



**QNI Resources Pty Ltd**  
**Brolga Project - Stage 2**  
**Environmental Management Plan**

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**March 2013**

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## **1. Introduction**

Current mining activity at the Brolga Project comprises a small scale single pit operation and associated infrastructure for mining approximately 30,000 tonnes per month of nickel ore from mining lease ML5866. The current mining activities are authorised under Environmental Authority M2728 (Level 2 Mining Project) and are undertaken in accordance with the approved Plan of Operations for the activity.

The current mining activities at the Brolga Project are an integral part of the proposed staged development of ML5866 and other mining leases in the Marlborough region to establish a domestic nickel ore supply to supplement existing nickel ore imports.

Following recent process trials of Brolga ore at the Palmer Nickel and Cobalt Refinery in Townsville, QNI Resources Pty Ltd now wish to progress with Stage 2 development of mining operations at the Brolga Project. In order to proceed with the proposed Stage 2 development, a new Environmental Authority (Level 1 Mining Project) is required to reflect the proposal to increase the scale of mining operations.

### **1.1 Purpose of the Environmental Management Plan**

This Environmental Management Plan (EM Plan) has been prepared in support of QNI Resources Pty Ltd application for an Environmental Authority to undertake Level 1 Mining activities as part of the Stage 2 development of the Brolga Project.

The EM Plan has been prepared in accordance with the Department of Environmental and Heritage Protection (DEHP) guideline *Preparing an environmental management plan (exploration permit or mineral development licence) for a level 1 mining project* and will form the basis by which QNI Resources Pty Ltd ensures its activities are managed in accordance with the requirements of the Environmental Authority to control identified environmental impacts.

### **1.2 Structure of the Environmental Management Plan**

The structure of this EM Plan reflects the requirements of Section 203 of the *Environmental Protection Act 1994* (EP Act), and is summarised in Table 1.



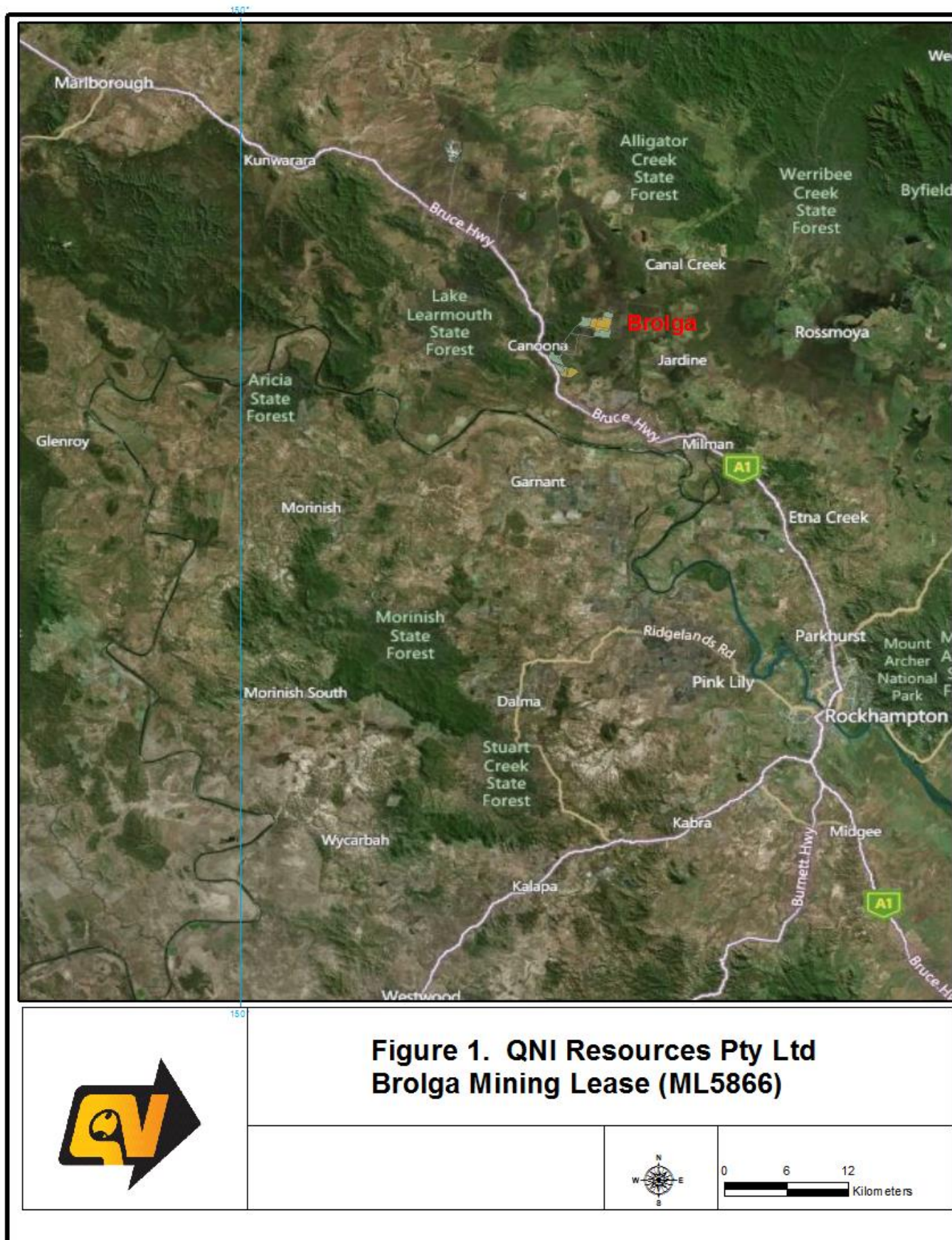


Figure 1. Project Location





**Table 1. Structure of the EM Plan**

Section 1 – Introduction	<ul style="list-style-type: none"><li>• the mining leases</li><li>• the land on which the mining activities are to be carried out</li><li>• identifies relevant stakeholders</li></ul>
Section 2 – Project Description	<ul style="list-style-type: none"><li>• describes all relevant mining activities</li></ul>
Section 3 – Environmental Values, Potential Impacts, Objectives, Commitments and Proposed Environmental Conditions	<ul style="list-style-type: none"><li>• identifies the environmental values likely to be affected by the mining activities,</li><li>• identifies the potential adverse and beneficial impacts of the mining activities on the environmental values</li><li>• details the environmental protection commitments to protect or enhance the identified environmental values;</li><li>• outlines the environmental protection objectives, standards and measurable indicators</li></ul>
Section 4 – Environmental Management	<ul style="list-style-type: none"><li>• describes the adopted measures for reporting and management</li><li>• outlines the research and development commitments</li><li>• details the environmental monitoring and reporting programs</li><li>• strategies for continuous improvement, staff training and environmental auditing</li></ul>

### 1.3 Overview of the Project

The Brolga Project is a historic nickel ore mine situated approximately 55 kilometres north of Rockhampton, Queensland (Figure 1). The total area of the lease (ML5866) encompasses 203 hectares of undulating land positioned across Lots 174, 176 and 177 on Plan LN473 (Figure 2). The area was mined by a previous operator between 1993 and 1995 during which time approximately 600,000 tonnes of nickel ore was produced. Active mining at the site ceased in 1995 and following closure of the mine, the site has been under the process of landform and vegetative rehabilitation to return it to its former land use as a grazing property.

In late 2012 QNI Resources Pty Ltd established a small scale single pit mining operation and associated infrastructure at the Brolga site to extract approximately 30,000 tonnes per month of nickel ore. Currently the ore is hauled by B-double trucks to the nearby Glen Geddes rail siding and stockpiled prior to loading into rail wagons for railing to the Palmer Nickel and Cobalt Refinery in Townsville.

Following recent process trials of Brolga ore at the Palmer Nickel and Cobalt Refinery, QNI Resources Pty Ltd now wish to progress with Stage 2 development of mining operations at the Brolga Project. The Brolga Project – Stage 2 development involves a significant expansion of mining activity at the site to increase nickel ore production to a (maximum) of 900,000 tonnes per annum (TPA). At the



rail siding the ore will be stockpiled and loaded into rail wagons and transported by rail for processing at the Palmer Nickel and Cobalt Refinery.

## **1.4 Project Location**

The Brolga Project – Stage 2 is located near Glen Geddes, approximately 55 km north of Rockhampton on the Bruce Highway. The small township of Yaamba is located approximately 13 km south east of the project. The Glen Geddes rail siding is located approximately 5 km to the west of the Brolga mine site adjacent to the North Coast rail line and is accessed via the existing Nickel Road and Raspberry Creek Road (Figure 2).

## **1.5 Project Name**

The project is referred to as the Brolga Project – Stage 2. Historically, the Brolga and Canoona mining projects were combined under a single Environmental Authority (M2728) and referred to as the *Brolga and Canoona Project*. As the current proposal is to progress Stage 2 development of the Brolga site only, the project is now referred to as the Brolga Project – Stage 2.

It is important to note that the current proposal does not include any mining activities at the Canoona Site (ML 5864 and ML7048).

## **1.6 Project Proponent**

The Brolga Project – Stage 2 will be developed and operated by QNI Resources Pty Ltd (QNI) for the subsidiary company Queensland Nickel Pty Ltd, owner/operator of the Palmer Nickel and Cobalt Refinery, Townsville.

Contact details for QNI Resources Pty Ltd are:

QNI Resources Pty Ltd  
Level 8 Waterfront Place  
1 Eagle Street  
BRISBANE QLD 4000



**Figure 2. QNI Resources Pty Ltd  
Brolga Mining Lease (ML5866) and Haul Route**

● Residential premises



0 0.6 1.2  
Kilometers

**Figure 2. Brolga mining lease and haul route.**



## 1.7 Real Property Descriptions

The real property descriptions of the land within the Brolga Project – Stage 2 footprint are shown in Table 2.

**Table 2. Real property descriptions for project activities.**

Project activity	Real property Descriptions
Mining activities within ML 5866	<ul style="list-style-type: none"><li>• Lot 174 Plan LN473</li><li>• Lot 176 Plan LN473</li><li>• Lot 177 Plan LN473</li></ul>
Haul Road	<ul style="list-style-type: none"><li>• Existing Nickel Road Reserve</li><li>• Existing Raspberry Creek Road Reserve</li></ul>
Rail siding	<ul style="list-style-type: none"><li>• Lot 193 Plan SP108275 (part of)</li></ul>

## 1.8 Land Use and Tenures

### 1.8.1 Mining Operations

Mining operations for the Brolga Project – Stage 2 are within the bounds of mining lease ML5866 which sits over the land parcels identified in Table 2 and shown on Figure 2. All three land parcels are freehold title and owned by QNI Resources Pty Ltd. The proposed mining operations and associated infrastructure will result in land disturbance within all three lots.

Land use adjacent to the Brolga Project is dominated by low intensity grazing activities. The Bruce Highway and North Coast Rail line are located approximately 5 km to the west of the Project site.

### 1.8.2 Haul Route

The haul route has been selected to utilise the existing Nickel Road and Raspberry Creek Road (Figure 2). Nickel Road comprises an unsealed road servicing three rural residences in addition to the Brolga site. Two of the residences are located on the section of Nickel Road between the mining lease and the rail siding that will be utilised as the haul route (approximately 4.7 kilometres), while the third residence is located further along Nickel Road from the mine.

A short section (approximately 600 meters) of Raspberry Creek Road is included in the haul route, connecting Nickel Road to the Bruce Highway. There are two rural residences located adjacent on this section of Raspberry Creek Road.

The haul route crosses the Bruce Highway at the Raspberry Creek Road intersection to access the existing Glen Geddes Rail Siding situated immediately to the west of the highway.

### 1.8.3 Rail Siding

The Glen Geddes Rail Siding is located on Queensland Rail land (part of Lot 193 on SP108275) adjacent to the North Coast Rail line. The siding comprises a haul road circuit to discharge loads and



a stockpile area. A single loader operates at the rail siding to build the stockpile as the ore is delivered, and to load trains as required.

## **1.9 Brolga Project Identified Stakeholders**

The Brolga Project has a range of stakeholders both internal and external to the operation.

Identified external stakeholders include:

- Department of Environment and Heritage Protection (DEHP)
- Department of Transport and Main Roads (DTMR)
- Queensland Rail (QR)
- Department of Natural Resources and Mines (DNRM)
- Ergon Energy
- Rockhampton Regional Council
- Robert Thomasson (property owner to north and east of Brolga mine site)
- Trevor Dunne (property owner on Nickel Road adjacent to haul route)
- Cameron and Cherly Hirsch (property owner on Nickel Road adjacent to haul route)
- Frank and Marjorie Brewitt (property owner on Nickel Road adjacent to haul route)
- Delwyn and Percy Leis (property owner on Raspberry Creek Road adjacent to haul route)
- David and Lee-Anne Leis (property owner on Raspberry Creek Road adjacent to haul route)





## **2. Description of the Project**

The Brolga Project - Stage 2 Development is an open cut nickel mine owned and operated by QNI Resources Pty Ltd on mining lease ML5866. The project is designed to produce up to 900,000 tonnes per annum of nickel ore and includes hauling of the extracted ore to the existing Glen Geddes rail siding for rail transport to the Palmer Nickel and Cobalt Refinery in Townsville.

