Donaldson Coal Pty Limited

ABEL UNDERGROUND MINE PART 3A ENVIRONMENTAL ASSESSMENT

Appendix C

Environmental & Community Risk Assessment and Establishment of a Site Based Risk Register for the Abel Project

F I N A L R E P O R T

A U G U S T 2 0 0 6

Environmental & Community Risk Assessment (ECRA) and Establishment of a Site Based Risk Register for the Abel Project.

Prepared for

Ellemby Resources

Mark McPherson
Director
Ellemby Resources
PO Box 37
MAITLAND, NSW 2320

AUGUST 2006

EMP1-1005-15

GSS ENVIRONMENTAL
Environmental, Land and Project Management Consultants

Environmental & Community Risk Assessment (ECRA) and Establishment of a Site Based Risk Register for the Abel Project.

Prepared for **Ellemby Resources**

Mark McPherson

Director

PO Box 37

MAITLAND, NSW 2320

Prepared by **GSS Environmental**

PO Box 3214

WAMBERAL, NSW 2260.

Original Date of Issue October 2005

GSSE Ref *EMP1-1005-15 ABEL Project ERA Report_v6_review of EA*

ISSUE AND AMENDMENT CONTROL HISTORY

Issue	Date	Description	Author	QA/QC
1	25.10.2005	Draft Report.	Chrissie Eckersley	Andrew Hutton
2	04.05.2006	Draft Report (reviewed to include Community Issues).	Andrew Hutton	Nicole Reilly
3.	31.05.2006	Final Copy of Report following comments from client.	Andrew Hutton	Nicole Reilly
4	25.07.2006	Review of report considering Final Draft of EA document.	Andrew Hutton	Nicole Reilly
5	7.08.2006	Review of report following comments from Minter Ellison	Andrew Hutton	Nicole Reilly

TABLE OF CONTENTS

TABLES

APPENDICES

ABBREVIATIONS

CCC	Community Consultation Committee
DoP	Department of Planning
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMS	Environmental Management System
ECRA	Environment & Community Risk Assessment
GSSE	GSS Environmental
ROM	Run Of Mine

1.0 INTRODUCTION

GSS Environmental (GSSE) was engaged by Ellemby Resources to undertake an Environmental and Community Risk Assessment (ECRA) and develop a Risk Register for the proposed Abel underground coal mine ("project").

Initially the project was undertaken to provide the basis for identifying issues prior to the commencement of the impact assessment phase of the project. Later the scope was extended to take into consideration community information and concerns collected during the assessment process, as well as additional or altered mitigation measures proposed as a result of the assessment studies.

A **qualitative risk assessment** methodology was developed by GSSE in accordance with the requirements of the Australian Standard ***AS/NZS 4360:2004 – Risk Management*.**

GSSE assembled a project team utilising key stakeholders as this was considered the most appropriate way to help define context and identify the possible risks which needed some consideration throughout the process. To this end a stakeholder workshop session was held at the GSSE office on the 21st October 2005. The workshop was facilitated by Andrew Hutton, Principal Environmental Consultant. This considered the

In addition to the workshop session, the Abel project team held a number of public meetings and undertook an extensive door knock and letterbox drop of all residents who have the potential to be affected by the proposal. The information that has been provided by the consultants working on the project and also that obtained through the community consultation strategy has been included in the risk assessment and, with the Statement of Commitments and mitigating effects, provides the final risk assessment for the project.

This report summarises the aims and objectives of the ECRA, describes the methodology used throughout the ECRA process, as well as detailing the various findings and presenting them as an Environmental Risk Register (attached as **Appendix A**).

1.1 Background to the Project

Donaldson Coal Pty Ltd currently owns and operates Donaldson Open Cut Mine, approximately 23 kilometres north-west of Newcastle. This open cut mine has approval to operate until 2012 at which point the economic reserves will be exhausted. Donaldson proposes to develop a new underground mine that will access coal reserves south of the Open Cut Mine. A major benefit of this proposal is that the area required for surface facilities can be placed within existing areas of disturbance

in the Donaldson open cut, and once brought to the surface, coal can be conveyed by truck or conveyor through the Donaldson open cut to the adjacent Bloomfield Coal Handling and Preparation Plant and rail loader for coal processing and loading.

The proposed underground mine, will have a production capacity of approximately 4.5 million tonnes per annum run-of-mine (ROM) coal and an operating life of over 20 years. The proposed method of extraction will be high productivity, continuous miner based bord and pillar systems, using pillar extraction techniques. This method allows the amount of coal being extracted to be varied so that subsidence can be controlled and a range of surface features protected.

The proposed underground lease area, within which coal will be extracted, extends southwards from John Renshaw Drive towards George Booth Drive. It is bounded on the eastern side by the F3 Freeway and on the western side by a geological feature in the vicinity of Buttai Creek.

Mining progresses southwards, mining will become deeper with the depth of cover ranging from 30m in the northern area immediately adjacent to John Renshaw Drive, to 450 metres a the southern boundary.

Access to the underground reserves will be from the Donaldson high wall north of John Renshaw Drive. A number of roadways will be driven under John Renshaw Drive with normal underground mining commencing on the southern side of John Renshaw Drive and progressing southwards. ROM coal will be transported via conveyor through the high wall to the ROM coal surge stockpile located within the existing Donaldson boxcut.

From the surge stockpile, coal will be transported to the Bloomfield Coal Handling and Preparation Plant (CHPP), initially by truck but later by conveyor, where it will be processed and loaded onto rail.

2.0 AIMS AND OBJECTIVES

Initially the aim of the project was undertaken to provide the basis for identifying issues prior to the commencement of the environmental impact assessment phase of the project. Later the scope was extended to take into consideration community information and concerns collected during the stakeholder engagement process, as well as additional or altered mitigation/control measures proposed as a result of the impact assessment studies.

The following specific aims and objectives were established for the Abel Underground Mine Project ECRA:

- To assemble the key stakeholders in the project to identify the activities, aspects and possible environmental impacts associated with the operation of the underground coal mine;

- To incorporate any concerns raised by the general community throughout the extensive Community Consultation Process;
- To consider these activities in isolation of any controls and determine a potential raw risk rating;
- To identify any controls required to mitigate or minimise the potential for the impacts in order to reduce the risk to the lowest level possible;
- To Provide the basis for the development of an action plan which identified the various issues requiring further consideration during the environmental impact assessment phase of project; and
- Determine the residual risk and ensure that is it appropriately low enough given the sensitivities of the project location. This was undertaken following consideration of the controls/mitigation strategies proposed as part of the Environmental Assessment for the project.

3.0 SCOPE

This ECRA covers the proposed Abel underground coal project, including the construction and operation phase of the mine.

