestead in relation to the mine site, Oben Park being situated the closest to the mine.

3.6.3 Assessment of Potential Impacts on Environmental Values

3.6.3.1. Johnson Extended Project Exploration Activities

Activities and associated potential impacts

During exploration, noise generating activities will consist of:

- Operation of drill rigs; and
- Vehicle and plant movements.

Exploration activities will generate negligible levels of vibrations.

Impact assessment

The Johnson Extended Project area is located on the northern side of the Coppabella Mine site, which is situated the furthest away from all sensitive receptors, as shown on **Figure 4**. Considering the low level of noise generated by exploration activities and the distance separating the sensitive receptors from the Johnson Extend Project area, it is highly unlikely that any noise will reach a sensitive receptor.

Table 3-20 presents the outcomes of the risk assessment of potential impacts from exploration activities on the acoustic and vibration environment at sensitive receptors.

Table 3-20 Risk Assessment Of Potential Impacts From Johnson Extended Project Exploration Activities On The Acoustic And Vibration Environment

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Noise and vibration	Human health, aesthetics and ecological health.	Construction of tracks for 2D seismic survey and drill site access, along with drill pad development and drilling generating noise and vibration that causes impacts to sensitive receptors	• Use and maintain low noise equipment; • Repair or replace defective mufflers of vehicles and plant with suitable effective mufflers; • All mobile equipment to be fitted with efficient silencing equipment to current Queensland mining standards. • Existing access and fence line tracks used where possible • Leaving or creating wind breaks or screening	1	C	Low	Review of hours of operations should complaints (that are not vexatious or frivolous) be received	1	D	Low

3.6.3.2. Johnson Extended Project Underground Mining Activities

Activities and associated potential impacts

Noise and/or vibration generating mining activities will consist of:

- Surface activities:
  - Construction/installation of monitoring bores, gas drainage facilities;
  - Earthworks for subsidence management; and
  - Operation of pumps and fans for gas drainage.

- Underground activities:
  - Operation of coal mining machinery; and
  - Blasting

Impact assessment

Noise modeling was undertaken for the purpose of the Noise Impact Assessment carried out for the Coppabella Underground Mine Project. Results of the modeling and noise impact assessment on sensitive receptors indicate that the EPP(Noise) indoor noise criteria will not be exceeded at any of the sensitive receptors, whether in daytime or nighttime.

Predictive blasting noise calculations and impact assessment were undertaken under the Noise Impact Assessment. The study finds that, based on the mine's blast parameters, the 10mm/s peak particle velocity criterion would be achieved at distances greater than 1.5 km from the blast and 5mm/s peak particle velocity criterion will be achieved at distances greater than 2.3km, which is the distance separating the mine from the nearest sensitive receptor.

The Noise Impact Assessment notes that airblast and flyrock would be expected to be minimal from an underground coal mine, and as such it is not further considered.

Table 3-21 presents the outcomes of the risk assessment of potential impacts from mining activities on the acoustic and vibration environment at sensitive receptors.

Table 3-21 Risk Assessment Of Potential Impacts From Johnson Extended Project Underground Mining Activities On The Acoustic And Vibration Environment

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Noise and vibration	Human health, aesthetics and ecological health.	Construction of tracks for access to gas drainage facilities, pumps, monitoring bores and subsidence impacted areas, along with the undertaking of subsidence management activities (re-profiling land) causing noise impacts to sensitive receptors	• Provide and maintain low noise equipment; • Repair or replace defective mufflers of vehicles and plant with suitable effective mufflers; • Existing access and fence line tracks used where possible • Leave or create wind breaks or screening;	1	C	Low	Review of hours of operations for certain activities should complaints (that are not vexatious or frivolous) be received.	1	D	Low
		Gas drainage, vehicle and equipment (e.g. pumps / fans) emissions, causing noise impacts to sensitive receptors	• Provide and maintain low noise equipment; • Repair or replace defective mufflers with suitable effective mufflers; • Leaving or creating wind breaks or screening;	1	D	Low		1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		Blasting undertaken as part of underground operations causing vibration impacts to sensitive receptors	• Blast design will ensure that all relevant ground vibration criteria are complied with at the boundary of the Mining Leases. • Blasting operations at the Johnson Extended Project will be conducted in accordance with Australian Standard AS 2187.2 Explosives - Use of Explosives. • Blast design will ensure that ground vibration does not exceed any relevant statutory limits at any sensitive receptor. • Appropriate warnings will be provided prior to blasting in accordance with legislative provisions.	1	D	Low		1	D	Low

3.6.4 Objectives

The primary objectives for noise and vibration are:

- To ensure that there is no unreasonable intrusive noise or vibration attributable to the mining operation at the nearest noise sensitive locations; and
- Control noise and vibration sources at the site to enable achievement of the statutory environmental protection objectives contained in the EPP(Noise).

3.6.5 Control Strategies

3.6.5.1. Johnson Extended Project Exploration And Underground Mining Activities

The control strategies identified in Table 3-22 are deemed appropriate to meet noise and vibration criteria at each sensitive receptor and keep impact risks low during the exploration and mining phases.

Table 3-22 Control Strategies: Noise and Vibration

Control Strategies	Explor.	Mining
Advise landholder of proposed activities	✓	
Obtain Landholder consent for any drill site located < 500m from a residence	✓	
Limit vehicle speed limits to 30km/hr on property tracks and 10km/hr when near a residence	✓	
Existing access and fence line tracks used where possible	✓	
Schedule activities for times when they will have least impact	✓	✓
Use and maintain low noise equipment;	✓	✓
Repair or replace defective mufflers of vehicles and plant with suitable effective mufflers;	✓	✓
All mobile equipment to be fitted with efficient silencing equipment to current Queensland mining standards.	✓	✓
Leave or create wind breaks or screening	✓	✓
Repair or replace defective mufflers of vehicles and plant with suitable effective mufflers;	✓	✓
Blast design will ensure that all relevant ground vibration criteria are complied with at the boundary of the Mining Leases.		✓
Blasting operations at the Johnson Extended Project will be conducted in accordance with Australian Standard AS 2187.2 Explosives - Use of Explosives.		✓
Blast design will ensure that ground vibration does not exceed any relevant statutory limits at any sensitive receptor.		✓
Appropriate warnings to be provided prior to blasting in accordance with legislative provisions.		✓

3.6.6 Proposed EA Conditions

3.6.6.1. Johnson Extended Project Exploration Activities

It is expected that environmental values relating to noise and vibration will be adequately protected and managed through implementation of the conditions of the *Code of environmental compliance for exploration and mineral development projects, DEHP, Version 1* (or more recent version).

3.6.6.2. Johnson Extended Project Underground Mining Activities

It is proposed to apply the following EA conditions:

Schedule D - Noise

D1 Subject to condition D2, noise from the mining activity must not cause an environmental nuisance, at any sensitive 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 belied in the opinion of the authorised officer) of environmental nuisance at any sensitive place, and the results must be notified within fourteen (14) days to the administering authority following completion of monitoring.

D3 If the environmental authority holder can provide evidence through monitoring that the limits defined in Table D1- Noise Limits and Table D2- Airblast Overpressure Level- Sensitive Place inclusive are not being exceeded then the holder is not in breach of condition D1. Monitoring must include:

a. LA, max adj, T
b. The level and frequency of occurrence of impulsive or tonal noise;
c. Atmospheric conditions including wind speed and direction; and
d. Location, date and time of recording.

D4 If monitoring indicates exceedance of the limits in Table D1- Noise Limits, then the environmental authority holder must:

a. Address the complaint including the use of appropriate dispute resolution if required; or

b. 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 authorities Noise Measurement Manual.

Table D1 – Noise Limits

Noise Level dB(A) measured as	**Monday to Saturday**			**Sundays and Public Holidays**		
	7pm–6pm	**6pm–10pm**	**10pm–7am**	**9am–6pm**	**6pm–10pm**	**10pm–9am**
	Noise measured at a “noise sensitive place”					
LA10,adj,10 mins	b/g+5	b/g+5	b/g+0	b/g+5	b/g+5	b/g+0
LA1,adj,10 mins	b/g+10	b/g+10	b/g+5	b/g+10	b/g+10	b/g+5

Table D2 – Airblast Overpressure Level – Sensitive Place

Noise Parameter	Monday to Saturday 6am – 7pm Noise measured at a "noise sensitive place"	Sundays and Public Holidays 9am – 7pm
Airblast overpressure level (dB linear peak)	115dB (80th percentile)	115dB (80th percentile)
Airblast overpressure level (dB linear peak)	120 dB (maximum)	120 dB (maximum)

Vibration

D6 Subject to condition D7, 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 any mistaken belief in the opinion of the authorised officer) of environmental nuisance at any sensitive place, and the results must be notified within fourteen (14) days to the administering authority following completion of monitoring.

D8 If the environmental authority holder can provide evidence through monitoring that the limits defined in *Table D3- Vibration limits* are not being exceeded then the holder is not in breach of condition D6.
Monitoring must include:

a. Location of the blasts/s within the mining area (including which bench level); and
b. Atmospheric conditions including temperature, relative humidity and wind speed and direction; and
c. Location, date and time of recording.

Table D3 – Vibration Limits

Vibration Parameter	Vibration measured at a sensitive place	
	Monday to Saturday 6am – 7pm	Sundays and Public Holidays 9am – 7pm
Houses and low rise residential buildings and commercial building not Included below	10 mm/s peak particle velocity	10 mm/s peak particle velocity

3.7 Waste

The regulatory requirements governing waste management in Queensland are provided by the following pieces of legislation.

- *Environmental Protection Act 1994* (EP Act)
- *Environmental Protection Regulation 2008* (EP Reg)
- *Environmental Protection (Waste Management) Regulation 2000* (EP(WM) Reg)
- *Waste Reduction and Recycling Act 2011* (WRR Act)
- *Waste Reduction and Recycling Regulation 2011* (WRR Reg)

The EP Act defines waste as anything, that is:

a. Left over, or an unwanted by-product, from an industrial, commercial, domestic or other activity
b. Surplus to the industrial, commercial, domestic or other activity generating the waste.

The EP Reg identifies certain ERAs relevant to waste management (e.g. for storage, transport, recycling and treatment of waste), the undertaking of which requires a development permit and a registration certificate. As such, the EP Reg stipulates that these ERAs must only be undertaken by licensed parties at licensed facilities.