At the planned production rate of 900,000 TPA, the Brolga Project - Stage 2 Development will require the mining, crushing and screening operations to operate 24 hours per day, five days per week. Hauling of ore from the mining lease to the rail siding is expected to be restricted to daylight hours (nominally 6am to 6pm) seven days per week. The timing for loading of trains will be dependent on Queensland Rail scheduling.

At the planned production rate of 900,000 TPA, mining activities at the Brolga Project site are expected to continue for approximately 3 years.

### **2.1 Description of the Mine**

The Brolga mine is a progressive single pit operation mining a discrete nickel enrichment to a depth of approximately 20 meters below natural ground surface. The nickel ore generally occurs in lenses that are selectively mined from the surrounding overburden material. The extracted nickel ore is crushed and screened on site (<75mm) and stockpiled in preparation for hauling to the rail siding.

Blasting of overburden or the nickel ore is not required at Brolga. Deep ripping of overburden using dozers is sufficient to allow the removal of the overburden with excavators and trucks. Depending on the mining sequence, the overburden is either hauled to a dedicated out of pit dump or dumped in pit as part of the mining operation.

### **2.2 Mining Sequence**

The mining sequence will generally involve the following steps:

- The next mining strip is marked out and vegetation is cleared using dozers. Vegetation is pushed into piles and selectively used to provide habitat in newly rehabilitation areas.
- Topsoil, which varies greatly in depth across the site, is stripped using scrapers or bulldozers. Where possible, the topsoil is directly spread onto areas of reshaped spoil for rehabilitation.
- When direct spreading is not achievable, topsoil is placed in stockpiles at strategic locations for later use in the rehabilitation process.
- Overburden is ripped using dozers and removed using a combination of dozers, excavators and trucks.
- The overburden material is transported to dedicated in-pit and out-of-pit spoil dumps.
- The exposed nickel ore is then ripped by dozers and mined by excavator into haul trucks.
- The mined ore is screened (<75mm) and stockpiled in preparation for hauling to the rail siding.

Figure 3 and Figure 4 shows the planned mining schedule for ML5866.

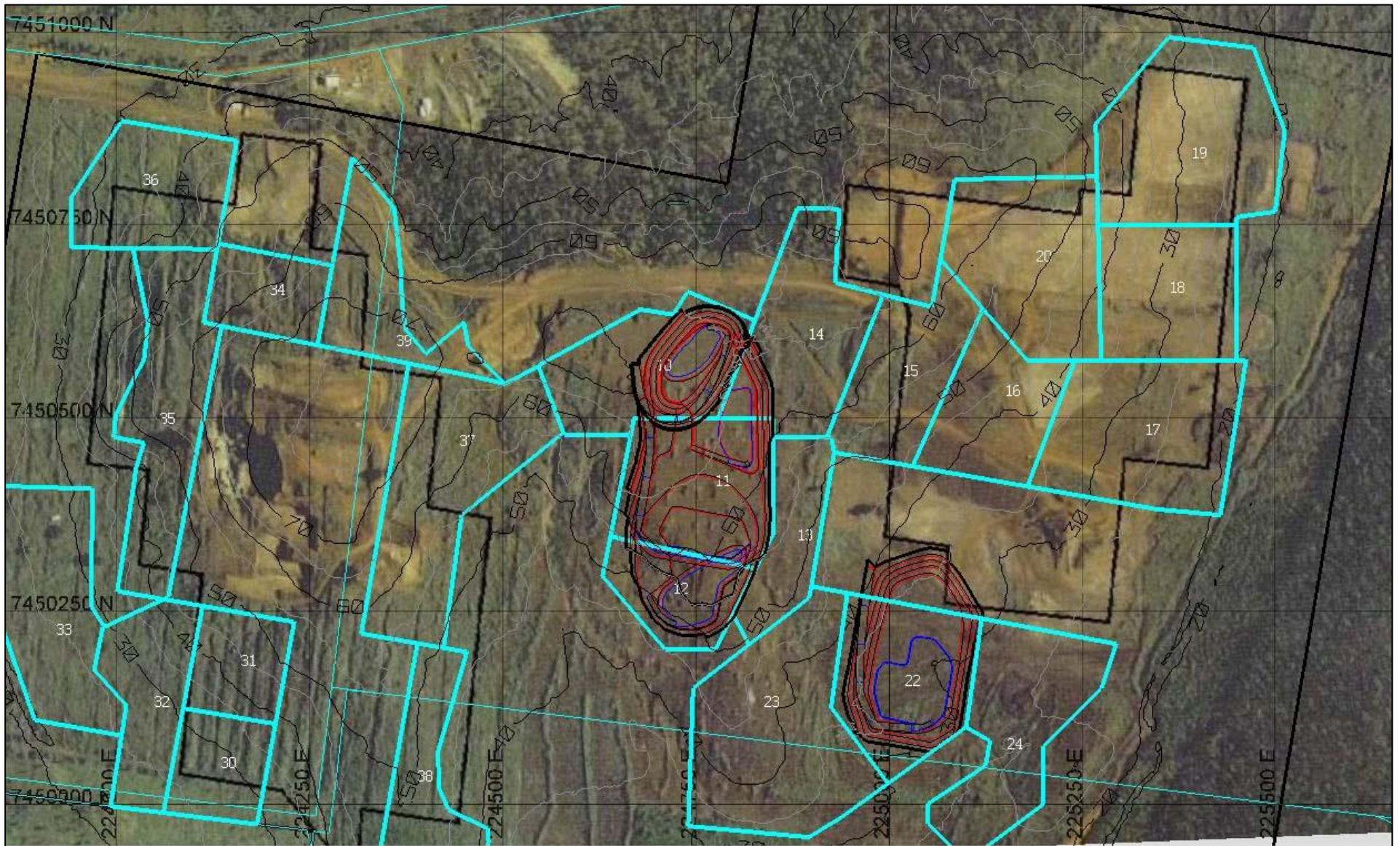


Figure 3. Proposed mining sequence for Brolga Project – Stage 2 Development.



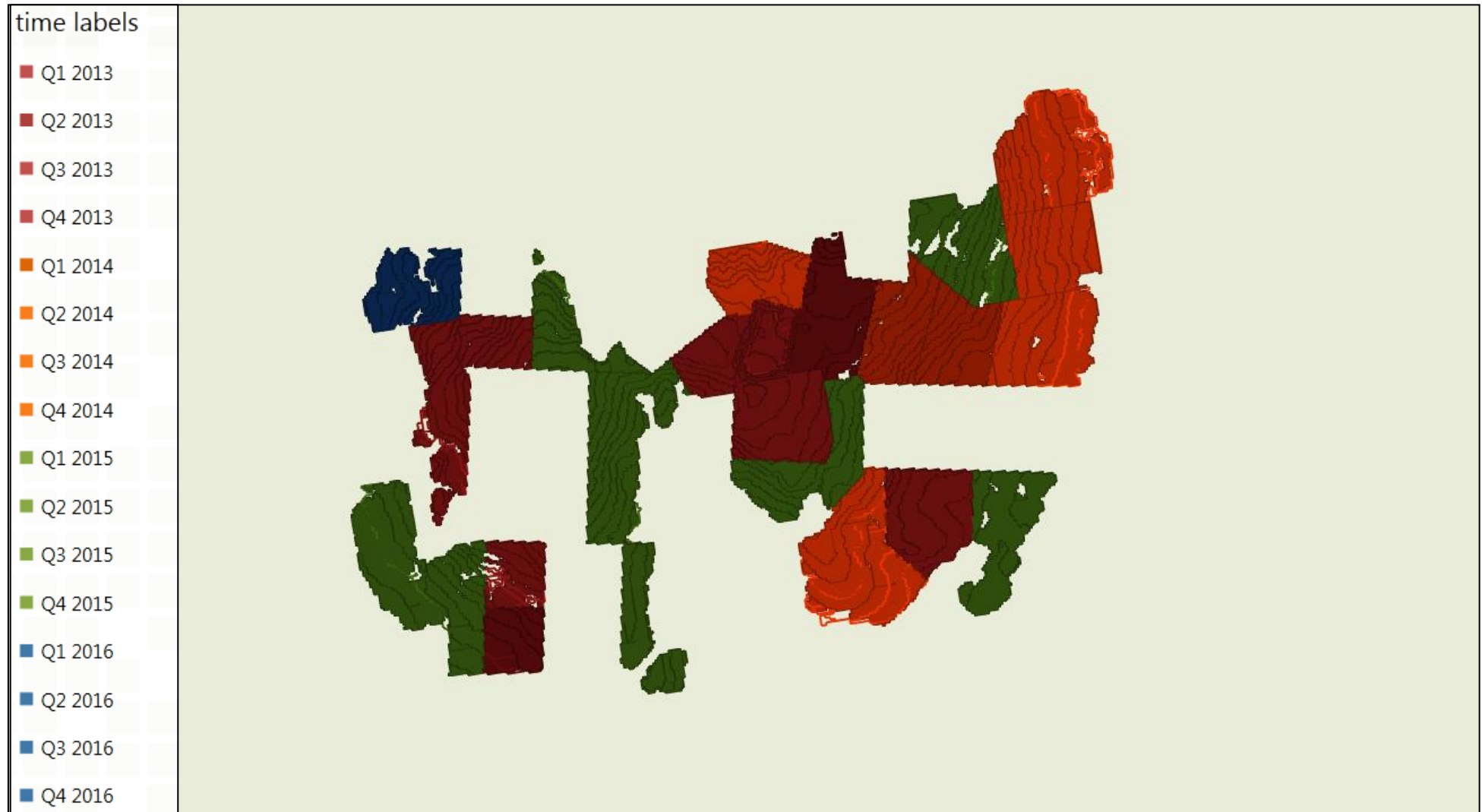


Figure 4. Timing for the mining sequence for Brolga Project – Stage 2 Development.



## **2.3 Mine Infrastructure and Facilities**

Given the short mine life of the Brolga Project, and its relatively close proximity to Rockhampton, it is not planned to install any additional temporary or permanent infrastructure at the mining lease or rail siding. The existing site office and crib room facilities (including the existing septic system) at the mine site will continue to be utilised to service the expanded mining proposal.

Mining and ore handling equipment will be routinely refuelled directly from a bulk fuel tanker dispatched from Rockhampton. Similarly, all required maintenance and repairs to light vehicles, haul trucks and mining equipment will be completed in the field by mobile mechanic operators, or the vehicle / machine transported to an off-site workshop if required. As such, bulk fuel storages and workshop facilities will not be required as part of the project. Minor storages of packaged hazardous materials (for example, a small quantity of fuels, greases, oils and coolants) will be stored at the site in accordance with AS1940 requirements.

## **2.4 Water Supply and Storage**

The water requirements for the current mining operations are provided by two groundwater bores located on Lot 176 Plan N473. Extracted groundwater is pumped to an existing farm dam (Dam 1) from where it is drawn, as required, for various mining activities such as dust suppression. The production rate for the most recently installed bore was measured at approximately 7 – 8 litres per second at the time of construction.

Water requirements for the expanded operation will be met through the installation of two additional groundwater bores also within Lot 176. Water demand for the expanded operation is anticipated to be approximately one ML per day, primarily for dust suppression.

Potable water for the office and crib room facilities will continue to be purchased from an external supplier and delivered to the mine site as required.

There are three dams in addition to Dam 1 located at the Brolga mine site. It is understood that the dams functioned as sediment control structures in association with stormwater diversion drains / banks during previous mining operations at the Brolga site. It is intended that the three dams would again be utilised as part of the erosion and sediment control plan for the site to minimise sediment export from the mining operation.

## **2.5 Rehabilitation and Decommissioning**

Rehabilitation of mining pits, overburden dumps and other disturbed areas will be undertaken using various heavy earthmoving equipment including dozers, excavators, trucks and graders. The focus of rehabilitation management for the Brolga Project is the creation of a self-sustaining land form, consistent with the surrounding landscape, that requires minimal on-going maintenance. This will be achieved through the management of stormwater flows to minimise soil erosion, rehabilitation of exposed spoil areas and control of declared weeds.

Disturbance caused by mining will be rehabilitated progressively during the mining process. Final rehabilitation land-use post mining operations will be a return to grazing land use.



### **2.5.1 Rehabilitated Land**

The removal of overburden will result in out-of-pit spoil dumps, which will be reshaped, recovered with previously stockpiled topsoil and rehabilitated. The resulting raised landform will not be out of place with the surrounding landscape of the area. After mining, pits and ramps that are not backfilled will be left as final voids and made safe.