Table 1 below describes the two (2) distinct phases of the project and details what activities were included within each of the phases.

Table 1: List of key phases of the project considered in the ECRA.

PROJECT PHASE	PROCESS BOUNDARY	ACTIVITIES
Mine Construction	Pre-mining development and construction phase.	Includes development headings, establishment of vent shafts and conveyors, excavation and construction of the Box-Cut, Portal Area, ROM stockpiles, interim and permanent surface facilities.
Underground Mining	Exploration of coal reserves and underground mining activities.	Coal mining, coal transportation to ROM coal stockpiles, coal processing and loading, subsidence, and water management.

4.0 METHODOLOGY

4.1 Workshop Sessions

Key Project team personnel were selected to form a "working group" for the ECRA. This enabled the risks to be assessed by those who have experience in the area, understand the project and also have the authority to action key "findings" that may have resulted from the ECRA process. These personnel were also able to provide the best insight into the environmental effects of the activity, the frequency that the activity is undertaken, and suggest suitable and practical control solutions where required.

The following table shows the date of the workshop session as well those who attended, including their responsibility within the Project team.

Table 2: Workshop Session and List of Attendees:

Workshop Session for the Mine Construction and Underground Mining 21st October 2005	
1). Sam Reich	*Manager, Exploration and Development, Ellemby Resources*
2). Mark McPherson	*Director, Ellemby Resources*
3). Steve Thornton	*Mine Planning Engineer, Ellemby Resources*
4). Phil Brown	*Environmental Manager, Tasman/Donaldson Coal*
5). Nicole Croker	*Environmental Consultant, Eco Central*
6). Andrew Hutton	*Principal Environmental Consultant, GSSE*
7). Chrissie Eckersley	*Senior Environmental Projects Scientist, GSSE*

4.2 Community Consultation Program

As part of the planning phase of the project an extensive Community consultation / engagement program was implemented. This program provided an opportunity for community concerns to be included as part of the environmental impact assessment stage of the project. This program will continue throughout the life of the mine through the formation of a Community Consultation Committee (CCC) once the mine commences operations.

The Community Consultation program undertaken to date includes the following key elements:

- Formation of a Community Liaison Committee which includes representatives from the surrounding community;

- Holding Public Meetings to provide information on the project. This also includes a series of presentations on key issues as identified by the community;
- The Project team has undertaken door knocks within the area that is likely to be affected by the proposal. The purpose was to speak with the each of the residents individually;
- Letter box drops have been undertaken within the area that is likely to be affected by the proposal with an information letter being left generally where people were not home during the door knock exercise; and
- A Liaison Officer has been appointed by the Project team to liaise with the community and be available to receive and respond to any community concerns/questions relating to the project.

Figure 1 shows the residents that have been identified within the proposed project area. The plan also shows those residents that were either "door knocked" or have received a letterbox drop on either the 17th November 2005 or 9th December 2005.

GSSE has attended a number of the Public Meetings and reviewed all minutes from the community information meetings and the Community Liaison Committee held to date. This has allowed GSSE to develop an excellent understanding of the issues that are most important or are of the greatest concern to the community.

The following is a summary of the key issues identified in the review:

- Impacts from Subsidence (specific issue relating to impacts as well as issues relating to possibly prohibiting development or increasing future buildings costs);
- Visual Impact of ROM Coal Stockpiles;
- Donaldson having relevant underground mining experience;
- Noise and Vibration from mining;
- Environmental Monitoring for the project;
- Cumulative impacts from mining in the area;
- Impacts on roads and traffic in the area;
- Propensity for Acid Mine Drainage to occur; and
- Issues related to the release of gases through subsidence and exploration drilling.

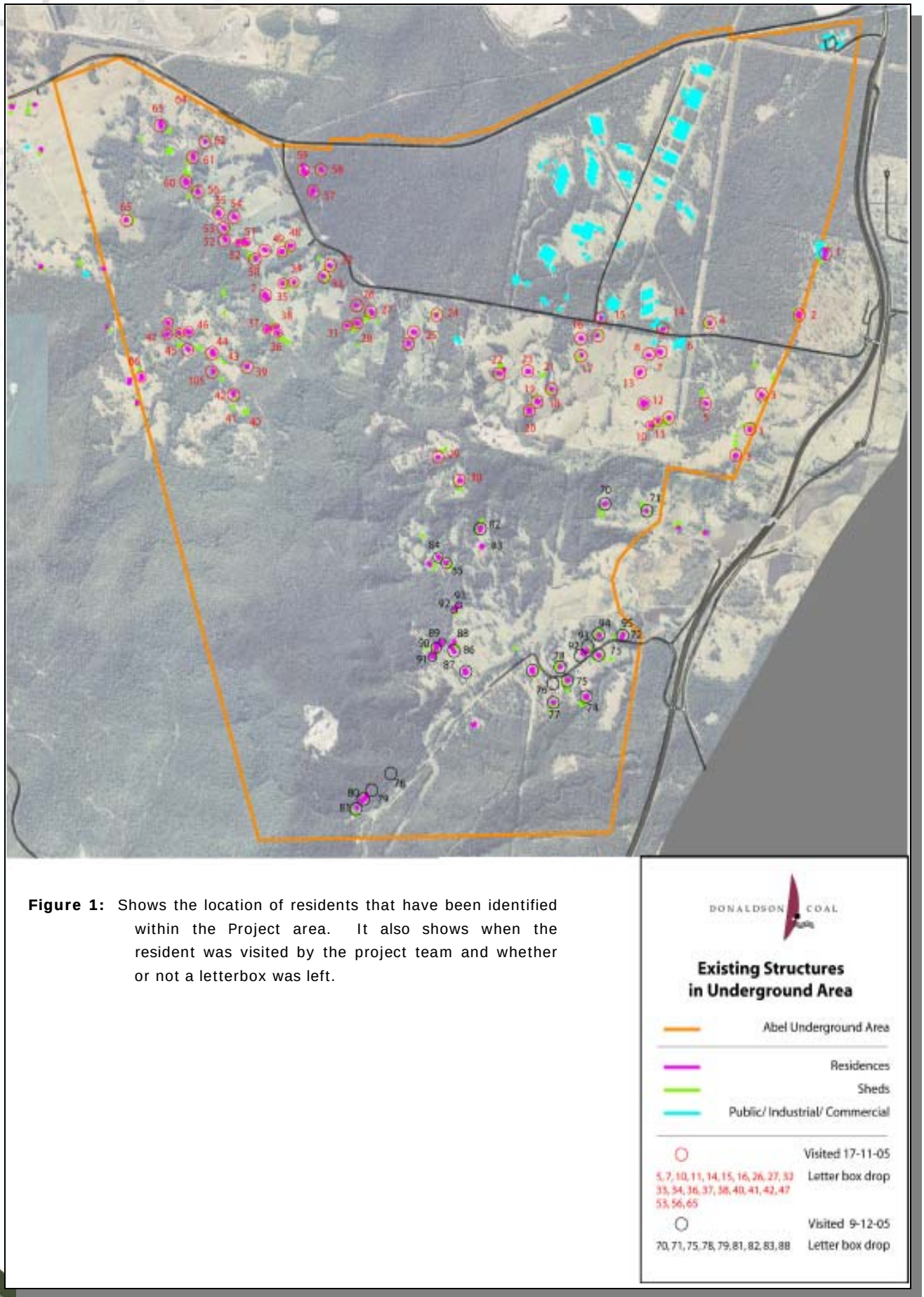

Figure 1: Shows the location of residents that have been identified within the Project area. It also shows when the resident was visited by the project team and whether or not a letterbox was left.

