Abel Underground Mine

Part 3A Project Application

Document prepared for the Department of Planning under the *Environmental Planning and Assessment Act 1979*

7 December 2005

SUMMARY

Document Purpose

This document is a Project Application prepared by Donaldson Coal Pty Ltd ('Donaldson') for the proposed Abel Underground Mine. It has been prepared under Part 3A of the *Environmental Planning and Assessment Act 1979*, which provides an assessment and approvals regime for major projects where the Minister for Planning is the approval authority.

In accordance with the Draft Guidelines: *Steps in the Assessment and Approval of Major Projects Under Part 3a* (26 July 2005), this Project Application provides information to confirm that the project is a Part 3A Project under the *Environmental Planning and Assessment Act 1979.*

This document also provides:

- a description of the project and any ancillary components as required by Section 75E(2) of the abovementioned Act;
- information on planning provisions, preliminary consultation and known views of the community and authorities;
- a description of required approvals and licences; and
- a preliminary assessment to identify the likely environmental issues, as determined by an Environmental Risk Assessment and Risk Register developed for the Project.

Project Overview

Donaldson Coal Pty Ltd ('Donaldson') currently owns and operates Donaldson Open Cut Mine, located approximately 23 kilometres north-west of Newcastle (refer Figure 1). This open cut mine has approval to operate until 2012 when it is considered current reserves will be exhausted. Donaldson proposes to develop a new underground mine south from the high wall of Donaldson Open Cut Mine. The mine will utilise existing areas of disturbance within the Donaldson Mine Lease for surface infrastructure and the existing Bloomfield Coal Handling and Preparation Plant (CHPP), rail loader and rail loop for coal processing and loading.

The proposed underground mine, referred to as 'Abel Underground Mine', will have a production capacity of approximately 4.5 million tonnes per annum run-of-mine (ROM) coal over 20 years. The proposed method of extraction will be high productivity, continuous miner based bord and pillar systems, using pillar extraction techniques. The amount of coal extracted will be varied to control subsidence to protect a range of surface features.

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

Abel Underground Mine will extract coal from the Upper Donaldson, Lower Donaldson and Ashtonfield coal seams. These seams dip downwards towards the south across the site at approximately 5 degrees. Mine access will be from the Donaldson high wall north of John Renshaw Drive. Underground mining will commence on the southern side of John Renshaw

Drive and progress southwards. ROM coal will be transported via conveyor through the high wall to the surface infrastructure area located within the existing Donaldson and Bloomfield mine lease areas.

Coal will be transported to the existing Bloomfield Coal Handling and Preparation Plant (CHPP) where it will be processed and loaded onto rail. Some expansion of Bloomfield's CHPP will be required to cater for Bloomfield's existing production and the Abel coal. This will require an increase of approximately 30% in Bloomfield's CHPP existing capacity of 5 million tonnes per annum ROM coal. The required changes to Bloomfield's CHPP to accommodate the Abel coal form part of this Development Application. Additional detail on the mining method and facilities is provided in Section 2.

The objectives of this proposal are to:

- Access coal resources within the proposed mine lease area using methods that control surface disturbance, whilst optimising resource extraction;
- Provide employment for approximately 375 employees from the lower Hunter Region;
- Maintain the market for Donaldson Coal, after the Donaldson Open Cut Mine approval ceases in 2012;
- Follow the principles of ecologically sustainable development by utilising existing surface disturbance areas within Donaldson Open Cut Mine (with rehabilitation of remaining areas as described by the Donaldson consent) and also utilising existing coal processing and rail loading infrastructure at Bloomfield to handle Abel coal; therefore minimising any additional surface disturbance;
- Minimise visual disturbance from proposed operations; and
- Conduct mining in a responsible manner, considering the existing and future environment and the community, in accordance with the principles of ecologically sustainable development.

Planning Aspects

Pursuant to *State Environmental Planning Policy (Major Projects) 2005* the proposed development is for the purpose of coal mining and therefore is a "project" which must be assessed under Part 3A of the *Environmental Planning and Assessment Act, 1979*. Given the advanced state of the "project" it is considered that it does not require concept approval.

Under Part 3A, a Project Application with Preliminary Assessment is required to be lodged with the Department of Planning for consideration. A Planning Focus Meeting has been held with the Department of Planning and other relevant Government Bodies and this application takes account of the comments made at that meeting.

The Abel Project Area is within Newcastle, Cessnock and Maitland Local Government Areas (LGAs). The majority of the proposed underground lease area is within Cessnock LGA. The eastern extent of underground mining is within Newcastle LGA and the northern section of the Bloomfield rail loop is within Maitland LGA. Mining and ancillary mining activities are permissible in all zones which apply in the Project Area.

Other plans, permits or licences required include:

- Mining Lease from the Department of Primary Industries (DPI).
- Licence under the *Protection of the Environment Operations Act 1997*;
- Approval to undertake works within a Mine Subsidence District under the *Mine Subsidence Compensation Act 1961*; and
- Approval to undertake works within a road reserve under the *Roads Act 1993* (requirement to be confirmed).

Relevant legislation, policies and strategies that are also being considered include the *Commonwealth Environmental Protection and Biodiversity Act 1999* with respect of migratory birds and RAMSAR wetlands, State Environmental Planning Policies No. 14 – Coastal Wetlands, 33 – Hazardous and Offensive Industry, 44 – Koala Habitat Protection and Major Projects 2005, *Hunter Regional Environmental Plan, 1989* (HREP) and *HREP – Heritage 1989,* Draft Lower Hunter Regional Strategy (Department of Planning), Hunter Catchment Blueprint (Hunter-Central Rivers Catchment Management Authority) and Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS).

The proposal does not conflict with the objectives of any of these strategies.

Consultation

Authority consultation for the Abel Coal Project to date has included discussions with all key Government Bodies as part of the Planning Focus Meeting, as well as detailed discussions with the Department of Planning, Department of Primary Industries and Cessnock City Council. Discussions to date have been positive and encouraging of the main project concepts, including the use of underground extraction methods aimed at controlling subsidence and the use of existing areas of disturbance and infrastructure.

Individual consultation by Donaldson Coal with the majority of landowners within the Project Area has occurred and is ongoing. This consultation includes individual meetings on key issues as required.

The company has also discussed the proposal with the Donaldson Open Cut Mine Community Consultative Committee (CCC), which includes a representative from Black Hill residences. Ongoing discussions are also being held with the Catholic Church and Coal and Allied, who both own large sections of land within the Project Area.

Environmental Risk Assessment

The Project Application for a Part 3A Project is required to include a Preliminary Assessment to identify likely environmental issues. To determine likely environmental issues, Donaldson has developed an Environmental Risk Assessment (ERA) and allocated risk values to all proposed aspects of the mine and potential impacts.

Risks were assigned without any mitigation measures or controls, and then re-assigned after development of appropriate controls (which form part of the development applied for), or after the addition of existing controls (for areas where existing controls are in place for Donaldson mine activities). The risk assessment process was completed by the project management team

and facilitated by specialist consultants. The risk assessment process, undertaken for both construction and operational project phases, is provided in Appendix A.

The Environmental Risk Register in Appendix A shows that many aspects of the proposed development are considered, with no controls, to be low or medium risk. Environmental risk associated with subsidence, if no controls were proposed, was considered to be high. When controls are introduced, risk associated with all aspects, including subsidence, reduces to low.

The ERA process has been used to focus on key issues where the risk of environmental impact is higher. Although, after implementation of controls, all aspects have been categorised as low level risk, focus has also been directed to those aspects that, without controls, present a higher level of risk. This applies particularly to subsidence issues.

Key Issues

Key issues associated with the Project, as identified by the Risk Assessment process, are:

- Impacts on the natural and human environment from planned and unplanned subsidence. Such subsidence impacts will be managed and controlled by using the bord and pillar method of mining rather than the longwall mining method;

- Impacts on regional groundwater supplies and quality from underground mining and tailings disposal, and any impacts on groundwater dependent ecosystems, which will be the subject of a comprehensive investigation; and

- Issues associated with surface infrastructure north of John Renshaw Drive, such as air quality, noise and visual aspects, although these will be minimised through the use of existing infrastructure and areas of disturbance.

The Preliminary Assessment provides a brief summary of the physical and human environment of the Project Area, and then focuses on the key issues associated with the proposed development as highlighted above.

Preliminary Assessment

Overview of the Project Area Environment

The Abel Project Area consists of generally disturbed land north of John Renshaw Drive within the existing Donaldson and Bloomfield mining leases, and the underground area south of John Renshaw Drive which has low undulating forested hills with patches of cleared land with rural/residential properties. The ridgeline associated with Black Hill runs east-west through the Project Area, with tributaries of Buttai Creek, Viney Creek/Weakleys Flat Creek and Four Mile Creek draining northwards from this ridgeline. Long Gully/Blue Gum Creek drains the southern side of the ridgeline westwards towards Pambalong Nature Reserve.

There are approximately 188 land holdings on the site. Private holdings in the underground section of the Project Area are generally rural/residential in nature. Services on the site include various transmission lines a water pipeline and roads.

Subsidence

A comprehensive subsidence study is currently underway. Preliminary Subsidence Classification Areas have been identified and the selected mining method aims to minimise subsidence whilst optimising resource extraction. All surface features requiring protection from subsidence will be identified and the mine plan designed, in consultation with relevant authorities and landowners, to control the subsidence impacts on these features.

Comprehensive and early consultation will be undertaken with relevant authorities and landholders to determine acceptable subsidence limits and restrictions. Donaldson is also devising several plans and diagrams to clearly explain the impacts of subsidence and how the land within the Project Area may potentially be affected.

Surface and Groundwater Hydrology

All watercourses in the Project Area fall within the definition of Schedule 1 or Schedule 2 steams, as defined in the *Draft Guidelines for Management of Steam/Aquifer Systems in Coal Mining Developments – Hunter Region* (August 2002, DIPNR). Schedule 2 steams within the project site include lengths of Long Gully, Blue Gum Creek, Viney Creek and Buttai Creek. The most important surface water feature on the site is considered to be the lower reach of Blue Gum Creek, which drains into Pambalong Nature Reserve adjacent to the Project Area.

Subsidence impacts to surface and groundwater hydrology will be controlled and minimised by the use of varied bord and pillar extraction mining methods and appropriate mitigation/remediation measures. This will involve the implementation of a mine plan that removes less or no coal under identified significant surface features such as farm dams and creeklines, thus reducing subsidence impacts on these features to non-significant levels. Impacts that could occur without controls, and are therefore being considered in detail to ensure the impact upon them is not significant, include an increase or decrease in bed slope gradient of water courses, minor surface cracking of the bed and banks which could possibly lead to erosion, underground leakage or surface ponding, changes to downstream water quality and changes in the structural integrity and water holding capacity of farm dams in the area.

Groundwater levels in the Donaldson coal seams and the overburden sediments have been partly depressurised due to dewatering of the Donaldson open cut mine. However, at the down-dip (southern) end of the proposed mine, groundwater heads are thought to be unaffected by mining at this stage. Controls to prevent groundwater impact will include comprehensive examination of existing groundwater conditions and flows to determine potential interactions, design of the extraction regime to cater for conditions and flows, with mining excluded from any potential areas of high impact that cannot be properly remediated. A groundwater study has commenced which will focus on the potential for any regional lowering of groundwater levels in hard rock or alluvial aquifers or nearby wetlands which would impact on the water supply of existing groundwater users and potentially impact on any groundwater dependent ecosystems.

Studies to date indicate that groundwater inflow volumes are expected to be manageable, with a low risk of problematic inflow rates occurring. Groundwater will most likely have elevated salinity and possibly a low pH, however, this will be confirmed by water quality testing. Groundwater inflows would be used for water supply, with any short-term excess flows being pumped to existing water management dams on Donaldson. Any impact on existing groundwater users is unlikely as groundwater quality is most likely too poor to be of beneficial use. There is also unlikely to be any impact of any groundwater dependent ecosystems, but further studies will be undertaken.

Surface Infrastructure Issues – Air Quality, Noise and Visual Aspects

Background noise assessments and monitoring have been undertaken as part of Donaldson's current mine activities. As mining will be underground, the only potential noise sources are from surface infrastructure. This will be located within a pit created by Donaldson mining, which will contain potential noise. Use of existing facilities reduces noise associated with construction, and the installation of an overland conveyor to Bloomfield's facilities will eventually reduce any potential noise associated with internal truck haulage. With the implementation of appropriate controls, the Environmental Risk Assessment allocated a low risk rating to potential noise impacts.

Air quality issues will also be confined to emissions from surface operations including stockpiling, conveying and other handling of coal on the surface, as well as ventilation emissions from the underground mine. Impacts on air quality, with proposed mitigation measures, have therefore been allocated a low risk category in the Environmental Risk Register.

No alteration to the existing visual landscape is expected from the underground coal operation. The subsidence assessment will determine any impact associated with a change in any structure due to subsidence. The Environmental Risk Assessment has determined that the potential for visual change due to underground mining to be very low. The proposed surface facilities will be located within the existing area of disturbance at Donaldson Open Cut Mine. Facilities will be located below a high wall that will screen views of any mining operations from John Renshaw Drive. A buffer of retained vegetation between the high wall and the road will also assist in screening operations. The location of the coal stockpile, as well as operational lighting, has been carefully considered to reduce visual impact from surrounding areas.