The purpose of the EP(WM) Reg is to protect the environment by:

a. Minimising the impact of waste to the environment including, in particular, the impact of waste so far as it directly affects human health
b. Establishing an integrated framework for minimising and managing waste under the principles of ecologically sustainable development.

The EP(WM) Reg provides for the reporting and tracking requirements of regulated waste.
The WRR Act defines a number of key concepts in relation to the management of waste including:

- the **waste and resource management hierarchy**, which, in the order of most preferred to least preferred waste and resource management option is:

a. Avoid unnecessary resource consumption;
b. Reduce waste generation and disposal;
c. Reuse waste resources without further manufacturing;
d. Recycle waste resources to make the same or different products;
e. Recover waste resources, including the recovery of energy;
f. Treat waste before disposal, including reducing the hazardous nature of waste; and
g. Dispose of waste only if there is no viable alternative.

- The **polluter pays principle** is the principle that all costs associated with the management of waste should be borne by the persons who generated the waste.
- The **user pays principle** is the principle that all costs associated with the use of a resource should be included in the prices of the goods and services (including government services) that result from the use.
- The **proximity principle** is the principle that waste and recovered resources should be managed as close to the source of generation as possible.

- The **product stewardship principle** is the principle that there is a shared responsibility between all persons who are involved in the life cycle of a product for managing the environmental, social and economic impact of the product.

The WRR Reg differentiates between waste types, particularly commercial and industrial waste, construction and demolition waste, and regulated waste.

3.7.1 Description Of Environment Relevant To Waste

Existing conditions in relation to waste at the location of the Johnson Extended Project reflect the existing land use of grazing i.e. the existing land use causes minimal to no waste-related impacts.
Facilities and services in the region relating to waste management include:

- Nebo Resource Recovery Centre, Nebo (Isaac Regional Council);
- General waste collection contractors;
- Hazardous waste contractors;
- Clean waste recycling facilities, (Mackay/Rockhampton); and
- Hazardous waste recycling facilities, (Mackay and Townsville).

3.7.2 Environmental Values And Sensitive Receptors

Environmental values associated with the Johnson Extended Project area that may be impacted by waste management practices associated with the project include human health, aesthetics, and ecological health and land use capability.

3.7.3 Assessment Of Potential Impacts On Environmental Values

3.7.3.1. Johnson Extended Project Exploration Activities

Activities and associated potential impacts

Waste management associated with exploration activities has the potential to impact on environmental values. Impact may be caused primarily through release of waste due inefficient use of resources or ineffective management causing contamination of land and surface water, degradation of social amenity, ecological health and land use capability. A secondary impact may be that pressure is put on municipal infrastructure due to increased peak demand on processing capacity.

Impact assessment

Table 3-23 presents the outcomes of the risk assessment of potential impacts from waste management associated with exploration activities on the aforementioned environmental values.
Considering their small magnitude, short-term and temporary nature, combined with the proposed control measures in this EMP, waste management associated with exploration activities on the Johnson Extended MLAs is expected to have negligible impact on environmental values.

Table 3-23 Risk Assessment Of Potential Impacts From Johnson Extended Project Exploration Activities' Waste Management On Environmental Values

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Waste management	Human health, aesthetics, ecological health and land use capability	Release of waste due inefficient use of resources or ineffective management causing contamination of land and surface water, degradation of social amenity and ecological health	• The waste management hierarchy (as previously described) will be employed • Waste will not be released directly or indirectly to any watercourse, waterway, groundwater, wetland or lake • Rubbish and waste will be removed from the drill site at the completion of the drilling activities (inclusive of all markers and flagging tape) • Regulated wastes will be stored in designated locations and will be removed from site by a licensed regulated waste contractor and taken to a licensed landfill that can accept regulated wastes • Drilling fluids contained within sumps will be removed via a sucker truck and disposed of at a designated waste disposal area • Waste will be segregated to maximise reuse and recycling opportunities and will be stored appropriately • Licensed contractors, transporters and disposal facilities will be used to manage waste	1	D	Low		1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
			• Regulated wastes will be tracked in accordance with the EP(WM) Reg • A register of all chemicals stored on site will be developed and maintained • A register of hazardous materials and their location will be kept on site.							
		Inefficient use of resources or ineffective management causing pressure on municipal infrastructure due to increased peak demand on processing capacity.	• The waste management hierarchy (as previously described) will be employed • Effective communication will be undertaken will waste management contractors and waste recovery facility managers as necessary	1	E	Low		1	E	Low

3.7.3.2. Johnson Extended Project Underground Mining Activities

Activities and associated potential impacts

Waste management associated with mining operations in the Johnson Extended Project area has the potential to impact on environmental values. Impact may be caused primarily through release of waste due inefficient use of resources or ineffective management causing contamination of land and surface water, degradation of social amenity, ecological health and land use capability. A secondary impact may be that pressure is put on municipal infrastructure due to increased peak demand on processing capacity.

Impact assessment

Table 3-24 presents the outcomes of the risk assessment of potential impacts from waste management associated with these activities on the aforementioned environmental values. Considering their small magnitude combined with the proposed control measures in this EM Plan, waste management associated with mining activities on the Johnson Extended MLAs is expected to have negligible impact on environmental values.

Impact assessment

Table 3-25 presents the outcomes of the risk assessment of potential impacts from waste management associated with these activities on the aforementioned environmental values.

Given the proposed control measures in this EMP, waste management associated with mining activities on the Johnson Extended MLAs is expected to have a low level of impact on environmental values.

Table 3-24 Risk Assessment Of Potential Impacts From Johnson Extended Project Exploration Activities' Waste Management On Environmental Values

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Waste management	Human health, aesthetics, ecological health and land use capability	Release of waste due inefficient use of resources or ineffective management causing contamination of land and surface water, degradation of social amenity and ecological health	• The waste management hierarchy (as previously described) will be employed • Waste will not be released directly or indirectly to any watercourse, waterway, groundwater, wetland or lake • Wastes will be collected and removed from site. • Regulated wastes will be stored in designated locations and will be removed from site by a licensed regulated waste contractor and taken to a licensed landfill that can accept regulated wastes. • Waste will be segregated to maximise reuse and recycling opportunities and will be stored appropriately • Licensed contractors, transporters and disposal facilities will be used to manage waste • Regulated wastes will be tracked in accordance with the EP(WM) Reg. • A register of all chemicals stored on site will be developed and maintained • A register of hazardous materials and their location will be kept on site.	1	D	Low		1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
			• Waste will be managed in accordance with the Coppabella Coal Mine waste management plan, which includes the setting of annual targets to track the generation of various categories of waste • Annual audits will report progress towards meeting targets and the effectiveness of waste reduction and recycling programs.							
		Inefficient use of resources or ineffective management causing pressure on municipal infrastructure due to increased peak demand on processing capacity.	• The waste management hierarchy (as previously described) will be employed • Effective communication will be undertaken will waste management contractors and waste recovery facility managers as necessary. • Waste will be managed in accordance with the Coppabella Coal Mine waste management plan, which includes the setting of annual targets to track the generation of various categories of waste • Annual audits will report progress towards meeting targets and the effectiveness of waste reduction and recycling programs.	1	E	Low		1	E	Low

Table 3-25 Risk Assessment Of Potential Impacts From Johnson Extended Project Mining Activities' Waste Management On Environmental Values

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Waste management	Human health, aesthetics, ecological health and land use capability	Release of waste due inefficient use of resources or ineffective management causing contamination of land and surface water, degradation of social amenity and ecological health	• The waste management hierarchy (as previously described) will be employed • Waste will not be released directly or indirectly to any watercourse, waterway, groundwater, wetland or lake • Regulated wastes will be stored in designated locations and will be removed from site by a licensed regulated waste contractor and taken to a licensed landfill that can accept regulated wastes. • Waste will be segregated to maximise reuse and recycling opportunities and will be stored appropriately • Licensed contractors, transporters and disposal facilities will be used to manage waste • Regulated wastes will be tracked in accordance with the EP(WM) Reg. • A register of all chemicals stored on site will be developed and maintained • A register of hazardous materials and their location will be kept on site. • Waste will be managed in accordance with the Coppabella Coal Mine waste	1	D	Low		1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
			management plan, which includes the setting of annual targets to track the generation of various categories of waste •Annual audits will report progress towards meeting targets and the effectiveness of waste reduction and recycling programs.							
		Inefficient use of resources or ineffective management causing pressure on municipal infrastructure due to increased peak demand on processing capacity.	•The waste management hierarchy (as previously described) will be employed •Effective communication will be undertaken will waste management contractors and waste recovery facility managers as necessary. •Waste will be managed in accordance with the Coppabella Coal Mine waste management plan, which includes the setting of annual targets to track the generation of various categories of waste •Annual audits will report progress towards meeting targets and the effectiveness of waste reduction and recycling programs.	1	E	Low		1	E	Low

3.7.4 Objectives

The primary objective in relation to waste management for the Johnson Extended Project during exploration, operation and post mining is to ensure that waste is managed (including generation, transportation, reuse, recycling, recover, treatment and disposal (if necessary)) in a way that protects all environmental values.

3.7.5 Control Strategies

3.7.5.1. Johnson Extended Project Exploration And Underground Mining Activities

Key control strategies in relation to the potential impacts associated with waste management for exploration and mining on the Johnson Extended Project area are described in **Table 3-26** below.

Table 3-26 Control Strategies: Waste

Control Strategies	Explor.	Mining
The waste management hierarchy will be employed	✓	✓
Waste will not be released directly or indirectly to any watercourse, waterway, groundwater, wetland or lake	✓	✓
Rubbish and waste will be removed from the drill site at the completion of the drilling activities (inclusive of all markers and flagging tape)	✓	
Regulated wastes will be stored in designated locations and will be removed from site by a licensed regulated waste contractor and taken to a licensed landfill that can accept regulated wastes.	✓	✓
Drilling fluids contained within sumps will be removed via a sucker truck and disposed of at a designated waste disposal area	✓	
Waste will be segregated to maximise reuse and recycling opportunities and will be stored appropriately	✓	✓
Licensed contractors, transporters and disposal facilities will be used to manage waste	✓	✓
Regulated wastes will be tracked in accordance with the EP(WM) Reg.	✓	✓
A register of all chemicals stored on site will be developed and maintained	✓	
A register of hazardous materials and their location will be kept on site.	✓	✓
Effective communication will be undertaken will waste management contractors and waste recovery facility managers as necessary.	✓	✓
Wastes will be collected and removed from site.	✓	✓
Waste will be managed in accordance with the Coppabella Coal Mine waste management plan, which includes the setting of annual targets to track the generation of various categories of waste		✓
Annual audits will report progress towards meeting targets and the effectiveness of waste reduction and recycling programs.		✓

3.7.6 Proposed Environmental Authority Conditions

3.7.6.1. Exploration Activities

Exploration activities shall be carried out in compliance with the standard conditions of the *Code of environmental compliance for exploration and mineral development projects, DEHP, Version 1* (or later version).