The main features of the progressive rehabilitation process for disturbed land include the following:

- construction of a stable final landform with minimal ponding of water within spoil dump areas;
- progressive construction of the final landform design as part of normal mining operations, such that minimal reshaping is required at the end of mining;
- use of suitable topsoil, which will either be stockpiled until suitable rehabilitation areas are available, or re-spread immediately across available rehabilitation areas;
- deep ripping (as an erosion control measure and to facilitate seed propagation), seeding and (if required) fertiliser application preferably prior to the commencement of the wet season to maximise the benefits of subsequent rainfall;
- treatment of declared weed species, when necessary; and
- minimisation of the final void area to reduce the potential for collection of water from direct rainfall and runoff from the rehabilitated landform.

Local plant species will be sourced where possible and included in the seed mix so as to restore elements of the pre-mining communities to the rehabilitated assemblages.

### **2.5.2 Dams**

The four small dams associated with the mine site will be retained as part of the post mining land use of low intensity grazing. During the early stages of rehabilitation the dams will continue to assist in sediment control from the site.

### **2.5.3 Mine Site Infrastructure**

The site office and crib hut facilities at the Brolga mine site will be removed at the completion of mining.

### **2.5.4 Roads**

At the completion of mining, internal access roads within ML5866 will also be decommissioned and rehabilitated.

### **2.5.5 Rail Siding Infrastructure**

The rail siding facilities at Glen Geddes will be retained to service other QNI Resources nickel mining interests in the Marlborough area.



### **3. Environmental Values, Impacts, Commitments and Draft Conditions**

Section three of the EM Plan outlines the environmental protection commitments associated with the Brolga Project and has been prepared in accordance with the DEHP guideline *Preparing an environmental management plan (exploration permit or mineral development licence) for a level 1 mining project*.

The commitments have been developed to minimise potential environmental impacts on identified environmental values as a result of the project. The commitments are aligned with the following environmental aspects:

- Air Quality
- Water Resources
- Noise and Vibration
- Land Management
- Rehabilitation
- Flora and Fauna Management
- Waste Management
- Community
- Cultural Heritage Management

Commitments are expressed so as to be measurable and auditable. The environmental protection objectives include measurable indicators to determine compliance with the commitments. For each commitment, proposed environmental authority conditions have been developed.

#### **3.1 General Conditions**

In accordance with the DEHP Guideline, it is understood that the administering authority will include mandatory conditions on the environmental authority in relation to financial assurance, maintenance of plant and equipment, environmental monitoring and storage of flammable and combustible liquids.

#### **3.2 Air Quality**

##### **3.2.1 Background**

Dust is the primary potential air contaminant associated with the Brolga Project. A secondary potential air contaminant is GHG emissions resulting from the combustion of diesel fuel in mining and hauling equipment.

Local air quality in the vicinity of the mine is influenced by a range of sources in addition to the project, including dust of natural origins (particularly during dry periods), bushfires and hazard reduction burn-off, dust associated with rural land uses and dust from local traffic on unsealed roads.



A desktop study of historic wind data indicates prevailing winds are from the south-east in the morning trending east north east in the afternoons with an increasing influence from the north east during the October to December.

The nearest receptors to the mine site are rural residences located 2.5 kilometres north of the site and 3.5 kilometres to the south-west of the site. The nearest receptors to the rail siding site are rural residences approximately 1 kilometre to the south east and 1 kilometre to the north.

A dust monitoring program was implemented at the Brolga site in November 2012 as part of current small scale mining activity.

### **3.2.2 Environmental Value**

The environmental values to be enhanced or protected under this EM Plan are the qualities of the air environment that are conducive to suitability for the life, health and wellbeing of humans.

### **3.2.3 Potential Impacts on the Environmental Value**

The increase in mining and ore handling activities associated with the Brolga Stage 2 development has the potential to increase air emissions to the surrounding environment, particularly dust and particulate emissions.

#### ***Dust and particulate emissions***

The specific activities that have the potential to generate particulate emissions are:

- Vegetation clearing
- Topsoil removal and stockpiling
- Overburden loading, transport and stockpiling
- Wind erosion from active stockpiles and waste rock dumps
- Nickel ore extraction and loading
- Stacking and reclaiming from stockpiles at the mining lease
- Hauling of ore along unpaved roads
- Stacking and reclaiming from stockpiles at the rail siding
- Loading to train wagons
- Wheel generated dust from other vehicles on unpaved roads
- Road grading
- Vehicle exhausts

Dust emissions may vary according to the following factors;

- Topsoil, ore and overburden stockpile properties
- Prevailing meteorological conditions
- Mining activities occurring, such as vegetation clearing, topsoil stripping, overburden removal or ore extraction
- Location, condition (e.g. moisture content) and extent of stockpiles
- Length of time between clearing of land and establishment of ground cover / rehabilitation.



Air emissions from the Brolga Project – Stage 2 development are not expected to create any public nuisance or health concerns. There is, however, potential for there to be minor impacts on local visual amenity in times of low rainfall and higher wind speed where airborne particulate matter travels further.

Dust control initiatives are tailored to address these higher risk periods, with greater focus on watering of haul roads and the use of dust suppression controls on stockpiles and ore loading and transfer points.

### ***Greenhouse Gases***

The proposed increase in the scale of mining activities will have a resultant increase in greenhouse gas emissions from combustion of diesel fuel in mining and hauling equipment. However, the increase in GHG emissions is considered insignificant within the context of the Central Queensland regional air shed and when compared to other large scale mining operations in the region.

#### **3.2.4 Environmental Protection Objective**

The Brolga Project's environmental protection objectives for air quality are:

- To minimise the impacts of mine-derived dust and particulates on sensitive receivers beyond the project's boundaries; and
- Minimise GHG emissions to the extent possible.
- Report GHG emissions in accordance with statutory reporting requirements.

#### **3.2.5 Control Strategies**

##### ***Dust Control***

The following control strategies for the management of air quality impacts will be implemented:

- Haul roads and other unsealed roads will be watered, as appropriate;
- Planning in advance of ore stockpiles, topsoil stockpiles and overburden dump locations to minimise handling, drop heights and wind erosion, where practicable;
- Minimise the area of land disturbed at any one time to that necessary for the operation;
- Vehicles will travel in accordance with set speed limits;
- Ongoing maintenance of roads will be undertaken to ensure they are in good condition;
- Topsoil stockpiles will be vegetated, where appropriate;
- Disturbed land will be progressively rehabilitated as soon as practicable, particularly for out of pit dumps;
- Loaded rail wagons will be veneered with a dust suppressant to minimise dust emissions during rail transport;
- Implementation of a dust monitoring program to monitor dust deposition at the lease boundary and rail siding; and
- Appropriate awareness training for relevant personnel.



## **Greenhouse Gases**

Diesel consumption by mining equipment and hauling vehicles is a source of greenhouse gas emissions and represents a significant operational cost. As such the following control measure will be implemented to ensure diesel use is as efficient as possible:

- The location of ore stockpiles and overburden dumps will be optimised to minimise the haul distance for fully laden trucks; and
- Preventative maintenance schedule for trucks, including monitoring of tyre condition.

### **3.2.6 Monitoring**

The air quality management strategy for the project includes the use of dust monitoring to assist in determining the effectiveness of dust control strategies. A localised dust monitoring program (comprising three dust deposition jars) was implemented for the existing mining operations at the Brolga site in November 2012. This monitoring program will be extended for the Brolga Project - Stage 2 development to include additional dust deposition monitoring locations adjacent to the rail siding.

### **3.2.7 Proposed Environmental Authority Conditions**

The proposed EA conditions for managing the potential impacts to air quality are included below.

#### ***Dust Nuisance***

- (B1) 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*.
- (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; or

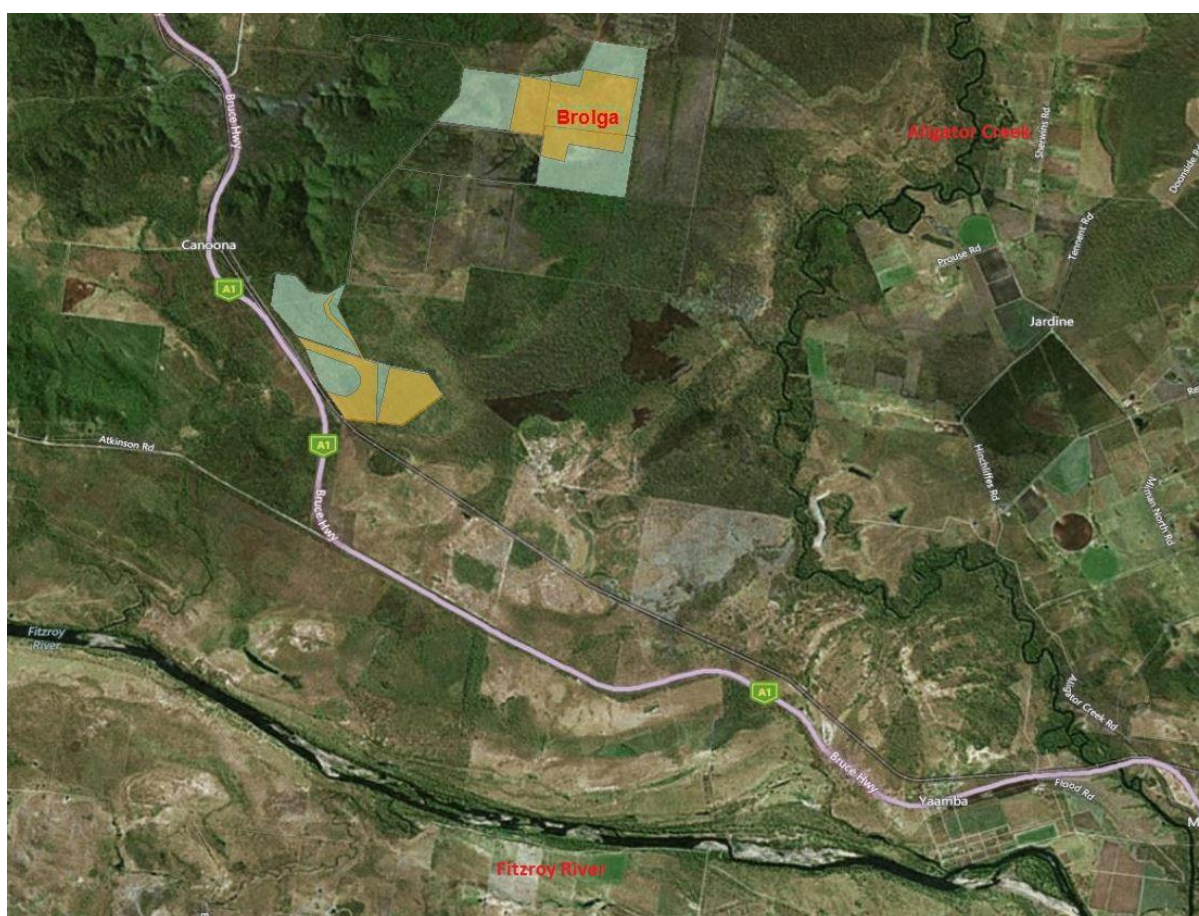


- b) immediately implement dust abatement measures so that emissions of dust from the activity do not result in further environmental nuisance.

### 3.3 Water Resources

#### 3.3.1 Background – Surface Water Resources

The Brolga Project is located entirely within the Fitzroy River Sub-basin (Queensland sub-basin 1300). To the west of the Brolga site, hillslopes form the western boundary of the Alligator Creek catchment, a major tributary of the Fitzroy River and located approximately three kilometres to the east of the site (Figure 5).