Other Issues

The Environmental Risk Assessment for potential flora and fauna impacts is considered low due to the nature of underground mining, which does not require land clearing. With subsidence controls, the impact on any change in landform on flora and fauna is expected to be low. Surface infrastructure, which would generally require land clearing, will be located in existing areas of disturbance within Donaldson and Bloomfield open cut mines.

A database search of the Atlas of NSW Wildlife has been undertaken for an area within a 5 kilometre radius of EL5497, which includes the Project Area. Flora and fauna data also exists for the Donaldson open cut site. A list of threatened species recorded on the site is provided in this Preliminary Assessment Report. The potential for subsidence impacts to alter stream flow will be examined, as will any impact on a small area of 'Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions', which has been proposed by the NSW Scientific Committee to be listed as an endangered ecological community.

The draft Department of Environment and Conservation (DEC) *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (July 2005) state that *'the main purpose of a preliminary assessment is to identify whether there are Aboriginal cultural heritage values associated with the subject site'*. A comprehensive Archaeological and Aboriginal Cultural Heritage Constraints Assessment has been undertaken for EL5497, which is the underground section of the Abel Project Area. A comprehensive Archaeological and Aboriginal Cultural Heritage Constraints Assessment has previously been undertaken (for the Donaldson open cut mine) for the smaller area containing proposed surface facilities.

Searches of the DEC Aboriginal Heritage Information Management System (AHIMS) reveal that approximately eleven Aboriginal sites are listed within the underground Project Area with at least five additional sites within the surface facilities Project Area. The sites identified include artefact scatters, grinding grooves and a scarred tree. A predictive model of site location constructed to identify areas of high archaeological sensitivity (ie. locations where there is a high probability of archaeological evidence occurring) indicates that there is potential for widespread evidence of Aboriginal occupation in the form of stone artefacts, but also other heritage site types such as grinding grooves and lithic quarries, to occur within the Project Area.

Potential impacts to Aboriginal heritage and cultural values may arise through the construction of surface facilities, such as conveyors, extraction fans, stockpiles and roads. Such impact will be very limited as most surface development will be within previously disturbed areas. The selected mining method will control subsidence impacts to any identified significant heritage sites or areas of archaeological/cultural value and sensitivity. Where impacts will occur, all relevant approvals will be obtained and necessary mitigation measures imposed.

There is expected to be minimal impact on the existing road network. All coal will be transported by conveyor and rail. Truck transportation in the initial stages of mining will be on the Donaldson Open Cut Mine internal haul roads.

Conclusion

The proposed use of the bord and pillar mining techniques will allow the implementation of a mine plan that will control and limit subsidence. This and the use of existing areas of disturbance for surface infrastructure and the use of existing infrastructure for coal handling and rail loading ensures that potential impacts associated with the Abel Underground Mine can be minimised and appropriately managed.

A comprehensive Environmental Risk Assessment has led to the development of a Risk Register which identifies all aspects of the Project, existing and proposed controls and 'residual risk'. Those items where risk remains have been identified as the key issues associated with the project, where further thorough investigation will be undertaken, in consultation with authorities and the local community. These key issues are impacts on the natural and human environment from planned and unplanned subsidence, which will be controlled by using bord and pillar methods rather than longwall mining, impacts on regional groundwater supplies and quality from underground mining and tailings disposal, which will be the subject of a comprehensive investigation, and issues associated with surface infrastructure north of John Renshaw Drive, such as air quality, noise and visual aspects, although these will be minimised through the use of existing infrastructure and areas of disturbance.

Socio-economic benefits from the proposed Abel Underground Mine include employment of approximately 375 persons, significant State Government royalties and Australian export earnings. These benefits will be provided with minimal impact on the environment, brought about by the careful selection of minimal impact mining methods, the implementation of appropriate mitigation and remediation controls, ongoing monitoring and consultation and the use of existing facilities.

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1.1 Document Purpose

This document is a Project Application for the proposed Abel Underground Mine. It has been prepared in accordance with Part 3A of the *Environmental Planning and Assessment Act 1979*, which provides an assessment and approvals regime for major projects where the Minister for Planning is the approval authority.

In accordance with the Draft Guidelines: *Steps on the Assessment and Approval of Major projects Under Part 3a* (26 July 2005), this Project Application provides the following information:

	Refer Report Section:
• Information to confirm that the project is a Part 3A Project under the *Environmental Planning and Assessment Act 1979;*	3.1
• Information to confirm that a concept approval is not required;	3.1
• A description of the project and any ancillary components as required by Section 75E(2) of the abovementioned Act;	2.1-2.9
• Location and a map identifying the site	Figures 1,2
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1.2 Project Overview

Donaldson Coal Pty Ltd ('Donaldson') currently owns and operates Donaldson Open Cut Mine, approximately 23 kilometres north-west of Newcastle (refer Figure 1). This open cut mine has approval to operate until 2012 when it is considered current reserves will be exhausted. Donaldson proposes to develop a new underground mine south from the high wall of Donaldson Open Cut Mine, utilising existing areas of disturbance within the Donaldson Mine Lease for surface infrastructure and the existing Bloomfield Coal Handling and Preparation Plant and rail loader for coal processing and loading.

The proposed underground mine, referred to as 'Abel Underground Mine', will have a production capacity of approximately 4.5 million tonnes per annum run-of-mine (ROM) coal over 20 years. The proposed method of extraction will be high productivity, continuous miner based bord and pillar systems, using pillar extraction techniques. The amount of coal extracted will be varied to control subsidence to protect a range of surface features.

The proposed underground lease area extends southwards from John Renshaw Drive towards George Booth Drive and is bounded on the eastern side by the F3 Freeway and the western side by a geological feature in the vicinity of Buttai Creek. The proposed underground lease area is shown on Figures 2 and 2a.

Abel Underground Mine will extract coal from the Upper Donaldson, Lower Donaldson and Ashtonfield coal seams. These seams dip downwards towards the south across the site at approximately 5 degrees. Mine access will be from the Donaldson high wall north of John Renshaw Drive. Underground mining will commence on the southern side of John Renshaw Drive and progress southwards. ROM coal will be transported via conveyor through the high wall to the surface infrastructure area located within the existing Donaldson and Bloomfield lease areas (refer Figure 10).

Coal will be transported to the existing Bloomfield Coal Handling and Preparation Plant (CHPP) where it will be processed and loaded onto rail. Some expansion of Bloomfield's CHPP will be required to cater for Bloomfield's existing production and the Abel coal. This will require an increase of approximately 30% in Bloomfield's CHPP existing capacity of 5 million tonnes per annum ROM coal. The required changes to Bloomfield's CHPP to accommodate the Abel coal form part of this Project Application. Additional detail on the mining method and facilities is provided in Section 2.

The objectives of this proposal are to:

- Access coal resources within the proposed mine lease area using methods that control surface disturbance, whilst optimising resource extraction;
- Provide employment for approximately 375 employees from the lower Hunter Region;
- Maintain the market for Donaldson Coal, after the Donaldson Open Cut Mine approval ceases in 2012;
- Follow the principles of ecologically sustainable development by utilising existing surface disturbance areas within Donaldson Open Cut Mine (with rehabilitation of remaining areas as described by the Donaldson consent) and also utilising existing coal processing and rail loading infrastructure at Bloomfield to handle Abel coal; therefore minimising any additional surface disturbance;

- Minimise visual disturbance from proposed operations; and
- Conduct mining in a responsible manner, considering the existing and future environment and the community, in accordance with the principles of ecologically sustainable development.

1.3 Applicant and Project Team

The applicant seeking approval is Donaldson Coal Pty Ltd ('Donaldson'). Donaldson has selected the following team of specialists to undertake the various assessment tasks for the application:

Role	**Company**	**Main Contact**
Project management, mine planning	Donaldson Coal	Mark McPherson
EIS co-ordination and planning	Eco Central	Nicole Croker
Subsidence assessment	Frith Consulting Services	Russell Frith
Subsidence assessment	Strata Engineering Australia	Steve Ditton
Water impact assessment	Dundon & Associates	Peter Dundon
Flora and fauna	Eco Biological	Col Driscoll
Air quality	Holmes Air Sciences	Nigel Holmes
Noise assessment	Richard Heggies and Associates	John Cotterill
Surface water, risk & soils	GSS Environmental	Rod Masters
Archaeology	South-east Archaeology	Peter Kuskie

All enquiries regarding the project should be directed in the first instance to Mark McPherson at Donaldson Coal (tel: 02 49342888).

2 PROJECT DESCRIPTION

2.1 Coal Resource

The Abel Project Area was drilled to measured/indicated resource status by R W Miller and Company in the late 1970's with information from 43 holes being available. In 2002, an additional nine holes were drilled in the northern part of the area by Excel Holdings. A further programme of twelve drill holes is currently underway, with five holes drilled to date. The object of this current program is to verify results from previous exploration and to gain additional data on coal quality, seam gas content, strata control and groundwater. Results to date have verified the extent and nature of the mining resource. Figures 3, 4 and 5 show drill hole locations and geological cross sections.

Former mining in or near the Project Area includes the Stockrington No. 2 Colliery which mined the West Borehole Seam in the southern section of the Project Area until the early 1980's. Other smaller mines also operated until that time, including Benwerrin, Black Hill Borehole, Mountainview, Buchannan Borehole, Newburn, Buttai Borehole, Rosewood and Duckenfield. These former workings are shown on Figure 6.

The coal resource to be mined includes the Upper and Lower Donaldson Seams and Ashtonfield Seam.

The mineable section of the Upper Donaldson Seam is within the northern and central parts of the Project Area, where seam thickness ranges from 1.5 to 3.2 metres. Depth of cover ranges from 30 to 250 metres. Upper Donaldson Seam washed products consist principally of semi-soft coking coal, with high ash thermal as a secondary product.

Mineable reserves within the Lower Donaldson Seam are within the central and southern parts of the Project Area, where the interval below the Upper Donaldson Seam exceeds 10 metres. Depth of cover ranges from 50 to 450 metres. Lower Donaldson Seam washed products consist principally of low and high ash thermal coal, with potential for a semi-soft coking coal product in the south-east part of the Project Area.

The Ashtonfield Seam resources are of mineable thickness in the north-eastern part of the Project Area. Working thickness ranges from 1.5 to 2.2 metres. The Ashtonfield Seam typically lies 20 metres below the Lower Donaldson Seam. Depth of cover ranges from 30 to 250 metres. Ashtonfield Seam washed products consist of semi-soft coking coal and low ash thermal coal.

Potential markets for Abel Underground Mine products are predominantly to Asian and European steel and energy producers.

It is proposed to mine approximately 4.5 million tonnes/year run-of-mine coal over 20 years. Calculated mineable resources are as follows:

- Upper Donaldson Seam - 61 million tonnes;
- Lower Donaldson Seam – 106 million tonnes; and
- Ashtonfield Seam – 15 million tonnes.

2.2 Mining Titles and Property Description

The Abel Project Area is located within the eastern section of Exploration Lease 5497 (EL5497), which has a surface area of 4950 hectares. The proposed underground mining area within this lease (refer Figure 7) has a surface area of approximately 2750 hectares and extends southwards from John Renshaw Drive towards George Booth Drive, bounded on the eastern side by the F3 Freeway and the western side by a geological feature in the vicinity of Buttai Creek.

Surface infrastructure will be located on the northern side of John Renshaw Drive within existing Mining Lease areas of Donaldson and Bloomfield. Areas of Donaldson Mine and Bloomfield Colliery that will be used for Abel facilities will be included in the new Abel Mining Lease.

2.3 Proposed Method of Operation

Abel Underground Mine is proposed as an underground coal mine with a design production capacity of approximately 4.5 million tonnes per annum of run of mine coal over 20 years.

The mine entries will be located in the highwall at the southern edge of the existing Donaldson Open Cut Mine Central Pit. A number of tunnels (roadways) will be driven underneath John Renshaw Drive to access the reserves which are located south of the road.

Coal will not be mined where depth of cover is less than 30 metres. Depth of mining will be between 30 metres and 450 metres.

Extraction will initially be from the Upper Donaldson seam. As mining operations move southwards, extraction will transfer to the Lower Donaldson seam.

The proposed method of extraction will be high productivity, continuous miner based bord and pillar systems, using pillar extraction techniques. The amount of coal extracted will be varied to control subsidence to protect a range of surface features.

A conveyor from the underground production areas will transport coal through the mine portals to a surge stockpile within the Donaldson open cut pit. Initially, trucks will transport coal to the existing Bloomfield coal handling and preparation plant. As production levels increase, an overland conveyor will replace truck haulage. All truck haulage and conveying to Bloomfield will be within existing coal operation areas, using private mine roads.

Figure 8 shows the proposed Mine Lease area together with preliminary subsidence classification areas that will influence mining. Figure 9 provides a schematic of the mining process and transport methods.