3.7.6.2. Underground Mining Activities

It is proposed to apply the following EA conditions:

Schedule C – Waste

C2 Unless otherwise permitted by the conditions of this environmental authority or with prior approval from the administering authority and in accordance with a relevant standard operating procedure, waste must not be burnt.

C3 The holder of this environmental authority may burn vegetation cleared in the course of carrying out extraction activities provided the activity does not cause environmental harm at any sensitive place or commercial place.

3.8 Water

This section addresses both surface water and groundwater potentially affected by the proposed Johnson Extended Project. It relies on the following technical studies:

- Hydraulics study[7] undertaken for the purpose of the wider Coppabella Underground Mine project in order to assess its potential impacts on Humbug Gully.
- Flood modeling baseline study of Humbug Gully[8]
- Groundwater Impact Assessment[9] carried out for the Coppabella Underground Mine project to understand the potential impacts of the underground mine on groundwater in the area.
- Aquatic ecology assessment undertaken of Humbug Gully to understand baseline aquatic ecology values.[10]

This section uses content from both studies that is relevant to the purposes of this EMP.

3.8.1 Description of Surrounding Environment

3.8.1.1. Surface Water

The Johnson Extended Project area is in the majority located within the Humbug Gully catchment area. Humbug Gully catchment rises in the foothills of the Carborough Range, about 10 km northwest of the existing mine site. The watercourse is ephemeral and is essentially linear in shape, with only minor tributary gullies branching from the main flow path. Humbug Gully is the only watercourse present within the project area. It drains from West to East and is a tributary of Harrybrandt Creek, which runs south of the Coppabella Mine site and drains to the west and south-west into Bee Creek. Ultimately surface water runoff from the region drains into the Isaac River approximately 60km to the south-east. The location of the abovementioned creeks is shown in **Figure 5**.

The flood modelling study provides a baseline assessment of the Humbug Gully flooding regime that will be used as reference for comparison with the expected flooding regime after subsidence has occurred due to the underground mining. A flood modelling study accounting for subsidence will be included in the scope of the subsidence management plan to be prepared at a later stage.

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[7] Coppabella Underground Mine, Hydraulic Report, Cardno Lawson Treloar, April 2001, prepared for Macarthur Coal Limited.

[8] Modelling and Assessment Report: Coppabella Underground Mine Flood Modelling, Alluvium, January 2014.

[9] Coppabella Underground Project, Groundwater Impact Assessment, Australasian Groundwater and Environmental Consultants Pty Ltd, December 2010, prepared for Macarthur Coal.

[10] Coppabella Underground Project: Aquatic Ecology. Frc Environmental, 2011. Draft report. Prepared for Ecological Survey and Management.

3.8.1.2. Groundwater

Alluvial aquifers

The alluvium in the project area is typically associated with Harrybrandt Creek and its tributaries, south of the current mine area and along the southern boundary, where it is generally confined to a relatively narrow band along the creeks and tributary channels.
The alluvium consists of silty clayey sand, sand and gravel which appear to be generally not well developed and relatively thin. Review of exploration borelogs indicates an average thickness for alluvial sediments of 1.3m ranging from 0.2m to 7m.

Tertiary aquifers

During site investigations, groundwater was intersected towards the base of the Tertiary between 22m (Monitoring Bore (MB) 11) and 40m (MB6). Hence the aquifer occurs at the base of the Tertiary sediments where the sandy to gravelly sand layer is present and is sufficiently porous to host groundwater. The occurrence and depth of the aquifer is likely to be variable and depend on the depth and extent of these more porous sandy and gravelly layers.

Groundwater levels in this aquifer ranged between 17.7m (MB11) and 39.3m (MB6) below ground level. This indicates this aquifer is confined to semi-confined beneath the overlying more clayey sediments.

Water quality analyses indicate that the Tertiary groundwater has a slightly alkaline pH and is dominated by sodium and chloride with total dissolved solids (TDS) of around 8,500mg/L making it saline, exceeding the guideline level for cattle. A relatively high sulphate level was recorded; however this was still within the range for livestock. Metal concentrations for selenium meet the livestock guideline, whilst concentrations of the other metals were either below the laboratory detection limit or below the relevant guideline level.

Permian overburden aquifer

Groundwater associated with the overburden sequences that is, not related to the coal seams, was intersected at four locations across the site at varying depths, from 63m in bore MB5 to greater than 100m in bores MB3 and MB4. Similarly the extent of groundwater inflows also varied from minor inflow at bore MB7 (<0.1L/s) to 2.2L/s in bore MB5 and was mostly associated with sandstone.

Groundwater levels measured in five monitoring bores constructed in this aquifer ranged from 37.0m (bore MB4) to 54.4m (bore MB7) below ground level. This indicates this aquifer is confined beneath the overlying less permeable sedimentary layers.

Water quality analyses indicate that groundwater from this aquifer has a slightly alkaline pH and is dominated by sodium and chloride with total dissolved solids (TDS) in excess of 12,500mg/L making it saline and exceeding the guideline levels for cattle. A relatively high sulphate level was recorded in bore MB5; however this is still within the range for livestock. Levels for selenium were equivalent to the livestock threshold in each bore. Other metal concentrations were either below the laboratory detection limit or below the relevant livestock guideline. Total petroleum hydrocarbon levels were all below the laboratory detection limits for the fractions analysed.

Coal seam aquifers

The coal seams targeted for the underground mine are restricted to the Permian Rangal Coal Measures, which include the Macarthur Seam (average thickness of 11m), and Leichhardt Lower Seam (average thickness of 6.5m), within the Coppabella Mine area. Other Permian coal seams include the Vermont and Girrah Seams within the Fort Cooper Coal Measures which are stratigraphically lower than the Rangal Coal Measures and will not be intersected by the underground mining. The coal seams are confined aquifers which generally exhibit low transmissivity and recharge rates, that is, of low to moderately permeability. Groundwater storage and movement occurs within the coal seam cleats and fissures and within open fractures that intersect the seams. Groundwater levels measured in the two monitoring bores constructed in this aquifer ranged from 47.0m to 63.9m below ground level.

Water quality analyses indicate that the Permian coal seam aquifer groundwater has a slightly alkaline pH and is dominated by sodium and chloride with TDS levels in excess of 10,500mg/L making it saline which exceed the guideline levels for cattle. Levels for selenium were equivalent to the livestock threshold in each bore. Other metal concentrations were either below the laboratory detection limit or below the relevant livestock guideline.

3.8.2 Environmental Values

3.8.2.1. Surface Water

Environmental values and Water quality Objectives for the watercourses in the region of the Coppabella Mine are identified in Schedule 1 of the *Environmental Protection (Water) Policy 2009* (EPP (Water)), particularly in the *Isaac River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Isaac River Sub-basin (including Connors River), DEHP September 2011* and the associated plan *WQ1301 - Isaac River Sub-basin*. Environmental Values identified by both documents and applicable to the watercourses in the mine area are those for the Isaac fresh waters in undeveloped areas, as follows:

- Aquatic Ecosystems, defined as “a community of organisms living within or adjacent to water, including riparian or foreshore area” (EPP (Water), schedule 2).
- Stock watering, defined as “suitability of water supply for production of healthy livestock“.
- Human consumer of aquatic food, defined as “health of humans consuming aquatic foods, such as fish, crustaceans and shellfish from natural waterways”.
- Primary recreation, defined as “health of humans during recreation which involves direct contact and a high probability of water being swallowed, for example, swimming, surfing, windsurfing, diving and water-skiing”.
- Secondary recreation, defined as “health of humans during recreation which involves indirect contact and a low probability of water being swallowed, for example, wading, boating, rowing and fishing”.
- Visual recreation, defined as “amenity of waterways for recreation which does not involve any contact with water—for example, walking and picnicking adjacent to a waterway”.
- Drinking water supply, defined as “suitability of raw drinking water supply”. This assumes minimal treatment of water is required, for example, coarse screening and/or disinfection.
- Cultural and spiritual values, defined as:

- "indigenous and non-indigenous cultural heritage" (e.g. custodial, spiritual, cultural and traditional heritage, hunting, gathering and ritual responsibilities; symbols, landmarks and icons; lifestyles (such as agriculture and fishing)) and
- the water's "aesthetic, historical, scientific, social or other significance, to the present generation or past or future generations". (EPP (Water), s. 6).

30 Mile Creek, Humbug Gully and Harrybrandt Creek will be affected by the project through water discharges from existing mine water storages. Humbug Gully will be affected by the project through ground disturbance (primarily subsidence). The environmental values relevant to the three watercourses are deemed to be:

- Aquatic Ecosystems
- Stock water
- Visual recreation
- Cultural and spiritual values

The baseline aquatic ecology investigations (FRC (2011)) identified that the biological values of the aquatic ecosystems within the study area are relatively low when compared with those of the wider catchment. The report noted the ephemeral nature of Humbug Gully as a primary driver of the EVs and that historical agricultural development and mining within the region has likely influenced water quality and the physical characteristics of aquatic habitats in the study area.

FRC (2011) identified physico-chemical water quality in the study area as being poor to moderate during field survey, and being characterised by high turbidity and low dissolved oxygen levels. Biodiversity was noted as being low, with only fish and macroinvertebrate species that are tolerant of varying and often harsh conditions inhabiting the study area.

FRC (2011) noted that the creeks within the study area would provide 'upstream' dispersal habitat for the fish species that were recorded in the study area (and possibly breeding habitat for some species) and that therefore macroinvertebrate and fish communities found within the study area are likely to contribute to the success of downstream populations through movement/migration.

FRC (2011) did not identify any endangered, vulnerable, or near threatened species of aquatic flora or fauna as occurring or being likely to occur in, the waterways of the study area.

3.8.2.2. Groundwater

The Groundwater Impact Assessment reviewed all potential environmental values related to groundwater. It concluded that aquifers associated with the Tertiary, Permian and coal seam sequences are of no, or limited value for most uses, with the only value being that for industrial purposes in relation to the proposed coal mine operation. Hence the environmental values for suitability of groundwater within the Coppabella Underground Project and therefore the Johnson Extended Project area that would need to be enhanced or protected are those for industrial use only.