The comprehensive list of concerns / issues identified during this Community consultation program have been considered by GSSE and integrated into the Environmental Risk Register for the project (see **Appendix A)**.

4.3 Determination and Assigning the Environmental & Community Risk Rating

4.3.1 Outline of General Approach

The following section outlines the approach used by GSSE to assign a specific Risk Rating to each aspect of the proposed underground coal project. Risk assessment is the formalised means by which the aspects of the project and their associated impacts are systematically identified, assessed, ranked according to perceived risk and addressed by means of appropriate and effective controls or management outcomes.

Risk is the chance of something happening that will have either a positive or negative impact upon the environment and/or the Community. It involves consideration of the sources of the risk (ie. underground mining) assessing the consequences and considering the likelihood that those consequences might occur. The impact may vary in consequence from ***Catastrophic*** *-a major event which could cause severe impact to the environment or the community* through to ***Insignificant*** *-no detrimental impact on the environment or the community is measured or envisaged*. The Environmental Risk Rating assigned to the activity during this process is measured in terms of both consequence (severity) and likelihood (probability) of the event occurring.

4.3.2 Compliance with AS/NZS 4360:2004 Risk Assessment– *Qualitative Risk Assessments.*

A qualitative risk assessment methodology was developed by GSSE in accordance with the requirements of the Australian Standard ***AS/NZS 4360:2004 – Risk Management*.**

It is intended that this **qualitative** assessment be used as an initial *screening* activity being the basis for identifying issues prior to the commencement of the impact assessment phase of the project. As work on the project assessment progressed, and the stakeholder engagement strategy implemented, the scope of the Risk Assessment was extended to take into consideration community information and concerns collected during the, as well as additional or altered mitigation measures proposed as a result of the assessment studies.

Throughout the project GSSE followed five (5) basic steps during the Risk Assessment process including:

(a) Establishing the internal and external context for the environmental risk assessment process, including developing consequence criteria and defining the structure of the risk assessment process. This is important to ensure that the objectives defined for the risk management process take into account the issues specific to the project as well as the external environment.

(b) Identifying the environmental and community related risks, including what could happen, when and where;

(c) Analysing the risks using a qualitative risk approach (i.e. identifying existing controls, determining specific consequences / likelihoods table (see **Table 3** below) and then determining the level of risk; and

(d) Evaluating the risks to determine the significant issues. The purpose of risk evaluation is to make decisions, based on the outcomes of the risk assessment, about which risks need controls or mitigation strategies and to assign priorities; and

(e) Establishing the controls to mitigate/treat the risks identified as part of the process. This involved identifying the range of options that were applicable and then preparing and committing to the implementation of the controls in the Statement of Commitments that supports the application to the Department of Planning.

4.3.3 Environmental Consequence

The allocation of an Environmental Risk Rating was based on the Consequence descriptions contained in **Table 3** below. The descriptions in the table below were developed by GSSE through experience undertaking previous Risk Assessment exercises and have been designed such that the working group could make a subjective assessment of the likely consequence using a series of assumptions or descriptors. The magnitude of the consequence of an event was assessed using these descriptors and assigned a Rating of 1 to 5 (see Table over page).

Table 3: Environmental Consequence Descriptions

1	**Catastrophic**	**A major event which could cause severe or irreversible damage to the natural and/or human environment.** • Major Closure Costs (i.e. estimated closure costs > $5M). • Permanent premature closure of the mine. • Severe or irreversible damage to natural environment. • Could kill or permanently disable people. • Actual or potential loss of credibility with key stakeholders (community / government). • Long term environmental liability/legacy to the Company. • Loss of global reputation for the Company. • Regulatory intervention, prosecution would occur (ie. Fines). • Negative publicity/complaints (National & Global media exposure). • Pollution event causes major downstream damage that is rectified by a long term remediation program over 12 months (e.g. failure of major tailings dam that pollutes *international* waters). • Total destruction of Cultural Heritage Sites and Artefacts.
2	**Major**	**An event which could have a substantial and permanent consequence to the natural and / or human environment.** • Major Closure Costs (i.e. estimated closure costs $1M - $5M). • Could cause temporary or long term closure of mine. • Substantial and permanent consequences to the natural environment. • Could cause serious injury or disease to people • Potential loss of credibility with key stakeholders (community / government) • Reported incident, regulatory intervention which would result in prosecution. • Adverse publicity and community complaints (National media exposure). • Pollution event which causes serious downstream damage that is rectified by a medium term remediation program over 1-12 months (e.g. failure of major tailings dam that pollutes *regional/national* waters). • Major permanent unrepairable damage to Cultural Heritage Sites and Artefacts.
3	**Moderate**	**An event which could create substantial temporary or minor permanent damage to the natural and / or human environment.** • Moderate Closure Costs (ie. estimated closure costs $500K - $1M). • Could cause temporary closure of the mine or disruptions to the operation. • Substantial temporary or minor permanent damage to the natural environment. • A reportable incident not likely to result in prosecution. • Could cause typical lost time injury (LTI) to people • Potential loss of credibility with key stakeholders (community / government) • Adverse local publicity and community complaints (Local media exposure). • Event which causes substantial temporary damage that is rectified by medium term remediation program over 3 – 6 months (i.e. earthworks to fix surface cracking under public roads or works required to stop water leaking from water storage structures). • Substantial permanent unrepairable damage to Cultural Heritage Sites and Artefacts.