2.4 Surface Facilities

Surface facilities (refer Figure 10) will be located on the northern side of John Renshaw Drive within a section of the Donaldson Open Cut Mine where the coal has been extracted but will be not backfilled. This area will be part of the new coal mine lease and will be transferred to the Abel Underground Mine operation from the existing Donaldson Open Cut Mine. A fan shaft will be located south of John Renshaw Drive within land owned by Donaldson.

Abel surface facilities will comprise:

- Access using approved Donaldson Coal private roads;
- Mine infrastructure comprising three mine portals, two ventilation fans, compressors and water supply pumps;
- Surface infrastructure comprising power supply, car parking areas, mine offices, bath-house for approximately 400 people, lamproom, first aid room, workshop, vehicle garage and storage areas, lighting and potable and process water supply;
- Underground coal conveying system terminating at a surge stockpile adjacent to the mine entry;
- Coal transport system from the surge stockpile to Bloomfield Coal Handling and Preparation Plant, initially by truck on internal haul roads, with an overland conveyor to be constructed;
- 33kV electricity supply from the new Beresfield sub-station and a mine 33kv/11kv sub-station;
- Connection to the existing Donaldson mine 380ML capacity dirty water dam;
- Connection to Hunter Water Corporation's potable water supply pipeline;
- Water pipeline connecting with the Bloomfield Coal Handling and Preparation Plant;
- Waste water disposal;
- Ventilation shaft on the southern side of John Renshaw Drive; and
- Small scale items such as monitoring boreholes and methane drainage if required for mine safety.

The majority of the area highlighted on Figure 2 as 'Abel Surface Study Area' will not be disturbed by Abel Mine activities. In order to select the most appropriate route for the proposed overland conveyor, a larger corridor has been selected for impact assessment studies, with various routes within this area to be considered. One route will then be selected from within this area.

2.5 Subsidence Management

Subsidence will be controlled by the use of a continuous miner based bord and pillar system that will vary pillar extraction to control subsidence impacts as required. The degree of subsidence is related to the depth of mine workings and the amount of coal that is removed. Therefore, the amount and areas of coal to be extracted will be varied to ensure subsidence impacts are acceptable.

Figure 8 shows Preliminary Subsidence Classification Areas, identifying surface features such as dwellings, farm dams, roads, public utilities, creeklines (in particular Schedule 2 creeks and above) and clifflines, where subsidence will need to be either prevented or kept below agreed limits.

Subsidence control mechanisms will include:

- The implementation of appropriate mitigation and remediation controls;
- exclusion zones where no mining will occur;
- variation on the amount of coal extracted to reduce the amount of subsidence; and
- use of the bord and pillar system to reduce the possibility of sink holes in low cover areas.

Subsidence Classification Areas (outlining acceptable subsidence impacts) will be developed for all areas in the Project Area in consultation with relevant government authorities and private and public landholders.

2.6 Gas and Water Management

At this stage the mine is not expected to be gassy or excessively wet.

Methane testing undertaken as part of the current exploration program indicates that the seams generate very low levels of methane. Therefore, it is unlikely that methane extraction equipment will be required. However, if the mine experiences methane generation from strata above or below the target seam, consideration would need to be given to the installation of goaf drainage plants.

Current testing also indicates that there is unlikely to be an excessive inflow of groundwater into the mine. Any inflow of water would be collected in underground sumps for partial clarification before being pumped to the main dirty water dam on the surface.

Expansion of the Bloomfield Coal Handling and Preparation Plant required to cater for Abel coal will require alterations to the existing water management system. These alterations form part of this project application and will include new collection systems for additional stockpile areas, consideration of additional plant water requirements and discharge and tailings disposal arrangements.

2.7 Workforce and Hours of Operation

It is expected that once peak production has been reached, the workforce will be in the vicinity of 375 persons with production occurring continuously 24 hours per day for up to 7 days per week, 50 weeks per year.

2.8 Interaction with Existing Mine Operations

Donaldson Open Cut Mine

Donaldson Open Cut Mine has consent to operate until 2012. The areas of Donaldson Mine that will be required for the Abel Underground Mine to operate are included in this Development Application for Abel Underground Mine. These include:

- existing Donaldson Coal private roads for coal haulage to Bloomfield, and the approved access road from John Renshaw Drive;
- selected areas of active and future mining that will be used for Abel surface facilities; and
- elements of the existing Donaldson dirty water management system.

The existing Donaldson final landform and rehabilitation plans will be amended to address the required modifications to cater for the Abel Underground Mine.

Donaldson currently delivers 2.5 million tonnes per annum ROM coal to the Bloomfield CHPP, however this amount is planned to decrease as Abel production increases.

Tasman Underground Mine

Tasman Underground Mine, to the south of George Booth Drive and Abel Underground Mine, was approved in 2004 for a maximum extraction of 960,000 tonnes per annum ROM coal. Coal from Tasman Underground Mine (which at November 2005 had commenced construction but not extraction) will be trucked to Bloomfield Coal Handling and Preparation Plant and Rail Loading facility for processing. Trucks will use approved roads through Donaldson Open Cut Mine to Bloomfield.

Other

The Bloomfield Coal Handling and Preparation Plant (CHPP) is also used, and will continue to be used, to process coal from other sources, including from the Bloomfield Group.

Bloomfield Coal Handling and Preparation Plant (CHPP) and Rail Loading Facility

The Bloomfield CHPP and rail loading facility will be used for the processing of coal from Abel Underground Mine. The CHPP and rail loading facility also handles coal from Donaldson Open Cut, Bloomfield and Tasman Mines. Bloomfield currently has a licence under the *Protection of the Environment Operations Act 1997* to process 3.5 million tonnes per annum product coal (approximately 5 million tonnes per annum ROM coal). An increase in capacity of 30% is required to cater for Abel coal.

Some modifications to the CHPP infrastructure will be required to accommodate Abel Coal. These changes include:

- Increasing the run of mine coal stockpile and reclaim facilities at Bloomfield to 300,000 tonnes capacity, by expanding the existing stockpile pad and in future installing a stackout conveyor with reclaim tunnel;
- Minor modifications to the CHPP to improve efficiencies, with a second tailings thickener to be added;

- Modification of coarse washery reject bin and outloading facilities as production increases;
- Expansion of clean coal gantries and stockpiles, with one new gantry to be added, increasing the clean coal stockpile size to 500,000 tonnes capacity;
- Modifications to the current water management system to cater for the abovementioned additions;
- Relocation of existing service roads to cater for larger stockpile pad areas; and
- Minor upgrading of train loading facilities at Bloomfield.

CHPP coarse reject and tailings will be handled in a similar manner to current practice. Coarse reject will be used to fill open cut voids under rehabilitation at Bloomfield, with tailings pumped into old underground workings and mine voids.

Figure 10 shows the location of the CHPP and proposed modifications.

These modifications form part of this development application, together with the use of the CHPP as described above.

2.9 Environmental Management and Mitigation Measures

Environmental Management

Donaldson adopted an Environmental Policy for its Donaldson Mine operations in September 2000. In its Environmental Policy, Donaldson acknowledges that it operates in an area that requires a genuine commitment to the environment and the community. To achieve this Donaldson has developed and adopted an Environmental Management System (EMS) in accordance with the principles of ISO 14001. Through implementation of the EMS Donaldson Coal has maintained a high level of environmental compliance.

Environmental Management Plans prepared as part of the EMS for Donaldson Open Cut Mine and which will be continued and modified for Abel operations include:

- Noise Management Plan;
- Water Management Plan;
- Waste Management Plan;
- Air Quality Management Plan;
- Erosion and Sediment Control Plan;
- Bushland Conservation Area Management Plan;
- Flora and Fauna Management Plan;
- Heritage and Archaeology Area Management Plans;
- Landscape Management Plan;
- Rehabilitation Management Plan; and
- *Tetratheca juncea* management plan.

The Donaldson Environmental Policy will apply to the Abel Underground Mine operations, and the existing EMS will be adapted to incorporate additional environmental requirements for the Abel operations.

Mitigation Measures

The Environmental Risk Register in **Appendix A** lists proposed controls, or mitigation measures, that will be used to control and manage potential risks from Abel operations. These controls were developed as part of the Environmental Risk Assessment that was undertaken for Abel Underground Mine and were developed for all risks categorised as Medium to High by the risk assessment process. Controls may be modified if required by the results of detailed specialist studies that will be undertaken as part of the Environmental Assessment for the project. Mitigation measures are summarised in **Table 1**.

Table 1 Summary of Mitigation Measures (from Appendix A)

Activity - Aspects	Summary of Mitigation Measures
Subsidence – cracking and water loss from creeks, changes in bed profile, damage to infrastructure, residences and farm dams damage to heritage items and topographic features.	• Implementation of appropriate mitigation and remediation controls. • Use bord and pillar mining methods, not longwall mining. • Mine plan designed to limit subsidence impacts to acceptable levels. • Early and ongoing consultation with local residents and authorities to determine requirements and design appropriate extraction plans. • Subsidence monitoring program to be implemented to ensure surface expression aligns with subsidence goals.
Subsidence – unpredicted strata collapse causing sink holes, unpredicted pillar failure – under items listed above.	• Implementation of appropriate mitigation and remediation controls. • Use bord and pillar mining methods, not longwall mining. • No mining at low depths of cover. • Mine plan designed to limit subsidence impacts to acceptable levels. • No underground roadway intersections at low depth of cover. • Pillar design to have adequate safety factor. • Subsidence monitoring program to be implemented to ensure surface expression aligns with subsidence goals.
Coal spillage from conveyors – water contamination.	• Earthworks, conveyor system and drainage design to contain and prevent spillage. • Regular conveyor maintenance and inspections to be undertaken.
Noise at surface infrastructure area and from conveyor system	• Noise Management Plan to be implemented. • Employee inductions and awareness. • Ongoing monitoring program. • Noise requirements to be included in Contractor specifications
Dust at surface infrastructure area	• Air Quality Management Plan to be implemented. • Employee inductions and awareness. • Ongoing air quality monitoring program. • Minimise areas of disturbance and rehabilitate existing Donaldson open cut areas surrounding surface infrastructure areas. • Use of water cart on existing Donaldson haul road.
Water – unplanned discharge – leak from overland line, spills etc	• Water Management Plan • Inspections and Maintenance • Earthworks Design • Engineering Controls • Employee Induction and Awareness Program
Groundwater – impact on regional water levels and groundwater dependent ecosystems	• Groundwater modelling to confirm. • Buffer area with exclusion zone around Pambalong Nature Reserve • Exclusion zone on mining below Schedule 2 creeks.

Activity - Aspects	Summary of Mitigation Measures
Odour (spontaneous combustion)	• Spontaneous Combustion Management Plan to be implemented. • Employee awareness and Induction Program. • Regular inspection of stockpiles.
Stockpiles – visual	• Configuration and design of pads to reduce visual disturbance • Lighting configuration to avoid lighting outside areas
Land clearing – flora and fauna disturbance, heritage damage and erosion and sedimentation	• Minimal clearing required for underground mining • Surface facilities predominantly on previously cleared land • Pre-clearing approvals to be obtained • Pre-clearing surveys to be undertaken • Employee and Contractor Inductions to be undertaken • Locations of known species, sites and artefacts to be clearly marked and provided to surveyors and land clearing contractors • Erosion and Sediment Control Plans for all areas to be cleared.
Hydrocarbons/chemicals spillage	• Storage in accordance with EPL, Australian Standards, Dangerous Goods Licence and Waste Guidelines.

3 PLANNING AND CONSULTATION

3.1 Application Process

The proposed development is for the purpose of coal mining as described in Schedule 1 Group 2 clause 5(1)(a) of *State Environmental Planning Policy (Major Projects) 2005*. It is therefore a Part 3A Major Project under the *Environmental Planning and Assessment Act, 1979*. Given the advanced state of the project it is considered that it does not require concept approval.

Under Part 3A, a Project Application with Preliminary Assessment is required to be lodged with the Department of Planning for consideration. A Planning Focus Meeting has been held with the Department of planning and other relevant Government Bodies and this application takes account of the comments made at this Meeting.

3.2 Relevant Planning Instruments

There are various Commonwealth, State and Local Government planning instruments, policies and strategies relevant to the proposed development.

State Environmental Planning Policies (SEPPs) that may be relevant to the Project are:

- SEPP No. 14 – Coastal Wetlands;
- SEPP No. 33 – Hazardous and Offensive Industry;
- SEPP 44 – Koala Habitat Protection; and
- SEPP (Major Projects) 2005

SEPP (Major Projects) 2005 identifies and provides the framework for Major Projects and the Part 3A process.

The *Hunter Regional Environmental Plan, 1989* (HREP) and *HREP – Heritage 1989* are applicable to the Project Area. Other State-based policies and strategies to be considered include:

- Draft Lower Hunter Regional Strategy November 2005 (Department of Planning);
- Hunter Catchment Blueprint (Hunter-Central Rivers Catchment Management Authority); and
- Hunter and Central Coast Regional Environmental Management Strategy (HCCREMS); and
- Thornton-Killingworth Sub-Regional Conservation and Development Strategy.