3.8.3 Assessment Of Potential Impacts On Environmental Values

3.8.3.1. Johnson Extended Project Exploration Activities

Activities to be carried out during exploration that have the potential to impact on surface and groundwater are as follows:

- Construction and use of tracks across Humbug Gully;
- Use of hazardous substances; and
- Clearing and soil disturbance in proximity to Humbug Gully.

Potential impacts associated with the above activities are as follows:

- Obstruction to flow paths causing changes in flood flow distributions;
- Sedimentation of watercourse; and
- Water contamination due to accidental release of hazardous substances.

Impact assessment

Considering the low magnitude and the temporary nature of the exploration activities, it is expected that such activities will have minor impacts on water quality.

Table 3-27 presents the outcomes of the risk assessment of potential impacts on water from exploration activities.

Table 3-27 Risk Assessment Of Potential Impacts On Water From Johnson Extended Project Exploration Activities

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Water	Aquatic Ecosystems Stock water Visual recreation Cultural and spiritual values	Obstruction to flow paths causing changes in flood flow distributions	•Divert water around areas of disturbance •Minimise the number of crossings of Humbug Gully and restrict the area of disturbance. •Landholder consent must be obtained for any drill site located < 500m from a stock watering point. •Water source points must be approved by the Landholder and identified with signage For any crossings: •Minimise alteration of the natural bed and bank profile •Spread material evenly within the bed and banks of the watercourse so that it does not interfere with the flow of water	1	D	Low		1	D	Low
	Aquatic Ecosystems	Degradation of water quality in Humbug Gully associated with modified stormwater flows (including sediment load) and sedimentation from disturbed areas	•Avoidance and minimisation of area of disturbance and implementation of effective sediment and erosion controls •Disturbed areas will be rehabilitated in a timely manner. •All drill sites must be prepared so that stormwater runoff into and from the drill site is minimised.	1	D	Low		1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		Degradation of aquatic habitat within Humbug Creek due to crossing activities undertaken within / adjacent the watercourse	• Drilling, excavation or clearing will be avoided, minimised and mitigated in Humbug Creek. • Minimise the number of crossings of Humbug Gully and restrict the area of disturbance. • All excavations and sumps will be backfilled and shaped to a stable landform similar to that of surrounding undisturbed areas. For any crossings: • Minimise alteration of the natural bed and bank profile • Avoid carrying out activities on the outside of the watercourse bend, on steep banks or where the soil type is prone to erosion (dispersive soils). • Spread material evenly within the bed and banks of the watercourse so that it does not interfere with the flow of water • Ensure natural stream bed controls or features that create natural waterholes are not lowered or removed. • Access tracks will not interrupt low flow along the watercourse. • Reuse existing watercourse crossings where possible and appropriate • All disturbed areas located within riverine areas will be rehabilitated prior to the onset of the wet season	1	C	Low		1	C	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		Degradation of surface or groundwater quality and associated aquatic habitat and loss of species diversity due to accidental release / leaks of hazardous substances used for exploration activities to watercourses	• Dam catchment exclusion areas must be identified and discussed at prestarts. • Storage and handling of flammable and combustible liquids must be in accordance with *AS 1940- Storage and Handling of Flammable and Combustible Liquids*. • Hydrocarbon spill controls must be in place and used appropriately (bunded pallets, covered to prevent rainwater accumulating, sealed containers etc.) • 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) • Drill water will be contained within a sump located at drill site and reused where practicable • The maintenance and cleaning of any vehicles, plant or equipment will not be carried out in areas from which contaminants can be released into any receiving waters. • Drill casings will be cut off approximately 1m below the natural surface and sealed with a cap and backfilled • All discarded core, drill chips and dried sludge will be disposed of in the drill sumps prior to backfilling • All rubbish and waste will be removed from	1	D	Low	Investigation and / or undertaking of surface water grab sampling should complaints regarding surface water quality impact (that are not vexatious or frivolous) be received	1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
			the drill site at the completion of the drilling activities (inclusive of all markers and flagging tape)							

3.8.3.2. Johnson Extended Project Underground Mining Activities

Activities and associated potential impacts

Underground mining activities to be carried out within the Johnson Extended Project leases during that have the potential to impact on water quality are:

- Underground mining; and
- Earthworks and soil-disturbing activities (e.g. subsidence remediation, vehicle traffic on unsealed roads/tracks, erosion of areas left free of vegetation and unsealed).

Potential impact from the above activities includes the following:

- Water sedimentation due to soil erosion;
- Soil disturbance due to subsidence causing erosion and water sedimentation;
- Loss of groundwater causing drawdown of water table;
- Water contamination due to accidental release of hazardous substances;
- Loss of surface water due to cracks in the ground from subsidence; and
- Alteration of flood patterns at Humbug Gully due to ground subsidence.

Impact assessment

Subsidence

The Hydraulics study of Humbug Gully assessed the potential impacts of subsidence on the watercourse using broad assumptions of potential subsidence levels. The study predicted that subsidence would cause a decrease in peak water levels, with the magnitude of change being roughly equivalent to the depth of subsidence – a maximum water level decrease of 1.81 m and 2.98 m for the average and worst case simulations, respectively. Peak velocities were predicted to decrease by up to 0.65 m/s in the area affected by subsidence, due to the flatter hydraulic grade line caused by the subsidence. With regards to sediment transport, it is predicted that large bed depressions caused by mine subsidence were likely to accumulate sediment at a higher rate than other regions of the creek. Otherwise, erosion and accretion were not predicted to be severe, with the largest average change in bed level predicted to be -0.09m for the wet year, high subsidence case.

Risk associated with potential impacts to water, and particularly Humbug Gully, associated with subsidence was initially considered to be high; however with the development and implementation of a subsidence management plan and the rehabilitation of disturbed areas the residual risk level associated with potential subsidence impacts is reduced to moderate.

As previously described, the subsidence management strategy and the underlying subsidence management plan for each longwall panel will identify and describe options for mitigating and managing subsidence impacts. The plan will address; the physical condition of surface drainage including erosion, incision processes, stream widening, tension cracking, lowering of bed and banks, creation of in-stream waterholes, changes to local drainage patterns and areas susceptible to high levels of erosion such as watercourse confluences. The plan will also address overland flow, capture of overland flow by subsided long-wall panels, increased overbank flows due to lowering of high bank watercourses and the portion of local and large scale catchment likely to be captured by subsided long-wall panels and the associated impacts on downstream users. The plan will include a flood study for Humbug Gully taking into account impacts from post-mining subsidence.

Disturbed areas will be rehabilitated in accordance with the provisions detailed in the Code of Environmental Compliance for Mining lease projects and Guideline for rehabilitation requirements for mining projects.

Other surface water impacts

Release or leaks of hazardous substances used for support and service activities associated with the underground mining may also cause degradation of the land resource; however this is assessed as a low risk.

Groundwater

The Groundwater Impact Assessment carried out for the wider Coppabella Underground Mine project has assessed the potential impacts of underground mining activities on groundwater. While the study did not account specifically for mining in the Johnson Extended Project area, it considered a much larger mining area and scope. Applying the conclusions of the study to the Johnson Extended Project is therefore considered conservative.

The study found that inflows into the underground mine were predicted to peak around 5.5ML/day for Options 1 & 3[11], and up to 17ML/day for Option 2. However, it predicts that the actual volumes of water pumped from the underground mine will likely be less than the volumes predicted as some water will be removed as moisture with the coal and some will be lost via the ventilation system. These losses may represent up to between 12L/s and 15L/s (1ML/day and 1.3ML/day).

Groundwater levels and regional impact

The study predicted that the underground mine development and operation would depressurise the Permian and coal seam aquifers as well as the Tertiary aquifer where it exists above the underground footprint, by facilitating groundwater flow into the underground workings. This would result in a lower elevation of the piezometric surface of these aquifers and create a cone of depression around the mine. Based on the simulated drawdown levels, the extent of impact on groundwater levels was confined to within 1km of the mine area. South Walker Creek Coal Mine, located some 10km to the north, is the nearest operational mine to the Coppabella site and is well outside the zone of impact. The study concluded that there would be no net cumulative drawdown impacts from the two mines on the regional aquifer. The scope of mining activities in the Johnson Extended Project area being much smaller than the one assessed by the study, a similar conclusion can be drawn.

Impact on existing farm bores

There are no operational domestic or stock bores within or adjacent to the proposed mining lease area. The nearest water supply bores (RN81848 and RN85078) are located approximately 4.5km from the mine site, which is beyond the predicted zone of groundwater

[11] Option 1 considered mining advancement from south to north thereby following the coal seam down-dip, and dewatering/pumping of groundwater inflows from the active mine area only. Option 2 considered mining advancement from south to north similarly to Option 1 but assumed dewatering/pumping of groundwater inflows from all mined areas. Option 3 considered mining advancement from north to south effectively following the coal seam up-dip toward the open cut mine area.

drawdown. The technical assessment noted that to confirm the modelling predictions, it is important that a groundwater monitoring program is implemented and where applicable the numerical model re-run incorporating monitoring results and operational experiences.

Impact on environmental values

The groundwater impact assessment found that there were no groundwater dependent ecosystems likely to be impacted by the Coppabella Underground Project. The only environmental value for the groundwater that would be relevant to the Coppabella Underground Project would be industrial use. Impact on the saline aquifers will not affect this environmental value as no nearby users of this saline groundwater exist. No other environmental values for groundwater were identified in the project area, due to the poor water quality and low bore yields.

Table 3-28 presents the outcomes of the risk assessment of potential impacts on water from mining activities.