4	**Minor**	**An event which could have temporary and minor effects to the natural and / or human environment.** • Minor Closure Costs (ie. estimated closure costs $100K - $500K). • Temporary minor damage to the natural environment. • Could cause a first aid injury to people. • Complaints received from near neighbours. • Could result in government intervention but not likely to result in prosecution. • Event which causes temporary minor damage which may require some minor rectification works (i.e. cracking on surface causing minor erosion in drainage lines). • Minor repairable damage to Cultural Heritage Sites and Artefacts.
5	**Insignificant**	**No detrimental impact on the natural and / or human environment is measured or envisaged.** • Minor Closure Costs (ie. estimated closure costs <$100K) • No detrimental impact to the natural environment. • Couldn't cause injury or disease to people. • No detrimental impacts to Cultural Heritage Sites and Artefacts.

4.3.4 Probability of an Incident occurring

The likelihood of an event occurring was considered by the working group. The likelihood (or probability) of an impact occurring was rated according to the following descriptions on **Table 4.**

Table 4: List of Probability Criteria Used in the ECRA.

PROBABILITY:	
A -	Almost certain to happen
B -	Likely to happen at some point
C -	Moderate: possible, heard of so it might happen
D -	Unlikely: not likely to happen
E -	Rare: practically impossible

4.3.5 Environmental Risk Matrix

The Risk Rating was assigned by combining the consequence with the probability that the consequence would occur. A numerical Risk Ranking between 1 and 25 was allocated for each aspect of the proposal using the "*Environmental Risk Matrix*" included as **Table 5** below.

Table 5: Environmental Risk Rating Matrix

Maximum Reasonable Consequence	Probability A	B	C	D	E
1	1	2	4	7	11
2	3	5	8	12	16
3	6	9	13	17	20
4	10	14	18	21	23
5	15	19	22	24	25

4.3.6 Risk Classification System

Depending on the numerical Risk Ranking, a Risk Rating Class was then applied to each aspect using the Risk Classification System. **Table 6** shows the different classes of the Risk Classification System.

Table 6: Risk Classification System

Risk Classification System :	
High Risk (H)	1 to 6 (Red)
Medium Risk (M)	7 to 15 (Yellow)
Low Risk (L)	16 to 25 (Green)

In accordance with this Risk Classification System, one of the following Environmental Risk Ratings was assigned to each aspect:

- **H (high)** being a *Class 1 Risk* - requires immediate management attention, a stop/stand down until rectified if deemed necessary.
- **M (moderate)** being a *Class 2 Risk* - acceptable with current controls but requires attention if controls absent or ineffective, and where practicable develop other controls to mitigate the risk.
- **L (low)** being a *Class 3 Risk* - assess and control as required.

4.3.7 Assessment of Effectiveness of Controls

Risk Rankings were allocated for each aspect of the proposed development, based on three (3) separate scenarios. The first considering **no controls,** which is a measure of the *raw* risk associated with the activity. The second

considered the risk rating with either **current controls** (where applicable) and where not in place, with the **proposed controls** determined by the working group.

In the context of this Environmental & Community Risk Assessment a control is considered to be either a hard engineering control (e.g. bunds, diversions, etc) or administrative control (e.g. work procedure(s) and/or management plan).

5.0 RISK REGISTER

GSSE has compiled the following Risk Register (**Appendix A**) to document the risk assessment outcome(s) for all aspects identified throughout the ECRA process. The community issues and concerns have been integrated into the Register and assigned a Risk Classification (where appropriate). The Risk Register has been separated into the two (2) key phases identified for the Abel Project, which included Mine construction and the operation of the Underground Mine.