Abel Underground Mine is not inconsistent with the objectives of these strategies. The Draft Lower Hunter Regional Strategy identifies the Donaldson site as a potential site for an inter-modal freight facility and does not identify any particular constraints for the area south of John

Renshaw Drive. It also notes (page 21) that '*access to mineral resources in the region will not be jeopardised by future urban or rural/residential development'.* The Thornton-Killingworth Sub-Regional Conservation and Development Strategy identifies mining activities north and south of John Renshaw Drive.

The Abel Project Area is within Newcastle, Cessnock and Maitland local government areas (LGAs). These are shown on Figure 11. The majority of the proposed underground lease and surface infrastructure areas are within Cessnock LGA. The eastern extent of underground mining is within Newcastle LGA and the northern section of the Bloomfield rail loop is within Maitland LGA.

The Project Area within Cessnock LGA is zoned 1(a) Rural which permits mining with consent. Within Maitland LGA, the rail loop is zoned 1(b), permitting coal freight activities with consent. The small eastern section of the underground area within Newcastle LGA is zoned 7(b) Environmental Investigation, which permits underground mining activities with consent.

The requirements of any relevant Development Control Plans will be considered as part of the Environmental Assessment.

Other plans, permits or licences required include:

- a Mining Lease from the Department of Primary Industries (DPI). A Conceptual Project Development Plan meeting was held with the DPI in May 2005 when the project was discussed and preliminary approval provided;
- A licence under the Protection of the Environment Operations Act 1997;
- Approval to undertake works within a Mine Subsidence District under the Mine Subsidence Compensation Act 1961; and
- Approval to undertake works within a road reserve under the Roads Act 1993 (requirement to be confirmed).

With regard to the need for a referral under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC)*,* preliminary studies indicate that there are no EPBC threatened species or communities within the Project Area. Detailed studies will be undertaken to determine any potential impact from the proposal on migratory birds using Pambalong Nature Reserve and downstream RAMSAR wetlands. A preliminary risk assessment indicates that, with proposed subsidence controls, any impact on the wetland associated with Pambalong Nature Reserve or downstream RAMSAR wetlands will not be significant.

3.1 Consultation

Authority consultation for the Abel Coal Project to date has included:

- Preliminary briefing with Department of Planning on 6 May 2005;
- Conceptual Project Development Plan meeting with DPI on 31 May 2005;
- Discussions with the Mayor and General Manager of Cessnock City Council during 2005;

- Discussions with the Minister of Planning in 2005; and
- Planning Focus Meeting held on 24 November 2005.

Discussions to date have been positive and encouraging of the main project concepts, including the use of underground extraction methods aimed at controlling subsidence and the use of existing areas of disturbance and infrastructure.

Individual consultation by Donaldson Coal with the majority of landowners within the Project Area has occurred and is ongoing. Such consultation will include individual meetings on key issues as required.

The company has also discussed the proposal with the Donaldson Open Cut Mine Community Consultative Committee (CCC), which includes a representative from the Black Hill locality. Ongoing discussions are also being held with the Catholic Church and Coal and Allied, who own large sections of land within the Project Area.

4 PRELIMINARY ASSESSMENT

4.1 Identification of Key Issues and Risk Assessment

The Project Application for a Part 3A Project is required to include a Preliminary Assessment to identify likely environmental issues. To determine likely environmental issues, Donaldson has developed an Environmental Risk Assessment and allocated risk values to all proposed aspects of the mine and potential impacts. The risk assessment process was completed by the project management team and facilitated by specialist consultants.

The risk assessment process, undertaken for both construction and operational project phases, is provided in Appendix A. The risk assessment process involved the following main steps:

- Establishment of the context for the risk assessment process;
- Identification of environmental risks;
- Analysis of risks; and
- Evaluation of risks to determine significant issues.

After identifying each aspect of proposed construction and operational works, an Environmental Risk Rating was applied to each aspect. This Risk Rating was based on Environmental Consequence Descriptions (Catastrophic, Major, Moderate, Minor, Insignificant) together with a 5 level probability rating for each aspect. This process provided an overall Risk Rating for each aspect, categorised as High, Medium or Low Risk.

For each project aspect, three separate scenarios were then considered:

- No controls – being a measure of 'raw' risk associated with an activity, or what may occur if no controls or mitigation measures are in place;
- Current controls – where applicable, as many aspects are already controlled as part of the environmental management of Donaldson Mine; and
- Proposed controls – which were determined by the working group to form part of the proposed development, for example, a bund, diversion, mining method or management plan.

The Environmental Risk Register provided in Appendix A shows that many aspects of the proposed development are considered, with no controls, to be low or medium risk. Environmental risk associated with subsidence, if no controls were proposed, was considered to be mainly high risk. When controls are introduced, risk associated with all aspects, including subsidence, reduces to low. Low Risk is categorised as 16 to 25 in the classification system. Controlled risk associated with project aspects ranged from 17 to 24.

The Environmental Risk Assessment process has been used to focus on key issues where the risk of environmental impact is higher. Although, after implementation of controls, all aspects have been categorised as low level risk, focus has also been directed to those

aspects that, without controls, present a higher level of risk. This applies particularly to subsidence issues.

Key issues are identified as:

- Those items that remain as a medium risk after implementation of controls (Nil);
- Those items that were identified as High risk prior to implementation of controls (Subsidence related issues); and
- Those items where risk categorisation requires further investigation to confirm potential impact (groundwater).

The following provides a brief summary of the physical and human environment, followed by an analysis of the main environmental issues associated with the proposed development, with emphasis on key issues as described above.

4.2 Overview of the Physical Environment

The Abel Project Area consists of the area of generally disturbed land north of John Renshaw Drive within the existing Donaldson and Bloomfield mining leases, and the underground area south of John Renshaw Drive that consists of low undulating forested hills with patches of cleared land with rural/residential properties.

There are approximately 1900 hectares of undisturbed vegetation and 900 hectares of fragmented vegetation in a farmland mosaic in the Abel Project Area.

The ridgeline associated with Black Hill runs east-west through the Project Area, with tributaries of Buttai Creek, Viney Creek/Weakleys Flat Creek and Four Mile Creek draining northwards from this ridgeline. Long Gully/Blue Gum Creek drains the southern side of the ridgeline eastwards towards Pambalong Nature Reserve. Some limited clifflines and steeper gullies are located along sections of the ridge.

4.3 Overview of the Human Environment

Land use within the Abel Project Area includes vacant bushland, rural/residential and the existing Donaldson Open Cut Mine and Bloomfield facilities north of John Renshaw Drive. There are approximately 188 land holdings on the site (refer Figure 12). Private holdings in underground section of the Project Area (south of John Renshaw Drive) are generally rural/residential in nature, with no large agricultural or horticultural enterprises. The Steggles chicken production site in the north eastern section of the underground mine area ceased operation several years ago.

Infrastructure in the Project Area includes a 330kV transmission line (excluded from the development area) and other lower voltage transmission lines, a water pipeline, and roads, including John Renshaw Drive and smaller roads to the south.

A Council search to identify property owners has been completed so that all property holdings and residences can be identified and consulted during the assessment process. The main landowners include Donaldson, Coal and Allied and the Catholic Church.

Archaeological aspects are discussed in Section 4.9.

4.4 Subsidence

A comprehensive subsidence study is currently underway. Preliminary Subsidence Classification Areas have been identified and the selected mining method aims to minimise subsidence whilst optimising resource extraction. All surface features requiring protection from subsidence will be identified and the mine plan designed, in consultation with relevant authorities and landowners, to control the subsidence impacts on these features.

Preliminary studies indicate that subsidence will be in the vicinity of:

- first workings - less than 20mm subsidence;
- partial extraction (below sensitive surface features) - less than 45mm subsidence;
- full extraction where depth of cover is between 50m and 200m – 275mm to 850mm subsidence; and
- full extraction at depths of cover greater than 200m – less than 475 mm subsidence.

The Environmental Risk Register (Appendix A) identifies various mitigation measures to control and manage subsidence. These are listed in Table 1, together with the various impacts that may occur as a result of subsidence.

Comprehensive and early consultation will be undertaken with relevant authorities and landholders to determine acceptable subsidence limits and restrictions. Donaldson is also devising several plans and diagrams to clearly explain the impacts of subsidence and how the land within the Project Rea may potentially be affected.

4.5 Surface and Groundwater Hydrology

Surface Catchments

The Abel Project Area consists of low undulating hills that are mostly forested, with large patches of cleared land. It is located within the lower section of the Hunter River catchment. For the purposes of this description, the site has been separated into four areas, which drain to the Hunter River though the different sub-catchments.

The largest of the areas incorporates the upper section of Long Gully and a lower reach of Blue Gum Creek, and drains into the Hexham Swamp sub-catchment. The watercourses in this area are generally ephemeral, not having a permanent water flow. However, Blue Gum Creek has a significant catchment area, including forested areas upstream of the project site, and would be expected to have at least a small base flow for the majority of the year. Blue Gum Creek has ponded areas that would be expected to remain wet, even in very dry conditions. Immediately downstream of where Blue Gum Creek exits the Project Area, it drains into Pambalong Nature Reserve, which consists of a series of swamps.

The second largest of the areas incorporates the upper sections of Weakleys Flat Creek and Viney Creek, and drains into the Woodberry Swamp sub-catchment. A large portion of the cleared land previously supported chicken production. The watercourses in this area are ephemeral.

The third catchment area incorporates an upper reach of Buttai Creek, and drains into the Wallis Creek sub-catchment. The watercourses in this area are ephemeral.

The smallest of the areas incorporates the upper section of Four Mile Creek, and drains into the Four Mile Creek sub-catchment. The watercourses in this area are ephemeral and the area also contains numerous farm dams of various sizes.

All the watercourses on site are categorised as Schedule 1 or Schedule 2 steams, as defined in the Draft Guidelines for Management of Steam/Aquifer Systems in Coal Mining Developments – Hunter Region (August 2002, DIPNR). The Schedule 2 steams within the project site include lengths of Long Gully, Blue Gum Creek, Viney Creek and Buttai Creek, as shown on Figure 8.

The most important surface water feature on the site is considered to be the lower reach of Blue Gum Creek, which drains into Pambalong Nature Reserve immediately downstream of Blue Gum Creek, adjacent to the Project Area.

Surface water quality

Donaldson conducts a regular surface water monitoring program of the three main creeks (Scotch Dairy Creek, Weakley's Flat Creek and Four Mile Creek) that traverse the existing Donaldson Mine property. Weakley's Flat Creek and Four Mile Creek have tributaries within the Abel Project Area. These creeks are sampled above and below the existing open cut mine site on a monthly basis for a suite of parameters as shown on Table 2. A baseline survey of these creeks was undertaken in 1997 and routine monitoring has been undertaken since June 2000.

Table 2 Existing Surface Water Quality Data

Sample Site	Date	PH (in situ)	EC (in situ) uS/cm	Total Dissolved Solids Mg/L	Total Suspended Solids Mg/L	Alkalinity Tot.) Mg/L	Acidity as CaCO3	Sulphates Mg/L
Weakley's Flat Creek Upstream	Min	4.00	145.00	95.00	1.00	15.00	2.00	1.00
	Max	8.30	3,480.00	2,020.00	252.00	115.00	55.00	115.00
	Avge	**6.96**	**629.69**	**400.75**	**16.50**	**52.86**	**14.89**	**29.77**
Four Mile Creek Upstream	Max	7.90	895.00	520.00	269.00	90.00	83.00	136.00
	Min	4.80	85.00	70.00	1.00	8.00	4.00	1.00
	Avge	**7.02**	**388.02**	**260.00**	**33.97**	**56.83**	**25.26**	**22.40**

Potential Surface Water Impacts

Surface water impacts from proposed surface infrastructure will be controlled by the implementation of existing Donaldson and Bloomfield Mine controls.

Subsidence impacts to surface water will be controlled and minimised by the use of varied bord and pillar extraction mining methods and appropriate mitigation/remediation measures. This will involve the implementation of a mine plan that removes less or no coal under identified significant surface features such as farm dams and creeklines, thus reducing subsidence impacts on these features to non-significant levels. Impacts that could occur without controls, and are therefore being considered in detail to ensure that the impact upon them is not significant, include an increase or decrease in bed slope gradient

of water courses, minor surface cracking of the bed and banks that could possibly lead to erosion, underground leakage or surface ponding, changes to downstream water quality and changes in the structural integrity and water holding capacity of farm dams in the area.

Detailed subsidence studies are currently being undertaken which will consider the impacts of the Abel Project on all surface water features and downstream features.

Management of impacts will be in accordance with *Draft Guidelines for Management of Steam/Aquifer Systems in Coal Mining Developments – Hunter Region* (August 2002, DIPNR); and specific consultations will be held with the Department of Natural Resources to ensure requirements are met.

Groundwater

Groundwater in the coal measure sediments is generally saline, and flows primarily within fracture permeability. The coal seams are generally the most permeable parts of the sequence, although they are at best only moderately permeable. The groundwater levels in the Donaldson coal seams and the overburden sediments have been partly depressurised due to dewatering of the Donaldson open cut mine. However, at the down-dip (southern) end of the proposed mine, groundwater heads are expected to be unaffected by mining at this stage.