**Figure 5. Proximity of the Brolga site to Alligator Creek and the Fitzroy River.**

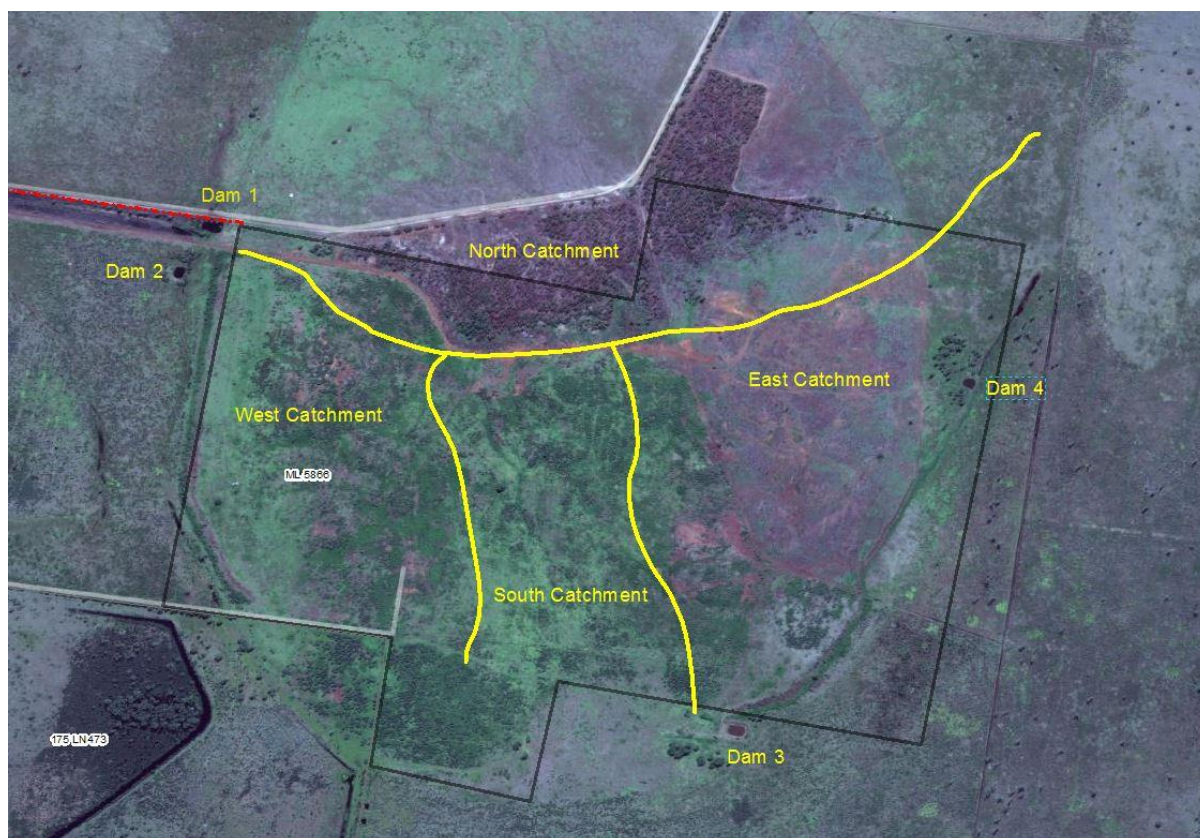
An assessment of waterways in the Brolga Project area was completed in January 2013 to assess the fluvial geomorphology and stream processes surrounding the site. The study identified three distinct landscape zones in the project area; hillslopes and transition zones to the west of the site, and plains surrounding the mining lease.

In summary, the study found that channelised drainage systems that form in the transition zone do not extend further downstream on the plains. Most of the stream energy that is generated in the hillslopes, which is then used to work the channels in the transition zone, has been lost further downstream towards the plains. This is due to limited additional runoff entering the system

downstream of the hillslopes and the flat terrain of the plains. As the streams lose energy the channels become less defined and runoff is dispersed across the plains.

### ***Brolga mining lease (ML5866)***

There are no ephemeral or permanent watercourses located within the Brolga Project site. The site topography directs surface water runoff into one of four catchments across the site as shown in Figure 6. Periods of flow are generally short and limited to periods during and immediately after rainfall events. Any flow within these watercourses is rare during the dry season.



**Figure 6. Brolga site stormwater catchments (approximate)**

The northern catchment drains off-lease to the north via a series of distinct drainage channels that flow through a relatively steep woodland area. The drainage channels discharge to the adjacent plains where the channels are less well defined and runoff is more dispersed across the flat terrain.

Similarly, to the west, runoff drains from the elevated area via distinct drainage channels to the west and north-west to the adjacent plains. A stormwater collection drain constructed along the western boundary of the mining lease intercepts runoff flowing across the plain and directs stormwater to a sediment control dam at the northern end of the collection drain.

The southern and eastern catchments both drain runoff from previously disturbed areas within the mining lease. The smaller southern catchment drains grassed hillslopes via distinct channels to the southern boundary of the lease. The topography to the south of the lease directs drainage from the southern catchment to an existing farm dam located in the south-east of the site. During period of high rainfall, the sediment dam overflows via a spillway to the adjacent grazing land.





Rainfall runoff from the eastern catchment drains via a number of distinct drainage channels to the east and south-east. A stormwater collection drain has been constructed near the eastern boundary of the lease and intercepts runoff from the eastern catchment. Stormwater runoff captured in the eastern stormwater drain flows to an existing sediment dam located in the north eastern corner of the site, or to the existing farm dam located in the south-eastern area of the site.

### ***Haul Route***

The haul route between the Brolga Project site and the Glen Geddes rail siding utilises the existing Nickel Road and Raspberry Creek Road. Adequate crossing of drainage lines intersected by these roads were installed at the time of construction.

### ***Rail Siding***

The Glen Geddes rail siding is located on generally flat terrain adjacent to the existing North Coast Rail line and is not intersected by any significant drainage channels. The potential for sediment to be exported in stormwater runoff from the rail siding is primarily managed by diversion of clean stormwater away from stockpile areas.

### **3.3.2 Surface Water Quality**

As there are no permanent watercourses within or adjacent to the Brolga Project site, previous water quality monitoring has been restricted to water quality samples collected from the existing farm dams located at the site. Water quality results for samples collected from the dams between July 2011 and February 2012 are shown in Table 3. Field results for water quality measurements taken on 3<sup>rd</sup> and 4<sup>th</sup> April 2013 are also included.

The Brolga Project site is located within the Fitzroy River sub-basin. Accordingly, the water quality data was compared with the water quality objectives for the Stock Watering Environmental Value as defined within the *Fitzroy River Sub-basin Environmental Values and Water Quality Objectives* (September 2011).


The comparison showed that the water quality results are below trigger values for all parameters with the exception of one total dissolved solids (TDS) result from Dam 1 for a sample taken in July 2011. All subsequent results have shown TDS levels for the dam to be less than trigger values.

### **3.3.3 Existing Surface Water Uses**

The land surrounding the Brolga Project site is dominated by low intensity grazing activities. There are no known industrial or domestic use of surface waters in the vicinity of the Brolga Project site. The primary industry values for surface waters within and adjacent to the site are therefore limited to stock watering. The watercourses within the project site are ephemeral in nature and therefore may provide seasonal habitat for aquatic fauna and flora.



**Table 3. Historic water quality data for dams 1 and 2 at Brolga mine.**

		Physicals				Ions	Biological	Total Metals																									
		Conductivity	Total Dissolved Solids (TDS)	pH (Field)	pH (Lab)	Fluoride	Thermotolerant coliforms	Arsenic (As)	Boron	Cadmium (Cd)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Cyanide	Lead (Pb)	Molybdenum	Nickel (Ni)	Selenium	Total Mercury (As)	Uranium (U)	Zinc (Zn)												
Units		µS/cm	mg/L	pH unit	pH unit	mg/L	CFU/100ml	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L												
LOR (ALS)		1	10	0.01	0.01	0.1	1	0.001	0.05	0.0001	0.001	0.001	0.001	0.004	0.001	0.001	0.001	0.01	0.0001	0.001	0.005												
Guidelines	Fitzroy Basin WQOs <i>a</i>		<i>c</i>				<100 <i>d</i>	0.5	5	0.01	1	1	1 <i>f</i>		0.1	0.15	1	0.02	0.002	0.2	20												
Date/Site																																	
28/07/2011 (Dam 1)		8060	5240	8.4	12.2 <i>e</i>	<0.1	~400	<0.001	<0.05	0.0004	0.058	0.013	0.004	0.013	<0.001	<0.001	0.131	<0.01	<0.0001	<0.001	0.009												
28/07/2011 (Dam 2)		345	224	8.6	8.57	<0.1	~180	0.001	<0.05	<0.0001	0.1	0.005	0.002	<0.004	<0.001	<0.001	0.061	<0.01	<0.0001	<0.001	<0.005												
23/11/2011 (Dam 1)		297	193	8.6																													
15/02/2012 (Dam 1)		258	167	8.6																													
4/4/2013 (Dam 1)		1340		8.2																													
4/4/2013 (Dam 2)		202		8.3																													
3/3/2013 (Dam 3)		109		8.0																													
3/3/2013 (Dam 4)		196		8.5																													
<b>Notes:</b>																																	
<i>a</i> Fitzroy River Sub-basin Environmental Values and Water Quality Objectives trigger values for Stock Watering Environmental Value, Table 10 & 11. Based on AWQG.																																	
<i>c</i> According to ANZECC:																																	
<table><tr><th colspan="3">Tolerances of livestock to total dissolved solids (salinity) in drinking water</th></tr><tr><th colspan="3">Total dissolved solids (mg/L)</th></tr><tr><td>No adverse effects on animals expected</td><td>Animals may have initial reluctance to drink or there may be some scouring, but stock should adapt without loss of production</td><td>Loss of production and a decline in animal condition and health would be expected. Stock may tolerate these levels for short periods if introduced gradually</td></tr><tr><td>0 - 4000</td><td>4000 - 5000</td><td>5000 - 10000</td></tr></table>																						Tolerances of livestock to total dissolved solids (salinity) in drinking water			Total dissolved solids (mg/L)			No adverse effects on animals expected	Animals may have initial reluctance to drink or there may be some scouring, but stock should adapt without loss of production	Loss of production and a decline in animal condition and health would be expected. Stock may tolerate these levels for short periods if introduced gradually	0 - 4000	4000 - 5000	5000 - 10000
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0 - 4000	4000 - 5000	5000 - 10000																															
<i>d</i> Indicative only of presence of microbial pathogens. ANZECC recommends taking a median value based on a number of readings generated over time. Investigations are warranted when 20% of results exceed four times the trigger value of 100 CFU/100ml (i.e. 400 CFU/100ml)																																	
<i>e</i> Result suspicious.																																	
<i>f</i> Value for cattle, different values given for other spp.																																	



### 3.3.4 Background – Groundwater Resources

Groundwater resources within the Fitzroy Basin were delineated and described by the (then) Department of Environment and Resource Management (DERM) in terms of their individual chemical characteristics. The report *Regional Chemistry of the Fitzroy Basin Groundwater* (September 2011) described the Fitzroy basin groundwater systems as very complex and delineated 44 separate groundwater zones throughout the Fitzroy Basin. Using available groundwater and surface water monitoring data, the DERM report analysed the salinity ranges and dominant chemical characteristics of each groundwater zone.

Groundwater resources underlying the Brolga Project site were included within zone 14 “Prospect-Fitzroy”. The predominant geology of zone 14 is described (broadly) as Palaeozoic volcanics and sediments, granitic rocks, Serpentine rocks, alluvium, coal measures and Mesozoic volcanics north west and south west of Rockhampton. The report also notes that alluvial groundwater types (of relevance to the Brolga project site) are generally aligned with alluvial and basaltic rocks, which are largely found in eastern and western areas which have relatively higher rainfall and groundwater recharge than the rest of the basin.

A groundwater extraction bore was installed by licensed drillers in October 2012 in the north-west corner of the site. The bore was installed to augment water supply from an existing groundwater bore and provide a reliable water supply for the current mining activities at the site. The bore log completed at the time of construction described the hydrogeology of the site to be topsoil to one meter overlying brown clays to five meters. Below five meters, rock of blue, green, yellow or red colour was encountered to a depth of 21.5 meters where drilling terminated. Groundwater was encountered in the rocky strata between seven and 21 meters below ground level (BGL). On completion, the standing groundwater level was measured to be 5.8m BGL.

As mining will occur across the elevated areas of the site, groundwater ingress into mining pits is not expected.

### 3.3.5 Groundwater Quality

The *Regional Chemistry of the Fitzroy Basin Groundwater* report describes groundwater chemistry for zone 14 as:

*Variable though low to moderate salinity. Complex groundwater data. Variability within depths, but generally similar chemical balance across depths. Largely alluvial sequence dominated by HCO<sub>3</sub>, Na and Cl with generally balanced cations although Na>Mg>Ca. Some relatively high SO<sub>4</sub> and NO<sub>3</sub>.*

The salinity ranges and dominant chemical characteristics of groundwater within zone 14 are summarised in Table 4 below:



**Table 4. Dominant chemical characteristics of groundwater zone 14.**

Zone	Depth	Groundwater data	Dominant ions		EC ( $\mu\text{Scm}^{-1}$ )		
			Cations	Anions	Percentile value		
					20th	50th	80th
14 - Prospect-Fitzroy	Deep	Moderate to abundant	Na	HCO <sub>3</sub>	756	1,420	2,150
	Shallow	Abundant	Na	Cl, HCO <sub>3</sub>	1,006	1,619	2,756

Source: Regional Chemistry of the Fitzroy Basin Groundwater, Table 2, page 21. DEHP (Sept 2011).

The standing groundwater level for the extraction bore at the time of construction was measured at 5.8 mBGL, indicating the bore is positioned within a shallow aquifer. Electrical conductivity of the groundwater measured at the time of construction was 1,300  $\mu\text{S}/\text{cm}$ . Electrical conductivity of the groundwater from the extraction bores measured on the 3<sup>rd</sup> April 2013 ranged between 2290 and 2380  $\mu\text{S}/\text{cm}$ .