APPENDIX A – Risk Register for Ellemby Resources

ENVIRONMENTAL RISK REGISTER - MINE CONSTRUCTION

Process Area	Activity	Aspect	Issue raised during Community Consult.	Raw				Existing Controls	Existing Controls				Proposed Controls	Residual Risk			
				C	P	R			C	P	R			C	P	R	
Mine construction	Development headings	Impact on John Renshaw Drive	no	2	c	2c	8 (M)		2	c	2c	8 (M)	Mine design agreed with RTA	3	d	3d	17 (L)
	Establishing Vent Shaft	Blasting	yes	4	c	4c	18 (L)		4	c	4c	18 (L)	Mine Safety Management Plan Contractor Management Plan	4	e	4e	23 (L)
		Threatened Flora and Fauna	no	3	b	3b	9 (M)		3	b	3b	9 (M)	Preclearing approvals Preclearing surveys Inductions Suitably qualified contractor Location of known *spp* . provided to surveyor	3	d	3d	17 (L)
		Aboriginal Heritage	no	3	c	3c	13 (M)		3	c	3c	13 (M)	Preclearing approvals Preclearing surveys Inductions Suitably qualified contractor Location of known sites and artefacts provided to surveyor	3	d	3d	17 (L)
		European Heritage	no	3	e	3e	20 (L)		3	e	3e	20 (L)					
		Noise	no	4	b	4b	14 (M)		4	b	4b	14 (M)	Orientation of the fan towards the NW away from residents and parallel to the ground Inductions Suitably qualified contractor Environmental contractor obligations included in the contract	4	d	4d	21 (L)
		Air Quality (commissioning)	no	5	d	5d	24 (L)		5	d	5d	24 (L)					
		Erosion and Sediment	no	4	b	4b	14 (M)		4	b	4b	14 (M)	Preclearing approvals Inductions Suitably qualified contractor Implementation of the Erosion and Sediment Control Plan	5	d	5d	24 (L)
	Conveyor	Threatened Flora and Fauna	no	3	b	3b	9 (M)		3	b	3b	9 (M)	Preclearing approvals Preclearing surveys Inductions Suitably qualified contractor Location of known *spp* . provided to surveyor	3	d	3d	17 (L)
		Aboriginal Heritage	no	3	b	3b	9 (M)		3	b	3b	9 (M)	Preclearing approvals Preclearing surveys Inductions Suitably qualified contractor Location of known sites and artefacts provided to surveyor	3	d	3d	17 (L)
		European Heritage	no	3	d	3d	17 (L)		3	d	3d	17 (L)					
		Noise	yes	3	c	3c	13 (M)		3	c	3c	13 (M)	Inductions Suitably qualified contractor Environmental contractor obligations included in the contract Orientate equipment so that noise emissions are directed away from noise sensative areas.	3	d	3d	17 (L)
		Dust	yes	4	d	4d	21 (L)		4	d	4d	21 (L)					
		Erosion and Sediment	no	3	c	3c	13 (M)		3	c	3c	13 (M)	Preclearing approvals Inductions Suitably qualified contractor Implementation of the Erosion and Sediment Control Plan	3	d	3d	17 (L)
		Visual (lighting)	yes	4	d	4d	21 (L)		4	d	4d	21 (L)	The location of the conveyor will follow the existing roadway and be a maximum of 15m so it is protected by the existing tree cover.				
	Box-Cut Excavation	Noise	no					Managed by an Existing Donaldson Open Cut Management Plan	4	d	4d	21 (L)					
		Dust	no					Managed by an Existing Donaldson Open Cut Management Plan	4	d	4d	21 (L)					
		water	no					Managed by an Existing Donaldson Open Cut Management Plan	4	d	4d	21 (L)					
		Blasting/excavation of box-cut	yes					Managed by an Existing Donaldson Open Cut Management Plan	4	d	4d	21 (L)					
		Flora and Fauna	no					Managed by an Existing Donaldson Open Cut Management Plan	4	d	4d	21 (L)					
		Aboriginal Heritage	no					Managed by an Existing Donaldson Open Cut Management Plan	4	d	4d	21 (L)					
		European Heritage	no					Managed by an Existing Donaldson Open Cut Management Plan	4	d	4d	21 (L)					
	Portal Area (Construction)	Noise	no	3	c	3c	13 (M)		3	c	3c	13 (M)	Inductions Suitably qualified contractor Environmental contractor obligations included in the contract	3	d	3d	17 (L)
		Dust	yes	4	d	4d	21 (L)		4	d	4d	21 (L)					
		Potentially sediment laden water leaving the site	no	4	d	4d	21 (L)		4	d	4d	21 (L)					
		Lighting-visual	yes	4	d	4d	21 (L)		4	d	4d	21 (L)					
		Traffic movement to and from site	yes	4	c	4c	18 (L)		4	c	4c	18 (L)					
		Threatened Flora and Fauna	no	4	b	4b	14 (M)		4	b	4b	14 (M)	Preclearing approvals Preclearing surveys Inductions Suitably qualified contractor Location of known *spp* . provided to surveyor	4	d	4d	21 (L)
		Aboriginal Heritage	no	3	d	3d	17 (L)		3	d	3d	17 (L)					
		European Heritage	no	3	e	3e	20 (L)		3	e	3e	20 (L)					
		Noise	no	4	b	4b	14 (M)		4	b	4b	14 (M)	Inductions Suitably qualified contractor Environmental contractor obligations included in the contract Orientate equipment so that noise emissions are directed away from noise sensative areas.	4	d	4d	21 (L)
		Air Quality (commissioning)	no	5	d	5d	24 (L)		5	d	5d	24 (L)					
		Erosion and Sediment	no	4	b	4b	14 (M)		4	b	4b	14 (M)	Preclearing approvals Inductions Suitably qualified contractor Implementation of the Erosion and Sediment Control Plan	4	d	4d	21 (L)
	Interim surface facilities (office, bath house, work shop, etc)	Threatened Flora and Fauna	no	4	b	4b	14 (M)		4	b	4b	14 (M)	Preclearing approvals Preclearing surveys Inductions Suitably qualified contractor Location of known *spp* . provided to surveyor	4	d	4d	21 (L)
		Aboriginal Heritage	no	3	d	3d	17 (L)		3	d	3d	17 (L)					
		European Heritage	no	3	e	3e	20 (L)		3	e	3e	20 (L)					
		Noise	no	4	b	4b	14 (M)		4	b	4b	14 (M)	Inductions Suitably qualified contractor Environmental contractor obligations included in the contract	4	d	4d	21 (L)
		Air Quality (commissioning)	no	5	d	5d	24 (L)		5	d	5d	24 (L)					
		Erosion and Sediment	no	4	b	4b	14 (M)		4	b	4b	14 (M)	Preclearing approvals Inductions Suitably qualified contractor Implementation of the Erosion and Sediment Control Plan	4	d	4d	21 (L)
		Waste management	no	4	c	4c	18 (L)		4	c	4c	18 (L)					
		Hydrocarbon/chemical storage	no	3	c	3c	13 (M)		3	c	3c	13 (M)	Storage in accordance with EPL, Australian Standards, DG & Waste Guidelines	5	d	5d	24 (L)
		Light	yes	4	d	4d	21 (L)		4	d	4d	21 (L)					
		Visual (including lighting)	no	4	c	4c	18 (L)		4	c	4c	18 (L)	Lights will be directed away from the nearby resident The buildings will be painted a colour that blends thm in with the surrounding natural environment	4	d	4d	21 (L)
		Dust	yes	4	d	4d	21 (L)		4	d	4d	21 (L)					
		Traffic movement to and from site	yes	4	c	4c	18 (L)		4	c	4c	18 (L)					
	Permanent surface facilities (office, bath house, work shop, etc)	Hydrocarbon/chemical storage	no	4	c	4c	18 (L)		4	c	4c	18 (L)					
		Light	no	4	d	4d	21 (L)		4	d	4d	21 (L)					
		Dust	yes	4	d	4d	21 (L)		4	d	4d	21 (L)					
		Noise	yes	4	d	4d	21 (L)		4	d	4d	21 (L)					
		Traffic movement to and from site	yes	4	c	4c	18 (L)		4	c	4c	18 (L)					

ENVIRONMENTAL RISK REGISTER - MINE CONSTRUCTION																			
Process Area	Activity	Aspect	Issue raised during Community Consult.	Raw				Existing Controls	Existing Controls				Proposed Controls	Residual Risk					
				C	P	R			C	P	R			C	P	R			
		Erosion and Sediment	**no**	4	b	4b	14 (M)		4	b	4b	14 (M)	Preclearing approvals Inductions Suitably qualified contractor Implementation of the Erosion and Sediment Control Plan	4	d	4d	21 (L)		
		Waste management	**no**	4	c	4c	18 (L)		4	c	4c	18 (L)							