Table 3-28 Risk Assessment Of Potential Impacts On Water From Johnson Extended Project Underground Mining Activities

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Water	Aquatic Ecosystems Stock water Visual recreation Cultural & spiritual values	Modification and / or obstruction of flow paths and ponding due to subsidence and surface activities causing changes in flood flow distributions	For non subsidence-related activities: • Divert water around areas of disturbance • Avoid or minimise the number of crossings of Humbug Gully and restrict the area of disturbance. • Spread material evenly within the bed and banks of the watercourse so that it does not interfere with the flow of water • Divert water around areas of disturbance • All disturbed areas located within riverine areas will be rehabilitated prior to the onset of the wet season For any crossings: • Avoid alteration of the natural bed and bank profile • Spread material evenly within the bed and banks of the watercourse so that it does not interfere with the flow of water • Rehabilitate when no longer in use	3	A	High	A subsidence management plan will be developed and implemented Disturbed areas will be rehabilitated in accordance with the provisions detailed in the *Code of Environmental Compliance for Mining Lease Projects*.	2	A	Moderate

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
			• Access tracks will not interrupt low flow along the watercourse. • Reuse existing watercourse crossings where possible and appropriate							
	Aquatic Ecosystems Visual recreation Cultural & spiritual values Industrial use (groundwater)	Degradation of water quality in Humbug Gully associated with modified stormwater flows (including sediment load) due subsidence, subsidence management and other activities	Avoidance and minimisation of area of disturbance and implementation of effective sediment and erosion controls.	2	B	Moderate	A subsidence management plan will be developed and implemented Disturbed areas will be rehabilitated in accordance with the provisions detailed in the *Code of Environmental Compliance for Mining Lease Projects*.	1	C	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		Degradation of aquatic habitat within Humbug Gully due to crossing activities undertaken within / adjacent the watercourse and degradation of aquatic habitat in Humbug Gully and elsewhere associated with surface and / or groundwater due to coal extraction, subsidence and subsidence managemen	• Avoid or minimise the number of crossings of Humbug Gully and restrict the area of disturbance. For any crossings: • Avoid alteration of the natural bed and bank profile • Avoid carrying out activities on the outside of the watercourse bend, on steep banks or where the soil type is prone to erosion (dispersive soils). • Spread material evenly within the bed and banks of the watercourse so that it does not interfere with the flow of water • Ensure natural stream bed controls or features that create natural waterholes are not lowered or removed. • Access tracks will not interrupt low flow along the watercourse.	3	B	High	A subsidence management plan will be developed and implemented Disturbed areas will be rehabilitated in accordance with the provisions detailed in the *Code of Environmental Compliance for Mining Lease Projects*. Where / if necessary an offset plan will be provided in accordance with the Queensland Biodiversity offset Policy to offset relevant residual impacts.	1	C	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		t activities								
		Localised diminution of groundwater resources through lowering due to coal extraction, water management and subsidence		1	A	Low	Undertake baseline and ongoing monitoring of groundwater levels and water quality in order to obtain additional information on groundwater conditions. Refer to the Groundwater Impact Assessment for further details.	1	A	Low
		Degradation of surface or groundwater quality and associated aquatic habitat and loss of species diversity due to accidental release / leaks of hazardous substances used for	• Storage and handling of flammable and combustible liquids must be in accordance with *AS 1940- Storage and Handling of Flammable and Combustible Liquids*. • 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.	1	D	Low	Undertake baseline monitoring of groundwater levels and water quality in order to obtain additional information on groundwater conditions. Refer to the Groundwater Impact Assessment for further details.	1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
		surface and underground activities to watercourses								

3.8.4 Objectives

The objectives with regards to water are:

- To maintain the existing chemical, physical and biological integrity of downstream water quality within acceptable parameters, so as to minimise potential impacts to the environmental values;
- To minimise impacts on groundwater quality and quantity, so as to protect the existing and potential future environmental values;
- To manage raw water usage to minimise potential impacts on the water supply system of the area;
- Maintenance of sufficient quantity and quality of surface water and protection of existing beneficial downstream uses of those waters (including maintenance of in-stream biota and the littoral zone); and
- Minimisation of impacts on flooding levels and frequencies both upstream and downstream of the project.

3.8.5 Control Strategies

3.8.5.1. Johnson Extended Project Exploration And Underground Mining Activities

Control strategies for exploration and underground mining activities are identified in Table 3-29.

Table 3-29 Control Strategies: Water

Control Strategies	Explor.	Mining
Divert water around areas of disturbance	✓	✓
Minimise the number of crossings of Humbug Gully and restrict the area of disturbance.	✓	✓
Landholder consent must be obtained for any drill site located < 500m from a stock watering point.	✓	
Water source points must be approved by the Landholder and identified with signage	✓	✓
Drilling, excavation or clearing will be avoided, minimised and mitigated in Humbug Creek.	✓	
Minimise the number of crossings of Humbug Gully and restrict the area of disturbance.	✓	✓
All excavations and sumps will be backfilled and shaped to a stable landform similar to that of surrounding undisturbed areas.	✓	
Dam catchment exclusion areas must be identified and discussed at prestarts.	✓	
Storage and handling of flammable and combustible liquids must be in accordance with *AS 1940- Storage and Handling of Flammable and Combustible Liquids*.	✓	✓
Drill water will be contained within a sump located at drill site and reused where practicable	✓	

Control Strategies	Explor.	Mining
The maintenance and cleaning of any vehicles, plant or equipment will not be carried out in areas from which contaminants can be released into any receiving waters.	✓	✓
Drill casings will be cut off approximately 1m below the natural surface and sealed with a cap and backfilled	✓	
All discarded core, drill chips and dried sludge will be disposed of in the drill sumps prior to backfilling	✓	
All rubbish and waste will be removed from the drill site at the completion of the drilling activities (inclusive of all markers and flagging tape)	✓	
All disturbed areas located within riverine areas will be rehabilitated prior to the onset of the wet season	✓	✓
Crossings		
Minimise alteration of the natural bed and bank profile	✓	✓
Spread material evenly within the bed and banks of the watercourse so that it does not interfere with the flow of water	✓	✓
Avoidance and minimisation of area of disturbance and implementation of effective sediment and erosion controls	✓	✓
All drill sites must be prepared so that stormwater runoff into and from the drill site is minimised.	✓	
Avoid carrying out activities on the outside of the watercourse bend, on steep banks or where the soil type is prone to erosion (dispersive soils).	✓	✓
Ensure natural stream bed controls or features that create natural waterholes are not lowered or removed.	✓	✓
Access tracks will not interrupt low flow along the watercourse.	✓	✓
Reuse existing watercourse crossings where possible and appropriate	✓	✓
Disturbed areas will be rehabilitated in a timely manner.	✓	✓
A subsidence management plan will be developed and implemented.		✓
An erosion and sediment control plan will be developed for other areas of disturbance.		✓
Disturbed areas will be rehabilitated in accordance with the provisions detailed in the Code of Environmental Compliance for Mining Lease Projects, Version 1 (or more recent version). For areas in Humbug Gully, rehabilitation will be undertaken as soon as practicable and prior to the onset of the wet season (~April).		✓

3.8.6 Proposed EA Conditions

3.8.6.1. Johnson Extended Project Exploration Activities

It is expected that environmental values relating to land quality will be adequately protected and managed through implementation of the conditions of the *Code of environmental compliance for exploration and mineral development projects, DEHP, Version 1* (or later version).

3.8.6.2. Johnson Extended Project Underground Mining Activities

It is proposed to use the following conditions applying to groundwater management :

Schedule E – Groundwater

E1 The holder of the environmental authority must develop and implement a groundwater monitoring program. The program must be able to detect a significant change to groundwater quality values (consistent with the current suitability of the groundwater for industrial use) due to activities that are part of this mining project. The groundwater monitoring program must detail:

a. The location of groundwater monitoring sites and the aquifers the sites are monitoring;
b. The frequency at which sampling will be undertaken;
c. The groundwater contaminant trigger levels;
d. The groundwater monitoring reporting requirements; and
e. Management measures to effectively mitigate and manage potential impacts on aquifers and existing groundwater users.

E2 Groundwater potentially affected by the mining operations must be monitored at two different representative locations within the Johnson Extended Project area.

E3 If the groundwater contaminant trigger levels defined in Table E1 are exceeded then the environmental authority holder must complete an investigation into the potential for environmental harm and notify the administering authority within twenty-eight (28) days of receiving the analysis results. Trigger values for table E1 are to be provided to the administering authority prior to the commencement of underground mining activities.

Table E1 - Groundwater Contaminant Trigger Values

Water Quality Indicator	Unit	Trigger Values
Electrical Conductivity	µS/cm	To be provided based on existing and planned groundwater baseline studies
pH	pH Units	To be provided based on existing and planned groundwater baseline studies
Dissolved solids (total)	mg/L	To be provided based on existing and planned groundwater baseline studies
Carbonate	mg/L	To be provided based on existing and planned

Water Quality Indicator	Unit	Trigger Values
		groundwater baseline studies
Bicarbonate	mg/L	To be provided based on existing and planned groundwater baseline studies
Total Alkalinity	mg/L	To be provided based on existing and planned groundwater baseline studies
Sulphate	mg/L	To be provided based on existing and planned groundwater baseline studies
Chloride	mg/L	To be provided based on existing and planned groundwater baseline studies
Calcium	mg/L	To be provided based on existing and planned groundwater baseline studies
Magnesium	mg/L	To be provided based on existing and planned groundwater baseline studies
Sodium	mg/L	To be provided based on existing and planned groundwater baseline studies
Potassium	mg/L	To be provided based on existing and planned groundwater baseline studies
Aluminium	mg/L	To be provided based on existing and planned groundwater baseline studies
Antimony	mg/L	To be provided based on existing and planned groundwater baseline studies
Arsenic	mg/L	To be provided based on existing and planned groundwater baseline studies
Molybdenum	mg/L	To be provided based on existing and planned groundwater baseline studies
Selenium	mg/L	To be provided based on existing and planned groundwater baseline studies
Silver	mg/L	To be provided based on existing and planned groundwater baseline studies
Iron	mg/L	To be provided based on existing and planned groundwater baseline studies
Mercury	mg/L	To be provided based on existing and planned groundwater baseline studies
Petroleum Hydrocarbons (total)		

Water Quality Indicator	Unit	Trigger Values
C_6 – C_9 Fraction	µg/L	To be provided based on existing and planned groundwater baseline studies
C_{10} – C_{14} Fraction	µg/L	To be provided based on existing and planned groundwater baseline studies
C_{15} – C_{28} Fraction	µg/L	To be provided based on existing and planned groundwater baseline studies
C_{29} – C_{36} Fraction	µg/L	To be provided based on existing and planned groundwater baseline studies
C_{10} – C_{36} Fraction (sum)	µg/L	To be provided based on existing and planned groundwater baseline studies

E4 If the groundwater contaminant trigger levels defined in the groundwater monitoring program are exceeded then the environmental authority holder must complete an investigation into the potential for environmental harm and notify the administering authority within twenty-eight (28) days of receiving the analysis results.