### 3.3.6 Groundwater Supply

Extracted groundwater is pumped to an existing farm dam (Dam 1) from where it is drawn, as required, for various mining activities such as dust suppression. The production rate for the extraction bore was measured at approximately 7 – 8 litres per second at the time of construction.

Water requirements for the expanded mining operation will be met through the installation of two additional groundwater bores within Lot 176. Water demand for the expanded operation is anticipated to be approximately one ML per day, primarily for dust suppression.

### 3.3.7 Environmental Values

The environmental water values to be protected are:

- The suitability of surface water for agricultural use; and
- The availability and suitability of groundwater for agricultural use.

### 3.3.8 Potential Impacts on the Environmental Values

Project activities that may affect surface water resources include:

- Modifying landforms in a manner that impacts sub-catchment hydrology;
- Changes to sub-catchment hydrology as a result of catching and retaining mine site runoff
- Operating dams associated with site water management system; and
- Release of surplus water during high rainfall events (discharge events).

The potential impacts on groundwater during mine operation are:

- Localised aquifer drawdown in the vicinity of extraction bores; and
- Contamination of groundwater by hydrocarbon and other chemical spillage from servicing and maintenance activities.

### 3.3.9 Proposed Environmental Protection Objectives

The Brolga Projects environmental protection objectives for water are to:



- Ensure the project does not detrimentally impact on the suitability of downstream surface water resources for agricultural use; and
- Ensure the project does not detrimentally impact on the availability and suitability of groundwater for agricultural use.

### **3.3.10 Control Strategy**

The following water management control strategies will be implemented:

- An erosion and sediment control plan will be developed and implemented as part of the Stage 2 expansion of the Brolga Project;
- 'Clean' water runoff from undisturbed areas is diverted away from disturbed areas where possible;
- Surface runoff from disturbed areas on-site is directed to sediment dams and preferentially used on-site for operational purposes to minimise the requirements for discharge off-site;
- Stormwater diversion drains / banks and dams are designed to capture the bulk of suspended sediment from runoff from disturbed areas prior to any discharge off-site;
- Sediment control devices will be routinely inspected;
- Sediment from stormwater diversion drains / banks and dams will be periodically removed to maintain design capacity;
- All water management structures are designed and constructed using practical hydraulic parameters based on an appropriate risk based rainfall event, catchment size, slopes, surface profile and soil types;
- Areas of disturbed or exposed soil will be managed to minimise the loss of sediment, either through revegetation and/or use of other stabilisation techniques to control erosion;
- Appropriate monitoring of water quality characteristics for all offsite water discharges;
- All significant quantities of hydrocarbons and chemical products are kept in bunded storages (temporary or permanent);
- Any significant leakage/spillage will be immediately reported and appropriately cleaned-up to prevent possible mobilisation of contaminants.

### **3.3.11 Monitoring**

A surface water and groundwater monitoring program will be implemented for the project site to monitor the effectiveness of control strategies in protecting the identified environmental values.

#### ***Surface water monitoring program***

Surface water samples will be collected on a quarterly frequency from the existing farm dams and dispatched to an independent NATA accredited laboratory for analysis of physico-chemical parameters, major ions and metalloids.

Event based sampling of surface waters will also be undertaken following significant rainfall events that result in off-site releases of water from the existing farm dams. Event based samples will be analysed for the same suite of parameters as quarterly samples by a NATA accredited laboratory.





### ***Groundwater monitoring program***

Groundwater levels will be monitored quarterly, preferably at a similar time of year to account for seasonal variations in groundwater levels.

### **3.3.12 Proposed Environmental Authority Conditions – Water**

The proposed EA conditions for managing the potential impacts to surface water and groundwater quality are included below:

#### ***Water General***

- (C1) All determinations of water quality must be:
- a) Performed by a person or body possessing the appropriate experience and qualifications to perform the required measurements;
  - b) Made in accordance with the methods prescribed in the latest edition of the Department of Environment and Heritage Protection's Monitoring and Sampling Manual;
  - c) Collected from the monitoring locations identified within the environmental authority, within 48 hours of each other where possible;
  - d) Carried out on representative samples; and
  - e) Analysed at a laboratory accredited (e.g. NATA) for the method of analysis being used.
- (C2) The release of any contaminants as permitted under this environmental authority, directly or indirectly to waters, other than internal water management infrastructure:
- a) Must not produce any visible discolouration of receiving waters; and
  - b) Must not produce any slick or other visible or odorous evidence of oil, grease or petrochemicals nor contain visible floating oil, grease, scum, litter or other objectionable matter.

#### ***Stormwater and water sediment controls***

- (C3) An Erosion and Sediment Control Plan must be developed and implemented for all stages of mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of stormwater.
- (C4) Stormwater, other than mine affected water, is permitted to be released off-site from:
- a) Erosion and sediment control structures (including sediment control dams) that are installed and operated in accordance with the Erosion and Sediment Control Plan required by condition C3;
  - b) Water management infrastructure that is installed and operated for the purpose of ensuring water does not become mine affected water.
- (C5) 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.



- (C6) Any spillages of wastes, contaminants or other materials must be cleaned up as quickly as practicable to minimise the release of wastes, contaminants or materials to any stormwater drainage system or receiving waters.

### ***Monitoring of water storage quality***

- (C7) Water storages identified in Table C1 must be monitored for the water quality characteristics specified in Table C2 at the monitoring locations and the *ambient monitoring program* frequencies specified in Table C1.

### ***Monitoring of water releases***

- (C8) In the event that water is released off-site from the water storages identified in Table C1 during significant rainfall events, the release must be monitored for the water quality characteristics specified in Table C2 at the monitoring locations and the *event based monitoring program* frequencies specified in Table C1.

**Table C1 Water Storage Monitoring**

Water storage description	Latitude	Longitude	Monitoring Location	Frequency of Monitoring	
				Ambient Monitoring Program	Event Based Monitoring Program
Dam 1	-23.0268	150.3054	Grab sample taken at dam spillway	Quarterly	Weekly during release events
Dam 2	-23.0279	150.3047	Grab sample taken at dam spillway	Quarterly	Weekly during release events
Dam 3	-23.0380	150.3171	Grab sample taken at dam spillway	Quarterly	Weekly during release events
Dam 4	-23.0303	150.3222	Grab sample taken at dam spillway	Quarterly	Weekly during release events

**Table C2 Water Storage Contaminant Trigger Values**

Water quality characteristic	Limit type	Contaminant Trigger Value
pH	Range	Greater than 4, less than 9
EC (uS/cm)	maximum	5970
Sulphate (mg/L)	maximum	1000
Flouride (mg/L)	maximum	2
Aluminium (mg/L)	maximum	5
Arsenic (mg/L)	maximum	0.5
Cadmium (mg/L)	maximum	0.01
Cobalt (mg/L)	maximum	1
Copper (mg/L)	maximum	1
Lead (mg/L)	maximum	0.1
Nickel (mg/L)	maximum	1
Zinc (mg/L)	maximum	20



- (C9) In the event that water storages defined in Table C1 exceed the contaminant trigger values defined in Table C2, the holder of this environmental authority must implement measures, where practicable, to prevent livestock access to the storages.

## **3.4 Noise and Vibration**

### **3.4.1 Background**

The Brolga Project – Stage 2 is located in a sparsely populated area comprising large rural holdings. The dominant land use surrounding the Project is low intensity grazing. The nearest receptors to the mine site are rural residences located 2.5 kilometres north of the site and 3.5 kilometres to the south-west of the site. The nearest receptors to the rail siding site are rural residences approximately 1 kilometre to the south east and 1 kilometre to the north.

At the planned production rate of 900,000 TPA, the Brolga Project - Stage 2 Development will undertake mining, crushing and screening operations 24 hours per day five days per week. Hauling of ore from the mine to the rail siding will occur during daylight hours (nominally 6am to 6pm) seven days per week. At peak production it is expected that, on average, eight trains will be loaded per week. The scheduling of trains is determined by Queensland Rail and trains can be scheduled at any time during the day or night.

As there is no requirement for blasting as part of mining operations at the Brolga site, impacts associated with ground vibration and peak air-blast overpressure are not anticipated.

### **3.4.2 Environmental Value**

The environmental value associated with noise and vibration is to protect the acoustic environment, such that sensitive and commercial places are not subjected to unreasonable interference from intrusive noise.

### **3.4.3 Potential Impacts on the Environmental Value**

Given the nature of mining activities at the Brolga Project site and the sparsely populated rural landscape within which it is located, the risk of potential impacts on the noise environmental value is considered low. However, the increase in mining and ore handling activities associated with the Brolga Stage 2 development has the potential to increase noise emissions to the surrounding environment. The major sources of noise associated with the Project are:

- Mining equipment such as excavators, dozers, graders and dump trucks;
- Haul trucks operating between the mine and rail siding;
- Stockpiling and loading activities at the rail siding;
- Rail transport operations.



#### **3.4.4 Proposed Environmental Protection Objective**

The environmental protection objective for noise and vibration is to avoid causing nuisance noise levels at sensitive receivers.

#### **3.4.5 Control Strategies**

The following control strategies will be employed for the management of noise impacts:

- Vehicles will be maintained in accordance with a maintenance schedule and fitted with appropriate mufflers;
- Targeted monitoring will be undertaken to check noise levels, as required.
- Any noise complaint associated with the mining operation will be investigated.
- Management practices will be reviewed and modified when the outcomes of an investigation of a noise complaint identify it is appropriate.

#### **3.4.6 Monitoring**

Any noise complaint associated with the mining operation will be investigated. Targeted noise monitoring at noise sources and sensitive places may be undertaken as part of the investigation process.

#### **3.4.7 Proposed Environmental Authority Conditions – Noise**

The proposed EA conditions to protect the acoustic environment are included below:

##### ***Noise Nuisance***

(D1) Noise from the mining activity must not cause a noise nuisance at any sensitive place.

##### ***Noise monitoring***

(D2) When requested by the administering authority, noise monitoring must be undertaken within a reasonable and practicable timeframe nominated by the administering authority to investigate any complaint (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) of noise nuisance at any sensitive place, and the results must be notified within 14 days to the administering authority following completion of monitoring. Monitoring must include:

- a) LA eq, adj, 15 mins;
- b) LA 1, 15 mins (internal – or a measured external noise level and calculation of corresponding internal noise level);
- c) the level and frequency of occurrence of impulsive or tonal noise;
- d) atmospheric conditions including wind speed and direction;
- e) effects due to extraneous factors such as traffic noise; and
- f) location date and time of recording.



- (D3) Noise is not considered to be a nuisance under condition (D1) if monitoring shows that noise from the mining activity does not exceed the following levels in the time periods specified in Table D1

**Table D1 – Noise Limits**

Noise Level dB(A)	7am – 6pm	6pm – 10pm	10pm – 7am
	Noise measured at a 'Sensitive place'		
LA eq, adj, 15 mins	46	46	41
	Noise measured at a 'Commercial place'		
LA eq, adj, 15 mins	51	NA	NA

- (D3) The method of measurement and reporting of noise levels must comply with the DEHP Noise Measurement Manual, Third Edition, 1 March 2000, or more recent editions or supplements as they become available.
- (D4) If monitoring indicates exceedance of the relevant limits in Condition (D1-3), then the environmental authority holder must:
- address the complaint including the use of appropriate dispute resolution if required; and;
  - immediately implement noise abatement measures so that emissions of noise from the activity do not result in further environmental nuisance.

## 3.5 Land management

### 3.5.1 Background

The Brolga Project area is a historic nickel ore mine encompassing 203 hectares of undulating land located in a sparsely populated area comprising large rural holdings. The dominant land use surrounding the Project is low intensity grazing.

The area was mined by a previous operator between 1993 and 1995 during which time approximately 600,000 tonnes of nickel ore was produced. Active mining at the site ceased in 1995 and following closure of the mine, the site has been under the process of landform and vegetative rehabilitation to return it to its former land use as a grazing property.

QNI Resources Pty Ltd actively manages the underlying land within Project area. This includes monitoring and, where required, treatment of weeds, feral animal control, fire risk management and maintenance of fencing.

### 3.5.2 Land Suitability

The proposed post-mining land use for the project site is low intensity grazing. In terms of soil conservation and agricultural land suitability, the proposed post-mining land use of low density cattle grazing is considered achievable provided appropriate landform designs, water management strategies and rehabilitation measures are implemented over the life of the Project.



### **3.5.3 Land Contamination**

A search of the online EPA database for listed contaminated land sites revealed that none of the parcels of land underlying the Brolga mining lease (ML5866) reported a contamination status on the Environmental Management Register (EMR) or Contaminated Land Register (CLR).

### **3.5.4 Environmental Values**

The environmental values of the land at the project site that are to be protected or enhanced are:

- The integrity of undisturbed land and ecosystems on the project site;
- The integrity of topsoil as a resource to be used in rehabilitation;
- The stability of disturbed land and ensuring it is non-polluting.