Controls to prevent groundwater impact will include comprehensive examination of existing groundwater conditions and flows to determine potential interactions, design of extraction regime to cater for conditions and flows, with mining excluded from any potential areas of high impact.

A groundwater study has commenced which will focus on:

- Potential for any regional lowering of groundwater levels in hard rock or alluvial aquifers or nearby wetlands;
- Impact on the water supply of existing groundwater users; and
- Potential impacts on any groundwater dependent ecosystems.

The investigation program for assessing these potential impacts will involve the following:

- Installation of monitoring piezometers;
- Hydraulic testing to determine aquifer hydraulic properties;
- Baseline monitoring of groundwater levels and groundwater quality;
- Groundwater flow modelling, for calibration and simulation of potential impacts;
- Identification of existing users;
- Identification of any groundwater dependent ecosystems; and
- Assessment of separate and cumulative impacts.

The most likely issues of key importance, as identified by the risk assessment, which will be the focus of environmental studies, will be:

- Regional and local groundwater level impacts;
- Potential impacts on nearby wetlands (Hexham Swamp and Pambalong Nature Reserve);
- Potential impacts of discharges of groundwater, mine waste water or contaminated stormwater.

Studies to date indicate that groundwater inflow volumes are expected to be manageable, with a low risk of problematic inflow rates occurring. Groundwater will most likely have elevated salinity and possibly a low pH, however, this will be confirmed by water quality testing. Groundwater inflows would be used for water supply, with any short-term excess flows being pumped to existing water management dams on Donaldson.

Any impact on existing groundwater users is unlikely as groundwater quality is most likely too poor to be of beneficial use. A search of groundwater users will be undertaken as part of the environmental assessment. There is also unlikely to be any impact of any groundwater dependent ecosystems, but further studies will be undertaken.

4.6 Noise and Vibration

Existing Acoustic Environment

Two background noise assessments have been conducted in the vicinity of the proposed Abel Mine. The first was prior to the commencement of the Donaldson Open Cut Mine (October 2000) in the northern extent of the Project Area and the second was for the Tasman Project (April 2001), located to the south of the Project Area.

A review of existing data from the baseline noise monitoring and the Donaldson Mine quarterly noise monitoring will be undertaken to identify the requirement of undertaking a current background noise assessment specific to Project Abel.

Noise Controls

As mining will be underground, the only potential noise sources are from surface infrastructure. This will be located within a pit created by Donaldson mining, which will contain potential noise. Use of existing facilities reduces noise associated with construction, and the installation of an overland conveyor to Bloomfield's facilities will eventually reduce any potential noise associated with internal truck haulage. With the implementation of controls, the Environmental Risk Assessment allocated a low risk rating from potential noise impacts.

Potential Noise & Vibration Impacts

Potential noise and vibration impacts may arise from the following activities:

- Dam and Roads construction;
- Construction equipment to be used on site;
- Surface facilities, ventilation fans and portals;
- Noise emissions from machinery entering or exiting the portal; and

- Haulage routes to Bloomfield coal preparation plant.

Assessment & Methodology

Some additional background noise monitoring will be undertaken and assessed in accordance with the NSW Industrial Noise Policy at the nearest affected noise sensitive receiver(s).

It is likely that the nearest potential noise and/ or vibration sensitive receivers from surface operations will be:

- Residences in the Black Hill area along Black Hill Road to the south and to the south west including those along Browns Road, Black Hill.
- Residences along John Renshaw Drive and Lings Road, Buttai.
- The former Bartter Enterprises site, currently owned by the Catholic Diocese of Maitland, would also be considered as a potentially noise sensitive receiver.

Other potential noise sensitive and/ or vibration sensitive receivers contained by or adjacent to the proposed Project Area are:

- Residences along Dog Hole Road and Stockrington Road.
- Residences in the Cedar Hill and Cedar Grove localities.
- Daracon Quarry, Stockrington.

Noise level predictions will be calculated using ENM environmental noise modelling software. The development of a Construction Noise and Vibration Management Plan and an Operational Noise and Vibration Management Plan would be required to display effective management of the issues.

4.7 Air Quality

The proposal is an underground mine and consequently air quality issues will be confined to emissions from surface operations including stockpiling, conveying and other handling of coal on the surface, as well as ventilation emissions from the underground mine. Impacts on air quality, with proposed mitigation measures, have been allocated a low risk category in the Environmental Risk Register (Appendix A).

Existing Air Quality Data

Monitoring programs to characterise the meteorological conditions and existing air quality have been in place since 2000. Figure 11 shows the locations of the meteorological station and air quality monitors. The air quality monitoring plan comprises eleven dust deposition gauges, one TSP monitor and one PM10 monitor. In addition, the DEC's PM10 monitor at Beresfield provides useful information on regional PM10 concentrations.

The results of the dust deposition monitoring carried out over the 12 months leading up to and including May 2005 (the most recent data at the time of writing) are shown in Table 3.

Gauges D1, D2, D3, D4, D5A and D10 provide data for the area potentially affected by the Abel Project. Gauges D6, D7, D8, D9 and D11 are too far from the Project Area, but do provide information on air quality conditions in the general area.

Measured dust deposition levels were generally low and with the exception DG8, all gauges recorded deposition levels less than the DEC's annual average assessment criterion of 4 g/m2/month. The high DG2 reading in May 2005 was due to insects and bird droppings in the gauge. DG8 also recorded an annual average deposition rate above 2 g/m2/month mainly due to the presence of contaminated samples. None of the higher readings is attributable to mining activity. Overall, dust deposition levels appear to be at satisfactory levels.

Measurements of PM10 and TSP concentrations have been made at sites referred to as the Beresfield and Bartter sites. The 24-hour average PM10 concentration has only exceeded the DEC's criteria of 50 μg/m3 once in the past 12 months, at the Beresfield site. Previous high results can generally be attributed to local bushfires.

The annual average PM10 concentration (running mean) at Beresfield exceeded the DEC 30 μg/m3 criterion for a period running from late 2002 to the end of 2003, but has been below the criterion since that time. The annual average PM10 concentration at Bartter Farms has not exceeded the criterion since monitoring commenced in late 1999. The annual average TSP concentration at Bartter Farms has also been lower than the DEC 90 μg/m3 criterion since monitoring commenced.

As with dust deposition, PM10 and TSP concentrations are satisfactory at present, but emissions sources of PM10 that might affect air quality in the Beresfield area will be carefully controlled to ensure that the area continues to comply with the DEC annual and 24-hour criteria of PM10. The Abel project is unlikely to contribute significantly to the PM10 burden in the Beresfield area.

Meteorological conditions

A meteorological station has been operating since 1999 as part of the Donaldson Project environmental monitoring program. The most common winds are from the west, west-northwest and east-southeast and southeast. Westerlies are most common in the winter and the south-easterlies in the summer. Autumn and spring show an intermediate pattern between that which applies in the summer and the winter.

Table 3 Dust deposition monitoring for the 12-month period to May 2005

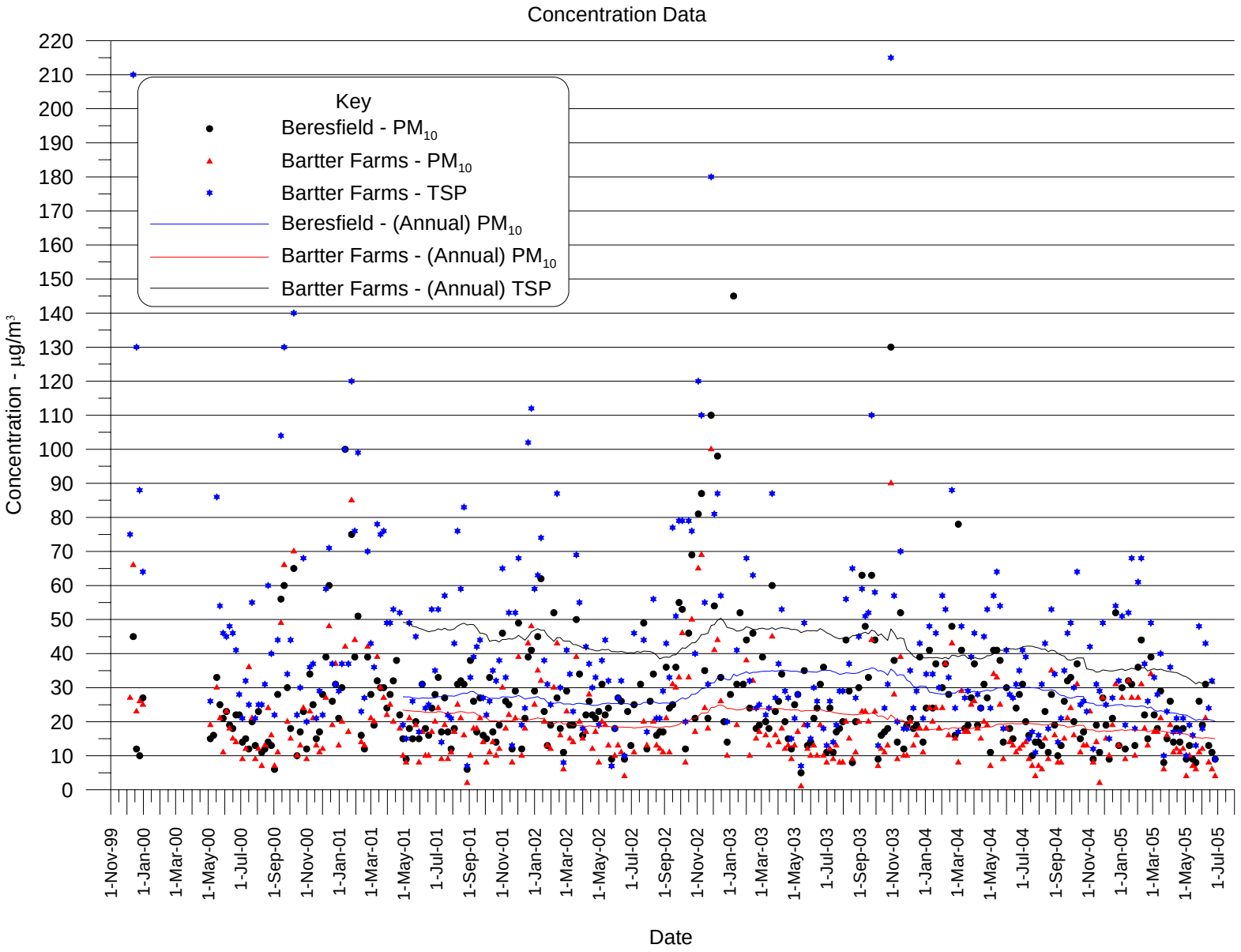
Month	Monthly dust deposition rate (g/m^2/month)										
	DG1	DG2	DG3	DG4	DG5A	DG6	DG7	DG8	DG9	DG10	DG11
Jun-04	0.4	0.6	0.7	0.9	0.6	1.4	1.0	0.9	1.0	1.0	0.8
Jul-04	0.4	0.6	5.3#	0.6	0.5	2.9	1.0	1.1	0.9	0.6	1.2
Aug-04	0.5	0.5	0.5	1.3	0.7	1.1	1.1	1.4	*	1.0	1.0
Sep-04	0.6	0.6	0.8	2.2	1.0	1.0	0.9	4.4	0.9	16.7#	1.1
Oct-04	0.7	0.9	1.2	0.9	0.8	1.4	1.0	10.5+	1.0	1.0	0.8
Nov-04	0.8	0.7	1.3	1.9	0.7	0.9	1.0	3.0	1.1	1.1	1.6
Dec-04	2.0	1.4	3.6	1.5	1.3	2.2	3.2	7.9	1.8	5.5#	2.5
Jan-05	1.2	1.0	3.7	1.6	1.4	4.0	2.3	2.7	2.6	2.5	2.8
Feb-05	1.2	1.2	1.8	1.6	1.3	2.0	1.7	*	2.3	1.5	2.3
Mar-05	1.3	0.9	1.4	0.9	0.9	3.0	1.2	7.7^	*	0.8	1.3
Apr-05	1.1	0.7	0.9	0.8	0.7	0.9	1.4	3.3	1.1	0.8	0.9
May-05	0.7	8.6#	1.1	0.8	0.7	0.8	0.9	4.4	1.2	0.8	1.1
Annual Average	**0.9**	**1.5**	**1.9**	**1.3**	**0.9**	**1.8**	**1.4**	**4.3**	**1.4**	**2.8**	**1.5**

** Funnel broken (vandals?)*
 # Insects and bird droppings reported
+ Insects and wasps mud nest build up reported
^ Insects, grass and twigs reported
Data supplied by Metford Laboratories

Assessment Approach

The air quality assessment will follow NSW DEC's guidelines (NSW DEC, 2001) which require the assessment to:

- Identify relevant pollutants;
- Ascertain existing concentrations (and deposition levels if relevant) of the relevant pollutants;
- Derive appropriate assessment criteria;
- Analyse the proposed operation of the mine and develop emissions inventories in a format suitable for use with a dispersion model;
- Prepare a meteorological data file for use with the dispersion model;
- Use estimated emissions, meteorological data and dispersion model to predict ground-level concentrations and deposition levels, and
- Compare predicted concentrations and deposition levels with assessment criteria after taking account of existing levels of pollution.