Annual report for groundwater

E8 All groundwater monitoring data must be reviewed on an annual basis. The review must include the assessment of groundwater levels and quality, and the suitability of the monitoring network. An annual report that assesses the impacts of mining on groundwater, and includes all groundwater monitoring results, must be forwarded to the administering authority by 30 September each year.

Temporary Interference with waterways

E26 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 Department of Natural Resources and Mines (or its successor) *Guideline – Activities in a Watercourse, Lake or Spring associated with Mining Activities.*

Stormwater and Water sediment controls

E28 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.

E29 Stormwater, other than mine affected water, is permitted to be released to waters from:

a) erosion and sediment control structures that are installed and operated in accordance with the Erosion and Sediment Control Plan required by condition E28

b) water management infrastructure that is installed and operated, in accordance with a Water Management Plan that complies with condition F27, for the purpose of ensuring water does not become mine affected water.

E32 Water Reuse

Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party (with the consent of the third party).

E37 Water General

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:

   Note: Condition F37 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.
c. collected from the monitoring locations identified within this environmental authority, within ten (10) hours of each other where possible;
d. carried out on representative samples; and
e. laboratory testing must be undertaken using a laboratory accredited (e.g. NATA) for the method of analysis being used.

E39 Annual Water Monitoring Reporting

The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority 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 exceedences with the conditions of this environmental authority; and
g. water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.

E41 Water Management Plan

A Water Management Plan must be developed by an appropriately qualified person and implemented.

E45 Saline Drainage

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

E46 Acid Rock Drainage

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

Sewage effluent
A sewage treatment plant is not currently planned so no conditions have been included.

E47 Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters as a result of the authorised mining activities, except as permitted under the conditions of this environmental authority.

Structures which are dams or levees constructed as part of environmentally relevant activities.
There are currently no dams or levees that are subject to these conditions on the MLAs.

Schedule G - Dams

G1 The consequence category of any structure must be assessed by a suitably qualified and experienced person in accordance with the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635) at the following times:

a. prior to the design and construction of the structure, if it is not an existing structure; or
b. if it is an existing structure, prior to the adoption of this schedule; or
c. prior to any change in its purpose or the nature of its stored contents.

G2 A consequence assessment report and certification must be prepared for each structure assessed and the report may include a consequence assessment for more than one structure.

G3 Certification must be provided by the suitably qualified and experienced person who undertook the assessment, in the form set out in the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635).

Design and construction of a regulated structure

G4 Conditions G5 to G9 inclusive do not apply to existing structures.

G5 All regulated structures must be designed by, and constructed under the supervision of, a suitably qualified and experienced person in accordance with the requirements of the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635).

G6 Construction of a regulated structure is prohibited unless the holder has submitted a consequence category assessment report and certification to the administering authority has been certified by a suitably qualified and experienced person for the design and design plan and the associated operating procedures in compliance with the relevant condition of this authority.

G7 Certification must be provided by the suitably qualified and experienced person who oversees the preparation of the design plan in the form set out in the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635), and must be recorded in the Regulated Dams/Levees register.

G8 Regulated structures must:

a. be designed and constructed in accordance with and conform to the requirements of the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635);
b. be designed and constructed with due consideration given to ensuring that the design integrity would not be compromised on account of:
i. floodwaters from entering the regulated dam from any watercourse or drainage line; and
ii. wall failure due to erosion by floodwaters arising from any watercourse or drainage line.

G9 Certification by the suitably qualified and experienced person who supervises the construction must be submitted to the administering authority on the completion of construction of the regulated structure, and state that:
c. the 'as constructed' drawings and specifications meet the original intent of the design plan for that regulated structure;
d. construction of the regulated structure is in accordance with the design plan.

G10 Operation of a regulated structure, except for an existing structure, is prohibited unless:
a. the holder has submitted to the administering authority:
i. one paper copy and one electronic copy of the design plan and certification of the 'design plan' in accordance with condition G8, and
ii. a set of 'as constructed' drawings and specifications, and
iii. certification of those 'as constructed drawings and specifications' in accordance with condition G9, and
iv. where the regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the DSA volume across the system, a copy of the certified system design plan.
v. the requirements of this authority relating to the construction of the regulated structure have been met;
vi. the holder has entered the details required under this authority, into a Register of Regulated Dams; and
vii. there is a current operational plan for the regulated structures.

G12 Each regulated structure must be maintained and operated, for the duration of its operational life until decommissioned and rehabilitated, in a manner that is consistent with the current operational plan and, if applicable, the current design plan and associated certified 'as constructed' drawings.

Mandatory reporting level

G13 Conditions G14 to G17 inclusive only apply to Regulated Structures which have not been certified as low consequence category for 'failure to contain – overtopping'.

G14 The Mandatory Reporting Level (the MRL) must be marked on a regulated dam in such a way that during routine inspections of that dam, it is clearly observable.

G15 The holder must, as soon as practical and within forty-eight (48) hours of becoming aware, notify the administering authority when the level of the contents of a regulated dam reaches the MRL.

G16 The holder must, immediately on becoming aware that the MRL has been reached, act to prevent the occurrence of any unauthorised discharge from the regulated dam.

G17 The holder must record any changes to the MRL in the Register of Regulated Structures.

Design storage allowance

G18 The holder must assess the performance of each regulated dam or linked containment system over the preceding November to May period based on actual observations of the available storage in each regulated dam or linked containment system taken prior to 1 July of each year.

G19 By 1 November of each year, storage capacity must be available in each regulated dam (or network of linked containment systems with a shared DSA volume), to meet the Design Storage Allowance (DSA) volume for the dam (or network of linked containment systems).

G20 The holder must, as soon as possible and within forty-eight (48) hours of becoming aware that the regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, notify the administering authority.

G21 The holder must, immediately on becoming aware that a regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, act to prevent the occurrence of any unauthorised discharge from the regulated dam or linked containment systems.

Annual inspection report

G22 Each regulated structure must be inspected each calendar year by a suitably qualified and experienced person.

G23 At each annual inspection, the condition and adequacy of all components of the regulated structure must be assessed and a suitably qualified and experienced person must prepare an annual inspection report containing details of the assessment and include recommended actions to ensure the integrity of the regulated structure.

G24 The suitably qualified and experienced person who prepared the annual inspection report must certify the report in accordance with the Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635).

G25 The holder must:

a. Within 20 business days of receipt of the annual inspection report, provide to the administering authority:

i. The recommendations section of the annual inspection report; and

ii. If applicable, any actions being taken in response to those recommendations; and

b. If, following receipt of the recommendations and (if applicable) actions, the administering authority requests a full copy of the annual inspection report from the holder, provide this to the administering authority within 10 business days6 of receipt of the request.

Decommissioning and rehabilitation

G27 Dams must not be abandoned but be either:

a. decommissioned and rehabilitated to achieve compliance with condition (G28); or
b. be left in-situ for a beneficial use(s) provided that:
i. it no longer contains contaminants that will migrate into the environment; and
ii. it contains water of a quality that is demonstrated to be suitable for its intended beneficial use(s); and
iii. the administering authority, the holder of the environmental authority and the landholder agree in writing that the dam will be used by the landholder following the cessation of the environmentally relevant activity(ies).

G28 After decommissioning, all significantly disturbed land caused by the carrying out of the environmentally relevant activity(ies) must be rehabilitated to meet the following final acceptance criteria:

a. the landform is safe for humans and fauna;
b. the landform is stable with no subsidence or erosion gullies for at least three (3) years;
c. any contaminated land (e.g. contaminated soils) is remediated and rehabilitated
d. not allowing for acid mine drainage; or
e. there is no ongoing contamination to waters (including groundwater);
f. rehabilitation is undertaken in a manner such that any actual or potential acid sulfate soils on the area of significant disturbance are treated to prevent or minimise environmental harm in accordance with the Instructions for the treatment and management of acid sulfate soils (2001)
g. all significantly disturbed land is reinstated to the pre-disturbed soil suitability class;
h. for land that is not being cultivated by the landholder:
i. groundcover, that is not a declared pest species is established and self-sustaining
ii. vegetation of similar species richness and species diversity to pre-selected analogue sites is established and self-sustaining, and
i. the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance caused by carrying out the petroleum activity(ies).
i. for land that is to be cultivated by the landholder, cover crop is revegetated, unless the landholder will be preparing the site for cropping within 3 months of petroleum activities being completed.

Register of Regulated Dams

G29 A Register of Regulated Dams must be established and maintained by the holder for each regulated dam:

G30 The holder must provisionally enter the required information in the Register of Regulated Dams when a design plan for a regulated dam is submitted to the administering authority.

G31 The holder must make a final entry of the required information in the Register of Regulated Dams once compliance with condition (G10) and (G11) has been achieved.

G32 The holder must ensure that the information contained in the Register of Regulated Dams is current and complete on any given day.

G33 All entries in the Register of Regulated Dams must be approved by the chief executive officer for the holder of this authority, or their delegate, as being accurate and correct.

G34 The holder must, at the same time as providing the annual return, supply to the administering authority a copy of the records contained in the Register of Regulated Dams, in the electronic format required by the administering authority.

3.9 Cultural Heritage And Native Title

3.9.1 Description Of Surrounding Environment

The Johnson Extended Project area is entirely overlapped by the Barada Barna People Native Title Claim (Claim number QC2008/011). The Johnson Extended Project ML areas (MLA 70384, 70385, 70386 and 70387) are entirely within land described as Lot 1 on SP107309. This parcel of land is held in Freehold title. Native Title has been extinguished over the area of the Johnson Extended Project area. Any Native Title issues associated with the operations of the Coppabella Coal Mine, the facilities of which will support the Johnson Extended Project, are dealt with through the normal operations of that mine. The Project proponent has a long standing relationship with the Barada Barna People and this will be continued through the execution of the Johnson Extended Project.

The Barada Barna People are the Aboriginal party under the *Aboriginal Cultural Heritage Act 2003* (ACHA) for the Johnson Extended Project and Coppabella Coal Mine areas. A Cultural Heritage Management Plan (CHMP) that covers the Johnson Extended Project and Coppabella Coal Mine areas has been entered into with the Barada Barna People. The CHMP was approved by the Queensland Government in accordance with section 107 of the ACHA in October 2010 and is designed to manage the protection of indigenous cultural heritage values as disturbance to land associated with operations occurs.