ENVIRONMENTAL RISK REGISTER - UNDERGROUND MINING

Process Area	Activity	Aspect	Issue raised during Community Consult.	Raw				Existing Controls	Existing Controls				Proposed Controls	Residual Risk			
				C	P		R		C	P		R		C	P		R
Underground Mining	Exploration	Bore holes not being capped and presenting a saftey issue or risk to stock and wildlife	yes	4	b	4b	14 (M)	All holes are either capped after use or made up as water monitoring bores.	4	d	4d	21 (L)					
	Coal Mining (Underground)	Subsidence (*see subsidence activity*)	n/a														
		Waste e.g. oily rags, crib waste, tyres	no	4	c	4c	18 (L)	Donaldson Waste Management Plan Emergency Preparedness & Response Plan Employee Inductions and Maintenance programs	4	c	4c	18 (L)					
		Water contamination from spills and leaks	no	4	a	4a	10 (M)	Donaldson Waste Management Plan Emergency Preparedness & Response Plan Employee Inductions and Maintenance programs	4	d	4d	21 (L)					
	Subsidence (specific issues)	Schedule 2 and above Creeks -cracking and water loss	yes	1	a	1a	1 (H)		1	a	1a	1 (H)	Non-longwall system Designed extraction regime to limit subsidence (minimum barrier of 40m between the 20mm lne of subsidence and the top of bank) Monitoring Surface Water Management Plan	3	d	3d	17 (L)
		Schedule 2 and above Creeks - changes in creek bed profile resulting in erosion and sediment in the creek	yes	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence (minimum barrier of 40m between the 20mm line of subsidence and the top of bank) Monitoring Surface Water Management Plan	3	d	3d	17 (L)
		Vegetation loss due to swamping/ waterlogging from ponding	no	3	b	3b	9 (M)		3	b	3b	9 (M)	Non-longwall system Designed extraction regime to limit subsidence. Monitoring	3	d	3d	17 (L)
		Water loss from farm dams	yes	3	a	3a	6 (H)		3	a	3a	6 (H)	Non-longwall system Assess the dam Drain if required and provide alternate water supply Reinstate the dam and refill Monitoring	3	d	3d	17 (L)
		Damage and disruption to public utilities	yes	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence Preparation of a speciifc Plan and Management as part of the SMP process to ensure safety and servicability of the utility. Mine Subsidence Board compensation	3	d	3d	17 (L)
		Damage to private residences	yes	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence Prepare and implement and Plan of Management for every Principal Residence to protect it from the mining induced subsidence. Assessment by structural engineer followed by ongoing monitoring. Mine Subsidence Board compensation	3	d	3d	17 (L)
		Prohibiting future development potential/opportunities for the landholder	yes	2	a	2a	3 (H)	Following subsidence from mining the land will not subside further therefore no restriction will apply to land.	4	d	4d	21 (L)	If future works are proposed prior to mining occurring the controls applicable to a Principal Residence will apply.				
		Gases being released from the mine as a result of cracking at the surface (ie. Possible Bushfire hazard if flammable)	yes	3	b	3b	9 (M)		3	b	3b	9 (M)	Drilling indicates that the mine is not expected to be gasey and gas extraction will not be required. If gas is found to be a problem an extraction is required a diffuser will be used. It has valves, flame traps and monitoring.	3	d	3d	17 (L)
		Private Utilities	yes	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence Prepare and implement and Plan of Management for every private utility to protect it from the mining induced subsidence. Mine Subsidence Board compensation.	3	d	3d	17 (L)
		Loss of Aboriginal heritage	no	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence Preparation of an Aboriginal Heritage Management Plan Minimise impacts to identified and potential sites and conserve identified sites where impacts are not to occur for operational reasons. Ongoing systematic survey of each area to be mined with participation of the Aboriginal stakeholders. Where it is deteremined that subsidence may impact, individual mitigation measures will be implemented to ensure that the impact is	3	d	3d	17 (L)
		Loss of European heritage	no	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence Minimise impacts to identified and potential sites and conserve identified sites where impacts are not to occur for operational reasons.	3	d	3d	17 (L)
		Topographic features (ie. Cliff lines)	yes	2	a	2a	3 (H)		2	a	2a	3 (H)	Trigger Action Responce Plans to be prepared in consultation with the DEC and Lands Council General cliff line instability or large scale collapses of the cliff faces are not expected to occur. Rock Fall Management Plans will be prepared. Non-longwall system. Designed extraction regime to limit subsidence. Rock Fall hazard controls	3	d	3d	17 (L)
		Natural features (ie. Wetlands)	yes	2	a	2a	3 (H)		2	a	2a	3 (H)	There is believed to be negligible hydraulic connection between the swamps and the deeper groundwater. Non-longwall system Designed extraction regime to limit subsidence Plus application of protective buffers.	3	d	3d	17 (L)
	Unpredicted strata collapse (sink holes)	Schedule 2 and above Creeks -cracking and water loss	yes	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadways intersections at low depth of covers. Monitoring Surface Water Management Plan	3	d	3d	17 (L)
		Schedule 2 and above Creeks - changes in creek bed profile resulting in erosion and sediment in the creek	yes	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadways intersections at low depth of covers. Monitoring Surface Water Management Plan	3	d	3d	17 (L)
		Vegetation loss due to swamping/ waterlogging from ponding	no	3	c	3c	13 (M)		3	c	3c	13 (M)	Non-longwall system No roadways intersections at low depth of covers. Monitoring Surface Water Management Plan	3	d	3d	17 (L)
		Water loss from farm dams	yes	3	c	3c	13 (M)		3	c	3c	13 (M)	No roadway intersections at low depth of cover. Assess the dam Drain if required and provide alternate water supply Reinstate the dam and refill Monitoring	3	d	3d	17 (L)
		Damage and disruption to public utilities	yes	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadway intersections at low depth of cover. Preparation of a speciifc Plan and Management as part of the SMP process to ensure safety and servicability of the utility. Mine Subsidence Board compensation	3	d	3d	17 (L)
		Damage to private residences	yes	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadway intersections at low depth of cover. Prepare and implement and Plan of Management for every Principal Residence to protect it from the mining induced subsidence. Assessment by structural engineer followed by ongoing monitoring. Mine Subsidence Board compensation	3	d	3d	17 (L)
		Prohibiting future development potential/opportunities for the landholder	yes	2	a	2a	3 (H)	Following subsidence from mining the land will not subside further therefore no restriction will apply to land.	4	d	4d	21 (L)	note: If future works are proposed prior to mining occurring the controls applicable to a Principal Residence will apply.				
		Gases being released from the mine as a result of cracking at the surface (ie. Possible Bushfire hazard if flammable)	yes	3	b	3b	9 (M)		3	b	3b	9 (M)	Drilling indicates that the mine is not expected to be gasey and gas extraction will not be required. If gas is found to be a problem an extraction is required a diffuser will be used. It has valves, flame traps and monitoring.	3	d	3d	17 (L)
		Private Utilities	yes	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadway intersections at low depth of cover. Prepare and implement and Plan of Management for every private utility to protect it from the mining induced subsidence. Mine Subsidence Board compensation.	3	d	3d	17 (L)
		Loss of Aboriginal heritage	no	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system No roadway intersections at low depth of cover. Preparation of an Aboriginal Heritage Management Plan Minimise impacts to identified and potential sites and conserve identified sites where impacts are not to occur for operational reasons. Ongoing systematic survey of each area to be mined with participation of the Aboriginal stakeholders. Where it is deteremined that subsidence may impact, individual mitigation measures will be implemented to ensure that the impact is accceptable.	3	d	3d	17 (L)
		Loss of European heritage	no	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system No roadway intersections at low depth of cover. Minimise impacts to identified and potential sites and conserve identified sites where impacts are not to occur for operational reasons.	3	d	3d	17 (L)