### **3.5.5 Potential Impacts on the Environmental Values**

The Project's activities with potential to impact on the environmental values of land are:

- Clearing of vegetation;
- Stripping and stockpiling of topsoil;
- Construction of access tracks and haul roads;
- Changes to existing landforms;
- Creation of final voids; and
- Potential land contamination from the inadequate management of hazardous materials including hydrocarbons.

### **3.5.6 Proposed Environmental Protection Objective**

The objectives to protect the environmental values of the Project land are to:

- Provide a stable, non-polluting landform;
- Provide a beneficial post mining land use;
- Ensure that topsoil is managed as a valuable resource;
- Ensure the contamination sources are managed appropriately.

### **3.5.7 Control strategies**

#### ***Topsoil Management***

The primary impact of the mining operation on topsoil is reduced biological, physical and chemical potential through displacement and stockpiling. Where significant disturbance of an area is due to occur topsoil is removed for later placement on the final rehabilitation surface. Topsoil stripping, stockpiling and replacement on rehabilitation areas are undertaken using a variety of heavy equipment including dozers, loaders, excavators and trucks. During these operations, topsoil may be affected through compaction, stockpile depth, prolonged periods of stockpiling, weed infestation on stockpiles and stockpile erosion.

The following control strategies will be employed for the management of topsoil:

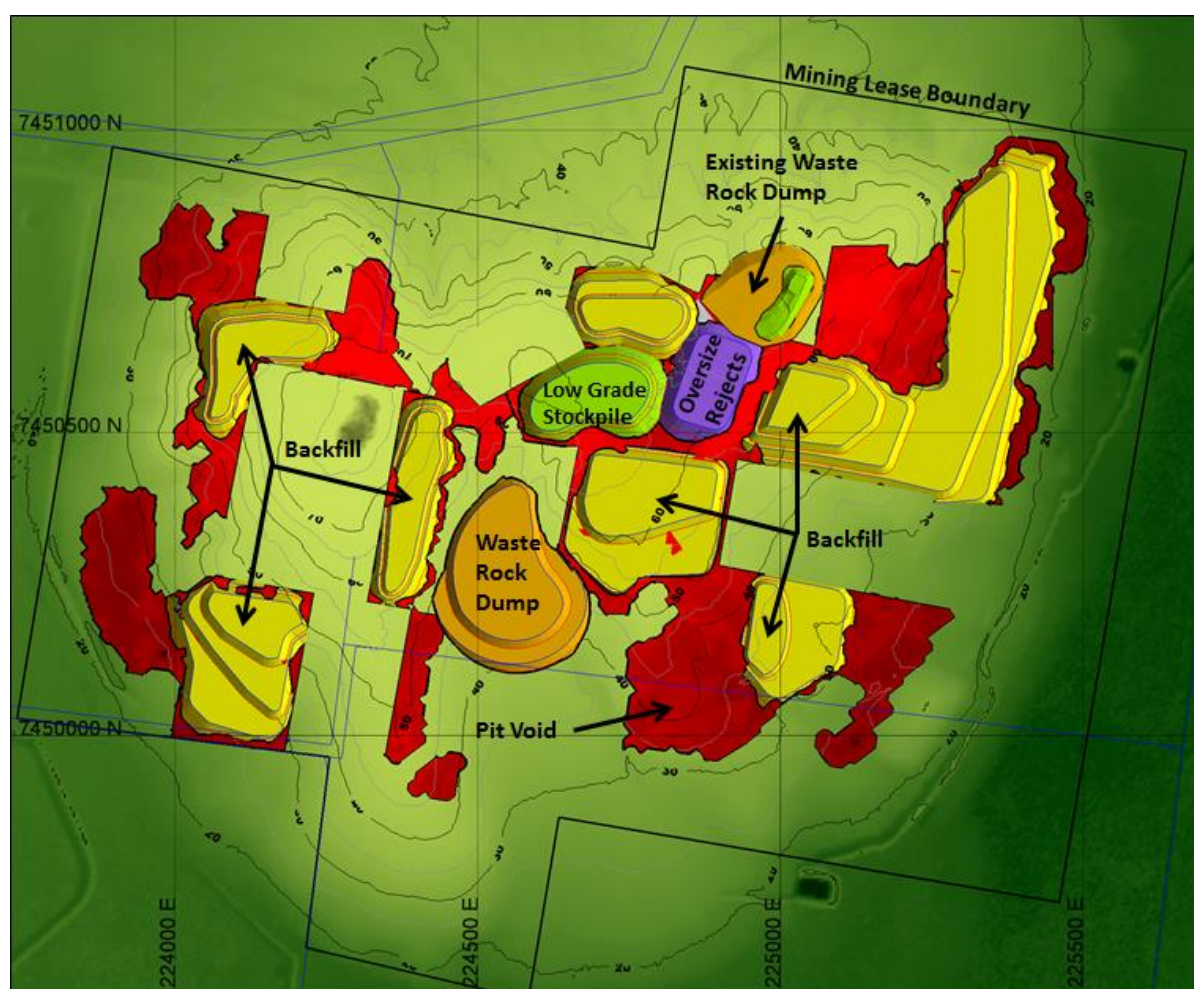


- Topsoil will be reused immediately in preference to stockpiling. Where this is not possible, stockpiles will be stabilised to prevent erosion;
- Topsoil stockpiles will be placed away from natural drainage areas so any run-off from the stockpile does not drain directly into flow paths without first being contained onsite.
- Topsoil material will also be placed so as not to affect any future infrastructure requirements or identified nickel ore resources;

### ***Waste Rock Management***

Waste rock will predominantly be disposed of directly into mined pits behind the operating strip as part of the mining operation. However, two out of pit overburden dumps are included in the mine plan to cater for periods in the mining sequence when it is not operationally possible to dispose of overburden in-pit. The location of the overburden dumps (in pit and out of pit) are shown conceptually in Figure 8.

An existing waste rock dump from previous mining activity in the northern part of site has not exhibited any indication of acid formation. Available water quality data for the site indicates mildly alkaline conditions.



**Figure 8. Conceptual plan showing pit voids, in-pit dumps and out of pit dumps.**





The following control strategies will be employed for the management of waste rock dumps:

- Waste rock dumps will be stabilised and rehabilitated as part of the progressive rehabilitation plan for the site.

### ***Final Voids***

A number of final voids will result from the mining operations at the Brolga Project site. The final voids will act as a sediment trap for suspended solids carried in run-off from the elevated landform. The extent and location of final voids is shown conceptually in Figure 8.

A void management strategy will be developed to identify:

- Measures to minimise potential impacts associated with the final void; and
- Measures for monitoring and management of potential impacts of the void over time.

### ***Weed Management***

A survey of the Project site in January 2012 identified the presence of the weed species shown in Table 5.

**Table 5. Weed species present on ML5866 in January 2012.**

<b>Name</b>	<b>Scientific Name</b>	<b>QLD Declaration Class</b>	<b>Other listings/ comments</b>
Lantana	<i>Lantana camara</i>	3	WoNS
Giant ratstail grass (GRT)	<i>Sporobolus pyramidalis</i>	2	Environmental weed
Snakeweed	<i>Stachytarpheta jamaicensis</i>	Not declared	Environmental and Agricultural weed
Guinea grass	<i>Megathyrsus maximus</i> var <i>maximus</i>	Not declared	Environmental weed (common pasture grass)
Buffel grass	<i>Cenchrus ciliaris</i>	Not declared	Environmental weed (common pasture grass)

The following control strategies will be employed for the management of weeds:

- Weeds will be managed in accordance with State Government and Rockhampton City Council requirements.
- An annual audit of weed treatment areas will be completed to assess the effectiveness of the weed control measures.

### **3.5.8 Monitoring**

The following monitoring activities will be implemented to assess the effectiveness of the land management control strategies:

- Visual inspection of topsoil dumps to assess stockpile stability and to identify any signs of wind and/or water erosion.
- Visual inspection of overburden and waste rock areas to assess stockpile stability and identify any signs of wind and/or water erosion.



- Routine inspection of boundary fences to ensure stock is excluded from operational and rehabilitation areas.
- Annual site inspection and audit of weed treatment areas to assess effectiveness of weed control measures.
- Routine inspections of hazardous material storage areas to assess compliance of storages with the required standards.

### **3.5.9 Proposed Environmental Authority Conditions – Land Management**

The proposed EA conditions for land management at the Brolga Project are included below:

#### ***Topsoil***

- (E1) Topsoil must be strategically stripped and stockpiled ahead mining for use in rehabilitation activities.

#### ***Preventing contaminant releases to land***

- (E2) Contaminants must not be released to land in a manner which constitutes nuisance or serious environmental harm.

#### ***Infrastructure***

- (E3) All infrastructure, constructed by or for the environmental authority holder during the mining activities, must be removed from the site prior to mining lease surrender, except where agreed in writing by the post mining land owner / holder. This is not applicable where the landowner / holder is also the environmental authority holder.

#### ***Residual voids***

- (E5) Residual voids must not cause any serious environmental harm to land, surface waters or any recognised groundwater aquifer, other than the environmental harm constituted by the existence of the residual void itself and subject to any other condition within this environmental authority.

## **3.6 Rehabilitation**

### **3.6.1 Background**

The Brolga Project site has been extensively cleared for mining operations and grazing land use. A relatively small area of regrowth vegetation consisting of Eucalypt woodland is present in the northern section of the mining lease. Mining by the previous operator of the site ceased in 1995 and following closure of the mine, the site has been under the process of landform and vegetative rehabilitation to return it to its former land use as a grazing property.

An assessment of the rehabilitation status of ML5866 was completed in January 2012. The review found that revegetation of the site has had a visible positive impact, with grass cover percentages



generally well above 50 per cent. It was noted that presence of lantana and other weeds has prevented most tree species (other than *Acacia* spp.) from taking hold creating a monoculture effect where dominant species thrive, reducing biological diversity.

The report found that the rehabilitated land in its current condition is largely suitable for use as grazing land with vegetation across the site being dominated by grasses. Several individual *Eucalypt* spp. trees are scattered across the site, however few appear to have been there prior to historic mining activities.

All areas that will be significantly disturbed by the Brolga Stage 2 development activities will be rehabilitated to a stable landform with a self-sustaining vegetation cover. Rehabilitation of disturbed land will generally proceed within two years of the areas becoming available for rehabilitation. However it is noted that in some situations, progressive rehabilitation within a two year timeframe may not be possible because the area may be operationally integrated with nearby areas that are unavailable for rehabilitation.

To achieve the rehabilitation objectives at the Brolga Project a schedule will be developed for the progressive implementation of the following key rehabilitation stages:

- Area re-contoured (reshaped to final grade);
- Area topsoiled;
- Area seeded (ripped and seeded, irrespective of germination success);
- Area established (vegetation has established, although minor reseeding/erosion repairs may be necessary); and
- Area successfully rehabilitated (compliance with rehabilitation success criteria)

### **3.6.2 Environmental Values**

The environmental values to be protected or enhanced through rehabilitation of disturbed land are:

- A stable non-polluting landform.
- The suitability of land to support beneficial post mining land use such as low intensity grazing.

### **3.6.3 Potential Impacts on the Environmental Values**

Potential impacts on rehabilitated land include:

- Erosion;
- Potential land contamination;
- Inadequate design principles for rehabilitation landforms including final voids; and
- Poor establishment of revegetated areas

### **3.6.4 Proposed Environmental Protection Objective**

The Brolga Project has the following objectives for rehabilitation:



- Achieve a self-sustaining habitat for low intensity grazing land use that requires minimal ongoing maintenance; and
- To ensure the land disturbed by mining activities will be made stable.

### **3.6.5 Control strategies**

The following control strategies will be employed to ensure the successful rehabilitation of disturbed areas:

- Infrastructure will be decommissioned, unless arrangement has been made with the post-mining landowner;
- Landform design that will emulate the natural drainage and slopes in the Project area, will be employed where possible;
- Contour banks will be constructed where required on re-contoured spoil to minimise erosion;
- A void management strategy will be developed prior to mine closure;
- Final voids, including pits and ramps not backfilled, will be made safe for persons and stock;
- Revegetation will be surveyed on an as required basis and maintenance will be carried out to meet rehabilitation success criteria;
- A rehabilitation schedule will be implemented and maintained;
- All mine traffic will be restricted to authorised access roads where possible.

### **3.6.6 Monitoring**

A rehabilitation monitoring program will be developed and implemented as part of the Rehabilitation Management Plan for the Brolga Project. The rehabilitation monitoring program will describe rehabilitation monitoring activities to be undertaken to assess the rehabilitation against defined success criteria.