Concentration Data
Key
Beresfield - PM10
Bartter Farms - PM10
Bartter Farms - TSP
Beresfield - (Annual) PM10
Bartter Farms - (Annual) PM10
Bartter Farms - (Annual) TSP
Concentration - µg/m3
Date
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
1-Nov-99
1-Jan-00
1-Mar-00
1-May-00
1-Jul-00
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1-Jan-04
1-Mar-04
1-May-04
1-Jul-04
1-Sep-04
1-Nov-04
1-Jan-05
1-Mar-05
1-May-05
1-Jul-05

4.8 Ecology

The Environmental Risk Rating for potential flora and fauna impacts is considered low due to the nature of underground mining, which does not require land clearing. With subsidence controls, the impact on any change in landform on flora and fauna is also expected to be low. Surface infrastructure, which would generally require land clearing, will be located in existing areas of disturbance within Donaldson and Bloomfield open cut mines, thus ensuring land clearing is kept to a minimum.

The draft *Guidelines for Threatened Species Assessment* (Department of Environment and Conservation, and Department of primary Industries, July 2005) states that '*the main purpose of a preliminary assessment is to determine the likelihood of the study area and subject site supporting threatened species. This step is primarily a desk top assessment involving searches of relevant databases and literature reviews to identify a list of threatened species that could potentially occur in the area'.* The guidelines list as items to be included in a preliminary assessment:

- *'A description of the location and nature of the proposed development;*
- *A description of dominant vegetation types;*
- *A description of habitat features;*
- *A list of threatened species that are known or likely to occur within the study area; and*
- *An assessment of which of the threatened species that are known or likely to occur are likely to be directly or indirectly affected by the proposal.'*

A database search of the Atlas of NSW Wildlife has been undertaken for an area within a 5 kilometre radius of EL5497, which includes the Project Area. Flora and fauna data also exists for the Donaldson open cut site.

The following Table 4 lists the species of threatened fauna recorded within a 5 kilometre radius of EL5497.

Table 4 Threatened Fauna Species recorded within 5km Radius of EL5497

Family	Species	Common Name	Status#
Frogs			
Hylidae	*Litoria aurea*	*Green and Golden Bell Frog	E1
Birds			
Acanthizidae	*Pyrrholaemus sagittatus*	Speckled Warbler	V
Accipitridae	*Hamirostra melanosternon*	Black-breasted Buzzard	V
Accipitridae	*Lophoictinia isura*	Square-tailed Kite	V
Anatidae	*Stictonetta naevosa*	*Freckled Duck	V
Anseranatidae	*Anseranas semipalmata*	*Magpie Goose	E1
Ardeidae	*Botaurus poiciloptilus*	*Australasian Bittern	V
Cacatuidae	*Calyptorhynchus lathami*	Glossy Black-Cockatoo	V
Ciconiidae	*Ephippiorhynchus asiaticus*	*Black-necked Stork	V
Climacteridae	*Climacteris picumnus*	Brown Treecreeper	E1

Family	Species	Common Name	Status#
Columbidae	*Ptilinopus magnificus*	Wompoo Fruit-Dove	V
Haematopodidae	*Haematopus longirostris*	*Pied Oystercatcher	V
Jacanidae	*Irediparra gallinacea*	*Comb-crested Jacana	V
Meliphagidae	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subsp.)	V
Meliphagidae	*Xanthomyza phrygia*	Regent Honeyeater	V
Petroicidae	*Melanodryas cucullata*	Hooded Robin	V
Psittacidae	*Lathamus discolor*	Swift Parrot	V
Psittacidae	*Neophema pulchella*	Turquoise Parrot	V
Rostratulidae	*Rostratula benghalensis australis*	*Painted Snipe (Australian subspecies)	E1
Strigidae	*Ninox connivens*	Barking Owl	V
Tytonidae	*Tyto novaehollandiae*	Masked Owl	E1
Marsupials			
Petauridae	*Petaurus australis*	Yellow-bellied Glider	V
Petauridae	*Petaurus norfolcensis*	Squirrel Glider	V
Phascolarctidae	*Phascolarctos cinereus*	Koala	V
Megachiropteran Bats			
Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V
Microchiropteran Bats			
Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V
Molossidae	*Mormopterus norfolkensis*	Eastern Freetail-bat	V
Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	V
Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V
Vespertilionidae	*Miniopterus australis*	Little Bentwing-bat	V
Vespertilionidae	*Miniopterus schreibersii oceanensis*	Eastern Bent-wing Bat	V
Vespertilionidae	*Myotis adversus*	Large-footed Myotis	V
Vespertilionidae	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V

E1-Engangered, V-Vulnerable as per Schedule 2 of the *Threatened Species Assessment Act 1995*

The majority of these species occupy open forest or riparian forest where subsidence impacts on their habitat will be negligible. Those species with common names marked with an asterisk would be dependant on the habitat in and around the Pambalong Swamp. The flow integrity of the catchments supplying this wetland will be maintained through controlled subsidence.

In addition to this list, the Sooty Owl has been recorded on Donaldson as well as during preliminary ground searches in the Abel Project Area.

The database search for endangered or vulnerable flora within a 5 kilometre radius of EL5497 indicated the presence of one threatened flora species, *Tetratheca juncea*.

The area above the proposed underground workings contains approximately 1900 hectares of relatively undisturbed vegetation and 900 hectares of fragmented vegetation in a farmland mosaic. The topography consists of a complex system of ridges (elevation around 200 metres) and steep gullies which drain across alluvial flats ultimately into the Hexham floodplain. The Environmental Risk Assessment undertaken indicates that, with subsidence controls, impact on flora and fauna in this area due to underground mining will be low.

The main potential for impact will be from the potential for subsidence to alter stream flows. Schedule 3 of the *Threatened Species Conservation Act, 1995* lists *'Alteration to the natural*

flow regimes of rivers, streams, floodplains & wetlands' as a key threatening process. The lower streamlines are likely to contain a variety of streamline and water dependant endangered ecological communities. A strong focus will therefore be placed on determining any impact on Pambalong Nature Reserve, which takes the flow from the Blue Gum Creek catchment. The environmental risk assessment indicates that, with proposed subsidence controls, any impact on the wetland associated with Pambalong Nature Reserve or downstream wetlands, will be low. Amphibian fauna will also be given particular attention.

Preliminary field investigation has shown that there are important areas of rainforest located in a number of deep gullies over the area to be mined. These forests meet the description of 'Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions' which has been proposed by the NSW Scientific Committee to be listed as an endangered ecological community.

Ecosystem mapping will be combined with the subsidence model to determine areas that require closer scrutiny by way of targeted searches, or by modifying the subsidence pattern to reduce impact.

Further studies will be undertaken of the conveyor and haul route proposed between Donaldson open cut and Bloomfield, however, the majority of this area is disturbed or cleared and the environmental risk assessment indicates that the potential for impact, with controls, is low.

4.9 Archaeology

The draft Department of Environment and Conservation (DEC) *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (July 2005) state that *'the main purpose of a preliminary assessment is to identify whether there are Aboriginal cultural heritage values associated with the subject site'*. The draft guidelines suggest a desktop scoping exercise that includes:

- *'a description of the location and nature of the proposed development;*
- *a description of any social and cultural values including the spiritual, traditional, historical or contemporary associations and attachments which the place or area has for the present-day Aboriginal community; and*
- *an assessment of which of the Aboriginal cultural heritage values that are known or likely to occur are likely to be directly or indirectly affected by the proposal'.*

A comprehensive Archaeological and Aboriginal Cultural Heritage Constraints Assessment (refer separate document) has been undertaken for EL5497, which is the underground section of the Abel Project Area. The smaller area containing proposed surface facilities is generally included in the area previously investigated for the Donaldson open cut mine, and is located in an area that has been or will be heavily disturbed by Donaldson mine activities prior to their installation. The underground Project Area assessment has identified all stakeholders and previous surveys undertaken on the site, with findings.

Searches of the DEC Aboriginal Heritage Information Management System (AHIMS) reveal that approximately eleven Aboriginal sites are listed within the underground Project Area with at least five additional sites within the surface facilities Project Area (refer Figure 13). The sites identified include artefact scatters, grinding grooves and a scarred tree. A predictive model of

site location constructed to identify areas of high archaeological sensitivity (ie. locations where there is a high probability of archaeological evidence occurring) indicates that there is potential for widespread evidence of Aboriginal occupation in the form of stone artefacts, but also other heritage site types such as grinding grooves and lithic quarries, to occur within the Project Area.

Potential impacts to Aboriginal heritage and cultural values may arise through the construction of surface facilities, such as conveyors, extraction fans, stockpiles and roads. Such impact will be very limited as most surface development will be within previously disturbed areas. The selected mining method will control subsidence impacts to any identified significant heritage sites or areas of archaeological/cultural value and sensitivity. Where impacts will occur all relevant approvals will be obtained and necessary mitigation measures imposed. Subsidence below creek and cliff areas will be minimal, as described in Section 2.5.

4.10 Socio-Economic Aspects

Socio-economic benefits from the proposed Abel Underground Mine will be:

- Employment - approximately 375 persons will be employed by Abel Underground Mine;
- Royalties to the State Government; and
- Export revenue for the Australian economy.

The development of Abel Underground Mine will enable employees from Donaldson Open Cut Mine, which is scheduled to close in 2011, to continue with employment at the Abel Underground Mine.

There are approximately 188 private land holdings and around 100 owners on the Abel Underground Mine site. The number of individual owners will be confirmed through consultation. Large areas of land are already owned by Donaldson, as well as Coal and Allied. There are no large commercial agricultural operations on the site, with the majority of landholdings being used for rural/residential or hobby farming.

4.11 Visual Aspects

No alteration to the existing visual landscape is expected from the underground coal operation. The environmental risk assessment has determined that the potential for visual change due to underground mining to be very low.

The proposed surface facilities will be located within the existing area of disturbance at Donaldson Open Cut Mine. Facilities will be located below a high wall that will screen views of operations from John Renshaw Drive. A buffer of retained vegetation between the high wall and road will also assist in screening operations.

There is some visual impact from the existing Bloomfield Coal Handling and Preparation Plant on existing houses within the Maitland LGA. This impact will be considered in the assessment process and mitigated where possible through the use of more directional lighting and shielding.

Visual impact associated with the proposed development will also focus on the impact from vehicles travelling along John Renshaw Drive and on any change in general scenic amenity associated with any relocation of infrastructure or potential subsidence.

4.12 Roads and Traffic

There is expected to be minimal impact on the existing road network. All coal will be transported by conveyor and rail. Truck transportation in the initial stages of mining will be on Donaldson Open Cut Mine internal haul roads.

A new intersection linking Donaldson Open Cut Mine with John Renshaw Drive (to be constructed as part of the Tasman Coal Mine approval) will be used by employees.

4.13 Soils and Land Capability

The proposed mine area includes the physiographic regions of East Maitland Hills, Awaba Hills and Sugarloaf Range. It also includes some of the Lower Hunter Plains Region (Matthei, 1995).

The East Maitland Hills region (the northern portion of the Project Area) is characterised by undulating low and rolling hills on Permian sediments on its midwestern area. This physiographic region generally consists of the Yellow, Red and Brown Podzolics and Soloths soil units. Lithosols are common on steeper slopes where as Euchrozems, Red Clays, Non-Calcic Brown Soils, Chocolate Soils, Black Earths and Prairie Soils are found on basaltic parent material.

The Lower Hunter Plain region (the south-eastern portion of the Project Area) is predominately composed of Prairie Soils, with some Chernozems and Brown Clays with Humic Gleys in the lower Hunter delta, Solonchaks on the tidal flats, Alluvial Soils and Siliceous Sands in the upper reaches of Wallis Creek and the Hunter River, Brown Podzolic Soils and Red and Yellow Earths on alluvial terraces, and Podzols on elevated sand sheets.

The central and south-western portions of the Project Area form part of the Sugarloaf Range and Awaba Hills physiographic regions.

The Sugarloaf Range is characterised by Triassic sediments, forming steep mountains. The dominant soil types of the Sugarloaf Range are Yellow and Red Podzolics, Yellow Earths and Lithosols on steep slopes and summit surfaces. Yellow Podzolics and Soloths occur on low hills and lower slopes.

The Awaba Hills consist of rolling low hills with Yellow Podzolics and Soloths with some Red and Brown Podzolics occurring on the upper slopes. Beach Loams and some Lithsols occur on resistant parent material.

A land capability review for Project Area has been undertaken in accordance with the Department of Planning rural land capability assessment system, which classifies land on the basis of an increasing soil erosion hazard and decreasing versatility of use. The system recognises the following three (3) types of land uses:

- land suitable for regular cultivation (Classes I, II & III);
- land suitable for grazing (Classes IV, V, & VI) ; and
- land not suitable for rural production (Classes VII, VIII, U & M).

These capability classifications identify the limitations to the use of the land as a result of the interaction between the physical resources and a specific land use. The principal limitation recognised by these capability classifications is the stability of the soil mantle.