Underground

ENVIRONMENTAL RISK REGISTER - UNDERGROUND MINING

Process Area	Activity	Aspect	Issue raised during Community Consult.	Raw C	Raw P	Raw R	Existing Controls	Existing Controls C	Existing Controls P	Existing Controls R	Proposed Controls	Residual Risk C	Residual Risk P	Residual Risk R
		Topographic features (ie. Cliff lines)	**yes**	2	d	2d 12 (M)		2	d	2d 12 (M)	Trigger Action Responce Plans to be prepared in consultation with the DEC and Lands Council General cliff line instability or large scale collapses of the cliff faces are not expected to occur. Rock Fall Management Plans will be prepared. Non-longwall system. No roadway intersections at low depth of cover. Rock Fall hazard controls	3	d	3d 17 (L)
		Natural features (ie. Wetlands)	**yes**	2	c	2c 8 (M)		2	c	2c 8 (M)	There is believed to be negligible hydraulic connection between the swamps and the deeper groundwater. Non-longwall system No roadway intersections at low depth of cover. Plus application of protective buffers.	3	d	3d 17 (L)
	Unpredicted subsidence from pillar failure	Schedule 2 and above Creeks -cracking and water loss	**yes**	2	d	2d 12 (M)		2	d	2d 12 (M)	Non-longwall system Pillar design to have adequate factor of safety Monitoring Surface Water Management Plan	3	d	3d 17 (L)
		Schedule 2 and above Creeks - changes in creek bed profile resulting in erosion and sediment in the creek	**yes**	2	d	2d 12 (M)		2	d	2d 12 (M)	Non-longwall system Pillar design to have adequate factor of safety Monitoring Surface Water Management Plan	3	d	3d 17 (L)
		Vegetation loss due to swamping/ waterlogging from ponding	**no**	3	d	3d 17 (L)		3	d	3d 17 (L)	Non-longwall system Pillar design to have adequate factor of safety Monitoring Surface Water Management Plan			
		Water loss from farm dams	**yes**	3	d	3d 17 (L)		3	d	3d 17 (L)	Pillar design to have adequate factor of safety Assess the dam Drain if required and provide alternate water supply Reinstate the dam and refill Monitoring			
		Damage and disruption to public utilities	**yes**	2	d	2d 12 (M)		2	d	2d 12 (M)	Non-longwall system Pillar design to have adequate factor of safety Preparation of a speciifc Plan and Management as part of the SMP process to ensure safety and servicability of the utility. Mine Subsidence Board compensation	3	d	3d 17 (L)
		Damage to private residences	**yes**	2	d	2d 12 (M)		2	d	2d 12 (M)	Non-longwall system Pillar design to have adequate factor of safety Prepare and implement and Plan of Management for every Principal Residence to protect it from the mining induced subsidence. Assessment by structural engineer followed by ongoing monitoring. Mine Subsidence Board compensation	3	d	3d 17 (L)
		Prohibiting future development potential/opportunities for the landholder	**yes**	2	a	2a 3 (H)	Following subsidence from mining the land will not subside further therefore no restriction will apply to land.	4	d	4d 21 (L)	If future works are proposed prior to mining occurring the controls applicable to a Principal Residence will apply.			
		Gases being released from the mine as a result of cracking at the surface (ie. Possible Bushfire hazard if flammable)	**yes**	3	b	3b 9 (M)		3	b	3b 9 (M)	Drilling indicates that the mine is not expected to be gasey and gas extraction will not be required. If gas is found to be a problem an extraction is required a diffuser will be used. It has valves, flame traps and monitoring.	3	d	3d 17 (L)
		Private Utilities	**yes**	2	d	2d 12 (M)		2	d	2d 12 (M)	Non-longwall system Pillar design to have adequate factor of safety Prepare and implement and Plan of Management for every private utility to protect it from the mining induced subsidence. Mine Subsidence Board compensation.	3	d	3d 17 (L)
		Loss of Aboriginal heritage	**no**	2	e	2e 16 (L)		2	e	2e 16 (L)				
		Loss of European heritage	**no**	2	e	2e 16 (L)		2	e	2e 16 (L)				
		Topographic features (ie. Cliff lines)	**yes**	2	e	2e 16 (L)		2	e	2e 16 (L)				
		Natural features (ie. Wetlands)	**yes**	2	d	2d 12 (M)		2	d	2d 12 (M)	There is believed to be negligible hydraulic connection between the swamps and the deeper groundwater. Non-longwall system Pillar design to have adequate factor of safety Plus application of protective buffers.	3	d	3d 17 (L)
	Conveyor	Noise (surface)	**yes**	4	c	4c 18 (L)		4	c	4c 18 (L)				
		Dust (surface)	**yes**	4	d	4d 21 (L)		4	d	4d 21 (L)				
		Coal spillage contaminating the water	**no**	3	b	3b 9 (M)		3	b	3b 9 (M)	Earthworks design and drainage control Conveyor maintenance and cleaning Inductions	4	d	4d 21 (L)
		Visual (lighting, colour)	**yes**	4	c	4c 18 (L)		4	c	4c 18 (L)	The location of the conveyor will follow the existing roadway and be a maximum of 15m so it is protected by the existing tree cover.			
	Portal Area (Operations)	Noise	**yes**	3	b	3b 9 (M)		3	b	3b 9 (M)	Implementation of Noise Management Plan in EMS (including monitoring) Employee Awareness and Inductions Orientate equipment so that noise emissions are directed away from noise sensative areas.	3	d	3d 17 (L)
		Dust	**yes**	3	b	3b 9 (M)		3	b	3b 9 (M)	Implementation of Air Quality Management Plan in EMS (including monitoring) Minimise surface disturbance Employee Awareness and Inductions Progresive Rehab Dust Supression (using water cart) Monitoring Regular Inspections	3	d	3d 17 (L)
		Potentially sediment laden water leaving the site	**no**	4	d	4d 21 (L)		4	d	4d 21 (L)				
		Lighting-visual	**yes**	4	d	4d 21 (L)		4	d	4d 21 (L)				
	Coal Handling and Preparation Plant (CHPP)	Noise	**yes**				(Existing Bloomfield Plant)							
		Dust	**no**				(Existing Bloomfield Plant)							
		Sediment laden water leaving the site	**no**				(Existing Bloomfield Plant)							
		Lighting-visual	**yes**				(Existing Bloomfield Plant)							
	ROM Stockpile (Operation)	Odour (Spontaneous combustion)	**no**	4	b	4b 14 (M)		4	b	4b 14 (M)	Spontaneous Combustion Management Plan Employee Awareness and Inductions Inspection of Stockpiles	5	d	5d 24 (L)
		Dust	**no**	4	c	4c 18 (L)		4	c	4c 18 (L)				
		Noise	**no**	4	a	4a 10 (M)		4	a	4a 10 (M)	Implementation of Noise Management Plan in EMS (including monitoring) Employee Awareness and Inductions Orientate equipment so that noise emissions are directed away from noise sensative areas.	4	d	4d 21 (L)
		Sediment laden water leaving the site	**no**	3	d	3d 17 (L)		3	d	3d 17 (L)				
		Visual	**yes**	5	a	5a 15 (M)		5	a	5a 15 (M)	Configuration and design of pads The access portals will be in the existing Donaldson open cut pit.	5	c	5c 22 (L)
	Water Management (surface water)	Leak from overland line	**no**	3	b	3b 9 (M)		3	b	3b 9 (M)	Water Management Plan Inspections and Maintenance Earthworks design Engineering controls	4	c	4c 18 (L)
		400ML Dam wall breach	**no**	3	e	3e 20 (L)		3	e	3e 20 (L)				
		Unplanned discharge	**no**	3	b	3b 9 (M)		3	b	3b 9 (M)	Water Management Plan Inspections and Maintenance Earthworks design Engineering controls	4	c	4c 18 (L)
	Ventilation	Particulate emission	**no**	5	d	5d 24 (L)		5	d	5d 24 (L)				
		Gasses released into atmosphere (e.g. methane) from underground	**no**	5	d	5d 24 (L)		5	d	5d 24 (L)				
	Gas Drainage System (may not be applicable)	high concentrated gas emissions	**no**	3	b	3b 9 (M)		3	b	3b 9 (M)	Drilling indicates that the mine is not expected to be gasey and gas extraction will not be required. If gas is found to be a problem an extraction is required a diffuser will be used. It has valves, flame traps and monitoring.	3	d	3d 17 (L)
		Gasses being released into the atmosphere from exploration or drilling.	**yes**	4	b	4b 14 (M)		4	b	4b 14 (M)	Drilling indicates that the mine is not expected to be gasey and gas extraction will not be required. If gas is found to be a problem an extraction is required a diffuser will be used. It has valves, flame traps and monitoring.	4	d	4d 21 (L)
		Odour	**no**	4	d	4d 21 (L)		4	d	4d 21 (L)				
	Water Management (groundwater)	Groundwater disposal	**no**	3	c	3c 13 (M)		3	c	3c 13 (M)	Implementation of an integrated site Surface & Groundwater Management Plan Internal use of groundwater Supply to CHPP Monitoring (SOC comittment)	3	d	3d 17 (L)
		Regional water levels	**yes**	3	b	3b 9 (M)		3	b	3b 9 (M)	Preparation of a Ground Water Management Plan (SOC committment) It is considered very unlikely that aquifers above the proposed workings, will be permanently impacted after mining Monitroing will be undertaken to confirm. There is considered to be limited hydraulic connectivity between the alluvium groundwater and the coal measures. No existing groundwater supplies are expected to be impacted.	4	c	4c 18 (L)
		Impact on groundwater users	**yes**	4	b	4b 14 (M)		4	b	4b 14 (M)	No existing groundwater supplies are expected to be impacted.	4	d	4d 21 (L)
		Impact on groundwater depended ecosystems	**yes**	4	b	4b 14 (M)		4	b	4b 14 (M)	Preparation of a Ground Water Management Plan (SOC committment) No adverse impacts are expected on any groundwater dependent ecosystems. Provide buffer which provides for no more than 20mm od subsidence at 40m from the edge of the community.	4	d	4d 21 (L)