The non-indigenous cultural heritage and history of the Coppabella area is the subject of a study and report *History of Coppabella South and Moorvale Mining Leases*. The conclusion drawn from the historical study is that there will be no conflict with or impact on European cultural heritage values on the region caused by the Coppabella Mine. The conclusion is confirmed by the archaeologists conducting the field studies to identify cultural heritage values and interests.

3.9.2 Environmental Values

Places and objects in the Johnson Extended Project and Coppabella Coal Mine mining lease areas with indigenous cultural heritage significance have been identified by the relevant Aboriginal groups including through a number of surveys and are the subject of various reports submitted directly to the Queensland Government, including for the development of the CHMP.

Non-indigenous cultural heritage values may include aesthetic, architectural, historical, scientific, social, or other significance of the place. As previously noted, non-indigenous cultural heritage values and interests of the Coppabella area have been assessed. The conclusion drawn from the historical study is that there will be no conflict with or impact on European cultural heritage values on the region caused by the Coppabella Mine.

3.9.3 Assessment Of Potential Impacts on Environmental Values

3.9.3.1. Johnson Extended Project Exploration And Underground Mining Activities

Activities and associated potential impacts

Exploration and mining activities proposed to be undertaken on the Johnson Extended Project area (including Coppabella Coal Mine areas) have the potential to impact on cultural heritage values to their detriment due project personnel being unaware of or not following cultural heritage management practices.

Impact assessment

Table 3-30 presents the outcomes of the risk assessment of potential impacts from execution of the Johnson Extended Project on cultural heritage values.

The progression of the Johnson Extended Project will be undertaken in consultation with the Barada Barna in accordance with the CHMP. The CHMP includes management practices to achieve the stated objectives and comply with the ACHA. The CHMP contains detailed statements of cultural heritage values and strategies to conserve these values. The CHMP also includes strategies to manage a range of activities (including mining and pastoral activities) impacting and/or potentially impacting, on the cultural heritage values of the area. It is considered that cultural heritage materials, places and interests will be protected by effective management under the CHMP.

Given the application of the CHMP and effective control strategies, the Johnson Extended Project is expected to have a low level of impact on cultural heritage values.

Table 3-30 Risk Assessment Of Potential Impacts From Johnson Extended Project On Cultural Heritage Values

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Cultural heritage	Indigenous and non-indigenous heritage values	Harm caused to indigenous or non-indigenous cultural heritage values caused by Project personnel being unaware of or not following cultural heritage management practices	• Implementation of the CHMP including all procedures and control strategies for indigenous heritage management • Drawings are utilised to accurately identify locations of items of cultural heritage value and future ground disturbance is planned to avoid where practicable items or areas of cultural heritage value • All employees working on the Johnson Extended Project will be trained in cultural heritage awareness during the site induction process • A cultural heritage inspection will be undertaken prior to any clearing • Procedures will be implemented should discovery of non-indigenous heritage items occur during project implementation including: Ceasing work and establishing a temporary buffer Notification to site and project management Assessing significance of the site using criteria established under the *Queensland Heritage Act 1992*, to determine the appropriate protection measures for identified sites	1	D	Low		1	D	Low

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
			Liaison with regulatory authorities to implement appropriate management							

3.9.4 Objectives

The objectives with regard to cultural heritage matters include:

- Retention of the integrity of intrinsic or attributed values of cultural heritage features on the lease area
- To interact with both Aboriginal and European groups who may have an interest in the area
- No incidents which impact cultural heritage values.

CHMP objectives for management of indigenous heritage are described fully within the CHMP.

3.9.5 Control Strategies

3.9.5.1. Johnson Extended Project Exploration And Underground Mining Activities

Key control strategies in relation to the management of the potential impacts of exploration and mining on cultural heritage values are described in **Table 3-31** below.

Table 3-31 Control Strategies: Cultural Heritage

Control Strategies	Explor.	Mining
Implementation of the CHMP including all procedures and control strategies for indigenous heritage management.	✓	✓
Drawings are utilised to accurately identify locations of items of cultural heritage value and future ground disturbance is planned to avoid where practicable items or areas of cultural heritage value	✓	✓
All employees working on the Johnson Extended Project will be trained in cultural heritage awareness during the site induction process.	✓	✓
A cultural heritage inspection will be undertaken prior to any clearing.	✓	✓
Procedures will be implemented should discovery of non-indigenous heritage items occur during project implementation including: Ceasing work and establishing a temporary buffer Notification to site and project management Assessing significance of the site using criteria established under the Queensland Heritage Act 1992, to determine the appropriate protection measures for identified sites Liaison with regulatory authorities to implement appropriate management.	✓	✓

3.9.6 Proposed EA Conditions

3.9.6.1. Johnson Extended Project Exploration Activities

All exploration activities shall be carried out in compliance with the standard conditions of the *Code of environmental compliance for exploration and mineral development projects, DEHP, Version 1* (or later version).

3.9.6.2. Johnson Extended Project Underground Mining Activities

It is not proposed to apply any EA conditions specific to cultural heritage.

3.9.6.3. Coppabella Coal Mine Activities

It is not proposed to apply any EA conditions specific to cultural heritage.

3.10 Social Environment

3.10.1 Description Of Surrounding Environment

The surrounding social environment of the Johnson Extended Project is effectively as per that of the adjacent Coppabella Coal Mine which has been in operation since 1998. Since that time the operations of the mine have had limited impacts on the local townships of Nebo, Coppabella and Moranbah and have had a substantial positive impact on regional and state economies.

The Lawrence Consulting (Lawrence (2012)) report for the Queensland Resources Council (QRC) based on expenditure data provided by QRC full-member companies, indicates that the resource sector contributed an estimated $36 billion in direct spending to the Queensland economy in 2011 / 2012, with the coal industry directly contributing 52.7% of that spending (approximately $19 billion). The coal industry spend was comprised of $3.0 billion in wages and salaries and $16.0 billion in voluntary community contributions and purchases of goods and services. Lawrence (2012) reported that the total economic impact (direct and indirect) from the resources sector to the Queensland economy in 2011/12 amounted to:

- $81.2 billion in output/turnover
- $73.1 billion in value added (contribution to gross state product)
- $30.5 billion in income (wages and salaries)
- 480,013 full-time equivalent jobs

This means that the resources sector contributed 25.8% of Gross State Product ($283.6 billion) and 20.5% of total employment (2,338,160 persons) in Queensland in 2011/12.
Lawrence (2012) reported the resource sector's direct expenditure and employment for the Mackay region (amalgam of Mackay and Isaac regional council areas) in 2011/2012, which is dominated by coal sector, was $6.422 billion and 14,076 jobs respectively, with resource sector-induced value added and employment being $13.230 billion and 78,464 jobs respectively.

Rolfe, Lockie, and Franettovich (2003) prepared the report *Economic and Social Impacts of the Coppabella Mine on the Nebo Shire* for the then owner of the mine, Australian Premium Coals. The report indicated that whilst operations of the mine had contributed to the transformation of Nebo from an agricultural and administrative centre towards a more mining focus, the development and operations of the mine had not appeared to have caused major adverse economic or social impacts.

The *Coppabella Environmental Management Plan* (29 March 2011) indicated that based on annual production of 5.3M tonnes of product coal at the Coppabella Coal Mine, the Gross State Product was increased by approximately $150M per year. The approximate annual expenditure on employment at the time of development the *Coppabella Environmental Management Plan* was $25M based on 250 full-time equivalent jobs at the mine, which resulted in an employment flow on effect of 360 full time equivalent jobs per year created in the region. The benefit attributable to increased employment flowed directly into the regional economy. Furthermore the plan provided an estimate of annual income to the state during the operational phase as being approximately $50M comprising coal royalties, rail freight and taxes and other expenses.

Issues of concern previously raised by local community members during previous consultation in consideration of the Coppabella Coal Mine have included the effects on the

communities and their ability to cope with the requirements of the additional workforce. Specific areas included infrastructure such as housing and industrial areas, schools and service providers.

3.10.2 Environmental Values

Values of the social environment relevant to the project area and potential impacts are amenity and access to social, community services and infrastructure in the region surrounding the project, including economic conditions and benefits.

3.10.3 Assessment Of Potential Impacts On Environmental Values

3.10.3.1. Activities And Associated Potential Impacts

The Johnson Extended Project has the potential to impact on social environment including through:

- Requirements associated with the need to assimilate workforce required for the Project including housing pressure
- Strain on community services in the local area, such as health and education
- Strain on community infrastructure such as roads and utilities
- Impacts to amenity through emissions such as dust, noise and visual amenity through landform change

3.10.3.2. Impact Assessment

Table 3-32 presents the outcomes of the risk assessment of potential impacts from execution of the Johnson Extended Project on social environment values.

Impacts to amenity through emission such as dust, noise and visual amenity through landform change, are addressed through section 3.3, 3.6 and 3.4 respectively.

Considering that the Johnson Extended Project will likely be developed as a life extension of future underground mining activities and following the cessation of large scale production from Coppabella Coal Mine open cut activities, the impact to social values is assessed as being of low magnitude. Levels of employment associated with the Johnson Extended Project and underground mining activities generally, will likely be lower than current levels of employment at the Coppabella Mine, and will not be in addition to current employment.

As such, associated impacts such as housing pressures and strain on services and infrastructure are likely to be lesser than the levels currently experienced.

Exploration activities for the Johnson Extended Project will be undertaken in conjunction with open cut mining activities at the Coppabella Coal Mine; however resourcing requirements for the exploration phase are negligible in comparison to operations for open cut or underground mining, and as such exploration phase impacts to social environment values are expected to be negligible.

Table 3-32 Risk Assessment Of Potential Impacts From The Johnson Extended Project On Social Environment Values

Aspect	Environmental Value	Potential impacting event	Standard controls	Risk ranking			Further controls (if required)	Residual risk ranking		
				C	L	R		C	L	R
Social environment	Amenity and access to services and infrastructure	Negative impact to amenity or access to services due to the activities and requirements associated with Johnson Extended Project activities	In addition to the actions previously identified to address amenity: • Ongoing engagement with surrounding landholders • Processes implemented for public, stakeholder and regulatory consultation and notification in relation to complaints • Ongoing engagement with local infrastructure and service providers • Utilise local suppliers wherever practicable	1	D	Low		1	D	Low

3.10.4 Objectives

The objectives with regard to social environment are:

- Minimising the exposure of the general public to risks of any adverse effects arising from the project
- Maintaining access to services and infrastructure by the local community
- Reducing the number of complaints by members of the local community towards zero
- Indirectly improving the delivery of services and infrastructure to the local community by contributing to the local economy
- Contributing to and enhancing where practical the social and community amenity and self-awareness.