### **3.6.7 Proposed Environmental Authority Conditions – Rehabilitation**

#### ***Rehabilitation landform criteria***

- (F1) All areas significantly disturbed by mining activities must be rehabilitated to a stable landform with a self-sustaining vegetation cover.
- (F2) Where possible, progressive rehabilitation must commence within 2 years when areas become available within the operational land.
- (F3) Complete an investigation into rehabilitation of disturbed areas and submit a report to the administering authority proposing acceptance criteria within 2 years of the commencement of Brolga Development - Stage 2 mining operations. The Rehabilitation Management Plan must, at a minimum:
  - a) map existing areas of rehabilitation;
  - b) detail rehabilitation methods applied to areas;
  - c) identify success factors for areas;
  - d) detail future rehabilitation actions and methods to be completed on disturbed areas;



- e) identify reference and rehabilitation sites to be used to support the development of rehabilitation success criteria;
- f) describe rehabilitation monitoring and maintenance requirements to be applied to all areas of disturbance;
- g) describe end of mine landform design plan and post mining land uses across the mine.

## **3.7 Flora and Fauna Management**

### **3.7.1 Background**

The Brolga Project – Stage 2 development encompasses an expansion of mining activities at the mining lease (ML5866) and continued use of the existing Glen Geddes rail siding. Both locations have been extensively disturbed as a result of their historic and current land uses.

#### ***Brolga site (ML5866)***

The Brolga Project site has been extensively cleared for mining operations and low intensity grazing activities. Recent assessment of the terrestrial flora at the mine site indicated that vegetation across the site is dominated by grasses with the exception of an area of woodland regrowth in the northern area of the lease.

The proposal to increase mining activity at the site will result in disturbance of a total area of approximately 122 hectares within the mining lease over the life of the operation. As indicated in the mine plan (Figure 3) disturbance will be predominately over previously disturbed areas of the site. The northern woodland regrowth area will be excluded from any significant disturbance.

#### ***Rail Siding***

It is thought that the existing Glen Geddes rail siding site was established during WWII. The historic buildings and other infrastructure was relocated many years ago and the site was used by the previous operator of the Brolga site to load nickel ore.

#### ***Regional Ecosystems***

There are no regional ecosystems mapped for the Brolga mining lease (ML5866). As noted above, small area of mapped regrowth vegetation that is a least concern regional ecosystem occurs at the northern part of the lease. This area will not be disturbed by the proposed mining activities.

#### ***Threatened Ecological Communities***

Search results from the EPBC Act Protected Matters report did not identify any threatened ecological communities in the Project area. The search did identify that the area is listed as an *indicative place* for the Capricornia Serpentinite Landscape on the Register of the National Estate (RNE).



## EPBC Act Threat-listed Species of Plants and Animals

Twelve threat listed species of plants and 17 threat listed species of animal under the EPBC Act have the potential to occur within the Brolga Project site based on the Protected Matters Search Tool results (Table 6).

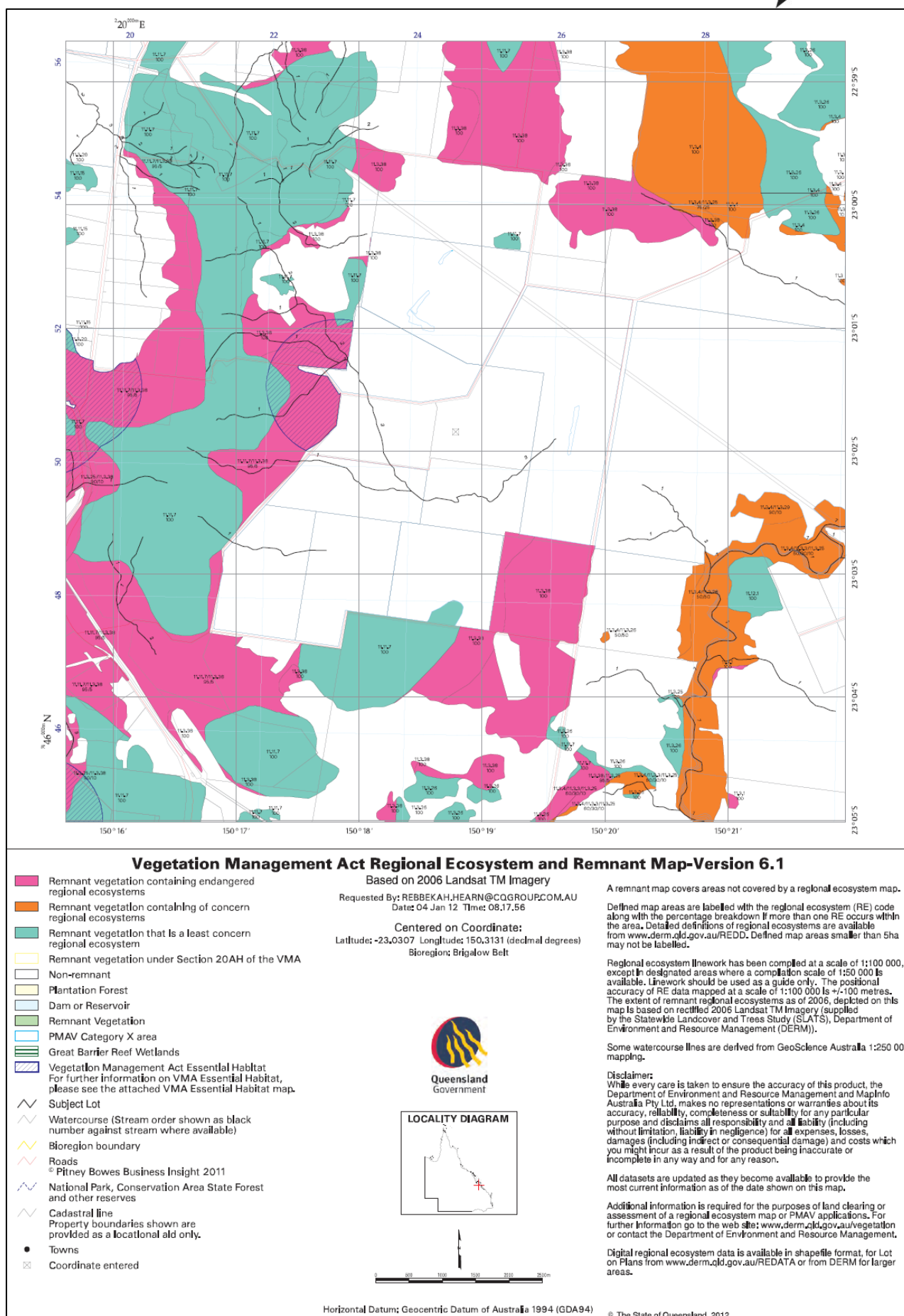
**Table 6. EPBC Act listed species with predicted likelihood of occurrence in the Brolga Project Area**

Species name	EPBC Act Status
<b>Mammals</b>	
Koala ( <i>Phascolarctos cinereus</i> )	Vulnerable
Northern Quoll ( <i>Dasyurus hallucatus</i> )	Endangered
Large-eared Pied Bat ( <i>Chalinolobus dwyeri</i> )	Vulnerable
South-eastern Long-eared Bat ( <i>Nyctophilus corbeni</i> )	Vulnerable
<b>Reptiles</b>	
Collared Delma ( <i>Delma torquate</i> )	Vulnerable
Ornamental Snake ( <i>Denisonia maculate</i> )	Vulnerable
Dunmall's Snake ( <i>Furina dunmalli</i> )	Vulnerable
Brigalow Scaly-foot ( <i>Paradelma orientalis</i> )	Vulnerable
Yakka Skink ( <i>Egernia rugosa</i> )	Vulnerable
Fitzroy River Turtle ( <i>Rheodytes leukops</i> )	Vulnerable
<b>Birds</b>	
Red Goshawk ( <i>Erythrorhynchus radiates</i> )	Vulnerable
Squatter Pigeon ( <i>Geophaps scripta scripta</i> )	Vulnerable
Black-throated Finch ( <i>Poephila cincta cincta</i> )	Endangered
Star Finch ( <i>Neochmia ruficauda ruficauda</i> )	Endangered
Black-breasted Button Quail ( <i>Turnix melanogaster</i> )	Vulnerable
Australasian Bittern ( <i>Botaurus poiciloptilus</i> )	Endangered
Australian Painted Snipe ( <i>Rostratula australis</i> )	Vulnerable
<b>Plants</b>	
<i>Cycas megacarpa</i>	Endangered
<i>Cycas ophiolitica</i>	Endangered
<i>Capparis thozetiana</i>	Vulnerable





Species name	EPBC Act Status
<i>Corymbia xanthope</i>	Vulnerable
<i>Hakea tineura</i>	Vulnerable
<i>Leucopogon cuspidatus</i>	Vulnerable
<i>Marsdenia brevifolia</i>	Vulnerable
<i>Neoroepera buxifolia</i>	Vulnerable
<i>Parsonia larcomensis</i>	Vulnerable
<i>Pimelea leptospermoides</i>	Vulnerable
<i>Pultenaea setulose</i>	Vulnerable
<i>Streblus pendulinus</i>	Endangered



**Figure 9. Regional Ecosystem Mapping for the Brolga Project area.**



## ***Nature Conservation Act Threat-listed Species of Plant and Animal***

A search of the Queensland Government wildlife online database indicated 18 (five animal and 13 plant) species listed as Endangered, Vulnerable or Near Threatened under the Nature Conservation Act were known to occur within the vicinity of the Brolga Project area. Included in this list were two birds, one mammal and four plants not listed in EPBC Act threat-listed species of plants and animals. The details of the additional threatened species from the Nature Conservation Act are included in Table 7.

**Table 7. Nature Conservation Act threatened species (those additional to EPBC Act listing) with predicted likelihood of occurrence in the Brolga Project Area.**

<b>Species name</b>	<b>Nature Conservation Act Status</b>
<b>Mammals</b>	
Ghost Bat ( <i>Macroderma gigas</i> )	Vulnerable
<b>Birds</b>	
Black necked stork ( <i>Ephippiorhynchus asiaticus</i> )	Near Threatened
Cotton pygmy-goose ( <i>Nettapus coromandelianus</i> )	Near Threatened
<b>Plants</b>	
<i>Macrozamia serpentina</i>	Endangered
<i>Olearia macdonnellensis</i>	Endangered
<i>Bursaria reevesii</i>	Vulnerable
<i>Stackhousia Tryonii</i>	Near Threatened

## ***Essential Habitats***

Essential habitat for *Neoroepera buxifolia* is mapped for the area to the east of the Brolga site. However, as the proposed haul route (which passes through this area) uses the existing road network there will be no impact on the essential habitat area.

### **3.7.2 Environmental Values**

The environmental value to be protected in relation to native flora and fauna are the biodiversity values of natural ecosystems, in particular endangered or threatened regional ecosystems.

### **3.7.3 Potential Impacts on the Environmental Values**

Potential impacts on fauna and flora species may include:

- Loss of habitat for through clearing activities;
- Fragmentation of populations and interruption to dispersal/movement corridors;



- Opportunity for weed species to establish in disturbed areas, that may alter the structure of existing habitats;

### **3.7.4 Proposed Environmental Protection Objectives**

Objectives for the management of biodiversity values include:

- Preventing the spread of existing weed species;
- Re-introducing flora and fauna to disturbed areas through staged rehabilitation program;
- To the extent possible, minimise the impact of the Project on identified significant ecosystems.

### **3.7.5 Control Strategies**

Mitigation measures intended to reduce the potential impacts of the Project on flora and fauna values of the Project site are described below.

- To the extent possible, only areas absolutely necessary for the construction and the operation of the project will be cleared;
- Clearance will be controlled by a Permit to Disturb process, and go/no-go areas will be identified, and managed through a GIS system;
- Standard dust suppression techniques will be used to minimise dust impacts on vegetation.

### **3.7.6 Monitoring**

The following monitoring activities associated with the management of flora and fauna will be implemented:

- Monitoring of habitat rehabilitation/restoration progress;
- Monitoring of the project site to assess the success of declared plant and environmental weed control program;
- Monitoring of the project site to identify any new declared plant or environmental weed infestations; and
- Monitoring of the project site for pest animal activity.

### **3.7.7 Proposed Environmental Authority Conditions – Flora and Fauna Management**

There are no specific Environmental Authority conditions proposed for flora and fauna management.

## **3.8 Waste Management**

### **3.8.1 Background**

The Brolga Project will produce a number of different waste types to be managed in accordance with the characteristics of the waste. All wastes will be segregated at the Project site and removed by a licensed waste management contractor for appropriate recycling or disposal. Hazardous wastes are handled in accordance with appropriate Material Safety Data Sheets (MSDS), site procedures and the *Environmental Protection (Waste Management) Policy 2000*.



Major waste types (including hazardous waste) generated by the Brolga Project are

- Regulated wastes (e.g. hydrocarbon waste);
- Vehicle batteries, oil filters, air filters and other wastes from maintenance activities;
- Scrap metal (e.g. drums);
- Wood waste including timber and pallets;
- Tyres including light vehicle tyres and mine truck tyres;
- General wastes (e.g. food scraps, wrapping paper, rags);
- Recyclable general waste (e.g. paper, cans); and
- Sewage waste.