ENVIRONMENTAL RISK REGISTER - UNDERGROUND MINING																				
Process Area	Activity	Aspect	Issue raised during Community Consult.	Raw				Existing Controls	Existing Controls				Proposed Controls	Residual Risk						
				C	P		R		C	P		R		C	P		R		
		Impact on shallow perched aquifers	**yes**	3	b	3b	9 (M)		3	b	3b	9 (M)	Preparation of a Ground Water Management Plan (SOC committment) There is considered to be limited hydraulic connectivity between the alluvium groundwater and the coal measures.	4	d	4d	21 (L)			
		Impact on groundwater quality	**yes**	4	d	4d	21 (L)		4	d	4d	21 (L)								
		AMD or acidic water being pumped from the mine to the surface	**yes**	3	c	3c	13 (M)		3	c	3c	13 (M)	Preparation of a Ground Water Management Plan (SOC committment) Groundwater quality is initially not expected to be acidic or have an TDS greater than with around 1500-2000 mg/L and pH around 7. Over time, a steady increase in salinity may occur, to an eventual salinity of around 3000-4000 mg/L TDS.	4	d	4d	21 (L)			
		Impact on hexham swamp (RAMSAR) and other wetlands	**no**	2	b	2b	5 (H)		2	b	2b	5 (H)	Preparation of a Ground Water Management Plan (SOC committment) There is believed to be negligible hydraulic interconnection between the Donaldson seams and the Hexham Swamp / Pambalong Nature Reserve. Plus application of protective buffers	4	c	4c	18 (L)			
	Interim surface facilities (office, bath house, work shop, etc)	Noise	**yes**	4	b	4b	14 (M)		4	b	4b	14 (M)	Implementation of Noise Management Plan in EMS (including monitoring) Employee Awareness and Inductions Orientate equipment so that noise emissions are directed away from noise sensative areas.	4	d	4d	21 (L)			
		Air Quality (commissioning)	**no**	5	d	5d	24 (L)		5	d	5d	24 (L)								
		Erosion and Sediment	**no**	4	d	4d	21 (L)		4	d	4d	21 (L)								
		Waste management	**no**	4	c	4c	18 (L)		4	c	4c	18 (L)								
		Light	**yes**	4	d	4d	21 (L)		4	d	4d	21 (L)								
		Dust	**yes**	4	d	4d	21 (L)		4	d	4d	21 (L)								
		Traffic movement to and from site	**yes**	4	c	4c	18 (L)		4	c	4c	18 (L)								
	Permanent surface facilities (office, bath house, work shop, etc)	Hydrocarbon/chemical storage	**no**	4	c	4c	18 (L)		4	c	4c	18 (L)								
		Light	**yes**	4	d	4d	21 (L)		4	d	4d	21 (L)								
		Dust	**no**	4	d	4d	21 (L)		4	d	4d	21 (L)								
		Noise	**yes**	4	d	4d	21 (L)		4	d	4d	21 (L)								
		Traffic movement to and from site	**yes**	4	c	4c	18 (L)		4	c	4c	18 (L)								
		Erosion and Sediment	**no**	4	d	4d	21 (L)		4	d	4d	21 (L)								
		Waste management	**no**	4	c	4c	18 (L)		4	c	4c	18 (L)								