3.10.5 Control Strategies

3.10.5.1. Johnson Extended Project Exploration And Mining Activities

Key control strategies in relation to the management of the potential impacts of exploration and mining on social environment values (in addition to strategies previously described to manage amenity impacts) are described in **Table 3-33** below.

Table 3-33 Control Strategies: Social Environment

Control Strategies	Explor.	Mining
Ongoing engagement with surrounding landholders;	✓	✓
Processes implemented for public, stakeholder and regulatory consultation and notification in relation to complaints.	✓	✓
Ongoing engagement with local infrastructure and service providers	✓	✓
Utilise local suppliers wherever practicable.	✓	✓

3.10.5.2. Coppabella Coal Mine Activities

Control strategies for the Coppabella Coal Mine activities are consistent with those described above and are contained in the *Coppabella Environmental Management Plan*, 29 March 2011 or later revision.

3.10.6 Proposed EA Conditions

3.10.6.1. Johnson Extended Project Exploration Activities

No EA conditions relating to the social environment are proposed.

3.10.6.2. Johnson Extended Project Underground Mining Activities

No EA conditions relating to the social environment are proposed.

3.10.6.3. Coppabella Coal Mine Activities

No EA conditions relating to the social environment are proposed.

4. Overarching Strategies

4.1 Framework

4.1.1 Training

The holder will develop an environmental induction package and assessment. All staff and contractors will receive an environmental induction upon commencement of employment at the Johnson Extended Project. The Environmental Induction Package will include the below elements:

- Legislative framework including relevance to the Johnson Extended Project and employees
- Cultural heritage requirements
- Water management requirements
- Waste management practices
- Land management requirements
- Rehabilitation strategies
- Air quality
- Noise
- Social responsibilities.

The induction package will include an assessment component to verify understanding of the environmental management requirements and practices.

In addition to the Environmental Induction, refresher packages as required and general environmental awareness topics will be developed for presentation to workgroups within regular "toolbox" meetings.

Training records and relevant authorisation registers will be maintained.

4.1.2 Non-conformity, Investigation And Preventive Action

Non-conformances will be identified through a variety of processes including audits, inspections, complaints and incidents or emergencies.

All non-conformances will be recorded, assessed for significance, investigated based on significance, corrective actions established and tracked through to completion. Non-conformances include incidents and/or injury and may also include near misses, procedure breaches, deficiencies or other items. It is the significance or the potential risk of the non-compliance that drive the processes.

4.2 Emergency Preparedness

An Emergency Response plan will be developed for the Johnson Extended Project and will detail emergency response actions and responsibilities. This plan will document the responsibilities of key personnel in the event of an emergency and the contact details for appropriate emergency services.

During the conduct of the catastrophic risk reviews, identification of all potential emergency situations that could result in significant environmental impacts will be undertaken. A list of potential high risk catastrophic environmental incidents will be maintained in the site risk register. Emergency responses to these potential situations will be incorporated into subsequent reviews and updates of all emergency procedures. An appropriate level of

preparedness will be maintained relative to the level of risk for each identified potential emergency situation.

All personnel will receive an appropriate level of emergency preparedness and response training. The site will maintain a dedicated emergency response team who will undergo regular training and operational drills involving identified high risk activities. Relevant managers will consider emergency preparedness drills for such events.

Any changes to emergency procedures will be documented and communicated to all personnel.

4.3 Communications

Communications include both internal and external parties. Procedures will be developed to ensure that matters relating to the implementation of the EMP are communicated to all personnel. Differentiation of complaints relevant specifically to Johnson Extended rather than Coppabella Mine operations will be discussed with the CMJV to ensure that the appropriate site deals with the complaint as relevant. In particular, communication of complaints and environmental incidents/emergencies will be handled in the following manner.

4.3.1 Complaint Handling

The holder will investigate and resolve all complaints received at the site through development and adoption of a Complaint Management System for the Johnson Extended Project, including complaint logging and handling procedures.

Complaints will be logged as follows:

- Name, address and contact number for complainant
- Time and date of complaint
- Reasons for the complaint as stated by the complainant
- Discussions / confirmation of responsibility with CMJV
- Investigations undertaken in response to the complaint
- Conclusions formed
- Actions taken to resolve complaint
- Any abatement measures implemented to mitigate the cause of the complaint
- Name and contact details of the person responsible for resolving the complaint.

4.3.2 Environmental Incidents And Emergencies

Environmental incidents and emergencies will be reported to the appropriate regulatory agency, as required. In the event of an incident, an environmental incident report form will be completed. The report will record the following, as a minimum:

- The name and telephone number of the designated contact person
- The location of the emergency or incident
- The date and time of the release
- The time the authority holder became aware of the emergency or incident
- The estimated quantity and type of any substances involved in the incident
- The actual or potential suspected cause of the release
- A description of the effects of the incident including any environmental harm that has occurred or may occur as a result of the release

- Any sampling conducted or proposed, relevant to the emergency or incident
- Actions taken to prevent any further release and mitigate any environmental harm caused by the release

An environmental incident register will be maintained in accordance with record control procedures.

An investigation will be conducted into each environmental incident, which shall include reporting requirements and recommendations for corrective or preventative action. A review of the effectiveness of the corrective or preventative action will be undertaken within one month of the occurrence of the incident and the relevant procedures are to be updated as required.

4.4 Measuring, Monitoring And Reporting

4.4.1 Monitoring

Monitoring will occur during all stages of the Project to ensure that control strategies are being effectively implemented and that objectives are being met within each component of the EM Plan. Monitoring will be conducted by suitably qualified personnel in accordance with required sampling methodologies.

Specific monitoring requirements for the different components are detailed within each section of the management plan.

Monitoring is undertaken using standard monitoring techniques and calibrated equipment operated by trained personnel. Calibration will be undertaken in accordance with the equipment manufacturer's recommendations. Calibration records are kept of the monitoring equipment used.

Analysis of samples is to be undertaken in accordance with the environmental authority. Monitoring results are compared against environmental authority conditions, and any non-conformance recorded against the monitoring result and reported as necessary. In the event of a non-conformance, investigation of the cause of the non-conformance will be undertaken and corrective and/or preventative action recommended. The effectiveness of the corrective and/or preventative action will be assessed by analysis of the next available monitoring results.

Results from all monitoring undertaken as part of this EMP will be maintained and be available within the timeframes required under environmental licensing requirements for the Project.

4.4.2 Auditing

Auditing of the environmental compliance of the Johnson Extended Project will consist of an annual environmental audit undertaken by an independent third party.

The audits will consider compliance with environmental authority conditions, implementation of control strategies and attainment of objectives as described in this EM Plan. The results will be communicated to senior management and as necessary in accordance with conditions of environmental authority. External audits will be conducted by a suitably qualified, experienced and independent person.

This program of external audits will be supported by interim internal audits. The internal audits will be undertaken to assess whether the EM Plan has been properly implemented and maintained and that objectives have been met. The results are communicated to senior management. These will be conducted by Johnson Extended staff during the period between formal annual external audits on a regular basis. Internal auditors will be selected on the basis of their understanding of environmental management principles and mining operations.

Action plans will be developed based on the audit findings (as necessary) in order to facilitate the continuous improvement process.

4.4.3 Review

The elements of this EM Plan will be regularly reviewed and revised to reflect changes to the Johnson Extended Project and new developments. Reviews, at varying levels of detail, as appropriate, will include assessing opportunities for improvement and the need for changes to the plan and will be conducted at the following frequencies:

- No longer than at annual intervals, or at increased frequency as required to address;
- When feedback is received from regulatory agencies
- When conditions arising from the project environmental authority are issued
- When/if changes to or new operating methods are proposed.

During the review of the elements of this EM Plan the following items will be considered:

- Summary of complaints/incidents and response actions
- Summary of results of monitoring and auditing conducted under the plan
- Assessment of opportunities for improvement of environmental performance
- Suggested amendments required to the plan.

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ABBREVIATIONS

Code	Department
4WD	Four Wheel Drive
ACHA	*Aboriginal Cultural Heritage Act 2003*
AS	Australian Standard
CHMP	Cultural Heritage Management Plan
CHPP	Coal Handling and Preparation Plant
CMJV	Coppabella and Moorvale Joint Venture
CH4	Methane gas
CO	Carbon Monoxide
CO2	Carbon Dioxide
DBCT	Dalrymple Bay Coal Terminal
DEHP	Department of Environment and Heritage
DERM	Department of Environment and Resource Management (Former Queensland Government Department)
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (Former Commonwealth Government Department)
EA	Environmental Authority
EM Plan	Environmental Management Plan
EP Act	*Environment Protection Act 1994*
EPC	Exploration Permit for Coal
EPP (Air)	*Environmental Protection (Air) Policy 2008*
EPP (Noise)	*Environmental Protection (Noise) Policy 2008*
EPP (Water)	*Environmental Protection (Water) Policy 2009*
EP Reg	*Environmental Protection Regulation 2008*
EP(WM) Reg	*Environmental Protection (Waste Management) Regulation 2000*
ERA	Environmentally Relevant Activity
ESA	Environmentally Sensitive Area
EV	Environmental Value
GED	General Environmental Duty
H Act	*Heritage Act 1992*
HERBRECS	Queensland Herbarium Records System
JORC	Joint Ore Reserves Committee
LPR	*Land Protection (Pest and Stock Route Management) Regulation 2003*
LTCC	Longwall Top Coal Caving
MB	Monitoring Bore
ML	Mining Lease
MLA	Mining Lease Application
Mtpa	Million tonnes per annum
NATA	National Association of Testing Authorities
NCR	*Nature Conservation (Wildlife) Regulation 2006*
NO2	Nitrogen Dioxide
NT Act	*Native Title (Queensland) Act 1993*
PAWC	Plant Available Water Capacity

Code	Department
PCI	Pulverized Coal Injection
PM	Particulate Matter
QRC	Queensland Resources Council
RE	Regional Ecosystem
REMP	Receiving Environment Management Program
ROM	Run-of-Mine
SO2	Sulfur Dioxide
TDS	Total Dissolved Solids
VMA	*Vegetation Management Act 1999*
VOC	Volatile Organic Compounds
WONS	Weeds of National Significance
WRR Act	*Waste Reduction and Recycling Act 2011*
WRR Reg	*Waste Reduction and Recycling Regulation 2011*