### **3.8.2 Environmental Values**

The Environmental values to be enhanced or protected at the Brolga Project are in accordance with those outlined within the *Environmental Protection (Waste Management) Policy 2000* and include the following:

- The life, health and wellbeing of people; and
- The diversity of ecological processes and associated ecosystems surrounding the Project.

### **3.8.3 Potential Impacts on the Environmental Values**

Environmental harm could occur within and adjacent to the project site if wastes are not managed properly. Ecosystems surrounding the project site could be detrimentally impacted if waste streams enter watercourses or groundwater systems. The potential for waste management to impact on the identified environmental values includes:

- Contamination of land through poor control over on-site waste management;
- Contamination of surface water or groundwater through poor waste management, particularly hydrocarbon and sewage waste management;
- Impacts on fauna and flora through inappropriate waste disposal and handling; and
- Loss of potentially recoverable resources due to ineffective waste stream segregation.

### **3.8.4 Proposed Environmental Protection Objective**

The environmental protection objectives for waste management at the Brolga Project are:

- To avoid contaminating land, surface water or groundwater through poor waste management practices.
- To manage waste through the use of licensed contractors, transporters and disposal facilities; and
- To minimise the generation of waste in accordance with the waste management hierarchy listed in the *Environmental Protection (Waste Management) Policy 2000*.

### **3.8.5 Control Strategies**

All waste at the Brolga Project will be managed in accordance with the *Environmental Protection (Waste) Policy 2000* waste management hierarchy of Avoidance; Reuse; Recycle; and Disposal. The movement of regulated waste in Queensland is subject to a waste tracking system under the *EP*





*(Waste) Regulation.* All waste movement from the site will be tracked in accordance with the requirements of Schedule 2 of the EP (Waste) Regulation. Specific waste management strategies for the Brolga Project include:

- Wastes will be segregated at the Project site to maximise the recovery of recyclable materials;
- Recyclable wastes will be collected separately and reused or recycled;
- All general wastes and recyclable wastes generated by the Project will be removed from the site by licensed contractors for transport to licensed disposal facilities; and
- Regulated waste will be removed from site by a licensed regulated waste removal and transport contractor for recycling or disposal in a licensed regulated waste disposal facility.

### **3.8.6 Monitoring**

Waste monitoring and tracking will be undertaken to record the movements of prescribed and regulated wastes (trackable wastes) in accordance with the Environmental Protection (Waste) Policy 2000.

### **3.8.7 Proposed Environmental Authority Conditions – Waste Management**

- (G1) Scrap tyres stored awaiting disposal or recycling must be stored in stable stacks less than 3 m high, and at least 10 m from any other scrap tyre storage area, or combustible or flammable material, including vegetation.
- (G2) All reasonable and practicable fire prevention measures must be implemented, including removal of grass and other materials within a 10 m radius of the scrap tyre storage area.
- (G3) Waste must not be burned or allowed to be burned on the licensed site unless by approval of the administering authority.
- (G4) Records of regulated waste must be kept for five years, and must include the following information:
- a) date of pickup of waste;
  - b) description of waste;
  - c) cross reference to relevant waste transport documentation;
  - d) quantity of waste;
  - e) origin of the waste;
  - f) destination of the waste; and
  - g) intended fate of the waste, for example, type of waste treatment, reprocessing or disposal.

*NOTE: Records of documents maintained in compliance with a waste tracking system established under the Environmental Protection Act 1994 or any other law for regulated waste will be deemed to satisfy this condition.*

- (G5) Regulated waste generated in the mining activity can be temporarily stored on site awaiting removal provided it is stored in a place and circumstance in which there is minimal risk of it causing contamination to land or waters, or a fire hazard.



- (G6) All regulated waste received at and removed from the site must be transported by a person who holds a current authority to transport such waste under the provisions of the Environmental Protection Act 1994.
- (G7) All waste removed from the site must be taken to a facility that is lawfully allowed to accept such waste under the provisions of the Environmental Protection Act 1994.
- (G8) A designated area must be set aside for the segregation of economically viable, recyclable solid and liquid waste.

## **3.9 Community**

### **3.9.1 Background**

The Brolga project is located in a rural setting with neighbours predominantly involved in low intensity grazing activities. Relevant stakeholders are listed in Section 1.

The key community benefits of the project are the potential opportunities for local employment and the direct and indirect economic benefit to local businesses from the construction and operational activities associated with the Project.

### **3.9.2 Environmental Value**

The environmental value to be protected is the lifestyle, including the wealth, health, safety, and wellbeing of the community surrounding the project site.

### **3.9.3 Potential Impacts on the Environmental Value**

The project has the potential to adversely impact on community environmental values as a result of:

- Dust emissions;
- Noise emissions;
- Surface and groundwater levels and quality; and
- Increased local traffic.

### **3.9.4 Proposed Environmental Protection Objectives**

Objectives for the management of social issues include:

- Minimise adverse impacts on the lifestyle and wellbeing of the community (including environmental nuisance to neighbours caused by the project);
- Construct and operate the project in a manner beneficial to the community where possible; and
- Respond to community concerns expeditiously.

### **3.9.5 Control Strategies**

Control strategies for the management of social issues include:



- Establishing access to appropriate site personnel for the community;
- Establishing a complaints receiving, recording and investigation process; and
- Investigating all complaints expeditiously and provide a response as soon as practicable.

### **3.9.6 Proposed Environmental Authority Conditions - Community**

#### ***Complaint response***

- (H1) All complaints (which is neither frivolous nor vexatious nor based on mistaken belief in the opinion of the authorised officer) received must be recorded including details of complainant, reasons for the complaint, investigations undertaken, conclusions formed and actions taken. This information must be made available for inspection by the administering authority on request.

## **3.10 Cultural Heritage**

### **3.10.1 Background**

The Brolga Project falls within the Native Title Claim of the Darumbal People (Claim QUD6131/98). There are currently no Cultural Heritage Management Plans or Cultural Heritage Management Agreements in place with the Darumbal People for the Project area. In order to identify and assess the potential impact of the Brolga Project – Stage 2 on Aboriginal and historic cultural heritage, QNI Resources completed Cultural Heritage due diligence assessment in December 2012.

#### ***Indigenous Cultural Heritage***

The Brolga Project is located within the traditional lands of the Darumbal People. A search of the Department of Aboriginal and Torres Strait Islanders and Multicultural Affairs (DATSIMA) database indicated that there are no known Aboriginal cultural heritage sites in the Project area, although this may reflect the lack of prior surveys completed.

As part of the Cultural Heritage Due Diligence assessment, the Project proposal was assessed against the *Aboriginal Cultural Heritage Act 2003 Duty of Care Guidelines*. The assessment identified that the much of the planned disturbance associated with the Project occurs in areas where there has previously been significant ground disturbance (Category 3 or Category 4).

#### ***Non-Indigenous Cultural Heritage***

The Cultural Heritage due diligence assessment found that there are no heritage listed sites, or know sites of potential heritage significance within the Brolga Project area. The assessment concluded that it is unlikely that the project activities will impact any places of historical heritage significance.

### **3.10.2 Environmental Value**

The environmental value to be protected is the cultural heritage interest and significance of Indigenous and non-Indigenous use and occupation of the project site.



### **3.10.3 Potential Impacts on the Environmental Value**

Mining activities and construction of associated infrastructure could potentially result in the destruction or burial of artefacts, disturbance of significant sites, and impacts on culturally significant settings.

### **3.10.4 Proposed Environmental Protection Objects**

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

### **3.10.5 Control Strategies – Cultural Heritage**

The following control strategies will be put in place for the management of the cultural heritage values of the site:

- Indigenous cultural heritage will be managed in accordance with the Aboriginal Cultural Heritage Act 2003 Duty of Care Guidelines, including the notification and involvement of the Darumbal People for any Aboriginal cultural heritage surveys required;
- In the event that unrecorded Aboriginal cultural heritage sites or materials are discovered in surface or sub-surface deposits during future operations, work at that particular location will cease and be cordoned off as a no-go area until traditional owner representatives are contacted to provide advice on significance of the finds and management/mitigation options.
- In the event that unrecorded historic cultural heritage sites or materials are discovered in surface or sub-surface deposits during future operations, work at that particular location will cease and be cordoned off as a no-go area. A suitably qualified cultural heritage specialist will be engaged to assess the site and what management/mitigation measures are required.
- Clearance will be controlled by a Permit to Disturb process, and go/no-go areas will be identified, and managed through a GIS system.

### **3.10.6 Proposed Environmental Authority Conditions**

There are no specific Environmental Authority conditions proposed for cultural heritage management.



## **4. Environmental Management**

Section four of the EM Plan outlines the environmental management framework associated with the Brolga Project – Stage 2 Development. Included in this section are details of environmental monitoring, reporting, training and auditing.

### **4.1 Monitoring**

Environmental monitoring programs for the Brolga Project have been designed to:

- detect environmental changes that may occur as a result of mining activities;
- monitor the effectiveness of the environmental protection commitments and control strategies detailed in this EM Plan; and
- to achieve compliance with the proposed Environmental Authority conditions.

The environmental monitoring programs are summarised in Table 8 and include monitoring of land (rehabilitation, erosion, weeds, pests, contamination), water (surface water, groundwater), air, waste and noise (as required). All samples taken for analysis are sent to an external NATA registered laboratory under chain of custody procedures.

### **4.2 Reporting**

The Proponent aims to provide timely, relevant and appropriately presented information to government authorities and other relevant external stakeholders on the environmental performance of the Brolga Project.

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

- Prepare Annual Returns as required under the *Environmental Protection Act 1994*;
- Submit National Pollutant Inventory (NPI) reports as necessary;
- Report incidents that may potentially compromise compliance with the conditions of the Environmental Authorities immediately to operations management.

### **4.3 Environmental Auditing and Review**

QNI Resources Pty Ltd will conduct environmental audits of the Brolga Project to assess compliance with regulatory commitments, EM Plan commitments and the Plan of Operations. The audit program ensures a senior management review of environmental performance via consideration of the audit reports.





**Table 8. Brolga Project Environmental Monitoring Programs**

<b>Brolga Mine Monitoring Schedule</b>				
<b>Monitoring Program</b>	<b>Parameters</b>	<b>Monitoring Frequency</b>	<b>Description of monitoring program &amp; procedures</b>	<b>Reference Standards</b>
Oil and fuel storage	Spill control & recovery measures	Annual survey / audit	Visually inspect storages and spill control facilities to ensure adequate storages and compliance with standards.	AS1940; Code of Environmental Compliance for Mining Lease Projects (CEC)
Dust deposition	Total dust fallout quantity	Monthly	Dust jars collected and replaced, samples sent to NATA accredited laboratory for analysis	AS3580.10.1; CEC
Surface water –dams / pits	Water quality	After each significant rain event, or on a quarterly basis	DEHP Water Quality Sampling Manual; water samples sent to NATA accredited laboratory for analysis under chain of custody protocols.	AS5667.1; AS5667.4; AS5667.6; AS5667.10; ANZECC
Groundwater	Groundwater level	Quarterly, at a similar time of year to account for seasonal variations	Measurement of standing water level (SWL) to monitor for aquifer drawdown in the vicinity of extraction bores	
Sediment control	Soil stability, erosion, maintenance of control measures	Following significant rainfall events; Annual survey / audit	Disturbed areas to be checked before wet season and controls put in place/maintained. Periodic inspections following significant rain & maintenance as required.	CEC Design of erosion/sediment control structure.
Rehabilitation progress	Success criteria to be determined & documented in Rehab Plan.	Annual survey of rehabilitated areas, and control sites.	Rehab success criteria and monitoring program to be developed and documented in the Rehabilitation Plan.	Rehab success criteria to be determined and documented.
Weeds	Presence and abundance of declared and environmental weed species.	Annual audit of weed control measures and annual site survey.	Annual survey / audit of treated areas to assess effectiveness; Annual survey of Project site to determine presence of declared and environmental weed species & inform weed control program	Land Protection (Pest & Stock Route Management) Act 2002
Pests	Presence and abundance of feral animals.	Frequency to be established following initial survey	Visual monitoring for presence of feral animals by site personal; feedback from adjacent landholders / graziers.	Land Protection (Pest and Stock Route Management) Act.
Waste	Waste audit	Annual survey / audit of waste management areas	Inspect waste storage facilities – ensure adequate and compliant; Review of waste tracking records.	Environmental Protection (Waste Management) Regulation 2008; CEC
Noise	Decibel meter reading	Monitoring as required by conditions of Environmental Authority.	Monitoring in the event of a valid noise complaint – in accordance with the noise monitoring requirements of the Environmental Authority conditions.	AS1055.1; AS1055.2; AS1055.3; Queensland EHP Noise Measurement Manual



#### **4.4 Environmental Training and Awareness**

QNI Resources Pty Ltd will ensure that employees, contractors and visitors receive appropriate environmental awareness training. This will be achieved through a variety of methods including induction training, toolbox presentations and printed information.