The method of land capability assessment takes into account a range of factors including climate, soils, geology, geomorphology, soil erosion, topography and the effects of past land uses. The classification does not necessarily reflect the existing land use; rather it indicates the potential of the land for such uses as crop production, pasture improvement and grazing.

According to the Land Capability Map Series Sheet 9232 – Newcastle 1:100,000 (Soil Conservation Service, 1984), the Project Area has been classified under 2 types of land

capability classes, “land suitable for grazing” (Classes IV & VI) and “land not suitable for rural production” (Classes VII & VIII). There is no land within the Project Area that is “suitable for regular cultivation” (Classes I, II or III).

The majority of the Project Area is classified as Class IV land. Although Class IV land consists of the “better” grazing land, it is not suitable for cultivation on a regular basis, due to slope gradient, soil erosion, shallowness or rockiness.

Considerable portions of the Project Area are designated as Class VI land that is essentially less productive grazing land not suitable for cultivation as productivity is variable due to lack of soil depth and fertility.

Class VII land and minor occurrences of Class VIII land are present in the Project Area. These land classes are characterised by steep slopes, shallow soils and rock outcrops.

4.14 Cumulative Impacts

Abel Underground Mine will interact with the nearby Tasman Underground Mine, Donaldson Mine, Bloomfield Mine and Bloomfield Coal Handling and Preparation Plant (CHPP) and rail loading facility. Abel Mine will utilise existing areas of disturbance with Donaldson Open Cut Mine to house surface infrastructure. Existing haul roads within Donaldson Mine will also be used. Consent for Donaldson Mine expires in 2012 and potential impacts associated with the operation of both Abel Underground Mine, Donaldson Mine and Bloomfield Mine will be examined. These will include such aspects as air quality, noise and water management.

Tasman Mine and Abel Mine will both utilise the Bloomfield CHPP and rail loading facility. Impacts associated with the combined use of this facility by these and any other mines will be examined to ensure activities meet licence requirements. Any impacts such as dust or noise associated with the combined transport of coal from Tasman and Abel within the Donaldson site will also be examined.

A Water Management study of Bloomfield CHPP is being undertaken to ensure modifications to the plant area required to cater for Abel coal are included in the modified dirty and clean water management system.

5 REFERENCES

Department of Planning, 2005
Draft Guidelines: Steps on the Assessment and Approval of Major projects Under Part 3a (26 July 2005)

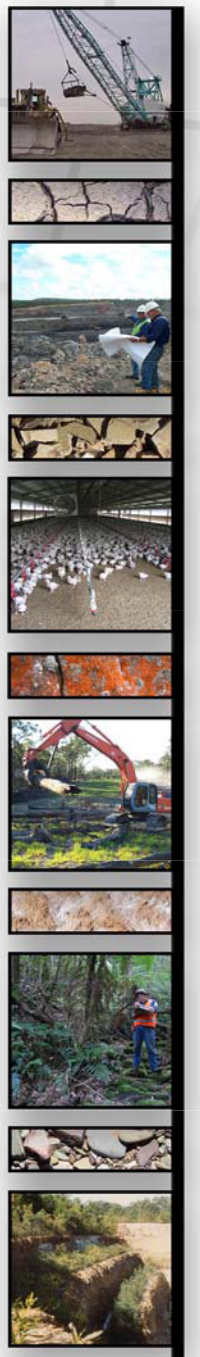
Department of Infrastructure, Planning and Natural Resources, 2002
Draft Guidelines for management of Stream/Aquifer Systems in Coal Mining Developments – Hunter Region.

Matthei, 1985
Soil Landscapes of Newcastle 1:100,000 Sheet.

NSW DEC, 2001
Approved Methods and Guidance For the Modelling and Assessment of Air Pollutants in New South Wales. New South Wales EPA, Sydney, NSW 2000. (Available www.epa.nsw.gov.au/air/amgmaap.pdf/).

Appendix A

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



OCTOBER 2005

Broad Brush Environmental Risk Assessment (ERA) and Establishment of a Site Based Risk Register for the Abel Project.

Prepared for

Ellemby Resources

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PO Box 37
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OCTOBER 2005

EMP1-1005-15

GSS ENVIRONMENTAL
Environmental, Land and Project Management Consultants

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Broad Brush Environmental Risk Assessment (ERA) and Establishment of a Site Based Risk Register for the Abel Project.

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Date of Issue October 2005

GSSE Ref EMP1-1005-15

ISSUE AND AMENDMENT CONTROL HISTORY

Issue	Date	Description	Author	QA/QC
1	25.10.2005	Draft Report	Chrissie Eckersley	Andrew Hutton

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TABLES

APPENDICES

ABBREVIATIONS

EMP	Environmental Managemant Plan
EMS	Environmental Management System
ERA	Environment Risk Assessment
GSSE	GSS Environmental
ROM	Run Of Mine
STD	Standard

1.0 INTRODUCTION

GSS Environmental (GSSE) was engaged by Ellemby Resources to undertake an Environmental Risk Assessment (ERA) and develop a Risk Register for the proposed underground coal project. A stakeholder workshop session was held at the GSSE office on the 21st October 2005. The workshop was facilitated by Andrew Hutton, a Senior Environmental Projects Manager of GSS Environmental.

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

2.0 AIMS AND OBJECTIVES

The aim of the ERA was to formally assess the risk of various activities associated with the underground coal project and to suggest possible management protocols for all environmental risks. GSSE followed four (4) fundamental steps during the ERA process:

(a) Establish the context for the risk assessment process;

(b) Identify the environmental risks;

(c) Analyse the risks; and

(d) Evaluate the risks to determine the significant issues.

Notwithstanding the above, the follow specific aims and objectives were established for the Abel Project ERA:

- Identify the activities, aspects and possible environmental impacts associated with the operation of the proposed underground coal project;
- consider these activities in isolation of any controls and determine a raw risk rating;
- identify any controls required to mitigate or minimise the potential for environmental impacts in order to reduce the risk to the lowest level possible;
- Provide the basis for the development of an action plan which identifies the various issues that require further consideration during the environmental impact assessment of the proposed project.

3.0 SCOPE

This ERA covers the proposed Abel underground coal project, including the mine construction phase.

It is acknowledged that throughout the Risk Register there were overlaps between the different process areas, however where possible this has been avoided.

Table 3.1: List of Key Process Areas considered in the ERA.

PROCESS AREA	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, subsidence, and water management.

4.0 METHODOLOGY

4.1 Workshop Sessions

Individuals from the project team were selected to form a “working group” for the ERA. This enabled the risks to be assessed by those who have experience in the area and also the authority to action key “findings” that may have resulted from the ERA process.

These individuals 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 show the date of the workshop session as well those who attended.

Table 4.1: List of Workshop Session and 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	*Senior Environmental Projects Manager, GSSE*
7). Chrissie Eckersley	*Senior Environmental Projects Scientist, GSSE*

4.2 Determination and Assigning the Environmental Risk Rating

The following section briefly outlines the methodology used to assign a specific Environmental Risk Rating to each aspect of the proposed underground coal project. Risk assessment is the formalised means by which hazards and associated dangers are systematically identified, assessed, ranked according to perceived risk and addressed by means of appropriate and effective controls.

Environmental Risk is the chance of something happening that will have an adverse impact upon the environment. The impact will vary in consequence from *Catastrophic* (a major event which could cause severe damage to the environment) through to *Insignificant* (no detrimental impact on the environment is measured or envisaged). The Environmental Risk Rating is measured in terms of consequence (severity) and likelihood (probability) of the event happening.

The allocation of a consequence rating was assigned by way of group consensus based on the descriptions contained in the following section below.

4.2.1 Environmental Consequence

The allocation of an Environmental Risk Rating was based on Environmental Consequence Descriptions contained in **Table 4.2** below:

Table 4.2: 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 (ie. 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**	**<u>An event which could have temporary and minor effects to the natural and / or human environment.</u>** • 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**	**<u>No detrimental impact on the natural and / or human environment is measured or envisaged.</u>** • 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.

4.2.2 Probability of an Incident occurring

The likelihood (or probability) of each impact occurring was also rated according to the following descriptions on **Table 4.3.**

Table 4.3: List of Probability Criteria Used in the ERA.

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

4.2.3 Environmental Risk Matrix

Numerical Risk rankings were allocated for each environmental aspect using the "*Environmental Risk Matrix*" on **Table 4.4** below. By using the "*Consequence*" and "*Probability*" rating a Risk Classification (see **Table 4.5**) was assigned between one (1) and twenty five (25), with one (1) being the highest risk and twenty five (25) the lowest.

Table 4.4: 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

4.2.4 Risk Classification System

A Risk Rating class was then applied to each aspect using the Risk Classification System. Table 4.5 show the different classes of the Risk Classification System.

Table 4.5: 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.

4.2.5 Assessment of Effectiveness of Controls

Risk Rankings were allocated for each environmental aspect, 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) or with the **proposed controls** determined by the working group.

In the context of an Environmental 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 (*attached as **Appendix A**)* to document the risk assessment outcome(s) for all aspects identified throughout the ERA process. The Risk Register has been separated into the two (2) key process areas identified for the Abel Project. They include:

(a) Mine Construction; and,

(b) Underground Mining.

APPENDIX A – Risk Register for Ellemby Resources

DRAFT ENVIRONMENTAL RISK REGISTER - MINE CONSTRUCTION

Process Area	Activity	Aspect	Raw (potential risk)				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	2	c	2c	8 (M)		2	c	2c	8 (M)	Mine design agreed with RTA	3	d	3d	17 (L)
Mine Construction	Establishing Vent Shaft	Blasting	4	c	4c	18 (L)		4	c	4c	18 (L)	Mine Safety Management Plan Contractor Management Plan	4	e	4e	23 (L)
Mine Construction	Establishing Vent Shaft	Threatened Flora and Fauna	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)
Mine Construction	Establishing Vent Shaft	Aboriginal Heritage	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)
Mine Construction	Establishing Vent Shaft	European Heritage	3	e	3e	20 (L)		3	e	3e	20 (L)					
Mine Construction	Establishing Vent Shaft	Noise	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)
Mine Construction	Establishing Vent Shaft	Air Quality (commissioning)	5	d	5d	24 (L)		5	d	5d	24 (L)					
Mine Construction	Establishing Vent Shaft	Erosion and Sediment	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)
Mine Construction	Conveyor	Threatened Flora and Fauna	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)
Mine Construction	Conveyor	Aboriginal Heritage	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)
Mine Construction	Conveyor	European Heritage	3	d	3d	17 (L)		3	d	3d	17 (L)					
Mine Construction	Conveyor	Noise	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)
Mine Construction	Conveyor	Dust	4	d	4d	21 (L)		4	d	4d	21 (L)					
Mine Construction	Conveyor	Erosion and Sediment	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)
Mine Construction	Conveyor	Visual (lighting)	4	d	4d	21 (L)		4	d	4d	21 (L)					
Mine Construction	Box-Cut Excavation	Noise					(Donaldson)	4	d	4d	21 (L)					
Mine Construction	Box-Cut Excavation	Dust					(Donaldson)	4	d	4d	21 (L)					
Mine Construction	Box-Cut Excavation	water					(Donaldson)	4	d	4d	21 (L)					
Mine Construction	Box-Cut Excavation	Blasting/excavation of box-cut					(Donaldson)	4	d	4d	21 (L)					
Mine Construction	Box-Cut Excavation	Flora and Fauna					(Donaldson)	4	d	4d	21 (L)					
Mine Construction	Box-Cut Excavation	Aboriginal Heritage					(Donaldson)	4	d	4d	21 (L)					
Mine Construction	Box-Cut Excavation	European Heritage					(Donaldson)	4	d	4d	21 (L)					
Mine Construction	Portal Area (Construction)	Noise	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)
Mine Construction	Portal Area (Construction)	Dust	4	d	4d	21 (L)		4	d	4d	21 (L)					
Mine Construction	Portal Area (Construction)	Potentially sediment laden water leaving the site	4	d	4d	21 (L)		4	d	4d	21 (L)					
Mine Construction	Portal Area (Construction)	Lighting-visual	4	d	4d	21 (L)		4	d	4d	21 (L)					
Mine Construction	Portal Area (Construction)	Traffic movement to and from site	4	c	4c	18 (L)		4	c	4c	18 (L)					
Mine Construction	ROM Stockpile at Bloomfield (Construction)	Threatened Flora and Fauna	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)
Mine Construction	ROM Stockpile at Bloomfield (Construction)	Aboriginal Heritage	3	d	3d	17 (L)		3	d	3d	17 (L)					
Mine Construction	ROM Stockpile at Bloomfield (Construction)	European Heritage	3	e	3e	20 (L)		3	e	3e	20 (L)					
Mine Construction	ROM Stockpile at Bloomfield (Construction)	Noise	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)
Mine Construction	ROM Stockpile at Bloomfield (Construction)	Air Quality (commissioning)	5	d	5d	24 (L)		5	d	5d	24 (L)					
Mine Construction	ROM Stockpile at Bloomfield (Construction)	Erosion and Sediment	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)
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	Threatened Flora and Fauna	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)
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	Aboriginal Heritage	3	d	3d	17 (L)		3	d	3d	17 (L)					
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	European Heritage	3	e	3e	20 (L)		3	e	3e	20 (L)					
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	Noise	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)
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	Air Quality (commissioning)	5	d	5d	24 (L)		5	d	5d	24 (L)					
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	Erosion and Sediment	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)
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	Waste management	4	c	4c	18 (L)		4	c	4c	18 (L)					

DRAFT ENVIRONMENTAL RISK REGISTER - MINE CONSTRUCTION

Process Area	Activity	Aspect	Raw (potential risk)				Existing Controls	Existing Controls				Proposed Controls	Residual Risk			
			C	P	R			C	P	R			C	P	R	
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	Hydrocarbon/chemical storage	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)
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	Light	4	d	4d	21 (L)		4	d	4d	21 (L)					
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	Dust	4	d	4d	21 (L)		4	d	4d	21 (L)					
Mine Construction	Interim surface facilities (office, bath house, work shop, etc)	Traffic movement to and from site	4	c	4c	18 (L)		4	c	4c	18 (L)					
Mine Construction	Permanent surface facilities	Hydrocarbon/chemical storage	4	c	4c	18 (L)		4	c	4c	18 (L)					
Mine Construction	Permanent surface facilities (office, bath house, work shop, etc)	Light	4	d	4d	21 (L)		4	d	4d	21 (L)					
Mine Construction	Permanent surface facilities (office, bath house, work shop, etc)	Dust	4	d	4d	21 (L)		4	d	4d	21 (L)					
Mine Construction	Permanent surface facilities (office, bath house, work shop, etc)	Noise	4	d	4d	21 (L)		4	d	4d	21 (L)					
Mine Construction	Permanent surface facilities (office, bath house, work shop, etc)	Traffic movement to and from site	4	c	4c	18 (L)		4	c	4c	18 (L)					
Mine Construction	Permanent surface facilities (office, bath house, work shop, etc)	Erosion and Sediment	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)
Mine Construction	Permanent surface facilities (office, bath house, work shop, etc)	Waste management	4	c	4c	18 (L)		4	c	4c	18 (L)					

DRAFT ENVIRONMENTAL RISK REGISTER - UNDERGROUND MINING

Process Area	Activity	Aspect	Raw				Existing Controls	Existing Controls				Proposed Controls	Residual Risk			
			C	P	R			C	P	R			C	P	R	
Underground Mining	Exploration	*see exploration's activity aspects*														
Underground Mining	Coal Mining (Underground)	Subsidence (*see also subsidence activity)*														
Underground Mining	Coal Mining (Underground)	Waste e.g. oily rags, crib waste, tyres	4	c	4c	18 (L)		4	c	4c	18 (L)					
Underground Mining	Coal Mining (Underground)	Water contamination from spills and leaks	4	a	4a	10 (M)		4	a	4a	10 (M)	Waste Management Plan Employee Inductions and Maintenance programs	4	d	4d	21 (L)
Underground Mining	Subsidence (specific issues)	Schedule 2 and above Creeks -cracking and water loss	1	a	1a	1 (H)		1	a	1a	1 (H)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Subsidence (specific issues)	Schedule 2 and above Creeks - changes in creek bed profile resulting in erosion and sediment in the creek	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Subsidence (specific issues)	Vegetation loss due to swamping/ waterlogging from ponding	3	b	3b	9 (M)		3	b	3b	9 (M)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Subsidence (specific issues)	Water loss from farm dams	3	a	3a	6 (H)		3	a	3a	6 (H)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Subsidence (specific issues)	Damage and disruption to public utilities	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Subsidence (specific issues)	Damage to private residences	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Subsidence (specific issues)	Private Utilities	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Subsidence (specific issues)	Loss of Aboriginal heritage	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Subsidence (specific issues)	Loss of European heritage	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Subsidence (specific issues)	Topographic features (ie. Cliff lines)	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Subsidence (specific issues)	Natural features (ie. Wetlands)	2	a	2a	3 (H)		2	a	2a	3 (H)	Non-longwall system Designed extraction regime to limit subsidence.	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Schedule 2 and above Creeks -cracking and water loss	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Schedule 2 and above Creeks - changes in creek bed profile resulting in erosion and sediment in the creek	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Vegetation loss due to swamping/ waterlogging from ponding	3	c	3c	13 (M)		3	c	3c	13 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Water loss from farm dams	3	c	3c	13 (M)		3	c	3c	13 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Damage and disruption to public utilities	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Damage to private residences	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Private Utilities	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Loss of Aboriginal heritage	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Loss of European heritage	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Topographic features (ie. Cliff lines)	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted strata collapse (sink holes)	Natural features (ie. Wetlands)	2	c	2c	8 (M)		2	c	2c	8 (M)	Non-longwall system No roadway intersections at low depth of cover	3	d	3d	17 (L)
Underground Mining	Unpredicted subsidence from pillar failure	Schedule 2 and above Creeks -cracking and water loss	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system Pillar design to have adequate factor of safety	3	d	3d	17 (L)
Underground Mining	Unpredicted subsidence from pillar failure	Schedule 2 and above Creeks - changes in creek bed profile resulting in erosion and sediment in the creek	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system Pillar design to have adequate factor of safety	3	d	3d	17 (L)
Underground Mining	Unpredicted subsidence from pillar failure	Vegetation loss due to swamping/ waterlogging from ponding	3	d	3d	17 (L)		3	d	3d	17 (L)					
Underground Mining	Unpredicted subsidence from pillar failure	Water loss from farm dams	3	d	3d	17 (L)		3	d	3d	17 (L)					
Underground Mining	Unpredicted subsidence from pillar failure	Damage and disruption to public utilities	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system Pillar design to have adequate factor of safety	3	d	3d	17 (L)
Underground Mining	Unpredicted subsidence from pillar failure	Damage to private residences	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system Pillar design to have adequate factor of safety	3	d	3d	17 (L)
Underground Mining	Unpredicted subsidence from pillar failure	Private Utilities	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system Pillar design to have adequate factor of safety	3	d	3d	17 (L)
Underground Mining	Unpredicted subsidence from pillar failure	Loss of Aboriginal heritage	2	e	2e	16 (L)		2	e	2e	16 (L)					
Underground Mining	Unpredicted subsidence from pillar failure	Loss of European heritage	2	e	2e	16 (L)		2	e	2e	16 (L)					

DRAFT ENVIRONMENTAL RISK REGISTER - UNDERGROUND MINING

Process Area	Activity	Aspect	Raw				Existing Controls	Existing Controls				Proposed Controls	Residual Risk			
			C	P	R			C	P	R			C	P	R	
Underground Mining	Unpredicted subsidence from pillar failure	Topographic features (ie. Cliff lines)	2	e	2e	16 (L)		2	e	2e	16 (L)					
Underground Mining	Unpredicted subsidence from pillar failure	Natural features (ie. Wetlands)	2	d	2d	12 (M)		2	d	2d	12 (M)	Non-longwall system Pillar design to have adequate factor of safety	3	d	3d	17 (L)
Underground Mining	Conveyor	Noise (surface)	4	c	4c	18 (L)		4	c	4c	18 (L)					
Underground Mining	Conveyor	Dust (surface)	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Conveyor	Coal spillage contaminating the water	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)
Underground Mining	Conveyor	Visual (lighting, colour)	4	c	4c	18 (L)		4	c	4c	18 (L)					
Underground Mining	Portal Area (Operations)	Noise	3	b	3b	9 (M)		3	b	3b	9 (M)	Implementation of Noise Management Plan in EMS Employee Awareness and Inductions	3	d	3d	17 (L)
Underground Mining	Portal Area (Operations)	Dust	3	b	3b	9 (M)		3	b	3b	9 (M)	Implementation of Air Quality Management Plan in EMS Employee Awareness and Inductions	3	d	3d	17 (L)
Underground Mining	Portal Area (Operations)	Potentially sediment laden water leaving the site	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Portal Area (Operations)	Lighting-visual	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Coal Handling and Preparation Plant (CHPP)	Noise					(Existing Bloomfield Plant)									
Underground Mining	Coal Handling and Preparation Plant (CHPP)	Dust					(Existing Bloomfield Plant)									
Underground Mining	Coal Handling and Preparation Plant (CHPP)	Sediment laden water leaving the site					(Existing Bloomfield Plant)									
Underground Mining	Coal Handling and Preparation Plant (CHPP)	Lighting-visual					(Existing Bloomfield Plant)									
Underground Mining	ROM Stockpile (Operation)	Odour (Spontaneous combustion)	4	b	4b	14 (M)		4	b	4b	14 (M)	Spontaneous Combustion Management Plan Employee Awareness and Inductions Inspection of Stockpiles	4	d	4d	21 (L)
Underground Mining	ROM Stockpile (Operation)	Dust	4	c	4c	18 (L)		4	c	4c	18 (L)					
Underground Mining	ROM Stockpile (Operation)	Noise	4	a	4a	10 (M)		4	a	4a	10 (M)	Implementation of Noise Management Plan in EMS Employee Awareness and Inductions	4	d	4d	21 (L)
Underground Mining	ROM Stockpile (Operation)	Sediment laden water leaving the site	3	d	3d	17 (L)		3	d	3d	17 (L)					
Underground Mining	ROM Stockpile (Operation)	Visual	5	a	5a	15 (M)		5	a	5a	15 (M)	Configuration and design of pads	5	c	5c	22 (L)
Underground Mining	Water Management (surface water)	Leak from overland line	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)
Underground Mining	Water Management (surface water)	400ML Dam wall breach	3	e	3e	20 (L)		3	e	3e	20 (L)					
Underground Mining	Water Management (surface water)	Unplanned discharge	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)
Underground Mining	Ventilation	Particulate emission	5	d	5d	24 (L)		5	d	5d	24 (L)					
Underground Mining	Ventilation	Gasses released into atmosphere (e.g. methane) from underground	5	d	5d	24 (L)		5	d	5d	24 (L)					
Underground Mining	Gas Drainage System (may not be applicable)	high concentrated gas emissions					n/a at this stage									
Underground Mining	Gas Drainage System (may not be applicable)	Odour					n/a at this stage									
Underground Mining	Water Management (groundwater)	Groundwater disposal	3	c	3c	13 (M)		3	c	3c	13 (M)	Implementation of Site Water Management Plan Internal use of groundwater Supply to CHPP	3	d	3d	17 (L)
Underground Mining	Water Management (groundwater)	Regional water levels	4	a	4a	10 (M)		4	a	4a	10 (M)	Groundwater Modelling to quantify impacts				
Underground Mining	Water Management (groundwater)	impact on groundwater users	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Water Management (groundwater)	impact on groundwater depended ecosystems	4	b	4b	14 (M)		4	b	4b	14 (M)	Groundwater Modelling to quantify impacts				
Underground Mining	Water Management (groundwater)	impact on shallow perched aquifers	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Water Management (groundwater)	impact on groundwater quality	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Water Management (groundwater)	impact on hexham swamp and other wetlands	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Interim surface facilities (office, bath house, work shop, etc)	Noise	4	b	4b	14 (M)		4	b	4b	14 (M)	Implementation of Noise Management Plan in EMS Employee Awareness and Inductions	4	d	4d	21 (L)
Underground Mining	Interim surface facilities (office, bath house, work shop, etc)	Air Quality (commissioning)	5	d	5d	24 (L)		5	d	5d	24 (L)					
Underground Mining	Interim surface facilities (office, bath house, work shop, etc)	Erosion and Sediment	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Interim surface facilities (office, bath house, work shop, etc)	Waste management	4	c	4c	18 (L)		4	c	4c	18 (L)					
Underground Mining	Interim surface facilities (office, bath house, work shop, etc)	Light	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Interim surface facilities (office, bath house, work shop, etc)	Dust	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Interim surface facilities (office, bath house, work shop, etc)	Traffic movement to and from site	4	c	4c	18 (L)		4	c	4c	18 (L)					
Underground Mining	Permanent surface facilities (office, bath house, work shop, etc)	Hydrocarbon/chemical storage	4	c	4c	18 (L)		4	c	4c	18 (L)					

DRAFT ENVIRONMENTAL RISK REGISTER - UNDERGROUND MINING

Process Area	Activity	Aspect	Raw				Existing Controls	Existing Controls				Proposed Controls	Residual Risk			
			C	P	R			C	P	R			C	P	R	
Underground Mining	Permanent surface facilities (office, bath house, work shop, etc)	Light	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Permanent surface facilities (office, bath house, work shop, etc)	Dust	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Permanent surface facilities (office, bath house, work shop, etc)	Noise	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Permanent surface facilities (office, bath house, work shop, etc)	Traffic movement to and from site	4	c	4c	18 (L)		4	c	4c	18 (L)					
Underground Mining	Permanent surface facilities (office, bath house, work shop, etc)	Erosion and Sediment	4	d	4d	21 (L)		4	d	4d	21 (L)					
Underground Mining	Permanent surface facilities (office, bath house, work shop, etc)	Waste management	4	c	4c	18 (L)		4	c	4c	18 (L)					